

Ireland West Airport Knock Strategic Development Zone

DRAFT Planning Scheme 2019

Natura Impact Report



In accordance with Article 6(3) and 6(4) of the Council Directive 92/42/EEC on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive)

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References

Appendices

Version	Description & Rationale	Section	Originated	Checked	Date
1.0	NIR IWAK SDZ Draft Planning Scheme	Environment Section Mayo County Council	L Brogan	L Walsh	27/05/2019

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1 INTRODUCTION

Mayo County Council has proposed a Strategic Development Zone (SDZ) for Ireland West Airport Knock (IWAK), in accordance with Part IX of the Planning and Development Act 2000-2010 and the Planning and Development (Strategic Environmental Assessment Regulations 2004-2011).

An Appropriate Assessment Screening was prepared for this SDZ to determine which, if any, of the Natura 2000 sites are in the zone of influence of the development and assess the potential effects on the conservation objectives of these sites with regard to, *inter alia*, indirect and cumulative effects on water quality, water volume, soil stability and possible introduction of invasive species.

1.1 HABITATS DIRECTIVE ASSESSMENT METHODOLOGY

Introduction

The format of this Habitats Directive Assessment follows the Commission's guidance which promotes a four-stage process including:

Stage 1 Screening

Screening for Appropriate Assessment is the introductory stage where the proposed plan or project is examined with reference to its effects on the conservation objectives of a Natura 2000 site. The outcome of a screening assessment is a statement concluding whether or not it is necessary to proceed to the succeeding step. Screening addresses the questioning statements or tests of Article 6(3), firstly, whether a plan or project is directly connected to, or necessary for the management of the Natura 2000 site. One example of this may be a conservation management plan for an SAC (not including SPAs) as referred to in Article 6(1) of the Habitats Directive. The second test questions whether the plan or project, either alone or in combination with other plans or projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

Where doubt exists as to the likelihood of significant effects, the application of the precautionary principle would indicate that an appropriate assessment must be carried out.

Stage 2 Appropriate Assessment

This may be regarded as the most complex stages of the HDA in that it includes a comprehensive study of the proposed plan or project and considers whether it, either alone or in combination with other plans or projects, will have significant effects on the integrity of the conservation objectives of a Natura 2000 site.

The appropriate assessment identifies any adverse effects on a Natura 2000 site, either alone or in combination with other plans or projects, and includes mitigation measures to avoid, reduce or offset negative effects and assessment of these measures. If, however, the adverse effects on the integrity of the site cannot be excluded, Stage 3 should be initiated.

Stage 3 Alternative Solutions

Following a Stage 2 negative result, that is, adverse effects cannot be excluded; an examination of alternative solutions or options, described in Article 6(4) of the Directive should be initiated. These alternative solutions which should have been identified in the appropriate assessment stage should then return to be reassessed by a Stage 2 appropriate assessment, similar to a new plan or a variation of an existing plan.

Alternatively, should no alternative solution which does not adversely effect a Natura 2000 site be identified, the 'least damaging' option should be considered with regard to Stage 4.

Stage 4 Imperative Reasons of Overriding Public Interest (IROPI) / Derogation

Described as the derogation process of Article 6(4), this final stage allows for the plan or project to proceed in the knowledge that it will have adverse effects on the conservation objectives and as a consequence the integrity of a Natura 2000 site. This is essentially an assessment of the compensatory measures which should be proposed to offset damage to the site and should be practical, implementable, enforceable and approved by the Minister and referred to the European Commission.

To summarise, while the first two stages (1 and 2) focus on the proposed plan or project and its potential adverse effects on the conservation objectives of a proximate Natura 2000 Network, Stage 3 examines alternative solutions to prevent adverse impacts on the integrity of Natura 2000 sites. Stage 4 of the HDA, also deemed a derogation process, is employed when it has been established that the proposed plan or project will have adverse impacts on the Natura 2000 sites, but no less damaging alternative solution exists. Essentially, it is an iterative process and the outcome at each successive stage determines whether a further stage in the process is required.

1.2 GUIDANCE

This document is being prepared for the IWAK SDZ with reference to the following European, National and DEHLG guidance documents on Habitats Directive Assessment:

- *Managing Natura 2000 Sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission, 2000;

- *Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.* European Commission, 2002;
- Department of Environment, Heritage and Local Government Circular Letter PD 2/07 and NPWS 1/07, 2007;
- Department of Environment, Heritage and Local Government Circular Letter SEA 1/08 and NPWS 1/08, February 2008;
- Department of Environment, Heritage and Local Government Circular Letter SEA L8/08, September, 2008;
- *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities.* DoEHLG, 2009.

1.3 STATEMENT OF AUTHORITY

The ecological surveys for this report were carried out by Leo Brogan (B.Env., Sc. M.Sc and Dip. Field Ecol.) who has the relevant academic qualifications and experience to undertaking habitat surveys and appropriate assessments.

1.4 METHODOLOGY

The methodology involved a desk study, consultation and literature reviews, site walkovers and detailed site surveys.

The desk study referred to the specific Natura 2000 site adjacent to the SDZ, as described by the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht. Detailed information on the SAC pertaining to the plan was reviewed and examined in detail. Data evaluated included Natura 2000 Standard Data Form, the specific site synopsis which describes the qualifying interests for which the site was designated in addition to the site's conservation objectives.

Site walkovers were undertaken to develop a clear knowledge and affinity with the SDZ were conducted on 29th April, 1st and 3rd of May 2019. Habitat types were assigned using Fossit (2000).

2 STAGE 1 SCREENING

2.1 LOCATION

Ireland West International Airport (IWAK) is located on a 243.6 ha site in the townland of Kilgarriff West as shown in Figure 1. It is centrally located along the National Primary Route (N17 Galway / Sligo) approximately 7 km southeast of the National Primary Road (N5) which links Mayo and Dublin. The airport is accessed off the R376 approximately 18km from Knock and 8 km south of Charlestown. The airport is situated on the summit of an east-west mountain ridge at 213m OD., which is steeply sloping to the north and east and less so to the south and west. A small river valley of formed by a headwater stream of the Sonnagh River (Sonnagh(MOY)_010) is located immediately to the west of the SDZ boundary.

Existing airside (area inside airport security fencing) uses include the runway; taxiway; aprons, terminal building, departure gates and navigational aids for the running of the airport. Landside (area outside the security fencing) uses comprise of the parking areas, car rental area which includes check-in desks and cafe. This also includes a small business park at the airport campus. An aerial photography map with of the SDZ boundary and existing airport infrastructure is shown in Figure 2.

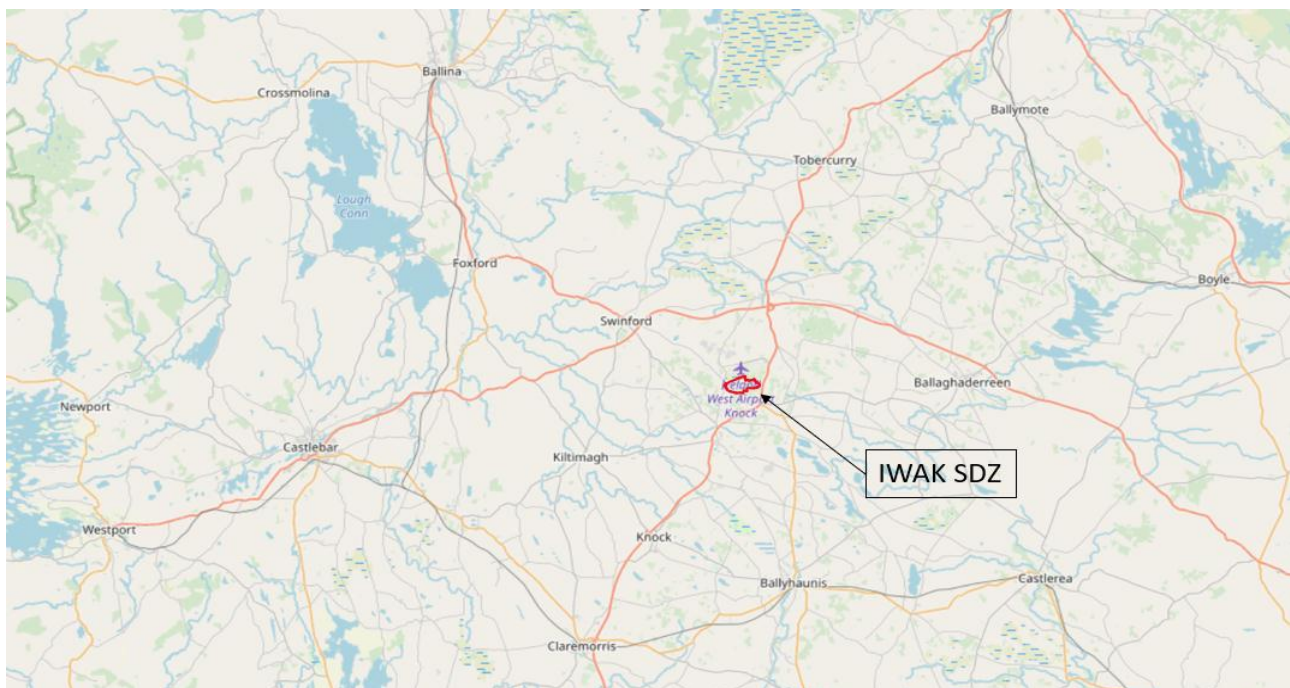


Figure 1 Ireland West Airport Knock Strategic Development Zone Location Map

The undeveloped lands to the north of the airport runway are comprised of several relatively small fields, many of which are partially overgrown or used as rough pasture, are bounded by stone walls. Lands to the south of the airport runway largely consist of cutover blanket bog.

2.2 NATURE OF STRATEGIC DEVELOPMENT ZONE

Ireland West Airport Knock was designated as a Strategic Development Zone by the Government of Ireland on the 30th May 2017 under SI 266 of 2017 which states the Ireland West Airport Knock Planning Scheme may principally include:

- (a) commercial activities including the development of infrastructure to support aviation including air cargo logistics facilities, aircraft hangars, maintenance and repair facilities, and airline and flight services,
- (b) the provision of hotel and conference facilities,
- (c) the development of any commercial or employment activity that, in the opinion of the first local authority having regard to the proper planning and sustainable development of its local authority area, requires to be located within the strategic development zone and cannot be reasonably accommodated at any other location in either the local authority area of the first local authority situated outside of the strategic development zone or the local authority area of any of the other local authorities in the Northern and Western Regional Assembly Area, and
- (d) the provision of supporting transport infrastructure.”

An indicative proposed layout of the IWAK SDZ is shown in Figure 3

Development within the proposed SDZ requires planning permission and which can be granted if the proposed development is found to be consistent with the Planning Scheme. There is no appeal procedure on an application for development within a Planning Scheme.

It is envisaged that at a strategic level, the development of the SDZ lands will be a hub for business development in the region.

The SDZ, consisting of 1-2 storey and 3-4 storey buildings, will be primarily on greenfield areas to the north of the runway as shown in the Masterplan in Figure 3 above. The overall footprint of the buildings and associated infrastructure will total approximately 95 Ha of the 120 Ha of undeveloped lands within the SDZ to the north of the terminal. The remaining 25 Ha will be reserved for attenuation of surface water, public amenity and conservation of upland habitats and water courses.



Figure 2 Outline of IWAK SDZ in red with existing infrastructure

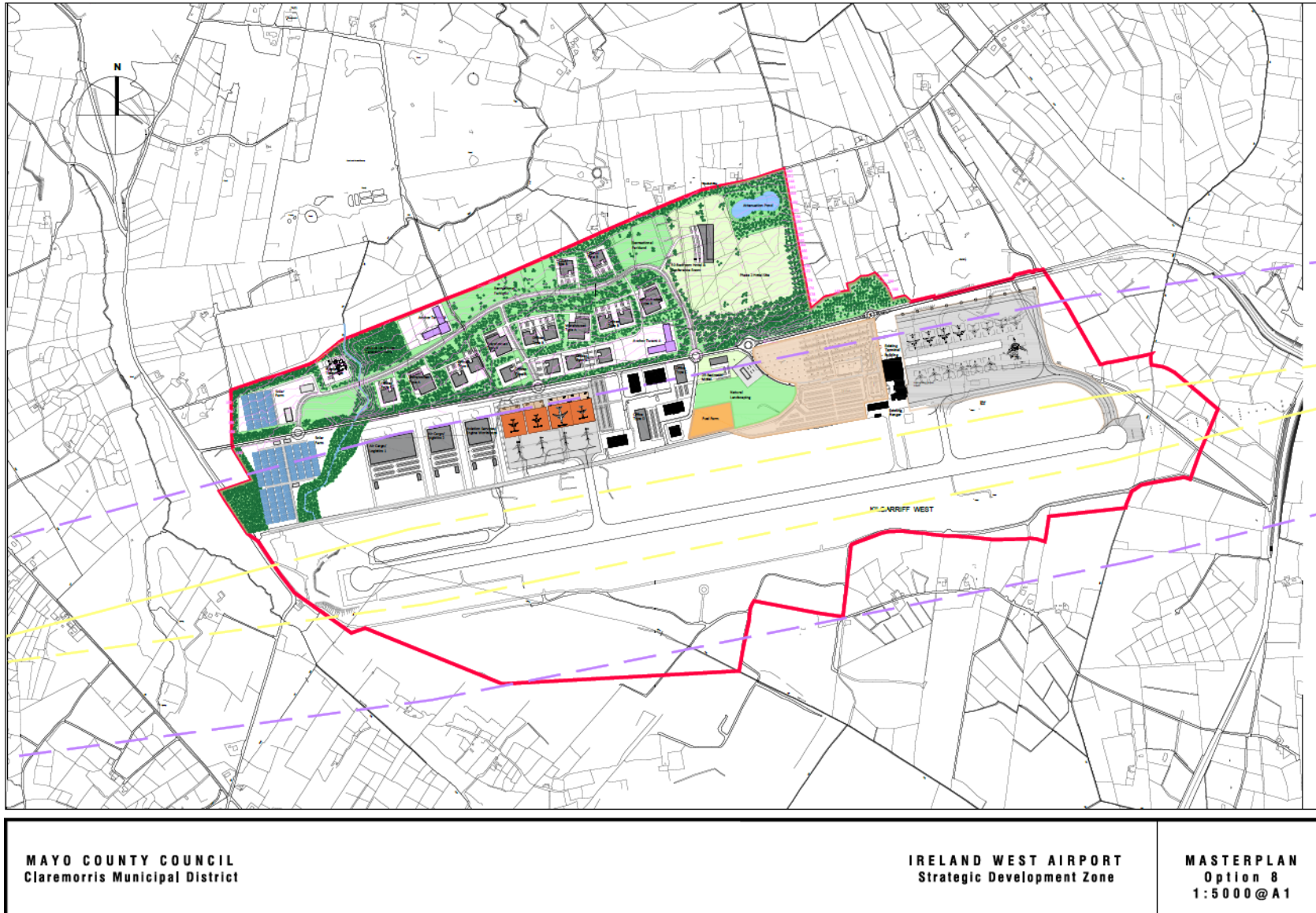


Figure 3 IWAK SDZ Masterplan

3 IDENTIFICATION OF RELEVANT NATURA 2000 SITES

A standard source-receptor-pathway conceptual model was used to identify a preliminary list of 'relevant' European sites (i.e. those which could be potentially affected). This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the proposed development, the model comprises:

- Source (s) – e.g. sediment run-off from the proposed development
- Pathway (s) – e.g. drains and streams connecting to a European site
- Receptor (s) – Qualifying habitats and species of European sites

There are 6 European sites located within 15km of the proposed development site (Figure 4). In addition, this screening assessment includes an evaluation of whether there are any pathways for effects on European Sites located outside of the 15km buffer potentially arising from the proposed development. A further two Natura 2000 sites outside of the 15km buffer zone (Lough Garra SPA and Callow Bog SAC) were included for screening purposes due to the presence of a hydrological pathway.

The pathways for effects, potential impacts and an evaluation of significance with reference to the European sites listed below are presented in Table 1 below.

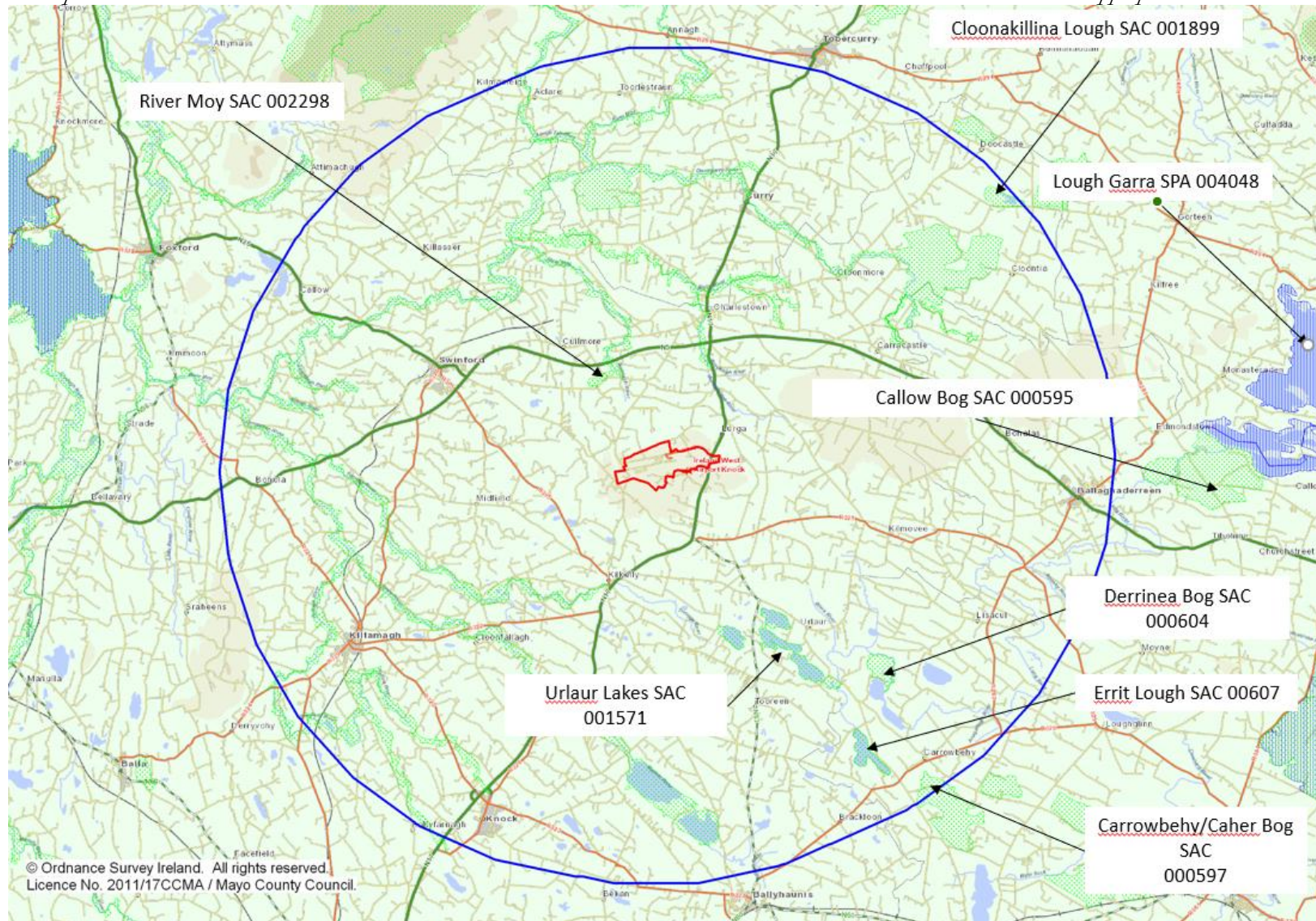


Figure 4 Natura 2000 sites within a 15 km radius of IWAK SDZ

Table 1 Designated Natura 2000 Sites within a 15km radius of the proposed development

European Sites	Distance from Project site	Conservation Objective Features of Interest	Potential pathways	Potential for interaction with mobile species (Annex II species/SPA Annex 1 bird species)	Potential for significant effects
River Moy SAC [002298]	3km to the south	<p>1092 White-clawed Crayfish (<i>Austropotamobius pallipes</i>)</p> <p>1095 Sea Lamprey (<i>Petromyzon marinus</i>)</p> <p>1096 Brook Lamprey (<i>Lampetra planeri</i>)</p> <p>1106 Salmon (<i>Salmo salar</i>)</p> <p>1355 Otter (<i>Lutra lutra</i>)</p> <p>7110 Active raised bogs*</p> <p>7120 Degraded raised bogs still capable of natural regeneration</p> <p>7150 Depressions on peat substrates of the <i>Rhynchosporion</i></p> <p>7230 Alkaline fens</p> <p>91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</p> <p>91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*</p>	Yes –Indirect hydrological pathway present for aquatic species in bold	Yes.	<p>The nature and scale of the SDZ on the lands to the north of the airport operational area is such that there is potential for unknown / possible effects on the conservation objectives of the Annex II aquatic species for which the SAC has been designated.</p> <p>A Stage 2 Appropriate Assessment is considered necessary to consider any potential significant effects on the Annex II aquatic species highlighted in bold.</p> <p>The remainder of the Features of Interest are terrestrial habitats which are not considered to be in the Zone of Influence of the plan due to the separation distances involved and the absence of any pathway for effects.</p>
Urlaur Lakes SAC (0001571)	5.8 km to south	3140 Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	No potential pathways	No	No potential for significant effects likely due to separation distance involved and absence of potential pathways.
Derrinea Bog SAC (000604)	9.8 km to the south	<p>7110 Active raised bogs</p> <p>7120 Degraded raised bogs still capable of natural regeneration</p> <p>7150 Depressions on peat substrates of the <i>Rhynchosporion</i></p>	No potential pathways	No	No potential for significant effects likely due to separation distance involved and absence of potential pathways.

European Sites	Distance from Project site	Conservation Objective Features of Interest	Potential pathways	Potential for interaction with mobile species (Annex II species/SPA Annex 1 bird species)	Potential for significant effects
Errit Lough SAC (006074)	11.5 km to the northeast	3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	No potential pathways	No	No potential for significant effects likely due to separation distance involved and absence of potential pathways.
Carrowbehy/Caher Bog SAC	14.65 km to the north	7110 Active raised bogs 7120 Degraded raised bogs still capable of natural regeneration 7150 Depressions on peat substrates of the Rhynchosporion	No potential pathways	No	No potential for significant effects likely due to separation distance involved and absence of potential pathways.
Cloonakillina Lough SAC	14.7 km to the north	7140 Transition mires and quaking bogs	No potential pathways	No	No potential for significant effects likely due to separation distance involved and absence of potential pathways.
Callow Bog SAC	38 km ¹ to the east	Active Raised Bog [7110] Degraded raised bog still capable of regeneration [7120] Depression on peat substrates of Rynchosporion.	No—Habitats not dependant on surface water levels/quality.	No	No potential for significant effects likely due to separation distance involved.
Lough Garra SPA	42 km to the east	Whooper Swans (<i>Cygnus cygnus</i>) Greenland White Fronted Geese (<i>Anser albinfrons flavirostris</i>)	Yes –Indirect hydrological pathway present for water dependant species	Yes	The description of the permitted uses in the greenfield areas to the south of the airport operational area are not significant in comparison to that on the north. Considering the separation distance involved there is no potential for significant effects likely to occur.

¹ Represents distance along the river channel

4 DESCRIPTION OF NATURA 2000 SITES WITHIN THE ZONE OF INFLUENCE

The only site from Table 1, determined to be within the zone of influence of the proposed SDZ is the River Moy SAC (002298). The IWAK SDZ area is 3 km from the River Moy SAC boundary but due to the hydrological pathway provided by the headwaters of the Sonnagh_010 waterbody, potential impacts on the Natura 2000 site are considered possible.

Figure 4.1 shows the location of the proposed SDZ boundary in relation to the River Moy SAC. The remainder of the Natura 2000 sites identified within a 15km radius of the IWAK SDZ, consisting of isolated lakes and raised bogs will not be effected, due to the separation distances involved and the absence of a potential pathway for effects as demonstrated in Table 1.

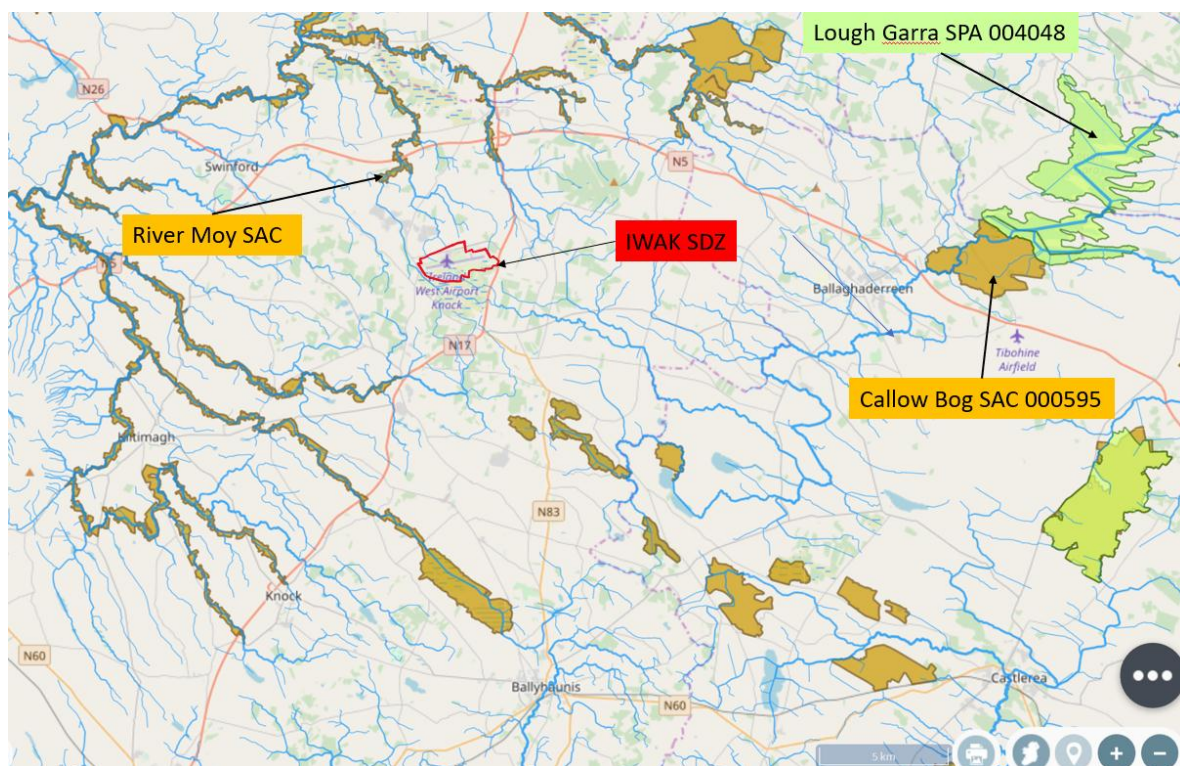


Figure 5 Proposed SDZ in relation to River Moy SAC and hydrological pathway to Lough Garra SPA and Callow Bog SAC via Lissydal Stream.

Due to the limited nature and the scale of the permitted uses to the south of the airport operational area there is no potential for effects on the Lissydal Stream or Lung River system. Despite the presence of a pathway for effects, Callow Bog SAC

and Lough Garra SPA are not considered to be in the zone of influence of the development due to the absence of a source for potential effects, required in the source-pathway model.

4.1 River Moy SAC (002298)

This site is a Special Area of Conservation (SAC), under the EU Habitats Directive, which lists the following habitats and species among the conservation interests:

1092 White-clawed Crayfish (*Austropotamobius pallipes*)

1095 Sea Lamprey (*Petromyzon marinus*)

1096 Brook Lamprey (*Lampetra planeri*)

1106 Salmon (*Salmo salar*)

1355 Otter (*Lutra lutra*)

7110 Active raised bogs*

7120 Degraded raised bogs still capable of natural regeneration

7150 Depressions on peat substrates of the *Rhynchosporion*

7230 Alkaline fens

91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*

The conclusion of the screening stage is that the development as proposed has the potential to significantly affect the integrity of the Annex II aquatic species listed in bold above. Therefore a Stage 2 Appropriate Assessment (Natura Impact Report) is necessary to consider any potential significant effects in greater details and propose measures considered necessary to control or mitigate any negative effects .

A copy of the NPWS detailed Conservation Objectives for the River Moy SAC are included in Appendix I.

5 STAGE 2 APPROPRIATE ASSESSMENT

Stage 2 of the Appropriate Assessment process has been undertaken in accordance with the following National and European Guidance documents;

- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. DoEHLG, 2010
- Assessment of plans and projects significantly affecting Natura 2000 sites and Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission, 2002.

Stage 2: Appropriate Assessment

The EU Guidance criteria for a Stage 2 Appropriate Assessment seeks the following information:

A description of the elements of the project that are likely to give rise to significant effects to European sites

- The setting out of the Conservation Objectives of the Natura 2000 site
- A description of how the project will affect key species and key habitats
- A description of how the integrity of the site (determined by the structure and function and conservation objectives) is likely to be affected by the project (e.g. habitat loss, disturbance, chemical changes, hydrological changes etc.

Natura Impact Report

This NIS addresses each of these items, but prior to doing so the following subsections provide a description of the existing environment at and surrounding the footprint of the SDZ and a description of the Annex II aquatic species considered to be within the zone of influence.

5.1 EXISTING ENVIRONMENT

5.1.1 Soils

The SDZ area immediately within the airport complex is comprised of concreted ground; runway strip and other developed areas for the general airport use. Surrounding this, the area is composed of blanket bog and glacial tills. Peat deposits in the vicinity vary from 0.2 m to 1.3 m in depth below ground level (bgl) with a thin layer of clayey gravel with cobbles and boulders encountered below the

peat layer. Bedrock exposure is apparent in a number of locations and as such, bedrock is deemed to be shallow throughout the development area.²

5.1.2 Geology

The plan area overlies mainly Ordovician rock unit group, particularly Horan, Carracastle and Tawnyinagh as shown in figure 6. Outcrops of intrusive igneous rocks such as feldspar / quartz porphyry are also present to the south west, north east and south east regions of the plan area.

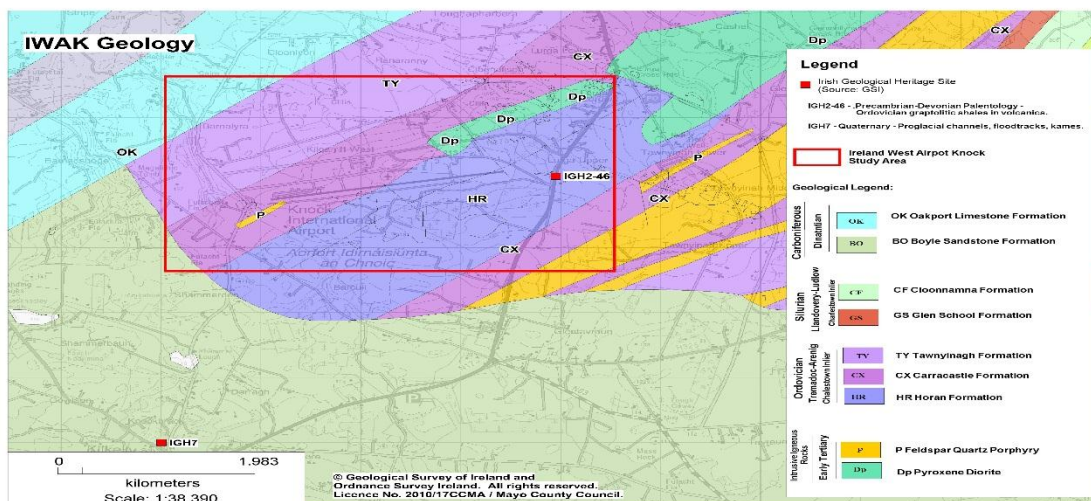


Figure 6 Geology of plan area and environs

The Horan, Carracastle and Tawnyinagh formations describe basalt, siltstone and chert; intermediate volcanic breccias; and tuff and minor chert formations respectively. Feldspar / quartz porphyry sequence of rocks are generally fine grained quartzo-feldspatic groundmass with large quartz of plagioclase crystals.

5.1.3 Hydrogeology

The plan area overlies two separate groundwater bodies; Kilkelly-Charlestown and Curlew Mountains, both of which are at good status³ and not at risk of meeting the WFD Directive objective in the current River Basin Management Plan 2017 to 2021.

² RPS Planning and Environment, 2010. Ireland West Airport Knock Cumulative Environmental Impact Statement. Prepared on behalf of Connaught Airport Development Company Limited

³ Under the WFD and all associated legislation pertaining to water status, groundwaters are ranked in one of just two status classes: Good or Poor

The aquifer underlying the majority of the plan area is classified by the GSI as being Poor (PI) and unproductive except for local zones. A locally important gravel aquifer (Lg), known as Swinford gravels, underlies the extreme north western corner of the site. An extensive quarry operated by *Harringtons Concrete and Quarries*, 350m to the northwest of the SDZ boundary, is currently extracting material from this geological resource.

The aquifer vulnerability in the north of the SDZ, where the majority of the development is proposed, is classified as High, which signifies that there is 3m-5m of subsoil overlying the aquifer.

Extensive areas of Extreme and X-Extreme (rock at or near the surface) aquifer vulnerability are mapped to the east and southeast of the existing carparking area. The footprint of the airport terminal and associated building are located within this area.

5.1.4 Surface Hydrology

Surface water in the IWAK SDZ area, as shown in Figure 7, drains to two catchments – the Moy Catchment (34 Moy & Killala Bay) in the north and the Shannon Catchment (26B Upper Shannon) to the south. As shown in Figure 8, the area to the north and east of the airport runway and terminal is drained by four 1st order headwater streams of the Sonnagh(MOY)_010 waterbody (IE_WE_34S020100). The Sonnagh(MOY)_010 flows northwest for 12km and enters the Moy_070 at Gurteen Bridge at Cornageeha 5.5 km northeast of Swinford. This waterbody is currently at Moderate Ecological Status with land drainage and emissions from IWAK Wastewater Treatment Plant considered to be the significant pressures contributing to its less than good ecological status⁴.

To the south of the airport, one 1st order stream of the Lissyaly Stream_010 Waterbody rises within the SDZ and flows southeast for 15km before entering the Lung_010 at Lissyaly Bridge as shown in figure 8. The Lissyaly Stream_010 is currently assigned Good Ecological Status (2010-2015)⁵ and is not at risk of failing to meet the WFD targets in 2021.

⁴ EPA Eden Website <https://wfd.edenireland.ie/> accessed 21/05/2019

⁵ The Q value result for the Lissyaly Stream_010 at Lissyaly Bridge in 2017 was 4-5, indicative of High Ecological Status.

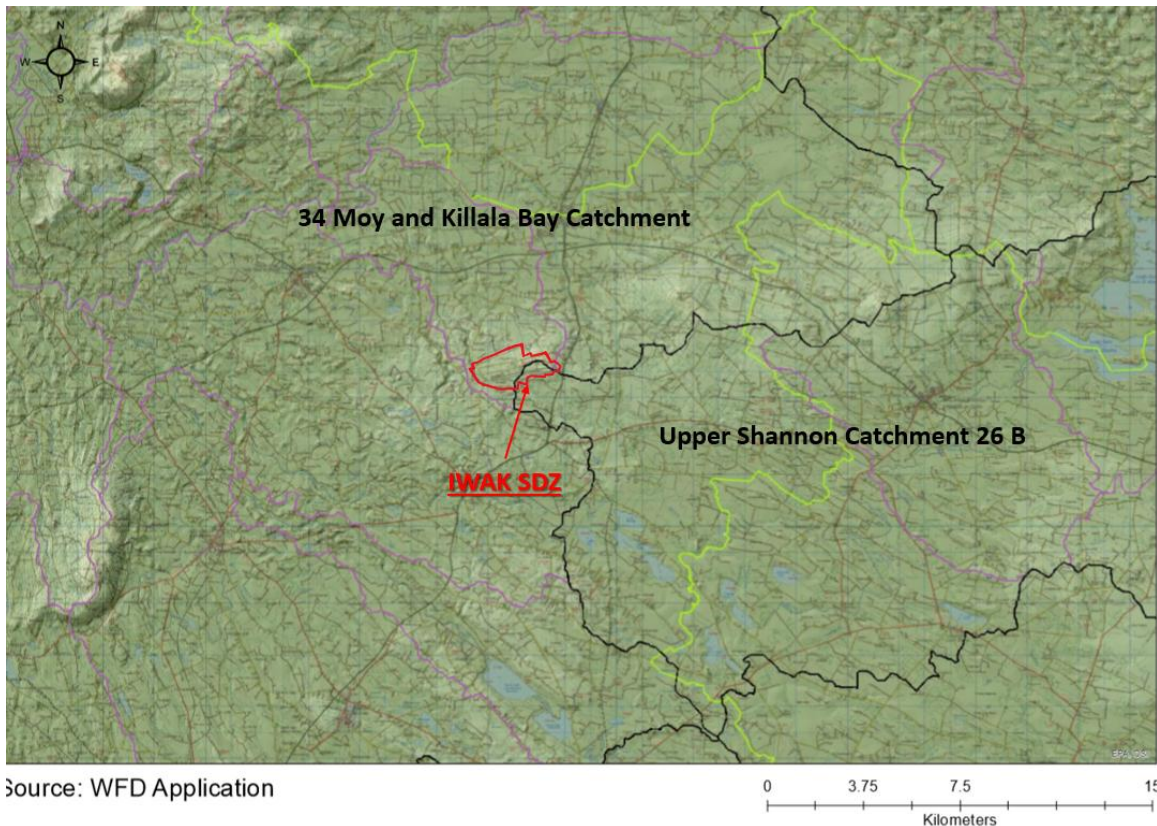


Figure 7 Moy and Killala Bay and Upper Shannon Catchments outlined in black

In summary the high density of streams in the southern part of the SDZ is due to impermeable nature of the underlying bedrock providing a small contribution to the baseflow in the streams with the exception of springs and seeps. During rainfall events, water movement will be rapid overland flow to the streams via local drainage ditches. In this scenario, suspended solids and excess nutrients in the soils generated due to land disturbance or excavation works has potential to transfer sediment into the drainage network and deposit further downstream as the flow velocities begin to decrease.

The potential for groundwater contamination in this scenario conversely, is low due to the impermeable nature of the bedrock.

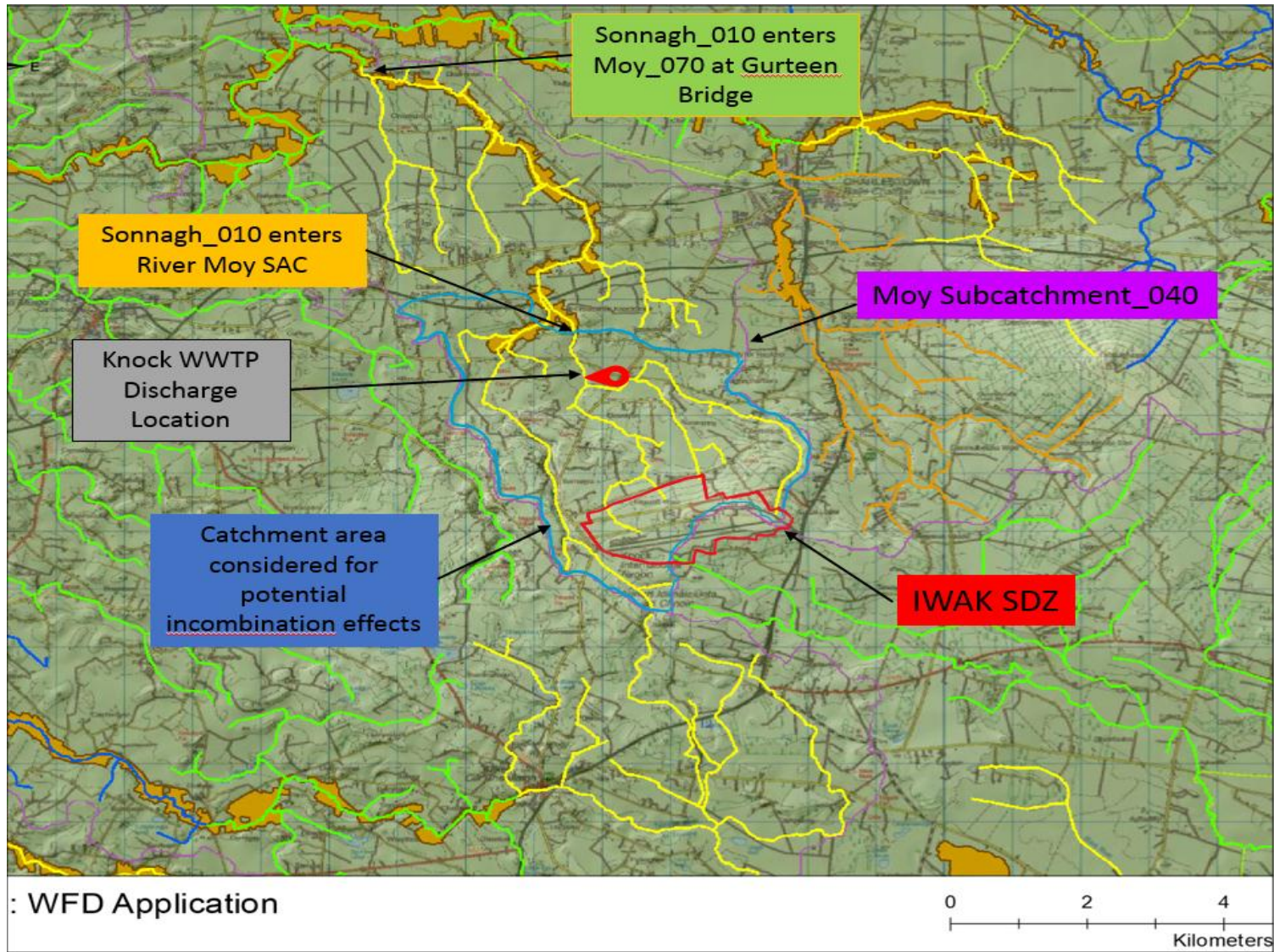


Figure 8 Water body statuses with IWAK SDZ area (red) and zone of influence considered for combination effects (blue)

5.1.5 Habitats

The majority of the land to the north of Knock airport is dominated by peatland habitats on sloping ground with shallow soil. Areas of wet grassland and acid flush habitat occur in the eastern half of the survey area. The peatland habitat/vegetation which occurs can be described as mostly wet heath (HH3) which has developed in what is essentially a disturbed, cutover blanket bog (PB4) landscape. This blanket bog habitat has, in the past, been extensively modified/damaged through peat-cutting, drainage and, in recent years, burning. Purple moor-grass (*Molinia caerulea*) and Ling heather (*Calluna vulgaris*) are the dominant species in the vegetation generally with a low cover of Sphagnum moss throughout. As a result of past disturbance the peatland habitats which occur do not correspond to the priority Annex I habitat active blanket bog. Close to the airport runway fence there has been extensive development of Willow (*Salix sp.*) scrub (WS1) in the cutover bog areas. There are also small areas of transition mire (PF3) and rich fen (PF1) habitat which have developed in wet hollows/cutaway pools within the cutover blanket bog areas in the south-west of the SDZ area.

Wet grassland and acid flush habitats dominate the eastern half of the SDZ area. The wet grassland habitat (GS4) has been agriculturally improved in the recent past and is quite species-poor. Soft rush (*Juncus effusus*) is the dominant plant species. The acid poor flush habitat (PF2) is much more natural in composition with Sharp-flowered rush (*Juncus acutiflorus*) dominating along with frequent Devil's bit scabious (*Succisa pratensis*).

Freshwater habitats type present include Upland Eroding Rivers (FW1), Drainage ditches (FW4) while build habitats included stone walls and other stone work (BL1) and Buildings and artificial surfaces (BL3). There are areas of disturbed ground within the plan area consisting of spoil and bare ground (ED1) and recolonising bare ground (ED3).

5.2 Designated Sites Of Conservation Importance

The River Moy SAC consists of the main channel of the River Moy, its 16 tributaries and also includes Loughs Conn and Cullin. Two priority habitats are found within the SAC; alluvial wet woodlands and raised bog in addition to several other Annex I habitats including old oak woodlands, alkaline fens, degraded raised bog and Rhynchosporion. Five Annex II species are noted including otter (*Lutra lutra*), white-clawed freshwater crayfish (*Austropotamobius pallipes*), (*Petromyzon marinus* and

Lampetra planeri) and Atlantic salmon (*Salmo salar*). Other notable species include plants such as bog asphodel (*Narthecium ossifragum*), carnation sedge (*Carex panicea*) and the moss (*Campylopus atrovirens*, bog mosses (*Sphagnum* spp.) and white beaked-sedge (*Rhynchospora alba*) are present.

The current national conservation status⁶ of the Annex II species for which the River Moy SAC has been designated, are presented in the Table 2.

Table 2 River Moy SAC qualifying Annex II species

Species code	Species name	Current Conservation Status (2013)
1092	White-clawed freshwater crayfish <i>Austropotamobius pallipes</i>	Inadequate
1095	Sea lamprey <i>Petromyzon marinus</i>	Bad
1096	Brook lamprey <i>Lampetra planeri</i>	Favourable
1106	Atlantic salmon <i>Salmo salar</i>	Inadequate
1355	Otter <i>Lutra lutra</i>	Favourable

5.3 River Moy SAC qualifying Annex II species

Site-specific conservation objectives for each of the above listed aquatic Annex II species for which the River Moy SAC has been designated, have been developed from detailed data on habitat and species. The following sections provide an ecological summary of each of the species and the detailed, site specific Conservation Objectives (Attributes and Targets) are presented in table 3 to 6.

5.3.1 White Clawed Freshwater Crayfish

Crayfish are freshwater relatives of the marine lobsters which they resemble closely. Species of crayfish can be found in many parts of the world with most species occur in North America (330 species) and Australia (100 species). There are seven European species including the White-clawed Crayfish which is the only species naturally occurring in Ireland. The populations of European crayfish have been affected by the impact of introduced mainly American species and disease (crayfish plague). The White-clawed Crayfish is listed on Annex II and Annex V of the Habitats Directive and the species is protected in Ireland under the Wildlife

⁶ NPWS (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

Acts. Up until 2018 Ireland remained the only part of the EU with no proven incidence of crayfish plague. Unfortunately, the species has been almost wiped out in a number of river systems in the south of the country due to plague outbreaks in 2018. The animal remains common in many lakes, rivers and streams in limestone districts. It is an important species ecologically both as a grazer of plants and as a favoured food item of the Otter.

Crayfish require hard water with a pH of >7 and calcium concentrations of > 5mg/l to form their exoskeleton which the adult males lose twice per year during molting. They are relative tolerant of pollution and populations are found in moderate quality water bodies (Q Value 3-4). They are slow growers reaching 9 cm in length during the first 5 years and up to 12 cm on full maturity. They mate in October/November with females incubate eggs until then hatch out in June /July. Given their large size, long lifespans and omniferous diet they occupy the position of keystone species where they occur. Their grazing habits also keep the luxuriant growth of macrophytes in check where excessive nutrient levels are present.

They occupy refuges among boulders, logs, rocks, cobbles sediment, accumulated leaf litter, channel banks and submerged tree roots from where they emerge to forage. Juveniles shelter in gravels, vegetation and tree roots and are more reliant on animal food sources than the adults. Overhanging bankside vegetation is highlighted as being important in determining population abundance as they provide shade , food and shelter.⁷

The Sonnagh(MOY)_010 is listed as one of the upper channels of the River Moy in which this species is found. A population is known to occupy a stretch of the Sonnagh_010/Moy_070 , 1.4km upstream of the main channel of the River Moy near the EPA monitoring site (IE_WE_34M020500) at Gurteen Bridge .

Table 3 Conservation Objective Attributes and Targets for White Clawed Freshwater Crayfish

⁷ J.D., O'Connor, W., O'Keeffe, C. & Lynn, D. (2010) A technical manual for monitoring white-clawed crayfish *Austropotamobius pallipes* in Irish lakes. Irish Wildlife Manuals, No 45, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

Attribute	Targets
Distribution	No reduction from baseline (Map 7 in Conservation Objectives)
Population structure: recruitment	Juveniles and/or females with eggs in all occupied tributaries
Negative indicator species	No alien crayfish species
Disease	No instances of disease (Crayfish plague introduced by contaminated equipment and water in the absence of vector species)
Water Quality	At least Q3-4 in all sites sampled by the EPA
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality

5.3.2 Sea and Brook Lamprey

The brook lamprey (*Lampetra planeri*) is an entirely freshwater animal while the sea lamprey (*Lampetera marinus*) spend most of their adult life at sea before migrating to freshwater to spawn. Brook lamprey live in the sediment of the stream or river and are non-parasitic as adults. Upon reaching maturity they migrate short distances upstream to spawn usually at the downstream ends of pools of the smaller rivers that sea or river lamprey.

The reproductive cycle for both species of lamprey are similar with brook lamprey tending to occupy the headwater streams which are not accessible to the sea or river lamprey. The males excavate redds or nests using their mouths to move stones and attract females to complete the process. Fertilized eggs are deposited in the nest and are buried in fine sediment. Lamprey and salmon species have similar preferences in terms of their spawning bed requirements. Two weeks later eggs hatch out into larvae (ammocoetes) which are then washed downstream and accumulate in areas of slower current. They bury themselves into stable sandy organic rich silt where they remain until transformation into adulthood occurs (3 to 6 years later) feeding on micro-organisms and detritus from the surface of the sediment. They form prey items for other fish such as minnow, stickleback, trout and eel and birds. During a 2-3 week period between July and September the transformation to 10-15cm adults lamprey occurs, after which time the sea and river lamprey migrate to sea, only to return again as adults to spawn.

Unspecified lamprey records have been recorded in upstream tributaries of the Sonnagh and Mullaghanoë Rivers⁸ as shown in figure 9. A survey of juvenile lamprey in the Moy Catchment in 2004⁹ recorded juvenile lamprey (due to the similarity of brook and river lamprey juveniles they were recorded as lamprey spp.) in the River Sonnagh north of the N5 and in the Mullaghanoë River. The abundance of lamprey species in the Mullaghanoë (74) was significant compared to that recorded in the River Sonnagh (5). Sea lamprey were also recorded in the Mullaghanoë River during the 2004 survey, the furthest inland location for this species in the Moy Catchment

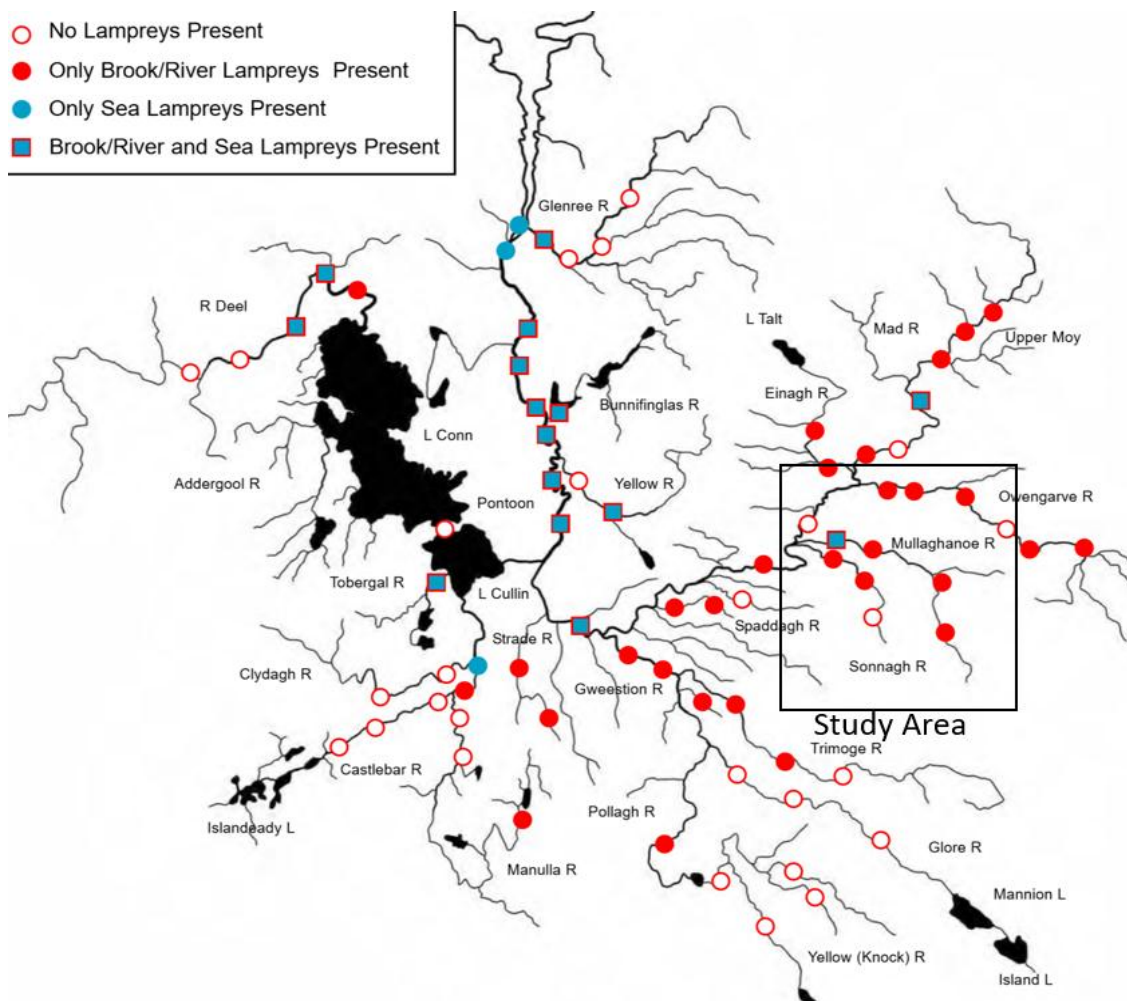


Figure 9 Map Showing Location of Sea and Brook/River Lamprey in Moy Catchment O' Connor 2004

⁸ Kurz, I & Costello, J. (1999). An outline of Biology, Distribution and Conservation of Lamprey in Ireland. Irish Wildlife Manuals No. 5. Duchas, The Heritage Service.

⁹ O' Connor, W. (2004) A survey of juvenile lamprey populations in the River Moy Catchment. Irish Wildlife Manual No. 15. National Parks and Wildlife Service.

Currently there are no artificial barriers on the Moy catchment limiting sea lamprey access upstream to spawning areas. The retention of silting habitat for larval lamprey is of critical importance for its conservation.

Table 4 Conservation Objective Attributes and Targets for Lamprey Species

Attribute	Targets	
	Sea Lamprey*	Brook Lamprey
Distribution; extent of anadromy*	Greater than 75% of main stem length of rivers accessible from estuary.	Access to all watercourses down to first order streams
Population structure for juveniles	At least 3 age/size groups present	At least 3 age/size groups present
Juvenile density in fine sediment	Mean Catchment Juvenile density at least 1 /m ²	Mean Catchment Juvenile density at least 2/m ²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds (clean gravels)	No decline in extent and distribution of spawning beds (clean gravels)
Availability of juvenile habitat	More than 50% of samples positive in 3 rd order channels downstream of spawning areas	More than 50% of samples positive in 2 nd order channels (and greater) downstream of spawning areas

5.3.3 Salmon (*Salmo Salar*)

The River Moy and a number of its tributaries (excluding the Sonnagh River) is a designated salmonid water course under the First Schedule of the EU (Quality of Salmonid Waters) Regulations (S.I. No. 293/1998). The River Moy is one of the best commercial salmon fisheries in Europe. Despite this, Atlantic salmon are under increasing threat and numbers has declined significantly in recent years as a result of water quality deterioration, namely from eutrophication, point discharges, acidification, siltation and forestry-related discharges. In addition, climate change has been deemed another threat and marine survival in salmon is also reduced.

Inland Fisheries Ireland in a submission by to the Strategic Development Zone SEA Scoping exercise, highlighted the importance of the Sonnagh(MOY)_10 in providing valuable salmon spawning and nursery habitat for the wider River Moy catchment. An EPA Q value of 4 is the minimum ecological status for favourable conservation condition of this species. Currently the Sonnagh_010 waterbody is failing to meet this standard. The EPA have characterised land drainage and

emissions from the IWAK wastewater treatment plant as being the significant pressures leading to its moderate ecological status.

Table 5 Conservation Objective Attributes and Targets for Salmon

Attribute	Targets
	Salmon (<i>Salmo salar</i>)
Distribution; extent of anadromy	100% of river channels down to 2 nd order streams accessible from estuary
Adult spawning fish	Conservation limit (CL) for each system consistently exceeded
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment abundance threshold value (currently set at 17 salmon fry /5 minutes sampling)
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes
Water Quality	At least Q4 in all sites sampled by the EPA

5.3.4 Otter (*Lutra lutra*)

The extent of freshwater habitat for otters within the River Moy SAC is calculated to be 480 km based on the fact that they will utilise freshwater habitats from estuary to river headwaters, as is found within the IWAK SDZ area.

Table 6 Conservation Objective Attributes and Targets for Otter

Attribute	Targets
	Otter (<i>Lutra lutra</i>)
Distribution	No significant decline
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1068.8 ha.
Extent of Freshwater (river) habitat	No significant decline. Area mapped and calculated as 479.4 km.
Extent of Freshwater (Lake) habitat	No significant decline. Area mapped and calculated as 1248.2 ha.
Couching sites and holts	No significant decline
Fish biomass available	No significant decline
Barriers to connectivity (for commuting across stretches of open water up to 500m)	No significant decline. For Guidance se Map 8 in CO

6 IMPACT PREDICTION

6.1 Introduction

This section identifies potential impacts; indirect and cumulative on the integrity of the River Moy SAC. Following further evaluation of this Natura 2000 site pertaining to its proximity to the SDZ area, in addition to transport and excavation requirements and infrastructural needs, it was concluded that any impacts to the River Moy SAC would be cumulative and indirect in nature.

Given that potential in-combination effects on the qualifying Annex II aquatic species are being considered, only those plans or projects downstream of the SDZ with a hydrological connection to the River Moy SAC are considered further i.e. the Sonnagh_010 waterbody upstream of the SAC boundary at Killeen (as outlined in blue in Figure 8 above).

The River Moy Catchment constitutes an area of 850 km², the designated portions of which are small as it mainly includes the riparian zone. The area considered for incombination effects is 17km² which represents less than 1% of the overall River Moy Catchment.

6.2 Potential pressures and threats to River Moy SAC

The potential threats and pressures to the qualifying Annex II species of the River Moy SAC are presented in table 7.

Table 7 Potential pressures and threats on qualifying Annex II species¹⁰

Habitat / species code	Habitat / species name	Principle threats and pressures	Importance Ranking
1092	<i>Austropotamobius pallipes</i>	<ul style="list-style-type: none"> Invasive non native species (I01) Introduction of disease (microbial pathogens) K0.03 	High
		<ul style="list-style-type: none"> Leisure Fishing (F02.03) Dredging and removal of limnic sediments (J02.02.01) 	Low

¹⁰ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Habitat / species code	Habitat / species name	Principle threats and pressures	Importance Ranking
		<ul style="list-style-type: none"> Management of aquatic and bank vegetation for drainage purposes (J02.10) Pollution of Surface waters (H01) 	
1095	<i>Petromyzon marinus</i>	<ul style="list-style-type: none"> Canalisation (J02.03.02) Reduction in migration/migration barriers (J03.02.01) 	High
		<ul style="list-style-type: none"> Pollution of Surface waters (H01) Bait digging/collection (F02.03.01) 	Medium
1096	<i>Lampetra planeri</i>	<ul style="list-style-type: none"> Dredging and removal of limnic sediments (J02.02.01) 	High
		<ul style="list-style-type: none"> Diffuse pollution to Surface Waters due to Agricultural and Forestry activities (H01.05) Other point sources pollution to Surface Waters (H01.03) Siltation rate changes,dumping, deposition of dredged desposits (J02.11) Bait digging/collection (F02.03.01) 	Medium
		<ul style="list-style-type: none"> Invasive non native species (I01) 	Low
1106	<i>Salmo salar</i>	<ul style="list-style-type: none"> Agricultural Intensification (A02.01) Poaching (F05.04) Diffuse pollution to Surface Waters due to Agricultural and Forestry activities (H01.05) Diffuse pollution to Surface Waters due to household sewage and wastewaters (H01.08) Disposal of household and recreational facility waste (E03.01) 	High
		<ul style="list-style-type: none"> Fertilization (A08) Artificial planting on open ground (non native trees) (B02.01.02) Use of Fertilizers (Forestry) (B05) 	Medium

Habitat / species code	Habitat / species name	Principle threats and pressures	Importance Ranking
		<ul style="list-style-type: none"> • Disposal of Household Waste (E03.01) • Disposal of Industrial Waste ((E03.02) • Predations (K03.04) • Water Abstractions from Surface water (J02.06) 	
		<ul style="list-style-type: none"> • Peat Extraction (C01.03) • Pollution to Surface waters by industrial plants (H01.01) • Invasive non native species (I01) • Modification of hydrographic functioning, general (J02.05) • Management of aquatic and bank vegetation for drainage purposes (J02.10) 	Low
1355	<i>Lutra lutra</i>	<ul style="list-style-type: none"> • Roads and Motorways (D01.02) • Pollution to Surface Water (H01) 	High

6.3 Identification of Potential Impacts

The principal effects arising from this plan are envisaged to be indirect and cumulative in nature. Due to the distance, nature of the plan, land-take, resource requirements and emissions, this plan will not see direct habitat loss or fragmentation. Indirect effects include alteration to water quality and volume and potential disturbance to Otters from noise, light pollution sources.

The conclusion of this current assessment is that the following impacts are possible as a result of the IWAK SDZ.

Deterioration of Water Quality

Currently the Ecological status of the River Sonnagh (Sonnagh(MOY)_010 water body) is classified as 'Moderate', based on its macroinvertebrate status. As a consequence, the objectives of the River Basin Management Plan is to restore good status. Increases or introduction of point and diffuse discharges during construction, excavation and operational phases of most projects inevitably occur. There is also potential for accidental release and fugitive emissions which may alter

the physico-chemical and biological characteristics of a water body. These alterations not only impact on the water quality of the Sonnagh(MOY)_010, but by extension, on the River Moy, into which the Sonnagh_010 flows. Species dependant on this aquatic habitat, including their predators, have the potential to be impacted.

Disturbance of Key Species

Key species within the River Moy SAC may potentially be disturbed by a deterioration in water quality. The white-clawed freshwater crayfish, *Austropotamobius pallipes* requires quite a diverse habitat to thrive and water quality of at least Q 3-4 (moderate status), while its predator the European otter (*Lutra lutra*) will indirectly be impacted by loss/reduction of crayfish populations (though otters also prey on trout and other fish). *Lampetra planeri* (Brook Lamprey) is an Annex II species within the River Moy SAC and juveniles were recorded in the lower reaches of the Sonnagh(MOY)_010 north of the N5 during a catchment survey in 2004 as shown in Figure 9. The IFI have stated in the SEA scoping response that the Sonnagh River provides valuable spawning and nursery habitat for *Salmo salar*. Given that lamprey have similar habitat requirements for spawning (clean gravels) disturbance to lamprey is a potential result of this development.

Silt-Laden Surface Water Runoff

A programme of major earthworks are envisaged within the SDZ area which will almost exclusively occur on greenfield areas to the north of the airport runway. The development is intended to progress on a building by building basis as potential businesses are attracted to the scheme. Initially infrastructure such as internal roads, sewerage, water supply and telecommunication will be installed. In the absence of specific control measures the headwater streams which occur within the footprint of the development have the potential to be subject to silt laden runoff, leading to increased levels of suspended solids and sedimentation effects further downstream as flow rates decrease. All Annex II aquatic species in the Sonnagh_010 waterbody would be negatively affected in this scenario.

Potential for indirect effects on the Moy_070 waterbody, into which the Sonnagh_010 flows, exists if significant uncontrolled discharges occur. The soil layer is mainly peaty in nature ranging from 0.2 to 1.3m deep with thin subsoils composed of clayey gravels, cobbles and boulder. Bedrock is generally shallow and is exposed in places. The exposure of peat and subsequent drying effects

increases the risk of losses of Ammonia to the headwater streams leading to a deterioration of water quality. Losses of sediment to streams from peat and subsoil stockpiles also presents significant potential for sedimentation.

Inadequately planned or poorly designed stream crossings could result in direct loss of aquatic habitat (spawning gravels) and result in release of sediment.

Discharges from IWAK Wastewater Treatment Plant

Currently Ireland West Airport Knock Wastewater Treatment Plant (WWTP) has a design population equivalent (PE) of 700 and provides secondary treatment of domestic sewage using a Sequencing Batch Reactor (SBR). Currently treated effluent is discharged to the Sonnagh River approximately 2 km downstream of the WWTP in order to achieve the dilution requirements (as shown in Figure 10).

The BOD loading is almost 30 times less than the waste assimilative capacity (WAC) of the river (at normal daily flow from plant). Likewise, regarding ammonia and suspended solids, the final effluent has been demonstrated to be sufficiently treated so as not to exceed the waste assimilative capacity of the receiving water; the Sonnagh River. The phosphorus loading (as orthophosphate), as the principal element associated with eutrophication and a vital consideration in terms of the protection of good and high water body status and restoration of less-than-good water bodies, was within the Waste Assimilative Capacity, occupying 50% of the available headroom.¹¹

Water quality monitoring data available on the EPA Eden Website¹² shows that there is a slight upward trend in Orthophosphate concentrations downstream of the discharge location between 2014 and 2015. Mean orthophosphate (mg/l) values for 5 samples in 2014 was 0.002 mg/l which increased to 0.006 mg/l for 6 samples in 2015. The trend is said not to be significant statistically but the mean concentration of orthophosphate is predicted to be 0.028mg/l by 2021 if the upward trend continues.

A Small Stream Impact Score (SSIS)¹³ was carried out in May 2019 immediately downstream of the treated effluent discharge location to assess the current ecological condition of the water body and assess any potential negative effects.

¹¹ Mayo County Council 2012 Habitats Directive Assessment Ireland West Airport Knock Local Area Plan 2012-2018

¹² Water Framework Directive Module Application <https://wfd.edenireland.ie/>

¹³ EPA 2018. Training Manual Catchment Assessment Training Course for Local Authorities

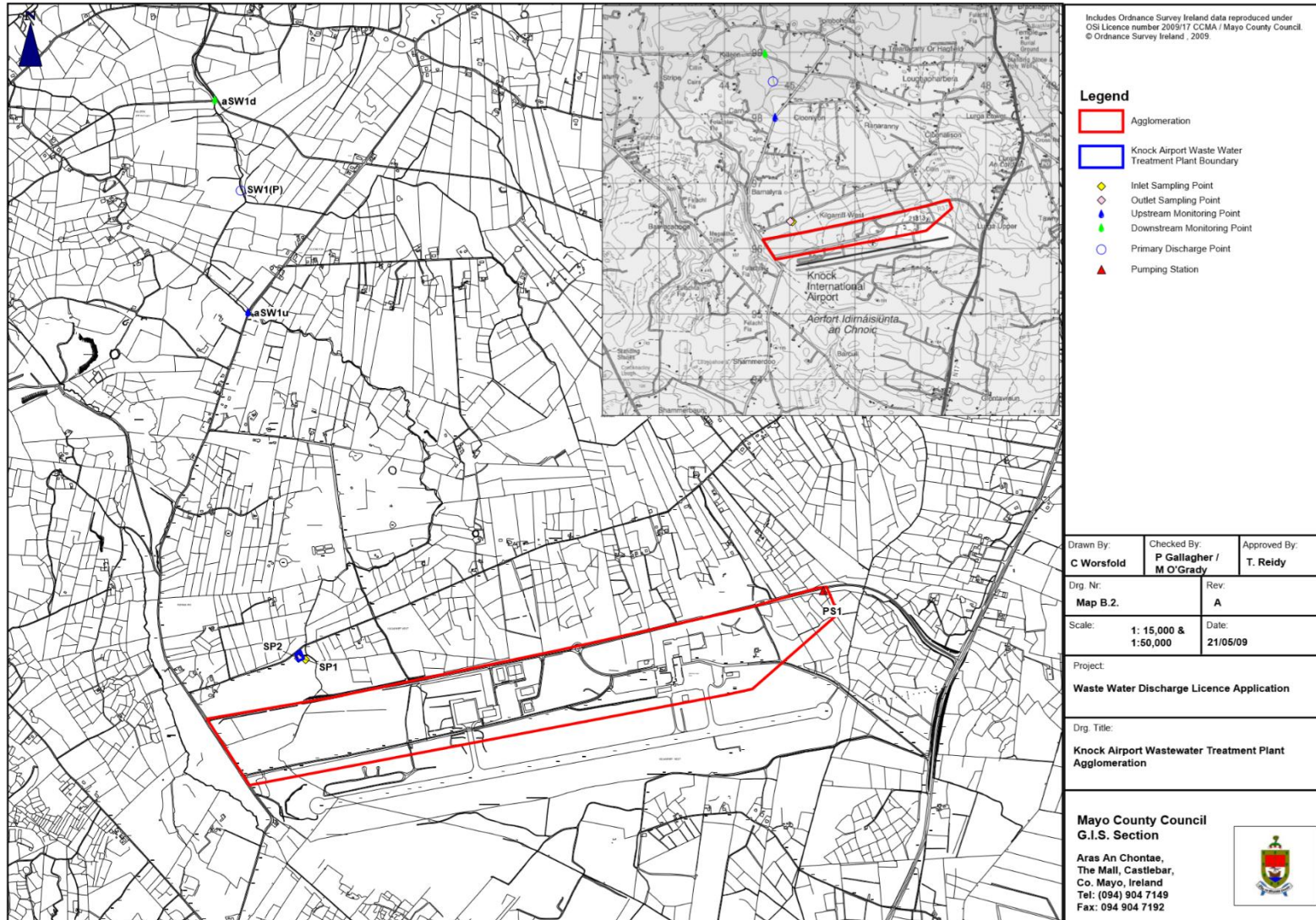


Figure 10 Map showing location of Knock Airport WWTP and discharge location for treated effluent.

The presence and high relative abundance of sensitive taxa such as Ephemeroptera and Plecoptera species and the relative absence or low relative abundance of tolerant taxa such as Amphipoda and Diptera indicated that the environmental pressures at the sample location was low. A score of 7.2 was recorded during the survey which puts the stream in the Indeterminate category with some evidence of impacts. When other biological indicators such as the percentage cover of filamentous algae (*Cladophora-Vaucheria*) on the stream bed are taken into account the ecological condition of the waterbody downstream of the discharge point appeared to be unaffected.

The current loading is estimated to be approximately 210 PE (population equivalent) which is 30% of the design PE.¹⁴

Under the Waste Water Discharge (Authorisation) Regulations, 2007 (as amended) and Article 6(3) and 6 (4) of the Habitats Directive, this Wastewater Treatment Plant is currently subject to Appropriate Assessment Screening to determine whether it is subject to an AA. This issue of elevated orthophosphate will, no doubt, be a consideration as exhibiting an indirect impact on the River Moy cSAC and a mitigating measure of including tertiary treatment i.e. P-removal by chemical precipitation or alternative should be a future recommendation. Since a Plant extension is envisioned to cater for an increasing population, this proposed change will necessitate its specific Appropriate Assessment Screening.

Water Abstraction

Water abstraction for the provision of drinking water for IWAK is currently from a pool of water which collects naturally within a disused gravel pit in Barnalyra, 1 km northwest of the SDZ planning boundary. Water is pumped from a 1 m diameter concrete caisson on the bottom of the pool, chlorinated and delivered to a 45 m³ reservoir within the grounds of Knock Airport.

The water in the pool is essentially a groundwater seep “spring” whereby the water level represents the groundwater table. The zone of contribution (ZOC)(0.4 km²) to the source is mainly from higher ground to the south of the pool. The current abstraction rate is 40-60 m³/day which includes a small quantity supplied by gravity to neighbouring houses (20 m³/day). There are unlikely to be any significant effects on the flow in the Sonnagh_010 due to the area of gravel aquifer (25km²)

¹⁴ Per cons 2019 . Knock Airport Wastewater Treatment Plant Caretaker (Senior Executive Technician Mayo County Council)

compared to the size of the ZOC (0.4km²). By extension there is unlikely to be any negative effects on the water dependant Annex II species being considered in this report.

A booster station with 40m³ storage and chlorination facilities was constructed in 2007. Results of a well test carried in 2004 estimated a safe yield of between 350 – 400 m³/day which is capable of providing for the short-term needs of the airport and proposed SDZ.

However, the long term proposal for water supply at IWAK will either involve the extension of the Lough Mask Regional Water Supply Scheme from Knock Village or the provision of drinking water from the proposed North East Mayo Regional Scheme. An extension of the existing water supply scheme or extending an alternative scheme to supply IWAK will incorporate activities involving construction, operational and decommissioning phases may pose a contamination threat to groundwaters which are currently classified as good. As with new wastewater treatment projects, water supply projects and any amendments to such projects will undergo screening for appropriate assessment.

Flood Risk

Increasing the area of hard surfaces will reduce the area of natural landscape which can intercept precipitation and thereby increase the risk of flooding in an already susceptible location. This may result in indirect impacts to water quality and to Annex I species within the River Moy SAC.

Utilisation of SuDS to restrict flows from any developments to green field rates is proposed. A strategic Flood Risk Assessment has been carried out and associated flood mitigation measures should ensure that there is no risk of flooding.

Soil Instability

The plan is proposed in an area composed of improved agricultural grassland, dry humid acid grassland, wet grassland, cutover bog, wet heath, dry siliceous heath with eroding upland rivers and exposed siliceous rock. Excavation and development within the SDZ and the consequent construction of borrow pits and creation of spoil heaps will, undoubtedly de-stabilise existing soils and subsoils.

There are significant geotechnical risks associated with the storage of peat, if stockpiles are not adequately stabilised. Landslides and ‘bogbursts’ have been

widely described and studied, and, following the Derrybrian incident in October 2003, heavily investigated from a water pollution viewpoint, resulting in a key ECJ court ruling against Ireland pertaining to inadequate environmental assessments for developments within Ireland, *inter alia*, windfarms, pig-rearing facilities, peat-extraction facilities and hotels.¹⁵

Introduction of Invasive Species

Already a recognised issue in Ireland, invasive species, defined as non-native species, floral or faunal, introduced accidentally or deliberately into an environment where habitats and existing indigenous species are threatened by transformation, destruction, competition, disease, predation etc. Examples of historical species invasion include *Rhododendron ponticum*, *Elodea canadensis* (Canadian pondweed) and *Sciurus carolinensis* (Grey squirrel) while more recent introductions include *Fallopia japonica* (Japanese knotweed), *Lagarosiphon major* (Curly leaf waterweed), and *Neovison vison* (American mink).

Any landscaping works involving the creation of constructed wetlands could lead to the introduction of spread of invasive ornamental aquatic plants such as *Lagarosiphon major*.

Of major concern is the potential threat of the unintentional introduction of crayfish plague to the catchment. The vector for the disease which has the potential to wipe out crayfish populations is unlikely to be the introduction of alien crayfish themselves but via equipment contaminated with the spores of the fungus-like plague.

The accidental introduction of Japanese Knotweed and Himalayan Balsam to a headwater stream as a direct result of the SDZ could lead to its spread to the riparian zone where it can proliferate through the waterbody downstream. Where it occurs the biological diversity of the riparian habitat will be reduced and the banks will be more prone to erosion during the winter months. These alien species out compete native plant species at ground, herb and shrub layers resulting in bare soils being exposed which can be eroded during flood events.

Noise and Light

Increased light and noise pollution during all phases; construction and operational of the SDZ will be another anticipated impact to be alleviated, particularly in relation

¹⁵ C-215/06 - Commission v Ireland

to the Annex II Otters. Traffic related impacts are of primary concern as death and injury to otter on roads is one of the biggest threat to the conservation status of this species.

Otters are known to use upland areas such as in this development as a means of commuting from one waterbody or catchment to another.

The above confirms that a number of impacts are predicted as a consequence of the Ireland West Airport Knock (IWAK) Strategic Development Zone. Maintaining the conservation status of the aquatic species of the River Moy cSAC, requires mitigation measures which are prescribed in Section 8.

6.4 Potential 'in combination' impacts – projects

As stated in Article 6(3) of the Habitats Directive (92/43/EEC); '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 combination' impacts reflect the potential impacts arising from policies and objectives of additional plans or projects. While not attributed to the causation of direct impacts, 'in combination' impacts may produce cumulative effects. These are notable as they refer to a series of potentially innocuous impacts which in combination with other modest impacts may produce significant impacts. Examples for this purpose include all new plans or projects or amendments to plans or projects within or adjacent to the Natura 2000 sites identified in this assessment which are likely to cause potential conflicts relating to water quality, water volume and flooding, soil instabilities and / or other unidentified potential impacts.

An operational sand and gravel quarry complex is located immediately to the northwest of the redline boundary of the SDZ as shown in Figure 11 below. A recent planning application (P18 993) has been lodged to extract up to 40,000 tonnes per annum of gravel deposits over a 4 hectare extraction area, within a 4.6 hectare development site over a 15 year term. The gravel is to be removed off site and dry screened at the existing processing facility in Barnalyra. There is no effluent discharge proposed at the new extraction area or processing facility which rules out any in combination effects with the proposed SDZ



Figure 11 Map Showing Location of Harringtons Quarry at Barnlyra with proposed extraction area outline in red and screening plant circled in yellow

Currently there are no plans/ proposals for IWAK itself that would warrant consideration with regard to any cumulative impact in conjunction with the SDZ.

Other than one off housing there are no major existing or proposed private or commercial developments within the area being considered for in-combination effects.

7 POTENTIAL IMPACT ASSESSMENT TO CONSERVATION OBJECTIVES OF ANNEX II SPECIES

Tables 8 to 11 assesses the potential impacts identified in Section 6.4 in relation to the detailed site specific Conservation Objectives for the aquatic Annex II species .

Table 8 Assessment of potential Impacts to Conservation Objectives for White Clawed Crayfish in the Zone of Influence of the SDZ.

Attribute	Target	Assessment	Mitigation Required
White Clawed Freshwater Crayfish			
Distribution	No reduction from baseline (Map 7 in Conservation Objectives)	<p>The potential effects of siltation caused by uncontrol excavations at the proposed development and the discharge of inadequately treated wastewater represents the principle negative potential effects on Crayfish distribution. There is very limited potential to undermine this target given the separation distance of 12 km to the known crayfish population at Gorteen Bridge.</p> <p>It is likely that business will be attracted to the SDZ on an individual basis allowing sufficient time for any upgrades to the existing treatment facility to be put in place.</p> <p>Potential hydromorphological impacts to the Sonnagh(MOY)_010 due to proposed landuse changes.</p>	<p>Applying the precautionary principle there maybe unmapped crayfish sites further upstream.</p> <p>Broad ranging sediment controls measures will be integrated into the construction methodology for this project.</p> <p>The requirement to upgrade Knock Airport wastewater treatment plant will be kept under close surveillance as the scheme grows incrementally.</p> <p>The frequency of effluent monitoring will be increased to ensure greater levels of confidence in the quality of the treated effluent.</p> <p>Sustainable Urban Development principles will be adopted in the design stage of development to prevent excessive erosion of stream channel during storm events.</p>
Population Structure	Juveniles and/or females with eggs in all occupied tributaries	As above	As above
Negative Indicator Species	No alien crayfish species	This development has minimal potential to undermine the target. The 4 main entry points for alien crayfish through live bait for anglers, fishfarming, live import for sale as food and for the	Awareness campaign for security and cargo handlers at airport and arriving passengers to recognise potential risks

Attribute	Target	Assessment	Mitigation Required
White Clawed Freshwater Crayfish			
		aquarium trade. With the potential exception of the Hotel and Conference facilities there are no other business ventures likely to act as vectors for alien crayfish species	
Disease	No instances of disease (Crayfish plague introduced by contaminated equipment and water in the absence of vector species)	Crayfish plague vectors are very unlikely to be associated with this development. This development will not attract anglers or water sports enthusiasts who could potentially be carrying contaminated equipment.	
Water Quality	At least Q3-4 in all sites sampled by the EPA	A Q value of 4 has been attained in 2013 and 2016, at monitoring station (Gurteen Bridge) immediately upstream of the known Freshwater Crayfish population, 1.4km upstream of the River Moy. EPA monitoring results for Orthophosphate (limiting freshwater factor for eutrophication) downstream of the WWTP discharge location show are low but are trending upwards as stated in Section 6.3	Sediment control measures during construction, careful siting of building to maximise the retention of tracts of peatlands to dampen flood peaks during rainfall events and increased surveillance sampling of the WWTP effluent discharge are some of the mitigation options available to ensure that the development does not cause a decrease in water quality.
Habitat Quality; Heterogeneity	No decline in heterogeneity or habitat quality	Habitat heterogeneity required to retain health crayfish populations will not be undermined by the development. No direct effects are predicted to occur while indirect effects such as increased sedimentation are a slight possibility given the separation distances involved (12km downstream of the development)	Broad ranging sediment controls measures will be integrated into the construction methodology for this project.

Table 9 Assessment of potential Impacts to Conservation Objectives for Sea and Brook Lamprey Species in the Zone of Influence of the SDZ.

Attribute	Target		Assessment	Mitigation Required
Sea and Brook Lamprey				
	Sea	Brook		
Distribution; extent of anadromy*	Greater than 75% of main stem length of rivers accessible from estuary.	Access to all watercourses down to first order streams	This development has minimal potential to undermine the target. Instream works associated with the 1 st order stream within the development zone has the potential to restrict distribution for spawning purposes. The only the branch of the Sonnagh that could provide spawning habitat for brook lamprey is that which flows adjacent to the WWTP in the west of the site . The nearest brook lamprey were recorded 5 km downstream of the SDZ within the SAC. A survey site 2 km downstream record no lamprey in 2004.	Applying the precautionary principle there maybe unrecorded brook lamprey sites further upstream or potentially within the SDZ. Any culverted streams will be constructed so as to facilitate lamprey migration during the spawning season
Population structure for juveniles	At least 3 age/size groups present	At least 3 age/size groups present	Lamprey larvae that hatch out are carried downstream to where they accumulate in areas of slower current. These areas are at a significant remove from the site to avoid being affected directly. Potential indirect effects of the development could be increased sediment transfer to these preferred juvenile habitats. Increased sedimentation above normal levels would not be expected to have any negative impact on this target.	Broad ranging sediment controls measures will be integrated into the construction methodology for this development. The requirement to upgrade Knock Airport wastewater treatment plant will be kept under close surveillance as the scheme grows. The frequency of effluent monitoring will be increased to ensure greater levels of

Attribute	Target		Assessment	Mitigation Required
Sea and Brook Lamprey				
	Sea	Brook		
			Reduction in water quality due to wastewater discharges or accidental releases to waters during emergencies such as fire or fuel spills has potential to undermine this target.	confidence in the quality of the treated effluent. An emergency response/oil spill contingency plan will be developed for the SDZ providing an inventory of all fuel and chemicals on the site and appropriate controls required for storage and use. It will be routinely updated as the site expands.
Juvenile density in fine sediment	Mean Catchment Juvenile density at least 1 /m ²	Mean Catchment Juvenile density at least 2/m ²	This development has minimal potential to undermine the target as stated in the above target referring to population structure	Broad ranging sediment controls measures will be integrated into the construction methodology for this development.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds (clean gravels)	No decline in extent and distribution of spawning beds (clean gravels)	Taking the precautionary principle it is assumed that suitable spawning habitat is located within the SDZ (middle reach of close to WWTP). Potential spawning gravels could be removed during instream works associated with construction of internal road and or installation of utilities. Sedimentation of these gravel beds is unlikely given the steep gradient but sedimentation effects are likely to occur downstream affecting known spawning gravels within the SAC.	Buffer zones will be created along all stream tributaries within the SDZ to prevent direct loss of spawning gravels . Broad ranging sediment controls measures will be integrated into the construction methodology for this development. Sustainable Urban Drainage principles will be adopted in the design stage of development to

Attribute	Target		Assessment	Mitigation Required
Sea and Brook Lamprey				
	Sea	Brook		
				<p>prevent excessive erosion of stream channel during storm events.</p> <p>Consideration should be given to avoiding instream works during the lamprey spawning season May and June .</p>
Availability of juvenile habitat	More than 50% of samples positive in 3 rd order channels downstream of spawning areas	More than 50% of samples positive in 2 nd order channels (and greater) downstream of spawning areas	Lamprey larvae that hatch out are carried downstream to where they accumulate in areas of slower current. These area will be significantly removed from the site to be affected directly. Potential indirect effects of the development could be increased sediment transfer to these preferred juvenile habitats. Increased sedimentation above normal levels would not be expected to have any negative impact on this target.	Broad ranging sediment controls measures will be integrated into the construction methodology for this development.

Table 10 Assessment of potential Impacts to Conservation Objectives for Salmon in the Zone of Influence of the SDZ.

Attribute	Target	Assessment	Mitigation Required
Atlantic Salmon (<i>Salmo salar</i>)			
Distribution; extent of anadromy	100% of river channels down to 2nd order streams accessible from estuary	This development has no potential to undermine the target as only 1st order streams occur within the development zone.	None
Adult spawning fish	Conservation limit (CL) for each system consistently exceeded	This development has potential to undermine these targets .	The requirement to upgrade Knock Airport wastewater treatment plant will be kept under close surveillance as the scheme grows incrementally.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment abundance threshold value (currently set at 17 salmon fry /5 minutes sampling)	Inland fisheries Ireland concerns pertaining to the developments reflect the importance of the Sonnagh(MOY)_010 in maintaining the productivity of the River Moy system.	The frequency of effluent monitoring will be increased to ensure greater levels of confidence in the quality of the treated effluent.
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	Adherence to the IFIs Guidance on Construction work in and adjacent to waters will be a prerequisite.	Tertiary treatment for phosphorous removal by chemical precipitation or an alternative method would prove a worthwhile consideration for Irish Water. This could be done as an add on to the existing plant or incorporated into a new plant if the SDZ is successful. A riparian buffer zone along the main tributary of the Sonnagh(MOY) in the west of the SDZ has been incorporated into the masterplan. This will retain the

			<p>existing ecosystem services such as shading, nutrient provision and vegetated channel margin.</p> <p>Culverting of water courses to be minimised through appropriate road lay out and development design.</p> <p>All instream works will be subject to the closed season in salmonid watercourses i.e. no works between 1st October and 30th April .</p> <p>Sustainable Urban Drainage principles will be adopted in the design stage of development to prevent excessive erosion of stream channel during storm events.</p> <p>No invasive species spread or introduced</p>
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Table 11 Assessment of potential Impacts to Conservation Objectives for Otter in the Zone of Influence of the SDZ.

Attribute	Otter (<i>Lutra lutra</i>)		
	Targets	Assessment	Mitigation Measures
Distribution	No significant decline	This development will have the potential to result in a decline in distribution of otters in the River Moy SAC. Otters utilise freshwater habitats for commuting and foraging. Their distribution could be impacted by disturbance to headwater streams and associated riparian zones due to construction works.	<p>A 10m buffer zone will be established along all existing headwater streams.</p> <p>If road crossings are required measures will be put in place to allow otters commute safely.</p> <p>Road culverts will be designed to ensure accessibility for otters.</p> <p>Road speeds will be curtailed during construction to minimise the risk of injury to commuting Otter.</p>
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1068.8 ha.	This development will not have the potential to result in a decline in extent of terrestrial habitat for otters in the River Moy SAC. Except for the freshwater habitats within the SDZ, the terrestrial habitats within the SDZ are of limited value in terms of foraging for Otters.	
Extent of Freshwater (river) habitat	No significant decline. Length mapped and calculated as 479.4 km.	Three headwater streams found within the SDZ , could potentially be utilised by otters for commuting or foraging but represent a small fraction of the overall length of 480 km. This development will not significantly undermine this target.	<p>Applying the precautionary principle there will be a 10m riparian zone created around the headwater streams within the site during construction and operation.</p> <p>Stream crossing will be minimised during the design phase.</p>

Attribute	Otter (<i>Lutra lutra</i>)		
	Targets	Assessment	Mitigation Measures
Extent of Freshwater (Lake) habitat	No significant decline. Area mapped and calculated as 1248.2 ha.	No decline in lake habitat will occur as a result of this development.	
Couching sites and holts	No significant decline	No known couching or holting sites present onsite so this target will not be undermined by development. However the accidental introduction of Invasive Alien Plant Species, such as Japanese knotweed, could potential impact couching sites/holts by making them less suitable due to shading and changes to native flora.	Ensure that strict biosecurity protocols are in place especially during the construction phase
Fish biomass available	No significant decline	<p>This development has the potential to cause a decline in fish biomass in the Sonnagh(MOY)_010 through the effects of uncontrolled sediment releases during construction.</p> <p>Excessive run off from paved surfaces during storm events could potential result in erosion of gravel beds in the headwaters reducing spawning habitat for its prey species such as salmon, trout, lamprey and eels.</p> <p>Reduction in water quality due to effluent discharges from Knock Airport Wastewater treatment plant could also potentially reduce the abundance/diversity of prey species.</p>	<p>Buffer zones will be created along all stream tributaries within the SDZ to prevent direct loss of spawning gravels due to high velocity runoff during the construction phase.</p> <p>Broad ranging sediment controls measures will be integrated into the construction methodology for this development.</p> <p>Sustainable Urban Development principles will be adopted in the design stage of development to prevent excessive erosion of stream channel during storm events.</p> <p>The requirement to upgrade Knock Airport wastewater treatment plant will be kept under close surveillance as the scheme grows. The frequency</p>

Otter (<i>Lutra lutra</i>)			
Attribute	Targets	Assessment	Mitigation Measures
			of effluent monitoring will be increased to ensure greater levels of confidence in the quality of the treated effluent.
Barriers to connectivity (for commuting across stretches of open water up to	No significant decline. For Guidance se Map 8 in CO	This project will not present any barriers to commuting routes indicated in Map 8 in the Conservation Objectives.	

8 MITIGATION MEASURES TO PROTECT SURFACE QUALITY

8.1 Construction Phase

The construction phase of the development will adhere to best practice guidance, particularly the CIRIA guidance document C532 Control of Water Pollution from Constructions Sites¹⁶. The construction approach will also adhere to the requirements set out in the Inland Fisheries Ireland guidance document Requirements for the Protection of Fisheries Habitat during Construction and Development Sites¹⁷

Specific mitigation measures for the protection of Annex II species from water pollution incidences may include the following during the construction phases of project to reduce potential indirect impacts on the River Moy SAC:

- The location of peat storage areas should minimise the risk of bog slides by maximising separation distances to watercourses.
- Use of fuel and chemical bunds, spill trays and emergency response kits
- Measures to collect, attenuate, settle and treat surface water runoff prior to discharge from the SDZ. Features such as swales, settlement ponds, silt dams and check dams will be installed where appropriate.
- Delineation and fencing off 10m buffer strips for all riparian zones with the SDZ.
- Concrete works will be carried out in dry conditions as far as is possible. Concrete lorries will use a concrete washout with pH adjustment.
- Sanitation and welfare facilities will be located in a secure compound. Foul effluent will make use of chemical facilities with periodic removal for offsite disposal.

8.1.2 Invasive Species

With the exception of Rhododendron, there were no invasive plant species identified during the site ecological surveys so an Invasive Species Management Plan is not specifically required. However in order to avoid accidental importation of invasive alien plant or disease causing vectors (.i.e. spores of the Crayfish Plague) species strict biosecurity protocols are required. All plant, machinery and site operative clothing will be inspected prior to site access to ensure that they are free from material containing non-native invasive species . All plant or

¹⁶ CIRIA 2001 Control of Water Pollution from Constructions Sites – A guide for Consultants and Contractors

¹⁷ Inland Fisheries Ireland 2016. Guidelines for the protection of fisheries during construction in and adjacent to waters.

machinery (including the under surfaces) working in or adjacent to water should be thoroughly cleaned and allowed to dry off fully before commencing works.

8.1.3 Construction Environmental Management Plan

In order to ensure water quality parameters within the site are managed effectively throughout the construction period it is proposed that prior to construction, a comprehensive Construction Environmental Management Plan will be developed, implemented and adhered to by any sub-contractors. This will incorporate all elements of the proposed works over the construction period. With reference to aquatic Annex II species detailed above, the following components will be developed, with input from a suitably qualified aquatic ecologist:

- A Surface Water Management Plan: This will be iterative and will follow an adaptive management structure to ensure its effectiveness in delivery of the surface water quality requirements set out in the Surface Water Regulations (2009) and the Salmonid Regulations (1988). Site-specific monitoring criteria will be required to ensure that the construction works are managed within the effective parameters to ensure that discharges from the site will not adversely affect Atlantic Salmon or brook lamprey, with reference to physiological impacts and siltation and habitat impacts; with implications for populations of these species occurring in the Sonnagh _010 . These measures will also benefit other aquatic species, including Eel and Brown Trout.
- An Erosion and Sediment Control Plan: This will provide for the effective management and limitation of sediment run-off and siltation in the tributaries and drains across the site and also provide for long term protection of the Sonnagh_010. This Plan will require input from geotechnical engineers, hydrologists, hydrogeologists and aquatic ecologists.

The provision and implementation of these plans will ensure that the mitigation measures proposed in this document, and the parameters for the avoidance of significance adverse effects on the Natura 2000 sites within the zone of influence are carried through into the construction phase.

8.2 Operational Phase

From the viewpoint of increased nutrients to surface waters from the existing Wastewater Treatment Plant, tertiary treatment to remove phosphorus by chemical precipitation or an alternative method would prove a worthwhile consideration. The

assimilative capacity of the receiving water body (Sonnagh(MOY)_010) will be reviewed if plant upgrade is considered necessary by Irish Water.

A surface water management system should be designed to ensure that no polluted runoff is discharged from the SDZ to nearby watercourses during the operational phase. All runoff will be collected in suitably sized attenuation ponds and discharged at Greenfield Runoff rates to Sonnagh_010. Surface water attenuation should cater for rainfall events up to and including the 100 year storm events. Prior to discharge from the site all surface water should pass through a Class 1 by pass separator to remove hydrocarbons.

Pesticide and herbicide use should be curtailed throughout SDZ Standard Operating Procedures (SOPs).

An Emergency Response Procedure (ERP) document should also be developed to ensure that accidental discharges of undesirable compounds are avoided or appropriately managed if released.

9 Conclusion

The proposed Ireland West Airport Knock Strategic Development Zone has been evaluated with regard to the designated Natura 2000 sites within the wider study area. Potential impacts affecting the Qualifying Interests of the River Moy SAC have been evaluated, with specific reference to the indirect water quality impacts affecting Annex II listed Sea/Brook lamprey, Atlantic salmon, Otters and Freshwater Crayfish. With the successful implementation of mitigation and monitoring measures described above, the proposed development, either alone or in-combination with other plans or projects will not result in significant adverse effects to the integrity of any European Sites, in view of their conservation objectives.

Potential impacts will be avoided through careful design at construction stage and via operational stage water quality management and a programme of ongoing monitoring. The mitigation measures set out in the current assessment, in addition to commitments from the Application Documents will be incorporated into a Construction Environmental Management Plan, to include a Sediment and Erosion Control Plan.

The implementation of these measures will successfully avoid the potential for downstream water quality impacts on the Sonnagh(MOY)_010 and River Moy SAC. The proponent and their contractors will be bound to incorporate these measures into the project proposal; effective implementation on site will ensure that there will be no significant effects, either individually or in combination with other plans or projects affecting the conservation interests or conservation objectives of the River Moy SAC, i.e. the integrity of this Natura 2000 site.

It is therefore concluded that the proposed development will not, beyond reasonable scientific doubt, adversely affect the integrity of any European Site (Natura 2000 site); whether directly, indirectly or cumulatively.

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APPENDIX I