NATURA IMPACT STATEMENT

Proposed Biogas Plant Development,

Kinincha Road, Gort,

Co. Galway.

Report prepared by Woodrow Sustainable Solutions Ltd.

On behalf of Sustainable Bio-Energy Ltd.

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DOCUMENT CONTROL

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STATEMENT OF AUTHORITY

This report is written by Hazel Doyle. Hazel is an Ecologist with Woodrow Sustainable Solutions Ltd. She has completed an honours B.Sc. specialising in Zoology and an M.Sc. in Biodiversity and Conservation. She has worked on assessments including Ecological Impact Assessment and Natura Impact Assessments / Appropriate Assessments. Furthermore, the author has experience in habitat surveys, mammal surveys, bird and bat surveys for a number of development projects such as wind energy developments and quarries. Hazel has also acted as an Ecological Clerk of Works (ECoW) for wind farm developments under construction. Hazel is a graduate member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

The report has been approved by Will Woodrow, who also had input into the report. Will is a Director at Woodrow Sustainable Solutions Ltd. and is an experienced ecologist with over 30 years of experience in ecological surveys and assessment. Will is a Chartered Ecologist and a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

As Will and Hazel are members of CIEEM they are required to abide by a strict code of professional conduct in all aspects of their work.

Hazel Doyle – Qualifications:

B.Sc. – Zoology, University College Dublin, 2009 - 2013.

M. Sc. – Biodiversity and Conservation, Trinity College Dublin, 2014.

Will Woodrow – Qualifications:

HND Conservation Management. Farnborough College of Technology, 1989.

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M.Sc. (Arch) – Advanced Environmental and Energy Studies. University of East London, 2006.

Table of Contents

1 INTRODUCTION

1.1 Background

Woodrow Sustainable Solutions Ltd. ("Woodrow") was commissioned by the client (Sustainable Bio-Energy Ltd.) to collate information to inform a screening for an Appropriate Assessment / Natura Impact Statement to be conducted by the relevant Competent Authority (in this instance Galway County Council). The proposed application site is located to the north-east of Gort town in south County Galway. The proposal involves the construction and operation of a biogas plant, hereafter referred to as the "Proposed Development".

This work assesses the potential for impacts upon European Sites (or "Natura 2000 sites") as a result of this proposal. European Sites include Special Areas of Conservation (SACs) designated for Annex I habitats and Annex II species of the Habitats Directive and Special Protection Areas (SPAs) designated for Annex I bird species of the Birds Directive.

1.2 Description and features of the Proposal

1.2.1 Location

The Proposed Development is situated to the north-east of Gort town in south County Galway, in the townlands of Gort, Kinincha and Glenbrack and can be found at the centroid grid reference *M 45496 03329*[1]. See **Figure 1** for the Geographic Location.

The proposed site is approximately 10.01 hectares in area (Halston, 2019) and is currently composed primarily of improved grassland and is used for agricultural grazing and equine related purposes.

Various site visits were undertaken by Woodrow to inform the Biodiversity Chapter which Woodrow also authored (see Chapter 5 of the Environmental Impact Assessment Report (EIAR) for this proposal). These site visits also informed the Stage One Screening Assessment and Stage Two Appropriate Assessment.

1.2.1 General layout and details of the proposal

The Proposed Development will comprise of the construction and operation of a commercial biogas plant which will transform naturally organic feedstock into biomethane and organic fertiliser / soil improver. Figure 2, 3 and 4 together illustrate the proposed site layout for the Proposed Development. The site includes an entrance area and access road leading from the N18 into the application site. This access road comprises 1.734 ha of the overall 10.01 ha of the Proposed Development. Overall, the proposed construction elements include:

- Main site entrance;
- Weighbridge;
- Office and control room building;
- Feedstock reception building;

[1] Irish Grid Reference http://irish.gridreferencefinder.com/?gr=M4549603329|Point_s_A|0&t=Point%20A&v=h (Accessed September 2019)

- Odour control unit;
- Process drainage and effluent storage tank;
- Digesters;
- Digestate storage tanks;
- Pump house;
- Gas Purification and bottling plant;
- Carbon Dioxide Compression Building;
- Gas flare and gas booster station;
- CHP enclosure;
- Boiler House;
- Storm Water Drainage;
- Foul Effluent Drainage; and
- Lighting fencing and security gates.

The eastern boundary of the site is defined by the Kinincha road; this road separates the site from the Cannahowna River and low-lying agricultural land which has historically been prone to flooding. Embankments form the northern and western boundaries of the site, enclosing the site's low-lying land.

The proposed biogas facility will be capable of accepting up to 90,000 tonnes of non-hazardous biodegradable feedstock per annum and will process both liquid and solid biodegradable wastes from agricultural and non-agricultural sources. Solid and liquid feedstocks will be delivered by suitable road tankers from off-site sources. Feedstocks will primarily comprise energy crops (grass silage), animal manure (cattle slurry) and residues sourced from producers /processers in the agri-food sector. Approximately 10no. lorry movements will be delivering material to the facility each day during normal operating hours (07:00 to 19:00 Monday to Sunday inclusive). The activity will operate on a 24-hour basis, 7 days per week.

More detailed descriptions of the proposal is presented in the EIAR.

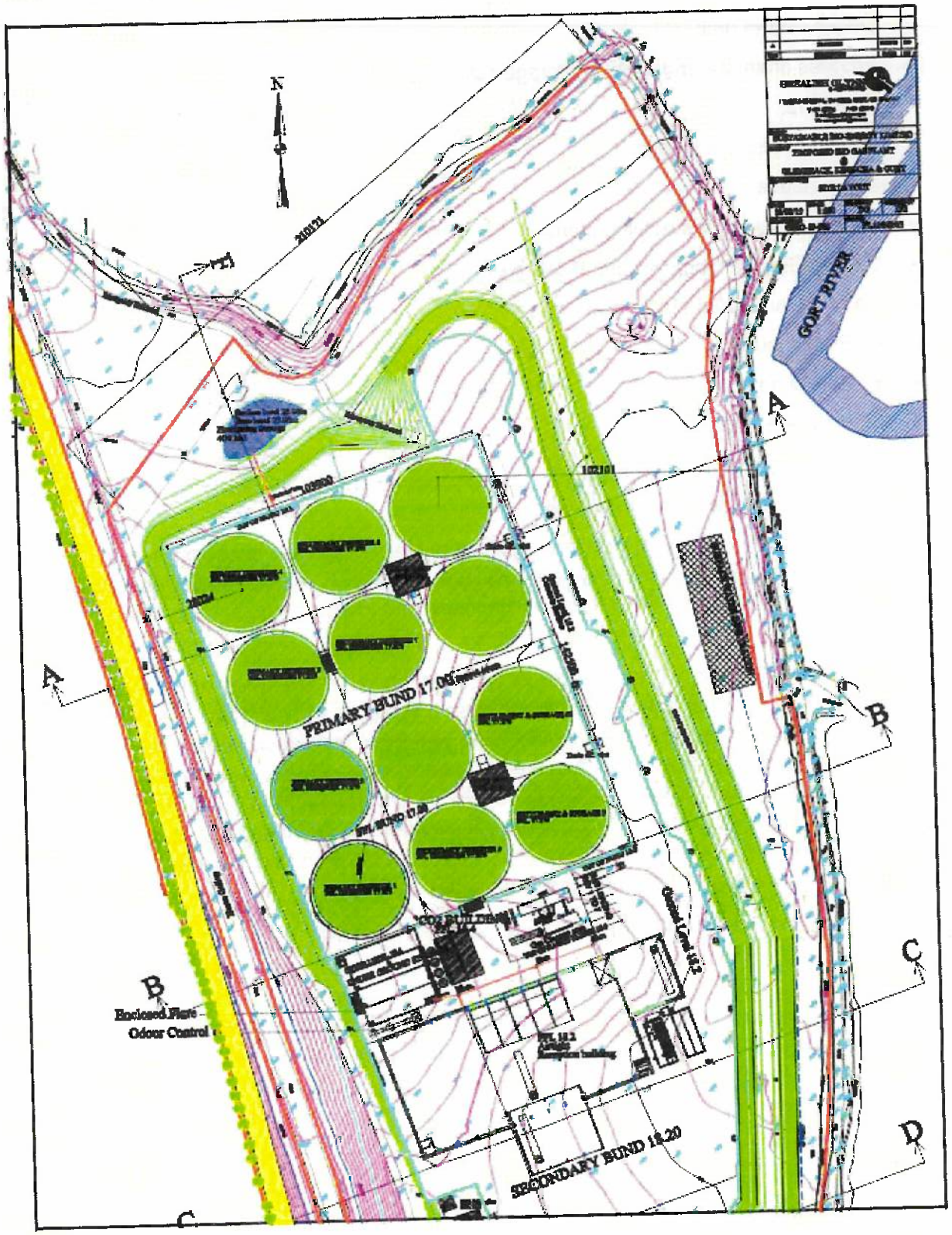
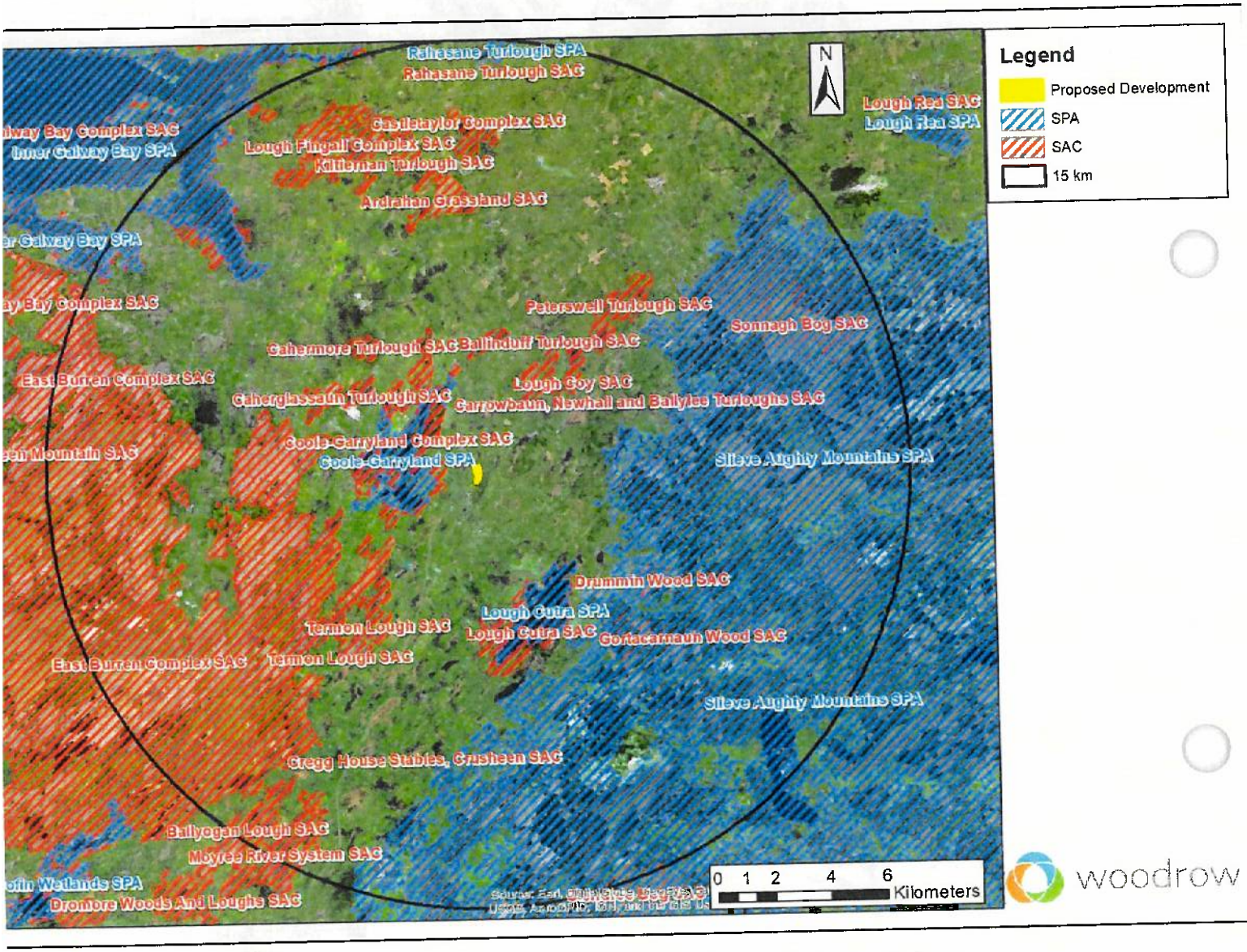


Figure 3: Site layout for the northern half of the Proposed Development (Source: Halston, dated 30.09.2019).

Figure 4: Site layout for the southern half of the Proposed Development (Source: Halston, dated 30.09.2019).



re 5: European Sites within 15 km of the Proposed Development near Gort, Co. Galway.

1.3 Legislative Context

1.3.1 Requirement for a Screening for Appropriate Assessment

The Habitats Directive was transposed into Irish law by the European Communities (Natural Habitats) Regulations 1997 and European Communities (Birds and Natural Habitats) Regulations 2011 (the Habitats Regulations). Regulation 42(1) of the 2011 Regulations requires that:

> *"A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site".*

Guidance document on Article 6(4) of the 'Habitats Directive' states that:

> *"Any uncertainty over the precise nature and/or magnitude of the adverse effects should be thoroughly tested. Where appropriate, a precautionary approach should be adopted and the assessment of adverse effect based on a worse-case scenario.*[2]"

If, at the Screening Stage, any potential for Likely Significant Effects (LSEs) is identified - there is a requirement for an Appropriate Assessment to be undertaken by the Competent Authority. A Screening for Appropriate Assessment was carried out for this Proposal.

The Screening for Appropriate Assessment concluded that LSEs could not be ruled out on six Special Areas of Conservation (SACs) due to the potential for impacts on:

- Surface and groundwater quality;
- Air quality;
- Habitat fragmentation; and,
- Lighting on lesser horseshoe bats.

The six SACs that 'screened in' following the Screening for Appropriate Assessment are:

- Coole-Garryland SAC (000252);
- Carrowbaun, Newhall and Ballylea Turloughs SAC (002293);
- Eastern Burren SAC (001926);
- Lough Coy SAC (002117);
- Caherglassaun Turlough SAC (000238); and,
- Kiltartan Cave (Coole) SAC (000286).

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[2] (European Commission, 2007)
http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf (Accessed September 2019)

The Screening for Appropriate Assessment is provided as Appendix I of this Natura Impact Statement.

1.3.2 Requirement for a Natura Impact Statement

The Appropriate Assessment test assesses whether, in view of applying the best scientific knowledge and the precautionary principle, and in light of the conservation objectives of the relevant Natura 2000 Sites, the proposed project, either alone or in combination with other plans or projects, may adversely affect the integrity of any Natura 2000 Sites.

If, following the screening process, a potential significant effect is predicted or cannot be ruled out; under Regulation 42(6) an Appropriate Assessment is required in order to determine the potential for impact on integrity of a European Site.

With the Screening for Appropriate Assessment having determined that potential significant effects on Natura 2000 Sites could not be ruled out (see Appendix 1), a Natura Impact Statement is required under Regulation 42(6) of the European Communities (Birds and Natural habitats) Regulations 2011. This Natura Impact Statement provides an assessment of the proposal considering potential impacts on Qualifying Interests within Natura 2000 Sites and provides mitigation measures to avoid impacts on the integrity of Natura 2000 Sites. This allows for an audit trail through Article 6 of the EU Habitats Directive to facilitate an Appropriate Assessment by a Competent Authority.

1.4 Structure/ Layout of this report

This Natura Impact Statement provides the information necessary for the Competent Authority, in this instance Galway County Council, to undertake an Appropriate Assessment of the proposal. The report sections, paragraphs and tables relate in sequence to the process of assessing the potential impact of the project in the context of sequential requirements of Article 6 of the EU Habitats Directive.

1.5 Main sources of consultation and information

The following information sources were consulted:

- Department of Environment, Heritage and Local Government (DoEHLG, 2009a). Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities;
- European Community Habitats Directive (92/43/EEC) – The Habitats Directive;
- European Communities (Natural Habitats) Regulations 1997;
- European Commission Environment DG (2001). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC;
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC;

- National Parks and Wildlife Services online Map Viewer[3];
- National Parks and Wildlife Service's data (downloaded GIS datafiles[4];
- Galway County Council Planning Portal[5];
- Irish Water website for information on Waste Water Treatment Plants[6];
- Air dispersion modelling using Aermod software, undertaken by Aona Environmental for the Gort Biogas Plant EIAR (2019); and,
- Online guidance and information on interpretation of air modelling data and threshold critical load values – www.apis.ac.uk.

Site visits to the Proposed Development site were conducted as part of the EIAR survey approach. These enabled a better understanding of the site, and also aided in the assessment of the potential for any adverse effects on the integrity of Natura 2000 Sites.

[3] NPWS Map Viewer http://webgis.npws.ie/npwsviewer/ (Accessed September 2019)
[4] NPWS Maps and Data https://www.npws.ie/maps-and-data (Accessed September 2019)
[5]Galway County Council Planning Portal http://gccapps.galway.ie/gis/cocomaps/ (Accessed September 2019)
[6] Irish Water https://www.water.ie (Accessed September 2019)

2 Impact Assessment

The Screening for an Appropriate Assessment (provided in Appendix I) for the proposal has deemed that this proposal could result in LSEs on Qualifying Interests (QIs) of European Sites within the Natura 2000 network and that a Natura Impact Statement is therefore required. The assessment of the potential impact on the integrity of these sites, with respect to structure and function of Qualifying Interests, is provided in Section 2 below.

2.1 Natura 2000 Sites highlighted within the Screening Assessment

Table 1 below details the Natura 2000 Sites for which the Screening for Appropriate Assessment concluded LSEs could not be ruled out. It includes the Qualifying Interests (QI) that could potentially be affected, as well as impact type and potential resulting effect(s).

Table 1 Potential adverse effects matrix for Natura 2000 Sites and QIs with the potential to be significantly affected by the Proposed Development

Natura 2000 Site	QI [QI Code]	Impact Type and Resulting Effect	Source of Conservation Objective information on each QI
Coole-Garryland SAC (000252)	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150]	Water quality impacts including pollution, eutrophication and sedimentation/siltation on this QI habitat. These impacts have the potential to affect various attributes of the conservation objectives for this QI such as a decline in secchi depth/transparency, an increase in nutrients, an indirect decline in typical species of the habitat and an effect on the macrophyte, phytobenthos and phytoplankton status[7]. Air quality impacts, notably nitrogen deposition, may result in affects such as increased eutrophication.	Site Specific Conservation Objectives for Ballyallia Lake SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000014.pdf (Accessed September 2019).
	Turloughs [3180]	Water quality impacts including pollution, eutrophication and sedimentation/ siltation on this QI habitat. These potential impacts have the potential to result in a decline in water quality and affect the natural structure and function of the turlough[8].	Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)

[7]Site Specific Conservation Objectives for Ballyallia Lake SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000014.pdf (Accessed September 2019)
[8]Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)

		Air quality impacts have the potential to affect various targets and attributes of the conservation objectives of this QI habitat including targets to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities" and "maintain typical species within and across the turlough".[9]	
	Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270]	Water quality impacts including pollution, eutrophication and sedimentation/ siltation, on this QI habitat. These potential impacts have the potential to result in a decline of water quality and affect the natural structure and function of the QI habitat[10]. Air quality impacts may affect various conservation objective attributes and targets including to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities".[11] Air quality impacts may also result in affects including a decline in species richness and an increase in grass species (APIS, 2019).	Site Specific Conservation Objectives for Lough Funshinagh SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000611.pdf (Accessed September 2019)
	Juniperus communis formations on heaths or calcareous grasslands [5130]	Air quality impacts may result in affects such as loss of species richness and/or changes in species composition (APIS, 2019). Air quality impacts may also affect the conservation objective target to maintain typical species for this QI habitat at at least 50% of the listed positive indicator species for the relevant vegetation group present.	Site Specific Conservation Objective for Mweelrea/Sheeffry/Erriff Complex SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001932.pdf (Accessed October 2019)
	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)	Air quality impacts may result in affects such as loss of species richness and/or species diversity and/or changes in species composition (APIS, 2019). Air quality impacts have the potential to affect conservation objective attributes on vegetation	Site Specific Conservation Objective for Killeglan Grassland SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002214.pdf (Accessed October 2019)

[9] Conservation Objectives Supporting Document Turloughs https://www.npws.ie/sites/default/files/publications/pdf/Turlough_3180_and_Cheno_rub_3270_SSCO_sup_doc_June_2017_V1.pdf (Accessed September 2019)
[10] Site Specific Conservation Objectives for Lough Funshinagh SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000611.pdf (Accessed September 2019)
[11] Conservation Objectives Supporting Document Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetationhttps://www.npws.ie/sites/default/files/publications/pdf/Turlough_3180_and_Cheno_rub_3270_SSCO_sup_doc_June_2017_V1.pdf (Accessed September 2019)

	(*important orchid sites) [6210]	for this QI habitat including the following parameters; vegetation composition: typical species, negative indicator species, non-native species, woody species and bracken (*Pteridium aquilinum*); and vegetation structure: broadleaf herb: grass ratio and litter, and the respective targets for these attributes.	
	Limestone pavements [8240]	Air quality impacts are likely to affect the more vegetated aspects of this QI habitat. Potential impacts are those similar to those listed above for calcareous grasslands [6210], and include a potential reduction of species richness and impacts on lower plants (APIS, 2019). Air quality impacts have the potential to affect conservation objectives including various vegetation composition attributes, including the =attribute: indicators of local distinctiveness of this QI habitat (NPWS, 2019b)[12].	Site Specific Conservation Objective for Gortnandarragh Limestone Pavement SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001271.pdf (Accessed October 2019)
	Taxus baccata woods of the British Isles [91J0]	Air quality impacts may result in affects such as nutrient imbalance of the trees and loss of species diversity of the under-storey vegetation, ground dwellers and epiphytes (APIS, 2019). Air quality impacts have the potential to affect the conservation objective attribute Vegetation composition: typical species (NPWS, 2018b)[13].	Site Specific Conservation Objective for Curraghchase Woods SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000174.pdf (Accessed October 2019)
Carrowbaun, Newhall and Ballylea Turloughs SAC (002293)	Turloughs [3180]	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. These impacts have the potential to result in a decline of water quality which may affect the natural structure and function of the turlough. As discussed above, air quality impacts also have the potential to affect various targets and attributes of the conservation objectives of this QI habitat including targets to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities" and "maintain typical species within and across the turlough".	Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)

[12] Site Specific Conservation Objective for Gortnandarragh Limestone Pavement SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001271.pdf (Accessed October 2019)
[13] Site Specific Conservation Objective for Curraghchase Woods SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000174.pdf (Accessed October 2019)

Eastern Burren SAC (001926)	Turloughs [3180]	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. This impact has the potential to result in a decline of water quality which may affect the natural structure and function of the turlough. As discussed above, air quality impacts also may affect various targets and attributes of the conservation objectives of this QI habitat including targets to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities" and "maintain typical species within and across the turlough".	Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)
	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. These water quality impacts have the potential to contravene the conservation objective target of this QI habitats to "maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of this QI habitat"[14].	Site Specific Conservation Objective for Ballycullinan Lake SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000016.pdf (Accessed September 2019)
	Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Water quality impacts including pollution, eutrophication and sedimentation/siltation on this QI habitat have the potential to contravene a conservation objective attribute of Vegetation composition: positive indicator species and the target for At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number per spring.	Site Specific Conservation Objective for Mweelrea/Sheeffry/Erriff Complex SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001932.pdf (Accessed October 2019)
	Alkaline fens [7230]	Water quality impacts have the potential to result in a decline of water quality which may affect the natural structure and function of the QI alkaline fen habitat.[15]	Site Specific Conservation Objective for Bunduff Lough and Machair/Trawalua/Mullaghmore SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000625.pdf (Accessed September 2019)

[14] Site Specific Conservation Objective for Ballycullinan Lake SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000016.pdf (Accessed September 2019)
[15] Site Specific Conservation Objective for Bunduff Lough and Machair/Trawalua/Mullaghmore SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000625.pdf (Accessed September 2019)

Lough Coy SAC (002117)	Turloughs [3180]	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. These impacts have the potential to result in a decline of water quality which may affect the natural structure and function of the turlough. As discussed above, air quality impacts also may affect various targets and attributes of the conservation objectives of this QI habitat including targets to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities" and "maintain typical species within and across the turlough".	Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)
Caherglassaun Turlough SAC (000238)	Turloughs [3180]	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. This impact has the potential to result in a decline of water quality which may affect the natural structure and function of the turlough. As discussed above, air quality impacts also may affect various targets and attributes of the conservation objectives of this QI habitat including targets to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities" and "maintain typical species within and across the turlough".	Site Specific Conservation Objectives for Ballinturly Turlough SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000588.pdf (Accessed September 2019)
	Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270]	Water quality impacts including pollution, eutrophication and sedimentation/siltation, on this QI habitat. These potential impacts have the potential to result in a decline of water quality and affect the natural structure and function of the QI habitat[16]. Air quality impacts may affect various conservation objective attributes and targets including to "maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities".[17]	Site Specific Conservation Objectives for Lough Funshinagh SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000611.pdf (Accessed September 2019)

[16]Site Specific Conservation Objectives for Lough Funshinagh SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000611.pdf (Accessed September 2019)

[17] Conservation Objectives Supporting Document Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetationhttps://www.npws.ie/sites/default/files/publications/pdf/Turlough_3180_and_Cheno_rub_3270_SSCO_sup_doc_June_2017_V1.pdf (Accessed September 2019)

		Air quality impacts may result in affects including a decline in species richness and an increase in grass species (APIS, 2018).	
Kiltartan Cave (Coole) SAC (000286)	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	Temporary loss and fragmentation of foraging habitat due to the potential, temporary loss of hedgerows during construction. There is a potential for LSEs on the internationally important lesser-horseshoe roost of this SAC as foraging habitat within 2.5km of this roost site may be lost or fragmented as part of this proposal. This has the potential to act in-combination with fragmentation of foraging habitat from the consented and operational M18 motorway located in close proximity to the application site and the SAC. There is also potential for disturbance and displacement of this QI species from external lighting of the Proposed Development.	Site Specific Conservation Objectives for Kiltartan Cave (Coole) SAC https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000286.pdf (Accessed September 2019)

2.2 Description of Natura 2000 Sites

This section of the report describes the Natura 2000 Sites, the Conservation Objectives, the Qualifying Interests (QIs), the character and extent of the QI's and current threats and pressures to the sites. As illustrated in **Figure 1**, the Proposed Development is located *c.* 900 m from the Coole-Garryland Complex SAC. The Cannahowna River runs adjacent to the north eastern boundary of the site and forms a direct hydrological connection to the Coole-Garryland Complex SAC via both surface and groundwater connections as discussed in **Section 2.2.1** below.

2.2.1 Description of Coole-Garryland Complex SAC

The Coole Garryland Complex SAC is located in a low-lying karstic limestone area *c.* 900 m west of the Proposed Development. It comprises of a series of turloughs, which are fed by springs and a partly submerged underground river, and is surrounded by woodland, pasture and limestone heath. The more well-known turloughs present in the site include Lydacan, Crannagh North, Raheen, Crannagh South, Coole, Garryland, Newtown and Hawkhill (NPWS, 2016). The site includes good quality examples of seven Annex I habitats, listed in **Table 2**, including four priority habitats, namely turloughs [3180], orchid-rich calcareous grassland [6210], limestone pavement [8240] and yew woodland [91J0].

2.2.1.1 QIs of Coole-Garryland Complex SAC being assessed further

To date no site-specific conservation objectives have been developed for Coole-Garryland Complex SAC. The conservation objectives document for this site is generic and states that the objective for this site is to *"maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected"*

QIs being assessed further within the NIS (evidence for which is provided in Appendix I) include:

- Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150];
- Turloughs* [3180];
- Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270];
- *Juniperus communis* formations on heaths or calcareous grasslands [5130];
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210];
- Limestone pavements* [8240]; and,
- *Taxus baccata* woods of the British Isles [91J0].

*denotes priority habitat

2.2.1.2 Character of the Qualifying Interests of the Coole-Garryland Complex SAC.

Table 2 outlines the QIs of Coole-Garryland Complex SAC and describes the extent and character of these interests in the context of their national status.

Table 2 Qualifying Interests of the Coole-Garryland Complex SAC

Qualifying Species of the Coole-Garryland Complex SAC	Extent and Character
Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150]	This Annex I habitat is recorded in 88 10km squares in Ireland and covers 56.02 ha or 5% of the SAC area. Representation is classed as "B" which is 'good representation' (NPWS, 2017). The overall conservation status of this habitat is considered to be Inadequate (NPWS, 2013).
Turloughs [3180]	Turloughs are recorded in 103 10km squares in Ireland and covers 425.76 ha or 4.13% of the SAC area. Representation is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be Inadequate (NPWS, 2013).
Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270]	This Annex I habitat is recorded in 12 10km squares in Ireland and covers 1258 ha or 1.85% of the SAC area. Representation is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be Favourable (NPWS, 2013).
Juniperus communis formations on heaths or calcareous grasslands [5130]	This Annex I habitat is recorded in 37 10km squares in Ireland and covers 11.2 ha or 0.3% of the SAC area. Representation is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be Inadequate (NPWS, 2013).
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	This Annex I habitat is recorded in 115 10km squares in Ireland and covers 11.2 ha or 0.10% of the SAC area. Representation is classed as "B" which is 'good representation' (NPWS, 2017). The overall conservation status of this habitat is considered to be Bad (NPWS, 2013).
Limestone pavements [8240]	This Annex I habitat is recorded in 63 10km squares in Ireland and covers 56.02 ha or 0.89% of the SAC area. Representation

	is classed as "A" which is 'excellent representation' (NPWS, 2017). The overall conservation status of this habitat is considered to be Inadequate (NPWS, 2013).
Taxus baccata woods of the British Isles [91J0]	This Annex I habitat is recorded in 7 10km squares in Ireland and covers .73 ha or 0.10% of the SAC area. Representation is classed as "B" which is 'good representation' (NPWS, 2017). The overall conservation status of this habitat is considered to be Bad-improving (NPWS, 2013).

2.2.1.3 Threats and Pressures on Coole-Garryland Complex SAC

Table 3 lists the threats, pressures and activities impacting Coole-Garryland Complex SAC.

Table 3 Threats, pressures and activities impacting Coole-Garryland Complex SAC. (Source: NPWS, 2017a)

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location*
I01	Invasive alien species	M	-	i
E03.03	Disposal of inert materials	L	-	b
C01.01	Sand and gravel extraction	L	-	i
A10.01	Removal of hedges and copses or scrub	L	-	i
J02.05	Modification of hydrographic functioning, general.	H	-	b
A04.01.02	Intensive sheep grazing	M	-	i
D01.02	Roads, motorways	M	-	o
J02.04.01	Flooding	L	-	b
A08	Fertilisation	H	-	i
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	L	-	b
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits	M	-	b

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location*
J01.01	Burning down	L	-	i
A04.01.01	Intensive cattle grazing	M	-	b
E03.01	Disposal of household / recreational facility waste	M	-	b
C03.03	Wind energy production	L	-	b
J02.01	Landfill, land reclamation and drying out, general.	H	-	i
E06.02	Reconstruction, renovation of buildings	H	+	i
B02.02	Forestry clearance	M	+	i

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

2.2.2 Description of Carrowbaun, Newhall and Ballylee Turloughs SAC

The Carrowbaun, Newhall and Ballylee Turloughs SAC is located in a low-lying karstic limestone area *c.* 1.35 km north east of the Proposed Development. It comprises of a series of turloughs, which are fed by springs and a partly submerged river, surrounded by woodland, pasture and limestone heath. The site includes good quality examples of the Annex I habitat turloughs* [3180].

2.2.2.1 QIs of Carrowbaun, Newhall and Ballylee Turloughs SAC being assessed further

To date no site-specific conservation objectives have been developed for Carrowbaun, Newhall and Ballylee Turloughs SAC. The conservation objectives document for this site is generic and states that the objective for this site is to *"maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected"* QIs being assessed further within the NIS include the QI habitat, turloughs.

2.2.2.2 Character of the Qualifying Interests of the Carrowbaun, Newhall and Ballylee Turloughs SAC.

Table 4 outlines the QIs of Carrowbaun, Newhall and Ballylee Turloughs SAC and describes the extent and character of these interests in the context of their national status.

Table 4 Qualifying Interests of the Carrowbaun, Newhall & Ballylee Turloughs SAC. (Source: NPWS, 2018)

Qualifying Species of the Carrowbaun, Newhall and Ballylee Turloughs SAC	Extent and Character
Turloughs [3180]	Turloughs are recorded in 103 10km squares in Ireland and covers 58.37 ha or .57% of the SAC area. Representation is classed as "B" which is good representation (NPWS, 2017). The overall conservation status of this habitat is considered to be Inadequate (NPWS, 2013).

2.2.2.3 Threats and Pressures on Carrowbaun, Newhall and Ballylee Turloughs SAC

Table 5 lists the threats, pressures and activities impacting Carrowbaun, Newhall and Ballylea Turloughs SAC.

Table 5 Threats, pressures and activities impacting Carrowbaun, Newhall and Ballylee Turloughs SAC. (Source: NPWS, 2017)

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location*
A08	Fertilisation	M	-	b
J02.10	Management of aquatic and bank vegetation for drainage purposes	M	-	b
E06.02	Reconstruction, renovation of buildings	H	-	i
A02.01	Agricultural intensification	M	-	b
J02.05	Modification of hydrographic functioning, general	H	-	b
A10.01	Removal of hedges and copses or scrub	M	-	i
J02.04.01	Flooding	M	-	b
E06.01	Demolishment of buildings & human structures	M	-	i

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location*
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	H	-	b
D01	Roads, paths and railroads.	M	-	i
E03.03	Disposal of inert materials	M	-	i
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits	M	-	b
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	H	-	i
E03.01	Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging)	L	-	i
E06.02	Reconstruction, renovation of buildings	M	+	i

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

2.2.3 *Description of Kiltartan Cave (Coole) SAC*

Kiltartan cave is a natural limestone cave situated north of Coole Park in Co. Galway, *c.* 500 m off the main M18, Galway-Ennis road and *c.* 500 m from the old N18 road. Kiltartan cave is located *c.* 1.9 km north of the Proposed Development. It is used as a winter hibernating site for the lesser horseshoe bat. This cave is of international importance due to the significant population of lesser horseshoe bats [1303].

2.2.3.1 QIs of Kiltartan Cave (Coole) SAC being assessed further:

- *Rhinolophus hipposideros* (lesser horseshoe bat) [1303]

2.2.3.2 Threats and Pressures on Kiltartan Cave (Coole) SAC.

Table 6 lists the threats, pressures and activities impacting Caherglassaun Turlough SAC (NPWS, 2016e).

Table 6 Threats, pressures and activities impacting on the Kiltartan Cave (Coole) SAC (Source: NPWS, 2017)[18]

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location
D01.02	Roads and motorways	H	-	b
J02.04.01	Flooding	H	-	b
G01.04.03	Recreational cave visits	M	-	i
E06.02	Reconstruction and renovation of buildings	M	+	o

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

[18]Natura 2000 form for Kiltartan Cave (Coole) SAC: https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF000286.pdf (Accessed September 2019)

2.2.4 Description of Eastern Burren SAC

NPWS (2016[19]) states that "*The East Burren Complex SAC is a large site which incorporates all of the high ground in the east Burren in Counties Clare and Galway and extends south-eastwards to include a complex of calcareous wetlands*". It is c. 3.5 km west of the Proposed Development. It comprises of a range of limestone habitats, including limestone pavement calcareous grassland and heath, scrub and woodland and a network of calcareous lakes and turloughs. The site includes some of the best known turloughs in Ireland.

2.2.4.1 QIs of the Eastern Burren SAC being assessed further:

- Turloughs [3180];
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210];
- Petrifying springs with tufa formation (*Cratoneurion*) [7220]; and,
- Alkaline fens [7230].

2.2.4.2 Character of the Qualifying Interests of the Eastern Burren Complex SAC

Table 7 outlines the Qualifying Interests of the Eastern Burren SAC and describes the extent and character of these interests in the context of their national status.

Table 7 Qualifying Interests of the Eastern Burren Complex SAC

Qualifying Species of the Eastern Burren SAC	Extent and Character
Turloughs [3140]	Turloughs are recorded in 103 10km squares in Ireland and covers 944.44 ha or 9.12% of the SAC area. Representation is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Inadequate* (NPWS, 2013).
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	This Annex I habitat is recorded in 107 10km squares in Ireland and covers 188.09 ha or 1.76% of the SAC area. Representation of this habitat is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Bad* (NPWS, 2013).
Petrifying springs with tufa formation (Cratoneurion) [7220]	This Annex I habitat is recorded in 83 10km squares in Ireland and covers 188.09 ha or 2.26% of the SAC

[19] Site Synopsis for East Burren Complex (Site Code: 001926). Version date. 9.2.2016. Accessed: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY001926.pdf (September 2019).

	area. Representation of this habitat is classed as "B" which is good representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Inadequate* (NPWS, 2013).
Alkaline fens [7230]	This Annex I habitat is recorded in 195 10km squares in Ireland and covers 188.09 ha or 0.96% of the SAC area. Representation of this habitat is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Bad* (NPWS, 2013).

2.2.4.3 Threats and Pressures on the Eastern Burren SAC.

Table 8 lists the threats, pressures and activities impacting the Eastern Burren SAC (NPWS, 2013b).

Table 8 Threats, pressures and activities impacting on the Eastern Burren Complex SAC (Source: NPWS, 2015b)[20]

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location
G01	Outdoor sports and leisure activities, recreational activities	L	-	i
A10.01	Removal of hedges and copses or scrub	L	-	i
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	L	-	i
A10	Extensive grazing or undergrazing by livestock	L	-	i
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	L	-	b
A10	Restructuring agricultural land holding	L	-	i
I02	Problematic native species	H	-	i
A05.02	Stock feeding	L	-	i

[20]Natura 2000 form for the Eastern Burren SAC: https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF001926.pdf (Accessed September 2019)

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location
E03.01	Disposal of household / recreational facility waste	L	-	i
H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities	H	-	i
H02.07	Diffuse groundwater pollution due to non-sewered population	L	-	b
D01.01	Paths, tracks, cycling tracks	L	-	i
H02.06	Diffuse groundwater pollution due to agricultural and forestry	H	-	i
A04.03	Abandonment of pastoral systems, lack of grazing	H	-	i
K02.01	Species composition change (succession)	H	-	i
A08	Fertilisation	L	-	i
D05	Improved access to site	L	-	b
A04.01	Intensive grazing	L	-	i
D01.02	Roads, motorways	L	-	b
A11	Other agriculture activities	H	+	i
D01.02	Roads, motorways	L	+	b
A10.01	Removal of hedges and copses or scrub	H	+	i
A05.02	Stock feeding	H	+	i
G01	Outdoor sports and leisure activities, recreational activities	L	+	i
A02	Modification of cultivation practices	M	+	i
D05	Improved access to site	L	+	b
D01.01	Paths, tracks, cycling tracks	H	+	i
A04.02	Non intensive grazing	H	+	i

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

2.2.5 *Description of Lough Coy SAC*

Lough Coy SAC is a small permanent lake in the middle of an almost circular turlough basin. There are drift deposits, as well as outcropping rocks and boulders on the relatively steep side walls, and small areas of scrub towards the top of the basin.

2.2.5.1 QIs of Lough Coy SAC being assessed further:

- Turloughs* [3180].

2.2.5.2 Character of the Qualifying Interests of Lough Coy SAC

Table 9 outlines the qualifying interests of the Lough Coy SAC and describes the extent and character of these interests in the context of their national status.

Table 9 Qualifying Interests of Lough Coy SAC.

Qualifying Species of Lough Coy SAC	Extent and Character
Turloughs* [3180]	Turloughs are recorded in 103 10km squares in Ireland and covers 58.07 ha or 0.56% of the SAC area. Representation is classed as "A" which is excellent representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Inadequate* (NPWS, 2013).

2.2.5.3 Threats and Pressures on Lough Coy SAC.

Table 10 lists the threats, pressures and activities impacting Lough Coy SAC (NPWS, 2017).

Table 10 Threats, pressures and activities impacting on the Lough Coy SAC (Source: NPWS, 2017)[21]

Code	Threats & Pressures	Rank*	+/-*	Threats/ Pressures Location
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits	M	-	b
H04.01	Acid rain.	M	-	i
A10.01	Removal of hedges and copses or scrub.	M	-	i
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters.	M	-	b
A08	Fertilisation	M	-	i

[21]Natura 2000 form for Lough Coy SAC: https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002117.pdf (Accessed September 2019)

E03.03	Disposal of inert materials.	L	-	o
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities	H	-	b
J02.05	Modification of hydrographic functioning, general.	M	-	b

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

2.2.6 Description of Caherglassaun Turlough SAC

Caherglassaun is a large lake located *c.* 6 km north-west of Gort and *c.* 5 km south-east of Kinvarra in the low-lying farmland of east Co. Galway. Situated in a natural depression just to the north-west of Coole Nature Reserve, this site comprises a permanent lake at its core, while the rest of the basin functions as a turlough. At times of high water, the site can flood to a depth of 10-15 m. A series of collapse features act as swallow-holes (NPWS, 2015a). Detailed conservation objectives are available for this SAC and are referenced in **Section 2.3** when assessing potential impacts of these QIs.

2.2.6.1 QIs of Caherglassaun Turlough SAC being assessed further:

- Turloughs* [3180];
- Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270]; and
- *Rhinolophus hipposideros* (lesser horseshoe bat) [1303].

2.2.6.2 Character of the Qualifying Interests of Caherglassaun Turlough SAC (000238)

Table 11 outlines the qualifying interests of the Caherglassaun Turlough SAC and describes the extent and character of these interests in the context of their national status.

Table 11 Qualifying Interests of Caherglassaun Turlough

Qualifying Species of Caherglassaun Turlough SAC	Extent and Character
Turloughs* [3180].	Turloughs are recorded in 109 10 km squares in Ireland and covers 152.40 ha or 92% of the SAC area. Representation is classed as "B" which is classed as good representation (NPWS, 2017). The overall conservation status of this habitat is considered to be *Inadequate* (NPWS, 2019a).
Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270].	This QI is recorded in 12 10 km squares in Ireland and covers 2.4 ha or 1.5% of the SAC area. Representation is classed as "C". The overall conservation status of this habitat is considered to be *Favourable* (NPWS, 2019a).

Rhinolophus hipposideros (lesser horseshoe bat).	This species is recorded in 74 10 km squares in Ireland and confined to the six west coast counties of Mayo, Galway, Clare, Limerick, Cork and Kerry (McAney, 1994). The overall conservation status of this species has been downgraded to Inadequate (NPWS, 2019a) from the previous classification of Favourable by the previous article 17 report (NPWS, 2013).

2.2.6.3 Threats and Pressures on Caherglassaun Turlough SAC.

Table 12 lists the threats, pressures and activities impacting Caherglassaun Turlough SAC (NPWS, 2016e).

Table 12 Threats, pressures and activities impacting on the Caherglassaun Turlough SAC (Source: NPWS, 2017)[22]

Code	Threats & Pressures	Rank*	+/-*	Inside/OutsideThreats/ Pressures Location
A08	Fertilisation	H	-	b
A04.01.01	Intensive cattle grazing	H	-	i
A10.01	Removal of hedges and copses or scrub	H	-	i
E03.01	Disposal of household / recreational facility waste	M	-	i
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters	L	-	o
J02.04.01	Flooding	H	-	b
A05.02	Stock feeding	H	-	i
A04	Grazing	M	+	i

*Rank: H = high, M = medium, L = low; I= inside, O = outside, B = both; +/- = Positive/Negative Impact

[22] Natura 2000 form for Caherglassaun Turlough SAC: https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF000238.pdf (Accessed September 2019).

2.3 Assessment of potential impacts and effects on Natura 2000 Sites and their QIs

Various site visits conducted principally to inform the EIAR also informed the appropriate assessment information regarding the potential effects on European Sites.

No Qualifying Interest habitats or species were recorded within the Application Site during the site visits. In addition, no invasive species were recorded. Following the bird surveys, it was established that the site itself is not suitable foraging habitat for any QI species of the nearby SPAs, however, there is potential for indirect impacts through hydrological connectivity from this site (through surface water features such as the adjacent Cannahowna River which drains into Coole-Garryland Complex SAC, the related foul water discharge from the Gort WWTP and groundwater connectivity due to the karst nature of the area). Wetland bird species including grey heron, little egret, mute swan, black-headed gull, lesser black-backed gull, teal, moorhen and lapwing were recorded in a wetland / flooded area between the site and the town of Gort, located *c.* 300 m south of the site. Some of these species recorded are listed as QIs for two SPAs, the Inner Galway Bay SPA and Rahasane Turlough SPA, and include teal, black-headed gull, grey heron and lapwing. These SPAs are located *c.* 10.2 km and 14.3 km from the site respectively and is considered very unlikely that there will be any significant levels of disturbance from this proposal.

The site visits also confirmed the need for mitigation measures during the construction phase in order to ensure there are sufficient environmental management measures put in place at the site during construction, to take into account for example the Cannahowna River which is adjacent to the site at the north eastern boundary.

2.3.1 Assessment of potential air quality impacts and effects on Coole-Garryland Complex SAC and it's QI habitats

During the operation of the Biogas Plant, the combustion processes of the plant will result in industrial emissions (see the Air Quality and Odour, Chapter 6 of the EIAR for more details on air quality impacts). Nitrogen deposition, if significant in extent has the potential to affect the QIs of Coole-Garryland Complex SAC. Due to the background levels of Nitrogen deposition currently at the Coole-Garryland Complex SAC, the close proximity of the SAC to the Proposed Development and the sensitive nature of the QIs to impacts on air quality, this SAC is the only Natura 2000 Site assessed for air quality impacts within this NIS (see **Table 2**). The potential effect on each of the QIs is assessed below.

Modelling analysis of the likely Nitrogen deposition arising from the proposal has been undertaken to inform the Appropriate Assessment. This provides a more detailed picture of the likely levels of Nitrogen deposition across the SAC, enabling the information to be seen in the context of the SAC as a whole and specific Qualifying Interest features, where data is available.

The original output of the Nitrogen deposition model produced as an output of the Air Quality and Odour, Chapter 6 of the EIAR, (Aona Environmental, 2019) concluded that there was a potential for the proposal to result in 0.3943 kg/N/ha/yr at the SAC location. This is based on a worst-case scenario at the nearest point to the SAC. This constitutes 7.9% of the critical load of

the habitat (this is based on a precautionary critical load of 5%, with references suggesting 5-10%)[23]. This is shown in the output modelling as detailed in **Table 13**.

Table 13 – Nitrogen deposition model output for the Coole-Garryland Complex SAC (Source: Aona Environmental, 2019)

Sensitive Natura 2000 Sites	Nitrogen Deposition (NDEP) and critical loads					
	PC NDEP (kg N/ha/yr)	NDEP Background (kg N/ha/yr)	NDEP TOTAL (kg N/ha/yr)	NDEP CRITICAL LOAD (kg N/ha/yr)	%PC of CRITICAL LOAD	%PC of NDEP Background
Coole-Garryland Complex SAC	0.3943	10.1	10.55	5	7.9%	3.9%

The precautionary basis for the screening assessment is therefore based on the lower threshold and also the potential value of Nitrogen deposition at the nearest point to the SAC being assumed to occur across the entire site.

Standard approaches to air pollution modelling[24] suggest that proposals that would not result in an increase in loading of greater than 10% of the critical load could reasonably be screened out of further detailed assessment. However, in this case, the combined percentage of the critical load of 7.9% (although less than 10%), with the fact that the background level is at 10.1 kg/N/ha/yr (which is above the precautionary adopted critical threshold of 5%), suggested that it could not reasonably be screened out.

The higher resolution output of the modelling is provided in **Figure 6**. It can be seen from the contours that the closest part of the SAC to the proposal is at a value between 0.4 and 0.2 kg/N/ha/yr. However, it can also be seen that the levels of Nitrogen deposition fall off towards the SAC, with only the tip of the SAC boundary falling close to the likely deposition of 0.4 kg/N/ha/yr. More detail on the modelling in relation to the SAC and wider area is provided in the Air and Odour Chapter (Chapter 6 of the EIAR) and associated Appendix.

Table 14 shows the baseline monitoring results at three locations, including Coole Garryland SAC and East Burren Complex SAC, the two nearest SAC supporting QI habitats sensitive to air quality impacts such as Nitrogen deposition. **Figure 6** shows the nitrogen deposition model with respect to the Coole-Garryland SAC.

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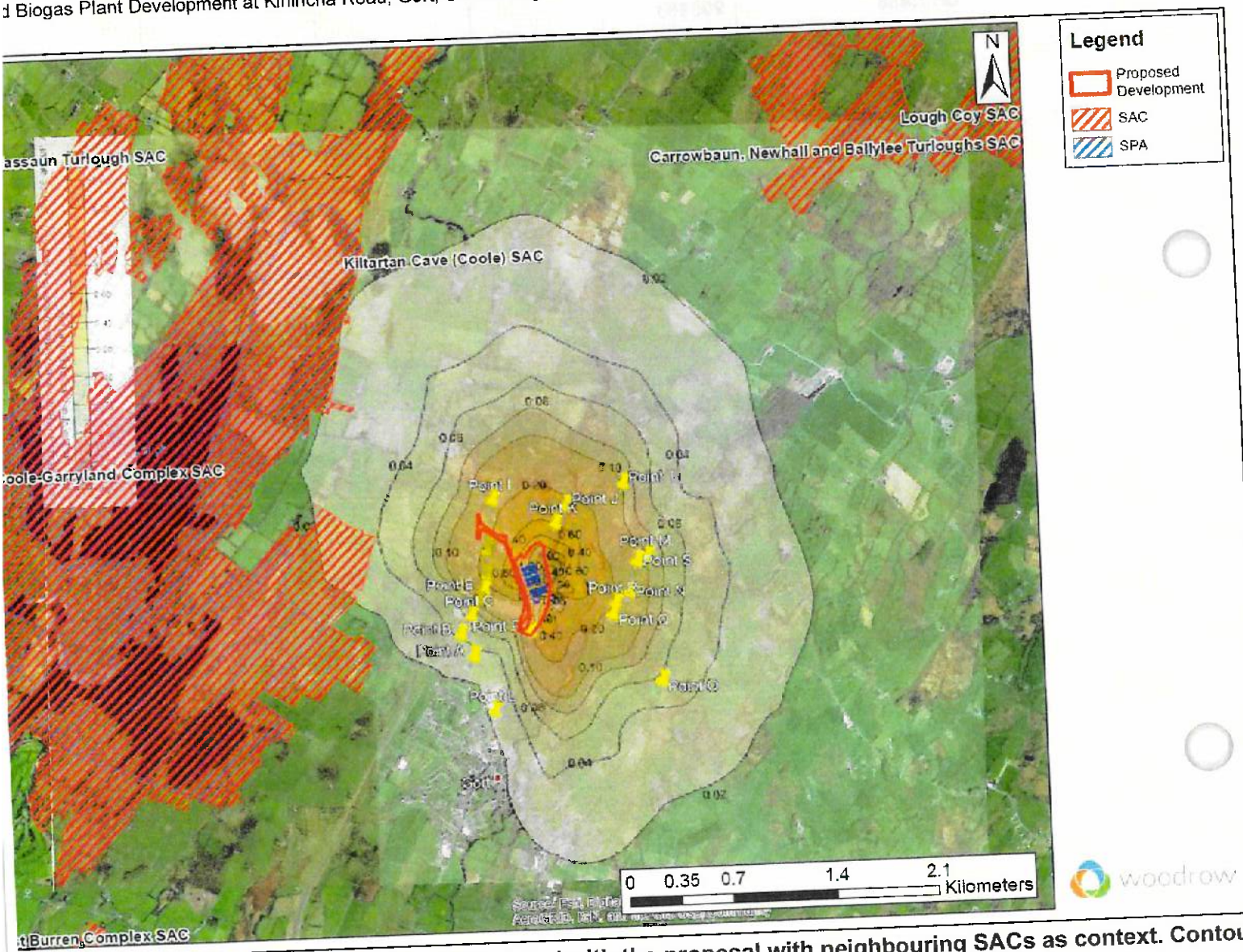
[23] It is stated in the Article 17 reporting document for Limestone Pavement in Northern Ireland that "Based on an assessment of relevant literature, this habitat is potentially sensitive to air pollution, with an estimated critical threshold of 5-10 kg N/ha/yr" – available at: http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H8240_NORTHERNIRELAND.pdf (Accessed September 2019)
[24] Eg. http://www.apis.ac.uk/air-pollution-modelling or http://www.scail.ceh.ac.uk/

Table 14 - Baseline air quality monitoring results (Source: Aona Environmental, 2019).

Location Reference	Location Description	Grid Reference	NO Conc. (µg/m3)	NO2 Conc. (µg/m3)	NOx Conc. (µg/m3)
AQML 1	At entrance to site, off R458	145143, 203683	3.3	3.4	6.7
AQML 2	Coole Garryland SAC	144386, 203331	< 1	2.0	2.0
AQML 3	East Burren Complex SAC	142503, 201094	2.4	1.6	4.0
Annual Mean Limit			-	40 - for protection of human health	30 - for protection of vegetation

The results indicate that the existing concentrations of NO, NO2 and NOx are all less than 25% of the annual limit for the protection of vegetation (30 µg/m3), with Coole-Garryland SAC having the lowest NOx concentration at 6.6% of the annual limit for the protection of vegetation. The existing NOx concentrations at the East Burren Complex SAC was show to be less than 15% of the annual limit for the protection of vegetation at 13.3%. According to Aona Environmental (2019), the Environmental Protection Agency's (EPA) Air Quality Index for Health (AQIH) is a number from one to 10 that identifies the current air quality currently in a region and whether or not this might affect human health. A reading of 10 means the air quality is very poor and a reading of one to three inclusive means that the air quality is good. The AQIH indicates that the area of the proposed development is in an area of good air quality.



re 6: Modelling of Nitrogen Deposition associated with the proposal with neighbouring SACs as context. Contour ented in gN/m² (x10 = kg N/ha/yr).

2.3.1.1 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150]
Natural eutrophic lakes are mainly in catchments dominated by mineral soils, often with highly intensive agriculture and some are close to large centres of population. Consequently, the habitat has been under significant pressure from eutrophication since the 1970s or before (NPWS, 2013). According to APIS (2019)[25], deposition of ammonia, nitrate and other forms of nitrogen from the atmosphere is unlikely to be the largest source of this nutrient to eutrophic standing waters (Jordan, 1997). This lake habitat is in fact found in mesotrophic waters in Ireland. Gibson *et al.* (1995) suggests that deposition of ammonia, nitrate and other forms of nitrogen from the atmosphere could be an important source of this nutrient in mesotrophic standing waters.

There is no information available on the exact location of Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* within the site, so from a precautionary perspective it is considered to relate to all waterbodies (in terms of determining the closest potential proximity). It is therefore assumed this habitat has the potential to occur within 2.1 km of the proposal.

It is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of 0.2kg/ha/yr. This is equivalent to 1.98% of the total background Nitrogen deposition in the area. The contribution from the proposal also reduces with distance from the proposal as illustrated in Figure 6.

Taking account of the above information, and results from the baseline air quality monitoring surveys, although there is no published critical threshold for this habitat, it is considered that the sensitivity level of the habitat, distance from the proposal and fall-off in levels of deposited Nitrogen, there is not likely to be any potential for impact on the integrity of this feature within the SAC in terms of ecological structure and function.

2.3.1.2 Turloughs [3180]*
Turloughs, being groundwater fed, are typically associated with high water quality. This is demonstrated by naturally low dissolved nutrients, clear water and low algal growth (O' Connor, 2017). The target for the attribute **soil nutrient status, nitrogen and phosphorus** for Turloughs is to "*Maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities*". According to O' Connor (2017), nutrient concentrations are typically low in turlough soils, but are highly variable (temporally, among soil types and with flood duration and land-use) and exert an influence on vegetation communities (Kimberley *et al.*, 2012; Kimberley and Waldren, 2012). Maintenance of the natural nutrient status is important as increases in soil nutrient status can significantly alter the vegetation communities and impact on sensitive aquatic assemblages.

This may indirectly affect the target for the attribute **typical species** for turloughs which is to "*Maintain typical species within and across the turlough*". Typical plant species of Turloughs in Ireland include *Callitriche palustris, Frangula alnus* (prostrate form), *Limosella aquatica, Potentilla fruticosa, Rorippa islandica, Teucrium scordium, Viola persicifolia* and others listed in O' Connor (2017). Turlough vegetation communities also support invertebrate species and

[25]Air Pollution Information System website: http://www.apis.ac.uk/ (Accessed September 2019)

2.3.1.3 *Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270]*

Nitrogen concentration and load in rivers in Ireland, particularly those in agricultural catchments, have been rising for a few decades (Zhou *et al.*, 2000). The main source of this nitrogen is inorganic fertilisers (Strong *et al.*, 1997) which may be used in the surrounding agricultural lands between the application site and the SAC.

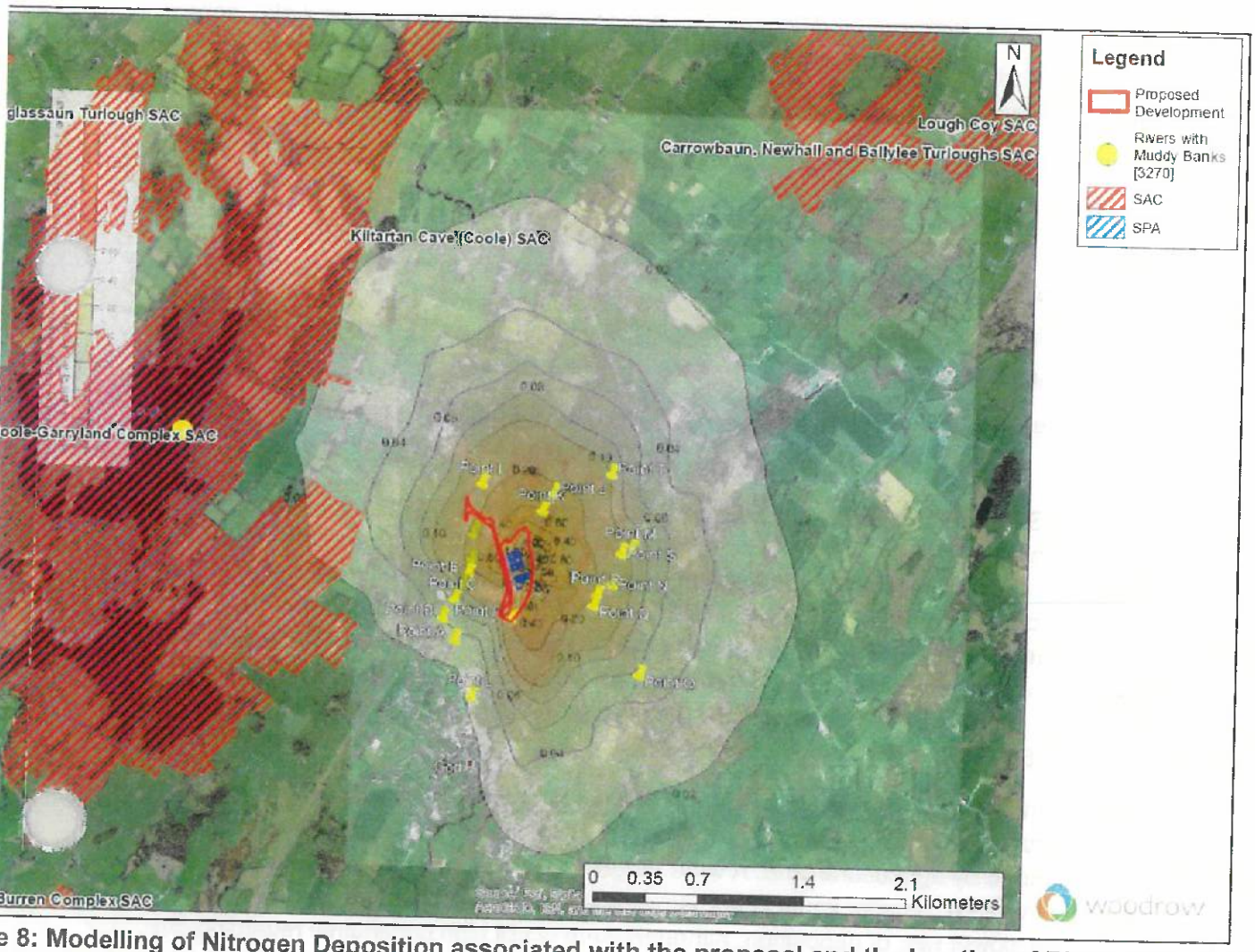
The target for the attribute **soil nutrient status, nitrogen and phosphorus** for Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation is to "*Maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities*" (NPWS, 2018).

According to APIS (2018), deposition of ammonia, nitrate and other forms of nitrogen from the atmosphere could be an important source of nitrogen in some upland catchments where intensive agricultural activity is absent. Detailed nitrogen budgets, however, do not exist, so the relative inputs from atmospheric deposition are unknown. In such cases, increasing nitrogen inputs from atmospheric sources are likely to have ecological impacts. In most lowland rivers and burns, nitrogen inputs from catchment land-use, not deposition from the atmosphere, are likely to be much more significant (Strong *et al.* 1997).

At the nearest point, Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation habitat is considered to occur within *c.* 2.3 km of the proposal (see **Figure 8**).

It is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of 0.2kg/ha/yr. This is equivalent to 1.98 % of the total Nitrogen deposition in the area (with the contribution from the proposal reducing with distance from the proposal).

Taking account of the above information, and the results of the baseline air quality monitoring, the limited sensitivity of the habitat, distance from the proposal and fall-off in levels of deposited Nitrogen, there is not likely to be any potential for impact on the integrity of this feature within the SAC in terms of ecological structure and function.



re 8: Modelling of Nitrogen Deposition associated with the proposal and the location of Rivers with muddy banks – source NPWS 2018)[28]. Contours presented in gN/m² (x10 = kg N/ha/yr).

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[28] NPWS habitat and species data https://www.npws.ie/maps-and-data/habitat-and-species-data (Accessed September 2019)

2.3.1.4 Juniperus communis formations on heaths or calcareous grasslands [5130]

According to APIS (2018), potential effects of nitrogen deposition on **dwarf shrub heath habitats** include:

- Changes in species composition with a marked decline in heather (*Calluna vulgaris*) and ericoids, and an increased dominance of grasses (Pitcairn and Fowler, 1991);
- Loss of mosses, liverworts and lichens which receive their nutrients from the atmosphere directly (Fangemeier *et al.*, 1994);
- Decline in *Racomiotrium lanuginosum* heath, one of the most extensive terrestrial, near-natural plant communities in Britain, and its replacement with grasses (Thompson and Baddeley, 1991);
- Increased risk of heather beetle attacks on *Calluna vulgaris*, encouraged by higher N levels in foliage;
- Initial N stimulated growth for *Calluna vulgaris*, increased litter, N return and mineralization; and,
- Negative effects on ericoid mycorrhiza and increase in drought sensitivity.

According to APIS (2018), the impact on lowland heathland is one of the best documented effects of nitrogen deposition with the results of many experimental studies available (Bobbink *et al.*, 1998). The scale of impacts needs to be understood in relation to the interactions between deposition and management practices (burning and grazing). Management intervention can reduce impacts of N through removal via burning and sod cutting. Impacts of nitrogen deposition are particularly associated with the Netherlands where livestock densities provide very high levels of ammonia emissions and deposition (De Graaf *et al.* 1998; Bobbink and Roelofs, 1995).

Impacts on lowland heathlands are likely where relict heathlands remain surrounded by an intensive agricultural landscape such as the juniper scrub potentially located to the east of the SAC and surrounded by agricultural land. A wide range of sources apply (*e.g.* nearness to pig, poultry or cattle farming). Smaller impacts are expected from oxidised nitrogen deposition (NOX) due to the slower rate of deposition, although there is still high uncertainty regarding the scale of impacts on heathlands adjacent to major roads or cities. The nearness to agricultural grassland also increases the likelihood of invasion by more nitrophilic grasses. N inputs will enhance N availability via increased litter production, decomposition and increased N mineralization.

Excessive Nitrogen input into this QI habitat has the potential to contravene targets for the attribute Vegetation composition (at least 50% of the listed positive indicator species for the relevant vegetation group present - as listed in Cooper *et al.* [2012]).

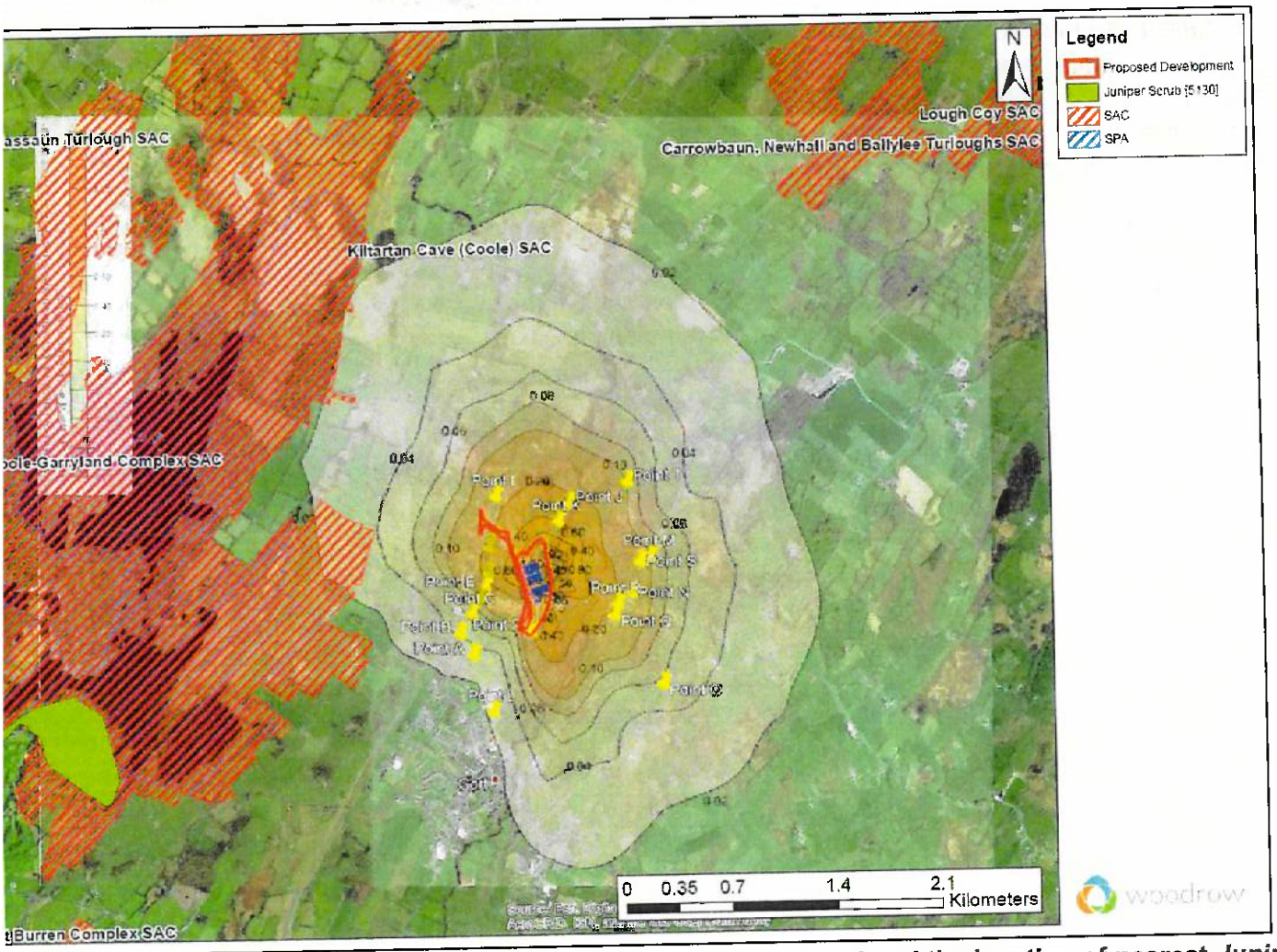
There is no published critical load for this habitat, although the critical loads recommended for use at 'detailed assessment stage' within the APIS dataset[29] for *Dry heaths* and *Sub-Atlantic semi-dry calcareous grassland* are 10 and 15 kg/N/ha/yr respectively.

At the nearest point, *Juniperus communis* formations on heaths or calcareous grasslands with habitat is considered to occur within *c.* 2.5 km of the proposal (see **Figure 9**).

It is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of 0.2kg/ha/yr. This is equivalent to <2 % of the total Nitrogen deposition in the area (with the contribution from the proposal reducing with distance from the proposal). This QI habitat, as shown in Figure 9, lies outside the contour map.

Taking account of the above information, including the results of the baseline air quality monitoring, the distance of the habitat from the proposal, its sensitivity and fall-off in levels of deposited Nitrogen, there is not likely to be any potential for impact on the integrity of this feature within the SAC in terms of ecological structure and function.

[29] Air Pollution Information System website: http://www.apis.ac.uk/indicative-critical-load-values (Accessed September 2019)



**re 9 – Modelling of Nitrogen Deposition associated with the proposal and the location of nearest *Juniperus comm*
ations (source NPWS 2018)[30]. Contours presented in gN/m² (x10 = kg N/ha/yr).**

NS habitats and species data https://www.npws.ie/maps-and-data/habitat-and-species-data (Accessed September 2019).

2.3.1.5 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (important orchid sites) [7210]*

This calcareous grassland habitat comprises species-rich plant communities found on shallow, well-drained calcareous substrates, often occurring on obvious geological features such as, in this case, outcropping limestone rock, and in association with limestone pavement, (NPWS, 2013). The conservation status of this Annex I QI habitat is assessed as Bad (NPWS, 2013).

According to APIS (2018), potential effects of nitrogen deposition on **calcareous grassland** include:

- Reduces species richness and/or species diversity/changes species composition;
- Loss of subordinate vascular plants e.g. *Thymus* species;
- Loss of rare or endangered species;
- Loss of characteristic calcicolous mosses and lichens at risk from shading and N accumulation;
- Increase in non-native calcifuge species;
- Increase in *Hypochaeris radicat* (Carroll *et al.*, 1997). Negative effects on nitrogen fixing legumes;
- Increased risk of drought effects; and,
- Loss of annuals and forbs will have implications for recovery, due to the short-lived nature of the seed bank (Bossuyt *et al.*,2005).

Below ground changes include:

- Reduction in pH in the surface top centimetres of soil;
- Increase in acid cations *e.g.* Al and Mn;
- N deposition increases rates of mineralization and nitrification, (Phoenix *et al.*, 2003); although as soils acidify with the release of protons nitrification rates may slow leading to higher NH4+ concentrations, which can be toxic to many calcicoles;
- Increase in soil N pool, which may have implications for the future habitat quality; and,
- These soils tend to be on the dry side with low denitrification rates, leaching losses are also low leading to N retention within the system (Phoenix *et al.*, 2003).

According to APIS (2018), these low productivity grasslands occur on shallow, well buffered soils (with a calcium carbonate content of *c.*10%), where the availability of both N and P is low (co-limited). The co-limitation by P, which reflects the higher soil pH and its influence on P solubility, has an important modifying influence on N deposition effects. This is because growth stimulation will be species specific, because of insufficient P, and many of the eutrophication /

competition effects associated with N will be more muted, making the ecosystem less vulnerable to N deposition.

The low productivity of calcareous grasslands is closely linked with their species richness. Increases in N above a certain level are likely to compromise the species richness of the habitat, although the relationship is somewhat more complicated. For example, it is stated in APIS (2018) that "*N deposition will favour those species that can tolerate low P availability under conditions of improved N supply and can also effectively scavenge and monopolise that additional N through storage e.g. Brachypodium pinnatum with underground rhizomes (Bobbink et al., 1998). The expansion of the rough grass Brachypodium pinnatum in calcareous grasslands has been attributed to excess atmospheric ammonia contributing to N deposition (Baxter and Farmer, 1994). This is quite a robust grass and will change the canopy structure of the grassland at the expense of lower plants and especially lichens.*"

Other sources suggest that increases in nitrogen deposition on calcareous grassland may not reduce species richness but can result in changes in species composition and the less presence of rare or scarce species as nitrogen increases (Van den Berg *et al.*, 2010; Caporn *et al.*, 2016)

The potential effects on this QI habitat may affect the attributes for this QI habitat including Vegetation composition: typical species; Vegetation composition: negative indicator species; Vegetation composition: non-native species; Vegetation composition: woody species and bracken (*Pteridium aquilinum*;, Vegetation structure: broadleaf herb: grass ratio; and Vegetation structure: litter and the respective targets for these attributes listed below in **Table 15.**

Table 15 – Conservation Objective attributes and targets for this QI habitat

Attribute	Target
Vegetation composition: typical species	At least seven positive indicator species present, including two "high quality" species.
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%.
Vegetation composition: non-native species	Cover of non-native species not more than 1%
Vegetation composition: woody species and bracken (*Pteridium aquilinum*)	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5% cover.
Vegetation structure: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%.
Vegetation structure: litter	Litter cover not more than 25%.

The published critical load for the EUNIS habitat Sub-Atlantic semi-dry calcareous grassland that equates to this habitat, recommended for use at 'detailed assessment stage' within the APIS dataset[31] is 15 kg/N/ha/yr.

[31]Air Pollution Information System website: http://www.apis.ac.uk/indicative-critical-load-values (Accessed September 2019)

There is no information available on the exact location of Semi-natural dry grasslands and scrubland facies on calcareous substrates habitat within the site, so from a precautionary perspective it is therefore assumed this habitat has the potential to occur at the nearest point of the site (within *c.* 0.9 km of the proposal), although orthophotographs suggest that it is likely to be largely a minimum of *c.* 2 km from the proposal.

As mentioned above, it is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of 0.2kg/ha/yr. This is equivalent to <2 % of the total Nitrogen deposition in the area (with the contribution from the proposal reducing with distance from the proposal and in the case of this QI habitat, having potentially negligible Nitrogen deposition).

Taking account of the above information, the distance of the habitat from the proposal, its sensitivity and fall-off in levels of deposited Nitrogen, there is not likely to be any potential for impact on the integrity of this feature within the SAC in terms of ecological structure and function.

2.3.1.6 Limestone Pavement [8240]

According to APIS (2019), limestone pavements have not been studied specifically with respect to N deposition but aspects of responses of communities on calcareous grasslands and neutral/acid grasslands may be informative. Nitrogen limited sites are the most sensitive to this impact type. Mosses and lichens are expected to be the most sensitive components of these systems, with N deposition leading to species changes and loss. Rough grass species can increase, leading to shading out of herb species, from overtopping and increased litter production.

Critical loads for these cover a wide range, illustrating a range of susceptibility depending on whether the system is N limited or P limited (see critical loads information below).

The published critical load for nitrogen for limestone pavements[32] is 5-10kg/ha/yr, with the SCAIL modelling (used for the screening report) using the lower end of the range, at 5 kg/ha/yr.

At the nearest point, Limestone pavement habitat is considered to occur within *c.* 1.65 km of the proposal (see **Figure 10**).

It is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of 0.2 kg/ha/yr on the eastern parts of the Coole-Garryland Complex SAC. This is equivalent to 1.98 % of the total Nitrogen deposition in the area (with the contribution from the proposal reducing with distance from the proposal, and the majority of limestone pavement areas occurring in areas where the proposal has the potential to result in <0.2 kg/ha/yr, i.e. they fall outside the contour map, see Figure 10. This equates to 4 % of the critical load for the habitat.

[32] Eg JNCC 2012 - http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H8240_NORTHERNIRELAND.pdf

2.3.1.7 Taxus baccata woods of the British Isles [91J0]

Woodlands provide a rough surface and tend to intercept larger amounts of both dry deposited N and orographic deposition than less rough surfaces *e.g.* grasslands. This is particularly the case for woodland edges, which experience the highest N deposition, especially where there is a local source of gaseous N such as roads and / or intensive agricultural areas. Thus, there is often a gradient of N deposition declining from the woodland edge.

According to APIS (2018), potential effects of nitrogen deposition on **woodlands** include:

- Increased growth, greatest where soil organic layer C:N ratio is high;
- Destabilisation; faster growth, reduced investments in roots leading to increased risk of drought stress and increased risk of uprooting. Damage to mature beech in the 1999 storm in Switzerland positively correlated with leaf N (Meyer *et al.*, 2008);
- Nutrient imbalance, crown discoloration (chlorosis / yellowing) associated with base cation, Mg and K deficiency leading to reduced growth rates, reduced crown densities and abnormal branching patterns;
- Change in mycorrhizal flora and reduction in numbers of large sporocarps, fruiting bodies, which appear particularly sensitive to NH_4^+. Sensitive mycorrhizas are replaced by those preferring rich conditions, tending to be those that are efficient at taking up P;
- Increased litter production;
- N accumulation as NH_4^+ or amino acids leading to increased sensitivity to abiotic and biotic stress - reduced frost hardiness, associated with effects on late growth cessation and early bud burst, as young tissue is highly frost sensitive; and,
- Winter desiccation; increased defoliation by leaf feeders; increased pathogen infection, though evidence is reported predominantly for beech.

There is no published critical load for this habitat, although the critical loads recommended for use at 'detailed assessment stage' within the APIS dataset[35] for Broadleaved woodland and Meso and eutrophic Quercus woodland are 10 and 15 kg/N/ha/yr respectively. A precautionary 10 kg/N/ha/yr is adopted for this habitat.

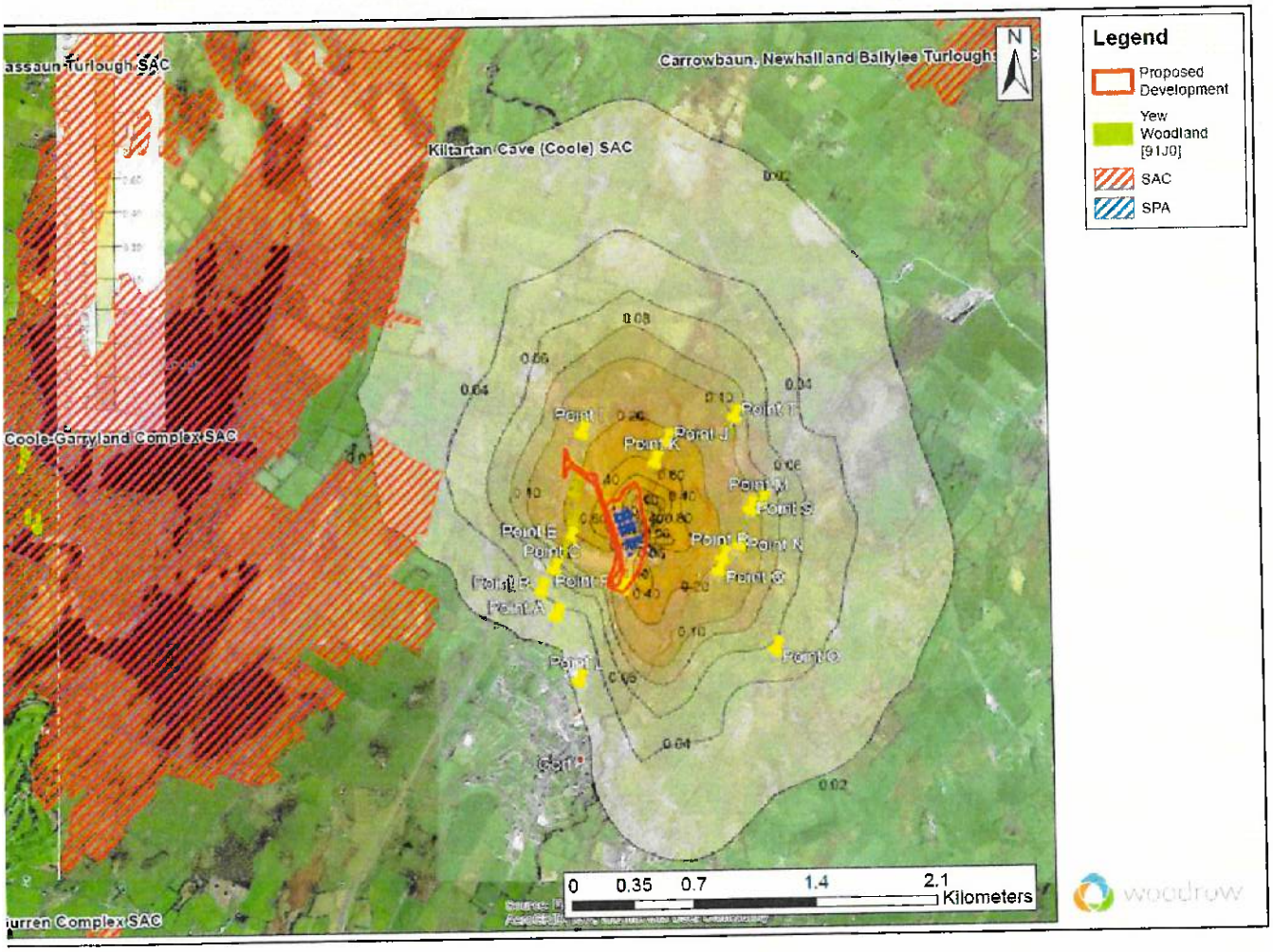
At the nearest point, *Taxus baccata* (Yew) woods of the British Isles habitat is considered to occur within *c.* 3.25 km of the proposal (see **Figure 11**).

It is considered that, according to the enhanced modelling of Nitrogen deposition, the proposal has the potential to result in a worst-case increase in Nitrogen deposition of <0.2 kg/ha/yr on the SAC. This is equivalent to <2 % of the total Nitrogen deposition in the area (with the contribution from the proposal reducing with distance from the proposal) and <2 % of the lower end of the

[35] http://www.apis.ac.uk/indicative-critical-load-values

critical threshold range for the associated habitats. This QI habitat however lies outside the contours, as shown in Figure 11.

Taking account of the above information, the distance of the habitat from the proposal, its sensitivity and fall-off in levels of deposited Nitrogen, there is not likely to be any potential for impact on the integrity of this feature within the SAC in terms of ecological structure and function.



re 11 - Modelling of Nitrogen Deposition associated with the proposal and the location of nearest Yew (*Taxus bac dland habitat (Source: NPWS 2018)[36]. Contours presented in gN/m2 (x10 = kg N/ha/yr).

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ilable at: https://www.npws.ie/maps-and-data/habitat-and-species-data. Accessed September 2019.

2.3.2 *Assessment of potential surface water quality impacts and effects on Coole-Garryland Complex SAC and its QI habitats.*

During operation, potential water quality impacts include nutrient enrichment and eutrophication from Gort Waste Water Treatment Plant (WWTP) and to which the Development proposes to connect to for foul water discharge. In the most recent available EPA site visit report[37] for the plant it is reported that the plant is not overloaded and was fitted with an upgrade to the aeration system; Fine bubble diffused air system (FBDA). Treated wastewater from Gort WWTP discharges directly into the Cannahowna (Gort) River which is hydrologically connected to the Coole-Garryland Complex SAC.

In March 2017 Irish water issued a press release stating that '*Irish Water has been granted planning permission for essential upgrade works to the Gort Water Treatment Plant*'. According to a second press release by Irish Water in April 2019 works on the upgrades to the treatment plant began in April 2018 and are due to finish in October 2019, near the time of submission of this application. According to this press release[38], the works are part of an upgrade to the Gort WWTP which, when complete, will provide a more advanced treatment process to help protect against contaminants and improve the quality of water supplied to customers from this plant.

As part of these works, the processes within the existing plant have been assessed and are being upgraded in order to provide a robust flocculation, coagulation, filtration process and disinfection system. These upgrades are necessary to ensure a fit for purpose water supply for the area. Therefore, there will be sufficient capacity and improved processing of the water being treated at Gort WWTP and the operation of the proposal will not have the potential to result in nutrient enrichment and/or eutrophication due to its connection to Gort WWTP. The connection from the Proposed Development to the Gort WWTP will be purely be for foul discharge from activities at the plant and will not include any process waste water from the operational Biogas Plant.

SAC features with potential surface water connectivity within the Coole-Garryland Complex SAC are:

- Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150];
- Turloughs* [3180] (Coole Turlough is river-fed); and,
- Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270].

The Cannahowna (Gort) River connects to the Coole-Garryland Complex SAC *c.* 3.65 km downstream (including *c.* 800 m of underground flow) from the nearest point of the Proposal. Potential water quality impacts identified within the Screening for Appropriate Assessment and Biodiversity Chapter of the EIAR included spillage of hydrocarbons and other pollutants and sediment-laden run-off entering the SAC during the construction period.

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[37] http://www.epa.ie/licences/lic_eDMS/090151b2806d74d5.pdf
[38] Irish Water Press Release: https://www.water.ie/news/upgrade-works-on-treatmen/ (Accessed September 2019).

Any such events, although unlikely, would result in impacts that may be short-lived but have the potential to be significant and have the potential to result in an adverse impact on the Natura 2000 Site.

Suitable mitigation is therefore required in order to ensure that there is no potential for a surface water pollution event that could result in even a temporary impact on the function of the SAC features of the aforementioned Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation and Turloughs (a priority Annex I habitat) and Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation. This mitigation is set out in **Section 3**.

Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150]

No detailed conservation objectives exist for the Coole-Garryland Complex SAC, however, Ballyallia Lake SAC in Co. Clare is designated for this QI habitat which has a detailed conservation objectives document. The main attributes of this QI habitat which has the potential to be impacted by the Proposed Development include water quality transparency and turbidity from the potential for sediments during construction enter the Gort river and subsequently the Coole-Garryland Complex SAC.

- Water quality transparency: The target of this attribute is to "*Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency*". Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity.
- Turbidity: The target of this attribute is to "*Maintain appropriate turbidity to support the habitat*". Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats.

There is a potential for the works to result in sediments entering the Gort river and undermining this conservation objective.

Turloughs* [3180] (Coole Turlough is partially river-fed)

- Soil type: The target of this attribute is to "*Maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities*". Maintenance of the natural nutrient status is important as increases in soil nutrient status can significantly alter the vegetation communities and impact on sensitive aquatic assemblages.

The Proposed Development has the potential to undermine this conservation objective due to the potential for nitrogen from the operational Biogas Plant.

Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270]

- Soil type: The target of this attribute is to "*Maintain nutrient status (phosphorus and nitrogen concentrations) appropriate to soil types and vegetation communities*".

Maintenance of the natural nutrient status is important as increases in soil nutrient status can significantly alter the vegetation communities and impact on sensitive aquatic assemblages.

The Proposed Development has the potential to undermine this conservation objective due to the potential for nitrogen from the operational Biogas Plant.

2.3.3 Assessment of potential groundwater quality impacts to SACs within the same groundwater body as the Proposed Development.

As listed in **Table 1**, Coole-Garryland Complex SAC, Carrowbawn SAC, Eastern Burren Complex SAC, Lough Coy SAC and Caherglassaun Turlough SAC are within 4.5 km of the Proposed Development, and all have Groundwater Dependent Terrestrial Ecosystems (GWDTEs) as QI habitats and are located within the same groundwater body as the proposal. These GWDTEs include turloughs, calcareous fens, petrifying springs and alkaline fens. It is considered that limited potential for groundwater impacts resulting from the proposal and the lower level of groundwater interchange with habitats such as petrifying springs and alkaline fens, that they are not likely to be affected by the proposal. However, any mitigation measures proposed with respect to turloughs would need to essentially sever the potential connectivity between the proposal and groundwater and will therefore ensure no impacts on any groundwater dependent habitats.

Other SACs within the same groundwater body include Sonnagh Bog SAC, Rahasane Turlough SAC and Glendree Bog SAC, all located over 10 km from the Proposed Development. These GWDTEs include turloughs and blanket bog habitats.

Sources of water contamination included in the risk assessment conducted by Gavin and Doherty (2019) include:

S1 Effluent – Effluent, process effluents or dirty storm water;

S2 Digestate Fertilizer – A by product of the industrial processes on site;

S3 Feedstock – Raw materials for the industrial processes on site which include agricultural wastes such as animal manure /dung and slurries, energy crops (e.g. grass silage), food wastes, catering wastes, vegetable and fruit residues, agricultural by-products and organic farm-based wastes; and,

S4 Other Hazardous Material – other hazardous material may include paints, lubricants, fuels, oils etc used during the construction or operational of the proposed development.

As listed in the Hydrology Chapter of the EIAR, pathways (comprising of any means by which sources may contaminate the listed receptors) include:

P1 – Infiltration of sources into the soil and subsoil across the site;

P2 – Infiltration of sources into the Karst Bedrock across the site;

P3 – The degradation of or compromise in integrity of the concrete used to construct bunding and hardstanding areas; and,

P4 – Corrosion or cracking of piping used for effluent/ process connections.

Receptors sensitive to the potential impacts of the sites works include:

R1 – Groundwater: Due to the limited cover of superficial deposits at the proposed site in part due to previous development at the site, there is a direct pathway between the site and groundwater, allowing for potential contamination.

R2 – Surface Water: The Cannahowna River to the east of the site is of hydrological importance as it discharges into Kincaara Bay. There are also a number of underground pathways where surface water is moved into the groundwater system, these act as a source for many of the turloughs in the area.

Due to the extensive karstification of the underlying limestone formations in the area the groundwater and surface water show a very high level of interconnectivity and therefore the inclusion of surface water as a receptor was adopted within the Hydrological Risk Assessment. A high degree of overlap is present in the determination of risk and appropriate mitigation of each receptor due to this significant interconnectivity.

The majority of the application site is classed as high groundwater vulnerability which means there is a high ease of which potential pollutants or contaminants can enter the groundwater. According to the Hydrogeological Report, the degree of interconnection in karstic systems is high and they support regional scale flow systems. Flow paths are up to 10 km in length. Some areas are of extreme vulnerability due to the thin nature of the subsoil, as well as the frequency of karst features, allowing point recharge.

Various karst features occur in close proximity to the application site according to the Geological Survey of Ireland's (GSI) karst feature database[39]. These karst features can be seen in the Hydrogeological Report (Gavin and Doherty Consultants, 2019). The majority of these features occur in the Tubber bedrock which the majority of the application site lies within. The northern section of the application site lies within the Newtown Member which is one of the differentiated strata that makes up the Tubber Formation (Gavin and Doherty Consultants, 2019).

During construction of the Proposed Development, potential groundwater quality impacts to the remaining Natura 2000 Sites include non-toxic contamination (sedimentation/siltation) and toxic contamination (pollution, chemicals, hydrocarbons). During operation, potential water quality impacts include nutrient enrichment / eutrophication and chemical pollution events (although limited in both cases).

A comprehensive geophysical survey of the site was undertaken by Apex Geophysics in May 2019 to determine the extent of karstified bedrock below the site in order to better determine any risk to the hydrogeological environment, in particular groundwater. Survey work included ground conductivity, electrical resistivity and seismic refraction. Surveys of the application site identified several karst features within the bedrock profile of the site. Areas where karstified bedrock has been observed are highlighted in geophysical cross sections R6, R7, R10, R12,

[39] Geological Survey Ireland: https://www.gsi.ie/en-ie/Pages/default.aspx (Accessed September 2019).

R13, found in the Hydrogeological Report (Gavin and Doherty Consultants, 2019). The most significant karst feature picked out by the survey is seen is the resistivity/ seismic profile section R6. This section shows a vertical area of low resistivity which persists over 20 m below ground level. This area is interpreted as weathered or fissured limestone and is likely to represent a significant fissure within the limestone bedrock. High resistivities (>10,000 Ohm-m) within limestone bedrock are typically indicative of air-filled fissures or voids. According to the Hydrology Chapter of the EIAR, high resistivities were observed across the central and southern parts of the site. These areas occur at depths of 7.5 mbgl to 25 mbgl across the application site.

Previous Ground Investigations (GIs) are limited to *c.*15 boreholes within a 15 km radius which encountered bedrock. Two trial pits were excavated on site in February 2018 by JBA consulting.

As discussed in the Hydrogeological Report in the EIAR, extensive evaluation of karst features in region was undertaken in 2014/ 2015 by ARUP in conjunction with HalcrowBarry. This investigation included a section of the M18 which lies approximately 500 m due west to the proposed biogas facility site. The findings concluded that over the entire length of the scheme much of the area would be classified as being high or medium risk with a small percentage considered as being low risk. In close proximity to the application site however, the scheme is observed to be split into 6 sections from the Coole Demense Overbridge to the end of the Scheme at the Gort Junction. These sections had a risk rating from Low to High Risk with the majority designated as Medium Risk.

2.3.3.1 Turloughs [3180] of the Natura 2000 Sites being assessed*

According to Waldren *et al.* (2015), turloughs are one of the characteristic features of the Irish karst landscape. They are transient lakes resulting from a combination of high rainfall and accordingly high groundwater levels in topographic depressions in the karst. A turlough is effectively a hydrogeological feature defined as *"A topographic depression in karst which is intermittently inundated on an annual basis, mainly from groundwater, and which has a substrate and/or ecological communities characteristic of wetlands"* (Tynan *et al.*, 2007).

During construction of the Proposed Development, potential water quality impacts to the SACs listed in **Table 2**, within the same groundwater body, include non-toxic contamination (sedimentation/siltation) and toxic contamination (pollution by chemicals / hydrocarbons). Such potential water quality impacts, if significant in extent at the QI location, have the potential to affect the QI turlough habitat of these SACs.

The target for the attribute water quality for Turloughs is to "*Maintain appropriate water quality to support the natural structure and functioning of the habitat*" (NPWS, 2018).

According to Waldren *et al.* (2015), the Planning and Development (Amendment) Act 2010 strengthens the relationship with the WFD, providing a clearer requirement for local authorities to consider potential impacts on high status water bodies. Turloughs are designated as groundwater-dependent terrestrial ecosystems GWDTEs under the WFD. The EU Water Framework Directive (2000/60/EC) requires good water status for all European waters to be achieved through river basin management planning and extensive monitoring and assessment

(Mostert, 2003). Achieving good groundwater status includes preventing significant damage to associated GWDTEs such as turloughs (Kilroy *et al.*, 2005). The conservation focus in this context is on the linkage between the groundwater body and the turlough and the prevention of significant damage from anthropogenic pressures.

Although any potential water quality impacts on turloughs in the SACs listed above are extremely unlikely, it has to be acknowledged that the potential connectivity of the proposal to any turloughs via groundwater routes is not fully known and levels of potential impacts are therefore uncertain.

The precautionary principle therefore requires that a potential impact is assumed and appropriate mitigation is put in place. In this instance the mitigation needs to ensure an effective severing of the potential connection between the construction works and operating plant and ancillary infrastructure (including drainage) and groundwater. Such mitigation is set out in **Section 3**.

2.3.4 Assessment of potential impacts on lesser horseshoe bats [1303] of Kiltartan Cave (Coole) SAC.

Kiltartan cave is a natural limestone cave situated north of Coole Park in Co. Galway (NPWS, 2013e)[40], located *c.* 500 m to the east of the new main Galway-Ennis road (M18) and *c.* 500 m west of the old main road (N18). This SAC occurs *c.* 1.9 km to the north the Proposed Development.

Kiltartan Cave (Coole) SAC has been selected for the QI lesser horseshoe bat (*Rhinolophus hipposideros*) because of the presence of an internationally important winter hibernation roost. Although lesser horseshoe bat has declined in many European countries, Ireland is considered a stronghold for the species (Marnell *et al.*, 2009). Ireland represents the most northerly and westerly limits of the species' distribution (Roche, 2001), with the species' presence confined to the six west coast counties of Mayo, Galway, Clare, Limerick, Cork and Kerry (McAney, 1994). In Ireland, the overall conservation status of lesser horseshoe bat was assessed as Favourable in the Article 17 report written in 2013 (NPWS, 2013a), however in the most recent Article 17 report (NPWS,2019a), the overall status of this Annex II species was been downgraded to Inadequate. According to NPWS (2019a), Limerick and North Kerry have shown worrying declines in habitat and range. These are considered likely to continue without significant intervention. For these reasons, Habitat, Range and their associated Future Prospects, which were all considered to be Favourable in the last report, are now considered Inadequate, and the Overall Status of this species is assessed as Inadequate and declining (NPWS, 2019a).

Kiltartan Cave (Coole) SAC has been selected for lesser horseshoe bats because of the presence of an internationally important winter hibernation roost. The EU habitat 'Caves not open to the public' [8310] is confined in Ireland to caves not open to the public that host

[40] Site Synopsis for Kiltartan Cave (Coole) SAC https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000286.pdf (Accessed October 2019).

important numbers of lesser horseshoe bat (NPWS, 2013a;NPWS, 2019a). This EU habitat is classed as Favourable in the latest Article 17 reporting (NPWS, 2019a).

Firstly, there is potential for impact on this QI in the form of decreasing the foraging habitat available to this species within 2.5 km of this internationally important roost site. The conservation objectives include relevant attributes and target stated below which have the potential to be undermined by the proposal:

- "*Extent of potential foraging habitat - No significant decline within 2.5 km of qualifying roost*"; and
- "*Linear features - No significant loss within 2.5km of qualifying roost*".

The above attributes and targets however, are more relevant to roosting bats during the summer months when bats are actively foraging and commuting between roosts and foraging grounds. Therefore, there will be no significant impact on this QI as these bats are specifically hibernating during winter months. There is potential for very limited impact during transitional periods when bats may conduct some flights and also when bats are flying, and potentially foraging, to and from the site before and after hibernation, and during periods of awakening from torpor/ hibernation due to increased temperature during the winter hibernating period.

Foraging habitat and linear features:

During construction, hedgerows and trees have the potential to be removed/ felled if necessary, to facilitate the proposed access road along the western boundary of the application site from the N18 road and from the proposed embankment along the eastern boundary of the application site. However, as indicated by Halston in October 2019, the hedgerow habitats bounding the application site will be strengthened; with more hedging planted to improve the boundaries of the site and as such increase the commuting and foraging potential for bats in the surrounding area. If hedgerows were to be felled, these impacts have the potential to reduce foraging areas and result in the loss of linear features with 2.5 km of the winter hibernation roost site. Lesser horseshoe bats forage on flying insects predominantly in deciduous woodland and riparian vegetation normally within a couple of kilometres of their roosts (Bontadina *et al.*, 2002; Motte and Libois, 2002). The bats rely on linear landscape features (e.g. treelines, stonewalls and hedgerows) to navigate and commute from roosts to feeding sites and they are reluctant to fly out in the open (Schofield, 2008).

Secondly, there is also potential for light pollution to impact on this Annex II bat species. The conservation objectives include relevant attributes and target stated below which have the potential to be undermined by the proposal:

- "*Light pollution - No significant increase in artificial light intensity adjacent to named roost or along commuting routes within 2.5 km of the roost*".

This species follows commuting routes from its roost to its foraging grounds during the active bat season, generally from March to August. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5 km around each roost (Schofield, 2008).

Light Pollution:

According to Stone (2013), lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Artificial light at night at or near roosts may impact bats in a number of ways, for example, delaying emergence time after dusk, causing abandonment of roosts when exits are lit at night and/or reducing reproductive success. According to Stone (2012), lesser horseshoe bats have been found to avoid commuting along routes lit with artificial light at levels as low as 3.7 lux emanating from energy efficient Light Emitting Diodes (LED) lights. Other lamp types producing light at similar levels have also been found to prevent commuting (Stone *et al.*, 2009). According to Schofield (2008), foraging areas that become lit at night may be abandoned, thus potentially increasing energetic costs for bats and reducing reproductive success at a population level. The target is that there is no significant increase in artificial light intensity adjacent to qualifying roosts or along commuting routes within 2.5 km of those roosts.

Thirdly, there is potential for impact on winter roost sites. The conservation objectives include relevant attributes and targets stated below which have the potential to be undermined by the proposal:

- "*Winter roosts – No decline in Condition*".

Winter roosts:

According to the detailed conservation document for this SAC (NPWS, 2018a), Kiltartan Cave (Coole) SAC has been selected for lesser horseshoe bat because of the presence of an internationally important winter roost (roost id. 219 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Mitchell-Jones *et al.*, 2007). The Proposed Development however, is not located in the immediate surroundings of the Kiltartan Cave (Coole) SAC and therefore, there will be no damage or disturbance to this roost and no significant effect will result on this hibernation roost site.

Likely conclusion is that, although small scale, any loss of linear features or inappropriate lighting has the potential to impact, therefore need mitigation to address hedgerow / habitat replacement (and enhancement) and lighting – aim measures towards areas where lesser horseshoe was recorded.

2.3.4.1 Bat Surveys conducted to inform the potential impact on lesser horseshoe bats.
In order to inform this assessment, bat surveys were conducted to inform the Biodiversity Chapter of the EIAR in terms of usage of the site by all bat species. These surveys were also used to inform this NIS using collected data on lesser horseshoe bats in particular to determine the numbers of this QI bats species using the site, their behaviour, habitat preference and locations recorded within the application site. Static bat surveys and activity bat surveys were conducted during the summer of 2018 and 2019. Lesser horseshoe bats were recorded in a number of instances within and in close proximity to the application site on various dates shown in **Table 16 below**. **Figure 12** shows the locations of these lesser horseshoe records. A total of 8 lesser horseshoe bats were recorded during static bat surveys during 2018 bat survey season.

Table 16: Records of lesser horseshoe bats within the site

Survey year	Deployment Month	Survey Type	Unit Number	No. of Bat Passes	Location in relation to the Application Site
2018	June	Static	10	1	Mature hedgerow along north-western boundary.
2018	July	Static	6	1	*c.* 30 m outside site boundary to the south.
2018	July	Static	19	6	Hedgerow along south-eastern boundary.

Figure 12: Location of static detectors and lesser horseshoe bat records within the application site.

2.4 Assessment of potential in-combination effects on Natura 2000 sites

The Screening Stage identified possible significant effects on the six Natura 2000 Sites as a result of impacts including potential surface and groundwater quality impacts during the construction and operation, potential for air quality impacts during operation and the potential cumulative fragmentation of linear habitats for foraging bats., The potential for these impacts to adversely affect the integrity of the Natura 2000 Sites in combination with other proposals is considered below.

2.4.1 Additive/Incremental Impacts

Additive incremental impacts consider multiple plans/projects (each with potentially insignificant effects) but which added together can give rise to a significant effect due to their proximity in time and space (CIEEM, 2016).

The first step in ascertaining the potential for in-combination effects in this regard is to identify other recently consented proposals in the vicinity. Following a search on the Galway County Council Mapping (http://gccapps.galway.ie/gis/cocomaps/), there are a limited number of planning applications within the wider area which have the potential to act in-combination with the current Proposed Development to result in significant cumulative effects on any of the QIs identified within the ZoI of the Proposed Development (Galway County Council, 2018).

2.4.1.1 M18 Motorway

Air quality impacts

The intention of air quality modelling and its conclusions, is to put the potential increase in specific airborne pollutants in the context of the current background levels and assess the potential impact of the increase on receptors. It is therefore, by definition a cumulative impact. The potential air quality impacts from the operation of the proposed biogas plant has the potential to act in-combination with, for example, the recent M18 road development, located in close proximity to this proposal and with similar air quality impacts during operation such as Nitrogen deposition.

Air quality impacts from the proposal were assessed in **Section 2.3.1** with input from the Air and Odour Quality Impact Assessment, Chapter 6 of the EIAR. The results of baseline diffusion tube air quality monitoring, conducted by Aona Environmental in 2019, are included in **Section 2.3.1** which shows that the air quality in the study area surrounding the site is very good, with NOx concentrations measured at the two nearest SACs supporting sensitive QIs, found to be less than 15% of the annual limit for the protection of vegetation (Aona Environmental, 2019).

Water quality impacts

The potential surface and groundwater quality impacts identified in **Section 2.3.3** are non-toxic contamination (sedimentation/siltation) and toxic contamination (pollution, chemicals, hydrocarbons) during construction, and nutrient enrichment/eutrophication during operation. The non-toxic and toxic surface water impacts, has the potential to act in-combination with, for example, the recent M18 motorway which has the potential for run-off of these materials from the road. According to Gavin and Doherty (2019), the N17 / N18 Gort to Tuam PPP Scheme, Construction Requirements Annex 4 to Part 2, Amendments to Standards, Addenda and Advice

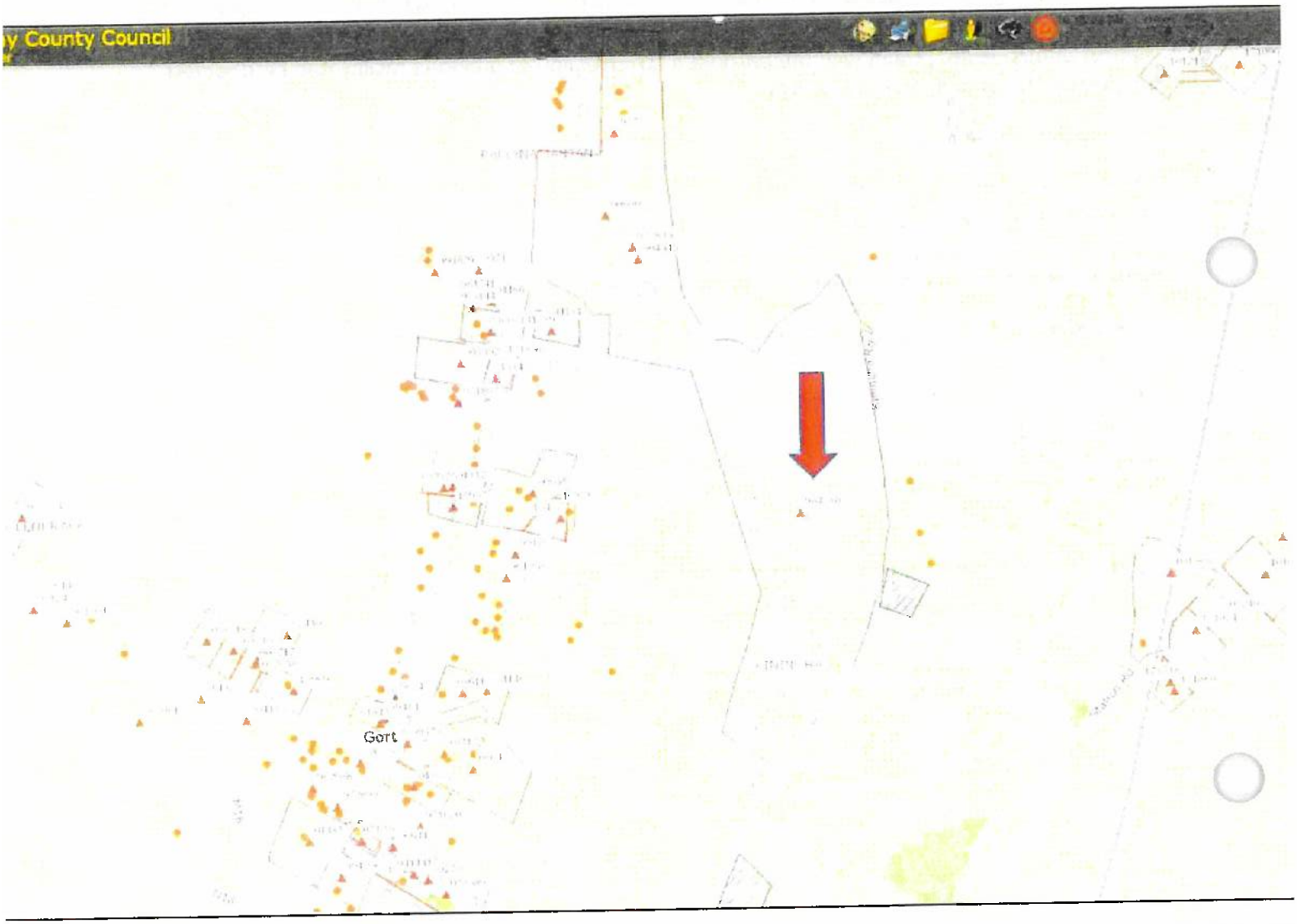
Notes, lists the documents that were adopted in respect to the design and construction of the scheme. This list contains the *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (undated). This document contains a list of groundwater mitigation measures to be considered for road construction schemes which are listed in the Hydrological Chapter of the EIAR. As stated in this, the extensive mitigation measures undertaken in the design and construction of the M18 Motorway scheme to protect and mitigate against any potential groundwater contamination the cumulative effects of this development with the proposed construction of a biogas facility can be deemed negligible Gavin and Doherty (2019).

Habitat fragmentation

In terms of commuting, the limited potential for temporary loss of linear habitats such as hedgerows and other vegetation during the construction of the Proposed Development, has the potential to act in-combination with loss and fragmentation of similar habitats from the recent M18 infrastructural development, located in close proximity to this proposal.

In terms of forging, the optimum foraging habitat (deciduous woodland and riparian vegetation) that is for the QI species will not be lost, however there will be small areas of grassland lost due to the proposal within the application site, as well as temporary limited loss of hedgerows (which is considered a foraging habitat) , which has the potential to act in-combination with loss and fragmentation of similar habitats from the recent M18 infrastructural development, located in close proximity to this proposal, however, if mitigation measure on habitat enhancement are implemented there will be minimal habitat loss from this proposal.

Figure 13 and **Table 11** shows Proposed Development applications or consented developments in the surrounding area.



re 13: Location of other proposals or recently consented applications in the vicinity of the application site (identif
ırrow).

Table 11 Recent proposals or consented developments in the surrounding area of the application site. (Note. Some of these developments are already in existence/operation).

Planning Reference Number	Location	Proposed Development
171860	Levally, Gort, Co. Galway.	Dwelling house, domestic garage/fuel store, septic tank, treatment system and percolation area and all ancillary sites works. Planning Application lodged with Galway County Council was dated 15/01/2018.
171024	Levally, Gort, Co. Galway.	Dwelling house, domestic garage/fuel store, septic tank, treatment system and percolation area and all ancillary sites works. Planning Application lodged with Galway County Council was dated 21/07/2017.
071172	Gort, Co. Galway.	To construct 8 no. units of various sizes in 3 No. buildings (Building 'A' ground and first floors, Building 'B' ground and first floors over basement storage and Building 'C' ground and first floor over basement (carpark) with a total of 10,942m2, consisting of warehousing, storage, showrooms, light industrial, ancillary retail and office use, with all associated car parking, landscaping, site works including sub-station and the upgrade of established site entrance. (Gross floor area 10,942sqm). Planning Application lodged with Galway County Council was dated 23/03/2007
072736	Glenbrack, Gort, Co. Galway.	To construct agricultural shed, silage base and effluent tank. (Gross floor area 126.7sqm) in the townland of Glenbrack. Planning Application lodged with Galway County Council was dated 29/06/2007.

The majority of the applications listed in **Table 11** are in a similar situation to this application site in terms of their proximity to the nearest Natura 2000 Site boundaries. The potential impacts of these developments generally relate to ongoing water quality impacts, notably as a result of nutrient increases with respect to septic tank applications or nutrient / other pollutant impacts with respect to any providing extra loading on the Gort WWTP. However, as the Gort WWTP is currently being upgraded by Irish Water to improve its treatment processes and increase its capacity, there will be sufficient capacity to treat wastewater for this proposal and future proposals in the surrounding area. As such, it is considered that due to the current upgrade works of Gort WWTP, there will be no in-combination effects in terms of water quality impacts from nutrient enrichment and/or eutrophication during operation.

Due to the lack of other significant construction projects being proposed in the area, the potential for in-combination impacts resulting from the construction stage is not likely.

As there are no other developments (consented or proposed) with Industrial Emission Licensing (IED) licences in the potential zone of influence, there will be no in-combination impacts on air quality.

2.4.2 Associated/connected developments

Associated/connected developments are those developments which may result as a consequence of the current planning application process (CIEEM, 2016).

In the case of the current Planning Application, no development may be caused as result of the current development and as such there is no potential for in-combination impacts with associated/connected developments.

3 Mitigation of effects

This Section aims to mitigate potential effects (identified in **Section 2.3 and 2.4**) caused by the Proposed Development on the Natura 2000 Sites with potential for being significantly affected by the proposal.

3.1 Mitigation of water quality during construction

3.1.1 Best practice guidance and standard mitigation of potential water quality impacts to Natura 2000 Sites

The construction stage of the Proposed Development has potential for significant effects on the surface water and groundwater quality of the Natura 2000 Sites highlighted in **Section 2.3**. There is potential for surface water quality impacts on the Cannahowna (Gort) River which is located adjacent to the north eastern boundary of the application site and which drains directly into the Coole-Garryland Complex SAC, designated for QI habitats sensitive to changes in water quality. There is also potential for impacting groundwater quality as the proposal is located on karst ground and hydrologically connected to SACs designated for GWDTEs such as turloughs within the same groundwater body as the Proposed Development.

A Construction Environmental Management Plan ("CEMP") for the Proposed Development, which also incorporates the Construction Waste Management Plan ("CWMP") and Incident Response Plan ("IRP"), can be found in the EIAR and also in **Section 3** of this NIS.

The documents below also outline the Best Practice Guidance on working near water and controlling of pollution and sediments by using appropriate mitigation measures. These measures are also included within the CEMP:

- IFI (2016). *Guidelines on protection of fisheries during construction works in and adjacent to waters - Guidance for consultants and contractors*;
- CIRIA (2006). *Control of water pollution from linear construction projects. Site guide.*; and,
- SEPA (2017). *Works and maintenance in or near water.* GPP 5.

Section 3.1 includes mitigation measures drawn from the above guidance and other sources which, along with all design mitigation proposed within the relevant chapters of the EIAR, must be put in place in order to ensure no water quality impacts on any Natura 2000 Site and therefore, no adverse effect on site integrity during the construction phase of this project. All appropriate best practice measures in relation ground water and surface water management at this site has been included in the CEMP documentation.

3.1.2 *Mitigation measures sourced from the EIAR based on facility design*

- Dedicated area of hardstanding for material deliveries separated a minimum of 10 m from adjacent watercourses.
- Dedicated area of hard standing for vehicle wash-out.
- Specific areas for oil storage and refuelling, separated a minimum of 10 m from adjacent watercourses and comply with legislation, including providing bunds sized 10 contain 110 % of fuel storage capacity.
- Use spill kits, fill point drip trays, bunded pallets and secondary containment units;
- Enclosed and secured site and fuel storage areas will be secondarily secured;
- Adhere to the Construction Waste Management Plan (CWMP) contained in the CEMP.
- Adhere to the site-specific Incident Response Plan (IRP) contained in the CEMP.
- Works involving the use of chemicals which are potentially harmful to the aquatic environment will be undertaken in a contained or lined area.
- Excavation and disposal off-site of contaminated soils (where required).
- A suitable casing will be used where wet concrete is proposed to ensure protection of groundwater until concrete has set.
- There will be no direct discharges to soils or surface water bodies during the operational phase of the development.
- A tank farm bund has been designed in accordance with best practice to contain any spillages /escape of organic materials. A second outer concrete bund, which encompasses areas where processing relating activities will be carried out is also included within the design.
- The digester and digestate storage vessels will be constructed in concrete (cast in-situ) to ensure integrity of the structure. Integrity testing of all structures will be undertaken as part of commissioning works.
- Land disturbance is expected to be minimised and quickly re-stabilised during the construction.
- Due to the limited soil and superficial cover present onsite, it is not thought that large quantities of soils and superficial deposits will be moved during construction.
- Critically, prior to and during the construction phase of the project, areas where the bedrock aquifer is exposed must be protected from surface activities.
- There will be no direct discharge to watercourses, including land drains.

- All outflows from drainage associated with construction will be by diffuse overland drainage at appropriate locations. The karst nature of the area means that there will be no on-site holding of any effluent or construction run-off potentially containing chemical pollutants or cementitious material excepting within appropriately bunded / contained areas.
- Disturbed ground within the site will be actively revegetated with appropriate site typical vegetation immediately post construction, in line with the Landscape Planting Scheme.
- There will be no effluent discharge, with a sealed effluent and water system whereby the plant is connected to the Gort foul sewer, process effluent is fully captured and removed from the site where not reused.

3.1.3 Mitigation measures sourced from the Hydrology Chapter.

Karstic mitigation

Additional mitigation measures from Gavin and Doherty (2019), include a programme of ground investigations which will take places as part of the detailed design of the facility will give an adequate evaluation of the karst bedrock which in turn will allow appropriate mitigation measures to be implemented to ensure the integrity of the foundation and bund design.

Mitigation measure against settlement on site due to karstified bedrock will involve founding the foundations of the biogas facility in competent bedrock. Founding of the structure on competent bedrock will mitigate against any possible settlement of the structure as a result of karst processes.

Mitigation measures following the Hydrogeological Risk Assessment (Sourced from: Hydrology Chapter):

- Programme of regular integrity testing of bunding;
- Programme of regular integrity testing of hardstanding areas;
- Programme of regular integrity testing of storage vessels and piping;
- Groundwater monitoring boreholes installed on site to ensure regular access and assessment of both water levels in the case of rising water levels in times of regional flooding as well as regular water testing to further ensure the integrity of the constructed mitigation;
- Incident response plan will include provision for total contamination clean up in the event of a spill; and,
- Determination of potential structure settlement should be determined after the completion of further ground investigation. The necessity for measures such as piled

foundations to mitigate against settlement that may cause cracking of hardstanding/ bunded areas should be assessed prior to construction.

According to Gavin and Doherty (2019), given the sensitivity of the receptors combined with the major impact of potential environmental effects on these receptors the overall designation of 'Low Risk' is **highly dependent on the mitigation measures outlined above**. In the absences of any outlined mitigation measures the hydrogeological risk to a given receptor can be deemed 'High Risk'. Therefore, the current overall designation of 'Low Risk' is only applicable in the case that all design and procedural mitigation measures are adhered to.

3.1.4 Mitigation of water quality impacts during construction sourced from the CEMP (Halston, 2019)

Potential water quality impacts during construction include toxic contamination (chemical or hydrocarbon pollution) and non-toxic contamination (generation of silt and sediments). During construction, site surface water will be controlled and any surface water cleaned using best practice pollution control measures set out below.

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained.
- Swales/ road side drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment and channel it to settlement ponds for sediment settling.
- Check dams will be maintained at regular intervals along interceptor drains and swales/ roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thus reducing the hydraulic loading to watercourses. The settlement ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period. Best practice and practical experience on other similar projects suggest that in addition to the drainage plans that are included in the EIAR, there are additional site-based decisions and plans that can only be made in the field through interaction between the Site Construction Manager and Environmental Advisors (hydrologist). In relation to decisions that are made on site, it is important to stress that these will be implemented in line with the

associated drainage controls and mitigation measures in Section 8 of the EIAR and to ensure protection of all watercourses.

Good housekeeping and facility management during the construction period will ensure that there will be no negative environmental impacts from the construction of the proposed facility. Sedimentation presentation controls include the following:

- Minimisation of exposed ground and soil stockpiles, through careful earthworks design.
- Minimising the time that ground is exposed and excavations are open through careful construction programming.
- Stockpiles will be located away from watercourses, limited in height to 3m (topsoil) and the surface smoothed.
- Silt fences will be placed around the stockpiles where required to limit the potential for rainfall to wash fines into the drainage system. These comprise a technical filter fabric positioned as a fence around the exposed soil and sediment to catch fines within the runoff and reduce the input of fine sediment to the drainage system. Stockpiles which may be present for some time will be covered or seeded.
- Areas around infrastructure will be landscaped, and restored with topsoil and revegetated as soon as possible.
- Location of construction activities away from water courses as far as possible.
- Track drainage, designed to prevent the interception of large volumes of water, will be porous and act as soakaways thereby minimising any direct discharge to watercourses.
- Wheel washing activities will be conducted in designated areas, with runoff waters being conducted to soakaways constructed according to best practice.
- Use of buffer zones, silt traps and settlement ponds to avoid sediment reaching watercourses.
- As and when necessary all groundwater will be pumped or will flow to a secure sediment pond on site. This pond will be of sufficient size in order to allow ample retention time for any solids to settle. If required as a precautionary measure absorbent pads or booms will be placed at the entry and exit of this pond. The pond will be located in a secure area and will only be accessed by the relevant personnel.
- Any mechanically propelled pumps will be located a safe distance from the water source in order to eliminate the potential of oils entering the water. All pumps will rest on drip trays of sufficient size.

- Prior to pumping any water from source, it will be visually assessed taking into account sediment content, clarity/colour, and evidence of any oils, solvents, etc. If there is any evidence of contaminants in the water absorbent pads or booms will be placed at the entry and exit of this pond.
- After sufficient retention time in the holding pond the water will either flow or be pumped to the land drains. Throughout the course of any discharge regular visual checks will be carried out, again taking into account any suspended solids, clarity, oil presence, etc.
- Monitoring of water discharges from the site will be undertaken as needed and as required by the consenting process. If there is a risk that contaminated groundwater may be present this must be fully evaluated in advance of excavation and pumping.
- For large excavations, the runoff from soil at temporary storage locations will be directed through appropriate sediment/silt control measures.
- In addition to soil excavation, the site works may require exposure of large areas of soil. Run-off water from such areas will be collected by temporary drainage and passed through settlement tanks or lagoons before discharging to surface water via an interceptor. Where soil is to be placed for landscaping purposes, the final formation face will be covered by a covering appropriate to facilitate plant growth and minimize erosion.

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- Supply of ready-mixed wet concrete products where possible or emplacement of pre-cast elements.
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site.
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete.
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.
- A 20m buffer distance to nearby water courses will be emplaced for the duration of the construction works to prevent accidental run-off.

3.1.5 *Additional mitigation measures*

- Given the proximity to the Cannahowna River which flows into the Coole-Garryland Complex SAC located *c.* 900m away and the karst nature of the area, it is recommended that, early in the construction phase, a project ecologist is on-site to confirm adequacy of mitigation detailed in the CEMP and all chapters of the EIAR and to recommend any further appropriate actions if required to avoid potential impacts to the Natura 2000 sites assessed in this report;
- As stated by Gavin and Dohery (2019) in the Hydrology Chapter, programmes of regular integrity testing of bunding, hardstanding areas, storage vessels and piping will be drawn up by a competent, qualified person to ensure there will be no potential for deterioration of these areas and the foundations of the site for the lifetime of the project;
- The foundation design needs to be cognisant of the overall designation of 'Low Risk' is highly dependent on the foundation design, programmes of integrity testing and all other mitigation measures outlined above to be implemented. If these are not
- These mitigation measures and proposed programmes of integrity testing need to ensure a **complete severing** of all connections to the groundwater and surface water on the site due to the high inter-connectivity between the surface and groundwater in this area and consequently to the Coole-Garryland Complex SAC and QI turloughs of the other SACs under assessment (Carrowbaun, Newhall and Ballylea Turloughs SAC, Lough Coy SAC and Caherglassaun Turlough SAC). If there is a connection between the works (construction and operational) and the groundwater and surface water, there will be potential for impact; and,
- As concluded in the Hydrology Chapter, given the sensitivity of the receptors combined with the major impact of potential environmental effects on these receptors the overall designation of 'Low Risk' is highly dependent on the mitigation measures outlined above. In the absences of any outlined mitigation measures, the hydrogeological risk to a given receptor can be deemed 'High Risk'. Therefore, the current overall designation of 'Low Risk' is only applicable in the case that all design and procedural mitigation measures are adhered to.

3.2 Mitigation of water quality impacts during operation

In addition to the mitigation detailed above for the construction stage, it is noted in **Section 2.4.1** that the Gort WWTP is overcapacity (Irish Water, 2017) and the Proposed Development has the potential to decrease the ability of the WWTP to treat water effectively. As such, there is potential for water quality impacts during the operation phase including nutrient enrichment and eutrophication, if the Gort WWTP is not upgraded. The Proposed Development intends to connect to this WWTP which discharges directly into the Cannahowna River which drains into the Coole-Garryland Complex SAC. The Gort WWTP needs to be upgraded in order for all other future proposals which connect to this treatment plant to result in no significant effect on the Coole-Garryland Complex SAC as a result of increased load on the currently overloaded WWTP.

As discussed in **Section 2.3.2** however, the Gort WWTP is currently, at the time of writing being upgraded and as such, there will be no impact on surface water quality through eutrophication and/ or nutrient enrichment from the operation of the Proposed Development.

There will be no effluent discharge from the operational biogas plant. There will be a sealed effluent and water system whereby the plant is connected to the Gort foul sewer and process effluent is fully captured and removed from the site where not reused.

Irish Water has provided the Client with a pre-connection enquiry letter which confirms that, subject to a valid connection agreement being put in place and conditions outlined within the pre-connection enquiry letter, the proposed connection to the Irish Water network in the form of Gort WWTP, can be facilitated. This facilitation is largely due to the proposed upgrade of the Gort WWTP which is currently underway to ensure there is sufficient capacity to treat water in the surrounding environs.

3.3 Mitigation of air quality impacts on sensitive habitats

Mitigation of air quality impacts have been sourced from Aona Environmental (2019) and are included below:

- The design and operation of the proposed Biogas facility will ensure that waste is not handled outside the Feedstock Reception Building;
- The Feedstock Reception Building will be totally enclosed with access into or out of the building only possible through automatic rapid open/shut doors and an airlock area. This will ensure the risk of fugitive odours escaping from the Feedstock Reception Building is eliminated. An odour control extraction system in the Feedstock Reception Building will maintain negative pressure in the abuilding. The air extracted from the Feedstock Reception Building will be treated in a Carbon Filter Bed system prior to being exhausted through a 22m high stack;
- There will be no emissions to atmosphere from the AD tanks or other process vessels containing odorous materials as waste will be contained within fully sealed tanks;

- The combustion of biogas in the CHP Gas Engine will destroy any odourous compounds contained in the biogas prior to being exhausted through a 22m high stack;
- The proposed 22m high stacks will ensure adequate dispersion of odours and air pollutants to allow for compliance with relevant environmental standards;
- An operating manual will be created for the facility which states the operational procedures to be followed in order to maintain and operate plant to agreed standards. These standards will include procedures for ensuring that generation of odour is kept to a minimum;
- Records of all key operational tasks will be kept on site. These records will include:
    - Total volumes and type of materials received on site;
    - Vehicle movements associated with material imports, compressed gas removal and digestate removal;
    - Subjective Odour Assessment daily log sheets;
- Any spillages significant enough to cause odour emission will be cleared as soon as practicable;
- In addition to the routine operational tasks, planned preventative and defect maintenance of all plant will be carried out. For plant which may have a significant odour release it is critical to ensure that effective performance is maintained; and,
- A Neighbour / Stakeholder Communication Plan will identify how and when contact will be made with stakeholders in relation to odour emissions off-site and establish a Complaints Records Procedure and a Response Protocol.

Additionally, all requests from the EPA on air quality monitoring will be adhered to including air quality monitoring and implementation of any redress schemes if air quality monitoring is shown to be significantly higher than the modelling.

3.4 Mitigation of impacts on lesser horseshoe bats

3.4.1 Mitigation of loss of commuting and foraging habitat for lesser horseshoe bat

The conservation objectives for lesser horseshoe bats state that "*there should be no significant decline of foraging habitat within 2.5 km of qualifying roosts*". Hedgerows within the application site will remain in-situ during the construction phase of the project and will be strengthened during the operational phase of the project. Hedgerow and/or treeline removal will be avoided and where any unavoidable removal will take place, these areas will be re-planted and other areas enhanced to ensure no loss of overall commuting and foraging habitat such as hedgerows and treelines.

Currently there are very few trees growing within the application site (bar semi-mature hawthorn along the northern boundary). As such, planting of trees and strengthening of linear habitat features is proposed with species including field maple (*Acer campestre)*, horse chestnut (*Aesculus hippocastanum)*, alder (*Alnus glutinosa*), birch (*Betula pubescens)*, wild cherry (*Prunus avium)*, pedunculate oak (*Quercus petraea)*, rowan (*Sorbus aucuparia)* and lime (*Tilia sp.) etc.* can be seen as an enhancement of the current planting at the application site which is currently species-poor and primarily supports managed agricultural habitats. The planting schedule shall avoid the use of any alien invasive plants such as the amber listed invasive species cherry laurel (*Prunus laurocerasus)*, montbretia (*Crocosmia X crocosmiflora)* and snowberry (*Symphoricarpos albus)*. More detail can be found in the Biodiversity Chapter, Chapter 6 of the EIAR. This will ensure that there is no adverse effect on the commuting and foraging of the lesser horseshoe bats of Kiltartan Cave (Coole) SAC.

There will be a small loss of grassland within the application site which could reduce less optimum foraging habitat for lesser horseshoe bats, however the proposed tree planting will provide for an increase in optimum foraging habitat for the Annex II species.

3.4.2 Mitigation of lighting disturbance on lesser horseshoe bats

Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5 km around each roost (Schofield, 2008). In order to minimise impact on this QI species, it is important to use as minimal light as possible and at as low a lux level as possible to prevent the conservation objectives for this Annex II species being undermined.

As detailed in **Section 2.3**, lesser horseshoe bats have been found to avoid commuting along routes lit with artificial light at levels as low as 3.7 lux emanating from energy efficient LED lights Stone (2012). Other lamp types producing light at similar levels have also been found to prevent commuting (Stone *et al.*, 2009). According to Schofield (2008), foraging areas that become illuminated at night may be abandoned, thus potentially increasing energetic costs for bats and reducing reproductive success at a population level. The target is that there is no significant increase in artificial light intensity adjacent to qualifying roosts or along commuting routes within 2.5 km of those roosts.

In order to prevent an adverse impact on this QI bat species, the external lighting plan must be designed to avoid significant disturbance and displacement of lesser horseshoe bats. Areas of vegetation within the operational site will be retained in close to darkness (1 lux) to provide suitable foraging and commuting locations for bats along the hedgerows and within the proposed open space. As such, the site will continue to support habitats in which bats can forage, and some areas will be improved / enhanced due to the planting of scattered trees around this site and the strengthening of linear habitat features.

4 CONCLUSIONS

This Natura Impact Statement concludes that if appropriate mitigation measures for this specific Proposed Development are implemented, outlined in **Section 3** and the CEMP, there will be no surface water or groundwater quality impacts during construction of the Proposed Development.

The report concludes that there will be no eutrophication and/ or nutrient enrichment impacts during the operation of the Proposed Development. This is based on the fact that the Gort WWTP is currently being upgraded at the time of writing this NIS. This will ensure that there is sufficient capacity to treat the foul water discharge from this proposal and other proposals in the surrounding area, resulting in no operational water quality impacts on Natura 2000 Sites which are hydrologically connected to this proposal. The population equivalent (P.E) was not obtained for the proposal, however this will be a relatively low P.E. Due to the fact that the Gort WWTP is not currently overloaded and will have additional capacity after upgrades for waste water treatment from proposals in the surrounding area, there will be not operational related eutrophication impacts.

It is concluded that air quality impacts resulting from the proposal will not adversely affect the integrity of the Coole-Garryland Complex SAC in terms of ecological structure and function of its Qualifying Interests. This is due to the relatively low concentrations of Nitrogen deposition likely to result (based on modelling) at the location of the QIs and the continuous reduction in levels of Nitrogen deposition with increase in distance from the Proposed Development. The results from the baseline air quality monitoring surveys, found in **Section 2.3.1** and in the Odour and Air Quality Impact Assessment, indicates that existing NOx concentrations at Coole-Garryland SAC is 2 µg/m3, 6 % of the annual limit for the protection of vegetation (30 µg/m3) (Aona Environmental, 2019).

It is also concluded that with mitigation such as lighting measures detailed in **Section 3** and with no overall loss of any linear habitat features such as hedgerows and treelines (but potential limited temporary loss, if unavoidable) and a proposed increase in linear features (hedgerows and treelines) there will be no loss (or limited temporary loss) of commuting and foraging habitats within 2.5 km of the lesser horsehoe bat roost site. There will be no decline of the roost condition due to the distance of the proposal from this hibernation roost site.

Therefore, it is considered that if the mitigation and guidance referred to in this NIS is adhered to in full, then in view of best scientific knowledge and in view of the conservation objectives of the aforementioned Natura 2000 Sites, the Proposed Development, Kinincha Road, Gort, Co. Galway, will not have any adverse effects on the integrity of any Natura 2000 Sites, either alone or in-combination with other plans or projects.

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APPENDIX 1 - Screening for Appropriate Assessment

Screening Assessment of Natura 2000 Sites

The following section provides information on the Natura 2000 Sites in the vicinity of the Proposed Development which have the potential to exist within the zone of influence of the proposal. In many cases a standard 15 km distance from a proposal is used as a potential zone of influence within which Natura 2000 sites should be screened for potential impact. However, in reality, the potential impacts on sites is dependent on the nature of impacts arising, the sensitivity of receptors and the causal links and conduits, rather than distance. In many cases the potential zone of influence is considerably less than 15 km (for example noise and airborne pollution) while the potential zone of influence could be greater than 15 km, for example if there is a direct water connection.

Natura 2000 sites with potential pathways for impacts are identified in order to establish the zone of influence of the proposal. These can then be assessed based on factors such as proximity to the Proposed Development, the Qualifying Interests (QIs) of the Natura 2000 Sites and their conservation status. A screening matrix, shown in **Table 1**, is then provided on potential impacts and any significant effect of the Proposed Development on these European designated sites.

For each site, the conservation objectives are laid out, the potential for the proposal to affect them is considered and a conclusion on potential for the Proposed Development to have a likely significant effect on the features (and therefore the Natura 2000 Site) is made.

e 1 Screening Matrix of all Natura 2000 Sites in the vicinity of the Proposed Development.

n grey and Qualifying Interests (QI) in **bold** have the potential to be impacted by the Proposed Development.

nation of terms used in Significance of Impact Matrix:

Significant Effect - Where a plan or project is likely to undermine any of the site's conservation objectives; **Possible Significant Effect** - Where a t has an indicated potential to undermine any of the site's conservation objectives, but where doubt exists about the risk of a significant effect in the ct. Nevertheless, where doubt exists about the risk of a significant effect, use of the precautionary principle requires this effect to be considered appr the [redacted] 6 assessment process.

opean Site: ne and e	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
le-ryland nplex SAC 252)[41]	• **Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150]** • **Turloughs* [3180]*** • **Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270]** • ***Juniperus communis* formations on heaths or calcareous grasslands [5130]** • **Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (***	900 m	Yes	Pathways: There are surface water and ground water connect from the proposed works to the Coole-Garryland Complex SAC and the water dependent QI habitats this SAC. The Proposed Development is hydrologically conne via the Cannahowna River and the Caherglassaun Turlough groundwater body of "poorly productive bedrock". This groundwater body is classified as At under the EPA envision mapping tool (EPA, 2018, (https://gis.epa.ie/EPAMaps/)) and in Poor WFD St (2010-2015). This status has deteriorated since the previous WFD Status which classified the groundw body as Good in 2007-2012. This groundwater bod within a larger aquifer which is classified as a Regi Important Karst Aquifer. The Cannahowna River is classified as Good upstream of the application site however, is unassigned downstream of the applica site. This river should be maintained in good water quality status as it feeds into the Coole-Garryland S 4 km downstream. However, this could be via overland/underground flow in sections. The river flc

e-Garryland Complex SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000252.pdf (Accessed Septemb

pean Site: and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	important orchid sites) [6210] • **Limestone pavements [8240]*** • ***Taxus baccata* woods of the British Isles [91J0]***			a northerly direction before flowing west north-west the Coole-Garryland Complex SAC. Potential impacts and effects: There is potential for both surface and groundwater quality impacts during construction and ope to result in a LSE on the water dependent QIs S There is also potential for impacts on air quality to a the QI habitats of this SAC through nitrogen deposit
owbaun, hall and ylea oughs (002293)[42]	• **Turloughs* [3180]**	1.35 km	Yes	Pathways: There is no surface water connection to this SAC wl is upstream of the Proposed Development. Howeve there is ground water connection between the appli site and this SAC which both lies within the Caherglassaun Turlough groundwater body, discus above. This groundwater body is classified as At Ri and of Poor WFD Status and is part of a larger aqui which is classified as a Regional Important Karst Ac Potential effects: Due to the groundwater connectivity, the nature of i being a poorly productive bedrock and the short dis between the proposed works and the SAC, there is potential for groundwater impacts during constructi and operation.
le-yland SPA 107	• Whooper Swan (*Cygnus cygnus*) [A038]	1.35 km	Yes	Pathways: Potential surface water and ground water con ctio exist to this Natura 2000 site to where whoo wa feed. Potential effects: The potential hydrological connection to this site ma impact the foraging habitat of whooper swan.

wbaun, Newhall and Ballylee Turloughs SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002293.pdf (A nber 2019).

opean Site: ne and le	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
artan Cave ole) SAC 0286)[43]	• Caves not open to the public [8310] • *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	1.9 km	Yes	Pathways: Hydrological connectivity will not have an impact u the QIs of this site. There is an ecological connecti lesser horseshoe bats have the potential to use the foraging habitats within the application site. Potential effects: There is a potential for LSEs on the lesser-horsesh of this SAC as foraging habitat may be lost as part proposal.
tern ren nplex SAC 926)[44]	• Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] • **Turloughs* [3180]** • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Alpine and Boreal heaths [4060] • *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Calaminarian grasslands of the Violetalia calaminariae [6130] • Semi-natural dry grasslands and scrubland facies on calcareous	3.5 km	Yes	Pathways: There is no surface water connection to this SAC. However, there is a ground water connection betwe the proposed works and part of the Eastern Burren with the north-eastern section of the SAC being loc within the same groundwater body as the proposec works. This groundwater body is classified as At Ri and of Poor WFD Status and is part of a larger aqu which is classified as a Regional Important Karst A Potential effects: Due to the groundwater connectivity, the nature of i being a poorly productive bedrock and the short dis between the proposed works and the SAC, there is potential for groundwater impacts to affect turlough petrifying springs and fens during construction and operation.

rtan Cave (Coole) SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000286.pdf (Accessed September 2
ern Burren SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001926.pdf (Accessed September 2019).

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] • Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] • **Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]** • **Petrifying springs with tufa formation (*Cratoneurion*) [7220]** • **Alkaline fens [7230]** • Limestone pavements [8240] • Caves not open to the public [8310] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • *Euphydryas aurinia* (Marsh Fritillary) [1065] • *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355]			
nduff ough SAC 295)[45]	• Turloughs [3180]	3.7 km	No	Potential pathways: There is no surface or groundwater connection to th SAC;the SAC is located within a different Karstic

nduff Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002295.pdf (Accessed September 201

ɔpean Site: ıe and le	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
				Turlough adjacent to the groundwater body where application site is located (EPA, 2018). Potential effects: As the SAC is located in a different groundwater b there will be no LSE on this SAC.
gh (002117)[46]	• **Turloughs* [3180]**	3.75 km	Yes	Potential pathways: There is a ground water connection between the proposed works and the Eastern Burren SAC with Coy SAC being located within the same groundwat body. This groundwater body is classified as At Ris of Poor WFD Status and is part of a larger aquifer v is classified as a Regional Important Karst Aquifer (2018). Potential effects: Due to the nature of it being a poorly productive be and the short distance between the proposed works the SAC, there is potential for groundwater impacts the turloughs of this SAC.
gh Cutra (000299)[47]	• Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303]	3.8 km	No	Potential pathways: Hydrological connectivity will not have an impact up the QI of this site. There is an ecological connectior lesser horseshoe bats have the potential to use the foraging habitats within the application site. Potential effects: There is a potential for LSEs on the lesser-horsesh of this SAC as foraging habitat within 3.8km may be as part of this proposal. However, the Conservation Objectives for this site state that there should be nc significant decline within 2.5 km of qualifying roosts

gh Coy SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002117.pdf (Accessed September 2019).
gh Cutra SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000299.pdf (Accessed September 2019).

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
				distance suggests that the Conservation Objectives not result in an LSE on this QI.
n Cutra (004056)	• Cormorant (*Phalacrocorax carbo*) [A017]	3.9 km	Yes	Potential pathways: Lough Cutra SPA is located within the same ground body as the Proposed Development. Potential effects: This hydrological connection however, does not hav potential to affect breeding cormorant at the site. Although cormorant will fly through and over the site route to and from the Inner Galway Bay SPA, there suitable breeding habitat in the vicinity of the applic site. The distance between the SPA and the Proposed Development is too great for there to be potential fo disturbance impacts affecting breeding cormorant a SPA.
ve Aughty -168)	• Hen Harrier (*Circus cyaneus*) [A082] • Merlin (*Falco columbarius*) [A098]	4 km	Yes	Potential pathways: Slieve Aughty SPA is located within the same groundwater body as the Proposed Development. Potential effects: This does not have the potential to affect either Qualifying Interest of the site. No other ecological connection exists. The EIA Development site does contain suitable breeding or foraging habitat for eith bird species of the SPA.
erglassaun ough SAC 1238)[48]	• **Turloughs* [3180]** • Rivers with muddy banks with *Chenopodion rubri*	4.4 km	Yes	Pathways: There is no obvious surface water connection to Caherglassaun Turlough SAC. There is a groundwa connection between the proposed works and the

erglassaun Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000238.pdf (Accessed Septembe

opean Site: ne and le	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	p.p. and *Bidention p.p.* vegetation [3270] • ***Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]**			Caherglassaun Turlough SAC with the SAC being located within the same groundwater body. Potential effects: There is potential for LSEs on the SAC from impac surface and groundwater quality during constructio operation. There is a potential for LSEs on the less horseshoe bat of this SAC as foraging habitat may lost as part of this proposal.
non Lough 321[49]	• Turloughs* [3180]	4.6 km	Yes	Pathways: The northern part of this SAC is located within the groundwater body as the Proposed Development. is no obvious surface water connection between th application site and the SAC. Potential effects: Due to groundwater connectivity and the short dist between the proposed works and the SAC, there is potential for groundwater impacts on the turloughs SAC, however, the mitigation measure proposed fc Natura 2000 sites in closer proximity will mitigate a similar effects to this site.
ermore ough SAC 294)[50]	• Turloughs* [3180]	5.3 km	No	Pathways: There is no surface water connectivity between the proposed works and Cahermore Turlough SAC. Th SAC is located within a Karstic Turlough adjacent t groundwater body where the application site is loc (EPA, 2018). Potential effects: There will be no LSE on this SAC as there is no groundwater connection to the turloughs of the SA

on Lough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001321.pdf (Accessed September 2019).
rmore Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002294.pdf (Accessed September 20

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
swell ugh SAC 318)[51]	• Turloughs* [3180] • Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270]	5.7 km	No	Pathways: This SAC is located upstream of the Proposed Development and is located within a different groundwater body. Potential effects: There will be no LSE on this SAC as there is groundwater or surface connection from the Propos Development to the SAC.
nmin Wood (002181)[52]	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	6.35 km	No	No ecological connection exists. This QI habitat is n groundwater dependent habitat and there is no surfa water connection to this SAC. Therefore, there will b LSE on this SAC.
acarnaun d SAC 180)[53]	• Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	6.7 km	No	No ecological connection exists. This QI habitat is n groundwater dependent habitat and there is no surfa water connection to this SAC. Therefore, there will b LSE on this SAC.
ahan ssland SAC 244[54]	• Alpine and Boreal heaths [4060] • *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Limestone pavements* [8240]	8.5 km	No	Pathways: There is no groundwater or surface water hydrologi connection to the SAC. Potential effects: There will be no LSE on this SAC as there is no groundwater or surface connection from the Propos Development to the SAC.

swell Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000318.pdf (Accessed September 201
mmin Wood SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002181.pdf (Accessed September 2019).
acarnaun Wood SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002180.pdf (Accessed September (20
ahan Grassland SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002244.pdf (Accessed September 201

ɔpean Site: ıe and e	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
ɟg House ɔles, ɜheen SAC 317[55]	• *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	9.8 km	No	Pathways: Hydrological connectivity will not have an impact u the QI species of this site Potential effects: There will be no LSE on this SAC due to the distan and the temporary loss of potential foraging habitat not result in a LSE on this QI species.

ɟ House Stables, Crusheen SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002317.pdf (Accessed Se

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
ay Bay plex SAC 68)[56]	• Mudflats and sandflats not covered by seawater at low tide [1140] • Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • *Salicornia* and other annuals colonising mud and sand [1310] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Turloughs* [3180] • *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-*	10.2 km	Yes	Potential pathways: There is potential for surface connectivity between t proposed works and the Galway Bay Complex SAC the Cannahowna River and potential overland/ underground flow during flood events from the turlo of the Coole-Garryland Complex SAC. However, th SAC is located in a different groundwater body. Potential effects: Due to the large distance, and the lack of an obviou direct surface water connection in the form of a spe river water body, there will be no LSE on the surfac water QI habitats of this SAC.

vay Bay Complex SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000268.pdf (Accessed September 2(

ɔpean Site: ıe and e	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	Brometalia) (* important orchid sites) [6210] • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] • Alkaline fens [7230] • Limestone pavements* [8240] • *Lutra lutra* (Otter) [1355] • *Phoca vitulina* (Harbour Seal) [1365]			

Galway PA 31)	• Great Northern Diver (*Gavia immer*) [A003] • Cormorant (*Phalacrocorax carbo*) [A017] • Grey Heron (*Ardea cinerea*) [A028] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Wigeon (*Anas penelope*) [A050] • Teal (Anas crecca) [A052] • Shoveler (*Anas clypeata*) [A056] • Red-breasted Merganser (*Mergus serrator*) [A069] • Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Dunlin (*Calidris alpina*) [A149] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull (*Larus canus*) [A182] • Sandwich Tern (*Sterna sandvicensis*) [A191]	10.2 km	No	Potential pathways: There is no groundwater or surface water connectio between the Inner Galway Bay SPA and the Development Development. Potential effects: There is potential for the foraging and wintering QI b species of the SPA to use the suitable wetland habi within the vicinity of the application site, and curlew, lapwing, teal, grey heron and black-headed g wer recorded during the winter bird surveys. Ho , it unlikely that significant numbers of birds from the SI populations would utilise the wetland habitat around Proposed Development due to the proximity of, and potential for disturbance from residential and public shopping areas to the south west.

ɔpean Site: ıe and e	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	• Common Tern (*Sterna hirundo*) [A193] • Wetland and Waterbirds [A999]			
ree R...r ɛm 0057)	• Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] • Alkaline fens [7230] • Limestone pavements [8240] • Caves not open to the public [8310] • *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] • *Lutra lutra* (Otter) [1355]	10.2 km	No	Potential pathways: There is no surface water connection between the proposed works and the Moyree River System SAC SAC is also located in a different groundwater body the site of the Proposed Development and therefor groundwater dependent habitats such as fens will r affected. Potential effects: There will be no LSE on this SAC due to a lack of connectivity.
gh Fingall ıplex SAC l606)[58]	• Turloughs* [3180] • Alpine and Boreal heaths [4060] • Juniperus communis formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-	10.35 km	No	There are no pathways to this SAC and as a result will be no effect on the QIs of this SAC.

ree River System SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000057.pdf (Accessed September 2
h Fingall Complex SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000606.pdf (Accessed September 2

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	Brometalia) (* important orchid sites) [6210] • Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] • Limestone pavements* [8240] • Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]			
letaylor plex SAC 242)[59]	• Turloughs* [3180] • Alpine and Boreal heaths [4060] • Juniperus communis formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] • Limestone pavements* [8240]	10.6 km	No	There are no pathways to this SAC and as a result i will be no effect on the QIs of this SAC.
ernan ough SAC 1285[60]	• Turloughs* [3180]	10.6 km	No	There are no pathways to this SAC and as a ult i will be no effect on the QIs of this SAC.

etaylor Complex SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000242.pdf (Accessed September 20
rnan Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001285.pdf (Accessed September 2019

ɔpean Site: ıe and le	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
nagh Bog ; (001913)[61]	• Blanket bogs (* if active bog) [7130]	10.85 km	Yes	Potential pathways: Blanket bogs are classed as groundwater depende terrestrial ecosystems by the EPA. As such, they c impacted by changes to ground water quality. Son Bog SAC is located within the same groundwater b as the Proposed Development. Potential effects: However, there will be no LSE due to the large dist between the Proposed Development and the SAC. mitigation measures proposed for groundwater qua avoid impacting the site closer to the proposed wor prevent any effects to this SAC.
/ogan gh SAC)019)	• Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae [7210]	12 km	No	Potential pathways: There is no surface water or groundwater connecti between Ballyogan Lough SAC and the Proposed Development. Potential effects: There will be no LSE on the QIs of this SAC due to distance of the QI.
asane ɔugh SAC)322)[62]	• Turloughs* [3180]	14.1 km	Yes	Potential pathways: There is a groundwater connection to this SAC. Rahasane Turlough SAC is located within the sam groundwater body as the Proposed Development. Potential effects: However, there will be no LSE due to the large dist between the Proposed Development and the SAC. potential for impacts will be mitigated for sites withi close proximity of the development.

agh Bog SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001913.pdf (Accessed September 2019).
sane Turlough SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000322.pdf (Accessed September 201

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
sane ugh SPA 89	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Golden Plover (*Pluvialis apricaria*) [A140] • Black-tailed Godwit (*Limosa limosa*) [A156] • Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] • Wetland and Waterbirds [A999]	14.3 km	Yes	Potential pathways: Rahasane Turlough SPA is located within the same groundwater body as the Proposed Development. A ecological pathway also exists as there is a potentia the foraging, wintering QI bird species of the SPA to the suitable wetland habitat within the vicinity the of the Proposed Development. Potential effects: However, none of the QI bird species of the SPA we recorded during the winter bird surveys at the development site and it is unlikely that significant numbers of birds from the SPA populations would u the wetland habitat around the Proposed Developm due to the proximity of, and potential for disturbance from, residential and public shopping areas to the s west.
dree Bog (001912)[63]	• Blanket bogs (* if active bog) [7130]	14.5 km	Yes	Potential pathways: There is a groundwater connection to this SAC. Gle Bog SAC is located within the same groundwater bo as the Proposed Development. Potential effects: However, there will be no LSE due to the large dista between the Proposed Development and the SAC. potential for impacts will be mitigated for sites withir close proximity of the development.
le-yland SPA 107)[64]	• Whooper Swan (*Cygnus cygnus*) [A038]	1.35 km	Yes	Potential pathways: There are surface water and ground water connecti from the proposed works to the Coole-Garryland Complex SPA. The Proposed Development is hydrologically connected to the Natura 2000 site via

dree Bog SAC Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001912.pdf (Accessed September 2019).
e-Garryland SPA Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004107.pdf (Accessed September 2019).

opean Site: ie and e	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
				Cannahowna River and the Caherglassaun Turlou groundwater body. The Cannahowna River is class as Good upstream of the application site however, unassigned downstream of the application site. Thi should be maintained in Good water quality status feeds into the Coole-Garryland SPA c. 4 km downs However, this could be via overland/underground fl places. Potential effects: Due to the close proximity there is potential for nois visual disturbance if whooper swan from the SPA u the suitable wetland habitat which exists within the vicinity of the application site to the east. However, unlikely that significant numbers of whooper swan f the SPA use this area of wetland due to the disturb from traffic and adjacent residential and public sho areas to the south west. Therefore, there will be no on this SPA.
gh Cutra (004056)[65]	• Cormorant (Phalacrocorax carbo) [A017]	3.9 km	No	Potential pathways: There is a hydrological connection between the pro works and the SPA with Lough Cutra SPA being lo within the same groundwater body. However, the C species for the site is not sensitive to impacts on groundwater quality. No ecological pathway exists. Cormorants will fly through and over the site on rou and from the Inner Galway Bay SPA however, no

gh Cutra SPA Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004056.pdf (Accessed September 2019).

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
				suitable breeding or feeding habitat exists within the vicinity of the application site. Potential effects: Due to the lack of an ecological pathway or surface connectivity to the application site, there will be no L on Lough Cutra SPA.
e Aughty (004168)[66]	• Hen Harrier (Circus cyaneus) [A082] • Merlin (Falco columbarius) [A098]	4 km	No	Potential pathways: No ecological connection exists. The application site does not contain suitable breeding or foraging habit either QI bird species of the SPA. There is a ground connection as the SPA is located within the same groundwater body, however, these species are not affected by impacts to groundwater. Potential effects: There will be no LSE on this SPA as there is no ecological connection to the SPA.

[66] e Aughty SPA Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004168.pdf (Accessed September 2019).

r Galway SPA 031)[67]	• Great Northern Diver (Gavia immer) [A003] • Cormorant (*Phalacrocorax carbo*) [A017] • Grey Heron (*Ardea cinerea*) [A028] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Shoveler (*Anas clypeata*) [A056] • Red-breasted Merganser (*Mergus serrator*) [A069] • Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Dunlin (*Calidris alpina*) [A149] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull (*Larus canus*) [A182] • Sandwich Tern (*Sterna sandvicensis*) [A191]	10.2 km	Yes	Potential pathways: There is no groundwater or obvious surface conne between the proposed works and the SPA. The SF located within the Kinvara-Gort groundwater body a not the Caherglassaun Turlough groundwater body There is an ecological connection with potential for foraging and wintering QI bird species of the SPA t the suitable wetland habitat within the vicinity of the application site. Potential effects: There is no hydrological connection to this SPA. Ci lapwing, teal, grey-heron, black-headed gull were recorded during the winter bird surveys. However, unlikely that significant numbers of birds from the S populations would utilise the wetland habitat aroun application site due to the distance and disturbance adjacent residential and public shopping areas to tl south west. Therefore, will be no LSE on this SPA.

pean Site: e and	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
	• Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]			
ısane ıugh SPA)89)[68]	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Golden Plover (*Pluvialis apricaria*) [A140] • Black-tailed Godwit (*Limosa limosa*) [A156] • Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] • Wetland and Waterbirds [A999]	14.3 km	Yes	Potential pathways: There is a hydrological connection between t[illegible] prop works and the SPA with the SPA being loca[illegible]ith same groundwater body as the proposed wo[illegible]s and this SPA is also a turlough, these QI bird species ma affected by impacts on groundwater An ecological pathway also exists as there is a pote for the foraging, wintering QI bird species of the SPA use the suitable wetland habitat within the vicinity, t east the application site however, it is unlikely that significant numbers of birds from the SPA populatio would utilise the wetland habitat around the applicat site due to the distance and disturbance from reside and public shopping areas adjacent to them to the s west. Potential effects: None of the QI bird species of the SPA were record during the winter bird surveys. It is unlikely that significant numbers of these QI bird species use the wetland areas, however, as there is potential for imp to groundwater, the QIs could be affected b[illegible]act groundwater.
ıdree Bog ; (001912)	• Blanket bogs (* if active bog) [7130]	14.5 km	No	Potential pathways: Glendree Bog SAC is located within the same groundwater body as the Proposed Development.

r Galway Bay SPA Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004031.pdf (Accessed September 2019)
ısane Turlough SPA Conservation Objectives: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004089.pdf (Accessed September 201

ɔpean Site: ıe and le	Qualifying Interests * denotes a priority habitat	Distance from Proposed Site	Within the ZoI?	Potential Pathways and Effects
				There is also potential for airborne nitrogen deposi affecting the blanket bog habitat. Potential effects: However, the due to the distance, there will be no l on this SAC.

Conclusions of Screening Assessment

The construction of the Proposed Development will not result in any direct loss of SAC or SPA habitat within the Natura 2000 Sites in the environs of the Proposed Development.

However, the Proposed Development will be built on a karst area, within a karstic groundwater body and adjacent to a watercourse (the Cannahowna River) which runs north and west, connecting to European Sites such as the Coole-Garryland Complex SAC and the Coole-Garryland SPA. The Proposed Development also proposes to connect to the Gort Waste Water Treatment Plant (WWTP). According to the latest Annual Environmental Report for this WWTP, the Gort WWTP is currently overloaded and over capacity (AER, 2016)[69], and is non-compliant and failing on four parameters (BOD, COD, TSS and Ammonia N) which exceeded emission limit values in 2016.

This proposal will increase the loading of the WWTP by a relatively low population equivalent (P.E), (this P.E figure was not obtained at the time of writing). However, this has the potential to result in water quality impacts given that the plant is already working over capacity.

Based on the above information and information in **Table 1**, due to hydrological connections via surface water and/or groundwater to European Sites sensitive to water quality impacts, the below Natura 2000 Sites and their QIs have screened in for potential adverse effects on site integrity. These water quality impacts during construction include pollution such as sedimentation and hydrocarbon input. Additionally, due to the proposed connection to the Gort WWTP which discharges into the Cannahowna River, and the fact that it is overcapacity, there is potential for operational nutrient enrichment and eutrophication of the Coole-Garryland Complex SAC which is hydrologically connected to the Proposed Development.

Also, due to the proximity of the Coole-Garryland Complex SAC and the sensitive nature of the QIs to air quality impacts, there is also potential for air quality impact such as nitrogen deposition on the QIs listed below.

There is ***potential*** for impacts on the following Natura 2000 sites and their QIs:

- Coole-Garryland Complex SAC:
  - Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150];
  - Turloughs* [3180];
  - Rivers with muddy banks with *Chenopodion rubri p.p.* and *Bidention p.p.* vegetation [3270];
  - *Juniperus communis* formations on heaths or calcareous grasslands [5130];
  - Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210];

[69]Annual Environmental Report http://www.epa.ie/licences/lic_eDMS/090151b2805fb513.pdf (Accessed September 2019).

- Limestone pavements* [8240]; and,
- *Taxus baccata* woods of the British Isles [91J0].

- Carrowbaun, Newhall and Ballylea Turloughs:
  - Turloughs * [3180].
- Eastern Burren SAC:
  - Turloughs* [3180];
  - Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210];
  - Petrifying springs with tufa formation (Cratoneurion) [7220]; and,
  - Alkaline fens [7230].
- Lough Coy SAC:
  - Turloughs * [3180].
- Caherglassaun Turlough SAC:
  - Turloughs* [3180].
- Kiltartan Cave (Coole) SAC:
  - Lesser horseshoe bats (*Rhinolophus hipposideros*) [1303].

The potential water quality impacts, in the absence of mitigation, include:

- Surface and/or groundwater pollution (hydrocarbon and chemical) and sedimentation/siltation from the construction phase; and,
- Nutrient enrichment/eutrophication and the presence of chemicals from the operational phase.

These impacts have the potential to affect the water quality dependent QIs listed above, and habitats (including any associated communities) which are sensitive to changes in water quality.

The potential air quality impacts include:

- Nitrogen deposition during the operation of the biogas plant which has the potential to affect all QIs of the Coole-Garryland Complex SAC.

Following the screening process above, the screening matrix (**Table 1**) ruled out sites for further assessment based on distance, the lack of a source-pathway-receptor linkage, the QIs and their specific sensitivities and the likelihood of a significant effect.

The screening assessment concluded that there is potential for LSE on the Coole-Garryland Complex SAC, Carrowbaun, Newhall and Ballylea Turloughs SAC, Eastern Burren SAC, Lough Coy SAC, Caherglassaun Turlough SAC and Kiltartan Cave (Coole) SAC and that an Appropriate Assessment is required.