Appendix 6
Ecological Review

Slane Bypass Project

(ABP: 318573-23)

September 2024

Report for An Bord Pleanála By:
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Contents

1. Scope of Review

This report comprises a review of the ecological reports for the Slane N2 Bypass project, to assist the inspector in their assessment of the Project. The following reports and their technical appendices were reviewed in detail:

- Appropriate Assessment (AA) Screening
- Natura Impact Statement (NIS)
- Environmental Impact Assessment Report (EIAR) Chapter 15 Biodiversity - Terrestrial Ecology
- EIAR Chapter 16 Biodiversity - Aquatic Ecology

Other EIAR chapters were reviewed from a non-technical perspective with regard to interactions or conflicts with the ecological assessments namely; Chapter 17 Water, Chapter 10 Air Quality, Chapter 9 Noise and Vibration, Chapter 12 Landscape and Visual, Chapter 25 Cumulative Effects, Chapter 18 Land, Soils, Geology and Hydrogeology, as well as the Project Description (Chapter 4 and 5) and Appendix 5.6 Environmental Operating Plan (EOP) which is a collation of mitigation measures from the various reports.

A site visit was undertaken on Tuesday 13th of August to the proposed bridge crossing location (Photo 1) as viewed from the southern bank towpath.

The 4 no. key reports are summarised in Section 2 of this report. Where any gaps or weaknesses are identified these are highlighted and then discussed in further detail in Section 3. In Section 4 a conclusion regarding the implications for the Boards AA determination and EIA decision is provided. Section 5 sets out Further Information that should be sought to address key gaps or weaknesses, while Section 6 recommends some conditions that may be appropriate to ensure the appropriate implementation of proposed mitigation measures.

Photo 1 View across Boyne valley from the south bank towpath. Bridge would be approximately mid-photo. River not visible (to back of field in foreground).

Statement of Competency

This assessment was completed by Kate Harrington MSc MCIEEM, an Ecologist who has 20 years' experience in undertaking ecological surveys and assessments in Ireland and abroad. Ms Harrington holds a B.A. (Natural Science) and M.Sc. in Zoology, with a focus on freshwater and marine aquatic systems, and has worked in research posts, as an ecological consultant, and as an ecological specialist in Uisce Éireann. Ms Harrington is experienced in the preparation of reports to inform Appropriate Assessment and Ecological Impact Assessment for a wide range of infrastructure projects. She also undertakes ecological surveys, develops ecological guidance documents and provides expert advice regarding best-practice. She has extensive experience of undertaking technical reviews of ecological assessments for development proposals with reference to regulatory requirements and best-practice guidance. Since 2021 she has worked as a freelance ecologist and is pursuing a PhD exploring the ecological value of native woodland plantations, based in Trinity College (Botany).

2. Review Findings

AA Screening

Project Details

An overview of the project is given and design mitigation measures listed including the avoidance of Annex I habitat, avoidance of any bridge structures within the river channel and provision of a 10m exclusion zone from the banks of the River Boyne.

Relevant details on construction methods are provided, with a focus on the construction of the River Boyne bridge. The report highlights that temporary working platforms for bridge construction will be installed outside the 10m exclusion zone, and provides details on the installation of a cofferdam from which the pilings for the bridge abutments will be constructed. Various protective/mitigation measures that have been incorporated into the project are listed.

Methods & Guidance

The report is dated June 2022, predating the other ecological assessments. It does not reference the OPR (2021) [1] guidance and EC (2021) [2] guidance. The methodology section outlines use of the source-pathway-receptor model, and while references are made to a 15km buffer, relevant sites are identified on the basis of the former model and not solely on the buffer in keeping with the latest guidance. The use of the river catchment is reasonable for site's with hydrologically connectivity.

European Sites considered

In identifying relevant European Sites, the following were brought forward for assessment:

- River Boyne and River Blackwater SAC (002299)
- Boyne Coast and Estuary SAC (001957)

[1] OPR (2021) Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland.
[2] EC (2021) Commission Notice. Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission

- River Boyne and River Blackwater SPA (004232)
- Boyne Estuary SPA (004080)

A range of distant lake and peatland sites, present within the Boyne catchment, are excluded on the basis of a lack of pathway. More detailed justification isn't given, however the Board can have regard the following:

- The sites are all in the uppermost reaches of the Boyne catchment;
- They are hydrologically upstream of the development area, and in separate groundwater bodies; and
- They are not designated for, nor likely to support, any mobile species that could potentially interact with the development area e.g. salmonids or lamprey.

It is therefore reasonable to conclude that no pathway for impacts via disturbance/air/water or groundwater exist, given the location of the scheme and nature of the works.

The Boyne Estuary SPA is screened-in on the basis of potential ex-situ species as it falls within the river catchment, however birds are not limited by river catchment boundaries. Several SPA's in the wider region, but outside of the Boyne catchment such as those within ca. 50km in the vicinity of Dundalk, Dublin and midland lakes, might have been considered for screening. The question is where to draw the line, as birds are mobile species, and while some have higher site fidelity than others, there is no specific geographic boundary that can be used to exclude the possibility that birds in the study area could theoretically be associated with any distant SPA. Wetland birds are most likely to use ex-situ sites close to their designated areas or connected to them. The potential for birds from other SPA sites to be present in the study area cannot be excluded, but they are likely to use the area only on a sporadic/intermittent basis. The birds associated with the Boyne Estuary SPA and Northwest Irish Sea SPA, by virtue of the river connection, are more likely to commute to the development area using the river as a navigation aid given its prominence in the landscape, and so it is reasonable that these SPA's are taken forward for further consideration, and that risks to other SPA's can be excluded.

The designation of the Northwest Irish Sea SPA post-dates this report. The SPA is considered in the NIS and so was effectively screened-in, which is justified given its location at the mouth of the Boyne estuary.

When considering the River Boyne and River Blackwater SPA, the assessment in Table 4-1 scopes out Alkaline fen from further assessment as follows:

However, Alkaline fens [7230] are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough which are all located upstream of the scheme near Delvin. The proposed scheme does not support connectivity to this priority habitat.

The conservation objectives for this SAC state:

Alkaline fen <u>has not been mapped in detail</u> for River Boyne and River Blackwater SAC and thus the exact total current area of the qualifying habitat in the SAC is currently unknown. The main areas of alkaline fen in the SAC are documented to occur in the vicinity of Lough Shesk, Freekan Lough, Newtown Lough in the upper reaches of the Stonyford River

As unmapped areas may be present, scoping out Alkaline fen at this stage is considered premature, and on a precautionary basis it should have been included for assessment in the NIS. This issue is considered in more detail in Section 3.

Information on Qualifying Interests/Special Conservation Interests

Due to the date of the assessment, the Water Framework Directive status data provided has now been superseded, and a revised version of the Flood Risk Assessment (FRA) is now available, however this is not of consequence for the AA Screening as the information is not used to exclude any European Sites from the assessment.

The Screening report provides an overview of data on qualifying interests, based on desktop and field data available at the time of writing and identifies otter, lamprey, salmon and Kingfisher within the Zone of Influence (ZoI) of the scheme, as well as the presence of invasive alien species.

The report highlights 32 bird species that are Special Conservation Interests (SCI) of European Sites, noting that suitable habitat in the ZoI may be present for up to 12 of these, though not stating which 12. This section (4.4.2) further states: *Coastal and/or wintering birds are not deemed to be present within the proposed scheme area due to lack of suitable habitat and timings of the proposed scheme, respectively.* However this does not translate to the findings of the assessment, which include the Boyne Estuary SPA on the basis that ex-situ species may occur within the ZoI of the scheme, and so this statement can be disregarded.

Likely Significant Effects

The report concludes that the significant effects that may arise from both the construction and/or operational stages are as follows:

- Noise/vibration/lighting/human presence impacts causing disturbance to species;
- Effects to aquatic habitats and species due to pollutant-laden run off reaching surface waters;
- Spread of invasive species;
- Groundwater quality risks (the potential for effects on Groundwater-Dependant Terrestrial Ecosystems (GWDTE's) were excluded due to lack of receptor);
- Loss, fragmentation or damage of habitat (direct loss of Annex I habitat), and supporting habitat for Annex II species or Special Conservation Interests (SCI);
- Air pollution due to dust and other pollutants;
- Physical presence of bridge and works causing a barrier for movement; and
- Collision risk of bridge (bird strike).

The impacts and effects considered at this high level cover the likely sources, pathways and effects, with the exception that the potential effects on GWDTE's should not have been excluded at this stage due to uncertainty regarding potential unmapped areas of Alkaline fen.

In-Combination Effects

A number of plans are highlighted namely; the National Development Plan, the National Biodiversity Action Plan (NBAP) (2017-2021), the (then draft) Meath County Development Plan, the Slane Local Area Plan 2009-2015 and the 2nd River Basin Management Plan (RBMP).

The NBAP has since been updated, though the conclusion that combined-effects would not occur remains valid as the plan is inherently focused on nature conservation. The Draft 3rd RBMP has also

been published since the time of writing the AA Screening report. No combined effects are considered likely from either the 2nd or 3rd plan as the RBMP supports protection of the catchment and its ecological interests.

The Section on the Meath CDP specifically references Boyne Greenway, noting *such projects arising will be subject to their own AA requirements*. Two Projects were identified as relevant to the in-combination assessment, with NIS's prepared for both developments. The assessment concludes that no in-combination effects are likely with these Projects on the basis that design mitigation measures have been incorporated.

The fact projects may be subject to AA and mitigation measures prescribed does not preclude combined-effects, unless the AA concludes that there will be no effects at all, as if there is some/any insignificant effects from different projects, these may combine to form significant effects.

Overall there is a conclusion that there is no potential for cumulative or in-combination effects.

Screening conclusion

A high level screening assessment is presented. Changes due to updated methods and data since the report was prepared are not of consequence to the final conclusion that the Project screen-in for AA. The Northwest Irish Sea SPA, absent from the AA Screening due to more recent designation, is including in the NIS. While the in-combination impacts section finds no potential for cumulative or in-combination effects, it is noted that the final AA conclusion finds *It is not possible to rule out LSE in combination with other plans and projects.*

AA Screening Potential Gaps/Weaknesses:

- The interaction between the Project and the Boyne Greenway (Navan to Slane) with regard to potential disturbance effects to Otter and Kingfisher from the operational stage of the Projects should have been brought forward for further assessment.
- Alkaline fen, as a qualifying interests of the River Boyne and River Blackwater SAC, is scoped-out at screening stage and consequently not considered in the NIS.

Natura Impact Statement

The report is dated June 2023, with a note that it was updated in November 2023 to reference the recently-designated Northwest Irish Sea SPA.

Project Details

The reader is referred to the EIAR Chapter 4 and 5 for the Project Details.

A comprehensive summary of construction and operational phase impacts is given, elaborating on those discussed in the AA Screening.

Two potential issues are highlighted with regard to the Project Description, and discussed further in Section 4:

- There is an exclusion zone of 10m from the top of the river bank where no work will be permitted (e.g. EIAR Section 5.4.6.2, 7.3.2.2) and no instream works are proposed, however there is reference to an exception for outfalls in a few sections of the NIS e.g. Section 6.2.1.1.1. '*no in-stream works (other than the construction of four outfalls) are proposed*' (in the SAC). This is presumed to relate to the works required to install the overflow scour protection mats (5.4.8.1) which are to be pinned to the ground-surface between the outfall and the riverbank. It is not clear that the installation of these mats has been assessed in the NIS as they are not specifically referenced in the assessment or mitigation sections.
- With regard to the cofferdams, which will be created to built the bridge piers, there appears to be a disconnect between the cofferdam measures proposed in the ecological reports and the Project construction description in terms of the expected water ingress.

A list of the 4 no. European Sites identified as relevant in the AA Screening report, together with their 'scoped-in' qualifying interests, is provided. Alkaline fen associated with the River Boyne and River Blackwater SAC is excluded from consideration based on its known/mapped extent, and that it was not identified in footprint of the scheme (Pg. 13).

Methods & Guidance

The section listing the guidance followed makes reference to OPR (2021) and EC (2021) guidance documents, which were missing from Screening report. An overview of consultation responses is provided (Table 3-1).

Surveys undertaken are summarised in Table 3-2. The extent of the surveys undertaken for fauna are considered comprehensive, relevant to the assessment, and span several years. Habitat surveys were undertaken with regard to the Fossitt habitat classification scheme, with any protected or invasive plant species recorded.

Baseline Data

Information on water and groundwater quality in the site and environs is provided. Dated water status information is presented, however the EIAR Water chapter includes more up-to-date information regarding WFD status, and this is not considered to have any consequence for the assessment. Invasive plant species records are presented with Japanese knotweed and Himalayan balsam occurring within the vicinity of the scheme.

A summary of European sites likely to be affected by the scheme includes the Northwest Irish Sea SPA, designated in October 2023.

The NIS (Section 4.3) then describes each SAC and SPA, and their qualifying interests, in more detail. Pertinent information on each European Site is highlighted below

River Boyne and River Blackwater SAC

For Alluvial forest the report states that *'the field surveys completed to inform the assessment of the Proposed Scheme did not identify any habitat with affinities to this QI habitat within or adjacent to the footprint of the Proposed Scheme'.* On the basis of information provided in the Terrestrial EIAR Biodiversity Chapter this is considered a potential weakness, and is discussed further in Section 3.

With regard to river lamprey and salmon, information from desktop and field data is presented highlighting both species occur in the Boyne in the vicinity of the scheme. Juvenile lamprey are likely to be present in sandy sediments within the zone of influence of the scheme. There is suitable salmon nursery and adult habitat in the reaches of the Boyne in Slane, with spawning habitat described from upstream tributaries. On the Mattock river, spawning and nursery habitat is present downstream of Project works in the Mooretown stream tributary of this river. Regular otter activity is confirmed throughout the area. The report highlights that nearest confirmed holt is ca. 1.3km upstream of the Project (data from surveys undertaken in 2023 for the Greenway project).

River Boyne and River Blackwater SPA

A Kingfisher breeding site was recorded in 2020 ca. 0.4km upstream of public realm, and ca. 1.6km upstream of the proposed bridge crossing. Overall the survey findings suggest Kingfisher are found foraging and commuting along this part of the Boyne around Slane, but breeding is sporadic with an absence of suitable nesting banks in the vicinity of the proposed bridge.

Boyne Coast and Estuary SAC

Estuarine habitats are considered on the basis of a low risk of waterquality impacts occurring in Slane persisting to contribute to pressures on downstream habitats, and a consequently a requirement for precautionary mitigation is specified. Dune habitats, which do not interact with tidal waters, are excluded from further consideration.

Boyne Estuary SPA & Northwest Irish Sea SPA

Similar to above, a low risk to bird species and their habitats arising from upstream pollution impacts is identified. SCI's likely to occur on ex-situ basis are considered based on species ecology and cross-referenced with findings of bird surveys. This assessment is considered comprehensive and identifies relevant bird species.

Conservation objectives

Section 5.1 includes a description of significant effects that have the potential to arise in the context of the European sites considered and their qualifying interests. The Northwest Irish Sea SPA is omitted from this table. Otherwise, the only notable omission in terms of adverse effects is any explicit reference to collision risk for wintering bird species.

Site-specific conservation objectives (attributes) are then provided. I note the following:

- For the River Boyne and River Blackwater SAC, Alluvial woodland, river lamprey and salmon all have restoration conservation objectives
- For the Boyne Coast and Estuary SAC, following recommended approach by NPWS the authors have used site-specific conservation objectives for Mediterranean salt meadows from Dundalk Bay SAC

Section 6 includes a lengthy assessment against each attribute, or group's of attributes, of the site-specific conservation objective's for each qualifying interest. I have summarised the potential adverse effects considered in the table below. These impacts are considered in the absence of mitigation unless otherwise stated (e.g. where design stage mitigation measures have been referenced). **Any potential issues for the AA are shown in bold font. Aspects of the assessment that are considered satisfactory are shaded in grey.**

Assessment against SSCO's

QI	Construction Phase	Operation Phase	Comment
River Boyne and River Blackwater SAC			
Alluvial Forest	No direct impacts (e.g. loss or damage to habitat) are predicted. Indirect impacts considered to potentially affect the identified downstream habitat relate to water quality impacts (releases of sediments & pollutants) and the spread of invasive species. Hydrological regime effects were excluded based on the findings of Flood Risk Assessment as the Project will not affect downstream flood.	No direct impacts (e.g. loss or damage to habitat) are predicted. Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but measures are required to ensure they operate effectively. The potential for the spread of invasive species during site operations is excluded. Hydrological regime effects were excluded based on the findings of Flood Risk Assessment as the Project will not affect downstream flooding.	**The habitat identified at risk is the mapped woodland ca. 12.6km downstream. Unmapped areas may also be present as stated in the site-specific conservation objectives document, and the author makes erroneous statements with regard to the classification of wet woodland habitat close to the scheme. The potential for adverse effects, and implications for the AA, are discussed further in Section 3 below.** It is noted that the potential for the spread of IAPS is excluded here for the operational stage, but a risk is acknowledged in the EIAR assessment of Alluvial woodland for the operational stage, and precautionary mitigation proposed. Given commitment to precautionary mitigation has been made, adverse effects can be excluded.
River Lamprey	No direct impacts (e.g. loss or damage to species or their habitat) are predicted. Indirect impacts considered to potentially affect lamprey or their habitat relate to water quality impacts (releases of sediments & pollutants), specifically to juvenile/spawning lamprey in the immediate vicinity of scheme. Adverse effects from light spill cannot be excluded. Adverse effects from dust cannot be excluded.	Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but measures are required to ensure they operate effectively. Adverse effects related to lighting and bridge shading excluded. The potential for the spread of invasive species during site operations affecting river margin nursery habitat is excluded.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), the assessment and mitigation measures proposed are considered robust and consequently adverse effects can be excluded.
Salmon	No direct impacts (e.g. loss or damage to species or their habitat) are predicted.	Adverse effects related to water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but	The hydroacoustic assessment provided in the NIS is a summary of that provided in the Aquatic Ecology EIAR Chapter, with reference to the latter, the assessment is robust and adverse effects can be excluded.

	Short-term hydroacoustic noise effects arising from construction of bridge piers are excluded. No direct impacts. Indirect impacts considered to potentially affect salmon or their habitat relate to water quality impacts (releases of sediments & pollutants). Adverse effects from light spill cannot be excluded. Adverse effects from dust cannot be excluded.	measures are required to ensure they operate effectively.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), the assessment of other risks to salmon and mitigation measures proposed are considered robust and consequently adverse effects can be excluded.
Otter	The proposed bridge is not considered to present a physical barrier as the river itself and 10m e tither side remain accessible to otter. Barrier effects are therefore excluded. Adverse effects may arise due to killing /injury of otter, impacts to food supply (arising from water quality impacts), loss of terrestrial habitat, loss of commuting habitat (Mooretown stream), air pollution (dust affecting water quality and impacting prey), and noise and lighting causing disturbance. Potential adverse effects to breeding/resting sites are not predicted as the assessment states *there were no confirmed couching or resting sites recorded during field surveys within or adjacent to the footprint of the Proposed Scheme (Section 6.2.1.1.4.3)*. As is standard practice however, pre-construction surveys are prescribed as a precautionary mitigation measure	Adverse effects could arise to due killing/injury, and mitigation is provided. Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but measures are required to ensure they operate effectively. The potential for the spread of invasive species (contributing to sedimentation affecting food resources) during site operations is excluded. Adverse effects related to lighting impacts were excluded on the basis that the bridge and cycle/pedestrian link will be unlit.	With regard to impacts to breeding/resting sites during the construction stage, it is unclear as to what '*within or adjacent to scheme*' means, as survey maps identify couching (resting) sites in close proximity to redline boundary (Figure 17 appears to identify a couch site ca. 80m from redline boundary). That said, a 30m buffer zone is considered adequate for couch sites[3], and mammal resistant fencing (Ref DG5000) would serve to adequately separate the construction works from the couching site. Mitigation for risks of killing/injury is also considered adequate. Consequently adverse effects can be excluded.

[3] https://cieem.net/wp-content/uploads/2019/07/natural-information-otters-and-development-2011.pdf

River Boyne and River Blackwater SPA			
Kingfisher	Disturbance effects excluded as temporary and will not affect natural range or availability of perching or commuting habitat. Localised habitat alteration in proximity the Boyne river channel is not considered to present a risk to the use of the Boyne as a commuting, perching or nesting habitat. Adverse effects may arise due to water quality (sediments & pollutants) impacts affecting prey availability and fishing success. Pre-construction surveys are prescribed as a precautionary mitigation measure.	Disturbance effects excluded on the basis that Kingfisher using the Boyne river channel are habituated to human presence in proximity to Slane. Adverse effects related to lighting impacts were excluded on the basis that the bridge and cycle/pedestrian link will be unlit. Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds).	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures proposed to address water quality deterioration risks are considered robust and adverse effects can be excluded. **With regard to construction and operational-stage disturbance, the surveys undertaken did not find breeding sites or suitable habitat in the vicinity of the bridge crossing, though the territory of Kingfisher associated with the closest known breeding site (2020) could include the bridge crossing areas. There is no detailed consideration of disturbance triggers or responses for this species e.g. refer to Goodship & Furness (2022[4]), in the context of the nature of the project. There is also an inconsistency between the NIS and EIAR Terrestrial Biodiversity assessments for Kingfisher (Refer to EIAR Terrestrial Biodiversity review below). Furthermore, new site-specific conservation objectives have been published for the SPA (July 2024). Clarification on these aspects is required and is further addressed in Section 3.**
Boyne Coast and Estuary SAC			
Estuaries, Mudflats & Sandflats Mediterranean & Atlantic Saltmarsh	Indirect impacts considered to potentially affect the identified downstream habitat relate to water quality impacts (releases of sediments & pollutants) . Hydrological regime effects were excluded based on the findings of Flood Risk	Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but measures are required to ensure they operate effectively.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), the assessment and mitigation measures proposed are considered robust and consequently adverse effects can be excluded.

[4] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

	Assessment as scheme will not affect downstream flood.	Hydrological regime effects were excluded based on the findings of Flood Risk Assessment as scheme will not affect downstream flood.	
Boyne Estuary SPA			
SCI Birds – incl. ex-situ Lapwing & Golden Plover	Adverse effects to ex-situ golden plover and lapwing arising from human disturbance and noise/vibration, are excluded. The assessment states that these species were mostly noted flying over area, and using agricultural grassland and can readily displace to other areas to avoid works. The potential for adverse effects arising from construction-stage lighting is identified and mitigation required. Indirect impacts considered to potentially affect the downstream habitat relate to water quality impacts (releases of sediments & pollutants) and the spread of invasive species.	Disturbance effects excluded on the basis that birds will readily displace to similar adjacent habitats. Light spill into agricultural grassland and from cycle/pedestrian bridge is identified *–but is not considered to result in any adverse effects. (6.5.1.2.1.1)* Collision risks to SCI species are excluded based on observations that fights were mainly over scheme area, rather than birds using habitat in and around scheme, the presence of other bridges in locality and 12m of freeboard. *(6.5.1.2.1.1)* Adverse effects related to Water quality impacts (releases of sediments & pollutants) are excluded based on design mitigation measures (drainage system including attenuation ponds), but measures are required to ensure they operate effectively.	While light spill from the cycle/pedestrian bridge is mentioned as a risk during the operational stage, it is clearly stated in the project description, as well as in other parts of this assessment, that this section over the river will remain unlit, and so the potential for adverse effects can be excluded. **The analysis of disturbance/displacement effects for both the construction and operational stages is vague given the available data to inform the assessment. e.g. *highly likely that displaced* golden plover and northern lapwing *will be able to relocate to proximal habitat that offers similar feeding opportunities (6.5.1.1.1.1).*** **Effects to ex-situ wintering wildfowl SCI species are considered further in Section 3.** With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures proposed to address water quality deterioration risks and invasive species risks are considered robust and adverse effects can be excluded.
Northwest Irish Sea SPA			

SCI Birds - incl. ex-situ cormorant, lesser black-backed gull, black-headed gull and herring gull	As above.	As above	Reviewing the site-specific conservation objectives for these species, in the context of the bird data provided in the EIAR, indicates that while their foraging ranges may extend to cover the study area, these species are versatile feeders with relatively low sensitivity to human disturbance. Consequently adverse effects can be excluded With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), the assessment and mitigation measures proposed are considered robust and consequently adverse effects can be excluded.

In-combination effects

The following plans are referenced:

- National Development Plan
- National Planning Framework (Oreland 2040)
- National Investment Framework for Transport in Ireland 2021
- National Roads 2040
- National Biodiversity Action plan 2017-2021. (outdated)
- Integrated Implementation Plan 2019-2024
- Draft Transport Strategy for the Greater Dublin Area 2022-2024
- Meath County Development Plan 2021-2027
- Louth County Development Plan 2021-2027
- County Meath Local Biodiversity Action Plan 2015-2020
- Louth Biodiversity Action Plan 2021-2026
- 2nd Cycle River Basin Management Plan

Plan-level risks are excluded based on their objectives which broadly support sustainable development, must comply with Habitats Directive, and that any project arising subject to their own AA requirements. As mentioned at AA Screening stage, the Boyne Greenway Restoration Scheme is mentioned but the potential for cumulative impacts with the Project is not explored. This is further discussed in Section 3.

Table 6-6 includes relevant planning/consent application search results which are considered in-combination with the Project. A review of these considering their nature, scale and location does not flag any concerns with regard to the conclusions excluding in-combination effects.

NIS Mitigation Measures

The authors make a distinction between design measures and mitigation measures at the outset of Section 7 of the NIS. The distinction is of no practical consequence for the assessment, which must consider whether adverse effects can be excluded on the basis of the efficacy of any protective measures, whether designed-in or otherwise.

Mitigation measures are generally comprehensive and address the potential adverse effects identified in assessment described above, with the following noted:

- Measures stated as incorporated into the design include the design of the bridge and certain mitigation measures which are also described in the project construction chapter (e.g. attenuation ponds, cofferdams).
- Pre-construction ecological surveys are clearly described. As mitigation for protection of these species has been described based on the surveys-to-date , the provision for pre-construction measures is considered appropriate as will only result in the identification of specific locations where these specified measures must be applied.
- Appropriate limitations on ground investigation works are provided.
- Construction stage mitigation measures related to lighting, noise, habitat loss, species loss/injury, invasive species and water pollution are specified in detail.
- Surface water monitoring procedures are specified in detail

- Operational stage measures primarily associated with the maintenance of drainage systems and fencing are prescribed.

The surface water monitoring programme specified involves sampling in watercourses and the attenuation pond outfalls. A stop-works order can be issued by the ECoW on the basis of exceedance of stated trigger levels. The use of a monitoring plan in this context, given the dynamic riverside environment, is considered in keeping with the EC (2021) guidance regarding monitoring of mitigation measures. The fact that the attenuation pond outfalls are monitored, with a specification that samples are taken after having rainfall, is a further safeguard, as issues will likely be captured at this point rather than in the river (which has significant dilution capacity in the case of the Boyne and so samples taken here may not reliably identify problematic discharges).

NIS Potential Gaps/Weaknesses

The following potential gaps/weaknesses are brought forward for further discussion in Section 3:

- Above-referenced concerns related to cofferdam operation and scour mat installation, with the potential to undermine the effectiveness of mitigation measures described related to bankside habitat protection, mammal movement, and water quality.
- Risks to possible alluvial woodland habitat in close proximity to the scheme are not assessed.
- Potential disturbance risks to Kingfisher with the River Boyne and River Blackwater SPA are not robustly closed out.
- Potential disturbance risks to ex-situ wintering birds associated with the Boyne Estuary SAC are not robustly closed out.
- As per the AA Screening review, Alkaline fen is not considered.
- As per the AA Screening review, interaction with the Boyne Greenway is not considered in sufficient detail.

EIAR Terrestrial Biodiversity

Project Details

Reference to is made to Chapter 4 and 5 of EIAR.

Methods & Guidance

Relevant guidance and legislation is referenced.

Surveys were undertaken at the appropriate time of year. Repeated visits to describe habitats and flora were undertaken, and specific surveys were undertaken for otter, bats, breeding and wintering birds, badger and amphibians. Given the extensive survey effort, it is considered reasonable that bespoke surveys for other protected mammals e.g. red squirrel and pine marten, were not undertaken, as signs of these species would be captured during habitat surveys, and surveys for other fauna.

Baseline Data

In addition to the SAC/SPA considered in NIS, pNHAs are assessed in this chapter. The pNHA's considered are those spatially overlapping the scheme (Boyne Woods pNHA), or within the zone of influence of water or air pollution impacts.

Habitat maps are provided (Fig 15.5 & 15.6), but given the extent of the survey area the habitat descriptions are provided are brief with no site or area-specific notes or comments to distinguish areas of varying quality or condition. There appears to be a page missing in the document (Page 15-24) which potentially includes the woodland habitat descriptions that are otherwise missing.

Riparian woodland (Fossitt Code WN5) is mapped in close proximity to the proposed bridge crossing, both on an instream island and on the northern bank of the Boyne. The short description of this habitat provides no information on its floral composition, other than noting that it is dominated by willow *Salix* spp. The authors have determined that the habitat does not correspond to Annex I Alluvial woodland on the basis that indicator species (alder and ash) were absent. This is not the correct basis for such a conclusion. The EU Annex I habitats interpretation manual identifies a sub-type of this habitat dominated by willow, and the site synopsis references willow-dominated habitat present within the SAC. There are three willow-dominated woodlands defined by the Irish Vegetation Classification system that correspond to Annex I Alluvial woodland (WL3D, WL3E and WL3F)[5]. The willow-dominated woodland mapped as WN5 adjacent to the bridge crossing (Photo 2) is likely to comprise one of these categories, though this could not be confirmed as access to the north bank of the river was not possible during my site visit, and no description of floral composition is provided in the NIS or EIAR. It is noted that the structure and function criteria assessment in O'Neill *et al* (2013)[6], used for determining conservation condition , require only 1 target species (willow, alder or ash) to be present. The location meets physical criteria, being on alluvium and subject to flooding (Perrin *et al,* 2008)[7], and so whether this habitat could represent Annex I Alluvial Woodland can only be confirmed by examination of the species composition of the woody and non-woody vegetation. It is further noted that a restoration objective is set for this habitat in the SAC, and as such degraded

[5] https://biodiversityireland.ie/ivc-classification-explorer/

[6] O'Neill, F.H. & Barron, S.J. (2013) Results of monitoring survey of old sessile oak woods and alluvial forests. Irish Wildlife Manuals, No. 71. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland http://www.botanicalenvironmental.com/wp-content/uploads/2014/01/PRJ33-Woodlands-monitoring-survey_IWM71.pdf

[7] Perrin, P.M, Martin, J.R., Barron, S.J., O'Neill, F.H., McNutt, K.E. and Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Dublin. http://www.botanicalenvironmental.com/wp-content/uploads/2011/03/Volume-I.pdf

examples of Alluvial woodland should be considered as having the potential to be restored on a precautionary basis in the absence of evidence otherwise.

Photo 2 Wet woodland on north bank immediate east of proposed Boyne crossing (photo taken from south bank towpath)

Reed and large sedge swamp: It is stated that the habitat in the study area would not meet the criteria for Annex I Hydrophilous tall herb swamps, but the stated reference is not provided (NPWS, 2020), and no justification is given. Reviewing the species listed with reference to the criteria provided by Martin *et al* (2013)[8] indicates that the stated dominant species do not meet the criteria for this habitat, and so the authors' conclusion is considered valid.

Fauna

Results are presented, supported by technical appendices, of detailed surveys undertaken for birds, bats, badgers and otter. Some inconsistencies in the information presented on bats and badgers were noted and are highlighted in Section 3.

[8] Martin, J.R; Devaney, F.M; O'Neill, F.H & A. Delaney (2013) Irish semi-natural grasslands survey. Annual report no. 5 Leinster. November 2019. Report for the NPWS. https://www.npws.ie/sites/default/files/publications/pdf/ISGS13_Leinster_Report.pdf

Evaluation & Assessment

The assessment focused on 'Important Ecological Features' (IEF's) following CIEEM guidance. Terrestrial features are primarily considered, with aquatic features addressed in the EIAR Aquatic Biodiversity chapter. Designated sites are considered, though the North-west Irish Sea SPA is not included in the assessment (it is referenced earlier in the report). This is not considered an issue as it is adequately assessed in the NIS. Collision risks with birds associated with the SPA's using the River Boyne corridor and the bridge structure are excluded at an early stage, in line with the rationale presented in the NIS.

The IEF's and likely significant effects identified are described below. **Any potential issues that are <u>additional</u> to those highlighted for the NIS are shown in bold font. Aspects of the assessment that are considered satisfactory are shaded in grey.**

IEF	Likely Significant Effects	Comment
River Boyne & Blackwater SAC	Construction Stage: • Significant effects to Alluvial forests were excluded on the basis of the FRA. It was concluded that there was the potential for adverse effects to Alluvial forests due to water pollution. • No loss of otter breeding/resting sites shall occur. Disturbance impacts ruled out on the basis that a localised impact would not significantly affect populations given the allowance of 10m buffer and evidence of their tolerance of human disturbance (evidence not provided). The risk of otters being killed or injured cannot be excluded and so requires mitigating measures. • The loss or degradation of supporting habitats considered. Loss of habitats is not considered significant, though no reason is given, but this is presumably down to the small extent and their low conservation interest. The fragmentation of the supporting habitats is considered a significant impact requiring mitigation, as are the risk of water quality impacts. • The risk of spread of invasive species in the area to downstream alluvial forest requires mitigation. • Risks from air pollution (dust) impacts to QI and non-QI habitats requires mitigation. Operation Stage: • On the basis of the water attenuation measures no effects to Alluvial forests or non-QI habitats are predicted. • Effects to Alluvial forests due to changes to hydrological regime excluded on basis of FRA. • Measures to control spread of IAPS should issues arise are provided on a precautionary basis. • Shading of non-QI habitat marsh/swamp/canal habitats is not considered significant due to extent/small scale of impact. • Bridge structure doesn't present an obstacle to commuting and foraging otter. • Killing/injury risk due to roadkill is a likely significant effect and requires mitigation. • Otter habituated to human presence/activity, and generally active at dawn and dusk, and so disturbance impacts not expected to significant affect this species. • No operational stage lighting impacts/effects are predicted as the bridge will be unlit.	Habitat fragmentation will be mitigated through the Habitat Restoration and Monitoring plan proposed for this area and detailed in the Mitigation measures. There are no additional issues to those highlighted relating to the AA Screening and NIS.
River Boyne & Blackwater SPA (Kingfisher)	Construction Stage: Likely significant effects to Kingfisher identified were: • Disturbance/displacement effects (due to noise & vibration) in absence of mitigation during construction stage.	**The significant noise/vibration effects concluded for Kingfisher (Page 15-78) are not explicitly mitigated. This assessment of**

	• Habitat degradation due to accidental incursion beyond construction footprint . • Water quality risks potentially affecting foraging habitat quality. • Spread of invasive alien species resulting in vegetation composition changes impacting habitat quality • Degradation of habitats and watercourses due to air pollution (dust). Operation: • Kingfisher are habituated to manmade structures, which are present throughout the Boyne channel and so new bridge will not cause fragmentation of their habitat • On the basis of the water attenuation measures no effects to kingfisher habitat are likely. • Kingfisher in the area around Slane would be habituated to human presence/activity and so disturbance effects are not considered significant. • No operational stage lighting impacts/effects are predicted as the bridge will be unlit.	**disturbance is inconsistent with the NIS (6.4.1.1.1) where significant disturbance effects were excluded. It is also noted that this was excluded as a risk for other bird features assessed, and so the conclusion may have been made in error, however this is speculation. As described in the NIS review, clarification on aspects of this assessment is required and is further addressed in Section 3.**
Boyne Estuary SPA	<u>Construction Stage:</u> • Water quality risks to habitat quality in downstream estuary pose a likely significant effect. • Displacement/Disturbance risks to ex-situ lapwing and plover are not considered significant due to availability of other habitats locally. <u>Operation Stage:</u> • The bridge provides sufficient height above water and cross-sectional area so as not to present an obstacle to SCI birds commuting/foraging along the River Boyne. • SCI birds are habituated to manmade structures, which are present throughout the Boyne channel and so new bridge will not cause fragmentation of their habitat. • On the basis of the water attenuation measures no effects to SCI habitat are likely. • SCI birds in the area around Slane would be to human presence/activity and so disturbance effects are not considered significant. • No operational stage lighting impacts/effects are predicted as the bridge will be unlit.	There are no additional issues to those highlighted relating to the AA Screening and NIS.
Boyne Coast and Estuary SAC	<u>Construction Stage:</u> • Water quality risks to habitat quality in downstream estuary pose a likely significant effect. <u>Operation Stage:</u> • On the basis of the water attenuation measures no effects to QI habitats are likely.	As above
Boyne Woods pNHA	<u>Construction Stage:</u> • There will be no semi-natural habitat loss, though the scheme adjoins the woods. • Spread of invasive alien species causing vegetation composition changes impacting habitat quality • Risks from air pollution impacts (dust) to habitats requires mitigation. Operation:	**Air pollution effects are considered for the closest 4 pNHA designations to the scheme, but**

	• Air pollution risks are excluded on basis of the Air Quality assessment with regard to particulate matter, nitrogen oxides and nitrogen deposition .	**not for other habitats. This is further discussed in Section 3.**
Crewbane Marsh pNHA	Construction Stage: • There will be no direct impacts to this pNHA (0.85km downstream). • Water quality risks to habitat quality in downstream habitat pose a likely significant effect. Operation Stage: • Air pollution risks are excluded on basis of the Air Quality assessment with regard to particulate matter, nitrogen oxides and nitrogen deposition. • On the basis of the water attenuation measures no effects to pNHA are likely. • Spread of invasive alien species causing vegetation composition changes impacting habitat quality - measures should be provide on a precautionary basis.	**The potential for this site to support groundwater-dependant habitats, and consequences for the Terrestrial EIAR Biodiversity Chapter and AA, are discussed in Section 3.**
Slane Riverbank pNHA	Construction Stage: • There will be semi-natural habitat loss. The scheme adjoins the public realm element. • Spread of invasive alien species vegetation composition changes impacting habitat quality • Risks from air pollution impacts (dust emissions) are identified but considered insignificant. Operation Stage: • Air pollution risks are excluded on basis of the Air Quality assessment with regard to particulate matter, nitrogen oxides and nitrogen deposition.	Mitigation measures are provided for identified risks, and significant effects are not likely.
Rossnaree Riverbank pNHA (4km downstream) Dowth Wetland pNHA (9.5km downstream) River Boyne Island pNHA (12.5km downstream)	Construction Stage: • There will be no direct impacts to these pNHA's. • Water quality risks to habitat quality in downstream habitat pose a likely significant effect. • Spread of invasive alien species vegetation composition changes impacting habitat quality Operation Stage: • Air pollution risks (considered for Rossnaree Riverbank pNHA only) are excluded on basis of the Air Quality assessment with regard to particulate matter, nitrogen oxides and nitrogen deposition. • On the basis of the water attenuation measures no effects to pNHA's are likely. • Spread of invasive alien species causing vegetation composition changes impacting habitat quality - measures should be provided on a precautionary basis.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified risks, and significant effects are not likely.
Boyne Coast and Estuary pNHA	Overlaps with SAC, refers to that assessment	As per SAC review above.
Boyne Estuary Wildfowl Sanctuary	Overlaps with part of SPA, refers to that assessment.	As per SPA review above.
HABITATS AND FLORA		

Eroding Upland River	Construction Stage: • 99m of river habitat lost from Mattock (Mooretown) stream due to the installation of 3 culverts. Operation Stage: • On the basis of the water attenuation measures proposed, no effects to this habitat are likely. • Culverts have been designed so as not to alter the hydrological regime. • Spread of invasive alien species causing vegetation composition changes impacting habitat quality - measures should be provided on a precautionary basis.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified risks, and significant effects are not likely.
Drainage Ditches	Construction Stage: • Drainage ditches are assessed in their functional sense (provision of drainage) with the loss stated as unquantified due to their seasonal nature. Operation Stage: • On the basis of the water attenuation measures proposed, no effects to this habitat are likely. • Culverts have been designed so as not to alter the hydrological regime.	**Drainage ditches are not described or assessed ecologically e.g. added floral diversity and feature of higher quality hedgerow boundaries which may be lost. The implications for the Terrestrial EIAR Biodiversity assessment are discussed in Section 3.**
Depositing lowland river, canals, large reed and sedge swamp, marsh	As these habitats overlap with SAC, and are considered supporting habitats , the assessment refers to the non-QI supporting habitats assessed under the River Boyne and River Blackwater SAC above.	As per SAC review above.
Wooded Habitats	Construction Stage: • Habitats considered of lower local value, but taken together considered to be of higher value. The permanent loss of hedgerows and treelines is 4213m. Small areas of scrub and woodland will be lost. No riparian woodland will be lost. The effect is considered long-term and irreversible, and significant at a local scale. • Risks from air pollution impacts (dust emissions) are identified but considered insignificant. • Water pollution risks to Riparian woodland WN5 are considered potentially significant, requiring mitigation. Operation Stage • On the basis of the water attenuation measures proposed, no effects to this habitat are likely.	**Such an extensive area of hedgerow/treeline could be considered a significant loss at a county/regional scale rather than a local scale, particularly if higher quality hedgerows are present e.g. supporting mature trees, with ditch and bank structures, or features of townland boundaries. The implications for the Terrestrial EIAR Biodiversity assessment are discussed in Section 3.** With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided

		for identified water pollution risks, and significant effects are not likely. For completeness, the risk of spread of invasive species to wooded habitats should be acknowledged, though it is noted that appropriate mitigation is provided, and so significant effects are not likely.
Undesignated Annex I habitat	<u>Construction Stage:</u> • Hydrophilous tall herb swamp has been mapped downstream of proposed scheme (>4km). • Water pollution risks to tall herb swamp are considered potentially significant, requiring mitigation. <u>Operation Stage</u> • On the basis of the water attenuation measures proposed, no effects to this habitat are likely.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified water pollution risks, and significant effects are not likely.
FAUNA		
Otter	As per SAC assessment	
Bats	<u>Construction Stage:</u> • No tree or building bat roosts were identified, though mitigation measures are proposed to ensure effects to roosting bats are avoided including pre-construction surveys of suitable habitats identified. • The loss of linear and woody habitat in Boyne valley will have a significant effect on the local bat population in terms of foraging and movement in the landscape (barrier effect). • Construction stage lighting is unlikely to result in significant effects on the local bat population due to short-term nature of the requirement, but mitigation proposed. <u>Operation Stage:</u> • The proposed bridge is not considered a significant obstacle but loss of habitat connectivity due to the presence of the road scheme and severance of commuting corridors is predicted to have long-term irreversible effects on the bat population. • Collision risk is considered in context of hitting cars. It is not considered to result in significant effects on local bat assemblage as peak bat activity and traffic activity periods don't align. • Lighting proposals have the potential to result in significant effects on the bat population.	Mitigation measures are provided for identified risks, the long-term effect on the bat population is noted.
Wintering Birds	<u>Construction Stage:</u> • Habitat Loss/Fragmentation is not considered significant on the basis that birds will relocate to similar habitat.	

	• Water pollution risks to habitats used by birds are considered potentially significant, requiring mitigation. • Disturbance impacts (noise, vibration, human presence) are not likely to effect birds significantly on the basis birds will relocate to similar habitat. <u>Operation Stage:</u> • The bridge provides sufficient height above water and cross-sectional area so as not to present an obstacle to wintering bird species commuting/foraging along the River Boyne. • Wintering birds are habituated to manmade structures, which are present throughout the Boyne channel and so new bridge will not cause fragmentation of their habitat. • On the basis of the water attenuation measures no effects to SCI habitat are likely. • SCI habituated to human presence/activity and so disturbance not significant. • No operational stage lighting impacts/effects are predicted as the bridge will be unlit.	As per SAC assessment, the justification regarding excluding disturbance impacts is weak. This is further discussed in Section 3. With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified water pollution risks, and significant effects are not likely.
Breeding Birds (excl. kingfisher)	<u>Construction Stage:</u> • Killing/injury of nesting birds and their eggs is potentially significant in the absence of mitigation. • Significant effects from the loss of semi-natural habitats e.g. hedgerows used by countryside breeding birds • Disturbance/displacement effects are not considered significant on the basis that works are temporary and short-term, and disturbance impacts are unlikely to affect the conservation status of breeding birds. <u>Operation Stage</u>: • As above for wintering birds	Refer to Section 3 regarding hedgerow assessment. Otherwise. mitigation measures are provided for identified risks, and significant effects are not likely.
Badger	<u>Construction Stage:</u> • 51 badger setts were recorded. 15 setts will be affected by scheme (within 50m) impacting 3 badger groups. • Habitat loss (foraging)– adverse effects noted as long-term and irreversible but not considered significant due to availability of alternative suitable habitat. • The loss of setts is considered significant for 2 of the badger groups directly impacted, and 1 further group for which setts will not be lost but that are within a zone of disturbance for pile driving works. • The effects on badgers are considered significant at a national scale. • Habitat fragmentation (e.g. severing network of setts, or separating setts from foraging areas) is considered significant, but reversible, as local populations adjust and find alternative areas. • Disturbance impacts are considered significant.	**Whether alternative habitat is 'available' to remaining sett complexes is likely to be specific to the location and accessibility e.g. presence of other barriers/roads in particular areas could significantly limit foraging grounds in addition to the barrier presented by the Slane bypass. Mammal passes are not discussed, despite their known benefit (Gaughran et al, 2021)[9].**

[9] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8415604/

	Operation Stage: • The proposed bridge is not considered a significant obstacle but loss of habitat connectivity due to the presence of the road scheme and severance of commuting corridors is predicted to have long-term but reversible effects on the badger population. • Collision risk is considered in context of hitting cars, with mitigation measures required. • Lighting proposals have the potential to result in significant effects on the badger population due to light spill into unlit areas.	**This may be due to the challenge of siting an underpass in a deep road cutting, as superficially the most appropriate places for such underpasses would appear to be in the longer sections of road, but these are also within deep cuttings.** **Refer to Section 3 for further discussion.**
Amphibians	Construction Stage: • Surface water pollution resulting in habitat degradation considered significant. • Loss of habitat within Boyne valley significant. Operation Stage: • On the basis of the water attenuation measures no effects to SCI habitat are likely.	With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified water pollution risks, and significant effects are not likely.

Cumulative effects

A total of 4 projects were shortlisted with the likelihood of cumulative effects excluded based on the ecological assessments and/or mitigation measures set out therein. Given the location, scale and nature of the projects described, and the proposed measures to replant removed vegetation and ensure protection of bat species, cumulative effects with the Project can be excluded.

There is no assessment of cumulative/in-combination effects between the Project and relevant plans. As for the review of the NIS, it would have been prudent to consider the interaction between the Project and the Boyne Greenway (Navan to Slane).

Mitigation Measures

Design measures are listed, followed by a comprehensive suite of mitigation measures. A few notable measures are highlighted:

- Permanent ponds will be installed in the first phase of earthworks, to be used as temporary settlement ponds.
- A project ecologist will be appointed to represent the contractor, and separately to represent MCC.
- Preconstruction surveys are specified for bats, badgers, otter, invasive species, kingfisher. As mitigation for protection of these species has been described based on the surveys-to-date , the provision for pre-construction measures is considered appropriate as will only result in the identification of specific locations where these specified measures must be applied. For badger, measures are set out on he basis of the current known set distribution, including the provision of an artificial sett. For otter and bat, measures are described for the scenario where holts or roosts are identified. With regard to the recent requirement that derogation licences for Annex IV species should be sought prior to submission of a planning application, it is noted that as there are no confirmed holts or roosts identified as impacted by the scheme based on surveys to date, such an application would not be appropriate.
- The standard seasonal constraint is included for breeding birds, and bird boxes will be erected to help offset some of the lost habitat.
- Mitigation for lighting during the construction stage is considered in-keeping with requirements for bats, and as such will serve to protect other nocturnal species.
- No current alien invasive species infestations in scheme area have been identified, the precautionary mitigation provided for the construction and operational stages is considered sufficient.
- Measures to facilitate otter movement include ledges within culverts and fencing at appropriate locations to guide otters to the culverts. During construction, fencing will guide mammals around the construction sites. There are no proposals for badger crossing points to facilitate east-west access aside from at the Boyne bridge area.

Residual Impacts

- Likely residual (unmitigated) impacts arising from Project are identified as a loss of wooded habitats, severance of foraging/community territory for bats and badgers, loss of badger

setts, and loss of tree's with moderate bat roosting potential. The overall conclusion suggests that residual impacts will not be significant once landscape planting is established.
- During the operation phase, temporary habitat loss associated with the River Boyne and River Blackwater SAC will be remediated through the development of a Habitat Restoration and Monitoring plan prepared by a qualified person(s) in consultation with the NPWS.

EIAR Terrestrial Biodiversity Assessment- Potential Gaps/Weaknesses

The following potential gaps/weaknesses are brought forward for further discussion in Section 3:

- Habitat descriptions could be significantly more detailed, particularly with regard to riparian woodland within the SAC in proximity to the scheme. Descriptions are entirely missing for certain wooded habitats (due to a missing page in documentation) and drainage ditches. There are no representative photographs provided, and no target notes associated with habitat maps, which would be considered best-practice.
- The landscape planting proposals are vague, and given the significant loss of wooded habitats, it would be preferable to see more detailed proposals presented. The detail of this plan will be informed by the baseline wooded habitat descriptions and mapping provided. It is also noted that addressing residual impacts to bats and badgers relies on the successful implementation of the landscaping plan.
- Tree removal measures specified at the end of Appendix 15.5 (Preliminary bat roost assessment) have not been fully captured in the mitigation measures section (or the EOP).
- There is no explanation as to why mammal underpasses have not been considered for the scheme.
- Air quality impacts related to nitrogen deposition are only considered in the context of the pNHA's.
- The measures highlighted with regard to the NIS also apply to the EIAR Terrestrial Biodiversity Assessment.

EIAR Aquatic Biodiversity Chapter

Project Details

Reference to is made to Chapter 4 and 5 of EIAR.

Methods & Guidance

The assessment is based on a combination of desktop and field data, the latter including a river habitat survey and biological water quality assessment. Standard survey methods were used.

Baseline Data

A detailed description of river habitats, water quality and aquatic species of the study area is provided. Salmon, trout and lamprey populations are supported in the Boyne and its tributaries.

Evaluation & Assessment

IEF's taken forward for further assessment are:

- River Boyne as a salmonid water, SAC and supporting Annex II species of international importance. The Boyne navigation canal is included though would not support QI species apart from otter.
- The Mooretown Stream – the upper reaches of this small tributary of the Mattock river are being culverted as part of the Project. The stream may support brown trout and brook lamprey, and eel, with sea trout known further downstream.
- The relevant aquatic receptors in the Slane reach of the Boyne are seasonally migrating salmon and sea trout (spring/summer/autumn); older resident brown trout; juvenile salmon (parr) over limited patches of nursery habitat; migrating lampreys and temporarily resident lamprey ammocoetes; resident coarse fish (pike, roach); plus macroinvertebrate and in-stream plant communities.

Construction Phase Assessment:

- Water quality risks relating to releases of suspended sediments, cement and hydrocarbons, and impacts for IEF's are discussed, with risks adequately identified. Likely effects relating to suspended sediments are excluded on the basis that sources and pathways for impacts via suspended sediments and hydrocarbons are dealt with through design and construction phase commitments and phasing (which include sediment control mitigation measures). Cement is highlighted as a risk from the pump-out cofferdam water in the Boyne floodplain during pier formation and mitigation is proposed.
- The bridge crossing phasing is discussed in detail, highlighting the need for phase 2 works (installation of reno mattress work platforms and sheet pile cofferdams) and phase 5 works (removal of same) to progress during dry weather, particularly on the lower southern bank (right hand bank).
- As mentioned in the NIS review, the constant ingress to cofferdam areas is highlighted, and it is noted pump-out water will be turbid and potentially contaminated with concrete washings and hydrocarbons. It is stated this pump-out water will be removed for off-site treatment and never discharge to the surrounding environment. The report states:
  'The intricacies of dealing with pump-out water from cofferdam construction areas will require a well thought-out and implemented system of collection, monitoring and off-site treatment. There will be strict implementation of all water pollution control measures and

daily monitoring of efficacy and security of such measures whilst the cofferdams are in place (refer to the construction phase monitoring set out in Section 16.7.1. This will be enforced by the Council on the contractor through express terms of the contract and the environmental monitoring by an official engaged by the Council'

- Concrete usage is to be contained within cofferdams, the height of which will be higher than the 1% AEP flood level.
- Hydroacoustic effects from pile driving, estimated to occur over 28 days, are discussed with regard to species-specific sensitivities and biology, with the conclusion that the noise levels may result in avoidance but that the effect would not be significant at a population level. The assessment is well-reasoned and supported by reference to research.
- The construction works within the Mooretown stream affects ca. 200m with culverts separated by realigned sections of channel. The stream is of relatively low ecological value, however the works are extensive and as such could affect the downstream Mattock river habitats and species. Mitigation measures proposed to address these risks.

Operational Phase Assessment:

- Alternations to road drainage are considered to be positive in the long-term due to improved drainage system on the new road relative to the existing N2, as the latter slopes steeply towards the river.
- Bridge shading is excluded as a significant effect with regard to aquatic fauna and flora, as the riparian vegetation in this reach comprises common emergent species, and shading provides potential beneficial microclimates for some fish.
- Scouring effects at Boyne crossing are excluded on the basis of hydraulic modelling.
- Habitat loss and fragmentation in the Mooretown stream due to culverts is not considered significant, though a slight negative impact is noted. It is noted the river supports trout, lamprey and possibly eel and culverted reaches meet fish passage criteria (agreement with IFI is noted).
- With regard to hydromorphology in the Mooretown stream, design measures in Chapter 4 aimed at reinstating suitable habitat are referenced with regard to mitigating any effects.
- It is noted that the attenuation ponds and culverts are designed to accommodate a 1% AEP rainfall event.

Cumulative Impacts

Particular consideration given to a quarry operation that indirectly discharges to the Boyne, with a review of the quarry's water management system and consideration of suspended solids data, meaning cumulative effects were excluded.

Mitigation measures

- Detailed mitigation measures are provided.
- With regard to cofferdam water ingress , it is stated that there can be no discharge the River Boyne, or general environment, and that pump-out water must be treated prior to discharge to the attenuation ponds, or stored and then removed off-site for appropriate treatment.
- Seasonal restrictions and further agreement with IFI are required for Mooretown stream works, as well as destocking of fish prior to works and dry-working arrangement by use of a

diversion channel. Steam habitats will be reinstated and an existing culvert removed. Prescriptive measures are included, and the requirement for final agreement of details with IFI noted.

- Measures to prevent the spread of invasive species are detailed.
- Design and maintenance requirements for the attenuation ponds and wetlands are set out.
- The role of the ECoW is detailed with regard to water quality monitoring procedures.

Conclusion

The reports concludes by identifying low and very low likelihood of residual impacts on aquatic IEF's of the River Boyne and Mooretown stream from the construction and operational phases respectively.

With the exception of potential water quality impacts related to the cofferdam water management and scour mats (see Section 3), mitigation measures are provided for identified risks, and significant effects are not likely.

Gaps or Weaknesses

The following potential gaps/weaknesses are brought forward for further discussion in Section 3:

- There is no reference to the scour mats proposed at the drainage system outfalls, and any specific mitigation that would be required for working within the 10m exclusion zone.
- Concerns re. mitigation to deal with water ingress to cofferdam are as described previously.

Submissions

A table is provided below with a summary of issues raised where relevant to the AA and Biodiversity assessments, a summary of the applicant's response and my comment on the matter. **Any potential issues that are additional to those highlighted for the NIS/Biodiversity Chapters are shown in bold font. Submissions that are considered to have been satisfactorily addressed by the applicant's response are shaded in grey.**

Comments related to the Section 49 procedure and the associated assertion that the EIA and Habitats Directives apply to that process are considered a planning/legal matter and are not included.

Submission & Issue Raised	Applicant Response	Comment
Alex & Carina Conyngham: The scale of the scheme appears to be larger than previously proposed with potentially greater impacts on the SAC and NHA that it crosses.	Refers to suite of environmental reports and studies, with appropriate mitigation measures applied, and also refers to the submission from the DAU who are satisfied with the protective measures detailed.	Notwithstanding the weaknesses raised in the review herein, the response is considered to address the submission given its general nature.
Fionan O Muircheartaigh: Highlights concerns that the proposed scheme could have a devastating effect on the river ecosystem and its fisheries, and hinder its ongoing recovery (post Boyne drainage scheme).	Response points to assessment in the aquatic ecology section of the EIAR which demonstrates the importance of the reach for migrating salmon, rather than spawning or nursery habitat, and describes how the scheme will have no direct impacts on river habitat, and that short-term disturbance associated with bridge construction will not impede salmon migration.	Notwithstanding the weaknesses raised in the review herein, the assessment of aquatic ecology is considered robust and the scheme does not have the potential to result in a devasting impact or hinder the recovery of the Boyne system.
Micheal & Elaine Cully: Some of the data regarding Appendix 15.4 Protected fauna is outdated. Note barn owl, pine marten and goldcrest observed in the local area.	Response points to field surveys undertaken and guidance followed, and the mitigation and monitoring measures that have been prescribed to protect flora and fauna.	The response might have mentioned that Appendix 15.4 is a record of ad-hoc desktop data from the NBDC website, which is standard practice to review and reference, and hence includes dated records. The field surveys provide a more comprehensive and up-to-date baseline, and a combination of both is relied on in determining whether significant effects occur.
Jack Rogers: The EIAR fails to fully explore impacts on red-listed species (e.g. daubentons bat and barn own) from lighting and traffic associated with the bridge. Hydrogeological impacts to nearby groundwater dependant ecosystems were not explored e.g. Tufa springs at Crewbane Marsh. The submission expresses concerns regarding the overall degradation of the SAC and SPA.	The response sets out the surveys and assessments completed to describe the ecology of the area. No sites suitable for barn owl territories were found. The DAU submission pointing to the adequacy of the assessments and mitigation measures is noted. Hydrogeological assessment found no significant effects to groundwater flow and quality. The EIAR assessed impacts to Crewbane Marsh pNHA.	There is a recent (2019) record of barn owl from Balrenny (N973780) ca. 2.6km to the north of the red-line boundary, which was not detailed in the desktop Appendix 15.4 (stated to capture records within 5km of the scheme). Otherwise, however, records for barn owl are dated and broad-scale atlas records, and no barn owl were observed during breeding bird surveys. Barn owl are likely to forage in the wider landscape, but available data does not indicate that there are important sites for this species in vicinity of the Project, and so significant effects are not likely. **Groundwater is only considered in terms of water quality impacts in the EIAR Biodiversity Assessments and NIS, and no explicit reference to assessment of impacts on groundwater flow arising from deep road cuttings could be found in the hydrogeology section of the EIAR. The presence of tufa springs in Crewbane Marsh is not information that is in the public domain, but aligns with other information suggesting**

		groundwater-dependant habitats may occur at this location (Refer to Section 3).
OPW: In the context of vegetation as a mitigation measure for screening, the OPW recommend that a vegetation and planting design and management plan is generated, and make some specific helpful recommendations with regard to tree selection e.g. should include a variety of native species to offer a resilient suite of species in the context of climate change. In addition they state that trees should be suited to local ground conditions, and subject to ongoing management.	The response points to commitments in the EIAR for the use of native species in woodland mixes, and for monitoring the establishment phase (up to 5 years) of vegetation. They note MCC will include for the preparation of a vegetation and planting design management plan.	**The referenced plan should identify where hedgerow vegetation is to be reinstated (as opposed to strips or rows of trees). Hedgerow requires specific long-term management in order to maintain a hedgerow structure. The referenced plan should also prescribe long-term management proposals for woodland blocks/belts, which may not reach their ecological potential unless these areas are monitored with periodic interventions undertaken are e.g. removal of diseased trees, thinning to create light and release slower growing species, retention of certain deadwood features. The plan should therefore specify restoration objectives for specific areas of planting, and include for long-term management of these habitats (Refer to Section 3).**
Heritage Council: 1.Recommend ABP condition the requirement for MCC to commission and independent ecologist to oversee the project ecological supervision by he contractor. 2.Culverts should be designed not to impede fish migration. 3.Greater mapping of hedgerow and drainage ditches is needed; the assertion of the negligible impact on the latter is noted but considered hard to justify based on the information provided. 4.Consultation with BSBI recorder regarding identifying plant records.	1.Response refers to the fact that The EIAR includes for such an 'Client Project Ecologist' in addition to the Contractors Ecologist. 2.The Aquatic Biodiversity Chapter identifies that the culvert design dimensions were agreed with IFI. Items 3-7 were dealt with by reference to the fact ecological surveys were undertaken in line with standard guidance.	1.Addressed 2.Addressed **3. The response doesn't adequately address this concern, which is a valid critique on the basis of the level of baseline information on habitats provided in the Terrestrial EIAR Biodiversity Assessment (Refer to Section 3).** **4. Considered further in Section 3.** 5. There is no reference in the Terrestrial EIAR Biodiversity Assessment that lands within the footprint of the scheme were not accessible for survey, and so it is understood that all lands were surveyed.

5.Lack of land access for survey – aerial photos should be used. 6.Teagasc Soil mapping should be used. 7.Urban biodiversity of Slane village provided. 8.No riparian vegetation should be unnecessarily removed, particular woody vegetation. 9. Noted the bridge will be unlit but express concern re. increase lighting between Slane and the new bypass. 10. Welcome the bridge design which reduces collision risk for wintering birds. 11. Pre commencement surveys should be conditioned. 12. Impact of badgers is of a concern, including the barrier effects of the road, and some form of badger pass should be considered. 13. Highlights the loss of 4km of hedgerows and treelines and recommends compensatory planting of native shrubs and trees, and that a detailed planting and landscape strategy is needed.	8. No works are permitted within the river or within the 10m exclusion zone. 9. Response confirmed the bridge will not be lit, and reference road lighting provisions in accordance with TII guidance. 10. Noted. 11. Response refers to sections of the EIAR which highlight the need for pre-commencement surveys. 12. Response notes that fencing will guide badger and otter under the proposed bridge crossing, and that measures will prevent any long-term significant impacts. The response further states that the residual impact is not significant. 13. Response points to indicative locations of planting, provided in the Chapter 12 (LVIA) and that temporary habitat loss within the SAC will be remediated through the development of a habitat restoration and monitoring plan in conjunction with NPWS	6. Teagasc soil maps are provide in Chapter 18 of the EIAR. Where the soil type is considered relevant to any potential weaknesses in the assessment it has been highlighted in this review. 7. Urban biodiversity descriptions could be expanded, but given the nature of the proposed works in these areas, are not considered a weakness in the assessment. **8. Refer to Section 3 re. scour mats from drainage system.** 9. The EIAR addresses lighting impacts on sensitive fauna (bats, badgers and wintering birds) though considers this insignificant. 10. Addressed 11. Addressed **12. I would concur that some form of passage for badger would help offset the magnitude of the impact. Refer to Section 3.** **13. A detailed landscape and planting plan/strategy should be sought. Refer to Section 3.**

DAU: Consider the measures set out in the EIAR and NIS are adequate if diligently implemented.	Refers to sections of the application where mitigation measures are provided, and also to the environmental Operating Plan within which measures will be included and provided to the contractor, which will be overseen by MCC.	Ecological supervision by both MCC and the Contractor is noted, the contractor should be contractually obliged to implement the measures described in full.
Note that there is no badger derogation licence requirement as there is an exemption allowing the destruction or interference of badger setts during construction works, though the death or injury of badgers must be avoided.	Response refers to badger mitigation measures set out to avoid impacts to badger	For clarity, Section 23(7)(c) of the Wildlife Act may apply: This act states that, *it shall not be an offence for a person—while constructing a road or while carrying on any archaeological operation, building operation or work of engineering construction, or while constructing or carrying on such other operation or work as may be prescribed, unintentionally to kill or injure such an animal or unintentionally to destroy or injure the breeding place of such an animal.* If it can be reasonably foreseen that the work would lead to killing or injuring a badger, or damaging or destroying the sett, then it is not possible to state that the act was "unintentional". On the basis of the mitigation proposed for badgers, and that TII/NRA's Guidelines for the treatment of badgers shall be followed, the requirements of the Wildlife Act will be met.
Two conditions are recommended, one requiring the that all mitigation measures shall be implemented in full, and one requiring a Badger conservation plan be submitted to the Board.	Noted the EOP, and that a badger conservation plan will be prepared prior to commencement of any works	

3. Description of Gaps or Weaknesses

Gaps or weaknesses in the assessments that were highlighted above are discussed further below. Where these gaps can be closed out with available information I have provided a justification, otherwise I have provided recommendations regarding further information that could be sought, or conditions that could be applied.

Cofferdams

There appears to be a disconnect between the cofferdam measures proposed in the ecological reports and other parts of the EIAR in terms of the expected water ingress, for example:

- NIS Section 7.3.2.4.2.9: *Constant water ingress is expected to the cofferdams surrounding bridge pier foundations during their construction. These containment areas will require regular, if not constant pumping out to retain dry conditions. The pump-out water is likely to be contaminated with sediment and concrete, and to a lesser extent hydrocarbons. These waters shall not be pumped directly to the Boyne or to any other watercourse. The contractor will be required to tanker and remove to a suitably licensed treatment facility. Before any concrete pouring has commenced, i.e., in the earth excavation stage, the ECoW will take daily pH readings of a sample of the pump-out water. This water will be transported by tanker and discharged into Attenuation Pond No. 2 or 3 for settlement of suspended solids. Once bulk liquid concrete pouring has commenced and concrete is curing, the ECoW will continue daily in-situ measurement of pump-out water. If pH remains between 6.0 and 9.0, then this water can still be discharged into the Attenuation Ponds for settlement of suspended solids. If pump-out water pH exceeds 9.0, the water will be treated to reduce pH, or transported off-site for disposal at a licenced facility.*

- Chapter 5 of EIAR Section 5.12.10.5.1.2.1: *The cofferdam will therefore provide an almost watertight working environment preventing flood waters from entering so that the work can be carried out safely, as the height of the cofferdam will be above the predicted maximum flood level. The cofferdam will contain any spoil or silt laden water arising from the work while also prevent the inrush of flood waters should a flood occur. Furthermore, the cofferdam will enclose the proposed excavation and piling works preventing any uncontrolled run-off during construction from reaching the River Boyne. However, rainwater will enter the cofferdam at times and some groundwater may also ingress from the base of the cofferdam. As such any groundwater ingress and rainwater will be pumped out via bowser and taken off-site to a suitably licensed facility for treatment/ disposal.*

- Chapter 18 Lands, Soils, Geology & Hydrogeology Section 18.4.1: *Limited dewatering including of groundwater ingress will take place from within constructed cofferdams at bridge foundations and piers. Groundwater ingress will be pumped out via bowser and taken off-site to a suitably licensed facility for treatment/ disposal;*

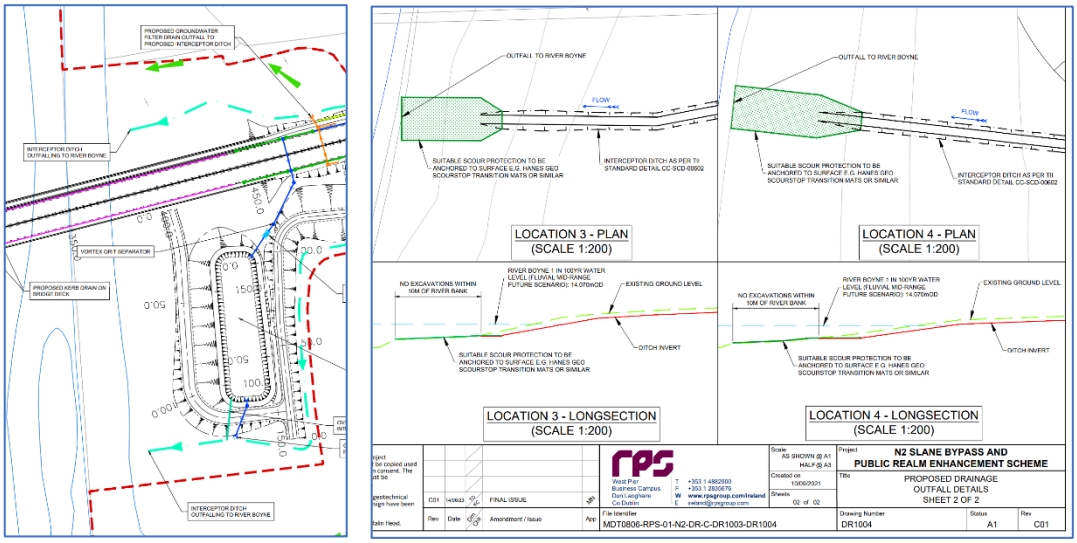
The NIS measures suggest that pH monitoring and adjustment will be required prior to discharge to attenuation pods, and that otherwise the discharge will be tankered to a licenced facility. It's generally unclear if the attenuation ponds have been sized/designed to account for the expected ingress volumes of water arising during this process given the apparent discrepancy in expectations.

References to design of these ponds is described in terms of operational stage run-off. There is no further detail in the Water Chapter of the EIAR. The subsoils in the area are alluvial sands and gravels, and so I would concur with the ecologists assessments that the excavation will constantly fill to the level of the adjacent river. I am also not personally aware of licenced facilities that accept such wastewater. The measures in the NIS clearly state that the cofferdam discharges shall not be discharged to the environment or the river, but to ensure any uncontrolled releases have no potential to occur, clarity should be sought on the efficacy of the proposed water management system. It is recommended that further information is sought regarding the efficacy of the proposed water management system as set out in Section 5.

Scour mats

There is an exclusion zone of 10m from the top of the river bank where no work will be permitted (e.g. EIAR Section 5.4.6.2, 7.3.2.2) and no instream works are proposed, however there is reference to an exception for outfalls in a few sections of the NIS e.g. Section 6.2.1.1.1. '*no in-stream works (other than the construction of four outfalls) are proposed*' (in the SAC). This is presumed to relate to the works required to install the overflow scour protection mats (5.4.8.1) which are to be pinned to the ground-surface between the outfall and the riverbank. Such works would be expected to be short-term and small in scale, however they are not clearly described in the NIS, nor any specific mitigation measures provided**.** Mitigation measures required might include limiting machinery access (i.e. hand-laying of mats) and timing of works. It is recommended that further information is sought to identify any implications for the Biodiversity or AA assessments, as set out in Section 5.

On the left an excerpt from drainage drawing DR0003 shows 2 no. interceptor ditch outfalls to Boyne from east side of river (bright green colouring) but stopping short of the banks (likely the 10m exclusion zone). On the right drawing DR0004 shows the scour mat areas in green within this zone.



Alkaline fen, Crewbane Marsh & Groundwater flow

Alkaline fen was excluded from consideration at AA Screening stage as it was not found within the footprint of the works, and is not mapped downstream in the Boyne. Where unmapped areas of habitat are know to occur, on a precautionary basis impacts to Alkaline fen should be considered.

With regard to adverse effects to any unmapped areas of this habitat downstream arising from water quality risks, air pollution or invasive species, the measures provided in the NIS are considered sufficiently robust to protect any downstream occurrences of this habitat from these impact sources.

The conservation interests of Crewbane Marsh pNHA, less than 1km east of the scheme, are briefly described in the Terrestrial EIAR Biodiversity Assessment but do not refer to any groundwater-dependant habitats. The geological maps however (Chapter 18, Fig 18.2) show there is an area of 'BminPD - Surface Water/ Groundwater Gleys Shallow Basic' at the Crewbane Marsh, with the chapter also noting the presence of a swallow hole in Crewbane. It is further noted that the available pNHA synopses (Goodwillie, 1992)[10] refer to fen habitat at this location. This tallies with information in the submission from Mr Jack Rogers regarding tufa springs at this location, through it is noted this information does not appear to be in the public domain. The geological conditions would suggest that Crewbane Marsh could support Alkaline fen habitat, or at least some groundwater-dependant habitats. Noting that the area is within private lands, the BSBI recorder for Meath might be able to confirm the presence of such habitats.

As fen or spring habitats have not been considered as a receptor in the AA or EIAR Biodiversity assessments, the question of whether impeded groundwater flow paths could alter conditions at Crewbane marsh is not addressed. In seeking to close out this risk pathway I could not find reference to explicit assessment in Chapter 18 (Lands, Soils, Geology & Hydrogeology) of the potential for proposed rock excavations, frequently referenced in the project description, to alter any groundwater flow paths, and its unclear whether rock removal at all is assessed in this chapter as it is only referenced in the context of the Boyne Valley Geological site as a receptor. It is therefore unclear if such risks have been sufficiently excluded, and if the extent of the zone of influence of any hydrogeological flow impacts has been established. Given the offset of nearly 1km, the risks to any habitats seem likely to be low, but there is not sufficient information to close out risks from this pathway entirely.

It is recommended that further information is sought to ensure unmapped Alkalkine fen is included in the AA Screening, and to consider potential effects on Crewbane Marsh pNHA, as set out in Section 5.

Air Quality – Nitrogen Deposition

Nitrogen deposition risks are not assessed for habitats other than 4 no. pNHA's that are closest to the scheme area. Reviewing the Air quality chapter suggests this may be due to the fact that the authors of that report considered risks to the SAC and pNHA's in the context of Alkaline fen habitat, presumably without consultation with the ecologists given its exclusion from the ecological assessments. As noted this habitat was not identified within the zone of influence of the scheme, and not brought forward for assessment in the NIS or Terrestrial EIAR. The air quality chapter did not consider risks to other habitats.

Given this review considers that on a precautionary basis, Annex I Alkaline fen and alluvial woodland may occur in close proximity to the scheme, the risks of nitrogen deposition on these habitats are discussed below.

[10] https://www.npws.ie/sites/default/files/publications/pdf/Goodwillie_1992_ASI_Catalogue.pdf

Critical nitrogen deposition loads, intended to account for long-term effects and resilience of ecosystem function, have been collated for Irelands Annex I habitats by (Kelleghan *et al*, 2022[11]). The critical load of 15-25kg/ha/year for Alkaline fen quoted in the air quality chapter is made with reference to a German document, however Kellaghan *et al* (2022) similarly specify a threshold for Alkaline fen (15-30 kg N/ha/year), as well as a change point for Alluvial woodland (15.3 kg N/ha/year).

The air quality assessment (10.4.2.4) states that the scheme results in an increase of 0.04kg/ha/year of nitrogen deposition in the immediate area of the proposed bridge crossing, which is below the 1% critical load employing TII significance criteria, and is therefore not considered to be a significant impact. By way of comparison, the EPA set a threshold of 0.3kgN/ha/year for screening-in for AA for agricultural emissions (EPA, 2023[12]). With these criteria met at the SAC bridge crossing, any habitats further offset will also remain unimpacted. On this basis the potential for adverse effects to the SAC habitats, or significant effects to pNHA habitats can be excluded.

No further action is required.

Wintering birds

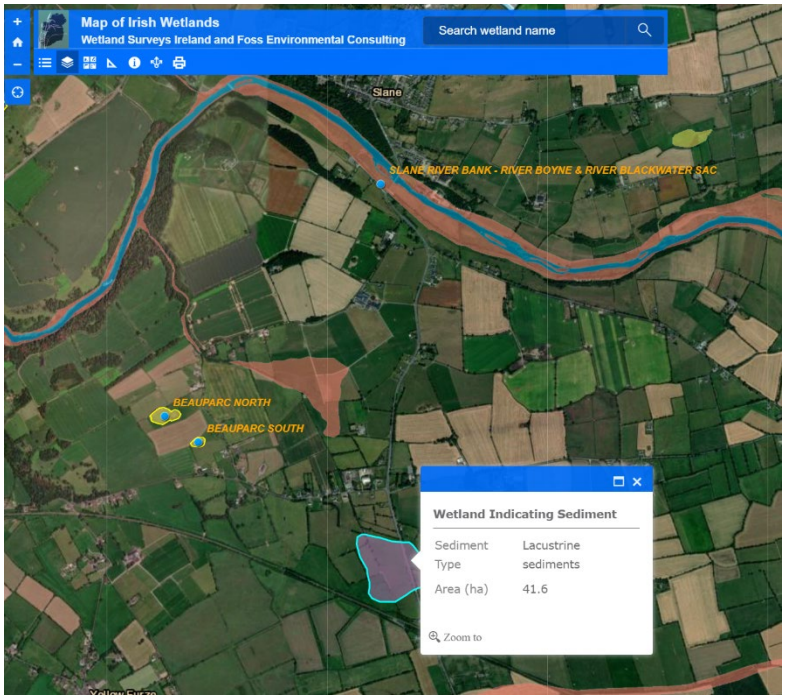
The analysis of disturbance/displacement affects for both the construction and operational stages is vague given the available data to inform the assessment, e.g. *highly likely that displaced golden plover and northern lapwing will be able to relocate to proximal habitat that offers similar feeding opportunities* (NIS Section 6.5.1.1.1.1). Similar statements are included in the Terrestrial EIAR Biodiversity Assessment for wintering birds. Given the extent of the baseline surveys undertaken, there is no clear analysis of which areas may be of most importance for wintering bird species in the scheme area, which would help justify the exclusion of displacement/disturbance risks (i.e. whether areas in the vicinity of the scheme are intermittently or regularly used). The statement that the considered SCI species were primarily recorded flying over the scheme is noted, and appears to refer to the findings of the vantage point surveys, but numerous records of these species are also presented in the tables in Appendix 15.2 associated with overwintering wildfowl and farmland surveys.

Overwintering wildfowl surveys were carried out across 3 winter seasons from 2019 to 2022, but no wildfowl species were recorded for the last survey (4 no. visits). In 2019/2020 (Figure 12) overwintering Lapwing and Golden Plover were recorded in a field ca. 500m the south of McGrunders Cross. This field is mapped as a known wetland location (see image below)[13], and is likely to be attractive to wintering wildfowl.

[11] Kelleghan, D.B., Fogarty, M., Welchman, S., Cummins, T., & Curran, T.P. (2022) Agricultural atmospheric ammonia: identification & assessment of potential impacts. *Irish Wildlife Manuals*, No. 135. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

[12] EPA (2023) Licence Application Instruction Note 1 (JN1) Assessment of the Impact of Ammonia and Nitrogen on Natura 2000 sites from Intensive Agricultural Installations. Version 2.0 March 2023.

[13] https://www.wetlandsurveys.ie/miw-intro



A map is not provided for the 2020/2021 records, but with reference to OSI maps location many of the records again seem to be associated with this area, with some sporadic records in other places. Considering disturbance risks, the other sites listed that are also set back from the scheme area (Turustianstown is south of McGrunders cross, Crewbane and Rosnaree are ca. 1km east, Higginstown is ca. 1km north and Taylors Lane (where Whooper swan were noted to regularly occur) ca. 2km east. Only SCI birds recorded at Mooretown, between the N51 and N2, are potentially within vicinity of the route, but this does not appear to be a regularly-visited site. Winter farmland bird surveys also observed Lapwing and Golden Plover, though locations or maps of records are not given.

Many waterbird species exhibit high sensitivity to noise or visual disturbance (Cutts et al, 2013[14]; Goodship & Furness, 2022[15]). The evidence-based disturbance thresholds specified for the qualifying interests in the Cutts et al (2013) toolkit are 300m for Golden Plover, and 200m for Lapwing, while Goodship & Furness (2022) quote a distance of 140-290m for Golden Plover. On the basis of this examination of the data (where location-specific information is provided), it seems reasonable that the risks associated with disturbance, lighting, noise can be excluded as regularly-used SCI bird areas are sufficiently offset from the scheme footprint, however for certainty, the assessment authors should provide clarity on this matter.

It is recommended that further information with regard to core bird usage areas, and disturbance thresholds of SCI's, is sought as set out in Section 5.

Kingfisher

With regard to construction and operational-stage disturbance, the surveys undertaken do not identify breeding sites or suitable habitat in the vicinity of the bridge crossing, though the territory of Kingfisher associated with the closest known breeding site (2020) could include the bridge crossing

[14] https://www.tide-toolbox.eu/tidetools/waterbird_disturbance_mitigation_toolkit/
[15] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

areas and Kingfisher will forage or commute along the Boyne channel. There is no detailed consideration of disturbance triggers or responses for this species e.g. with reference to Goodship & Furness (2022[16]), in the context of the nature of the project, to support the statements made with regard to the sensitivity of this species to disturbance. There is also an inconsistency between the NIS and EIAR Terrestrial Biodiversity assessments for Kingfisher, with the latter suggesting mitigation measures for disturbance impacts (at international scale) are required, but specific reference to such measures in the mitigation section could not be found. Furthermore, new site-specific conservation objectives have been published for the SPA (July 2024), and there is an opportunity to assess the impacts of the scheme with reference to these detailed objectives. It is recommended that further information is sought to confirm all necessary mitigation measures have been applied, and to review the assessment in the context of the new conservation objectives, as set out in Section 5.

Bats

The reference quoted with respect to Bats and lighting (BCI, 2010) is not provided. This reference is as follows:

- Bats and Lighting – Guidance Notes for Planners, Engineers, Architects, and Developers (Bat Conservation Ireland, 2010).

The protective measures for bats at the end of Appendix 15.5 are not fully captured in the Terrestrial EIAR Biodiversity mitigation section.

There is also a discrepancy regarding the number of trees considered to have bat roost potential between the appendix and the Terrestrial EIAR Biodiversity Assessment (34 in appendix and 31 in the Biodiversity chapter), however this would be addressed by the pre-construction surveys proposed.

These are relatively minor issues that would likely be dealt with by the project ecologists, but the EOP should be adjusted to capture the measures in Appendix 15.5, which can be addressed in the planning conditions.

It is recommended that a planning condition is included to ensure protective measures specified for bats are fully captured in the EOP. Suggested text is included in Section 6.

Badgers

Given the predicted impact on the badger population, the feasibility of providing mammal passes should be explored, or a justification provided as to why they cannot be provided.

There are inconsistent references to the number of badger setts being lost e.g. references to 2 or 5 setts lost from the Cullen/Fennor badger group, and the total setts listed in Section 15.6.1 does not add up to the quoted 15. An artificial sett is being provided to mitigate impacts to the Mill house badger group, but not the Cullen/Fennor badger group.

It is recommended that further information is sought in order to have confidence that impacts to badgers have been offset insofar as is possible, as set out in Section 5.

[16] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Landscape/Planting mitigation

Specific Landscape Mitigation measures are specified in Chapter 12, Table 12-38 and shown in Figure 12.7. This references new woodland planting and new hedgerow planting, the latter to reform field boundaries and integrate with the landscape. This mitigation is referenced in the Terrestrial EIAR Biodiversity Chapter.

It is recommend that, based on more detailed surveys of woody habitat features, the Board should condition the provision of a detailed ecologically-informed landscape/planting plan which should take account of the following:

- The plan should identify where hedgerow vegetation is to be reinstated, as opposed to strips or rows of trees. Hedgerow requires specific long-term management in order to maintain a hedgerow structure. The plan should also prescribe long-term management proposals for woodland blocks/belts, which may not reach their ecological potential unless these areas are monitored with periodic interventions undertaken beyond the 5 year establishment phase e.g. removal of diseased trees, thinning to create light and release slower growing species, retention of certain deadwood features. The plan should therefore specify restoration objectives for specific areas of planting, and include for long-term management of these habitats.
- In certain cases reference is made to a high percentage of evergreen species for visual screening. Given the few native evergreen tree species (Scots pine, holly, yew), this will need to be balanced with delivering ecologically appropriate mixes of trees based on targeted woodland type, soil characterises, drainage, aspect and exposure.
- There is also reference under SLM 11 to removal of SAC woodland, this appears to relate to the area of WD1 (mixed broadleaved woodland) which intersects the SAC boundary, rather than any Annex I habitat, of which there is none within the scheme footprint. It is recommended that soil and material be removed and retained for re-use. Viewed from afar during my site visit (see Photo 1 – woodland on northern slope), this woodland appears to contain high proportion of ash subject to dieback, and so removal of soils may lead to a lot of ash regrowth, potentially making management of the replanted area challenging.
- There is also reference to the replanting of riparian margins with a wet woodland mix at this location. Any planting within the SAC would need to be agreed with NPWS. It is noted that there is commitment to Habitat restoration and Monitoring plan for this part of the SAC and so any planting proposals would be expected to form part of this plan.

<u>It is recommended that a planning condition is included to define requirements for a detailed landscaping/planting/restoration plan. Suggested text is included in Section 6.</u>

Habitat surveys of wooded features and drainage ditches

Habitat surveys do not present sufficient detail on the quality of hedgerows and treelines to appropriately inform future landscaping and restoration proposals. There is also a lack of information on the ecological condition of drainage ditches, and their association with hedgerow features. Finally, woodland habitat descriptions are missing (due to missing page) and a proper assessment of the potential for the nearest wet woodland habitats to meet Annex I criteria has not been made. It's noted that in the cited consultation exercise in the NIS that NPWS recommended that the quality of woodland to the north of the river and within the SAC boundary be checked.

It is recommended that further information is sought, so that wooded habitats are fully and accurately described, as set out in Section 5.

Despite the presence of potential Annex I woodland in close proximity to the scheme, it is clear that this area will not be directly impacted. The mitigation measures provided to protect water and air quality and prevent the spread of invasive species, notwithstanding the queries regarding cofferdam water ingress, will serve to sufficiently protect this area of wet woodland.

No further action is required with regard to assessing adverse effects to potential Alluvial woodland habitat.

BSBI database

The BSBI database was checked for Flora Protection Order species and none were found for the scheme area. At the 10km scale (N97), records of *Juncus compressus* are noted, as per the site synopsis referenced in the Terrestrial EIAR Biodiversity Chapter. Otherwise, notable 3rd schedule invasive species, not referenced in the reports are *Elodea canadensis* (N9673) associated with the canal, and Rhododendron (Drivers Wood, N9674). As no instream works are proposed *Elodea* unlikely to be encountered, while Drive wood is located adjacent to the N2 in Slane and separated by a wall and so will not be at risk of spread from the public realm elements of the scheme. There are no apparent gaps in the assessment with regard to protected or invasive species within or adjacent to the footprint of the scheme. As noted above, consultation with the Meath BSBI recorder could be undertaken with regard to clarifying the habitats present in Crewbane Marsh pNHA.

Refer to further information sought in regard to Crewbane Marsh pNHA.

Boyne Greenway

It would have been reasonable to take account of the ecological interactions between the Boyne Green way (Navan to Slane) proposals together with the proposed Slane bypass in considering cumulative/in-combination impacts at Appropriate Assessment stage and in the EIAR Biodiversity Assessments. Cumulative effects are excluded on the basis that the greenway will be subject to its own AA requirement. As noted in the review of the AA Screening, the fact that projects may be subject to AA, and mitigation measures prescribed, does not preclude combined-effects as cumulative effects can arise from numerous non-significant impacts. Furthermore, in this case it is more of a synergistic effect that arises in the context of the operational stage of both developments through the provision of easier access to the future greenway provided by the Slane bypass scheme, facilitating greater use of the greenway, which is one of the stated objectives of the bypass project. Various submissions also mention the greenway in the context of increased usage, including the potential for Slane to be an associated tourism hub.

The preferred route for the Boyne greenway between Navan and Slane was published in December 2023 and while not available to the applicant as the reports were finalised, given data was received from the consultants undertaking surveys for the greenway, and included in this application, and that both applications are proposed by Meath County Council, there should be recourse to seek further details of the scheme and proposed mitigation measures.

The proposed route in the vicinity of Slane follows the existing towpath to the south of the river, which is currently a rough track and frequented by walkers but unlikely to be used much by cyclists. Appendix 15.7 (Otter Survey records) indicate frequent use of this towpath by otter, and this was also

observed during my site visit with numerous paths suggesting otter are crossing between the canal and river. Ongoing disturbance risks to important ecological features such as otter and Kingfisher from increased use of their habitat have the potential to affect their conservation status.

It is recommended that further information is sought with regard to cumulative assessment with the Boyne Greenway, as set out in Section 5.

4. Summary of Implications for AA determination and EIAR decision

The need for Appropriate Assessment of the scheme was correctly screened-in by the Applicant and an NIS prepared. With regard to Appropriate Assessment conclusion, and the application of the integrity test, having reviewed the gaps/weaknesses of relevance to the AA in Section 3, I consider that further information is required to enable the Board to remove all reasonable scientific doubt as to adverse effects on the integrity of the River Boyne and River Blackwater SAC and SPA, alone and in-combination with other plans and projects. Specifically:

- Potential weaknesses regarding water management proposals related to cofferdam use need to be addressed, and an assessment of any mitigation measures required for the installation of scour protection mats within the floodplain exclusion zone carried out;
- A pathway for impacts to potential groundwater-dependant fen habitats needs to be ruled out;
- Disturbance effects to Kingfisher and Wintering birds need to be ruled out; and
- A robust assessment of the operational stage of scheme in-combination with the Boyne Greenway should be carried out.

Further to the above, which is also relevant to the EIAR Biodiversity Assessments, the following information is required to confirm that significant effects to important ecological features can be ruled out in the EIAR:

- An assessment of any impacts to groundwater flow paths to Crewbane Marsh pNHA is needed;
- Confirmation that significant effects to badger have been reduced insofar as possible;
- Provision of habitat descriptions of woody habitats, including potential Annex I Alluvial Woodland;
- Further information regarding linear habitat features is needed, in order to provide a robust basis to inform a detailed landscaping/planting restoration plan.

5. Further Information Request

Cofferdams and water management during construction:

There are inconsistencies in the description of potential water ingress to the cofferdams during bridge construction between the NIS, Chapter 5 and Chapter 18 with references to both 'constant ingress' and 'limited dewatering'. With regard to the proposed use of the attenuation ponds for water management during this phase of construction, or potential tankering, it is unclear whether the level of water ingress has been quantified and the water management system designed accordingly. The applicant shall provide calculations on the expected volume of ingress to the cofferdams during the construction phase, with cognisance of the alluvial subsoils, together with the capacity of the attenuation ponds to treat the expected volumes. If tankering is proposed, clarify the expected number of tanker trips and confirm disposal facility options.

River bank exclusion zone:

An exception is noted to the 10m exclusion zone from the river bank (e.g. NIS Section 6.2.1.1.1.) for the construction of four outfalls. The applicant shall clarify if this relates to the scour mats shown in drawing DR0004. As there is no further reference to these works in the NIS or EIAR Biodiversity chapters, provide an assessment of same, and describe any mitigation measures (e.g. manual installation, timing of works) required to avoid adverse effects to qualifying interest of the European sites, or any other habitats, flora or fauna.

Potential groundwater dependant habitats:

On a precautionary basis, the applicant is requested to have regard to the potential for unmapped areas of Alkaline fen habitat in the AA Screening, as stated in the site-specific conservation objectives for The River Boyne and River Blackwater SAC, and consider whether likely significant effects can be excluded. If likely effects cannot be excluded, the adequacy of the mitigation measures in the NIS should be considered in the context of the conservation objectives for this qualifying interest.

Available information suggests that groundwater-dependant habitats may occur within Crewbane Marsh pNHA, with soil mapping showing groundwater gleys at this location, and Goodwillie (1992) *Information on Areas of Scientific Interest* report (available on npws.ie) referencing fen habitat at this location. A submission (Mr Jack Rogers) also references tufa springs at Crewbane. Given the location of this site in private lands, the applicant should engage with the BSBI recorder to see if they have any further data on habitats within the site. A pathway for impacts via potentially impeding groundwater flows to groundwater-dependant habitats the process of excavating the road cuttings has not been identified in

the EIAR Biodiversity assessments. The applicant is requested to confirm whether there is the potential for any groundwater flow paths to Crewbane Marsh pNHA to be altered by the proposed road cutting and any associated rock excavations. This shall be confirmed by a hydrogeologist, and any consequences for the AA or EIAR Biodiversity assessments addressed by the applicant's ecologist's.

Wintering Birds:

The applicant shall, through the provision of updated bird use maps, confirm locations of Golden Plover and Lapwing recorded during the winter farmland bird surveys (Appendix 15.2, Table 26, 27 and 28) and during the overwintering wildfowl surveys undertaken in 2020/2021 (Appendix 15.2, Table 33). These maps should identify any core roosting and foraging areas used by these species, such as the mapped wetland at McGrunder's cross (refer to www.wetlandsurveys.ie mapping). With reference to published disturbance thresholds (e.g. Cutts et al (2013) *Waterbird disturbance mitigation toolkit*; Goodship & Furness (2022) *Disturbance Distances Review. NatureScot Research Report 1283*), the applicant should then highlight any implications for the assessment of adverse effects on the integrity of European Sites.

Kingfisher:

Provide a revised assessment of any potential disturbance effects to Kingfisher during construction and operation of the project, addressing current inconsistencies between the NIS and Terrestrial EIAR Biodiversity assessment with regard to noise/vibration impacts, and describe any mitigation measures required. The assessment should be carried out with reference to disturbance triggers and thresholds for this species, and to the recently updated site-specific conservation objectives for the River Boyne and River Blackwater SPA.

Badger:

Confirm the number of badger setts being lost as a result of the scheme, as there are inconsistent references in the Terrestrial EIAR Biodiversity assessment. Demonstrate that the opportunities for mitigating impacts to the badger population have been maximised, including the feasibility of installing mammal passes and the provision of additional artificial setts.

Linear Woody Habitats and Drainage Ditches:

The description of woody habitat features is not considered sufficiently robust to inform adequate and area-specific planting/restoration proposals. The applicant shall provide a more detailed description of linear woody habitats, and highlight any features of significance e.g. banks, ditches, double-rows, mature hedgerow, with reference to Foulkes et al (2013*) Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal*. Woodlands of Ireland, Dublin. (available at https://www.woodlandsofireland.com/).

Woodland:

Woodland habitat descriptions are missing from the Terrestrial EIAR Biodiversity assessment due to a missing page. In providing the missing information on wooded habitats, the applicant should include a detailed description of the vegetation composition of the wet woodland habitat adjacent to the scheme (nearest mapped area of WN5 to the Boyne crossing on north bank) and classify this habitat with regard to the Irish Vegetation Classification system (noting crossover's with Annex I habitat), the EU Interpretation Manual for Annex I habitats, and the conservation condition criteria detailed in O'Neill et al (2013) *Results of monitoring survey of old sessile oak woods and alluvial forests.* Irish Wildlife Manuals, No. 71. (available on npws.ie).

Boyne Greenway:

One of the stated objectives of the bypass project is to facilitate greater use of the proposed Boyne Greenway (Navan to Slane). The potential for synergistic cumulative impacts therefore potentially arises from the operational stages of both developments, and cumulative effects cannot be excluded solely on the basis that the greenway will be subject to its own AA requirement. Such impacts may have potential to result in adverse disturbance effects to otter and Kingfisher associated with the River Boyne and River Blackwater SAC and SPA respectively. The applicant shall provide an assessment of the cumulative ecological effects of the operational stages of both developments.

6. Potential Planning Conditions

Bats

The Project ecologist shall update the Environmental Operating Plan to take account of the tree removal measures specified at the end of Appendix 15.5 (Preliminary bat roost assessment).

Landscaping/Planting Plan

The applicant is requested to provide an ecologically-informed landscaping/planting plan which should take account of the following:

- Identify where hedgerow's are to be reinstated (as opposed to strips or rows of trees).
- Specify ecological restoration objectives for specific areas of planting. Where a semi-natural woodland type is the specific restoration objective, prescribe long-term management proposals for woodland blocks/belts, which may not reach their ecological potential unless monitored with periodic interventions undertaken e.g. removal of diseased trees, thinning to create light and release slower growing species, retention of certain deadwood features. Hedgerow requires specific long-term management in order to maintain a hedgerow habitat structure.
- Where soil from removed woodland areas is to be reused for woodland creation, woodland creation and management proposals shall take account of the potential for regrowth of ash with dieback.
- Any planting of riparian woodland within the SAC shall be agreed with NPWS.

Ecological Review

Slane Bypass Project

(ABP: 318573-23)

Review of Applicant's Response

January 2025

Report for An Bord Pleanála By:

Kate Harrington M.Sc. MCIEEM

Contents

7. Scope of Review

This document comprises a review of the responses to the additional information request provided by the Applicant in the following document:

Meath County Council (MCC) Slane Bypass and Public realm Enhancement Scheme, Additional Information Response Document. December 2024. ABP-318573-23. Available at: https://www.pleanala.ie/en-ie/case/318573

Comments are provided on each response item in the next section.

8. Response to Further Information Request

Item 3(a) Cofferdams and water management during construction

There are inconsistencies in the description of potential water ingress to the cofferdams during bridge construction between the Natura Impact Statement, Chapter 5 and Chapter 18 with references to both 'constant ingress' and 'limited dewatering'. Regarding the proposed use of the attenuation ponds for water management during this phase of construction, or potential tankering, it is unclear whether the level of water ingress has been quantified and the water management system designed accordingly. The applicant shall provide calculations on the expected volume of ingress to the cofferdams during the construction phase, with cognisance of the alluvial subsoils, together with the capacity of the attenuation ponds to treat the expected volumes. If tankering is proposed, clarify the expected number of tanker trips and confirm disposal facility options.

Comment on Applicants Response:

The detailed analysis provided confirms seepage rates will be low, and as such the constant ingress referenced will not result in large volumes of water requiring management. The number of tanker trips is low given the 11 month timeframe. The proposed water management measures can therefore be considered adequate to negate any risks to the environment and River Boyne, and clarify uncertainties noted in the original documentation. The applicant has provided a detailed and robust assessment that addresses the information sought.

Item 3(b) Riverbank exclusion zone:

An exception is noted to the 10m exclusion zone from the river bank (e.g. NIS Section 6.2.1.1.1.) for the construction of four outfalls. The applicant shall clarify if this relates to the scour mats shown in drawing DR0004. As there is no further reference to these works in the NIS or EIAR Biodiversity chapters, provide an assessment of same, and describe any mitigation measures (e.g. manual installation, timing of works) required to avoid adverse effects to qualifying interest of the European sites, or any other habitats, flora or fauna.

Comment on Applicants Response:

Clarification has been provided with regard to the location, design and installation of the scour mats, which will be installed manually over the ground surface in a few hours and will not require instream access. No further mitigation measures to those already specified in the EIAR or NIS are required, and the outcomes of these assessments are not altered. The applicant has provided a detailed and robust assessment that addresses the information sought.

Item 3(c) Potential groundwater dependant habitats:

On a precautionary basis, the applicant is requested to have regard to the potential for unmapped areas of Alkaline fen habitat in the AA Screening, as stated in the site-specific conservation objectives for The River Boyne and River Blackwater SAC, and consider whether likely significant effects can be excluded. If likely effects cannot be excluded, the adequacy of the mitigation measures in the NIS should be considered in the context of the conservation objectives for this qualifying interest.

Available information suggests that groundwater-dependant habitats may occur within Crewbane Marsh pNHA, with soil mapping showing groundwater gleys at this location, and Goodwillie (1992) Information on Areas of Scientific Interest report (available on npws.ie) referencing fen habitat at this location. A submission () also references tufa springs at Crewbane. Given the location of this site in private lands, the applicant should engage with the BSBI recorder to see if they have any further data on habitats within the site. A pathway for impacts via potentially impeding groundwater flows to groundwater-dependant habitats the process of excavating the road cuttings has not been identified in the EIAR Biodiversity assessments. The applicant is requested to confirm whether there is the potential for any groundwater flow paths to Crewbane Marsh pNHA to be altered by the proposed road cutting and any associated rock excavations. This shall be confirmed by a hydrogeologist, and any consequences for the AA or EIAR Biodiversity assessments addressed by the applicant's ecologist's.

Comment on Applicants Response:

The applicant has undertaken specialist botanical surveys of the relevant areas identifying Annex I quality tufa springs and alkaline fen within Crewbane marsh pNHA, and an area of non-Annex I tufa formation outside the pNHA to the south of the River Boyne. They developed a hydrogeological conceptual site model which defines the hydrological Zone of Contribution (ZoC) (area contributing water) to Crewbane Marsh pNHA. They then quantified the potential loss in groundwater recharge area and volume to this ZoC as 0.11% and 0.18% respectively. They confirm that this impact is of imperceptible significance and will not adversely affect the groundwater dependent terrestrial ecosystems (GWDTE) within and around the pNHA. Groundwater flows will be affected to a max of 82m from the road cutting, and flowpaths to the pNHA , which is 650m away at its closest point, would not be impacted. They also confirmed that due to the nature of the bedrock underlying the scheme, groundwater flow in the aquifer will be shallow and diffuse, and hydrological connectivity within it not be altered by the Proposed Scheme. On this basis the ecological assessment concludes that the finding of no likely significant effects to alkaline fen within the River Boyne and Blackwater remains valid due to the nature and scale of the impact and the location of the sensitive habitats. On a similar basis the significant effects to the tufa spring habitats can be excluded. No amendments to mitigation measures outlined in the NIS or EIAR are required. The applicant has provided a detailed and robust assessment that addresses the information sought.

While the applicant references the stage 1 AA screening test in its conclusion with regard to alluvial fen (Appendix C, Section 1.3), the Board could consider that likely significant effects should not be excluded at AA screening stage in line with other qualifying interests of the River Boyne and River Blackwater SAC, but it can have confidence that, given the detailed assessment presented, the Stage 2 test of no significant effects is met.

Item 3 (d) Wintering Birds:

The applicant shall, through the provision of updated bird use maps, confirm locations of Golden Plover and Lapwing recorded during the winter farmland bird surveys (Appendix 15.2, Table 26, 27 and 28) and during the overwintering wildfowl surveys undertaken in 2020/2021 (Appendix 15.2, Table 33). These maps should identify any core roosting and foraging areas used by these species, such as the mapped wetland at McGrunder's cross (refer to www.wetlandsurveys.ie mapping). With reference to published disturbance thresholds (e.g. Cutts et al (2013) Waterbird disturbance mitigation toolkit; Goodship & Furness (2022) Disturbance Distances Review. NatureScot Research

Report 1283), the applicant should then highlight any implications for the assessment of adverse effects on the integrity of European Sites.

Comment on Applicants Response:

The applicant has provided additional detail with regard to location of Golden Plover and Lapwing recorded during the scheme surveys, the numbers of birds occurring, and their disturbance/distance thresholds. Detailed maps are provided. No regularly occurring populations of lapwing occur within the scheme area, or within the disturbance buffer (200m) for this species. For Golden Plover, there were no sightings within the footprint or within the disturbance buffer (500m) for this species. The clarifications provided have no implications for the NIS assessment. The applicant has provided a detailed and robust assessment that addresses the information sought.

Item 3(e) Kingfisher:

Provide a revised assessment of any potential disturbance effects to Kingfisher during construction and operation of the project, addressing current inconsistencies between the NIS and Terrestrial EIAR Biodiversity assessment with regard to noise/vibration impacts, and describe any mitigation measures required. The assessment should be carried out with reference to disturbance triggers and thresholds for this species, and to the recently updated site-specific conservation objectives for the River Boyne and River Blackwater SPA.

Comment on Applicants Response:

The applicant has clarified the noted inconsistencies and confirmed that the NIS and EIAR mitigation measures remain unchanged. They have also provided a revised assessment with referenced to the latest conservation objectives.. They further provided some additional data with regard to barn owl, which confirms there will be no significant effect to that species. The applicant has provided a detailed and robust assessment that addresses the information sought.

Item 3(f) Badger:

Confirm the number of badger setts being lost as a result of the scheme, as there are inconsistent references in the Terrestrial EIAR Biodiversity assessment. Demonstrate that the opportunities for mitigating impacts to the badger population have been maximised, including the feasibility of installing mammal passes and the provision of additional artificial setts.

Comment on Applicants Response:

The applicant has clarified the noted inconsistencies with regard to number of badger setts subject closure and has provided a list of those that will be temporarily or permanently closed together with their sett status, usage and type. Of the setts to be removed permanently, only one is a main sett, with other setts used intermittently to various degrees.

They have also confirmed a range of enhanced mitigation measures to reduce impacts on the badger population, including 6 additional dedicated badger/mammal underpasses, an additional artificial sett, and additional mammal-proof fencing.

With the provision of further mitigation measures, the impacts to the badger population are further reduced. Increased accessibility via the underpasses will facilitate badgers seeking alternative

suitable sett sites. In the medium-long term significant effects to the local population should be offset. It is unclear in Section 15.7.2 of the Terrestrial Ecology Chapter if proposed operational-phase monitoring of mammal resistant fencing for 3 years post-construction also includes for monitoring of artificial setts. Post-construction monitoring of all badger mitigation measures should be undertaken, with adaptive management as required (e.g. if artificial setts remain unoccupied and ecologists consider it appropriate to re-install setts in alternative locations). Such a flexible approach is reasonable given the extent to which the local habitat is being altered for this species, and natural variance in population dynamics. The Board could specify this monitoring approach in a planning condition (suggested text provided in Section 3).

Item 3(g) Linear Woody Habitats and Drainage Ditches:

The description of woody habitat features is not considered sufficiently robust to inform adequate and area-specific planting/restoration proposals. The applicant shall provide a more detailed description of linear woody habitats, and highlight any features of significance e.g. banks, ditches, double-rows, mature hedgerow, with reference to Foulkes et al (2013) Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. (available at https://www.woodlandsofireland.com/).

Comment on Applicants Response:

The applicant has provided a detailed revised hedgerow assessment based on revised field surveys. The survey information provided addresses the information request. Although not explicitly stated by the applicant, the information provided Appendix F should be used to inform the planting/restoration/landscaping proposals, which should include hedgerow features linked to the wider network and planted and maintained using hedge-laying techniques, particularly in areas where higher scoring hedgerows are to be lost. The Board could specify this requirement in a planning condition (suggested text provided in Section 3). .

Item 3(h) Woodland:

Woodland habitat descriptions are missing from the Terrestrial EIAR Biodiversity assessment due to a missing page. In providing the missing information on wooded habitats, the applicant should include a detailed description of the vegetation composition of the wet woodland habitat adjacent to the scheme (nearest mapped area of WN5 to the Boyne crossing on north bank) and classify this habitat with regard to the Irish Vegetation Classification system (noting crossover's with Annex I habitat), the EU Interpretation Manual for Annex I habitats, and the conservation condition criteria detailed in O'Neill et al (2013) Results of monitoring survey of old sessile oak woods and alluvial forests. Irish Wildlife Manuals, No. 71. (available on npws.ie).

Comment on Applicants Response:

The missing page is provided which outlines some additional habitat descriptions. In addition, as expected, the applicant has confirmed that the wet woodland habitat meets Annex I alluvial woodland criteria, though it is not in favourable condition. The applicant provides updated EIAR text with regard to the wet woodland habitat confirming its proximity and habitat classification. They do not provide similar updated text for the NIS with regard to the location of formerly unmapped areas

of this qualifying interest, however regardless of proximity this habitat will not be impacted by the scheme, and so the NIS conclusions remain valid. Additional mitigation required marking off/excluding access to the nearest wet woodland habitats has been provided.

Item 3(i) Boyne Greenway:

One of the stated objectives of the bypass project is to facilitate greater use of the proposed Boyne Greenway (Navan to Slane). The potential for synergistic cumulative impacts therefore potentially arises from the operational stages of both developments, and cumulative effects cannot be excluded solely on the basis that the greenway will be subject to its own AA requirement. Such impacts may have potential to result in adverse disturbance effects to otter and Kingfisher associated with the River Boyne and River Blackwater SAC and SPA respectively. The applicant shall provide an assessment of the cumulative ecological effects of the operational stages of both developments.

Comment on Applicants Response:

The applicant has considered the potential for adverse effects due to a change in recreational usage as a result of the scheme. They note evidence of existing recreational usage of the towpaths, and highlight that the proposed car park is largely to compensate for loss of on-street parking in the village. They conclude that despite facilitating additional access, in the context of ongoing recreational activity, the proposed scheme alone is not expected to result in adverse effects on otter and kingfisher. The risk of any adverse effects in-combination with the proposed Greenway project is therefore considered to be negligible

There is no NIS/EIAR to reference for the Greenway project at present. No key sensitive habitats for otter or kingfisher are identified in vicinity of the Slane towpath access points as part of the proposed scheme (i.e. areas for which the applicant has design control over for the purposes of the proposed scheme and could devise mitigation measures for if necessary). This has been further clarified by the revised kingfisher assessment provided. While otter commute along the towpath in the vicinity of the access point, they are generally active when visitors would not be using the greenway, which would further reduce the potential for interaction. Though the scheme facilitates local access, the potential impacts of the greenway on the qualifying interests, will be a matter for assessment and mitigation within the NIS and EIAR for that project. In this context, the applicants in-combination assessment is considered reasonable, and current mitigation measures in the NIS are considered adequate for the protection of qualifying interests. The greenway project will need to ensure surfacing, fencing and lighting proposals continuye to faciliate mammal access between wetland habitats on either side of the towpath, appropriate lighting, and protection of sensitive locations.

9. Conclusions

Possible planning conditions:

- **Badger Mitigation Monitoring** - Meath County Council shall appoint an ecologist to undertake monitoring of all badger mitigation measures for 3 year post-construction,

including usage of underpasses and artificial setts. Given the extent to which the local habitat is being altered for this species, and natural variance in population dynamics, an adaptive management approach shall be implemented (e.g. relocation of artificial setts if they remain unused).

- **Hedgerow restoration** - The hedgerow appraisal in Appendix F should be used to inform the Landscaping/Planting proposals. Such proposals shall include hedgerow features linked to the wider network and planted and maintained using hedge-laying techniques. These shall be focused in areas where higher value hedgerows (refer to HAS score) are to be lost.

Conditions suggested previously:

Bats

The Project ecologist shall update the Environmental Operating Plan to take account of the tree removal measures specified at the end of Appendix 15.5 (Preliminary bat roost assessment).

Landscaping/Planting Plan

The applicant is requested to provide an ecologically-informed landscaping/planting plan which should take account of the following:

- Identify where hedgerow's are to be reinstated (as opposed to strips or rows of trees).
- Specify ecological restoration objectives for specific areas of planting. Where a semi-natural woodland type is the specific restoration objective, prescribe long-term management proposals for woodland blocks/belts, which may not reach their ecological potential unless monitored with periodic interventions undertaken e.g. removal of diseased trees, thinning to create light and release slower growing species, retention of certain deadwood features. Hedgerow requires specific long-term management in order to maintain a hedgerow habitat structure.
- Where soil from removed woodland areas is to be reused for woodland creation, woodland creation and management proposals shall take account of the potential for regrowth of ash with dieback.
- Any planting of riparian woodland within the SAC shall be agreed with NPWS.