6 FLORA AND FAUNA

6.1 INTRODUCTION

1 This chapter presents an evaluation of the proposed development as set out in Chapter 6, **Volume 3B** of the Environmental Impact Statement (EIS) in relation to the potential for ecological impacts within the Meath Study Area (MSA).

2 That chapter describes the nature and extent of the proposed development, including elements of the overhead line (OHL) design and the towers. It provides a factual description, on a section by section basis, of the entire line route. The proposed line route is described in Chapter 6, Volume 3B of the EIS using townlands and tower numbers as a reference. The principal construction works proposed as part of the development are set out in Chapter 7, **Volume 3B** of the EIS.

3 The receiving environment of the MSA is described and evaluated in terms of flora and fauna. The potential impacts (direct, indirect and cumulative) of the proposed development on flora, fauna and fisheries of the MSA are evaluated and, where necessary, mitigation measures are proposed in order to avoid or reduce the severity of impacts. The potential impacts of the proposed development on European sites (sites designated as candidate Special Areas of Conservation (cSACs) or Special Protection Areas (SPAs) that form part of the Natura 2000 network) in the surrounding area have also been evaluated. This appraisal is presented separately in the form of a *Natura Impact Statement* (NIS) (refer to **Volume 5** of the application documentation).

4 The proposed development involves the construction of 165 individual steel towers, along a route totalling approximately 54.5km in length and the stringing of conductors and the earth wires that will be supported by the towers. For the purpose of this chapter, the proposed alignment is described in a south to north direction.

5 For description purposes, the proposed transmission line including towers and conductors is generally referred to as the ’alignment or line' in text here. Towers and associated conductors are the main infrastructure being developed. The ’study area' includes the route of the alignment but also the wider area in the vicinity as relevant to key ecological receptors discussed.

6 A large number of ecological studies, consultations and associated reports have been carried out to inform the baseline ecology of the receiving environment and recommended design since 2007. These have informed the ecological impact assessment and include the following:

- *Route Constraints Report* (September 2007);

- *Route Constraints Report Addendum*, (September 2007);
- *North-South 400 kV Interconnection Development Preliminary Re-evaluation Report* (May, 2011);
- *North-South 400 kV Interconnection Development Final Re-evaluation Report* (April, 2013);
- *North-South 400 kV interconnection Development Preferred Project Solution Report* (July 2013);
- Public consultation process; and
- Ecological studies (2007 – 2014).

7 These studies have informed the approach which has been taken throughout the route selection process with the aim of avoiding where possible, potential impacts on the ecological receptors identified. The approach includes avoiding locating structures on hedgerows and treelines of high ecological value, which are the main notable ecological receptors in the MSA.

6.1.1 Objectives

8 The objectives of the flora and fauna evaluation included:

- To carry out a desktop study in order to determine the previously recorded ecology of the area;
- To carry out a baseline flora and fauna survey of areas in close proximity to the proposed development;
- Evaluate the ecology of the MSA based on the results of desk and field studies and identify Key Ecological Receptors (features of ecological importance that may be sensitive to impacts from the proposed development);
- To predict the potential direct and indirect impacts of the proposed development on the flora and fauna of the area;
- To propose mitigation measures in the design, construction and operation of the proposed development so as to minimise potential impacts on flora and fauna; and
- To prepare this chapter of the EIS (Flora and Fauna) in accordance with the requirements of national and international legislation and inform the NIS (refer to **Volume 5** of the application documentation).

6.1.2 Statutory and Guidance Documents Context

9 The appraisal has been prepared in accordance with the following legislation:

- Consolidated EIA Directive 2011/92/EU;
- *Wildlife Acts 1976-2012*;
- The Habitats Directive 92/43/EEC;
- The Birds Directive 2009/147/EC;
- The European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 411/2011], as amended;
- European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 [S.I. No. 456/2011], as amended;
- European Union (Environmental Impact Assessment and Habitats) Regulations 2011 [S.I. No. 473/2011];
- European Union (Environmental Impact Assessment and Habitats) Regulations 2012 [S.I. No. 246/2012]; and
- Flora (Protection) Order, 1999.

10 In addition, in considering the ecological impacts of the proposed development in the MSA, regard was made to the following guidance and information documents:

- *Cavan County Development Plan 2014-2020*;
- Department of Arts, Heritage and the Gaeltacht (DAHG) (2011). *Irelands National Biodiversity Plan: Actions for Biodiversity 2011 – 2016*;
- Department of Environment, Community and Local Government (DoECLG) (March 2013). *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*;
- DoEHLG (2009). *Appropriate Assessment of Plans and Projects in Ireland*;
- EirGrid (2012). *Ecology Guidelines for Transmission Projects*; *A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects*;
- Environmental Protection Agency (EPA) (2002*). Guidelines on the information to be contained in Environmental Impact Statements*;

- EPA (2003*). Advice notes on current practice (in the preparation of Environmental Impact Statements)*;
- EPA (2013). *Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIS Processes: Practitioners Manual;*
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*;
- European Commission (2013). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*;
- Fossitt (2000). *A Guide to Habitats in Ireland*;
- Institute of Ecology and Environmental Management (IEEM) (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom;*
- *Meath County Development Plan 2007 – 2013*;
- *Meath County Development Plan 2013-2019*;
- National Roads Authority (NRA) (2005a). *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;*
- NRA (2005b). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes;*
- NRA (2006a). *Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 1, National Roads Authority);*
- NRA (2006b). *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes;*
- NRA (2006c). *Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin;*
- NRA (2006d). *Guidelines for the Treatment of Bats during the Construction of National Roads Schemes;*
- NRA (2009a). *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;*
- NRA (2009b). *Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority);*

- Smith et al. (2011). *Best Practice Guidance for Habitat Survey and Mapping in Ireland; and*

- NRA (2010). Guidelines on the management of Noxious Weeds and non-Native Plan Species on National Roads

6.1.3 Meath Study Area (Ecology Context)

11 A consideration of the general ecological character of the study area is important in scoping and evaluating key ecological receptors. The MSA traverses County Meath with the most northerly towers located in County Cavan. Due consideration has been given to known ecological sites that occur in the wider MSA (within 5km of the alignment), while more detailed assessment of ecological receptors has been undertaken within the likely zone of impact which is deemed to be within an 80m wide corridor centred on the alignment.

12 The landscape in this area is largely dominated by agricultural farmland, managed for livestock rearing, dairy farming and arable farmland. Fields are typically extensive and actively managed for agriculture. Field boundaries largely consist of overgrown linear hedgerows with many growing in association with more mature trees. Mature deciduous treelines occur, notably around demesnes. Areas of immature forestry are scattered throughout the alignment including several recently planted areas (2012/ 2013) predominantly in former wet grassland.

13 A general difference exists between landscape and habitats within the study area to the north of the N52 road (Towers 280 to 237) and lands further to the south (Towers 280 to 402). This southern section consists largely of relatively flat intensively managed mixed farmland (arable and livestock grazed). Two major river crossings occur in this section, at the River Boyne (near Trim) and at the River Blackwater (near Donaghpatrick Village at Teltown). This section includes a number of large demesne estates with associated mature deciduous woodland. Large fields in this section of the alignment are typically enclosed by mature, species-rich hedgerows with large mature trees. A number of these mature field boundaries will require crossing by the alignment.

14 The northern section of the MSA consists of rolling drumlins with smaller intensively managed fields typically enclosed by hedgerows. Arable land is less frequent and linear semi-natural woodland occurs at several alignment crossing points. Less managed grassland and wet grassland occurs locally, much of which has recently been drained and planted with trees. A number of lakes are located at least 0.5km from the proposed alignment in the northern section including Whitewood, Newcastle and Breaky Loughs.

15 More significant ecological features, such as designated conservation sites, semi-natural woodland, wetlands, semi-natural (unimproved) species rich grasslands, are scarce in the MSA and are largely avoided by careful line design, except where the River Boyne and River Blackwater are oversailed by the proposed alignment

16 The key static ecology features requiring consideration are the boundary hedgerows and river crossings. Treelines and rivers (including wooded riparian corridors) are the key ecological receptors requiring consideration. These habitats are also important for protected fauna as they are typically used for breeding, shelter, feeding and commuting. Mobile flocks of Whooper Swans specifically also require consideration. More significant ecological features such as designated conservation sites, and significant areas of semi-natural habitat are scarce in the area and are largely avoided by careful line design which included repeated appraisal and due consideration to ecological concerns identified during the design phase of the development.

6.1.4 Project Description

17 A detailed description of the proposed development is presented in Chapters 6 and 7, **Volume 3B** of the EIS. The key phases of the development as relevant to the evaluation of ecological impacts will consist of the construction and operational phases.

6.1.4.1 Construction Phase

18 The following activities will be undertaken during the construction phase and therefore need to be given due consideration in the evaluation of ecological impacts:

- Site clearance and any drainage requirements at tower locations to facilitate construction;
- Temporary access routes to be used by machinery during construction;
- The use of heavy machinery and associated disturbance within the 'works area' during construction;
- The excavation of soils for the installation of tower foundations and any associated drainage requirements;
- Excavations required for guard pole structures[18];
- All works associated with modifications to existing 110 kV transmission OHL;

[18] Where a conductor is to be strung over roads, protection known as guarding will be erected prior to the commencement of stringing operations.

- The use of concrete and other potentially harmful substances at each works area;
- Management, storage and disposal of excavated material during the construction;
- Locations to be used by machinery for the stringing of conductors; and
- Trimming and lopping of woody vegetation to facilitate clearance beneath the line between towers.

6.1.4.2 Operational Phase

19 The operational phase of the development will require:

- Occasional tree trimming beneath the alignment to ensure safe clearance distances around infrastructure;
- Maintenance of towers and associated equipment throughout the lifetime of the proposed development;
- Maintenance of bird diverters as the line may pose a collision risk to vulnerable bird species; and
- Monitoring of mitigation measures (including bird diverters) to ascertain and ensure effectiveness of proposed mitigation measures, with improvements being made if and as required.

6.1.5 Constraints and Technical Difficulties

20 The main constraint during the preparation of the EIS was restricted land access to undertake baseline surveys (refer to Sections 1.5.1 and 1.5.2 of **Volume 3B** of the EIS for further details on restricted access). However, notwithstanding this difficulty, a comprehensive description of the baseline ecology of the MSA, likely to be impacted by the proposed development, is presented in this chapter of the EIS. This evaluation is based on a combination of different survey approaches including:

- Walkover ecology surveys (see further information on methodology in **Section 6.2**) were undertaken on lands where access for survey was granted and at locations where the alignment crosses public roads. In all, 44 tower locations and associated alignment sections were subjected to walkover field surveys.
- Visual surveys of the route were undertaken from an extensive network of public roads throughout the MSA and at all locations where the alignment crosses public roads. This allowed a large proportion of the route to be viewed and together with

desktop sources (Geographical Information System (GIS) and aerial photo analysis) enabled a thorough consideration, identification and confirmation of habitat types and dominant species composition. In all, approximately 68 tower locations and a large number of intervening alignment sections were subjected to visual surveys.

- LiDAR (Light Detection and Ranging) imagery (refer to Section 1.5 of **Volume 3B** of the EIS for a detailed description of LiDAR and its capabilities) and other GIS datasets (including the subsoils dataset (Meehan 2004), Ordnance Survey Ireland (OSI) six inch mapping, OSI contours, OSI 1:5,000 vector mapping) were used to assist in identifying habitats along the proposed development where walkover or visual surveys were not possible.

- Regarding the flightline survey undertaken as part of the Winter Bird Survey, the enclosed nature of the landscape meant that long range visibility was limited over much of the study area, in particular south of the townland of Mountainstown (near Tower 291). This influenced the type and appropriateness of survey methods used. Appropriate survey methodologies e.g. Scottish Natural Heritage (2014) were tailored to the local environment so as to ensure the collection of quality data with the aim of identifying flightlines and accurately recording Whooper Swan distribution.

21 To overcome the difficulties with limited land access, and to ensure that appropriately robust appraisals were undertaken, a precautionary approach was adopted in the design of the proposed development. In those situations where towers are required on lands that were not subject to field survey, tower locations were selected based on the presence of habitats of low ecological value (e.g. improved agricultural grassland) thereby minimising the potential for impacts of significance associated with tower construction.

22 Further details on the methodology used in defining the baseline ecology of the study area is presented in **Section 6.2**.

6.2 METHODOLOGY

23 The ecological appraisal included three main elements to inform the baseline ecology of the MSA. These included consultation with key stakeholders, a desktop ecological evaluation, and field surveys. The approach and methodology has regard to the guidance documents listed in **Section 6.1.2**.

6.2.1 Consultation and Constraints Identification

24 As part of the overall proposed development and EIS preparation, a desktop review was carried out to identify features of ecological importance within the wider MSA and surrounding region, including a review of sites designated for nature conservation.

25 Consultation with various state agencies and environmental Non-Governmental Organisations (NGO's) was undertaken to inform the EIS. As part of the consultation on the *Preferred Project Solution Report (PPSR)* (July, 2013) these consultees were invited to comment on the preferred line design and issues to be addressed in the environmental appraisal.

26 The project ecologist consulted with the National Parks and Wildlife Service (NPWS) through the Development Applications Unit (DAU) and directly with divisional ecologists and local staff from the Northern and Eastern Division of the NPWS, Inland Fisheries Ireland (IFI), Meath County Council and Cavan County Council.

27 A summary of key meetings conducted with prescribed authorities and key NGO parties is detailed below.

6.2.1.1 National Parks and Wildlife Services (NPWS)

28 Meetings were conducted with NPWS divisional ecologists on the following dates: 21st October 2010, 26th November 2011, 13th November 2012 and 18th December 2012.

29 The outcome of these meetings was an approach to locating the vast majority of towers off hedgerows and onto agricultural land and avoiding hedgerows and treelines. The approach also included avoiding other semi-natural habitats such as wetlands and woodlands.

30 It was confirmed that flight diverters would be used for sections of transmission lines identified as being of a localised collision risk hazard for wintering birds, in particular Whooper Swan.

31 The outcome of these meetings resulted in response letters from the Department of the Arts Heritage and the Gaeltacht (DAHG) on the 13th February and 10th April 2013, refer to **Appendix 6.2, Volume 3D Appendices** of the EIS. These letters indicated that they were satisfied with the approach being adopted in relation to ecological assessment for the development, and welcomed the fact that there would be less hedgerow loss due to the modified approach (avoidance of hedgerows and treelines).

6.2.1.2 Inland Fisheries Ireland (IFI)

32 A meeting was held with IFI on 1st October 2013 which focused on water quality protection measures and significant fisheries in the MSA. During this meeting, clarification was provided to IFI regarding the proposed development works and associated risks. It was confirmed that water pollution prevention measures would be carefully considered in the EIS. No further correspondence has been received to date.

6.2.1.3 Department of Agriculture, Food and Marine (DAFM)

33 All tower locations were reviewed by the managers of the wildlife programme in the DAFM[19]. The DAFM has a very extensive database (data as recent as 2012) of badger sett locations throughout County Meath (32.17% farmland surveyed) and Cavan (38.26% farmland surveyed) which they have gained as part of the Bovine Tuberculosis (BTB) eradication programme Eradication of Animal Diseases Board (ERAD). The DAFM advised which towers may potentially disturb badger setts. In this regard, towers potentially close to a known badger sett were relocated as a precautionary measure in order to avoid potential impacts. It was however also noted that towers which offset hedgerows are also likely to avoid and / or minimise disturbance. It should be noted that information on badger sett locations collected under the ERAD programme is confidential and therefore locations are not detailed in this EIS.

6.2.1.4 BirdWatch Ireland

34 As part of ongoing consultation with BirdWatch Ireland, reports on Winter Bird Studies conducted in the MSA (October 2013) were submitted for comments.

35 A submission was received from BirdWatch Ireland on 6th November 2013 relating to this report and other ongoing EirGrid projects. This submission is included in **Appendix 6.2, Volume 3D Appendices** of the EIS. A number of key considerations relevant to the project were outlined as follows

- Ireland's obligations for protection of birds and the protection status of birds;
- Best practise guidelines to reduce the impact of power lines on birds;
- Potential impacts to sensitive bird species in particular collision and displacement impacts; and
- Required actions including required surveys to inform the assessment of potential impacts, recommendations for an Avian Protection Plan and post construction monitoring.

[19] http://www.agriculture.gov.ie/animalhealthwelfare/diseasecontrol/bovinetbbrucellosiseradicationschemes/wildlifepolicybadgers/

36 A subsequent meeting was held with BirdWatch Ireland on 11th December 2013. During this meeting BirdWatch Ireland reiterated concerns detailed in their submission, in particular, in relation to Whooper Swans and wider impacts on populations, appropriate mitigation and monitoring.

6.2.1.5 Meath County Council

37 A meeting was held with Meath County Council on 5th November 2013. During this meeting the following topics were considered; access requirements, water quality protection measures and management of soils in relation to excavation of tower foundations. It was confirmed to Meath County Council that a number of ecological data sources available for County Meath including Anon (2010), Martin J (2006) and Smith *et* al., (2011) were considered in the evaluation.

6.2.1.6 Cavan County Council

38 A meeting was held with Cavan County Council on 17th October 2013. It was outlined to Cavan County Council that the approach in the development design was to locate towers off hedgerows and to avoid other sensitive habitats such as wetlands. It was also highlighted that an extensive six years of winter bird studies has been conducted to inform the assessment of impacts on Whooper Swans and other bird species. Water quality protection was outlined by Cavan County Council as a key consideration for the construction phase of the proposed development.

6.2.1.7 An Bord Pleanála

39 The scoping opinion received from An Bord Pleanála (Appendix 1.3, **Volume 3B Appendices** of the EIS) identified the following issues as being relevant to this chapter of the EIS:

- Baseline data should include an ecological survey of all works sites at an appropriate time of the year. Where ex-situ impacts are possible survey work may be required outside of the development sites.
- Assess the impacts on flora, fauna and habitats with particular regard to:
    - Natura 2000 sites and other (proposed) sites;
    - Habitats and species listed on Annexes I, II and IV of the Habitats Directive;
    - Birds listed on Annex I of the Birds Directive and important habitats for birds including nesting, feeding / wintering areas and flight corridors;
    - Habitats that can be considered to be corridors or stepping stones for the purpose of article 10 of the Habitats Directive;

- Other species protected under the Wildlife Acts, Red Data Book species; and biodiversity in general; and
- The assessment should include the indirect effects of construction activity, including construction access, as well as long term impacts in terms of fragmentation and severance.

- An assessment of potential impacts on the aquatic environment during construction and operation, including impacts on water table levels or groundwater flow which may impact on wetland sites some distance away.
- Any proposed mitigation measures should be identified in a construction management plan which must be included as part of the EIS / NIS.
- The EIS should address the issue of invasive alien plant and animal species, and methods to ensure they are not introduced or spread.
- An assessment of the extent and cumulative impact of hedgerow removal or linear woodland loss along the route. Mitigation should include suitable planting of native species and timing of works outside the nesting season.
- Identify any requirement for licenses or derogations arising.

40 Consultees who informed this response as relevant to the flora and fauna section of the MSA included: Minister for Arts, Heritage and the Gaeltacht (Development Applications Unit), EPA, Meath County Council, Cavan County Council and Inland Fisheries Ireland. Key relevant information (relating to flora and fauna) detailed in this response, is considered in this section of the EIS.

6.2.2 Project Design Approach

41 Key project design approaches to avoid or minimise impacts (informed by a combination of: consultation outcomes, a review of known impacts of overhead electricity lines, and best practice) recommended by the project design team included:

- Avoidance of OHL development within European sites (i.e. cSACs or SPAs) and Natural Heritage Areas (NHAs) and proposed NHAs (pNHAs), except where oversailing is unavoidable at river crossings.
- Avoidance of notable semi-natural areas (non-designated – e.g. raised bogs and other wetlands, semi-natural woodland areas identified in published ecology datasets, field surveys and aerial imagery).

- Identification of non-designated ecological sites where targeted field survey was advised. Where such surveys were not possible, mitigation by avoidance was adopted.

- Minimising the development footprint and avoidance of locating towers within woodland type habitats (of some local ecological value) e.g. mature demesne woodland, linear mature semi-natural woodland.

- Sensitive siting of towers with respect to hedgerows and treelines. The siting of towers along hedgerows has only been considered where field survey allowed for adequate consideration of hedgerow quality in terms of ecological value and where impacts were quantitatively assessed.

- A minimum buffer zone of 5m to be retained between tower sites and all natural watercourses. Distances of over 20m are to be retained between tower locations and larger streams and rivers. Such buffer zones aim to minimise risks to water quality and associated sensitive aquatic receptors (e.g. salmonids and otter). A minimum buffer zone of 60m will be retained between tower sites and the River Boyne and River Blackwater. In the case of some minor drains / highly modified stream banks a minimum of 5m buffer will be retained.

- Avoidance of potential badger sett habitat (hedgerows / treelines and other woody habitat) and maintenance of a buffer zone (5m from outer extent of tree crown) which minimises significant risk of disturbance.

- Avoidance of known badger setts (identified during field surveys or in the DAFM dataset.

- Minimise cutting of mature trees to accommodate the OHL. Where possible impacts to mature deciduous tree lines and more extensive mature woodland in particular in demesne estates are avoided or minimised where possible.

6.2.3 Desk Study

42 As part of the overall project development and preparation of the EIS, a desktop literature review was carried out. This included a review of documented evidence regarding the effect of OHL developments on ecology as well as a review of material (published and un-published reports and datasets) to identify features of ecological importance within the wider MSA and surrounding region, including a review of sites designated for nature conservation. This involved the following:

- Identification of all sites designated for nature conservation (cSAC, SPA, NHA, pNHA) within 30km of the proposed development and a review of their site synopses, other

available information and identification of potential linkage to effects from the proposed development.

- Review of Ordnance Survey maps, aerial photography and other available GIS datasets (subsoils, contour mapping etc.) to assist in identifying habitats and features of potential ecological interest that occur within the MSA.

- A review of detailed LiDAR imagery – which allowed accurate tree-line / hedgerow identification in addition to heights. A detailed description of LiDAR and its capabilities are summarised in Section 1.5 of **Volume 3B** of the EIS. This information facilitated a quantification of hedgerow / treeline impact.

- Review of EPA water quality data and river catchment water quality information (Water Framework Directive).

- Review rare and protected species records within the MSA including relevant information sources for protected flora, bats, otter, birds and badger (including the National Biodiversity Data Centre records).

- Review of ecological reports, literature and extensive database of existing ecology survey data (referenced throughout this text and listed in the bibliography) conducted for NPWS and Meath County Council (Meath Wetlands and Coastal Habitat Survey 2010). This includes relevant information for the MSA including woodland, semi-natural grasslands and wetland datasets. Sources reviewed are listed in **Appendix 6.1, Volume 3D Appendices** of the EIS.

- Detailed review of published and unpublished literature on interactions of birds and powerlines in particular, and other potential impacts of OHLs on wildlife and natural habitats.

- Consultation with interested birdwatchers / landowners regarding bird species of conservation concern, in particular Whooper Swans.

- An evaluation of impacts to hedgerows and treelines was undertaken using available GIS datasets. This study entitled *Hedgerow Impact Study*, (September 2011) assisted in informing the evaluation and informed the line design. This report is presented in **Appendix 6.3**, **Volume 3D Appendices** of the EIS.

- An evidence based study on actual impacts of electricity lines on hedgerows / treelines in other similar habitats / areas in Ireland. This was undertaken to inform the impact assessment and inform best mitigation practice. This study entitled *Intervening Hedgerow Impact* is presented in **Appendix 6.4, Volume 3D Appendices** of the EIS.

6.2.4 Field Studies

43 Extensive field surveys have been carried out throughout the MSA over a seven year period (2007-2014). These included multidisciplinary ecology surveys (habitats, flora and fauna), winter and breeding bird surveys and bat surveys as presented in **Table 6.1**.

44 During these surveys, areas of scientific and / or conservation interest, as well as the presence of protected plant and faunal species, in the vicinity of the proposed development were investigated. Relevant survey reports are included as appendices (refer to **Appendices 6.3 – 6.6, Volume 3D Appendices** of the EIS) and the main findings are summarised in the body of this section of the EIS. Further details of the survey methodology are presented in the following paragraphs.

Table 6.1: Survey Works and Periods Conducted

Survey Period	Surveys Conducted
November 2007 - March 2008	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
July - September 2008	Baseline ecology surveys (habitats, breeding birds and protected mammals and flora) conducted at alignment road crossings.
October 2008 - April 2009	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
April - June 2009	Baseline ecology surveys (habitats, breeding birds and protected mammals and flora) conducted at alignment road crossings.
October 2009 - April 2010	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted on the route corridor of the final alignment (Corridor 3 and 3B).
March - July 2010	Walkover surveys were conducted on specific landholdings where consent was granted. These surveys included an evaluation of hedgerow ecological value, bird survey, habitat description including botanical identification, assessment of bat roost potential and recording of other mammal evidence (otter and badger signs). Bat activity surveys were conducted at alignment road crossings.
October 2010 - April 2011	Monthly winter bird surveys were conducted in the wider study area (all route corridors). A focussed flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
May - June 2011	An evidence based study was conducted to assess actual impacts of locating towers on hedgerows in summer 2011 by examining existing electrical infrastructure. This report looked at the longer-term impacts of locating towers in

Survey Period	Surveys Conducted
	hedgerows and informed approaches for minimising impacts with future developments.
October 2011 - April 2012	Monthly winter bird surveys were conducted in the wider study area (all route corridors). A focussed flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
July 2012	A study on potential impacts caused by lopping of trees / hedgerows under the then indicative line route was conducted in summer 2012.
April - July 2012	Breeding bird surveys were conducted from the extensive road network crossed by the alignment and noteworthy habitats up to 2km away. These surveys targeted key relevant and sensitive ground nesting bird species including Lapwing, Snipe and Curlew.
October 2012 - April 2013	Monthly winter bird surveys were conducted in the wider study area (including all route corridors). A focused flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
March-July 2013	Breeding bird surveys were conducted from the extensive road network crossed by the alignment and noteworthy habitats up to 2km away.
August, September and October 2013	Bat activity surveys were conducted at alignment road crossings.
July - September 2013	Multi-disciplinary walkover surveys were conducted on specific landholdings where consent was granted. These surveys included an evaluation of hedgerow ecological value, identification of larger treelines potentially impacted (for checking accuracy of LiDAR tree height evaluation), bird survey, habitat description including botanical identification, consideration of bat roost potential, recording of other mammal evidence (otter and badger signs).
July - October 2013	Multi-disciplinary walkover surveys (habitats, birds and protected mammals and flora) were conducted at alignment road crossings. Specific bat surveys were conducted at alignment road crossings.
October 2013 - April 2014	Monthly winter bird surveys were conducted in the wider study area. A focused flightline study was conducted at identified relevant locations on the route corridor of the final alignment.
June, July and September 2014	Bat activity surveys were conducted at alignment road crossings.
Late March - August 2014	Breeding bird surveys were conducted from the extensive road network, crossed by the alignment and noteworthy habitats up to 2km away.

6.2.4.1 Habitats

45 A multi-disciplinary walkover survey following the methodology outlined by the NRA (2009) was undertaken in areas along the proposed alignment where access for surveying was permitted by landowners. This included a survey of the proposed location of towers, temporary access routes, stringing areas and areas beneath the proposed conductors (intervening hedgerows and habitats). A visual survey of the proposed route was also undertaken from the extensive network of public roads throughout the MSA and at all locations where the alignment crosses public roads. This allowed a large proportion of the route to be surveyed in the field. These visual surveys were deemed to be adequate to assess habitats of low ecological interest (following methodology outlined in Smith *et al,* 2011). These surveys aimed to record the habitats, flora and fauna present within the survey area as described in the following paragraphs.

46 Where land access was available, surveys were undertaken of all semi-natural habitats encountered along the alignment including the collection of data on dominant vegetation, qualitative consideration of plant species diversity, vegetation structure, topography, drainage, disturbance and management. The data was recorded and the habitats encountered during site visits were classified in accordance with Fossitt (2000) and where appropriate, reference was made to the EU Habitats Directive classification. Specific surveys of hedgerows and treelines were undertaken with a view to assessing their importance based on species composition, structure and management. The methodology used during the survey of hedgerows broadly followed those proposed by Murray (2003). Walkover surveys along watercourses in the vicinity of the proposed development were also undertaken. Watercourse characteristics including bankside vegetation, substrate, and flow rate were recorded. An evaluation was made on the suitability of the habitat for aquatic species of conservation concern.

47 Species identification and nomenclature follows Parnell and Curtis (2012) for higher plants, Watson (1981) for bryophytes and Fitter *et al.* (1984) for grasses and sedges.

48 In addition to habitat surveys, fauna surveys were conducted to assess usage of the areas by birds and mammals (see below).

49 Following the completion of desktop analysis and field surveys, habitat maps of the entire proposed alignment were prepared according to the methodology outlined in Smith *et al*. (2011). The habitat maps detail habitats and habitat complexes recorded within the alignment including a general 40m buffer zone either side of the centre line and the extent of LiDAR imagery (dated November 2013). The mapping takes account of whether the habitat determination was made by detailed field survey, visual field inspection from a distance or from remote sensing techniques as recommended by Smith *et al.* (2011).

50 Faunal surveys were conducted to evaluate usage of the areas by birds and mammals (see below regarding extent of survey). Considering the characteristics of the habitats present and the nature of the proposed development, it was considered unnecessary to carry out evaluations of more specialised groups such as invertebrate species although incidental records of Lepidoptera (Butterflies and Moths) and Odonata (Dragonflies and Damselflies) were made.

6.2.4.2 Birds

51 Early scoping was informed by extensive consultation (NPWS and public consultation) and a detailed literature review (e.g. Lack 1986; Gibbons *et al*. 1993; Crowe 2005; Lynas *et al.* 2007; Colhoun and Cummins 2013 and EirGrid 2012). Scoping studies identified birds and specifically Whooper Swans as a faunal group requiring consideration in the study area. Whooper Swans are listed on Annex I of the EU Birds Directive and are known to occur in significant numbers throughout the wider study area. The species is also reported as being vulnerable to potential collision as they lack agile flight (EirGrid 2012).

52 Extensive multi-year and seasonal bird surveys were conducted to take into account all bird species likely to be present throughout the year within the MSA and their activities (i.e. breeding, wintering and passage migrant bird species) focusing on identified sensitive species and in particular species of conservation significance (Lynas *et al.* 2007 & Colhoun and Cummins 2013) and Annex I of the EU Birds Directive identified as occurring in the study area. These species were the 'Target Species' upon which bird survey efforts focused. The main aim of these studies was to determine the distribution and abundance of species of conservation significance throughout the wider study area that are likely to be sensitive to the proposed development.

53 A full year of bird surveys (undertaken as monthly surveys) was conducted in 2009, 2012, 2013 and 2014. In addition to these full annual surveys, winter bird surveys were undertaken in 2008, 2010 and 2011. These are discussed below under Breeding and Wintering birds.

6.2.4.2.1 Breeding Birds

54 Annual breeding bird surveys were conducted (refer to **Table 6.1**). The appraisal was also informed by a desk study, consultation and public feedback. The final 2014 report (which includes both the Cavan Monaghan Study Area (CMSA) (refer to **Volume 3C** of the EIS) and MSA) considers all survey years to date and is presented in **Appendix 6.5, Volume 3D Appendices** of the EIS.

55 The breeding bird surveys were carried out during the recommended period for conducting breeding bird surveys (late March to end of July inclusive, with more focussed surveys in April, May and June). The methodology broadly followed BirdWatch Ireland countryside breeding bird survey methodologies and appropriate methods detailed in Gilbert *et al.* (1998). A section of road / track at all alignment road crossings was walked and all birds were recorded by sight and call. In addition, fields and other habitats off the road were surveyed for bird activity using binoculars (10 x 42 magnifications) or telescope as required. Lakes, ponds, rivers and woodlands were surveyed for wildfowl, waders and passerines (as relevant). Such surveys were also undertaken within lands that were accessed elsewhere along the alignment.

56 The surveys were conducted early to mid-morning (between 5.30am and 12pm). Further surveys were conducted from suitable vantage points for birds of prey during the afternoon period, to determine presence / absence of these species. Evening surveys were also conducted when daily bird activity increased again. Suitable habitat for breeding birds including scrub, cutaway bog, rivers (e.g. Boyne and Blackwater) and lakes (e.g. Whitewood Lough) were surveyed in the general area of the proposed alignment (within 1km). Particular attention was paid to lakes and ponds where species prone to collision with OHL including Mute Swan, Great Crested Grebe, Coot, Grey Heron and Cormorant may potentially breed.

57 All bird species were recorded by call and sightings and based on the summary findings of the two repeat surveys conducted per season, bird breeding was categorised as:

- Probable / confirmed breeder (B);
- No breeding evidence though possibly breeding (NC); and
- Non-Breeder i.e. wintering, passage migrant or habitat unsuitable (NB).

58 A list of bird species was detailed for each location and signs of breeding activity were recorded in the field. Based on the findings of the early and late season survey (overall year), a summary list of target breeding bird species was compiled. Location and comments on general abundance and habitat association are provided for all target species of conservation significance. Weather conditions during all of the site visits were deemed to be suitable for carrying out bird survey work.

59 Any nocturnal bird activity was recorded during bat surveys to determine presence of species such as Woodcock.

6.2.4.2.2 Wintering Birds – Whooper Swans

60 Whooper Swans were identified at an early stage in the project as a key target species requiring survey and evaluation to inform the overall appraisal and mitigation for the proposed development. Other less significant target species identified were wildfowl such as: Mute Swan, Cormorant and duck species.

61 Surveys were conducted based on Wetland Bird Survey (Webs) Core Counts methodology detailed in Gilbert et al. (1998) and Vantage Point flightline surveys were based on Scottish Natural Heritage (2013) methods as appropriate. Surveys focused on target species identified during scoping and in consultation with NPWS. However, the survey allowed for identification of other potentially relevant species that may occur based on suitable habitats present e.g. Hen Harrier Winter Roosts (CMSA relevant only - refer to **Volume 3C** of the EIS).As detailed in **Table 6.1**, seven years of extensive surveys were conducted within the study area, including all route corridors considered in earlier stages of the project development and the wider landscape, including up to 5km east and west of the outer corridors focussing on key sites and target species. These surveys were conducted monthly from October to April to encompass the entire period that wintering Whooper Swan are present in Ireland. Surveys were conducted every year from winter 2007 / 2008 to 2013 / 2014 inclusive. Survey effort significantly expanded from winter 2010 / 2011 to 2013 / 2014 inclusive, with regular surveys undertaken throughout each month. **Appendix 6.6, Volume 3D Appendices** of the EIS details the most recent (2013 / 2014) *Winter Bird Report* which includes a summary of all previous survey findings in particular detail on flightline survey findings for all years, survey effort (numbers of times site surveyed) and summary count data analysis.

62 Wildfowl Counts: Extensive drive round surveys were conducted (at least twice per month) of known winter bird sites (sourced from BirdWatch Ireland I-Webs database) and numerous other potential sites in the vicinity of the proposed development including areas of temporary flooding and fields host to suitable crops which can change over the course of the year(s). All sites were scanned by an observer using binoculars and telescope as appropriate, from vantage points on public roads. Potential Whooper Swan habitats close to these sites were also checked, as were areas deemed suitable for Whooper Swans that were seen whilst driving between sites. Data was collected on numbers of Whooper Swans present, other birds present, weather conditions and habitat type.

63 Flightline Surveys: The aim of the survey was to identify flightlines which may be relevant to the location of the proposed development. The flightline survey methodology was modelled around known and well utilised Whooper Swan areas in relation to known roost sites (a generally relatively secure location where Whooper Swans rest at night) as this is where flight activity would typically be highest. Vantage point locations were selected on this basis and surveys were undertaken at dawn and dusk as per standard methodology guidance.

64 Sites (lakes and identified forage areas) were checked before commencement of watches (before dusk) to determine where Whooper Swans were located, thereby enabling the observer to determine the direction and locations to which these birds moved. Dawn watches generally commenced half an hour before sunrise and continued for a further hour after. Similarly, dusk watches generally started half an hour before sunset and continued for a further hour after to detect night flying birds which is feasible as they are very vocal. Daylight surveys of Whooper Swans were also conducted during the Wildfowl count surveys (although Whooper Swans do not generally move much during daytime feeding periods).

65 Where changes in numbers of Whooper Swans were detected at key sites between dusk and dawn surveys (i.e. overnight) or between survey dates, it was possible that unrecorded flights had occurred and this has also been factored in to the assessment as possible flightlines.

66 In addition to standard terrestrial survey methods, aerial survey from light aircraft was undertaken. Two aerial surveys per year were conducted of the entire MSA in winters 2010 / 2011, 2011 / 2012 and 2013 / 2014. Three surveys per year were conducted in 2012 / 2013. The survey methodology followed the NPWS approach for monitoring extensive and relatively inaccessible SPAs such as the Shannon Callows. A four seat, single engine light aircraft was used for the survey. The surveys were undertaken in conditions of good light and visibility, when flocks of Whooper Swans were detectable up to at least 10km either side of the aircraft. To minimise disturbance, the plane avoided flying below 1000 feet (approximately 300m) as much as possible. Two experienced ornithologists undertook the Whooper Swans census.

67 These aerial surveys allowed confirmation of total numbers of Whooper Swans and locations utilised within the MSA, including areas that could not easily be surveyed during terrestrial surveys. This survey methodology also had the added benefit of verifying the accuracy of standard terrestrial surveys. It also indicated any sites where more survey work would have been beneficial regarding potential flightlines and allowed accurate counts of birds at specific sites and the overall survey area.

6.2.4.3 Terrestrial Mammals

68 A terrestrial mammal survey was carried out on all sites (lands where permission to survey was granted) targeting particular potential breeding habitat (i.e. hedgerows / treelines) in the vicinity of the proposed tower locations. The key target mammals potentially occurring within habitats which may be potentially affected by the proposed development are badger, bat species and, to a much lesser extent, otter and deer species. Other species as detailed in **Table 6.12** are also considered in the evaluation. Potentially suitable bat roost trees and foraging habitat were also noted (see bat survey methodology in **Section 6.2.4.3.3**).

69 Badgers setts and otter holts tend to be located in unmanaged woody vegetation associated with hedgerows / treelines and in the case of otters, drains and streams linked to more significant foraging habitat e.g. rivers and lakes (Hayden and Harrington 2000). Outside these areas, in managed farmland (where the towers are mostly located) the risk of disturbance to breeding sites is very low. In this regard mitigation by avoidance was adopted in those areas not subject to walkover surveys by ensuring that tower locations are removed from areas that provide suitable badger or otter habitat as described above. The presence of other protected species including Irish Hare, Pine Marten and Red Squirrel were recorded if signs were observed. Other common mammal species were also noted.

70 All signs and tracks were evaluated as they were encountered in the field (Bang and Dahlstrom, 2004). Suitable mammal habitat and incidental records of other common faunal groups were also noted e.g. deer species, Irish Hare and rabbits.

71 Survey methods adopted during the target species surveys, for otter and badger are outlined as follows.

6.2.4.3.1 Otter

72 Dedicated otter surveys were conducted at river and bridge crossings within or close to the alignment and a minimum 100m upstream and downstream (where access was possible) to confirm otter presence in the area.

73 In addition, all drains and watercourses at lands accessed were checked for signs of otter presence and activity such as holts (breeding and temporary), slides and territorial marking points (spraints), with each sign recorded.

6.2.4.3.2 Badger

74 Badger activity was determined by surveys for setts, trails, latrines and feeding signs. Surveys for badger activity were undertaken at those lands that were subject to field survey (landholdings where permission was granted and alignment road crossings) paying particular attention to suitable habitat in proximity to the alignment (proposed tower locations, temporary access routes and habitat traversed by the alignment). The DAFM provided information as to whether proposed towers and associated works areas were likely to be located in close proximity to badger setts based on their available data. Based on this information, all proposed tower and works locations were located at a suitable location so as to avoid disturbances to badger setts.

6.2.4.3.3 Bats

75 No known bat roosts or sites with significant potential for bat roosts such as old buildings, souterrains, caves, houses or other buildings will be impacted by the proposed development. Potential tree roost sites were identified along the proposed alignment. The confirmation of bat roosts in trees is very difficult, even with regular bat activity surveys at potential tree roost sites, as noted by Kelleher and Marnell (2006). The approach to the bat survey is outlined below:

- Trees which have potential as bat roosts were identified with reference to Andrews *et al*. (2013). These generally consist of trees with cavities, splits, cracks, knotholes and under loose bark. These features are consistent with old mature or dying trees. Mature trees with potential as temporary bat roosts may be impacted due to tree lopping required. An evaluation was conducted of potential tree roost sites from alignment road crossings. Where land access was facilitated, tower locations and sections where tree lopping is likely to be required were examined.

- Where treelines could not be accessed or viewed; GIS mapping of larger / mature treelines was reviewed to identify very mature treelines where precautionary mitigation is proposed. This appraisal was based on detailed aerial imagery (including LiDAR). This allowed more mature treelines consistent with possible bat roost sites to be identified.

- During late Summer and Autumn 2013 and Summer 2014, dusk and night bat activity surveys were conducted at all alignment road crossings, using a bat detector in dual mode (heterodyne and frequency division). This allowed the detection of bat presence, evidence of roosts from bat emergence at dusk and song perches, habitat associations, and relative abundance. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations. The bat survey was conducted from dusk to dark and into night. The survey involved spot surveys (generally 5 to 10 minute duration) at all road crossings focussing on mature treelines. In addition, a drive round survey at and between all road crossings was conducted based on detection and car speed detailed outlined in Roche et al. 2012. All rivers and lakes in the vicinity of the proposed alignment were surveyed.

76 The bat surveys conducted allowed for the:

- Determination of any evidence of bat roosts (to support visual assessment);

- Confirmation of key habitats where bats congregate e.g. taller mature hedgerows;

- Identification of bat species present in the area;

- Identification of tree lines / mature deciduous woodland areas where precautionary mitigation is recommended; and

- The findings of the survey within a large subsample of possible bat roost habitat (treelines/ hedgerows at road crossings) provided data on the likelihood of bat roosts being present in trees across the entire route.

6.2.4.4 Fisheries and Aquatic Ecology

77 Ponds and lake habitats will be avoided by the proposed development. A number of streams and larger rivers will be oversailed by the proposed development. Visual surveys of these watercourses in the vicinity of the alignment were undertaken. Watercourse characteristics including bankside vegetation, substrate and flow rate were recorded. An assessment was made on the suitability of the habitat for aquatic species of conservation concern (e.g. freshwater crayfish and Atlantic Salmon). Watercourses were mapped according to Fossitt (2000).

78 Given that direct impacts are avoided to streams and rivers it was considered that no instream sampling was required.

79 Towers are not located in or along watercourse riparian zones. In this regard the potential for direct impacts to water courses and associated protected species is avoided.

80 For more information on water quality protection and the approach to minimise impacts to associated fisheries and aquatic ecology refer to **Chapter 8** of this volume of the EIS.

6.2.4.4.1 Other Fauna

81 The Common frog (*Rana temporaria*), the Smooth newt (*Triturus vulgaris*) and the Common lizard (*Lacerta vivipara*) are all protected species under the *Wildlife Act 1976 and 2000* (as amended) and have a widespread distribution in Ireland. Each of these species is likely to occur within the MSA. Pools, ponds, drainage ditches and wet grasslands provide suitable habitat for amphibians in the area. The Common lizard is widespread in suitable habitats such as dry banks, heathland and bog habitats. These species and potential breeding habitat were noted if seen.

82 Other species such as Marsh fritillary (*Euphydryas aurinia*) may potentially occur within the MSA. Signs of this species were searched for during field surveys based on Northern Ireland Environmental Agency (2011) methods.

83 Taking into consideration the ecology of the MSA coupled with the characteristics of the proposed development it was considered unnecessary to carry out field surveys of other more specialised faunal groups including fungi, invertebrates and moths.

6.2.5 Evaluation of Ecological Significance

84 The significance of any particular predicted impact is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. It is necessary, therefore, to determine the value of ecological features within the MSA in order to evaluate the significance and magnitude of possible impacts.

85 The method of evaluating ecological significance used in this study is based on a standard approach developed by the NRA (2009b), in the Ecological Assessment of National Road Schemes and has been adopted for use in electricity transmission projects (EirGrid, 2012). The results of desktop and field surveys were used to evaluate the significance of identified ecological sites located in the MSA on an importance scale ranging from international (A) - national (B) - county importance (C) - local importance, high value (D) - local importance, low value (E). Those features identified as being of high local importance or greater, are then given particular mention in the ecological evaluation as 'Key Ecological Receptors' when considering the potential for significant impacts and subsequent requirement for appropriate mitigation. The criteria shown in **Table 6.2** have been used in evaluating ecological value within the MSA. In addition, to the criteria listed in **Table 6.2** the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and the social values of an ecological feature such as educational, recreational and economic value.

86 Specific habitat and species identified were evaluated based on protected status and in the case of specific habitats they are identified if they are potentially of high local ecological value.

87 Individual hedgerow and treeline habitat at tower locations were summarised into one of three evaluation categories (high, moderate or low) broadly based on NRA (2006a) – *Ecological Criteria for Evaluation of Hedgerows* and also with reference to Smith *et al.* (2011).

88 This evaluation for each hedgerow surveyed can be summarised briefly as follows:

- High Value – These hedgerows are relatively rare. They are generally a species rich, robust and relatively wide hedgerow dominated by native species and generally include old 'standard' trees and or associated watercourses. Woodland ground flora indicator species will typically be well represented. Protected mammal breeding sites (e.g. bats, badger, otter) are more likely to be present. These hedgerows tend to be old semi-

natural linear woodland habitats and many are associated with old townland boundaries. Many will have streams associated.

- Moderate Value – These hedgerows are the typical hedgerows common in the Irish landscape, variably managed to the requisite criteria (refer to NRA 2006).

- Low Value – These are generally the most managed hedgerows and relatively species poor. Many have an overgrazed field layer and will have low to moderate woody species diversity. Many of these hedgerows will be remnant hedgerows. This type of hedgerow is also relatively common.

Table 6.2: Criteria Used in Assessing the Ecological Importance of Sites

Ecological Evaluation Scheme (NRA 2009b)
International Importance: • 'European Site', including candidate Special Area of Conservation (cSAC) or Special Protection Area (SPA); • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended); • Features essential to maintaining the coherence of the Natura 2000 Network; • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive; • Resident or regularly occurring populations (assessed to be important at the national level) of the following: - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive; and / or - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive; • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971); • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972); • Biosphere Reserve (UNESCO Man & The Biosphere Programme); • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979); • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979); • Biogenetic Reserve under the Council of Europe; • European Diploma Site under the Council of Europe; and • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance: • Site designated or proposed as a Natural Heritage Area (NHA); • Statutory Nature Reserve; • Refuge for Fauna and Flora protected under the Wildlife Acts; • National Park; • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and / or a National Park; • Resident or regularly occurring populations (assessed to be important at the national level) of the following: - Species protected under the Wildlife Acts; and / or - Species listed on the relevant Red Data list; and

Ecological Evaluation Scheme (NRA 2009b)
• Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance: • Area of Special Amenity; • Area subject to a Tree Preservation Order; • Area of High Amenity, or equivalent, designated under the County Development Plan; • Resident or regularly occurring populations (assessed to be important at the County level) of the following: - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive; - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive; • Species protected under the Wildlife Acts; • Species listed on the relevant Red Data list; • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance; • County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared; • Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county; and • Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value): • Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: - Species of bird, listed in Annex I and / or referred to in Article 4(2) of the Birds Directive; - Species of animal and plants listed in Annex II and / or IV of the Habitats Directive; - Species protected under the Wildlife Acts; and - Species listed on the relevant Red Data list. • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; and • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value): • Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; and • Sites or features containing non-native species that are of some importance in maintaining habitat links.

[Source: *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) – page 16.]

cSAC = candidate Special Area of Conservation; SPA = Special Protection Area; NHA = Natural Heritage Area

BAP = Biodiversity Action Plan (these have been published for many local authority areas)

6.2.6 Assessment of Impacts and Impact Significance

89 The evaluation of impacts is broadly based on guidance offered by the Institute of Environmental and Ecological Management (IEEM) in the published *Guidelines for Ecological Impact Assessment* (2006) with reference to national guidance provided in EirGrid (2012), NRA (2009) and EPA (2002). Impacts are discussed and evaluated in relation to impact type

(positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, reversibility, timing and frequency.

90 Criteria for describing and assessing impact and magnitude are presented in **Tables 6.3** and **6.4**.

Table 6.3: Criteria Used in Ecological Impact Assessment

Positive or Negative: Is the impact likely to be positive or negative? International and national policy now pushes for projects to deliver positive outcomes for biodiversity.
Character: The type of habitat (e.g. natural or highly modified woodland; mature or recently established, wet or dry) is important, as is the quality of the site (e.g. undamaged active blanket bog).
Significance State whether a site has a designation, such as a SAC or NHA, or contains a listed (Annex I) habitat. The ecological value of a site can be assigned a rating using an evaluation scheme (e.g. undesignated areas of semi natural broadleaved woodland are normally rated as high value, locally important).
Sensitivity: Indicate changes that would significantly alter the character of an aspect of the environment (e.g. changes in hydrology of a wetland due to placing of temporary rubber matting or aluminium road panels).
Magnitude and extent: A scheme may effect only a small part of a site but the area of habitat affected in that location (in hectares) should be given in the context of the total area of such habitat available (e.g. 1ha of a woodland which measures 30ha in total)
Duration: Indicate the time for which the impact is expected to last prior to recovery or reinstatement of impacted habitats and / or species. The duration of an activity may differ from the duration of the resulting impact caused by the activity (e.g. short term construction activities may cause disturbance to birds during the breeding season, however, there may be longer term impacts due to a failure to reproduce in the disturbed area during that season). EPA (2002) timescales used as follows: • Temporary (0-1 years) • Short term (1-7 years) • Medium term (7-15 years) • Long term (15-60 years) • Permanent (60+ years)
Reversibility: Identify whether an ecological impact is permanent (non-reversible) or temporary (reversible – with or without mitigation).
Timing and Frequency: Some changes may only cause an impact if they happened to coincide with critical life-stages or seasons (for example, the bird nesting season). This may be avoided by careful scheduling of the relevant activities.

(Sources: IEEM, (2006); EPA (2002))

Table 6.4: Criteria for Assessing Impact Magnitude

Impact Magnitude	Definition
No change:	No discernible change in the ecology of the affected feature.
Imperceptible Impact:	An impact capable of measurement but without noticeable consequences.
Minor Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary, but these consequences are not considered to significantly affect the distribution or abundance of species or habitats of conservation importance.
Moderate Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect the distribution and / or abundance of species or habitats of conservation importance.
Substantial Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to significantly affect species or habitats of high conservation importance and to potentially affect the overall viability of those species or habitats in the wider area.
Major Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the development boundary. These consequences are considered to be such that the overall viability of species or habitats of high conservation importance in the wider area is under a very high degree of threat (negative impact) or is likely to increase markedly (positive impact).

(Source: Gittings, (1998); EPA (2002))

91 A separate evaluation of impacts procedure is detailed specifically for collision risks to Whooper Swans. The evaluation is more relevant to bird species. It is based on sensitivity of populations and magnitude of possible impacts, as outlined in **Table 6.5**. The magnitude of possible impact considers the proposed development in the context of the survey findings and likely impacts from a development of this nature based on existing information and evidence of co-existence.

92 This approach follows standard assessment criteria based on Percival (2003) with additional consideration of NRA (2009b). Sensitivity and magnitude risk is determined based on:

- Seven years of information gathered on winter bird distribution, known wintering bird concentrations, significance of these concentrations and flight line surveys conducted;

- Desk study / literature review on potential impacts and mitigation approaches; and
- Evidence of actual impacts determined through ongoing studies / observations by surveyors.

Table 6.5: Criteria for Assessing Impact on Bird Species

Components	Definition
Sensitivity factor	**VERY HIGH:** Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited in this case means mentioned in the citation text for the site as a species for which the site is designated. **HIGH:** Species that contribute to the integrity of an SPA but which are not cited as species for which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, rednecked phalarope, roseate tern and chough. Species present in nationally important numbers (>1% Irish population). **MEDIUM:** Species on Annex 1 of the EC Birds Directive Species present in regionally important numbers (>1% regional (county) population), other species on BirdWatch Ireland's red list of Birds of Conservation Concern. **LOW:** Any other species of conservation interest, including species on BirdWatch Ireland's amber list of Birds of Conservation Concern not covered above.
Magnitude of Possible Impact	**VERY HIGH:** Total loss or very major alteration to key elements / features of the baseline conditions such that the post development character / composition / attributes will be fundamentally changed and may be lost from the site altogether. Guide: < 20% of population / habitat remains. **HIGH:** Major loss or major alteration to key elements / features of the baseline (pre-development) conditions such that post development character / composition/ attributes will be fundamentally changed. Guide: 20-80% of population / habitat lost. **MEDIUM:** Loss or alteration to one or more key elements / features of the baseline conditions such that post development character / composition / attributes of baseline will be partially changed. Guide: 5-20% of population / habitat lost. **LOW:** Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character / composition / attributes of baseline condition will be similar to predevelopment circumstances / patterns. Guide: 1-5% of population / habitat lost. **NEGLIGIBLE:** Very slight change from baseline condition. The change is barely distinguishable, approximating to the 'no change' situation. Guide: < 1% population / habitat lost.

93 The considerations of magnitude and sensitivity are brought together in order to determine the significance of the potential impact. This is achieved by cross-tabulating the magnitude and

sensitivity, using **Table 6.6**, to give a prediction of the significance of each potential impact on bird species.

Table 6.6: Significance Matrix: Combining Magnitude and Sensitivity to Assess Significance of Potential Impact on Bird Species

SENSITIVITY (→) / **MAGNITUDE OF EFFECT (↓)**	**Very High**	**High**	**Medium**	**Low**
Very High	Very High	Very High	High	Medium
High	Very High	Very High	Medium	Low
Medium	Very High	High	Low	Very low
Low	Medium	Low	Low	Very low
Negligible	Low	Very low	Very low	Very low

94 The following is a summary description of each category of significance, as outlined in **Table 6.6**:

- **Very low** and **low** should not normally be of concern and there is no requirement for further mitigation.
- **Medium** represents a potentially significant impact that requires careful individual evaluation. It may be of a scale that can be resolved by revised design and /or appropriate mitigation.
- **Very high** and **high** represent a highly significant impact on bird populations.

6.2.7 Appropriate Assessment

95 Article 6(3) of the EU Habitats Directive requires an 'Appropriate Assessment' to be carried out by a competent authority where a plan or project is likely to have a significant impact on a designated European Site (commonly referred to as a Natura 2000 site). In Ireland, European Sites include cSACs and SPAs.

96 The EU Commission's methodological guidance (2002) promotes a four stage process to undertaking Appropriate Assessment with the outcome of each successive stage determining if a further stage in the process is required. The first stage is referred to as Screening, and this is carried out to determine the potential for significant impacts from the plan or project, alone and or in combination with other plans or projects on European Sites. The outcome determines the necessity for undertaking a more detailed (Stage 2) Appropriate Assessment and preparation of a Natura Impact Statement (NIS) where potential impacts are deemed to be of significance. It

is the responsibility of the competent authority (or consenting authority) to undertake the Appropriate Assessment.

97 In the case of the proposed development (MSA and CMSA), a NIS has been prepared (refer to **Volume 5** of the application documentation) as the potential for significant impacts on eight European sites could not be ruled out at the screening stage.

98 Stage 1 Screening (for Appropriate Assessment) was carried out without reference to mitigation measures. Whereas, mitigation is a central part of the Stage 2 appropriate assessment process. In conducting a Stage 2 Appropriate Assessment, mitigation measures should be tested to ensure they are effective and capable of implementation. Hence, a series of mitigation measures have been developed to ensure that the proposed development will not adversely affect the integrity of the European sites concerned. These measures are detailed in the NIS where it is concluded that the conservation interests of the relevant European sites will not be compromised and that the development will have no adverse impact on the integrity of the relevant sites.

6.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

99 The potential impacts on flora and fauna in the MSA occur during both the construction and operational phase. Details of the potential impacts are included in **Section 6.5**. Overall, the construction programme is anticipated to last approximately three years. The proposed development entails the construction of towers as individual sites separated on average by a distance of approximately 340m. In general the construction phases can be broken down into the following: site preparation (including laying of temporary rubber matting or aluminium road panels, removal of fences and erection of temporary fencing where required), all works associated with modifications to existing 110 kV transmission OHL, installation of tower foundations, erection of towers, guard poles, tree lopping, stringing of conductors, commissioning of the line and reinstatement of land.

100 The following activities and ecological features in particular warrant specific attention in the consideration of potential impacts:

- Construction Phase:
    - Permanent and Temporary habitat loss during site clearance / construction;
    - Disturbance to Fauna; and
    - Pollution runoff risks to surface and groundwater quality (aquatic receptors).
- Operational Phase:

- Presence of OHL (conductors and earth wire) may present a collision risk to sensitive bird species; and
- Ongoing maintenance activities.

6.4 EXISTING ENVIRONMENT

6.4.1 Designated Conservation Areas

101 The locations of designated sites within 30km of the alignment are illustrated in Figure 6.1, **Volume 3D Figures** of the EIS. The extensive buffer zone 30km is used to ensure adequate consideration is given to all sites potentially linked to the development. Sites detailed include candidate cSAC, SPA for Birds, NHA and pNHA.

102 Further details of those designated sites within 5km of the alignment are presented in **Table 6.7**. Considering the scale and characteristics of the proposed development, it is considered highly unlikely that sites further than 5km would be impacted. However, due consideration is given to sites outside of this 5km radius where there is potential for the following impacts:

- Designated sites known to support important populations of wintering birds; and
- Designated aquatic sites located downstream of the alignment.

103 Where it is deemed that the conservation interests of such sites could potentially be impacted, they are also included within **Table 6.7**, which lists designated sites in order of increasing distance from the alignment.

104 Further detail regarding cSAC and SPA (European) sites is provided in the NIS, (refer to **Volume 5** of the application documentation).

Table 6.7: Designated Sites for Nature Conservation within 5km of the Alignment within the MSA

Site Code	Site	Designation	Site Description	Approximate Distance to the Alignment
002299	River Boyne and River Blackwater	cSAC	The site is designated for the following; River Lamprey *Lampetra fluviatilis,* [1106] Salmon *Salmo salar* (only in fresh water), [1355] Otter *Lutra lutra,* [7230] Alkaline fens, [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).	0km (oversailed)
04232	River Boyne and River Blackwater	SPA	The river site is designated for breeding Kingfisher *Alcedo atthis.*	0km (oversailed)
001558	Breakey Loughs	pNHA	This lough contains lakes, wetlands and associated semi natural shoreline woodland.	1.5km
001357	Trim	pNHA	This site is included in the River Boyne and Blackwater SAC / SPA.	2.3km
001324	Jamestown Bog	NHA	This site is designated for protection of raised bog.	2.9km

105 There are 3 designated areas for conservation within 5km of the development. Of these, the River Boyne and Blackwater (cSAC and SPA) is oversailed by the alignment twice, with conductors the only element of the development proposed to be located within the site boundary. The River Boyne and Blackwater cSAC is selected for habitats including alkaline fen and alluvial woodlands, both listed on Annex I of the EU Habitats Directive. This cSAC is also selected for Atlantic salmon, otter and River / Brook Lamprey, all listed on Annex II of the EU Habitats Directive. This river is also designated as an SPA for breeding Kingfisher. SPAs for birds are designated based on the presence of internationally significant populations of listed bird species. Kingfisher is listed on Annex I of the EU Birds Directive.

106 The point where the alignment crosses the Boyne section includes the river channel. The northern side is a steep bank with scattered mature hawthorn, elder and ruderal vegetation. Immediately adjacent to the northern river bank are taller Ash trees. The closest tower, Tower 355 is located in farmland close to the cSAC boundary (approximately 6m). However it is located 60m from the actual river watercourse. The southern bank is flatter and consists of

improved grassland with no significant woody vegetation. Tower 356 is approximately 160m from the cSAC boundary and river watercourse.

107 The point where the alignment crosses the River Blackwater section consists of the main river channel with improved grassland fields up to within approximately 5m of the edge of the channel either side. A narrow riparian fringe consisting of wet grassland vegetation and a few scattered low Willow trees adjacent to the river channel. Three towers are relatively close to the cSAC boundary as follows. Tower 311 is located in farmland approximately 191m south of the SAC boundary (195m from the river edge). Tower 310 is located in farmland approximately 88m north of SAC boundary (100m from the river edge) in farmland. Tower 309 is located in a hedgerow with associated wet grassland 84m north-west of the SAC boundary (105m from the river edge).

108 Jamestown Bog (NHA) is the next closest designated site (2.9km) and it is considered that no impacts will arise to this site due to distance from the development and absence of direct connections to the designated site from areas within the development footprint.

109 No other European sites occur within 5km of the development and no other sites will be measurably affected by the development.

110 Breaky Lough is a pNHA which is avoided by the development and hence will not be affected.

111 Trim pNHA is avoided by the development and hence will not be affected.

6.4.2 Non-Designated Sites of Conservation Interest

112 A number of non-designated sites of varying ecological value that occur in proximity to the alignment were identified during the desktop studies. These sites together with a brief description and evaluation are listed in **Table 6.8.**

Table 6.8: Non Designated Sites of Ecological Value in Proximity of the Alignment within the MSA

Site Name	Description	Evaluation	Location (with reference to alignment)
Cutover Bog at Emlagh	Remnant raised bog and extensive cutover bog. Extensive bog woodland fringe. Large Heath Butterfly.	County importance	Area identified is a minimum 500m from nearest Towers 294 to 290.
Brittas Estate Woodlands	Key core areas identified in NSNW Woodland Habitats 2010 data set - consist of mature demesne woodland.	Local Importance (Higher Value)	Areas identified > 50m from closest Tower 266 and alignment.
Newcastle Lough	Managed as a Nature Reserve by the Irish Wildlife Trust[20] This site is used regularly by Cormorant and Mute Swan and irregularly by Whooper Swan as a roost site.	County importance	Newcastle Lough is located > 2km east of nearest Tower 250 and alignment
Miltown Crossroads	NSNW Woodland Habitats 2010 data set - consist of riparian Oak – Ash-Hazel woodland.	Local Importance (Higher Value)	Areas identified > 850m from closest Tower 246 and alignment
Wetland in townland Balloughly	Wetland habitats including marsh, dense Willow scrub and associated habitats.	Local Importance (Higher Value)	Wetland 125m north of nearest Tower 240 and alignment

113 All non-designated sites of high conservation value located in proximity of the alignment have been avoided through careful selection of the final route.

6.4.3 Rare and Protected Flora

114 **Table 6.9** presents the protected (*Flora Protection Order, 1999)* or rare plant species with records occurring in grid squares N85, N86, N87, N88 and N89 (from Preston *et al*., 2002). The habitat requirements of these species are also presented (Webb *et al* 1996) and the likelihood of any impacts. No rare or protected flora were recorded during the course of field surveys in the vicinity of the proposed development. Bog Rosemary *Andromeda polifolia* was recorded at the Cutover Bog area at Emlagh (refer to **Table 6.9**) which is avoided by the proposed development.

[20] http://iwt.ie/what-we-do/reserves/newcastle-lake-co-meath/.

Table 6.9: Rare and Protected Plant Species Previously Recorded in the Study Area

Common name	Latin name	Status	Category	Habitat Requirements	10km Square	Likelihood of Impact
Small Cudweed	*Filago minima*	Protected	Data Deficient Species. Not recently recorded (Martin, 2006)	Sandy and gravelly places, mainly in South and East; rare.	N79	None
Cowslip	*Primula veris*	Scarce	Species not Considered Threatened in the Republic of Ireland but protected in NI.	Pastures; frequent in the centre	N79 N88 N87 N86 N85 N95 N94	Possible at Tower locations in grassland
Betony	*Stachys officinalis*	Protected	Endangered. Not recently recorded (Martin, 2006)	Woods and bushy places	N88	Possible in mature woodland habitat crossed
Bog-rosemary	*Andromeda polifolia*	(NI)	Species not Considered Threatened in the Republic of Ireland but protected in NI	Bogs, mostly lowland; frequent in the Centre; rare elsewhere.	N79 N87 N86	None towers avoid this habitat
Shepherd's-needle	*Scandix pecten-veneris*	Protected	Extinct	Tilled fields	N86	None
Hairy St John's-wort	*Hypericum hirsutum*	Protected	Endangered	Woods and shady places; locally frequent in the Liffey valley, very rare elsewhere.	N86	Unlikely towers avoid this habitat
Red Hemp-nettle	*Galeopsis angustifolia*	Protected	Endangered. Not recently recorded (Martin, 2006)	Calcareous gravels, especially on eskers in the East -Centre; rare.	N85	None towers avoid this habitat

Source: Preston *et al* 2002

6.4.4 Habitats

6.4.4.1 General Ecological Character of the Route

115 The route is described to introduce the ecological character along sections and also to illustrate the context of recognisable ecological features of high local value. The description of the line route is from south to north. The line route is broken into two broad regions – Southern and Northern section. Within each of the two regions, subsections based on groups of towers are described with details of key ecological features.

6.4.4.1.1 Southern Region – (Woodland Substation – Tower 280)

Woodland - Bogganstown (existing transmission line to New Tower 402)

116 Land use along the route of the existing towers consists predominantly of intensively managed mixed farmland with dense linear hedgerow / woodland field boundaries.

117 Hedgerow field boundaries are the key ecology features identified as they are traversed by the alignment.

Bogganstown - Branganstown (crossing of R154): Towers 402 – 374

118 Land use along this route consists predominantly of large fields of intensively managed arable and cattle grazed farmland, typically with mature hedgerows and treelines at field boundaries. New forestry planting (2012/2013) is evident in the townland of Culmullin.

119 Noteworthy ecological habitats are mature linear woodland and hedgerows at field boundaries and the Derrypatrick and Boycetown River crossings. The Boycetown River crossing in particular includes a less managed floodplain with unimproved grassland / scrub / linear hedgerow - riparian habitat. No towers will be located in this area.

R154 (Branganstown) - R161 crossing (South-west of Bective Abbey): Towers 374 – 353

120 The landscape is relatively flat and dominated by large arable fields with smaller fields used for cattle, sheep and horse grazing. Mature linear woodland is typical on field boundaries. Between Tower 356 and 355 the line route crosses Boyne River cSAC / SPA. Scrub and a line of Ash trees occur adjacent to the northern side of the river channel. A stream crossing, which is a tributary of the River Boyne but located outside the cSAC, is crossed between Towers 364 and 365. The proposed OHL oversails an esker feature with low scrubby semi natural woodland with taller immature Ash between Towers 364 and 363. Roadside grassland verges are notably species rich in this area. In addition, a number of scarcer farmland breeding bird species were recorded in this area including Yellowhammer, Tree sparrow and Skylark. Kingfishers are a common breeding bird species along the River Boyne and tributaries.

R161 crossing (South-west of Bective Abbey) - Durhamstown: Towers 353 - 324

121 The landscape is relatively flat and dominated by mixed farming with mature hedgerow / treeline field boundaries. There is a large demesne estate (Dunderry area) which has mature treelines and woodlands. The main wooded area and the most robust treelines at Dunderry estate are avoided. The line will cross several mature linear woodland field boundaries between Towers 342 and 340. The Clady River (which is a tributary of the River Boyne) is crossed between Towers 350 to 351. Between Tower 332 and 330 an extensive area of conifer plantation woodland is traversed.

Durhamstown - Teltown: Towers 324 - 308

122 The landscape is relatively flat and dominated by arable farming with some livestock grazing. Field boundaries are typically hedgerows / mature linear woodland. The line crosses the M3 road between Tower 319 and 320. A tributary of the River Blackwater is crossed between Towers 318 and 317. The line crosses the River Blackwater SAC / SPA between Towers 311 and 310. Tree cover is limited at this location. Conductors also cross a drainage channel of the River Blackwater floodplain and an isolated area of less improved wet grassland / tall herb habitat between Tower 309 and 308. This general area is used by Whooper Swans and a flightline occurs at the River Blackwater crossing point.

Teltown – N52 road: Towers 308 – 280

123 The landscape is relatively flat and managed principally for livestock grazing with some arable fields. Mature trees in field boundaries are typical in this area. Areas of forestry and less managed farmland are traversed in places. A large area of degraded raised bog / bog woodland is avoided to the west of Tower 290 in the townland of Emlagh. The land north of Mountainstown Demesne is more open with very large arable / dairy farms. This area is used occasionally by foraging and roosting Whooper Swans. At the N52 road the land starts to rise into rolling drumlin country. Noteworthy areas of local ecological interest crossed include:

- Mature forestry between Towers 301 and 300 and between Towers 298 and 297;
- Less managed farmland with breeding Lapwing west of Towers 296 and 295 in the townland of Oristown;
- Mature treelines with associated wet ditches between Towers 289 and 288 at Mountainstown Demesne; and
- Whooper Swan foraging and roosting areas at Clooney and Drakerath townlands.

6.4.4.1.2 Northern Region – (North of N52 road: Towers 280 – 237)

Clooney - West Kilmainhamwood Village: Towers 280 – 251

124 The landscape in this area is dominated by long low hills with large improved pasture fields and some arable land. The main features of ecological value are limited to hedgerows and woodland at Brittas Estate Whitewood Lough is an important local ecological feature located, at its closest point, approximately 600m east of the alignment.

125 Key features of ecological value in this area are:

- Mature deciduous woodland at Brittas Estate: Between Towers 269 and 267 the edge of one block of mature deciduous woodland is crossed while a wider block is also crossed between Towers 268 and 267. Tree species include mature Beech, Oak, Ash, Holly and non-native laurel.

- Three stream crossings with associated semi natural woodland (low growing) between Towers 260 and 261, Towers 259 and 258 and Towers 252 and 251 (Kilmainhamwood River). These woodland habitats will be crossed but impacts to trees avoided.

- Whooper Swans use the area west of the alignment in particular at Cruicetown. A flightline also crosses this section to Whitewood Lough though the bulk of Whooper Swan activity was recorded to the west of the alignment.

West Kilmainhamwood Village – Start Cavan Monaghan Study Area (CMSA): Towers 251 - 237

126 This area is dominated by low drumlin hills. Habitats typically consist of improved pastures with scattered fields of semi improved species poor, wet grassland. Fields are relatively small and lined with lower hedgerows which include scattered semi mature trees dominated by Ash. This area has been extensively drained and planted with new forestry in 2012 / 2013 on former species poor wet grassland.

6.4.4.2 Habitat Descriptions

127 This section describes habitats identified within an 80m corridor centred on the proposed line route. It also considers habitats traversed by temporary access routes, many of which extend beyond 80m.

128 This section of the report should be read in conjunction with Figures 6.2.1 - 6.2.21 (Habitat Maps), **Volume 3D Figures** of the EIS which details all habitats identified within the 80m corridor including the alignment. A cover sheet indicates all habitat types and mosaic identified in habitat mapping.

129 A list of flora species recorded is detailed in **Appendix 6.8, Volume 3D Appendices** of the EIS.

130 In addition**, Appendix 6.7** Flora & Fauna Plates of Survey Area), **Volume 3D Appendices** (of the EIS illustrates the typical habitats recorded within the wider MSA.

131 Habitat types recorded at and adjacent to the development site are summarised below (Fossitt 2000). The vast majority of these habitats described are crossed by the alignment (conductor only) but not necessarily directly impacted by tower locations or construction activity areas.

- Freshwater: Other artificial lakes and ponds (FL8);
  Eroding / upland Rivers (FW1);
  Depositing / Lowland rivers (FW2); and
  Drainage ditch (FW4).
- Grassland: Improved agricultural grassland (GA1);
  Dry calcareous and neutral grassland (GS1);
  Dry meadow and grassy verge (GS2); and
  Wet grassland (GS4).
- Woodland & scrub: Oak-Ash-Hazel woodland (WN2);
  Broadleaved woodland (WD1);
  Conifer plantation (WD4);
  Scrub (WS1);
  Immature woodland (WS2);
  Hedgerows (WL1); and
  Treelines (WL2).
- Cultivated & built land: Arable crops (BC1);
  Stonewalls and other stonework (BL1); and
  Buildings and artificial surfaces (BL3).

6.4.4.2.1 Other Artificial Lakes and Ponds

132 Several small ephemeral ponds with no fringing wetland vegetation were located in improved grassland within the MSA. These ponds are not considered to be of high ecological value and will be avoided by site works.

6.4.4.2.2 Rivers (FW1) and (FW2)

133 The proposed alignment crosses 41 identified watercourses including 2 along the existing section of line. Larger identified rivers crossed are detailed in **Table 6.10**.

Table 6.10: Larger Rivers and Streams Crossed by the Proposed Alignment and Distance of Closest Towers

River Name	Nearest Tower	Distance to River (m)[21]
Derrypatrick River	390 387	38 25
Boycetown River	377	55
Bective River	364	17
Boyne River (cSAC / SPA)	355 356	60 (6) 160 (160)
Clady River	347	12
Blackwater (cSAC / SPA)	309 310 311	105 (84) 100 (88) 195 (191)
Moynalty River	297	20
Altmush Stream	261	30
Kilmainham River	251 252	90 60

134 Water courses include relatively slow flowing large rivers including the Rivers Boyne and Blackwater. Most river edge habitat traversed by the proposed alignment is modified by past drainage works such as the Office Public Works (OPW) arterial drainage schemes which have impacted flood plain habitats and natural flooding regimes. The Boycetown River crossing is an exception with some evidence of former natural riparian floodplain and associated less modified habitats. Impacts will be avoided to habitats and species at this location.

[21] Distance to SAC / SPA boundary in brackets where relevant.

135 Riparian habitats along the alignment are variable in extent and type and include; improved grassland, isolated trees and lines of trees / hedgerow.

136 The key ecological receptors at watercourses considered are riparian vegetation (in particular, habitats listed on Annex I of the Habitats Directive), fish species (Atlantic salmon and lamprey), Crayfish, otter and breeding Kingfisher.

137 The Boyne and Blackwater Rivers are considered to be of international importance based on cSAC designation. Tributaries of the Boyne and Blackwater such as the Boycetown River are linked to these sites and are considered of similar status as they are spawning streams for salmonids and often host habitats utilised by Kingfisher and otter for feeding, breeding and / or nursery areas. Other rivers and smaller streams crossed by the alignment are also of high ecological value, being important for fisheries and associated riparian habitats.

6.4.4.2.3 Drainage Ditch (FW4)

138 This habitat is not mapped as it is associated with field boundaries and associated hedgerows and treelines habitats which are mapped. Drainage ditches are typically regularly maintained and contain a variety of wetland and weed species such as Reed canary-grass (*Phalaris arundinacea)*, Nettles, Broad-leaved dock (*Rumex obtusifolius*) and grass species. Aquatic plants such as Fools watercress (*Apium nodiflorum*), Water cress (*Rorippa nasturtium-aquaticum*), Duckweed (*Lemna* spp.) and Brooklime (*Veronica beccabunga*) were also noted. These habitats are not typically of high ecological value except where protected species may occur. These habitats will largely be avoided except where towers are proposed to be located in hedgerows / linear woodland.

6.4.4.2.4 Improved Agricultural Grassland (GA1)

139 This habitat occupies the vast majority of the MSA and is where the majority of towers are proposed to be located and where temporary access routes will pass through. It is managed for agricultural purposes and consists of grassland which has been reseeded and / or regularly fertilised and is either heavily grazed, used for silage making or planted as part of an arable rotation. This habitat is principally dominated by Perennial rye grass (Lolium perenne) and is species poor. More semi improved grassland types also occur scattered along the proposed alignment in particular along the more northern sections. Agricultural herb species are common namely, Creeping buttercup (Ranunculus repens) and Dandelion (Taraxcum officinale), with Nettles, docks (Rumex sp.) and umbeliferae species more frequent at field edges. Rushes (Juncus spp.) occur on poorly drained soils and areas of reduced management intensity, but rush pasture is not a dominant feature of the study area. This is a highly modified habitat of low ecological value and the species recorded within the habitat are common throughout the wider countryside. The habitat is generally of low value to wildlife species although Whooper Swan

may use the habitat as foraging grounds during winter months at certain locations. Dry Calcareous and Neutral Grassland (GS1).

140 Several relatively unimproved fields were noted during the survey including at Tower Locations; 261, 256 and 249. Herb species are more dominant (relative to grass species) and include Knapweed (*Centaurea nigra*), Hawkbit (*Leontodon* spp.) Yellow Rattle (*Rhinanthus minor*) and Narrow leafed plantain (*Plantago lanceolata*). While not recently re-seeded these fields are not species rich examples of this habitat. They are subject to some agricultural management including addition of fertilisers. The examples of the habitat recorded within the study area do not correspond with habitats listed on Annex I of EU Habitats Directive such as *important orchid sites* (6210) and in all cases are not considered to be of significant ecological value.

6.4.4.2.5 Dry Meadow and Grassy Verge (GS2)

141 This habitat is well developed at roadsides particularly in the Trim area. These areas are dominated by tall grass species and are associated with hedgerows. A diversity of herb species occur including Field scabious (*Knautia arvensis*), Cow parsley (*Heracleum sphondylium*), Vetches (*Vicia* spp.), Common valerian (*Valeriana officinalis*), False oxlip (*Primula x polyantha*), Ladies bedstraw (*Galium verum*), Horsetails (*Equisetum* spp.), Wall lettuce (*Mycelis muralis*), Meadow vetchling (*Lathyrus pratensis*), Knapweed (*Centaurea nigra*), Thistle (*Cirsium* spp.), Cowslip (*Primula veris*), Meadow buttercup (*Ranunculus acris*) and Creeping buttercup. This habitat is avoided by the proposed development and will be oversailed at road crossings.

6.4.4.2.6 Wet Grassland (GS4)

142 This habitat is found in several fields scattered principally along the northern half of the proposed development. Many areas have recently (in 2012 / 2013) been drained and planted with forestry. This grassland habitat is poorly drained and typically managed for cattle grazing. They have been subject to some land improvements and general low levels of fertiliser input. Consequently species diversity is affected and they are not considered good examples of this habitat. Species composition varies and is dominated by abundant rushes, mainly Soft rush (*Juncus effusus*), and broadleaved herbs such as Broad leaved plantain (*Plantago major*), Lady's smock (*Cardamine pratensis*), Creeping buttercup, Marsh ragwort (*Senecio aquaticus*), Selfheal (*Prunella vulgaris*), Compact rush (*Juncus conglomeratus*) and Daisy (*Bellis perennis*). This habitat is not of significant ecological value.

143 Noteworthy GS4 habitat includes an isolated more species rich area close to the River Blackwater (beside Tower 309). Species noted here include Reed canary-grass, occasional sedges (*Carex* spp.) and flowering herb species including Yellow flag iris (*Iris pseudacorus*), Wild Angelica (*Angelica sylvestris*) and Meadowsweet (*Filipendula ulmaria*).

144 Examples of Wet grassland habitat recorded within the MSA do not correspond with the more species rich Annex I habitat 'Molinia meadows (6410)'.

6.4.4.2.7 Oak-Ash-Hazel Woodland (WN2)

145 Semi natural woodland dominated by Hazel (a low growing species) is crossed at three locations in the northern section of the proposed development (between Towers 261 and 260, 259 and 258 and 252 and 251). These woodlands are relatively species rich and tree species noted include Alder (*Alnus* glutinosa), Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Willow (*Salix* spp.) and occasional Holly (*Ilex* spp). Ground flora is relatively diverse and includes Lords-and-ladies (*Arum maculatum*), Bluebells (*Mertensia virginica*), Wood anemone (*Anemone nemorosa*), Lesser celandine (*Ranunculus ficaria*), Dog violet (*Viola canina*), Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*). These wooded areas have associated streams and are locally important for breeding birds and potentially mammals such as badger. These habitats are considered to be of high (local) ecological value. While these areas are traversed by the alignment, impacts will be avoided as no tree lopping is likely to be required here.

6.4.4.2.8 Broadleaved Woodland (WD1)

146 Blocks of mature intact broadleaved woodland are avoided by the alignment where possible. The exceptions are: Brittas Estate where a section is crossed between Towers 267 and 269 and a number of smaller pockets of woodland identified in Habitat Maps. Species noted include mature Beech (*Fagus sylvatica*), Oak (*Quercus* spp.), Ash and Cherry laurel (*Prunus laurocerasus*). Woodland described at Brittas Estate is considered to be a site of Local Importance (Higher Value).

147 Within the Brittas Estate new deciduous plantations have been established adjacent to mature woodlands consisting of deciduous trees including Beech.

148 Broadleaved woodland is locally important for common breeding birds, foraging bats and potentially badgers.

6.4.4.2.9 Conifer Plantation (WD4)

149 Several blocks of coniferous plantation are crossed by the proposed alignment. Tree species planted include Sitka spruce (*Picea sitchensis*), Larch (*Larix* spp.) and Alder at the block boundary. These plantations are predominantly closed canopy and are typically greater than 10m high. Tree trimming will be required in these areas as they will potentially interfere with the conductors. Conifer plantations are highly modified habitats of low botanic value though they are locally important for common wildlife including breeding birds and deer species.

6.4.4.2.10 Scrub (WS1)

150 Gorse and Hawthorn scrub with some immature Ash trees were noted on an esker between Towers 363 and 364. This habitat is also scattered along the alignment and is evaluated as moderate local value.

6.4.4.2.11 Immature Woodland (WS2)

151 There is extensive evidence of recent drainage and planting of species poor wet grassland in particular around the northern end of the route and at Culmullin townland at the extreme south. This habitat is evaluated as low ecological value.

6.4.4.2.12 Hedgerows (WL1)

152 Hedgerows form field and road boundaries along the alignment. They are typically relatively low growing linear woodland features often with scattered trees mainly Ash (*Fraxinus excelsior*) and Hawthorn (*Crataegus monogyna*). The most common species are Hawthorn, Blackthorn (*Prunus spinosa*), Bramble (*Rubus fruticosus*), Elder (*Sambucus nigra*), Honeysuckle and Dog rose (*Rosa canina*). Common tree species include Ash, Sycamore (*Acer pseudoplatanus*), and occasional Oak. Hedgerows are managed typically at most roadsides though many hedges, especially in the northern section of the alignment, are unmanaged and overgrown. Hedgerows are important nesting areas for birds and are utilised by bats as foraging corridors. Badger setts may potentially exist in some hedgerows.

153 For the purposes of defining potential impacts, hedgerows (WL1) are subdivided into two categories' as follows:

- WL1 A = More managed / low hedgerows typically dominated by Hawthorn. These are generally less than 6m high and no significant tree trimming will be required; and
- WL1 B = Overgrown / unmanaged hedgerows typically with immature or semi mature trees (dominated by Ash). There may be isolated mature standard trees. These are generally less than 12m high and in many cases tree lopping and / or trimming will be required.

154 Hedgerows are locally important for wildlife and as corridors for linking semi natural areas in a managed agricultural landscape.

6.4.4.2.13 Treelines (WL2)

155 There are numerous examples of mature treelines within the MSA. They consist of dense well-structured mature linear woodland with infrequent gaps. The linear woodlands are

predominantly species rich with Ash, Oak, Beech (*Fagus sylvatica*), Willow (*Salix* spp.), Hawthorn, Sycamore, Hazel (*Corylus avellana*), Blackthorn and occasional Holly (*Ilex aquifolium*) and Spindle (*Euonymus europaeus*). Typical associated vegetation includes fern species (e.g. Harts tongue (*Phyllitis scolopendrium)*, male (*Dryopteris filix-mas*) and occasional polypody (*Polypodium* spp.) fern species) and creepers including Ivy, Honeysuckle and Brambles. Herbs noted include Herb-robert (*Geranium robertianum*), Dog violet, Stitchwort (*Stellaria* spp.), Cleavers (*Galium aparine*), Nettle, Primrose (*Primula vulgaris*) and ruderal weeds at the woodland edge (Nettle, dock and thistle). Linear woodland habitat acts as refuge for plant diversity in an intensively managed region. These habitats are important breeding habitats for most common birds noted and provide foraging networks for bats. They may also be utilised by badgers as suitable sett locations.

156 Identified WL2 habitat is typically greater than 13m in height with trees > 20m in height recorded in some cases. These will be areas where tree lopping will definitely be required and hence impacts will arise.

157 Treelines are of local ecological value being important for wildlife and as corridors for linking semi-natural areas in a managed agricultural landscape.

6.4.4.2.14 Arable Crops (BC1)

158 This habitat is included as GA1 in habitat maps. It occupies a large part of the southern half of the MSA and is intensively managed for the production of arable crops including cereals and potatoes. 'Weed' species noted include Chickweeds (*Stellaria* spp.), Fumitory (*Fumaria* spp), occasional Poppy (*Papaver rhoeas*) and Oat grass species (*Avena* spp.). This habitat is of low ecological value botanically, though several specific bird species of conservation interest including Yellowhammer and Whooper Swan use this habitat.

6.4.4.2.15 Stonewalls and Other Stonework (BL1)

159 This habitat is associated with hedgerows in parts of the northern section. These habitats are considered under WL1 habitat and impacts will be avoided.

6.4.4.2.16 Buildings and Artificial Surfaces (BL3)

160 The alignment crosses a large number of tracks and roads. Temporary access routes follow existing tracks and roads as much as possible. The alignment avoids crossing buildings, bridges etc. This is a highly modified habitat.

6.4.5 Fauna

6.4.5.1 Birds

161 The main findings of the bird surveys are summarised in this section under breeding and wintering birds. The focus is on bird species identified as being at potential risk from impacts associated with the development (Target species). Sensitivity to potential effects of the OHL development is based on the extensive desktop study conducted, consultation with relevant stakeholders and field studies. Sensitivity factors include one or more of the following – known collision risk (with transmission lines), risk of disturbance (during site clearance works), displacement (permanent outcome of development) and species distribution within the study area. EirGrid Guidelines (2012) detail vulnerability of bird species in Ireland to collision with electricity transmission lines and this has also informed the evaluation. This evaluation is detailed as appropriate for individual species detailed below.

162 Target species were identified as species sensitive to this type of development. They are species listed on Annex I of the EU Birds Directive (79/409/EEC)[22] and birds listed as being of high (Red listed) and medium (Amber listed) conservation concern (as identified by Colhoun and Cummins (2013)). Also considered are common species which have been identified as relatively sensitive to potential collision impacts from this type of development (EirGrid, 2012).

6.4.5.1.1 Breeding Birds

163 A detailed survey of breeding birds in the MSA has been undertaken to inform the ecological impact evaluation. This survey report is presented in **Appendix 6.5, Volume 3D Appendices** of the EIS. Key species of conservation significance identified are summarised below into potentially sensitive and relatively non sensitive to potential impacts from the development.

164 The species accounts presented below relate to those species of conservation concern that are considered to be sensitive to the OHL development as per rationale described in Section 6.4.5.1 above.

6.4.5.1.1.1 Sensitive Species of Conservation Significance

165 **Lapwing** (Red Listed) is a scarce breeding species in the overall study area. During 2014 a pair of Lapwing was recorded in the early part of the breeding season (23rd April) at a regular breeding site (see below) in the townland of Oristown (within 500m of the alignment). These birds were displaced by land reclamation works soon after (before 7th May). A pair noted actively displaying at a new site beside Clooney Lough (c. 750m from the alignment) on 7th May may have been these birds. No Lapwing were recorded at both these sites during following

[22] The species listed in Annex I of the EU Birds Directive are those in danger of extinction, rare, vulnerable to specific changes in their habitat requiring particular attention for reasons of the specific nature of their habitat.

surveys including that of the 28th May. During 2013, two pairs of Lapwing were noted as probably breeding in the townland of Oristown at the same location where recorded in early 2014. Two pairs of Lapwing were noted here also in 2012, while in 2011 two non-breeding individuals were located close by in the townland of Clongill (approximately 1km north). This general area is locally important for breeding Lapwing. Based on NRA (2009) evaluation criteria (>1% county breeding population) this area is evaluated as being of County importance for breeding Lapwing specifically. This is a moderately collision prone species and is sensitive species to disturbance at breeding sites and potential displacement.

166 **Kingfisher** (Annex I EU Birds Directive and Amber Listed) is strongly associated with river, riparian habitats and lakes in the overall MSA where it is relatively common. It was recorded during surveys regularly in the MSA at the Rivers Boyne and Blackwater. These rivers are crossed by the proposed alignment. The main river channel of the Rivers Boyne and Blackwater are designated as an SPA (site code 004232) specifically for breeding Kingfisher. Kingfishers were also recorded regularly at Whitewood Lough (approximately 600m from proposed alignment). Kingfishers are likely to breed / forage around lakes and rivers throughout the study area. This is not a collision prone species but is sensitive to disturbance of breeding habitat where the alignment crosses potential breeding areas (rivers and associated riparian areas).

167 **Woodcock** (Red Listed) were not recorded as a breeding species within the MSA. This species is a cryptic species active at night which likely breeds in scrub, overgrown wetland edges and forestry in the study area. This species is considered a moderately collision prone species. This skulking sedentary species is not considered sensitive to the development.

168 **Cormorant** (Amber Listed) frequent at the larger rivers and lakes. Cormorants are regularly recorded on Whitewood Lough and this is a probable breeding site. Newcastle Lough in MSA is another potential breeding site and regular roost site. This is considered a highly collision prone species. The larger Boyne and Blackwater River crossings are potentially sensitive collision risk locations for this species.

169 **Great Crested Grebe** (Amber Listed) is a local breeding species associated with lakes. One to three pairs typically breed annually on Whitewood Lough which is located c. 600m from the proposed alignment at its nearest point. This species also recorded and probably breeding on suitable lake habitats at Lough Ervey (approximately 1.3km from the alignment); Breakey (approximately 2.88km from the alignment) and probably Newcastle Loughs (approximately. 2.2km from the alignment). This is a relatively sedentary species that nevertheless is highly susceptible to collision with powerlines.

170 **Little Grebe** (Amber Listed) occasionally breeds on small lakes removed from the development including Ervey Lough, Breakey Lough Little, Clooney Lough, Newcastle Lough and possibly Whitewood Lough. This species is considered a highly collision prone species.

171 **Mute Swan** (Amber Listed) are a widespread breeding species on waterbodies from small ponds to large lakes throughout the MSA. In MSA this species regularly breeds on a number of sites within 2km of the proposed alignment including; Whitewood Lough, Ervey Lough Newcastle Lough and Breakey Lough. They also utilise larger rivers such as the River Boyne and Blackwater and the Tara Mines Tailing Ponds.

172 Mute Swan are considered a highly collision prone species. The Boyne and Blackwater River crossings are potentially sensitive collision risk locations for this species

173 **Snipe** (Amber Listed) are a scarce breeding species in the MSA as suitable breeding habitat (wet grassland and wetlands) is rare. To date, this species was only recorded in the townland of Oristown (same area as Lapwing) in 2013 only. This species is considered a medium collision prone species. Suitable habitat is largely avoided and this species is not considered sensitive to the development.

174 Common species which are moderately or highly vulnerable to collision are summarised below. Most of these species listed are associated with water bodies which will not be impacted by the proposed development, the exception being Pheasant which is breed for recreational hunting.

- Duck species and Moorhen;
- Grey Heron; and
- Pheasant.

6.4.5.1.1.2 Non-Sensitive Species of Conservation Significance

175 **Peregrine Falcon** (Annex I EU Birds Directive) was the only other species noted as possibly breeding in the wider MSA, though no potential nest areas were determined and breeding habitat is unsuitable in the vicinity of the development.

176 **Yellowhammer** (Red Listed) is a small passerine species common in mixed (tillage and livestock) farmland in the MSA and was regularly recorded in all surveys. This species is not considered a collision prone species. It may be susceptible to disturbance during woody vegetation clearance prior to construction.

177 **Barn Owl** (Red Listed) is a nocturnal bird of prey species which potentially breeds in the MSA. This species typically breeds in old uninhabited buildings and outhouses though they may possibly use hollows in large old trees. This species is very rare in the study area (Balmer *et al*., 2013). None were recorded during surveys in MSA and impacts to typical nesting areas are avoided. No significant potential nest sites (old trees with large cavities) were determined at any alignment roadside crossings or lands accessed. The likely absence of breeding sites in proximity to the alignment coupled with the relatively rare occurrence of the species throughout the MSA suggests that collision risk would be negligible

178 The following passerine species of high conservation concern were recorded which are considered to have low susceptibility to collision with powerlines (EirGrid, 2012); Meadow Pipit and Grey Wagtail. Meadow Pipit are widespread along the alignment in wet grassland and semi-improved pasture. Grey Wagtail was recorded along watercourses and associated riparian habitat.

179 The following passerine species of moderate conservation concern were recorded which are considered to have low susceptibility to collision with powerlines (EirGrid, 2012); House Sparrow, Kestrel, Skylark, Linnet, Sand Martin, Starling, Swallow, Swift, Tree Sparrow, and Stock Dove. Some woody vegetation nesting species may be susceptible to disturbance during woody vegetation clearance prior to construction.

6.4.5.1.1.3 Wintering Birds

180 Detailed multi-annual surveys have been conducted on wintering birds to inform the ecological impact consideration with particular focus on Whooper Swan. These surveys have been conducted annually since 2007 / 2008.

181 The most recent survey report which covers 2013 / 2014 winter survey period, considers all previous surveys and is presented in **Appendix 6.6, Volume 3D Appendices** of the EIS. The key findings of this study, in relation to sites and inter year usage by Whooper Swan is detailed in Figure 6.3.1, **Volume 3D Figures** of the EIS. Identified and probable flightlines based on surveys conducted are detailed in Figure 6.3.2, **Volume 3D Figures** of the EIS.

182 A summary of the key findings of the annual winter survey from 2007 / 2008 to 2013 / 2014 are detailed below.

Whooper Swans (Annex I EU Birds Directive)

183 Whooper Swans were highlighted in the An Bord Pleanála (the Board) scoping opinion and also during consultation with BWI and NPWS, as a species extensively using the MSA in numbers that regularly exceed nationally significant levels (greater than 150 birds (Boland *et al*., 2010).

This species is considered susceptible to collision with powerlines, (EirGrid 2012). In this regard, Whooper Swan was identified as a key target species for consideration regarding potential impacts of the development. Criteria for assessing impacts on bird species in terms of collision risk and the significance of those impacts on birds are detailed in **Tables 6.5** and **6.6**.

184 Over a period of seven years, surveys for Whooper Swan and other wintering birds were undertaken monthly during the period of October to April. 39 individual sites were identified in the MSA as being utilised by Whooper Swan during the survey period. An additional 15 sites were identified in the literature review or in consultation with NPWS as historical Whooper Swan sites, however no birds were recorded over the survey period. The Whooper Swan sites identified as part of this study are part of more extensive sites / areas highlighted and evaluated as part of the International Swan Census (Crowe 2005). For example, the River Blackwater site (in Crowe 2005) includes individual sites detailed herein, such as Fyanstown, Sedenrath, Tara Mines Tailings Ponds and Headford Estate. Flocks of Whooper Swan are highly dynamic and can be clustered together in large flocks or spread throughout the wider landscape in smaller flocks. Variables including food availability, security from predators (large open fields are preferred) and areas of temporary flooding all influence distribution and hence flightlines and flightline regularity in the study area. As detailed above, the wider study area has been subject to continual winter surveys between 2007 / 2008 and 2013 / 2014 inclusive as highlighted in Figure 6.3.1, **Volume 3D Figures** of the EIS.

185 A summary of the most important individual Whooper Swan sites identified based on average values for the survey period (WSP1-7) are summarised in **Figure 6.1**.

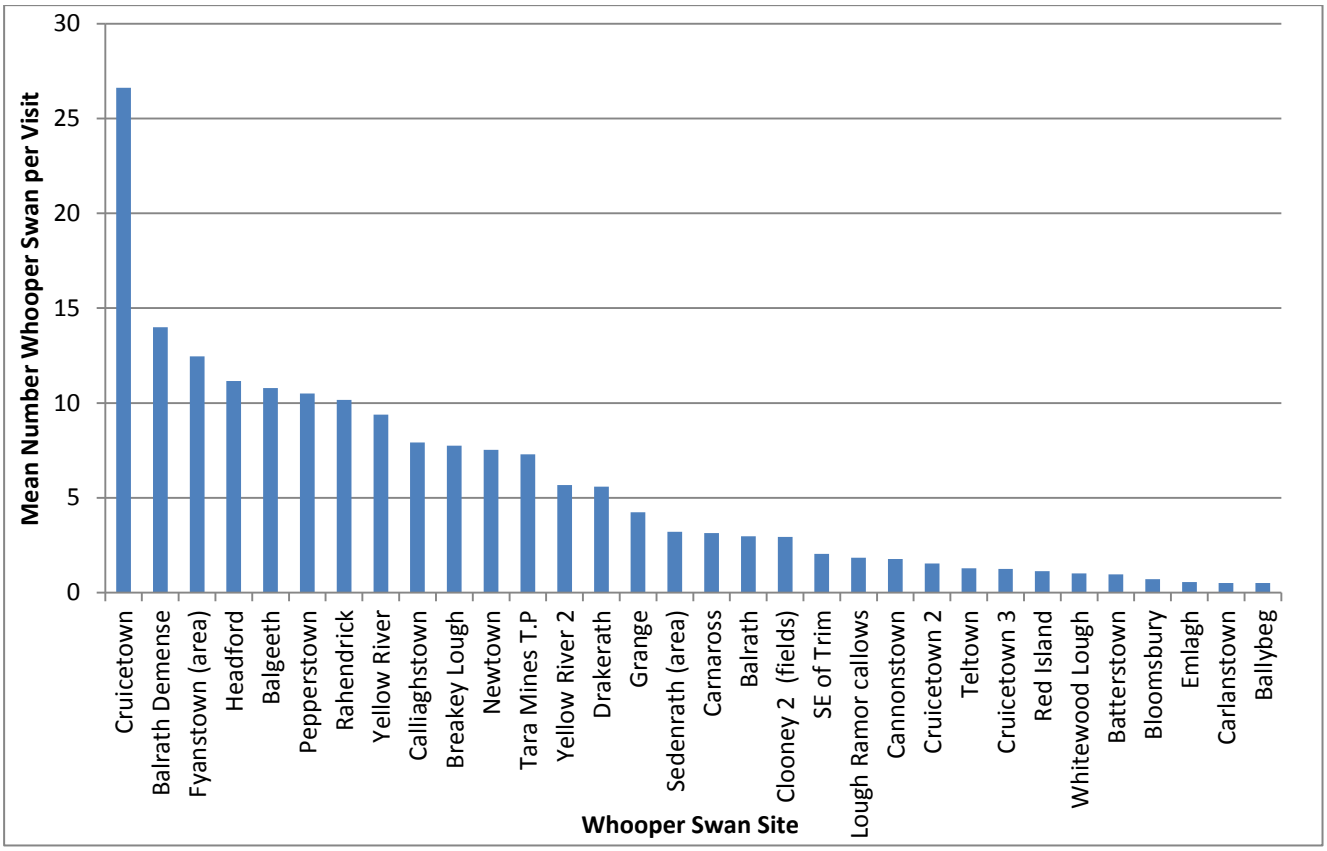

Figure 6.1: Key Sites are Ranked Based on Highest to Lowest Average Bird Counts during Surveys

186 It is possible to merge the information gathered on these sites (**Figure 6.1**) into larger key areas. This is based on information from the flight line survey with movements to and from roost sites. These key areas are identified in **Table 6.11**.

Table 6.11: Sites identified during survey as being associated with Key Areas based on flightlines identified between roost and forage areas

KEY AREA	SITES
Balrath	Balrath Demesne
Balrath	Balgeeth
Balrath	Pepperstown
Balrath	Calliaghstown
Balrath	Balrath
Balrath	Cannonstown
Clooney	Clooney 2 (fields)
Cruicetown	Cruicetown

Cruicetown	Newtown
Cruicetown	Cruicetown 2
Cruicetown	Cruicetown 3
Cruicetown	Whitewood Lough
River Blackwater Valley (between Kells and Navan)	Headford
River Blackwater Valley (between Kells and Navan)	Grange
River Blackwater Valley (between Kells and Navan)	Fyanstown (area)
River Blackwater Valley (between Kells and Navan)	Yellow River
River Blackwater Valley (between Kells and Navan)	Tara Mines T.P
River Blackwater Valley (between Kells and Navan)	Yellow River 2
River Blackwater Valley (between Kells and Navan)	Sedenrath (area)
River Blackwater Valley (west of Kells)	Rahendrick
River Blackwater Valley (west of Kells)	Carnaross
Emlagh	Emlagh
Emlagh	Carnaross

187 The key areas where Whooper Swan concentrate and where flightlines emanate (in relation to the study area covered) are the River Blackwater Valley (between Kells and Navan), Cruicetown, Balrath, River Blackwater (west of Kells) and Breaky Lough. Clooney and Emlagh contain much lower and less frequent records. All these sites are located between 0.9km (Cruicetown) and 16km (Balrath) from the alignment. The Blackwater Valley (between Kells and Navan) is the most important area for Whooper Swan, with significant roost sites at Tara Mines tailings ponds and Headford estate and outlying regularly used forage sites up to 10km distant from these roost sites.

188 The Blackwater Valley (between Kells and Navan), Balrath and Cruicetown areas (as defined in **Table 6.11**) support (at least occasionally) nationally important numbers of Whooper Swan. Other less important areas are the River Blackwater (west of Kells), Breaky Lough and Emlagh. These are either well removed from the proposed alignment and / or no flightlines linking these sites have been recorded, or are likely. It should be noted that land reclamation works have occurred in recent years at the Cruicetown roost and forage site, and numbers have diminished, however it continues to be regularly utilised by lower numbers of Whooper Swan.

189 Details of flightline surveys are included in the *Winter Bird Report* for the MSA, **Appendix 6.6**, Volume 3D Appendices of the EIS.

190 The key findings of the study are summarised below from the southern most to northern most point of the proposed development. The detailed *Winter Bird Study* is presented in **Appendix 6.6, Volume 3D Appendices** of the EIS:

- The area south of the River Blackwater to Woodland substation does not hold significant concentrations of Whooper Swan. Despite regular drive round and aerial surveys no significant concentrations of Whooper Swans were observed.
- A regular nationally important population of Whooper Swans overwinter in the Blackwater Valley area.
- The alignment crosses the Blackwater River between various foraging sites in the Blackwater Valley and an important roost site at Tara Mines Tailings Ponds.
- Overwintering sites in the Blackwater Valley include Sedenrath, Fyanstown and Bloomsbury, and the outlying sites at Grange.
- The Whooper Swans in the River Blackwater Valley mostly roost at Headford Estate (away from the alignment) and Tara Mines Tailing Ponds (alignment bisects flightline).
- An irregularly used foraging site is over sailed by the alignment between Towers 309 and 310 at Teltown. Numbers at this site never exceeded national importance.
- Whooper Swans irregularly use arable farmland along the Yellow River area in numbers which can reach close to National Importance. This area is located between 1 and 2km east of the alignment (Towers 291 to 295). Flightlines noted in this area are to Tara Mines Tailings Ponds roost site which avoids crossing the alignment.
- The extensive arable farmland between the townland of Mountainstown up to the N52 road crossing supports a number of highly dispersed irregularly utilised sites. Sites used are governed by food availability (potatoes preferred) and temporary flooding. These include the following sites (fields used); Drakerath, Red Island, Clooney 2, Coolaliss and Clooney Lough.
- South of Clooney Lough, a more recent Whooper Swan site (2012 / 2013 surveys) was identified in the townland of Drakerath (approximately 500m west of Tower 286). No birds were recorded here in previous and most recent (2013 / 2014) surveys. The Drakerath site consists of a flooded potato field which was utilised as a foraging and roosting site. No flightlines were recorded crossing the alignment in this area and observed Whooper Swans were noted foraging and roosting only at this location.
- Smaller flocks of Whooper Swans were noted as regularly foraging in various fields west of Clooney Lough (Coolaliss and Clooney 2). A roost site (area of temporary

flooding) was noted adjacent to the foraging area at Clooney 2. The distance of observed foraging and roost areas was approximately 300 to 500m west of the alignment at Towers 280 and 281. One flightline was observed crossing the alignment in this area and 4 flightlines were noted very close to here (<500m from the alignment).

- The northern section of the proposed development passes close to Cruicetown, a foraging and roosting site for Whooper Swan. While the birds concentrate at Cruicetown, varying numbers spread out from this site to different foraging areas, and to Whitewood Lough (which specifically requires flights across the alignment). This area includes a flight line which was recorded in some years as crossing the alignment including in 2013 / 2014.

Golden Plover

191 Golden Plover were recorded on one occasion in nationally important numbers – a flock of over 3000 birds were observed roosting in November 2008 at Tara Mines Tailings Pond. Much smaller flocks (not reaching nationally important numbers) have been observed feeding in the River Blackwater Valley area during each year of survey. No flightlines were observed crossing the proposed alignment during surveys, though it is likely that they occasionally cross this area. This species has been highlighted (EirGrid 2012) as being of medium susceptibility to collision with transmission lines.

Other Species

192 Small numbers of potentially sensitive species including Curlew, Lapwing, Shelduck and other duck species roost on Tara Mines Tailings Ponds, though none were noted ever leaving / returning to this area during survey. No flightlines for these species were observed crossing the alignment. In this regard no significant impacts are expected.

193 Large flocks of gulls (dominated by Lesser Black Backed Gulls) roost at Tara Mines Tailings Ponds and spread out at dusk and dawn to farmland including the Blackwater River Valley. These are considered to have low susceptibility to collision with powerlines (EirGrid Guidelines, 2012).

194 No other waterfowl / wader species were recorded crossing the line route.

6.4.5.1.1.4 Summary Bird Evaluation

195 A summary evaluation of the key bird species determined and key areas are detailed in **Table 6.12**. For sites with flightlines refer to Figure 6.3.2, **Volume 3D Figures** of the EIS.

Table 6.12: A Summary and Evaluation of Key Bird Areas and Species within the MSA

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flightlines
Whooper Swan	River Blackwater Valley (includes various sites) Regular National Importance (Irregular International Importance)	Whooper Swan sites are concentrated between 2.5 and 4km away from alignment. A regular flight line was confirmed as crossing the alignment.
Whooper Swan	Cruicetown Area County importance	Whooper Swan roost and forage site identified at Cruicetown. Birds also use sites south of here all located between 0.5 and 1.5km away from alignment. The drop in numbers in recent years may be a result of drainage works on the lake roost site. A flight line was confirmed as crossing the alignment to Whitewood Lough. These birds typically arrive later in the winter (after December) and numbers are generally highest in February / March.
Whooper Swan	Yellow River. County importance	No flight line was confirmed or is likely relevant to the proposed development. However this area is close to the alignment (500m - 1km east of the alignment). The Whooper Swan here are part of the wider River Blackwater Valley population and were recorded roosting at Tara Mines Tailing Ponds.
Whooper Swan	Teltown Locally important (Higher value)	An irregular forage site for low numbers of Whooper Swan (locally significant) is crossed at Teltown. This area is oversailed by alignment between Towers 309 and 310. These birds are part of the river Blackwater Valley population.
Whooper Swan	Clooney Lough (area) Locally important (Higher value)	Whooper Swan sites are concentrated between 0.3 and 0.6km away from alignment. A flight line was confirmed as crossing the alignment.
Whooper Swan	Drakerath Area and red island (area) Locally important (Lower value).	This Whooper Swan site (noted in 2012 only) is located 0.5km west of the alignment. No flight line was confirmed as crossing the alignment.
Cormorant	River Boyne and Blackwater	These rivers are traversed by the alignment presenting a localised collision risk for this species.

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flightlines
	Locally important	
Lapwing	Oristown townland County important	Nest areas are avoided by alignment. The alignment is located between 200m and 400m of core Lapwing territories (2014, 2013, 2012 and 2011 data). The breeding habitat was partly affected by land reclamation works in April 2014, and breeding birds were displaced. This may affect future use of this area.
Golden Plover	Tara Mines Tailings Ponds (roost site). River Blackwater Valley also used by lower numbers. Nationally important	Sites detailed are bisected by the alignment presenting a localised collision risk for this species. While not observed flying across the alignment, it is likely that flights do occur.
Great crested grebe	Lough Ervey, Lough Breaky and Newcastle Lough Locally important	Sites where this species breeds are avoided being located >500m from the alignment.
Mute Swan	Lough Ervey, Lough Breaky and Newcastle Lough Locally important (Higher value)	Loughs where this species breeds are avoided being located >500m from the alignment.
Mute Swan	River Boyne and Blackwater crossing Locally important (Higher value)	These rivers are traversed by the alignment presenting a localised collision risk for this species.
Little Grebe	Lough Ervey, Lough Breaky and Newcastle Lough Locally important (Higher value)	Loughs detailed are avoided being located >500m from the alignment.
Snipe	Oristown townland Locally importance (Lower value)	The alignment is located approximately 400m east of an irregularly used (2013 record only Snipe breeding area impacted partly by land reclamation works in April 2014.
Common collision prone species: Grey Heron, Common duck species,	Throughout study area concentrated at rivers and hedgerow crossings Locally important (Lower value)	Numerous locations are traversed which will present localised collision risks to common species.

Key Bird Species to consider	Key Areas and Evaluation	Description of Location / Flightlines
Moorhen and Pheasant		
Kingfisher	River Boyne and Blackwater crossing. Internationally important	Rivers traversed by proposed alignment are used by Kingfisher. Kingfisher fly at low heights are not at significant risk of collision with transmission lines.
Kingfisher	Other River Crossings, Lakes (Whitewood Lough). Locally important (Higher value)	Rivers traversed by the proposed alignment are used by Kingfisher. Lakes utilised by Kingfisher are avoided (>500m) by the alignment.
Yellowhammer	Hedgerow field boundaries between Towers 401 and 280 Locally important (Higher value)	Hedgerow nest areas and arable land (field edge) forage areas are traversed by the proposed alignment.

Note: River Blackwater Valley sites include Sedenrath, Fyanstown, Bloomsbury and Fyanstown 2

6.4.5.2 Mammals

196 Mammal surveys were undertaken in areas where potentially suitable habitat (hedgerows, scrub and treelines) occurred at proposed tower locations.

197 Based on a review of the National Biodiversity Data Centre (NBDC) database, BCI website and field survey findings, the following protected mammals utilise the MSA and require consideration regarding potential impacts: badger, otter, Irish hare, deer (species) and bat (species). **Table 6.13** lists the mammals identified within the study area and potentially occurring within the alignment based on this review.

Table 6.13: Protected Mammals Occurring in the MSA and Legal Status

Common Name	Latin Name	Protected Status
Irish hare	*Lepus timidus subsp. hibernicus*	Habitats Directive Annex V *Wildlife Amendment Act, 2000*
European otter	*Lutra lutra*	Annex II of EU Habitats Directive Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Eurasian badger	*Meles meles*	*Wildlife Amendment Act, 2000*
Myotis Bat species	*Myotis*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Daubenton's Bat	*Myotis daubentonii*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Natterer's Bat	*Myotis nattereri*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Leislers Bat	*Nyctalus leisleri*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
European rabbit	*Oryctolagus cuniculus*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Pipistrelle bat species	*Pipistrellus*	Annex IV of Habitats Directive *Wildlife Acts*
Common pipistrelle	*Pipistrellus pipistrellus sensu lato*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Soprano pipistrelle	*Pipistrellus pygmaeus*	Annex IV of Habitats Directive

		Wildlife Amendment Act, 2000
Brown Long-eared Bat	*Plecotus auritus*	Annex IV of Habitats Directive *Wildlife Amendment Act, 2000*
Red deer	*Cervus elaphus*	Wildlife Amendment Act, 2000
Hedgehog	*Erinaceus europaeus*	Wildlife Amendment Act, 2000

Source: National Biodiversity Data Centre (NBDC) 2013

198 The findings of surveys for these species are summarised below.

6.4.5.2.1 Bats

199 All Irish bat species are protected under the *Wildlife Act 1976* (as amended in 2000) and Annex IV of the EU Habitats Directive 1992. Bats are further protected across Europe under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983).

200 No site with significant potential for bat roosts such as old buildings, souterrains, caves, houses and other buildings will be impacted by the development. In addition all known bat roosts provided by NPWS and Biodiversity Ireland) are avoided.

201 The MSA contains a large network of hedgerow, treeline and scattered patches of woodland habitat, which provide abundant foraging routes for bat species throughout the area. River corridors also provide foraging and commuting potential. An evaluation of potential tree roost sites conducted from the roadside and on lands accessed for survey, confirmed that very old mature decaying trees suitable as temporary summer bat roosts and possible maternal roosts, are very scarce in the study area. No trees were identified with bat signs or as having potential as maternity roosts.

202 Bat activity surveys confirmed abundant bat foraging activity along mature hedgerows, rivers and linear woodland throughout the alignment. Bat species recorded included foraging and commuting Common pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's (*Nyctalus leisleri*) and Daubenton's (*Myotis daubentonii*).

203 An unidentified (*Myotis* sp) song perch, indicatory of a roost site (locally), was recorded on 4th August 2014 at Ballybrigh townland (Grid Reference: N 840 606) near mature trees and an old building. This territorial activity (male bat) indicates a probable roost site in the old building which is avoided by the proposed alignment route (70m to south).

204 No sites showing high potential as a maternity bat roost were identified under the route of the alignment.

205 Treelines with potential of being at least temporary bat roosts are identified as mature treelines (WL2) in habitat maps. In this regard a standard mitigation approach will be implemented which is to identify potential suitable tree roosts requiring appropriate precautionary mitigation (based on NRA Guidelines[23]) to be implemented as appropriate for tree cutting activities during the construction phase.

6.4.5.2.2 Otter

206 The otter is fully protected in Ireland under the *Irish Wildlife Act 1976* (as amended 2000). It is also listed on the Irish Red Data book as 'International Important'. The otter is also protected under Annex II of the EU Habitats Directive giving it strict protection as a species of community interest for which EU nations must designate cSAC. The otter is also listed on Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) of which Ireland has ratified.

207 Otter signs (spraints and trails) were noted at the Rivers Boyne and Blackwater close to the proposed line route crossing points, as would be expected based on the known distribution of this species.

208 Evidence of an otter breeding site was recorded at one river draining into the River Blackwater. This site is approximately 100m from Tower 309 (50m from the alignment).

209 A number of areas with suitable breeding habitat will be traversed by the OHL (riparian river corridors). The location of all works areas associated with the development away from potential breeding habitat means risks of disturbance to otter breeding sites is very low.

6.4.5.2.3 Badger

210 Badgers are listed on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) as a species to be protected and whose exploitation must be regulated. The species is protected in Ireland under the *Irish Wildlife Act 1976* (as amended 2000). The line design avoids known and potential badger breeding areas. Where towers are to be located in hedgerows, these areas have been surveyed and no badger setts were observed at, or in the vicinity of, the tower locations.

[23] http://www.nra.ie/environment/environmental-construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

211 Field surveys conducted at roadsides and fields accessed found limited evidence of badgers and no breeding, outlier or other setts were found. No setts were recorded at tower locations or within wider landholdings surveyed. Well-worn wildlife tracks, noted widely, are utilised by badgers and hair and other signs were detected.

212 Recent published data received from the Department of Agriculture indicates a relatively widespread number of breeding badger sites in the MSA. Setts are typically located in hedgerows / linear woodland rather than in scrub or woodlands. Badger populations have likely decreased considerably in Ireland in recent years (Source: Department of Agriculture), and the population in County Meath is likely to be lower than that recorded in Smal (1995). That report detailed 122 setts as being confirmed in 28 x 1km squares in County Meath and badgers were considered common therein.

213 Based on current Department of Agriculture datasets, the location of towers has avoided known badger sett locations. The Department ERAD manager advised that in Meath known badger setts are almost entirely located in field boundary habitat. The avoidance of field boundaries (except where surveyed) means all known badger setts are avoided. In addition, the potential for an unknown badger sett to be disturbed by the development is very low given un-surveyed hedgerows / tree-lines and unmanaged areas are avoided as tower locations.

6.4.5.2.4 Other Protected Mammals

214 Other protected mammals noted included Irish hare (*Lepus timidus hibernicus*). This species was noted on several occasions in grassland throughout the MSA.

215 The Irish hare is a quarry species (may be hunted under licence) and has limited protection under domestic legislation. It is listed in the Irish Red Data book as internationally important and in Appendix III of the Bern Convention as a protected species. It is also listed under Annex V of the Habitats Directive as a species which may be exploited but not to the extent that it's favourable conservation status is compromised (Hayden & Harrington, 2000).

216 Deer (red deer and red deer / Sika hybrids) are relatively common in wooded areas particularly plantation woodland. Signs and sightings were made at several areas where access was permitted. These areas tend to be managed habitats subject to ongoing management / disturbance.

217 Other protected species which may occur in the study area include red squirrel (*Sciurus vulgaris*) however it is largely absent in the MSA as grey squirrel are now common. Red squirrel is rapidly declining as grey squirrel outcompete and displace red squirrel from the midlands and eastern side of Ireland (NPWS / EHS 2008).

218 The red squirrel occupies a variety of woodland types across much of Ireland. It is protected under the Fifth Schedule of the *Irish Wildlife Act 1976* (as amended 2000) and is on Schedule III of the Bern Convention.

219 No other protected mammal species were noted.

6.4.5.3 Other Mammals

220 Common mammal species noted included grey squirrel (*Sciurus carolinensis*), rabbit (*Oryctolagus cuniculus*), fox (*Vulpes vulpes*). Irish stoat (*Mustela erminea*), wood mouse (*Apodemus sylvatica*), pygmy shrew (*Sorex minutus*), hedgehog (*Erinaceus europaeus*) and brown rat (*Rattus norvegicus*) are also likely to be common in the MSA.

6.4.5.4 Fisheries and Aquatic Species

221 The majority of the route south of Whitewood Lough is within the Boyne River catchment. Whitewood Lough is within the River Dee catchment.

222 A total of 39 river and stream crossings were identified (as detailed in the OSi 1:50,000 Discovery Data Maps) as being crossed by the new section of the alignment (Towers 237 to 401). An additional two river crossings are traversed by the existing line linking Tower 402 to the Woodland Substation.

223 The Rivers Blackwater and Boyne are the largest rivers crossed by the alignment. In addition a number of drainage channels are crossed, which drain into these rivers. The Blackwater River is a major tributary of the River Boyne. It has a good stock of Brown trout *Salmo trutta* and spawning Atlantic salmon (*Salmo salar)* (O'Reilly, 2004). The Boyne is the main river draining County Meath and is considered as one of Ireland's premier game fisheries both for Salmon (spring) and Brown trout fishing. Salmon are considered scarce (except in late summer with floods) on the section of the River Boyne near Trim at the line route crossing point (O'Reilly, 2004).

224 Other protected aquatic species which may occur in rivers crossed by the alignment include White-clawed Crayfish *(Austropotamobius pallipes)* and lamprey species, in particular River Lamprey *(Lampetra fluviatilis)*.

225 No known Freshwater Pearl Mussel (*Margaritifera Margaritifera)* populations exist in the rivers crossed and habitat is unsuitable (NPWS 2013 data – from website).

226 Whitewood Lough located approximately 0.5km from the alignment is a noted coarse fishery (Inland Fisheries Ireland - consultation). Species include Roach (*Rutilus rutilus*), Bream (*Abramis brama*) and Pike (*Esox lucius*).

6.4.5.5 Other Fauna

227 Common frogs were recorded in wet habitat in proximity to the line route. Drainage ditches and ponds within the study area provide potential breeding sites for common frog and smooth newt. These habitats will be avoided.

228 No reptile species were noted during the survey.

229 Marsh fritillary was not recorded. Typical habitat of marsh fritillary (breeding and feeding wetland sites) will be avoided by the proposed development.

230 Habitats such as wetlands, species rich grassland, known marsh fritillary sites and to a large degree wooded habitats are avoided.

6.4.6 Invasive Alien Species

231 The spread of alien species (both flora and fauna) is recognised as a major threat to biodiversity in Ireland (Stokes *et al.* 2006). The only terrestrial invasive alien plant species recorded was Japanese Knotweed (*Fallopia japonica*). The species was regularly recorded growing in dense stands along the public road network in the wider study area. The species was not recorded during field surveys conducted along the alignment (walkover or visual surveys).

232 Aquatic and riparian habitats crossed by the alignment have the greatest potential to support invasive species and facilitate their dispersal. Works associated with the construction of towers avoid these areas.

6.4.7 Key Ecological Receptors

233 Following a review of the existing environment presented above, it is possible to determine key ecological (site) receptors that occur within the MSA requiring consideration regarding potential impacts and mitigation. These include specific sites that have been identified as being of local Importance (Higher Value) or greater.

234 Also detailed are specific habitats and species with high protection or conservation status.

235 These identified key ecological receptors may potentially be impacted by works associated with the proposed development and are therefore taken forward in this report for evaluation and

appropriate mitigation (as required). Details of the key ecological receptors within the study area are presented in **Table 6.14**. Cowslip is noted in **Section 6.4.3** as a species previously recorded in the study area. It is not protected in Ireland and it is not considered a key ecological receptor. Betony is noted in **Section 6.4.3** as a species previously recorded in the study area; however it has not been recorded in recent years. Betony was not recorded during surveying. Betony habitat is avoided, unless already surveyed where no Betony was recorded. In this regard, it is not considered a key ecological receptor.

Table 6.14: Summary Evaluation of Key Ecological Receptors and Locations within the MSA

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
River Boyne cSAC / SPA	International	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish.	Between Towers 355 and 356
River Blackwater cSAC / SPA	International	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish.	Between Towers 310 and 311
Larger streams draining into River Boyne and Blackwater	International * (Cumulatively)	Riparian habitat. Potential spawning areas for salmon and main breeding sites for otter. Potential Kingfisher breeding sites. All species detailed are qualifying interests for the River Boyne and Blackwater cSAC / SPA.	Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River 3 crossings between Towers 344 and 347. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309 Small stream between Tower 313 and 314 Small stream between Tower 317 and 318
Whooper Swans	Annex I of EU Birds Directive Nationally significant population (Boland *et al* , 2010)	Refer to **Table 6.12** above.	Towers 307 and 312 (River Blackwater Crossing) – Whooper Swan West of Yellow River Area (Towers 291 and 295) Towers 279 to 283 (Whooper Swan feeding and roost at Clooney). Towers 257 to 268 (Whooper Swan feeding and roost area near Cruicetown / Whitewood Lough)
Golden Plover	Annex I of EU Birds Directive Nationally significant population (Boland *et al*, 2010)	Refer to **Table 6.12** above. Nationally significant numbers of Golden Plover were observed 2008 / 2009. In more recent years numbers are much lower.	Flightline crosses River Blackwater (Towers 307 to 312) Clooney Lough Area (east of Towers 281 and 282) Yellow River Area (west of Towers 293 to 295)
Lapwing (breeding sites)	Red Listed breeding species of high conservation concern. Area identified supports > 1% Co Meath breeding population. County Important Site. Recent land reclamation works and disturbance (April 2014) may reduce	The Oristown area is a county (Meath) important breeding site for Lapwing with a minimum 2 – 3 pairs in addition to occasional breeding snipe.	Nest areas will be avoided. Alignment (Towers 294 to 296) is located between 200m and 400m east of core territories (2014, 2013 and 20112012 data).

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
	this evaluation in future years though habitat is still partly suitable.		
Treelines (WL2)	Cumulatively these habitats are of County Importance as habitats and for wildlife	Lines of mature tree standards occur at specific field boundary locations described. These consist predominantly of very old probably planted trees and some are likely to be semi natural habitats.	41 treelines were identified as crossed along the alignment.
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats and for wildlife	Very overgrown hedgerows with trees.	113 crossings of hedgerow type B identified along the alignment.
Other river crossings	Cumulatively these habitats are of County Importance for fisheries, habitats and protected fauna.	Riparian habitat, aquatic fauna including lamprey species, salmon and white clawed crayfish.	Including specific rivers detailed above there is a requirement to cross 41 rivers in total.
Mature deciduous woodland (WD1)	Cumulatively these habitats are of Local Importance (Higher Value)	Mature demesne woodland. The area impacted is beside woodland surveyed in the National Woodlands monitoring survey also located within Brittas estate. [24]	Brittas Estate woodland (WD1) is the largest block of mature deciduous woodland identified and is located between Towers 267 and 269. Other mature deciduous woodland patches are crossed between Towers 262 - 263, 272 - 273, 291 - 292, 321 - 322, and 336 – 337.
Bats	Annex IV of Habitats Directive Wildlife Acts	Mature linear woodland (WL2) and deciduous woodland blocks (WD1) affords possible roost sites.	Various possible (at least temporary) roost sites are identified – refer to WL2 habitat highlighted in Habitat maps. An *Myotis* sp. song perch indicatory of a roost site (locally) was recorded in 2014 at Ballybrigh townland (Grid Reference: N 840 606) near mature trees not crossed by the alignment. No sites with high potential as a maternity bat roost were identified under the route of the alignment.
Otter	Annex IV of Habitats Directive Wildlife Acts	Rivers streams and associated riparian habitats crossed by the alignment provide possible breeding and actual foraging areas for otter.	41 river crossings identified as possible otter breeding sites. In particular the following rivers are linked to the River Boyne and Blackwater SAC: Between Towers 355 and 356; and Between Towers 310 and 311.

[24] http://www.npws.ie/researchprojects/woodlands/

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
			Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 347 and 344. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309. Small stream between Towers 313 and 314. Small stream between Towers 317 and 318 Kilmainham River between Towers 251 and 252.
Badger	Wildlife Acts	Breeding sites (setts) usually occur along base of hedgerows or amongst scrub or woodland habitat.	Badger setts are likely to occur at low densities in the vicinity of hedgerow habitat crossed by the alignment. Towers are located away from suitable breeding habitat.
Kingfisher	Annex I of EU Birds Directive Nationally significant population reason for River Boyne and Blackwater designation as SPAs	Rivers streams and associated riparian habitats crossed by the alignment provide possible breeding and foraging areas.	41 river crossings identified as possible Kingfisher breeding sites. In particular the following rivers are linked to the River Boyne and Blackwater SPA: Between Towers 355 and 356. Between Towers 310 and 311. Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 344 and 347. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309 Small stream between Towers 313 and 314. Small stream between Towers 317 and 318. Kilmainham River between Towers 251 and 252.
Breeding birds (including Yellowhammer)	Identified locally significant populations of in particular Yellowhammer a red listed species of high conservation concern	Hedgerows and treelines (potential nesting areas).	Mixed arable farmland between Towers 280 and 401.

Site / Feature	Evaluation [1]	Brief Description of Ecological Receptor	Relevant Location
Semi natural Oak-Ash-Hazel woodland	Local Importance (Higher Value)	This low growing woodland will be spanned by the towers without requirement for significant trimming.	Low growing semi natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 258 and 289 and Towers 251 and 252. Habitat will be avoided.

Note**:** 1. The evaluation for birds and mammals is informed by protection status and observed numbers (in some cases identified). Birds are evaluated based on Lynas *et al.* (2007) and protection status. Wintering birds' sites which regularly exceed 1% of national population are evaluated as being nationally important (Boland et al (2010)).

* Streams draining into the Rivers Boyne and Blackwater are considered as internationally important specifically because of their importance to mobile species (salmon, Kingfisher and Otter) crucial to maintenance of populations in the River Boyne and Blackwater SAC / SPA

6.5 POTENTIAL IMPACTS

236 The identification and description of impacts presented below takes account of the characteristics of the receiving environment as described throughout **Section 6.4** with particular reference to the Key Ecological Receptors identified in **Section 6.4.5**. Impacts are presented in relation to each phase of the project (construction and operation).

237 The impacts described in this section are those ecological impacts predicted due to the proposed development prior to the consideration of any appropriate mitigation measures, refer to **Section 6.6**. Residual impacts describe potential impacts following implementation of mitigation measures, refer to **Section 6.7**.

6.5.1 Do Nothing Scenario

238 In the case of no development occurring, there would continue to be changes in biodiversity or potentially the ecological value of habitats and species as a result of on-going land management within the MSA. It is most likely that most of the area would continue to be managed intensively for agriculture. Possible changes in management could include further land drainage, scrub clearance and afforestation - the majority of which may have a localised negative impact on ecological value / biodiversity of the area. It is not expected that changes in land-use would be influenced by whether the proposed development proceeds or not.

239 The potential ecological impacts of the proposed development are detailed in **Section 6.5.2** (construction phase impacts) and **Section 6.5.3** (operational phase impacts) below. Residual impacts are described under **Section 6.7** post mitigation being implemented.

6.5.2 Construction Impacts

240 Based on the nature of the proposed development and the baseline ecological data collected on the proposed development site, the following activities warrant specific attention in the consideration of ecological impact:

- Permanent habitat loss to hedgerows, treelines and grasslands associated with construction activity including woody vegetation clearance, site access, tower foundation excavation, tower construction and line stringing within the defined works area for each tower location;
- Permanent / temporary habitat loss / disturbance associated with stockpiling of material on vegetation outside the works area (if required);

- Temporary habitat loss / disturbance associated with the laying of temporary rubber matting or aluminium road panels and trimming of vegetation to widen existing access gaps in the hedgerows, if necessary;
- Temporary habitat disturbance associated with guard locations (at road and other OHL crossings) and areas used for machinery required during stringing of conductors;
- Temporary noise and physical presence disturbance impacts from machinery and staff at work area locations to fauna (birds and mammals);
- Pollution runoff risks to surface water quality through drains and other watercourses close to the works area, potentially linked to more ecologically important streams, rivers and lakes;
- Pollution runoff risks to ground water quality in the vicinity of works area potentially linked to ground fed wetlands and other surface water features;
- Tree lopping of more mature treelines under the proposed alignment for conductor clearance and or installation of towers;
- Tree lopping and clearance in managed plantation woodland areas crossed by the alignment for construction and ongoing maintenance of the way-leave;
- Tree and hedgerow trimming under the proposed alignment; and
- Tree lopping of mature deciduous woodland in particular at Brittas Estate.

241 Potential ecological receptors of impacts:

- Habitats that occur within the footprint of the development;
- Watercourses surrounding and downstream of the alignment;
- Bird and mammal activity; and
- Identified Key Ecological Receptors (see **Table 6.14**).

6.5.2.1 Direct Impact (Habitats)

242 Direct impacts upon habitats of highest ecological value have been minimised by constraint identification and avoidance and subsequently careful consideration to tower locations, stringing locations and temporary access routes. While other factors influence the siting of towers, ecological constraints have been addressed to the extent that the layout avoids the most important and sensitive habitats in the wider study area. In addition, due to the nature of the

proposed development it is possible to span certain habitats of conservation interest and therefore avoid direct impacts. In the following paragraphs habitat loss and disturbance is assessed in relation to tower locations, along the alignment beneath conductors, and at stringing areas (where machinery used during stringing process will be stationed).

243 No impacts are expected to any protected flora species as none were recorded and potential habitats are avoided.

6.5.2.1.1 Habitat Loss and Disturbance - Tower Locations

244 In following the precautionary principle, all towers have been carefully positioned to ensure that there will be no direct impacts on habitats of high ecological value. No towers are located in higher value habitats or sites that are identified as Key Ecological Receptors. Due to the nature of the proposed development, with careful design it has been possible to span or oversail the key ecological sites. Furthermore, habitats of ecological value outside of these sites have largely been avoided.

245 The greatest impact is associated with the locating of towers on hedgerows / treelines of moderate to low value (approximately 400m impacted). The maximum level of impact here will typically be 30m of hedgerow or treeline per tower location. Therefore, the overall impact will be 390m of hedgerow removal for the construction of the 13 towers identified.

246 Post construction, hedgerow habitat will naturally re-generate under towers. This is based on observations of towers along existing transmission lines, and protection of these habitats from livestock grazing; refer to **Appendix 6.3, Volume 3D Appendices** of the EIS. Hedgerow re-growth can be hampered by livestock grazing and or excessive damage to the soil structure around towers.

247 Stockpiling of spoil material has the potential to cause additional short term habitat loss should it be placed in a manner that would smother vegetation. Works areas located adjacent or close to hedgerows / treelines may disturb these habitats through inappropriate soil management or damage by heavy machinery.

248 The overall impact of direct habitat loss resulting from the construction of the towers in hedgerow treeline habitat is deemed to be a temporary moderate impact. This evaluation is based mainly on the ecological value of the habitats and the overall area of habitat involved.

249 **Table 6.15** indicates the number of towers that are located in various habitats, evaluation of impact and the potential area impacted.

Table 6.15: Impact of Locating Towers in Each Habitat Type within the MSA

Habitat [1]	Number of Towers	% of all Towers	Maximum Area / length habitat impacted (worst case) [2]	Assessment of Impact [3]
Improved agricultural grassland (GA1) – includes BC1 (arable farmland)	142	86.1	14.2ha	Imperceptible
Dry calcareous and neutral grassland (GS1)	3	1.8	0.3ha	Imperceptible
Wet grassland (GS4)	2	1.2	0.2ha	Imperceptible
(Mixed) conifer woodland (WD3) / dry meadow and grassy verge (GS2)	1	0.6	0.1ha	Imperceptible
Hedgerows (WL1A)	7	4.2	210m	Minor
Hedgerows (WL1B)	4	2.4	120m	Minor
Treelines (WL2)	2	1.2	60m	Minor
Immature woodland (GS2)	4	2.4	0.4ha	Imperceptible

Note: assumptions in evaluation:

1. All tower bases in linear woodland habitats (WL1A, WL1B and WL2) extend into grassland habitats detailed above. Assuming an area of 900m^2 impacted at each structure location and, where relevant 30m of linear habitat impacted.
2. Magnitude of impacts on hedgerows and treelines informed by NRA (2006) evaluation. Evaluation for other habitats based on Table 6.2.

6.5.2.1.2 Habitat Loss and Disturbance – Under Conductors

250 The habitats identified as being potentially impacted are mature hedgerow with trees, mature treelines and mature woodland. The requirement for a minimum 74m corridor (tree removal) within woodland areas is also considered.

Hedgerows and Treelines

251 There will be a requirement for cutting / trimming of woody vegetation including mature tree lopping at many of the linear woodland field boundaries (WL1 (Type B) and WL2 habitat) and areas of deciduous woodland areas (WD1) traversed by the alignment. This is to provide a minimum 6m clearance beneath the lowest conductors and main sections of woody vegetation.

252 The number of linear habitats crossed and estimated number of mature tree lopped is summarised in **Table 6.16**. For the purposes of description, lopping is where an obvious tree above 6m height (typically much more) will be cut. Trimming is the removal of boughs or reduction in height but retention of much of the tree structure.

253 The degree of tree lopping will vary based on factors including tower heights, closeness of hedgerow to towers, lowest point of conductor sag and topography.

254 Based on observed typical hedgerow heights under existing transmission lines, hedgerows with a height of up to 9m on flat terrain typical of the MSA, are unlikely to be lopped. Therefore, significant tree lopping and trimming will only be required on overgrown hedgerows (over 9m) with semi mature and mature trees (WL1 Type B) and mature treelines (WL2) occurring in the MSA at least on flatter topography.

255 The number of hedgerow and treeline crossings of the alignment is identified in **Table 6.16**. Based on the 5m woody vegetation clearance requirements below the lowest conductor, an estimate of the total number of treeline (WL2) and overgrown hedgerows (WL1 – Type B) requiring minor trimming and more extensive tree cutting / pollarding is detailed.

Table 6.16: Number of Linear Woodland Habitat Features Oversailed by the Alignment and Assessment of Impact

Habitat [1 2]	Number of linear woody habitat features oversailed by alignment [3]	Impact	Assessment of Impact
Hedgerows (WL1 – Type A)	161	No impact predicted.	None
Hedgerows (WL1 - Type B)	113	Tree lopping required at most alignment crossings. Tree trimming required.	Moderate
Treelines (WL2)	41	Tree lopping and trimming required at all alignment crossings.	Moderate

Note:
1. Hedgerows Type A - hedgerows that do not include mature trees and therefore should not require tree lopping or significant trimming as vegetation is typically below the heights where woody vegetation cutting is required.
2. Hedgerows Type B – Overgrown hedgerows that typically include at least 1 mature tree and therefore will likely require tree lopping or bow cutting and / or hedgerow trimming.
3. Estimate is based on interpretation of LiDAR imagery coupled with field observations.

256 Tree height will be permanently reduced at WL2 and WL1 (Type B) habitats under the alignment. The linear woodland habitat structure will be retained.

257 No tree cutting is required at riparian areas of the River Boyne and Blackwater cSAC / SPA crossings.

258 The overall impact of direct habitat loss resulting from the lopping of trees in hedgerow / treeline habitat over sailed by the conductors is deemed to be a moderate construction phase impact. This evaluation is based mainly on the ecological value of the habitats and retention of the lower tree structure and overall linear woodland habitat structure.

Woodland Areas

259 Long term habitat loss is foreseen in woodland areas that the OHL will traverse. Specifically, tree felling will be required at:

- Mature deciduous woodland at Brittas Estate;
- Smaller blocks of deciduous woodland identified in **Table 6.17** and on habitat maps; and
- Six other separate blocks of coniferous plantation woodlands.

260 In a worst case scenario there may be a requirement for a clearway corridor of up to 74m in woodland areas identified. An estimate of total area of this habitat impacted (trees will be permanently cleared) is detailed in **Table 6.17**. Locations indicated by tower locations are outlined in Habitat Maps.

Table 6.17: Areas of Woodland Crossed by the Proposed Alignment

Location	Woodland Type	Evaluation	Extent of Woodland loss	Assessment of Impact
Brittas Estate (Towers 267 to 269)	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	1.1 (2.8% of the wider mature woodland - c.a. 39ha) [1]	Moderate
Between Towers 291 and 292	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 336 and 337	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 321 and 322	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 262 and 263	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Between Towers 272 and 273	Mature Deciduous Woodland (WD1)	Local Importance (Higher Value)	<0.1ha [2]	Minor
Brittas Estate (Towers 267 to 269)	Immature Deciduous Woodland (WD1)	Local Importance (Lower Value)	1.2ha [1]	Minor

Location	Woodland Type	Evaluation	Extent of Woodland loss	Assessment of Impact
Between Towers 246 and 247 Between Towers 247 and 248 Between Towers 296 and 299 Between Towers 300 and 301 Between Towers 330 and 332 Between Towers 391 and 392	Mature Coniferous/ Mixed plantation Woodland (WD3 / WD4)	Local Importance (Lower Value)	10ha [1]	Minor

Note:
1. 74m corridor likely required
2. 74m corridor not likely to be required

261 This level of impact will be much reduced at detailed design stage (in consultation with the landowner) as tree clearance will only be carried out if strictly required. The clearing of trees in Brittas Estate means WD1 habitat will change to scrub / immature woodland. This woodland type habitat, while managed to keep tree vegetation height low, will still be contiguous with the wider deciduous woodland area within Brittas Estate. Typical flora and fauna will be retained.

262 The overall impact of direct habitat loss resulting from the lopping of trees in deciduous woodland habitat over-sailed by the conductors is deemed to be a long term moderate impact. This evaluation is based mainly on the ecological value of the overall woodland habitat.

263 While no invasive species were recorded during surveys there is a potential that site works and associated soil disturbance could lead to spread of invasive species which requires mitigation consideration.

264 Low Oak-Ash-Hazel woodland is crossed by the alignment at three locations (refer to Habitat Maps **Volume 3D Figures** in the EIS). Given the low growth of this woodland no tree cutting is likely required.

6.5.2.1.3 Habitat Loss and Disturbance – Temporary Access Routes

265 In selecting appropriate temporary access routes, wet areas and areas comprising semi-natural habitat have largely been avoided.

266 Some clearance of woody vegetation to facilitate site access may be required to widen existing access points. However, in choosing suitable temporary access routes, potential adverse ecological impacts have been largely avoided by using existing farm tracks and gaps in hedgerows wherever possible. All temporary access routes were assessed by an ecologist and

no significant potential impacts were identified. Given that farm scale type machinery will be utilised during construction only minimal vegetation clearance is likely to be required at existing gaps. No temporary access routes cross habitats of high ecological value such as wetlands or semi natural woodland areas.

267 Potential localised impacts are determined to be imperceptible and short term.

6.5.2.1.4 Habitat Loss and Disturbance – Stringing and Guarding Locations

268 Stringing areas have been identified in the vicinity of all angle towers for locating machinery required for the process of stringing conductor cables. These are all located in habitats of low ecological interest and avoid those sites identified as Key Ecological Receptors (see **Table 6.14** and Habitat Maps presented in Figures 6.2.1 - 6.2.19, **Volume 3D Figures** of the EIS). These areas will be reinstated post works and standard pollution controls (as detailed below) implemented.

269 Some minor temporary habitat disturbance may occur at those sites where guard poles are to be temporarily erected during the stringing of conductors. A number of these areas identified include hedgerows in close proximity (see Habitat Maps presented in Figures 6.2.1 - 6.2.21, **Volume 3D Figures** of the EIS). Hedgerows will be avoided by site works and all works will take place within improved grassland. These areas will be reinstated post works and standard pollution controls (as detailed below) will be implemented.

6.5.2.1.5 Habitat Loss and Disturbance – Structure alterations Arva – Navan 110 kV Line (conflict with 400 kV span from Tower 307 to Tower 308)

270 It is proposed to replace polesets IMP 314 and 315 along the Arva – Navan 110 kV line, which is an existing transmission line, to accommodate the proposed development. These poles are located in grassland habitats of low ecological value. New poles will be located immediately adjacent to current pole locations. No additional hedgerow loss/ trimming is required. These areas will be reinstated post works and standard pollution controls (as detailed below) will be implemented. The impact is considered a temporary imperceptible negative impact based on the low ecological value of the site.

6.5.2.2 Secondary (Indirect) Impacts to Habitats

6.5.2.2.1 Hydrological Impacts to Wetlands

271 No wetlands of conservation importance occur in the vicinity of the development in MSA. The key consideration for the development in MSA is protection of water quality and associated aquatic receptors in streams and rivers located in the vicinity of the development (see below).

6.5.2.2.2 Water Quality (Aquatic Receptors)

272 Water quality perturbations associated with construction activity have potential to impact upon the ecologically sensitive River Boyne and Blackwater cSAC and other non-designated waterways in the vicinity of the development. Key river sites are identified in **Table 6.10**. However smaller streams and drainage ditches require water quality protection measures.

273 For tower locations in proximity to watercourses, works that could give rise to impacts would be associated with sediment release during the erection of towers or potential contamination of surface water from concrete and / or fuels used during construction.

274 No substantial or major impacts are likely from the development given the very localised scale of works located away from rivers.

275 Potential impacts on freshwater habitats arising from the construction phase include, in the absence of mitigation, deterioration of water quality due to sediment release during the excavation of tower foundations or potential contamination of water from concrete and / or fuels during construction. Such potential impacts in the absence of mitigation could cause direct and indirect impact on aquatic ecology as follows:

- Sedimentation – temporary smothering of gravel beds with consequent loss of fish and spawning habitat.
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build up of sediment and loss of suitable habitat for crayfish and spawning habitat for lamprey and salmonids.
- Sedimentation impacts in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish.
- Sedimentation impacts in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates.
- Localised construction phase reduction of surface and groundwater quality in wetlands removed from, but linked to the proposed development.
- Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect impacts on fish, fish food and fish habitats and other aquatic species.
- There is no requirement for in-stream works which has significantly reduced both direct and indirect impacts to the aquatic systems and their flora and fauna.

276 The sources of such impacts have been identified as tower locations where works are proposed in proximity to watercourses and surface and ground water dependant habitats. These locations are illustrated on the Habitat Maps presented in Figures 6.2.1 - 6.2.21**, Volume 3D Figures** of the EIS. All tower locations are located away from sensitive natural watercourses and permanent drainage features and therefore the risk of pollution of surrounding watercourses is low. Best practice construction techniques that will be adhered to during the construction of the proposed development will also minimise the potential for these impacts to occur.

277 It is concluded that in the absence of mitigation, possible deterioration of water quality of surrounding surface water during the construction phase may result in temporary, moderate, negative impacts to aquatic receptors.

278 Felling of conifer plantations required to facilitate the development also has the potential to impact water quality of downstream watercourses due to the possible release of sediments and nutrients. Considering the limited extent of forestry felling (10ha WD3 / WD4 at six locations as shown in **Table 6.17**) and an absence of sensitive watercourses in this area, no impacts of significance are foreseen as a result of this activity.

279 Further details on the potential impacts on water quality (post mitigation) are addressed in **Chapter 8** of this volume of the EIS.

6.5.2.2.3 Direct and Indirect Impacts on Fauna (Mammals and Birds)

280 The following activities have been identified as having the potential to impact fauna during the construction phase; disturbance due to increased human activity and vehicular access and habitat loss / displacement and / or damage. These are considered in more detail below.

281 Noise associated with construction works and traffic activity may disturb resident birds and mammals. However, in most cases, mammals and birds within the MSA are thought to be sufficiently mobile so as to temporarily relocate from works areas. Construction noise will not be significantly different from current agricultural activities, so is unlikely to cause undue disturbance. Therefore this temporary negative impact is deemed to be minor. In addition nesting areas for common birds (hedgerows / treelines) will mostly be avoided.

282 Breeding Lapwing in the townland of Oristown may potentially be disturbed should development works be carried out close to this site during the bird breeding season. This disturbance impact is considered be short term in duration and minor. This evaluation is informed by the fact that works will be located at least 200m from the core breeding area (despite recent 2014 disturbance due to land improvement). Lapwing typically continue to breed in areas adjacent to

farmland used for intensive agriculture and associated machinery disturbance, as will be the case for the development works.

283 It is considered that imperceptible impacts will arise to Whooper Swans and Golden Plover as sites where these species were recorded are generally removed from the development. This evaluation is informed by the fact that Whooper Swans typically use areas in the vicinity of noise and other disturbance e.g. roads, farm management activities etc.

284 Trees occur along the boundary of many of the streams traversed by the alignment. In this regard tree lopping may be required. This has potential to result in disturbance to kingfisher breeding areas. Disturbance impacts have potential to result in unlikely temporary moderate impacts. This species requires particular consideration at streams linked to the River Boyne and Blackwater cSAC / SPA.

285 Bat species may roost in large mature trees that provide suitable crevices and hollows. Surveys have confirmed that such large mature trees are very rare throughout the zone of potential impact. Felling or trimming of such trees that function as transient bat roosts will cause displacement or death if not felled using appropriate techniques ('soft' felling). It is concluded therefore that there is potential that temporary tree roosts will be lost during the construction phase. This is considered an unlikely, temporary, moderate negative impact.

286 The potential for disturbance impacts on otter and their breeding sites has been minimised by the placement of towers (and sections of temporary access routes) away from potentially suitable habitat (significant watercourses and associated semi-natural habitat). As detailed in **Table 6.10** works areas are sufficiently removed from potential otter breeding areas. It is determined that the potential disturbance can be classed as an unlikely temporary moderate negative impact.

287 There are no confirmed badger sett entrances within 50m of any works area and therefore this impact is not foreseen. However, it is possible that unidentified badger setts occur in proximity (within 50m) to works areas and therefore this potential impact can be described as a possible temporary moderate negative impact. The risk of disturbance to badger breeding sites is considered to be very low based on:

- Locating towers away from hedgerows / treelines where badger setts typically occur;
- The highly managed farmland nature of tower locations confirmed using LiDAR as managed farmland regularly driven over by farm machinery;
- Avoidance of known badger setts from desktop data and field studies; and

- General scarcity of badgers in the study area as noted during field surveys.

288 In summary, key mammal and bird receptors requiring mitigation consideration regarding potential construction phase disturbance impacts include: otter; bats; badgers; Lapwing; Kingfisher and other breeding bird species.

6.5.2.2.4 Construction Impacts on Key Ecological Receptors

289 A summary of potential impacts associated with the construction phase is presented in **Table 6.18**. The magnitude of potential impacts range from temporary imperceptible to permanent moderate in significance.

Table 6.18: Summary of Potential Construction Phase Impacts, prior to mitigation, on Identified Key Ecological Receptors within the MSA

Site/ Feature	Evaluation	Area	Potential Impact Source	Assessment of Potential Impact
River Boyne cSAC / SPA	International	River Boyne crossing.	Temporary Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species in European sites.	Temporary moderate
River Blackwater cSAC / SPA	International	River Blackwater crossing.	Temporary Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species in European sites.	Temporary moderate
Larger Streams draining into River Boyne and Blackwater	International (Cumulatively) *	Boycetown River between Towers 376 and 377. Between Towers 358 and 359. Between Towers 350 and 351. Clady River three crossings between Towers 347 and 344. Blackwater River - natural flood plain drainage ditch between Towers 308 and 309. Small stream between Towers 314 and 313. Small stream between Towers 318 and 317.	Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species European sites.	Temporary moderate
Whooper Swan and Golden Plover	Annex I of EU Birds Directive. Nationally significant population.	All sites identified.	Temporary disturbance from forage areas during construction.	Temporary imperceptible
Lapwing (breeding sites)	Red listed breeding species of high conservation concern. Area identified supports > 1% County Meath breeding population. County Important Site.	Oristown townland.	Temporary disturbance and displacement associated with noise from works area and other construction related disturbances in identified areas used by breeding Lapwing.	Temporary minor
Treelines (WL2)	Cumulatively these habitats are of County Importance as habitats	Refer to **Table 6.16**. 41 crossings along alignment identified.	Tree lopping is required at 41 tree lines crossed by the alignment. Permanent reduction in height and retention of habitat.	Moderate

Site/ Feature	Evaluation	Area	Potential Impact Source	Assessment of Potential Impact
	and for wildlife.			
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats and for wildlife.	Refer to **Table 6.16.** 113 crossings along alignment identified.	Tree lopping required at 113 Hedgerows with mature trees crossed by the alignment. Permanent reduction in height and retention of habitat	Moderate
Linear woodland habitat (WL1A, WL1B, and WL2)	Cumulatively these habitats are of Local Importance (Higher Value) as habitats and for wildlife.	Refer to **Table 6.16**. Towers located in 13 locations of WL1A, WL1B, and WL2 habitat.	390m of hedgerow / treeline vegetation removed at for locating 13 towers.	Permanent minor
Other River Crossings	Local Importance (Higher Value).	Including specific rivers detailed above there is a requirement to cross 41 rivers in total.	Indirect water pollutant impacts, disturbance to riparian habitats and aquatic species.	Temporary moderate
Mature deciduous woodland (WD1)	Cumulatively these habitats are of Local Importance (Higher Value).	Refer to relevant areas including Brittas Estate in **Table 6.17.**	Mature tree clearance may be required within a maximum 74m wide corridor.	Moderate
Bats	Annex IV of Habitats Directive *Wildlife (Amendment) Act, 2000*	Towers in hedgerows, 41 mature treelines crossed, 113 hedgerows with trees (crossed) and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible temporary bat roost sites. No significant sites identified in surveys.	Disturbance and displacement to bat roosts in mature trees lopped (WL2, WD1 and WL1 B habitats).	Temporary moderate
Otter	Annex IV of Habitats Directive *Wildlife Acts*	41 river crossings identified as possible otter breeding sites. Sites with more potential are larger river crossings.	Very low disturbance and displacement risk to possible otter breeding sites associated with tree cutting where the line traverses streams/ rivers (possible breeding areas).	Temporary moderate
Badger	*Wildlife (Amendment) Act, 2000*	All tower locations, 41 mature treelines, 113 hedgerows with trees and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible bat	Very low disturbance risk to possible badger breeding sites	Temporary moderate

Site/ Feature	Evaluation	Area	Potential Impact Source	Assessment of Potential Impact
		roost sites.		
Kingfisher	Annex I of EU Birds Directive Nationally significant population reason for River Boyne and Blackwater designation as SPAs	41 river crossings identified as possible Kingfisher breeding sites.	Very low disturbance risk to possible Kingfisher breeding sites associated specifically with tree cutting where the line traverses streams / rivers.	Temporary moderate
Breeding birds (including Yellowhammer)	Identified locally significant populations of in particular Yellowhammer a red listed species of high conservation concern	All areas where potential disturbance to woody vegetation.	Localised disturbance risk associated specifically with tree cutting to common breeding birds' sites in treelines / mature hedgerow vegetation.	Temporary minor.
Semi natural Oak-Ash-Hazel woodland	Local Importance (Higher Value)	Low growing semi natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 289 and 258 and Towers 252 and 251. Habitat will be avoided.	Woody vegetation trimming is unlikely to be required given the low heights (<6m) of woody vegetation.	Temporary imperceptible

6.5.3 Operational Impacts

290 Key identified impacts during the operational stage are discussed throughout this section. The main features of the operational phase of the proposed development that could give rise to ecological impacts include:

- The presence of the line (conductors and earthwires) presents a collision risk to vulnerable bird species;
- Ongoing trimming of tall vegetation where the line crosses hedgerows; and
- Ongoing maintenance of equipment as may be required.

6.5.3.1 Direct Impacts (Habitats)

6.5.3.1.1 Habitat Loss and Disturbance

291 There will be a requirement for ongoing trimming of hedgerow, treeline and woodland vegetation that occur between towers over a cycle of approximately five years. This is to ensure adequate clearance beneath the OHLs is maintained throughout the operational phase of the proposed development. Such trimming will only be carried out on individual trees identified, that may interfere with the alignment, at each crossing point, therefore trimming will only be carried out at a selection of sites during each cycle. The value of hedgerows as wildlife corridors for dispersing and feeding birds and mammals, and as commuting corridors for bats, will not be adversely affected. This impact is therefore deemed to be an ongoing (every 5 years), short term imperceptible impact.

292 There may also be minor disturbance impacts to mammals and birds associated with vegetation management. This impact is deemed to be a temporary imperceptible negative impact.

6.5.3.2 Secondary (Indirect) Impacts to Habitats

6.5.3.2.1 Habitat Alteration

293 The operational phase will lead to potential localised ecology changes around tower locations, including alteration of habitat types by management factors including how much grazing by livestock will be allowed. Where towers are located in woody vegetation, the removal of livestock grazing post construction may result in scrub extension into these areas which were formerly managed. In this regard, there is a potential positive increase in semi natural habitat.

294 Towers in grazed areas tend to be targeted by grazing animals for shelter and scratching. In this regard increased grazing and soil poaching can permanently affect habitats locally. In this regard habitat recovery, for example hedgerow re-establishment may be reduced if a tower is located in a hedgerow gap. This is considered a permanent imperceptible impact.

6.5.3.2.2 Water Quality (Aquatic Receptors)

295 There is potential for impacts to water quality in particular where works are proposed close to streams and rivers during operational maintenance works. Potential impacts may arise to downstream aquatic receptors. This is predicted as a short term, minor, localised impact.

6.5.3.3 Direct and Indirect Impacts on Fauna (Birds and Mammals)

6.5.3.3.1 Birds

296 The operational phase of a transmission line can result in the following potential impacts to birds: bird mortalities caused by collisions with conductors or earth wire, electrocution, displacement/barrier effects from previously used areas.

297 Electrocution from phase to phase contact with powerlines has been highlighted in literature as a potential issue for large raptors in particular (e.g. Golden Eagles). However, this issue is largely confined to lower voltage distribution lines, when birds attempt to alight on support structures. The design of a transmission line is such that the distance between live elements cannot be bridged by even the largest bird species occurring in Ireland (Golden Eagle). Therefore, electrocution is not considered a significant issue for raptor species or for wildfowl in the study area.

6.5.3.3.1.1 Whooper Swans

298 The assessment of potential impacts and effect on Whooper Swan populations is informed by the following;

- An extensive desktop study was conducted to inform this evaluation (refer to Winter Bird Study in **Appendix 6.6, Volume 3D Appendices** of the EIS, and the reference list in the **Bibliography** in this volume of the EIS).
- Seven years of winter bird studies conducted to gather evidence on flightlines, numbers, local concentrations and evidence of ringed birds (which can be used to identify bird movements).
- Potential displacement and collision impacts were informed by observed interactions of Swans (Mute, Whooper and Bewick) and Geese (species) with powerlines and wind

turbines, existing published scientific information, Environmental Impacts Statements for similar type developments and consultation with relevant experts (including Royal Society for Protection of Birds and BirdWatch Ireland).

- Swans are identified as a species group susceptible to collision with powerlines (EirGrid (2012); Becker & Lichtenberg (2005)). There are likely to be increased collision risks to juvenile and less experienced birds in particular during periods of poor visibility (e.g. at night and during misty conditions) (Hunting 2002).

- Geese species including Greylag and Pink-footed were subject of a specific transmission line interaction study by the author, refer to MBEC[25] (2006b). The impact assessment in this chapter was informed by surveys conducted of bird collision mortalities along an existing 400 kV line in Scotland. The sites surveyed were locations where geese (species) concentrated, and fly regularly over 400 kV and 220 kV transmission lines. Sites surveyed support internationally important numbers of Greylag and Pink footed Geese (relatively similar species in terms of potential susceptibility to collision with transmission lines). No signs were ever noted of geese or indeed swans (present in the area) colliding with transmission lines, despite regular flights observed across transmission lines in this study. Species observed as colliding with transmission lines during these surveys included common species such as Grey Heron or species not recorded in the MSA e.g. Guillimot (sea bird).

- Whooper Swan (and Mute Swan) interactions with existing transmission lines have been recorded by the author in counties Mayo, Monaghan and at Toome Bridge in Northern Ireland. Whooper Swan have been observed flying over and foraging close by, beside and under transmission lines. These observations and surveys serve as an indication that Whooper Swan may habituate to transmission lines. A number of observed sites in Northern Ireland support internationally important numbers of Whooper Swan (e.g. Toome Bridge area – near Lough Neagh SPA). Toome Bridge in particular supports internationally important numbers of Whooper Swan which regularly forage and flyover a 275 kV transmission line which was constructed between 1963 and 1978 (source Northern Ireland Electricity). While occasional collisions occur (source RSPB), these areas have been recently marked with flight diverters and the area continues to support a thriving population of Whooper Swan (Hall et al, 2012) at favourable conservation status.

- Studies conducted in the Netherlands (Fijn et al., 2012) on wintering swans found low levels of collision mortality within wind farm developments (and associated electricity infrastructure), even in sites with a high degree of transit flights through operational

[25] The author of this chapter of the EIS was a co-author of the MBEC McKenzie Bradshaw (2006b). *Bird - Power Line Collision Field Study.* Prepared for Scottish and Southern Energy plc.

wind farms and relatively high numbers (>500) of birds regularly present. In a review of swan and goose fatalities at wind farms only 2 Whooper Swan were recorded as fatalities from monitoring undertaken at 46 different wind farms across 8 countries (Rees 2012). Wind farms similarly to transmission lines present an identifiable collision risk to birds including Whooper Swan. The research data above indicates that actual collision risk from wind farms is low even where wintering swans concentrate and regularly fly over.

- During the course of the Whooper Swan study conducted in Meath and Monaghan (2007 – 2014), signs of Whooper Swan and or Mute Swan collisions with distribution lines were observed at various locations (including two sites near Ballybay and the Cruicetown site in MSA). This is consistent with general (non published) observations that low and mid voltage lines close to (within 500m) concentrations of wintering swans are a localised collision hazard.

- The Icelandic Whooper Swan population (population which winters in Ireland) is considered to be at favourable conservation status (source: JNCC) and populations in Ireland have increased between 2000 and 2005 by 11% (Crowe et al., 2005) and by 6% between 2005 and 2010 (Boland et al., 2010) notwithstanding the already extensive transmission and distribution line infrastructure which they may potentially collide with.

- Observations of Whooper Swan flocks (between 2007 and 2014) in MSA and CMSA noted good recruitment of juveniles to flocks observed with regular observations of adults with larger broods (3+ fledged juveniles) in recent years indicating that the population is recruiting. Whooper Swan continue to concentrate in areas even where distribution and transmission line infrastructure cross nationally or county important sites.

- A submission received from NPWS, for the previous oral hearing on the development, identified that collision impacts on Whooper Swan may arise at a local level and it is unlikely that the national population nor any Special Protection Area (SPA) will be impacted, refer to **Appendix 6.2, Volume 3D Appendices** of the EIS.

- APLIC, 1994 cites that collisions with transmission lines "*are not a biologically significant source of mortality for thriving bird populations".* The Whooper Swan population in Ireland is increasing based on current data and can be considered as being at favourable conservation status.

299 Based on the information summarised above it is considered highly unlikely that the proposed development will give rise to substantial or profound impacts to Whooper Swan populations and sub populations in the MSA during the operational phase. The key approach therefore in the assessment is to identify local areas where a moderate or less adverse impact could arise.

Collision Impacts

300 The key consideration in assessing impacts to Whooper Swans in the MSA is the location of regular roost sites relative to the proposed development as roost sites are the likely key sensitive locations where collisions are most likely to occur based on literature review. Location of roost sites will dictate the relevance and likely regularity of flightlines (increases close to roost site), and hence collision risk, which is identified as the key potential impact. Important regularly used roost sites where flightlines are relevant to the proposed development include Cruicetown, Tara Mines Tailings Ponds, Whitewood Lough and more irregularly the Clooney Lough area. These roost sites have been observed as linked to multiple potential forage sites which regularly change, depending on farm management (associated food availability), field size (larger open fields are preferred) and temporary flooding (which can be used for roost purposes).

301 The sites observed as linked by flightlines to Tara Mines Tailings Ponds include Yellow River, River Blackwater Valley (Fyanstown, Sedenrath, Fyanstown 2, Bloomsbury and Teltown) and irregularly used sites north and east of here (e.g. Batterstown, Nr Tara Mines and Randelstown). The Blackwater Valley sites detailed require crossing by Whooper Swan of the proposed alignment while the other sites avoid crossing. The Yellow River site and other potential areas north and east of Tara Mines Tailings Pond avoid crossing by Whooper Swan of the alignment.

302 The sites observed as linked by flightlines to Cruicetown include Whitewood Lough, Newtown, Mullagheven crossroads, Cruicetown 2 and Cruicetown 3. Whitewood Lough requires crossing of the proposed alignment while the other sites avoid crossing.

303 Other areas where Whooper Swan were observed close to the alignment (< 2km) include sites that Whooper Swan used temporarily due to short term favourable conditions. The suitability of these areas was dictated by land management activities and rainfall. They include Drakerath, Clooney Lough area (including Coolaliss and Clooney 2 sites) and Red Island farmland.

304 The summary flightline data and relevance of flightlines observed in relation to the proposed development for all survey years are provided in **Table 6.19.**

305 The approach in this evaluation was to identify areas with relatively regular yearly and inter-year Whooper Swan flightlines which cross the proposed alignment and also to consider the location of observed flocks relative to the proposed alignment. Typical observed flight heights during surveys were generally at heights at or just above hedgerow / treeline height (15 - 20m). This height would be within the height range of the lowest conductors which range from 39.5 m at the tallest proposed tower down to 9 m at the point of maximum sag (the 9 m maximum sag would rarely arise as it would only occur at maximum operating conditions, typically the lowest

most conductor would be some metres higher than this at its lowest point). Based on the scientific literature Whooper Swan flight behaviour is such that they tend to fly over the highest conductors, and in this regard the greatest risk of collision is associated with collision with the earth (shield) wires (APLIC 2012). These are located above the conductors and as they are thinner than the conductors, can be less visible. The typical height of the earth wires range from 50 m at the tallest proposed tower down to 19.5 m at the point of maximum sag.

306 Based on the results of the flightline surveys between 2010 and 2014 (findings of which are consistent with survey findings noted prior to this); the following assessment is made regarding the regularity of flightlines and assessment of whether a potential impact will arise (**Table 6.19**).

Table 6.19: Regularity of flightlines observed across the proposed alignment, collision impact determination and requirement for mitigation based on data from 2010 – 2014

Whooper Swan area identified as relevant to the proposed alignment	Relevant section of alignment	Regularity of flightline and comments	Potential Collision Impact (yes/ no) – Mitigation required
Blackwater River Valley (between Navan and Kells)	Between Towers 307 and 312 at the River Blackwater crossing point	14% surveys (8) identified flightline across the alignment. Regular flightline determined by numbers which reached 124 birds. Counts recorded between 2007 and 2010 were above the threshold for National Importance.	Yes. Mitigation required.
Breaky Lough	Between Towers 237 to 252 east of Breaky Lough	No flightlines observed. Whooper Swan roosted on Lake and flights observed were between lakeside grassland and lake. No regular flightline determined between here and Ervey Lake (bisected by alignment) or other sites noted.	No. Mitigation not required.
Clooney	Between Towers 279 and 283 west of Clooney Lough	7% surveys (1) observed flightline crossing the alignment and a further 4 in close vicinity (<500m). Relatively regular flightline determined	Yes. Mitigation required.
Cruicetown	Between Towers 257 to 268 near Cruicetown / Whitewood Lough	12% surveys identified flightline (5) between WSP 4 and 7 across the alignment. Regular flightline determined by numbers which reached 124 birds. Counts recorded between 2007 and 2010 were above the threshold for National Importance.	Yes. Mitigation required.
Emlagh	Between Towers 297 and 301	No flightlines confirmed as likely across the alignment.	No. Mitigation not required.

Ervey Lake	Between Towers 237 to 252 west of Ervey Lough	No flightlines observed. Whooper Swans observed (very infrequent) roosted on lake.	No. Mitigation not required.

307 A potential collision risk may additionally arise in the Yellow River area between Towers 291 and 295. While no flights crossed the alignment, flights were observed in close vicinity (<1km) and this is a relatively regularly used site by numbers which reach national importance. In this case it is considered that mitigation is warranted. To summarise, based on the field survey conducted, potential collision risk is identified as being at specific key areas along the proposed development. These areas include:

- The River Blackwater Crossing - The alignment bisects a regularly used flightline between Tara Mines Tailings Pond (roost site) and foraging areas in the River Blackwater Valley.

- The area near Clooney Lough – The alignment passes through an extensive open agricultural landscape where potatoes are grown, at scattered locations, which attracts Whooper Swan. The locations used and hence flightlines are highly variable and depend on crop rotation (farm management), flooding and alternative food source availability. Roost sites are limited and were observed to be primarily local flooding, Cruicetown and unknown areas to the east of the alignment.

- The alignment east of Cruicetown – The alignment bisects a relatively regularly used flightline (observed most years including 2013 / 2014) between Whitewood Lough (roost site) and foraging / roost area at Cruicetown.

- The Yellow River area is relatively regularly used (not every year) by large flocks of Whooper Swan. These birds were observed to roost at Tara Mines Tailings Ponds and flightlines observed did not cross the alignment. This important foraging area is quite close to the alignment and in this regard it is likely that some birds may cross the alignment.

- A number of other sites close to the alignment are irregularly used including in the town lands of Red Island and Drakerath (2012 records only). Impacts are likely to be imperceptible at these locations though occasional collisions could arise if Whooper Swan are again attracted to these areas.

308 Figure 6.3.2, **Volume 3D Figures** of the EIS details a summary of all flightlines observed over the course of the baseline studies including those at these locations which are considered relevant for consideration of potential impacts.

309 The key locations where a potential collision impact is identified are highlighted below for further consideration. The assessment is based on the identified flightlines and their regularity. Estimates of avian collision rates with powerlines from a range of other studies were reviewed (Erickson et al, 2001, Hunting, 2002, SPSSE, 2006). In particular Hunting (2002) provides a comprehensive review of studies which have examined the factors contributing to collision risk with powerlines. Based on his review of research there is some evidence to suggest that juvenile birds can be more susceptible to collision than adults and there is strong evidence to indicate that weather/visibility is a key factor increasing collision risk. Studies varied in their methodologies and target species, however, reported collision rates quoted ranged from <0.001 to 0.74%. With regard to the final assessment below a 'worst-case scenario' of 1% is taken and following the criteria outlined in **Table 6.5** the magnitude of this impact is considered low.

310 The evaluation of impact significance (refer to methodology and terminology described in **Section 6.2.6**, **Table 6.5** and **Table 6.6**), prior to mitigation, is detailed below for Whooper Swan at relevant locations identified:

- ***River Blackwater Valley (between Kells and Navan):***

  Sensitivity = *Very High*. Whooper Swan are listed on Annex 1 (Birds Directive). The site is regularly utilised (every year 2007 – 2014). A regularly recorded nationally important population uses this area.

  Magnitude Description = *Low*. The alignment presents a risk to a regularly occurring Whooper Swan flightline between Tara Mines Tailings Ponds and foraging sites in the Blackwater valley. The alignment is removed (>2km) from the main roost site at Tara Mines Tailings Ponds allowing Whooper Swan adequate distance to gain suitable flight height and see the alignment. Based on existing research information and observations at existing transmission lines Whooper Swan will continue to use this area and will habituate (fly over) the alignment. A low level of collisions may potentially occur with conductors / earth wire, in particular during the short term, before mature Whooper Swan habituate. Collision risk is likely to be higher for immature birds and during periods of poor visibility. Mitigation proposed in the next section will reduce collision risk.

  Significance = *Medium*

- ***Clooney Lough Area:***

  Sensitivity = *High* Whooper Swan are listed on Annex 1 (Birds Directive). The wider area around Clooney Lough is utilised and sites where they have been recorded to date are irregularly used, and change based on available forage habitat / roost opportunities.

No significant roost site exists in this area which reduces risk and temporary roost sites (floods) observed were adjacent to foraging areas minimising flights.

Magnitude Description = Low (Minor shift away from baseline). The alignment presents a risk to an irregular Whooper Swan flightline in this area. Based on existing research information and observations at existing transmission lines Whooper Swan will continue to use this area and will habituate. The alignment presents a collision risk at this location, however its significance is considered low due to the irregularity of the flight activity. A low level of collisions may potentially occur with conductors / earth wire, in particular during the short term, before mature Whooper Swans habituate. Collision risk is likely to be higher for immature birds and during periods of poor visibility. Mitigation proposed in the next section will reduce collision risk.

Significance = Low

- ***Cruicetown (Whooper Swan):***

Sensitivity = High. Whooper Swan are listed on Annex 1 (Birds Directive). Cruicetown was an important (former) roost site with numbers reaching national importance. In recent years numbers have decreased, however, numbers may increase again in the future. It remains an important foraging site and staging area during spring migration for numbers of birds which do not currently reach national importance.

Magnitude Description = Low (Minor shift away from baseline). Whooper Swan regularly fly from Cruicetown to roost at Whitewood Lough. The alignment presents a risk to a regular Whooper Swan flightline in this area. Based on existing research information and observations at existing transmission lines Whooper Swan will continue to use the area and will habituate. The alignment presents a collision risk at this location, however its significance is considered low due to the numbers of birds present. A low level of collisions may potentially occur with conductors / earth wire, in particular during the short term, before mature Whooper Swan habituate. Collision risk is likely to be higher for immature birds and during periods of poor visibility. Mitigation proposed in the next section will reduce collision risk.

Significance = Low

311 The Yellow River site is a regularly used site by numbers which reach (at least close to) National Importance. Flightlines observed at Yellow River were generally away from the alignment (towards Tara Mines Tailings Ponds). Given the importance of the Yellow River Area (occasional National Importance) and closeness to the alignment, precautionary mitigation is detailed.

312 In this regard, site-specific mitigation is required for areas detailed above to reduce this identified collision risk as much as possible, refer to **Section 6.6.2**.

313 Other locations where relatively regular flocks of Whooper Swan occur close by (within 1km) include Drakerath. While observed Whooper Swan at Drakerath stayed for an extended period in 2012 foraging and roosting was observed on the site and no flightlines were observed. In this regard Whooper Swan are unlikely to collide with the alignment and impacts are considered imperceptible at this location.

Displacement Impacts

314 The route of the alignment avoids the vast majority of observed foraging and roost sites. Most sites regularly used are located at a distance from the alignment including the most regularly used and most important sites, refer to **Table 6.20** for sites and distance to the alignment.

Table 6.20: Important Whooper Swan sites relative to the proposed alignment

Whooper Swan Site	Distance from alignment (km)
Cruicetown (roost and forage site)	>1
Balrath (area) (roost and forage site)	16
Blackwater Valley (forage area predominantly – less regular roost site)	3-4
Headford Estate (roost Site)	6
Tara Mines Tailings Ponds (roost site)	3

315 The alignment crosses one site used by Whooper Swan for foraging at Teltown (adjacent to the River Blackwater crossing). This is a relatively irregularly used site, used by low numbers particularly in more recent years (maximum = 15 No. between winter 2009 and 2014). In 2008 and 2009 counts of 38 swans were recorded here in March. This site will be crossed by the alignment and hence there is a risk that Whooper Swan will be displaced from this location during the operational stage. This impact is considered unlikely and of low significance given that Whooper Swan continue to use sites close to existing transmission line infrastructure, have abundant alternative forage sites, and it is not a significant area for Whooper Swan based on the results of the winter bird study. Abundant alternative foraging areas are located in the wider area and Teltown is not considered a significant roost site as it does not hold regular standing water.

316 No other measurable impacts (e.g. loss habitat) are likely to arise to Whooper Swan.

6.5.3.3.1.2 Other Birds

317 A number of bird species are identified in **Table 6.12** which may also potentially collide with the OHL. The key species requiring consideration are those with high susceptibility to collision. These include Mute Swan, Cormorant and Great Crested Grebe. The key areas where a potential collision impact may arise are large river crossings as a suitable buffer zone (>500m) exists between the development and breeding sites (lakes). Given the very low numbers of these species observed in the study area and no flightlines observed, it is considered that outside of larger river crossings impacts will be imperceptible. At the Boyne and Blackwater River crossing, collision impacts are considered minor for Cormorant and Mute Swan.

318 Golden Plover were recorded in nationally important numbers in the River Blackwater area. This species regularly flies over transmission lines throughout its range and low numbers of individuals have been recorded in one study (Bevanger 2004) as colliding with power lines. This is not considered a species at significant risk of collision with the development and potential impacts to this species are considered imperceptible.

319 Breeding Lapwing at Oristown may be impacted by indirect impacts from the development associated with increased predation / disturbance from Buzzard and Corvid (Hooded Crow and Raven). The new towers will afford increased perching opportunities afforded for these predatory species close to a county important Lapwing nesting area. This will potentially increase current predation / disturbance risks to breeding Lapwing. Lapwing are rapidly declining as a breeding species in Ireland, and as a ground nesting species they are very vulnerable to disturbance. Transmission lines have been highlighted in studies as causing potential indirect predatory or disturbance impacts to ground nesting bird species throughout the world including Lammers & Collopy (2007). The land reclamation works observed at the breeding site in 2014 may have permanently displaced / removed this local breeding site. However based on previous regular usage and some suitable breeding habitat remaining, this area is evaluated as still being of County Importance.

320 A worst case scenario is that due to the new transmission line, there is increased opportunity for predation by corvids and buzzard (additional perching location for observing potential prey) which leads to breeding Lapwing populations abandoning this area due to predation and or additional disturbance. Displacement of Lapwing from this area would result in as a long-term moderate adverse impact at a county level as there are few other alternative sites in the nearby area.

321 Tree trimming may cause temporary disturbance to birds that utilise the hedgerows. This impact is deemed to be an on-going, temporary imperceptible negative impact with trimming works likely to recur at intervals of c. 5 years.

6.5.3.3.1.3 Mammals

Disturbance

322 No significant disturbance impacts are expected to protected mammals including otter, badger or bat species.

323 The level of operational traffic and ongoing maintenance is expected to be sufficiently low so as to avoid any disturbance impacts on birds and mammals that utilise the MSA.

6.5.3.4 Operational Impacts on Key Ecological Receptors

324 A summary of potential impacts associated with the operational phase is presented in **Table 6.21**. The magnitude of the predicted impacts range from imperceptible to moderate in significance.

6.5.3.5 Operational Impacts on Key Ecological Receptors

325 A summary of potential impacts on key ecological receptors identified during the operational phase is detailed in **Table 6.21**.

Table 6.21: Summary of Potential Operational Phase Impacts, prior to mitigation, on Identified Key Ecological Receptors within the MSA

Site / Feature	Evaluation	Area	Potential Impact source	Assessment of Potential Impact
Whooper Swan	Annex I of EU Birds Directive. Nationally / County significant population.	River Blackwater valley (between Kells and Navan).	Collision with conductors and earth wire.	Permanent medium[1]
Whooper Swan	Annex I of EU Birds Directive County significant population	Cruicetown Clooney Lough Area.	Collision with conductors and earth wire.	Permanent low[1]
Whooper Swan	Annex I of EU Birds Directive. Nationally significant population.	West Yellow River.	Collision with conductors and earth wire.	Permanent low[1]
Whooper Swan	Annex I of EU Birds Directive	Other Sites identified.	Collision with conductors and earth wire.	Permanent negligible[1]
Whooper Swan	Annex I of EU Birds Directive	Teltown.	Displacement from the foraging area at Teltown.	Permanent low
Cormorant and Mute Swan	Local Importance	River Boyne and Blackwater.	Collision with conductors and earth wire.	Permanent low
Lapwing (breeding sites)	Red Listed breeding species of high conservation concern. Area identified supports > 1% County Meath breeding population. County Important Site.	Oristown townland.	Displacement of breeding Lapwing as a result of indirect impacts associated with increased predation / disturbance by perching corvids / buzzard in the townland of Oristown.	Permanent moderate
All River Crossings	International (Cumulatively)	41 rivers crossed in total.	Potential water pollution associated with maintenance works.	Temporary imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2)	Cumulatively these habitats are of Local Importance (Higher Value) as habitats and for wildlife.	Towers located in 13 linear woodland habitat type locations	No / poor hedgerow re-growth at tower location in hedgerow gap due to trampling by livestock (indirect impact).	Permanent minor

Site / Feature	Evaluation	Area	Potential Impact source	Assessment of Potential Impact
Treelines (WL2	Cumulatively these habitats are of County Importance as habitats and for wildlife.	41 crossings along alignment identified.	Irregular woody vegetation trimming under alignment.	Temporary imperceptible
Mature deciduous woodland	Cumulatively these habitats are of Local Importance (Higher Value).	Refer to **Table 6.17.**	Irregular woody vegetation trimming under alignment.	Temporary imperceptible
Hedgerows with mature trees (WL1 – Type B)	Cumulatively these habitats are of County Importance as habitats and for wildlife.	113 crossings along alignment identified.	Irregular woody vegetation trimming under alignment.	Temporary imperceptible
Other Birds	Identified locally significant populations of in particular Yellowhammer a red listed species of high conservation concern.	Throughout.	Collision with transmission line.	Permanent imperceptible
Protected mammals	Annex IV of Habitats Directive. *Wildlife Acts.*	Throughout.	Disturbance during maintenance.	Temporary imperceptible

Note 1: Collision risk assessment for Whooper Swan based on Percival (2003)

6.5.4 Decommissioning

326 The proposed development will become a permanent part of the transmission infrastructure. The expected lifespan of the development is in the region of 50 to 80 years. This will be achieved by routine maintenance and replacement of hardware as required. There are no plans for the decommissioning of the OHL. In the event that part of, or the entire proposed infrastructure is to be decommissioned, all towers, equipment and material to be decommissioned will be removed off site and the land reinstated. Impacts would be expected to be less than during the construction phase and would be of short term duration.

6.6 MITIGATION MEASURES

6.6.1 Mitigation by Avoidance

327 Consideration of various design options has led to the current proposed design that is deemed to have the least ecological impact taking account all other location factors and constraints.

328 The line route has been selected to avoid designated areas as far as possible. No towers will be located within any European Sites, however the alignment conductors will cross the River Boyne and River Blackwater cSAC and SPA at two locations.

329 Tower 355 is the closest tower to the River Boyne crossing. It is located approximately 6m from the boundary of the cSAC and 56m from the SPA site boundary of the European site.

330 Tower 309 is the closest tower to the River Blackwater crossing. It is located approximately 84m from the cSAC boundary and 97m from the SPA site boundary of the European site.

331 Where possible, towers, temporary access routes, guard pole structures and stringing areas have been located away from habitats and sites of ecological importance. Furthermore, where possible, access to tower locations will be via existing tracks used by farm machinery on a regular basis. Existing field access points (e.g. gaps / farm gates) to local roads will be used to avoid creating additional hedgerow gaps.

332 The line has been routed at least 600m from the closest lakes and associated sensitive habitats and species.

333 No towers are located in high (local) value habitats and all are located in habitats not evaluated as key ecological receptors and typically of low ecological value. Only semi-natural habitats, including hedgerow field boundaries, which were adequately surveyed, were considered as tower locations.

334 The alignment has avoided areas where Whooper Swans concentrate for foraging. Key roost sites are generally at least 2.5km from the alignment except at Cruicetown which is less than 1km away.

335 The alignment avoids crossing a core breeding area for Lapwing of County importance though it is located within 200m. It also avoids locally important breeding bird habitats such as semi natural woodlands, wetlands and the vast majority of hedgerow / treelines.

336 The tower locations and access routes will avoid potential breeding sites that protected mammals such as otter, badger, bats and birds (specifically Kingfisher) typically use including; field boundaries (treelines / hedgerows), stream / rivers and associated riparian habitats, old buildings, caves, bridges and souterrains etc.

337 All towers are located a minimum of 50m from major rivers and at least 5m from other water features including small streams.

338 During the construction phase as part of the construction management plan, aquatic monitoring will take place by a suitably qualified Ecological Clerk of Works (ECoW) to confirm that pollution control measures are effective. Following detailed design consideration, and as required, temporary silt screens will be installed in drains / small streams deemed to be possibly at risk of water pollutant discharge.

339 Suitable breeding sites for amphibians such as drainage ditches will be avoided as far as possible.

340 The location of towers will avoid identified wetlands habitats.

341 It is intended that excavated material will be used on site for landscaping or for re-instatement measures within managed farmland only. Semi-natural habitats such as wetlands and hedgerows will be avoided. Other wastes will be removed for disposal at an appropriate licensed waste disposal facility (refer to **Chapter 12** in this volume of the EIS).

342 The spread and introduction of invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010). Any invasive plant material noted on site will be removed off site and disposed of at appropriate licensed waste disposal facility. Any invasive species found to occur within 15m of working areas will require a specialist method statement for its eradication to avoid the spread of invasive species, this will ensure compliance with the *European Communities (Birds and Natural Habitats) Regulations 2011* [S.I. No. 477 of 2011]. The presence of non-native species and requirement for actions will be confirmed by the ECoW.

343 For any landscaping or tree planting works only native species will be utilised. All invasive species should be avoided.

6.6.1.1 Specific Additional Mitigation by Avoidance (River Boyne and Blackwater cSAC/SPA)

344 At designated site crossings, the construction works area will be located so as to avoid disturbance to riparian vegetation and river banks potentially used by breeding Kingfisher, otter, Lamprey, White-clawed Crayfish, fish species including salmonids and freshwater invertebrates.

345 The following precautionary mitigation will be implemented for the River Boyne and River Blackwater cSAC / SPA:

- Tower bases and all associated construction activity will be located at least 50m from the designated site river bank. Riparian semi-natural habitat will be retained undisturbed.
- Towers and all associated construction activity will be located in managed habitats relative to larger streams draining into designated river sites.
- The transmission line crossing point has been selected at relatively narrow points of the cSAC / SPA at each of the two river crossings.
- No in-stream or bankside works will take place within the cSAC /SPA or in drains and rivers draining into these rivers.
- The design of the tower and sag of the lowest conductor wire has been designed in a manner which rules out potential interference from vegetation at designated site boundaries, in particular at the River Boyne crossing. Thus no woody vegetation cutting/associated disturbances are required.
- Stringing of the transmission line will be conducted without a requirement to conduct work within the designated site boundary. Access will be avoided by machinery and personnel to habitats contained within the designated site boundary, such as the rivers and associated riparian habitats.
- A minimum buffer zone of 20m will be retained between tower sites and all tributaries of designated rivers to minimise risks to sensitive aquatic receptors (e.g. salmonids, kingfisher and otter).

6.6.2 Mitigation by Reduction

346 The potential impacts detailed in **Section 6.5** can be reduced through careful mitigation. The key approach for minimising risks such as disturbance to wildlife and protection of water quality is the appointment of an appropriately experienced ECoW on site during construction, to advise on the detailed implementation of the design approach and implement ecological mitigation as detailed in this EIS and as will be detailed in the Construction and Environmental Management Plan (CEMP). An outline CEMP has been included in **Appendix 7.1, Volume 3B** of the EIS, and forms part of the application documentation.

347 The role of the ECoW will include:

- Supervision of construction works and ensure compliance with legislation;
- Monitoring habitats and species during the course of construction works and effectiveness of mitigation;
- Provision of advice regarding the avoidance and minimisation of potential disturbance to wildlife;
- Provide recommendations on appropriate responses / actions to site specific issues (e.g. identification of previously unrecorded breeding sites during construction works); and
- Liaison with NPWS, IFI and other prescribed authorities, when required.

348 In addition to the construction phase, it is recommended that the ECoW will be appointed during the pre-construction (landowner liaison stage) and post construction phases (minimum two years) in particular to monitor mitigation measures, refer to **Section 6.7.1**.

6.6.2.1 Construction Phase Mitigation

349 A CEMP will be implemented for the construction phase of the project with respect to all mitigation detailed in this EIS (refer to Appendix 7.1**, Volume 3B Appendices** of the EIS for an outline CEMP).

350 The mitigation measures to be included in the CEMP in relation to flora and fauna will be implemented as part of the construction management.

351 Work method statements, which will incorporate all the mitigation measures in the EIS, will be developed by construction and site contractors, agreed with statutory authorities and ECoW

(where appropriate) and implemented by construction crews for all construction activities, these will be detailed in the CEMP.

6.6.2.1.1 Habitats

352 The works area will be clearly marked / fenced. Hedgerow, tree and scrub vegetation that are to be retained which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. No materials will be stored within 5m of hedgerows / trees / scrub. Materials, especially soil burden can prevent air and water circulating to the roots of trees / shrubs.

353 Where towers are to be located on field boundaries comprised of hedgerows, the vegetation will be removed to ground level. Works will be implemented in a manner to minimise soil disturbance and compaction outside of the tower foundations and in particular where the root structures of the hedgerow remain. Post construction a wooden fence will be installed around the tower base to prevent livestock access and replanting carried out with low growing woody species of local provenance including Blackthorn, Hawthorn and Hazel. This will allow re-establishment of the hedgerow in the gap where the tower is located. Where required, disturbed areas of grassland will be appropriately prepared and reseeded with a locally sourced grass mix, similar to that already occurring within the surrounding fields. Reseeding works will be undertaken within 3 weeks of construction works to avoid flushing of exposed soil downstream.

354 Tree cutting and lopping at linear woodland features under conductors will be undertaken in a manner which minimises the requirement for extensive tree lopping. Large mature trees will be pollarded by qualified foresters / tree surgeons so as to retain as much of the treeline / linear habitat structure and in a manner which retains ground flora species and which does not kill the tree. The trimming regime will involve a scalloping or profiling effect which will minimise the effect on vegetation. Overall, it will not change the structure and ecological function of these linear woodland features, and will not measurably affect associated fauna post construction.

355 There will potentially be a requirement for 74m wide corridors in the woodland identified in **Table 6.17**. Machinery access to these areas will be minimised as much as possible to minimise soil compaction and damage to woodland ground flora. In consultation with landowners areas of dead wood will be retained so as to improve local biodiversity. Low growing scrub (woodland vegetation) habitat will be retained under the conductors.

356 Where construction work is required close to mature trees, the National Joint Utilities Group *Guidelines for the Planning Installation and Maintenance of Utility Services in Proximity to Trees'* (NJUG 10) will be followed so as to minimise damage.

357 Tree cutting will be undertaken by a qualified forester / tree surgeon aimed at minimising the degree of cutting. The ECoW will provide input where necessary, to minimise the impact on surrounding habitats and/or species e.g. through suggesting the direction of tree fall. As part of this the ECoW will also advise on sensitive areas to avoid in particular at river crossings.

358 As noted, impacts to hedgerows and linear woodland caused by access requirements will be avoided by the selection of temporary access routes via existing farm access points and gaps in hedgerows. Existing gates onto local roads will be used, rather than creating additional hedgerow gaps. Any alteration to temporary access routes will be agreed with the ECoW in advance to ensure avoidance of impacts to ecologically sensitive receptors.

359 Any temporary material used to allow machinery access will be removed post works to allow habitat regeneration.

6.6.2.1.2 Water Quality

360 A drainage and sediment control plan will be implemented by contractors during site works. The plan will detail specific mitigation measures (taken from mitigation measures, outlined in this chapter and **Chapter 8** of this volume of the EIS) to address site specific issues. This will be implemented as part of the CEMP. The drainage and sediment control plan will implement all specific mitigation measures outlined in the EIS to address site specific issues and will achieve this by including all relevant mitigation measures detailed in the outline CEMP. The outline CEMP has been included in **Appendix 7.1, Volume 3B** of the EIS, and forms part of the application documentation.

361 Risks of significant amounts of potential pollutants from construction activities reaching local watercourses are considered minimal due to the strict pollution control measures which will be taken. A CEMP will be prepared at detail design stage which will include measures for works in the vicinity of watercourses based on mitigation measures detailed in **Chapter 8** of this volume of the EIS. As noted above, the outline CEMP has been submitted with this EIS and forms part of the application documentation. This approach has referred to relevant requirements for the *Protection of Fisheries Habitats during Construction and Development Works at River Sites* (Eastern Regional Fisheries Board, 2006).

362 Potential impacts caused by spillages, drip and or spills during the construction phase will be reduced by the maintenance of an adequate supply of spill kits and hydrocarbon adsorbent packs at labelled stations at all working areas, with all vehicles on-site carrying spill kits. All personnel will be fully trained in the use of the equipment. Any used spill kits will be disposed of appropriately off-site.

363 As part of the CEMP a spill method statement will be drawn up which all personnel will adhere to.

364 A 24 hour, 7 day per week Emergency Response protocol for leaks / spill of hydrocarbons and / or chemicals will be drawn up and implemented. This must be implementable in the unlikely event of an accidental spillage of chemicals, hydrocarbons or release of sediment to the surface or ground water system.

365 No infilling or storage of soil cleared for construction works will take place within 5m of drainage ditches and other identified wetlands or other habitats of ecological value as identified by the ECoW. Excavated materials from construction works will be deposited within the works area where there is no significant risk of run-off into local watercourses.

366 During the excavation and removal of soil for construction works, fuel oil interceptors and silt traps or sedimentation ponds will intercept surface water run-off in particular at tower locations close to (within 5m of smaller streams and drainage ditches). As part of their environmental and works requirements, the contractor will establish a maintenance schedule and operational procedure / method statement for silt and pollution control measures during the construction period. This will be monitored for effectiveness by the contractor and ECoW.

367 Oil, petrol and other fuels containers will be double-skinned and bunded to be able to contain 110% volume. Bund specification will conform to the current best practice for oil storage such as Enterprise Ireland's *Best Practice Guide BPGCS005 Oil Storage Guidelines*. All waste oil, empty oil containers and other hazardous wastes will be disposed of in conjunction with the requirements of the *Waste Management Acts 1996 to 2008*, as amended.

368 Pouring of concrete will only take place in designated locations and concrete washings will be treated off site following current best practice guidelines including *Pollution Prevention Guidelines for Northern Ireland and Scotland SEPA PPG 5* (2007). Concrete washings will not be discharged to surface water and poured concrete will be allowed to cure for a minimum of 48 hours in the dry.

369 Raw or uncured waste concrete or similar will be disposed of by removal to approved / licensed disposal site. It is noted that there will be a concrete truck wash out at the batching plant area. This washout will be directed to the three bay water recycler provided at this location.

370 Water courses which have been identified as potentially at risk of pollution from construction activities (e.g. drains and smaller streams linked to the River Boyne and Blackwater) will have appropriately designed silt traps (based on drain and potential runoff characteristics identified) installed in consultation with IFI (where necessary).

371 Refuelling of machinery, will be carried out on level, hard surfaced designated areas where possible, at least 20m from watercourses and drainage ditches. In the event that refuelling is required outside of this area, fuel will be transported in a mobile double skinned tank and a spill tray will be employed during refuelling operations.

372 All machinery will be regularly refuelling maintained and checks from leaks. Services will not be undertaken within 50m of aquatic features, including dry drainage ditches. Servicing must be undertaken on level, hard surfaced designated areas where possible.

373 Construction materials such as hydrocarbon, cement and grout will be stored in bunded areas or silos which will be regularly inspected by the site manager. General construction practices will adhere to the requirements for the protection of fisheries habitat during construction and development works at river sites published by IFI (*2006*).

374 Weather conditions will be taken into account when planning construction activities to minimise risk of extreme runoff from works areas.

6.6.2.1.3 Fauna (Birds and Mammals)

375 Scrub, hedgerow or tree removal / trimming should be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the *Irish Wildlife Act 1976* (as amended), though there are exceptions for exempted developments.

376 Given the intervening timescale between any decision to grant planning approval and commencement of actual site clearance and construction, and once exact felling requirements of the proposed development are known, confirmatory bat surveys of specific mature trees identified for felling will be undertaken by a bat specialist prior to tree cutting in order to verify and update the conclusion set out in this EIS. This pre-construction survey will aim to re-confirm the number and location of bat roosts that would be impacted by felling (no bat roosts were confirmed as part of field surveys for the proposed development). In order to proceed with the felling of trees that may be identified as bat roosts, it will be necessary to acquire a derogation licence from NPWS. NRA, (2006a) guidance in relation to tree felling and hedgerow removal will be followed throughout the site clearance phase of the proposed development. These measures will be outlined in detail in the CEMP that is to be drawn up for the construction phase of the proposed development.

377 Pre-construction surveys will be undertaken at watercourses and adjacent habitats that occur in close proximity to tree felling areas to confirm presence / absence of otter breeding sites in relation to the conditions which have been evaluated in the EIS. This is required due to the

strict legal protection of otters (and their resting or breeding places) and given the likely timescale between any decision to grant planning approval and the commencement of development (likely to be greater than 2 years). Details of the preconstruction survey methodology and the approach to be taken will be outlined in the CEMP that is to be drawn up for the construction phase of the development with reference to relevant guidance documents (NRA 2006c). No direct impacts are expected to arise as works will require an agreed method statement and be monitored by the ECoW.

378 Pre-construction surveys for badger setts will be conducted at woody vegetation required for cutting to confirm the conditions which have been anticipated to be encountered in the EIS. This is required to inform site clearance activities given the legal protection of badger breeding sites and likely timescale between any decision to grant planning approval and construction (likely to be greater than 2 years). A buffer zone will be established around any known badger setts through the erection of temporary posts and wires with 'no entry' signs erected. No direct impacts are expected to arise as works will require an agreed method statement and be monitored by the ECoW based on relevant guidelines (NRA 2006b).

6.6.2.2 Specific Additional Mitigation by Reduction (River Boyne and River Blackwater cSAC/SPA)

379 The following specific precautionary mitigation will be implemented for the River Boyne and River Blackwater cSAC / SPA.

380 To ensure no disturbance arises to breeding Kingfisher and otter, no tree trimming will take place prior to completion of pre-construction surveys which will be carried out to confirm the conditions which have been anticipated to be encountered in the EIS. These will be carried out at an appropriate time of year, at locations identified where there is a potential for these species to breed. These locations include:

- Boycetown River between Towers 376 and 377;
- Stream between Towers 358 and 359;
- River Boyne (cSAC / SPA) between Towers 355 and 356;
- Stream between Towers 350 and 351;
- Clady River three crossings between Towers 344 and 347;
- Small stream between Towers 317 and 318;
- Small stream between Towers 313 and 314;

- River Blackwater (cSAC / SPA) between Towers 310 and 311; and
- Kilmainham River between Towers 251 and 252.

381 Confirmatory pre-construction surveys, to confirm the conditions which have been evaluated, will be undertaken at described watercourses where tree felling may lead to disturbance risks to Kingfisher breeding sites. This is required given the likely timescale between any decision to grant planning approval and the commencement of actual site clearance and construction and the dynamic nature / changes in Kingfisher breeding site locations. If tree cutting is required at a breeding Kingfisher site than this work will only take place once Kingfisher have finished breeding (as confirmed by ECoW) or outside the breeding Kingfisher season (typically March to end August). Tree cutting will be conducted in a manner which does not damage the breeding site / river bank through careful pollarding of tree limbs and retention of tree root structures and lower vegetation under which this species typically breeds.

382 Confirmatory pre-construction surveys will also be undertaken for otter breeding sites. If an otter breeding site is determined that may possibly be disturbed than tree trimming activities will be suspended until such time that the otter breeding site is vacated and breeding activity is finished, as confirmed by ECoW. Tree trimming will be conducted in a manner which does not damage the breeding site / river bank through careful pollarding of tree limbs and retention of tree root structures and lower vegetation under which this species typically breeds.

383 Stringing of the powerlines will be conducted manually at river crossing points to avoid any requirement for access by machinery, and associated disturbance impacts on European Sites.

6.6.2.3 Operational Phase Mitigation

6.6.2.3.1 Water Quality

384 There will be no direct discharges to the water environment during the operational phase. No other potentially significant impacts to water quality are anticipated during the operational phase.

6.6.2.3.2 Fauna (Birds)

385 The key operational impacts identified are potential collision risks to Whooper Swans at locations identified in **Table 6.21**.

386 Mitigation by avoidance of feeding and roosting sites has been implemented as far as possible in the selection of the alignment. However given the geographic spread of Whooper Swans in this area and other significant non-ornithological constraints, it will not be possible to avoid

crossing regular Whooper Swan flightlines between roost and feeding sites. In this regard there is potential for collisions in particular with the earth wire component of the alignment.

387 Mitigation to reduce impacts at specific sites is required in the form of earth wire marking with bird flight diverters. Based on available information and research based studies reviewed, this will reduce potential collision risks associated with the new alignment. Studies where a reduction in swan collisions was observed on transmission lines include Frost (2008) and Slater (2006). Barrientos *et al.* (2011) in a review of 21 line marking studies concluded that line marking reduced bird mortalities by 55-94% where an observed effect was noted pre-line marking. In this regard precautionary line marking is a best practice approach to minimise the collision risk of the new alignment. Swan flight diverters type, effectiveness and configuration are discussed in detail in APPLIC (2012) and this informed the proposed mitigation. As with all line marking mitigation, the success of this will require ongoing monitoring, as specified in **Section 6.7.2**.

388 The type of flight diverters recommended are swan flight diverter markers constructed from high-impact grey PVC (UV stabilised) fitted approximately 5m apart along each earth wire, see **Figure 6.2**. This line marking is proposed for the earth wires to increase visibility of the earth wires to flying birds.

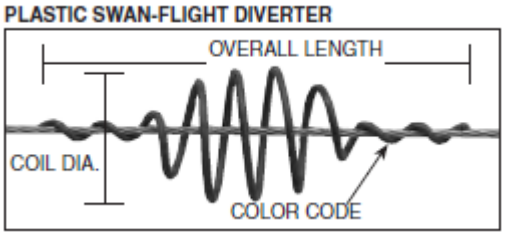

Figure 6.2: Swan Flight Diverters

389 Areas identified as requiring line marking are defined as; "*Locations in which the alignment bisects observed relatively regular flight paths by Whooper Swan between feeding and roosting areas*", larger river crossings (including the River Boyne) or nationally important concentrations in close proximity (<1km) i.e. the Yellow River area.

390 Areas and lengths of alignment proposed for marking with flight diverters are highlighted in Figures 6.3.3 and 6.3.4, **Volume 3D Figures** of the EIS and described as follows:

- Between Towers 307 and 312 at the River Blackwater crossing point it is recommended that approximately 1.6km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan, Golden Plover, Cormorants and Mute Swan.

- West of the Yellow River foraging area between Towers 291 and 295. The main identified flightline does not cross the alignment. However there is potential that Whooper Swan could move towards the area of the alignment. Given that high numbers occur in this area it is recommended that approximately 1.5km of the earth wires are marked with swan flight diverters.

- Between Towers 279 and 283 west of Clooney Lough; it is recommended that approximately 1.5km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan.

- Between Towers 257 to 268 near Cruicetown / Whitewood Lough; it is recommended that approximately 3.3km of the earth wires are marked with swan flight diverters. Key target bird species identified which may collide with the alignment include Whooper Swan.

391 In addition, between Towers 355 and 357 (including the River Boyne Crossing), 60cm diameter marker spheres will be added to the earth wire to increase visibility. These will be placed at 30 metre intervals alternating orange and white, see **Figure 6.3**. Key target bird species identified which may collide with the alignment include Cormorants and Mute Swan.

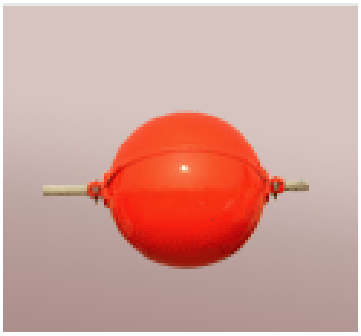

Figure 6.3: Marker Spheres

392 Mitigation in the form of ’Bird Perch Deterrents” is proposed for cross arms of Towers 295 and 296 in the townland of Oristown to assist in deterring perching corvid species and Buzzard which may potentially disturb or predate breeding Lapwing in the townland of Oristown. Suitable bird perch deterrents for transmission line metal crossarms are available with appropriate design specifications. These are designed to deter perching predatory birds hence reducing potential predation / disturbance impacts to ground nesting Lapwing.

393 Scrub, hedgerow or tree trimming should be undertaken outside of the bird nesting period, which begins on March 1st and continues until August 31st, in order to protect nesting birds. All birds and their nesting places are protected under the *Irish Wildlife Act 1976* (as amended 2000), though there are exceptions for exempted developments.

6.6.3 Mitigation by Remedy

394 The following remedial mitigation is proposed:

- Hedgerow re-establishment success will be checked two years after construction at tower locations by the ECoW. Where poor or no hedgerow re-growth has occurred, replanting with similar native hedgerow species will be carried out so as to ensure linear habitats are retained / re-established. If new fencing is required or maintenance then this will be implemented in consultation with the landowner.

395 Monitoring will be undertaken to confirm the effectiveness of proposed flight diverter mitigation (see **Section 6.7.1** for further information).

6.7 RESIDUAL IMPACTS

396 The post mitigation residual impacts for each Key Ecological Receptor identified as potentially impacted during the construction and operational phases are detailed in **Tables 6.22** and **6.23** respectively. **Table 6.22** deals with the construction phase and **Table 6.23** deals with the operational phase.

397 In summary the residual adverse impacts of the proposed development on ecological receptors identified within the study area range from imperceptible to minor (Low – in the case of Whooper Swan collision risk) in significance.

Table 6.22: Summary of Residual Impacts (following adoption of mitigation) relevant to Specific Key Ecological Receptors Associated with the Construction Phase

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Whooper Swans and Golden Plover	All sites identified	Temporary disturbance from foraging sites.	Temporary imperceptible	CEMP to outline construction stage monitoring by ECoW so as to confirm impacts as detailed and implement approaches for minimising impacts if relevant.	Imperceptible
River Boyne and Blackwater cSAC / SPA and associated tributaries	River Boyne crossing	Surface water pollution (aquatic receptors). No disturbance to riparian area.	Temporary moderate	CEMP to include measures to control water pollution. Pre-construction monitoring by ECoW to monitor works activity so as to confirm impacts as detailed.	Imperceptible
All other river crossings (41 rivers in total)	There is a requirement to cross 41 No. rivers.	Indirect water pollutant impacts, disturbance to riparian habitats, disturbance to qualifying species European sites.	Temporary moderate	CEMP to include measures to control water pollution. Pre-construction monitoring by ECoW to monitor works activity so as to confirm impacts as detailed.	Imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2) 13 towers located in Hedgerows	Towers located in hedgerows.	390m of linear woodland removal during construction at tower locations.	Temporary minor	CEMP to include measures to minimise works area and soil compaction. Fence area post works so gap with Tower is not accessible to livestock. Replant with low growing native woody species similar to surrounding species. Monitor success re-growth and additional replanting as required.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Treelines (WL2)	Refer to **Table 6.16**. 41 crossings along alignment identified. Two towers located in treelines.	Tree lopping and trimming. Treeline removal at tower locations.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees. Pre-construction-monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor
Mature deciduous woodland	Refer to **Table 6.17.**	Tree lopping.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees where possible. Pre-construction monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor
Hedgerows with mature trees (WL1 – Type B)	Refer to **Table 6.16**. 113 crossings along alignment identified. 11 towers located in Hedgerows.	Tree lopping and trimming. Hedgerow removal at tower locations.	Permanent moderate	CEMP to include measures to minimise works area. Pollard rather than completely lop trees. Pre-construction monitoring by ECoW to inform if timing constraints on works activity regarding protected species breeding sites (see below).	Minor
Lapwing (breeding sites)	Oristown townland.	Disturbance and displacement.	Temporary minor	CEMP to include measures to monitor Lapwing breeding status and inform construction manager regarding approaches for minimising impacts if relevant.	Imperceptible
Bats	Towers in hedgerows, 41 mature treelines crossed, 113 hedgerow	Disturbance and displacement to bat roosts in mature trees lopped (WL2, WD1 and WL1	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
	with trees (crossed) and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible temporary bat roost sites. No significant sites identified in surveys.	B habitats)			
Otter	41 river crossings identified as possible otter breeding sites. Sites with more potential are larger river crossings	Very low disturbance and displacement risk to possible otter breeding sites associated with tree cutting where the line traverses streams / rivers (possible breeding areas).	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible
Badger	All tower locations, 41 mature treelines, 113 hedgerow with trees and mature woodland identified at Brittas Estate and other mature deciduous woodland locations afford possible bat roost sites.	Very low disturbance risk to possible badger breeding sites associated specifically with tree cutting where the line traverses mature hedgerows, treelines and woodland habitats.	Temporary moderate	CEMP to include mitigation measures detailed herein.	Imperceptible
Other Bird Species	All areas where potential disturbance to woody	Localised disturbance risk associated specifically with tree cutting to common	Temporary minor	CEMP to include mitigation measures detailed herein.	Imperceptible

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
	vegetation.	breeding birds sites in treelines/mature hedgerow vegetation.			
Oak-Ash-Hazel woodland	Low growing semi-natural woodland and associated streams crossed at three locations between Towers 260 and 261, Towers 289 and 258 and Towers 252 and 251. Habitat will be avoided.	Woody vegetation trimming is unlikely to be required given the low heights (<6m) of woody vegetation.	Temporary imperceptible	Monitor by ECoW	Imperceptible

Table 6.23: Summary of Residual Impacts (following adoption of mitigation) Relevant to Specific Key Ecological Receptors Associated with the Operational Phase

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Whooper Swans	River Blackwater.	Collision with conductors and earth wire.	Permanent medium[1]	Earth wire marked with flight diverters. Monitoring (operational management plan).	Low
Whooper Swan	Cruicetown Clooney Lough Area	Collision with conductors and earth wire.	Permanent low[1]	Earth wire marked with flight diverters. Monitoring (operational management plan)	Negligible[1]
Whooper Swan	West of Yellow River	Collision with conductors and earth wire.	Permanent negligible[1]	Earth wire marked with flight diverters. Monitoring (operational management plan)	Negligible[1]
Whooper Swan	Other Sites identified	Collision with transmission line.	Permanent negligible[1]	Monitoring (operational management plan)	Negligible[1]
Whooper Swan	Teltown	Displacement from the foraging area at Teltown.	Permanent negligible[1]	Monitoring (operational management plan).	Negligible[1]

Site / Feature	Area	Description of Impact Source	Potential Impact	Mitigation	Residual Impact
Cormorant and Mute Swan	River Boyne and Blackwater.	Collision with transmission line.	Permanent low	Earth wire marked with flight diverters (River Boyne and River Blackwater).	Imperceptible
Lapwing (breeding sites)	Oristown townland.	Increased predation risk associated with perch opportunities associated with new towers at Oristown.	Permanent moderate	Perch deterrents at Oristown area. Monitoring.	Minor
All River Crossings	41 rivers crossed in total.	Water pollution associated with maintenance works.	Temporary imperceptible	Standard water pollution controls depending maintenance works.	Imperceptible
Linear woodland habitat (WL1A, WL1B, and WL2)	Towers located in 13 linear woodland habitat type locations.	No / poor hedgerow re-growth at tower location in hedgerow gap due to trampling by livestock (indirect impact).	Permanent low	Implement mitigation and monitoring.	Imperceptible
Treelines (WL2	41 crossings along alignment identified.	Ongoing trimming under alignment	Temporary imperceptible	None specific to habitat (see below re fauna)	Imperceptible
Mature deciduous woodland	Refer to **Table 6.17.**	Ongoing trimming under alignment.	Temporary imperceptible	None specific to habitat (see below re fauna).	Imperceptible
Hedgerows with mature trees (WL1 – Type B)	113 crossings along alignment identified.	Ongoing trimming under alignment.	Temporary imperceptible	None specific to habitat.	Imperceptible
Other Birds	Blackwater Valley Area and throughout.	Collision with transmission line.	Temporary imperceptible	Hedgerow cutting to be implemented outside the bird breeding season.	Imperceptible
Protected mammals	Throughout	Disturbance during maintenance.	Temporary imperceptible	None	Imperceptible

Note: 1 Collision risk assessment for Whooper Swan based on Percival (2003)

6.7.1 Monitoring

398 In order to ensure the effectiveness of mitigation measures, monitoring will be required, specifically regarding the success of implementing Whooper Swan bird flight diverters. This monitoring will be conducted by an appropriately qualified and experienced ornithologist in consultation with NPWS.

399 A clearly defined monitoring programme will be developed and implemented for Whooper Swans to assess effectiveness of line marking. All locations where flightlines were identified will be surveyed during the pre-planning stage, construction and operation stages (up to 5 years). Surveys will be conducted at all sites identified, monthly between October and April when Whooper Swans are present in the area. Throughout the lifetime of proposed monitoring works, additional areas where flightlines or collisions are recorded will be added to the list of areas to be surveyed. Landowners with towers on their land will be engaged with and encouraged to get in touch with the bird surveyor regarding observed Whooper Swan or other bird species collisions. The results of winter monitoring and engagement with landowners will inform further actions to minimise risks as highly transient species (in terms of distribution and flightlines) like Whooper Swans require ongoing consideration after the planning stage. Yearly monitoring reports for the construction and operational phases will detail required actions and will be drafted in consultation with NPWS or other relevant experts as appropriate.

400 Hedgerow re-establishment at all tower location will be monitored to ensure robust hedgerow re-establishment. Further replanting of hedgerow species and fencing will be implemented in consultation with landowners as required.

6.8 INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

401 Interrelationships have been identified between impacts on flora and fauna and impacts on human beings and land use (see **Chapter 3** of this volume of the EIS). The approach of locating towers in areas of low ecological interest (mostly managed grassland) has had the effect of minimising the impacts on ecology while at the same time potentially increasing the impact on agricultural production. Some towers located, in particular, on arable farmland will lead to small permanent areas under towers where intensive agriculture will not take place.

402 There is a potential for interactions between EMF (see **Chapter 5** of this volume of the EIS**)** and fauna species. However, the operating conditions for the proposed development will ensure that EMF will remain below the restriction levels specified in EMF guidelines for Ireland and the EU. A review of scientific research on topics relating EMF to health of humans and other species did not show that EMF at these levels would have adverse effects on these populations.

403 Interrelationships have been identified between flora and fauna and soils, geology and hydrogeology (see **Chapter 7** of this volume of the EIS) and between flora and fauna and water (see **Chapter 8** of this volume of the EIS). This chapter should be read in conjunction with both these chapters for a full understanding of the main interrelationships between these environmental topics.

404 The transport of soil or vegetative material during construction works could potentially facilitate the spread of invasive alien species such as Japanese Knotweed (*Fallopia japonica*). Appropriate controls will be in place to ensure that the proposed works do not result in the spread of invasive alien species. The mobilisation and transport of soil via surface water runoff could potentially impact ecologically sensitive receptors that occur within watercourses downstream of the proposed development. Soil water runoff controls during construction are also a key consideration relevant to downstream aquatic species and habitats and suitable mitigation controls are detailed. Construction works will not be undertaken within wetland sites and no significant impacts on the eco-hydrology of wetlands are foreseen.

405 The conclusions of the water chapter (see **Chapter 8** of this volume of the EIS) are that based on a review of the construction methodology, flora and fauna and soils, geology and hydrogeology chapters; there are no significant cumulative (interrelated) impacts as a result of the proposed development. Any impacts on surface or ground water quality could impact on water dependant habitats and species that occur within the MSA. In this regard appropriate mitigation is detailed to protect water quality which is adequate for protecting such water dependant ecological receptors.

406 There are also interrelationships between ecological impacts and landscape (see **Chapter 11** of this volume of the EIS) in the case where the removal or trimming of wooded features (including woodlands, hedgerows and treelines) may have adverse effects on both flora and fauna and landscape. As mentioned throughout this chapter, the impacts on such wooded features has been minimised by, where possible, locating towers away from hedgerows and other wooded areas. The use of bird flight diverters may also increase the visual impact of the alignment at specific locations.

6.9 CONCLUSIONS

407 This chapter presents an evaluation of the potential ecological impacts (direct, indirect and cumulative) of the proposed development on the flora and fauna of the MSA and details appropriate mitigation where an impact is predicted.

408 The project design has sought to minimise ecology impacts as far as possible insofar as not locating towers in semi-natural habitats of ecological value (including hedgerows) and away

from rivers / streams (and associated riparian habitats). This is a key approach and best practice for minimising impacts to ecology receptors. The context of the study area, a highly managed landscape dominated by habitats of low ecological value is a key fact which has informed the overall evaluation. The key ecological features considered are rivers (including the River Blackwater and Boyne – European sites), boundary hedgerows / treelines and Whooper Swans. The EIS has drawn on extensive studies to inform the consideration of impacts and appropriate general and site specific mitigation has been identified.

409 The development and implementation of a CEMP, which will include monitoring of construction by an ECoW, is a key instrument in ensuring the implementation of all mitigation measures during construction. Operational phase monitoring is a key recommendation regarding the success of mitigation of impacts on Whooper Swans. An outline CEMP has been included in **Appendix 7.1, Volume 3B** of the EIS, and forms part of the application documentation. All relevant mitigation measures set out in the EIS are included in the outline CEMP and will be incorporated into the final CEMP.

410 It is considered that the 'low' residual impact identified for Whooper Swans associated with collision risk is in a worst case scenario only. Based on the numbers of swans recorded in the area and the predicted low level of mortality that could be expected due to collision with the proposed transmission line it can be concluded with a high level of certainty that the proposed development will not impact in a significant way on the wider population of Whooper Swan in the area and will not alter the overall conservation status of this species.