10 CUMULATIVE IMPACTS AND IMPACT INTERACTIONS

10.1 INTRODUCTION

1 This chapter considers the potential for cumulative impacts arising from the proposed development in association with other development, as well as the interaction between potential impacts on different environmental receptors arising from the proposed development.

10.1.1 Legislative Requirements

2 As described in **Chapter 1** (of this volume of the Environmental Impact Statement (EIS)), pursuant to Article 3 of the Consolidated EIA Directive 2011/92/EU, "*the environmental impact assessment shall identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 12, the direct and indirect effects of a proposed development on the following factors*:

(a) *human beings, flora and fauna;*

(b) soil, water, air, climate and the landscape;

(c) material assets and the cultural heritage;

(d) the ***interaction between the factors referred to in points (a), (b) and (c)."*** *[emphasis added]*

3 Furthermore, the information to be included in an EIS must provide "*a description of the likely significant effects",* which description should cover the *"direct effects and any indirect, secondary,* ***cumulative****, short, medium and long-term, permanent and temporary, positive and negative effects of the project"* [emphasis added].

4 The Environmental Impact Assessment (EIA) process is only concerned with projects. However, many projects, especially in the area of public infrastructure, have been prefigured in plans, strategies and policies previously adopted. In May 2012, EirGrid published the *Grid25 Implementation Programme 2011-2016* (IP), which is a strategic overview of how the early stages of 'Grid25' are intended to be implemented. The publication of this document, and an associated Strategic Environmental Assessment (SEA), followed a national scale public consultation process. The IP document identifies EirGrid's understanding of those parts of the transmission system that are envisaged as likely to be developed over the next five years in order to give effect to Government policy. Indeed, the proposed North-South 400 kV Interconnection Development is specifically referred to in the IP document. The Environmental Report, for the purposes of strategic environmental assessment (SEA), which accompanied the

IP, provides the strategic environmental framework for the proposed development and future related projects and, at an appropriate level or tier, considers cumulative impacts and interactions arising.

10.2 METHODOLOGY

5 The European Commission's *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (EC, 1999) refer to the following in its consideration of cumulative impacts:

- **"*Cumulative Impacts:*** *The impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project, for example:*
    - *Incremental noise increase from a number of separate developments;*
    - *Combined effect of individual impacts e.g. noise, dust and visual from one development on a particular receptor; and*
    - *Several developments with insignificant impacts individually but which together have a cumulative effect e.g. development of a golf course may have an insignificant impact, but when considered with several nearby golf courses there could be a significant cumulative impact on local ecology and landscape.*"

6 For this EIS the methodology and approach is informed by the 1999 *EU Guidelines for the Assessment of Indirect and Cumulative Impacts* and reference was also made to 2002 and 2003 Environmental Protection Agency (EPA) guidance documents.

7 Cumulative impacts may arise from the combined effects of a number of existing or proposed developments, in combination with the proposed development being evaluated, on a single receptor / source. Where relevant, potential cumulative effects in the context of the existing baseline have been identified in the individual environmental chapters.

10.2.1 Proposed and Potential Developments

8 For the purpose of the evaluation of potential cumulative impacts 'proposed' development has been taken to include:

- A permitted electricity transmission development, or proposed development currently in the planning process, located within the counties of Monaghan, Cavan and Meath;

  In this particular instance, in assessing cumulative impacts, an appraisal has been conducted of the proposed interconnector, including that section of the project located

between the border with Northern Ireland and Turleenan, County Tyrone (i.e. to include the SONI portion of the proposed second interconnector); and

- Permitted or proposed development with the potential for significant cumulative effects with the proposed development, e.g. major linear infrastructure development, such as proposed road development, windfarms, other Strategic Infrastructure Development (SID), or public utilities and services along the route corridor.

9 Accordingly, proposed developments are those developments or proposals which are considered to have a degree of certainty although they may not yet have been granted approval or consent. Thus, the location and nature of such development and proposals is known.

10 For the purpose of the evaluation of potential cumulative impacts, 'potential' development has been taken to include proposals which have not yet been the subject of a planning application but which the project team is aware of from plans, strategies and / or local knowledge. This includes *inter alia* transmission infrastructure, windfarm and other electricity generation proposals (in particular those which are subject to Gate 3 connection offers).

11 Potential developments are development proposals which are considered to have a reasonable degree of certainty however, no application for approval or consent has been made. The cumulative assessment has sought to identify potential impacts based on available information.

12 The spatial scope of proposed and potential developments is not prescribed and is dependent on their scale and context relative to the proposed North-South 400 kV Interconnection Development and having regard to particular sensitive receptors.

10.3 PROPOSED DEVELOPMENTS

10.3.1 Transmission Projects

13 The proposed overhead line (OHLs) and including electricity transmission infrastructure developments included within the cumulative assessment are summarised in **Table 10.1.** In addition the following proposed developments are specifically acknowledged and their potential in-combination impacts with the proposed interconnection development within Ireland are considered:

10.3.1.1 SONI Element of the Proposed Interconnector

14 In December 2009, an application for the SONI proposal was submitted to the Northern Ireland Planning Service for that portion of the proposed cross-border transmission infrastructure

development located in Northern Ireland (Ref. O/2009/0792/F). The application was accompanied by an Environmental Statement (ES).

15 As set out in **Section 1.1.3.1**, in August 2010, the Northern Ireland Environment Minster referred the SONI proposal to the Planning Appeals Commission (PAC) for a public inquiry. Subsequently, further information was requested in respect of the application. Addenda to the ES were submitted in January 2011 and October 2011. The public inquiry commenced in March 2012 and, as at the date of this EIS, stands adjourned. At the public inquiry, the PAC made a number of requests for additional information with regard to the application. When adjourning the public inquiry, the PAC requested that a consolidated ES be prepared. In May 2013 a second application was submitted for planning permission for works associated with the construction of the main infrastructure under the 2009 application (Ref. 0/2013/0214/F). Subsequently a consolidated ES was submitted in June 2013. The ES for the purposes of that application is a consolidated ES which assesses the environmental effects of both the main infrastructure works under the 2009 application and the associated works under the 2013 application. SONI submitted an Addendum to the consolidated ES in June 2015. The consolidated ES and consolidated ES addendum are included as Appendix C and D of the *Joint Environmental Report*, which comprises **Volume 4** of the application documentation.

16 The SONI proposal is included within the cumulative assessment set out in **Section 10.4**.

17 In addition, a high-level overview of potential impacts and related transboundary issues arising in respect of the overall EirGrid and SONI proposed interconnector, taking into account the EC Transboundary Guidance document, is included at **Section 10.6**. This overview references the *Joint Environmental Report* which comprises **Volume 4** of the application documentation.

18 For clarity, the following terms have been used throughout this chapter to describe the proposed interconnector:

- The **proposed interconnector**: The overall project from Turleenan to Woodland (i.e. both the SONI and EirGrid sections), including all proposed works;
- The **Tyrone – Cavan Interconnector**: That portion of the proposed interconnector located in Northern Ireland being proposed by SONI; and
- The **North-South 400 kV Interconnection Development**: That portion of the proposed interconnector located in Ireland being proposed by EirGrid.

10.3.2 Major or Strategic Infrastructure Developments

19 Other permitted and proposed developments with the potential for significant cumulative effects with the proposed development included within the cumulative assessment are also summarised in **Table 10.1**. This includes major or strategic infrastructure proposals such as roads, which are identified within relevant County Development Plans.

Table 10.1: Permitted and Proposed Transmission, Major and SID Projects

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
09447	Cavan County Council	ESB Networks	To build a 38 kV OHL from existing Shercock 38 kV Station	Shinan, Shercock and across the townlands Lecks, Croley, Lisdrumskea, and to a point at Lisdrumfad, Shercock	Grant with conditions	22/07/2010
09561	Monaghan County Council	ESB Networks	To build a 38 kV OHL from existing Shercock 38 kV Station	Shinan, Shercock and across the townlands Lecks, Croley, Lisdrumskea, and to a point at Lisdrumfad, Shercock	Grant with conditions	23/06/2010
PL17.PA0013	Meath County Council	College Proteins	Biomass Combined Heat And Power (CHP) Plant	College Road, Nobber, County Meath	Grant with conditions	28/02/2013
PL25.VA0013	Westmeath County Council & Meath County Council	EirGrid	Proposed 110 kV Circuit From Mullingar 110 kV Station, Co. Westmeath to Kinnegad 110 kV Station at Killaskillen Townland, Co. Meath	County Westmeath and County Meath	Grant with conditions	10/01/2013
PL17.PA0026	Meath County Council	Indaver Ireland Limited	Amendments to existing Permissions for Waste Energy Plant	Carranstown, Duleek, County Meath	Grant with conditions	04/02/2013

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
10485, 12306, 13125, 13206 and 13207	Monaghan County Council	Gaeltech Energy Developments Ltd	Reg. Ref. 10485: Construction of 8 no. wind turbines of hub height 70m (also referred to as the Old Mill Wind Farm in this report). Reg. Ref. 12306: Amendments to Reg. Ref. 10485. Reg. Ref. 13125: Single wind turbine with a hub height of 80m. Reg. Ref. 13206: 38 kV overhead line from a substation in Lisduff to a substation in Killycard, County Monaghan. Reg. Ref. 13207: new 38 /20 kV wind farm substation and associated works at Lisduff, County Monaghan.	Townlands of Carrickatee, Tossy, Lisduff, Loughmourne, Corderrybane, Greagh, Drumlane, Drumguillew Upper, Shane, Tullycarragh, Derryisland, Monagar, Muldrumman, Tullyskerry and Killycard.	All granted with conditions	Reg. Ref. 10485: 20/11/2011 Reg. Ref. 12306: 27/11/2012 Reg. Ref. 13125:17/07/2013 Reg. Ref. 13206: 13/01/2014 Reg. Ref. 13207: 30/09/2013

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
O9/270 /PL02 .236608	Cavan County Council	PWWP Developments Limited	Wind farm of up to seven turbines, anemometry mast, electrical substation, access tracks, underground cabling and ancillary works.	Raragh and Corrinshigo, Kingscourt, County Cavan**.**	Grant with conditions	15/11/2010
KA / 120679	Meath County Council	SSE Renewables Ireland Ltd.	Five wind turbines of up to 80m hub height and up to 82.5m rotor diameter with a total tip height not exceeding 121.25m, a transformer and crane handstand are a at each turbine, underground electrical and communication cables linking the turbines, internal site tracks, a permanent meteorological mast 80m high, drainage works, a substation and associated equipment and control building with a wastewater treatment system and associated works.	Teevurcher and Agheragh, Tierworker, Kells (see **Figure 10.1**)	Granted	06/06/2013
PA0038	An Bord Pleanála	North Meath Windfarm Limited	Construction of 3 windfarm clusters comprising *inter alia:* a combined total of 46 no. wind turbines with a	County Meath [located in the vicinity of the North South 400 kV Interconnector between Towers	An application for planning	

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
			maximum tip height of up to 169 metres and associated turbine foundations, hardstanding areas and drainage; 1 meteorological mast (80 metres in height); a 110 kV substation; 6 no. borrow pits, new entrances and site tracks; cabling between turbines and on-site substation and the existing Gorman substation; and all associated site development works. Details of the proposed development including an EIS are available at www.emlaghwindfarm.ie.	282 and 295 [Refer to **Figure 10.2.**]	approval was lodged with An Bord Pleanála on 6th October 2014.	
KA/140921 / PL17 .244357	Meath County Council / An Bord Pleanála	Cregg Wind Farm Limited	10 year planning permission for the construction, operation and decommissioning of a wind farm of up to six no. wind turbine generators to export electricity to the national grid. Each turbine will be up to 150 metres to blade tip height with an associated crane hardstand. The works will also require the	Cregg, College and Rathgillen townlands, Nobber, County Meath.	Refused by Meath County Council. Decision due from An Bord Pleanála 19./5/2015	The appeal is due to be decided by 19./5/2015

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
			construction of an electrical substation, a meteorological mast, cabling and access tracks to each turbine and ancillary works including a temporary construction compound and site entrance access upgrades for abnormal loads.			
PA00041	An Bord Pleanála	Element Power Ireland	Maighne Wind Farm consisting of up to 47 no. turbines in 5 no. clusters, 1 no. electricity substation and associated works. The turbine clusters will be connected to the grid via underground cables (38 kV) mostly along the public road. Two connection options to the national grid are proposed – one at Woodland Substation (County Meath) and the other at Maynooth Substation, County Kildare).	North County Kildare and South County Meath.	The application was lodged on 9th April, 2015.	N/a
N/A		National Transport Authority	Phase II of the Dublin to Navan rail link. The Railway Order was substantially complete but was deferred by the Infrastructure and	Dublin to Navan rail link	On hold	N/A

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
			Capital Investment 2012–2016 Medium Term Exchequer Framework (November 2011)			
N/A	N/A	NRA	Leinster Orbital Route (LOR) - in the vicinity of Trim	Feasibility / On hold		
N/A	Cavan and Meath County Council	NRA	The improvement / replacement of a section of the N3	From a location south of the Cavan / Meath County boundary (in the townland of Derver, County Meath), to an appropriate location on the existing network between the townlands of Thomas Court or Drumroosk and Kilnaleck, Butlersbridge County Cavan, a potential distance of 46km	Suspended	N/A
N/A	Louth and Meath County Council	NRA	The N52 Ardee bypass consists of 4.48km of reduced single carriageway roadway and commences to the west of Ardee running east to the N2 road North of Ardee. The scheme includes two river crossings of the River Dee and River Garra, a staggered junction at Silver Hill road and a T-junction with	North of Ardee, County Louth	Planning Stage	N/A

PLANNING APPLICATION REFERENCE	PLANNING AUTHORITY	NAME OF APPLICANT	DEVELOPMENT	ADDRESS OF THE PROPOSAL	DECISION / STATUS	DATE OF FINAL GRANT
			the Mullinstown Road.			
N/A	Monaghan County Council	NRA	Upgrade approximately 28km of the N2 in north County Monaghan between the village of Clontibret and the border of County Tyrone.	Clontibret to the border of County Tyrone.	Suspended	N/A

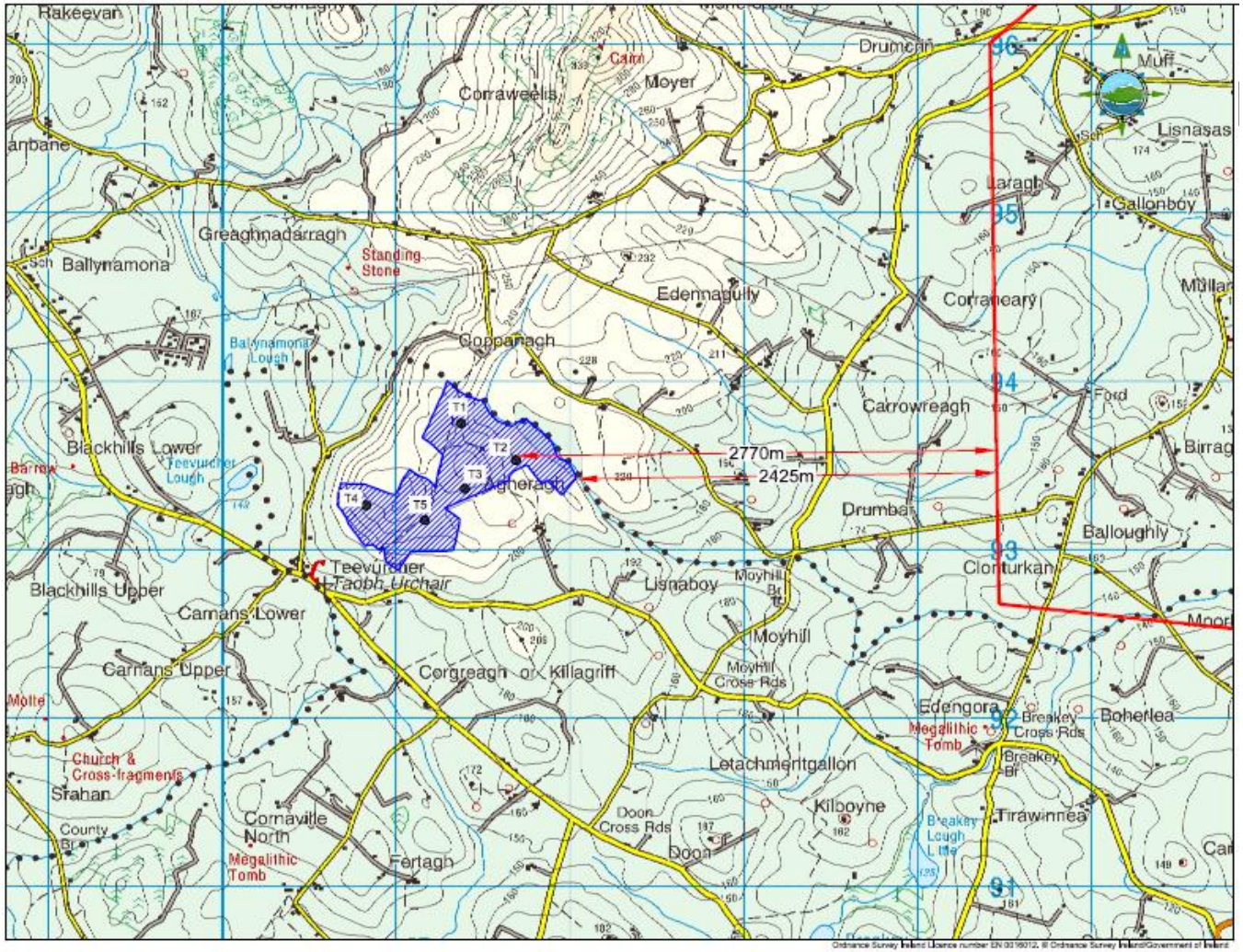

Figure 10.1: Teevurcher Windfarm Relative to the Proposed Development

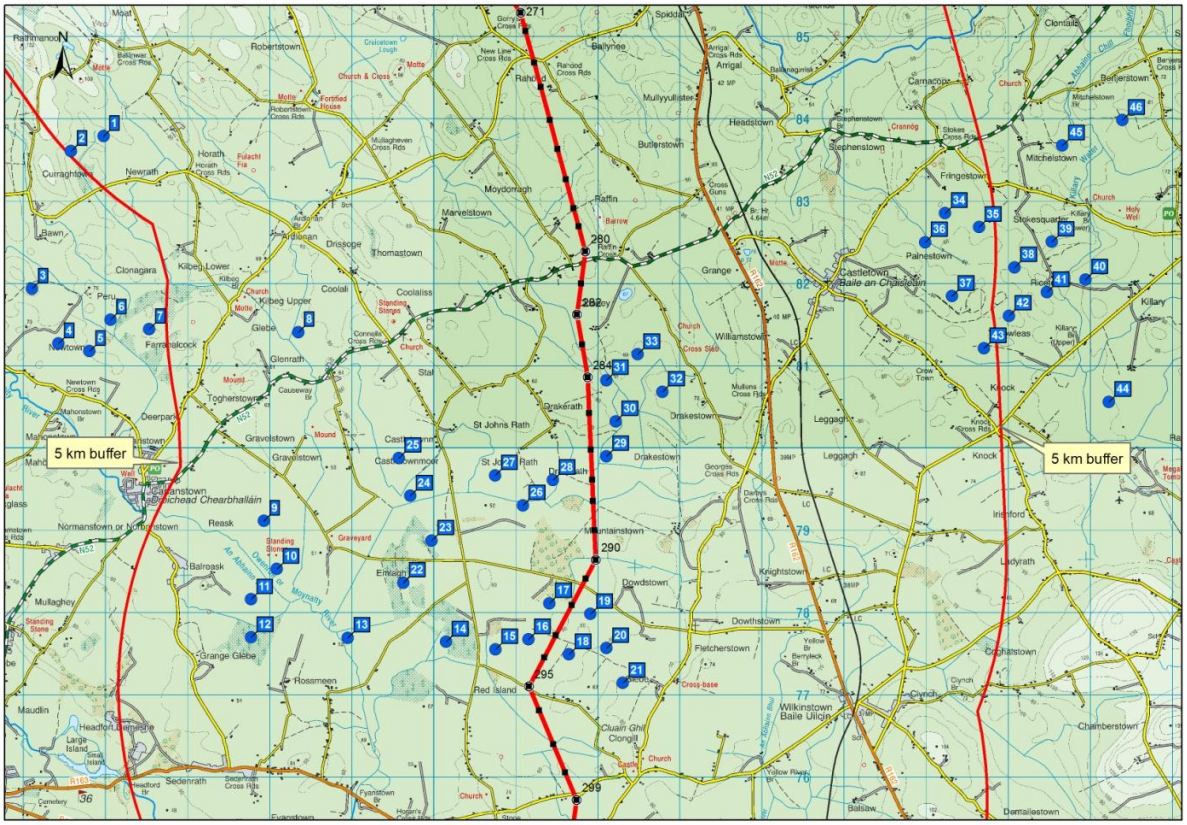

Figure 10.2: Proposed Emlagh Wind Farm Relative to the Proposed Development

10.3.2.1 Emlagh SID Wind Farm Development

20 As identified in **Table 10.1,** an application for approval has been submitted to the SID Division of An Bord Pleanála (the 'Board') for a windfarm (the 'Emlagh Wind Farm') (ABP Ref. PA0038). The windfarm which is proposed in three clusters, is located north-east of Kells, County Meath and includes 46 turbines with a tip height of 169m, 18 of which are to be located within 2km of the proposed North-South 400 kV Interconnector. The proposed cluster windfarm development is intersected by the alignment of the proposed North-South 400 kV Interconnection Development and is illustrated in **Figure 10.2**.

21 The distance of the individual turbines to the centreline of the proposed North-South 400 kV Interconnection Development is set out in **Table 10.2**.

22 An EIS accompanied the application for approval to the Board.

Table 10.2: Distance of Proposed Emlagh Wind Farm Turbines to the North-South 400 kV Interconnection Development

Turbine	Distance to MSA Line Route (m)	Turbine	Distance to MSA Line Route (m)
1	4540	24	2220
2	4950	25	2340
3	6640	26	855
4	6320	27	1180
5	5950	28	475
6	5680	29	185
7	5200	30	320
8	3400	31	225
9	4005	32	902
10	3385	33	650
11	3545	34	4400
12	3430	35	5105
13	2280	36	4140
14	1140	37	4500
15	570	38	5230
16	270	39	5685
17	250	40	6105
18	250	41	5645
19	252	42	5185
20	620	43	4840
21	995	44	6330
22	1940	45	5950
23	1980	46	6730

10.3.2.2 Maighne SID Wind Farm Development

23 As identified in **Table 10.1,** an application for approval has recently been submitted to the SID Division of the Board for a windfarm (the 'Maighne Wind Farm') (ABP Ref. PA0041). An EIS accompanied the application for approval to the Board.

24 The nearest of the five proposed windfarm clusters is located south-east of Enfield, County Meath, approximately 15.6km from the proposed development (Tower 402). Given the distances between the proposed North-South 400 kV Interconnection Development and the windfarm clusters no cumulative impacts are predicted to arise.

25 The Maighne Wind Farm application proposes that the windfarm clusters be connected to the grid via underground cables which will mostly be located along the public road. Two connection options to the grid are proposed – one at Woodland Substation (County Meath) and the other at Maynooth Substation (County Kildare). The applicant advises *"However, only one of these routes will be constructed following the identification of the preferred connection point by the Transmission System Operator".*

26 In the event the Maighne Wind Farm connects to the grid at Maynooth Substation, County Kildare, no cumulative impacts would be predicted to arise with the proposed development because of the distances involved. However, in the event it connects to the grid at Woodland, County Meath, localised cumulative impacts may arise. In this regard, the application shows the underground cable stopping at the main Woodland Substation gate but no specific works are proposed within the substation lands itself; the application sets out "*in parallel with these works the on-site electrical works; substation and internal cable network and off-site connection works to the EirGrid substation at Maynooth or Woodland will be completed".*

27 However, as the proposed Maighne Wind Farm is not yet eligible for a connection offer and the likelihood is that the proposed development will be constructed prior to works relating to the Maighne Wind Farm, no cumulative impacts are predicted to arise.

10.3.2.3 Electricity Distribution Line and Telecommunications Line Crossings

28 The proposed North-South 400 kV Interconnection Development crosses other existing transmission, distribution and telecommunications lines. This will result in localised cumulative visual impact at the crossing points; however, in the context of the extent of existing wire-scape across the study area, this impact is considered to be negligible.

29 Where the proposed 400 kV line route traverses existing transmission, distribution and telecommunication lines and conflict occurs, diversion works will be required and there is potential for impact. In addition to identifying those lines which need to be diverted, lines that need to be modified (that is lowered) but not diverted, are also identified. The proposed specific advance works for each of the three separate line types are detailed and an environmental evaluation was undertaken, in the report entitled *North-South 400 kV Interconnection Development Identification and Resolution of Conflicts with Existing Overhead Line Infrastructure* (2015) (see **Appendix 7.2, Volume 3B Appendices**).

30 The cumulative impact assessment in this section of the chapter focuses on the advance works to the distribution and telecommunication lines which do *not* form part of the subject application for planning approval to An Bord Pleanála and which will be undertaken by ESB Networks and the relevant telecommunication provider (Eircom).

31 Electricity distribution lines will be undergrounded at the identified 11 no. conflicted crossing points (see **Appendix 7.2, Volume 3B Appendices**). This will entail the placement of an underground cable in place of the existing OHL, with the existing pole sets over the requisite length being removed. Additional line / cable interface structure works will also be necessary to join the underground cable (UGC) with the OHL.

32 Given the nature and scale of the works proposed, the ecological value of the receiving environment, and because the locations are not at or near surface waters or known archaeological, architectural and cultural heritage sites, no significant cumulative impacts are expected to arise on the environment of the area. While sections of distribution OHL will be removed, there will be no significant cumulative visual impact benefit at the crossing points as a result of the introduction of the 400 kV OHL.

33 During construction, these works may result in temporary lane or road closures, but as these will be scheduled to be undertaken in advance of the construction stage of the proposed 400 kV OHL, and will not overlap with that construction stage, there will be no potential cumulative traffic impacts.

34 There are 59 no. roadside locations where the proposed 400 kV route crosses existing OHL telecommunications lines. The telecommunications lines will be undergrounded by Eircom and placed under public roads before the 400 kV OHL construction takes place.

35 The undergrounding works will be undertaken by Eircom in accordance with its standard construction methodologies and, in circumstances where those works will be undertaken well in advance of the construction stage of the North South Interconnection Development, the proposed undergrounding works in the areas identified will not result in potential cumulative impacts on the environment of those areas. While sections of telecommunications lines will be removed, there will be no significant cumulative visual impact benefit at the crossing points as a result of the introduction of the 400 kV OHL.

36 During construction, these works may result in temporary lane or road closures, but will be scheduled to be undertaken in advance of the construction stage of the proposed 400 kV OHL. Therefore, there will be no potential cumulative traffic impacts.

10.3.2.4 Other Proposed Developments

37 Planning applications in the vicinity of the proposed development are monitored on a regular basis to ensure potential conflicts do not arise. The types of planning applications that typically occur in the vicinity of the proposed development primarily relate to applications for single rural dwellings and agricultural developments. Permitted developments in close proximity to the centre line of the OHL, with extant permissions are identified on the Line Route Map – Detail (1:2,500), contained in Volume 1B of the application documentation. Extant permissions in close proximity to the OHL are also identified in **Table 10.3**.

Table 10.3: Extant Planning Permissions

County	Townland	Register Reference and Brief Description of Development	Decision Date / Decision due Date	Approx. Distance to North-South 400 kV (measured from the centre line)
Monaghan	Sreenty Between Towers 185 and 186	Reg. Ref. 09525 - consists of a 2 storey dwelling, detached garage, wastewater treatment system and percolation area and associated site works off new entrance. Significant Information revised plans consist of change of boundaries.	10.02.10	98.3m (approx.)
Monaghan	Greagh (Cremorne By) Between Towers 154 and 155	Reg. Ref. 13206 – consists of a 38 kV overhead line from a substation in Lisduff, Corderrybane, Greagh, Drumlane, Drumguillew Upper, Shane, Derryisland, Monagar, Muldrumman, Tullyskerry and Killycard, County Monaghan. Significant Further Information: The final 637m section of the line will be underground from Muldrumman to the substation at Killycard. The proposed locations for the poles are indicative only and a 50m wide corridor is proposed to facilitate micrositing if required.	13.01.14	0m 38 kV crossing

County	Townland	Register Reference and Brief Description of Development	Decision Date / Decision due Date	Approx. Distance to North-South 400 kV (measured from the centre line)
Monaghan	Tullynamalra Castleblayney Between Towers 172 and 173	Reg. Ref. 09561 - consists of a planning permission to build a 38 kV overhead line from a point in the townland of Cargaghoge and across the townlands of Cargaghmore, Ouvry, Sreenty, Corrienenty, Lisacullion, Tullyglass, Reduff, and in to existing Tullynamalra 38 kV station.	14.03.11	0m 38 kV crossing
Meath	Castlemartin Between Towers 310 and 311	Reg. Ref. KA101277 - consists of a dwelling, domestic garage & horse stables. . This is not constructed as confirmed from planning check Feb 2015.	05.01.2011	160m (approx.)
Meath	Neillstown Between Towers 327 and 328	Reg. Ref. NA120940 - consists of a storey and half type dwelling & garage.	03.07.2013	110m (approx.)
Meath	Betaghstown (ED Ardbraccan) Between Towers 328 and 329	Reg. Ref. NA900568 / NA130660 - consists of a two storey dwelling & garage. Extension to planning to 09/2019.	04.07.2013	170m (approx.)
Meath	Balbrigh Between Towers 350 and 351	Reg. Ref. NA101302 - consists of a single storey dwelling & detached garage, Demolition of existing cottage.	02.06.2011	60m (approx.)
Meath	Trubley Between Towers 357 and 358	Reg. Ref. TA120157 - consists of two no. two-storey houses and associated works.	28.08.2012	60m (approx.)
Meath	Creroge Between Towers 368 and Towers 369	Reg. Ref. TA70570 / TA120768 - consists of demolition of existing and construction of two storey dwelling and garage. This is not constructed as	20.11.2007	80m (approx.)

County	Townland	Register Reference and Brief Description of Development	Decision Date / Decision due Date	Approx. Distance to North-South 400 kV (measured from the centre line)
		confirmed from planning check Feb 2015.		

38 If construction of the permitted developments occurs at the same time as the proposed North-South OHL or advance distribution and telecommunications-related works, it may result in temporary localised lane or road closures but is not expected to give rise to significant cumulative traffic impacts.

39 There will be localised cumulative landscape and visual impacts arising from the proximity of these developments, once constructed with the proposed North-South 400 kV Interconnection Development. While new residences within 500-800m of the line would potentially experience significant visual impact where open views are possible, in the context of the dispersed nature of rural housing generally and the pattern of low voltage wirescape no significant cumulative impacts are anticipated to arise.

10.4 EVALUATION OF POTENTIAL CUMULATIVE ENVIRONMENTAL IMPACTS FOR PROPOSED DEVELOPMENTS

40 The cumulative assessment of proposed developments, as defined in **Section 10.2.1** and identified in **Section 10.3** and in **Table 10.1** in particular, is set out below.

10.4.1 Human Beings and Socio Economic

41 The impacts of the Tyrone – Cavan Interconnector, which is also a significant capital investment, will be similar in nature to the North-South 400 kV Interconnection development, therefore similar effects are likely to arise in terms of positive economic benefits, both locally during the construction phase and nationally during the operational phase. Cumulatively, the two elements of the proposed interconnector are likely to create positive economic cumulative impacts, as they help ensure that the transmission network has the capacity to facilitate economic growth and a competitive electricity market. Furthermore, no other developments have been identified in the study area which could give rise to additional significant cumulative impacts on human beings in terms of **population & economic** considerations. There are a number of landholdings along the line route already traversed by existing high voltage transmission infrastructure and localised cumulative impacts are predicted due to the

construction and operation of the proposed development. The land use impacts include additional land taken up by towers and land oversailed by the OHL, with associated implications for farming practices. A detailed consideration of these impacts is included in the baseline assessment in Appendix 3.1, **Volume 3C Appendices** and **Volume 3D Appendices** of the EIS. The proposed Emlagh Wind Farm will also have significant impacts on a number of land parcels along the line route. These impacts have also been considered and evaluated in Appendix 3.1, **Volume 3C Appendices** and **Volume 3D Appendices** of the EIS.

42 There are no cumulative impacts on land parcels north of the border (located in the vicinity of towers 103 – 107) arising from the OHL development south of the border in combination with any other known developments north or south of the border.

43 In terms of **tourism and amenity**, and having regard to the tourism assets identified by Fáilte Ireland and the Northern Ireland Tourist Board relative to the location of both the Tyrone – Cavan Interconnector and the North – South 400 kV Interconnection developments, neither of these proposed developments will give rise to significant cumulative impacts. Furthermore, no other projects have been identified in the study area which could give rise to significant cumulative impacts.

44 The nature of **Electric and Magnetic Fields** (EMF) means that there are unlikely to be cumulative impacts with other developments, as EMF from a particular source dissipates within a relatively short distance. In particular, when the EMFs arising from the proposed development are added to the EMFs arising from the Tyrone – Cavan Interconnector, the cumulative impacts are not just the sum of the individual sources, but depend on the relative direction of the field as well as the distance. Outside of the proposed electrical infrastructure, no other projects have been identified which could give rise to significant cumulative impacts arising from EMF in combination with the proposed development.

10.4.2 Flora & Fauna

45 Cumulative effects may arise from the combination of potential impacts of the development being assessed with a number of other developments and land management practices including agricultural, industrial, point source pollution and waste water treatment. This can include multiple impacts of varying sources and magnitudes upon the same receptor / resource.

46 Projects identified in the vicinity of the development and considered to potentially result in cumulative impacts include:

- 38 kV Overhead Lines from Tullymalra Station to Shercock Station and Lisduff to Killycard. The majority of supporting structures for the line are single pole intermediate

structures. The grants of planning permission require that bird flight diverters be installed at appropriate locations along the lines.

- Raragh, Lisduff, Cregg and Teevurcher Wind Farm Developments.

- North Meath Wind Farm Limited: The extensive Emlagh Wind Farm development occurs in close proximity to the proposed development. The residual impacts identified in the Emlagh Wind Farm EIS to shared ecological receptors are; negligible for birds (including Whooper Swan) and low for bats. Residual impacts to aquatic ecology including designated sites common to this development are not significant i.e. the conservation status of ecology receptors in receiving waters will not be affected.

47 The residual impacts for the projects detailed were reviewed to inform this appraisal. No significant negative impacts are outlined regarding potential impacts common to relevant ecology receptors outlined in this EIS for the proposed development. The potential receptors that may be common to the proposed development and other projects have been identified as Whooper swans and other birds, protected mammals, habitats of ecological interest and the qualifying interests of the River Boyne and Blackwater cSAC / SPA.

48 The projects detailed have identified appropriate mitigation measures for minimising potential impacts to relevant ecological receptors. Mitigation includes water protection measures (relevant to River Boyne and Blackwater cSAC / SPA) and bird flight diverters for OHL developments. No significant residual impacts are identified to birds, including Whooper swan and protected mammal species. Cumulative habitat loss is not significant as only a relatively small area is expected to be impacted and this is mostly restricted to habitats of low ecological value.

49 In conclusion, it is considered that no significant cumulative (additional) effects will arise to relevant flora and fauna from the proposed development in combination with these other proposed developments.

50 The Tyrone – Cavan Interconnector is almost identical in nature and similar in scale to the North-South 400 kV Interconnection Development. Cumulative impacts on habitats within the study area and with respect to the wider countryside are limited by the small footprint of individual towers, and the significance of any impacts is limited by the low conservation interest of the habitats that are likely to be affected. Habitats of conservation importance have been avoided as a result of the route selection process. Direct habitat impacts are largely restricted to improved grassland and some hedgerows.

51 The habitats in County Monaghan in the vicinity of the border are similar to those within the study area of the Tyrone - Cavan Interconnector and this development will lead to further losses

of primarily agricultural and pasture land. Whilst potentially increasing the amount of habitat lost, permanent losses are small. Construction practices and mitigation measures (as published in the consolidated ES and EIS) will ensure that impacts are minimised during construction. Overall, while losses of these habitats will be additive to losses arising from other human activities, including agriculture and extensions of the built environment, the cumulative impact on habitats arising from the construction and operation of the North-South 400 kV Interconnection Development and the Tyrone - Cavan Interconnector is predicted to be Not Significant.

52 There is some potential for cumulative impacts on mammal species, but none of these are likely to be significant and with the standard mitigation (as published in consolidated ES, consolidated ES Addendum and EIS) applied during the construction of the overall development, there will be no cumulative impacts on these species.

53 The potential collision risk associated with the development of the interconnector has been examined for bird species including Whooper Swan which overwinter in small numbers at local sites (non-SPA sites) in Northern Ireland and south of the border. The potential collision risk that may be present to migrating or dispersing swans moving from staging sites and between SPA sites has also been examined in the EirGrid *Natura Impact Statement* and the *SONI Information to Inform Habitats Regulation Assessment*. Individual birds show considerable mobility within their winter range, and there is a potential for these birds to cross the line of the interconnector, located in counties Monaghan, Cavan and / or Meath, with a consequent risk of collision. Surveys of wintering swans carried out for the part of the proposed interconnector in Northern Ireland indicate that there is a low risk of birds crossing the line of the Tyrone - Cavan Interconnector. The numbers using the Blackwater catchment in County Meath are generally restricted to 20-40 birds (Crowe 2005), and birds using the lakes of south Armagh are also generally present in very small numbers. The impact on swan populations that may use sites on both sides of the border is likely to be of negligible significance in terms both of population numbers and on availability of feeding sites. Standard mitigation measures to render the OHL more visible in those parts considered to present the greatest risk will be implemented in both jurisdictions, and will reduce the overall risk of collision (which is considered to be low and not significant).

54 There is a potential for minor impacts on the habitats of the majority of the breeding bird species that are present within the corridor of the proposed OHL. Breeding bird populations in these habitats are generally thinly distributed and, while there will be minor impacts on bird distributions at a local level, there is unlikely to be an impact on breeding bird numbers arising from the proposed interconnector. In the absence of significant impacts on breeding birds, it is unlikely that cumulative impacts on these species will arise (Not Significant).

10.4.3 Soils, Geology and Hydrogeology

55 Based on a review of the construction methodology, ecology and water chapters of the EIS (and the supporting documentation referred to in those chapters), there are no significant cumulative impacts predicted to arise as a result of the proposed development in association with other development. Intact peatlands and fens have been avoided by the proposed development and, therefore, there are no potential impacts on the ecohydrogeology of these areas. All groundwater bodies have been classified as being of Good Status as defined in the Water Framework Directive (WFD). No significant predicted impacts are likely to occur on the River Boyne and Blackwater groundwater dependent terrestrial ecosystems (GWDTE) as part of this proposed development. The proposed development will not have a significant impact on the WFD status of groundwater bodies either short term or long term.

56 The North-South 400 kV Interconnection Development is similar in nature to the Tyrone - Cavan Interconnector. The potential impacts to geology and soils will primarily result from the construction of the proposed towers. Given the distance of each tower from the next and the nature of the impacts, cumulative impacts between towers are unlikely. Mitigation measures (as outlined in the consolidated ES and EIS) will be undertaken to reduce the significance of any impacts. For these reasons it has been assessed that the potential cumulative Geology and Soils impacts are negligible.

10.4.4 Water

57 Cumulative effects may arise from the effects of the proposed development in combination with a number of other developments and land management practices including agricultural, industrial, point source pollution and waste water treatment. This can include multiple impacts of varying sources and magnitudes upon the same receptor / resource. The main pressures on surface water quality along the proposed development are agriculture and wastewater discharges (wastewater treatment plants and septic tanks).

58 Based on a review of the construction methodology, ecology and soils, geology and hydrogeology chapters, there are no significant cumulative impacts predicted as a result of the proposed development in association with other planned or proposed developments. Intact peatlands and fens have been avoided by the proposed alignment and, therefore, there are no potential impacts on the ecohydrology of these areas. Most surface water catchments currently do not meet Good Status as defined in the WFD. The main pressures on surface water catchments along the proposed development are agriculture and wastewater treatment plants. The proposed development will not have a significant impact on the WFD status of streams either short term or long term. For the reasons set out in detail in the Natura Impact Statement (NIS) submitted to the Board with the application for planning approval, no adverse effects on

the integrity of the River Boyne and Blackwater cSAC / SPA will occur as a result of this proposed development.

59 The North-South 400 kV Interconnection Development is similar in nature and scale to the Tyrone–Cavan Interconnector. Impacts arising from the proposed interconnector on water environment are short term in nature and limited to the immediate area of the proposed towers, substations and associated infrastructure. Other developments are considered sufficiently remote from the proposed interconnector to prevent any cumulative effects from occurring. No significant cumulative impacts occur during the operational phase.

10.4.5 Noise and Vibration

60 There a number of areas within the study area for the proposed development where the line route crosses over or near to existing power or other similar infrastructure. The noise impact from these existing sources is catered for in the background noise surveys.

61 There is the potential for cumulative impact with the construction phase of the interconnector project and that of the Emlagh Wind Farm project. In the event the projects' construction phases coincide in proximity to a noise sensitive receptor, site management mitigation will be used to adhere to the construction phase noise limits. The Emlagh Wind Farm has been designed to achieve 43dB or 5DB above background noise at the nearest sensitive receptor for night time noise. As such, the cumulative impact of the Emlagh Wind Farm and the North-South 400 kV Interconnection Development is not expected to be significant at any sensitive receptor. There will be no significant cumulative impact to sensitive receptors in the operational phase.

62 No other project has been identified in the study area that might produce cumulative noise and vibration impacts to sensitive receptors.

63 The North-South 400 kV Interconnection Development, if constructed at the same time as the Tyrone - Cavan Interconnector, has the potential to generate a number of working areas in the same general location in the border area. However as the towers are a distance from each other (for example, there are approximately 350m between the last tower in Ireland and the first tower in Northern Ireland), and having regard to the mitigation measures (as outlined in the consolidated ES and EIS) there will not be cumulative noise and vibration impacts to sensitive receptors.

10.4.6 Air – Climate and Air Quality

64 Cumulative air quality impacts have the potential to arise locally when construction activities associated with the proposed development take place at the same time as other developments in a specific location; this would include construction of the Tyrone – Cavan Interconnector. In considering cumulative impacts, no other permitted or proposed projects have been identified in counties Monaghan, Cavan and / or Meath which could give rise to significant cumulative impacts on Air Quality & Climate. At a wider scale with regard to cumulative climate change and greenhouse gas effects, when operational, the Tyrone – Cavan Interconnector will increase transmission capacity and promote the uptake of renewable energy sources, such as wind, by improving access to the end market, which will have cumulative long-term beneficial greenhouse gas and climate change effects. Similarly, the proposed windfarms will also contribute to cumulative long-term beneficial greenhouse gas and climate change effects.

10.4.7 Landscape

65 There are a number of areas within which the alignment of the proposed development crosses over or near to existing power infrastructure. As a result, there is potential for significant localised cumulative landscape effects between Towers 130 and 131 in the townland of Drumsook at Drumgristin and Coogan's Loughs, County Monaghan and between Towers 233 and 234 in the townland of Corraneary (ED Enniskeen), County Cavan. Localised significant visual cumulative effects will occur between Towers 180 and 181 in the townland of Corrinenty / Corbane, County Monaghan and between Towers 233 and 234 in the townland of Corraneary (ED Enniskeen), County Cavan.

66 As identified in **Table 10.1,** a 46 turbine wind farm is proposed in three clusters north-east of Kells (Emlagh Wind Farm). Due to the turbine height of 169m, the wind farm is potentially widely visible within the North-South Interconnection Development study area.

67 A number of photomontages have been prepared to illustrate the nature of cumulative effects (refer to Photomontages 48A, 48B, 48C, 49, 50, 50A, and 54 included in **Volume 3C Figures**). Analysis has concluded that there are two distinct types of cumulative effect.

68 Where the viewer is in close proximity to the transmission line, and turbines are visible, there is an adverse cumulative landscape effect. Proximity to transmission line towers means that they are perceived as being of comparable height to the more distant turbines in some views (although the average height of towers in this location is approximately 39m and the turbines are 169m). In such views, both proposals appear as one development. The simple form of a wind farm can become visually complex when seen in close context to a high voltage

transmission line. This results in a localised intensification in the character of a landscape of energy generation. Refer to Photomontages 48A, 50, 50A included in **Volume 3B Figures**.

69 Where the viewer is in close proximity to a wind turbine and the transmission line is visible in the distance, there is less adverse landscape effect. The scale of the transmission line is diminished by the much larger scale of the wind farm and the two developments are perceived as separate. While the cumulative effects remain high, they diminish with increased distance from the transmission line. Refer to Photomontages 48B, 48C and 49 included in **Volume 3B Figures**.

70 Therefore, while there would be many opportunities to view both the proposals sequentially and simultaneously, the highest cumulative impacts will occur within approximately 500m of the transmission line when both developments are visible at close distance. Cumulative landscape effects will also arise from the construction of the proposed wind turbines at Teevcurcher, adding the character layer of energy generation to the overall rural landscape character to the south and east of Lough an Leagh mountain. However, the distances between the proposals means that the cumulative impact is not significant. Cumulative landscape effects will also arise from the construction of the proposed turbines at Raragh, Lisduff and Cregg.

71 The impacts of the Tyrone-Cavan Interconnector and North-South 400 kV Interconnection Development have been cumulatively assessed and adverse cumulative effects are predicted in terms of landscape and visual impacts as follows:

- Impacts between Tyrone - Cavan Interconnector and North-South 400 kV Interconnection Development OHL on parts of the Mullyash Uplands Landscape Character Area. Where cumulative effects do occur, these are either localised or involving visibility over such distances that do not result in significant cumulative effects.

- Impacts between Tyrone - Cavan Interconnector and North South 400kV Interconnection Development overhead line on properties within 500-600m of the transmission line with open views towards the proposed development.

72 However, as the transmission line travels through an enclosed valley along the border, the potential for extensive cumulative visual effects are reduced. Where cumulative effects do occur, these are either localised or involve visibility over such distances that do not result in significant cumulative effects. The continuous nature of the development would result in the SONI and EirGrid sections being perceived as one transmission line in the landscape at and close to the border.

10.4.8 Material Assets

73 In terms of **Material Assets - General** – no other projects have been identified which could give rise to significant cumulative impacts on the existing utilities and infrastructure in the area.

74 In terms of **Material Assets – Traffic**, the cumulative impacts associated with the North-South 400 kV Interconnection Development and other developments have been evaluated for potential cumulative traffic impacts. As part of this appraisal, the construction programme, proposed haulage routes and the geographical location of other developments have been considered.

75 In addition to the construction of the North-South 400 kV Interconnection Development and the Tyrone – Cavan Interconnector, North Meath Wind Farm Ltd. propose to construct a windfarm at Emlagh, County Meath. This has also been assessed in relation to cumulative traffic impacts as outlined below:

a) Chapter 13 of the EIS submitted with the windfarm application estimates the daily volume of traffic to be generated by the construction phase of the windfarm development to be 339 No. vehicular trips per day. When combined with construction traffic estimated to be generated during the construction phase of an angle tower (in the worst case scenario) of 46 No. vehicles, this results in a total cumulative generated traffic volume of 385 No. vehicles.

b) For this cumulative impact assessment it has been assumed that the “worst case” scenario will occur, whereby towers for the proposed North-South 400KV Interconnection development will be constructed in the vicinity of Emlagh Wind Farm at the same time as construction of the windfarm turbines. It has also been assumed that construction traffic for both developments will use both the N52 and R162 to access the respective local site access roads.

c) From Table 13.1 of the Emlagh EIS, the N52 has an Annual Average Daily Traffic (AADT) of 3,045 vehicles. The additional 385 No. vehicles would equate to a 12.6% increase in AADT.

d) From Table 13.2 of the Emlagh EIS the R162 has an AADT of 3,724 vehicles. The additional 385 vehicles would equate to a 10.3% increase in AADT.

e) As outlined above, traffic on the road network will increase for the duration of the construction phase. While the percentage increases are slightly above 10%, this is generally reflective of the low number of vehicles generally using these roads. Furthermore, the figures above present the peak additional flow along each road and assume all construction traffic will access both the N52 and R162 and therefore a worst

case scenario. These peak flows would only be occurring for short durations. From a capacity perspective, the road network will be able to cater for the "worst case" cumulative flows predicted.

76 In assessing the cumulative traffic impacts associated with the North-South 400 kV Interconnection Development and other developments, it has been concluded that the potential cumulative traffic impacts are Not Significant.

10.4.9 Cultural Heritage

77 The proposed Emlagh Wind Farm development is to be located within 2km of the proposed OHL development. It is noted that the scale of the wind turbines is much greater than the OHL towers proposed and that they will have an influence over a much greater distance.

78 Should the windfarm development proceed, there will be cumulative impacts on the setting of archaeological and architectural sites in the vicinity, in particular, these include Mountainstown House (RPS No. MH012-100) with its associated demesne landscape (NIAH Garden Survey No. ME-42-N-829790) and Dowdstown House (RPS No. MH011-124) with its associated demesne landscape (NIAH Garden Survey No. ME-42-N-903631).

79 It is acknowledged in this evaluation, that the proposed OHL development crosses the western extent of Mountainstown demesne landscape, where it will have a negative direct, physical impact as well as a moderate impact on the setting of the demesne as a whole. However due to its scale and remove from Mountainstown House, it will only slightly, negatively affect the setting of the house. The proposed turbines, although situated outside the demesne landscape, are located to the north, south and west of the demesne and will have an adverse impact on the setting of the demesne – turbines will be visible to the rear of the house when accessing it along the entrance avenue to the east. The proposed windfarm would result in an adverse cumulative impact on the setting of Mountainstown House and its associated demesne landscape.

80 The proposed North-South 400 kV Interconnection Development passes from north to south approximately 500m to the west of Dowdstown House. The principal view from the front of the house is to the south and there are extensive agricultural buildings to the west of the house between it and the proposed OHL development. The proposed OHL development is expected to have a slight to imperceptible impact on the setting of the house. There are four wind turbines (18, 19, 20 and 21) proposed to the south of Dowdstown at a distance from 550m to 1200m. These would be visible from the house and its surroundings and would result in an adverse cumulative impact on the setting of the house.

81 At the interface between the North-South 400 kV Interconnection Development and the Tyrone – Cavan Interconnector there is the potential for cumulative impacts. An appraisal of archaeological, architectural and cultural heritage sites in the region found no significant cumulative impacts.

82 As both the SONI and EirGrid sections of the proposed interconnector propose a standard programme of archaeological mitigation, cumulative impacts on the previously unrecorded cultural heritage resource will be Not Significant.

10.5 THE PROPOSED INTERCONNECTOR (FROM TURLEENAN TO WOODLAND)

83 In May 2013, the European Commission published *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects*[93]' (the 'EC Transboundary Guidance document'). The aim of the EC Transboundary Guidance document was to build on *"experience and the good practices identified so far"* in the EIA field and to provide a greater clarification of how to approach "*large - scale transboundary projects".* These types of project are defined in the EC Transboundary Guidance document as those which are "physically located in more than one country" (such as the proposed interconnector).

84 The EC Transboundary Guidance document (page 10) further states:

> *"For large - scale transboundary projects, the developer must comply with the requirements of the national EIA requirements of each country in which the project will be implemented. The developer should prepare individual national EIA reports and a* ***joint environmental report that covers the whole project and assesses its overall effects, in particular cumulative and significant adverse transboundary effects***. (Emphasis added).

85 While the EC Transboundary Guidance document (page i) does state that it "*in no way creates any obligation for the Member States or project developers"*, it is considered a useful consolidation of current best practice for projects such as the proposed interconnector.

86 Accordingly, a *Joint Environmental Report* has been prepared by EirGrid and SONI for the entirety of the proposed interconnection development. It is intended as a high-level summary

[93] http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf

document to compliment the EIS and consolidated ES in each jurisdiction. The purpose of the JER is to provide the reader with an overview of impacts and the transboundary issues of the proposed interconnector, taking into account the EC Transboundary Guidance document. The full details of the project are contained in the respective planning applications and accompanying documents, which should be read in conjunction, so that the extensive detail provided in relation to the project can be fully appreciated. The *Joint Environmental Report* comprises **Volume 4** of the application documentation submitted to An Bord Pleanála and is submitted as part of the Consolidated ES Addendum to the Department of the Environment in Northern Ireland. A summary of its findings is set out below.

10.5.1 Human Beings and Socio Economic

87 The EirGrid and SONI proposed interconnector will be a significant capital infrastructure investment in Ireland and Northern Ireland. There will also be an employment benefit arising from required construction workers, which would impact positively on the construction industry. There is also an interrelated positive impact from contractors / construction workers staying in the local area, which will benefit the local hospitality industry. As with the other **population and economic** benefits the cumulative impacts will be additive and possibly synergistic.

88 The context of the relatively small area[94] where direct land take impacts, land restriction impacts (at the base of the towers) and land damage impacts potentially occur, the short term nature of construction impacts and the fact that land utilisation will not change significantly under and adjoining the OHLs, overall, the **land use** impact is imperceptible.

89 For the EirGrid and SONI proposed interconnector, impacts to **tourism** will not be direct as no tourist sites will be physically impacted by the proposed interconnector. Negative impacts are anticipated to be limited to construction impacts of noise and traffic, limited setting impacts at cultural heritage sites, and landscape and visual impacts. Tourism impacts arising as a result of visual and cultural impacts at key tourism sites including the Argory, Navan Fort, the Monaghan Way, Bective Abbey and the Boyne Valley Driving Route will not be significant.

90 For the EirGrid and SONI proposed interconnector, even the maximum EMF levels from the proposed 400 kV line are still below EMF guidelines of both Ireland and Northern Ireland and the EU. Authoritative reviews of scientific research on topics relating EMFs to health of humans

[94] The area of the 583 land parcels along the proposed interconnector alignment is approximately 8,870ha. The area upon which direct impacts occurs (10.5ha + 22.2ha + 124ha + 1.4ha + 14.8ha) is 2% of the total area.

and other species do not show that EMFs at these levels would have adverse effects on these populations.

10.5.2 Flora & Fauna

91 The proposed interconnector will not adversely impact upon populations of European and / or nationally protected habitats / species in both jurisdictions; however, the proposed interconnector does have potential to impact upon local populations of protected fauna. Mitigation measures will be implemented at the construction and operation phase to eliminate or minimise identified impacts. Where impacts are minimised the residual impact is outlined. The level of residual impacts were assessed from an entire project perspective with the highest impact being 'minor negative' to hedgerows / treelines, Wintering birds (Whooper Swans) and Breeding birds (Lapwing). All other impacts are considered negligible.

10.5.3 Soils, Geology and Hydrogeology

92 For the proposed interconnector, it is considered no significant impacts will occur on the geology and groundwater conditions in Ireland or Northern Ireland; accordingly, it is concluded that the proposed interconnector will have no significant transboundary or cumulative impacts on soils, geology and hydrogeology. With regard to the operational phase of the development, no significant impacts on the local hydrogeological environment are predicted. Indeed, any impact on the soils and geology predicted is considered to be imperceptible.

10.5.4 Water

93 The predicted impacts on the water environment as a result of the construction phase of the proposed interconnector is short term and negligible. With regard to the operational phase of the development, no significant impacts on the local water environment are predicted with the implementation of proposed mitigation measures. The predicted impact on the water environment is considered to be long term and imperceptible.

10.5.5 Noise and Vibration

94 For the proposed interconnector it is predicted that the highest noise emissions levels will be that of construction noise at the Turleenan Substation, extension of Woodland Substation and the construction of the OHL. However, these impacts will be short term and of a limited nature. Mitigation measures have been provided to reduce the potential impact from construction noise. Construction and operation of a temporary construction material storage yard located near Carrickmacross, County Monaghan has been assessed and mitigation measures have been

identified and evaluated to reduce the potential noise and vibration impacts. The residual impact for the overall interconnector is not predicted to be significant.

95 Once complete, the operational noise impact of the proposed interconnector will be limited to intermittent corona noise and continuous transformer / plant noise at the two substations. There will be no operational phase vibration impacts to sensitive receptors from the proposed interconnector. All predicted noise levels are below the recommended levels and targets set by the WHO and are thus within acceptable limits with regard to residual impacts for noise and vibration.

96 It is therefore considered that the proposed interconnector will not result in any significant noise and vibration effects.

10.5.6 Air – Climate and Air Quality

97 The proposed interconnector will increase transmission capacity and promote the uptake of renewable energy sources, such as wind, by improving access to the end market, which will have cumulative long-term beneficial greenhouse gas and climate change effects.

98 In terms of dust, no significant impacts are predicted following the implementation of good construction practice, which incorporates the implementation of the identified mitigation measures. Traffic or vehicular emissions will not give rise to significant air quality effects. With the implementation of the identified mitigation measures, no significant local air quality effects are predicted.

10.5.7 Landscape

99 An OHL of the length and nature of the proposed interconnector will inevitably have landscape and visual impacts. However, considerable efforts have been made in the routeing and design processes to avoid or minimise these impacts as much as possible.

100 The route and location of the proposed interconnector was selected based on the results of a number of studies of alternatives which examined the environmental, technical and economic constraints present between various route corridors, line route options, and design details. Landscape and visual impacts were two major environmental constraints that influenced the selection of the preferred route corridor, the line route, and the components of (what became) the proposed interconnector.

101 The alternatives studies were therefore the principal means by which the permanent and operational effects of the OHL and substation have been mitigated by avoidance. Detailed

routeing of the line has sought to achieve the “best fit” with the landscape, using landform and vegetation whilst recognising the technical constraints of the construction and operation of an OHL.

102 The proposed interconnector will be located within an area that is primarily agricultural, consisting of low rolling hills, shallow valleys and structured fields, which often have overgrown hedgerows and many mature trees. After construction, the towers and OHLs would remain as significant visual elements in the landscape.

103 Over time, any vegetation cut back affected by construction works will generally re-grow and any new replacement planting will become established. Clearance of vegetation that could fall on the OHL, general inspections and any repairs will periodically be undertaken, however, the level of activity in the landscape would be greatly reduced following construction.

104 As outlined in the ES, mitigation measures will reduce visual impacts of the proposed Turleenan Substation and would see the embankments, earth bunds and entrance road heavily planted with predominantly native woodland. Over time, as the mitigation landscape matures, views of the substation would be filtered and assimilated back into the local landscape setting.

105 The landscape appraisal indicates that there would be significant adverse impacts upon the landscape of some parts of the assessed area. There would also be significant adverse effects on the visual amenity afforded from many locations from within the immediate area along following the line route. However, notwithstanding these conclusions, it is considered that the landscape and visual resource of the wider assessed area along the proposed interconnector alignment would not be adversely impacted or deteriorate to a significant degree; the overall impact upon landscape and visual amenity in general is therefore restricted to those receptors / areas within close proximity to the towers and OHL.

10.5.8 Material Assets - Traffic

106 The operational stage of the EirGrid and SONI proposed interconnector will generate minimal volumes of traffic. The construction of the North-South 400 kV Interconnection Development could occur at the same time as the Tyrone – Cavan Interconnector. However, due to the geographical location of the two elements and associated haulage routes, there are unlikely to be any significant cumulative traffic impacts arising.

107 Specifically, due to the nature of the proposed interconnector, the construction phase will consist of multiple discrete construction sites. Access to the individual sites will generally be achieved via existing field accesses and existing internal access routes where available.

108 Furthermore, despite the scale of the proposed interconnector, the volumes of vehicles required to attend each individual construction location along the length of the linear development will be relatively low and this traffic will be spread out over several weeks, the duration it will take to construct individual structures. Due to the length of the proposed line, traffic will be dispersed over a large area during the construction phase, notwithstanding the fact that construction will occur in any one location for a relatively short duration.

10.5.9 Cultural Heritage

109 While the proposed interconnector will not have a direct physical impact on the upstanding remains of any known archaeological sites or architectural features, it will have such an effect on a number of demesne landscapes. The impact on one of the demesnes landscapes, Brittas, was found to be significant. A further 4 demesne sites will experience a moderate negative impact in terms of setting. There will be likely significant effects to the setting of a number of features. In summary there will be 24 moderate negative, seven moderate to significant negative and six significant negative impacts to archaeological sites. In additional there will be three moderate negative and one moderate to significant negative impacts to architectural sites. All other sites in the receiving environment will not be affected by the proposed interconnector or will have a slight negative impact.

10.6 EVALUATION OF POTENTIAL CUMULATIVE ENVIRONMENTAL EFFECTS FOR POTENTIAL DEVELOPMENT

110 As set out in **Section 1.2.1**, 'potential' development has been taken to include proposals which have not yet been the subject of a planning application but which the project team is aware of from plans, strategies and / or local knowledge. This includes *inter alia* transmission infrastructure, windfarm and other electricity generation proposals (in particular those subject to Gate 3 connection offers). The cumulative assessment is based on available information.

10.6.1.1 Future Substation in the Vicinity of Kingscourt

111 As noted in **Chapter 2** of this volume of the EIS, the need for the intermediate substation near Kingscourt is not now expected to arise for at least another ten years and is not, therefore, included in this application for development consent, but rather will be the subject of a separate future application for approval (which will itself be the subject of an EIA).

112 However, the future substation is included within the cumulative impact appraisal for the North-South Interconnection 400 kV Development based on the following information:

(1) **Location:** An appropriate location for an intermediate substation, and associate tie-in will be in the vicinity of the point of intersection of the north-south oriented proposed development and the existing east-west oriented Flagford-Louth 220 kV OHL, near Kingscourt, County Cavan. A 5km zone centred on the point of intersection of the North-South 400 kV Interconnection Development and the Flagford-Louth 220 kV OHL which would be the preferred location for a potential future substation is illustrated in **Figure 10.3**. The location would be designed to minimise impact on the amenities and environment of the area.

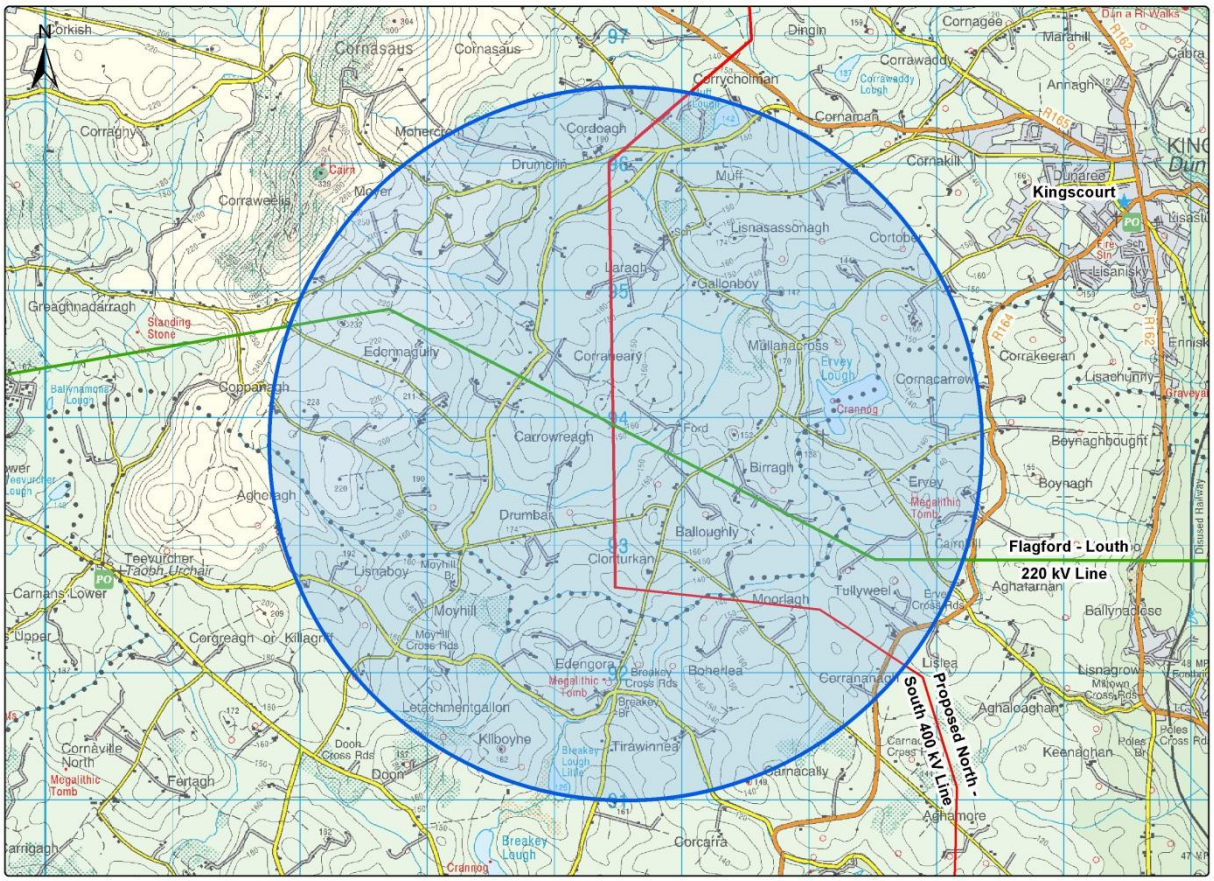

Figure 10.3: Substation Zone (5km)

(2) **Design:** There are two principal types of substation technology available: Air Insulated Switchgear (AIS) and Gas Insulated Switchgear (GIS). Both options have been considered in the cumulative impact assessment. Refer to **Figure 10.4**.

- The approximate site area requirement (footprint) for an AIS substation is in the order of 400m x 400m. AIS switchgear and transformers are usually installed outdoors. A separate control building is also required which houses protection and control equipment associated with the switchgear and other HV equipment.

- A GIS substation uses SF6 gas, which has a higher dielectric strength than air, to provide the insulation for the switchgear. The conductors and switchgear contacts are insulated by pressurised SF6 gas requiring much smaller clearances than those of AIS substations and hence the footprint of a typical GIS substation compound would be approximately 300m x 200m.

Figure 10.4: Typical AIS and GIS Substations

(3) **Tie-ins:** A future substation ideally will connect with both of the North-South 400 kV Interconnection Development and the Flagford-Louth 220 kV OHL. The further away the site the greater the length of circuit required to tie-in the transmission lines to the substation. These circuits could be OHL or underground and will be routed to minimise impact. Both options have been considered in the cumulative impact assessment.

10.6.1.2 Evaluation

113 The substation zone has taken into consideration *inter alia* distance to settlements and avoids Kingscourt town to the north-east. Therefore the development of a future substation within the zone is not anticipated to give rise to additional significant cumulative impacts on human beings in terms of **population & economic** considerations.

114 No major tourist sites will be physically impacted by the proposed North-South 400 kV Interconnection Development and no major tourism sites are located within the substation zone, accordingly no significant visual and cultural cumulative impacts are likely arise from the construction of a future substation. Negative cumulative impacts on **tourism** considerations are anticipated to be limited to construction impacts of noise and traffic, setting impacts at local cultural heritage sites, and localised landscape and visual impacts.

115 The cumulative **land use** impacts arising from the construction of a future substation are likely to be locally significant. The land use at the location of the substation will likely change from agriculture (the dominant land use in this area) to industrial (for both AIS and GIS options). The closer the substation site to the existing OHLs the greater the likelihood of cumulative impacts arising from intensification of substation and OHL infrastructure on directly affected land parcels and on adjoining properties.

116 The design of a future substation (AIS or GIS) will be required to comply with the guidelines developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which form the basis for the European Union's (EU) Recommendation (1999/519/EC) which sets out guidelines for member states on limiting the exposure of the public to **EMFs** in locations where people spend significant time. The EU recommendation is the guideline applicable in Ireland. Development of a site within the substation zone will result in a significant potential impact on the **ecology** in the area of the substation site, but this is unlikely to be significant in terms of the ecological value of the habitats at the site and / or within the wider area. Potential ecological constraints relate to impacts on water quality which can be avoided by appropriate mitigation during construction and operational phases of the proposed development (such as those identified in **Table 11.1)**.

117 The development of a substation and intensification of associated OHL infrastructure in the area may result in cumulative impact on sensitive receptors in the area. Potential impacts will be site-specific however mitigation measures (such as those identified in **Table 11.1**) will be implemented to reduce potential impacts on the **water, soil geology and hydrogeology** environment. The potential for significant cumulative impacts is low.

118 There is potential for cumulative **noise and vibration** effects arising from the future construction of a substation at the point of intersection of the proposed development and the existing Flagford-Louth 220 kV OHL near Kingscourt. The design of the substation will be required to meet noise and vibration limits values and site management mitigation will also be required to meet construction phase noise limits. Therefore, the cumulative impact is not expected to involve any significant noise and vibration impacts.

119 In terms of **air quality**, the proposed development and a future substation represent investment in the transmission grid and these will have positive long term residual impacts on greenhouse gas emissions as they will facilitate further development and connection of renewable energy sources thereby reducing the dependence on fossil fuels with consequent reduction in greenhouse emissions.

120 There is potential for cumulative **landscape and visual** effects arising from the future construction of a substation. The substation zone comprises an area of drumlin landscape with

low intensity agriculture in small fields. The station and associated tie-in masts would be potentially visible from the local road network and particularly from elevated land within the zone. Visual effects will most likely be locally significant after construction, reducing as the screening effects of planting come into effect. The closer the substation to the existing OHLs the greater the likelihood of cumulative visual impacts arising from intensification of substation and OHL infrastructure. The further away the substation from the existing OHLs the greater the length and presence of OHL in the area generally; these impacts would not be evident if the circuits were underground.

121 The landscape effect will depend on the final location of the substation - lower lying locations are likely to have less adverse impact on the character of the drumlin landscape. Site selection will seek to minimise adverse effects on ground contours and existing vegetation.

122 If the AIS option is chosen the visual effects would arise from visible electrical equipment, a building, fencing and screen planting. The GIS option would result in localised visibility of a large new building with associated fencing and screen planting.

123 If an AIS option is chosen the visual characteristics will be more apparent as the majority of electrical equipment will be external and will be more visible; however, the building would not be as tall as that of the GIS option.

124 There is potential for cumulative **traffic** effects arising from the future construction of a substation at the point of intersection of the proposed interconnector and the existing Flagford-Louth 220 kV OHL near Kingscourt. The cumulative traffic effects will depend on the exact location of the substation but will most likely be locally significant both during and after construction, as traffic will predominantly be related to the construction generated traffic of the substation site and the background operational traffic of the North-South 400 kV Interconnection Development.

125 There is potential for cumulative impacts on the setting of **cultural heritage** sites from the future construction of a substation at the point of intersection of the proposed interconnector and the existing Flagford-Louth 220 kV OHL near Kingscourt. The significance of these cumulative impacts will be dependent on the exact location of the substation but will most likely be locally significant after construction, reducing as the screening effects of planting come into effect.

126 With respect to known cultural heritage sites, mitigation by avoidance will be employed, where possible. There would therefore be no cumulative impact on the known cultural heritage resources. Likewise the potential development will provide for a standard programme of

archaeological mitigation similar to the proposed development, cumulative impacts on the previously unrecorded cultural heritage are likely to be Not Significant.

10.6.2 Gate 3 Project Connection Offers

127 The Gate 3 Offer Project refers to the third round of connection offers that are currently being issued to electricity generators under the Group Processing Approach (GPA). The GPA allows for strategic processing of generation applications for grid connection and was introduced by the Commission for Energy Regulation (CER) in 2004. It allows applications to be processed by EirGrid and ESB Networks Ltd in groups or batches known as 'Gates'.

128 Figure 10.5 in **Volume 3B Figures** shows the Gate 3 Offers within 10km of the North-South 400 kV Interconnection Development. The locations refer to the proposed electricity generator substations. The generators listed include turbines, windfarms and biomass facilities. The cumulative impact assessment outlined in this section focuses on the contracted and unprocessed generators (both Gate 3 and non-GPA) not already identified in **Table 10.1**, and is based on the following information:

(1) **Nature of Development:** Turbines**,** windfarms and biomass facilities.

(2) **Scale:**

Windfarm / turbine developments: this includes potential developments with an output of between .06MW – 64MW approximately. The smaller developments include single turbines associated with existing industrial premises; the larger developments comprise windfarms with a number of turbines.[95]

Biogas Facility – this includes a potential development with an output of approximately 0.5MW. These are industrial type facilities usually associated with existing industrial premises.

(3) **Location**: The evaluation focuses on potential Gate 3 developments located within 6km of the proposed interconnector measured from the proposed electricity generator substations. Having regard to distance, the undulating / Drumlin nature of the wider landscape and intervening screening, potential developments located further away are not considered likely to result in significant potential cumulative impacts.

[95] It is noted that a 620MW windfarm Gate 3 application is unprocessed. This application is linked to the UK export market. Given the speculative nature of this particular application without connection offer or planning, it is not considered further in this cumulative impact assessment.

129 A summary of the potential developments within 6km of the proposed North-South 400 kV Interconnection Development is set out in **Table 10.4.**

Table 10.4: Potential Gate 3 Developments

Status	Applicant Name	MEC (MW)	Type	Distance from Proposed Development (to generator substation)
Contracted				
Monaghan	Natural Release Ltd	0.499	Biogas	1km
Monaghan	Tullynamalra (1)	0.5988	Wind	1.2km
Monaghan	Nafferty Hill (1)	2.04	Wind	6.1km
Monaghan	Grove Hill (1) formerly Tullynageer	16.1	Wind	4.3km
Cavan	Kingscourt (1)	18	Wind	1.5km
Unprocessed				
Monaghan	Tullynamalra	1.4012	Wind	1 .2km
Monaghan	Ughtyneil (1)	4	Wind	4.1km
Monaghan	Ughtyneil (2)	10	Wind	3.7km
Meath	Ughtyneill (3)	15	Wind	3.1km
Cavan	Kilberry (1)	30	Wind	3.5km
Cavan	Taghart (1)	64.4	Wind	2.2km

10.6.2.1 Evaluation

130 The identified Gate 3 developments are likely to create positive economic cumulative impacts. However, given the scale and / or distance between the respective potential developments and the proposed North-South 400 kV Interconnection Development, none are likely to give rise to significant adverse cumulative impacts on **population & economic** considerations.

131 In terms of **tourism and amenity**, having regard to the tourism assets identified by Fáilte Ireland relative to the location of the proposed development and the identified Gate 3 developments and the likelihood that tourist sites will not be physically impacted it is considered unlikely that there will be significant cumulative impacts.

132 The cumulative **land use** impacts arising from the construction of Gate 3 projects are likely to be locally significant. The dominant land use in these areas is agricultural and if these projects are progressed there will be local changes from agricultural use to windfarm or intensified industrial use. The land use impacts will generally range from imperceptible to moderate adverse at the sites of windfarms and imperceptible to profound adverse at the site of the biogas facility.

133 The nature of **Electric and Magnetic Fields** (EMF) means that there are unlikely to be cumulative impacts with other developments, as EMF from a particular source dissipates within a relatively short distance. Given the distance between the proposed development and the potential developments, it is not anticipated that significant cumulative impacts would arise.

134 In terms of **ecology**, potential receptors that may be common to the proposed development and the potential developments outlined in **Table 10.3** and Figure 10.5, **Volume 3B Figures** will possibly be Whooper Swans and other birds, protected mammals, habitats of ecological interest and the qualifying interests of the River Boyne and Blackwater cSAC and SPA. Projects will have to identify appropriate mitigation measures for minimising potential impacts to relevant ecological receptors. Mitigation by design and avoidance in the first instance should prevent significant impacts to sensitive ecological receptors in the immediate environs of each potential development e.g. by siting developments in low value habitats and away from watercourses and regular bird flight lines. Further mitigation should include water protection measures (relevant to River Boyne and Blackwater cSAC / SPA) and bird flight diverters for potential OHL connections. Given the scale and nature of these potential projects and the need for planning permission or approval it is likely that once appropriate mitigation measures are applied, no significant residual impacts will be identified to sensitive ecological receptors including protected species such as Whooper Swan. Given the stringent mitigation measures which will be implemented for the proposed North-South 400 kV Interconnection development, it is

considered that no significant cumulative (additional) effects will arise as a result of the proposed development and these potential developments.

135 There are not likely to be significant cumulative impacts predicted to arise as a result of the proposed development in association with the **potential Gate 3** developments on **water, soils, geology and hydrogeology**.

136 The proposed development will not have a significant impact on the Water Framework Directive status of groundwater bodies either short term or long term.

137 The proposed development will not have a significant impact on the WFD status of streams either short term or long term. For the reasons set out in detail in the Natura Impact Statement (NIS) submitted to the Board with the application for planning approval, no adverse effects on the integrity of the River Boyne and Blackwater cSAC / SPA will occur as a result of this proposed North-South 400 kV Interconnection development. Likewise, should the potential developments be successful in eventually being granted planning permission or approval, they will likely have had to meet similar requirements. In conclusion, based on the above, coupled with separation distances particularly in relation to soils and geology, it is considered that no significant cumulative (additional) effects will arise as a result of the proposed North-South 400 kV Interconnection development and these potential developments.

138 Once complete, the operational **noise** impact of the proposed development will be limited to intermittent corona noise and continuous transformer / plant noise at Woodland Substation. There will be no operational phase vibration impacts to sensitive receptors. All predicted noise levels are below the recommended levels and targets set by the WHO and are thus within acceptable limits with regard to residual impacts for noise and vibration. The predicted noise and vibration levels from the potential developments will also likely be below recommended guideline levels and targets set by the WHO. Furthermore, given these developments are at a distance from the proposed development, it is considered that there should not be any significant cumulative noise and vibration effects.

139 In terms of **air quality**, the proposed development and Gate 3 developments will have positive long term residual impacts on greenhouse gas emissions as they facilitate renewable energy sources thereby reducing the dependence on fossil fuels with consequent reduction in greenhouse emissions.

140 There is potential for cumulative **landscape and visual** effects arising from the possible future construction of the Gate 3 proposals as outlined in **Table 10.3** and Figure 10.5, **Volume 3B Figures**. The cumulative landscape and visual effects will depend on the exact location of the proposed developments but will most likely be locally significant for any windfarm with five or

more turbines within 5km of the proposed development. The potential windfarms at Kilberry (30MW; potentially 10-15 turbines; distance of 3.5km) and Ughtyneil (up to 30MW potentially 10-15 turbines; distance of 3.1- 4.1km) and Taghart (64.4MW potentially 20-30 turbines; distance of 2.2km) are examples of such developments. The highest impacts would occur where the viewer is located within 1km of the transmission line with views of both towers and turbines. The cumulative landscape and visual effects of the proposed development and potential windfarms further removed from the proposed development will reduce due to the increased distance, intervening topography and natural screening.

141 Given the distance between the proposed development and the Gate 3 developments outlined in **Table 10.3** and Figure 10.5, **Volume 3B Figures** there are unlikely to be any significant cumulative impacts on the **material assets - general** such as rail infrastructure, gas networks, airfields etc.

142 There is potential for cumulative **traffic** impacts arising from the possible future construction of the Gate 3 developments outlined in **Table 10.3** and Figure 10.5, **Volume 3B Figures 5**. For these projects, traffic on the road network will increase for the duration of the relevant respective construction phases. For the proposed North-South 400 kV Interconnection development, it is assumed that all construction traffic will access both the N52 and R162 resulting in percentage increases slightly above 10%. These percentage increases are reflective of the low number of vehicles generally using these roads. Furthermore, the percentage increases above present the peak additional flow along each road, and therefore is a worst case scenario. These peak flows would only be occurring for short durations. Similar scenarios are likely to apply for the potential developments. However, as these potential developments are somewhat removed from the proposed development, the resultant traffic is therefore unlikely to impact on the same junctions at the same time, coupled with the fact that the traffic associated with the proposed development is itself insignificant, it is unlikely that the traffic generated will have a significant cumulative effect on the road network. From a capacity perspective, the road network should therefore be able to cater for the “worst case” cumulative flows predicted and cumulative effects are not likely to be significant.

143 There is potential for cumulative impacts on the setting of **cultural heritage** sites arising from the possible future construction of the Gate 3 developments. These cumulative impacts on the setting of cultural heritage sites will depend on the exact location of the proposed developments but will most likely be locally significant for any windfarm with 5 or more turbines within 5km of the proposed development. The potential windfarms at Kilberry (30MW; potentially 10-15 turbines; distance of 3.5km), Ughtyneil (30MW potentially 10-15 turbines; distance of 3.1km-4.1km) and Taghart (64.4MW potentially 20-30 turbines; distance of 2.2km) are examples of such developments. The potential cumulative impacts of the proposed development and potential windfarms further removed from the proposed development will reduce due to the increased distance, intervening topography and natural screening. With respect to known cultural heritage resource, should the potential developments accord with the philosophy of mitigation by avoidance, then there should be no potential direct cumulative impact. Likewise should the potential developments provide for a standard programme of archaeological mitigation similar to the proposed development, cumulative impacts on the previously unrecorded cultural heritage are not likely to be significant.

10.7 IMPACT INTERACTIONS

10.7.1 Methodology

144 The European Commission's *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (EC, 1999) refer to the following in its consideration of interactive impacts:

- **"*Impact Interactions:*** *The interactions between impacts whether between the impacts of just one project or between the impacts of other projects in the area, for example:*
    - *A chemical plant producing two streams of waste that are individually acceptable but react in combination producing highly significant levels of pollution;*
    - *Emissions to air from one project reacting with emissions from an existing development; and*
    - *Two major developments being constructed adjacent to one another and during overlapping time periods will have many interactive impacts, from land use issues to construction and operational noise."*

145 For this EIS the methodology and approach is informed by the 1999 EU *Guidelines for the Assessment of Indirect and Cumulative Impacts* and reference was also made to 2002 and 2003 EPA guidance documents.

146 **Table 10.2** shows a matrix of significant interactions likely to occur between potential impacts arising from the proposed development. The boxes marked in **Table 10.5** indicate that a potential relationship exists between any two environmental issues associated with the proposed electricity transmission development. The level of interaction between the various topics will vary greatly; however, the table allows the interactions to be recognised and developed further, where necessary. Summary details on each of the interactions anticipated are provided in **Table 10.6.**

Table 10.5: Overview of Potential Interactions / Interrelationships

		Human Beings				Flora and Fauna	Soils, Geology and Hydrogeology	Water	Air		Landscape	Material Assets		Cultural Heritage
		Population & Economic	Land Use	Tourism & Amenity	EMF				Noise & Vibration	Climate & Air Quality		General	Traffic	
Human Beings	Population & Economic			✓					✓		✓			
	Land Use					✓	✓	✓	✓					
	Tourism & Amenity	✓									✓			✓
	EMF	✓				✓								
Flora and Fauna			✓				✓	✓			✓			
Soils, Geology and Hydrogeology						✓		✓						
Water						✓	✓							
Air	Noise & Vibration	✓											✓	
	Climate & Air Quality												✓	
Landscape		✓				✓	✓	✓	✓			✓		✓
Material Assets - General						✓					✓			
Material Assets - Traffic						✓		✓	✓	✓	✓			✓
Cultural Heritage				✓		✓			✓		✓			

147 The following are the interactions anticipated from the proposed development.

Table 10.6: Summary of Potential Interactions / Interrelationships

Subject	Interaction With-	Interactions / Interrelationships
Human Beings – Population & Economic	Tourism and Amenity	There may be a slight reduction in tourism spend and associated economic activity in the immediate areas where the proposed development will be located.
	Landscape	There is a negative impact which arises from the visual impacts, where dwellings are located in close proximity to the proposed development.
	Air – Noise & Vibration	There is the potential for noise impact to Human Beings in the form of impact to sensitive receptors such as private dwellings etc. in the construction phase and the operational phase. In the operational phase corona noise has the potential to cause noise impact during inclement weather conditions. These impacts are addressed in the EIS and are not deemed to be significant.
Human Beings – Land Use	Flora & Fauna	Many farmers participate in Environmental Schemes funded by the Department of Agriculture, Food and the Marine, for example the Agricultural Environmental Options Scheme (AEOS) and Green Low-Carbon Agri-Environmental Scheme (GLAS). Environmental Options such as Species Rich Grass, Traditional Hay Meadows and Tree Planting may be affected by the placement of the OHLs and the towers. Therefore there is a potential impact on biodiversity on farms. In addition, if trees are cleared in the vicinity of OHLs there is a potential impact on shelter. Overall, the impact from the proposed development on the biodiversity on farms and the availability of shelter is imperceptible.
	Soils, Geology and Hydrogeology	Soil quality will be affected by the construction works and there is a potential effect on land drainage. Both of these consequences of construction will have a negative impact on crop growth. With effective implementation of the mitigation measures recommended the overall impact is assessed to be negligible.

Subject	Interaction With-	Interactions / Interrelationships
	Water	During construction there is a potential effect on water quality due to surface runoff and this could impact on water sources for livestock. With effective implementation of the mitigation measures recommended this impact is negligible.
	Air – Noise & Vibration	During the construction and operational periods noise may impact on livestock. Maintenance works and helicopter inspections will cause noise that may have an effect on livestock. With effective implementation of the mitigation measures recommended this impact is imperceptible.
	Air Quality & Climate	Dust may be generated at construction sites and along access tracks which may affect quality of crops.
Human Beings – Tourism and Amenity	Landscape	The OHL will be visible from some short sections of the Monaghan Way and the Boyne Valley Driving Route. This may be perceived as reducing the attractiveness of these areas for tourism and amenity purposes.
	Cultural Heritage	The OHL will be visible from specific areas within Bective Abbey. This may be perceived as reducing the attractiveness of this location for tourism and amenity purposes.
	Population & Economic	There may be a slight reduction in tourism spend and associated economic activity in the immediate areas where the proposed development will be located.
Human Beings – EMF	Human Beings - Population & Economic	There is a potential for interactions with human beings. However, the operating conditions for the proposed 400 kV line will ensure that EMF will remain below EMF guidelines for Ireland and the EU. A survey 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. Refer to Chapter 8, of this Volume of the EIS.

Subject	Interaction With-	Interactions / Interrelationships
	Flora & Fauna	There is potential for interactions from EMF with flora and fauna. The types of interactions that can occur and the related research and scientific studies are detailed in **Chapter 8** of this volume of the EIS. Research accumulated over the past 40 years on plants and animals exposed to ELF EMF from transmission lines and research conducted in the laboratory does not confirm any harmful effects of EMF on the health, behaviour, productivity, or reproductive potential of plants and animals.
Flora & Fauna	Soils, Geology and Hydrogeology	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 put 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 a key consideration relevant to downstream aquatic species and habitats and suitable mitigation controls are detailed, the implementation of which will ensure that there are no significant effects. Construction works will not be undertaken within wetland sites and no significant impacts on the eco-hydrology of wetlands are foreseen.
	Water	Any impacts on surface or ground water quality could impact on water dependent habitats and species that occur within the study area. In this regard effective implementation of the mitigation measures recommended is detailed to protect water quality which will protect such water dependent ecological receptors.

Subject	Interaction With-	Interactions / Interrelationships
	Human Beings - Land Use	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. This will be of local ecology gain in particular for seed eating bird species such as Yellowhammer (red listed species of high conservation concern).
	Landscape	Interrelationships between ecological impacts and landscape have been identified in the case where the removal or trimming of wooded features (including woodlands, hedgerows and treelines) may have adverse effects on both ecology and landscape. 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, to mitigate potential impacts on birds in flight, may also increase the visual impact of the alignment at specific location.
	Traffic	Flora and Fauna due to the removal of vegetation at access locations to accommodate vehicular access to construction sites.

Subject	Interaction With-	Interactions / Interrelationships
Soils, Geology and Hydrogeology	Water, and Flora and Fauna	Soils and geology has an important inter-relationship with the water and ecology environment, as a determinant of water chemistry, river flow regimes, water storage capacity and watercourse location. It also has a potential impact on water quality through the ability of bedrock and surface deposits to filter potential pollutants. Potential ecological impacts could occur through the mishandling of soils or through the deposition of excavated soils in ecologically sensitive areas. These potential impacts have been identified and mitigations suggested in Section 7.5 and Section 7.6, Chapter 7 Soils and Geology of **Volumes 3C** and **3D** of the EIS. An evaluation was undertaken based on the identification of potential sources, pathways and receptors along the line route. If all three elements (source, pathway and receptor) are present, there is a linkage and there is a potential impact to the receptor(s). In terms of surface water and ecology, a groundwater dependent terrestrial ecosystem (GWDTE) - the Boyne and the Blackwater cSAC is oversailed by the line route, however, no towers are located in any cSAC or SPA in County Meath. The proposed development will not have any adverse effect on the integrity of this cSAC. Moreover, no significant predicted impacts are likely to occur as part of this development. In terms of surface water and ecology in the CMSA, there are no cSACs or groundwater dependent terrestrial ecosystems (GWDTE) in close proximity to the line route.
	Traffic	Soils due to the excavations associated with construction.

Subject	Interaction With-	Interactions / Interrelationships
Water	Soils, Geology and Hydrogeology and Flora & Fauna	Water has an important inter-relationship with the soils and ecological environment, as a determinant of water chemistry, river flow regimes, water storage capacity and watercourse location. It also has a potential impact on water quality through the ability of bedrock and surface deposits to filter potential pollutants. Potential ecological impacts could occur through the mishandling of soils or through the deposition of excavated soils in ecologically sensitive areas. These potential impacts have been identified and mitigations in Chapter 6 Flora and Fauna of **Volumes 3C** and **3D**, and Chapter 7 Soils and Geology of **Volumes 3C** and **3D**, of the EIS. This chapter should be read in conjunction with **Chapter 6** Description of Development and **Chapter 7** Construction, of this volume of the EIS. An evaluation was undertaken based on the identification of potential sources pathways and receptors along the line route. If all three elements (source, pathway and receptor) are present, there is a linkage and there is a potential impact to the receptor(s). In terms of water, in counties Monaghan and Cavan there are no cSACs or groundwater dependent terrestrial ecosystems (GWDTE) in close proximity to the line route. In terms of water in Meath, the Boyne and Blackwater cSAC and groundwater dependent terrestrial ecosystems (GWDTE) are oversailed by the conductors in two locations. No significant predicted impacts are likely to occur as part of this development at the crossing locations or at towers adjacent to the cSAC. Moreover, the proposed development will not have any adverse effect on the integrity of this cSAC or any other European site. In counties Monaghan and Cavan, a number of non-designated ecological sites (wetlands) of varying value that occur in proximity to the alignment have been identified during the desktop studies. Only those sites within 1km of the alignment were considered due to their non-designated status (of lower importance than designated sites listed above) and the essentially non-destructive nature of works associated with the proposed OHL. The predicted impact is negligible.

Subject	Interaction With-	Interactions / Interrelationships
Air – Noise & Vibration	Material Assets - Traffic	In terms of traffic, during the construction phase, the noise and vibration impacts will be predominantly associated with the road traffic impacts. These potential impacts have been addressed in Chapter 9 Noise and Vibration of **Volumes 3C** and **3D** of the EIS. No significant noise and vibration impacts are predicted
	Human Beings	There is the potential for noise impact to Human Beings in the form of impact to sensitive receptors such as private dwellings etc. in the construction phase and the operational phase. In the operational phase corona noise has the potential to cause noise impact during inclement weather conditions. These impacts are addressed in the EIS and are not deemed to be significant.
Air – Climate and Quality	Material Assets - Traffic	During the construction phase, air and climate impacts will be associated with the construction activities of the project and road traffic impacts. Traffic emissions themselves will not give rise to significant air quality effects from vehicular emissions. With the implementation of mitigation measures no significant local air quality effects are predicted.
Landscape	Cultural Heritage	The proposed development will form a new feature in the environment and potentially affect the setting of certain sites which are of archaeological, architectural and cultural heritage importance, some of which will be prominent landscape features and may contain important views or prospects. These include Bective Abbey, Teltown, Brittas Estate and the Fair of Muff. It will also potentially affect the perception of the time depth of the wider landscape character.

Subject	Interaction With-	Interactions / Interrelationships
	Human Beings	There is a negative impact on population which arises from the visual impact, where dwellings are located in close proximity to the proposed development with no intervening vegetation or topography The tourism industry often relies on the character of landscape and new development can affect landscape character. Therefore, the proposed development could potentially affect a visitor experience if: • a particular tourist destination is affected to a degree that a sensitive aspect of the landscape character is significantly changed, • if the general landscape character is changed in such a way as to alter characteristics that are promoted by the tourist industry, • if the proposed development adversely affects an appreciation of the landscape's time depth. The OHL will be visible from some short sections of the Boyne Valley Driving Route, from Bective Bridge and within and the Blackwater Valley. This may be perceived as reducing the attractiveness of these areas for tourism and amenity purposes, although the adverse effects are localised.
	Flora and Fauna	The proposed development can impact on vegetation and habitat at construction and operational stages and therefore on landscape character and visual amenity in the immediate vicinity of the proposed development. This can include removal or trimming of trees and hedgerows and soil compaction. The highest impacts occur where mature trees or woodland are located within the safety clearance distances along the alignment. Swan flight diverters increase the discernibility of the earth wires and conductors at close distance.
	Noise and Vibration	Noise from high voltage OHLs can impact on landscape character in the immediate vicinity of the proposed development.
	Water	Changes to drainage patterns can impact on landscape character.

Subject	Interaction With-	Interactions / Interrelationships
	Soils, Geology and Hydrogeology	Changes to soils and geology can impact on landscape character. This is most likely at construction stage where soil compaction and changes to ground profile can occur.
	Material Assets General	Aviation markers increase the discernibility of the OHL conductor at close distances.
	Material Assets – Traffic	Landscape due to the laying of temporary access tracks (where required).
Material Assets - General	Landscape & Flora and Fauna	The use of aviation marker spheres on the line between Towers 355 and 357 may increase the visual impact of the alignment, refer to Chapter 11 Landscape of **Volume 3D** of the EIS. This location corresponds with one of the most sensitive locations identified along the alignment of the proposed development, where towers are visible from Bective Bridge looking along the River Boyne. The use of aviation marker spheres on the line between Towers 355 and 357 will negate the need for swan diverters on this section of the OHL, refer to Chapter 6 Flora and Fauna, of **Volume 3D** of the EIS.
Material Assets - Traffic	Air – Noise & Vibration	In addition to the impact on the road network, road vehicles also have an associated impact on other environmental factors such as air pollution, dust generation, noise and vibration. During the operational phase this will be minimal due to the low volumes of traffic that will be generated, however, during the construction phase these impacts, although temporary in nature, will prove more significant. Traffic has also the potential to impact on several other environmental factors dependent on circumstances. This likelihood for such impacts would increase when vehicles leave the public road network. These potential
	Air – Climate & Air Quality	
	Landscape	
	Cultural Heritage	
	Flora & Fauna	
	Water	

Subject	Interaction With-	Interactions / Interrelationships
		impacts traffic may indirectly cause are as follows: • Landscape due to the laying of temporary access tracks (where required); • Cultural heritage due to potential damage due to vibrations caused by heavy vehicles operating near cultural heritage sites; • Flora and Fauna due to the removal of vegetation at access locations to accommodate vehicular access to construction sites; • Water quality due to potential fuel or fluid leaks reaching groundwater.
Cultural Heritage	Landscape	The proposed development will form a new feature in the environment and impact visually on sites which are of archaeological, architectural and cultural heritage importance, some of which will be prominent landscape features and may contain important views or prospects.
	Human Beings - Tourism	Some of the more prominent archaeological, architectural or cultural heritage sites, structures, monuments or features may also be tourist attractions. The proposed development may be perceived as reducing the attractiveness of certain of these sites by having an impact on their setting.
	Flora and Fauna	The proposed development may impact on demesne boundaries or planted landscape features within a demesne resulting in the removal of vegetation. This may also be perceived as reducing the attractiveness of these sites by having an impact on their setting.
	Noise and Vibration	Noise from high voltage OHLs can impact on the setting of archaeological, architectural or cultural heritage sites, structures, monuments or features. This may be perceived as reducing the attractiveness of the setting of these sites. It is noted that Chapter 9 of **Volumes 3C** and **3D** of the EIS concludes that it is not expected that noise arising will cause annoyance.
	Material Assets - Traffic	Vibrations caused by heavy vehicles operating near cultural heritage sites have the potential to cause damage to these sites.

10.8 CONCLUSIONS

148 The assessment chapters in the *Joint Environmental Report* (**Volume 4** of the application documentation) contain assessments of the likely significant interacting effects arising from the overall EirGrid and SONI proposed interconnector. During the assessment process, coordination took place between assessment specialists to ensure that interacting impacts arising from the proposed interconnector were identified, assessed and, where appropriate, mitigated. There is potential for localised cumulative effects on particular receptors / sources in respect of landscape and cultural heritage; however this is predicted to be Not Significant. There will be separate significant localised landscape and cultural heritage cumulative impacts with the proposed interconnector and proposed and potential windfarm developments and the future Kingscourt Substation.

149 In conclusion in respect of the proposed North-South 400 kV Interconnection Development, likely significant localised cumulative effects on particular receptors / sources are predicted to arise in respect of landscape and cultural heritage as a result of the proposed development in combination with other developments (including those which have not yet been constructed).

150 In addition, while there is potential for the impacts described to interact, it is unlikely, as a result of the mitigation measures proposed, that any of these interactions will result in significant additional impacts that are not already anticipated by each environmental topic.