6 DESCRIPTION OF DEVELOPMENT – TRANSMISSION CIRCUIT AND SUBSTATION WORKS

6.1 INTRODUCTION

1 This chapter provides a description, on a section by section basis, of the entire line route for the proposed development – that is, that portion of the proposed interconnector extending from the jurisdictional border with Northern Ireland to, and including within, Woodland 400 kV Substation, County Meath. The proposed line route is described using townlands and tower numbers as a guideline (refer to **Section 6.2** and **Figures 6.1** to **6.21**). This chapter also provides an overview of the project elements, including the overhead line (OHL) design, the towers and works to the existing Woodland Substation.

2 The principal construction works proposed as part of the development are set out in **Chapter 7** of this volume of the EIS. In this regard, associated and ancillary works and other considerations for the purpose of this EIS includes:

- A temporary construction material storage yard at Monaltyduff and Monaltybane, Carrickmacross, County Monaghan comprising *inter alia* associated site works, new site entrance onto the L4700 Local Road, 2.6m high boundary palisade fencing (with noise barrier affixed) and associated ancillary staff facilities and parking; and
- All associated and ancillary development works including permanent and temporary construction and excavation works.

3 **Chapter 7** of this volume of the EIS also describes the construction techniques and equipment which will be used on the proposed development.

6.2 DESCRIPTION OF LINE ROUTE

4 As described in **Chapter 5** of this volume of the EIS, for ease of reference and local identification, the proposed transmission circuit is presented in two sections. These are the Cavan Monaghan Study Area (CMSA) and the Meath Study Area (MSA).

5 The proposed line route is described on a section by section basis using townlands and tower numbers. Each section is described in the text and supported by a corresponding figure. This figure is intended to illustrate where the line changes direction within that particular section - accordingly only angle towers are identified. The line route is also illustrated on a series of A1 aerial maps (contained in **Volume 3B Figures,** of the EIS). These detailed maps show the

location of all towers (intermediate, angle and transposition) in addition to many of the constraints which the proposed line seeks to avoid.

6.2.1 CMSA – New 400 kV Line

6 The proposed development in the CMSA comprises a single circuit 400 kV overhead transmission circuit supported by 134 towers (Tower 103 to Tower 236) extending generally southwards from the jurisdictional border with Northern Ireland (between the townland of Doohat or Crossreagh, County Armagh, and the townland of Lemgare, County Monaghan) to the townland of Clonturkan, County Cavan for a distance of approximately 46km. It includes lands traversed by the conductor from the jurisdictional border to Tower 103 and from Tower 103 to Tower 236 inclusive and lands traversed by the conductor strung from Tower 236 to Tower 237 (the first tower on the MSA section of the proposed development).[74] It also includes modifications to existing 110 kV transmission overhead lines (OHLs), and all associated and ancillary development works including permanent and temporary construction and excavation works.

7 The line route has been chosen to minimise environmental impacts as detailed in **Chapter 5** of this volume of the EIS.

8 The border crossing detail is illustrated in **Figure 6.1**. Tower 102 is located in Northern Ireland in the townland of Doohat or Crossreagh in County Armagh and the alignment travels along the lower contours of the landscape in a south-easterly direction in the townland of Lemgare, County Monaghan.

9 There is a slight deviation to the line route at Tower 105 in the townland of Lemgare in County Monaghan. From this location the alignment oversails the jurisdictional border in the townland of Crossbane, County Armagh in order to avoid an existing house.

[74] Between Tower 106 and Tower 107 the proposed transmission line crosses the jurisdictional border with Northern Ireland at two points - from the townland of Lemgare, County Monaghan into the townland of Crossbane, County Armagh and back into the townland of Lemgare, County Monaghan. This results in a section of the span between Tower 106 and Tower 107 oversailing Northern Ireland. The oversail section forms part of the SONI proposal.

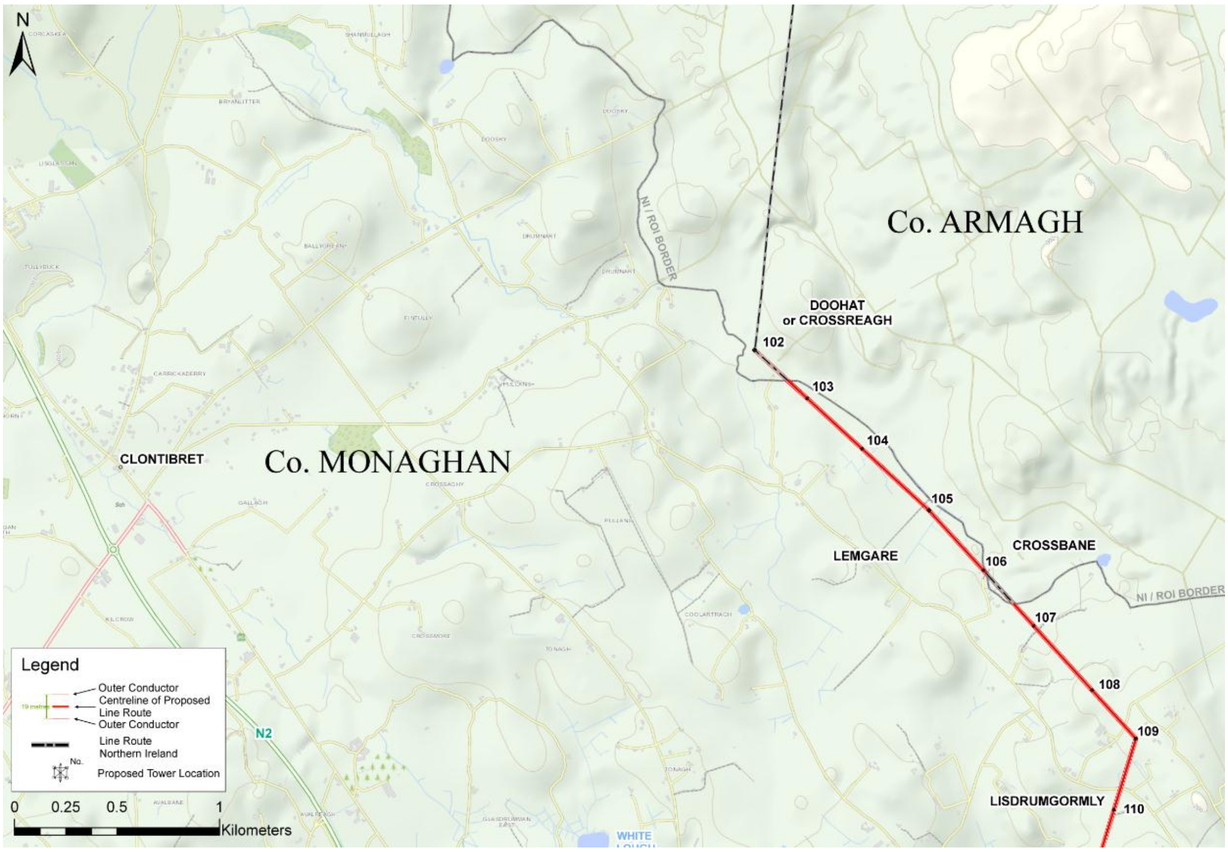


Figure 6.1: Border Detail

[This map is also provided in A3 format in **Volume 3B Figures**]

10 The CMSA section of the overall circuit is presented in **Figure 6.2**.

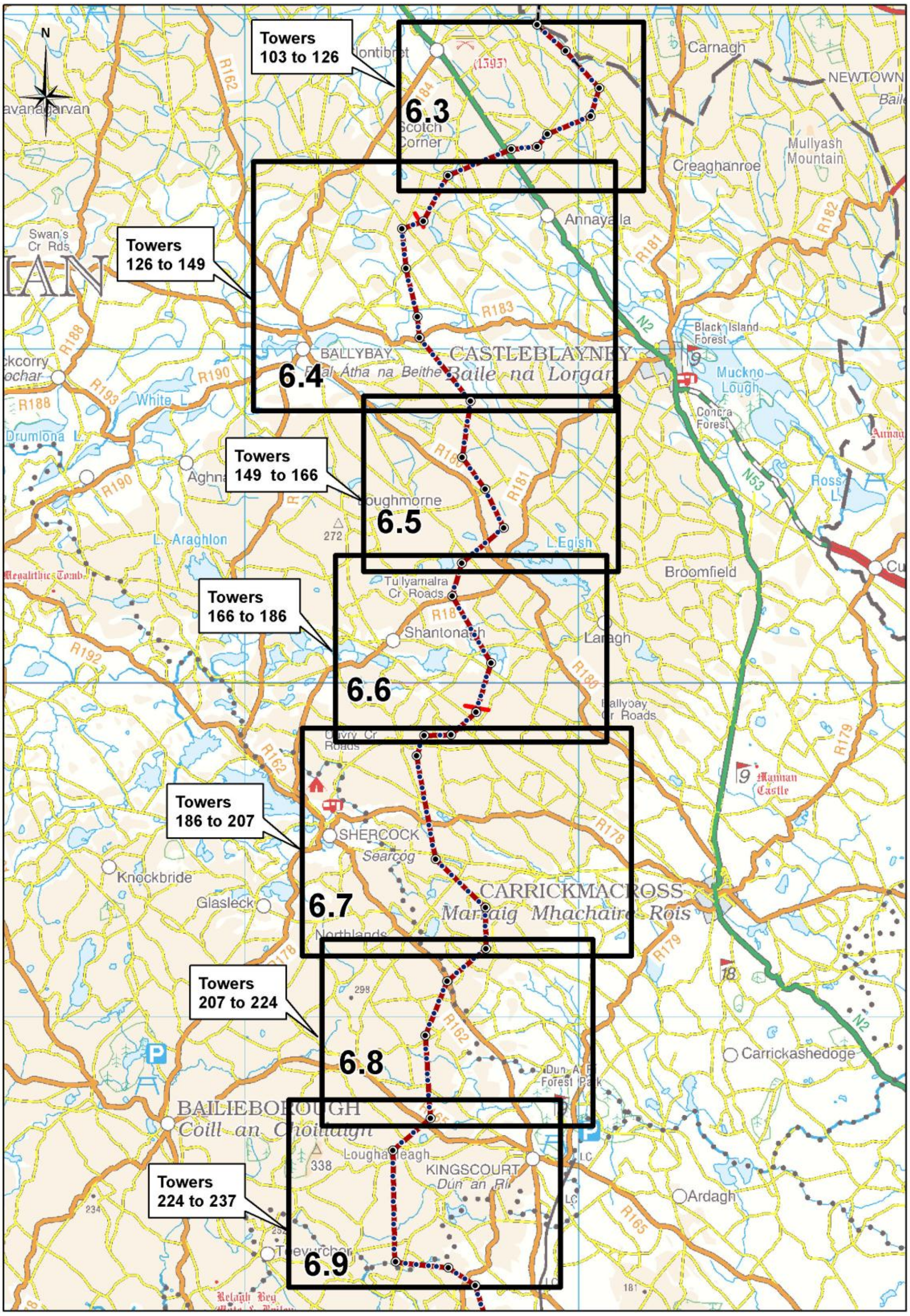


Figure 6.2: CMSA Section of Transmission Circuit

Lemgare to Cornamucklagh North Towers 103 to 126

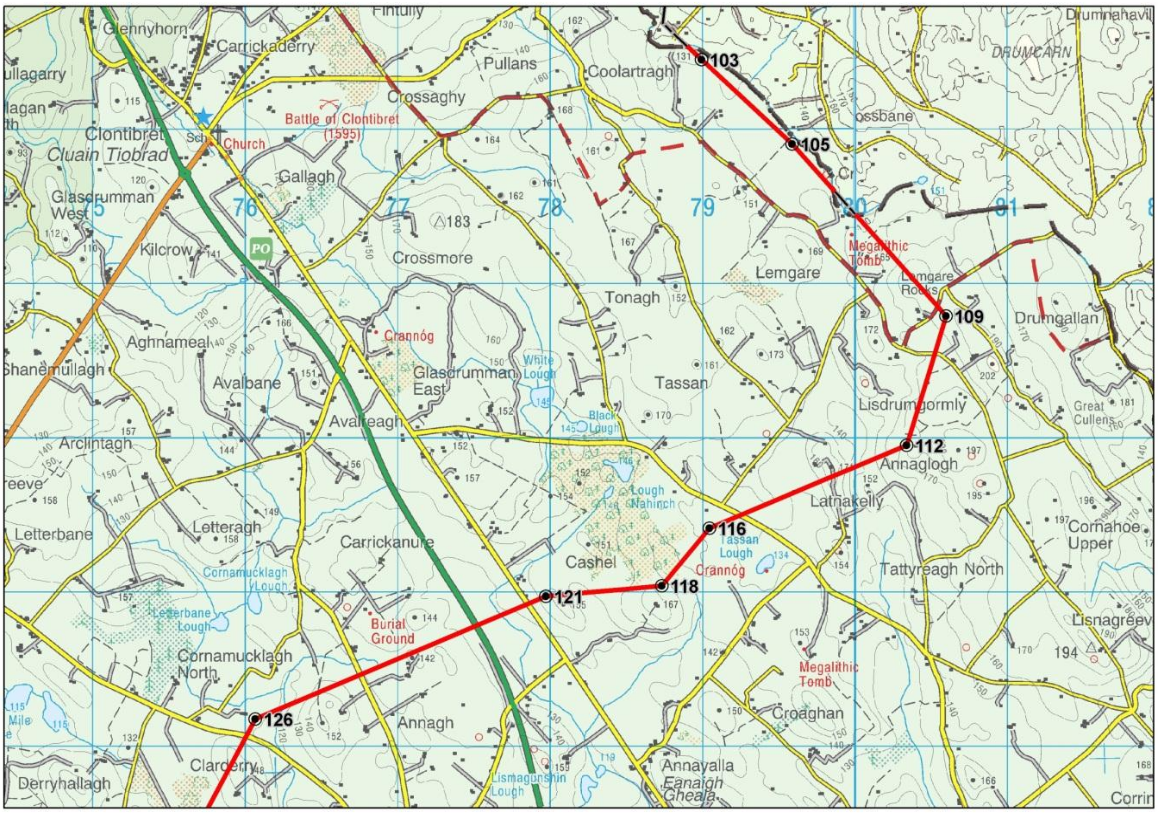


Figure 6.3: Towers 103 to 126

11 As mentioned above Tower 102 is located in Northern Ireland in the townland of Doohat or Crossreagh in County Armagh and the alignment travels along the lower contours of the landscape in a south-easterly direction in the townland of Lemgare, County Monaghan. Again, as referred to above there is a slight deviation to the line route at Tower 105 in the townland of Lemgare. From this location the alignment oversails the jurisdictional border in the townland of Crossbane, County Armagh in order to avoid an existing house. The alignment in the aforementioned section is routed in a valley which straddles the two jurisdictions.

12 At Tower 109, in the townland of Lisdrumgormly, County Monaghan, the line route deviates in a more south-westerly direction crossing a minor road on its way. At Tower 112, in the townland of Annaglogh, County Monaghan, the line route diverts further to the south-west to avoid Tassan Lough to the south. Between towers 116 and 121, the line route 'dog-legs' to the south in order to avoid the Cashel Bog complex. Straight 118 to 121 was chosen as the preferred location for the transposition alignment as it can be facilitated here without incurring any additional impact on the environment (over and above that which would occur if a standard configuration was proposed here) and there is also limited housing in the immediate area (see **Section 5.4.2.2**). Thereafter, the alignment reverts to a south westerly direction and traverses

to Tower 126, in the townland of Cornamucklagh North, County Monaghan, in order to avoid, both ribbon development extending from Cremartin, as well as the general site of the battle of Clontibret to the north.

Cornamucklagh North to Drumguillew Lower Towers 126 to 149

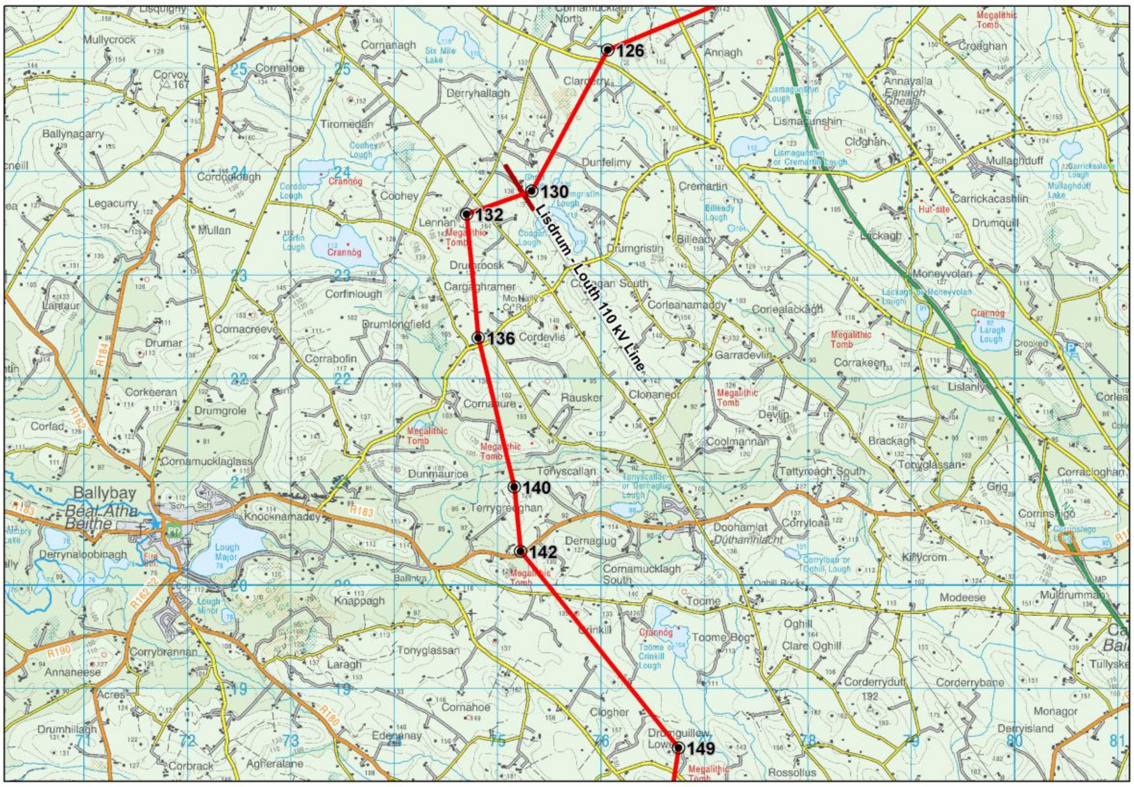


Figure 6.4: Towers 126 to 149

13 From Tower 126, in the townland of Cornamucklagh North to Tower 130, in the townland of Drumroosk the alignment travels in a south-westerly direction in order to avoid cutover bog at Clarderry and Derryhallagh (Monaghan By). The alignment is also routed in this location so as to avoid a drumlin at Derryhallagh and the lakes to the west and south of the line route. At Tower 130, the alignment turns further to the south-west, and crosses the existing Lisdrum-Louth 110 kV line. At Tower 132 in the townland of Drumroosk, the alignment turns in a southerly direction to meet up with Tower 136 in the townland of Cornanure (Monaghan By). Once again, thereafter, the alignment deviates to the south-east and again slightly deviates south at Tower 140 in the townland of Terrygreeghan in order to facilitate a house planning permission in the townland of Terrygreeghan. At Tower 142, also in the townland of Terrygreeghan, the alignment deviates south-east and traverses the main R183 Castleblayney–Ballybay road, approximately 1.5km west of Doohamlet. The alignment is routed in this area in order to avoid the villages of Doohamlet and Ballybay, and to avoid close proximity to the church at Ballintra. The alignment minimises the number of road crossings within the area, and

is located at what is considered to be an appropriate distance from Lough Major, which is located to the east of Ballybay. The alignment then traverses a local road in a south-easterly direction to Tower 149 in the townland of Drumguillew Lower.

14 The alignment between Tower 142 and Tower 149 traverses a valley and avoids a ridge line which follows the direction of the road to the west of the line route. The alignment route within this section avoids the wetland complex at Crinkill, as well as some fragments of mixed woodland located either side of the route.

Drumguillew Lower to Aghmakerr Towers 149 to 166

Figure 6.5: Towers 149 to 166

15 At Tower 149 in the townland of Drumguillew Lower, the alignment follows in a southerly direction, crossing two minor roads. The alignment in this section is routed to avoid ribbon development that occurs along a minor road to the east of line straight 149 to 154. The alignment maintains a distance from Drumhowan GAA pitch and a megalithic tomb located to the east of the line route. At Tower 154, in the townland of Greagh (Cremorne By), the alignment deviates in a south-easterly direction, crossing a minor road where ribbon development occurs. The alignment deviates slightly at Tower 157, in the townland of Greagh (Cremorne By) and joins up with Tower 161 in the townland of Cooltrimegish, in order to avoid cutover bog in the townland of Brackly (Cremorne By). The line in this section is also routed so

as to avoid ribbon development which occurs on the main R180 from Lough Egish, and also to avoid the scenic route north of Lough Egish. The line route follows this alignment in order to avoid high ground at Lisduff, Tossy and Brackly (Cremorne By). At Tower 161 in the townland of Cooltrimegish, the alignment route turns in a south-westerly direction to cross the R180 Carrickmacross–Ballybay road and a minor road, thereby avoiding ribbon development, and continues to Tower 166 in the townland of Aghmakerr.

Aghmakerr to Sreenty Towers 166 to 186

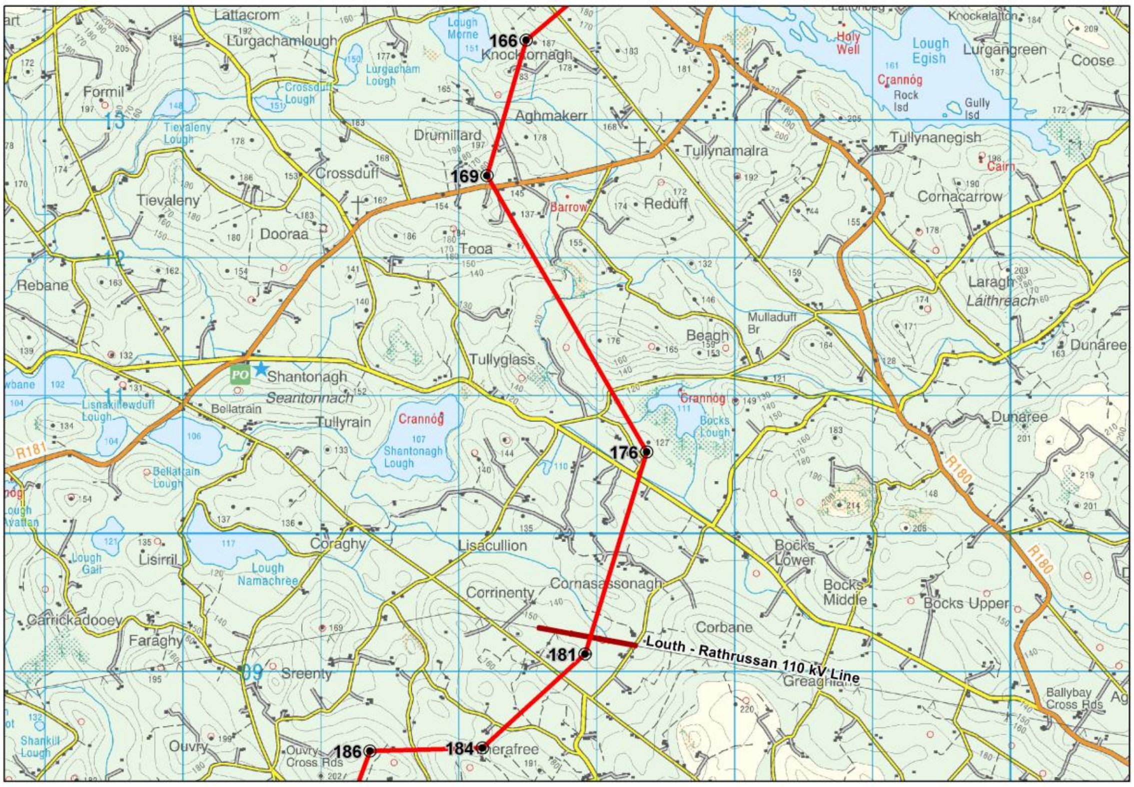


Figure 6.6: Towers 166 to 186

16 At Tower 166 in the townland of Aghmakerr, the alignment turns south-west (crossing a minor road) and then deviates south-east at Tower 169 in the townland of Drumillard (Cremorne By) in order to cross the R181 Shercock to Lough Egish road. The alignment avoids the church at Lough Egish to the east and the houses located along the R181. The alignment continues through the townlands of Tullyglass and Tooa in order to avoid a scenic route located 1.5km to the east of Shantonagh. The alignment crosses a minor road within this section and is routed in order to avoid the scenic route, Shantonagh Lough, and Bock’s Lough.

17 At Tower 176, in the townland of Tullyglass the alignment turns south-west in order to avoid Bock's Lough, a wetland woodland complex of high local value. The alignment has been designed in this location in order to obtain an optimum crossing of the existing Louth–Rathrussan 110 kV line and to circumvent the lakes to the east and west of Shantonagh Lough. The line route crosses the existing 110 kV line in that location in order to avoid the ribbon development located along the minor road to the north-west. At Tower 181 in the townland of Corrinenty the line route turns south-west and then west at Tower 184 in the townland of Ummerafree to meet up with Tower 186 in the townland of Sreenty. The alignment crosses a number of minor roads in this section and is routed to avoid ribbon development to the south.

Sreenty to Scalkill Towers 186 to 207

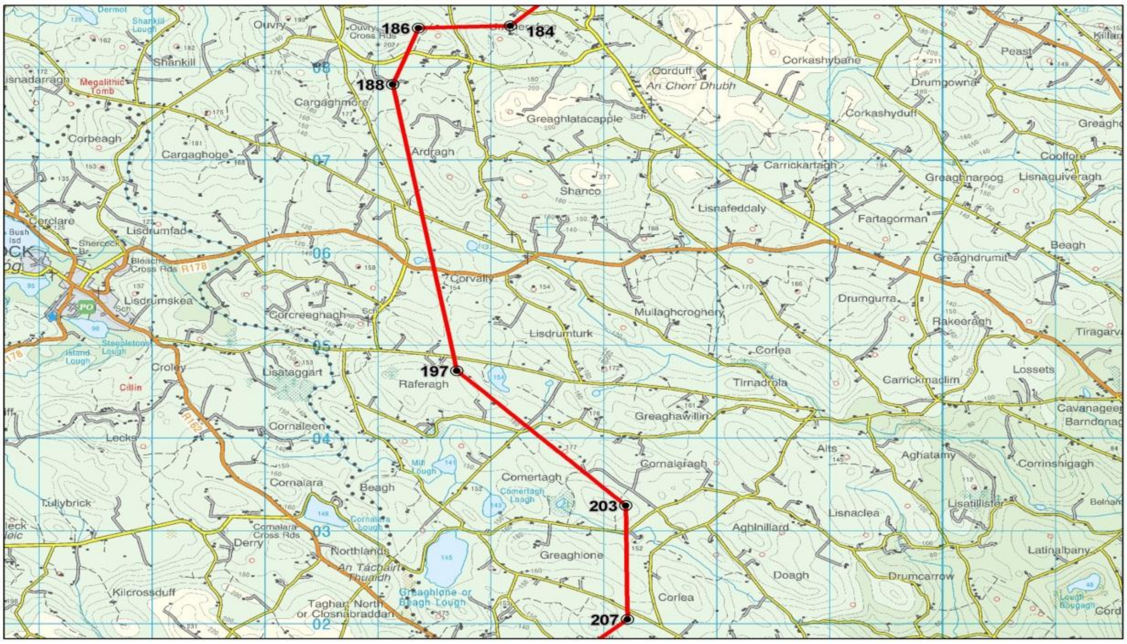


Figure 6.7: Towers 186 – 207

18 From Tower 186, in the townland of Sreenty the alignment crosses a minor road to Tower 188 in the townland of Ardragh and, thereafter, it traverses the countryside in a southerly direction crossing two minor roads and the R178 Shercock to Carrickmacross road 3km east of Shercock. The route is aligned in this direction in order to avoid Corduff and the high contours at Shanco (Farney By), and Greaghlatacapple and Corduff (Farney By) and to avoid established one-off housing.

19 At Tower 197, in the townland of Raferagh to Tower 203 in the townland of Doagh the line route turns south-east and crosses two minor roads, thus avoiding the cluster of one-off housing in the same townland to the east of the line route. The alignment is routed in this area so as to avoid the lakes to the east and west of the alignment. At Tower 203, the line route changes

direction to the south and crosses two minor roads before reaching Tower 207 in the townland of Scalkill.

Scalkill to Dingin Towers 207 to 224

Figure 6.8: Towers 207 to 224

20 At Tower 207 in the townland of Scalkill, the alignment turns south-west and proceeds to Tower 212 in the townland of Lisagoan crossing on its path two minor roads and crossing the main R162 (Kingscourt–Shercock) road approximately 5.5km north-west of Kingscourt and the Cavan-Monaghan county boundary, in order to circumvent the lakes west of the line route located at Northlands. The line route is also at a distance (approximately 1.27km) from the wetland complex of Greaghlone Lough in this area. At Tower 212, in the townland of Lisagoan the line route crosses several minor roads, in order to avoid the ribbon development that emanates from the town of Kingscourt and the townland of Drumiller. At Tower 217, in the townland of Corlea (Clankee By), the alignment heads in a southerly direction and avoids the higher contours to the west at Cornamagh and the ribbon development on the lower slopes located to the west of the alignment and continues to Tower 224 in the townland of Dingin.

Dingin to Clonturkan Towers 224 to 237

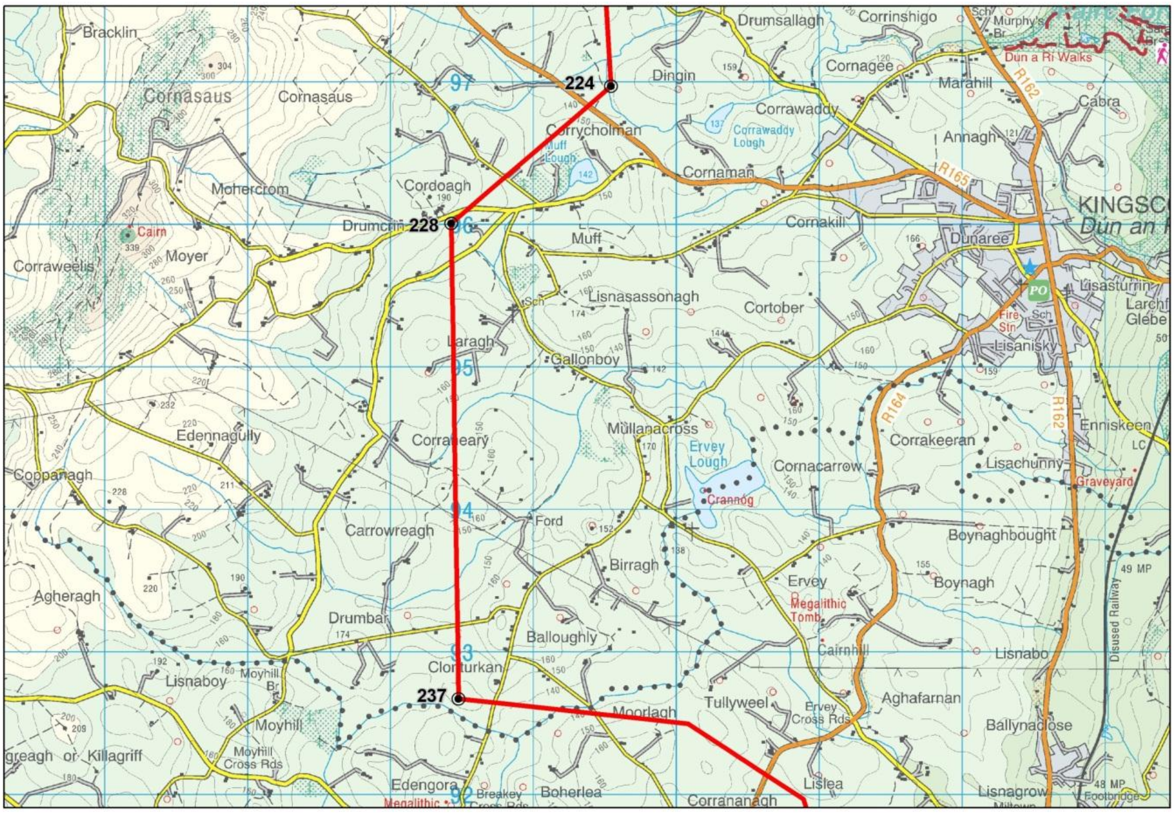


Figure 6.9: Towers 224 to 237

21 At Tower 224, in the townland of Dingin, the alignment traverses to the south-west to cross the R165 Kingscourt-Bailieborough road (approximately 3.2km west of Kingscourt), in order to avoid the ribbon development which extends from Kingscourt and to keep to the lower slopes of Lough-an-Lea, while maintaining a sufficient distance from Dún-an-Rí Forest Park. The alignment route crosses several minor roads and passes to the north of Muff Lough. At Tower 228 in the townland of Cordoagh (ED Enniskeen), the alignment proceeds in a southerly direction crossing some minor roads and avoiding Lough-an–Lea to the west and Ervey Lough to the east to Tower 237 in the townland of Clonturkan, County Cavan. The alignment crosses the existing Flagford–Louth 220 kV Line and follows this trajectory in order to avoid the ribbon development extending from Kingscourt.

6.2.2 MSA – New and Existing 400 kV Line

22 The proposed development in the MSA comprises a new single circuit 400 kV overhead transmission circuit supported by 165 new towers (Tower 237 to Tower 401) extending for a distance of approximately 54.5km from Tower 237 in the townland of Clonturkan, County Cavan to Tower 402 (an existing double circuit tower on the Oldstreet to Woodland 400 kV

transmission line) in the townland of Bogganstown (ED Culmullin), County Meath. It also includes modifications to an existing 110 kV transmission OHL, and all associated and ancillary development works including permanent and temporary construction and excavation works.

23 The line route has been chosen to minimise environmental impacts as detailed in **Chapter 5** of this volume of the EIS.

24 It also includes the addition of a new 400 kV circuit for some 2.85km along the currently unused (northern) side of the existing double circuit 400 kV overhead transmission line (the Oldstreet to Woodland 400 kV transmission line) extending eastwards from Tower 402 in the townland of Bogganstown (ED Culmullin), County Meath to Tower 410 and the Woodland Substation in the townland of Woodland, County Meath.

25 The MSA section of the overall circuit is presented in **Figure 6.10.** A more detailed section by section breakdown is provided below.

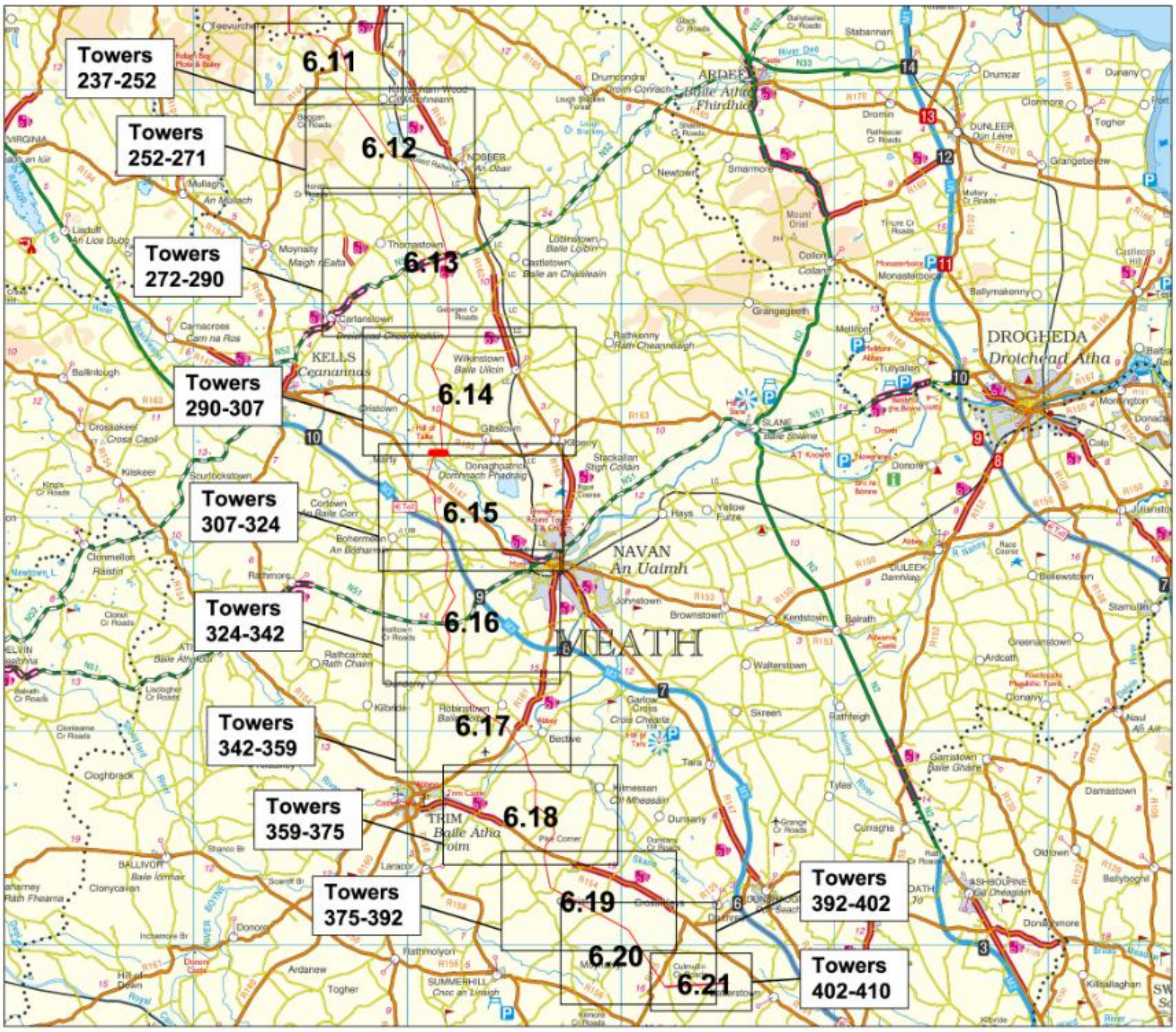


Figure 6.10: MSA Section of Circuit

Clonturkan to Shancor Towers 237 to 252

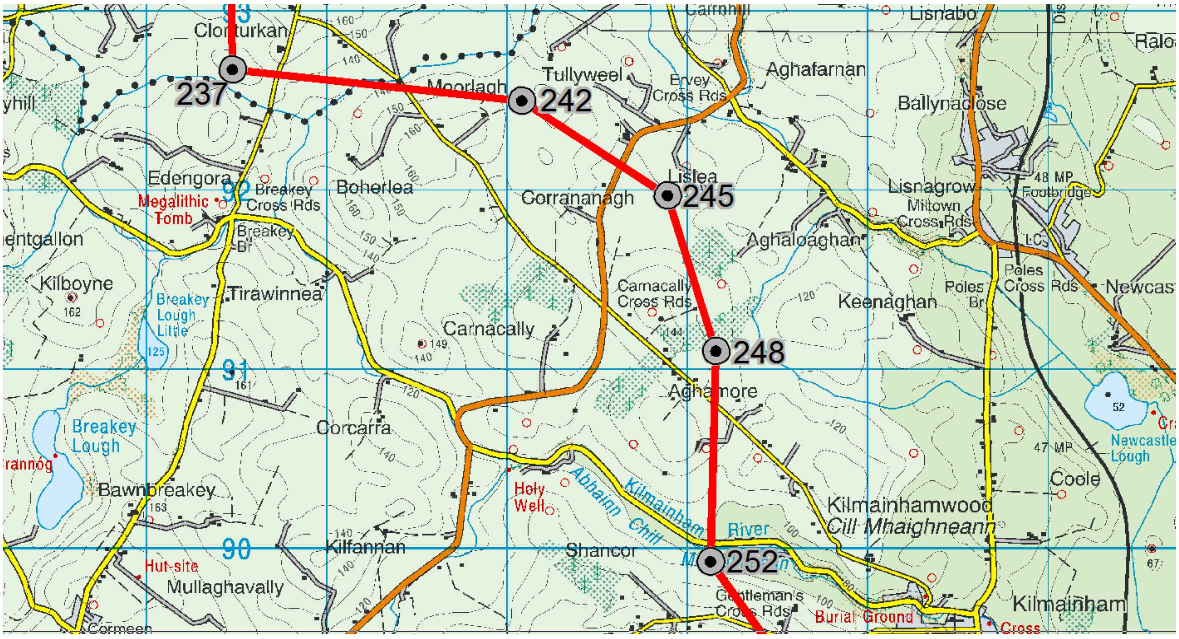


Figure 6.11: Towers 237 to 252

26 From Tower 237 in the townland of Clonturkan, County Cavan, the line route proceeds in an easterly direction in the area of the boundary between counties Cavan and Meath, avoiding an ecologically sensitive area to the north, and a number of national monuments to the south. Between Tower 237 and Tower 242 in the townland of Tullyweel, the line route crosses two local roads. The line route turns south-east at Tower 242 avoiding viewpoint VP21 (as detailed in the *Meath County Development Plan* (CDP)). The line route then crosses the R164 Regional Road between Towers 244 and 245, before turning south at Tower 245 in the townland of Lislea to avoid the railway line to the east, a cluster of national monuments and Newcastle Lough (which has recorded Whooper swan activity). Between Towers 245 and 248, the line route travels south south-east crossing agricultural land and small sections of forestry. Between Towers 248 and 252 the route aligns south to ensure separation is maintained from the village of Kilmainhamwood, crossing two local roads (between Tower 249 and Tower 250 and between Tower 251 and Tower 252). The line route crosses Kilmainham River between Towers 251 and 252.

Shancor to Rahood Towers 252 to 271

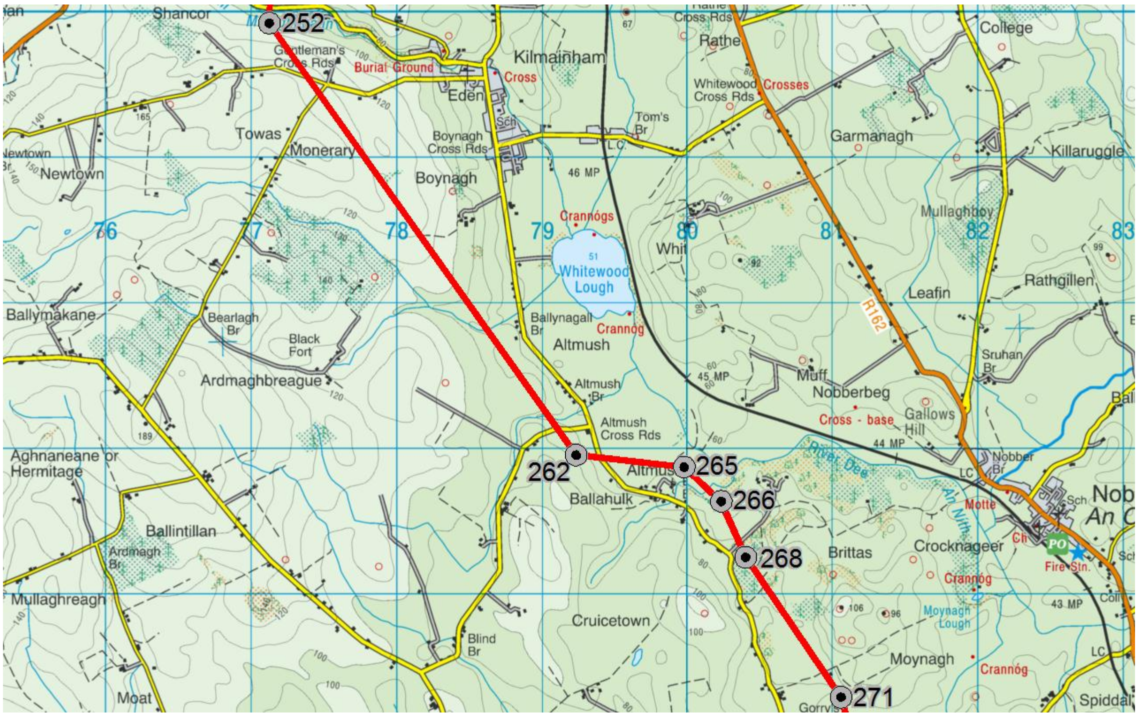


Figure 6.12: Towers 252 to 271

27 The line extends in a south-easterly direction between Tower 252 and Tower 262 in the townland of Cruicetown (ED Cruicetown). Between Towers 253 and 254, the line route crosses two local roads and continues to avoid the village of Kilmainhamwood which lies to the east. Between Towers 254 and 262, the line route crosses agricultural land avoiding a number of key viewpoints both to the west and east (VP18 and VP19 as designated in the Meath CDP). The line route is also routed along this path to avoid Whitewood Lough, several Crannógs and Whitewood House. Between Towers 260 and 262, the line route crosses the Altmush county geological site (towers are not located on the feature of interest within this geological site) and a local road.

28 The line route veers east at Tower 262 near the Altmush crossroads to avoid high ground and a number of viewpoints further south (VP16 and VP17). The line then continues in this direction until Tower 265 located in the townland of Altmush (ED Cruicetown). At Tower 265 the line route turns in a south-easterly direction crossing a tributary to the River Dee.

29 Between Towers 266 and 271, the line route takes a series of slight bends to minimise the impact on the Brittas Demesne while also avoiding high ground to the west and the village of Nobber and high ground to the east. The line route crosses at the edge of Brittas Demesne avoiding the core features of the demesne. The line route in this area also avoids Cruicetown Lough and Cruicetown Church and Graveyard (a National Monument) to the west; and a

designated landmark and viewpoint VP17 (as detailed in the Meath CDP) which are also located to the west of the line route.

Rahood to Dowdstown (ED Castletown) Towers 271 to 290

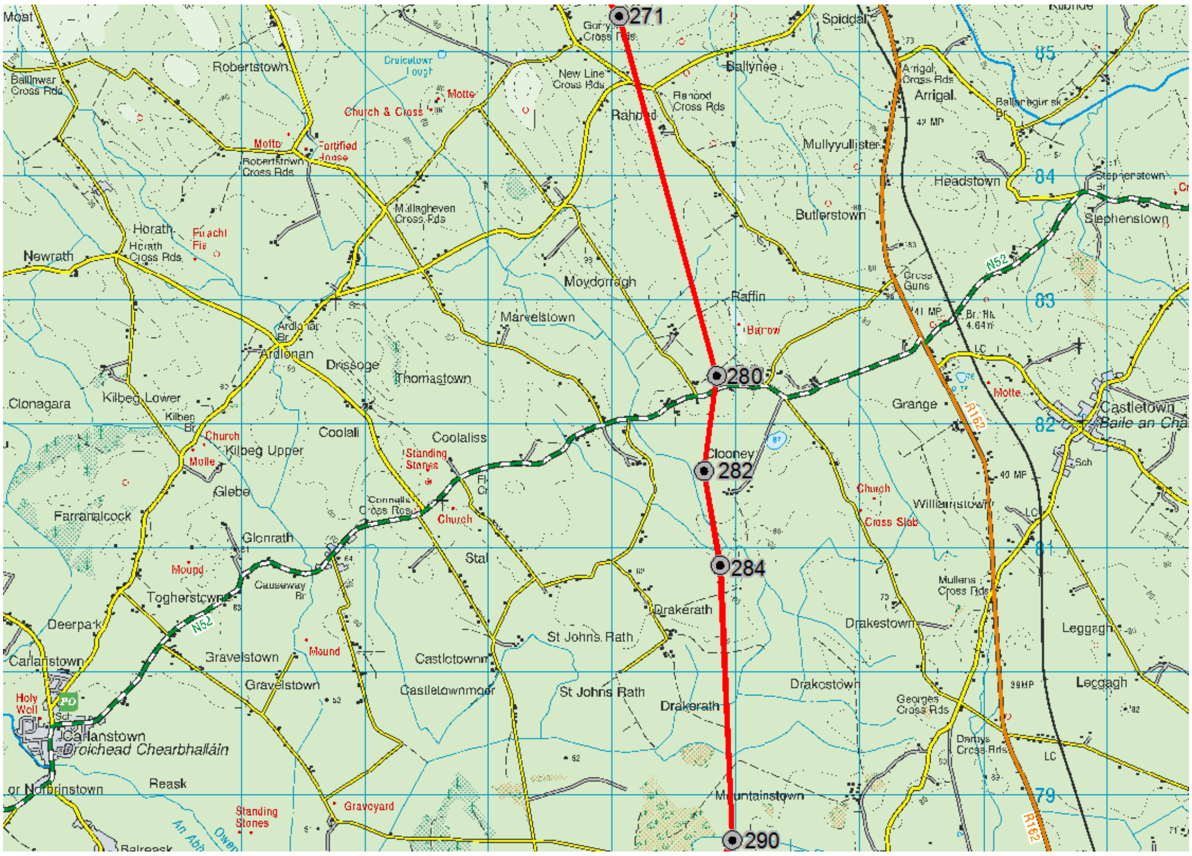


Figure 6.13: Towers 271 to 290

30 At Tower 271, situated in the townland of Rahood, the line route kinks slightly, travelling in a more southerly direction crossing agricultural land until reaching Tower 280 in the townland of Clooney. By making this slight alteration in direction, the line route bisects a gap between several houses clustered in the area. This section of the line route crosses a local road between Towers 272 and 273 and avoids a viewpoint to the west (VP16).

31 The line route deviates slightly at Tower 280 to avoid a farmyard to the west and a house to the east. It crosses the N52 to the west of Raffin Cross, and follows this route until arriving at Tower 282 in the townland of Clooney. The line route turns slightly east but continues generally south at Tower 282 until reaching Tower 284 in the townland of Drakerath where the route turns to an almost southerly direction and maintains this direction until reaching Tower 290. This section of the line route passes through the townlands of Drakerath and Mountainstown and is routed such that the line avoids the villages of Castletown, approximately 3km to the east, and Carlanstown, approximately 6km to the west, and an ecologically sensitive area to the west.

Dowdstown (ED Castletown) to Diméin Bhaile Ghib (Gibstown Demesne) Towers 290 to 307

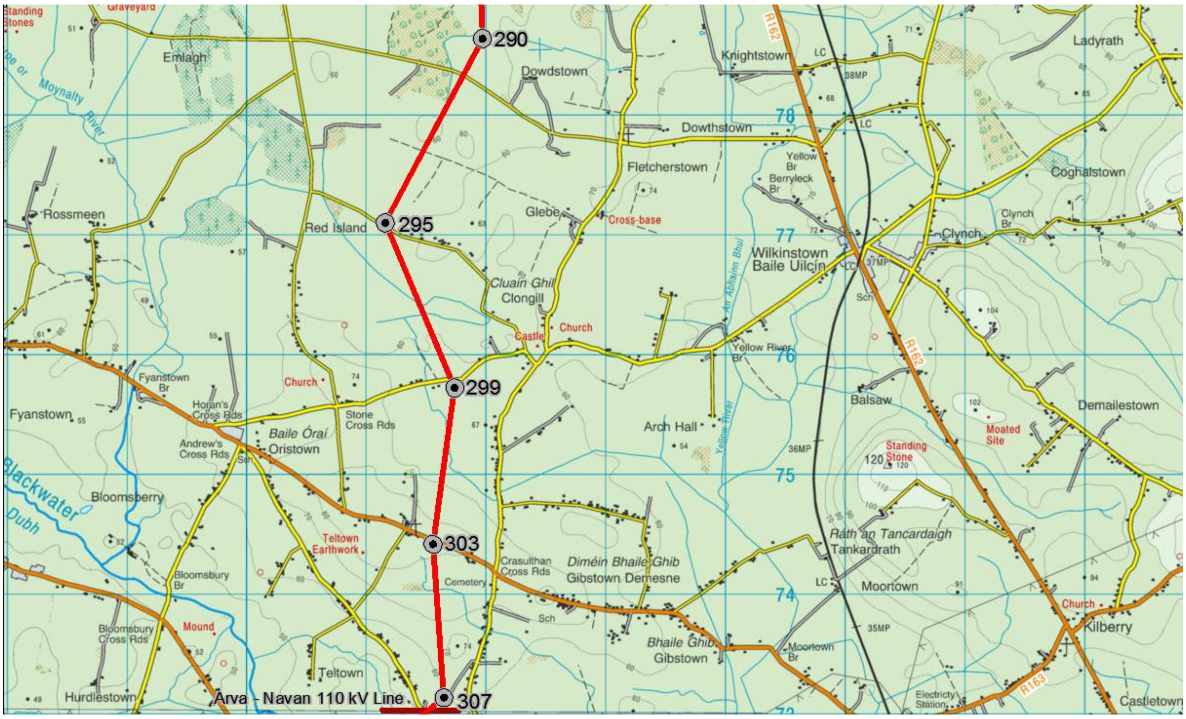


Figure 6.14: Towers 290 to 307

32 The line route veers in a south-westerly direction between Towers 290 in the townland of Dowdstown (ED Castletown) and Tower 295 in the townland of Cluain an Ghaill (Clongill), crossing a local road between Towers 291 and 292 and avoiding a large ecologically sensitive area to the west.

33 To avoid the villages of Clongill and Wilkinstown to the east and Oristown to the west, the line route changes to a south-easterly direction at Tower 295 in the townland of Cluain an Ghaill (Clongill) and follows this direction until reaching Tower 299 in the townland of Baile Órthaí (Oristown). The line route crosses a local road between Towers 295 and 296 and a local road between Towers 298 and 299.

34 To minimise the length of line traversing Gibstown Demesne and to cross the R163 at a location where there is a gap in the housing along it, the line route changes direction at Tower 299 in the townland of Baile Órthaí (Oristown) to a south-westerly route until reaching Tower 303. The line route crosses the R163 Regional Road between Towers 302 and 303. Between Towers 303 and 307, the route follows an approximately southwards bearing, avoiding the village of Bhaile Ghib (Gibstown) to the east. Between Towers 307 and 308, the line route crosses the existing Arva-Navan 110 kV line.

Diméin Bhaile Ghib (Gibstown Demesne) to Durhamstown Towers 307 to 324

Figure 6.15 Towers 307 to 324

35 In order to avoid the village of Donaghpatrick, the line route veers south-west at Tower 307 and maintains this direction until Tower 309 in the townland of Tailtin (Teltown), crossing a local road between Tower 307 and 308, in order to minimise the crossings of the River Blackwater. At Tower 309, the line route turns to a south south-westerly direction in order to avoid Teltown Church and a site recorded on the Record of Protected Structures (RPS) to the west. The line continues in this direction until reaching Tower 312 in the townland of Castlemartin, having made a crossing of the River Blackwater between Towers 310 and 311, and the R147 between Tower 311 and Tower 312 approximately 600 metres west of Finnegans Cross Roads.

36 In order to find a suitable crossing point of the nearby local road, the line route then veers south-eastwards between Tower 312 in the townland of Castlemartin and Tower 314 in the townland of Tankardstown (ED Ardbraccan) crossing a local road between Tower 313 and 314. The line route aligns south between Towers 314 and 316 in the townland of Tankardstown (ED Ardbraccan) crossing a dismantled railway between Towers 314 and 315.

37 To avoid housing and commercial premises in this area, the line route deviates to a south south-easterly direction at Tower 316, then changes direction at Tower 317 to an almost southerly direction and crossing a local road before reaching Tower 318 in the townland of Grange (ED Ardbraccan). Between Tower 318 and Tower 319, the line route turns south-east

to avoid several houses located to the south. The line route veers south at Tower 319 in order to avoid Ardbraccan Demesne to the east, crossing the M3 to the west of Navan and then continuing south until reaching Tower 322 in the townland of Durhamstown. The line route crosses a local road between Towers 321 and 322 and avoids the aforementioned houses which are situated along this local road. Between Tower 322 and 324 in the townland of Durhamstown, the line route veers to the south-east to avoid housing located to the south.

Durhamstown to Philpotstown (ED Bective) Towers 324 to 342

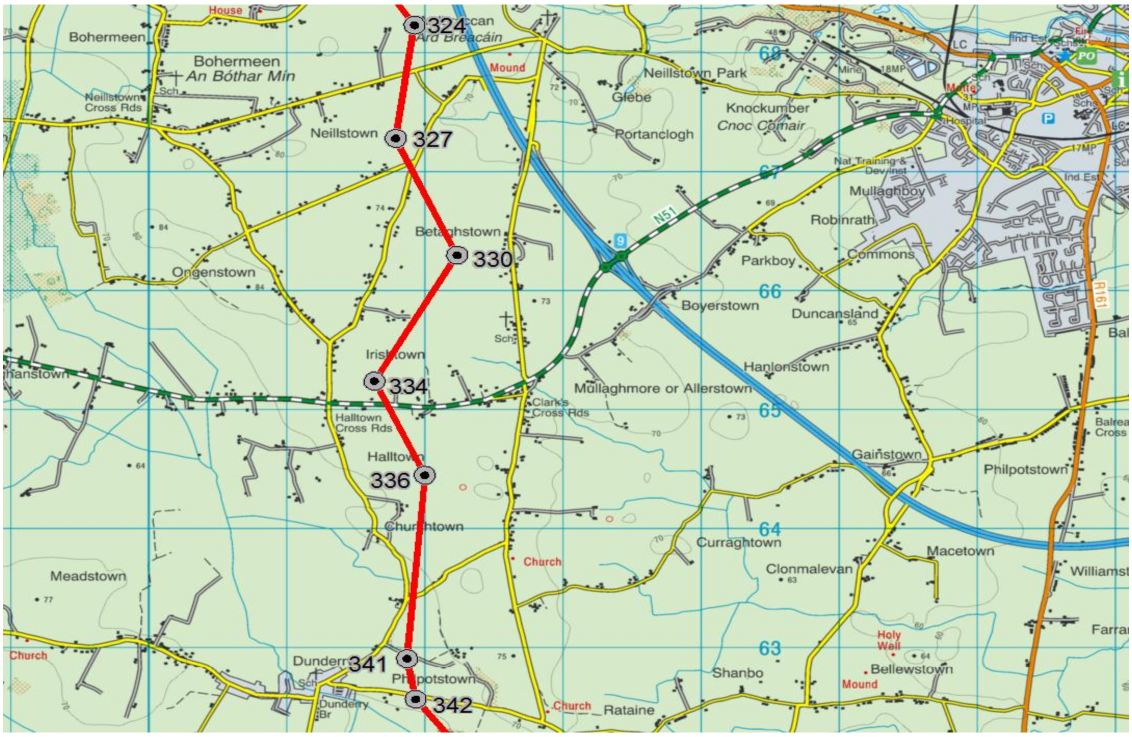


Figure 6.16: Towers 324 to 342

38 In order to avoid housing on the local road to the south, the line route turns to a south south-west direction at Tower 324 and maintains this direction until Tower 327 in the townland of Neillstown (ED Ardbraccan), crossing a local road between Tower 325 and 326.

39 Between Towers 327 and 330, the line route veers south-east to avoid housing, crossing two local roads between Towers 327 and 328. The line route veers south-west between Tower 330 in the townland of Betaghstown (ED Ardbraccan) and Tower 334 in the townland of Irishtown (ED Ardbraccan), just north of the N51 near Halltown Crossroads.

40 The line route changes direction at Tower 334 to avoid housing along the N51 and a national monument to the south, following a south-easterly path until Tower 336 in the townland of Halltown. This section of the line route crosses the N51 approximately 3km to the west of the

town of Navan and avoids Jamestown Bog pNHA which is located approximately 3km to the west of the line route.

41 At Tower 336 the line route turns to a near southerly direction to avoid a national monument to the east, until Tower 341 in the townland of Philpotstown (ED Bective) crossing a local road between Towers 339 and 340. The line route then deviates slightly east between Towers 341 and 342 in the townland of Philpotstown (ED Bective), crossing a local road, avoiding Dunderry House and the village of Dunderry.

Philpotstown (ED Bective) to Trubley Towers 342 to 359

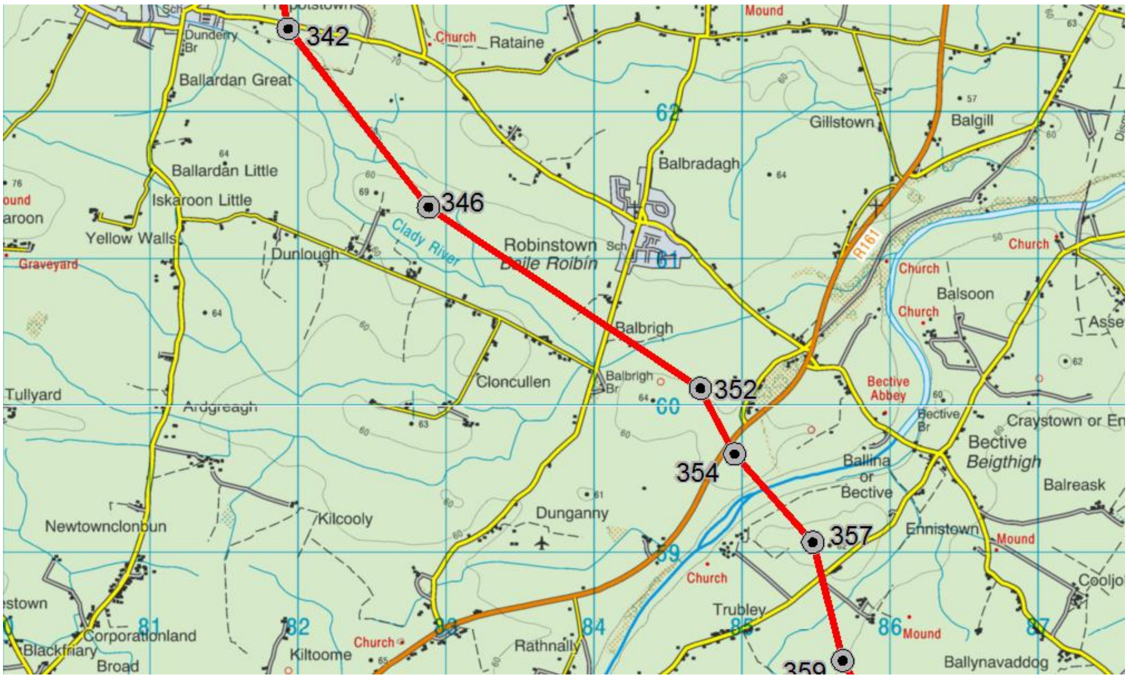


Figure 6.17: Towers 342 to 359

42 The line route follows a south-easterly direction between Tower 342 and Tower 346 in the townland of Dunlough running parallel to the eastern bank of the Clady River. A change in direction occurs at Tower 346 in order to avoid established one-off housing and Trim Airfield, resulting in the line route travelling in a more easterly direction until reaching Tower 352 in the townland of Balbrigh crossing a local road between Towers 349 and 350 and crossing the Clady River between Towers 350 and 351. In order to avoid VP86 (as detailed in the Meath Landscape Character Assessment), the line route follows a south south-easterly direction between Tower 352 and Tower 354 in the townland of Rathnally, crossing the R161 Regional Road between Towers 353 and 354. At Tower 354 the line route turns to a south-easterly heading and follows this direction until Tower 357 in the townland of Trubley, crossing the River Boyne, while avoiding the village of Bective and Bective Abbey to the east. To the west the line route also avoids Trim Airfield and the location of lands in respect of which a new planning

application for two houses has been granted in the townland of Trubley. Between Towers 357 and 359, the line route travels in a south south-easterly direction crossing a local road between Towers 357 and 358.

Trubley to Branganstown Towers 359 to 375

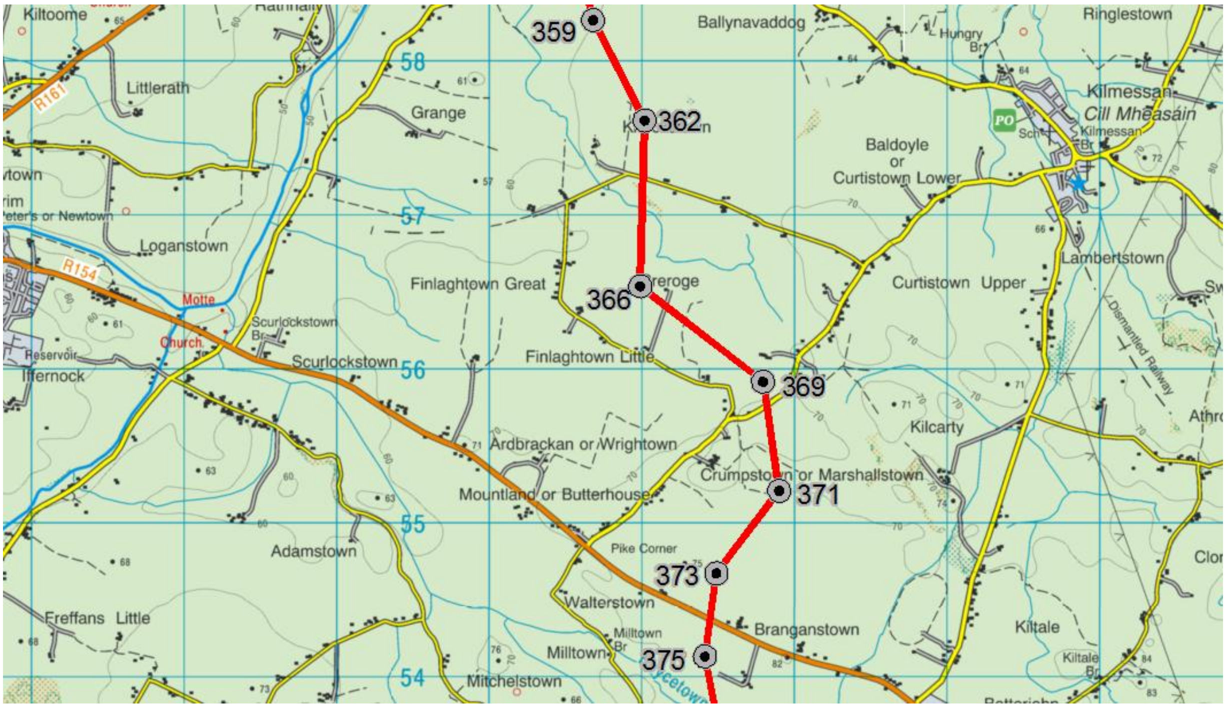


Figure 6.18: Towers 359 to 375

43 At Tower 359 the line route turns slightly east but maintains an overall south south-easterly direction until Tower 362 in the townland of Knockstown (ED Kilcooly). At Tower 362 the line route aligns south until Tower 366 in the townland of Creroge, avoiding the village of Kilmessan to the east while also maintaining sufficient distance from the Hill of Tara to the east and the town of Trim to the west. The line route veers south-east at Tower 366 and travels in this direction until Tower 369. The line route follows a southerly direction between Towers 369 and 371 in the townland of Crumpstown or Marshallstown (ED Galtrim), crossing a local road which is a designated cycle route between Tower 369 and 370.

44 The line route turns south-west at Tower 371 in order to avoid housing on the R154 to the south, following this direction until Tower 373 in the townland of Branganstown. Between Towers 373 and 375, the line route follows a near southerly direction crossing the R154 Regional Road in the townland of Branganstown.

Branganstown to Culmullin Towers 375 to 392

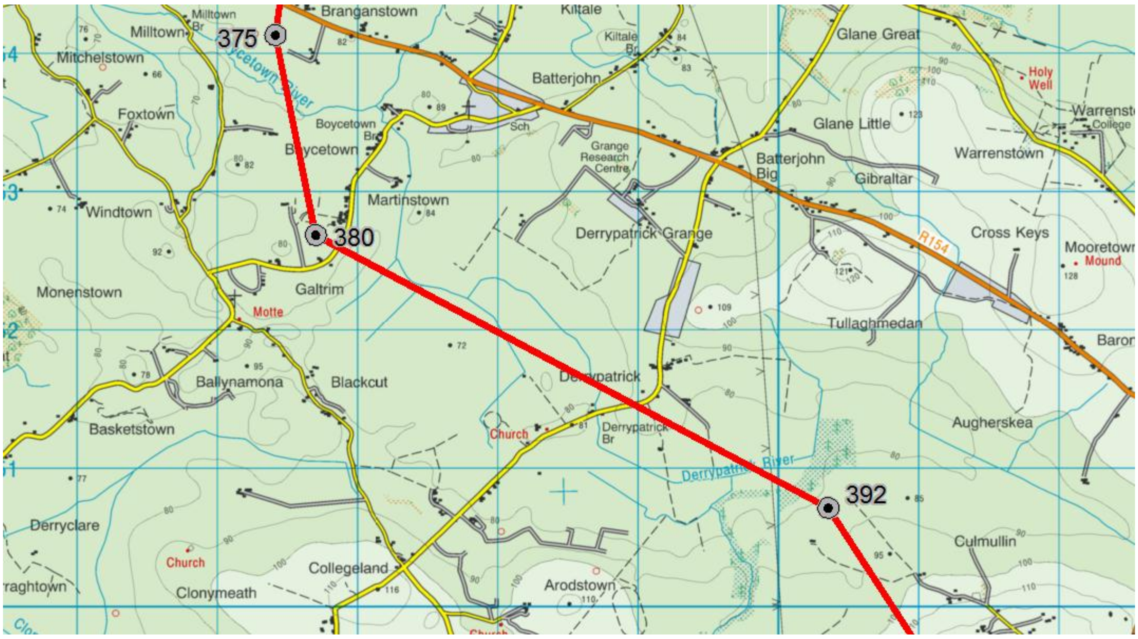


Figure 6.19: Towers 375 to 392

45 The line route travels in a south south-easterly direction between Tower 375 in the townland of Branganstown and Tower 380 in the townlands of Boycetown and Galtrim, turning slightly to avoid Galtrim Demesne. This section of the route crosses the Boycetown River between Towers 376 and Tower 377. Such that the impact on Galtrim Moraine is minimised, the line route veers south-east at Tower 380, following this direction until reaching Tower 392 (in the townland of Culmullin) crossing two local roads, Galtrim Moraine and the Derrypatrick River and passing close to Derrypatrick Bridge.

Culmullin to Bogganstown (ED Culmullin) Towers 392 to 402 (Existing Oldstreet to Woodland OHL Route)

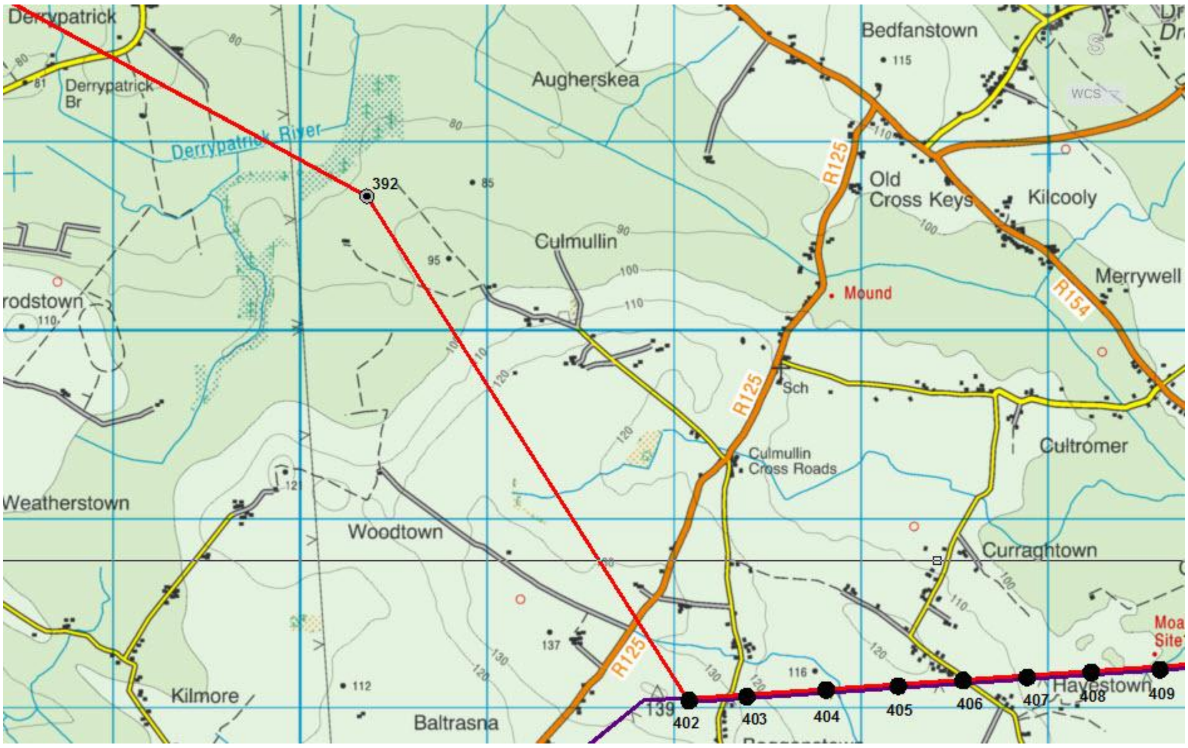


Figure 6.20: Towers 392 to 402

46 The line route deviates slightly at Tower 392 in Culmullin (ED Culmullin) such that it can tie into the existing line but maintains a south-easterly direction until reaching Tower 402 (an existing double circuit tower on the Oldstreet to Woodland circuit) in the townland of Bogganstown (ED Culmullin), crossing the R125 Regional Road approximately 1km south-west of Culmullin Crossroads. The line route in this area avoids ecologically sensitive areas to the east and west between Towers 397 and 399.

Bogganstown (ED Culmullin) to Woodland Towers 402 to 410 (Existing Oldstreet to Woodland OHL Route)

Figure 6.21: Towers 402 to 410

47 This portion of the proposed line route comprises the addition of a new 400 kV circuit for some 2.85km along the currently unused (northern) side of the existing double circuit 400 kV overhead transmission line (the Oldstreet to Woodland 400 kV transmission line).

48 From Tower 402 the line route follows an easterly direction on the existing double circuit structures of the Oldstreet to Woodland 400 kV circuit, crossing two local roads before connecting to an end mast (Tower 410) adjacent to the existing Woodland Substation in the townland of Woodland, County Meath. The end mast is where the existing circuit connects into the substation bay - Bay E10 (see **Section 6.3.3**).

6.3 OVERHEAD LINE ELEMENTS

49 An OHL is made up of a number of elements, the design and approach to which is a primary consideration to the line design process. These elements are:

- Towers and associated foundations; and
- Conductors & shieldwires (wires) and associated hardware (including insulators and fittings).

6.3.1 Towers and Associated Foundations

50 Towers are one of the most significant components of OHL. There are three types of tower typically used for OHL transmission developments. These are detailed below:

- **Intermediate or suspension towers** are used on straight sections of an alignment. Electricity conductors hang on, or are suspended from, the cross arms of these towers resulting in these towers being somewhat taller and slimmer than angle towers and typically requiring smaller foundations.

- **Angle / tension towers** are so-called because the electricity conductors pull off the crossarms (i.e. connecting to the towers under tension). This requires the angle tower to have a greater mechanical strength than the intermediate tower. These towers are used at points when the OHL changes direction, where the line terminates, such as at substations (for example Tower 410 on the existing Oldstreet to Woodland OHL) or in order to break a long linear span. Angle towers use heavier steel members and can also be shorter than comparable intermediate towers (while still maintaining the same clearance between the ground and the electricity conductor). This gives the towers the appearance of being 'stockier' than the intermediate tower. Due to the required increase in mechanical strength, angle towers will also typically have much larger foundations than intermediate towers.

- **Transposition towers** change the physical position of the conductors on a transmission line (known as phases) while maintaining electrical phase separation and clearance. Transposition phases can be important over long linear lengths as it balances the electrical impedance[75] between phases of a circuit. As noted in **Chapter 5** of this volume of the EIS, analysis by EirGrid shows that the operating performance of the proposed interconnector will benefit from a single point of transposition. Transposition is the practice of transposing or rearranging the spatial arrangement of the three electricity wires or conductors that make up the three-phase circuit. The transposition takes place over four structures (the transposition alignment) as illustrated in **Chapter 5** (**Figure 5.19**), of this volume of the EIS.

[75]Electrical impedance is a measure of the opposition that a circuit presents to the passage of the electrical current as the length of the circuit increases.

51 Tower foundations (per tower leg) typically range from 2m to 3.5m in depth to the invert level of the foundation and anywhere from approximately 2 x 2 metres squared to 9 x 9 metres squared, in plan area depending on tower type. However, the type and size of the foundations will ultimately depend on the type of tower, ground conditions and terrain. Further detail relating to foundation types and their installation is outlined in **Chapter 7** of this volume of the EIS.

6.3.2 Modifications to Existing 110 kV Transmission Overhead Lines

52 The proposed development also includes modifications to the existing Lisdrum-Louth 110 kV, Louth-Rathrussan 110 kV and Arva-Navan 110 kV transmission lines. These advance modifications will be required to ensure that there is sufficient electrical safety clearances maintained between the 110 kV OHL and 400 kV conductor at the point of crossing. The modifications involve lowering the height of the existing 110 kV transmission lines, at the point of the crossing of the proposed 400 kV route. This will be achieved by the insertion of additional wood polesets and / or the replacement of existing structures with wood polesets that are lower in height, as follows:

- Where the proposed 400 kV overhead transmission line intersects with the Lisdrum–Louth 110 kV transmission line the insertion of two new polesets (approximately 14m and 16m high) is proposed. In addition an existing 17.7m high poleset will be replaced by a new poleset approximately 12m high.

- Where the proposed 400 kV overhead transmission line intersects with the Louth-Rathrussan 110 kV transmission line an existing 19.6m high lattice steel tower and an existing 19.7m high poleset will both be replaced by new polesets (both approximately 19m high).

- Where the proposed 400 kV overhead transmission line intersects with the Arva-Navan 110 kV transmission line two existing polesets (14.7m and 15.7m high) will be replaced by two new polesets (both approximately 14m high).

6.3.3 Conductors and Associated Infrastructure

53 Relevant conductor and associated infrastructure components include:

- **Conductors** are the wires that carry the electricity and comprise a number of conducting aluminium wires around a high strength core consisting of steel wire (see **Figure 6.22**). Each phase typically consists of a number of single conductors forming a conductor bundle. Generally, the higher the voltage level, the higher the number of conductors in the bundle.

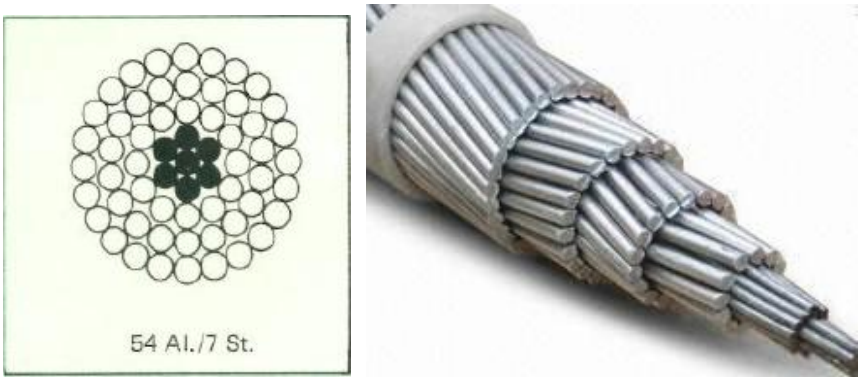


Figure 6.22: Diagrammatic and Actual Cross Section of a Typical Conductor (ACSR)

- To achieve the required power capacity of the proposed interconnector, it will be necessary to install a pair of conductors per phase (known as a twin bundle – see **Figure 6.23**). These conductors will be separated by spacers at regular intervals. The distance of the conductors from the ground is determined not only by the lateral clearance away from the line but also by the height of the conductor overhead. For the proposed 400 kV OHL, the minimum conductor height above ground has been designed to 9m.

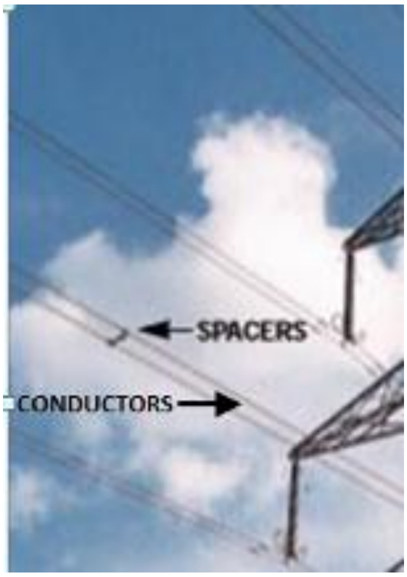


Figure 6.23: Twin Bundle Configuration

- **Earth / ground wire or shield wire and optical fibres (OPGW)** are installed above the live conductors at the top of the tower to minimise the likelihood of direct lightning strikes to the conductors. Shield wires are also conductors but serve a different purpose to live conductors. Should lightning strike the line it will in all likelihood strike a shield wire rather than a live conductor (as they are installed above the live conductor). This will not necessarily prevent the line from tripping out but it will protect the line from being damaged by very quickly dissipating the energy in the lightning strike away from the line and into the ground. In such circumstances, if the line did trip out it can be restored automatically in less than a second. Shield wires may include optical fibres used in respect of controlling the power system and communication.

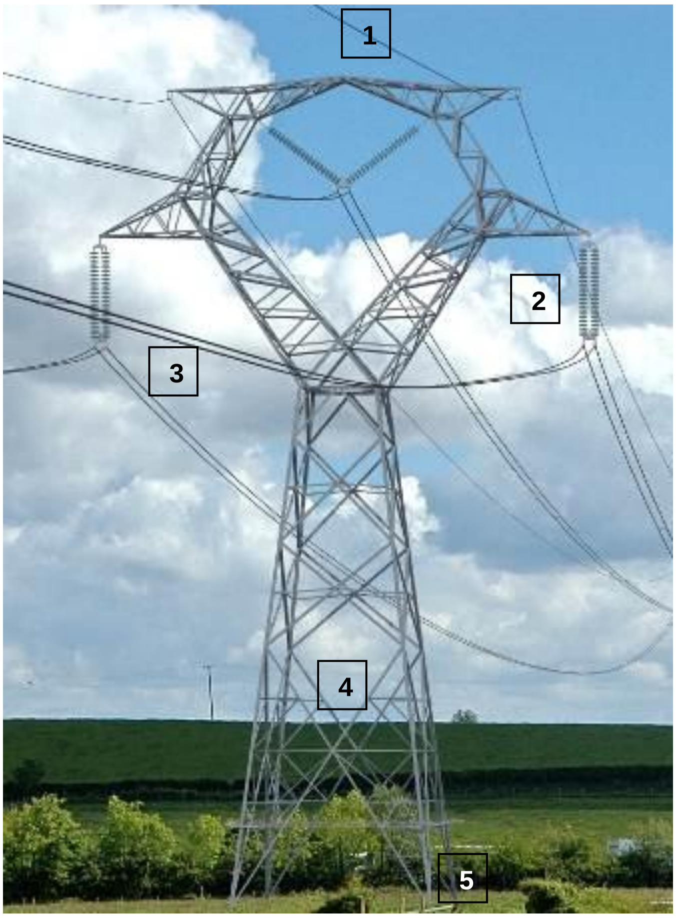
- **Insulators** support the conductors and have to withstand both normal operating voltage and surges as a result of switching and lightning strikes. For transmission lines these tend to be suspended below the structure and comprise a number of glass or composite discs, the number of which increases for the higher voltages. The preferred insulator for the proposed development is the composite type (see **Figure 6.24**). The advantages of this modern design include: slimline appearance; lighter weight; more repellent to airborne pollutants (resulting in a reduction in the noise or ‘crackle’ that can emanate from high voltage OHLs during periods of high humidity); and silicon rubber insulator sheds which are less susceptible to damage. **Chapters 9** of **Volumes 3C** and **3D** of the EIS consider the issue of corona noise in greater detail.

Figure 6.24: Typical Composite Insulator

6.3.3.1 Proposed Tower Design for the New 400 kV OHL

54 As addressed at **Chapter 4** of this volume of the EIS, it is intended to use the 'C-IVI-1 hot rolled' (IVI) lattice steel tower design for the proposed development. The IVI design raises the centre phase to increase the apparent height while reducing the width of the tower thereby ensuring a more slender proportion to the structure. The tower's overall shape comprises a diamond located at the top of a relatively narrow body. Located on either side of the diamond shape are two cross supporting arms, the two outer phasing arrangements. In both front and side elevation the tower forms a symmetrical structure comprised of a typical steel lattice framework.

55 The general arrangement for the IVI tower design (including conductors and associated infrastructure) is illustrated in **Figure 6.25.** The IVI tower is designed to accommodate two shield wires connected to the extremities of the upper most cross arm.



1. Earthed Shield wires
2. Insulators
3. Conductors
4. Tower
5. Concrete foundation for each tower footing

Figure 6.25: General Arrangement of a C-IVI-1 (IVI) Tower

56 The three different tower types (i.e. intermediate, angle and transposition) for the proposed development are illustrated in **Figures 6.26, 6.27** and **6.28**, and described below.

57 Three types of angle tower are required: a 30 degree angle tower, a 60 degree angle tower, and a 90 degree angle tower. The lower arms vary to allow for the appropriate tension angle on the line. The use of each type of tower is determined by technical requirements at each location along the route. Detail on which type of tower is used in each location is contained in **Tables 6.1** and **6.2.**

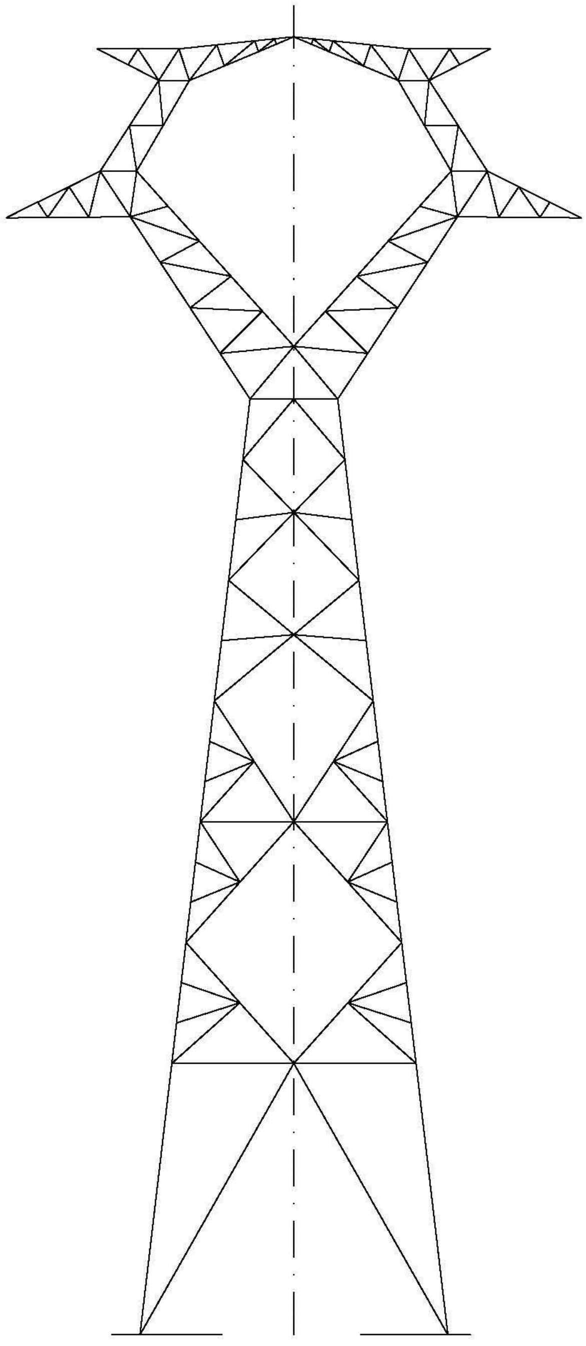


Figure 6.26: Proposed 400 kV Intermediate C-IVI-1 Lattice Tower

(Not to be scaled - for illustrative purposes only)

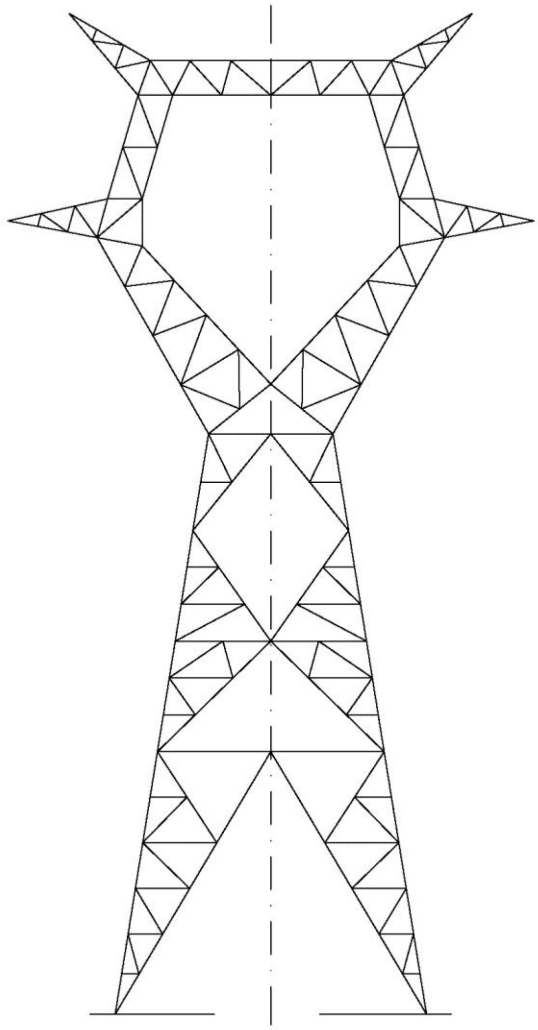


Figure 6.27: Proposed 400 kV Angle C-IVI-1 Lattice Tower

(Not to be scaled **-** for illustrative purposes only)

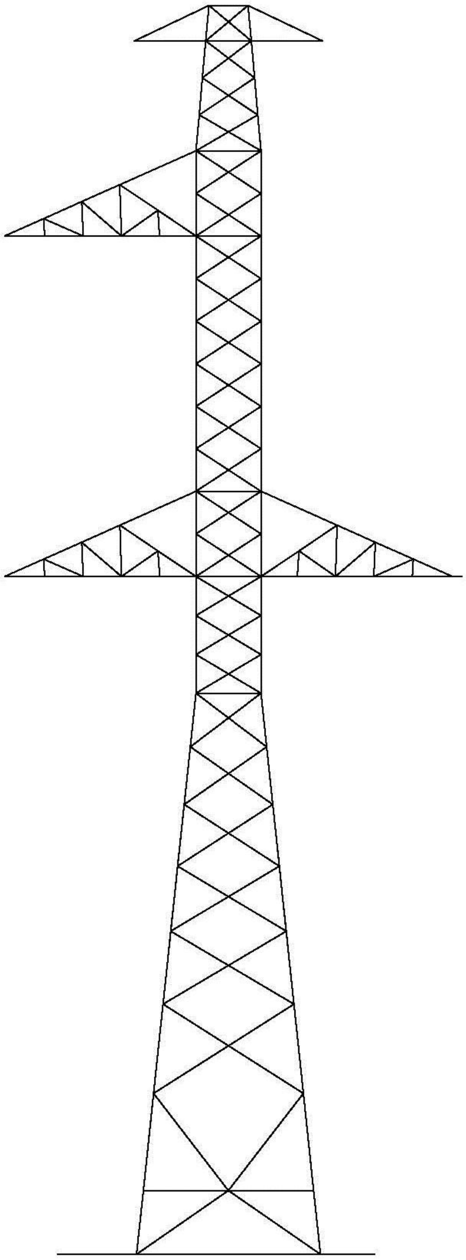


Figure 6.28: Proposed 400 kV Transposition Tower

(Not to be scaled - for illustrative purposes only)

6.3.3.2 Proposed Tower Types and Heights for the New 400 kV Circuit

58 The spacing, type, and angle tower and the height of the towers for the new 400 kV transmission circuit vary depending on technical requirements which relate primarily to topography. Spacing between the proposed towers averages at approximately 340m.

59 Tower heights will range from approximately 26m to 51m. Towers are measured above ground level at the centre point of the tower to a height at the centre point of the tallest point of the tower. For the 400 kV towers the tallest points are the earthed shieldwires (refer to **Figure 6.25**). Small variances in measurement will naturally arise with uneven ground conditions.

60 A list of towers, their locations and heights is included in **Table 6.1** and **Table 6.2**. The planning drawings (see **Volume 1B** of the application documentation) which accompany the application also provide the detail of each tower height.

Table 6.1: Tower Heights for the New 400 kV Line (CMSA Section)

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
103	Intermediate	31	128.382	363
104	Intermediate	42	131.138	445
105	Angle	34.2	131.32	395
106	Intermediate	37	138.878	184*
107	Intermediate	38	151.774	425
108	Intermediate	36	187.501	319
109	Angle	28.2	187.673	364
110	Intermediate	36	173.487	358
111	Intermediate	32	179.418	156
112	Angle	26.2	176.529	254
113	Intermediate	43	147.487	331
114	Intermediate	39	155.49	407
115	Intermediate	39	149.309	409
116	Angle	29.2	147.375	127
117	Intermediate	28	153.949	358
118	Angle	36.2	152.905	250

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
119	Transposition	45.98	148.858	200
120	Transposition	50.98	140.249	315
121	Angle	36.2	143.983	425
122	Intermediate	39	125.166	384
123	Intermediate	41	136.91	427
124	Intermediate	42	133.515	402
125	Intermediate	32	135.514	426
126	Angle	36.2	121.59	328
127	Intermediate	31	140.994	450
128	Intermediate	38	130.41	327
129	Intermediate	40	133.988	445
130	Angle	36.2	126.876	308
131	Intermediate	43	137.811	363
132	Angle	36.2	136.422	226
133	Intermediate	42	141.02	243
134	Intermediate	34	128.907	310
135	Intermediate	41	111.934	420
136	Angle	35.2	102.375	368
137	Intermediate	33	121.76	289
138	Intermediate	41	98.333	402
139	Intermediate	27	117.431	426
140	Angle	36.2	109.298	304
141	Intermediate	36	124.917	321
142	Angle	36.2	100.163	259
143	Intermediate	36	105.57	393
144	Intermediate	40	125.309	328
145	Intermediate	42	113.318	445
146	Intermediate	41	118.929	385
147	Intermediate	38	113.964	345

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
148	Intermediate	38	121.324	284
149	Angle	36.2	135.826	219
150	Intermediate	43	130.545	389
151	Intermediate	41	150.405	280
152	Intermediate	43	150.179	363
153	Intermediate	43	168.48	454
154	Angle	33.2	181.204	410
155	Intermediate	40	190.564	336
156	Intermediate	31	187.798	416
157	Angle	36.2	186.254	225
158	Intermediate	33	187.557	409
159	Intermediate	38	189.034	362
160	Intermediate	33	185.387	290
161	Angle	36.2	179.321	208
162	Intermediate	43	179.22	500
163	Intermediate	42	163.358	329
164	Intermediate	29	195.584	164
165	Intermediate	43	177.559	439
166	Angle	28.2	179.935	290
167	Intermediate	32	178.56	469
168	Intermediate	42	163.971	266
169	Angle	29.2	153.828	418
170	Intermediate	37	140.096	304
171	Intermediate	29	148.876	416
172	Intermediate	43	128.419	208
173	Intermediate	31	152.569	260
174	Intermediate	41	143.826	279
175	Intermediate	34	132.28	428
176	Angle	35.2	119.15	433

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
177	Intermediate	32	141.273	289
178	Intermediate	38	132.103	312
179	Intermediate	35	153.955	220
180	Intermediate	42	140.654	279
181	Angle	31.2	148.917	373
182	Intermediate	39	164.983	301
183	Intermediate	36	178.928	336
184	Angle	36.2	165.884	328
185	Intermediate	41	181.474	486
186	Angle	36.2	181.396	324
187	Intermediate	43	161.359	325
188	Angle	28.2	178.133	344
189	Intermediate	38	178.499	284
190	Intermediate	37	173.579	347
191	Intermediate	32	150.426	304
192	Intermediate	39	134.067	426
193	Intermediate	32	144.11	396
194	Intermediate	42	137.575	272
195	Intermediate	42	137.762	348
196	Intermediate	36	151.978	417
197	Angle	29.2	172.837	294
198	Intermediate	43	171.87	390
199	Intermediate	40	161.508	341
200	Intermediate	43	160.516	353
201	Intermediate	40	170.176	449
202	Intermediate	34	153.698	257
203	Angle	26.2	158.822	230
204	Intermediate	30	150.818	321
205	Intermediate	40	151.149	343

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
206	Intermediate	43	158.196	334
207	Angle	33.2	151.682	252
208	Intermediate	27	162.87	208
209	Intermediate	39	143.773	393
210	Intermediate	38	153.23	276
211	Intermediate	43	148.535	389
212	Angle	34.2	138.384	293
213	Intermediate	30	157.303	343
214	Intermediate	33	154.284	393
215	Intermediate	41	141.58	362
216	Intermediate	35	166.193	350
217	Angle	31.2	160.41	409
218	Intermediate	38	147.095	289
219	Intermediate	40	147.838	459
220	Intermediate	34	167.76	193
221	Intermediate	41	154.889	451
222	Intermediate	32	155.456	353
223	Intermediate	36	134.443	333
224	Angle	29.2	132.796	360
225	Intermediate	38	147.678	297
226	Intermediate	39	145.163	462
227	Intermediate	42	153.882	357
228	Angle	31.2	157.718	383
229	Intermediate	43	146.953	385
230	Intermediate	37	169.852	380
231	Intermediate	39	154.782	381
232	Intermediate	42	140.254	381
233	Intermediate	43	163.586	295
234	Intermediate	43	146.693	432

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
235	Intermediate	41	142.488	315
236	Intermediate	31	157.945	385 to MSA 237

*** Note: A section of the span between Tower 106 and Tower 107 oversails Northern Ireland. The oversail section forms part of the SONI proposal**

Table 6.2: Tower Heights for the New 400 kV Line (MSA Section)

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
237	Angle	29.2	150.629	337
238	Intermediate	41	140.567	328
239	Intermediate	42	129.036	367
240	Intermediate	34	141.249	244
241	Intermediate	37	148.482	339
242	Angle	33.2	141.252	296
243	Intermediate	35	145.401	315
244	Intermediate	39	124.023	356
245	Angle	29.2	116.208	274
246	Intermediate	39	115.695	348
247	Intermediate	35	127.636	288
248	Angle	36.2	125.686	269
249	Intermediate	34	124.298	199
250	Intermediate	35	122.622	389
251	Intermediate	39	103.526	322
252	Angle	36.2	99.709	341
253	Intermediate	36	130.176	375
254	Intermediate	43	134.042	337
255	Intermediate	35	132.651	367
256	Intermediate	39	124.259	423
257	Intermediate	40	113.749	418

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
258	Intermediate	35	92.198	386
259	Intermediate	35	78.552	440
260	Intermediate	27	88.894	306
261	Intermediate	39	73.48	250
262	Angle	29.2	76.815	298
263	Intermediate	42	51.622	205
264	Intermediate	35	54.012	243
265	Angle	29.2	57.874	347
266	Angle	33.2	55.563	208
267	Intermediate	36	65.688	211
268	Angle	36.2	59.69	415
269	Intermediate	43	59.101	370
270	Intermediate	35	67.192	381
271	Angle	29.2	78.725	235
272	Intermediate	36	75.475	395
273	Intermediate	39	88.262	305
274	Intermediate	31	102.035	417
275	Intermediate	31	91.1	365
276	Intermediate	35	84.604	381
277	Intermediate	35	74.975	368
278	Intermediate	31	76.03	229
279	Intermediate	39	72.062	349
280	Angle	31.2	72.675	399
281	Intermediate	39	67.395	343
282	Angle	31.2	60.515	370
283	Intermediate	43	61.007	404
284	Angle	36.2	58.37	437
285	Intermediate	38	66.809	446
286	Intermediate	43	52.649	362

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
287	Intermediate	35	51.216	261
288	Intermediate	32	53.469	354
289	Intermediate	39	54.993	360
290	Angle	33.2	53.588	259
291	Intermediate	35	54.626	366
292	Intermediate	43	54.686	412
293	Intermediate	37	56.999	306
294	Intermediate	36	55.73	397
295	Angle	36.2	51.907	315
296	Intermediate	40	52.904	448
297	Intermediate	40	52.008	370
298	Intermediate	43	58.806	363
299	Angle	36.2	61.748	340
300	Intermediate	33	62.49	280
301	Intermediate	35	63.323	382
302	Intermediate	43	72.917	317
303	Angle	29.2	81.093	395
304	Intermediate	39	71.618	335
305	Intermediate	31	65.79	268
306	Intermediate	31	63.459	286
307	Angle	33.2	56.396	267
308	Intermediate	39	44.701	285
309	Angle	33.2	40.833	379
310	Intermediate	39	41.669	404
311	Intermediate	39	46.172	300
312	Angle	33.2	53.491	367
313	Intermediate	42	51.007	456
314	Angle	33.2	51.147	286
315	Intermediate	31	51.88	300

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
316	Angle	29.2	56.177	334
317	Angle	33.2	60.027	308
318	Angle	33.2	61.772	314
319	Angle	29.2	62.723	305
320	Intermediate	35	62.029	274
321	Intermediate	35	64.31	316
322	Angle	29.2	68.691	259
323	Intermediate	35	71.133	299
324	Angle	29.2	69.288	344
325	Intermediate	35	69.098	296
326	Intermediate	39	70.912	323
327	Angle	29.2	74.561	308
328	Intermediate	43	71.316	413
329	Intermediate	39	74.959	357
330	Angle	29.2	74.667	269
331	Intermediate	35	73.839	397
332	Intermediate	39	73.104	344
333	Intermediate	33	74.542	207
334	Angle	30.2	77.772	400
335	Intermediate	43	74.498	471
336	Angle	36.2	71.7	275
337	Intermediate	37	72.007	224
338	Intermediate	35	70.994	326
339	Intermediate	36	67.575	368
340	Intermediate	36	66.275	355
341	Angle	33.2	63.57	347
342	Angle	34.2	61.32	424
343	Intermediate	43	59.292	422
344	Intermediate	35	61.066	398

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
345	Intermediate	39	58.806	297
346	Angle	33.2	59.666	390
347	Intermediate	39	55.937	337
348	Intermediate	39	56.638	367
349	Intermediate	40	55.807	395
350	Intermediate	43	55.234	399
351	Intermediate	35	56.314	326
352	Angle	29.2	57.684	212
353	Intermediate	31	57.888	290
354	Angle	33.2	59.884	232
355	Intermediate	35	58.216	287
356	Intermediate	35	57.432	280
357	Angle	33.2	60.255	405
358	Intermediate	39	56.035	425
359	Angle	36.2	60.124	190
360	Intermediate	35	62.726	318
361	Intermediate	31	65.143	226
362	Angle	29.2	63.684	211
363	Intermediate	35	62.996	335
364	Intermediate	35	61.482	258
365	Intermediate	31	62.683	274
366	Angle	29.2	63.914	342
367	Intermediate	35	66.195	345
368	Intermediate	31	68.532	330
369	Angle	33.2	66.003	350
370	Intermediate	35	71.156	367
371	Angle	29.2	69.696	340
372	Intermediate	35	70.654	335
373	Angle	29.2	75.664	262

Tower Number	Type of Tower	Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
374	Intermediate	31	76.94	283
375	Angle	29.2	73.054	242
376	Intermediate	32	70.853	388
377	Intermediate	32	74.452	297
378	Intermediate	31	75.321	355
379	Intermediate	35	73.006	193
380	Angle	33.2	74.505	351
381	Intermediate	35	80.242	416
382	Intermediate	37	71.914	330
383	Intermediate	39	73.072	396
384	Intermediate	35	73.718	265
385	Intermediate	31	77.033	353
386	Intermediate	35	73.655	230
387	Intermediate	39	75.11	412
388	Intermediate	38	84.342	415
389	Intermediate	39	78.974	335
390	Intermediate	43	76.391	297
391	Intermediate	43	76.878	354
392	Angle	29.2	83.285	248
393	Intermediate	31	88.5	281
394	Intermediate	31	89.979	362
395	Intermediate	39	98.195	366
396	Intermediate	31	121.979	249
397	Intermediate	31	127.16	278
398	Intermediate	35	122.316	413
399	Intermediate	43	124.903	376
400	Intermediate	39	132.238	322
401	Angle	35.2	131.098	278

61 The line width of the proposed 400 kV IVI tower is approximately 19m (see **Figure 6.29**). This is measured from outer conductor to outer conductor.

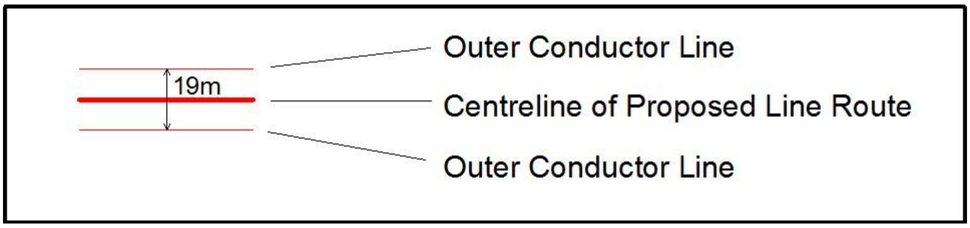


Figure 6.29: Line Width Measurement

6.3.3.3 Towers along the Existing 400 kV Line

62 The proposed development also includes approximately 2.85km of the new circuit supported on existing 400 kV double circuit towers. One side of these towers is currently in use supporting the existing Oldstreet to Woodland 400 kV circuit; the other side is spare and available for the proposed development. The existing tower height details are provided in **Table 6.3**, and one of the intermediate towers is illustrated in **Figure 6.30**.

Table 6.3: Tower Heights for the Existing Oldstreet to Woodland Line

Existing Tower Number	Existing Type of Tower	Existing Tower Height (m)	Elevation (mAOD)	Overhead Line Span to next Tower (m)
402	Double Circuit	52.5	138.208	312
403	Double Circuit	60.8	125.942	420
404	Double Circuit	60.8	114.371	388
405	Double Circuit	56.8	114.100	352
406	Double Circuit	56.8	119.499	342
407	Double Circuit	56.8	108.142	340
408	Double Circuit	57.8	101.279	372
409	Double Circuit	56.8	100.638	254
410	Double Circuit	52.5	97.523	68m to substation

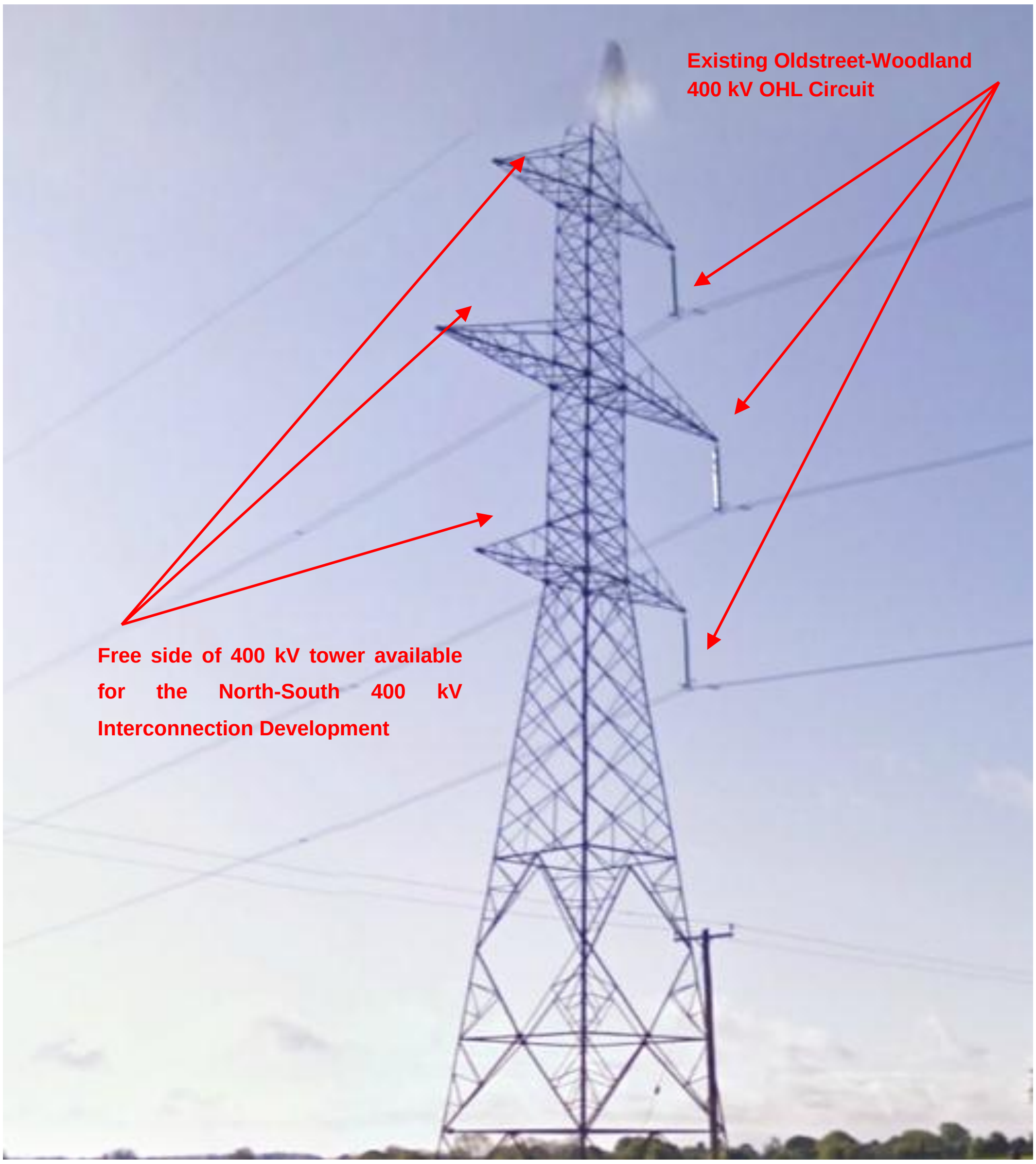


Figure 6.30: Existing 400 kV Double Circuit Tower near Woodland Substation

63 The proposed works and construction activities associated with utilising the free side of the existing Oldstreet-Woodland 400 kV OHL for a distance of 2.85km are described in **Chapter 7** of this volume of the EIS.

6.3.3.4 Modifications to Existing 110 kV Transmission Overhead Lines

64 The proposed development also includes modifications to the existing Lisdrum-Louth 110 kV, Louth-Rathrussan 110 kV and Arva-Navan 110 kV OHL transmission lines. These advance modifications will be required to ensure that there is sufficient electrical safety clearances maintained between the 110 kV OHL and 400 kV conductor at the point of crossing. The modifications involve lowering the height of the existing 110 kV transmission lines, at the point of the crossing of the proposed 400 kV route. This will be achieved by the insertion of additional wood polesets and / or the replacement of existing structures with wood polesets that are lower in height, as follows:

- Where the proposed 400 kV overhead transmission line intersects with the Lisdrum–Louth 110 kV transmission line the insertion of two new polesets (approximately 14m and 16m high) is proposed. In addition an existing 17.7m high poleset will be replaced by a new poleset approximately 12m high.

- Where the proposed 400 kV overhead transmission line intersects with the Louth-Rathrussan 110 kV transmission line an existing 19.6m high lattice steel tower and an existing 19.7m high poleset will both be replaced by new polesets (both approximately 19m high).

- Where the proposed 400 kV overhead transmission line intersects with the Arva-Navan 110 kV transmission line two existing polesets (14.7m and 15.7m high) will be replaced by two new polesets (both approximately 14m high).

65 New poleset heights range from approximately 11.5m to 19m. Polesets are measured above ground level to the tallest point. Small variances in measurement will naturally arise with uneven ground conditions. A list of polesets, their locations and heights is included **Table 6.4**, and a poleset is illustrated in **Figure 6.31**.

66 A list of polesets, their locations and heights is included in **Table 6.4**.

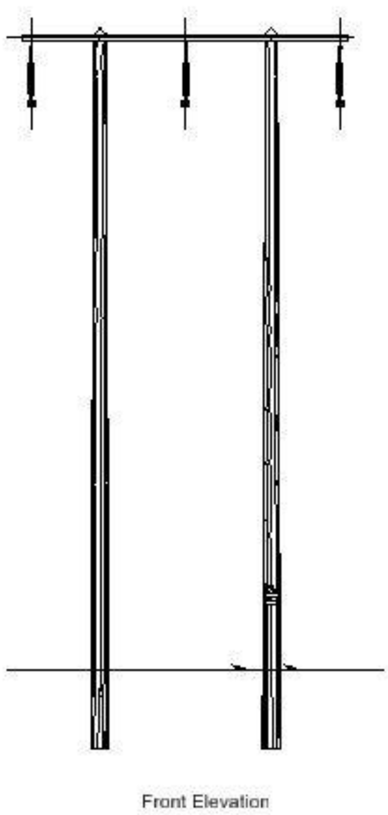


Figure 6.31: Proposed 110 kV Poleset

(Not to be scaled - for illustrative purposes only)

Table 6.4: Poleset Heights for 110 kV alterations

Structure Number	Structure Type	Existing	New Structure Height above ground (m)	Elevation (mAOD)	Overhead Line Span to next Structure (m)
Lisdrum – Louth 110 kV Line					
55	Existing Poleset	18.7	N/A	124.431	141
55a	New Poleset	N/A	15.7	130.490	115
56	New Poleset	17.7	11.7	137.821	95
56a	New Poleset	N/A	13.7	132.615	145
57	Existing Poleset	19.7	N/A	124.461	246
Louth - Rathrussan 110 kV Line					
99	Existing Tower	19.6	N/A	145.361	273
100	New Poleset	19.7	18.7	143.961	210
101	New Poleset	19.6	18.7	142.849	239
102	Existing Poleset	18.7	N/A	152.585	231
Arva – Navan 110 kV Line					
313	Existing Poleset	14.7	N/A	44.146	278
314	New Poleset	14.7	13.7	47.595	155
315	New Poleset	15.7	13.7	53.815	207
316	Existing Poleset	16.7	N/A	57.205	142

6.3.3.5 Tower Material

67 The towers are made from galvanised steel and are grey in colour. The towers may be (re) painted matt grey at intervals throughout the life of the towers as protection against corrosion.

6.3.3.6 Fixing of Tower Positions

68 The line design for the proposed development identifies fixed tower structure positions for the new transmission circuit. This provides clarity to landowners and other interested parties on the location of the OHL and associated infrastructure relative to particular landholdings, nearby dwellings, buildings, other structures and considerations such as environmental constraints.

Accordingly, EirGrid is not seeking any approval for ‘micro-siting’ (small deviations from the locations) of structures proposed in the application.

6.3.4 Works within the Substation Site

69 An extension of the existing Woodland Substation is necessary to allow the connection of the new 400 kV circuit. The existing substation has a total size of approximately 7.7ha, located within ESB’s overall landholding in this area of approximately 27.2ha. The proposed works will take place on a site of approximately 0.544ha within and immediately adjacent to the substation and include:

- A western extension of the existing compound (approximately 0.231ha). The approximate location of the works is identified on **Figure 6.32**;
- Erection of a gantry structure to allow the OHL entry into Bay E10 at the north western corner of the substation (18m high to insulator chain connection; 28m to Franklin tip / lightning rod height);
- Erection of 2 No. new gantry structures located each side of the existing corridor (18m high to insulator chain connection; 28m to Franklin tip height);
- An extension to the existing 400 kV busbar to accommodate new 400 kV bay at location E10;
- New 400 kV line bay including the provision of the following electrical equipment;
    - Installation of 1 No. Circuit Breaker (7.398m high);
    - Installation of 3 No. Current Transformers (8.175m high);
    - Installation of 3 No. Inductive Voltage Transformers (8.175m high);
    - Installation of 3 No. Disconnectors with Earth Connections (7.67m high);
    - Installation of 6 No. Pantograph Disconnecting Switch with Earthing switch (13.70m high);
    - Installation of 3 No. Surge Arresters (8.70m high);
    - Installation of 6 No. Support Insulator Bars (13.70m high); and
    - Installation of 5 No. Support Insulators (13.70m high).

- Extension of the existing substation palisade fencing (2.6m high) to accommodate the works;
- Installation of 1 No. Lightning monopole to protect Bay E10 (28m to Franklin tip / lightning rod height); and
- Construction of additional land drains to connect to the existing drainage network via a proposed new surface water manhole.

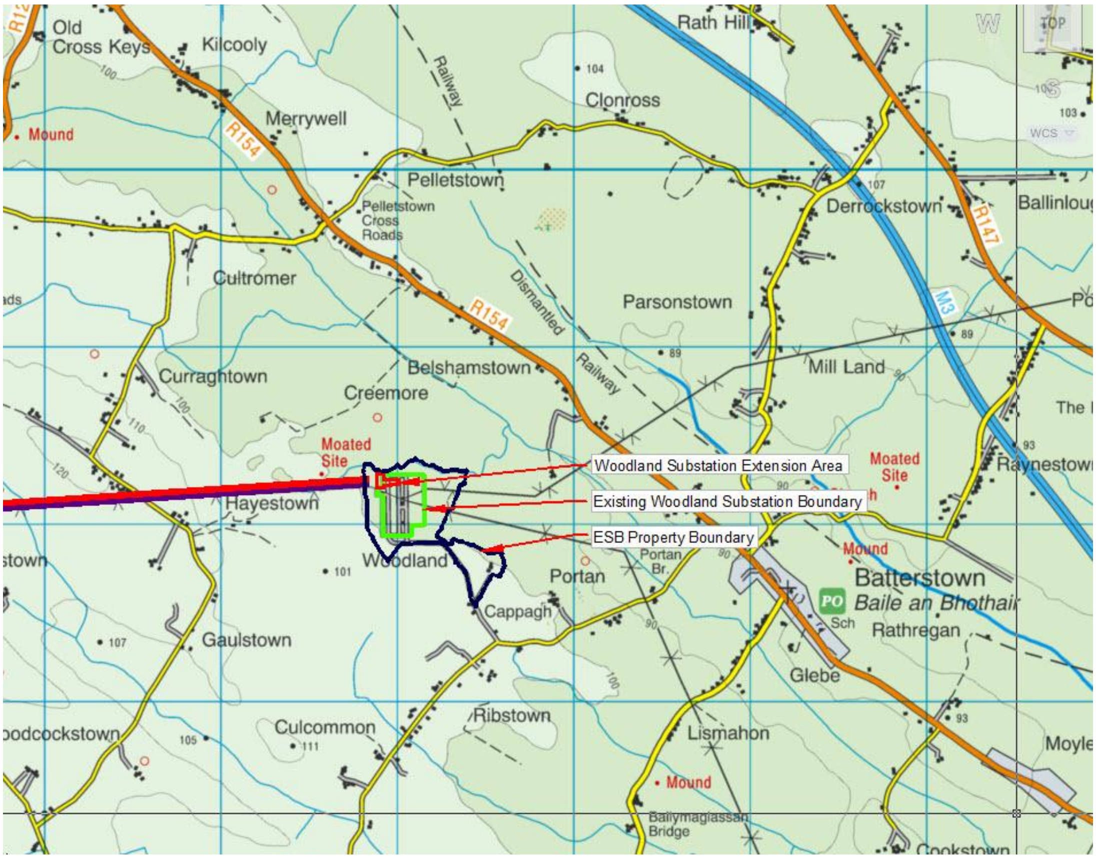


Figure 6.32: Location of Works to Woodland Substation (in red)

6.4 OPERATIONAL ACTIVITIES

6.4.1 Overhead Lines

70 Maintenance patrols will be completed on the proposed transmission line once the proposed 400 kV route has been commissioned. These will include an annual visual survey by helicopter, a climbing patrol every eight years (frequency increases 40 years post energisation to once every six years) and an infrared patrol by helicopter, one year post energisation and once every five years thereafter. Follow up foot patrols may be completed to specific sites upon completion of a helicopter patrol. A conductor sag check is also completed 20 years post energisation in

the same year a climbing patrol is completed. Emergency maintenance patrols may also be required following severe storms. Arising from these patrols, corrective maintenance work may be identified as being required. The type of corrective maintenance required varies from replacement of worn or damaged hardware, insulators or earthwire straps to timber cutting. Access to lands will be required on these occasions and shall occur in accordance with the relevant ESB/IFA Code of Practice and relevant statutory provisions. ESB also provides advance notification to landowners in advance of helicopter patrols occurring.

71 It is the responsibility of ESB to keep trees and high hedges cut, to ensure a requisite level of electrical clearance to the line and more particularly to avoid any possible danger to people. The amount of cutting will normally be sufficient for a few years growth; however, care is taken to minimise impacts and potential damage to shelter belts.

72 Further detail on the maintenance of the OHL and towers is provided in **Chapter 7** of this volume of the EIS.

6.4.2 Woodland 400 kV Substation

73 The operation of the Woodland 400 kV Substation will be similar to that currently occurring – the proposed development will essentially comprise a new bay within the existing substation. Woodland Substation is normally unmanned with the equipment operated by remote control. Visits to site by operational staff will generally be confined to weekly visits for routine plant inspection. Access for maintenance, which may require the use of a truck, will normally be limited to once per annum.