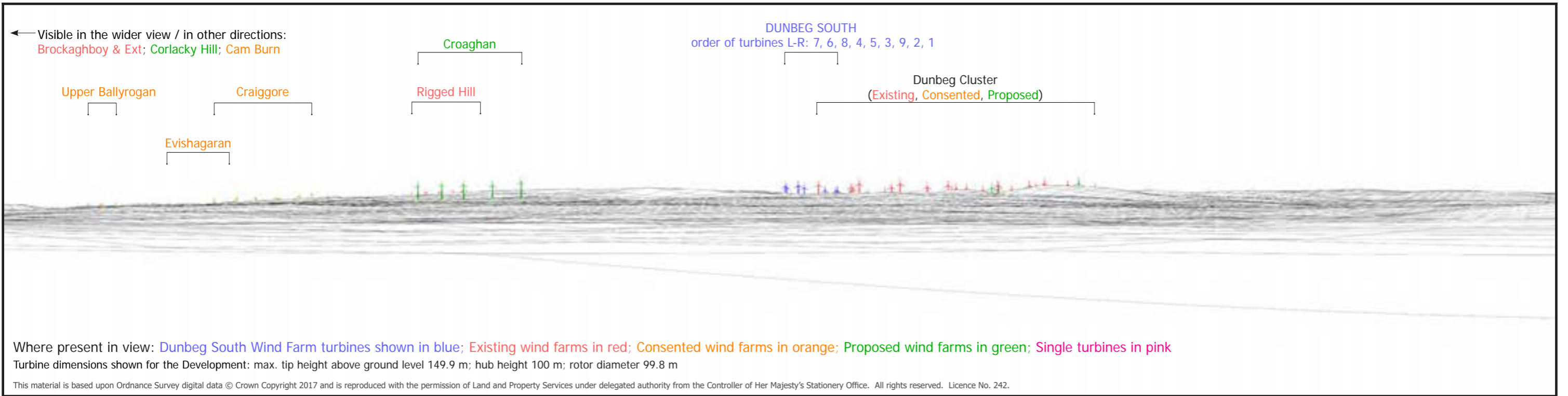


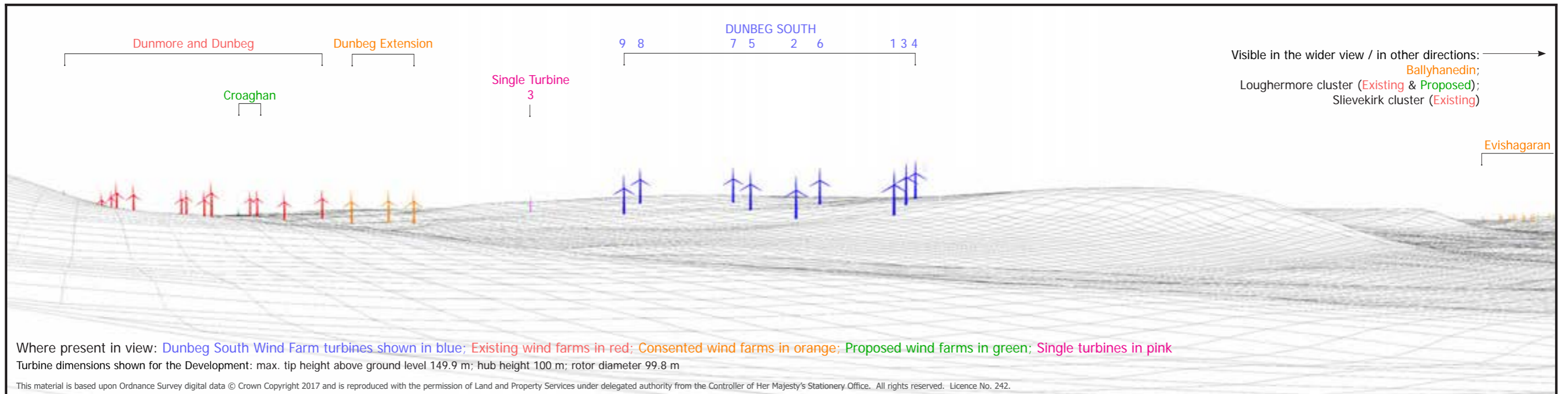
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.22 VIEWPOINT 8: BALLINAREES ORANGE HALL, B201, WINDYHILL ROAD		Easting: 278852 Northing: 430214 Elevation A.O.D: 137 m Bearing: 224.80 ° Approx. Included Angle: 80 ° Approx. distance to nearest turbine: 6.44 km to T8		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: A	THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.22 VP8 RevA_01117.indd</small>				

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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM		Easting: 282877 Northing: 432492 Elevation A.O.D: 50 m Bearing: 230.94 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 10.89 km to T8		
	FIGURE 4.23 VIEWPOINT 9: B201, WINDYHILL ROAD NEAR COLERAINE				
LANDSCAPE AND VISUAL IMPACT ASSESSMENT					
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.				

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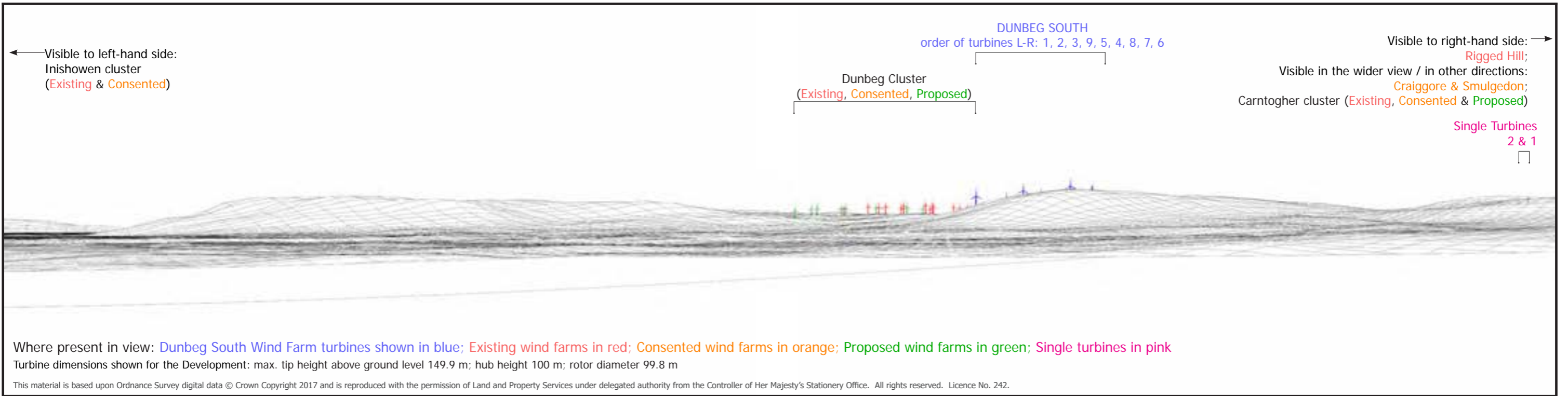
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM		Easting: 270487 Northing: 427688 Elevation A.O.D: 168 m Bearing: 128.67 ° Approx. Included Angle: 80 ° Approx. distance to nearest turbine: 3.59 km to T1		
	FIGURE 4.24 VIEWPOINT 10: BINEVENAGH SCENIC DRIVE NEAR LISNAGRIB				
LANDSCAPE AND VISUAL IMPACT ASSESSMENT					
DRAWN / APPROVED: SMC / GM DATE: Dec. 2017 PRINT SIZE: A3 REVISION: C	NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.				

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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.25 VIEWPOINT 11: BINEVENAGH LAKE VIEWPOINT		Easting: 268722 Northing: 430622 Elevation A.O.D: 378 m Bearing: 136.53 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 7.02 km to T1		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT				
DRAWN / APPROVED: SMc / GM DATE: Dec. 2017 PRINT SIZE: A3 REVISION: C	NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.				

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LANDSCAPE AND VISUAL IMPACT ASSESSMENT

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SMc/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.26 VP12 RevB_21117.indd

DUNBEG SOUTH WIND FARM

FIGURE 4.26

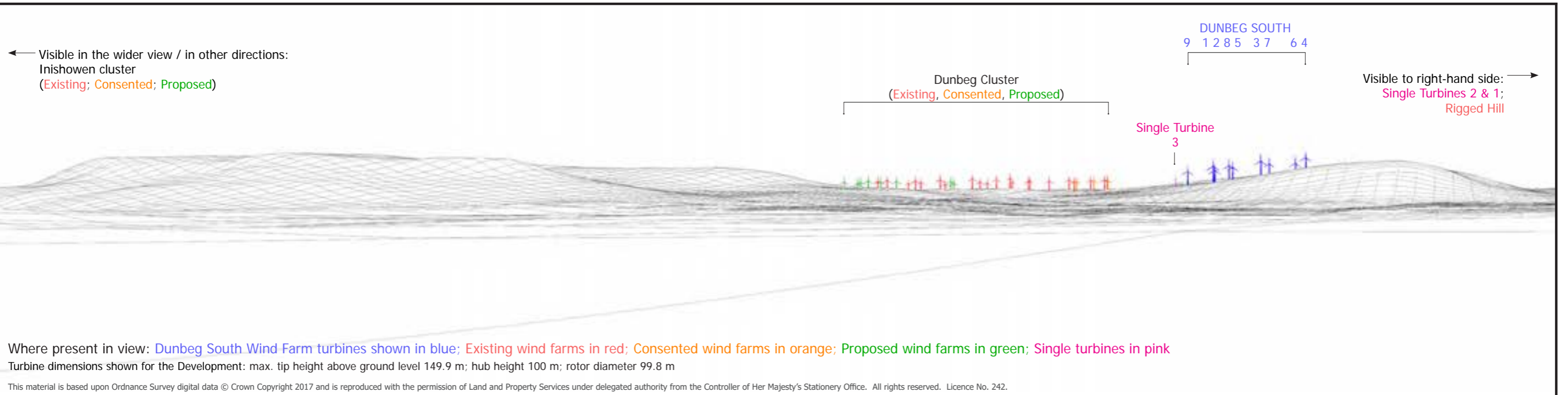
**VIEWPOINT 12:
DOGLEAP ROAD, ROE VALLEY
COUNTRY PARK ENVIRONS**

Easting:	267261
Northing:	419671
Elevation A.O.D	77 m
Bearing:	50.16 °
Approx. Included Angle:	75 °
Approx. distance to nearest turbine:	8.09 km to T3



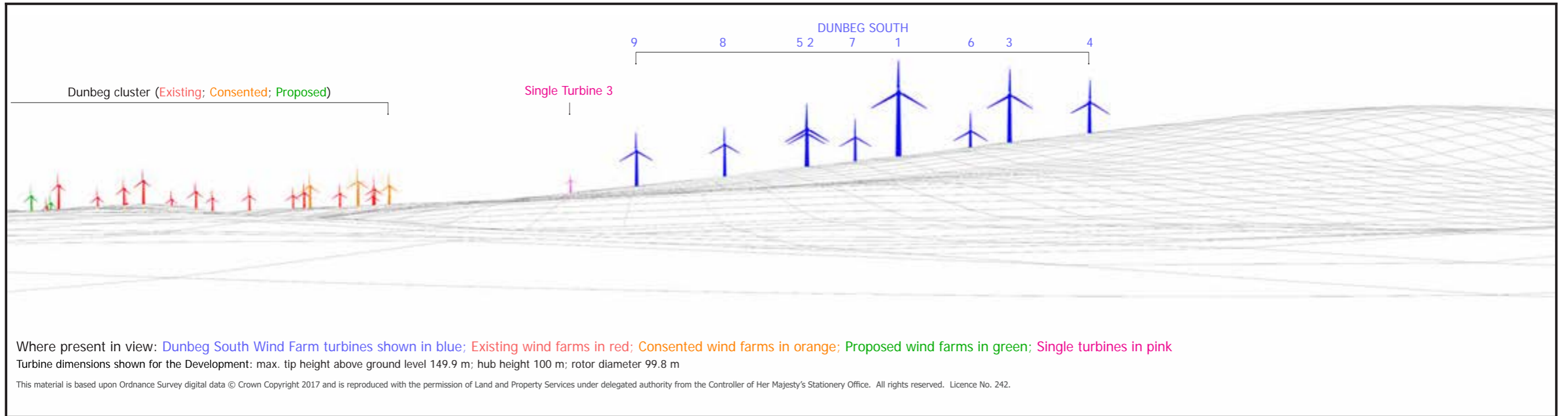
NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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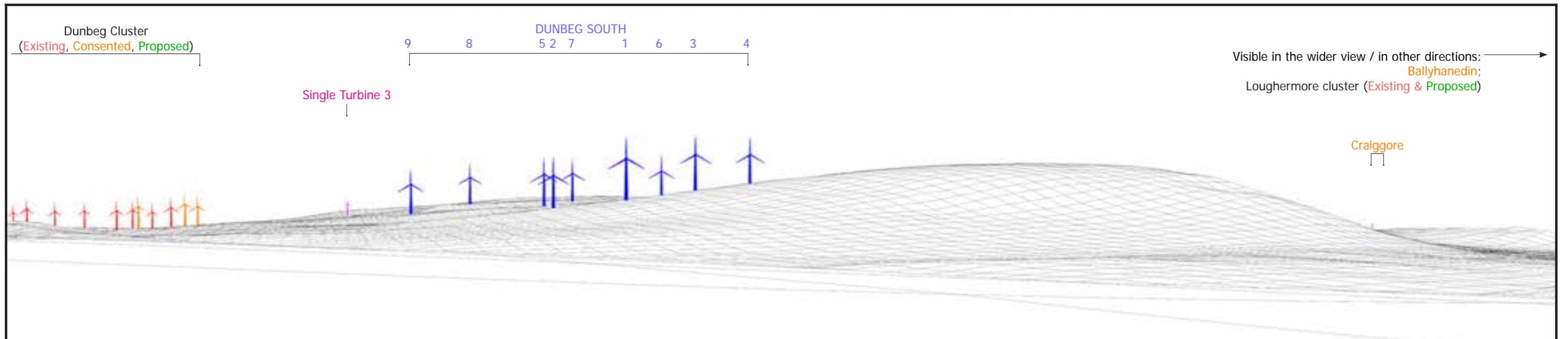
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.27 VIEWPOINT 13: A2 SCENIC ROUTE NEAR SEACOAST ROAD GARDEN CENTRE		Easting: 266355 Northing: 423789 Elevation A.O.D: 22 m Bearing: 76.46 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 6.90 km to T1		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
DRAWN / APPROVED: SMC / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	<small>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</small> <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.27 VP13 RevB_21117.indd</small>				

CONSENTED (LA01/2018/0200/F)



Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM		Easting: 271568 Northing: 425634 Elevation A.O.D: 61 m Bearing: 100.97 ° Approx. Included Angle: 80 ° Approx. distance to nearest turbine: 1.64 km to T1		
	FIGURE 4.28 VIEWPOINT 14: BOLEA ROAD MIDDLE		THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.28 VP14 RevB_21117.indd</small>		

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Where present in view: Dunbeg South Wind Farm turbines shown in blue; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

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LANDSCAPE AND VISUAL IMPACT ASSESSMENT

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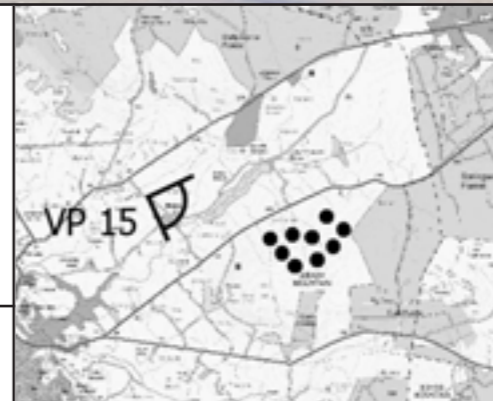
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SMc/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.29 VP15 RevC_051217.indd

DUNBEG SOUTH WIND FARM

FIGURE 4.29

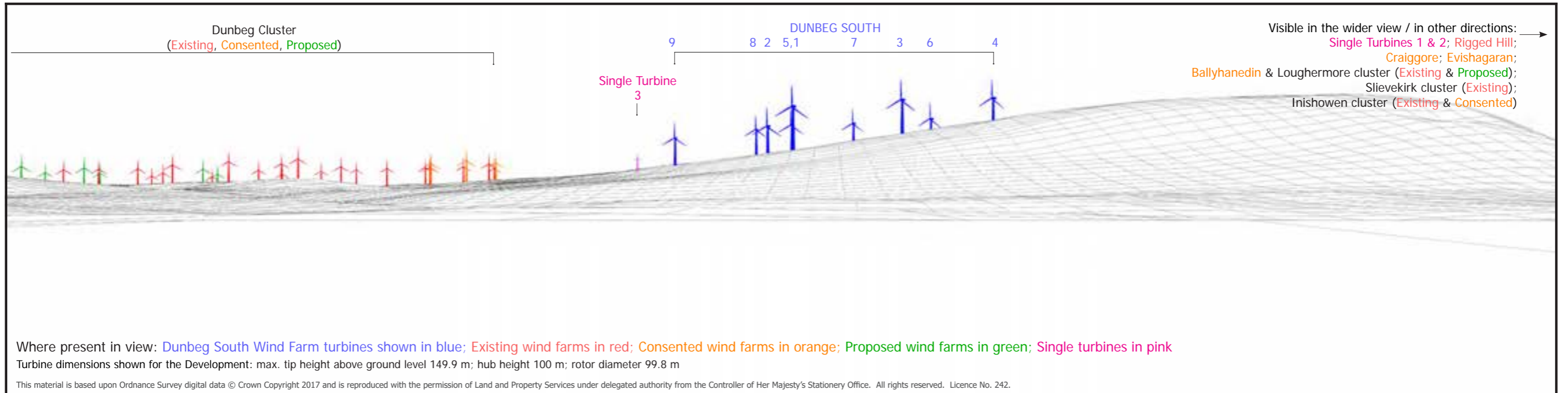
**VIEWPOINT 15:
DRUMALIEF ROAD OFF B201**

Easting:	270821
Northing:	425971
Elevation A.O.D	70 m
Bearing:	104.30 °
Approx. Included Angle:	80 °
Approx. distance to nearest turbine:	2.43 km to T1



NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

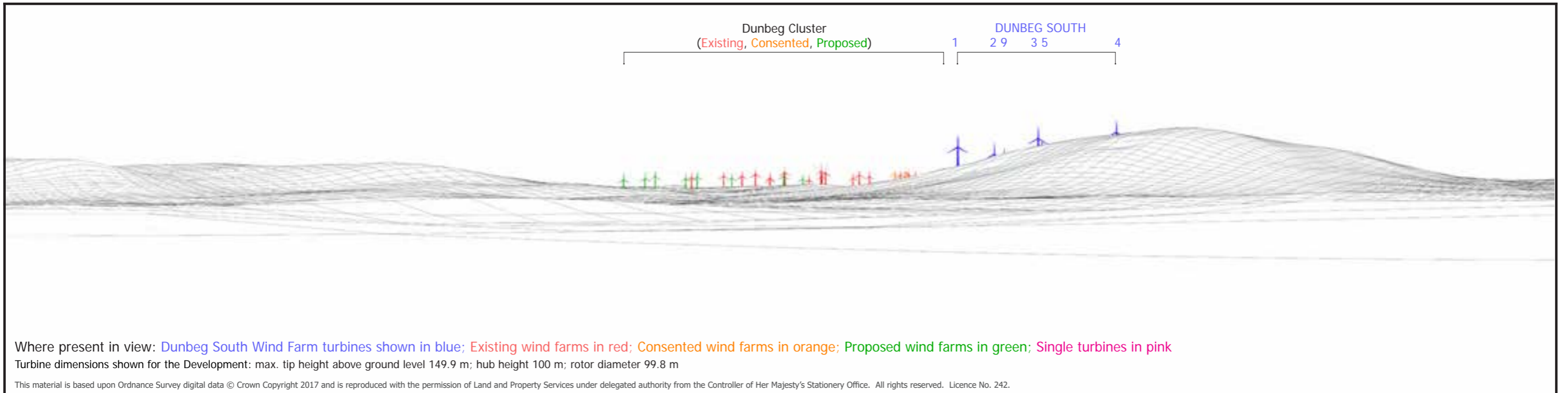
CONSENTED (LA01/2018/0200/F)



Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.30 VIEWPOINT 16: BOLEA ROAD NEAR DERAMORE PRESBYTERIAN CHURCH		Easting: 270653 Northing: 425169 Elevation A.O.D: 52 m Bearing: 89.67 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 2.51 km to T1		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION SMc/ 15 029 02/ SMcDwggs/ DBS_LVIA Fig 4.30 VP16 RevC_051217.indd		

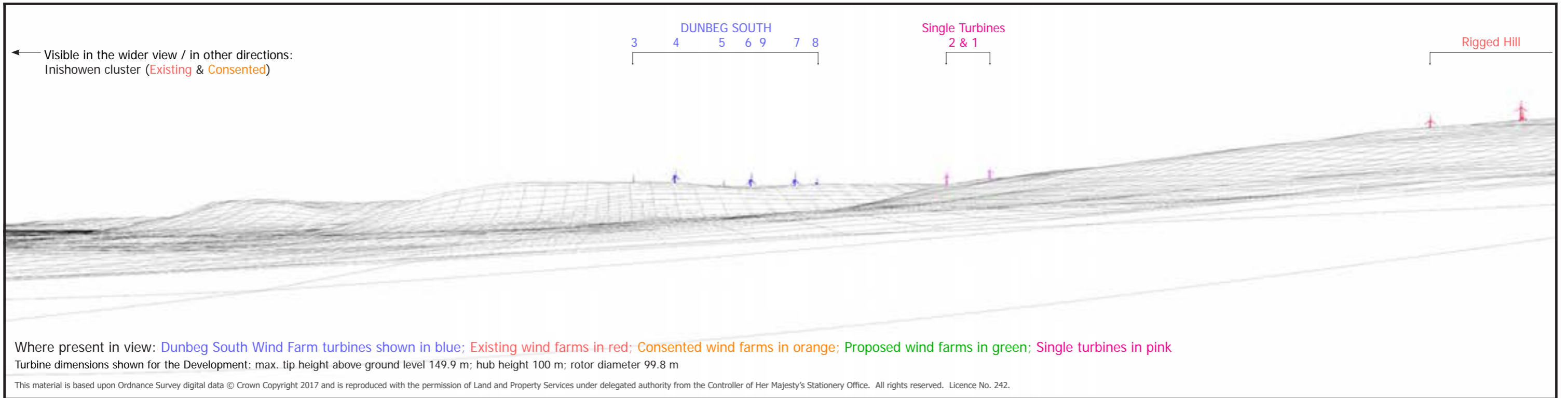
NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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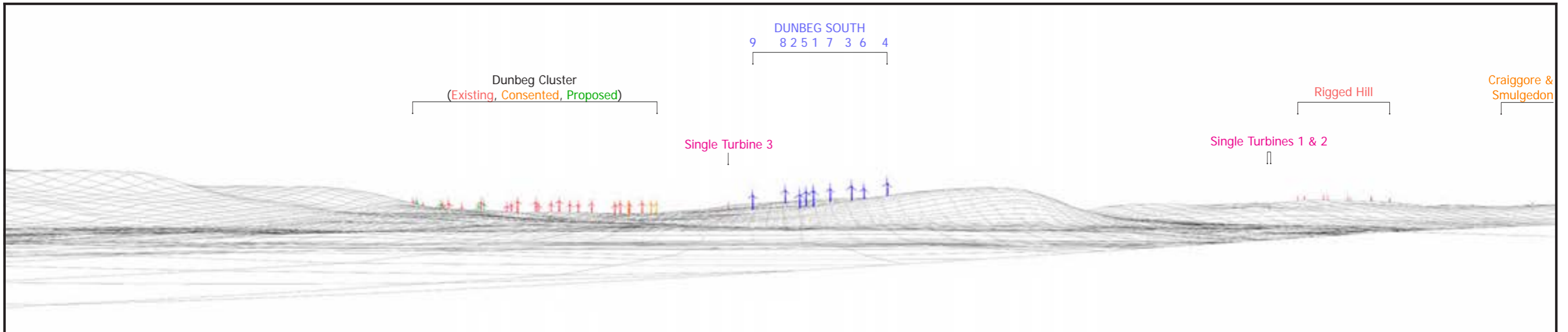
<p>Shanti McAllister landscape planning and design</p> <p>info@shantimcallister.co.uk www.shantimcallister.co.uk</p>	<p>DUNBEG SOUTH WIND FARM</p> <p>FIGURE 4.31</p> <p>VIEWPOINT 17: DRUMMOND CRICKET CLUB, DRUMSURN ROAD</p>	<p>Easting: 269276 Northing: 422651 Elevation A.O.D: 34 m Bearing: 61.11 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 4.65 km to T1</p>										
<p>LANDSCAPE AND VISUAL IMPACT ASSESSMENT</p>												
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DRAWN / APPROVED:	DATE:	PRINT SIZE:	REVISION:									
SMc / GM	Nov. 2017	A3	B									
<p>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</p> <p>SMc/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.31 VP17 RevB_21117.indd</p>	<p>NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.</p>											

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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.32 VIEWPOINT 18: GORTNARNEY ROAD NEAR DRUMSURN		Easting: 273271 Northing: 418367 Elevation A.O.D: 137 m Bearing: 5.25 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 6.08 km to T4		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.32 VP18 RevB_21117.indd</small>				

CONSENTED (LA01/2018/0200/F)



Where present in view: Dunbeg South Wind Farm turbines shown in blue; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

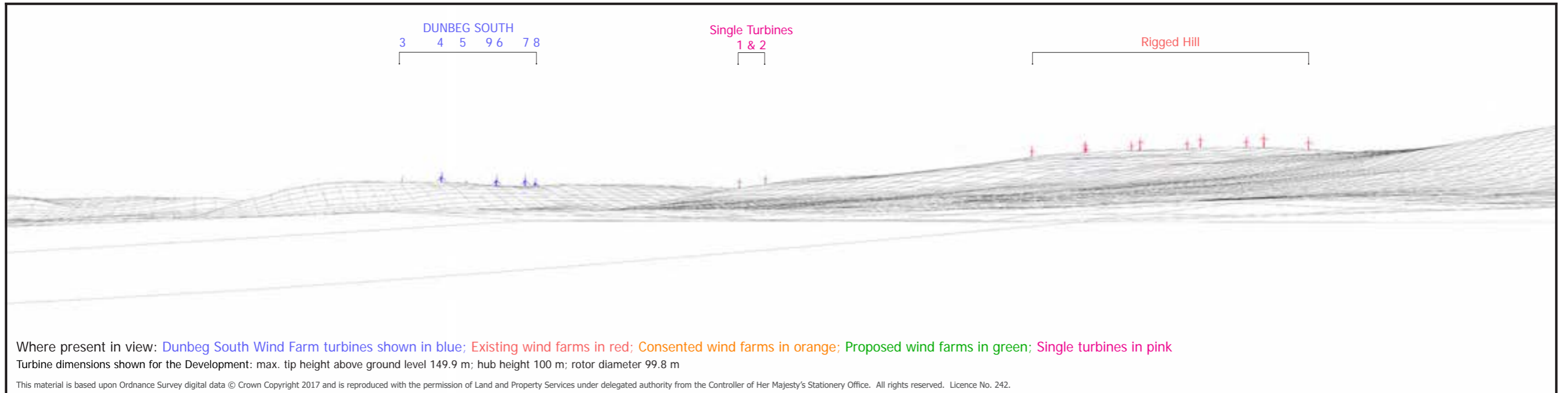
Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

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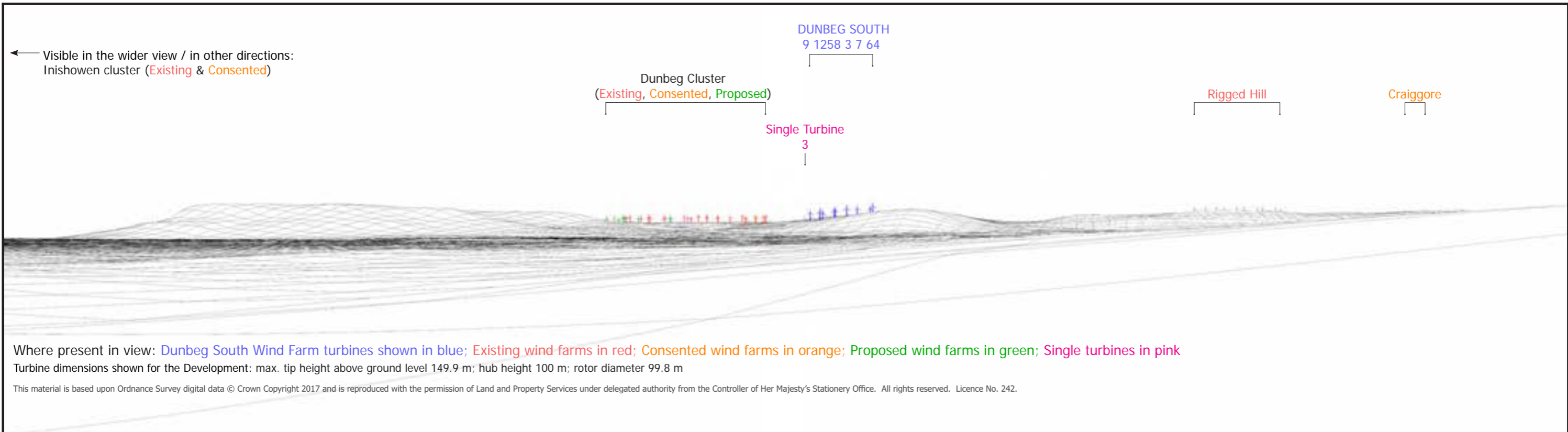
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.33 VIEWPOINT 19: SEACOAST ROAD NEAR BALLYKELLY		Easting: 266015 Northing: 425472 Elevation A.O.D: 14 m Bearing: 92.07 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 7.10 km to T1		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.33 VP19 RevB_21117.indd</small>				

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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.34 VIEWPOINT 20: DRUMSURN VILLAGE AT FIR ROAD		Easting: 271776 Northing: 417278 Elevation A.O.D: 90 m Bearing: 14.84 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 7.70 km to T4		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
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LANDSCAPE AND VISUAL IMPACT ASSESSMENT

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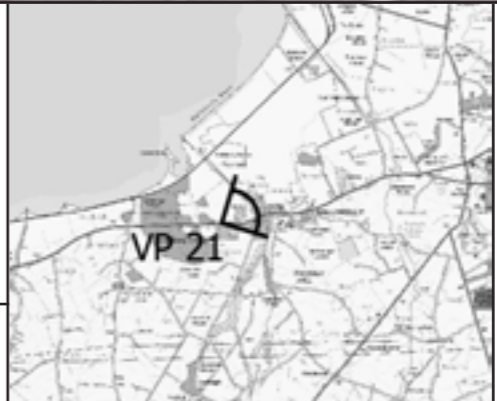
SMc/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.35 VP21 RevB_21117.indd

DUNBEG SOUTH WIND FARM

FIGURE 4.35

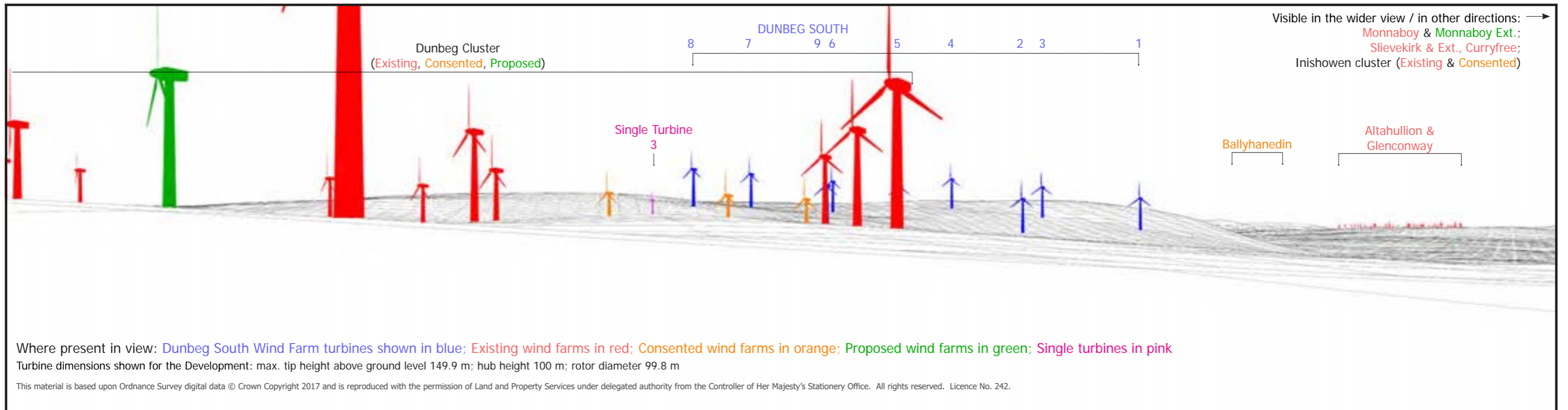
**VIEWPOINT 21:
FOYLE WAY NEAR RIVERVIEW HOUSING DEVELOPMENT, A2, BALLYKELLY TOWN**

Easting:	261822
Northing:	422139
Elevation A.O.D	30 m
Bearing:	75.80 °
Approx. Included Angle:	80 °
Approx. distance to nearest turbine:	11.74 km to T1



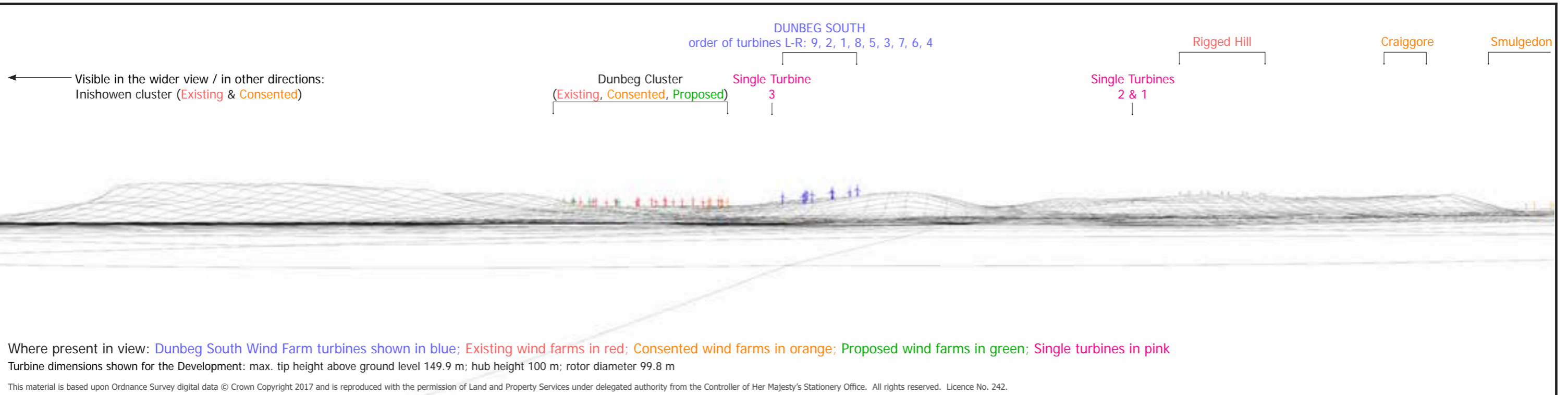
NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

CONSENTED (LA01/2018/0200/F)



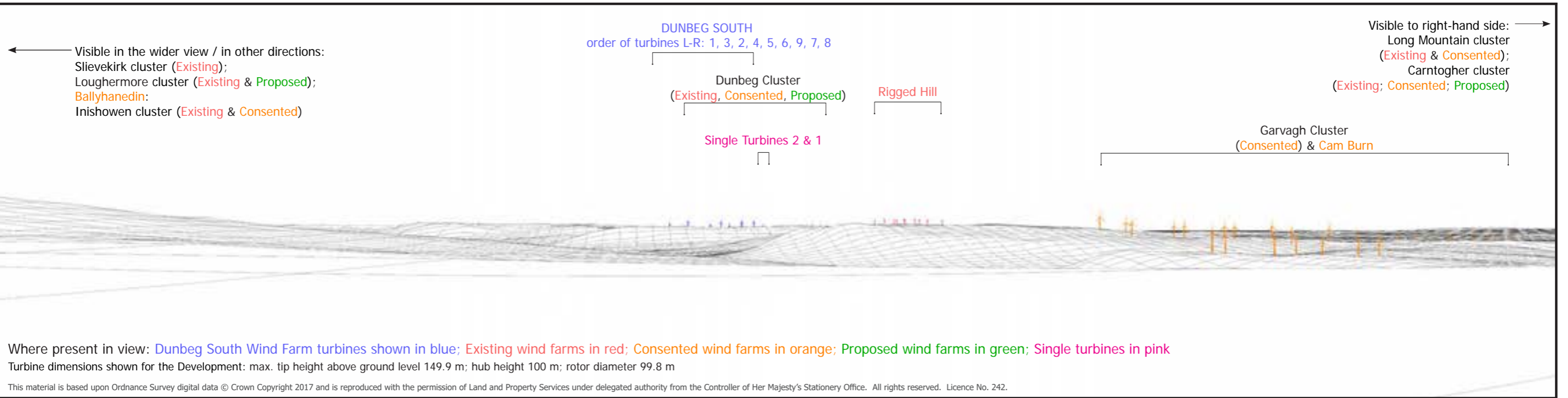
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.36 VIEWPOINT 22: BOLEA ROAD UPPER NEAR DUNMORE WIND FARM SITE ENTRANCE		Easting: 274777 Northing: 428503 Elevation A.O.D: 226 m Bearing: 195.30 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 2.84 km to T9		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT	NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.			
DRAWN / APPROVED: SMC / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	<small>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</small> <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.36 VP22 RevB_21117.indd</small>				

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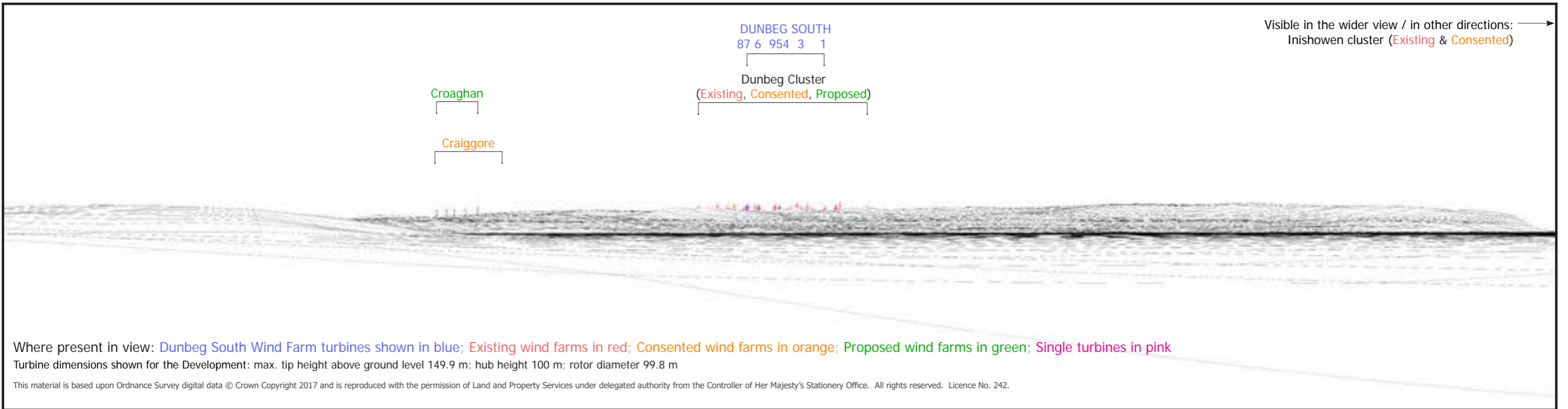
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.37 VIEWPOINT 23: BANK BIRD HIDE AND RAILWAY CROSSING NEAR BALLYKELLY		Easting: 261275 Northing: 423546 Elevation A.O.D: 6 m Bearing: 82.57 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 11.99 km to T1		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION <small>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.37 VP23 Revb_21117.indd</small>				



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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM		Easting: 272968 Northing: 410393 Elevation A.O.D: 421 m Bearing: 3.5 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 14.23 km to T4		
	FIGURE 4.38 VIEWPOINT 24: BENBRADAGH MOUNTAIN, ULSTER WAY				
LANDSCAPE AND VISUAL IMPACT ASSESSMENT					
DRAWN / APPROVED: SMC / GM	DATE: Dec. 2017	PRINT SIZE: A3	REVISION: C		
<small>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</small>		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.			

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<p>LANDSCAPE AND VISUAL IMPACT ASSESSMENT</p>											
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SMc / GM	Nov. 2017	A3	B								
<p>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</p> <p>SMc/ 15 029 02/ SMcDwggs/ DBS_LVIA Fig 4.39 VP25 RevB_21117.indd</p>											

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← Visible in the wider view / in other directions:
 Carntogher Cluster (Existing; Proposed)
 Long Mountain Cluster (Existing; Consented)

DUNBEG SOUTH
 order of turbines L-R: 6, 4, 7, 3, 8, 5, 9

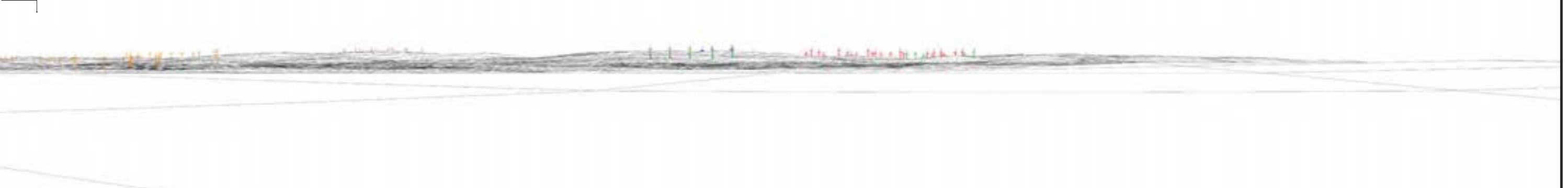
Garvagh Cluster
 (Consented) & Cam Burn

Rigged Hill

Croaghan

Dunbeg Cluster
 (Existing, Consented, Proposed)

Evishagaran



Where present in view: Dunbeg South Wind Farm turbines shown in blue; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

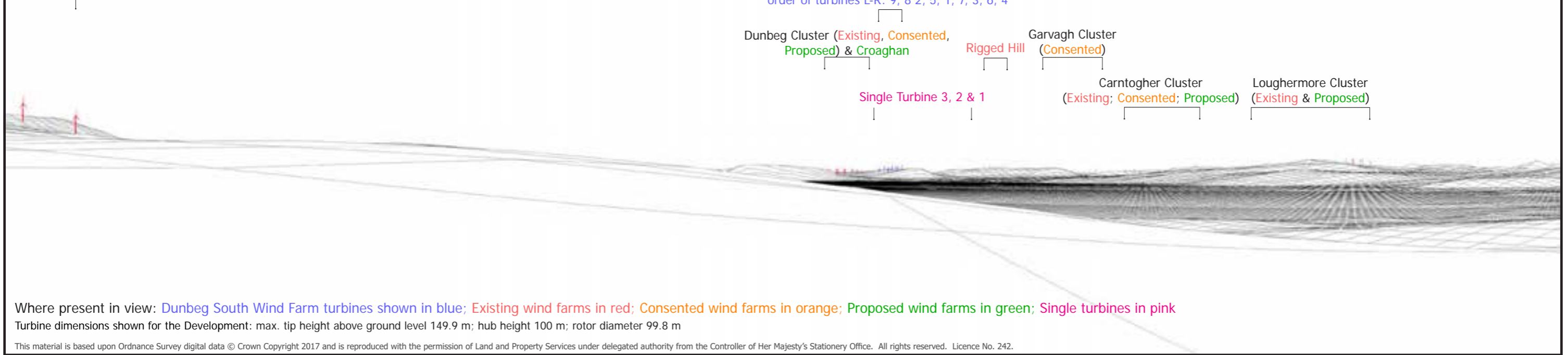
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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 4.40 VIEWPOINT 26: PARKING LAYBY ON A26 NEAR DAMHEAD (BELFAST-BOUND SIDE)		Easting: 289409 Northing: 429374 Elevation A.O.D: 32 m Bearing: 254.91 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 15.36 km to T8		
	LANDSCAPE AND VISUAL IMPACT ASSESSMENT		<p>NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.</p>		
DRAWN / APPROVED: SMc / GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: B	<p>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</p> <p>SMC/ 15 029 02/ SMCdwgs/ DBS_LVIA Fig 4.40 VP26 RevB_21117.indd</p>				

CONSENTED (LA01/2018/0200/F)

Inishowen cluster
(Existing & Consented)

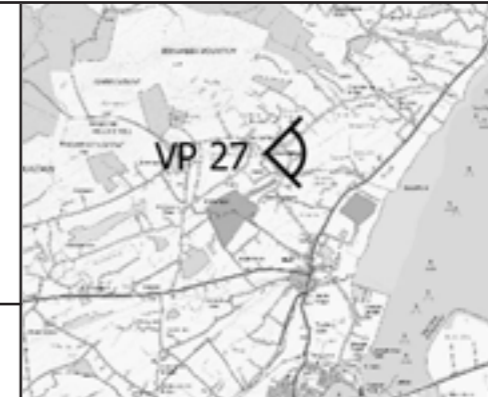


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DUNBEG SOUTH WIND FARM

FIGURE 4.41
VIEWPOINT 27:
ESKAHEEN, INISHOWEN,
CO. DONEGAL

Easting: 245770
Northing: 427105
Elevation A.O.D: 113 m
Bearing: 93.90 °
Approx. Included Angle: 75 °
Approx. distance to nearest turbine: 27.36 km to T1



LANDSCAPE AND VISUAL IMPACT ASSESSMENT			
DRAWN / APPROVED: SMc / GM	DATE: Dec. 2017	PRINT SIZE: A3	REVISION: C

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SMc/ 15 029 02/ SMcDwgs/ DBS_LVIA Fig 4.41 VP27 RevC_051217.indd

NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

CONSENTED (LA01/2018/0200/F)



5

Archaeology & Cultural Heritage



DUNBEG SOUTH WIND FARM

FIGURE 5.1
LOCATION OF PROPOSED
WIND FARM SITE

-  LAND UNDER APPLICANT CONTROL
-  PLANNING APPLICATION BOUNDARY



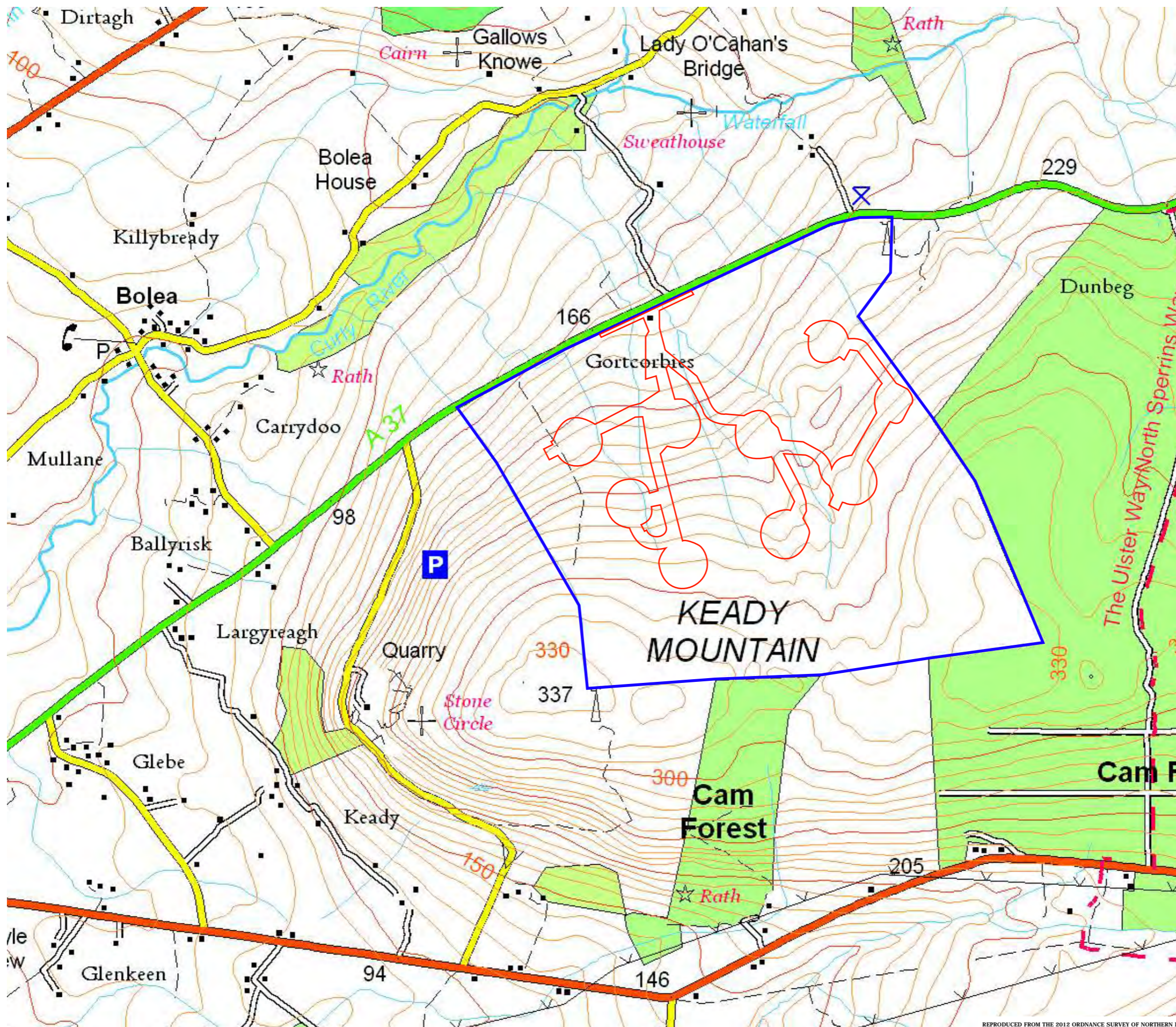
N/A N/A

N/A

0 800M

ENVIRONMENTAL STATEMENT
2017

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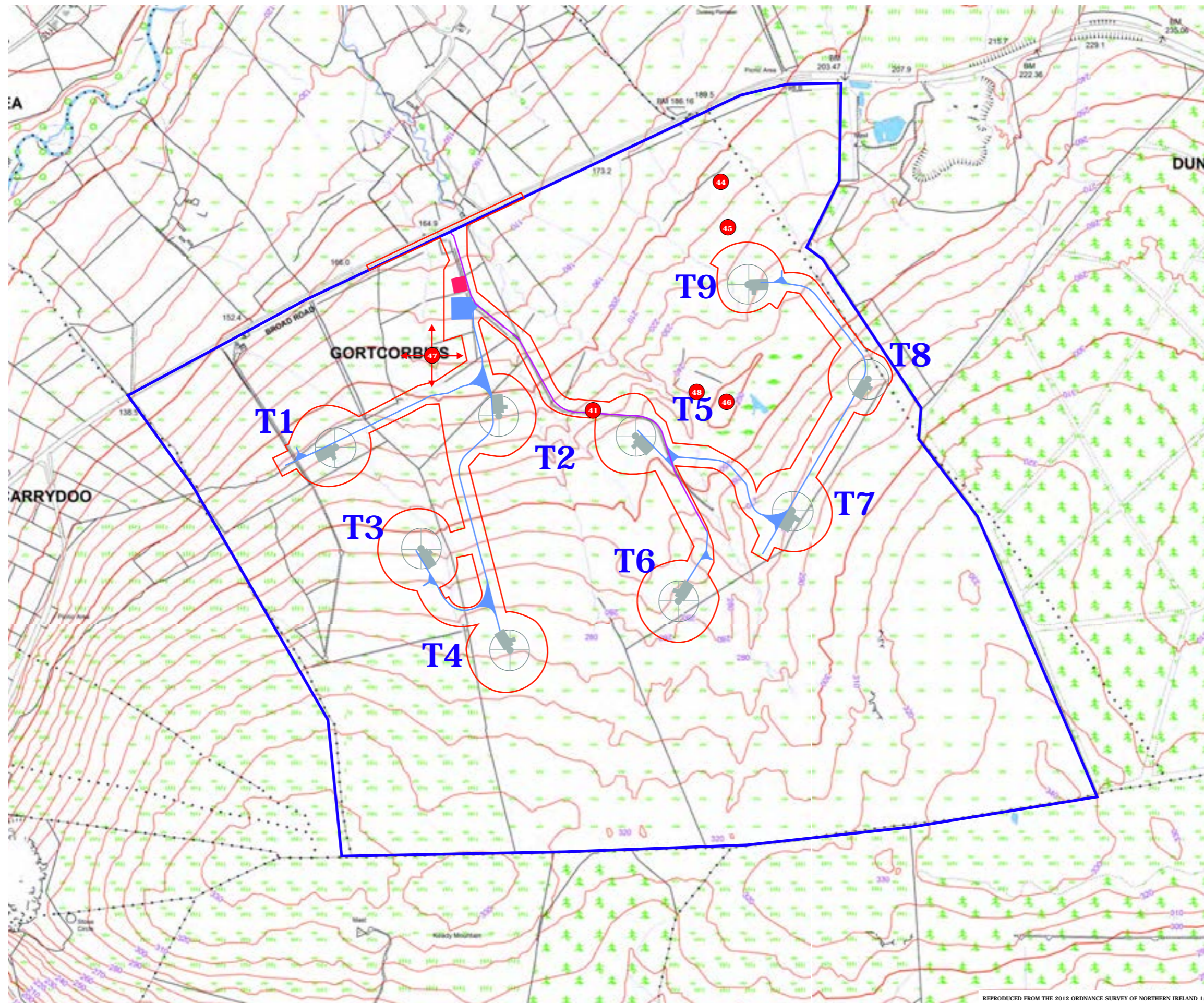
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DUNBEG SOUTH WIND FARM

FIGURE 5.2
LAYOUT OF PROPOSED WIND FARM SITE



-  LAND UNDER APPLICANT CONTROL
-  PLANNING APPLICATION BOUNDARY
-  SMR SITES



DATE	N/A	ISSUED TO	N/A
DRAWING NUMBER	N/A		
0 800M			

ENVIRONMENTAL STATEMENT
2017

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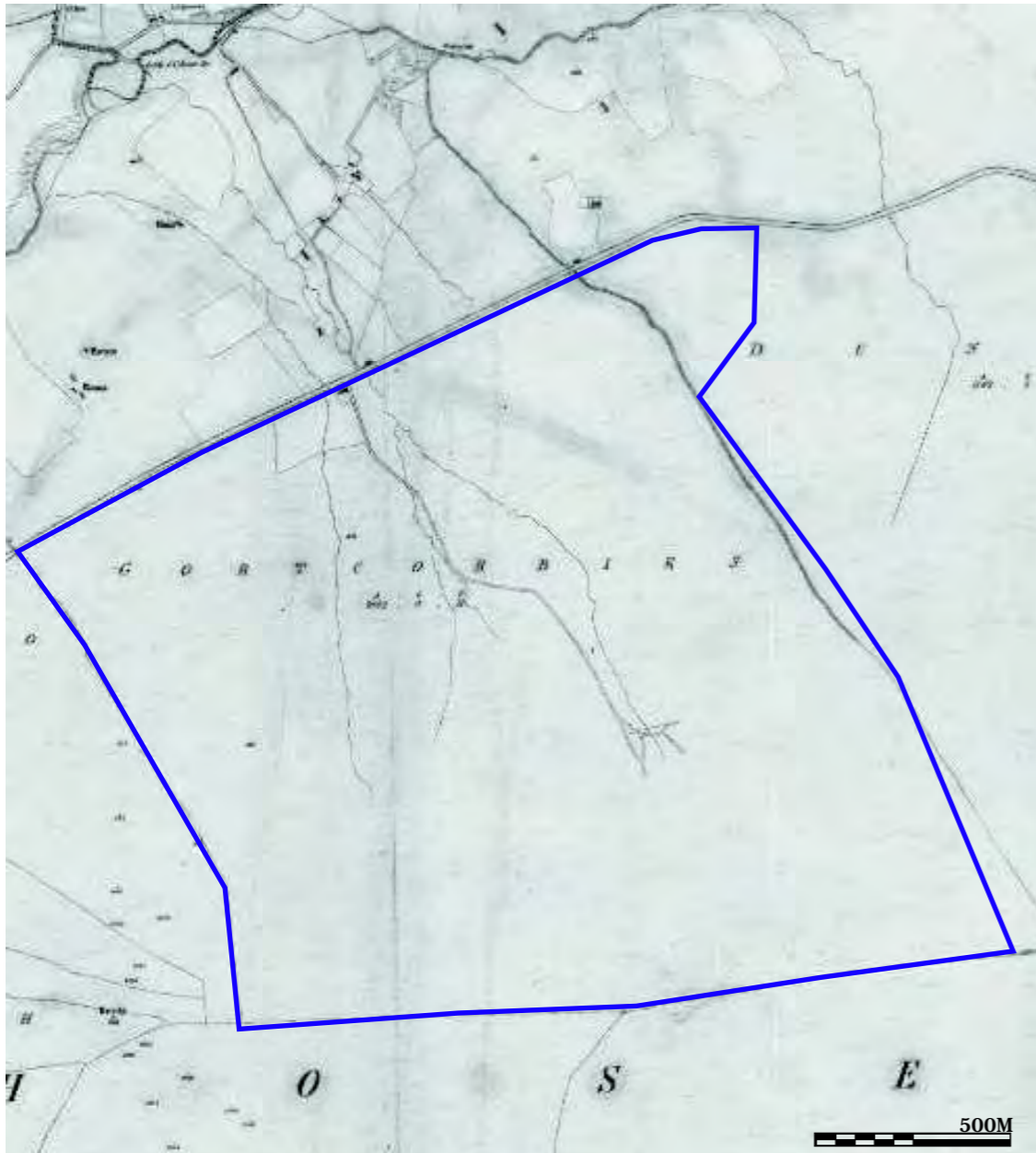
REPRODUCED FROM THE 2012 ORDNANCE SURVEY OF NORTHERN IRELAND 1:50,000 MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE. © CROWN COPYRIGHT 2012. LICENCE NUMBER 242

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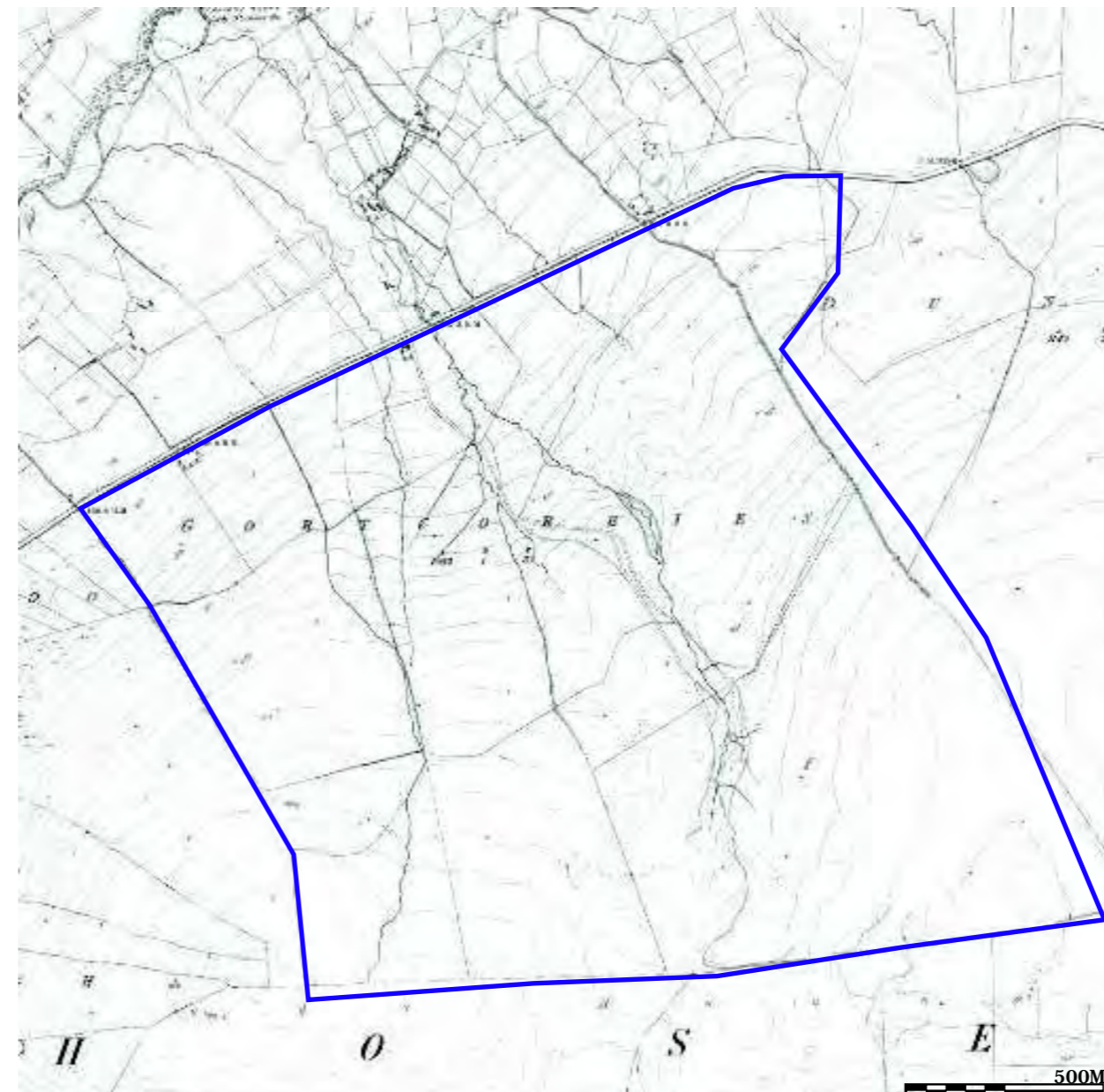


DUNBEG SOUTH WIND FARM

FIGURE 5.3
1ST AND 2ND EDITION OS
MAPS SHOWING LOCATION OF
DEVELOPMENT SITE



1ST EDITION OS MAP SHOWING LOCATION OF PROPOSED WIND FARM DEVELOPMENT



2ND EDITION OS MAP SHOWING LOCATION OF PROPOSED WIND FARM DEVELOPMENT



DWG03163D0001-04 PNIRcoh040

N/A

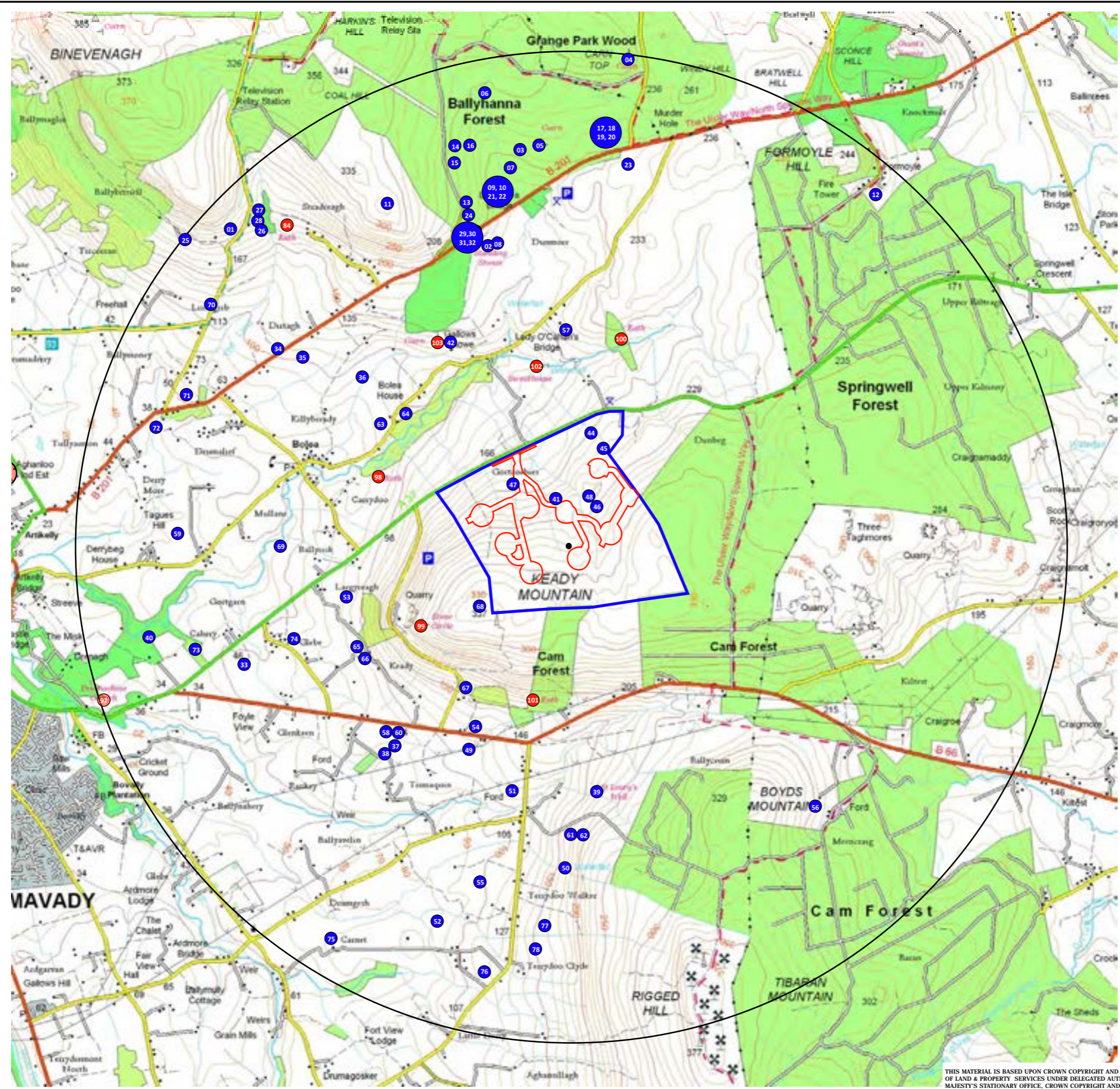
ENVIRONMENTAL STATEMENT
2017





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DUNBEG SOUTH WIND FARM

FIGURE 5.4
KNOWN ARCHAEOLOGICAL SITES, WITHIN 5KM OF THE PROPOSED APPLICATION SITE



-  LAND UNDER APPLICANT CONTROL
-  PLANNING APPLICATION BOUNDARY
-  ARCHAEOLOGICAL SITES OF REGIONAL IMPORTANCE
-  ARCHAEOLOGICAL SITES OF LOCAL IMPORTANCE



PROJECT DWG03163D0001-04 | DRAWING PNRc0h040

SCALE N/A

0 1.5KM

ENVIRONMENTAL STATEMENT
2017

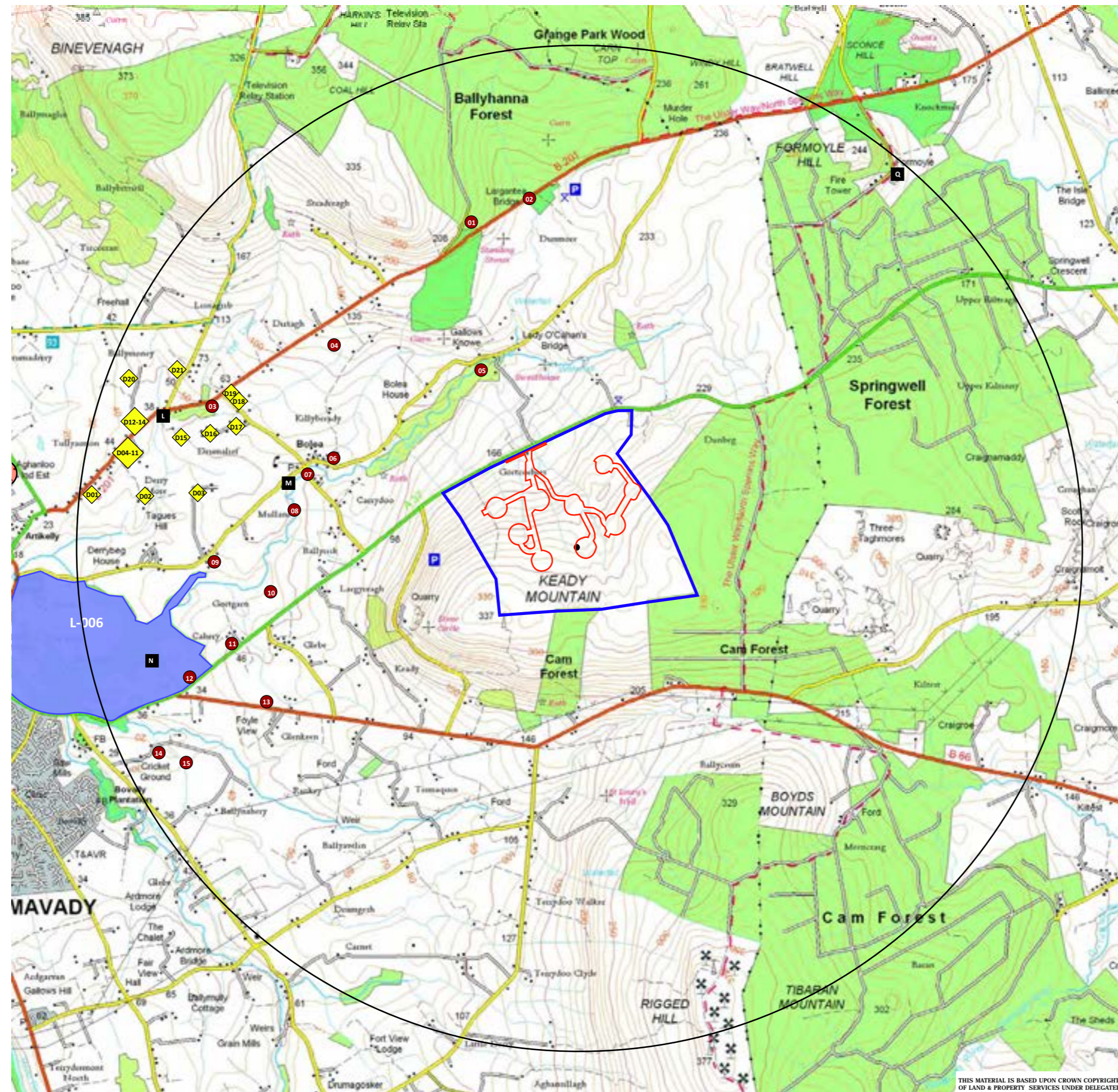
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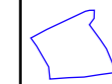





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DUNBEG SOUTH WIND FARM

FIGURE 5.5
KNOWN INDUSTRIAL
HERITAGE SITES, LISTED
BUILDINGS, HISTORIC
GARDENS AND DEFENCE
HERITAGE SITES WITHIN 5KM
OF THE PROPOSED
APPLICATION SITE



-  LAND UNDER APPLICANT CONTROL
-  PLANNING APPLICATION BOUNDARY
-  INDUSTRIAL HERITAGE SITES
-  LISTED BUILDINGS
-  HISTORIC GARDENS
-  DEFENCE HERITAGE SITES



PROJECT DWG03163D0001-04 | CLIENT PNIRco040

SCALE N/A

0 1.5KM

ENVIRONMENTAL STATEMENT
2017

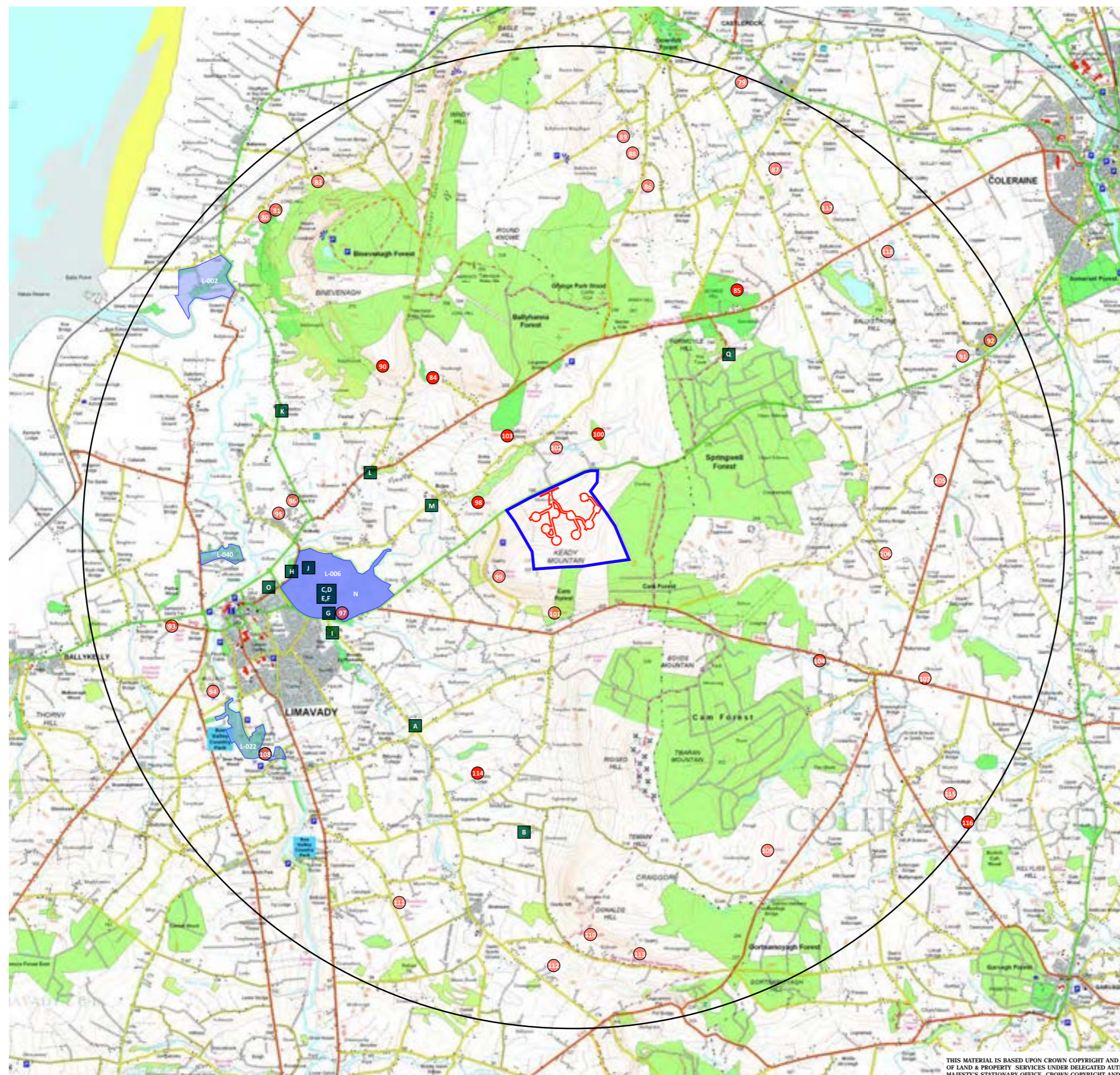
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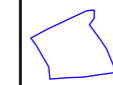






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DUNBEG SOUTH WIND FARM

FIGURE 5.6
KNOWN ARCHAEOLOGICAL SITES, HISTORIC BUILDINGS AND HISTORIC GARDENS IDENTIFIED FOR POTENTIAL VISUAL IMPACT ANALYSIS



-  LAND UNDER APPLICANT CONTROL
-  PLANNING APPLICATION BOUNDARY
-  ARCHAEOLOGICAL SITES OF REGIONAL IMPORTANCE IDENTIFIED FOR VISUAL IMPACT ANALYSIS
-  ARCHAEOLOGICAL SITES OF REGIONAL IMPORTANCE EXCLUDED FROM VISUAL IMPACT ANALYSIS
-  HISTORIC GARDEN IDENTIFIED FOR VISUAL IMPACT ANALYSIS
-  HISTORIC GARDEN EXCLUDED FROM VISUAL IMPACT ANALYSIS
-  HISTORIC BUILDING EXCLUDED FROM VISUAL IMPACT ANALYSIS



PROJECT DWG03163D0001-04 PROJECT NO PNIRco040

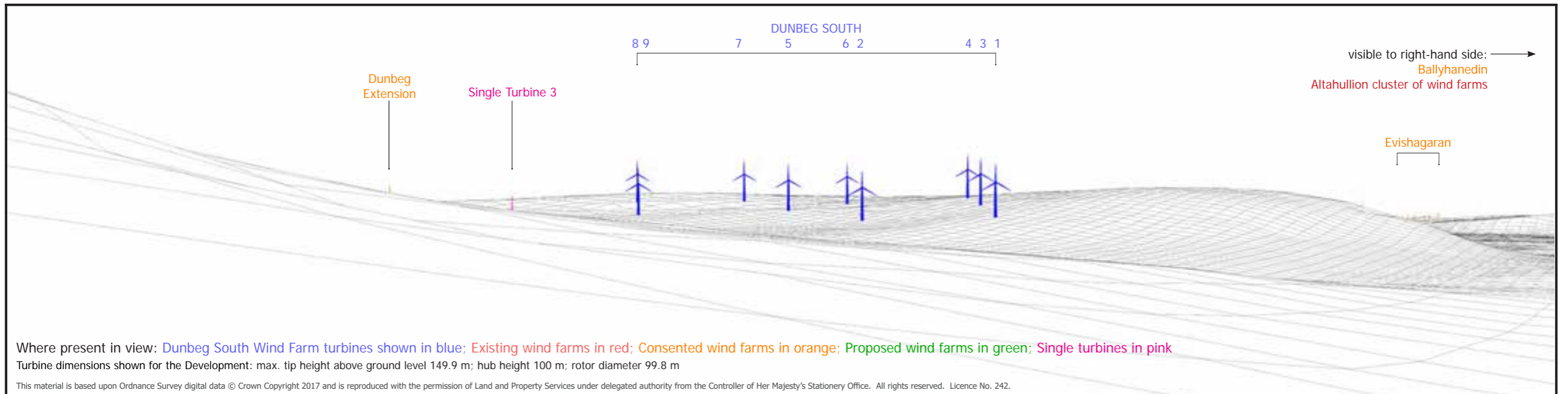
DATE N/A

0 3km

ENVIRONMENTAL STATEMENT 2017

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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 5.7 MONUMENT LDY 06: 05		Easting: 271466 Northing: 427885 Elevation A.O.D: 185 m Bearing: 138.26 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 3.14 km to T1		
	ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
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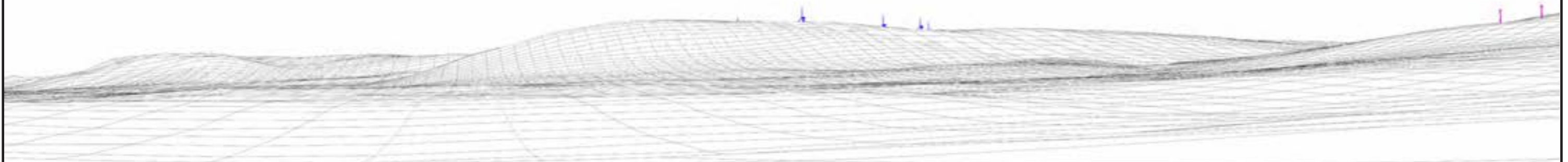
CONSENTED (LA01/2018/0200/F)

← Visible to left-hand side:
Inishowen cluster
(existing & consented)

DUNBEG SOUTH
3 4 6 7 8

Visible to right-hand side: →
Rigged Hill

Single Turbines
2 & 1



Where present in view: Dunbeg South Wind Farm turbines shown in blue; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

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SMc/ 15 029 02/ SMCdwgs_CultHerit/ DBS_CultHerit Fig 5.13 RevA_011117.indd

DUNBEG SOUTH WIND FARM

FIGURE 5.13

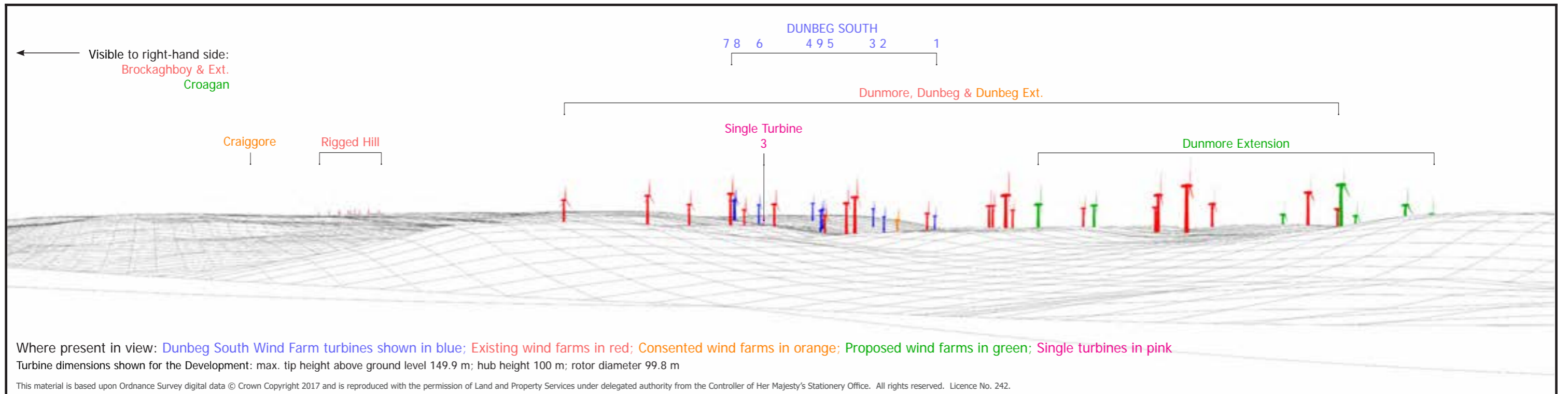
MONUMENT LDY 17: 58

Easting: 272130
Northing: 420037
Elevation A.O.D: 91 m
Bearing: 18.69 °
Approx. Included Angle: 75 °
Approx. distance to nearest turbine: 4.91 km to T4



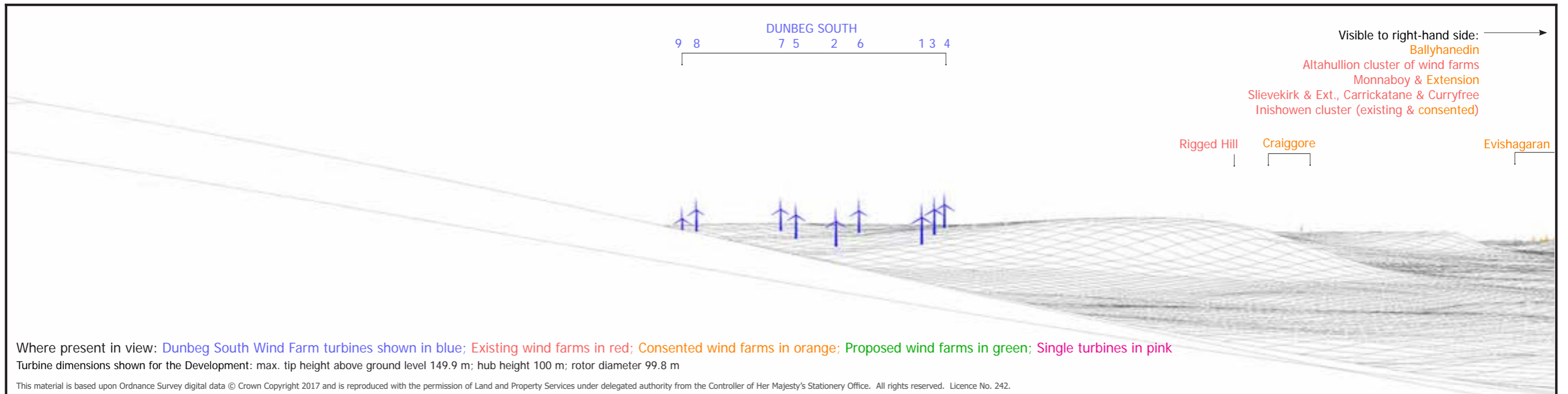
NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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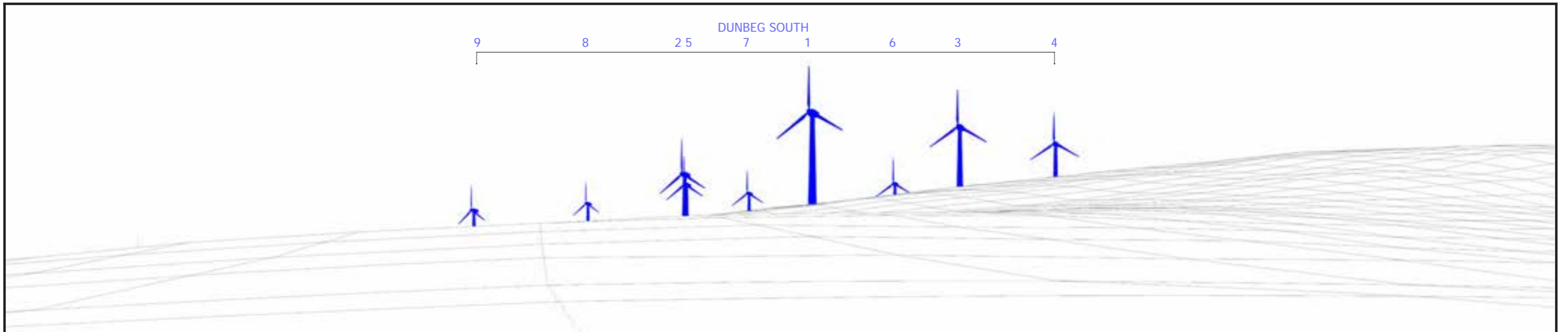
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 5.8 MONUMENT LDY 06: 09		Easting: 277164 Northing: 429824 Elevation A.O.D: 246 m Bearing: 215.6 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 5.07 km to T9		
	ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
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<p>ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT</p>												
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SMc /CL & GM	Nov. 2017	A3	A									
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Where present in view: **Dunbeg South Wind Farm turbines shown in blue**; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

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SMc/ 15 029 02/ SMCdwgs_CulHerit/ DBS_CulHerit Fig 5.10 RevA_011117.indd

DUNBEG SOUTH WIND FARM

FIGURE 5.10

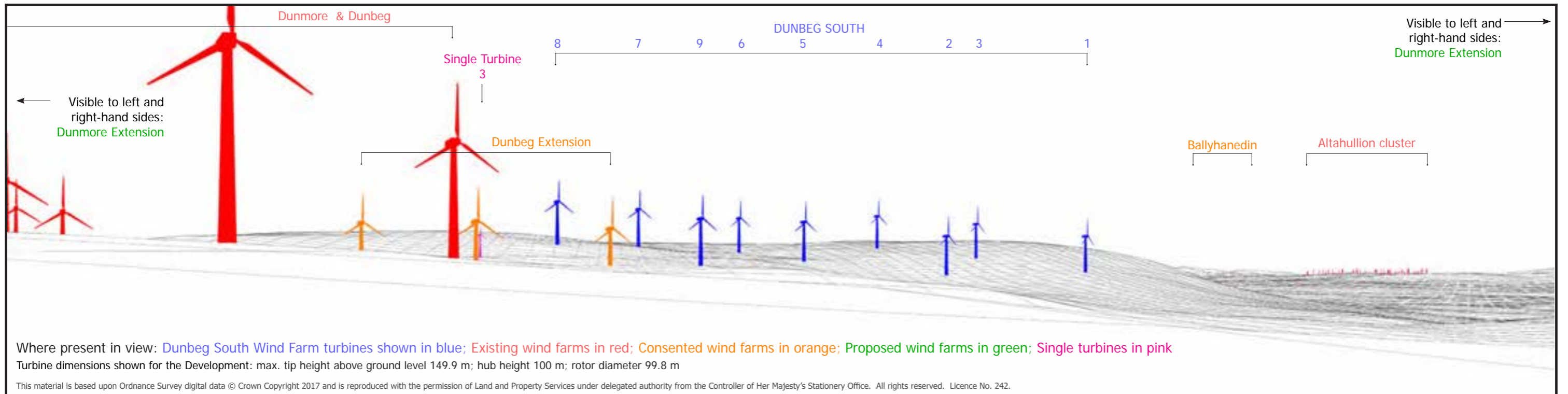
MONUMENT LDY 10: 06

Easting:	272001
Northing:	425551
Elevation A.O.D	75 m
Bearing:	105.00 °
Approx. Included Angle:	80 °
Approx. distance to nearest turbine:	1.19 km to T1



NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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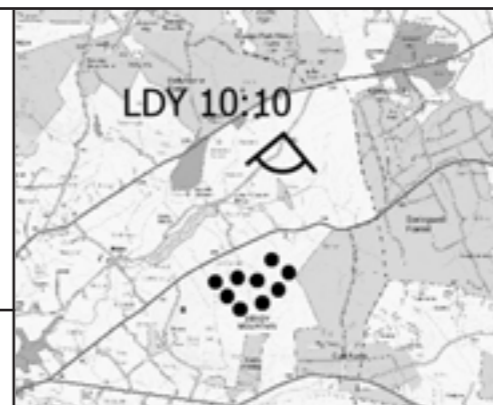
SMc/ 15 029 02/ SMcDwggs_CulHerit/ DBS_CulHerit Fig 5.11 RevA_011117.indd

DUNBEG SOUTH WIND FARM

FIGURE 5.11

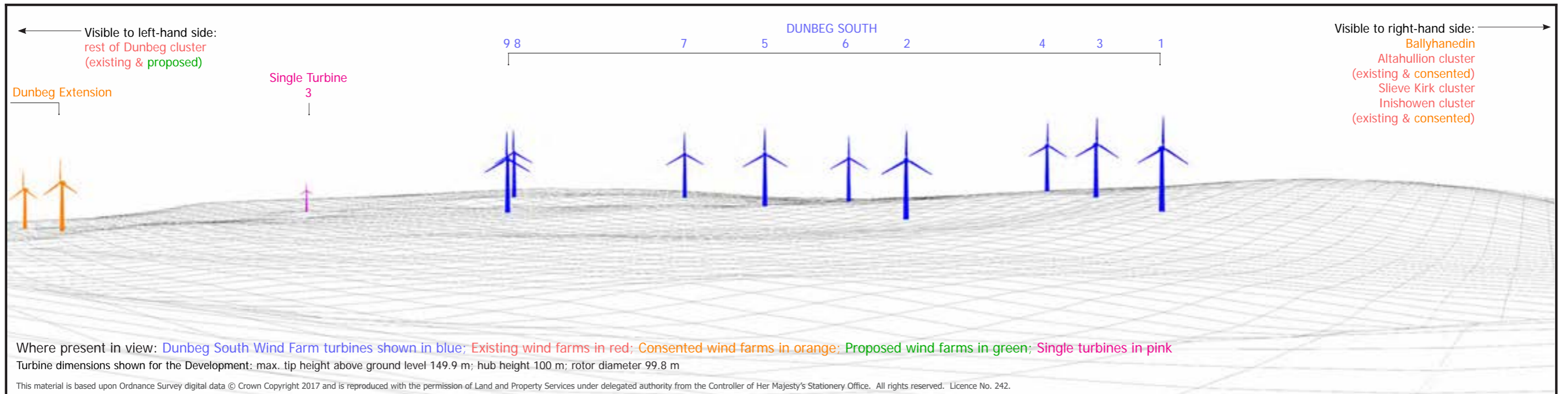
MONUMENT LDY 10: 10

Easting:	274421
Northing:	427987
Elevation A.O.D	212 m
Bearing:	191.07 °
Approx. Included Angle:	75 °
Approx. distance to nearest turbine:	2.31 km to T9



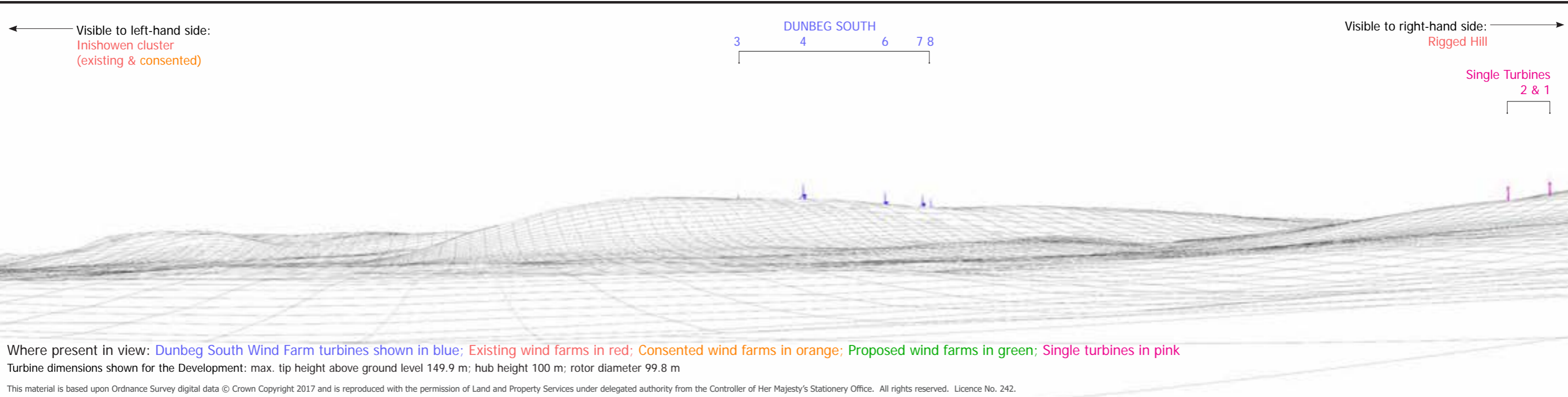
NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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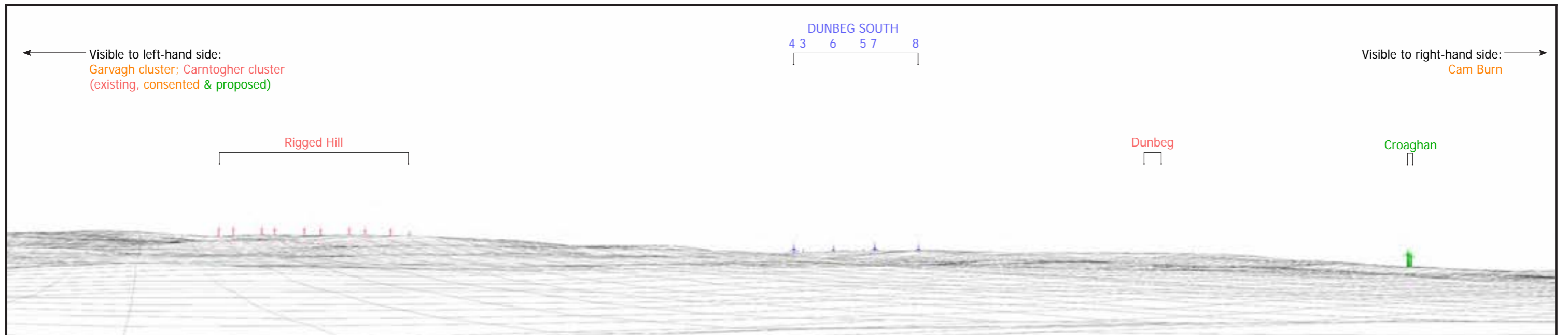
Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 5.12 MONUMENT LDY 10: 16		Easting: 272574 Northing: 426887 Elevation A.O.D: 133 m Bearing: 142.61 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 1.73 km to T1		
	ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT		NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.		
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Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk	DUNBEG SOUTH WIND FARM FIGURE 5.13 MONUMENT LDY 17: 58		Easting: 272130 Northing: 420037 Elevation A.O.D: 91 m Bearing: 18.69 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 4.91 km to T4		
	ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT				
DRAWN / APPROVED: SMc / CL & GM DATE: Nov. 2017 PRINT SIZE: A3 REVISION: A	NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.				

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Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

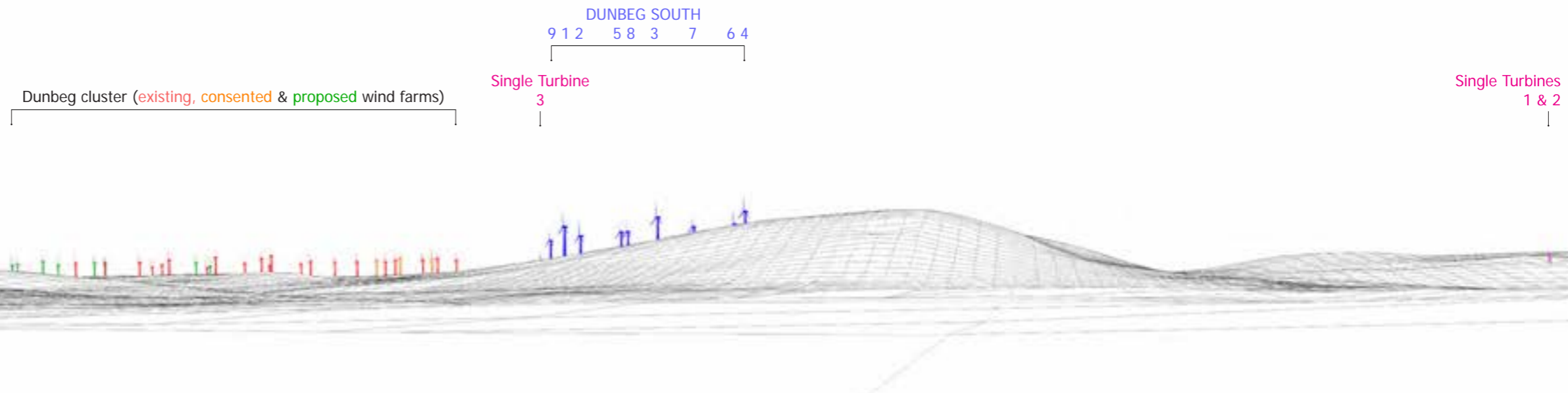
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<p>Shanti McAllister landscape planning and design info@shantimcallister.co.uk www.shantimcallister.co.uk</p>	<p align="center">DUNBEG SOUTH WIND FARM</p> <p align="center">FIGURE 5.14</p> <p align="center">MONUMENT LDY 18: 16</p>	<p>Easting: 281942 Northing: 419054 Elevation A.O.D: 119 m Bearing: 305.8 ° Approx. Included Angle: 75 ° Approx. distance to nearest turbine: 9.81 km to T6</p>		
<p>ARCHAEOLOGY & CULTURAL HERITAGE IMPACT ASSESSMENT</p> <table border="1"> <tr> <td>DRAWN / APPROVED: SMc / CL & GM</td> <td>DATE: Nov. 2017</td> <td>PRINT SIZE: A3</td> <td>REVISION: A</td> </tr> </table> <p><small>THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LTD. AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION</small></p>				
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NOTE: This Figure must be viewed in conjunction with the analysis of landscape and visual effects contained in Chapter 4 of the Environmental Statement and the detailed methodology for the preparation of visualisations contained in Technical Appendix 4.2, in particular the paragraphs referencing Scottish Natural Heritage Guidance regarding the limitations of visualisations.

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Where present in view: Dunbeg South Wind Farm turbines shown in blue; Existing wind farms in red; Consented wind farms in orange; Proposed wind farms in green; Single turbines in pink

Turbine dimensions shown for the Development: max. tip height above ground level 149.9 m; hub height 100 m; rotor diameter 99.8 m

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**ARCHAEOLOGY & CULTURAL HERITAGE
IMPACT ASSESSMENT**

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DUNBEG SOUTH WIND FARM

FIGURE 5.15

L-006

Easting:	268709
Northing:	423748
Elevation A.O.D	27 m
Bearing:	74.42 °
Approx. Included Angle:	75 °
Approx. distance to nearest turbine:	4.69 km to T1



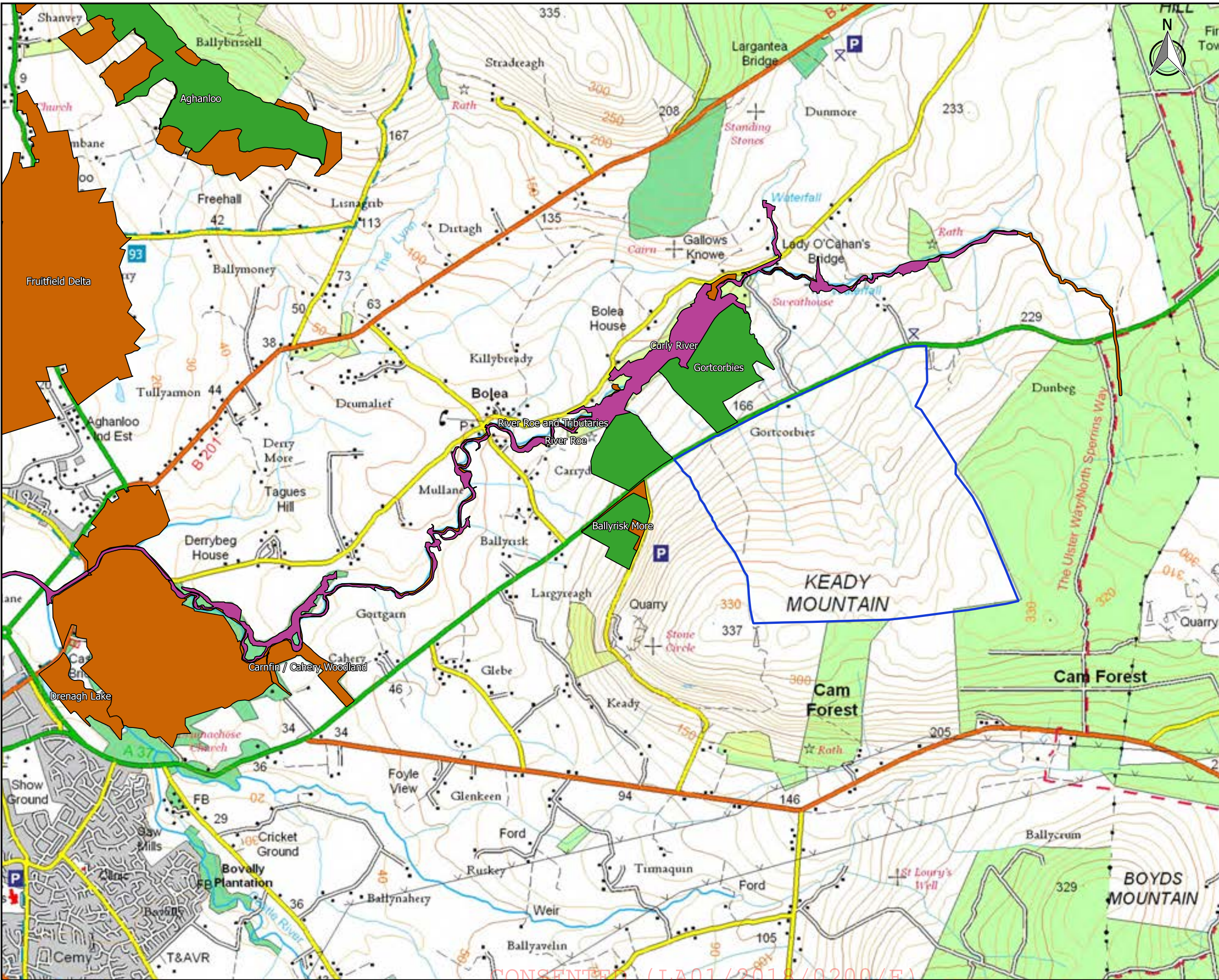
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SMc/ 15 029 02/ SMCdwgs_CultHerit/ DBS_CultHerit Fig 5.15 RevA_011117.indd

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6

Ecology



DUNBEG SOUTH WIND FARM

FIGURE 6.1

NATURE CONSERVATION DESIGNATIONS

- KEY**
- LAND UNDER APPLICANT CONTROL
 - SPECIAL AREAS OF CONSERVATION
 - AREAS OF SPECIAL SCIENTIFIC INTEREST
 - SITE OF LOCAL NATURE CONSERVATION IMPORTANCE

LAYOUT DWG 03219D1001-02	LAYOUT NO. PNIRdbx028
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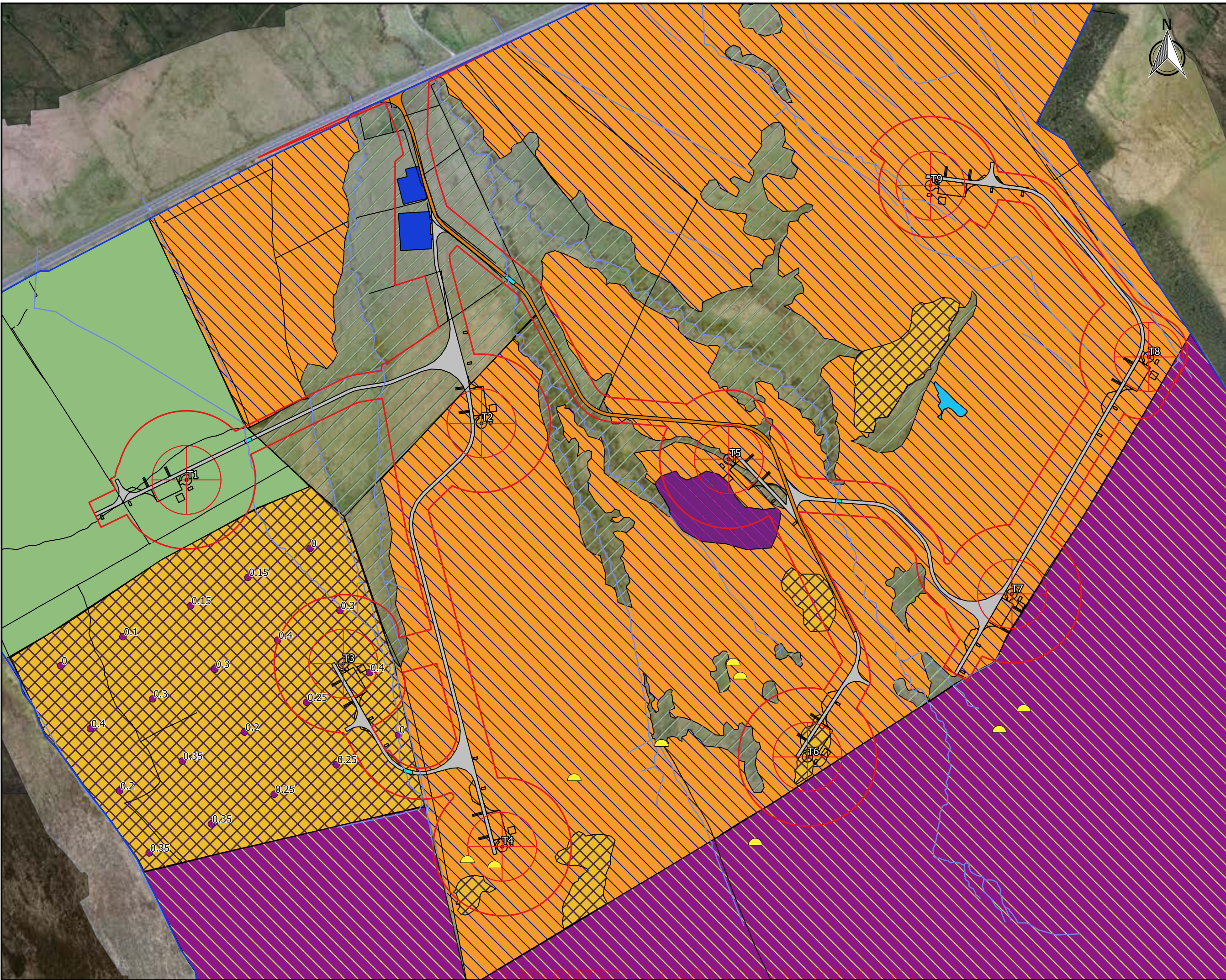
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KEY

- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- PEAT DEPTHS
- SUCCISA PRATENSIS
- WATERCOURSE
- BOUNDARIES
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING
- DAM POND
- M15 (52%) M17 (48%)
- M6d (MIRE)
- SEMI-IMPROVED GRASSLAND
- M15d (WET HEATH)
- U4d (GRASSLAND)
- M23a (PMGRP)

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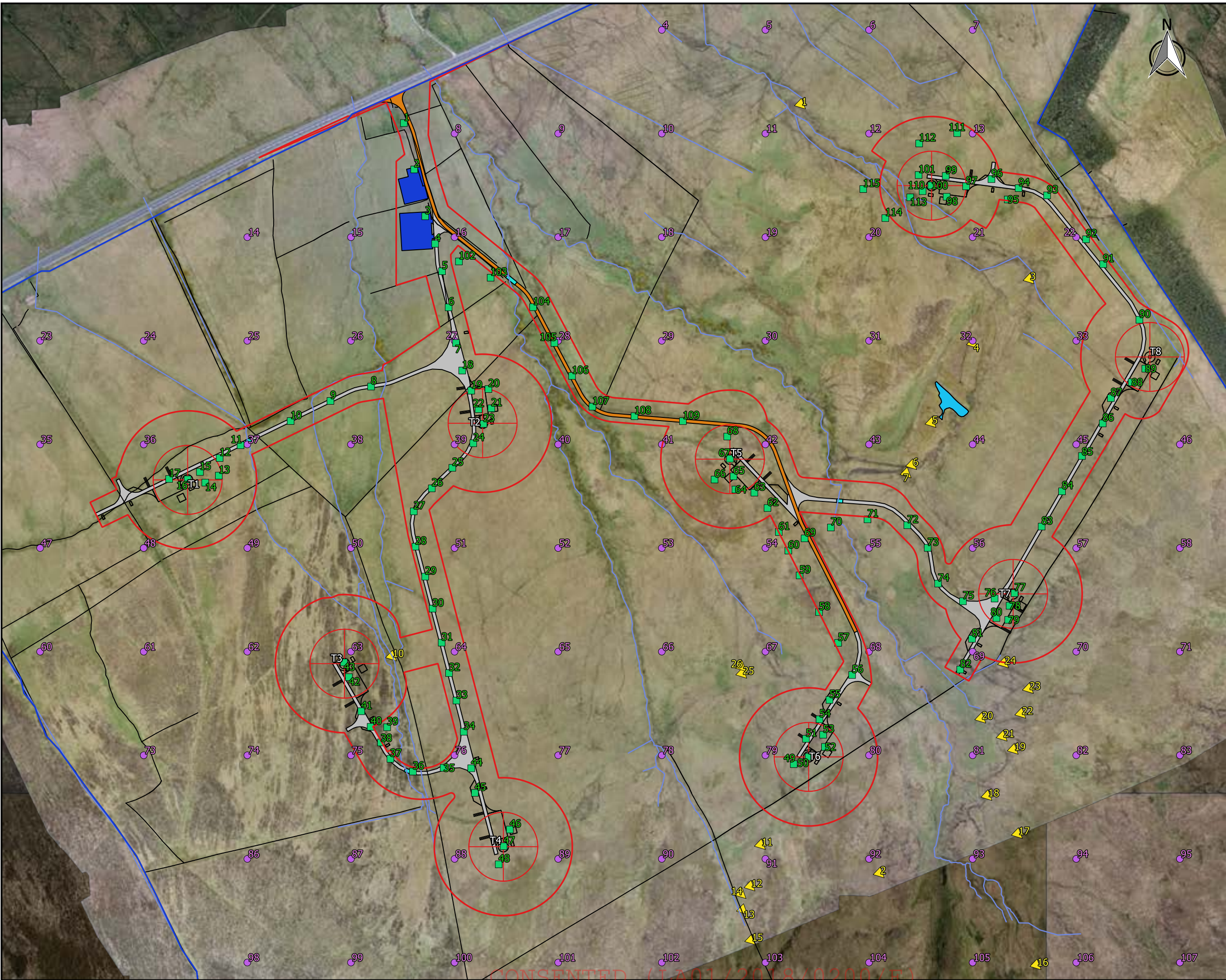
DUNBEG SOUTH WIND FARM

FIGURE 6.3

NVC QUADRATS & GWDTE'S

KEY

- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- NVC PHASE 2 QUADRAT (2017)
- PEAT DEPTHS
- ▲ GWDTE
- WATERCOURSE
- BOUNDARIES
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING
- DAM POND



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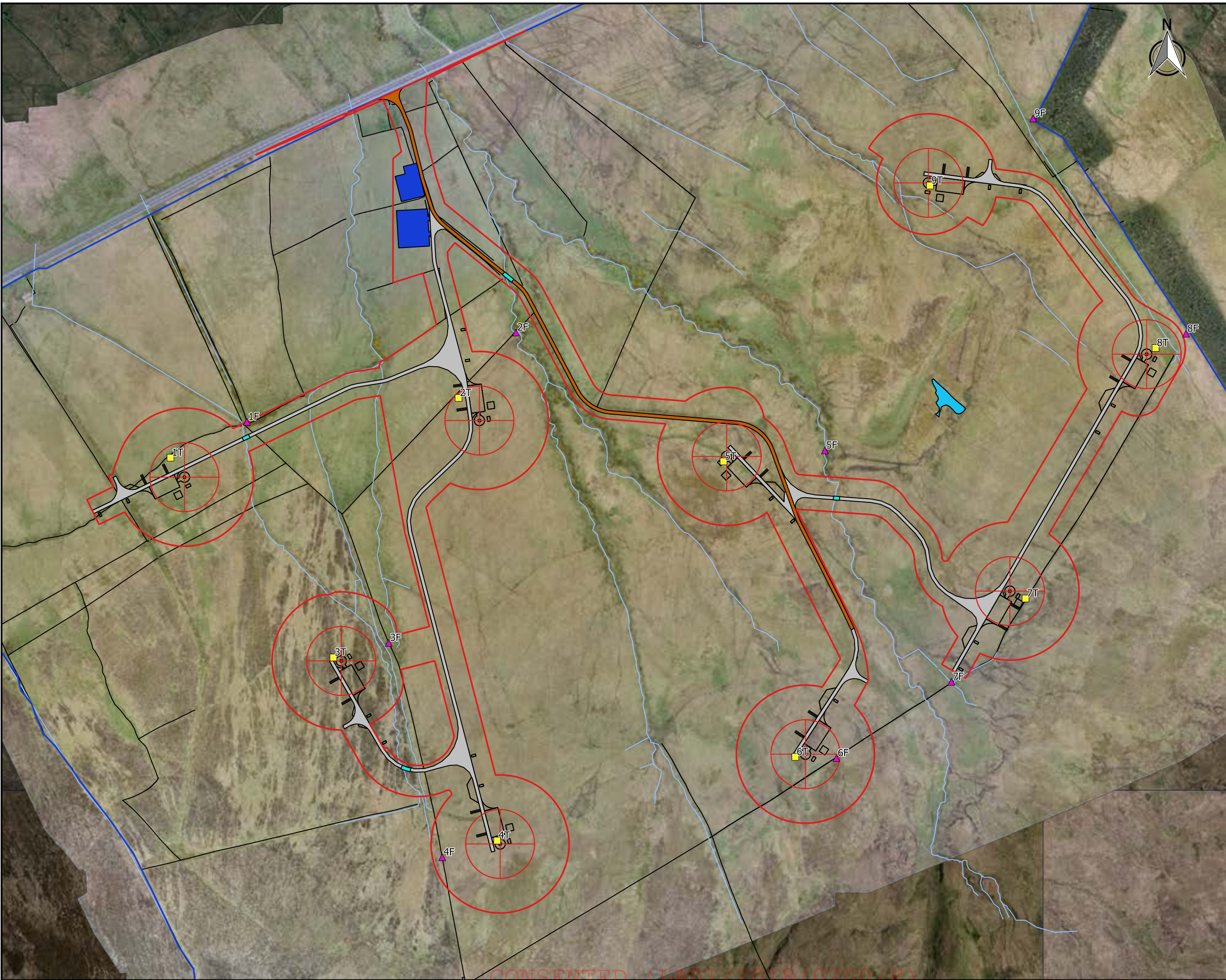
DUNBEG SOUTH WIND FARM

FIGURE 6.4

STATIC DETECTOR MONITORING LOCATIONS

KEY

- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- TURBINE MONITORING LOCATION
- FEATURE MONITORING LOCATION
- WATERCOURSE
- BOUNDARIES
- TURBINE LOCATION
- SUBSTATION & COMPOUND
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING
- DAM POND



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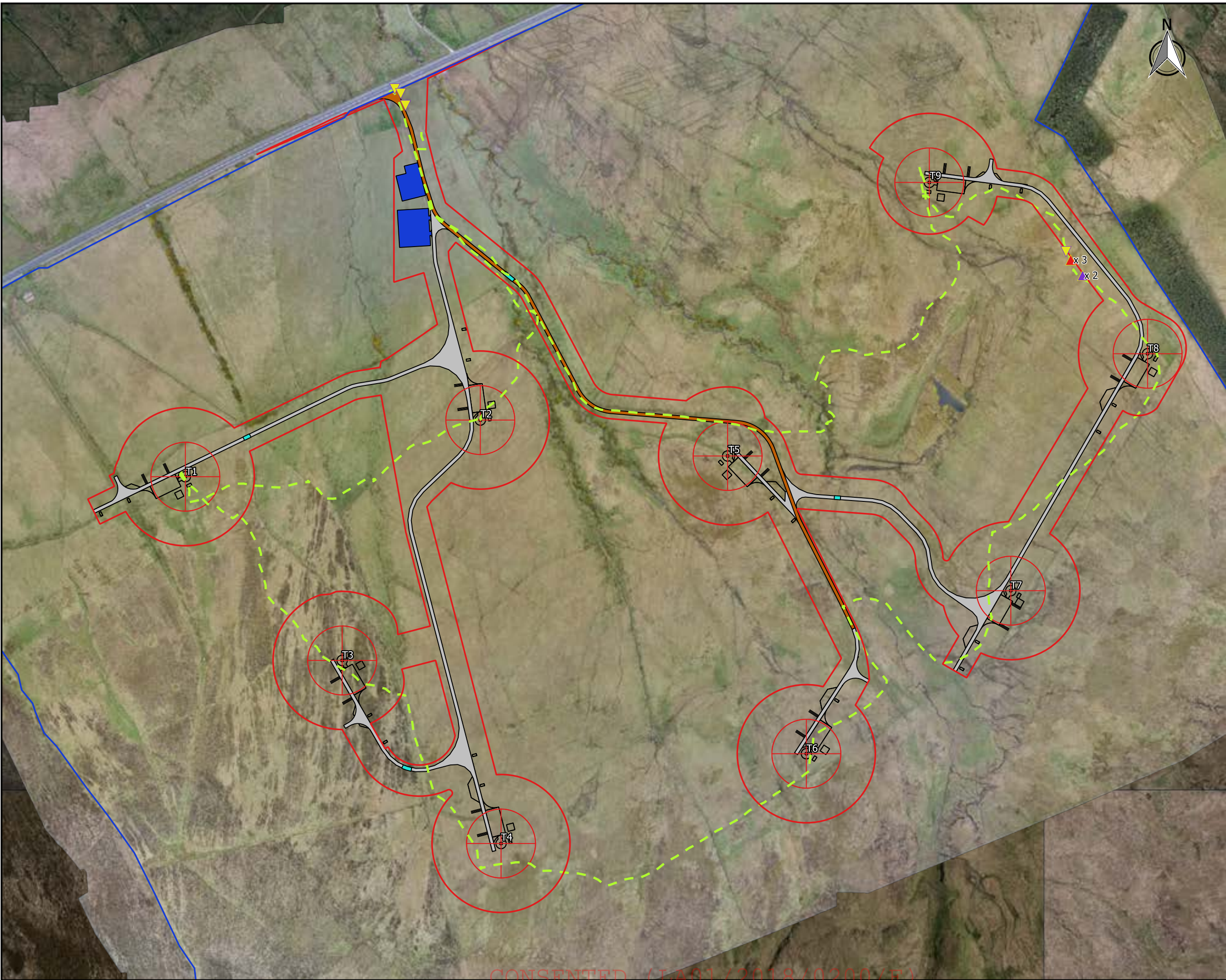
- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- N. LEISLERI
- P. PIPISTRELLUS
- P. PYGMAEUS
- TRANSECT
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING

LAYOUT DWG 03219D1001-02	LAYOUT NO. PNIRdbx028
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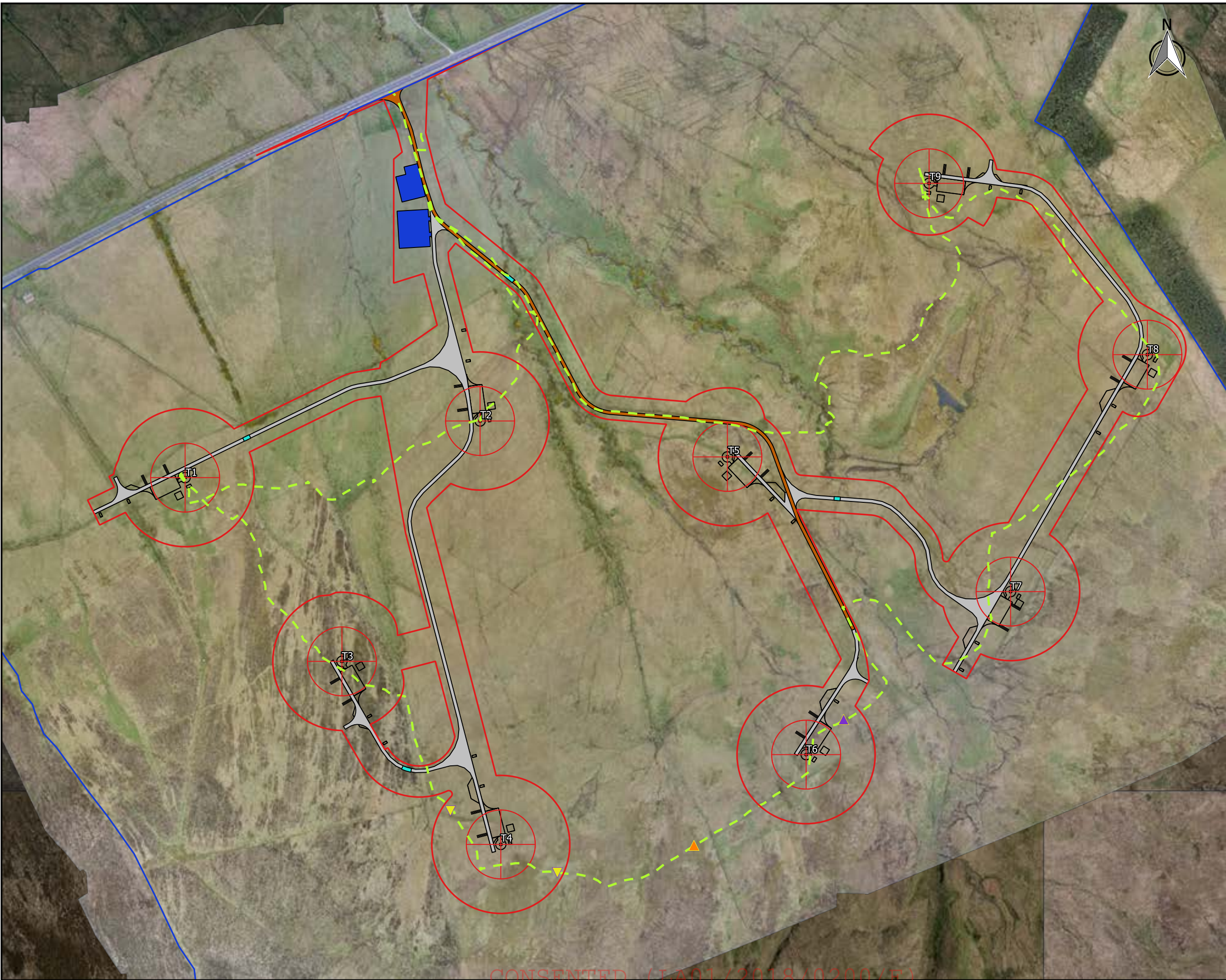
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KEY

- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- N. LEISLERI
- P. PIPISTRELLUS
- MYOTIS SPP
- TRANSECT
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING



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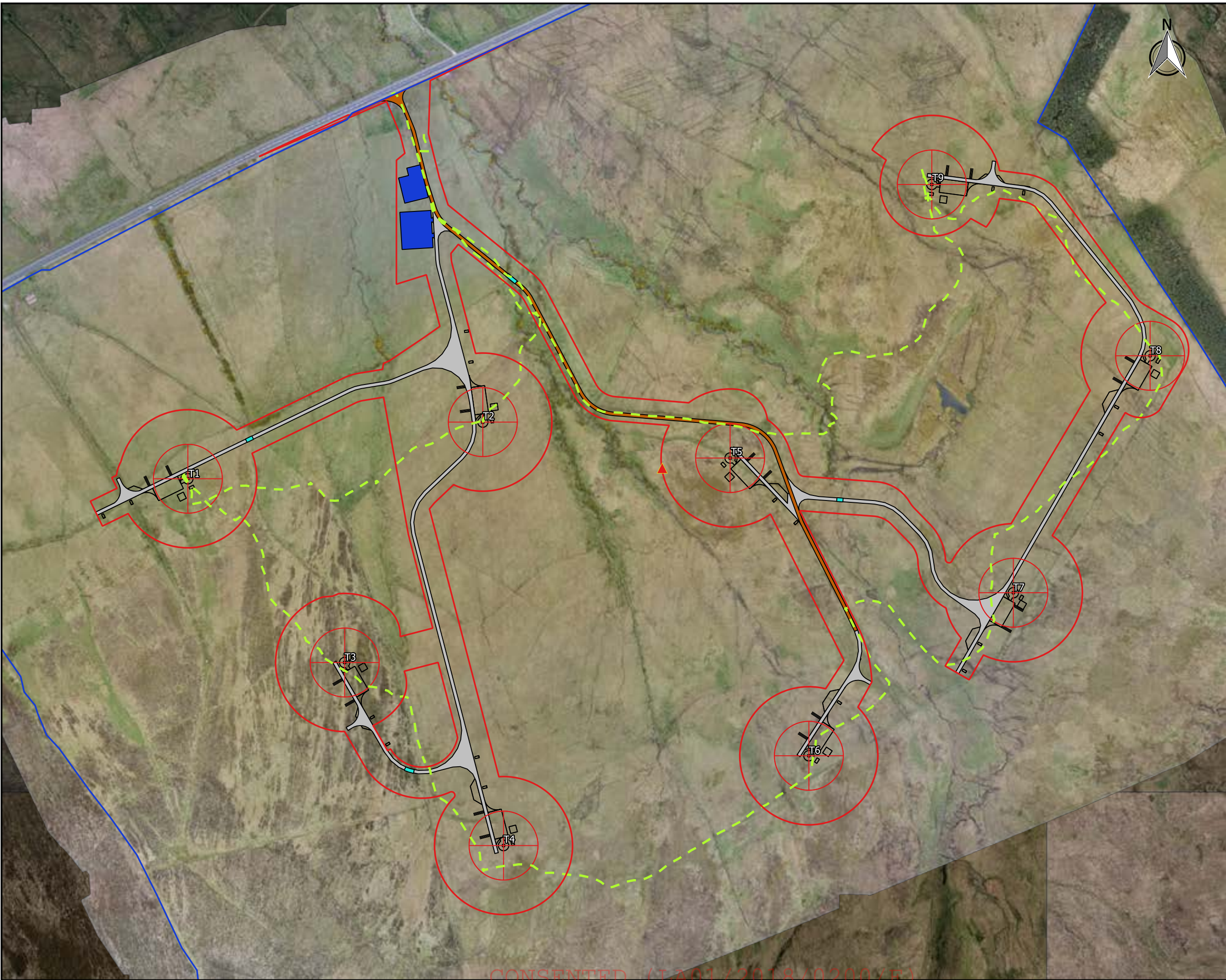
- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- P. PYGMAEUS
- TRANSECT
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING

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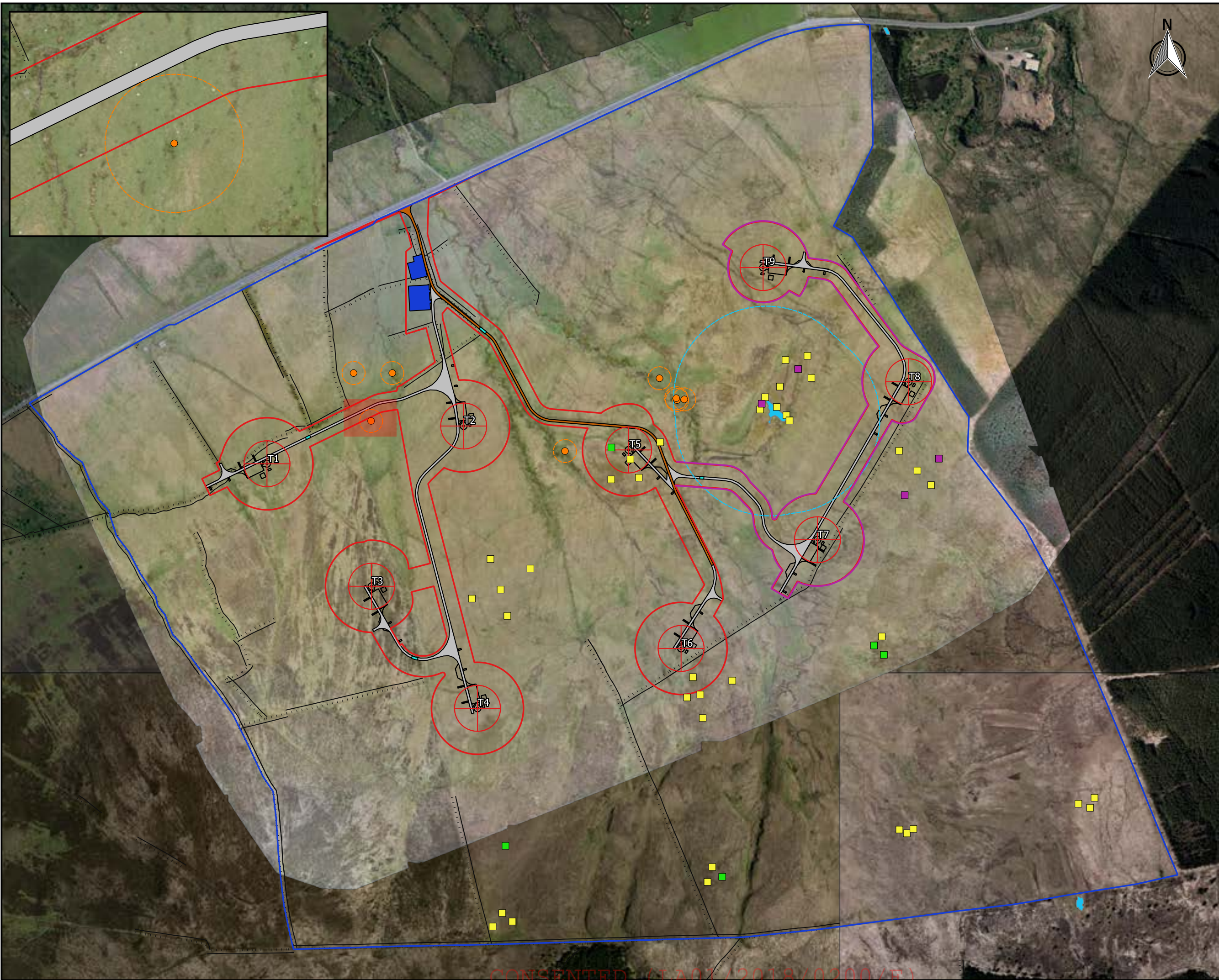
- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- LIZARD OBSERVATIONS
- NEWT OBSERVATIONS
- NEWT (DRIFT) FENCE
- REFUGIA
- BADGER SETT
- 25m BUFFER
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING
- DAM POND
- 200m BUFFER
- OLD STONE BANK

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DUNBEG SOUTH WIND FARM

FIGURE 6.9

HABITAT MANAGEMENT

KEY

- LAND UNDER APPLICANT CONTROL
- PLANNING APPLICATION BOUNDARY
- PMGRP COMPENSATION AREA (11.1ha)*
- WET HEATH COMPENSATION AREA (3.5ha)*
- WATERCOURSE
- BOUNDARIES
- TURBINE LOCATION
- COMPOUND & SUBSTATION
- WATERCROSSING
- EXISTING TRACK (UPGRADED)
- SITE TRACK
- CRANE HARDSTANDING
- DAM POND

* COMPENSATION AREAS HAVE BEEN CALCULATED EXCLUDING THE INFRASTRUCTURE LAYOUT.

LAYOUT DWG	LAYOUT NO.
03219D1001-02	PNIRdbx028
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7

Ornithology



DUNBEG SOUTH WIND FARM

FIGURE 7.1

ORNITHOLOGY VIEWPOINT COVERAGE

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- Turbines
- Site Boundary
- 500m Turbine Buffer
- Viewpoint 1 (VP1)
- Viewpoint 2 (VP2)
- Viewpoint 3 (VP3)
- Area Visible from VP1 only
- VP1 2km Extent
- Area Visible from VP2 only
- VP2 2km Extent
- Area Visible from VP3 only
- VP3 2km Extent
- Area visible from VP1 and VP2
- Area visible from VP1 and VP3
- Area visible from VP2 and VP3
- Area visible from VP1, VP2 and VP3

The shaded regions represent areas 50m above ground level, which can be seen from 1.8m above ground level from the viewpoints.



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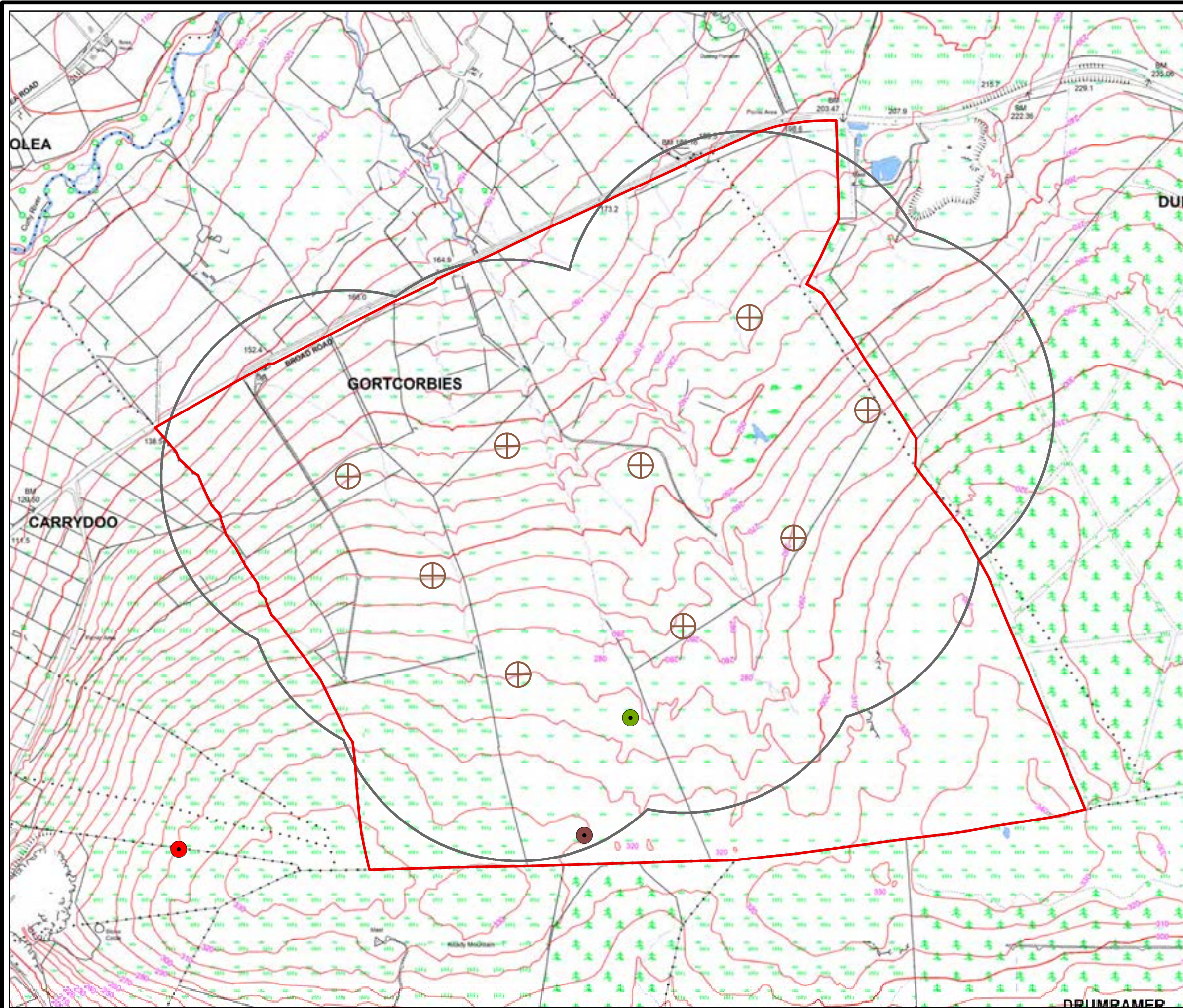
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DUNBEG SOUTH WIND FARM

FIGURE 7.2
LOCATIONS OF RED GROUSE SIGHTINGS

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Red Grouse Pair 26 Apr 2017
-  Male Red Grouse 30 Mar 2017
-  Fresh Droppings 03 Feb 2016



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DUNBEG SOUTH WIND FARM

FIGURE 7.3

LOCATIONS OF TERRITORIAL SNIPE AND LOCATION OF CURLEW SIGHTING

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Territorial Snipe 24 May 2017
-  Territorial Snipe 10 May 2017
-  Territorial Snipe 28 Apr 2017
-  Territorial Snipe 26 Apr 2017
-  Territorial Snipe 10 Jun 2016
-  Territorial Snipe 09 Jun 2016
-  Territorial Snipe 29 Apr 2016
-  Single Curlew 30 May 2016



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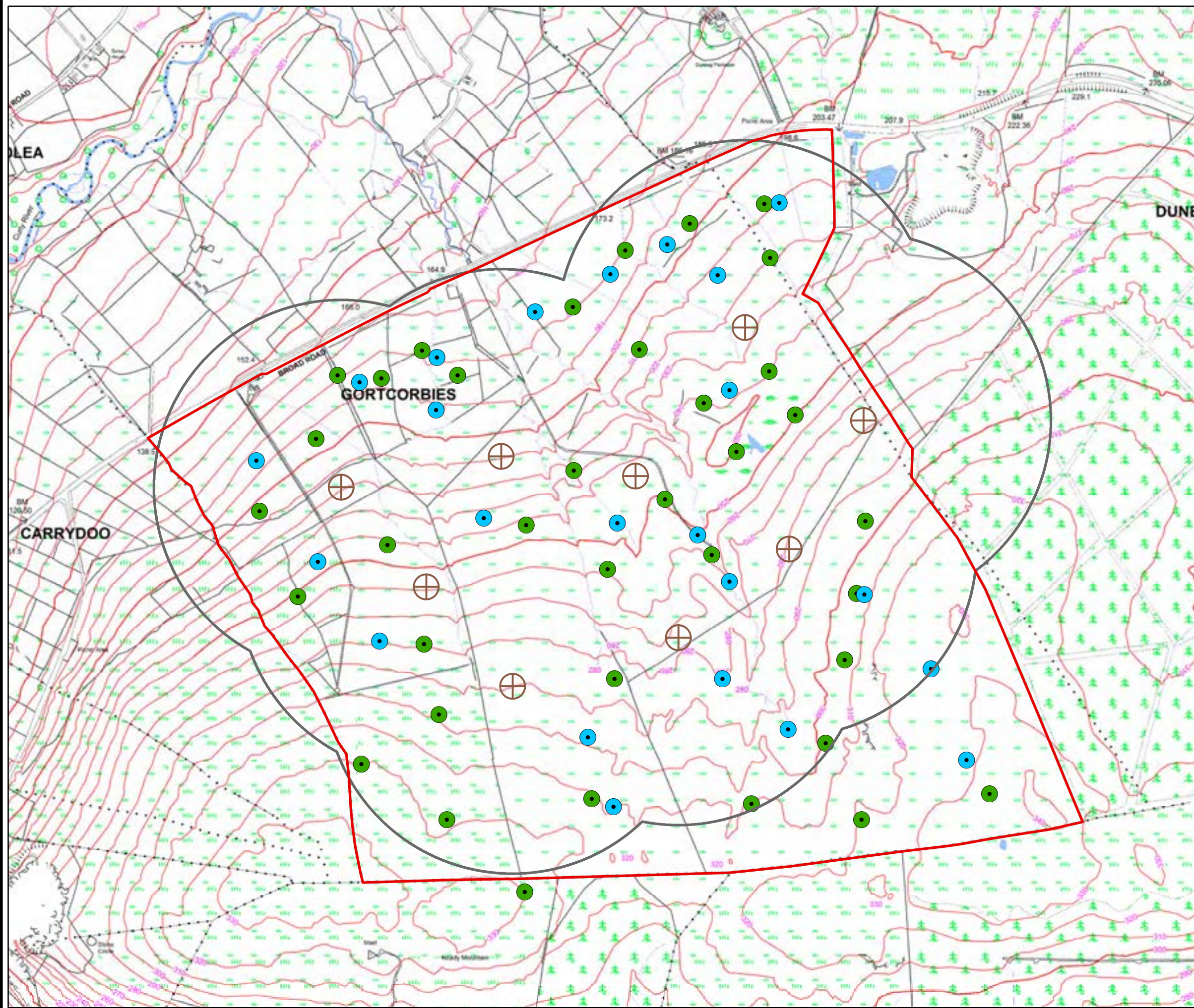







DUNBEG SOUTH WIND FARM

FIGURE 7.4

LOCATIONS OF BREEDING SKYLARKS AND MEADOW PIPITS

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Skylark Territories 2017 Season
-  Meadow Pipits Territories 2017 Season



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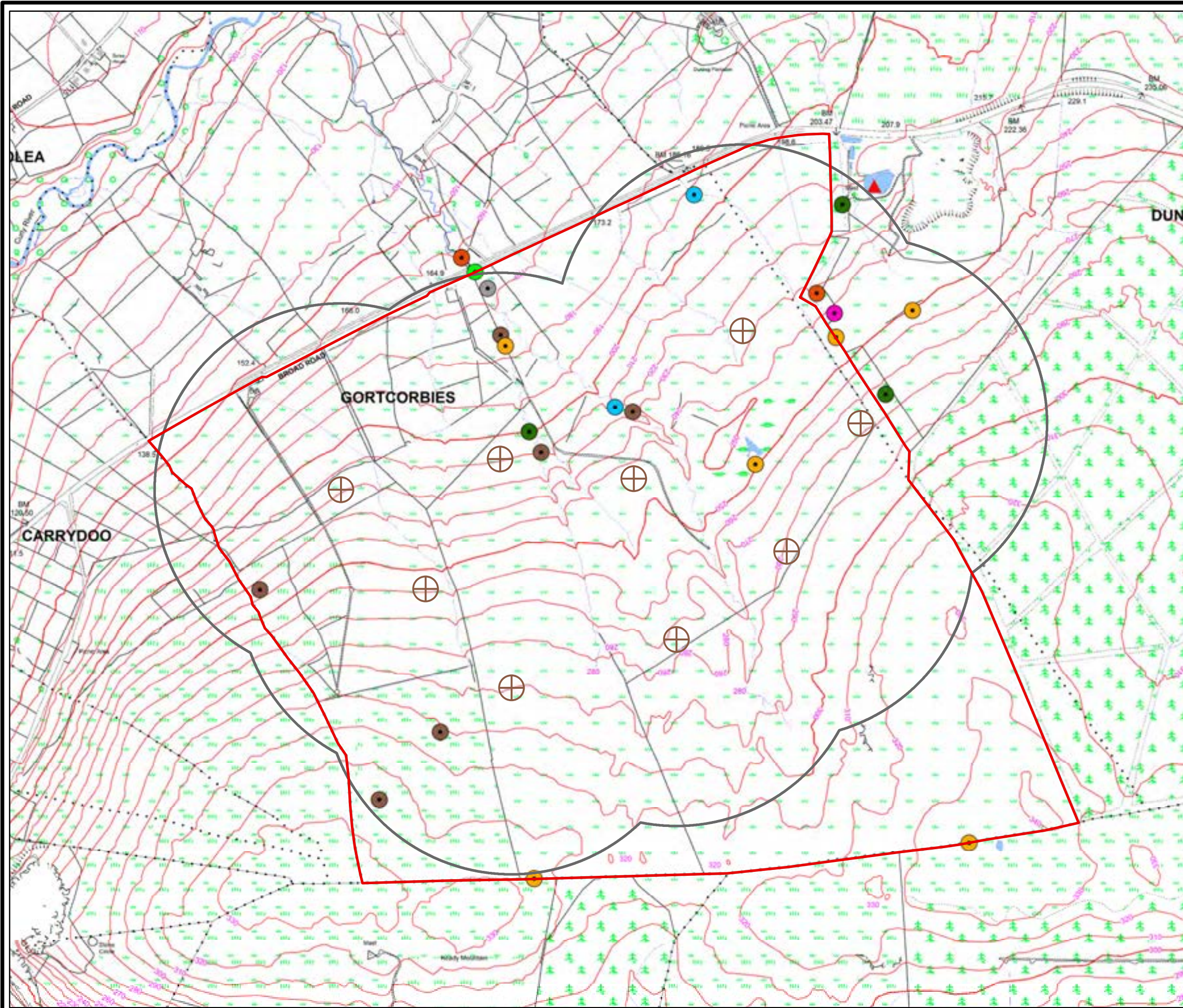














DUNBEG SOUTH
WIND FARM

FIGURE 7.5A

LOCATIONS OF OTHER
BREEDING BIRDS - 1

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Stonechats *pairs*
-  Wrens *singing males*
-  Swallow *nest site*
-  Pied Wagtail *pair*
-  Grey Wagtail *pairs*
-  Cuckoo *singing males*
-  Chaffinches *pairs*
-  Blackcap *singing males*
-  Little Grebe and Moorhen



LAYOUT DWG: 03219D0001-06 LAYOUT NO: PNIRdbx028

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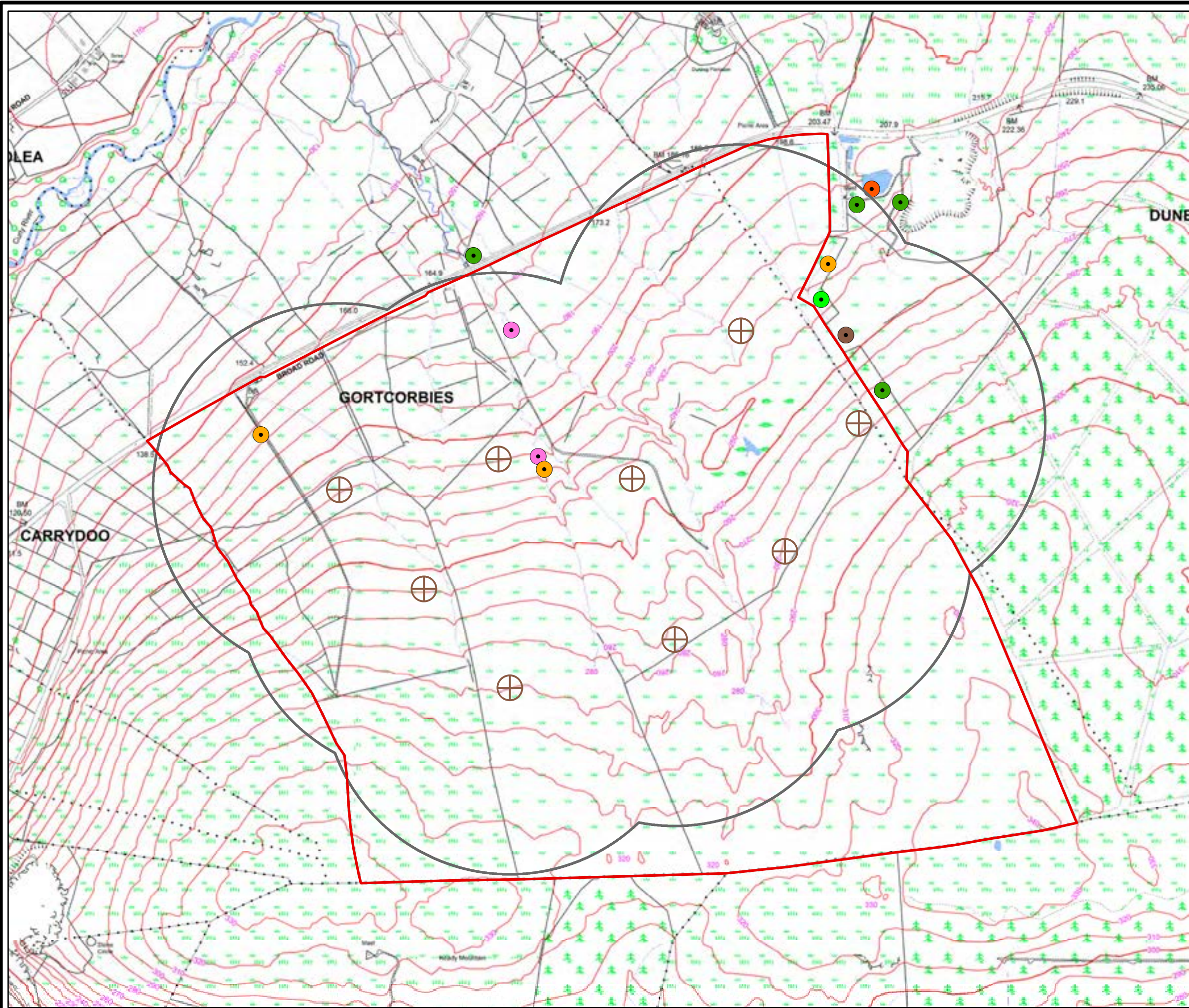


DUNBEG SOUTH WIND FARM

FIGURE 7.5B

LOCATIONS OF OTHER BREEDING BIRDS - 2

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- Turbines
- Site Boundary
- 500m Turbine Buffer
- Willow Warblers *singing males*
- Grasshopper Warbler *singing male*
- Song Thrushes *singing males*
- Mistle Thrushes *singing males*
- Robins *pairs*
- Reed Bunting *pair*



LAYOUT DWG: 03219D0001-06 LAYOUT NO: PNIRdbx028

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
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DUNBEG SOUTH
WIND FARM

FIGURE 7.6
HEN HARRIER
FLIGHTLINES

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Hen Harrier Flightlines



LAYOUT DWG: 03219D0001-06 LAYOUT NO: PNIRdbx028

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DUNBEG SOUTH
WIND FARM

FIGURE 7.7

FLIGHTLINES FOR OTHER
ANNEX 1 BIRD SPECIES

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Whooper Swan Flightlines
-  Peregrine Flightlines
-  Merlin Flightlines



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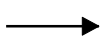



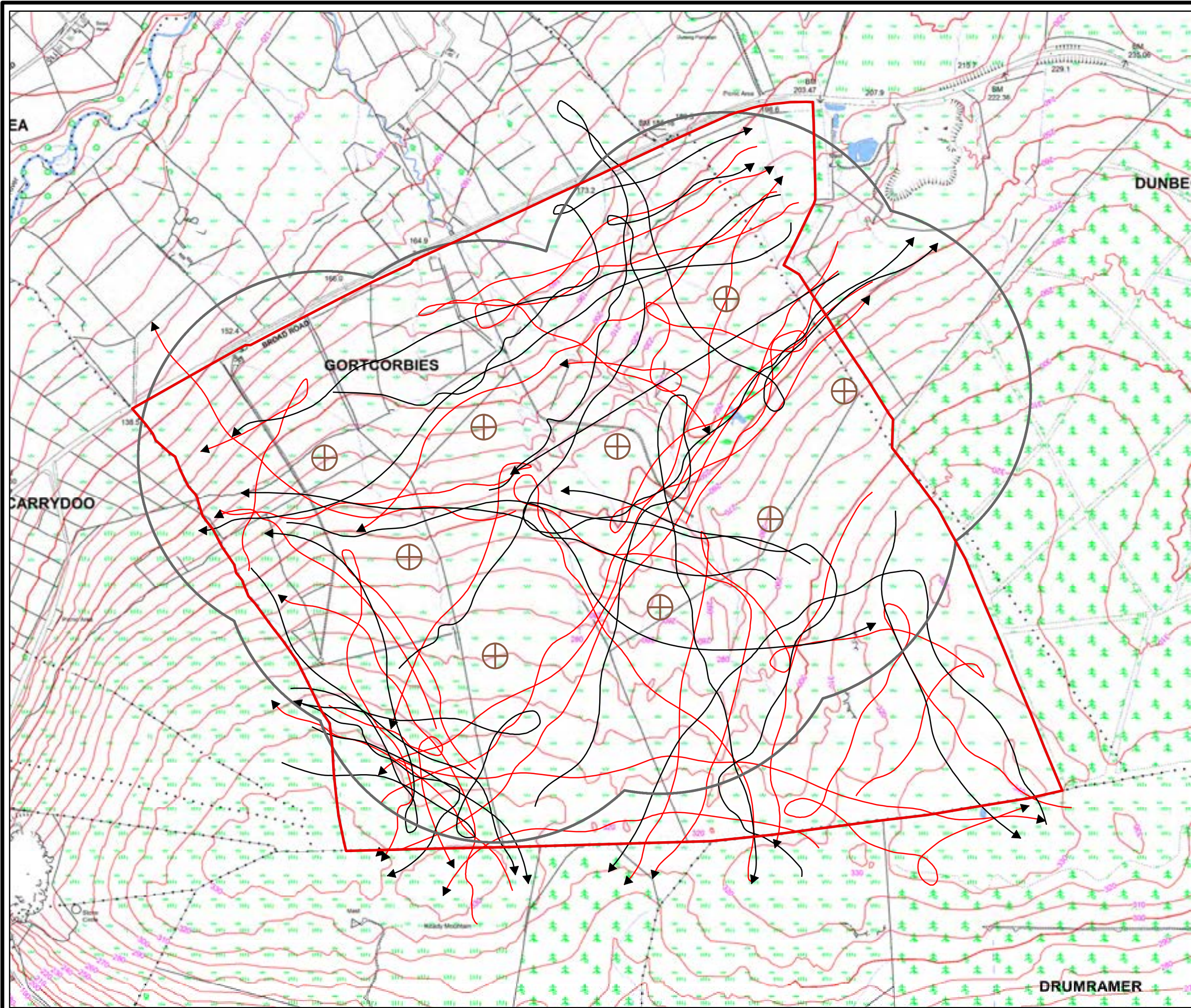
DUNBEG SOUTH
WIND FARM

FIGURE 7.8

KESTREL FLIGHTLINES

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Kestrel Flightlines Year 1
-  Kestrel Flightlines Year 2



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



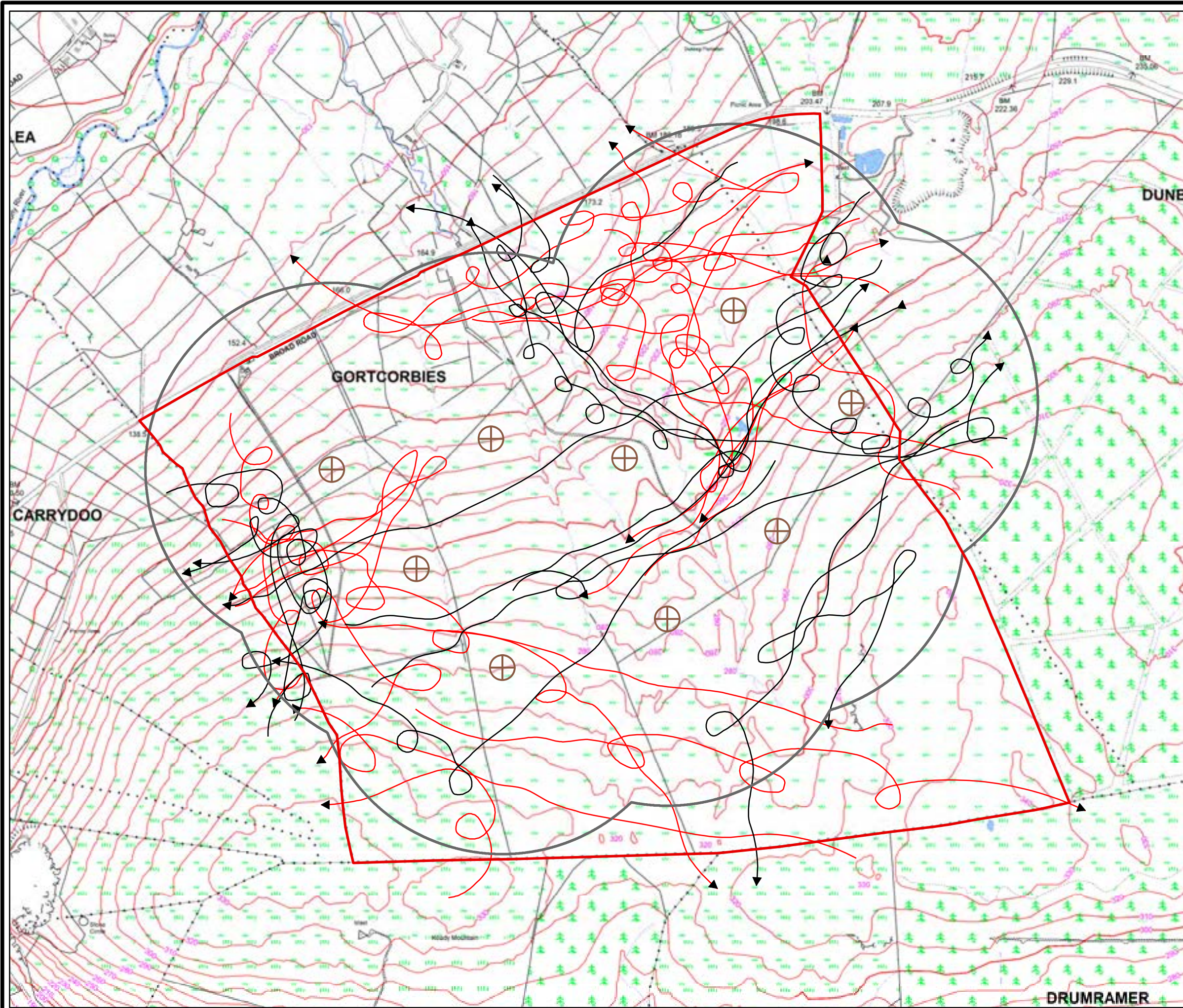
DUNBEG SOUTH
WIND FARM

FIGURE 7.9

BUZZARD FLIGHTLINES

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-  Turbines
-  Site Boundary
-  500m Turbine Buffer
-  Buzzard Flightlines Year 1
-  Buzzard Flightlines Year 2



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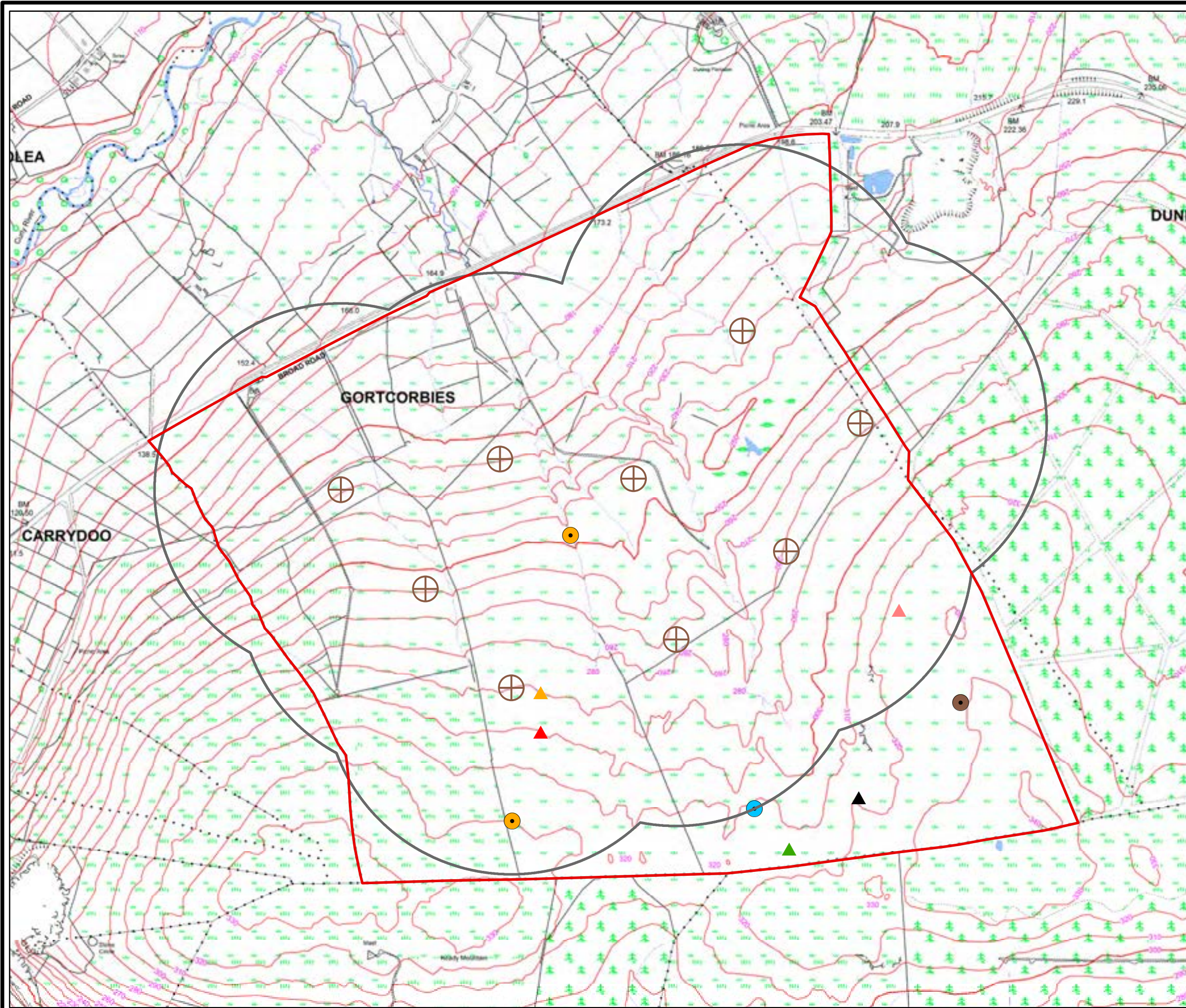


DUNBEG SOUTH WIND FARM

FIGURE 7.10

WINTER BIRD SIGHTINGS

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- Turbines
- Site Boundary
- 500m Turbine Buffer
- Single Golden Plover *03 Feb 2017*
- 9 Golden Plover *03 Feb 2017*
- 4 Golden Plover *18 Feb 2016*
- 20 Golden Plover *08 Dec 2015*
- 32 Golden Plover *03 Dec 2015*
- Woodcock Sightings
- Jack Snipe Sightings
- Snow Bunting Flock *(12 birds)*



LAYOUT DWG: 03219D00001-06 LAYOUT NO: PNIRdbx028

DRAWING NUMBER: 03219D2226-01

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8

Fisheries



DUNBEG SOUTH WIND FARM

FIGURE 8.1

Location of the Proposed Site in the Curly River Sub-Catchment and the Overall River Roe Catchment

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— Curly River Catchment
 — River Roe Catchment



LAYOUT DWG	N/A	LAYOUT NO.	N/A
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DRAWING NUMBER	03219D2228-03
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SCALE AS SHOWN

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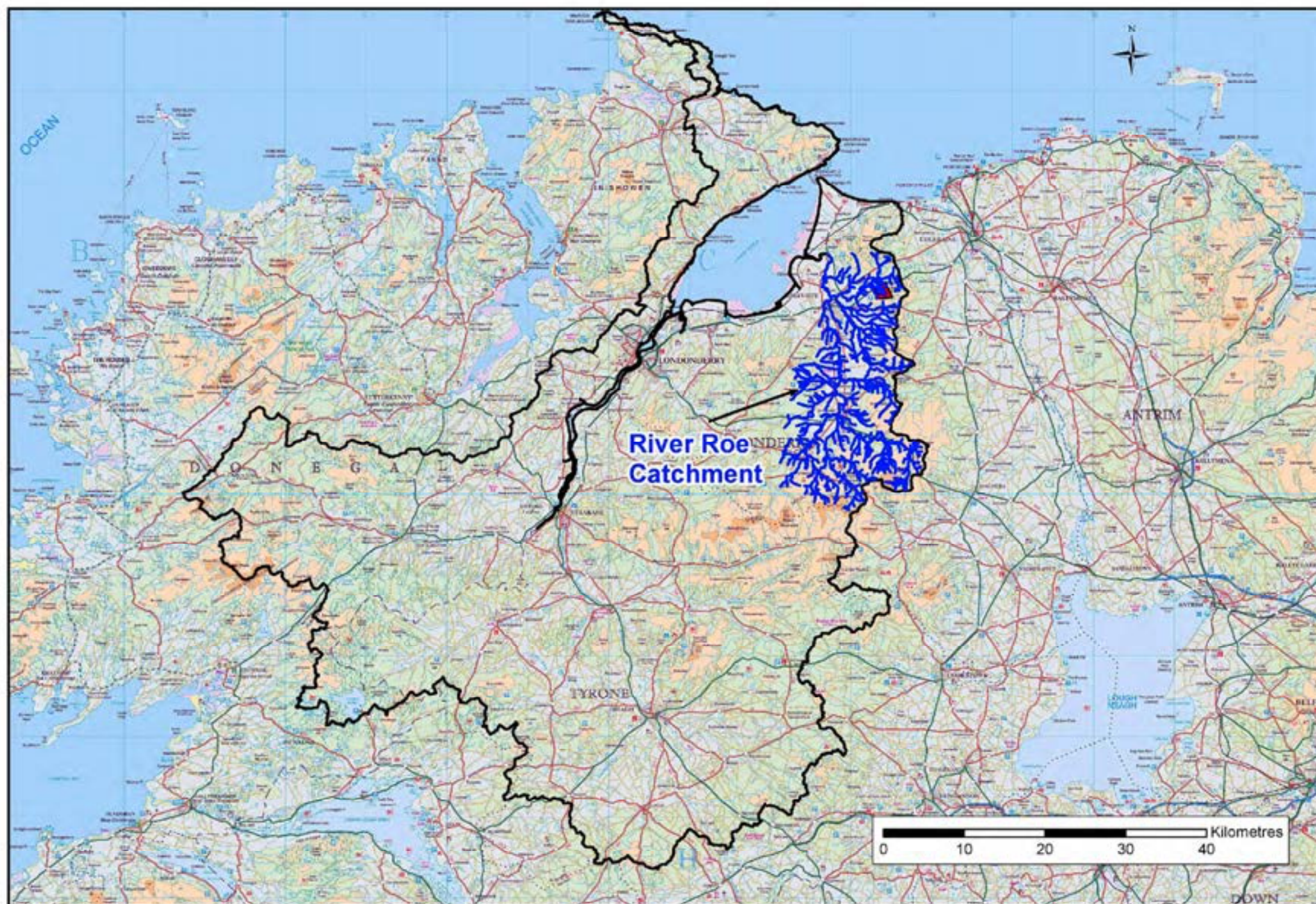





DUNBEG SOUTH
WIND FARM

FIGURE 8.2

Location of the Proposed Site
in the River Roe Catchment
as Part of the Foyle Basin

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-  River Roe Catchment
-  Site Location
-  Foyle Basin



LAYOUT DWG: N/A LAYOUT NO: N/A

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SCALE AS SHOWN

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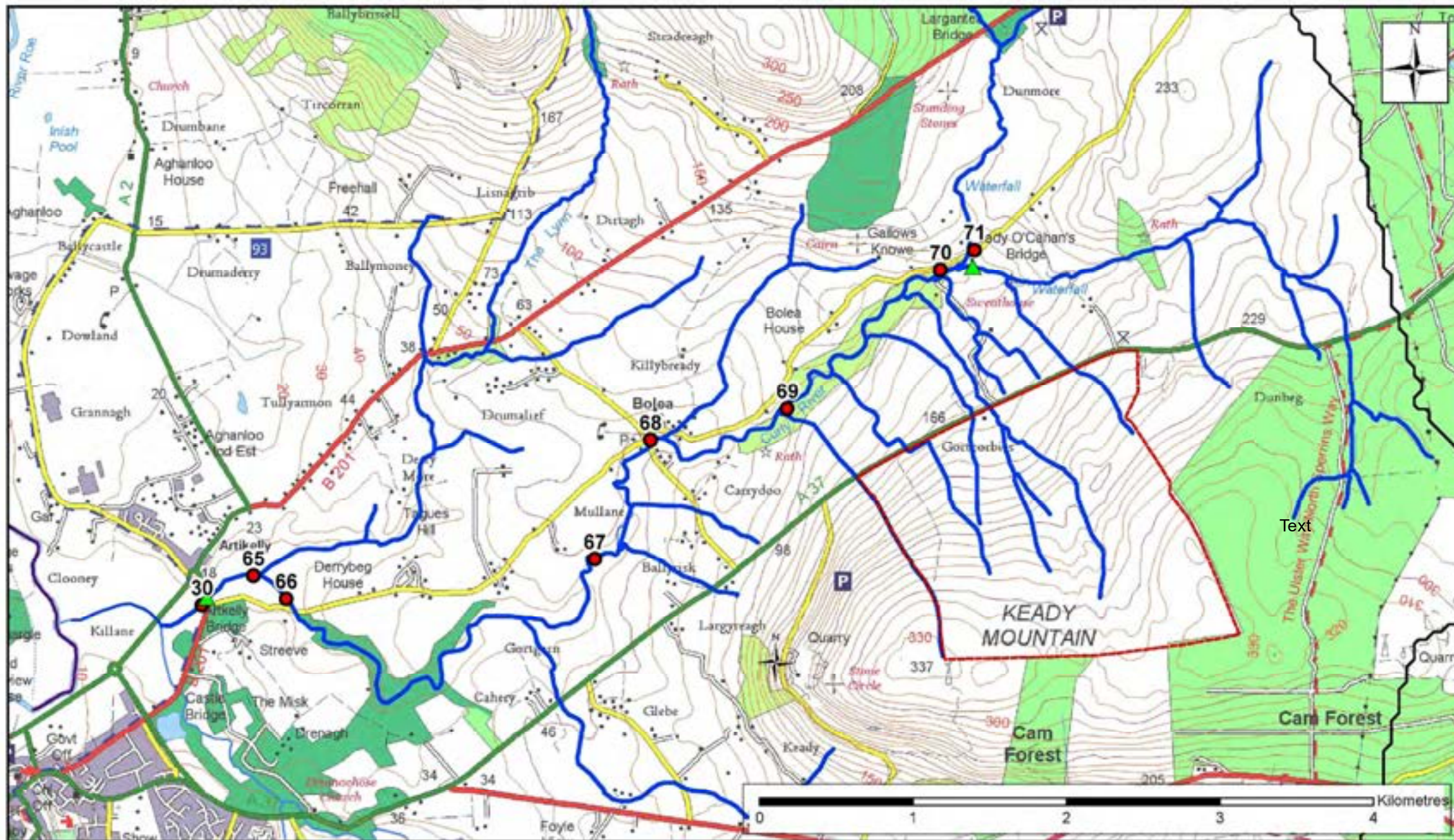


DUNBEG SOUTH WIND FARM

FIGURE 8.3

Location of NIEA Monitoring Stations and Loughs Agency Fish Survey Sites on the Curly River

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2017 LICENCE NUMBER 0100031673.



- NIEA monitoring stations
- Loughs Agency Fish Survey Sites
- Curly River
- River Roe
- Site boundary



LAYOUT DWG: N/A LAYOUT NO: N/A

DRAWING NUMBER: 03219D2230-01

SCALE AS SHOWN

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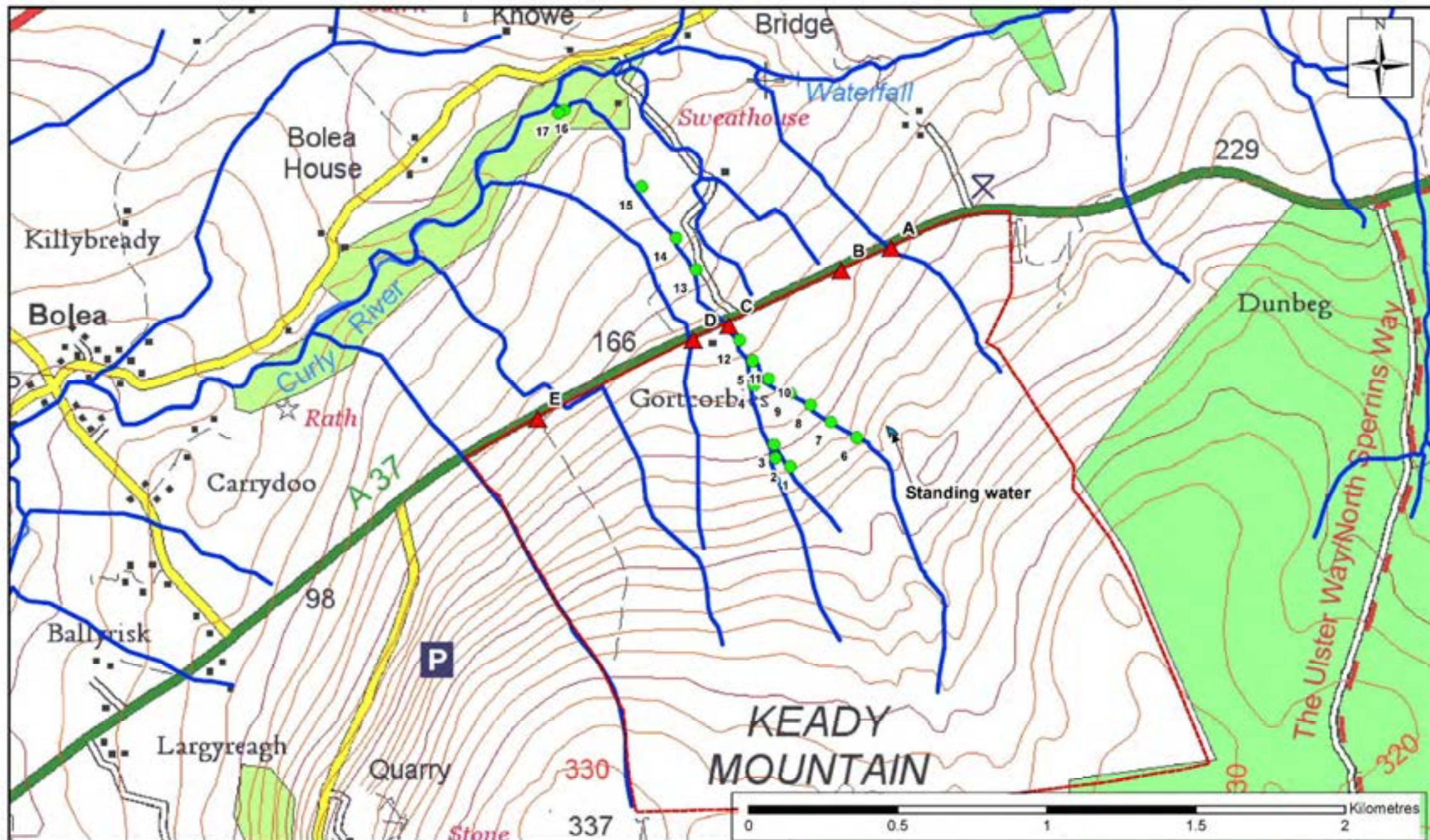


DUNBEG SOUTH WIND FARM

FIGURE 8.4

Location of ES Fish Survey and Stream Quality Sites on the Curly River

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- P,IA fish survey sites
- Stream quality sites
- Site boundary



LAYOUT DWG: N/A LAYOUT NO: N/A

DRAWING NUMBER: 03219D2231-01

SCALE AS SHOWN

ENVIRONMENTAL STATEMENT & PLANNING APPLICATION 2017

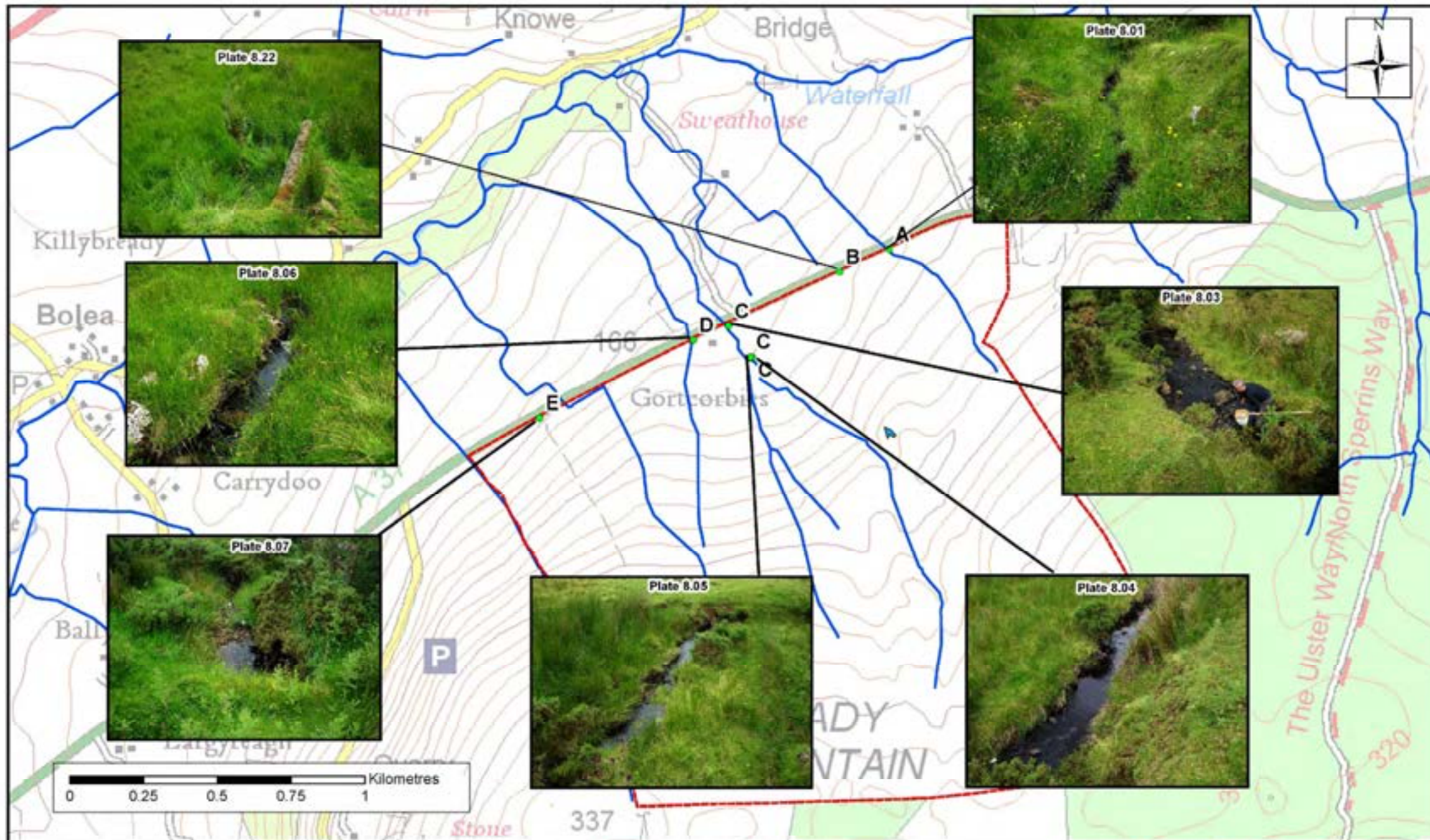
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DUNBEG SOUTH
WIND FARM

FIGURE 8.5

Location and General
Characteristics of Site
Drainage Streams A-E
- Photo Images

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2017 LICENCE NUMBER 0100031673.



Site boundary



LAYOUT DWG: N/A | LAYOUT NO: N/A

DRAWING NUMBER: 03219D2232-01

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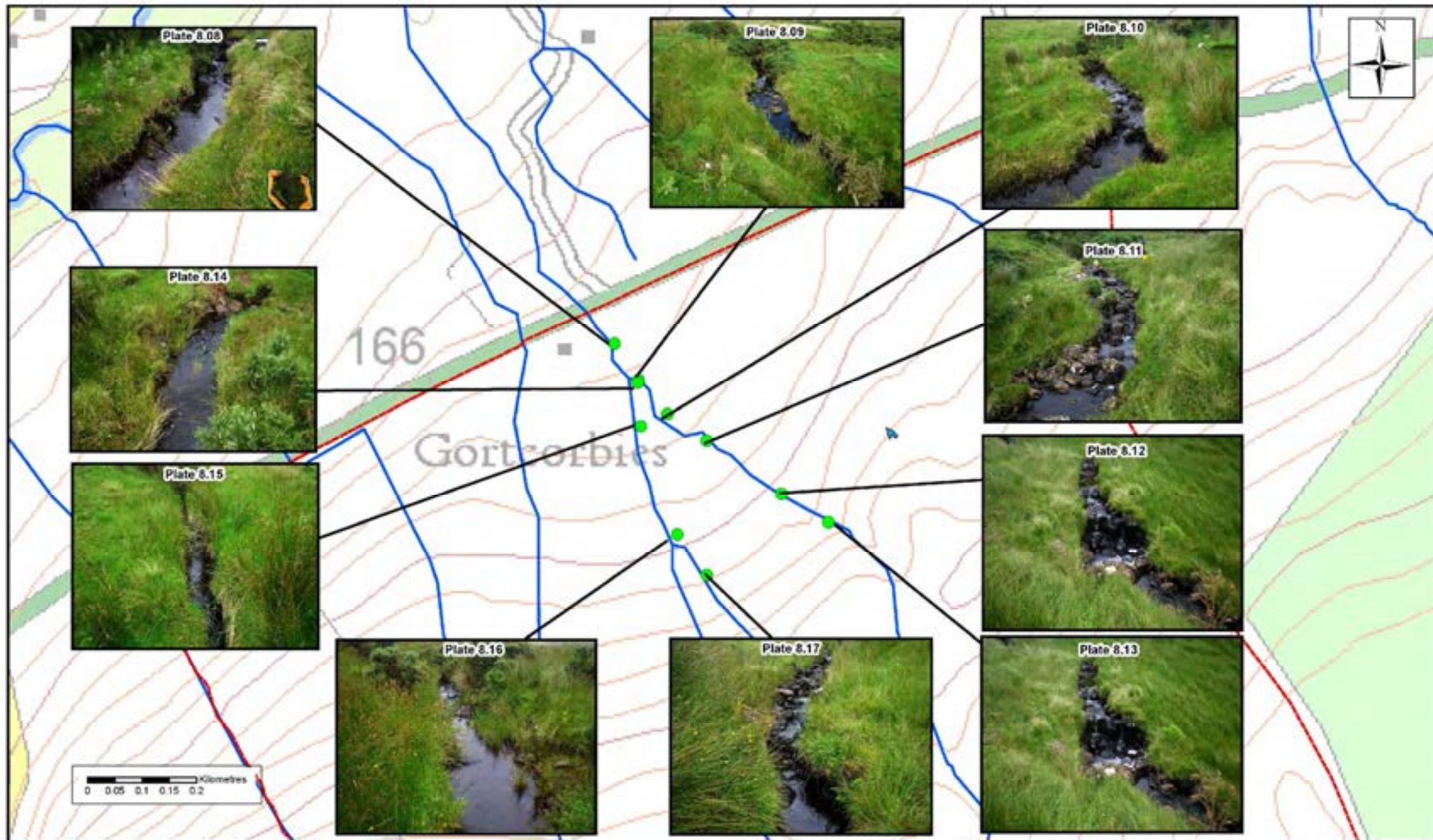
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DUNBEG SOUTH
WIND FARM

FIGURE 8.6

Outline Habitat Assessment
of Stream C within
Preliminary Site Boundary
- Photo Images

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Site boundary



LAYOUT DWG: N/A LAYOUT NO: N/A

DRAWING NUMBER: 03219D2233-01

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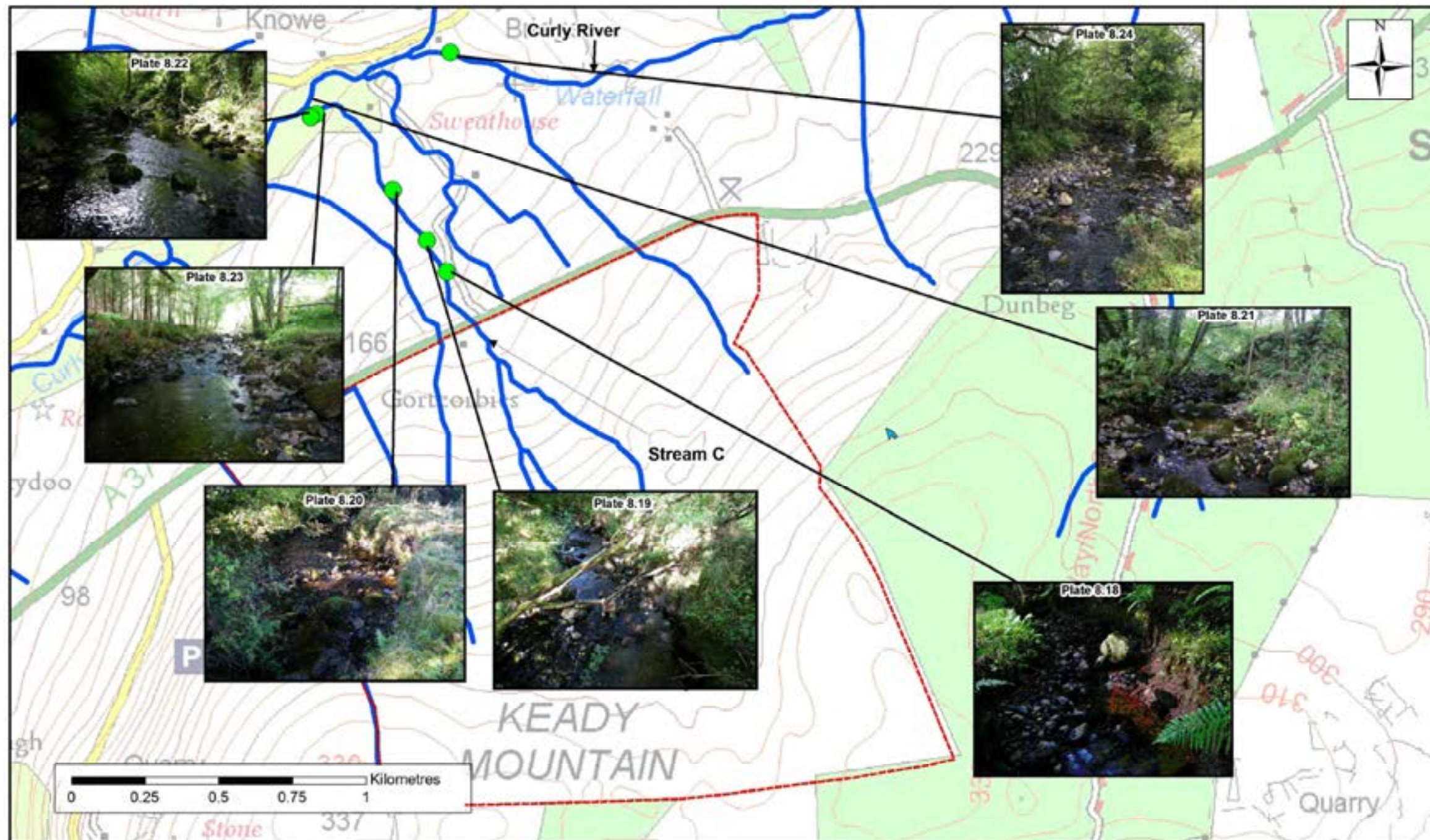
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DUNBEG SOUTH
WIND FARM

FIGURE 8.7

Outline Habitat Assessment
of Stream C outwith
Preliminary Site Boundary
- Photo Images

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Site boundary



LAYOUT DWG: N/A LAYOUT NO: N/A

DRAWING NUMBER: 03219D2236-01

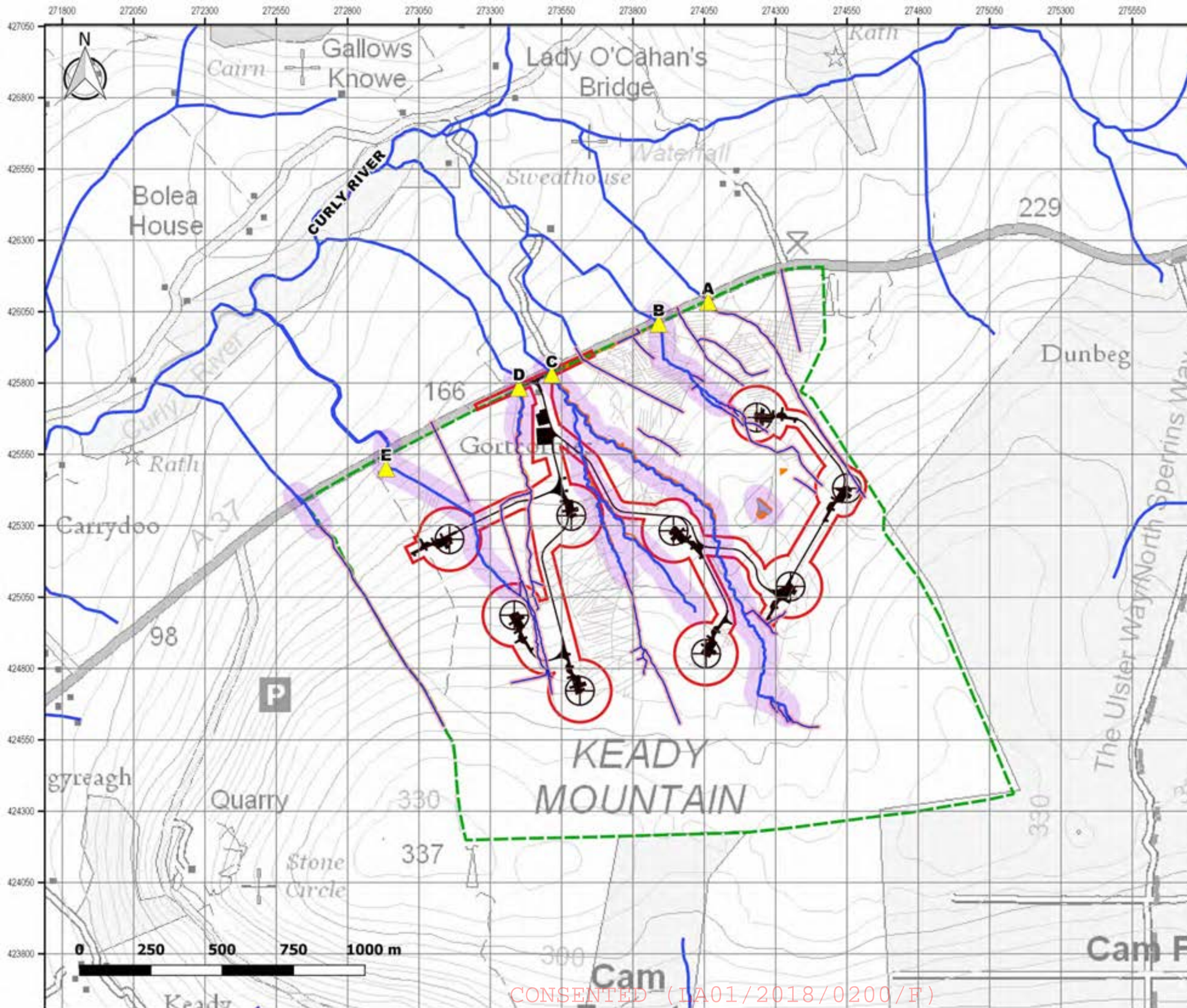
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9

Geology & Water Environment



DUNBEG SOUTH WIND FARM
FIGURE 9.1
SITE HYDROLOGY

- Legend**
- Proposed Layout**
- Site Boundary
 - Application Boundary
 - Proposed Infrastructure Layout
- Water Features**
- Significant Watercourse
 - Minor Watercourse
 - Other Features
 - Pond
- Hydrological Constraints**
- 50m Buffer
 - 10m Buffer
 - Indicative Pluvial Flooding
- Fisheries Assessment**
- Cross Referencing**
- Fisheries Stream ID

LAYOUT DWG 03219D1001-02	T-LAYOUT NO. PNIRdbx028
DRAWING NUMBER MCL115-77 Fig 9.1_2	
SCALE 1:10000 @ A3	

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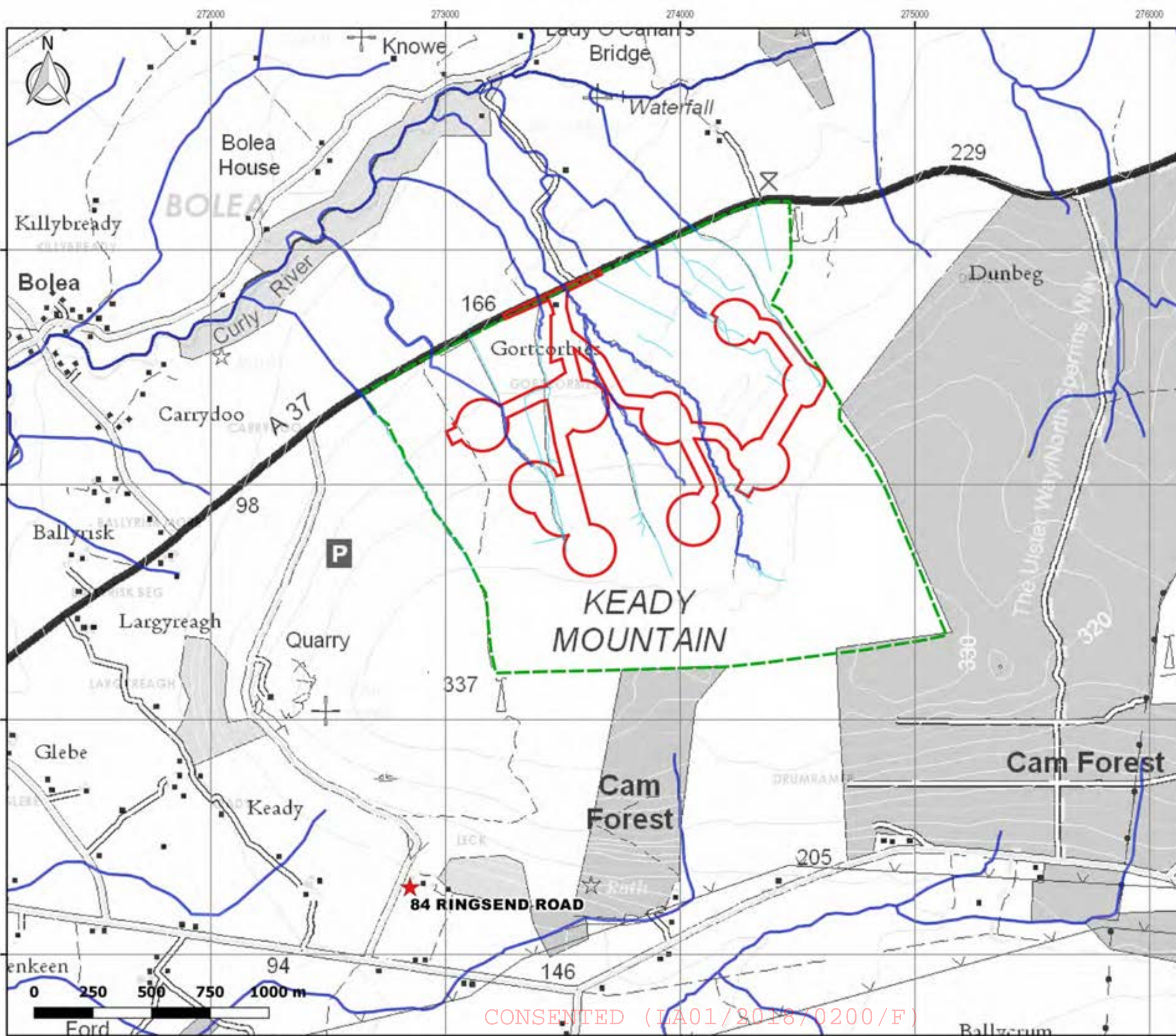
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 Newtownabbey BT36 5QA

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 W: www.mccloyconsulting.com

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DUNBEG SOUTH WIND FARM
FIGURE 9.2
ABSTRACTIONS

- Legend**
- Site Boundary
 - Planning Boundary
- Water Features**
- Significant Watercourse
 - Minor Watercourse
 - ★ Council : Private Water Supply (Spring)

LAYOUT DWG	T-LAYOUT NO.
3219D1001-02	PNIRdbx028

DRAWING NUMBER
MCL115-77_FIG 9.2_2

SCALE
1:15000 A3

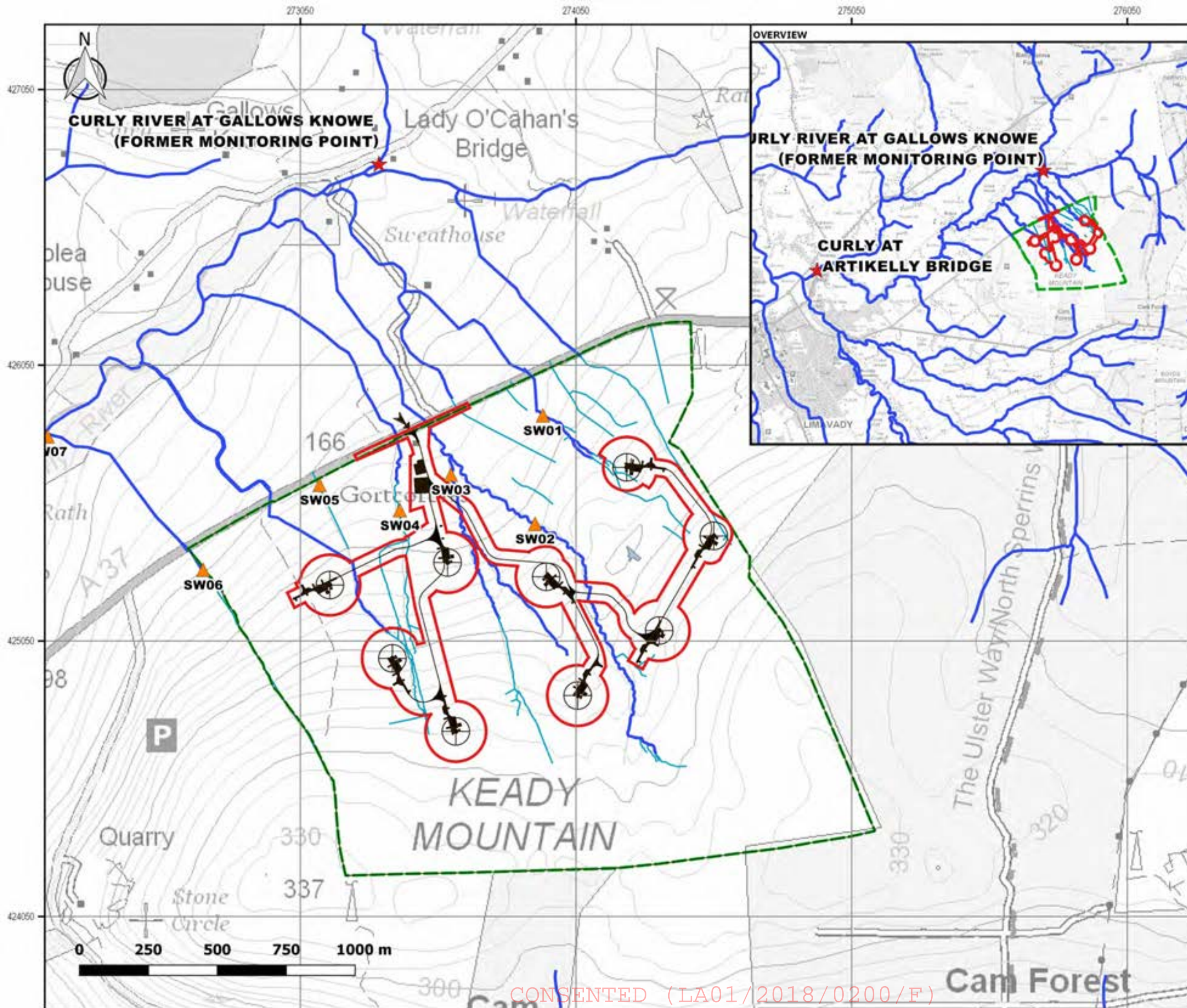
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DUNBEG SOUTH WIND FARM
FIGURE 9.3
WATER QUALITY MONITORING

- Legend**
- Application Boundary
 - - - Site Boundary
 - Water Features**
 - Significant Watercourse
 - Minor Watercourse
 - Surface Water Quality Monitoring Location**
 - ▲ McCloy Baseline Monitoring Location
 - ★ NIEA Monitoring Location

DRAWING NUMBER
MCL115-77_FIG 9.3_2

SCALE
MAIN MAP 1:12,500 @ A3

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DUNBEG SOUTH WIND FARM

FIGURE 9.4

DESIGNATED SITES

Legend

-  Application Boundary
-  Preliminary Boundary
- Designated Sites**
-  SPA and ASSI
-  SAC and ASSI

LAYOUT DWG	T-LAYOUT NO.
03219D1001_02	PNIRdbx028

DRAWING NUMBER
MCL115-77_FIG 9.4_2

SCALE
1:40,000 A3

ENVIRONMENTAL STATEMENT

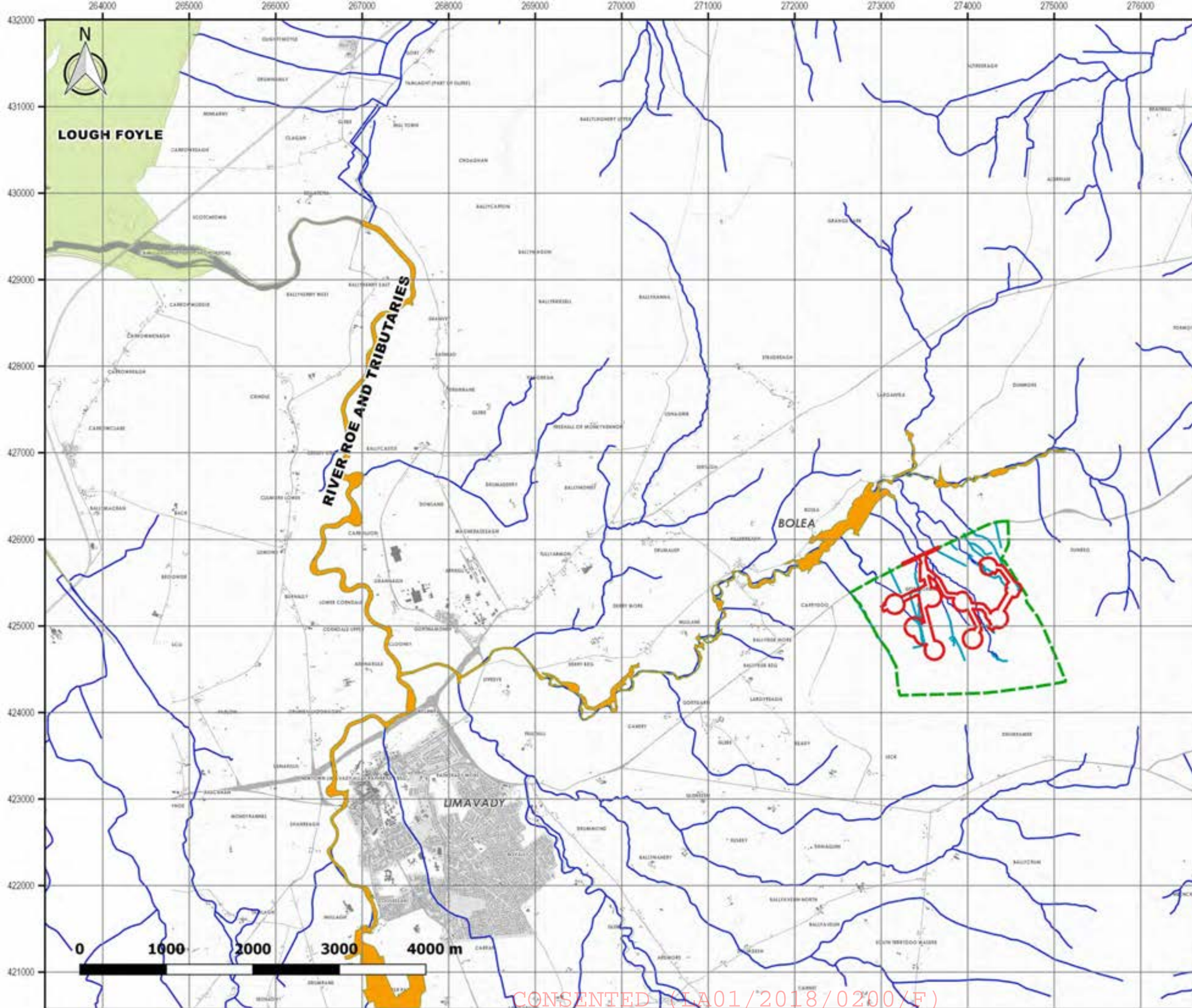
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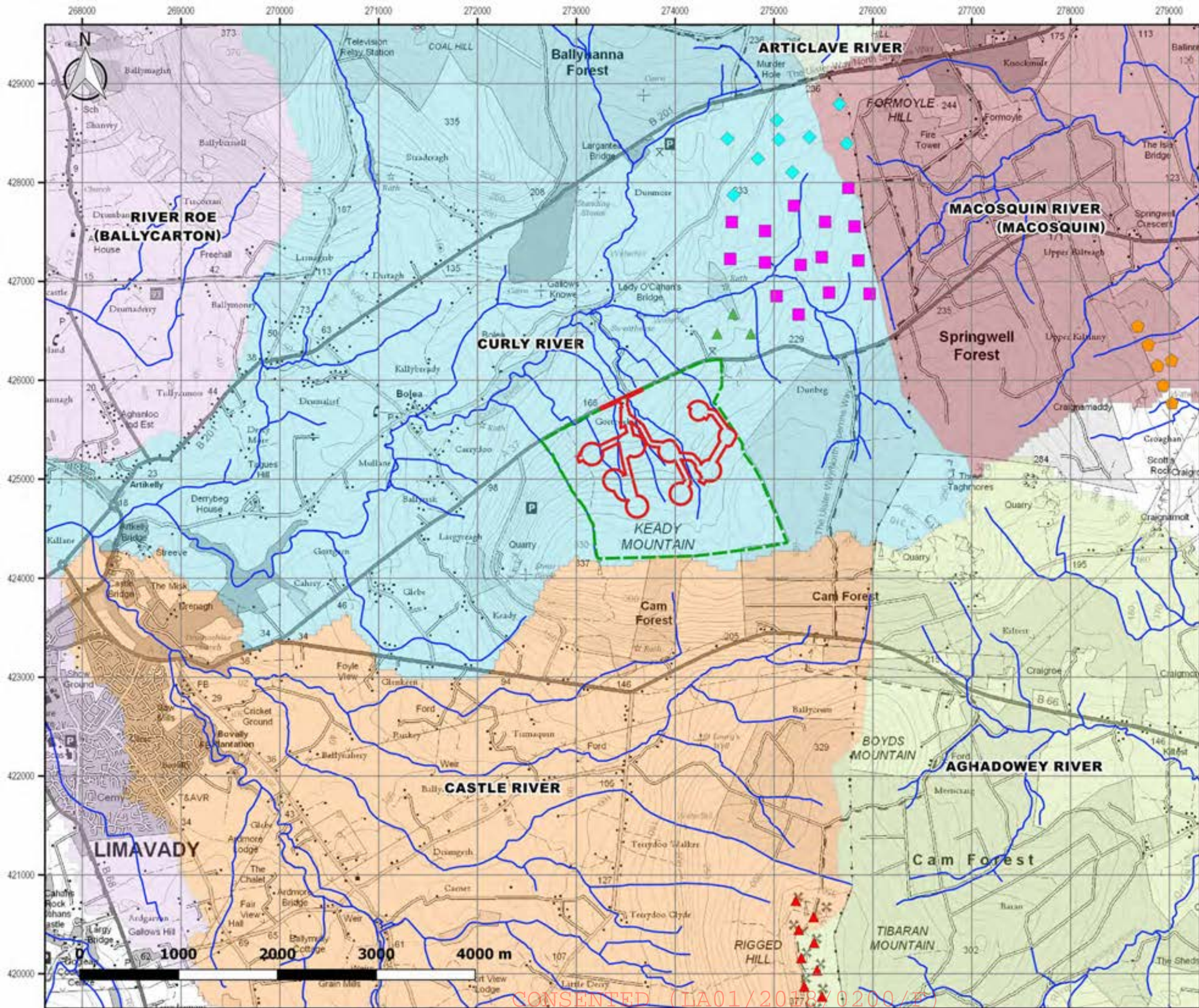
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DUNBEG SOUTH WIND FARM
FIGURE 9.5
CUMULATIVE ASSESSMENT

- Legend**
- Application Boundary**
 - Site Boundary
 - Significant Watercourses
 - Windfarms within 40km**
 - Croaghan
 - Dunbeg
 - Dunmore
 - Rigged Hill
 - Dunbeg Extension
 - WFD Surface Water Bodies**
 - Aghadowey River
 - Castle River
 - Curly River
 - Macosquin River (Macosquin)
 - River Roe (Ballycarton)
 - Shinney Water

LAYOUT DWG	T-LAYOUT NO.
03219D1001_02	PNIRdbx028

DRAWING NUMBER
MCL115-77_FIG 9.5_2

SCALE
1:35,000 @ A3

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10

Noise



DUNBEG SOUTH WIND FARM

FIGURE 10.1

PREDICTED NOISE FOOTPRINT FOR PROPOSED WIND FARM

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Legend

- Turbine Location
- Receiver Location
- Survey Location
- Unoccupied Location

Predicted Noise Level

- >35dBA
- >40dBA
- >45dBA
- >50dBA
- >55dBA

Grid intervals at 1 km

The LA90,10min descriptor has been used

The noise footprint has been calculated at a wind speed of 8m/s at 10m height using the ISO:9613-2 propagation model with all barrier attenuation (i.e. shielding by hills) removed. The figure may therefore show slightly more conservative results than those numerically calculated and presented in the acoustic chapter and should be considered illustrative only.



LAYOUT DWG: 03219D0001-06

LAYOUT NO: PNIrdxb028

DRAWING NUMBER

03219D2902-01

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DUNBEG SOUTH WIND FARM

FIGURE 10.2

PREDICTED CUMULATIVE NOISE FOOTPRINT

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2017 LICENCE NUMBER 0100031673.

Legend

- Turbine Location
- Receiver Location
- Survey Location
- Unoccupied Location

Predicted Noise Level

- >35dBA
- >40dBA
- >45dBA
- >50dBA
- >55dBA

Grid intervals at 1 km

The LA90,10min descriptor has been used

The noise footprint has been calculated at a wind speed of 8m/s at 10m height using the ISO:9613-2 propagation model with all barrier attenuation i.e. shielding by hills) removed. The figure may therefore show slightly more conservative results than those numerically calculated and presented in the acoustic chapter and should be considered illustrative only.

Turbines prefixed "T" are the proposed Dunbeg South turbines, turbines A1-A14 are the existing Dunbeg turbines, turbines A15-A17 are the consented Dunbeg Extension turbines, turbines B1-B4 & B6-B8 are the existing Dunmore turbines, turbines B9-B16 are the proposed Dunmore Extension turbines and S2-S4 are the three single turbine schemes considered



LAYOUT DWG: 03219D0001-06

LAYOUT NO: PNIrdxb028

DRAWING NUMBER

03219D2903-01

SCALE - 1:40,000 @ A3

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11

Traffic & Transport



DUNBEG SOUTH WIND FARM

FIGURE 11.1

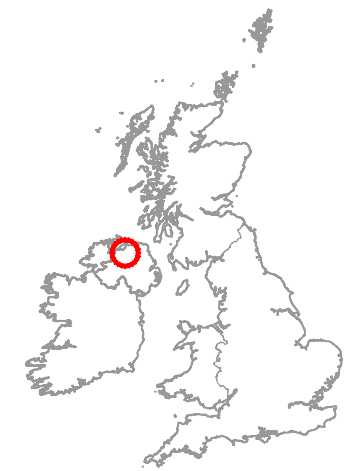
TURBINE DELIVERY ROUTE

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KEY

SITE

PROPOSED DELIVERY ROUTE



LAYOUT DWG: N/A | T-LAYOUT NO.: N/A

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SCALE - 1:150,000 @ A3

ENVIRONMENTAL STATEMENT 2017

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Table of Contents

Chapter 1	Introduction & Policy Context
Chapter 2	Proposed Development
Chapter 4	Landscape & Visual
Chapter 5	Archaeology & Cultural Heritage
Chapter 6	Ecology
Chapter 7	Ornithology
Chapter 9	Geology & Water Environment
Chapter 10	Noise
Chapter 11	Traffic & Transport

1

Introduction & Policy Context

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Appendix 1: Introduction & Policy Context

Appendix 1.1 RES Letter of Intention to Submit

Appendix 1.2 CC & G DC Response



Renewable Energy Systems Limited
Willowbank Business Park, Willowbank Road, Millbrook, Larne
County Antrim, Northern Ireland BT40 2SF, United Kingdom
T +44 (0)28 2844 0580 F +44 (0)1923 299 299
E info@res-group.com www.res-group.com

Ms C McKeary
Causeway Coast & Glens DC
Coleraine Planning Office
County Hall
Castle Rock Road
Coleraine
BT51 3HS

Our Ref: 03219-000572

12th June 2017

Dear Ms McKeary,

Re: Intention to Submit an Environmental Statement for the proposed Dunbeg South Wind Farm (LA01/2017/0725/PAN)

Pursuant with the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2012 (Part III: Preparation of Environmental Statements), Regulation 8 (1), RES UK Ltd duly gives notice of its intention to submit an Environmental Statement in support of a planning application for a wind energy project referred to as Dunbeg South Wind Farm, in the townland of Gortcorbies, approximately 7km northeast of Limavady, Co. Londonderry (see enclosed Site Location Plan and Site Boundary Drawing).

The Environmental Statement will be submitted in support of a planning application for a wind farm comprising up to 9 three bladed wind turbines, each up to a maximum of 149.9m tip height, associated external electricity transformers; underground cabling; a new created site entrance; access tracks; turning heads; crane hardstandings; control building and substation compound and energy storage containers. During construction and commissioning there would be a number of temporary works including a construction compound with car parking; temporary parts of crane hardstandings; welfare facilities and temporary guyed meteorological masts. The purpose of the development is for the generation of electricity.

Under Part III, Regulation 8 (2), we identify the major issues which will be addressed in this Environmental Statement as:

- the implications of siting the wind turbines on the landscape quality and the visual character of the site;
- the impact on local population (traffic generation, noise, shadow flicker, employment);
- the impact on local flora and fauna;
- the impact on the historic and archaeological interest of the site and surrounding area.

We note that on receipt of the developer's notice of intention to submit, the Council will notify the relevant authorities likely to be concerned by the proposed development under Part III, Regulation 8, Paragraph 3 (b)

(i & ii). The developer would like to be informed of the names and addresses of the bodies as detailed under Part III, Regulation 9, Paragraph 3 (b) (iii).

We also request that the Council communicates our intention to enter into consultation, with anybody identified by the Council in order to ascertain whether the body has information in its possession that they consider relevant to the preparation of the environmental statement and that such information should be made available to the developer, under Part III Regulation 8.

Further to this, RES and the various consultants that are carrying out survey work for the Dunbeg South site, have notified some authorities regarding the proposed development in order to ascertain whether the body has information which they consider to be relevant to the preparation of the environmental statement. Consultation has taken place with the following bodies:

1. Atkins Global
2. Causeway Coast and Glens Borough Council – Environmental Services Department
3. City of Derry Airport
4. Ministry of Defense
5. Defense Infrastructure Organisation
6. Geological Survey of Northern Ireland
7. DEARA – Fisheries Branch
8. DEARA – Rivers Agency
9. DEARA - Natural Environment Division
10. DEARA - Drinking Water Inspectorate
11. DEARA - Water Management Unit
12. DEAEA - Land and Groundwater Team
13. Inland Fisheries
14. Fisheries Inspectorate
15. Loughs Agency
16. RSPB
17. Shared Environmental Services
18. Defence Infrastructure Organisation
19. Eircom (EMR Solutions)

20. Everything Everywhere

21. Joint Radio Company Ltd

22. Northern Ireland Water Wind Farm Management (Magdalene)

23. OFCOM

We trust the information provided is satisfactory, however if you have any queries please do not hesitate to contact us.

Yours sincerely,



Garth McGimpsey
Senior Development Principal
E garth.mcgimpsey@res-group.com
T +44 (0) 28 2844 0597

Enc:

Site Location Plan 03219D2202-02

Site Boundary Drawing 03219D2501-03



**Causeway
Coast & Glens
Borough Council**

Mr Garth McGimpsey
Res Energy Systems Ltd
Unit C1 & C2 Willowbank Business Park
Willowbank Road
Millbrook
Larne
BT40 2SF

Causeway Coast and Glens
Local Planning Office
County Hall
Castlerock Road
Coleraine
BT51 3HS

Date:	25th July 2017
Your Ref:	03219-000572
Our Ref:	LA01/2017/0781/DETEIA (Please quote at all times)
Please Contact:	Gary McClelland
Contact Number	0300 200 7830

Dear Sir,

Location: Dunbeg South Wind Farm, Broad Road, Limavady.

Proposal: Wind farm comprising of 9 No. Wind Turbines.

I refer to your letter of 12 June 2017 and accompanying plans and information requesting a determination under Regulation 8(1)(a) of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 as to whether or not the above proposal would or would not be an EIA development as defined by the same Regulations.

Your proposal falls within Category 3.J of Schedule 2 of the Regulations, is likely to have significant environmental effects, and is therefore EIA development under the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017. Any application for the proposal, if submitted, will therefore be required to be accompanied by an Environmental Statement. The Council is not permitted to grant planning permission for such a development unless it has taken environmental information into consideration, including an Environment Statement.

If you wish to proceed with the development you should notify the Council whether or not you accept this determination. If you do not accept the determination you may seek a hearing before the Planning Appeals Commission. Notification that you do not accept the determination and propose to seek a hearing before the Planning Appeals Commission must be received by the Council within 4 weeks from the date of this letter.

If you accept the determination, the Council will provide you with a list of authorities which,

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by reason of their specific environmental responsibilities, are likely to be concerned by the proposed development and may hold information which will be relevant to the preparation of your environmental statement.

You have already advised that you will submit an Environmental Statement. The Environmental Statement should include the following chapters:

- A visual impact assessment / impact on landscape character assessment - to include views from critical viewpoints,
- An accumulation impact study demonstrating the impact of the proposal in association with existing and approved single wind turbines and wind farms in the area
- A noise assessment chapter, in accordance with EHO comments dated 18 July 2017 (attached)
- A traffic and transportation chapter, in accordance with TNI comments dated 10 July 2017 (attached)
- A chapter on the links with European sites designated under the Habitats Regulations, in accordance with Shared Environmental Service comments dated 06 July 2017 (attached)
- An archaeological chapter addressing impacts on the archaeological features of the immediate area, in accordance with DFC HED comments dated 30 June 2017 (attached)
- A water features survey (and potential risk assessment if required), in accordance with DAERA comments dated 07 July 2017 (attached)
- A report detailing the impact on groundwater flow paths, groundwater receptors (aquifers) or secondary receptors, in accordance with DAERA comments dated 07 July 2017 (attached)
- An extended Phase 1 Habitat Survey, bird surveys and bat surveys and other information, in accordance with DAERA comments dated 07 July 2017 (attached).
- A chapter advising on other impacts - shadow flicker assessment, electromagnetic interference, reflected light and ice throw.

Please note, Loughs Agency have not responded to the Council's consultation.

Yours faithfully



For Head of Planning

Enclosed:

- EHO comments dated 18 July 2017
- TNI comments dated 10 July 2017
- Shared Environmental Service comments dated 06 July 2017
- DFC HED comments dated 30 June 2017
- DAERA comments dated 07 July 2017

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CONSULTEE COMMENTS

Application Reference:	LA01/2017/0781/DETEIA	Council Ref:	2448/17/JO'K
Date Consulted:	20 June 2017		
Location:	Dunbeg South Wind Farm, Broad Road, Limavady		
Proposed Development:	Intention to submit an Environmental Statement		
Comments:	<p>Wind turbines have the potential to adversely impact upon neighbouring premises due to noise, electromagnetic interference, shadow flicker etc. The Environmental Services Department's remit and consultation response in relation to such applications is however confined to the potential noise impact. Given that this proposal relates to a new windfarm this department would consider there is a need for noise impacts to be addressed within any proposed Environmental Statement.</p> <p>The Department of Trade and Industry document entitled "The Assessment and Rating of Noise from Wind Farms ETSU-R-97" describes a framework for the rating and assessment of wind farm noise and gives indicative noise levels calculated to offer a reasonable degree of protection to neighbours, without placing unreasonable restrictions on wind energy development. The Institute of Acoustics' 'Good Practice Guide (GPG) to the application of ETSU-R-97 for the assessment and rating of wind turbine noise' was issued in May 2013 and is available to view at the Institute of Acoustics website.</p> <p>The applicant is therefore requested to undertake a noise assessment for the proposed windfarm in accordance with ETSU-R-97 and the IOA's Good Practice Guide. Any properties in the vicinity, committed development or earlier applications and other wind energy developments either constructed, approved or planned (as highlighted in the planning supporting statement) must be considered in the assessment. It is incumbent upon the developer to ensure that all relevant development has been considered. In cases where there are other approved turbines to be considered it should be confirmed if they are constructed and operational at the time of the assessment, and the manufacturer and model clearly specified. The Good Practice Guide should be applied to the prediction of noise impact from all turbines which contribute to a cumulative noise impact.</p> <p>The ETSU-R-97 approach allows for a <u>simplified assessment</u> where it can be demonstrated, by way of calculation, that the noise impact of the turbine including the impact of any other existing or proposed turbines/windfarms will not exceed 35 dB LA90,10min for wind speeds up to 10m/s at any property other than the applicant's own</p>		

Note - Any consultation response provided by this Department is based on currently available information relevant at the time of application and is limited to the supporting documentation submitted by the applicant/agent. This Department accepts no responsibility for any inaccuracies contained within the application documentation or associated communications available.

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house.

Where this cannot be demonstrated the full assessment methodology must be followed which includes:

- determining a study area and identifying all potentially affected properties
- undertaking a background noise level measurement survey consisting of simultaneous measurement of background noise levels at representative properties, with wind speed and direction at the proposed turbine site
- analysing data to remove rain affected and atypical data, and derivation of noise limits for day-time and night across wind speeds up to 12 m/s
- prediction of the noise impact of the turbine (including the cumulative noise impact of any other existing or proposed wind energy developments) at noise sensitive property
- demonstration of compliance with the limits across the wind speed range.

ETSU-R-97 allows for some increase on noise limits where the occupier of a property has a financial involvement with the turbine. Within any submitted noise impact assessment any financially involved receptors should be identified. It should be demonstrated that ETSU-R-97 derived limits, with an increased lower absolute level of 45dB LA90,10min can be met at such properties.

A further response will be provided by the Environmental Services Department on receipt of the information (i.e. noise assessment/ revised noise assessment) requested. In the interim it is recommended that planning approval is not granted.

Consultation at an early stage with the Environmental Services department on the noise assessment stage is encouraged, particularly on the number and positioning of background noise level measurement locations (if the full assessment method is required).

Date: 18 July 2017

Issued on behalf of the Head of Health and Built Environment.

Note - Any consultation response provided by this Department is based on currently available information relevant at the time of application and is limited to the supporting documentation submitted by the applicant/agent. This Department accepts no responsibility for any inaccuracies contained within the application documentation or associated communications available.

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Historic Environment Division
Causeway Exchange
1-7 Bedford Street
Belfast
BT2 7EG

Tel: 028 9082 3100
Email:
HEDPlanning.General@communities-
ni.gov.uk

Date: 30 June 2017

Dear Sir/Madam

Planning Application Ref.: LA01/2017/0781/DETEIA
Location: Dunbeg South Wind Farm
Broad Road
Limavady.
Proposal: Wind Farm comprising of 9 no. Wind Turbines.

The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015

Thank you for your consultation on the above application, received by DfC on 20/06/2017

Historic Environment Division (HED) has reviewed the details of the application and provides summary comments as follows:

Archaeology and Built Heritage

HED Historic Monuments - should it be determined that an Environmental Impact Assessment (EIA) is required then Historic Environment Division: Historic Monuments (HED: HM) would require an archaeological section within it. However, if it is determined that an EIA is not necessary then HMU would still require an Archaeological Impact Assessment (AIA) with a particular focus on the archaeological features of the immediate area.

Historic Environment Division (HED) has reviewed the details of the application and provides summary comments as follows:

Should you seek further clarification on any of the issues raised in this response, please do not hesitate to contact the HED Planning Team.

Kind Regards

Historic Environment Division

Archaeology & Built Heritage

Section Reference SM11/1 LDY 010: 021 and 020

Considerations

There are a number of archaeological sites and monuments recorded within the environs of the application site with a particular focus of settlement activity dating to the prehistoric period. These include an extensive field system and occupation sites (LDY010:021, LDY010:020) within the proposed development area. LDY010:021 represents a complex of field banks and huts, and extends over an area at least 1km². LDY010:020 represents a mound, 13m in diameter, which was partially excavated in the 1940s and contained Neolithic and Beaker pottery. An Early Bronze Age burial site is also located within the proposed development area: LDY010:019 contained fragments of a cremation accompanied by the remains of a Food Vessel. Further archaeological sites and monuments are found adjacent to the proposed development area, some of which are Scheduled for protection. Policies BH1 and BH2 of PPS6 refer. This is a large, upland application site which contains extensive known archaeological remains.

Therefore, should it be determined that an Environmental Impact Assessment (EIA) is required then Historic Environment Division: Historic Monuments (HED: HM) would require an archaeological section within it. However, if it is determined that an EIA is not necessary then HMU would still require an Archaeological Impact Assessment (AIA) with a particular focus on the archaeological features of the immediate area. The AIA should be prepared by a professional archaeologist/archaeological consultancy to include:

1. A detailed overview of the likely impact of development on the archaeological sites and monuments located close to the proposed development. This should include a desktop survey of the area, making use of any relevant information held in the Monuments and Buildings Record, historic maps of the area, information of archaeological sites, monuments, and artefacts held by the Ulster Museum, consultation of the excavation database and any other relevant sources. There should be a field inspection of the application site to identify any other previously unrecorded, upstanding archaeological remains, and to identify areas of highest archaeological potential.
2. An assessment of the potential impacts of this development on those known archaeological sites and monuments within its environs, either Scheduled or in State Care, and monuments that are of local importance. Scheduled and State Care monuments are protected under the *Historic Monuments and Archaeological Objects (Northern Ireland) Order* and also afforded protection under the provisions of *Planning Policy Statement 6 – Planning, Archaeology and the Built Heritage, Policy BH1*. Any development within the immediate vicinity of a Scheduled or State Care monument that may affect it or its setting would not be permitted under **PPS 6 Policy BH1**. Monuments that are of local significance such and associated below-ground remains are protected under **PPS 6 Policy BH2**.
3. A mitigation strategy, possibly to include an initial geophysical survey of the site, to identify any previously unrecorded archaeological remains within the

development area. The mitigation strategy must include environmental sampling, and should include options for preservation of archaeological remains *in-situ*, or for the appropriate identification and excavation recording of remains where preservation *in-situ* cannot be achieved. The mitigation strategy should also make provisions for works that may be necessary after the field work is completed. This may include post-excavation processing and analysis of the archaeological material retrieved, preparation of specialist reports etc. and the preparation of a final report. All this should be in line with PPS 6 Policy guidelines.

Shared Environmental Service
County Hall
182 Galgorm Road
Ballymena
Co. Antrim
BT42 1QF

Date 06/07/2017

Planning Reference: LA01/2017/0781/DETEIA

Proposal: Intention to submit an Environmental Statement.

Location: Dunbeg South Wind Farm, Broad Road, Limavady.

SES advises that based on the documentation supplied for LA01/2017/0781/DETEIA, the proposal is not wholly or partly in a sensitive area within the meaning of Part 1, Regulation 2 (f) of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015. Note that SES has not reviewed whether this site is within another sensitive area as defined in Regulation 2 (a), (b), (c), (d), (e).

This proposal will be subject to the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended). As such a Habitats regulation Assessment is required to be completed for any planning permission applied for.

The proposal identifies a large area of land on Keady Mountain to the North East of Limavady for the potential development of a Wind Farm. At this stage no details on the size or number of wind turbines has been supplied.

From this initial desk based assessment, SES would confirm that potential hydrological links exist between the area and the River Roe and Tributaries SAC from watercourses discharging into the Curly River from the northern boundary of the area and potentially to the Castle River system from watercourses to the southern boundary of the area. There may also be potential disturbance or collision risks to the ornithology features of Lough Foyle SPA to the north.

SES would not need to see a full EIA Environmental Statement in order to carry out an HRA as the information required could be supplied as part of the planning application process. However, if Causeway Coast and Glens Planning concur with the applicant and determine that the proposal is EIA development, SES would recommend the following to be included in any Environmental Statement to enable HRA to be carried out on the application.

A section on links with European Sites designated under the Habitat Regulations as highlighted above, including the following detailed information.

"An Environmental Management Plan (EMP) for the construction, operational and decommissioning phases of the development that identifies all direct or indirect pollution pathways to the River Roe and Tributaries SAC and any aerial disturbance/collision pathways from the proposal site to the SPA features in Lough Foyle. The statement should also state what mitigation measures will be employed during construction, operation and decommissioning to negate any adverse effects that may occur from these pathways on the conservation objectives/features of River Roe and Tributaries SAC, Lough Foyle SPA or any other European Site identified."

Shared Environmental Service

CONSENTED (LA01/2018/0200/F)

Planning Response Team
Klondyke Building
Cromac Avenue
Gasworks Business Park
Lower Ormeau Road
Belfast
BT7 2JA
Tel: 028 9056 9604
Email: planningresponse.team@daera-ni.gov.uk

Date: 07 July 2017

Dear Sir/Madam

Planning Application Ref.: LA01/2017/0781/DETEIA
Location: Dunbeg South Wind Farm
Broad Road
Limavady.
Proposal: Wind Farm comprising of 9 no. Wind Turbines.

Thank you for your consultation on the above which was received by DAERA on 20/06/2017

Our statutory duty is to ensure that the natural and historic environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development.

We have reviewed the details of the application and would provide summary comments as follows:

Drainage and water

The Drinking Water Inspectorate (DWI) advise the application should consider the potential of private water supply sources being present in the vicinity of the development. Where these supplies are used as drinking water sources they are required to be protected in the interests of public health. DWI refers the applicant to standing advice in the explanatory note.

Water Management Unit are of the opinion that, based on the nature of this proposal, impacts on the water environment generated by this proposal are unlikely to be significant, subject to best practice and appropriate mitigation being applied throughout the duration of the proposal.

Inland Fisheries have no comments to make to this proposal as it falls under Lough's Agency's remit.

Land, Soil and Air

Regulation Unit has considered the impacts of the proposal on the environment and on the basis of the information provided refers to standing advice.

Natural Heritage and Conservation Areas

Natural Environment Division (NED) has supplied scoping information relevant to priority habitat and protected species for an Environmental Statement.

CONSENTED (LA01/2018/0200/F)

If you wish to discuss anything raised in our response, please do not hesitate to contact Planning Response Team (details above).

Kind Regards

Planning Response Team

On behalf of DAERA

Drainage & Water

Section Reference: LA08/2017/0623/F

Considerations

The application should consider the potential of private water supply sources being present in the vicinity of the development. Where these supplies are used as drinking water sources they are required to be protected in the interests of public health. The Drinking Water Inspectorate (DWI) refers the applicant to standing advice in the explanatory note below.

Explanatory note

The foundations for wind turbines could potentially impact on groundwater flow paths, groundwater receptors (aquifers) or secondary receptors. Hence it is recommended that the applicant considers the potential risks to potential receptors. Please see Northern Ireland Environment Agency guidance available on the Northern Ireland Planning Portal on water features surveys and wind farms:

http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/water_features_surveys.pdf

http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/wind_farms_and_groundwater_impacts-3.pdf

The Planning Authority should consider if the following water features were identified within the following radius from the proposed wind turbine:

- private (or public) water supply used for drinking water: 250 m
- any other spring, well or borehole that is not used as a drinking water supply: 50 m

If any of the above water features are identified they should be assessed to determine if they will be impacted by the proposals in relation to the quality or sufficiency of drinking water supplies. Where a public water supply is identified further consultation should take place with Northern Ireland Water.

With regards to an EIA determination: it is the planning case officer's decision whether they wish to obtain the water features survey (and potential risk assessment if required) outside or as part of an EIA.

Drainage & Water

Section Reference:

WMU/PC/ 28083-1

Considerations

Water Management Unit are of the opinion that, based on the nature of this proposal, impacts on the water environment generated by this proposal are unlikely to be significant, subject to best practice and appropriate mitigation being applied throughout the duration of the proposal.

Explanatory Note

Water Management Unit's comments are subject to the relevant environmental authorisations being granted.

Informatives

Best practice and appropriate mitigation must be applied in accordance with NIEA's published guidance. The applicant should refer to and adhere to the relevant precepts contained in the Standing Advice Notes, paying particular attention to:

Standing Advice Note No.4 – Pollution Prevention Guidance

Standing Advice Note No. 5 – Sustainable Drainage Systems

Standing Advice Note No.11 – Discharges to the Water Environment

Standing Advice Note No. 22 - Culverting

Standing Advice Note No. 23 – Commercial and Industrial

The applicant should also refer to the Standing Advice Note No. 24 – Pre-Application Discussion Advice, which outlines the matters the applicant should consider whether or not an EIA is required.

(Standing Advice Notes are available on the NI Planning Portal www.planningni.gov.uk under Advice/NIEA Guidance.)

The following is the response of Inland Fisheries of the Department for Agriculture, Environment and Rural Affairs (DAERA) to this application.

Considerations

Inland Fisheries have no comments to make to this proposal as it falls under Lough's Agency's remit.

Land, Soil & Air

Considerations

Regulation Unit Land and Groundwater Team has considered the impacts of the proposal on the environment and on the basis of the information provided refers to standing advice in the explanatory note below.

Explanatory note

The foundations for wind turbines could potentially impact on groundwater flow paths, groundwater receptors (aquifers) or secondary receptors. Hence it is recommended that the applicant considers the potential risks to potential receptors.

Please see Northern Ireland Environment Agency guidance available on the Northern Ireland Planning Portal on water features surveys and wind farms:

http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/water_features_surveys.pdf

http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/wind_farms_and_groundwater_impacts-3.pdf

The Planning Authority should satisfy themselves whether water features were identified within the following radius from the proposed wind turbine:

- surface water course: 10 m
- private (or public) water supply used for drinking water: 250 m
- designated groundwater dependant terrestrial ecosystem: 250 m
- any other spring, well or borehole that is not used as a drinking water supply: 50 m

Only if potential receptors (water features) have been identified and a risk assessment has been prepared Regulation Unit should be consulted for advice.

With regards to an EIA determination: it is the planning case officer's decision whether they wish to obtain the water features survey (and potential risk assessment if required) outside or as part of an EIA.

Natural Heritage

Section Reference: CB24672-1

Planning Reference: LA01/2017/0781/DETEIA

NIEA Natural Heritage Division (NED) has previously supplied scoping information on this proposal to Blackstaff Ecology (Our Ref: C850, dated 17 June 2016).

Key environmental considerations

NED has carried out a desktop search of currently available information – see below. Please note that this information is correct at this point in time, but should be reviewed before submitting the Environmental Statement (ES) / planning application. You should also refer to the recommended websites, detailed below, for other relevant information.

Please also find enclosed advice on the information that NED considers necessary to assess the potential effects on natural heritage interests from this development proposal. The information provided should be as comprehensive as possible and follow the guidance detailed below. This will reduce the likelihood of further environmental information being requested which could delay the processing of the planning application. We recommend that the applicant contacts the planning authority to engage in the pre-application process to avoid any delays.

NIEA Standing Advice for bats, otters, badgers, wild birds, common lizard, smooth newt, birds, priority species, hedgerows and priority habitats can be found at:

http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/standing_advice.htm

Designated sites

- Please note that this proposal may be subject to the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended) (known as the Habitats Regulations): the site lies within the watershed of the River Roe and Tributaries Special Area of Conservation (SAC) and Area of Special Scientific Interest (ASSI).
- Gortcorbies ASSI, which has been designated for Purple Moor-grass and rush pastures, lies adjacent to the northern boundary of the proposed site.
- Ballyrisk More ASSI, which has also been designated for Purple Moor-grass and rush pastures, lies close to the western boundary of the proposed site.
- The site lies within Binevenagh Area of Outstanding Natural Beauty (AONB).

Habitats and protected species

- The proposed development site is located within rough pasture and upland heath. Other habitats in the surrounding area include semi-improved grassland, scrub and extensive coniferous plantation. There is an active quarry within 500m.
- NED data layers suggest that the southern section of the site may support peatland habitats.
- From data held by NED, it is recommended that an extended Phase 1 Habitat Survey, bird surveys (as detailed below) and bat surveys are carried out for this proposal. The results of the Phase 1 survey may indicate that further habitat and species surveys are required. NED survey

Natural Heritage

specifications and other planning related advice can be found at: <https://www.daera-ni.gov.uk/articles/site-surveys>.

- NED recommends that all survey works comply with British Standard 42020:2013, which came into effect on 31 August 2013. The British Standard provides recommendations and guidance for those engaged in planning and development, whose work might affect or have implications for conservation, or the enhancement of biodiversity.

Birds

- Records held by NED indicate that Hen Harriers (EU Birds Directive: Annex 1) probably nested inside the development site in 2011 and 2013. No information for 2014 or 2015 is currently available but nesting was likely within 1km of the site boundary in 2016. Another nest site previously used by this species is located a distance of 5km. This development is, therefore, located within the typical core breeding season foraging range (2.5km) of this species from the former nest site and therefore could potential present a risk of habitat loss (through avoidance) or collision to this species, either in isolation or in combination with a number of neighbouring wind farms within 5km. There is also a significant risk of disturbance to breeding harriers nesting at the previously used nest sites within the development boundary.
- There are a number of potential Peregrine (EU Birds Directive: Annex 1) nest sites within 4km of the development site, including the neighbouring quarry. No nesting is known to have occurred at any of these locations since at least 2008, however. In the event of any of the above sites being re-occupied it is possible that the proposed development would present a risk of collision or disturbance to Peregrines.
- No nesting by other raptors of conservation concern is known to have occurred within 2.5km of the development boundary in recent years. Merlin (EU Birds Directive: Annex 1) and Kestrel (Amber-listed species of conservation concern in Ireland) have been recorded between 2km and 5km and are likely to occur occasionally in the vicinity of the windfarm site.
- The development site is not known to support breeding waders and NED has no records of significant breeding wader sites within a distance where disturbance by construction work or an operating turbine would be likely. The presence of Curlew (Red-listed) and Snipe (Amber-listed) within the development site cannot be ruled out, however. Golden Plover (Red-listed) were recorded breeding at a distance of 1.3km from the site boundary in 2011.
- Potential habitat for Red Grouse is limited in the vicinity of the development site and the species is not known to occur at this locality.
- The site is not close to a known flyway or foraging/roosting area for large numbers of waterfowl and is therefore unlikely to present a significant collision risk to these species.
- It is likely that the area holds a range of additional bird species typical of upland heath and grassland and forest edge.

Ornithological information required

- NED recommends that a full range of bird surveys as is carried out at this site according to SNH guidelines <http://www.snh.gov.uk/docs/C278917.pdf>. This should include the following:

Natural Heritage

- Transect-based surveys of breeding and wintering birds within a radius of 500m of the turbine perimeter (suitable habitat up to 800m for Curlew). A minimum of four visits should be made per breeding season.
 - A search of suitable habitat in the surrounding area for breeding raptors to a distance of 2km from the site boundary.
 - A programme of vantage point watches for flight activity of raptors and other large species during the breeding season and winter. A minimum of 36 hours of observation should be conducted from each vantage point in each season.
 - Collision risk estimates should be calculated using standard methods (SNH 2000a, b) with appropriate avoidance rates for all raptors and large-bodied species for which there are sufficient data.
- The developer should also consult with the Northern Ireland Raptor Study Group over the recent status and foraging range of Hen Harriers, Merlins, Peregrines and Kestrels in the local area.
 - The impact on bird populations of the proposed development on bird populations should be assessed in combination with consented and planned windfarms within a 10km radius.
 - It is anticipated that two years of survey work will be required for both breeding and non-breeding seasons. Results should be presented for review after one year, when the need for further surveys will be assessed.

Bird References:

- Scottish Natural Heritage (2000a) Guidance: Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action <http://www.snh.gov.uk/docs/C205425.pdf>
- Scottish Natural Heritage (2000b) Calculation of collision risk for bird passing through rotor area <http://www.snh.gov.uk/docs/C234672.pdf>
- Scottish Natural Heritage (2014) Guidance: Recommended bird survey methods to inform impact assessment of onshore wind farms. May 2014. <http://www.snh.gov.uk/docs/C278917.pdf>

Further guidance

Additional sources of information

1. The DAERA website <https://www.daera-ni.gov.uk/> includes:
 - Details of all regional, national and international designated sites in Northern Ireland
 - Northern Ireland Biodiversity Strategy
 - Northern Ireland Habitat and Species Action Plans
 - Areas of Outstanding Natural Beauty
 - Landscape Character Areas
 - Environmental Legislation

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2. Useful information on planning and natural heritage, including survey specifications, can be found on the DAERA website at <https://www.daera-ni.gov.uk/topics/land-and-landscapes/development-management>
3. Information on the flora, fauna and geology of Northern Ireland can be obtained from the Habitats website: <http://www.habitas.org.uk/>
4. Site specific environmental data (e.g. species records) can be obtained from the Centre for Environmental Data and Recording (CEDaR). These can be accessed by contacting CEDaR, National Museums NI, 153 Bangor Road, Cultra, Holywood, BT18 0EU. Website: <http://www.nmni.com/cedar>
5. NED promotes the submission of biodiversity data to CEDaR, and recommends that species records generated as part of the EIA process are submitted to CEDaR by going to: <http://nmni.com/CEDaR/Submit-records>

General Scoping Guidance for Environmental Impact Assessment

Guidance on the scoping stage of Environmental Impact Assessment (EIA) and on the information to be included in an Environmental Statement (ES) is provided by the European Commission and can be found at: <http://ec.europa.eu/environment/eia/eia-support.htm>.

NED recommends "Guidelines for Ecological Impact Assessment in the UK and Ireland" produced by the Chartered Institute of Ecology and Environmental Management (CIEEM). This provides best practice guidance for assessing the ecological impact of plans and projects. The document can be downloaded from:

http://www.cieem.net/data/files/Publications/EcIA_Guidelines_Terrestrial_Freshwater_and_Coastal_Jan_2016.pdf

NED would emphasise the following:

- The ES should describe both habitats and species of flora and fauna present. It should cover both the proposed site and the surrounding area. It should include any designated sites and protected species which may be affected.
- Proposals which may impact on a European site, however distant (i.e. Special Areas of Conservation and Special Protection Areas), will require a Habitats Regulations Assessment (HRA). Sufficient information must be provided to the competent authority to enable them to complete this.
- The topography, geology, soils and water environment of the site and surrounding area should be described.
- The ES should include a description of the likely significant effects, both positive and negative, at all stages of the development to include direct, indirect, secondary and cumulative effects in the short, medium and long term. A description of the forecasting methods used to predict these effects should also be included.
- A description of proposed measures to prevent, reduce or offset any significant adverse affects on the environment (i.e. Avoidance, Mitigation, Compensation, and Enhancement) must be included.

Natural Heritage

- An indication of any difficulties encountered during the EIA process, limitations of surveys and any uncertainties in the data must be included.
- The different chapters of the ES should be inter-related and the ecology chapter should be cross referenced where appropriate.

Flora and Fauna

- The ecological baseline of the site must be characterised. Following from this, the extent and nature of any further survey work that may be required should be identified. Surveys must cover flora and fauna present in all seasons.
- A habitat survey (i.e. JNCC Phase 1) should be carried out to map the habitats on site and identify areas which are likely to be of high nature conservation value or particularly vulnerable to impact from the proposed development. Areas thus identified should be subject to more detailed survey, i.e. National Vegetation Classification (NVC).
- Faunal surveys should include a full breeding bird survey and protected species surveys. The timing of surveys is critical and they must be carried out at appropriate times of year.
- Surveys should highlight any Northern Ireland or European priority habitats and species which may be present on the site or surrounding area.
- Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.
- Protected species surveys should be carried out to NED specifications. Note that these may be updated in the light of new knowledge at any time. Therefore it is advised to check the NED website for the most up to date specifications immediately prior to commencement of surveys.
- Full survey reports should be included in the appendix of the ES. All maps and diagrams should be of an appropriate scale for interpretation.
- NED reserve the right to determine whether the survey information submitted is adequate or when additional information is required.
- Survey information regarding species vulnerable to persecution should be included as a confidential annex to the ES, which should not be made publically available. The species of concern are badgers (*Meles meles*), freshwater pearl mussels (*Margaritifera margaritifera*), goshawks (*Accipiter gentilis*), hen harriers (*Circus cyaneus*), and peregrines (*Falco peregrinus*).

Landscape

NIEA may need to comment on proposals with the potential to significantly affect Binevenagh Area of Outstanding Natural Beauty (AONB). The landscape chapter of the ES should:

- Establish the current landscape designation and policies covering the site and its surroundings.
- Assess the direct effects on landscape and public perception of change.
- Describe the landscape character of the site and its surroundings.

Natural Heritage

- Describe where the potential zone of theoretical visibility for the development and its associated infrastructure will extend to, including combination effect with established development.
- Establish the potential key landscape issues and the areas requiring further investigation during the baseline studies (See '*Guidelines for Landscape and Visual Impact Assessment*', The Landscape Institute and the Institute of Environmental Management and Assessment, London 2013).

Water and Hydrology

- A description of the water environment of the area - running and static surface waters, groundwaters, estuaries, coastal waters and the sea, including run-off and drainage.
- A description of the hydrology, water quality and use of any water resources that may be affected by the development (e.g. water supply, fisheries, angling, bathing, amenity, navigation, effluent disposal).
- The consequences of changes to the hydro-geological system of the area on peatland, rivers, streams, flushes and wetland habitats should be described.

Mitigation Measures

A description of the measures proposed to prevent, reduce or offset any significant adverse effects on the environment caused by the development must be included in the ES. These measures can be summarised as:

- Avoidance: Priority should be given to avoiding negative impacts, especially those that could be significant. Consideration should be given to alternative strategies or locations, changes to the project design and layout, changes to methods and processes, changes to implementation plans and management practices including regulating the timing of activities.
- Mitigation: Opportunities should be sought, wherever possible, to reduce negative impacts on the environment, ideally to the point where they are no longer significant.
- Compensation: Where avoidance or mitigation of negative impacts is not practicable measures to compensate for impacts should be proposed.
- Enhancement: Opportunities should be sought in every new development to deliver net ecological gain rather than just limiting environmental damage. Enhancement measures may lead to an increase in the biodiversity of a site.

Mitigation measures should be incorporated into the design of a project from the outset and included on plans and drawings where appropriate. Mitigation which simply comprises a list of recommendations will generally not be acceptable.

Other recommendations include:

- A description of the criteria used to establish the magnitude and significance of environmental impacts. A tabular presentation should be used to summarise key direct and indirect impacts.

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- The mitigation proposed should be clearly described and its effect on the magnitude and significance of these impacts should be assessed and clearly explained.
- Any uncertainty in the effectiveness of proposed mitigation measures should be explained and, where appropriate, evidence should be provided of successes from other similar projects.
- The implementation of proposed mitigation should be clearly described and, if necessary, arrangements for monitoring the implementation and success of mitigation measures should be stated.

Environmental Management Plan

An Environmental Management Plan (EMP) should be produced to detail the construction phase of the project and the implementation of the mitigation measures described in the ES. It will provide the management framework for the planning and implementation of construction activities and describe how working practices will avoid or minimise impacts to the environment at all stages of the development. It should provide details of procedures for monitoring and reporting the environmental effects of the development during construction. It should include the following information:

- Pre construction site conditions should be described to establish a baseline against which construction effects can be assessed.
- A site plan to show the location of construction activities, access routes, the storage of materials, the position of plant and the location of any sensitive receptors (e.g trees, peat, watercourses).
- A detailed programme of the work to be carried out including timing and sequencing of works.
- Methods of construction and working practices should be specified, including equipment and materials to be used.
- Details of how mitigation measures will be implemented should be clearly stated.
- Details of procedures for monitoring and reporting the environmental effects of the development during construction and in the operation phase.

A Habitat Management Plan should form part of the ES. This should show how the habitats, flora and fauna of the site will be protected during and after construction. It should also include a long term plan for the management of the site for nature conservation and, if appropriate, show details of compensation or enhancement measures, such as habitat restoration and creation.

Habitat restoration and creation measures must be carefully considered and a rationale provided for the choice of measures. Techniques for habitat restoration and creation must be detailed, site specific and follow current best practice. Evidence should be provided which shows that the proposed measures have a reasonable likelihood of success. If proposed techniques are unproven then a more detailed description and rationale for their use will be required. Proposed measures must have clearly defined criteria for success so that they can be adequately measured and monitored.

The HMP should include a long term monitoring plan, detailing how the ecology of the site will be monitored to demonstrate the success of any proposed mitigation, compensation or enhancement

Natural Heritage

measures. The monitoring plan must span an appropriate time frame depending on the type of development, the habitats and/or species being monitored, and the likely timescales of any habitat restoration or creation measures. The monitoring plan must include measurable targets and details of contingency measures should monitoring reveal unfavourable results.

Consideration must be given to the long term ecology of the site at the end of the lifetime of the development. For example, it may not be appropriate to leave infrastructure, such as access tracks, in place where sensitive habitats are present when this could lead to the long term degradation of these habitats. Issues such as these must be adequately addressed within an appropriate Decommissioning and Restoration Plan.

DFI Roads



Department for

Infrastructure

An Roinn

Bonneagair

www.infrastructure-ni.gov.uk

**Network Planning
Northern Division**

Causeway Coast and Glens
Local Planning Office

Co.Hall
Castlerock Road
Coleraine
BT51 3HS

Tel: 028 7034 1421

Planning Authority Case Officer:
Planning Application Ref:
Date consultation received:
Date of Reply:

Cathy McKeary
LA01/2017/0781/DETEIA
20th June 2017
10th July 2017

Location: Dunbeg South Wind Farm, Broad Road, Limavady

Proposal: Wind farm comprising of 9no. wind turbines

Drawings received dated 14th June 2017 refer.

DFI Roads would advise that the A37 Broad Road is a Protected Route.

No vehicular accesses exist onto Broad Road, there are several agricultural field gates but for the purposes of Policy PPS3 a field gate is not an access.

Should the Planning Authority accept this proposal accessing onto the Protected Route; DFI Roads will require access visibility splays of 4.5m x 215m, access width of 6m minimum for the first 20m, entry and exit radii of 10m minimum and entrance gates should be located far enough from the edge of the carriageway to allow the largest vehicle likely to use the access to stop clear of the carriageway when the gates are closed.

DFI Roads will require a Traffic and Transportation Chapter to be included within the Environmental Statement. The Traffic chapter should include a Transportation Assessment and should address issues of Haul Routes for all vehicles that will be attracted to the site during construction, installation and maintenance of the development.

DFI Roads would advise that the Dept has a proposal for a climbing lane at this location and the Applicant is advised to contact the DFI Roads, Strategic Routes Improvement Team at County Hall, Coleraine regarding this proposal.

DFI Roads Case Officer: Victor Sinclair
Network Planning

Issued on behalf of the Divisional Roads Manager



CONSENTED (LA01/2018/0200/F)

2

Proposed Development

CONSENTED (LA01/2018/0200/F)

Appendix 2: Proposed Development

Appendix 2.1 Potential Grid Connection

Appendix 2.1

Introduction

The Consenting Context

- 2.1 Although a grid connection is an integral, requisite part of any wind farm project, it typically follows a completely separate consenting route. Normally the applicant seeking planning permission for the wind farm will be the developer, whereas the grid connection consent will normally be sought by the relevant owner of the local distribution or transmission network, in this case Northern Ireland Electricity Ltd.
- 2.2 The Best Practice Guidance to PPS 18 states that whilst the routing of such lines by NIE is usually dealt with separately to the application for the wind farm, developers will generally be expected to provide details of indicative routes and method of connection.
- 2.3 Any Environmental Impact Assessment should assess the complete project, rather than a portion thereof and this is the purpose of this Appendix.
- 2.4 This chapter contains the following:
- Appendix 2.1.1: Known archaeological monuments within 1 km of potential grid route
 - Appendix 2.1 Figures 1 & 2 are referenced in the text as appropriate.

Potential Grid Connection

- 2.5 RES has submitted an application for a grid connection for the Development to NIE and is currently awaiting a project specific response, which we understand has been delayed due to ongoing energy policy discussions between the Department of Economy (DfE), the Utility Regulator and NIE. Therefore the exact means of grid connection is unknown at the time of writing. Based on RES's knowledge of the grid connection system and NIE's published plans for future grid upgrades, RES has been able undertake an assessment to determine the grid connection option most likely favoured by NIE, which is to the proposed cluster substation beside Cam Quarry.
- 2.6 The Development could be connected to the Cam cluster substation by approximately 8 km of underground cable. The route would begin at the connection point within the Development, and thereafter would follow the public road corridor from the wind farm site entrance to the indicative cluster location, as shown in Appendix 2.1 Figure 1: Potential Grid Connection.
- 2.7 For an underground cable connection the trench would be similar to those used on the main Development site, as shown in Volume 3: Figure 2.14. The trench will be approximately 0.5 m - 0.75 m wide and 1.0 m deep and could run in the road

side verges adjoining the carriageway, or within footways adjoining the carriageway, although it is also possible that the cable would be laid within the carriageway itself. At 33 kV, underground cables are normally laid to a depth of 0.9 m. To lay this cable a trench is dug, bedding material, normally sand, is placed along the trench-base, the cable laid and then covered with more sand. The cables are then protected by a layer of protective plastic covers and then backfilled with subsoil and original topsoil and turfs.

- 2.8 For bridge crossings along the road, the cable could be laid within the bridge, if there is sufficient excavation depth, or otherwise via directional drilling under the watercourse.
- 2.9 The construction activities would include the following:
- Clearance of land (including vegetation strip as appropriate)
 - Digging of trenches
 - Backfilling of trenches and remediation.
- 2.10 The land should be reinstated as near as reasonably practicable to its original condition.
- 2.11 It is anticipated that the works would be implemented by NIE using its permitted development rights as a statutory undertaker.

Potential Impacts

- 2.12 An assessment of the likely significant environmental impacts of the proposed underground grid connection route has been undertaken under the following headings:
- Landscape and visual
 - Ecology
 - Ornithology
 - Geology and the water environment
 - Fisheries
 - Cultural heritage and archaeology
 - Noise
 - Traffic and transport.

Landscape and Visual

- 2.13 The grid connection will originate at a proposed new cluster substation on Shinny Road beside the existing Cam Quarry approximately 3.5 km to the south east of Macosquin and 5.5 km from the proposed Development (straight line distance). The proposed grid connection route follows a short section of the Shinny Road to Broad Road (A37) and travels west along the A37 to the Site Entrance of the proposed Development. The section of Shinny Road in proximity to the proposed Cluster Substation is a reasonable width to allow it to accommodate traffic travelling to and from the existing quarry but it is otherwise a relatively quiet

road. There are no residential properties immediately adjacent to the edge of the road corridor which is bounded along most of its length by a narrow grass verge, low gappy hedgerows and scrubby vegetation, post and wire fences and some clumps of hedgerow trees. It often has an open aspect with views orientated eastwards into the adjacent agricultural landscape overlooking Coleraine.

- 2.14 It is anticipated that there will be minimal disturbance to existing trees, hedgerows or adjacent fields along Shinny Road but that there may be disturbance to grass verges adjacent to the road where it is not possible to lay the cable below the road surface. Where the road corridor and verges are narrower it may be necessary to trim back or remove some sections of existing hedgerows and trees in order to allow sufficient working space for construction machinery.
- 2.15 The A37 road corridor is wide and predominantly includes a hard shoulder between the wind farm site entrance and the Shinny Road. There are grass verges, embankments, areas of coniferous forestry, hedgerows and agricultural fields beyond the hard shoulder at various points which are unlikely to be affected by the proposed grid connection.
- 2.16 The following measures are recommended:
- Consideration should be given to the protection of established trees and hedgerows during cable installation and where appropriate temporary fencing should be erected;
 - Excavated materials arising from the excavations that cannot be reused in reinstatement works should not be dumped onto roadside verges but should be removed from site on an ongoing basis during the construction period;
 - Construction works should be planned such that they occur within as short a time period as reasonably practicable in order to minimise the period during which visual and physical disturbance occurs;
 - Where there is disturbance to grass verges it should be reinstated promptly on completion of the construction works subject to the appropriate ground and weather conditions. The ground should be regraded to a profile that matches adjacent verges and should be cultivated where necessary and re-seeded with grass seed of an appropriate species mix to that which is present elsewhere along the road corridor. Reseeded areas should be watered in periods of dry weather in order to ensure that the seed germinates and establishes successfully. Works to verges should be planned to give due consideration to weather conditions and, when necessary, avoided in excessively wet or cold conditions in order to avoid compacting or otherwise damaging soil structure.
- 2.17 The grid connection route, as well and the proposed Development is located within the Binevenagh Area of Outstanding Natural Beauty and Landscape Character Area 36, Binevenagh, which is deemed to be high sensitivity to wind energy development. However, the proposed grid connection works will be confined to existing roads and are not unlikely to result in permanent changes to

the physical structure of existing landscape character elements. Nor will they introduce a visible new element of landscape character because all cables will be undergrounded. Therefore, providing the aforementioned measures are adopted, the magnitude of effects on landscape character will be negligible and the overall landscape effects are deemed to be Not Significant.

- 2.18 The primary visual receptors will be users of the road network who are generally deemed to be of low sensitivity but also tourists travelling along the A37 who are deemed to be of high sensitivity. Farmers on the adjacent upland grazing and pastoral fields are deemed to be of low sensitivity. There are unlikely to be significant views of the grid connection works beyond the immediately vicinity of the works.
- 2.19 There will be temporary disruption to Shinnny Road and A37 during construction of the grid connection route which will be experienced by all visual receptors for a short period of time during which the magnitude of visual effects is deemed to be moderate. However, the completed works will not be visible and the experience of visual receptors located along the grid connection route will be unchanged by its construction. Therefore, the overall magnitude of visual effects is also deemed to be negligible and the overall visual effects are deemed to be Not Significant.

Ecology

Habitats

- 2.20 This section considers the potential impacts of the proposed grid connection on the flora & fauna interests along the proposed route. Desk records were identified from the National Biodiversity Network (NBN) Gateway and DAERA database of designated sites. The route follows the wind farm access track from the substation to the public road (approx. 100 m) and it is currently proposed to bury the cable under the public road for 8 km from the Site entrance to the closest cluster substation.
- 2.21 The proposed route (along the A37 (towards Coleraine), then south along the Shinnny Road to the new proposed cluster substation at Cam Quarry) lies alongside the road network for almost its entire length. The proposed route was assessed as part of a desktop study in November 2017. These methods were aimed at identifying the habitats and species found or likely to be found along the proposed grid connection route.
- 2.22 Within the wind farm Site, the proposed grid connection follows the route of the proposed access track which lies within semi-improved grassland. Between the Site entrance and the Shinnny Road the proposed grid connection option would be buried in the carriageway, (or in the roadside verge) which primarily consists of rank semi-improved grassland with occasional trees/scrub. The wider landscape is a mix of grassland, heath/blanket bog and coniferous forestry on the edges of the uplands, with improved/semi-improved agricultural grassland in the lower enclosed land.

2.23 Mature trees, hedgerows and river crossings are the areas of conservation value along the proposed grid connection route. However, it is proposed to bury the cable in the roadside verge, away from these habitats of conservation value. Tree roots will be avoided by the use of British Standard BS5837: 2005 Trees in relation to Construction - Recommendations.

Fauna

2.24 Bats and common lizard occur in the vicinity of the section within the site boundary. However, the access track it is proposed that the connection will follow has been designed to avoid these species.

2.25 There are no National Biodiversity Network (NBN) records for European protected species of fauna within the 3.7 km radius of the centre point of the route corridor. However, bats, badger, smooth newt and common lizard are all considered to be likely to occur in the area between the wind farm entrance and Cam Quarry, with Cam Forest potentially providing good habitat red squirrel (which also have the potential to also be present along the route).

2.26 The direct potential impacts on important ecological receptors are related mostly to any potential habitat loss and disturbance of habitats as a result of activities to excavate a trench for an underground cable. Any trenching to lay an underground cable should involve immediate reinstatement of the low quality habitats found in the roadside verges. Therefore, the net habitat loss should be neutral.

2.27 The direct potential impacts on faunal receptors are related mostly to habitat loss and disturbance of habitats as a result of activities to excavate a trench for an underground cable. In addition there is the potential for direct disturbance to protected fauna from construction noise and associated activities themselves. Any trenching to lay an underground cable would involve immediate reinstatement of the habitats. Therefore, the net habitat loss would be neutral.

2.28 Disturbance of habitats along the route also has the potential to result in indirect impacts on faunal species which inhabit those habitats and this could include, bat species, smooth newt, badger and common lizard all of which have been recorded along or in close proximity to the route.

2.29 No operational impacts from normal operation of an underground connection are predicted. Should the cable be required to be excavated for maintenance this would result in habitat disturbance but this should be reinstated following works.

2.30 On the basis of the desk study undertaken the significance of the potential impacts is assessed to be low-negligible, however pre-construction mitigation measures that should be adopted by the construction contractor are proposed below:

- Pre-construction surveys to identify areas of sensitive habitat which should be avoided;

- Pre-construction protected species to identify species or features supporting species along the route and allow the preparation of appropriate mitigation;
- Preparation of a construction method statement for the grid connection stating how impacts on protected species and habitats would be avoided; and
- The use of an ECoW (Ecological Clerk of Works) during construction to ensure that all of the above measure is properly implemented.
- Tree roots will be protected by the implementation of BS5837:2005, where excavations will not be permitted inside the RPA (Root Protection Area). Which are;
 - 12 times the diameter of the trunk measured at 1.5 m for a single stemmed tree or;
 - 10 times the diameter of the tree measured immediately above the root flare for a multi-stemmed tree.
- No spoil, vehicles, fuel, materials, temporary buildings or ancillary equipment shall be stored inside the RPA. Existing ground levels within the RPA should not be raised or lowered.
- It is not possible at this stage to completely rule out the need to remove small sections of hedgerow or trees but if this was required, these should be replanted or replaced.

2.31 Completion of a programme of ecological and ornithological mitigation works would offset the loss of the ecological resource that would occur as a result of the construction of the grid connection. Taking the proposed mitigation into account, no significant residual effects are anticipated to occur.

Ornithology

2.32 During the construction phase there is a low risk of disturbance to breeding birds in any hedges or trees along the initial (Shinny Road) section of the route. For the section of the route following the A37 the risk of disturbance to breeding birds would be negligible. No operational effects are predicted.

2.33 The following mitigation measures are recommended:

- If cutting or removal of hedges and trees is required then this should be done outside the bird breeding season (1st March to 31st August).
- If work is to be done during the breeding season then there should be a pre-construction survey to establish whether nesting birds are present. During March and after mid-July the likelihood of active nests being present would be very low.

2.34 With implementation of the proposed mitigation there should be no residual effects.

Geology & Water Environment

2.35 Potential direct effects of the proposed grid connection route are on water quality, water resource and flood risk to surface and groundwater in the affected

sub-catchments. The nature of the development type would not be anticipated to have any potential for significant geological effect. Potential indirect effects on water dependant habitats are addressed separately within the ecology section.

Hydrogeology

- 2.36 The proposed grid route falls fully within the Magilligan Groundwater Body. The Bedrock aquifer underlying the route is the Upper Basalt Formation. The bedrock has moderate potential where fracture flow is dominant as intergranular porosity is negligible.
- 2.37 Where Glacial Sand and Gravel is present this is classified as a potential superficial aquifer.
- 2.38 Groundwater vulnerability across the length of the connected is variable:
- Along Broad Road the bedrock aquifer is indicated to be protected by Superficial Deposits of Till, with a resulting groundwater vulnerability of Class 2.
 - Towards the eastern section of the route (Shinny Road) where the bedrock is overlain Alluvium groundwater vulnerability class 4e. Isolated deposits of Glacial Sand and Gravel are present in the western section of the route which also result in the bedrock having a vulnerability of 4e.
 - Where the bedrock is not protected by Superficial Deposits (toward Cam Quarry) the classification is Class 5 (High).
 - In the centre of the route and at the junction of Broad Road and Shinny Road where peat is present the bedrock groundwater vulnerability is Class 4c.
- 2.39 The Magilligan groundwater has a Water Framework Directive (WFD) water quality status of 'Poor'.
- 2.40 A number of abstractions from groundwater have been identified within 250 m of the grid route as shown on Figure 9.2: Abstractions.

Hydrology

- 2.41 The proposed grid route is split across two surface water catchments as detailed below:
- The western extent of the route, comprising 39% of the total cable route length, is located within the Curly River Body catchment which is within the Roe Local Management Area which falls within the North Western River Basin District. The hydrology baseline is consistent with the baseline presented in Chapter 9: Geology and Water Environment with WFD mapping.
 - The eastern section is 61.2% is located within the Macosquin River Body catchment which falls within the Lower Bann Local Management Plan, under the Neagh Bann River Basin District

- 2.42 NIEA waterbody WFD classifications for surface water quality monitored within the Curly River catchment in 2014 and 2015 returned classifications of "Moderate" and "Good" status.
- 2.43 NIEA waterbody WFD classifications for surface water quality monitored within the Macosquin River in 2014 and 2015 returned classifications of "Moderate" status.
- 2.44 The Curly River forms part of the Roe River and Tributaries SAC and ASSI designations as protected areas under the WFD due to the presence of Atlantic Salmon.
- 2.45 The nature of the proposed development (underground cable to a depth of 0.9 m) would have no effect on, and would not be affected by, floodplains and flooding. Flooding is not considered further.
- 2.46 The nature of the proposed development (underground cable) and the methods used to cross watercourses (i.e. within existing bridge decks or by directional drilling) would have no potential to affect watercourse morphology, and so potential for effects at watercourse crossings are not considered further.
- 2.47 Other effects associated with typical construction activities would be similar to those described in Chapter 9: Geology and Water Environment and would be solely associated with the construction phase. No operational effects are anticipated.
- 2.48 The following table summarises the potential surface and ground water constraints to development of the grid connection, as well as likely potential effects.
- 2.49 The following table summarises the potential surface and ground water constraints to development of the grid connection, as well as likely potential effects.

Appendix 2.1 Table 1: Summary of Hydrological Constraints and Effects

Baseline Characteristic / Summary Description		Receptor	Unmitigated Potential Effect	
Groundwater	Aquifers with moderate to low yield and local flow.	Abstractions / Private Water Supplies within a 250 m screening buffer of the proposed cable route.	Reduced Groundwater Quality	Limited potential for short term slight deteriorations in water quality due to excavations that would release sediments; use of mechanical plant with associated fuels and lubricants.
			Reduced Groundwater Quantity	Shallow excavations associated with cable laying would not be anticipated to cause any change in groundwater flow routes.
Surface Water	Waterbodies with current WFD status of "Moderate"	Water feature crossings and works in proximity to water features.	Reduced water quality	All watercourse crossings coincide with existing road crossings and culverts; the cable will be laid within the existing culvert structure or

Baseline Characteristic / Summary Description		Receptor	Unmitigated Potential Effect	
	to "Good".		Changes to watercourse morphology	via directional drilling under the watercourse. Methods will not cause requirement for any in-stream work or work that would directly affect watercourse morphology or cause potential for pollution of the watercourse.

- 2.50 Mitigation to address potential deterioration of water quality (due to excavations, runoff from the works, and use of oils fuels and lubricants) associated with the types of construction activities anticipated shall be similarly addressed by the surface water management and pollution prevention measures stated in Chapter 9: Geology and Water Environment and accompanying Technical Appendix 9.1: Water Framework Directive Assessment.
- 2.51 Given the short duration of construction and limited localised areas of disturbance proposed during the construction of the grid connection route, it is considered that there would be no significant impacts on the water quality of the surface water and groundwater or on the use of groundwater by identified abstractions and water supplies provided the mitigation measures set out above are adopted.

Fisheries

- 2.52 The proposed underground grid route crosses 7 watercourses between the Development Substation and the proposed new cluster substation proposed at Cam Quarry, as detailed in the Geology and Water Environment section. All of these channels are located in one or other of two waterbodies as defined under the WFD, Curly River (UKGBNI1NW020204060), assessed as of Good ecological status in 2015, and Macosquin River (Macosquin) (UKGBNI1NB030308220), assessed as of Moderate ecological status in 2015. All of the watercourses to be traversed are relatively small and likely to be at best of Medium sensitivity with regard to fisheries and aquatic ecology.
- 2.53 Installation of the cable should be within the existing bridge structure at all watercourse crossing locations provided there is sufficient excavation depth. If this cannot be achieved, installation should be by directional drilling under the watercourse. Either approach will avoid any interference with the integrity of the stream channel and will therefore not result in any loss of or damage to aquatic habitats. Similarly there will be no interruption to fish passage within stream channels.
- 2.54 Construction processes should follow industry standard guidelines to ensure that no sediment or other polluting substances are released into the watercourses, in

particular Pollution Prevention Guidance (PPG5): Works and maintenance in or near water.

2.55 With the suggested mitigation, effects are predicted to be not significant.

Archaeology and Cultural Heritage

2.56 A detailed desktop survey was undertaken for the proposed grid connection route, extending to a 1 km wider corridor either side of it. This entailed a review of the Sites and Monuments Records, the Industrial Archaeological Records, the Historic Buildings Archive, the Historic Gardens Register and the Defence Heritage Records, which are maintained by the Department of the Environment: Historic Environment Division (DOE: HED).

2.57 The identification of historic environment constraints is based solely upon the results of the desk-based assessment. No field survey was carried out at this stage of the assessment.

2.58 Appendix 2.1 - Figure 2 shows the route of the proposed grid connection and the location of any cultural heritage resources within the search area.

2.59 The desk top survey has identified no sites of cultural heritage importance along the route of the proposed grid connection.

2.60 Beyond the proposed grid connection route, the desk top survey identified 11 features of cultural heritage interest. Appendix 2.1-1 at the end of this assessment contains details of these sites.

2.61 Prehistoric remains are identified at six of the sites. These comprise an un-located stone circle (1), an un-located megalithic tomb (2), a burial mound (3), a multi period occupation site (4), an unlocated urn burial and possible barrow (7) and an un-located standing stone (10).

2.62 Early Christian monuments are identified at one site (8). This consists of a rath.

2.63 The remaining sites are of uncertain date. They consist of a two field systems (5 and 6), a sweat house (9) and a graveyard (11).

2.64 The number of features identified within the search area would suggest that the proposed grid connection route passes through an area of low cultural heritage interest. Taking into account that the proposed grid connection will be inserted into verges at the sides of existing roads, or within the carriageway, the probability of encountering previously undiscovered sites of archaeological significance during construction work is considered to be very low.

2.65 There will be no operational impacts on cultural heritage following the construction of the proposed grid connection.

2.66 It is recommended that no further archaeological input is required for the proposed grid connection.

Noise

- 2.67 There are a limited number of residential properties located along, and within the vicinity of the potential underground grid connection route. The route is likely to be constructed along Broad Road (A37) and a short section of Shinnys Road.
- 2.68 During the construction phase, noise generating plant would be used and it is likely that noise levels would temporarily increase at residential properties within the vicinity of the construction works along the grid connection route.
- 2.69 Construction activities with the potential to generate noise from grid connection construction are likely to include clearance of land, digging of trenches and backfilling of trenches and remediation.
- 2.70 In Northern Ireland, advice on construction noise assessment is referred to in 'The Control of Noise (Codes of Practice for Construction and Open Sites) Order (Northern Ireland) 2002¹. This legislation advises the use of British Standard BS 5228: Part 1:1997 as being suitable for giving guidance on appropriate methods for minimising noise from construction and open sites in Northern Ireland.
- 2.71 Since the 1997 version has been superseded by British Standard BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise'² this has been identified as being suitable for the purpose of giving guidance on appropriate methods for minimising noise from construction activities.
- 2.72 The ABC method described in Annex E of BS 5228-1:2009 sets threshold noise levels for specific periods based on the ambient noise level. Category A would be deemed appropriate due to the relatively low levels of ambient noise along the proposed route. This category sets minimum L_{Aeq} criteria of: 65 dB(A) during weekdays (0700-1900) and Saturdays (0700-1300); below 55 dB(A) at evenings and weekends; and below 45 dB(A) for night-time (2300-0700) periods.
- 2.73 Noise levels due to the construction of the grid connection route will be mitigated by the short-term nature of the activity but further mitigation including the installation of acoustic barriers or the restriction of working hours per day could also be considered, if required.
- 2.74 There are many strategies to reduce construction noise and any mitigation adopted should not be limited to the measures suggested.
- 2.75 The Pollution Control and Local Government (NI) Order 1978 provides information on the need for ensuring that best practicable means are employed to minimise

¹ 'The Control of Noise (Codes of Practice for Construction and Open Sites) Order (Northern Ireland) 2002', The Department of the Environment, November 2002

² 'Code of Practice for Noise and vibration control on construction and open sites - Part 1: Noise', British Standards Institution, BS 5228-1:2009

noise³. For all activities, measures will be taken to reduce noise levels with due regard to practicality and cost.

2.76 With appropriate mitigation, if required, it is assessed that there will be no residual significant effects during the construction phase.

2.77 There are no anticipated effects during the operational phase.

Traffic and Transport

2.78 The connection is approximately 8 km in plan length and as the majority of the route is adjacent to the Broad Road (A37) and on a short section of the Shiny Road (both in rural areas), there are a limited number of residential properties within the vicinity of the proposed grid connection route.

2.79 All grid connection construction works should be undertaken in accordance with a Construction Method Statement and any associated road opening licences, agreements or permits. A Traffic Management Plan including details of any temporary road closures should be agreed with DfI Roads prior to the commencement of works. The Traffic Management Plan should be developed to ensure any disruption during the underground cable works will be kept to a minimum. However, it is likely that there will be temporary, local traffic disruptions for the duration of the underground cable installation works.

2.80 It is expected that there will be some disruption to traffic flows along the carriageways flanking the proposed grid route that will be managed but some narrower routes (i.e. Shiny Road) may require temporary road closures.

2.81 No significant residual effects are anticipated to occur.

2.82 When installed, the underground cable will have no adverse effect upon traffic during the operational phase.

³ 'Pollution Control and Local Government (NI) Order 1978', published by Her Majesty's Stationary Office, 1978

Summary

Appendix 2.1 - Table 2 provides a summary of the potential environmental effects and proposed mitigation.

Topic	Construction Impacts	Operational Impacts	Mitigation	Residual Effects
Landscape and visual	Disturbance to grass verges, cutting and potential removal where necessary of hedgerows and trees.	None	<ul style="list-style-type: none"> ▪ Consideration should be given to the protection of established trees and hedgerows during cable installation and where appropriate temporary fencing will be erected. ▪ Excavated materials arising from the excavations that cannot be reused in reinstatement works should not be dumped onto roadside verges but should be removed from site on an ongoing basis during the construction period ▪ Construction works should be planned such that they occur within as short a time period as reasonably practicable in order to minimise the period during which landscape and visual effects occur ▪ Where there is disturbance to grass verges it should be reinstated promptly on completion of the construction works subject to the appropriate ground and weather conditions. 	No significant impacts
Ecology	Damage to habitat in roadside verge. Indirect impacts due to habitat disturbance along the route on faunal species which inhabit those habitats,	None	<ul style="list-style-type: none"> ▪ Tree roots should be protected by the implementation of BS5837:2005, where excavations will not be permitted inside the RPA (Root Protection Area). ▪ No spoil, vehicles, fuel, materials, temporary buildings or ancillary equipment should be stored inside the RPA. Existing ground levels within the RPA will not be raised or lowered. 	No significant impacts

Topic	Construction Impacts	Operational Impacts	Mitigation	Residual Effects
	<p>which could include bats, badger, smooth newt, and common lizard all of which have been recorded along or in close proximity to the route.</p>		<ul style="list-style-type: none"> ▪ Pre-construction surveys to identify areas of sensitive habitat which should be avoided ▪ Pre-construction protected species surveys to identify species or features supporting species along the route and allow the preparation of appropriate mitigation ▪ Preparation of a construction method statement for the grid connection stating how impacts on protected species and habitats would be avoided ▪ The use of an ECoW (Ecological Clerk of Works) during construction to ensure that all of the above measures are properly implemented. 	
Ornithology	<p>Low risk of disturbance to breeding birds along the route.</p>	None	<ul style="list-style-type: none"> ▪ If cutting or removal of hedges and trees is required then this should be done outside the bird breeding season (1st March to 31st August). ▪ If work is to be done during the breeding season then there should be a pre-construction survey to establish whether nesting birds are present. During March and after mid-July the likelihood of active nests being present would be very low. 	No residual impacts
Geology, Hydrology & Hydrogeology	<p>Limited potential for short term slight deteriorations in ground water quality within 250 m of cable route.</p>	None	<ul style="list-style-type: none"> ▪ The location and nature of the private water supply sources identified by the initial screening assessment should be confirmed and investigated prior to construction. Where applicable and if a potentially significant effect was perceived as likely, a water supply disruption and mitigation plan should be prepared and agreed with the relevant authority and/or affected parties 	No significant impacts

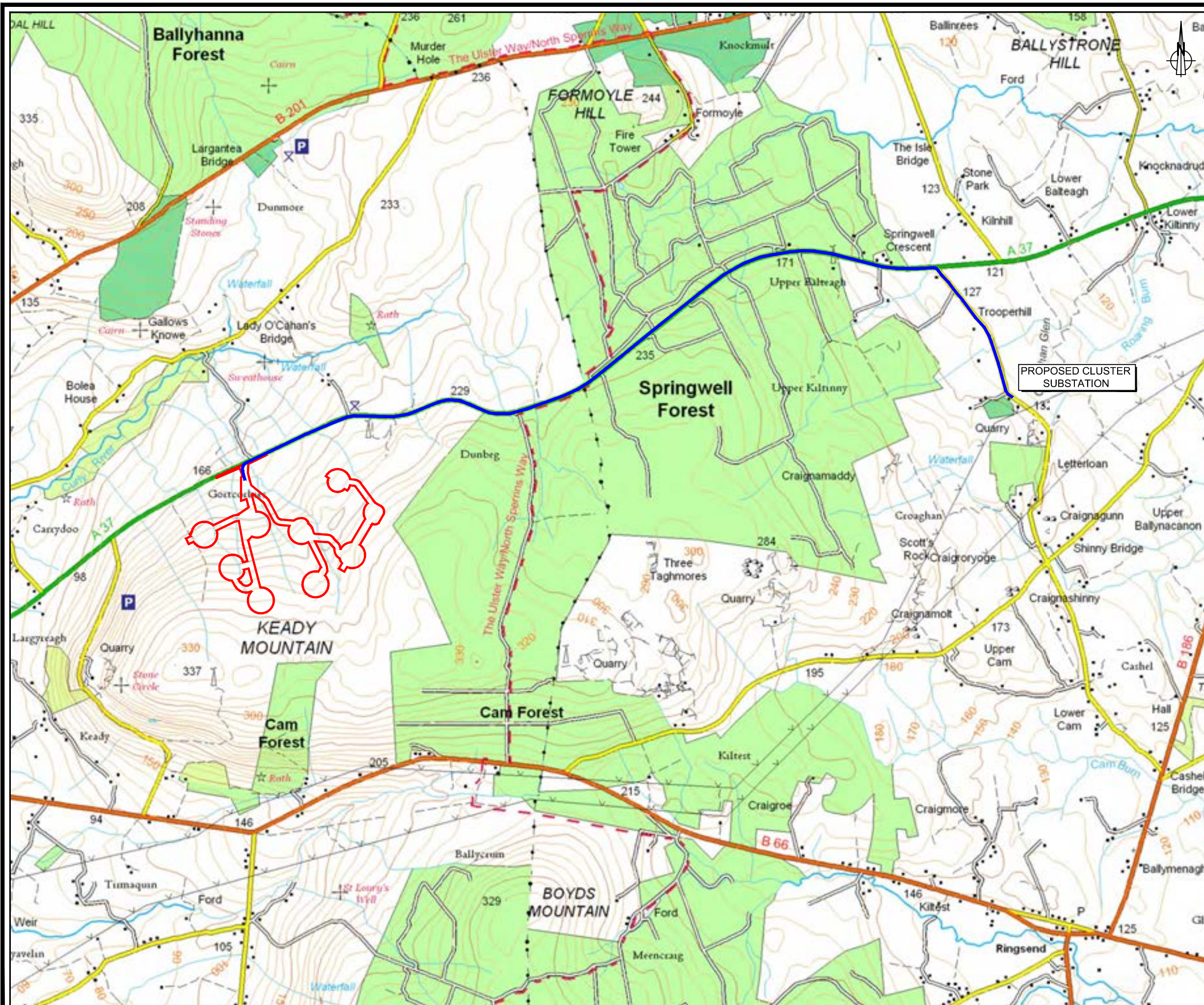
Topic	Construction Impacts	Operational Impacts	Mitigation	Residual Effects
			prior to undertaking the work.	
Fisheries	Release of sediment or pollutants into watercourses near crossings.	None	<ul style="list-style-type: none"> Construction processes should follow industry standard guidelines to ensure that no sediment or other polluting substances are released into the watercourses, in particular Pollution Prevention Guidance (PPG5): Works and maintenance in or near water. 	Not significant impacts
Noise	Potential short term noise increase at limited number of residential properties within the vicinity of the construction works along the grid connection route.	None	<ul style="list-style-type: none"> Installation of acoustic barriers or the restriction of working hours per day could be considered, if required. 	No residual impacts
Transport and Traffic	Temporary local traffic disruption for the duration of the cable laying, including some temporary road closures.	None	<ul style="list-style-type: none"> Grid connection construction works should be undertaken in accordance with an agreed Construction Method Statement and any associated road opening licences, agreements or permits. A Traffic Management Plan including details of any temporary road closures should be agreed with Transport NI prior to the commencement of works to ensure any disruption during the underground cable works will be kept to a minimum. 	No significant impacts

Appendix 1: Known archaeological monuments within 1km of the proposed grid connection route.

No.	SMR No.	Type	Date	Description
1	LDY 10:15	2 Stone Circles (Unlocated)	Local	This site is described in PSAMNI as two stone circles. One is a ring of small stones 72ft in diameter, on a hill at the E edge of a deep gully, with a raised mound of soil in the centre, possibly a grave. The other is 100yd east of the first on another hill. It consists of nine small stones, the remains of a ring 18ft in diameter. Four stones outside it may be part of an outer ring. A hammer stone was found at the time of inspection. These circles cannot now be located.
2	LDY 10:18	Megalithic Complex (Unlocated)	Local	This site consists of stone circles with a cist burial and an associated chambered grave, excavated in 1945 by A. McL. May. There was an inner and outer circle of stones, with a maximum diameter of 20ft, with the cist slightly south of centre and a cairn set at its east-southeast edge. The cairn was oval 21ft by 16ft with a central polygonal chamber. The site cannot now be located.
3	LDY 10:19	Burial Mound	Local	This site, which was excavated by McL.May, was 30yds southwest of a stone circle and chambered grave, LDY 10:18. The site consisted of a mound 70ft in diameter with a burial in a pit on top, east of the centre. In the pit was an urn with fragments of a cremation, stratified 4" above a food vessel.
4	LDY 10:20	Multi-Period Occupation Site	Local	This site is located on a hillock at the E side of a ravine with excellent views to north. It is composed of a central mound which may have been excavated by McL.May in the 1940s as there is a trench visible. The mound is 13m in diameter and on average 1m high above a surrounding berm 6.5m wide. On the edge of the berm sits a low, stony bank 0.2m high internally and 0.5m externally. McL.May's excavation uncovered two paved hearths with circa two hundred sherds of decorated Neolithic pottery and worked flints, including end scrapers, hollow scrapers and knives. There were also some Late Mesolithic Bann Flake type flints found at the site. There were also sherds of Beaker type pottery found.

No.	SMR No.	Type	Date	Description
5	LDY 10:21	Field System	Local	Located on gently sloping ground with the Curly river in a valley to northwest and good views northeast and southwest along the valley, this complex of field banks and groups of huts extends uphill for 900m and across the hill for circa 800m. One group of huts lies between the 600' and 700' contours and is enclosed by a low bank. The second group lies between the 800' and 900' contours and is closely associated with a field bank. Five field banks have been noted straggling across the hillside and they are all generally parallel to each other. Three portions of field fence run down-hill, occasionally running in to the cross-hill banks at right angles.
6	LDY 10:22	Field System	Local	This is a complex of field boundaries. No further details are available at present on the SMR.
7	LDY 10:32	Urn Burials in Possible Barrow (Unlocated)	Local	There does not appear to be any local knowledge of this site where, according to the OS memoirs "four crocks full of bones and earth were discovered" in 1834. From the description given of these pots they would appear to be the remains of Bronze Age urn burials, possibly in a large barrow (hence the suggestion that this was a fort). The site cannot now be located.
8	LDY 10:10	Counterscarp Rath, Possibly Hillfort	Regional	This site is located on a natural local eminence with ground falling steeply to the Curly water at south, and to east and west. The natural feature has been scarped to create a circular enclosure, 25m by 24m in diameter, with evidence of a perimeter bank, ditch and counterscarp bank. The site survives best at east where a ramped entrance crosses the ditch, but elsewhere the inner bank seems to fade into a berm. Stone visible in the bank may represent an original revetment and the causeway may also have been revetted. At the east, the inner bank is 5m wide, 0.25m high internally and 1.75-2m above the ditch, which is 3m wide and 0.3m below the counterscarp bank. This, in turn, is 3m wide where present. The ramp at the east is 2.5m wide.
9	LDY 10:14	Sweat House	Regional	This sweat house is built of rough, unmortared stones, in a beehive shape, with a lintelled entrance at ground level. It is set south of a waterfall, beside a substantial stream. The roof is almost intact, but most of the east side of the structure has collapsed. The rest remains stable.

No.	SMR No.	Type	Date	Description
10	LDY 07:84	Standing Stone	Local	The OS Memoirs state that this standing stone was located in the holding of Jacob Hunter, and locally called the "Grey Stone". Its location is not known, and the only known standing stone in the area is the Dunalis Standing Stone LDY 7:55, in Formullan townland, and located to the E of the house known as "The Pass". The OS Memoirs record the "Grey Stone" as being "4 ft high, 2 ft 10 inches broad and 2 1/2 ft thick". This site is not shown on either the 1853 or 1954 editions of the OS 6-inch maps.
11	LDY 11:19	Graveyard	Local	The area in which the burial ground is shown on earlier OS 6" maps is now a large grass field and there are no visible remains of the graveyard enclosure. It is on a localized rise with the ground falling to a stream at the east and to the west. The graveyard may well have occupied the summit of the rise, but there are no visible remains of it. Topsoil stripping prior to quarry expansion was carried out under archaeological supervision northwest of the graveyard site. No archaeological features or artefacts were uncovered. Topsoil was stripped from another proposed extension to Croaghan Quarry under archaeological supervision, W of the graveyard. Nothing of archaeological significance was uncovered.



DUNBEG SOUTH
WIND FARM
APPENDIX 2.1
FIGURE 1
POTENTIAL GRID
CONNECTION ROUTE

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- KEY**
- PLANNING APPLICATION BOUNDARY
 - POTENTIAL GRID CONNECTION ROUTE

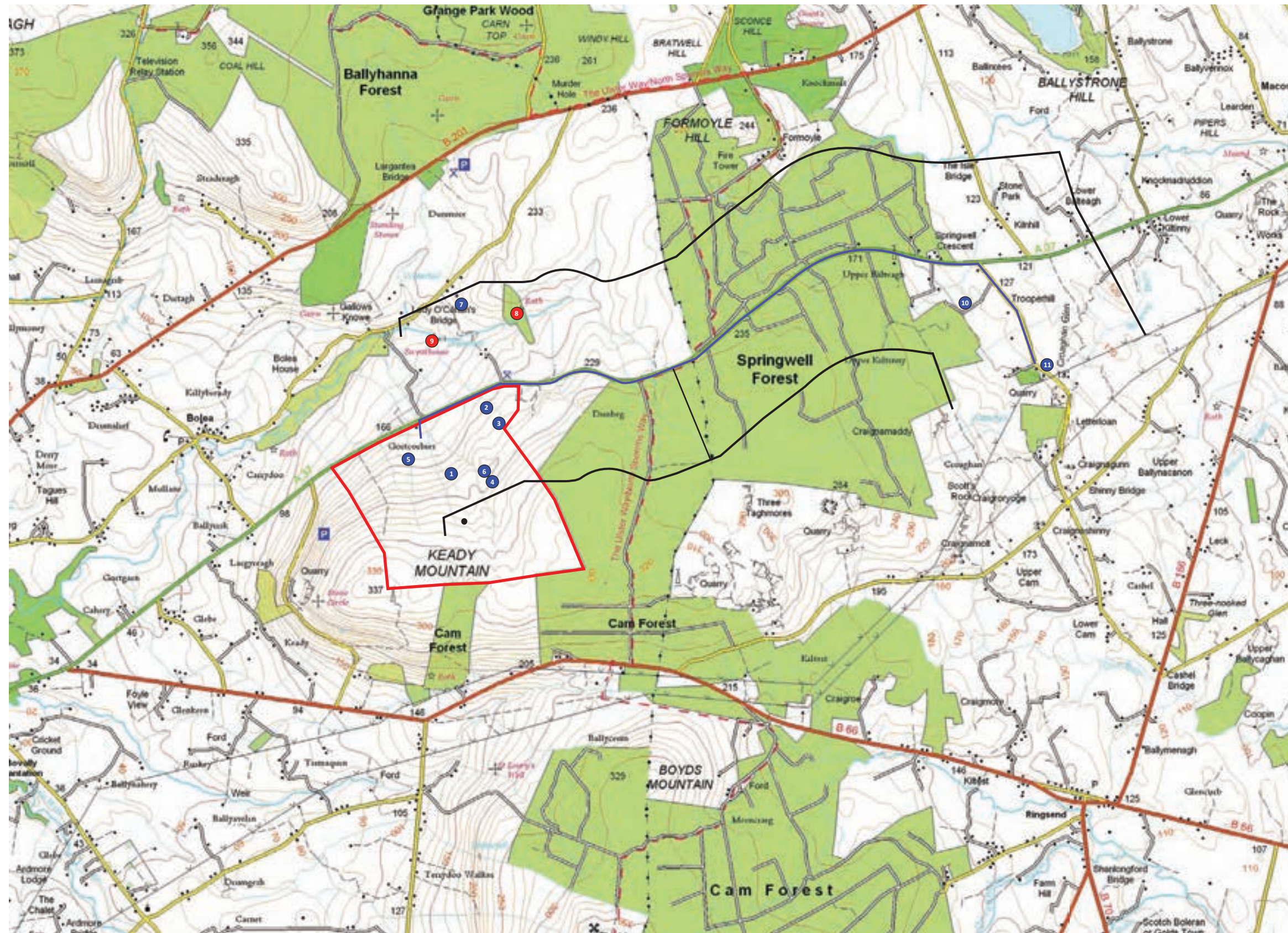
LAYOUT DWG	N/A	T-LAYOUT NO.	N/A
DRAWING NUMBER			
03219D2506-01			
SCALE - 1:30,000 @ A3			
ENVIRONMENTAL STATEMENT 2017			
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DUNBEG SOUTH WIND FARM

APPENDIX 2.1 FIGURE 2

KNOWN CULTURAL HERITAGE FEATURES WITHIN 1KM OF PROPOSED GRID CONNECTION ROUTE



- ARCHAEOLOGICAL SITES OF REGIONAL IMPORTANCE
- ARCHAEOLOGICAL SITES OF LOCAL IMPORTANCE



DWG03163D0001-04 PNIRc040

N/A



ENVIRONMENTAL STATEMENT 2017

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4

Landscape & Visual

Appendix 4: Landscape & Visual

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Appendix 4.2	LVIA Methodology
Appendix 4.3	Landscape Character Areas
Appendix 4.4	Viewpoint Selection
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Abbreviations used in the Landscape and Visual Impact Assessment

- AoHSV Area of High Scenic Value
- AONB Area of Outstanding Natural Beauty
- ASQ Area of Scenic Quality
- EIA Environmental Impact Assessment
- LCA Landscape Character Area
- LVIA Landscape and Visual Impact Assessment
- NIEA Northern Ireland Environment Agency
- NILCA Northern Ireland Landscape Character Assessment
- NIRLCA Northern Ireland Regional Landscape Character Assessment
- PPS 2 'Planning Policy Statement 2 Natural Heritage'
- PPS18 'Planning Policy Statement 18 Renewable Energy'
- PVP Provisional Viewpoint
- RES RES UK & Ireland Ltd; the Applicant
- SPPS 'Strategic Planning Policy Statement for Northern Ireland (SPPS): Planning for Sustainable Development'
- SPG 'Supplementary Planning Guidance to Accompany Planning Policy Statement 18, Renewable Energy'
- ZTV Zone of Theoretical Visibility

Best Practice Guidance publications used in the formulation of the LVIA Methodology

The Landscape Institute / Institute of Environmental Management and Assessment (2013) 'Guidelines for Landscape and Visual Impact Assessment, Third Edition'

- 4.1 The aim of these guidelines (GLVIA) is to encourage high standards for the scope and content of landscape and visual impact assessments, based on the opinion and practice of members of the Landscape Institute and the Institute of Environmental Management and Assessment.
- 4.2 The guidelines establish principles to assist in achieving consistency, credibility and effectiveness in LVIA, when carried out as part of an EIA. The following general principles of good practice are adhered to in the methodology for this LVIA:
- Clearly describe the methodology and the specific techniques that have been used;
 - Use clearly defined and agreed terminology;
 - Avoid generalisations about designated landscapes and their ability to accommodate change;
 - Be as impartial as possible;
 - Draw upon the advice and opinions of others and carry out consultations;
 - Organise and structure the assessment to focus upon the key issues of relevance to decision-making;
 - Openly acknowledge any deficiencies or limitations that may have constrained the assessment;
 - Consider the most significant effects in all instances.

Scottish Natural Heritage (August 2017) 'Siting and Designing Wind farms in the Landscape. Version 3a'

- 4.3 This guidance provides principles for the design and location of wind farms with the aim of ensuring that wind farm developments appear appropriate within the landscape. The guidance supersedes the landscape sections within SNH (2001) 'Guidelines on the Environmental Impacts of Wind farms and Small Scale Hydroelectric Schemes' and reflects a development in the understanding of issues such as appropriate layouts for different locations, turbine size and design, wind farm extensions and cumulative development. The guidance acknowledges that understanding of these issues is constantly evolving and this guidance will be regularly reviewed and updated to reflect this.

Scottish Natural Heritage (March 2012) 'Assessing the Cumulative Impact of Onshore Wind Energy Developments'

- 4.4 This guidance sets out recommended principles for the assessment of cumulative landscape and visual impacts arising from wind farms. As per the guidance above, it is acknowledged that understanding of cumulative issues is constantly evolving and this guidance would be regularly reviewed and updated to reflect this.

Scottish National Heritage (February 2017) 'Visual Representation of Wind Farms, Version 2.2'

- 4.5 This guidance was originally published in 2006 to summarise and explain what was feasible, available and reasonable in terms of current good practice in the production of illustrations such as photomontages, wirelines and ZTV figures for use within an LVIA. It was revised in 2014 and 2017 to reflect developing experience and to ensure that visualisations are easier for the public and decision makers to use whilst also stressing that they are only a tool to aid decision making and must be considered alongside other information. SNH also recognise that different approaches may be appropriate for different types of developments, in different countries and for small scale projects. The prescriptive aspects of the guidance, and how they are interpreted in this LVIA, are included in Technical Appendix 4.2, paragraph 4.46.
- 4.6 Cognisance has been taken of the new guidance in this LVIA and its recommended methodology for taking photographs has been followed. However, the visualisations that accompany this LVIA are not printed at the large scale recommended by the guidance to allow for the practical and cost-effective distribution of public consultation material. SNH advises that printed visualisations should be produced at A1 size and viewed at a comfortable arm's length distance to facilitate easy comparison between viewpoints. In this LVIA the visualisations have been produced at A3 and, for clarity, the finished photomontages are presented on the same page as their corresponding wirelines for all shortlisted viewpoints.

Landscape Institute (2011) 'Advice Note 01/11: Photography and photomontage in landscape and visual impact assessment'

- 4.7 This publication provides advice to landscape professionals on photography and photomontage methods in LVIA for all types of development. It does not provide specific advice in relation to wind energy development and endorses the SNH guidance above in this respect.

Northern Ireland Environment Agency (August 2010) 'Wind Energy Development in Northern Ireland's Landscapes: Supplementary Planning Guidance to Accompany Planning Policy Statement 18 Renewable Energy'

4.8 The SPG provides broad strategic guidance on appropriate locations for wind energy development based on the definition of Landscape Character Areas (LCAs) within the NILCA. It is described in detail in Chapter 4, paragraph 4.64.

The Countryside Agency and Scottish Natural Heritage (2004) 'Landscape Character Assessment Guidance for England and Scotland. Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity'

4.9 The topic paper provides an overview of current thinking about landscape sensitivity and landscape capacity in terms of the concept involved and the practical techniques that are being used. Its aim is to set out some of the key principles, clarifying some of the issues, helping with definitions of key terms and providing examples of the approaches that are currently being used.

Technical Appendix 4.2: LVIA Methodology

- 4.10 This LVIA methodology has been specifically developed for wind farm development in Northern Ireland in accordance with the best practice guidance, where applicable (listed in Technical Appendix 4.1). The LVIA makes reference to mapped information, planning policy and existing landscape character assessment documents, and uses photographs and field survey work, together with the professional judgement of an experienced Landscape Architect. It combines existing desktop information, such as maps and documents, with detailed site surveys of the Study Area. The desktop study includes a review of relevant planning policies in order to identify any elements or parts of the Study Area which are recognised for their landscape or visual qualities and any preferred locations for wind farms that may already have been identified. It also evaluates likely levels of acceptable change for various parts of the Study Area in accordance with current definitions of landscape and visual sensitivity.
- 4.11 Potential landscape and visual effects are assessed as separate but linked issues. Both require a combination of quantitative and qualitative evaluation. The 'Magnitude' of landscape effects is derived from the extent to which physical changes cause changes in landscape character and value. The 'Magnitude' of visual effects relates to changes in the composition of views and people's perception of/responses to these physical changes.
- 4.12 For both landscape and visual effects the 'Significance' of effect is derived from the assessment of 'Landscape Value', the nature of the receptors in question (hereafter referred to as 'Sensitivity') and the nature of the effects on these receptors (hereafter referred to as the 'Magnitude' of change that will be experienced) and also by using professional judgement in relation to site circumstances. It is important to recognise that the landscape is constantly evolving and that opinions on the beneficial or adverse effects of wind farms are highly subjective. Therefore, whilst a judgement is made on the significance of effects, no judgement is made on whether these effects are beneficial or adverse.

Baseline Characterisation: Landscape Character

- 4.13 The meaning of landscape in this LVIA is in accordance with the SPPS definition as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors*" (see section 4.2.1 of SPPS). The first stage of this LVIA establishes the existing landscape character of the Study Area. It includes a description of landform, land cover, seasonal elements and historical and cultural associations. Landscape character is the result of unique interactions between different elements such as geology, soils, vegetation and historical and current human influences. Natural, man-made, physical and aesthetic attributes are considered alongside the physical condition, frequency and rarity of these attributes. Areas of distinct, recognisable or common character are

defined individually as LCAs. Existing definitions of LCAs are analysed by site survey.

- 4.14 Defining landscape character allows landscape value to be analysed. An understanding of landscape character and value requires an understanding of the processes that have created this character and future processes that may alter it. The overall value to society of each LCA is evaluated against defined criteria and their Sensitivity to development and change is established. The LVIA notes if/where existing definitions of landscape character have been amended. Some LCAs may not be considered in detail following the Baseline Assessment if they are not judged to be significantly affected by the Development. For example, LCAs on the periphery of the Study Area, or those from which there are few or no views of the Development. Such LCAs are clearly identified in the Baseline Assessment (Chapter 4, starting at paragraph 4.99), Technical Appendix 4.3 and Figure 4.3.

Landscape Value

- 4.15 Values are attached to landscapes by different stakeholders for a variety of reasons. The LVIA process seeks to establish a definition of Landscape Value that reflects both this range of opinions and each particular landscape's contribution to the overall landscape character of the Study Area. Defining the value of a particular landscape to society requires the recognition of 'sense of place' through consideration of factors such as condition, scenic quality, tranquillity, remoteness, rarity, cultural associations, history, conservation and recreational interests, and broader social, economic and environmental aspects.
- 4.16 The definition of landscape value has been derived from best practice guidance and the SPG, which defines Landscape Value as "*the intrinsic value that is attached to a landscape, often reflected in designation or recognition. It expresses national or local consensus as to the (degree of) importance of a landscape, for reasons including landscape quality, scenic (or visual) quality, wildness and tranquillity, natural and cultural heritage interests, cultural associations and recreational opportunities.*"
- 4.17 The following criteria outline the general principles that are used to inform and guide the assessment of Landscape Value:
- **Outstanding Landscape Value:** Such landscapes may be outstanding because of factors such as dramatic scenic quality, or unspoilt beauty. They may also contain rare cultural or historic features, have notable cultural associations, important geological features or contain a large proportion of high quality habitats. They are likely to be in good condition, with a distinctive sense of place, and may be of national or international importance that is evidenced by statutory designation;
 - **High Landscape Value:** Such landscapes may be aesthetically pleasing and have positive characteristics including features that are unspoilt and in good condition, a high proportion of sites that are of geological or ecological interest, notable historic associations and a strong sense of

place. These areas may be of national or regional importance that is evidenced by relevant statutory designations;

- **Moderate Landscape Value:** Such landscapes may have overall good aesthetic qualities, with some intact characteristic features, but with other features that are not in optimum condition, or which are fragmented or spoilt. These areas may contain a smaller number of features of interest and may be of local importance;
- **Low Value:** Such landscapes may be in poor condition, or have undergone change to the extent that they do not have a distinctive or coherent character, aesthetic quality or strong sense of place. Few characteristic features are likely to remain intact and features may be highly fragmented or spoilt. These areas may contain a limited number of notable features or associations and are unlikely to be statutorily designated.

Landscape Sensitivity

4.18 The SPG defines 'Landscape Sensitivity' as a term based on the inherent sensitivity of landscape receptors to changes in both landscape character and visual terms, and which, in EIA terms, can also be used to encompass the value placed upon landscape. This definition has been updated by the GLVIA¹ which advises that sensitivity should be clearly separate from value. It should combine judgements on the susceptibility of landscape receptors to change caused specifically by the Development with the Value attached to the landscape in question. Therefore, in the context of this LVIA judgements on Landscape Sensitivity consider the susceptibility of landscape receptors to the changes caused specifically by the Development. The LVIA takes account of the stability and resilience of LCAs to withstand change and recuperate from loss or damage to their character elements resulting from the Development without unacceptable detrimental effects on overall character. An understanding of how different landscape attributes interact assists in defining if, and how, wind farm development may be suitably placed in the landscape. It also allows choices to be made on suitable turbine layouts and sizes of wind farms, which vary according to the characteristics of the receiving landscape. Key landscape attributes that are likely to influence sensitivity to wind farm developments include:

- **Scale and Enclosure:** The perception of the size and presence of various character elements, such as landform, trees and houses, against which the relative scale of larger features such as wind turbines are perceived. Consideration is given to whether the landscape is open or enclosed, the range of views (e.g. close, medium or long range), and the extent to which elements such as topography and vegetation provide screening. Landscapes that are visually contained may be less sensitive, although close range views from populated areas may increase sensitivity. A

¹ The Landscape Institute and IEMA (April 2013) 'Guidelines for Landscape and Visual Impact Assessment 3rd Edition' section 5.39

Proposed Development should be of a size and layout that is in keeping with the receiving landscape character;

- **Skyline:** The extent to which people's eyes are drawn towards the skyline depends on the simplicity or complexity of the skyline and whether there are other elements or foci distributed in the view and/ or along the skyline. Where they are visible, skylines are often important character components, and wind farm developments should relate well to them;
- **Landscape Pattern:** Understanding the complexity of a landscape can help to determine how a development might relate or conflict with the character of the receiving landscape. A landscape may have a simple composition, such as open moorland, or be more complex, for example, a rugged landscape containing many peaks, or a mosaic of land uses. New development should be designed to relate well to any strong existing landscape patterns, such as hedgerow networks or drainage ditches;
- **Remoteness and Tranquillity:** The introduction of turbines may not only result in physical effects on the landscape but, together with the movement of blades, may impact on the perceived sense of remoteness and tranquillity. The extent to which a landscape is remote or tranquil is considered in the assessment of Sensitivity;
- **Features of Interest:** The presence of natural and cultural heritage features, such as designated habitats, archaeological sites, and specific cultural associations, which serve to make a landscape particularly special or unique. New developments should not diminish the enjoyment of these features;
- **Manmade Influence:** Some landscapes may contain existing, large-scale elements, such as buildings, structures, commercial forestry, and transport infrastructure, which indicate the extent to which the character is already shaped by man. This may influence how the landscape would be affected by wind farm development. A mix of different man-made elements may lead to visual confusion or interruption. Landscapes which are already heavily influenced by man-made elements may also be less sensitive to wind farm development, although close proximity to settlement may also increase sensitivity;
- **Rarity** is the frequency, or density of rare or unusual landscape features which serve to make a landscape particularly special or unique;
- **Quality** is influenced by the physical state of the existing landscape, its intactness and its ability to repair after loss. High quality landscapes may be more or less sensitive to change depending on the robustness of their individual character elements;
- **Value:** The value attributed to the landscape is an important factor to be considered when assessing the sensitivity of a given landscape.

4.19 The consideration of each of the key landscape attributes described above enables a considered judgement to be made on the level of sensitivity to be apportioned to each defined LCA within the Study Area. The level of sensitivity relates specifically to the Development. The following criteria outline the general principles that are used to inform and guide the assessment of Landscape Sensitivity:

- **High Landscape Sensitivity:** A landscape where the majority of attributes are unlikely to withstand change without causing a change to overall landscape character to the extent that it would be difficult or impossible to restore. The frequency and sensitivity of receptors may be high but not exclusively so;
- **Medium Landscape Sensitivity:** A landscape with a combination of attributes that is capable of absorbing some degree of change without affecting overall landscape character. There are unlikely to be large numbers of sensitive receptors;
- **Low Landscape Sensitivity:** A landscape where the majority of attributes are robust and/ or tolerant of change to the extent that change or development would have little or no effect on overall landscape character. It is likely to be easily restored and the frequency and sensitivity of receptors may be Low but not exclusively so.

Baseline Characterisation: Visual Character

4.20 The visual context of the site is described and a ZTV is established to indicate where all, or part of, the Development is likely to be visible from. A ZTV is a map-based diagram of where and how many wind turbines, or wind farms, would theoretically be visible from all parts of the Study Area. The ZTV is first used to assist the identification of areas with theoretical visibility and the location of viewpoints as part of the Baseline Assessment. It is then used to aid the assessment of visual effects because the turbines would be the most visible element of the Development, particularly during the operational period.

4.21 The ZTV is created using computer-generated contour data at 50 m intervals (Ordnance Survey of Northern Ireland's digital terrain model, or 'DTM'). A three-dimensional computer model of the Development is created and accurately located within the DTM. Categories of theoretical visibility are indicated using different colours, for example, areas with theoretical visibility of all the proposed turbines would be indicated by one colour, and areas with visibility of lesser numbers of turbines would be indicated by contrasting colours. The computer model takes account of the effect the curvature of the earth would have on visibility, and is based on a viewing height of 2 m.

4.22 ZTV diagrams are based on the visibility of the turbine blade tips unless otherwise stated. Blade tip visibility means that any area where the tip of the blade is theoretically visible is indicated on the diagram. This approach is in accordance with the SNH recommendation to err on the side of over-representation of potential

effects. A Reverse ZTV diagram is used as a clear means of illustrating the parts of the Study Area where no turbines would be visible.

Viewpoint Selection

- 4.23 Viewpoints are chosen as part of the Baseline Assessment to provide a representative sample of viewers (receptors) and types of views of the Development across the Study Area and, most importantly, to demonstrate potential views of the Development rather than to show the screening effect of landscape features. Viewpoints are always selected in publicly accessible locations and those frequented by members of the public, such as public rights of way, car parks, popular visitor attractions and views from settlements, as well as viewpoints located in particularly scenic areas, are favoured because these are likely to represent a greater concentration of sensitive visual receptors. Viewpoints from which the Development is likely to be prominent are also favoured if they are available. Private residential views are represented where possible by the selection of appropriate viewpoints on public roads in proximity to residential receptors. This is in accordance with current best practice guidance. A selection of Provisional Viewpoints (PVPs) is identified through the Baseline Assessment. These are assessed through an initial site survey and those that are most representative of typical views, locations and receptors across all parts of the Study Area that fall within the ZTV are retained from more detailed assessment in the LVIA. The viewpoint selection process for this project is described in Technical Appendix 4.4.
- 4.24 When carrying out viewpoint surveys, the nature of the view is noted, whether partial or full views of the Development would be experienced, whether views are static or transitory, how prominent the Development may be, and whether large numbers of properties or viewers would experience such views. In many cases finding an uninterrupted view can be difficult and viewpoint locations where there is a significant amount of existing screening or no safe stopping place (e.g. on a busy road) are generally not shortlisted. This is to ensure the safety of both the surveyor and any third parties, such as the planning authority and members of the public, who may wish to visit the viewpoints. Therefore, although the views chosen are representative they cannot always be typical of the whole Study Area.
- 4.25 Viewpoint locations are illustrated in all the Figures which accompany the LVIA and the process for producing these illustrations is described in detail in paragraph 4.41 below.

Summary Description of the Development

- 4.26 Details of the Development and its associated infrastructure are described in detail in Chapter 2: Proposed Development of this ES and summarised briefly in relation to landscape and visual effects in Chapter 4, paragraph 4.37. To ensure that visual effects are minimised, factors such as layout and turbine specification, colour scheme, rotation pattern of blades, uniformity, and infrastructure design may be considered. The Development is considered from the perspective of the shortlisted

viewpoints. Computer generated wireline models and photomontages are used to examine the design.

Assessment of Effects on Landscape Character

4.27 Landscape effects may include direct physical changes to landscape elements caused by the Development or indirect effects, such as effects on the setting of a particular landscape that may arise as a consequence of the Development. The potential landscape effects across the Study Area are identified by the on-site analysis and verification of landscape character information gathered as part of the Baseline Assessment. The landscape assessment criteria described below provides a framework for the assessment of landscape effects. It must be noted that there may be exceptions to these broad categories due to specific local characteristics that may apply in individual circumstances. This LVIA does not seek to determine whether the potential landscape effects of the Development would be beneficial or adverse because this is a subjective matter that depends very much on the viewer's own opinion.

Magnitude of Landscape Effects

4.28 The Magnitude of effect on landscape character is defined as the degree of change that would result from the introduction of the Development in terms of size or scale, geographical extent of the area that would be influenced, and the duration and reversibility of the proposed change. It is dependent on a number of factors, including:

- The degree to which landscape character elements would be altered by the Development;
- The number of turbines and their prominence within the landscape;
- Whether effects would have a direct physical effect on a landscape or indirectly affect its character by having an effect on its setting;
- The distance of the Development from the LCA in question;
- The duration, permanence and extent of the effect in physical terms.

4.29 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of landscape effects:

- **High Landscape Magnitude:** The Development would be immediately apparent and would result in substantial loss or major alteration to key elements of landscape character to the extent that there is a fundamental and permanent, or long-term, change to landscape character. The change may occur over an extensive area;
- **Medium Landscape Magnitude:** The Development would be apparent in the view and would result in loss or alteration to key elements of landscape character to the extent that there is a partial long-term change to landscape character. The change may occur over a limited area;

- **Low Landscape Magnitude:** The Development would result in minor loss or alteration to key elements of landscape character to the extent that there may be some slight perception of change to landscape character. The change may be temporary and occur over a limited area;
- **Negligible Landscape Magnitude:** The Development would result in such a minor loss or alteration to key elements of landscape character that there would be no fundamental change.

Significance of Landscape Effects

4.30 The EIA Directive requires the LVIA to identify and assess the acceptability of significant effects. Best practice guidance recognises that the significance of effects is not absolute and is related specifically to the Development. It is also dependent on the points considered within the landscape sensitivity appraisal, the factors that influence the Magnitude of change, and the relationship between Landscape Sensitivity and Magnitude of Landscape Effect.

4.31 This LVIA uses the following criteria to inform and guide the assessment of the Significance of Landscape Effects:

- **Significant Landscape Effects:** Effects that would occur when the majority of landscape attributes are deemed to be highly sensitive and the magnitude of change would alter landscape character to the extent that it would become defined, or considerably influenced, by the presence of the Development;
- **No Significant Landscape Effects:** Effects would not be significant when the majority of landscape attributes are not deemed to be highly sensitive and where the Development would have little, or no, effect on existing landscape character. This would also occur where the Development can be integrated into the existing Study Area without the loss of key landscape attributes landscape effects. Where the Development is easily noticeable but the number and sensitivity of landscape attributes decreases, so landscape character will become less defined by the Development and more so by other landscape attributes.

Assessment of Visual Effects

4.32 Visual effects relate to changes in the composition of views and people's responses to these changes. It is evident from research, and publications on public attitudes to wind farms, that opinions vary greatly, ranging from strongly adverse to strongly positive, depending on the type and nature of effects and individual perceptions. This LVIA does not seek to determine whether the potential visual effects of the Development would be beneficial or adverse because this is a subjective matter that depends very much on the viewer's own opinion. The assessment criteria described in this section below provides a framework for the assessment of visual effects. It is noted that there may be exceptions to these broad categorisations due to specific characteristics that may apply to individual circumstances.

- 4.33 The potential visual effects across the Study Area are identified in four stages:
- i. ZTV diagrams are created. A desk-based analysis of these is carried out in order to gain a broad understanding of the nature of visibility in the Study Area, and to identify viewpoint locations. Wirelines are created as working drafts for all viewpoints;
 - ii. The ZTVs and viewpoint locations are verified on site. The presence of screening elements, such as vegetation, is noted because this is not reflected by the ZTVs bare-ground representation of visibility. Key visual receptors within the Study Area are identified during the site survey, and the assessment of potential visual effects on each of these receptor groups is made. Visual receptors may include, for example, people within settlements, on vehicular routes, at tourist destinations, etc. The viewpoints are assessed for the extent to which they provide truly representative views of the key visual receptors and typical views within the Study Area.
 - iii. In most cases photographs are taken from each viewpoint location. However, in accordance with SNH guidance, viewpoint locations beyond 20 km from the Development may not require photomontages where the proposed turbines are below 150 m in height and where they are unlikely to be perceptible features in the view. A judgement on which viewpoints require photomontages is made on a case-by-case basis in each LVIA;
 - iv. Finally, a detailed assessment of visual effects is made from each viewpoint. This is assisted by computer-generated wirelines and photomontages, which provide as realistic as possible visualisations of how the Development would appear within each viewpoint, and which are presented as Figures in the Environmental Statement.

Assessment of Viewpoints

- 4.34 From each viewpoint a description is provided of the existing view and potential changes that would result from the Development. The effect of the Development on the existing view is then assessed. The following elements are considered in the description and assessment of visual effects from each viewpoint:
- The existing visual character and quality of the viewpoint (including whether it is within a designated landscape, the presence of visual detractors, etc.);
 - The character of the existing landscape against which the turbines would be viewed including any screening provided by existing surface features, vegetation and local topography;
 - The viewpoint location, the presence and concentration of receptors, and receptor sensitivity (for example, would people view the site during work or leisure activities, whilst in transit, etc.);

- The number of turbines that would be visible, their scale, distance from the viewpoint and their position in the view in relation to other features in the viewpoint;
- The duration of the potential effect, i.e. is it long term or temporary, continuous or transitory (the latter meaning that the receptor would be exposed to the effect for a short time);
- Whether effects would occur during construction and decommissioning of the Development.
- The presence of existing wind farms, particularly those in close proximity to the Development, are considered as part of the assessment of visual effects as well as the assessment of cumulative visual effects.

Sensitivity of Visual Receptors

4.35 The Sensitivity of visual receptors is dependent on the nature of the receptor and the value of the view, including other landscape elements within it. The following criteria, which are drawn from current best practice guidance (Technical Appendix 4.1), outline the general principles that are used to inform and guide the assessment of visual sensitivity at each viewpoint:

- **High Visual Sensitivity:** may typically include residents of properties where the main view is orientated towards the Development, or people undertaking recreation where the landscape within which the Development is seen is the primary reason for attraction (e.g. walkers, cyclist and drivers on scenic routes). Receptors are more likely to be within a designated landscape and could be attracted to visit more frequently, or stay for longer, by virtue of the view;
- **Medium Visual Sensitivity:** may typically involve people undertaking active recreational pursuits where the wider landscape within which the Development is not seen as the primary reason for attraction (e.g. golf, water sports, theme and adventure parks, historic sites, parks and gardens). Receptors are less likely to be within a designated landscape and could be attracted to visit more frequently or stay for longer by virtue of the facilities and features of the particular attraction rather than by the value of the view;
- **Low Visual Sensitivity:** may typically include vehicular travellers; outdoor workers (e.g. farm and forestry workers); people in indoor workplaces and community facilities; and residents within larger settlements. Receptors are unlikely to be within a designated landscape and are most likely to be present at a given viewpoint by virtue of some other need or necessity unrelated to the appreciation of the landscape or visual value.

Magnitude of Visual Effects

- 4.36 The Magnitude of effect on visual character is defined as the degree of change that would result from the introduction of the Development. It is dependent on a number of factors, including:
- The prominence of the Development within the view;
 - The number of turbines and extent of the Development that would be visible;
 - The angle and elevation of the view;
 - The proportion of the view that is affected by the Development;
 - The scale and character of the landscape in which the Development would be viewed;
 - The duration, permanence and frequency of available views.
- 4.37 Factors such as the distance of a wind farm from a viewpoint, weather conditions, time of day/year, angle of view, and composition of other elements in the view, all contribute to the assessment of visual effects. This LVIA uses these factors to define levels of visual prominence as follows:
- **Visually Dominant:** The Development would occupy a commanding or elevated position and would seem to tower above the surrounding landscape from the viewpoint in question and/or from the surrounding landscape. The Development would become more important or noticeable than anything else in the view.
 - **Visually Prominent:** The Development would be immediately noticeable and likely to attract attention due to its size or position within the view.
 - **Visible:** The Development would be evident and perceptible from the viewpoint in question and/or from the surrounding landscape but would not be a prominent feature.
 - **Not Visible:** The Development would not be seen or would not be immediately apparent to the naked eye.
- 4.38 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of visual effects:
- **High Visual Magnitude:** The Development would be a dominant and immediately apparent feature that would affect and change the overall character of the view and to which other features would become subordinate;
 - **Medium Visual Magnitude:** The Development would form a visible and recognisable new element within the overall view and would be readily noticed without changing the overall nature of the view;
 - **Low Visual Magnitude:** The Development would form a component of the wider view that might be missed by the casual observer. Awareness of the

Development would not have a marked effect on the overall quality of the view;

- ***Negligible Visual Magnitude:*** The Development would be barely perceptible, or imperceptible, and would have no marked effect on the overall quality of the view.

Significance of Visual Effects

4.39 The EIA Directive requires the LVIA to identify and assess the acceptability of significant effects. Best practice guidance recognises that the significance of effects is not absolute and is related specifically to the Development. It is also dependent on the points considered within the appraisal of sensitive visual receptors, the factors that influence the magnitude of change, and the relationship between Visual Sensitivity and Magnitude of Visual Effect.

4.40 This LVIA uses the following criteria to inform and guide the assessment of the Significance of Visual Effects:

- ***Significant Visual Effects:*** Effects that would occur when the majority of visual receptors are deemed to be highly sensitive and the magnitude of change would alter visual character to the extent that it would become defined, or considerably influenced, by the presence of the Development;
- ***No Significant Visual Effects:*** Effects would not be significant when the majority of visual receptors are not deemed to be highly sensitive and where the Development would have little or no effect on existing views. The Development would be likely to constitute a minor component of the wider view, which might be missed by the casual observer, and awareness of the Development would not have a marked effect on the overall quality of the view. Where the Development is easily noticeable but the number and sensitivity of visual receptors decreases, so overall visual character will remain less defined by the Development and more so by other elements of the existing view.

Production of Viewpoint Visualisations: Wirelines and Photomontages

4.41 Computer-generated wirelines and photomontages are used to assist the assessment of potential visual effects by providing an accurate impression of the scale, size and appearance of the turbines from the chosen viewpoints.

4.42 A wireline model of the Development and surrounding terrain is generated from each viewpoint using ReSoft Wind Farm R4, map tiles and digital terrain data provided by Ordnance Survey of Northern Ireland, the proposed turbine layout, and individual turbine geometry. Turbine blades are displayed at an angle of 0°, i.e. the uppermost blade is always shown pointing directly upwards, in order to demonstrate the highest possible level of visibility. All cumulative wind farms are shown on the wirelines. The wireline model is an accurate model of the bare-ground topography. Land cover elements are then overlaid onto this model in the form of photographs, which are taken at each viewpoint location. Both the wireline

and photograph cover a minimum 80° - 180° angle of view depending on the actual extent of the view on site. For example, the view on site may be constrained on both sides by tall vegetation or be part of a wider panorama. A 50° - 53.5° view is generally accepted as the normal viewing angle of the human eye².

- 4.43 In accordance with best practice guidance all photographs are taken with a full frame digital Single Lens Reflex (SLR) camera and a digital lens focal length of 50 mm (to provide as accurate a representation of the human eye as possible). The largest possible aperture setting is used to ensure the maximum level of detail in the view is shown. A panoramic tripod head is used to obtain true horizontal alignment of the photographs and maintain a constant height above ground (1.5 m).
- 4.44 Accurate records are taken on site of weather conditions and time of day. Viewpoint coordinates are recorded using a hand-held Global Positioning System (GPS, accurate to 3.65 m).
- 4.45 The photographs are merged together and the resulting image is imported into the software programme where it provides the backdrop to the wireline. The wireline terrain data may differ slightly from that pictured in the photograph due to deficiencies in the digital terrain model data (DTM). This can cause the turbines to appear slightly above or below the ground. Therefore minor adjustments may be made to the software settings to ensure that the photograph and wireline match before the turbines are rendered consistently with model data. On completion the wireline is hidden so that only the finished photomontage is visible.
- 4.46 Visualisations are prepared in accordance with the SNH best practice guidance as far as practical and SNH's best practice guidance recommends that the following information on the limitations of visualisations is included in all LVIA methodologies³:
- "Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:
 - A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
 - The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate;
 - A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
 - The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;

² Paper presented to British Wind Energy Association Conference by K. Hawkins of E4environment Ltd and Dr P. Marsh of Environmental Data Analysis (2001) 'The Camera Never Lies' and Scottish National Heritage (2017) 'Visual Representation of Wind Farms'

³ Scottish National Heritage (2017) 'Visual Representation of Wind Farms', Annex A: Information on limitations of visualisations

- To form the best impression of the impacts of the wind farm proposal these images are best viewed at the viewpoint location shown;
- The images must be printed at the right size to be viewed properly (The visualisations in this LVIA are 130 mm x 42 mm at A3);
- You should hold the images flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, you should stand at arm's length from the image presented to gain the best impression.
- It is preferable to view printed images rather than view images on screen. If you do view images on screen you should do so using a normal PC screen with the image enlarged to the full screen height to give a realistic impression. Do not use a tablet or other device with a smaller screen to view the visualisations described in this guidance.

4.47 In many scenarios wind farms are visible as elements of wide angle views which can only be appreciated if viewers turn their heads from side to side or move through the landscape. Wirelines and photomontages show the turbines in accurate proportion to other visual elements. However, the overall scale of the view is reduced by the practical need to illustrate the view on a single sheet of paper that allows as many people as possible to have fair and easy access to the published Environmental Statement. Features that are of note in wider views, but which are beyond the angle that can be illustrated in the viewpoint figures, such as other wind farms, are included in the detailed written descriptions of viewpoints in the LVIA report. Photomontage figures should be reproduced at a minimum of 300 pixels per inch to ensure best quality representation of the viewpoints.

4.48 It must be noted that the purpose of wirelines and photomontages is to help the assessor establish what the Development's visual effect might be by providing a 'snapshot' of what the Development would look like within the landscape. They should always be viewed in conjunction with the LVIA report which provides a detailed written assessment of visual effects, as well as a visit to all of the viewpoints in appropriate weather conditions. Wirelines are not intended to be visually representative images but they are generally accepted as an illustrative digital imaging tool. They provide a good indication of the location of turbines within the landscape and their relationship with the Cumulative Baseline of other wind farms in the Study Area. If these limitations are recognised, visualisations can be accepted as adequate representations for the purpose of the LVIA.

Assessment of Effects of the Proposed Layout on the Site

4.49 This LVIA is primarily concerned with the operational phase of the Development. However, consideration is also given to the potential effects during construction and decommissioning. During the construction period a number of activities would occur that may temporarily or permanently affect the physical landscape or visual amenity of the Study Area. Temporary effects may only last for the duration, or

part of, the construction period and may include effects such as the visibility of construction traffic, plant, and stockpiled materials. If managed adequately these construction effects can be minimised or avoided. Permanent effects would result from irreversible physical changes to the site such as the removal of vegetation, alteration of landform and new access arrangements.

- 4.50 Details of the Development and its associated infrastructure are described briefly, starting at paragraph 4.37 and in more detail in Chapter 2: Proposed Development. Mitigation measures to avoid or minimise both temporary and permanent effects are proposed in paragraph 4.217.

Design Evolution and Mitigation Measures

- 4.51 During the course of the EIA the layout of the Development may change as part of an iterative assessment and design process. Liaison between all parties involved in the EIA is a key part of this process and the LVIA takes cognisance of the findings of other chapters, such as Archaeology and Cultural Heritage. Mitigation measures which seek to avoid, reduce, or compensate for landscape and visual effects would generally be implemented as part of this process and may include, for example, changes to layout and turbine specification, colour, uniformity of layout, undergrounding of onsite power cables, and infrastructure design. Following the implementation of mitigation measures in relation to physical site constraints (e.g. the presence of protected species, hydrological features, etc.) the Development would be considered from the perspective of the identified viewpoints. The computer-generated wirelines would be used to examine initial designs and identify opportunities to improve the layout in visual terms where necessary.
- 4.52 Further mitigation proposals, including any potential enhancement of landscape and visual character, will be made, where possible and appropriate, to address any potential effects which would remain with the final layout. It is important to note that the scope for mitigating the visual effect of wind farms is greatly restricted by the functional siting requirements, the scale of the turbines, and the characteristic movement of the blades.

Assessment of Residual Landscape and Visual Effects

- 4.53 Where mitigatory design proposals are implemented in order to reduce significant landscape and visual effects, the resulting reduction in effects is assessed and described in paragraph 4.218.

Assessment of Cumulative Effects

- 4.54 In relation to LVIAs of individual developments, cumulative effects are taken to mean *"the additional changes caused by a proposed wind farm in conjunction with other similar developments"*⁴.

⁴ Scottish Natural Heritage (March 2012), 'Assessing the Cumulative Impacts of Onshore Wind Energy Developments' paragraph 7, paraphrased from the GLVIA para 7.12

- 4.55 *"The purpose of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a wind farm would have additional impacts when considered in addition to other existing, consented or proposed windfarms. It should identify the significant cumulative effects arising from the proposed wind farm"*⁵. In other words, the purpose of the cumulative impact assessment is to measure the incremental effect of the Development on the Cumulative Baseline rather than to assess the combined effects of all, or some, of the Cumulative Baseline with the Development.
- 4.56 The Cumulative Baseline comprises existing, consented and proposed (in-planning) wind farms in an appropriate cumulative Study Area. In this LVIA the cumulative Study Area extends primarily to a 30 km radius with the exception of the south west of the Study Area where the radius has been increased to include the Slievekirk cluster of wind farms (see Technical Appendix 4.4 and Figure 4.5). Particular attention is paid to clusters of wind farms because these are already likely to be prominent features. Existing single turbines are noted as features within the existing landscape and visual baseline, and in particular if they appear within selected viewpoints. Their locations are not illustrated in the wirelines or included in the ZTVs unless they have been subject to the same EIA assessment process as the Development, have a hub height of at least 50 m and are located within a 5 km radius of the Development.
- 4.57 It must be noted that cumulative effect of some magnitude is largely unavoidable in any Study Area which contains existing wind farms and a judgement must be made on the relative and appropriate weight that is given to the various elements of the actual and assumed Cumulative Baseline. Current best practice guidance⁶ makes it clear that this baseline should extend to operational and consented schemes but not necessarily to those which are the subject of undetermined applications for planning permission. Existing and consented wind farms are generally considered to be part of baseline landscape and visual character and the effects of the Development take consideration of their presence, or anticipated presence. The incremental effect of the Development on a Cumulative Baseline which includes other proposed wind farms is also considered. However, it is noted that applications for planning permission may be rejected and therefore, if a scheme is not yet approved, relatively limited weighting should be afforded to it when assessing the incremental effects of the Development. This LVIA includes existing, consented and proposed wind farms in its cumulative assessment but the weight afforded to individual schemes is a matter for the decision maker based on the evidence presented in the LVIA.
- 4.58 The assessment criteria described in this section provides a framework for the assessment of cumulative landscape and visual effects. It is noted that there may

⁵ Scottish Natural Heritage (March 2012), *'Assessing the Cumulative Impacts of Onshore Wind Energy Developments'*, paragraph 55

⁶ Including PPS18 at paragraph 1.3.37 and the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017

be exceptions to these broad categorisations due to specific characteristics that may apply to individual circumstances.

Assessment of Cumulative Landscape Effects

4.59 Cumulative landscape effects relate to the incremental degree of change to the existing landscape character or physical fabric of the Study Area that would result from the introduction of the Development over and above that of the Cumulative Baseline. The magnitude of cumulative change to landscape character is dependent on a number of factors, including:

- The presence, appearance and interrelationship of other cumulative wind farms in the Cumulative Baseline, and the degree to which this already influences landscape character;
- The incremental change to landscape character elements that would be caused by the Development;
- The incremental effect of the Development on the overall number of turbines, their prominence within the landscape, and their effect on landscape scale;
- Whether effects are direct or indirect;
- The distance of the Development from the LCA in question, and from other cumulative wind farms that may also affect the LCA in question;
- The duration, nature, permanence and extent of the effect in physical and visual terms;
- The value attached to the landscape in question, including any landscape designations.

Magnitude of Cumulative Landscape Effects

4.60 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of Cumulative Landscape Effects:

- **High Cumulative Landscape Magnitude:** The introduction of the Development to the Cumulative Baseline would be immediately apparent and would result in substantial incremental loss of, or major alteration to, key elements of landscape character to the extent that there would be a fundamental and permanent, or long-term, change to landscape character. The change may occur over an extensive area;
- **Medium Cumulative Landscape Magnitude:** The introduction of the Development to the Cumulative Baseline would be immediately apparent and would result in the incremental loss of, or alteration to, key elements of landscape character to the extent that there would be a partial long-term change to landscape character. The change may occur over a limited area;

- **Low Cumulative Landscape Magnitude:** The introduction of the Development to the Cumulative Baseline would result in minor incremental loss of, or alteration to, key elements of landscape character to the extent that there may be some slight perception of change to landscape character. The change may be temporary and occur over a limited area;
- **Negligible Cumulative Landscape Magnitude:** The introduction of the Development to the Cumulative Baseline would result in such a minor incremental loss of, or alteration to, key elements of landscape character that there would be no fundamental change to landscape character.

Significance of Cumulative Landscape Effects

4.61 The Significance of Cumulative Landscape Effects is dependent on the points considered within the landscape sensitivity appraisal, the factors that influence the Magnitude of change upon it, and the relationship between landscape Sensitivity and Magnitude of cumulative landscape effect. The following criteria outline the general principles that are used to inform and guide the assessment of the Significance of cumulative landscape effects:

- **Significant Cumulative Landscape Effects:** Effects that would occur when the majority of landscape attributes are deemed to be highly sensitive and the incremental effects of the Development would alter landscape character to the extent that it would become defined or considerably influenced by the presence of wind farms, taking account of Cumulative Baseline conditions;
- **No Significant Cumulative Landscape Effects:** Effects would not be significant when the majority of landscape attributes are not deemed to be highly sensitive and where the Development would have little or no incremental effect on the existing landscape character. Where the Development can be integrated into the existing Cumulative Baseline, without the loss of key landscape attributes, cumulative landscape effects would also be deemed as Not Significant. This level of significance would also occur where the Development is easily noticeable but its incremental effects would not cause the landscape character to become more defined by wind farms than it currently is, or to become more defined by wind farms than by other landscape attributes.

Assessment of Cumulative Visual Effects

4.62 Cumulative visual effects relate to the degree to which wind energy developments feature in particular views or sequences of views, and the resulting effects of this upon visual receptors. Current best practice guidance advises that the potential receptors of cumulative visual effects should be identified and the most significant receptors selected for detailed assessment. This LVIA considers simultaneous and sequential cumulative visual effects that may arise within the Study Area, and in

relation to the selected viewpoints. The presence of existing wind farms, particularly those that are closely related to the Development, are considered as part of the assessment of visual effects as well as the assessment of cumulative visual effects.

- 4.63 Simultaneous cumulative visibility is the extent to which the Development would be visible with one or more other cumulative wind farms from a single location, either in the same or different directions. Sequential cumulative visibility is the extent to which the Development would be viewed in succession with one or more other cumulative wind farms by receptors travelling through the landscape, regardless of whether or not the sites themselves are inter-visible.
- 4.64 The LVIA principally considers the degree to which the Development would contribute to wind energy development becoming a significant or defining characteristic of visual character. The sensitivity of visual receptors remains the same as that already defined in the visual effect assessment because the visual resource is unaltered. Different criteria are used for assessing Magnitude and Significance of Cumulative Visual Effects.

Magnitude of Cumulative Visual Effect

- 4.65 The Magnitude of cumulative visual effect is dependent on a number of factors, including:
- The nature of the Cumulative Baseline, i.e. the presence, appearance and intervisibility of existing, consented and proposed developments;
 - The incremental effect that the Development would have on the prominence and distance of wind farms from visual receptors;
 - The incremental effect that the Development would have on the number of turbines and the extent of wind farms that can be seen simultaneously, or sequentially;
 - The incremental effect that the Development would have on the proportion of the view that is affected by wind turbines and the number of wind farms that would be visible in their entirety or otherwise;
 - The visual relationship between the Development and other wind farms, including separation distances between developments;
 - The scale and character of the landscape in which the Development would be viewed alongside the Cumulative Baseline;
 - The nature of available views, including angle of view, prominence, screening elements, elevation, and distance from the viewpoint location.
 - The duration, frequency and permanence of available views, including whether the potential cumulative effect is likely to be frequent (i.e. it would occur regularly, repetitively, or with short time lapses between occurrences) or occasional (i.e. it would occur infrequently, with long time lapses or distances between occurrences);

- Whether the viewer would need to look in the same direction or different directions to obtain cumulative views;
 - The speed and mode of travel of visual receptors, and duration of cumulative views.
- 4.66 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of cumulative visual effects:
- **High Cumulative Visual Magnitude:** The Development would increase the scale of wind turbines in the landscape to a level at which the view would become dominated by wind farms;
 - **Medium Cumulative Visual Magnitude:** The Development would result in a noticeable increase in turbines but this increase would not result in wind farms being the dominant feature of the view;
 - **Low Cumulative Visual Magnitude:** The Development would be visible but would constitute a component of the view that might be easily missed by the casual observer and would not contribute to the overall prominence of wind farms within the view;
 - **Negligible Cumulative Visual Magnitude:** The Development would be barely perceptible, or imperceptible, and would have no effect on the perception of wind turbines within the view.

Significance of Cumulative Visual Effect

- 4.67 The Significance of cumulative visual effects is dependent on the points considered within the appraisal of sensitive receptors, the factors that influence the Magnitude of cumulative visual effects, and the relationship between visual Sensitivity and Magnitude of cumulative visual effect. The following general principles are used to inform and guide the assessment of the Significance of Cumulative Visual Effects:
- **Significant Cumulative Visual Effects:** Effects that would occur when the majority of visual receptors are deemed to be highly sensitive and the addition of the Development to the Cumulative Baseline would result in the view becoming defined, or considerably influenced, by wind turbines;
 - **No Significant Cumulative Visual Effects:** Effects would not be significant when the majority of visual receptors are not deemed to be highly sensitive and where the Development would have little or no incremental effect on existing views. The Development is likely to constitute a barely perceptible, or imperceptible, component of the wider view, which might be missed by the casual observer. Awareness of the Development would not have a marked effect on the overall quality of the view. Where the Development may still be a noticeable addition to views containing wind farms in the cumulative baseline but it would not cause the overall visual character of the view to become defined by wind turbines rather than by other elements of the existing view the overall effects would also be deemed to be Not Significant.

Technical Appendix 4.3: Landscape Character Areas

- 4.68 There are 20 Landscape Character Areas (LCAs) within the Study Area. The Development is located within LCA 36 Binevenagh and a detailed description of this LCA is contained within the Baseline Assessment of the LVIA, Chapter 4, starting at paragraph 4.103.
- 4.69 There are five other LCAs which are in close proximity to the Development or which contain shortlisted viewpoints. Detailed descriptions of these LCAs are contained within the Northern Ireland Landscape Character Assessment (NILCA) and the SPG to PPS18. The NILCA classifies the landscape into areas of distinct and separate character called Landscape Character Areas (LCAs), and defines overall Landscape Value. The SPG provides further broad guidance on the LCAs that are defined in the NILCA, including their overall Sensitivity, specifically in relation to wind energy developments. The detailed descriptions of the LCAs that are contained in the NILCA and SPG are not reproduced in this LVIA but Table 4.3.1 summarises the Landscape Value and Sensitivity of these LCAs in relation to the Development. The location of all LCAs is shown on Figure 4.3.

Technical Appendix Table 4.3.1: Summary of Landscape Value and Sensitivity

Landscape Character Area	Landscape Value	Landscape Sensitivity to proposed Development
LCA 33 Lough Foyle Alluvial Plains	Moderate	Low
LCA 36 Binevenagh	Very High	Medium
LCA 37 Roe Basin	High	Low
LCA 38 Eastern Binevenagh Slopes	Low to Moderate	Low
LCA 54 Coleraine Farmland	Low to Moderate	Low
Inishowen Coastal Area and Uplands	Moderate to High	Low

- 4.70 The following 14 LCAs have not been assessed in detail because the Baseline Assessment, including site assessment, indicates that they are on the periphery of the Study Area and the ZTV, and/or because they do not contain shortlisted Viewpoints. Such LCAs would not be significantly affected by the Development and have therefore not been subject to further detailed assessment.

Technical Appendix Table 4.3.2: LCAs not assessed in this LVIA

Landscape Character Area
LCA 29 Sperrin Mountains
LCA 30 Sperrin Foothills

Landscape Character Area
LCA 31 Burngibbah and Drumahoe
LCA 32 Derry Slopes
LCA 34 Loughermore Hills
LCA 35 Magilligan Lowlands
LCA 39 Glenshane Slopes
LCA 51 Garvagh Farmland
LCA 53 Lower Bann Floodplain
LCA 55 Garry Bog
LCA 56 Dervock Farmland
LCA 57 Causeway Coast and Rathlin Island
LCA 58 Long Mountain Ridge
LCA 59 Cullybackey and Clough Mills Drumlins

Northern Ireland Regional Landscape Character Assessment

- 4.71 A Regional Landscape Character Assessment has recently been prepared for Northern Ireland (NIRLCA, 2015) and is intended to provide a strategic overview of landscape character that can be used to inform future detailed local studies and that will be updated on a more regular basis than the NILCA. It divides the province into 26 regional landscape character areas that updates and provides further detail on the previous 130 LCAs. However, because the NIRLCA is still in its early stages and has yet to be reflected in the development of detailed local studies the NILCA still provides a greater level of detail and is used as a direct reference point for the SPG.
- 4.72 Binevenagh Ridge is Regional LCA 10 in the NIRLCA and is described as being a distinct series of west-facing scarps which run from Binevenagh Mountain to Gortnamoyagh (boundary indicated on Figure 4.3) which reflects a broadly similar area to that covered by the northern and central parts of LCA 36 Binevenagh terminating at the Sperrin AONB boundary in the southern half of LCA 36, and also covering the western side of LCA 38 Eastern Binevenagh Slopes. The description of RLCA 10 is broadly similar to these LCAs and it notes the relationship between Binevenagh Mountain and the adjacent Magilligan strand as being "*the centrepiece*" of the AONB.
- 4.73 In addition to landscape character as a largely aesthetic quality, the NIRLCA defines a number of 'Ecosystem Services' which are defined as "*the benefits provided by ecosystems that contribute to making human life both possible and worth living*"⁷.

⁷ GLVIA (2013) page 155.

Whilst wind farms are recognised as being a past, present and future force for change in RLCA 10 they are also recognised as 'provisioning' and 'climate regulating' ecosystem services that are of benefit to us. The RLCA notes that landscape sensitivity studies may be required to determine the potential for this landscape to absorb further development without adverse effects on the character or the ridge or adjacent lowlands including cumulative effects. These elements are considered in the assessment of effects in this LVIA.

Technical Appendix 4.4: Viewpoint Selection

Desk-based selection of Provisional Viewpoint Locations

4.74 The Baseline Assessment stage of the LVIA identified locations most likely to experience visibility of the Development and contain key receptors due the theoretical levels of visibility indicated by the ZTV diagrams and the potential sensitivity of either the location and / or the visual receptors likely to be present at these locations. The following were identified as being potential key receptors and key parts of the Study Area which should be considered in the search for provisional viewpoints PVPs:

- Locations within the three AONBs in the Study Area - Binevenagh, the Sperrins and the Causeway Coast - because these areas are statutorily designated as nationally recognised high quality landscapes. They are likely to attract visitors by virtue of this designation and contain various visitor amenity sites and attractions;
- Locations from which the Development would be seen within the wider context of the Binevenagh range of uplands, including locations within the setting for the Binevenagh AONB;
- The Giant's Causeway World Heritage Site because it is an internationally designated heritage site (UNESCO) and the primary tourist attraction in Northern Ireland;
- Locations from public rights of way, scenic drives and cycling routes where viewers are likely to be present for the primary purpose of appreciating scenic views. Such locations might include the Ulster Way network of footpaths including waymarked trails through Springfield Forest and the west side of Keady Mountain, the Binevenagh range of uplands to north, the National Cycle Network including parts of the route which traverse Binevenagh and the Roe Valley, classified scenic driving routes along various parts of the Causeway Coast, Roe Valley and the Binevenagh Scenic Drive which terminates at viewing areas on the summit of Binevenagh Mountain;
- Residential properties and areas of rural settlement in close proximity to the Development where viewers may be static and obtain views for long periods of time;
- Viewpoints that have been previously used in the assessment of visual effects for the Dunbeg cluster of wind farms because these wind farms are located within the same part of the Study Area as the Development and are likely to be visible in conjunction with the Development in many instances;

- Cross-border views from the Inishowen peninsula in County Donegal which is part of the Wild Atlantic Way tourist trail and where a number of scenic designations are identified by the County Development Plan.
- 4.75 Using this search criteria, 51 PVPs were identified and analysed through the production of a preliminary ZTV diagram, preliminary wirelines and map-based research. These PVPs are listed in Table 4.4.1 below. Twenty eight of these PVPs were used in the previous Dunbeg, Dunbeg Extension or Dunmore Wind Farm LVIAs.

Initial site assessment and viewpoint 'shortlisting'

- 4.76 All 51 PVP locations were visited as part of an initial site assessment (PVP locations are indicated on Figure 4.4). Levels of actual visibility, the nature of visual receptors present at each location, and the overall viability of each viewpoint location were analysed (see Table 4.4.1 below). A proposed 'shortlist' of 22 viewpoint locations was made which included a proportionate number of locations representing typical views of the Development, key visual receptors and key locations within the Study Area. For ease of analysis these shortlisted viewpoints were categorised as follows:
- A. Views from primary and secondary routes, including tourist areas;
 - B. Views representing residential properties and rural settlement within approx. 5 km of the Development;
 - C. Residential properties and settlements within 5 - 15 km of the Development;
 - D. Views illustrating the wider landscape setting and visibility of the Development in the context of the adjacent Dunbeg cluster of wind farms.
- 4.77 A number of PVPs were not shortlisted because they were found to provide no actual view of the Development. The reasons for this usually arose from differences between theoretical and actual visibility which is explained in Technical Appendix 4.2. Other PVPs were not shortlisted if a more typical view was demonstrated elsewhere, where no safe stopping place was possible to take a photograph or where the viewpoint location would not be easily accessible to the public.
- 4.78 The proposed shortlist of viewpoint locations was presented to the local planning authority, Causeway Coast and Glens Borough Council, for their review and comment. The preparation of both wirelines and photomontages were proposed to illustrate all shortlisted viewpoint locations within 20 km of the Development and wireline diagrams were proposed for the two PVPs -numbers 13 and 31 - which were selected to represent long range views. This approach is in accordance with current Scottish Natural Heritage Guidelines on wind farm visualisations and agreement to this approach was sought from the Council.
- 4.79 The Council responded with broad agreement to the proposed shortlist of viewpoint locations but requested:

- The omission of two long range viewpoints located at the Giant's Causeway (PVP 31) and the A6 near Dungiven (PVP 32) which they felt were unnecessary (see Plate 4.4.1 below). These PVPs had been shortlisted to demonstrate the lack of visibility from a potentially sensitive tourist location and well-trafficked route between Belfast and Derry and their inclusion in the LVIA would not have resulted in the identification of significant effects;
- The inclusion of three further PVP locations along the A37 that had not been initially included in the proposed shortlist - PVPs 1, 18 and 21. These have been included in the final LVIA as Viewpoints 4, 1 and 6 respectively;
- They also suggested that five additional locations were added to the shortlist. Following discussion, four of these locations were included: PVP 52 located on Windyhill Road on the outskirts of Coleraine is included as final Viewpoint 9; PVP 53 on Windy Hill Road overlooking the existing Dunmore wind farm is included as final Viewpoint 7; PVP 55 located at a housing development on the A2 in Ballykelly is included as final Viewpoint 21; and PVP 56 located on the A2 Causeway Coast scenic driving route near Limavady is included as final Viewpoint 19. A fifth location, PVP 54 near Limavady, was not included because it was agreed that PVP 12 (final Viewpoint 13) offered a better location representing views from this part of the Study Area.

Technical Appendix Table 4.4.1: Provisional Viewpoints and Proposed Shortlist

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
A	Views representing primary and secondary routes, including tourist areas			
1 *	Keady Mountain near A37	272385, 425080	0.8 km East	Used in previous LVIA's for Dunbeg Cluster of wind farms. Offers views over wind farm development area with a backdrop of wider views across lowlands around Limavady, Lough Foyle and Inishowen. Not initially shortlisted because there are similar views from PVPs 20 & 21 which are located on the primary road network with a greater number of potential receptors but requested by Council to be included. Final Viewpoint 4

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
2	Binevenagh Scenic Drive near Lisnagrib	270451, 427797	3.6 km South-east	Used in LVIAs for other wind farms in Dunbeg Cluster. Scenic driving route, tourist destination and rural properties within AONB. Offers sequential views with PVPs 9 and 24 which together illustrate views on the route to Binevenagh summit. Final Viewpoint 10
3	A37 parking Layby near Dunbeg	27744, 426205	1.4 km South-west	Used in LVIAs for other wind farms in Dunbeg Cluster. Stopping place on A37 with close range views of proposed development in conjunction with Dunbeg and Dunmore, within AONB Final Viewpoint 2
9	Bishop's Road, Binevenagh Scenic Drive	270630, 428489	4.2 km South-east	Used in LVIAs for other wind farms in Dunbeg Cluster and along with PVPs 2 and 25 to illustrate sequence of views on scenic route. However, PVP 2 provides a clearer illustration of views of the proposed development alongside Dunbeg and Dunmore wind farms so has been shortlisted in favour of this PVP.
11	Largantea Picnic Site, Windy Hill	273684, 428444	3.0 km South	Used in LVIAs for other wind farms in Dunbeg Cluster, tourist amenity site and part of local sculpture trail. Not shortlisted in favour of PVP 49 which offers views of a similar extent that are less constrained by foreground topography and vegetation.
21	Broad Road Lower	273305, 425758	3.7 km North-east	Used in Dunmore submission and FEI for Dunbeg Extension. In conjunction PVPs 21 & 22 illustrate the changing nature of views on the western approach towards the proposed development from the A37 and they are shortlisted for this reason. Final Viewpoint 6

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
22	Broad Road Upper	270830, 424054	2.63 km North-east	see above Final Viewpoint 5
23 *	A37 near Dunbeg	270672, 423893	0.46 km South-east	Not initially shortlisted because similar views are represented by PVPs 21 & 22 but requested by Council to be included. Final Viewpoint 3
33	Ulster Way at Springfield Forest	276094, 428042	3.8 km South-west	Selected to represent potential views from Ulster Way. Not shortlisted because views will be screened by forestry.
45	B66 Ringsend Road near junction with A37	270000, 423325	3.9 km North-east	Selected to represent views from the secondary road network in proximity to the proposed wind farm. Not shortlisted in favour of PVPs 21 and 22 which are similarly located.
B	Views representing residential properties and rural settlement within approx. 5 km of the Development			
7	Drumalief Road off B201	270942, 425873	2.4 km South-east	Used in LVIAs of other wind farms in Dunbeg cluster. Represents views from rural residential properties and allows comparison with previous LVIAs. Final Viewpoint 15
10	Bolea Road near Deramore Presbyterian Church	270634, 425147	2.5 km East	Used in LVIAs of other wind farms in Dunbeg cluster. Represents views from rural residential properties and allows comparison with previous LVIAs. Final Viewpoint 16
38	Cam Road	279142, 424334	4.6 km North-west	As above, represents views from rural houses located on elevated land to east of proposed wind farm. However, views are limited in nature so not shortlisted.
39	Terrydoo Road near Cam Forest	273499, 421400	3.2 km North	Represents visual relationship between proposed wind farm and Keady Mountain in views from rural roads and properties located in the countryside around Drumsurn village. However, views limited so not shortlisted.

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
43	Drumsumn Road on approach to Limavady	270650, 420950	4.5 km North-east	Selected for the same reasons as PVP 44. Not shortlisted in favour of PVP 44 which has potential visibility of more of the proposed turbines.
44	Drumsumn Road near cricket club	269280, 422750	4.6 km North-east	Shortlisted to represent views from rural properties and an outdoor recreation facility on the tertiary road network between Limavady and Drumsumn. Final Viewpoint 17
46	Drumalief Road II	271650, 425080	1.8 km East	Used for Dunbeg wind farm (appeal hearing) to illustrate potential effects on rural properties. Not shortlisted in favour of PVP 7 which is similarly located.
47	Bolea Road lower	271590, 425650	1.5 km South-east	Used for Dunbeg wind farm (appeal hearing). Represents views from residential properties on lower slopes of Dunbeg below existing wind farms. Not shortlisted in favour of PVPs 10 and 48 which are similarly located.
48	Bolea Road middle	272110, 426150	1.6 km South-east	Used for Dunbeg wind farm (appeal hearing). Represents views from residential properties on lower slopes of Dunbeg below existing wind farms. Final Viewpoint 14
C	Views representing Residential properties and settlements within 5 - 15 km of the Development			
6	Roe Park Hotel, Limavady	266769, 421785	7.3 km North-east	Used in previous LVIAs for Dunbeg Cluster to illustrate views from tourist destination within Limavady. Not shortlisted in favour of PVP 12 which offers similar views from a more widely accessible location on a designated tourist driving route.
8	A2 Scenic Drive near Aghnaloo Industrial Estate	268064, 426125	5.1 km South-east	Used in previous LVIAs for Dunbeg Cluster but views in this part of the Study Area can be adequately represented by PVPs 2, 9 & 12. The landscape in the foreground of this location is not in good quality and the majority of views are likely to be obtained from fast-moving vehicles.

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
12	Scenic Route at Ballykelly	26631, 423308	6.9 km East	Used in previous LVIAs for Dunbeg Cluster, located on a scenic driving route and represents views from a range of visual receptors. Shortlisted for these reasons and accepted by Council as an alternative to their proposed PVP 54. Final Viewpoint 13
14	Coolagh Road near Greysteel	258641, 419420	15.7 km North-east	Used in Dunbeg Extension LVIA, represents views from rural residential properties in the wider study area. Not shortlisted because PVPs 12, 16 & 30 are thought to adequately illustrate the nature and extent of views from this part of the Study Area given the local planning authorities emphasis on closer range views.
15	New Line near B61, Loughermore Forest	263654, 417536	12.0 km North-East	As above
16	Railway Crossing at Ballykelly	261274, 423545	12 km East	Used in previous LVIAs for Dunbeg Cluster and illustrates views within context of Magilligan lowlands, Binevenagh summit, Lough Foyle and Inishowen. Final Viewpoint 23
18 *	A37 near Macosquin	281585, 428100	7.5 km South-west	Used in previous LVIAs for Dunbeg Cluster but offers limited views of proposed turbines. Not initially shortlisted but requested by Council to be included. Illustrates nature of views from A37 in proximity to Coleraine town. Final Viewpoint 1
19	Drummond Hotel, Ballykelly	263137, 422330	10.3 km North-east	Used in previous LVIAs for Dunbeg Cluster to represent views in western approach along the A2 at the edge of a settlement and at a likely location for tourists and other static views. Not shortlisted in favour of PVP 12 which offers closer-range views in the same direction and with similar receptors.

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
20	Loughermore Road, Ballykelly	262274, 421647	11.5 km North-east	As per PVP 14
24	Benbradagh Mountain, Ulster Way	273034, 410398	14.2 km North	Shortlisted to represent elevated views from the southern part of the Study Area, located on the Ulster Way, likely cumulative effects with wind farm developments in addition to Dunbeg and Dunmore. Final Viewpoint 24
25	Binevenagh Lake carpark	269294, 430605	7.0 km South-east	Selected in conjunction with PVPs 2 and 9 to illustrate sequence of views along scenic route to Binevenagh summit. Shortlisted to illustrate potential views from the summit. Final Viewpoint 11
26	Boleran Village	280507, 418850	8.6 km, North-west	Selected to represent potential views from settlement in this part of the Study Area but not shortlisted because views are limited in nature.
27	Temain Hill near Rigged Hill wind farm	275325, 418418	6.4 km North-west	Selected to represent potential cumulative views with Rigged Hill. Not shortlisted in favour of PVP 41 where there are likely to be a larger number of visual receptors with similar views as from this location.
28	Drumsurn Village I	272126, 416871	8.0 km North	Selected to represent views from village and viewpoint location was used in Smulgedon LVIA. Not shortlisted in favour of PVP 40 which offers slightly clearer views from a different location within the same village.
29	B197 between Dungiven & Limavady at Gortnahey village	268101, 413581	12.5 km North-east	Selected to represent potential views from settlement but not shortlisted because views are limited in nature.
30	Roe Country Park environs	267331, 418439	8.0 km North-east	Used in previous LVIA's for Dunbeg Cluster of wind farms. Shortlisted to represent views from well-used public amenity landscape in Roe Valley including walkers, drivers and cyclists. Final Viewpoint 12

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
35	Ballystrone Road off A37	280650, 428400	6.8 km South-west	PVPs 35 - 37 selected to represent views of wind farm when approached from Coleraine direction from pastoral land and rural dwellings adjacent to Springfield Forest illustrates relationship with Dunbeg and Dunmore in approaches from this direction. PVP 36 shortlisted because it is located where a greater number of visual receptors are likely to occur.
36	Ballinarees Orange Hall, Windy Hill Road	278900, 430250	6.4 km South-west	See above. Used in previous LVIAs for Dunbeg Cluster of wind farms. Final Viewpoint 8
37	Isle Road	278781, 428889	5.5 km South-west	As per PVP 35
40	Drumsumn Village II	271800, 417450	7.7 km North	Alternative location to PVP 28 representing potential views from Drumsumn village. Final Viewpoint 20
41	Gortnahey Road	273800, 417850	6.0 km North	Shortlisted to represent elevated views from rural properties located in the countryside around Drumsumn village. Final Viewpoint 18
42	Terrydoo Road lower	271850, 419310	5.8 km North-east	Selected for the same reasons as PVP 41. Not shortlisted in favour of PVP 41 which has potential visibility of a greater number of the proposed turbines.
D	Views representing wider landscape setting and visibility of the Development in the context of the adjacent Dunbeg cluster of wind farms			
4	Ballyhemlin near Bushmills	295448, 439180	25.0 km South-west	Used in previous LVIAs for Dunbeg Cluster to illustrate longer-range views from Causeway Coast landscape. Not shortlisted in favour of PVP 31.
5	B17 at Cloyfin near Coleraine	288146, 435477	16.8 km South-west	Used in previous LVIAs for Dunbeg Cluster to illustrate longer-range views on elevated approach to Coleraine from Causeway Coast, including rural properties on secondary road network. Not shortlisted for this LVIA because

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
				similar range and extent of views are illustrated by PVPs 31, 34 and 51.
13	Eskaheen, Inishowen	245770, 427105	27.3 km East	Used in previous LVIA's for Dunbeg Cluster, represents long-range elevated views from Co. Donegal parts of Study Area. Shortlisted for these reasons. Final Viewpoint 27
17	Ballyvelton Road, Ballyrashane near Coleraine	289260, 430996	15.5 km South-west	Used in previous LVIA's for Dunbeg Cluster to represent elevated longer-range views from Causeway coast landscape, including rural properties. Not shortlisted in favour of PVP 34 which is located on the primary road network at a natural stopping place.
31	<i>Giant's Causeway environs</i>	<i>295880, 444198</i>	28.5 km South-west	<i>Represents long distance views from World Heritage Site - an area of international importance within the 30km Study Area for the proposed wind farm. Council deemed it unnecessary to include in LVIA.</i>
32	<i>Picnic Area off A6 near Dungiven</i>	<i>266703, 409118</i>	16.9 km North-east	<i>Shortlisted to represent views from primary transport route including views into Sperrin AONB, in proximity to town, tourist amenity area. Council deemed it unnecessary to include in LVIA.</i>
34	Parking Layby on A26 near Damhead	289491, 429287	15.3 km South-west	Represents views from main route between Ballymoney and north coast on approach to Coleraine; similar to views from PVP 17 but likely to include a larger number of visual receptors. Final Viewpoint 26
49	Bolea Road upper near Dunmore site entrance	274380, 427700	2.8 km South-west	Represents close range views and visual relationship with Dunbeg and Dunmore viewed against the backdrop of Keady Mountain and south-westward views into the Sperrins. Shortlisted as an alternative to PVP 11 where similarly located views are more constrained by foreground features. Final Viewpoint 22

Provisional Viewpoint (shortlisted PVPs shown in bold; PVPs added at Council's request indicated with an asterisk *; those omitted at Council request shown in <i>italics</i>)		Provisional grid reference	Approx. distance from nearest Dunbeg South turbine & direction of view	Reason for provisional selection and shortlisting decision
50	B69 between Rasharkin & Portglenone	297800, 408369	29.0 km North-west	Selected to represent longer-range views from the south eastern part of the Study Area. Not shortlisted because site assessment suggested that views from this area were more likely to be orientated eastwards away from the proposed wind farm which is unlikely to be a noticeable visual element in views from this location.
51	Portstewart town	281552, 438690	14.7 km South-west	Selected to illustrate the potential cumulative effects of the proposed wind farm alongside Dunmore and Dunbeg when viewed from the seaside towns along the north coast. Final Viewpoint 25
E	Additional viewpoint locations requested by Council during viewpoint selection discussions			
52*	Windyhill Road	283274, 432629	10.8 km South-west	Used in previous LVIAs for Dunbeg Cluster of wind farms. Final Viewpoint 9
53*	Windyhill Road West	273027, 428016	2.6 km South	Final Viewpoint 7
54	Ballykelly Road	265645, 423121	7.8 km North-east	Initially requested by Council as an additional PVP but subsequently agreed that p12 would adequately represent views from this part of the Study Area.
55*	Riverview housing development, Ballykelly	261876, 422167	11.7 km North-east	Used in previous LVIAs for Dunbeg Cluster of wind farms. Final Viewpoint 21
56*	Seacoast Road	266090, 425485	7.1 km East	Used in previous LVIAs for Dunbeg Cluster of wind farms. Final Viewpoint 19

Technical Appendix Plate.4.4.1 Wirelines of Omitted Provisional Viewpoints 31 and 32



PVP 31: Giants Causeway (above) and PVP 32: A6 near Dungiven (below)



Final Viewpoint Selection

- 4.80 A total of 27 final Viewpoints have been selected for consideration in this LVIA. Detailed descriptions of the final Viewpoints are an integral part of the Visual Impact Assessment section of the LVIA (Chapter 4 starting at paragraph 4.127). Their locations are indicated on all map-based Figures (Figures 4.1 - 4.11) and visualisations to accompany the detailed written analysis of these Viewpoints are provided in Figures 4.15 - 4.41.
- 4.81 Whilst it is noted that the Council's primary concern is the visual effect of the Development on close-range viewpoints, the baseline assessment, including the viewpoint selection process, identified a number of key visual receptors including; residents of rural properties and settlements located in close proximity to the Development but also elsewhere in the Study Area; tourists on scenic routes, footpaths and cycle routes throughout the Study Area; receptors located within the AONB but also those located at greater distances with views illustrating the wider landscape setting and visibility of the Development in the context of the adjacent Dunbeg cluster of wind farms. Planning policy guidance recognises that wind farms will, by their nature, often be clearly visible from close range viewpoints but that this will not necessarily equate to adverse visual effects. Therefore, the final Viewpoints presented in this LVIA are intended to represent typical views of the Development that are likely to be obtained in different parts of the Study Area, from key locations and by key visual receptors. They have been grouped into categories so that the different types of views, receptors, and specific areas they represent can be accurately described and understood without unnecessary repetition. A complete list of the final Viewpoints and categories are provided in

Table 4.4.2 below. Detailed descriptions of these Viewpoints are provided in the LVIA, Chapter 4 starting at paragraph 4.130.

Technical Appendix Table 4.4.2: Final Viewpoints

Final Viewpoint no. and location	PVP number	Final Grid Reference	
Category A: Views from primary and secondary transport routes, including tourist routes			
A1: Views from the A37 road corridor between Coleraine and Limavady			
1	A37 near Macosquin (Figure 4.15)	PVP 18	281603, 428108
2	A37 Parking Layby near Dunbeg Wind Farm (Figure 4.16)	PVP 3	275677, 426261
3	A37 near Dunbeg Wind Farm, Broad Road Upper (Figure 4.17)	PVP 23	273244, 425742
4	Keady Mountain near A37 (Figure 4.18)	PVP 1	272380, 425103
5	Gortgarn Road near Junction with A37, Broad Road Middle (Figure 4.19)	PVP 22	270833, 424005
6	A37 Layby, Broad Road Lower (Figure 4.20)	PVP 21	269992, 423391
A2: Views from the secondary B201 road corridor between Coleraine and Limavady			
7	Windyhill Road West (Figure 4.21)	PVP 53	273119, 428091
8	Ballinarees Orange Hall, B201, Windy Hill Road (Figure 4.22)	PVP 36	278852, 430214
9	B201 Windyhill Road near Coleraine (Figure 4.23)	PVP 52	282877, 432492
A3: Views from the Binevenagh Scenic Drive			
10	Binevenagh Scenic Drive near Lisnagrib (Figure 4.24)	PVP 2	270487, 427688
11	Binevenagh Lake Viewpoint (Figure 4.25)	PVP 25	268722, 430622
A4: Views from the Roe Valley and Causeway Coast Scenic Routes to the west			
12	Dogleap Road, Roe Valley Country Park Environs (Figure 4.26)	PVP 30	267261, 419671
13	A2 Scenic Route near Seacoast Road Garden Centre (Figure 4.27)	PVP 12	266355, 423789
Category B: Views from residential properties and rural settlement within 5 km of the Development			
14	Bolea Road Middle (Figure 4.28)	PVP 48	271568, 425634
15	Drumalief Road off B201 (Figure 4.29)	PVP 7	270821, 425971
16	Bolea Road near Deramore Presbyterian Church (Figure 4.30)	PVP 10	270653, 425169

Final Viewpoint no. and location		PVP number	Final Grid Reference
17	Drummond Cricket Club, Drumsurn Road (Figure 4.31)	PVP 44	269276, 422651
Category C: Views from residential properties and settlements within 5 - 15 km of the Development			
C1: Views from rural residential properties and settlements between 5 - 15 km from the Development			
18	Gortnarney Road near Drumsurn (Figure 4.32)	PVP 41	273271, 418367
19	Seacoast Road near Ballykelly (Figure 4.33)	PVP 56	266015, 425472
C2: Views from settlements between 5 - 15 km from the Development			
20	Drumsurn Village at Fir Road (Figure 4.34)	PVP 40	271776, 417278
21	Foyle Way near Riverview Housing Development, A2, Ballykelly Town (Figure 4.35)	PVP 55	261822, 422139
Category D: Views illustrating the wider landscape setting and visibility of the Development in the context of the adjacent Dunbeg cluster of wind farms			
22	Bolea Road Upper near Dunmore Wind Farm Site Entrance (Figure 4.36)	PVP 49	274777, 428503
23	Bank Bird Hide and Railway Crossing near Ballykelly (Figure 4.37)	PVP 16	261275, 423546
24	Benbradagh Mountain, Ulster Way (Figure 4.38)	PVP 24	272968, 410393
25	Portstewart Town at Portstewart Point Car Park (Figure 4.39)	PVP 51	281462, 438682
26	Parking Layby on A26 near Damhead (Belfast-Bound Side) (Figure 4.40)	PVP 34	289409, 429374
27	Eskaheen, Inishowen, Co. Donegal (Figure 4.41)	PVP 13	245770, 427105

Technical Appendix 4.5: Cumulative Baseline

- 4.82 This Technical Appendix provides details of the wind farms that are considered to form the 'Cumulative Baseline' for this LVIA as described in the LVIA, Chapter 4 starting at paragraph 4.203. The Cumulative Baseline refers to all existing, consented and proposed wind farms within the 30 km Study Area and any existing and consented wind farms beyond this distance that are visible within the final Viewpoint selection. There are a total of 36 wind farms considered to be part of the Cumulative Baseline for this LVIA, of which 22 are existing, 10 are consented and 4 are proposed. It also includes single turbines where they are existing elements within the final Viewpoints. Any single turbines within 5 km of the Development that are either existing or subject to a valid planning consent (i.e. within the past five years) and where they are of a comparable size to commercial wind turbines (with an overall minimum blade tip height of 50 m) are also indicated on the wirelines for the final Viewpoints (Figures 4.15 - 4.41). There are three such turbines, the details of which are listed in Tables 4.5.1 below together with full details of all wind farms that have been considered.
- 4.83 Visually and / or physically distinct clusters of wind farms are grouped together in this LVIA for ease of reference and because it allows for a better understanding of their interrelationships. These clusters are referred to in Table 4.5.1 below and described in the LVIA chapter 4, Table 4.3.

Technical Appendix Table.4.5.1 Wind Farms included in the Cumulative Baseline

See following page

5

Archaeology & Cultural Heritage

CONSENTED (LA01/2018/0200/F)

Appendix 5: Archaeology & Cultural Heritage

- Appendix 5.1 Known monuments within 5km
- Appendix 5.2 Known Industrial Heritage within 5km
- Appendix 5.3 Known Historic Buildings within 5km
- Appendix 5.4 Historic Scotland - EIS Scoping of Wind Farm Proposals, Assessment of Impact on the Setting of Historic Environment Resource, some General Considerations
- Appendix 5.5 Known Regionally Important

Appendix 5.1: Known archaeological monuments within 5km of the proposed wind farm development.

No.	SMR No.	Type	Importance	Description
1	LDY 06:04	Enclosure	Local	This site is located on quite steeply sloping ground which rises to a hill at northwest and falls to a stream valley at southeast. There are excellent views east and over lower ground to southeast and north. There is no ditch visible and the only evidence for a monument is a localised flattening in the general slope which could represent an eroded platform. This measures approximately 22m by 30m and is about 0.4m high.
2	LDY 06:06	Two Standing Stones	Local	Located on S-facing upland pasture, this site consists of two large upright stones, orientated northwest-southeast, 2.2m apart. The north stone is 1.5m high, measuring 0.85m wide by 0.75m thick and the south stone is 1.7m high, measuring 0.98m by 0.75m. There is no visible evidence that the two stones are part of a megalithic tomb although PSAMNI refers to a scatter of smaller stones around the two large ones.
3	LDY 06:07	Round Cairn	Local	This site is located on southwest facing upland pasture. It consists of a partly turfed-over round cairn with rounded stones up to 0.6m across exposed in the centre. The cairn is 15.7m by 14m across and about 1.7m high. A short length of stone wall has been built across the cairn east-west to serve as a sheep shelter. A hollow in the cairn on the north side has provided the stones.

No.	SMR No.	Type	Importance	Description
4	LDY 06:08	Round Cairn	Local	Located on a prominent hilltop surrounded by maturing forest but with the site and immediate surroundings left unplanted. There is a good view east-northeast over coastal lowland and to a panorama of other summits elsewhere. The site consists of a roughly circular cairn, 16m by 17m and up to 1.5m high, made up of moderate sized stones, but extensively dug into and robbed out from east right through to the centre. Some stone has also spilled off around the edges.
5	LDY 06:16	Round Cairn	Local	This site is located on south-southeast sloping upland pasture. This cairn is largely turfed over, but stones are exposed in a small central area 3m across. The cairn is 8.6m by 8.8m across and 1.3m high. The stones seem to have been robbed out. There is a small upright stone about 0.6m high standing 17m northwest of the cairn, but it may not be associated with it.
6	LDY 06:17	Round Cairn	Local	This site is located on S-facing upland pasture. This cairn is 4.1m by 4.4m across and 0.75m high. It is turfed over and has possibly been extensively robbed for stone for the dry stone walls nearby.
7	LDY 06:18	Round Cairn	Local	Located on south-southwest-facing upland pasture, this is a neat round cairn of loose round stones, up to 0.6m across. The cairn is 8.8m by 8.4m across and 1.4m high. There are traces of a length of wall on the top of the cairn, perhaps a sheep shelter like on another cairn, LDY 06:07, and a disturbed area on the north side of the cairn seems to have provided the stones for it.

No.	SMR No.	Type	Importance	Description
8	LDY 06:20	Cairn	Local	This cairn is close to, but separate from the pair of standing stones LDY 06:06. It consists of an irregular rough scatter of quite large rounded boulders and earth, 10.5m by 18m across. This may not be an antiquity.
9	LDY 06:21	Round Cairn	Local	Located on south-sloping land, this is a round cairn, 14m by 14.7m across and about 1.5m high, partly turfed over around the edges and very disturbed in the centre, with many hollows, especially at east and southeast. Rabbits have added to the disturbance. The cairn sits on a slight rise on the hill slope
10	LDY 06:22	Round Cairn	Local	Located on south-facing upland pasture, the remains of this cairn are 10.6m by 9.7m across and 0.4m high. The cairn is very ruined and difficult to measure. It is largely turfed over, but a few stones are visible on the surface. It sits on a slight rise on the slope. A standing stone, LDY 06:40, stands 1.75m north of the cairn.
11	LDY 06:26	Round Cairn	Local	This site is located high up on Stradreagh, with excellent views all round. The ground falls from the rocky knoll on which the site stands to S. The site is a disturbed, but still visible, round cairn, with the perimeter most clear at S. The centre is much more disturbed with hollows and a recent small cairn super-imposed. The cairn is 13.2m by 12.7m across and 1.5m high. A field wall crosses close to the site and has also caused disturbance.
12	LDY 06:30	Landscape Feature	Local	A small sub-circular enclosure set in grass field northwest of Springwell forest, on ground sloping to northeast. The enclosure consists of a dry stone wall enclosing a platform 14.5m by 18.5m with several large trees and stumps set inside. There is no ditch. Overall it gives the impression of an estate enclosure/tree ring and not an archaeological feature. The wall is a maximum of 1.25m high.

No.	SMR No.	Type	Importance	Description
13	LDY 06:31	Hut Site	Local	Located on a southeast-facing hillslope, this is a booley site with hut foundations, associated banks and lynchets. There are three huts north of a stream, all rectangular. The east site is 4.7m by 3.4m across with walls 0.7m thick. The middle hut is 6.5m west of the first and is 3.3m by 5.6m, with walls 0.7m thick. The west hut is 13m west of the second and is 3.3m by 5.6m with walls 0.7m thick. On the south side of the stream is another rectangular foundation, 4m by 3.6m, with walls again 0.7m thick. There is a fifth hut site nearby, also rectangular, 5.7m by 4.2m. There are numerous ruined stony banks in the vicinity, largely obscured by vegetation, which may well be associated with the huts.
14	LDY 06:32	Possible Hut Site	Local	Located on southeast-facing upland pasture, this site consists of a rough pile of stone about 3m across, with two areas of loose scattered stones, one 9m in diameter and the other 8m by 7m across. These seem more likely to be booley sites than cairns.
15	LDY 06:33	Round Cairn	Local	This site is located on gently sloping, southeast-facing upland, on a slight local eminence. This is a very ruined cairn, possibly robbed for the booley settlement nearby (LDY 06:32). It is 13.5m by 14m across and 0.75m high. The surface of the cairn is very uneven with loose stone lying around.
16	LDY 06:34	Hut Site	Local	This site is located on a level area of land between two streams. It consists of a small sub-rectangular foundation of a double faced stone wall, with rounded corners, 6.3m long by 4m wide, with a small annex on the SE end, 2.8m wide. There is an entrance on the SW side, face with a flat upright stone on each side. A few stony banks in the area may be associated with the site, but some could be more recent.
No.	SMR No.	Type	Importance	Description

17	LDY 06:35	Four Cairns	Local	<p>This site is located on a level area of upland on an otherwise south facing hillside. It consists of two cairns and two mounds of stone, largely turfed over, which may be part of a single long cairn, or could be two separate monuments. The W mound is oval, 6m by 5m across and 1.2m high. At its east end, two large blocks of stone about 10m high could conceivably be part of a chamber. The east mound is more elongated, 8m by 4.4m and 0.8m high. It is poorly defined on the north side with some earth-fast stones around the S which could be a kerb. The two other cairns are close by, one 3m to northwest, 4m by 3.8m across and 0.7m high, and the other 10m to north, 3m by 3.5m across and 0.6m high.</p>
18	LDY 06:36	Round Cairn	Local	<p>Located on the edge of a level patch of upland grazing on an otherwise south facing slope, this is a small, neat, round cairn, turfed over, 34m due south of LDY 06:35. It is 4.2m by 4m across and 0.6m high. To north-northeast are two standing stones, about 4m from the centre of the cairn. The west stone is 0.40m by 0.55m and about 0.2m high (it may have fallen) and the east stone is 0.8m by 0.3m and 0.65m high.</p>
19	LDY 06:37	Ring Bank and Cairn	Local	<p>Located on level ground in upland pasture on an otherwise south facing slope, this is a small cairn of stones, turfed over, measuring 6m by 3.2m across and 0.4m high. It includes some large stones around the edge, but these do not form a consistent kerb. It is 3m due north of a ring cairn, which consists of a circular bank 1.6m wide and 0.3-0.6m high, enclosing an area 9.2m by 9.3m diameter, with an entrance at southeast, 1.4m wide, marked by two large stones. Slightly east of the centre is a small mound of stones and earth 1.5m in diameter, and 0.3m high.</p>
20	LDY 06:38	Possible Cairn	Local	<p>This site is located on a slight eminence on a gentle south sloping upland area. It is a very dubious site, but in view of the scatter of stones and the position, it may be a cairn. Nothing now remains of the site, but the road nearby could have removed all the stones. The area of the site is roughly 9m by 14m across.</p>

No.	SMR No.	Type	Importance	Description
21	LDY 06:39	Stone Scatter, Possible Cairn	Local	This site consists of an amorphous scatter of stones in forming a roughly circular area, with a possible kerb on the SE side. The site is too disturbed to measure.
22	LDY 06:40	Standing Stone	Local	This site is located in a slight hollow on otherwise well drained, south facing upland pasture. The stone stands 17.5m from a cairn, LDY 06:22. It is triangular in shape and 0.7m high.
23	LDY 06:43	Cup and Ring Marked Stone	Local	This site is located in a coarse reed and grass field with a slight fall to north. A cairn, LDY 06:08, is visible on higher ground to north. The cup and ring mark stone was recorded here by J. Marshall, and cannot now be located.
24	LDY 06:44	Hut site	Local	This site is located in an area planted with young conifers with ground falling to southeast. It was noted on an aerial photograph as a small circular enclosure, roughly 12m in diameter. On the ground, it is visible as a roughly circular, grass grown ring, 12.4m by 11.3m across, possibly representing a house or small enclosure. The ring shows as a slightly raised feature with no obvious entrance. Stone lies below the grass and it seems likely that this represents a circular wall rather than a bank. The wall is 2.7m wide, 0.75m high internally and 0.6m externally.
25	LDY 06:53	Possible Long Cairns (Unlocated)	Local	This site is described in the OS memoirs as "Two long graves locally called Giant's Graves...raised of soil and small stones, some of which stones appear on the surface. They lie E and W and near the base of Ballyhanna Mountain, one 125yds N of the other. Those graves were explored in two different places in 1806...in hopes of getting hidden treasure, but nothing of interest found". No further details available at present.

No.	SMR No.	Type	Importance	Description
26	LDY 06:54	Cairn (Unlocated)	Local	This site is recorded in the OS memoirs as "a small hill, locally called the Ree...considered a very gentle place. It is also believed to have been formed by the Danes... There was a large quantity of stones round its base and on its surface, but the greater part of those stones had been removed from time to time to build houses. The hill measures 28yds by 24yds". The site cannot now be located. No further details available at present.
27	LDY 06:55	Standing Stone (Unlocated)	Local	This site is recorded in the OS memoirs as "Murchys Stone is a standing stone in the townland of Stradreagh... This stone stands in a sloping position and measures 5ft in height, 8ft in length and 2'6" in thickness." No further details available at present.
28	LDY 06:56	Souterrain (Unlocated)	Local	This site is recorded in the OS memoirs as "a cave...now 50 years closed". No further details available at present.
29	LDY 06:57	Enclosure (Unlocated)	Local	This site is described in the OS memoirs as "the ruins of a Danish fort. The parapet is totally demolished and nothing of it remains at present on the premises but three moderate sized stones that formerly stood on the parapet ... this fort was circular, 46yds in diameter." No further details available at present.
30	LDY 06:58	Souterrain (Unlocated)	Local	This souterrain is described in the OS memoirs as "The mouth is on a level with the ground, is 1ft high and 1'6" broad. Its extent cannot at present be ascertained as it is choked up with stones but its architecture is exactly similar to all others in this country, the side walls being formed of stones without cement and covered with long flags stretched across them." No further details available at present.

No.	SMR No.	Type	Importance	Description
31	LDY 06:59	Cairn/Megalithic Tomb (Unlocated)	Local	This site is described in the OS memoirs as "There stands at present...an ancient grave 7 and a half ft long, 5'9" broad and about 1ft high. There is a stone sunk at the head of the grave 53" long, 34" high and 6" thick. There are two other stones of inferior size sunk along the side of the top, covered with small stones and now grown over with soil..." No further details available at present.
32	LDY 06:60	Enclosure (Unlocated)	Local	This site is recorded in the OS memoirs as "Largantea Fort is on William Shannon's farm and 100yds from the house. This fort is of stone as is the wall and is 48ft in diameter and very rough". No further details available at present.
33	LDY 10:02	Encampment	Local	Located on the crest of a ridge running north-south, with excellent views all round, very little of this site survives above ground level. This is a commanding position over the surrounding land. A strip of darker grass in the SW corner of the field seems to mark out a roughly rectangular area 25m by 55-60m, which could be the remains of the fortification. According to the OS field notes, the site was traditionally held to be a Roman encampment, in the form of a parallelogram, 90yds by 40yds. The site is marked on the 2nd edition OS 6" map as "site of Old Encampment" with a dotted rectangle.
34	LDY 10:03	Enclosure	Local	Nothing would appear to survive of this site, which is marked "fort" on the 1st edition OS 6" map, nor is there any trace of the lime kiln noted in the OS memoirs as being next to it. The area is now improved grassland with buildings to west and excellent views to south, west and northwest.
No.	SMR No.	Type	Importance	Description

35	LDY 10:04	Enclosure	Local	<p>Very little appears to have survived of this site, which was marked "fort" on the 1st edition OS 6" map. There is a level area of ground in the field which could be the last remains of this site. It is set on a south facing hillslope with good views south-southwest. An old drystone wall cuts through the site at southeast. The level area is about 30m in diameter and there is no trace of a bank, ditch or any internal features.</p>
36	LDY 10:05	Enclosure	Local	<p>This site is located in grassland next to a small stream with good views to south, but blocked by higher land elsewhere. Little, if anything survives of this site, which is marked "fort" on the 1st edition OS 6" map. According to the OS memoirs, it was mostly destroyed and under crop. Remains of an almost semi-circular ridge may be part of the site and a hint of a circular platform can be seen when viewed from southeast, 0.3-0.5m high. This arc of higher ground can be traced for some 50m. It is possible that this is a natural ridge and not archaeological.</p>
37	LDY 10:08	Rath	Local	<p>This rath is one of a pair with LDY 10:09. The sites were excavated in 1964 in advance of a drainage scheme. Presently no trace remains of the sites. The raths were set close together with extensive views all round.</p>
38	LDY 10:09	Rath	Local	<p>This rath was one of a pair with LDY 10:08. The raths were excavated in advance of a drainage scheme in 1964. There are now no visible traces of either rath, on an area of improved grassland with excellent views all round.</p>

No.	SMR No.	Type	Importance	Description
39	LDY 10:12	Holy Well	Local	This holy well lies south of a now ruined farm, used for cattle sheds and storage. The well is a spring which emerges from a steep east-west slope. There is no sign of a surrounding enclosure or other Early Christian feature. At the well is a large oak tree. The well itself has a modern concrete cover and sill. According to the OS memoirs, the well was famous "for the cure of leprosy and other bodily diseases". The well was inhabited by two trout, whose appearance to the afflicted was thought to guarantee a cure - if the fish did not appear, a cure was unlikely. One of the trout was caught and eaten by a local man "and after the eating of it he lost his eyesight immediately and remained stone blind during the remainder of his life"
40	LDY 10:13	Burial Mound (Unlocated)	Local	This site is recorded in the OS memoirs as "a cairn of stones raised at some former period over the body of Finn McQuillan, a chief of the Dunluce family...and the body of Miss Laura O'Donnell...who was deep in love with the aforesaid McQuillan... There is no cairn to be seen at present, but the supposed site is planted with fir oak...and ash. There is a small mound 15ft long, 7ft broad and 1ft high which has been raised by Marcus McCausland Esq. upon the spot that tradition has marked out as the site of the grave of these two lovers". This site cannot now be located.
41	LDY 10:15	2 Stone Circles (Unlocated)	Local	This site is described in PSAMNI as two stone circles. One is a ring of small stones 72ft in diameter, on a hill at the east edge of a deep gully, with a raised mound of soil in the centre, possibly a grave. The other is 100yd east of the first on another hill. It consists of nine small stones, the remains of a ring 18ft in diameter. Four stones outside it may be part of an outer ring. A hammer stone was found at the time of inspection. These circles cannot now be located.

No.	SMR No.	Type	Importance	Description
42	LDY 10:17	Round Cairn	Local	<p>This site is located on gently sloping S-facing improved pasture, enclosed by dry stone walls. It is a badly robbed round cairn 19.2m in diameter. It stands circa 1.2m high, with the central area hollowed out. A large capstone measuring 1.3m by 2.15m is visible in the centre. north of the large stone is a small, circular dry-stone wall enclosure, 5m in diameter, with no entrance, possibly built to protect a small tree growing in the centre. To the south there are four larger stones set along the edge of the cairn, probably the remains of a kerb south and an area of loose stones lies south of cairn. Some modern clearance stone have been piled on the cairn. It is 300yds E of a wedge tomb, LDY 010:016.</p>
44	LDY 10:18	Megalithic Complex (Unlocated)	Local	<p>This site consists of stone circles with a cist burial and an associated chambered grave, excavated in 1945 by A. McL. May. There was an inner and outer circle of stones, with a maximum diameter of 20ft, with the cist slightly S of centre and a cairn set at its east=southeast edge. The cairn was oval 21ft by 16ft with a central polygonal chamber. The site cannot now be located.</p>
45	LDY 10:19	Burial Mound	Local	<p>This site, which was excavated by McL. May, was 30yds SW of a stone circle and chambered grave, LDY 10:18. The site consisted of a mound 70ft in diameter with a burial in a pit on top, E of the centre. In the pit was an urn with fragments of a cremation, stratified 4" above a food vessel.</p>

No.	SMR No.	Type	Importance	Description
46	LDY 10:20	Multi-Period Occupation Site	Local	This site is located on a hillock at the east side of a ravine with excellent views to the north. It is composed of a central mound which may have been excavated by McL.May in the 1940s as there is a trench visible. The mound is 13m in diameter and on average 1m high above a surrounding berm 6.5m wide. On the edge of the berm sits a low, stony bank 0.2m high internally and 0.5m externally. McL.May's excavation uncovered two paved hearths with circa two hundred sherds of decorated Neolithic pottery and worked flints, including end scrapers, hollow scrapers and knives. There were also some Late Mesolithic Bann Flake type flints found at the site. There were also sherds of Beaker type pottery found.
47	LDY 10:21	Field System	Local	Located on gently sloping ground with the Curly river in a valley to northwest and good views northeast and southwest along the valley, this complex of field banks and groups of huts extends uphill for 900m and across the hill for circa 800m. One group of huts lies between the 600' & 700' contours and is enclosed by a low bank. The second group lies between the 800' & 900' contours and is closely associated with a field bank. Five field banks have been noted straggling across the hillside & they are all generally parallel to each other. Three portions of field fence run down-hill, occasionally running in to the cross-hill banks at right angles.
48	LDY 10:22	Field System	Local	This is a complex of field boundaries. No further details are available at present on the SMR.
49	LDY 10:23	A.P. Site (Circular Enclosure)		This site appeared on aerial photographs as the remains of a bank ring with an entrance gap at NE. The ring was complete by a vague cropmark which shows a small ditch surrounding the bank inside and outside, circa 60m in diameter. The feature is set in an area of damp grassland, skirted to S by a small stream and with good views all round. There are no visible remains of the feature on the ground.

No.	SMR No.	Type	Importance	Description
50	LDY 10:24	A.P. Site (Circular Cropmark)	Local	This site appeared on aerial photographs as a circular feature circa 25m in diameter cut through by linear features. On the ground, the site is difficult to interpret but is possibly an enclosure. It is cut through by a modern trench at S and the interior is sloping with large grassed over rocks, boulders and natural tussocks. Patches of bank with low, wetter iris covered external trench can be seen in places. The bank is quite inconsistent, but elevated bank-like stretches form a roughly circular enclosure with a small gap on west.
51	LDY 10:25	A.P. Site (Circular Enclosure)	Local	This site showed up on aerial photographs as a pale cropmark defining a banked enclosure circa 30m, bisected by an old field boundary. There are no visible remains of the site on the ground, though it would be a good location for a rath.
52	LDY 10:26	A.P. Site (Enclosure and Field Banks)	Local	This site appeared on aerial photographs as a faint pale cropmark of a banked enclosure circa 20m in diameter, beside a stream. 100m N of this were cropmarks of two slightly converging field boundaries circa 90m long running approximately east-west, but these looked relatively modern. On the ground, there is no trace of the old field banks. The site of the circular enclosure is very level beside the stream. No archaeological features could be seen.
53	LDY 10:27	A.P. Site (Cropmark)	Local	This site appears on aerial photographs as a faint, dark cropmark, almost circular, circa 10-12m in diameter on the lower slopes of Keady Mountain. There are no visible traces of this feature on the ground. The approximate location is a patch of thistles. This may not be an antiquity.

No.	SMR No.	Type	Importance	Description
54	LDY 10:28	A.P. Site (Enclosure)	Local	This site appeared on aerial photographs as a faint cropmark of a roughly circular banked enclosure circa 45m in diameter. This is a good site location. The cropmark lies on level ground, beyond which land rises to north towards Keady Mountain. No archaeological features are visible on the ground.
55	LDY 10:29	A.P. Site (Circular Cropmark)	Local	This site appeared on aerial photographs as a faint pale cropmark of a small banked, circular enclosure circa 20m in diameter. This cropmark lies in a very wet boggy field. It has recently been used as rough grazing land. There are one or two very slight dips in the field, but no trace of any discernible banks or ditches. There are some drier areas in the field. It is possible that an enclosure may have existed here, but also possible that the cropmark is due to differential drainage.
56	LDY 10:30	A.P. Site (Circular Cropmark)	Local	This site appeared on aerial photographs as a cropmark defined by a dark outline, a possible enclosure circa 15m in diameter. A dark linear feature ran east-northeast/west-southwest just north of the possible enclosure. The field in which the cropmarks are located rises steeply to west and the ground levels out beyond the east field boundary. There are some natural rises and hollows in the location of the cropmark. Approximately mid-way across the field, water runs out from a pipe into a stream and this may explain the linear feature. No trace of the enclosure could be found.
57	LDY 10:32	Urn Burials in Possible Barrow (Unlocated)	Local	There does not appear to be any local knowledge of this site where, according to the OS memoirs "four crocks full of bones and earth were discovered" in 1834. From the description given of these pots they would appear to be the remains of Bronze Age urn burials, possibly in a large barrow (hence the suggestion that this was a fort). The site cannot now be located.

No.	SMR No.	Type	Importance	Description
58	LDY 10:34	Urn Burials in Cist (Unlocated)	Local	This site is recorded in the OS memoirs as "In 1778 there were two earthen urns discovered in a sandy hill locally called the Needling Nowl...They contained bones and ashes; one of them was carved. They were enclosed in a stone building, the top of which was level with the ground." The site cannot now be located and there is no local tradition of urns being found here. Much of the townland is now under conifers, owned by Forest Service.
59	LDY 10:35	Souterrain (Unlocated)	Local	This site is recorded in the OS memoirs as "a cave...15 yards long and 4ft wide at the mouth...the stones of the building have fallen in. The mouth has been closed for five years and is now covered with soil". A local farmer recalled his school master had told them of a cave in this townland some 40/50 years ago, but he did not know where it was. Other farmers also knew of this tradition, but not where the souterrain is located.
60	LDY 10:36	Enclosure (Unlocated)	Local	This site is recorded in the OS memoirs as "an oblong space of ground...locally said to be the ruins of a Danish fort. It stands 1-3ft higher than the field...The space occupied by...a cluster of bushes is 20yds in length and 12 yds in breadth". There is now no local knowledge of this site and it remains unlocated.
61	LDY 10:37	Standing Stone (Unlocated)	Local	This standing stone, recorded in the OS memoirs as "8 and a half ft long, 2ft broad and 2'2" thick" which was tumbled in 1804, could not be located. Much of this townland appears to be owned by Forest Service and is covered in conifer plantations.

No.	SMR No.	Type	Importance	Description
62	LDY 10:38	Urn Burials (Unlocated)	Local	This site is recorded in the OS memoirs as "a small green hill...local tradition says that at some former period there was a number of earthen crocks containing bones and ashes got at some depth under the surface of the above hill." . The hill could not be located and the tradition of the urns no longer survives. Much of the townland is covered by conifer plantations.
63	LDY 10:39	Enclosure (Unlocated)	Local	This site was recorded in the OS memoirs as "nothing remains of the fort of earth...but an old hawthorn commonly called the Fairy Bush..." A branch of the bush was cut down by a local man " ...after which his property wasted away himself died of a lingering disease. The people are still afraid to destroy this bush which is the only remnant of this fort". There is now no local knowledge of a fort or fairy thorn in the area, and the site, which has probably been destroyed, remains unlocated.
64	LDY 10:40	Sweat House (Unlocated)	Local	The only sweat house known to local people is the one in Dunbeg (LDY 010:016), and although several people commented that there could have been one in Bolea, they did not know where it could be located. The OS memoirs record a "rude vapour bath...in Bolea...beside the Curly. The cavern was first heated by fire and the individuals then placed among the warm stones". The site remains unlocated.
65	LDY 10:41	Enclosure (Unlocated)	Local	This site is recorded in the OS memoirs as "the ruins of a Danish fort...The parapet was composed of soil and is at present demolished, except about 42yds which stands circa 2ft high. This fort...was a circular shape, 44yds in diameter. It seems as if there is a building of some description in the interior...there is 23ft of the foundation of a wall...2ft broad and 1ft high". There is now no local knowledge of this site, and it remains unlocated.

No.	SMR No.	Type	Importance	Description
66	LDY 10:42	Enclosure (Unlocated)	Local	There does not appear to be any local knowledge of this site which is recorded in the OS memoirs as being destroyed in 1830 and further destroyed in 1832. A number of metal artefacts, including "an ancient sword" and "pike heads" were supposed to have been uncovered. The site was at most 31ft in diameter, which seems rather small to be a rath.
67	LDY 10:43	Cairn and Standing Stone	Local	This site is described in the OS memoirs as "a large cairn of stones 5'6" high, 50ft long and 21ft broad, called the Leck Stone... On the summit of the cairn there is a large stone 8ft long, 1'8" broad and 4'6" thick. E of this stone there lies two others of inferior size and there are several stones sunk into the ground round the base of the cairn, three of which are 3ft higher than the surface of the field.". Part of this site may still survive. In the northeast corner of a field is a large stone which is alleged to be the Leck Stone. It is 2m long, 1m wide and 0.75m high. It is on a S facing slope of Keady Mountain, with good views south, west and northwest, and a stream 2m to east.
68	LDY 10:44	Cairn and Possible Stone Circle	Local	This site is set on the summit of Keady Mountain with excellent views all round. It was described in the OS memoirs as "a sepulchral circle of stones" surrounding a cairn. There does not appear to be any remains of the stone circle, but the cairn still survives. It appears as an elongated mound, orientated northeast-southwest, circa 30m north-south by 15m east-west. It survives to a height of just under 2m at northeast, but circa 1m elsewhere.
69	LDY 10:45	Standing Stone	Local	This massive boulder looks more like a glacial erratic than an archaeological monument. It is presently resting on the S bank of the Curly River. It is approximately 2.25m high and 4.5-5m wide on its broadest side, which corresponds to the measurements given in the OS memoir. The holes described in the memoirs where people had tried to take millstones from this large stone are clearly visible on its N side.

No.	SMR No.	Type	Importance	Description
70	LDY 10:47	Enclosure	Local	A farmer who owns land close to the possible location of this site spoke of a large mound of clay, circa 50yds across, that was levelled using a digger 5-10 years ago. This may have been the site recorded in the OS memoirs as one of two levelled forts in the townland, which was 50yd in diameter. The farmer pointed out a level platform circa 30m north of the site. This is just under a quarter of a circle and there are the possible remains of a bank, at most 0.25m high and 3.5-4m wide. This encloses a level area which is 0.5m higher than the ground at outside it. It is cut by a road to northwest and by a field boundary to E.
71	LDT 10:48	Souterrain	Local	Although nothing is now visible of this souterrain, its location is known by the present owners of the house recorded in the OS memoirs as "a cave at William Johnston's back door". They noted that when the foundations of the house were being reinforced in the 1940s, a series of 'tunnels' of drystone construction were noted. The largest of these would appear to have run for approximately 30m of more in an east-west direction and most of their length is still preserved beneath the ground. It is presently covered by a house, farmyard and outbuildings.
72	LDY 10:50	Well	Local	A local farmer pointed out this well which, from its location, would appear to be that recorded in the OS memoirs as "a spring called the Holy Well or Mary's Well and is so called after an old woman named Mary Gilbraith who used to frequent the well". The farmer knows it as The Caul well, as the spring water is noted for always being very cold. It is circular, circa 2m diameter and circa 0.5m deep. It is 2m from the river to W where the overflow from the well drains away.
73	LDY 10:51	Battle Site	Local	The OS memoirs record this as the site of a battle between the McQuillans of Dunluce and the O'Cahans

No.	SMR No.	Type	Importance	Description
74	LDY 10:53	Tower House	Local	A crenellated tower house is designated 'The Lady Whits House Unforfeited' in the Down Survey parish map of Drumcross, located within 'The 3qr Gleab of Gortnegarne', which is now two adjoining townlands - Gortgran and Glebe. The Civil Survey indicates that these were See lands in the 17th century, but there is no historical identification of the 'Lady Whit' forthcoming. There are no visible remains.
75	LDY 17:21	Enclosure	Local	This site is defined along its north half by old field boundaries which enclose a semi-circular area. To south and west the limits of the site are unclear, and there is nothing visible on the ground to suggest the large oval enclosure shown on the OS map. The OS memoirs describe the site as circular, 120ft in diameter. The area of the site stands 0.4-0.7m higher than the fields to north and northwest and at northeast there may be remains of a ditch 1.2m below the site and 3m wide. No internal or other external features could be discerned. The semi-circular area defined by the field boundaries is 60m in diameter northwest-southeast..
76	LDY 17:22	A.P. Site (Cropmark)	Local	This site appeared on aerial photographs as a sub-circular cropmark visible as a dark outline circa 20m in diameter on cultivated land. The enclosure appeared to be slightly flattened at east. There are no visible remains of this feature on the ground. The area of the field where the cropmark was seen is on a very slight rise and would seem to be a good rath location.
77	LDY 17:23	A.P. Site (Circular Cropmark)	Local	This site appeared on aerial photographs as a pale circular cropmark circa 25m in diameter, on the lower slopes of Rigged Hill. A linear cropmark is tangential to the enclosure at northwest, running west for 20m. There are no visible remains of any archaeological features on the ground.

No.	SMR No.	Type	Importance	Description
78	LDY 17:30	A.P. Site (Cropmarks)	Local	This site appeared on aerial photographs as dark cropmarks which may reflect parts of ditched enclosures and old field banks. An arc of a circular enclosure circa 40m diameter is incomplete at north. A second arc, northwest of the first, 30m across appears to be cut across at north by a stream. Other linear cropmarks can be seen S of these. There are no archaeological features visible on the ground.

Appendix 5.2: Known industrial heritage record assets within 5km of the proposed wind farm development.

No.	IHR No.	Site Type	Townland	Description
1	1387	Flax Holes	Stradreagh	This site is recorded as "Flax holes" on the 1832 map, but it is not shown on any of the subsequent editions.
2	1388	Bridge	Largantea	This site is identified as a bridge carrying the road from Coleraine to Limavady over unnamed upland stream. It is shown but undesignated on the 1832 map. It is recorded as "Largantea Br." on the subsequent editions of 1853, 1907 and 1923.
3	1465	Reservoir	Drumallief	This site is recorded on 1907 map as "Reservoir (Limavady UD Waterworks) Londonderry". It is shown and recorded on the 1923 map as the same.
4	1466	Flax Hole	Killybready	This site is recorded as "Flax hole" on the 1831 map, but it is not shown on any of the subsequent editions.
5	1467	Bridge	Gortcobies / Largantea	The site is recorded as "Lady O'Cahans Bridge" on the 1831 map. It is shown and recorded on the subsequent editions of 1853, 1907 and 1923 as the same.

No.	IHR No.	Site Type	Townland	Description
6	1468	Two Mills (One a Flax Mill)	Bolea	This site is identified a mill complex, made up of four different elements. The first (1468.1) is identified as a mill. It is shown and recorded as "Mill" on the 1831 map. It is recorded as "Flax Mill" on the 1853 map, as "Flax Mill (disused)" on the 1907 edition and as "Flax Mill" on the 1923 edition. The second site (1468.2) is identified as a mill. It is shown and recorded as "Mill" on the 1831 map. It is recorded as "Mill (in ruins)" on the 1853 edition. It does not appear on any subsequent editions. The third site (1468.3) is identified as a mill stream. It is shown and recorded as "Mill Stream" on the 1831 map. It is shown but undesignated on the 1853 map. It is recorded as "Millrace" on the 1907 and 1923 editions. The fourth site (1468.4) is identified as a mill pond. It is shown but undesignated on the 1831 map. It is recorded as "Mill Pond" on the 1853 edition. It is shown on the 1907 map, but undesignated. It is recorded as "Mill Pond" on the 1923 edition.
7	1469	Bridge	Bolea / Killybready	This site is identified as a bridge, carrying road over the Curly River. It is shown and recorded on the 1831 map as "Broken Bridge". It is shown but undesignated on the subsequent editions of 1853, 1907 and 1923.
8	1470	Flax Mill	Carrydoo	The site is identified as a flax mill complex and is made up of two different elements. The first (1470.1) is identified as a flax mill. It is shown and recorded as "Flax Mill" on the 1831 map, and on the subsequent edition in 1853. It does not appear on the 1907 or 1923 editions. The second site (1470.2) is identified as a millrace. It is not clearly obvious on the 1831 map, however it is shown but undesignated on the 1853 edition. It does not appear on any subsequent editions.
9	1471	Brick and Tile Works	Derrymore	This site is recorded as "Derrymore Brick & Tile Works" on the 1907 map. It is shown and recorded on the 1923 map as "Derrymore Brick & Tile Works & Clay Pit".

No.	IHR No.	Site Type	Townland	Description
10	1472	Brickfield	Largyreagh	This site is shown and recorded as "Brick" on the 1831 map.
11	1473	Brickfield	Cahery	This site is shown and recorded as "Brick" on the 1831 map.
12	1474	Brickfield	Cahery	This site is shown and recorded as "Brick" on the 1831 map.
13	1475	Reservoir	Glenkee	This site is shown and recorded as "Reservoir (covered)" on the 1907 map, and the subsequent 1923 edition.
14	1479	Brickfield	Drummond	This site is shown and recorded as "Brick" on the 1831 map. It is recorded as "Brick Field" on the 1853 map. It does not appear on any subsequent edition.
15	1480	Flax Mill	Ballynahery	This site is identified as a flax mill complex, and is made up of three different elements. The first (1480.1) is identified as a mill. It is shown and recorded as "Mill" on the 1831 map. It is recorded as "Flax Mill" on the 1853 edition. It does not appear on any of the subsequent editions. The second site (1480.2) is identified as a millrace. It is shown but undesignated on both the 1831 and 1853 editions. It is difficult to trace however, and it was not clear whether or not it is shown on any of the subsequent editions. The third site (1480.3) is identified as a mill pond. It is shown but undesignated on the 1831 edition. It was recorded as "Mill Pond" on the 1853 map. It is shown on the 1907 and 1923 editions as marshy ground.

Appendix 5.3: Historic building register assets within 6km of the proposed wind farm development.

No.	HBR No.	Address	Grade	Description
A	02/08/007	St Canice's C of I Church, Balteagh Parish, Drumsurn Road, Limavady	Not Listed	A pleasing example of a late Georgian church without chancel, built of stone with three stage tower. However the extent of alterations since the second half of the nineteenth century, the ubiquity of church buildings of this type and the use of inappropriate materials degrades the heritage value of the building to the point where listing cannot be justified.
B	02/08/010	House, 21 Lislane Road, Gortnarney, Limavady	B2	The house exhibits consistency with the Georgian style and simple proportions and is nicely located exploiting a pleasant view. Whilst it is of later than apparent date it is the only surviving farmhouse of its type in an area where they were common until recently.
C	02/11/002A	Drenagh House, 15 Dowland Road, Fruithill, Limavady	A	An imposing large Victorian country house built in a classical manner with restrained Georgian taste externally and fine decorative and architectural detailing internally. First country house commission of the eminent architect Charles Lanyon 1812-89. The house enjoys a handsome setting in a good landscaped demesne.
D	02/11/002B	Drenagh Estate Coach House, 17 Dowland Road, Fruithill, Limavady	B2	Fine imposing symmetrically arranged outhouses enclosing a square coach yard in a severe Georgian classical style. The only blemish in the symmetry viewed from the courtyard is the large bellcote on the south east range.
E	02/11/002C	Drenagh Estate Gardener's House & Barn, 17 Dowland Road, Fruithill, Limavady	B2	A good example of early Georgian building and historically illustrates the out-houses of the original Fruithill House.

No.	HBR No.	Address	Grade	Description
F	02/11/002E	Viewing Platform, Drenagh Estate, 17 Dowland Road, Fruithill, Limavady	B1	A fine example of an exedra in a robust neo classical manner reminiscent of Italian Renaissance work.
G	02/11/002G	East lodge (Logan's Lodge), Drenagh Demesne, 38 Broad Road, Limavady	B1	A neat late Georgian gate lodge with gothic overtones which contrasts with the neo classicism of the entrance gate piers. (Renumbered from HB02/11/003).
H	02/11/002H	West Lodge, Drenagh Demesne, 11 Dowland Road, Limavady	B2	A fine piece of Neo Classical architecture especially in respect of the main facade and very much recalls the works of Palladio and Burlington. It is a chaste piece of early Victorian architecture from the office of an eminent architect. Sydney Smith's comment is not really applicable "Almost as if the Big House had come down to the front gate and had a pup". The main facade is superior to anything externally at the main house. (Renumbered from HB02/11/001)
I	02/11/005	Appletree House, 31 Drumsurn Road, Limavady	Not Listed	A late victorian stone built small house, unpretentious and with good proportions to the front elevation. However the front elevation is also the only element which retains the original character, therefore listing is not justified.
J	02/11/006	Streeve House, 25 Dowland Road, Limavady	B1	An interesting late Georgian house with earlier Georgian detail to front door and internal door architraves.

No.	HBR No.	Address	Grade	Description
K	02/11/011	Aghanloo House, Glebe, Aghanloo, Limavady	B1	A pre 1830 building surviving in a reasonably unaltered form. Interesting for its earlier alterations when a standard two storey three bay glebe 'type' was attached to the existing double pile hunting lodge. The junction has been well disguised with bedroom fireplaces being used to provide the standard pair of chimneys on the ridge. The main chimneys normally in this position, are on the gable of the former lodge abutting the main roof. The interior is intact as are most of the surroundings, particularly the group of mature trees which enhance its setting.
L	02/11/019	67 Windyhill Road, Drumalief, Limavady	B2	A good example of a two room vernacular direct entry cottage, beautifully situated in a depression at a bend of a river. The subdivision of the main rooms is an interesting hybrid of the type. With the exception of the concrete floors and the upper room fireplace, all the original fittings are well preserved including the door stop from a broken horse shoe iron.
M	02/11/020	77 Bolea Road Bolea Limavady	B2	A rustic style late 18th century small school building of one classroom, formerly thatched, later supported by Kildare Street Society, now a dwelling house. A quaint vernacular style building nestling with its gable into the side of the road.
N	02/11/0021	Gamekeeper's House (The Pheasantry), Drenagh Demesne, 66 Broad Road, Limavady	B2	A good mid Victorian house of decorative interest well designed to present a good exterior within the demesne and an example of the self-sufficiency of life on a landed estate.
O	02/15/002	Killeen House, 52 Killane Road, Limavady	Not Listed	A suburban Victorian villa. Some of the interior detail is intact but the late Victorian character has been degraded by the flat roofed kitchen extension and the replacement of sash windows by plastic .

No.	HBR No.	Address	Grade	Description
Q	03/13/008	Formoyle Parish Church, 16 Formoyle Road, Coleraine	B+	An unusual example of a small, freestanding early Victorian, hall-type stone church, which was constructed circa 1843 by the Clothworkers Company and is located in a historic rural farmland setting. Whilst modest in scale and proportion, this remote parish church is embellished with decorative Gothic-Revival detailing, which significantly elevates the architectural interest. This serves to highlight the ambitious intentions, which were envisioned for this church during the time of construction. Although the building is now rarely used, the character and fabric of the interior, exterior and setting have remained largely unaltered.

Appendix 5.4: Historic Scotland- “EIS Scoping of Wind Farm Proposals, Assessment of the Impact on the Setting of the Historic Environment Resource, Some General Considerations”

The Historic Scotland General Considerations document lists a number of factors that contribute to the characterisation of the setting of an historic environment asset. The relevant factors are:

- Importance of topographic location for understanding the function of the site and the choice of its location
- Relevance of current or past land use
- Group setting and relationship to, and inter-visibility with other sites in the landscape
- Visual prominence of the site, but bearing in mind that sites need not necessarily be visually prominent to have a significant setting
- Visual dominance of the proposed development relative to the scale of the site and its current place in the landscape
- Scale and extent both of the site and the development
- Views both to and from the site including the cases where the development and the site may not be indivisible but are both caught in important views-key vistas/prospects/panorama/sightlines
- Presence, extent and scale of existing development within the surroundings of the site and how that currently affects the site’s setting
- Distance between the site and the development
- Presence of intervening buildings/vegetation/topography between the site and development
- Nature and scale of the landscape which comprises the setting of the site and its ability to absorb new development without eroding the key characteristics and value of the site
- Recreational/leisure value of the site within its surroundings whether formally or informally
- Less tangible experiential qualities e.g. sense of remoteness/evocation of historic past/sense of place/cultural identity/spiritual responses
- Cumulative impact measured with other similar developments in the wider area

The document states “in general, it is the relationship of the historic environment asset with its current surroundings, not with any hypothetical sense of ‘original’ (i.e. historic) setting which is of concern, though clearly any elements of original, historic setting will be very important’.

Appendix 5.5: Known regionally important monuments and gardens within 10km of the proposed wind farm development.

No.	SMR No.	Type	Importance	Description
79	LDY 02:04	Rath	Regional	This is a prominent platform rath with a partially preserved perimeter bank above a lower, damp interior. It sits high above its surroundings, close to the edge of a ridge with good views. The interior is 33.3m across north-south and the bank at north-west, where it is best preserved, is 8m wide, 1-1.2m high internally and 3.5m above the outer ditch which is 4.5m wide and 1.2m deep. At north and west, a farm lane sits above the ditch. At east and south, where the bank is absent, the ditch is much narrower and shallower, 2.6m wide, 1.8m below the platform and 0.5m deep.
80	LDY 05:05	Church Site and Cross Carved Stone	Regional	The site is located in the parish of Magilligan or Tamlaghtard, on the summit of a hill. The summit probably reflects the limits of the site, but there is no visible evidence of an enclosure and the aerial photograph may simply reflect the natural topography. The summit is 53m by 50m across. There are no visible remains of the church, recorded by Reeves as 35 by 19ft. The cross slab is set upright in the E edge of the stone boundary which crosses the site. It has a dressed front and sides, and is 1.32m high and 0.42m wide at the base, widening to 0.53m at the top. The cross carved on the slab is a double-armed "Cross of Lorraine". The church is said to have been founded by St. Patrick.

No.	SMR No.	Type	Importance	Description
81	LDY 05:05	Multi-Period Church, Graveyard, Saint's Grave and Holy Well	Regional	The site is located in the parish of Magilligan or Tamlaghtard. This church is a long, narrow rectangular structure, within a graveyard. The church is lit by a single lancet window, possibly C13th in the east wall. The church walls still have remnants of plaster on them in places. There are graves in the interior of the church. The mortuary house is east of the east gable of the church and is traditionally the grave of St. Cadan, the patron of the church. The church is said to be one of Patrick's seven foundations in Cianacht. The ruin is of the medieval parish church, repaired in 1622 and in use until the C18th.
82	LDY 05:14	Large Earthwork Enclosure (Craigbolie Castle or Dun Cruitheni)	Regional	In a magnificent setting on a roughly north-south narrow ridge which comes to a point at south, below the cliffs of Binevenagh. The site can only be approached along the narrow ridge and can only be seen from the cliff top to east. The site is roughly D-shaped, 30.75m north-south by 13.75m east-west, with the straight edge to west defined by a low stony bank, as is the east side. At north and south, the bank is much more substantial. At south, the bank falls to a lower annex, 11.5m by 12.2m, defined by a substantial stony bank. A gap in this bank to northeast may be the original entrance. A roughly circular raised area 9m in diameter in the centre is probably a structure and is described in detail in the OS memoirs.

No.	SMR No.	Type	Importance	Description
83	LDY 06:02	Counterscarp Platform Rath	Regional	<p>This site is located on a north facing slope, and consists of a central oval platform, 26m by 39m, with a featureless interior. At the north, the platform is defined by a scarp which falls 2m to a level berm, before the natural slope falls away. The east edge is also defined by a scarp. At the south, however, the perimeter is defined by a substantial bank, ditch and counterscarp bank. The west edge has a continuation of the ditch, with a field boundary along the line of the counterscarp. At the south, the bank is 5m wide, 1.5m high internally and 1.4m above the ditch, which is 3-3.5m wide and 1.4m below the outer bank. This, in turn, is 3.5m wide and 1.4m high externally. There is a possible entrance, 2.5m wide at the southeast, where the ditch fades away.</p>
84	LDY 06:05	Rath	Regional	<p>This site is located at a break of slope with ground falling steeply to south-southwest and fine views over lower ground. The enclosure is sub-rectangular, 28m by 27m, with a rectangular house within. It is enclosed by a ditch south-west-northeast and an inner bank. The bank is 1.5m high internally, 6m wide and circa 3m above the ditch, which is 1.4m deep and 6.5m wide. There is an entrance causeway at the southeast. The foundations of the round cornered rectangular house are 0.4m high, and 9.5m by 5.2m internally. It has an entrance at the east and two small hummocks which could be internal features. It seems to be too large for the enclosure & may post-date the rath, possibly C17th.</p>

No.	SMR No.	Type	Importance	Description
85	LDY 06:09	Rock Fortification (Giant's Sconce or Dunceithirn)	Regional	This site is located on the summit of Sconce hill with ground falling away on all sides. The flattish top of the hill is enclosed by a once substantial stone wall which has been heavily damaged. The W slope of the outcrop shows many tumbled stones and boulders, probably from the wall. The area enclosed is 52.6m by 28.5m across, and the remains of the wall are 3.5m wide and up to 1m high. There is an entrance at S, 1.5m wide and 4.8m long, formed by boulders. At the east, 5m below the main site is a fortified platform with the remains of a stone wall on its eastern edge. The wall on the eastern edge of the upper enclosure is said to have had an intra-mural chamber, but this was destroyed in the early C19th, and only a hollow remains, 9.2m long by 2.4m wide.
86	LDY 06:10	Rath	Regional	This site is located on the southwest edge of a large rounded hill with ground falling to a valley at the west, south and northwest, and extensive views south-southeast and west. The rath uses the natural defences at the west and south which form a steep approach, and here there is no trace of an enclosing bank. At the east and northeast where the exterior approach is level, there is a perimeter bank 1.5m high internally, 2m externally and 2.5m wide. There is a gap in the bank at the east, 1.3m wide. The area enclosed is 35m by 32m, and within the interior is a linear raised feature 1.5m wide by 0.2m high, possibly part of a structure, running east-west. The site sits 5m above the valley at the northwest.
87	LDY 06:11	Standing Stone	Regional	This is a substantial stone set in the north edge of a wall field boundary. It is close to the summit of a low rounded hill with ground falling to the west and east, and good views. The stone is 1.6m high, 1m wide and 0.55-0.9m deep.

No.	SMR No.	Type	Importance	Description
88	LDY 06:13	Rath	Regional	<p>This rath is extremely overgrown with briars and thorns, making observation almost impossible. It sits in a dramatic location on the edge of a steep sided valley which falls away to the west and north. There is a levellish approach over grass fields from the east. The rath is defined by an enclosing bank except at the west where the steep drop seems to have rendered it unnecessary. It is very hard to measure; approximately 1m high and 3-4m wide. There would appear to be a raised area within the interior as the OS memoirs suggests, probably a house platform, but too overgrown to measure.</p>
89	LDY 06:14	Mound, Possibly Motte	Regional	<p>This site consists of a high, central mound with perimeter bank and steep sides, falling to an enclosing ditch and outer bank. It has been formed by adapting a natural hill. The summit is very overgrown, measuring approximately 25m by 15m across. The bank has an inner revetment, and is 2.5m wide and 1.5m high. At the west, the mound stands 8m above the ditch, which is crossed by a causeway 3.8m wide. The ditch here is 4.5m wide with revetted faces. Beyond is the bank 3.75-4m wide, 1.2m above the ditch and 1.3m high externally with a stream beyond. At SW, the bank is more substantial, 2.2m above the ditch, 5m wide and 1m above an adjoining D-shaped area - a bank 1.2m high and 3m wide defines its east edge.</p>
90	LDY 06:25	Round Cairn	Regional	<p>A well preserved round cairn set high on upland with excellent views over the Roe valley and coast. The cairn is visible as a prominent circular grass-grown cairn, generally well preserved but with a central cist showing past disturbance. There is a stone revetment of boulders visible around the base. The cairn is 14m by 13m across, and 1.4-1.75m high. The cist is 0.9m by 0.7m by 0.4m deep. The line of boulders is on average circa 0.4m high and 0.4m wide.</p>

No.	SMR No.	Type	Importance	Description
91	LDY 07:10	Long Mound (Piper's Hill)	Regional	<p>This is a massive elongated mound on low ground near the Macosquin river. The measurements given in 1981 as 45m east-west by 12.5m north-south relate only to the summit of the structure. At the base, it is circa 60m east-west by 30m north-south. A wet ditch is very apparent along its north edge, 3-4m wide and 0.5-1m deep. From the north the mound ranges from 3-4.5m high and from S it stands anything from 6-8m high. The mound is comprised of stone and earth with large boulders visible in places. The summit is accessible from along the north side but it is unclear whether this entrance is original. The summit is mostly flat but is scarped up a little on its northern and western edges. There is some evidence for a stone structure 3m by 1.5m along the northern edge. The site is covered in dense scrub, although located on low ground the ditch and bank on the summit of the northern landward side suggest that it had a defensive function. It seems to be an unusual defended/fortified mound.</p>
92	LDY 07:45	Plantation Village Site	Regional	<p>The village of Macosquin was founded in 1615 for the Merchant Taylors Co. and extended between the church and castle (now the site of the rectory) on both sides of Main St. The Raven map of 1522 shows a large house surrounded by a bawn wall, the church and seven houses. An excavation south of the church & east of the Dunderg road failed to uncover any C17th remains, although two medieval ditches, possibly field boundaries, were found. Ground works by NIE to build a substation and lay 60m of cable in Macosquin were carried out under archaeological supervision. No archaeological features or artefacts were uncovered during the work [G&L, July 2006]. Excavation of service trenches in the SW corner of playing fields within the historic settlement boundary was carried out under archaeological supervision. No archaeological deposits were encountered [ADS, 2009].</p>

No.	SMR No.	Type	Importance	Description
93	LDY 09:05	Counterscarp Rath (Rough Fort)	Regional	This is a fine rath, owned by the National Trust. It is a prominent landmark, with good views to Binevenagh and hills surrounding the Roe valley. The rath consists of a large central area, 38m north-south by 34.5m east-west, surrounded by two banks with a ditch in between. The inner bank is 5.5m wide, 1.2m high internally and 3.5m over the ditch which in turn is 7m wide and 2.2m below an outer bank 3.1m wide and 1.7m high. An entrance to the rath at east is marked by a gap in the banks and causeway 5m wide over the ditch.
94	LDY 09:06	Scarped Mound (Daisy Hill or Drumceatt or The Mullagh)	Regional	Prominently sited in the local landscape and commanding a splendid view all round, this is an ideal site for an assembly. The site is an impressive natural mound which may have been slightly sculpted. The north side certainly looks artificial and the south and west sides also have sharp profiles. The mound is approximately 10-12m high and slightly oval, measuring approximately 60m north-south by 55m east-west. There is no trace of a perimeter bank. On the west side is a pond which may be artificial. The mound closely resembles Rathcroghan, a scarped mound. The site is traditionally held to be that where the convention of Drumceatt was held in AD 590, attended by Aedh, "monarch of Ireland" and by St. Columbcille, who came from Iona to it. Topsoil stripping from a site northeast of the mound, 40m by 20m, was carried out under archaeological supervision. The only feature uncovered was an old drain, nothing of archaeological significance was found [NAC, May 02].
95	LDY 09:48	WWII Trainer Dome	Regional	This is a concrete dome used for training flight bombers and gunners during World War II. It used projector technology to provide simulated conditions and to test the accuracy of gunners. The N.I. Defence Heritage Project identified this as a probably unique survival in N.I., with perhaps as few as three or four in the UK as a whole.

No.	SMR No.	Type	Importance	Description
96	LDY 09:50	WWII Airfield (Aghanloo Airfield)	Regional	<p>This site was chosen in 1938 as an Armament Training Station. By 1940 it was utilised by aircraft from Aldergrove, and during World War II, a number of Aldergrove units kept detachments here. The airfield was used by Whitley and Blenheim Bombers as well as Lockheed Hudsons and Hurricane fighter planes and it served as an important deterrent to German submarines in the north Atlantic during the early part of World War II. EHS:PHM have already scheduled a gunner training dome at this airfield and this area incorporates more of the site including hangars, control tower and fortified underground Battle Headquarters.</p>
97	LDY 10:01	Multi-Period Church Site and Graveyard (Drumachose Church)	Regional	<p>This ecclesiastical site has been in use since the C6th, founded by St. Cannice. The current ruin is of the medieval parish church, founded in C13th. Much of the fabric of the church appears to remain intact. The east gable survives to roof level, as does the west gable. Most of the north wall survives to a height of up to 2m; most of the S wall has been destroyed. The walls are of sandstone with a rubble core. There is a high lancet window in the east gable and another in the west gable. The graveyard surrounding the church has been raised much higher than the church interior by burials, most dating to C19th. There are still family plots in use in the graveyard.</p>
98	LDY 10:06	Rath	Regional	<p>This site is located in a low-lying, poorly drained area with ground falling to Curl river at the north. The field in which the rath lies had been recently ploughed at the time of survey, although the platform itself had not been touched. The rath consists of a platform 33m by 32m set above field level, with an eroded perimeter bank. There is no trace of a ditch. The bank is 4m wide, 1.2m high internally and 1.5-1.7m externally. The interior is quite damp and may have been rigged in the past. There is much stone visible in the eroded bank and several gaps, but none are clearly original.</p>

No.	SMR No.	Type	Importance	Description
99	LDY 10:07	Cairn and Enclosure	Regional	<p>This site is located on a level terrace on the W slope of a hill with excellent views southwest, west and northwest. The site consists of a circular perimeter of large boulders, enclosing an area 18m by 20m. The bank/wall is 3m wide and up to 0.5m high, with a possible entrance at the east, 2.8m wide. The outer edge of the perimeter is less well defined, with some tumbled stone. At the centre is a slightly raised area of smaller stones 0.4m high and 5m in diameter, with a second possible feature south of the entrance against the bank, 4m in diameter. The site seems more likely to be some form of a cairn surrounded by an enclosing bank of earth & stone, rather than a rath or cashel.</p>
100	LDY 10:10	Counterscarp Rath, Possibly Hillfort	Regional	<p>This site is located on a natural local eminence with ground falling steeply to the Curly water at the south, and to the east and west. The natural feature has been scarped to create a circular enclosure, 25m by 24m in diameter, with evidence of a perimeter bank, ditch and counterscarp bank. The site survives best at east where a ramped entrance crosses the ditch, but elsewhere the inner bank seems to fade into a berm. Stone visible in the bank may represent an original revetment and the causeway may also have been revetted. At the east, the inner bank is 5m wide, 0.25m high internally and 1.75-2m above the ditch, which is 3m wide and 0.3m below the counterscarp bank. This, in turn, is 3m wide where present. The ramp at the east is 2.5m wide.</p>

No.	SMR No.	Type	Importance	Description
101	LDY 10:11	Rath	Regional	This site consists of a large circular enclosure, 31m by 30m, set on the S slopes of Keady Mountain, with excellent views south, east and west. The site lies within a forested area. The rath platform is enclosed by a bank and wide outer ditch. It is built on a steep north-south slope. The interior slopes to south, and the ditch and bank dimensions vary in relation this slope. There is some revetting visible in the bank, which is 7m wide, 1.5m high internally and 3m above the ditch, which at the north, is 4m wide and 1.5m deep. To the south, the ditch becomes shallower & fades away. There are several gaps in the bank, one at the north 1m wide and a second at the northeast 3m wide. The original entrance however, seems to be at S, where the ditch is absent.
102	LDY 10:14	Sweat House	Regional	This sweat house is built of rough, unmortared stones, in a beehive shape, with a lintelled entrance at ground level. It is set south of a waterfall, beside a substantial stream. The roof is almost intact, but most of the east side of the structure has collapsed. The rest remains stable.
103	LDY 10:16	Wedge Tomb (Well Glass Spring)	Regional	This site is located on a rocky area, close to gorse and scrub on a very prominent S-facing slope. The wedge tomb consists of a facade 5.4m across of five stones with a central horizontal sill stone facing southwest. The chamber immediately behind the facade has largely collapsed but further towards the rear of the cairn a capstone 1.5m by 1.4m is still in situ. The surviving cairn is 5.7m southwest-northeast by 5.2m southeast-northwest, but it has been extensively robbed. It was excavated in the 1930s and found to have three chambers. The first contained no burials, but sherds of Beaker pottery and a flint scraper. The second contained more pottery and the remains of at least six adults, a child of circa 12 and an infant. The third contained pot shreds, charcoal and some bones.

No.	SMR No.	Type	Importance	Description
104	LDY 11:01	Graveyard and Souterrain (Nicholl's Ground)	Regional	<p>This graveyard is defined by a sub-rectangular platform standing 1.5m above the surrounding land at SE, and 0.5m high at the north and west. It has a tumbled dry stone wall around most of its perimeter. The interior slopes down to the east and what may be an upper platform is discernible to the west of the site. The interior is uneven and stony, but no definite features could be seen. The owners stated that when the grass is cut one can see many small boulders which are supposed to mark graves. The last burial that they knew of was circa 150 years ago. In a field to the west, there is a souterrain known to local people. Its precise location is unclear, but the owner stated that it runs north-south and that the walls are of fine dry-stone construction of very flat stones.</p>
105	LDY 11:06	Counterscarp Rath	Regional	<p>This site is located on what is now marshy land with good views all round. The site is at present very overgrown and has been disturbed by animal burrows. The site consists of a platform 1-2m high and 15m in diameter, with a perimeter bank and an outer ditch, enclosed by a counterscarp bank and possible second ditch (though this may be a later drainage ditch). The inner bank is 4m wide and 0.5-0.75m high internally. The ditch is 2m deep and 6m wide. The counterscarp bank is 3m wide and 1.5m high, while the possible outer ditch is 6m wide and 1.5m deep. Most of these features can be traced around the outside of the rath, except to northeast where modern field boundaries make them unclear.</p>

No.	SMR No.	Type	Importance	Description
106	LDY 11:17	Sweat House	Regional	Little is presently visible of this sweathouse. Set in a conifer plantation, the ground is obscured with branches, grass and a thick carpet of pine needles. Previous field visits recorded as small, stone built sweathouse, internally bottle shaped with a chamber 4ft long by 2'8" wide. Some evidence of corbelling was detected. The northeast end of the site abuts a modern field boundary. It is set on a rocky plateau with no obvious source of water near at hand.
107	LDY 11:18	Sweat House	Regional	As with LDY 11:17, another sweathouse nearby, little of this site is presently visible. Set in a virtually impenetrable area of dense gorse and briar bushes mixed with many clumps of hawthorns, this site could not be fully examined at the time of visit. Earlier field reports record a small, partially ruined, corbelled, beehive-shaped structure. The SE portion had been damaged many years ago and at the time of visit in 1986, it was mounded with earth and filled with modern rubbish. It was 1.5m high, and measured 2.9m by 1.4m internally. There is no visible source of water to the site, but it may have been drawn from a spring noted on the OS map 100-150m southwest of the site.
108	LDY 16:03	Castle and Bawn (O'Cahan's Castle)	Regional	This site was recorded in the OS memoirs as one of the O'Cahan castles, date of foundations unknown, "on a river cliff with moat at N...very defensive position". They also give a plan of the foundations of a castle and bawn, apparently destroyed in the 1820s. Davies, (1941) recorded no surface remains, but mortar fragments and traces of a stone revetment at the north. The site is on a rocky shelf on the steep bank of the River Roe, protected from the land side by a deep ditch.

No.	SMR No.	Type	Importance	Description
109	LDY 17:01	Large Enclosure (Cashel)	Regional	<p>This site is located on a rocky outcrop on the 900ft contour on the edge of Sperrin Plateau. The land drops on E and slopes away gently elsewhere. There are magnificent views north, east and south. The site consists of a large oval enclosure, 69m north-south by 74.7m east-west, defined by a ring of stones approximately 2m wide. Only the base of the wall survives. It is composed of large, loose stones set upright with smaller stones used for packing. It is best preserved at W and SW, with three possible entrances, all narrow, at the west and southwest. The remains of the wall seem little changed from the OS memoir description of 1835. The interior is slightly domed but relatively flat with some natural rock outcrops. The site may be associated with booleying.</p>
110	LDY 17:04	Rath (King's Fort or Ring's Fort)	Regional	<p>This site is located on a very defensive position on a terrace with extensive views the east, south and west. The rath consists of a fairly circular, level interior, 28m by 32m, surrounded by a steep bank running southwest-north-northeast. There is an impressive ditch following the line of the inner bank and a portion of an outer bank at SE. The bank is 2m high internally, 6m externally and 3m wide, while the ditch is 3-4m wide and 2m. Along the S side there is no bank where the natural slope of the hill falls away steeply. There is an entrance at northeast, 2m wide and a corresponding causeway over the ditch 4m wide. The bank rises to a special eminence just west of the entrance.</p>

No.	SMR No.	Type	Importance	Description
111	LDY 17:10	Central Court Tomb	Regional	<p>This site superficially resembles a central court cairn (i.e. a central irregular oval with opposing single chambers). It defies easy classification in spite of excavation and was included by De Valera as a possible court tomb. It is located at the end of a low ridge with good views east and west. The main structural stones are present, but all the cairn material has gone. The site consists of a court or irregular oval or orthostats, with a chamber on either side, both single chambers. The one at north has a very large capstone in situ. Neither chamber has close court tomb affinities, and both resemble portal tombs. There is no obvious entrance to the court, except for a small gap between the orthostats at W. Finds included Neolithic pottery and worked flints.</p>

No.	SMR No.	Type	Importance	Description
112	LDY 17:16	Killen, Possibly Cashel or Souterrain (The Rhellick)	Regional	<p>This site may have been an Early Christian monument, most probably a cashel, which was re-used as a killeen - a burial ground for unbaptised people, particularly infants. It is still regarded by locals as a burial ground even though it has not been used in living memory. The site is presently very over grown with very restricted views in all directions except to the W, as it is set near the bottom of a little valley. The main area of the site is a circular platform, raised up to 1m above surrounding ground, defined by a stone bank some 3m wide and 0.75m high internally at north, whilst to the south it is only 0.3m high. The interior is studded with many earth-fast stones; some of these may mark graves, but many appear to be structural. To the east part of the interior burrowing animals have exposed in places what may be the top of a souterrain. This is composed of large stone flags laid horizontally on top of a set of walls of smaller stones; it appears to run for at least 5m north-south. The internal diameter of this cashel is in the circa 18m, and its entrance may have been to the south, although this is not clear. Due to the very overgrown nature of the site accurate measurements and an accurate plan could not be made. To the west of this circular enclosure is a second sub-circular area which is attached to the above area at its S edge and again at its northwest edge. This area is defined by a substantial dry-stone wall, 2.5m thick at its base and 1.25m high. It is 15m north-south, and 20-25m east-west. The nature of this enclosure and its exact relationship with the cashel is unclear.</p>

No.	SMR No.	Type	Importance	Description
113	LDY 17:18	Wedge Tomb	Regional	<p>This wedge tomb consists of a cairn 42ft by 30ft, orientated east-west, with a two chambered gallery and a large capstone E of the cairn. The two chambers are separated by a septal stone & have a backstone. The site now sits in a crater formed by quarry spoil, leaving it 4m below the surrounding quarry. The tomb was excavated in 1937, and finds included sherds of Late Neolithic pottery, worked flints including scrapers, hollow scarpers, knives, a Bronze Age barbed-&-tanged arrowhead (under the septal slab separating the two chambers), a leaf shaped arrowhead and small fragments of human bones scattered through the chambers, representing at least two skeletons, one male and the other probably female.</p>
114	LDY 17:58	Cairn (The Fairy Bush)	Regional	<p>This site was recorded in the OS memoirs as two cairns, one 5ft high, 44ft long and 16ft broad, and the other having a canopy of stones 20ft long and 15ft broad. Set on the north facing slope of a hill, it is more commonly known as the Fairy Bush rather than Tasseys Hill. It enjoys good views in all directions, especially to the north and west, but the immediate view to the south is blocked by the crest of the hill. The site appears to be a cairn, although the exact type is unclear. It was previously covered with thorn trees, but the last of these died this year, and now the site is an elongated stony mound in grassland. At best the cairn is 0.75m high at north, but to the south it is at most 0.3m high. It is defined, particularly to the north end, by large earth-fast stones, possibly the remains of a kerb. The main body of the cairn is made up of large and small stones mixed with clay and soil. It measures 12m north-south, and 8m east-west at its northern end. No internal features are presently visible. The landowner is very sympathetic to the survival of this site, and so it would appear to be in no immediate danger.</p>

No.	SMR No.	Type	Importance	Description
115	LDY 18:17	Rath	Regional	<p>This site consists of a roughly D-shaped platform set in levelish, poorly drained terrain. There is a slight fall to the north, east and south, but higher ground to the west. Another rath (LDY 18:16) is visible to the southeast. The rath comprises a central platform, 33m by 31m, set above its surroundings with a slight perimeter bank and a ditch remnant at the northwest. The bank is 3.5m wide, 0.4m high internally at northwest, 0.6m at S and 1.75m high externally at northwest, 1m at S. The ditch is 3.5m wide and 0.6m deep at northwest. The outer face of the rath is slightly eroded, exposing stone used in construction. The platform is lowest at the east, but there is no definite entrance.</p>
116	LDY 18:16	Rath	Regional	<p>At the S end of a north-south drumlin ridge, with an extensive view east and south. The site is circular & consists of a platform 31m in diam. & standing c.1.3m above ground level at S, but at much the same level at north & surrounded by a perimeter bank & trace of a ditch. The interior slopes gently to the south with the lie of the land & is densely covered with a large no. of boulders, making the surface very uneven. In the S sector is a waterlogged depression. The bank is fairly well preserved, 1m high internally, 2.1m externally & 3m wide. There is an entrance gap 3m wide, possibly original, at the southwest & a wide modern one at the north. The ditch is largely filled in except at the where it is defined by a shallow waterlogged depression.</p>

No.	SMR No.	Type	Importance	Description
117	LDY 07:01	Mound	Regional	In a commanding position at the east end of a ridge with excellent views. Although overgrown, the mound is very well preserved & is composed of a ditch dug around a natural height with material added to the summit as well as an outer bank. The central mound is 22.6m across the summit, with a perimeter bank 1.5m wide, 0.6m high internally & dropping 4.8m to the ditch, which is c.4.5m wide & 1.5-2m below the outer bank. This in turn is 6.5m wide & 1.25m high externally. A ramp crosses the ditch & runs up to the summit at south, 2m wide where the outer level makes approach easiest. There would appear to be a corresponding gap in the bank, though it is very overgrown.
118	LDY 07:04	Souterrain and Ogham stone	Regional	Set just west of a reservoir within a localised rise. The entrance to this souterrain runs down vertically via a manhole cover with a cemented base. This is not the original entrance, as it was below the top water level for the reservoir. It was excavated in 1934 & was T-shaped in plan (only the long straight part is now accessible), with 3 chambers which runs in a straight line east-west for 67ft. They are on slightly different levels & are connected by narrow creeps. Beyond is a long transverse chamber, now filled in; sherds of souterrain ware were found in it. A lintel in the roof of the 2nd chamber bears an Ogham inscription, showing the souterrain could not be earlier than the Early Christian period.

Historic Gardens

Ref. No.	Name	Description
L-002	Bellarena	The demesne was founded in the mid-17 th Century on flat ground on the River Roe. The house dates from the late-17 th Century, with additions in 1797, 1823 and 1840 (Listed HB02/09/002). The stables, farm and offices are pre-1823. There are lawns at the house and large mature shrubs with very necessary shelter trees beyond, both around the house and as further shelter belts for the fields. The walled garden, which is pre-1830s, has been cleared of original planting for modern convenience. The eastern end was an orchard.
L-005	Downhill	Downhill is an important landscaped site, which was designed to compliment the house of 1770s. This is in spite of the fact that the planned planting of the headland was impractical and did not survive for very long. The fine garden buildings survive. Most notable within the site, is the gardens at Bishop's Gate. They were created in the late 19 th Century and much enhanced and enlarged by Jan Eccles from 1962. They are maintained as ornamental gardens by the National Trust. The planting extends up the Black Glen. The walled garden of 1786 is not planted up. These gardens were laid out in 1778 and extended in 1783. Two artificial lakes/fish ponds also survive. Planting on the south side of the road is now the responsibility of the Forest Service. There is a fine stand of Sitka Spruce, possibly planted circa 1850 and other forest planting, lakes and walks.
L-006	Drenagh	The demesne is part walled and dates from the early 18 th century. The present house was built in 1837 (Listed HB02/11/002), which sits amidst lawns. There are fine woodland, parkland and shelter belt trees. The ground within the demesne is undulating, descending to the Castle River running to the south of the house and to the Curly River to the north and east. Neither river is used as an ornamental feature. The terrace presently overlooks what has become dense woodland, including exotics and rhododendrons. Two formal gardens were laid out by Frances Rhodes – The "Moon Garden", an enclosed area influenced by both Chinese and Arts and Crafts garden design, and the "Orbit Garden", planted with shrubs, trees and herbaceous material. An area south-east of and adjacent to the house had a late 20 th Century ornamental garden, which is now grassed. The walled garden is used for nursery planting.

Ref. No.	Name	Description
L-022	Roe Valley Park (Sir Thomas Phillip's Garden)	Known site of an early 17 th Century house and garden, which is not visible above ground. Raven's picture map shows a formal garden at the house, orchards and further formal gardens to the west along the River Roe. There was a deer park to the north. The present day Country Park contains trees planted in the late 18 th and early 19 th centuries.
L-040	Ardnagle	A late 18 th Century demesne on flat land in the Roe Valley, with substantial shelter belt trees. <i>The Register of Trees for Co. Londonderry 1768-1911</i> lists many as planted in 1796. The house, built in 1788 (Listed HB02/10/005) was a dower house for Pellipar at Dungiven. There is a man-made pond. The ornamental gardens have gone.

6

Ecology

Appendix 6: Ecology

Appendix 6.1	Information to Inform HRA
Appendix 6.2	NVC Quadrat Data & Photos 2016
Appendix 6.3	NVC Quadrat Data & Photos 2017
Appendix 6.4	GWDTE Data & Photos 2016
Appendix 6.5	Bat Annex
Appendix 6.6	Bat Survey Report (Confidential)
Appendix 6.7	Herpetofauna Survey Report
Appendix 6.8	Outline Habitat Management Plan
Appendix 6.9	DEARA - NED Consultations

Appendix 6.1: Information to Inform a Habitat Regulations Assessment

Introduction

1. Blackstaff Ecology was commissioned by RES Ltd (RES) to provide information to inform a Habitat Regulations Assessment (HRA) for a proposed wind farm at Dunbeg South, near Limavady, Co. Derry/Londonderry.
2. A HRA is required where a project may give rise to significant effects upon a Natura 2000 site. Natura 2000 is a European network of protected sites which includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Tributary streams flow through the proposed site and enter the Curly River, a component of the River Roe and Tributaries SAC, approximately 500m north of the site boundary.
3. The Curly River is a tributary of the River Roe, which enters the Lough Foyle SPA at its closest point to the proposed development, around 8.0km to the north west. Lough Foyle is also a Ramsar site, with boundaries coincident with those of the SPA. However, the only potential functional pathway connecting the proposed development with Lough Foyle SPA is the rivers of the River Roe catchment. The SPA is approximately 16.7km downstream of the wind farm site. The scale of potential effects on the SPA designation features (populations of wintering waterfowl) and conservation objectives is unlikely to be detectable in view of the nature of potential impacts arising from construction (possible sediment release) and the effective remoteness of the proposed development from the SPA. Lough Foyle SPA is therefore not considered further in this HRA.
4. A HRA is undertaken by the Competent Authority that takes the decision on the project, in this case the Department of the Environment (DoE). The following information (to inform a HRA) have been compiled to present the information required for NIEA to undertake a HRA.

Habitat Regulations Assessment

5. HRA consists of a four staged approach (EC 2002¹) consisting of a 'Test of Likely Significance' and if necessary an 'Appropriate Assessment':
 - Stage One: **Screening or 'Test of Likely Significance'** - the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;
 - Stage Two: **Appropriate Assessment** - the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation

¹ European Commission (2002) *Assessment of plans & projects significantly affecting Natura 2000 sites, Methodological guidance on the provisions of Article 6 (3) & (4) of the Habitats Directive 92/43/EEC*. Office of the Official Publications of the European Communities, Luxembourg.

objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

- Stage Three: **Assessment of Alternative Solutions** - the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site;
- Stage Four: **Assessment Where Adverse Impacts Remain** - an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

Description of the Project

Site Description

6. The Proposed Dunbeg South Wind Farm, hereafter referred to as 'the Development' is located on privately owned agricultural lands. The main wind farm site is located approximately 6km northeast of Limavady, Co. Derry/Londonderry.

Proposed Development

7. The Planning Application Boundary (red line boundary) is shown on Figure 6.1. This boundary contains the main wind farm site, including positions of the turbines and associated infrastructure, with 50m micro-siting. A detailed plan of the Development showing the position of the turbines and other infrastructure is shown on Figure 6.2: Infrastructure Layout.
8. It is anticipated that the Development will have an operational lifetime of approximately 30 years from the date of commissioning, after which the above ground infrastructure would be removed and the land remediated. Therefore the effects are largely long-term temporary as opposed to permanent.
9. Planning permission is being sought for the Development comprising the following:
 - 9 three-bladed horizontal axis wind turbines of up to 149.9 m tip-height
 - Turbine foundations
 - Hardstanding areas at each turbine location for use by cranes erecting and maintaining the turbines
 - Electricity transformers
 - Approximately 3.5 km of new access track and 1.1 km of upgraded access track
 - Three temporary meteorological ('met') masts
 - Wind farm substation compound containing a control building
 - Energy storage containers
 - On-site electrical and control network of underground (buried) cables
 - Connection from the substation to the local grid network
 - Temporary construction compound
 - Permanent and temporary drainage works

- Associated ancillary works
 - New site entrance from the public road.
10. A temporary construction compound measuring 2430m² will be constructed. On completion of the wind farm construction, 1,056m² of temporary construction compound will be utilised permanently for Energy Storage and the remaining 1,374m² will be reinstated to their original form following construction.
11. A summary of the hardstanding that will be constructed for the Development is provided in Table 1.

Table 1 - Summary of Temporary and Permanent Hardstanding

Wind Farm Element	Temporary hardstanding ² in m ²	Permanent Hardstanding ³ in m ²
Turbines and transformer pads	N/A	226 per turbine = 2486
Crane pads and laydown areas	630 per turbine = 5670	800 per turbine = 7200
On-site access tracks (new)	N/A	23,351
Existing on-site access tracks (upgraded)	N/A	5,850
Control building & substation compound	N/A	1541
Energy storage hardstanding		750
Construction compound	1436	N/A
Temporary met mast	100	N/A
Total hardstanding in m ²	7,106	41,414
Total Hardstanding in ha	0.71 ha	4.14 ha
Total Hardstanding as % of total area within the Planning Application Boundary (Area A: 40.36 ha).	1.75%	10.26%

Site Drainage

12. Buffers to watercourses have taken account of and infrastructure designed in accordance with best practice guidance for site drainage. The potential impact of preferential routing of drainage and associated erosion and sediment wash-off within the sub-catchments draining the site will be mitigated through the measures which will be incorporated into the site SuDS Design. Contractors and sub-contractors will be required to follow all pertinent Pollution Prevention Guidance (PPG).
13. In particular, to address potential effects on waters entering local watercourses:

² Temporary hardstanding: this refers to ground which will be occupied by hardstanding / built structures during the construction of the Proposed Wind Farm Development, and the temporary met mast. However, once the proposed wind farm has been constructed / mast removed this land will be reinstated and available for grazing.

³ Permanent hardstanding: this refers to ground which will be occupied by hardstanding / built structures throughout the lifetime of the proposed wind farm.

- Attenuation ponds and silt fences will be provided adjacent to surface water drains to prevent pollution and sedimentation of watercourses;
 - Direct drainage into existing watercourses will also be avoided to ensure that sediment and runoff from disturbed ground is not routed directly to the watercourses;
 - Flow and sediment transport in any track drainage swales will be minimised by reducing concentrated flows, installing regular cross culverts and the use of check dams placed at regular intervals within the trackside drainage swales; and
 - Track drainage swales, where required, will discharge into attenuation ponds excavated on the downslope side, or silt fences.
14. Measures will be used to mitigate any potential impacts on the water quality of sub-catchments through peat erosion, stream acidification and metals leaching during construction. Measures will include:
- Sediment control measures (e.g. check dams, silt fences etc.) will be employed in the vicinity of watercourses and within the artificial drainage network during construction;
 - Watercourses will be monitored throughout the construction period by the ECoW to identify any excessive mobilisation of sediments through the minor channels network, which will be mitigated by temporary sediment control measures (e.g. geotextiles/straw/bales/brush);
 - If dewatering of excavations is required, pumped discharges will be passed through attenuation ponds and silt fences to capture sediments before release to the surrounding land;
 - Where there is a permanent relocation of peat, the ground will be reinstated with vegetation as soon as practicable; and
 - Works requiring disturbance of soils and peat will be suspended during periods of heavy rain.

Description of Natura 2000 Site

River Roe and Tributaries

15. The Curly River, constitutes part of the River Roe and Tributaries SAC, and flows westwards approximately 500m to the north of the Development red line boundary. Five watercourses and their tributaries flow through the development site and enter the Curly River. The boundary of the SAC in relation to the proposed wind farm is illustrated in Figure 6.1.
16. The primary reason for designation is the presence of the Annex II species Atlantic salmon *Salmo salar*. Other qualifying features present include the Annex I listed habitats 'Old sessile oak woodland with *Ilex* and *Blechnum* in the British Isles' and 'Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation' and the Annex II species otter *Lutra*

lutra. Other Annex II species present include sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis*. Table 2 below describes the qualifying features for the designation of the Natura 2000 site.

Table 2: River Roe and Tributaries SAC Qualifying Features & Conservation Objectives.

Qualifying Feature	Representativity ¹	Relative Surface ²	Conservation Status ³	Global Assessment ⁴	Description
91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	C	C	B	C	145.56ha Cover
3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	C	C	B	C	82.09ha Cover
	Population ⁵	Isolation ⁶	Conservation ⁷	Global ⁸	
1106 Atlantic Salmon	C	C	B	B	Resident Population
1355 Otter	C	C	B	C	Common
1095 1099 Lamprey spp.	D	-	-	-	Present
¹ Degree of representativity of the habitat type: A Excellent, B Good, C Significant, D Non-Significant ² Area of the site covered by the natural habitat type in relation to the total area covered by that natural habitat type within the national territory: A 100% ≥ p >15%, B 15% ≥ p >2%, C 2% ≥ p >0% ³ Degree of conservation of the structure and functions of the natural habitat type, concerned including restoration possibilities: A Excellent, B Good, C Average/Reduced ⁴ Global assessment of the value of the site for conservation of the natural habitat type concerned: A Excellent, B Good, C Significant ⁵ Size & density of the population of the species present on the site in relation to the populations present within national territory: A 100% ≥ p >15%, B 15% ≥ p >2%, C 2% ≥ p >0%, D Non-Significant ⁶ Degree of isolation of the population present on the site in relation to the natural range of the species: A isolated/almost isolated, B not-isolated, but on margins of area of distribution, C not-isolated within extended distribution range ⁷ Degree of conservation of the features of the habitat which are important for the species concerned and possibilities for restoration: A Excellent, B Good, C Average/Reduced ⁸ Global assessment of the value of the site for conservation of the species concerned: A Excellent, B Good, C Significant					
Conservation Objectives					
91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	Maintain & where feasible expand the extent of existing oak woodland but not at the expense of other SAC features (There are areas of degraded heath, wetland & damp grassland which have the potential to develop into oak woodland).				
	Maintain & enhance oak woodland species diversity & structural diversity.				
	Maintain the diversity & quality of habitats associated with the oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to oak woodland				
	Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation.				
	Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.				
3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	Maintain and if possible enhance extent and composition of community.				
	Improve water quality				
	Improve channel substrate quality by reducing siltation.				
	Maintain and if feasible enhance the river morphology				
1106 Atlantic Salmon	Maintain & if possible expand existing population numbers & distribution (preferably through natural recruitment) & improve age structure of population.				

	Maintain & if possible enhance the extent & quality of suitable salmon habitat - particularly the chemical & biological quality of the water & the condition of the river channel & substrate.
1355 Otter	Maintain & if possible increase population numbers & distribution.
	Maintain the extent & quality of suitable otter habitat, in particular the chemical & biological quality of the water & all associated wetland habitats.

Impacts on Natura 2000 Site

17. The proposed project is not directly connected with or necessary to the management of the Natura 2000 site.
18. The likely significance of effects of the proposed project on the Natura 2000 site and its conservation objectives have been assessed taking into account the source-pathway-receptor model. The source is defined as the individual elements of the proposed project that have the potential to impact on the Natura 2000 site, its qualifying features and its conservation objectives. The pathway is defined as the means or route by which a source can migrate to the receptor. The receptor is defined as the Natura 2000 site and its qualifying features. Each element can exist independently however a potential impact is created where there is a linkage between the source, pathway and receptor.

Likely Significance of Effects on Qualifying Features & Conservation Objectives

Atlantic Salmon

19. The presence of Atlantic salmon is the primary reason for site selection. Salmon require clean, well-oxygenated river gravel for spawning, good water quality, a substrate consisting of coarse boulder, cobble and pebble for juvenile fry and parr, an abundant food supply and unimpeded access to and from the sea (JNCC 2013⁴). The overall conservation status of Atlantic salmon in the UK is favourable (range)-Inadequate (population) (JNCC 2013³). JNCC 2013 indicates that the number of spawners reaching Northern Ireland waters since 2007 has declined due to reduced survival at sea.
20. There is a potential link between source, pathway and receptor during construction, operation and decommissioning of the proposed wind farm. Elements of the proposed wind farm as described above in paragraphs 7-11 above have in the absence of appropriate mitigation measures the potential to have significant adverse effects on the water quality downstream which is a key component in the conservation status of salmon. Salmon are particularly susceptible to deteriorating water quality due to sedimentation. Suspended solids can physically choke fish, disrupt feeding behaviour, smother salmon eggs and disrupt or prevent alevin emergence reducing the fitness of fry and parr and their ability to cope with natural pressures (Hendry &

⁴ Joint Nature Conservation Committee (2012) *Third Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2007 to December 2012*, Peterborough, JNCC, viewed on 06.07.2017, Available from: <<http://www.jncc.gov.uk/article17>>.

Crag-Hine 2003⁵). The significance of effects would be greater during the salmon spawning season which extends from October to March.

Lamprey

21. Lamprey species are Annex II species, but are not listed as qualifying species for the SAC. River lamprey is an anadromous species that migrates from the sea to breed in freshwater, while brook lamprey is entirely a freshwater species. Lamprey are reported as requiring clean, well-oxygenated river gravel for spawning with suitable hiding places, good water quality and slower flowing nursery habitat with a sandy silt substrate for juveniles. River lamprey also require unimpeded access to and from the sea (JNCC 2007⁶). The overall conservation status of river lamprey in the UK is Unfavourable-Inadequate but improving (JNCC 2012⁴). Trends for lamprey species in Northern Ireland cannot be estimated due to lack of data, but they are judged to have poor future prospects, in part due to water quality issues (JNCC 2012⁴).
22. There is a potential link between source, pathway and receptor during construction, operation and decommissioning of the proposed wind farm. Elements of the project have in the absence of appropriate mitigation measures the potential to have significant adverse effects on water quality which could impact on lamprey. Pollution can have a major impact of lamprey; smothering spawning gravels and nursery silt habitat and making the watercourse unsuitable for ammocoetes (Maitland 2003⁷ & Goodwin 2009⁸). The significance of effects on lamprey would have a greater impact during the spawning season.

Otter

23. Otter is a qualifying feature, but is not the primary reason for site selection. Otter requires good water quality, suitable shelter for resting and breeding and an abundant food supply dominated by fish (Chanin 2003⁹). The overall conservation status of otter in the UK is Favourable (JNCC 2012⁴). Although there is some evidence for recent increase of the species, JNCC (2012⁴) records the population as stable.
24. There is a potential link between source, pathway and receptor during construction, operation and decommissioning of the proposed wind farm. Elements of the proposed wind farm as describe above in 7-11 above have in the absence of appropriate mitigation measures the potential to have significant adverse effects on

⁵ Hendry, K. & Cragg-Hine, D (2003) *Ecology of the Atlantic Salmon, Conserving Natura 2000 Rivers, Ecology Series No. 7*, English Nature, Peterborough.

⁶ Joint Nature Conservation Committee (2007) *Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006*, Peterborough, JNCC, viewed on 06.07.2017, Available from: <<http://www.jncc.gov.uk/article17>>.

⁷ Maitland, P.S. (2003) *Ecology of the River, Brook and Sea Lamprey*, Conserving Natura 2000 Rivers, Ecology Series No. 5, English Nature, Peterborough.

⁸ Goodwin, C.E., Dick, J.T.A, Elwood, R.W. (2009) A preliminary assessment of the distribution of the sea lamprey (*Petromyzon marinus* L.), river lamprey (*Lampetra fluviatilis* (L.)) and brook lamprey (*Lampetra planeri* (Bloch)) in Northern Ireland, *Biology and Environment: Proceedings of the Royal Irish Academy* 109B, 47-52.

⁹ Chanin, P. (2003) *Ecology of the European Otter*, Conserving Natura 2000 Rivers Ecology Series No. 10, English Nature, Peterborough.

water quality that could lead to a reduction in fish populations, ultimately impacting on the conservation status of otter.

Oak Woods

25. The habitat type 'old sessile oak woods with Ilex and Blechnum in the British Isles' is a qualifying feature, but is not the primary reason for site selection. The habitat is characterised as woodland dominated by a mixture of oak *Quercus* spp. and birch *Betula* spp. The overall conservation status of oak woods in the UK is Bad/Declining (JNCC 2013⁴).
26. The river channel of the River Roe and its tributaries has a tree fringe along a large proportion of its length. Occasionally this fringe widens out up the valley sides to discreet woodland blocks. The site is considered to support one of the best examples of the oakwood habitat in the UK. The proposed wind farm at its nearest point is 500m from Cahan's Bridge, where this habitat type is present. There is no identified pathway between source and receptor during construction, operation or decommissioning.

Water-crowfoot Rivers

27. 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation' is a qualifying feature, but is not the primary reason for site selection. Stream flow characteristics vary from fast-flowing spate rivers with dynamic flow regimes in upper catchments to the broad, slower moving, mature River Roe as it nears Lough Foyle. At the upper end of the River Roe and along its tributaries, the aquatic flora reflects the highly acidic character of the water, particularly in its moss communities, In the middle reach the channel vegetation is characterised by greater water -moss *Fontinalis antipyretica* while in lower reaches of the River Roe where the flow is less dynamic the bryophyte community is generally replaced by beds of stream water-crowfoot *Ranunculus penicillatus* ssp. *penicillatus* in the channel and reed canary-grass *Phalaris arundinacea* along the banks.

Likely Significance of Effects on Integrity of Natura 2000 Site

28. The primary potential effect associated with the proposed wind farm is a possible change in the water quality of watercourses within the Natura 2000 site during construction, operation and decommissioning. Maintaining water quality is the most important factor required for the specific structure and function of the site. It is a key indicator of conservation status and is an important factor for the conservation status of the qualifying features.
29. Changes in the chemical and biological water quality of watercourses can be used as an indicator to evaluate the condition of the Natura 2000 site and its qualifying features taking into account the conservation objectives. Good water quality is necessary for the long-term maintenance of the Natura 2000 site and its designation features.

30. In the absence of appropriate mitigation measures, deterioration of water quality during construction, operation or decommissioning of the proposed wind farm has the potential to have a significant effect on the integrity of the Natura 2000 site and on its water dependant qualifying features affecting their conservation status and resulting in significant adverse effects on the distribution and abundance of species populations. The design of the proposed wind farm has evolved throughout the EIA process taking into consideration constraints that have been identified and highlighted as part of baseline environmental surveys. A number of mitigation measures have therefore been incorporated into the design of the proposed wind farm in order to avoid and/or reduce any adverse effects on the Natura 2000 site (see paragraph 14 above).

In-Combination Effects with Other Projects

31. There are currently a number of impacts occurring within the Natura 2000 site that have an influence on its conservation and management. The primary effects relevant to the proposed project include deterioration of water quality within the catchment of the Natura 2000 site from point-source pollution including urban and industrial centres; point-source pollution from development including existing and consented wind farm developments; and diffuse pollution from commercial forestry in the upper catchment and farming in the lower catchment. There is potential for these impacts to act in combination causing cumulative adverse effects on water dependant qualifying features, affecting their conservation status, and the overall integrity of the Natura 2000 site. The implementation of the mitigation measures set out in the EIA would ensure that the proposed wind farm does not contribute to any cumulative impact on designated nature conservation sites.

Stage One: Information to Inform Screening or Test of Likely Significance

Table 3: Screening Matrix	
Name of project or plan	Construction of 9 turbine wind farm at Dunbeg South
Project reference	Not known
Name and location of Natura 2000 site	River Roe and Tributaries SAC, Co. Derry/Londonderry
Brief description of the project or plan	RES Ltd propose to construct a wind farm consisting of nine wind turbines with associated infrastructure at Dunbeg South, near Limavady, Co. Derry/Londonderry. The layout of the proposed project is shown in Figure 6.2. The proposed project is not directly connected with or necessary to the management of the Natura 2000 site.
Brief description of the Natura 2000 site	The River Roe and Tributaries SAC approaches to within 500m of the proposed wind farm. The boundary of the SAC in relation to the proposed wind farm is illustrated in Figure 6.1. The primary reason for designation is the presence of the Annex II species Atlantic salmon <i>Salmo salar</i> . Other qualifying features present include the Annex I habitats 'Old sessile oak woodland

	<p>with <i>Ilex</i> and <i>Blechnum</i> in the British Isles' and 'Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation' and the Annex II species otter <i>Lutra lutra</i>. Other species present include brook lamprey <i>Lampetra planeri</i> and river lamprey <i>Lampetra fluviatilis</i>. A copy of the Natura 2000 Standard Data Form and the Conservation Objectives can be found at http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030361.pdf.</p>
<p>Assessment Criteria</p>	
<p>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.</p>	<ul style="list-style-type: none"> • Proposed Project The proposed wind farm will involve construction of nine wind turbines (overall height 149.9 m) and associated infrastructure, including newly created site entrance, access tracks, crane hardstandings, control building and substation compound, electricity transformers, underground cabling, energy storage containers and drainage works. During construction there would be a number of temporary works including a construction compound with car parking, an enabling works compound, temporary parts of crane hardstandings, welfare facilities and three temporary guyed lattice type meteorological masts. These activities have the potential to cause peat slide, accidental leaks or spillage and release of pollutants such as sediment, silt, concrete, fuel, oils, chemicals or other waste material that would result in point source pollution causing significant adverse effects on the designated sites, their qualifying features and conservation objectives. • In Combination with Other Projects There are currently a number of impacts occurring within the Natura 2000 site that have an influence on its conservation and management including pollution from urban and industrial centres, existing (and consented) wind farm developments, commercial forestry and farming.
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:</p> <ul style="list-style-type: none"> • Size and scale; • Land-take; • Distance from Natura 2000 site or key features of the site; • Resource requirements (water abstraction etc); • Emission (disposal to land, water or air); • Excavation requirements; • Transportation requirements; • Duration of construction, operation, de-commissioning etc; 	<ul style="list-style-type: none"> • Size and scale The Planning Application Boundary for the proposed wind farm encloses approximately 43ha. The proposed wind farm will result in the permanent land take of approximately 6.9ha to accommodate the infrastructure footprint and a temporary land take of approximately 3.3ha to accommodate the construction footprint. • Land-take No land within the boundary of the River Roe and Tributaries SAC will be required for the construction, operation or decommissioning of the wind farm. • Distance from Natura 2000 site The red line boundary lies approximately 700m to the south of the SAC boundary. • Resource requirements None • Emission (disposal to land, water or air) Excavation of foundations for turbines, hardstandings and associated buildings may require disposal of mineral soil to licensed landfill sites. Possible temporary dewatering may require disposal to local land surfaces via attenuation ponds and screens.

	<ul style="list-style-type: none"> Excavation requirements Excavation of foundations for turbines, hardstandings and associated buildings, and for access routes will be required. Transportation requirements Construction materials and equipment, turbine towers, blades and machinery, together with all materials and hardware for the construction of the substation, transformers and temporary structures will be transported to the site using the public highway network. Decommissioning will require the removal of wind farm components by road. Duration of construction, operation, de-commissioning etc. Duration of construction has yet to be determined. It is anticipated that the wind farm will have an operational life of 30 years. In Combination with Other Projects The primary effects relevant to the proposed project include deterioration of water quality within the catchment of the Natura 2000 site from point-source pollution including urban and industrial centres; point-source pollution from development including existing (and consented) wind farm developments; and diffuse pollution from commercial forestry in the upper catchment and farming in the lower catchment. There is potential for these impacts to act in combination causing cumulative adverse effects on water dependant qualifying features, affecting their conservation status, and the overall integrity of the Natura 2000 site.
<p>Describe any likely changes to the site arising as a result of :</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance to key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value (water quality etc). 	<ul style="list-style-type: none"> Reduction of habitat area There will be no reduction of habitat area. Disturbance to key species The proposed development is distant from key species and they will not be disturbed. Habitat or species fragmentation The proposed development is distant from the SAC and there will be no habitat or species fragmentation. Reduction in species density The primary effect associated with the proposed wind farm is a potential change in the water quality of watercourses hydrologically linked to the Natura 2000 site. Poor water quality and increased sedimentation can have significant influences on qualifying features and can result in population declines. Salmon are susceptible to deteriorating water quality due to sedimentation. Suspended solids can physically choke fish, disrupt feeding behaviour, smother salmonid eggs and disrupt or prevent alevin emergence reducing the fitness of fry and parr and their ability to cope with natural pressures (Hendry & Cragg-Hine 2003). Pollution can also have a major impact of lamprey; smothering spawning gravels and nursery silt habitat and making the watercourse unsuitable for ammocoetes (Maitland 2003 & Goodwin 2009). The significance of effects on salmon and lamprey would be greater during the spawning season. A decline in fish populations has the potential to impact on the otter population. Sediment control measures will be an integral part of the design of the wind farm, including attenuation ponds and silt fences adjacent to surface water

	<p>drains: avoiding direct drainage into existing watercourses; installing regular cross culverts and check dams placed at regular intervals within the trackside drainage swales; track drainage swales, will discharge into attenuation ponds excavated on the downslope side, or silt fences; where there is a permanent relocation of peat, the ground will be reinstated with vegetation as soon as practicable; and works requiring disturbance of soils and peat will be suspended during periods of heavy rain. As a result there will be no effects on species downstream of the wind farm and no reduction in species density.</p> <ul style="list-style-type: none"> • Changes in key indicators of conservation value (water quality etc). <p>There will be no change in water quality or other ecological parameters in the SAC as a result of construction, operation or decommissioning of the wind farm.</p>	
<p>Provide indicators of significance as a result of the identification of effects set out above in terms of:</p> <ul style="list-style-type: none"> • Loss • Fragmentation • Disruption • Disturbance; • Change to key elements of the site (e.g. water quality etc). 	<p>In the absence of likely effects on designation feature species and habitats, there is no requirement for impact significance indicators.</p>	
<p>Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts are not known.</p>	<p>Impacts on designation features and SAC conservation objectives are not likely to be significant.</p>	
<p>Is the proposal directly connected with or necessary to management of the site for conservation of N2K features? If yes proceed no further.</p>	<p>No</p>	
<p>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site</p>	<p>Tributary streams that flow through the development site enter the Curly River, 500m outside the development site boundary. Waterborne pollutants have the potential to enter the Natura site, with adverse effects on designation features.</p>	
<p>N2K Feature: Mention all features</p>	<p>Describe any likely direct or indirect effects to the N2K features arising as a result of: loss; reduction of habitat area; disturbance; habitat or species fragmentation; reduction in species density; changes in key indicators of conservation value (e.g. water quality, climate change).</p>	<p><u>*Effect Significant/Not Significant? Why?</u></p>

Atlantic salmon	Tributary streams draining the proposed development site could potentially become contaminated with hydrocarbons, cements, peat and silt leading to pollution affecting individual fish and salmon breeding habitats in the SAC.	<p><u>Not significant</u> Tributary streams draining the site are unlikely to be able to carry significant loads of pollutants. Sediment control measures will ensure that any sediments arising from the works will not reach the streams. The distance of the Development from the Curly River means that any pollutants would in any case be well-dispersed and diluted and would not affect transient or breeding salmon.</p> <p>There will be no loss of habitat that supports the designation features, there will be no reduction of habitat area, there will be no disturbance of designation species, habitat or species fragmentation, reduction in species density or changes in key indicators of conservation value arising from the Development.</p>
Lamprey species	Tributary streams draining the proposed development site could potentially become contaminated with hydrocarbons, cements, peat and silt leading to pollution affecting individual fish and lamprey breeding habitats in the SAC.	<p><u>Not significant</u> See comments for Atlantic salmon (above).</p>
Otter	Tributary streams draining the proposed development site could potentially become contaminated with hydrocarbons, cements, peat and silt leading to pollution affecting otters and their aquatic prey in the SAC.	<p><u>Not significant</u> See comments for Atlantic salmon (above).</p>
Old sessile oakwoods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	There are no likely impacts of the Development on SAC terrestrial habitats.	<p><u>Not significant</u> There are no likely pathways for effects on woodland habitats arising from the Development. The distance from the Natura site indicates that there are unlikely to be issues arising from runoff or other factors during construction, operation or decommissioning.</p>
Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	Tributary streams draining the proposed development site could potentially become contaminated with hydrocarbons, cements, peat and silt leading to pollution of SAC waters, leading to changes in water quality, affecting aquatic plant communities through blanketing and toxic or near-	Tributary streams draining the site are unlikely to be able to carry significant loads of pollutants. Sediment control measures will ensure that any sediments arising from the works will not reach the streams. The distance of the Development from the Curly River means that any pollutants would in any case be well-dispersed and diluted and would not have significant

	toxic effects.	effects on plant communities. There will be no loss of habitat that supports the designation feature, there will be no reduction of habitat area, there will be no disturbance of species that are components of the designation habitat, habitat or species fragmentation, reduction in species density or changes in key indicators of conservation value arising from the Development.
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***Only mitigation measures designed within the application can be considered at this stage. Any conditions that NIEA would impose must be assessed through the appropriate assessment stage.**

Describe any likely impacts on the Natura 2000 site as a whole in terms of:	Effect considered significant/non-significant: Finding of No significant effects Matrix
<ul style="list-style-type: none"> Interference with the key relationships that define the structure of the site; Interference with key relationships that define the function of the site. 	
The Curly River, part of the SAC, could potentially become contaminated with sediment, derived from construction and decommissioning activities at the proposed development site, which could be transported downstream to affect water quality and thus salmon individuals from the designation population.	<u>Not significant</u> Distance of the proposed development from the SAC, flow characteristics of tributary streams and on-site sediment control measures will ensure that there will be no interference with the key relationships that define the structure or the function of the site.

Provide details of any other projects or plans that together with the project or plan being assessed could (directly or indirectly) affect the site.	Provide details of any likely in-combination effects and quantify their significance -
None known	N/A
Is the potential scale or magnitude of any effect likely to be significant?	
Alone?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
In-combination with other projects of plans?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

Conclusion: Is the proposal likely to have a significant effect on an N2K site?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
IF IT HAS BEEN DETERMINED THAT THE PROPOSAL WILL NOT HAVE A SIGNIFICANT EFFECT THEN ASSESSMENT IS COMPLETED. IF ANY PART OF THE PROPOSAL IS LIKELY TO HAVE A SIGNIFICANT EFFECT AN APPROPRIATE ASSESSMENT WILL BE REQUIRED – STAGE 2 AA.	

Data collected to carry out the assessment

Who carried out the assessment?	Dr Brian Sutton BSc PhD CEnv MCIEEM
Sources of data	Provided with application, client's drawings, Spatial-NI website and aerial photography.
Level of assessment completed	Stage 1 – Test of Likely Significance
Where can the full results of the assessment be accessed and viewed?	

NIEA CDP Response to consultation.	
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Appendix 6.2 – NVC Quadrat Data & Photos 2016

Quadrat no. 1	Date 20th July 2016	Estimated Slope (°) 15	
Quadrat size 2m x 2m	Grid Ref IC 74143 26054		
Surveyor KH	Altitude (m asl) 197	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Juncus acutiflorus</i>	9	<i>Kindbergia praelonga</i>	2
<i>Ranunculus flammula</i>	4	<i>Calliergonella cuspidatum</i>	4
<i>Holcus lanatus</i>	3		
<i>Galium palustre</i>	3		
<i>Anthoxanthum odoratum</i>	2		
<i>Cynosurus cristatus</i>	2		
<i>Agrostis capillaris</i>	2		
<i>Ranunculus acris</i>	3		
<i>Potentilla erecta</i>	3		
<i>Leontodon autumnalis</i>	2		
<i>Cirsium dissectum</i>	1		
<i>Trifolium repens</i>	3		
		Species Total	14
NVC Code MG6b <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland (<i>Anthoxanthum odoratum</i> sub- community)	Site & Vegetation Description Rush pasture with tall and dense sward. Grazing pressure very low / absent		

CONSENTED (LA01/2018/0200/F)



Photo of Quadrat 1

Quadrat no. 2	Date 15th June 2016	Estimated Slope (°) 3	
Quadrat size 2m X 2m	Grid Ref IC 74293 26054		
Surveyor CL	Altitude (m asl)	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Anthoxanthum odoratum</i>	4		
<i>Festuca rubra</i>	4		
<i>Potentilla erecta</i>	4		
<i>Carex panicea</i>	4		
<i>Molinia caerulea</i>	7		
<i>Juncus acutiflorus</i>	4		
<i>Luzula multiflora</i>	3		
<i>Carex flacca</i>	3		
<i>Nardus stricta</i>	4		
<i>Trifolium repens</i>	2		
<i>Cirsium dissectum</i>	1		
<i>Galium saxatile</i>	3		
<i>Ranunculus flammula</i>	1		
<i>Carex viridula</i>	1		
<i>Pedicularis sylvatica</i>	1		
<i>Pseudoscleopodium purum</i>	2		
<i>Calliergonella cuspidatum</i>	1		
<i>Hylocomium splendens</i>	7		
<i>Pleurozium schreberi</i>	4		
<i>Dicranum scoparium</i>	1		
		Species Total	20
NVC Code U5c <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland; <i>Carex panicea</i> - <i>Viola riviniana</i> sub-community	Site & Veg Description Grassland with low levels of grazing. Sward species-rich. Little evidence of livestock disturbance		

sub-community



Photo of Quadrat 3

Quadrat no.	4	Date	20th July 2016	Estimated Slope (°)	5
Quadrat size	2m x 2m	Grid Ref	IC 73843 25904		
Surveyor	KH	Altitude (m asl)	180	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		9	<i>Sphagnum papillosum</i>		5
<i>Potentilla erecta</i>		4	<i>Hylocomium splendens</i>		2
<i>Anthoxanthum odoratum</i>		2	<i>Rhytidiadelphus squarrosus</i>		4
<i>Molinia caerulea</i>		2	<i>Thuidium tamariscinum</i>		4
<i>Galium saxatile</i>		3	<i>Calliergonella cuspidatum</i>		4
<i>Carex echinata</i>		3			
<i>Deschampsia caespitosa</i>		2			
<i>Festuca ovina</i>		4			
			Species Total		13
NVC Code	Site & Vegetation Description				
U4d	Sward tall and relativey open with low <i>Sphagnum</i>				
<i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland	hummocks. Grazing pressure very low / absent				

CONSENTED (LA01/2018/0200/F)

Luzula multiflora – *Rhytidiadelphus loreus*
sub-community



Photo of Quadrat 4

Quadrat no.	5	Date	20th July 2016	Estimated Slope (°)	10
Quadrat size	2m x 2m	Grid Ref	IC 73993 25904		
Surveyor	KH	Altitude (m asl)	197	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus effusus</i>		5	<i>Calliergonella cuspidatum</i>		5
<i>Nardus stricta</i>		5	<i>Rhytidiadelphus squarrosus</i>		4
<i>Ranunculus flammula</i>		2	<i>Thuidium tamariscinum</i>		2
<i>Cynosurus cristatus</i>		3			
<i>Trifolium repens</i>		3			
<i>Carex viridula</i>		4			
<i>Juncus bulbosus</i>		3			
<i>Cirsium palustre</i>		3			
<i>Cirsium dissectum</i>		3			
<i>Lotus pedunculatus</i>		3			
<i>Carex echinata</i>		4			
<i>Carex pulicaris</i>		1			
<i>Potentilla erecta</i>		3			
<i>Ranunculus acris</i>		2			
<i>Juncus acutiflorus</i>		2			
<i>Taraxacum officinale</i> agg.		2			
<i>Holcus lanatus</i>		3			
<i>Carex flacca</i>		2			
<i>Cerastium fontanum</i>		1			
<i>Euphrasia</i> sp.		2			
			Species Total		24
NVC Code	M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community				
	Site & Vegetation Description Edge of heavily-grazed rush pasture. Very species-rich				

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Photo of Quadrat 5

Quadrat no.	6	Date	20th July 2016	Estimated Slope (°)	5
Quadrat size	2m x 2m	Grid Ref	IC 74143 25904		
Surveyor	KH	Altitude (m asl)	209	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Juncus acutiflorus</i>		8		<i>Rhytidiadelphus squarrosus</i>	6
<i>Holcus lanatus</i>		5		<i>Hylocomium splendens</i>	3
<i>Epilobium palustre</i>		3		<i>Thuidium tamariscinum</i>	4
<i>Ranunculus acris</i>		2		<i>Calliergonella cuspidatum</i>	6
<i>Juncus conglomeratus</i>		3		<i>Plagiothecium undulatum</i>	1
<i>Potentilla erecta</i>		4			
<i>Trifolium repens</i>		3			
<i>Molinia caerulea</i>		2			
<i>Deschampsia caespitosa</i>		1			
<i>Carex echinata</i>		2			
<i>Cynosurus cristatus</i>		2			
<i>Carex panicea</i>		2			
<i>Ranunculus flammula</i>		1			
<i>Equisetum fluviatile</i>		1			
<i>Luzula campestris</i>		1			
				Species Total	20
NVC Code	Site & Vegetation Description				
M26b <i>Molinia caerulea</i> – <i>Crepis paludosa</i> mire <i>Festuca rubra</i> sub-community	Tall, dense rush pasture with low intensity, patchy grazing pressure				

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Photo of Quadrat 6

Quadrat no. 7		Date 20th July 2016	Estimated Slope (°) 3	
Quadrat size 2m x 2m		Grid Ref IC 74293 25904		
Surveyor KH	Altitude (m asl) 220		Site Dunbeg South	
Species		DOMIN	Species	DOMIN
<i>Juncus acutiflorus</i>		8	<i>Thuidium tamariscinum</i>	3
<i>Holcus lanatus</i>		5	<i>Calliergonella cuspidatum</i>	5
<i>Potentilla erecta</i>		3	<i>Pseudoscleropodium purum</i>	3
<i>Taraxacum officinale</i> agg.		2		
<i>Anthoxanthum odoratum</i>		1		
<i>Cirsium palustre</i>		1		
<i>Ranunculus flammula</i>		3		
<i>Cirsium dissectum</i>		1		
<i>Trifolium repens</i>		3		
<i>Molinia caerulea</i>		2		
<i>Carex panicea</i>		1		
<i>Carex pulicaris</i>		1		
<i>Danthonia decumbens</i>		1		
<i>Luzula campestre</i>		1		
<i>Carex viridula</i>		1		
<i>Deschampsia caespitosa</i>		2		
			Species Total	18
NVC Code		Site & Vegetation Description		
M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> Mire <i>Anthoxanthum odoratum</i> sub-community		Grazing pressure low and patchy. Sward tall and dense		

	with few bryophytes
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Photo of Quadrat 7

Quadrat no. 8		Date 20th July 2016	Estimated Slope (°) 3	
Quadrat size 2m x 2m		Grid Ref IC 73543 25743		
Surveyor KH	Altitude (m asl) 175		Site Dunbeg South	
Species		DOMIN	Species	DOMIN
<i>Cynosurus cristatus</i>		7	<i>Calliergonella cuspidatum</i>	7
<i>Bellis perennis</i>		2		
<i>Rumex acetosa</i>		1		
<i>Prunella vulgaris</i>		3		
<i>Cirsium palustre</i>		3		
<i>Ranunculus repens</i>		3		
<i>Cerastium fontanum</i>		2		
<i>Leontodon autumnalis</i>		5		
<i>Galium palustre</i>		1		
<i>Trifolium repens</i>		3		
<i>Lolium perenne</i>		2		
<i>Juncus bulbosus</i>		3		
<i>Carex leporina</i>		1		
<i>Ranunculus flammula</i>		1		
<i>Deschampsia caespitosa</i>		1		
<i>Juncus acutiflorus</i>		2		
			Species Total	17
NVC Code MG8 <i>Cynosurus cristatus</i> – <i>Valtha palustris</i> grassland		Site & Vegetation Description Mesotrophic grassland with heavy grazing pressure. Sward very short and open with tussocks of <i>Juncus effusus</i>		

	nearby
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Photo of Quadrat 8

Quadrat no.		Date		Estimated Slope (°)	
9		20th July 2016		6	
Quadrat size		Grid Ref			
2m x 2m		IC 73693 25754			
Surveyor	Altitude (m asl)		Site		
KH	178		Dunbeg South		
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		8	<i>Rhytidiadelphus squarrosus</i>		7
<i>Trifolium repens</i>		3	<i>Pseudoscleropodium purum</i>		4
<i>Cynosurus cristatus</i>		4	<i>Thuidium tamariscinum</i>		3
<i>Anthoxanthum odoratum</i>		1			
<i>Ranunculus repens</i>		3			
<i>Cirsium palustre</i>		1			
<i>Cirsium dissectum</i>		1			
<i>Potentilla erecta</i>		2			
<i>Holcus lanatus</i>		2			
<i>Juncus conglomeratus</i>		2			
<i>Deschampsia caespitosa</i>		1			
			Species Total		14
NVC Code		Site & Vegetation Description			
U4b <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland		Grazing pressure moderate and patchily distributed. Sward short and very open			

Holcus lanatus – *Trifolium repens* sub-community



Photo of Quadrat 9

Quadrat no.	10	Date	20th July 2016	Estimated Slope (°)	9
Quadrat size	2m x 2m	Grid Ref	IC 73843 25754		
Surveyor	KH	Altitude (m asl)	186	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Dactylorhiza maculatum</i>		1	<i>Calliergonella cuspidatum</i>		6
<i>Juncus acutiflorus</i>		8			
<i>Holcus lanatus</i>		1			
<i>Potentilla erecta</i>		3			
<i>Ranunculus flammula</i>		2			
<i>Cirsium palustre</i>		2			
<i>Cirsium dissectum</i>		2			
<i>Molinia caerulea</i>		1			
<i>Trifolium repens</i>		3			
<i>Carex echinata</i>		3			
<i>Epilobium palustre</i>		2			
<i>Carex panicea</i>		2			
<i>Juncus conglomeratus</i>		2			
			Species Total		14
NVC Code	Site & Vegetation Description				
M25c <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire	Sward tall and dense. Low grazing pressure				

Angelica sylvestris sub-community	
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Photo of Quadrat 10

Quadrat no.	11	Date	20th July 2016	Estimated Slope (°)	5
Quadrat size	2m x 2m	Grid Ref	IC 73993 25754		
Surveyor	KH	Altitude (m asl)	206	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Anthoxanthum odoratum</i>		2		<i>Hylocomium splendens</i>	6
<i>Festuca ovina</i>		7		<i>Thuidium tamariscinum</i>	5
<i>Potentilla erecta</i>		3		<i>Dicranum scoparium</i>	1
<i>Euphrasia</i> sp.		2			
<i>Nardus stricta</i>		3			
<i>Galium saxatile</i>		3			
<i>Carex flacca</i>		2			
<i>Danthonia decumbens</i>		2			
<i>Carex pilulifera</i>		1			
<i>Agrostis capillaris</i>		3			
<i>Carex echinata</i>		4			
<i>Holcus lanatus</i>		5			
Bare rock		4			
				Species Total	15
NVC Code	Site & Vegetation Description				
U5d <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland;	Closely-grazed grassland with abundant sheep dunging. Surrounded by <i>J. acutiflorus</i> pasture. Sward very short				

Calluna vulgaris – *Danthonia decumbens*
sub-community

~3cm tall



Photo of Quadrat 11

Quadrat no.	12	Date	15th June 2016	Estimated Slope (°)	
Quadrat size	2m X 2m	Grid Ref	IC 74143 25754		
Surveyor	CL	Altitude (m asl)	Site Dunbeg South		
Species		DOMIN	Species	DOMIN	
<i>Anthoxanthum odoratum</i>		4	<i>Bare ground</i>	2	
<i>Potentilla erecta</i>		3			
<i>Cirsium palustre</i>		1			
<i>Lolium perenne</i>		3			
<i>Luzula multiflora</i>		2			
<i>Nardus stricta</i>		5			
<i>Trifolium repens</i>		2			
<i>Carex panicea</i>		4			
<i>Festuca ovina</i>		5			
<i>Ranunculus acris</i>		3			
<i>Carex echinata</i>		4			
<i>Molinia caerulea</i>		2			
<i>Juncus acutiflorus</i>		5			
<i>Juncus effusus</i>		2			
<i>Pseudoscleopodium purum</i>		4			
<i>Hylocomium splendens</i>		7			
			Species Total	16	
NVC Code	U5c <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland; <i>Carex panicea</i> - <i>Viola riviniana</i> sub-community		Site & Veg Description Grassland with light levels of grazing. Sward moderately diverse.		



Photo of Quadrat 12

Quadrat no.	13	Date	20th July 2016	Estimated Slope (°)	0
Quadrat size	2m x 2m	Grid Ref	IC 74293 25754		
Surveyor	KH	Altitude (m asl)	231	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		9	<i>Rhytiadelphus squarrosus</i>		6
<i>Holcus lanatus</i>		5	<i>Kindbergia praelonga</i>		2
<i>Rumex acetosa</i>		2			
<i>Cynosurus cristatus</i>		3			
<i>Trifolium repens</i>		3			
<i>Juncus effusus</i>		1			
<i>Ranunculus flammula</i>		2			
<i>Anthoxanthum odoratum</i>		1			
<i>Ranunculus acris</i>		2			
<i>Deschampsia caespitosa</i>		2			
			Species Total		12
NVC Code	Site & Vegetation Description				
MG6b <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland	Low grazing pressure. Sward tall and quite dense				

Anthoxanthum odoratum sub-community



Photo of Quadrat 13

Quadrat no.	14	Date	20th July 2016	Estimated Slope (°)	2
Quadrat size	2m x 2m	Grid Ref	IC 73243 25604		
Surveyor	KH	Altitude (m asl)	181	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Deschampsia caespitosa</i>		4	<i>Rhytiadelphus squarrosus</i>		5
<i>Ranunculus acris</i>		3	<i>Thuidium tamariscinum</i>		4
<i>Potentilla erecta</i>		3	<i>Pseudoscleropodium purum</i>		3
<i>Anthoxanthum odoratum</i>		3			
<i>Holcus lanatus</i>		4			
<i>Juncus effusus</i>		6			
<i>Nardus stricta</i>		3			
<i>Carex echinata</i>		2			
<i>Cynosurus cristatus</i>		3			
<i>Carex pulicaris</i>		1			
<i>Agrostis capillaris</i>		2			
<i>Carex flacca</i>		1			
<i>Trifolium repens</i>		3			
<i>Cardamine pratense</i>		1			
<i>Dactylorhiza maculata</i>		1			
<i>Luzula campestre</i>		1			
			Species Total		19
NVC Code	Site & Vegetation Description				
U4d <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland	Rush pasture / mesotrophic grassland boundary. Sward tall, open and very grassy. Grazing pressure low				

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Luzula multiflora – *Rhytidiadelphus loreus*
sub-community



Photo of Quadrat 14

Quadrat no.	15	Date	20th July 2016	Estimated Slope (°)	3
Quadrat size	2m x 2m	Grid Ref	IC 73393 25604		
Surveyor	KH	Altitude (m asl)	184	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Cynosurus cristatus</i>		5			
<i>Cirsium arvense</i>		4			
<i>Ranunculus repens</i>		3			
<i>Rumex acetosa</i>		3			
<i>Cirsium palustre</i>		4			
<i>Holcus lanatus</i>		7			
<i>Lolium perenne</i>		5			
<i>Juncus effusus</i>		4			
<i>Poa pratensis</i>		2			
<i>Trifolium repens</i>		3			
<i>Cerastium fontanum</i>		2			
<i>Anthoxanthum odoratum</i>		1			
<i>Ranunculus flammula</i>		2			
<i>Nardus stricta</i>		3			
<i>Prunella vulgaris</i>		3			
<i>Bellis perennis</i>		3			
<i>Taraxacum officinale</i> agg.		2			
<i>Carex leporina</i>		2			
<i>Juncus acutiflorus</i>		2			
<i>Carex echinata</i>		2			
<i>Leontodon autumnalis</i>		3			
			Species Total		21
NVC Code	Site & Vegetation Description				
MG6b	Mesotrophic grassland with low grazing pressure.				
<i>Lolium perenne</i> – <i>Cynosurus cristatus</i>	Surrounding habitat is <i>J. effusus</i> pasture. Sward quite				

CONSENTED (LA01/2018/0200/F)

grassland <i>Anthoxanthum odoratum</i> sub-community	short with no bryophytes due to thick grass growth
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Photo of Quadrat 15

Quadrat no. 16	Date 20th July 2016	Estimated Slope (°) 3	
Quadrat size 2m x 2m	Grid Ref IC 73543 25604		
Surveyor KH	Altitude (m asl) 181	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Holcus lanatus</i>	8		
<i>Cirsium palustre</i>	2		
<i>Cynosurus cristatus</i>	5		
<i>Juncus effusus</i>	4		
<i>Lolium perenne</i>	5		
<i>Trifolium repens</i>	3		
<i>Ranunculus repens</i>	3		
<i>Cirsium arvense</i>	2		
<i>Prunella vulgaris</i>	1		
<i>Cerastium fontanum</i>	2		
<i>Achillea millefolium</i>	1		
<i>Agrostis capillaris</i>	1		
<i>Anthoxanthum odoratum</i>	1		
<i>Cirsium dissectum</i>	2		
<i>Rumex acetosa</i>	2		
		Species Total	15
NVC Code MG6b <i>Lolium perenne</i> – <i>Cynosurus cristatus</i>	Site & Vegetation Description Clear evidence of improvement = mesotrophic grassland. Sward thick with no bryophytes due to shading by		

grassland <i>Anthoxanthum odoratum</i> sub-community	grasses. Surrounding habitat <i>J. effusus</i> pasture. Grazing pressure moderate
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Photo of Quadrat 16

Quadrat no.	17	Date	20th July 2016	Estimated Slope (°)	8
Quadrat size	2m x 2m	Grid Ref	IC 73693 25604		
Surveyor	KH	Altitude (m asl)	185	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Plantago major</i>		4	<i>Brachythecium rutabulum</i>		1
<i>Juncus effusus</i>		5			
<i>Poa annua</i>		5			
<i>Alopecurus geniculatus</i>		1			
<i>Lolium perenne</i>		5			
<i>Cynosurus cristatus</i>		3			
<i>Cerastium fontanum</i>		1			
<i>Trifolium repens</i>		2			
<i>Holcus lanatus</i>		5			
<i>Juncus articulatus</i>		1			
<i>Prunella vulgaris</i>		1			
<i>Ranunculus flammula</i>		1			
Bare ground / stones		7			
			Species Total		13
NVC Code	Site & Vegetation Description				
MG6b	Well-used stony track cut through <i>J. effusus</i> pasture. Many ruderal / annual species present				

Lolium perenne – *Cynosurus cristatus*
grassland
Anthoxanthum odoratum sub-community



Photo of Quadrat 17

Quadrat no.	18	Date	20th July 2016	Estimated Slope (°)	8
Quadrat size	2m x 2m	Grid Ref	IC 73843 25604		
Surveyor	KH	Altitude (m asl)	199	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		8	<i>Thuidium tamariscinum</i>		5
<i>Nardus stricta</i>		4	<i>Rhytiadelphus squarrosus</i>		5
<i>Cynosurus cristatus</i>		5	<i>Pseudopscleropodium purum</i>		3
<i>Potentilla erecta</i>		3	<i>Calliergonella cuspidatum</i>		7
<i>Cirsium palustre</i>		2			
<i>Ranunculus acris</i>		3			
<i>Ranunculus flammula</i>		2			
<i>Luzula campestris</i>		1			
<i>Carex panicea</i>		1			
<i>Carex viridula</i>		1			
<i>Cirsium dissectum</i>		2			
<i>Linum catharticum</i>		1			
<i>Anthoxanthum odoratum</i>		1			
			Species Total		17
NVC Code	Site & Vegetation Description				
U5c <i>Nardus stricta</i> - <i>Galium saxatile</i>	Rush pasture with moderate grazing pressure, creating				

CONSENTED (LA01/2018/0200/F)

NVC Code	Site & Vegetation Description
MG6b <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland <i>Anthoxanthum odoratum</i> sub-community	Grazing pressure within quadrat very low. Sward tall but quite open



Photo of Quadrat 19

Quadrat no.	20	Date	20th July 2016	Estimated Slope (°)	5
Quadrat size	2m x 2m	Grid Ref	IC 74143 25604		
Surveyor	KH	Altitude (m asl)	231	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		8	<i>Sphagnum fallax</i>		4
<i>Potentilla erecta</i>		4	<i>Sphagnum papillosum</i>		6
<i>Juncus squarrosus</i>		3	<i>Hylocomium splendens</i>		5
<i>Molinia caerulea</i>		4	<i>Rhynchospora loreus</i>		4
<i>Deschampsia flexuosa</i>		5	<i>Polytrichum commune</i>		4
<i>Carex echinata</i>		2	<i>Sphagnum capillifolium</i>		5
<i>Carex flacca</i>		1			
<i>Cirsium palustre</i>		3			
			Species Total		14
NVC Code	Site & Vegetation Description				

M6d <i>Carex echinata</i> – <i>Sphagnum recurvum/auriculatum</i> mire <i>Juncus acutiflorus</i> sub-community	Rush pasture - very wet underfoot. Grazing pressure low and patchy, creating tall but relatively open sward. Sphagna in carpets and low hummocks
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Photo of Quadrat 20

Quadrat no. 21	Date 20th July 2016	Estimated Slope (°) 3	
Quadrat size 2m x 2m	Grid Ref IC 74293 25604		
Surveyor KH	Altitude (m asl) 238	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Juncus acutiflorus</i>	9	<i>Rhytiadelphus squarrosus</i>	6
<i>Holcus lanatus</i>	5	<i>Thuidium tamariscinum</i>	5
<i>Potentilla erecta</i>	4	<i>Hypnum jutlandicum</i>	2
<i>Molinia caerulea</i>	4	<i>Hylocomium splendens</i>	5
<i>Ranunculus acris</i>	2		
<i>Carex pulicaris</i>	2		
<i>Trifolium repens</i>	3		
<i>Nardus stricta</i>	2		
<i>Anthoxanthum odoratum</i>	1		
<i>Pedicularis sylvatica</i>	3		
<i>Carex flacca</i>	2		
<i>Luzula campestre</i>	1		
		Species Total	16

<p>NVC Code M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community</p>	<p>Site & Vegetation Description Sward tall but open. Abundance of <i>P. sylvatica</i> helping to reduce vigour of grass species in general area of sampling. Grazing pressure low and patchy</p>
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Photo of Quadrat 21

<p>Quadrat no. 22</p>	<p>Date 20th July 2016</p>	<p>Estimated Slope (°) 2</p>	
<p>Quadrat size 2m x 2m</p>	<p>Grid Ref IC 74443 25604</p>		
<p>Surveyor KH</p>	<p>Altitude (m asl) 245</p>	<p>Site Dunbeg South</p>	
<p>Species</p>	<p>DOMIN</p>	<p>Species</p>	<p>DOMIN</p>
<p><i>Juncus acutiflorus</i></p>	<p>9</p>	<p><i>Sphagnum papillosum</i></p>	<p>3</p>
<p><i>Ranunculus flammula</i></p>	<p>4</p>	<p><i>Sphagnum fallax</i></p>	<p>5</p>
<p><i>Holcus lanatus</i></p>	<p>4</p>	<p><i>Calliergonella cuspidatum</i></p>	<p>6</p>
<p><i>Molinia caerulea</i></p>	<p>5</p>	<p><i>Thuidium tamariscinum</i></p>	<p>4</p>
<p><i>Deschampsia caespitosa</i></p>	<p>2</p>	<p><i>Rhytidiadelphus squarrosus</i></p>	<p>4</p>
<p><i>Carex echinata</i></p>	<p>3</p>		
		<p>Species Total</p>	<p>11</p>

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with scattered <i>Molinia</i> tussocks. Sward patchy with pleurocarpous mosses abundant in shorter / more open areas. Grazing pressure low



Photo of Quadrat 24

Quadrat no.	25	Date	15th July 2016	Estimated Slope (°)	8
Quadrat size	2m x 2m	Grid Ref	IC 7324325454		
Surveyor	KH	Altitude (m asl)	200	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		9			
<i>Potentilla erecta</i>		3			
<i>Molinia caerulea</i>		4			
<i>Luzula campestre</i>		1			
<i>Anthoxanthum odoratum</i>		1			
<i>Carex pulicaris</i>		2			
<i>Deschampsia caespitosa</i>		2			
<i>Dactylorhiza maculata</i>		1			
<i>Carex panicea</i>		1			
<i>Holcus lanatus</i>		2			
<i>Pseudoscleropodium purum</i>		6			
<i>Thuidium tamariscinum</i>		4			
<i>Rhytiadelphus squarrosus</i>		6			
			Species Total		13

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acuteiflorus-Galium palustre</i> rush pasture; <i>Juncus acuteiflorus</i> sub-community	Rush pasture with scattered <i>Molinia</i> tussocks. Grazing pressure low



Photo of Quadrat 25

Quadrat no.	26	Date	15th July 2016	Estimated Slope (°)	8
Quadrat size	2m x 2m	Grid Ref	IC 733932545		
Surveyor	KH	Altitude (m asl)	196	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus effusus</i>		4			
<i>Holcus lanatus</i>		6			
<i>Anthoxanthum odoratum</i>		1			
<i>Cynosurus cristatus</i>		4			
<i>Lolium perenne</i>		2			
<i>Trifolium repens</i>		4			
<i>Cerastium fontanum</i>		2			
<i>Rumex acetosa</i>		3			
<i>Prunella vulgaris</i>		2			
<i>Ranunculus repens</i>		2			
<i>Nardus stricta</i>		1			
<i>Deschampsia caespitosa</i>		1			
<i>Luzula campestre</i>		1			
<i>Poa trivialis</i>		2			
<i>Kindbergia praelonga</i>		4			
<i>Rhytidiadelphus squarrosus</i>		4			
			Species Total		16

<p>NVC Code</p> <p><i>Festuca rubra</i>-<i>Holcus lanatus</i>-<i>Anthoxanthum odoratum</i> provisional grassland community (Rodwell et al. 2000)</p>	<p>Site & Vegetation Description</p> <p>Short, thick sward with scattered <i>Juncus effusus</i> tussocks. Some improvement evident (<i>Lolium</i>). Moderate grazing pressure. Mesotrophic plant assemblage</p>
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Photo of Quadrat 26

Quadrat no.	27	Date	15th July 2016	Estimated Slope (°)	10
Quadrat size	2m x 2m	Grid Ref	IC 7354325454		
Surveyor	KH	Altitude (m asl)	197	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		7			
<i>Deschampsia caespitosa</i>		4			
<i>Ranunculus acris</i>		3			
<i>Lotus pedunculata</i>		4			
<i>Potentilla erecta</i>		3			
<i>Nardus stricta</i>		4			
<i>Carex panicea</i>		1			
<i>Anthoxanthum odoratum</i>		3			
<i>Cynosurus cristatus</i>		3			
<i>Cirsium dissectum</i>		1			
<i>Taraxacum officinale</i>		2			
<i>Holcus lanatus</i>		6			
<i>Cirsium palustre</i>		1			
<i>Juncus conglomeratus</i>		2			
<i>Carex pulicaris</i>		1			
<i>Carex echinata</i>		1			
<i>Luzula campestre</i>		2			
<i>Rhytiadelphus squarrosus</i>		5			
<i>Pseudoscleropodium purum</i>		4			
			Species Total		19

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with flora typical of mesophytic assemblage. Sward short and patchy, showing signs of moderate grazing pressure due to palatable grasses



Photo of Quadrat 27

Quadrat no.	28	Date	15th July 2016	Estimated Slope (°)	8
Quadrat size	2m x 2m	Grid Ref	IC 7369325454		
Surveyor	KH	Altitude (m asl)	201	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Cirsium arvense</i>		5			
<i>Cynosurus cristatus</i>		4			
<i>Ranunculus repens</i>		5			
<i>Trifolium repens</i>		4			
<i>Holcus lanatus</i>		6			
<i>Agrostis capillaris</i>		2			
<i>Lolium perenne</i>		3			
<i>Juncus effusus</i>		4			
<i>Rumex acetosa</i>		3			
<i>Cerastium fontanum</i>		2			
<i>Cirsium palustre</i>		2			
<i>Anthoxanthum odoratum</i>		3			
<i>Thuidium tamariscinum</i>		3			
<i>Rhytiadelphus squarrosus</i>		5			
			Species Total		14

NVC Code	Site & Vegetation Description
<i>Festuca rubra</i> - <i>Holcus lanatus</i> - <i>Anthoxanthum odoratum</i> provisional grassland community (Rodwell et al. 2000)	Very closely-grazed mesotrophic sward. Much sheep dunging



Photo of Quadrat 28

Quadrat no.	29	Date	15th July 2016	Estimated Slope (°)	10
Quadrat size	2m x 2m	Grid Ref	IC 7384325454		
Surveyor	KH	Altitude (m asl)	217	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		8			
<i>Ranunculus acris</i>		3			
<i>Potentilla erecta</i>		3			
<i>Cynosurus cristatus</i>		3			
<i>Dactylorhiza maculata</i>		1			
<i>Molinia caerulea</i>		2			
<i>Anthoxanthum odoratum</i>		1			
<i>Carex pulicaris</i>		2			
<i>Nardus stricta</i>		2			
<i>Trifolium repens</i>		3			
<i>Luzula campestre</i>		1			
<i>Leontodon autumnalis</i>		1			
<i>Holcus lanatus</i>		2			
<i>Agrostis capillaris</i>		1			
<i>Rhytidadelphus squarrosus</i>		6			
<i>Calliargonella cuspidatum</i>		6			
<i>Hylocomium splendens</i>		3			
Bare rock		4			
Species Total					17

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with low grazing pressure. Sward patchy and quite open



Photo of Quadrat 29

Quadrat no.	30	Date	15th July 2016	Estimated Slope (°)	20
Quadrat size	2m x 2m	Grid Ref	IC 7399325454		
Surveyor	KH	Altitude (m asl)	234	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Achillea millefolium</i>		4			
<i>Plantago lanceolata</i>		3			
<i>Euphrasia sp.</i>		3			
<i>Potentilla erecta</i>		3			
<i>Anthoxanthum odoratum</i>		4			
<i>Cynosurus cristatus</i>		5			
<i>Prunella vulgaris</i>		2			
<i>Thymus polytrichus</i>		2			
<i>Cerastium fontanum</i>		2			
<i>Deschampsia caespitosa</i>		4			
<i>Cirsium palustre</i>		3			
<i>Galium saxatile</i>		3			
<i>Trifolium repens</i>		3			
<i>Viola riviniana</i>		3			
<i>Festuca ovina</i>		5			
<i>Cirsium dissectum</i>		4			
<i>Holcus lanatus</i>		6			
<i>Rumex acetosa</i>		4			
<i>Rhytiadelphus squarrosus</i>		6			
			Species Total		19

<p>NVC Code</p> <p><i>Festuca rubra</i>-<i>Holcus lanatus</i>- <i>Anthoxanthum odoratum</i> provisional grassland community (Rodwell et al. 2000)</p>	<p>Site & Vegetation Description</p> <p>Very short, closely-grazed sward at top of river bank. Obvious sheep paths and abundant dunging. Species rich with evidence of some calcareous influence (<i>Thymus</i>)</p>
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Photo of Quadrat 30

Quadrat no.	31	Date	15th July 2016	Estimated Slope (°)	7
Quadrat size	2m x 2m	Grid Ref	IC 7414325454		
Surveyor	KH	Altitude (m asl)	252	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Nardus stricta</i>		8			
<i>Potentilla erecta</i>		4			
<i>Anthoxanthum odoratum</i>		2			
<i>Carex echinata</i>		3			
<i>Galium saxatile</i>		2			
<i>Carex flacca</i>		2			
<i>Carex panicea</i>		3			
<i>Pedicularis sylvatica</i>		1			
<i>Luzula campestre</i>		1			
<i>Deschampsia caespitosa</i>		2			
<i>Pseudoscleropodium purum</i>		5			
<i>Rhynchospora squarrosa</i>		5			
<i>Thuidium tamariscinum</i>		3			
<i>Rhynchospora loreus</i>		4			
<i>Hypnum jutlandicum</i>		1			
<i>Brachythecium rutabulum</i>		1			
Species Total					16

NVC Code	Site & Vegetation Description
U5 <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	Sward short and patchy. Moderate grazing (i.e. selective due to relative unpalatability of <i>Nardus</i>)



Photo of Quadrat 31

Quadrat no.	32	Date	15th July 2016	Estimated Slope (°)	0
Quadrat size	2m x 2m	Grid Ref	IC 7429325454		
Surveyor	KH	Altitude (m asl)	250	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Eriophorum angustifolium</i>		7			
<i>Festuca ovina</i>		3			
<i>Eriophorum vaginatum</i>		2			
<i>Narthecium ossifragum</i>		3			
<i>Molinia caerulea</i>		5			
<i>Drosera rotundifolia</i>		2			
<i>Juncus bulbosus</i>		2			
<i>Sphagnum papillosum</i>		6			
<i>Sphagnum cuspidatum</i>		5			
<i>Polytrichum commune</i>		3			
<i>Sphagnum capillifolium</i>		3			
<i>Rhytidiadelphus loreus</i>		1			
Open water		5			
				Species Total	12

NVC Code	Site & Vegetation Description
M17 <i>Trichophorum caespitosum</i> - <i>Eriophorum vaginatum</i> blanket mire	Drain at side of peat cutting with small, open pools. Moderate sheep grazing / dunging



Photo of Quadrat 32

Quadrat no.	33	Date	15th July 2016	Estimated Slope (°)	15
Quadrat size	2m x 2m	Grid Ref	IC 7444325454		
Surveyor	KH	Altitude (m asl)	263	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Juncus acutiflorus</i>		8			
<i>Ranunculus acris</i>		5			
<i>Holcus lanatus</i>		5			
<i>Potentilla erecta</i>		3			
<i>Anthoxanthum odoratum</i>		2			
<i>Poa pratensis</i>		1			
<i>Trifolium repens</i>		3			
<i>Rumex acetosa</i>		3			
<i>Cynosurus cristatus</i>		3			
<i>Deschampsia caespitosa</i>		2			
<i>Cirsium palustre</i>		1			
<i>Luzula campestre</i>		1			
<i>Rhytidadelphus squarrosus</i>		6			
<i>Pseudoscleopodium purum</i>		6			
			Species Total		14

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with low grazing evident. Sward patchy with some open areas, where shorter forbs dominate. <i>Ranunculus acris</i> especially abundant here. Clearly part of downhill flush



Photo of Quadrat 33

Quadrat no. 34	Date 20th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 72793 25304		
Surveyor KH	Altitude (m asl) 167	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Anthoxanthum odoratum</i>	4	<i>Dicranum scoparium</i>	1
<i>Potentilla erecta</i>	6	<i>Cladonia</i> sp. (on rock)	1
<i>Cirsium palustre</i>	1	<i>Hypnum jutlandicum</i>	1
<i>Plantago lanceolata</i>	1	Bare Rock	4
<i>Cynosurus cristatus</i>	2		
<i>Nardus stricta</i>	7		
<i>Trifolium repens</i>	2		
<i>Carex flacca</i>	3		
<i>Festuca ovina</i>	4		
<i>Holcus lanatus</i>	2		
<i>Cirsium dissectum</i>	3		
<i>Galium saxatile</i>	3		
	2		
<i>Carex pulicaris</i>	1		
<i>Deschampsia caespitosa</i>	4		
<i>Pseudoscleopodium purum</i>	2		
<i>Thuidium tamariscinum</i>	6		
<i>Rhytidiadelphus squarrosus</i>	7		
<i>Calliergonella cuspidatum</i>	4		
<i>Hylocomium splendens</i>	6		
<i>Polytrichum commune</i>	1		
		Species Total	24
NVC Code	Site & Veg Description		

U5c *Nardus stricta*-*Galium saxatile*
grassland; *Carex panicea*-*Viola riviniana*
sub-community

Grassland with moderate levels of grazing. Sward
species-rich. Some evidence of mild disturbance
by livestock. Evidence of some base-rich flushing
in presence of *Carex flacca* & *C. pulicaris*



Photo of Quadrat 34

Quadrat no. 35	Date 20th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 72943 25304		
Surveyor KH	Altitude (m asl) 193	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Potentilla erecta</i>	5		
<i>Anthoxanthum odoratum</i>	4		
<i>Holcus lanatus</i>	4		
<i>Trifolium repens</i>	2		
<i>Nardus stricta</i>	6		
<i>Festuca ovina</i>	6		
<i>Juncus effusus</i>	5		
<i>Luzula campestris</i>	2		
<i>Juncus acutiflorus</i>	4		
<i>Carex pulicaris</i>	2		
<i>Juncus bulbosus</i>	1		
<i>Carex flacca</i>	5		
<i>Scapania umbrosa</i>	1		
<i>Pseudoscleopodium purum</i>	4		
<i>Thuidium tamariscinum</i>	5		
<i>Rhytidiadelphus squarrosus</i>	5		
<i>Hylocomium splendens</i>	6		
		Species Total	17
NVC Code	Site & Vegetation Description		

U5c *Nardus stricta*-*Galium saxatile* grassland; *Carex panicea*-*Viola riviniana* sub-community

Grassland with moderate grazing. Quite species-rich.



Photo of Quadrat 35

Quadrat no.	36	Date	20th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 73093 25304		
Surveyor	KH	Altitude (m asl)	207	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Deschampsia caespitosa</i>		3			
<i>Anthoxanthum odoratum</i>		4			
<i>Holcus lanatus</i>		3			
<i>Festuca vivipara</i>		2			
<i>Ranunculus repens</i>		1			
<i>Trifolium repens</i>		2			
<i>Festuca ovina</i>		5			
<i>Nardus stricta</i>		6			
<i>Cynosurus cristatus</i>		3			
<i>Juncus effusus</i>		5			
<i>Juncus acutiflorus</i>		3			
<i>Cirsium palustre</i>		3			
<i>Rumex acetosa</i>		1			
<i>Potentilla erecta</i>		2			
<i>Agrostis capillaris</i>		4			
				Species Total	15
NVC Code	Site & Vegetation Description				

U5c *Nardus stricta*-*Galium saxatile* grassland; *Carex panicea*-*Viola riviniana* sub-community

Acid grassland with tussocks of *Nardus* and *Festuca ovina* dominant, together with scattered *Juncus effusus*. Few forbs. Less species-rich than Q34 and with no bryophytes. Evidence of some base-rich flushing e.g. presence of mesotrophic forbs such as *Ranunculus acris* and *Trifolium repens*



Photo of Quadrat 36

Quadrat no.	37	Date	20th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 73243 25304		
Surveyor	KH	Altitude (m asl)	219	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Galium saxatile</i>		5			
<i>Juncus acutiflorus</i>		7			
<i>Potentilla erecta</i>		5			
<i>Juncus squarrosus</i>		3			
<i>Nardus stricta</i>		4			
<i>Festuca ovina</i>		5			
<i>Anthoxanthum odoratum</i>		5			
<i>Luzula campestris</i>		1			
<i>Carex viridula</i>		2			
<i>Polytrichum commune</i>		8			
<i>Rhytiadelphus squarrosus</i>		6			
<i>Rhytiadelphus loreus</i>		4			
<i>Pseudoscleropodium purum</i>		4			
<i>Thuidium tamariscinum</i>		4			
<i>Sphagnum fallax</i>		4			
				Species Total	15
NVC Code	Site & Vegetation Description				

M23a *Juncus effusus/acutiflorus-Galium palustre* rush-pasture; *Juncus acutiflorus* sub-community

Fewer mosses recorded and drier underfoot - different field than Q37. Some livestock damage to sward evident e.g. localised mild poaching and dunging. Sward dense Abundance of *Holcus lanatus* suggests potential transition to MG10 possibly due to localised base-rich flushing



Photo of Quadrat 38

Quadrat no.	39	Date	20th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 73543 25304		
Surveyor	KH	Altitude (m asl)	216	Site	Dunbeg South
Species		DOMIN	Species	DOMIN	
<i>Ranunculus repens</i>		2			
<i>Ranunculus acris</i>		5			
<i>Luzula campestris</i>		3			
<i>Anthoxanthum odoratum</i>		4			
<i>Cynosurus cristatus</i>		4			
<i>Carex flacca</i>		4			
<i>Potentilla erecta</i>		5			
<i>Trifolium repens</i>		4			
<i>Rumex acetosa</i>		2			
<i>Holcus lanatus</i>		5			
<i>Festuca ovina</i>		6			
<i>Cirsium palustre</i>		2			
<i>Juncus acutiflorus</i>		8			
<i>Viola riviniana</i>		2			
<i>Cirsium dissectum</i>		2			
<i>Calliergonella cuspidatum</i>		6			
<i>Pseudoscleropodium purum</i>		2			
<i>Rhytidiadelphus squarrosus</i>		7			
			Species Total	18	
NVC Code	Site & Vegetation Description				

M23a *Juncus effusus/acutiflorus-Galium palustre* rush-pasture; *Juncus acutiflorus* sub-community

In comparison with Q34 - Q38, sward shorter and with greater quantity of *Juncus acutiflorus* present. Drainage channels cut to improve drainage nearby. Quite species-rich



Photo of Quadrat 39

Quadrat no. 40	Date 20th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 73693 25304		
Surveyor KH	Altitude (m asl) 221	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Cirsium palustre</i>	4	<i>Rhytiadelphus squarrosus</i>	2
<i>Cirsium arvense</i>	2	<i>Mnium hornum</i>	3
<i>Juncus effusus</i>	5	<i>Hypnum jutlandicum</i>	2
<i>Juncus acutiflorus</i>	2		
<i>Cynosurus cristatus</i>	2		
<i>Luzula campestris</i>	2		
<i>Anthoxanthum odoratum</i>	3		
<i>Cirsium dissectum</i>	2		
<i>Trifolium repens</i>	3		
<i>Cerastium fontanum</i>	3		
<i>Sagina procumbens</i>	2		
<i>Ranunculus repens</i>	3		
<i>Holcus lanatus</i>	4		
<i>Rumex acetosa</i>	2		
<i>Potentilla erecta</i>	3		
<i>Nardus stricta</i>	4		
<i>Poa annua</i>	5		
<i>Carex demissa</i>	3		
<i>Carex flacca</i>	3		
<i>Agrostis</i> sp.	4		
		Species Total	23
NVC Code M23b <i>Juncus effusus/acutiflorus-Galium</i>	Site & Vegetation Description Sward very short and closely grazed by sheep. Tallest		

palustre rush pasture; *Juncus effusus* sub-community

species are relatively unpalatable thistles, *Juncus* & *Nardus*. Steep riverbank adjacent to quadrat. Disturbed ground has created niche for *Sagina procumbens*, *Cirsium arvense*, *Cerastium fontanum*, *Poa annua*. Edge of quadrat against stand of *Juncus effusus*. Mixture of acid grassland and disturbed ground species has resulted in localised area of species-rich sward. Represents transition between *Juncus effusus* sub-community M23b and MG10a where *Holcus lanatus* dominates together with *Juncus effusus* and a lower diversity and abundance of fen species are present



Photo of Quadrat 40

Quadrat no. 41	Date 15th June 2016	Estimated Slope (°) 5	
Quadrat size 2m X 2m	Grid Ref IC 73843 25304		
Surveyor CL	Altitude (m asl)	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Nardus stricta</i>	8		
<i>Calluna vulgaris</i>	2		
<i>Carex echinata</i>	2		
<i>Carex nigra</i>	1		
<i>Carex panicea</i>	5		
<i>Carex viridula</i>	1		
<i>Carex hustiana</i>	3		
<i>Potentilla erecta</i>	5		
<i>Galium saxatile</i>	2		
<i>Anthoxanthum odoratum</i>	3		
<i>Juncus squarrosus</i>	2		
<i>Luzula multiflora</i>	2		
<i>Pedicularis sylvatica</i>	2		
<i>Hylocomium splendens</i>	8		
Bare soil	2		
		Species Total	14
NVC Code	Site & Vegetation Description		

U5c <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland;	Lightly grazed acid grassland Moderately diverse
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Photo of Quadrat 41

Quadrat no. 42	Date 20th June 2016	Estimated Slope (°) 5	
Quadrat size 2m X 2m	Grid Ref IC 73993 25304		
Surveyor KH	Altitude (m asl) 254	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Carex panicea</i>	6		
<i>Juncus acutiflorus</i>	6		
<i>Carex echinata</i>	3		
<i>Carex pulicaris</i>	1		
<i>Juncus bulbosus</i>	3		
<i>Nardus stricta</i>	5		
<i>Carex demissa</i>	3		
<i>Potentilla erecta</i>	2		
<i>Anthoxanthum odoratum</i>	1		
<i>Juncus conglomeratus</i>	1		
<i>Hypnum jutlandicum</i>	2		
Bare soil	8		
		Species Total	11
NVC Code M23a <i>Juncus effusus/acutiflorus</i> - <i>Galium</i>	Site & Vegetation Description Sward short and waterlogged. Closely grazed with		

<p><i>palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community</p>	<p>some poaching creating areas of bare, peaty soil. Sward dominated by sedges <i>Carex</i> spp. The presence of <i>C. panicea</i> and <i>C. pulicaris</i> indicates base-rich flushing</p>
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Photo of Quadrat 42

<p>Quadrat no. 43</p>	<p>Date 20th June 2016</p>	<p>Estimated Slope (°) 5</p>	
<p>Quadrat size 2m X 2m</p>	<p>Grid Ref IC 74143 25304</p>		
<p>Surveyor KH</p>	<p>Altitude (m asl) 250</p>	<p>Site Dunbeg South</p>	
<p>Species</p> <p><i>Festuca ovina</i></p> <p><i>Anthoxanthum odoratum</i></p> <p><i>Juncus effusus</i></p> <p><i>Juncus acutiflorus</i></p> <p><i>Trifolium repens</i></p> <p><i>Poa pratensis</i></p> <p><i>Holcus lanatus</i></p> <p><i>Equisetum fluviatile</i></p> <p><i>Rhytiadelphus squarrosus</i></p>	<p>DOMIN</p> <p>2</p> <p>2</p> <p>7</p> <p>6</p> <p>3</p> <p>7</p> <p>4</p> <p>1</p> <p>7</p>	<p>Species</p>	<p>DOMIN</p> <p>9</p>
<p>NVC Code</p> <p>M23b <i>Juncus effusus/acutiflorus-Galium</i></p>		<p>Site & Vegetation Description</p> <p>Sward tall and dominated by <i>Poa pratensis</i> and</p>	

<i>palustre</i> rush pasture; <i>Juncus effusus</i> sub-community	<i>Juncus</i> spp. Species-poor rush pasture. Difficult to separate from species-poor MG10a <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture
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Photo of Quadrat 43

Quadrat no. 44	Date 15th June 2016	Estimated Slope (°) 8	
Quadrat size 2m X 2m	Grid Ref IC 274293 425304		
Surveyor CL	Altitude (m asl) 291	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Juncus acutiflorus</i>	4	<i>Pseudoscleropodium purum</i>	4
<i>Juncus effusus</i>	3	<i>Rhytiadelphus squarrosus</i>	4
<i>Potentilla erecta</i>	4	<i>Hylocomium splendens</i>	3
<i>Ranunculus acris</i>	3	<i>Calliergonella cuspidata</i>	3
<i>Ranunculus repens</i>	4		
<i>Anthoxanthum odoratum</i>	4		
<i>Festuca rubra</i>	4		
<i>Galium saxatile</i>	3		
<i>Luzula multiflora</i>	1		
<i>Holcus lanatus</i>	3		
<i>Carex panicea</i>	4		
<i>Cynosurus cristatus</i>	4		
<i>Nardus stricta</i>	5		
<i>Cirsium palustre</i>	3		
<i>Viola riviniana</i>	2		
<i>Trifolium repens</i>	3		
<i>Lysimachia lemorum</i>	1		
<i>Cerastium fontanum</i>	1		
<i>Dactylorhiza maculata</i>	1		
		Species Total	23
NVC Code	Site & Vegetation Description		

M23a *Juncus effusus/acutiflorus-Galium palustre* rush pasture; *Juncus acutiflorus* sub-community

Quite species rich



Photo of Quadrat 44

Quadrat no. 45	Date 20th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 74443 25304		
Surveyor KH	Altitude (m asl) 283	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Juncus acutiflorus</i>	9		
<i>Ranunculus acris</i>	5		
<i>Anthoxanthum odoratum</i>	2		
<i>Festuca ovina</i>	2		
<i>Holcus lanatus</i>	4		
<i>Carex echinata</i>	1		
<i>Poa pratensis</i>	2		
<i>Thuidium tamariscinum</i>	2		
<i>Rhytiadelphus squarrosus</i>	7		
		Species Total	9

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Dense rush-dominated sward. Sparsely grazed, better grazing elsewhere on site (all sheep on lower ground during survey). Species-poor. Hard to distinguish from MG10a <i>Holcus lanatus-Juncus effusus</i> rush pasture



Photo of Quadrat 45

Quadrat no. 46	Date 20th June 2016	Estimated Slope (°) 5	
Quadrat size 2m X 2m	Grid Ref IC 74593 25304		
Surveyor KH	Altitude (m asl) 291	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Ranunculus acris</i>	4		
<i>Cirsium palustre</i>	2		
<i>Rumex acetosa</i>	3		
<i>Juncus acutiflorus</i>	9		
<i>Anthoxanthum odoratum</i>	4		
<i>Trifolium repens</i>	3		
<i>Carex echinata</i>	1		
<i>Potentilla erecta</i>	2		
<i>Cerastium fontanum</i>	1		
<i>Equisetum fluviatile</i>	1		
<i>Festuca rubra</i>	4		
<i>Rhytidadelphus squarrosus</i>	7		
<i>Calliergonella cuspidatum</i>	6		
		Species Total	13

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with waterlogged soil. Sward tall and dense. Some disturbance from resting sheep evident among rushes e.g. flattened vegetation



Photo of Quadrat 46

Quadrat no. 47	Date 27th June 2016	Estimated Slope (°) 12	
Quadrat size 2m X 2m	Grid Ref IC 72943 25154		
Surveyor KH	Altitude (m asl) 213	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Potentilla erecta</i>	2	<i>Pseudoscleropodium purum</i>	2
<i>Anthoxanthum odoratum</i>	4	<i>Rhytiadelphus squarrosus</i>	6
<i>Deschampsia caespitosa</i>	7	<i>Thuidium tamariscinum</i>	5
<i>Nardus stricta</i>	7	<i>Calliergonella cuspidatum</i>	5
<i>Cirsium dissectum</i>	2	<i>Hylocomium splendens</i>	2
<i>Juncus acutiflorus</i>	4		
<i>Carex pulicaris</i>	2		
<i>Ranunculus acris</i>	2		
<i>Trifolium repens</i>	3		
<i>Festuca ovina</i>	5		
<i>Cirsium palustre</i>	2		
<i>Carex panicea</i>	2		
<i>Cynosurus cristatus</i>	2		
<i>Galium saxatile</i>	2		
<i>Luzula campestre</i>	2		
<i>Festuca vivipara</i>	1		
<i>Holcus lanatus</i>	2		
<i>Carex flacca</i>	2		
<i>Viola riviniana</i>	1		
		Species Total	24
NVC Code	Site & Vegetation Description		

U5c *Nardus stricta*-*Galium saxatile*
grassland; *Carex panicea*-*Viola riviniana*
sub-community

Sward dominated by relatively unpalatable grasses
i.e. *Nardus* and *D. caespitosa*. Sedges scarce. Quite
dry underfoot. Adjacent areas with more palatable
grasses more closely grazed by sheep. More species
rich as a result



Photo of Quadrat 47

Quadrat no.	48	Date	27th June 2016	Estimated Slope (°)	12
Quadrat size	2m X 2m	Grid Ref	IC 73093 25154		
Surveyor	KH	Altitude (m asl)	230	Site	Dunbeg South
Species		DOMIN	Species	DOMIN	
<i>Holcus lanatus</i>		5			
<i>Potentilla erecta</i>		2			
<i>Nardus stricta</i>		7			
<i>Luzula campestris</i>		2			
<i>Carex echinata</i>		3			
<i>Deschampsia caespitosa</i>		6			
<i>Anthoxanthum odoratum</i>		2			
<i>Festuca ovina</i>		5			
<i>Juncus acutiflorus</i>		4			
<i>Poa pratensis</i>		1			
<i>Carex flacca</i>		2			
<i>Thuidium tamariscinum</i>		3			
<i>Rhytiadelphus squarrosus</i>		5			
<i>Pseudoscleropodium purum</i>		3			
			Species Total	14	
NVC Code	Site & Vegetation Description				

U5c *Nardus stricta*-*Galium saxatile*
grassland; *Carex panicea*-*Viola riviniana*
sub-community

Tussocky sward dominated by *Nardus* and
Deschampsia. Drier than Q49 resulting in fewer
sedges and much less *J. acutiflorus*. Indication of
some base-rich flushing due to presence of *Carex*
flacca



Photo of Quadrat 48

Quadrat no. 49	Date 27th June 2016	Estimated Slope (°) 12	
Quadrat size 2m X 2m	Grid Ref IC 73243 25154		
Surveyor KH	Altitude (m asl) 237	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Erica tetralix</i>	1		
<i>Calluna vulgaris</i>	1		
<i>Carex echinata</i>	7		
<i>Potentilla erecta</i>	4		
<i>Festuca ovina</i>	6		
<i>Carex flacca</i>	6		
<i>Anthoxanthum odoratum</i>	2		
<i>Carex panicea</i>	6		
<i>Deschampsia caespitosa</i>	3		
<i>Juncus squarrosus</i>	2		
<i>Holcus lanatus</i>	4		
<i>Sphagnum capillifolium</i>	2		
<i>Sphagnum papillosum</i>	2		
<i>Sphagnum fallax</i>	7		
<i>Rhytiadelphus loreus</i>	2		
		Species Total	15
NVC Code	Site & Vegetation Description		

M6b *Carex echinata*-*Sphagnum fallax*/
denticulatum mire; *Carex nigra*-*Nardus*
stricta sub-community

Sward short, open and boggy, dominated by low
carpets of *Sphagna* and sedges. Grazed heavily
which is maintaining *Calluna* as an infrequent, low and
scattered carpet within sward



Photo of Quadrat 49

Quadrat no.	50	Date	27th June 2016	Estimated Slope (°)	11
Quadrat size	2m X 2m	Grid Ref	IC 73393 25154		
Surveyor	KH	Altitude (m asl)	235	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Calluna vulgaris</i>		9			
<i>Potentilla erecta</i>		2			
<i>Deschampsia caespitosa</i>		1			
<i>Nardus stricta</i>		2			
<i>Carex panicea</i>		2			
<i>Carex echinata</i>		2			
<i>Carex flacca</i>		1			
<i>Festuca ovina</i>		2			
<i>Hylocomium splendens</i>		1			
<i>Rhytiadelphus loreus</i>		8			
<i>Pleurozium schreberi</i>		7			
<i>Scapania umbrosa</i>		1			
<i>Thuidium tamariscinum</i>		6			
<i>Aulacomnium palustre</i>		1			
<i>Hypnum jutlandicum</i>		5			
				Species Total	15
NVC Code	Site & Vegetation Description				

M19 *Calluna vulgaris*-*Eriophorum vaginatum* mire

Upland wet heath with *Calluna* dominant and with abundant pleurocarpous mosses. Although *Calluna* dominates, its short stature and gappy structure indicates moderate grazing over a wide area



Photo of Quadrat 50

Quadrat no.	51	Date	27th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 73543 25154		
Surveyor	KH	Altitude (m asl)	238	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Juncus acutiflorus</i>		10			
<i>Ranunculus acris</i>		2			
<i>Potentilla erecta</i>		3			
<i>Ranunculus repens</i>		2			
<i>Taraxacum officinale</i> agg.		1			
<i>Leontodon autumnalis</i>		2			
<i>Festuca ovina</i>		4			
<i>Anthoxanthum odoratum</i>		2			
<i>Carex flacca</i>		1			
<i>Ranunculus flammula</i>		3			
<i>Carex viridula</i>		1			
<i>Trifolium repens</i>		2			
<i>Holcus lanatus</i>		2			
<i>Luzula campestris</i>		2			
<i>Cardamine pratensis</i>		1			
<i>Cynosurus cristatus</i>		1			
<i>Rhytidiadelphus squarrosus</i>		6			
<i>Calliergonella cuspidatum</i>		5			
				Species Total	18

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture sward taller and more dense than in Q52 / 53 / 54 with greater abundance of <i>J. acutiflorus</i> thatch beneath. This indicates lower grazing pressure as a result of the waterlogged soils. Quite species-rich as a result



Photo of Quadrat 51

Quadrat no. 52	Date 27th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 73693 25154		
Surveyor KH	Altitude (m asl) 247	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Ranunculus acris</i>	5		
<i>Anthoxanthum odoratum</i>	4		
<i>Juncus acutiflorus</i>	8		
<i>Potentilla erecta</i>	4		
<i>Cirsium dissectum</i>	1		
<i>Carex flacca</i>	3		
<i>Carex panicea</i>	4		
<i>Nardus stricta</i>	4		
<i>Juncus effusus</i>	5		
<i>Holcus lanatus</i>	3		
<i>Trifolium repens</i>	3		
<i>Festuca ovina</i>	4		
<i>Luzula campestris</i>	3		
<i>Cynosurus cristatus</i>	1		
<i>Cirsium palustre</i>	1		
<i>Cardamine pratensis</i>	1		
<i>Pedicularis sylvatica</i>	1		
<i>Rhytidadelphus squarrosus</i>	8		
<i>Calliergonella cuspidatum</i>	6		
<i>Pseudoscleropodium purum</i>	5		
<i>Thuidium tamariscinum</i>	5		
	Species Total		21

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with relatively open sward; species-rich



Photo of Quadrat 52

Quadrat no. 53	Date 27th June 2016	Estimated Slope (°) 2	
Quadrat size 2m X 2m	Grid Ref IC 73843 25154		
Surveyor KH	Altitude (m asl) 250	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Potentilla erecta</i>	4		
<i>Juncus acutiflorus</i>	9		
<i>Anthoxanthum odoratum</i>	4		
<i>Ranunculus flammula</i>	2		
<i>Carex echinata</i>	3		
<i>Cirsium dissectum</i>	1		
<i>Holcus lanatus</i>	2		
<i>Festuca ovina</i>	5		
<i>Galium palustre</i>	1		
<i>Luzula campestris</i>	1		
<i>Carex viridula</i>	3		
<i>Carex pulicaria</i>	3		
<i>Carex panicea</i>	3		
<i>Juncus bulbosus</i>	4		
<i>Cardamine pratensis</i>	1		
<i>Taraxacum officinale</i> agg.	1		
<i>Calliergonella cuspidatum</i>	8		
<i>Thuidium tamariscinum</i>	2		
<i>Rhytidiadelphus squarrosus</i>	4		
<i>Pseudoscleropodium purum</i>	3		
<i>Polytrichum commune</i>	2		
		Species Total	21

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with relatively open sward; species-rich



Photo of Quadrat 53

Quadrat no.	54	Date	27th June 2016	Estimated Slope (°)	2
Quadrat size	2m X 2m	Grid Ref	IC 73993 25154		
Surveyor	KH	Altitude (m asl)	254	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Juncus acutiflorus</i>		9			
<i>Anthoxanthum odoratum</i>		4			
<i>Potentilla erecta</i>		4			
<i>Luzula campestris</i>		3			
<i>Carex echinata</i>		2			
<i>Rhynchospora squarrosa</i>		7			
<i>Polytrichum commune</i>		2			
<i>Thuidium tamariscinum</i>		2			
<i>Hylocomium splendens</i>		2			
<i>Sphagnum fallax</i>		1			
<i>Sphagnum papillosum</i>		1			
<i>Sphagnum denticulatum</i>		1			

	Species Total	13
NVC Code	Site & Vegetation Description	
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Open rush pasture with good diversity of mosses; small element of M6a <i>Carex echinata-Sphagnum fallax/denticulatum</i> mire present as acid-loving <i>Sphagna</i> and <i>Polytrichum commune</i>	



Photo of Quadrat 54

Quadrat no.	55	Date	27th June 2016	Estimated Slope (°)	20
Quadrat size	2m X 2m	Grid Ref	IC 74143 25154		
Surveyor	KH	Altitude (m asl)	256	Site	Dunbeg South
Species	DOMIN	Species	DOMIN		
<i>Juncus acutiflorus</i>	7	<i>Thuidium tamariscinum</i>	5		
<i>Potentilla erecta</i>	5	<i>Rhytidiadelphus squarrosus</i>	8		
<i>Ranunculus acris</i>	5	<i>Polytrichum commune</i>	4		
<i>Anthoxanthum odoratum</i>	2	<i>Hypnum jutlandicum</i>	1		
<i>Trifolium repens</i>	3	<i>Pseudoscleropodium purum</i>	1		
<i>Cynosurus cristatus</i>	2				
<i>Cirsium dissectum</i>	2				
<i>Festuca ovina</i>	4				
<i>Pedicularis sylvatica</i>	3				
<i>Veronica officinalis</i>	1				
<i>Carex pulicaris</i>	2				
<i>Carex flacca</i>	3				
<i>Carex panicea</i>	1				
<i>Carex viridula</i>	2				
<i>Ranunculus flammula</i>	4				
<i>Holcus lanatus</i>	3				
<i>Nardus stricta</i>	4				
<i>Viola palustris</i>	1				
<i>Luzula campestris</i>	2				

	Species Total	24
NVC Code	Site & Vegetation Description	
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Rush pasture with vegetation characteristic of wet flush e.g. <i>Viola palustris</i> , <i>Ranunculus flammula</i> , <i>Carex</i> spp. Sward species-rich	



Photo of Quadrat 55

Quadrat no.	56	Date	20th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 74293 25154		
Surveyor	KH	Altitude (m asl)	259	Site	Dunbeg South
Species		DOMIN	Species		DOMIN
<i>Festuca ovina</i>		2			
<i>Juncus acutiflorus</i>		9			
<i>Anthoxanthum odoratum</i>		2			
<i>Cirsium palustre</i>		2			
<i>Ranunculus acris</i>		3			
<i>Carex panicea</i>		3			
<i>Potentilla erecta</i>		4			
<i>Trifolium repens</i>		3			
<i>Taraxacum officinale</i> agg.		1			
<i>Carex echinata</i>		2			
<i>Galium saxatile</i>		1			
<i>Carex pulicaris</i>		1			
<i>Cirsium dissectum</i>		1			
<i>Cardamine pratensis</i>		1			
<i>Cerastium fontanum</i>		1			
<i>Rumex acetosa</i>		1			
<i>Rhytidadelphus squarrosus</i>		8			
			Species Total		17

NVC Code	Site & Vegetation Description
M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community	Relatively ungrazed rush pasture - better sward available downslope and further west



Photo of Quadrat 56

Quadrat no. 57	Date 20th June 2016	Estimated Slope (°) 10	
Quadrat size 2m X 2m	Grid Ref IC 74443 25154		
Surveyor KH	Altitude (m asl) 281	Site Dunbeg South	
Species	DOMIN	Species	DOMIN
<i>Potentilla erecta</i>	4		
<i>Festuca ovina</i>	5		
<i>Anthoxanthum odoratum</i>	5		
<i>Pedicularis sylvatica</i>	2		
<i>Calluna vulgaris</i>	4		
<i>Nardus stricta</i>	4		
<i>Juncus squarrosus</i>	5		
<i>Erica tetralix</i>	4		
<i>Juncus acutiflorus</i>	6		
<i>Trichophorum germanicum</i>	2		
<i>Polygala serpyllifolia</i>	2		
<i>Rhytidiadelphus squarrosus</i>	4		
<i>Rhytidiadelphus loreus</i>	5		
<i>Hylocomium splendens</i>	6		
<i>Polytrichum commune</i>	4		
<i>Pseudoscleropodium purum</i>	2		
<i>Sphagnum denticulatum</i>	4		
<i>Hypnum jutlandicum</i>	3		
		Species Total	18

<p>NVC Code</p> <p>M23a <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture; <i>Juncus acutiflorus</i> sub-community</p>	<p>Site & Vegetation Description</p> <p>Rush pasture with abundant pleurocarpous mosses. Developing into wet heath and species-rich due to mosaic of two habitats. <i>Calluna</i> very short due to heavy grazing</p>
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Photo of Quadrat 57

Quadrat no.	58	Date	20th June 2016	Estimated Slope (°)	10
Quadrat size	2m X 2m	Grid Ref	IC 74593 25154		
Surveyor	KH	Altitude (m asl)	302	Site	Dunbeg South
Species		DOMIN		Species	DOMIN
<i>Festuca ovina</i>		7			
<i>Potentilla erecta</i>		4			
<i>Galium saxatile</i>		3			
<i>Polygala serpylliifolia</i>		1			
<i>Calluna vulgaris</i>		5			
<i>Carex panicea</i>		2			
<i>Juncus squarrosus</i>		5			
<i>Luzula campestris</i>		1			
<i>Aulacomnium palustre</i>		2			
<i>Polytrichum commune</i>		2			
<i>Thuidium tamariscinum</i>		3			
<i>Sphagnum capillifolium</i>		4			
<i>Rhytidiadelphus squarrosus</i>		5			
<i>Rhytidiadelphus loreus</i>		6			
<i>Hypnum jutlandicum</i>		3			
Bare rock		4			