

EIS No: 2074



ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM AT
LACKAGH/DERGVONE/BUCKHILL BARR/LARKFIELD/GORTERMONE
(DRUMAHIRE BY.)

CO. LEITRIM

NON-TECHNICAL SUMMARY

MAIN REPORT

&

APPENDICES

VOLUME 1 to 3

Prepared for

airtricity Developments (Ireland) Ltd.,
National Management Centre,
Clonard,
Sandyford,
Dublin 16

Prepared by

Fehily Timoney & Co.,
Core House,
Pouladuff Road,
Cork.

February 2003



Rec'd by post:
24/3/03

EIS No: 2074



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AN TAISCE

THE NATIONAL TRUST FOR IRELAND

The Tailors' Hall Back Lane Dublin 8 Telephone 01 4541786 Fax 01 4533255

Ms. Orla Hussey,
Fehily Timony and Company,
Consultants in Engineering and Environmental Sciences,
Corehouse,
Pouladuff Road,
Cork.

March 12th, 2002.


Re.: Wind Energy Project at Lackagh.

Dear Ms. Hussey,

Thank you for your letter of the 16th August, 2001, requesting comment on this project. We would welcome the provision of appropriately site wind energy projects in Ireland, provided that sites of significant landscape or natural heritage quality are not adversely affected.

In this case the site is part of a plateau running in an arc over towards Monesk in County Cavan, we consider that it is one of the most significant areas of blanket bogs and plateau lakes in Ireland and, therefore, warrants SAC status. However, we note from the map that there is extensive forestry in this area and in order to consider the appropriateness of this site for a wind energy project we would require further data. I look forward to hearing from you.

Yours sincerely,



Ian Lumley,
Heritage Officer, An Taisce.



CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Our Ref.: Q:\2001\134\05\Let009\OH

Mr. Philip Geoghegan,
Chairman,
An Taisce,
Tailors Hall,
Backlane,
Dublin 8

16th August 2001

RE: Wind Energy Project at Lackagh, Co. Leitrim

Dear Mr. Geoghegan,

eirtricity Developments Ltd. have retained Fehily Timoney & Co. (FTC) to prepare an Environmental Impact Statement (EIS) for a proposed wind energy project at Lackagh, north Co. Leitrim. The EIS will accompany the planning application for the development to be submitted to Leitrim County Council. As part of the EIS process, consultation with interested parties is sought. A brief description of the development is provided herein. Any comments or concerns regarding the development can be submitted to FTC for consideration in the preparation of the EIS.

Location

The site is located in a rural area approximately 6km south of Manorhamilton, and is primarily used for rough grazing. A map showing the location of the site is attached.

Proposed Development

The proposed development will consist of the following:

- wind turbines with an overall height not exceeding 100m;
- internal site access roads;
- site compound to include control building, electrical pylon, transformer and other electrical hardware; and
- connection to the ESB grid.

Continued .../...

CORE HOUSE POULADUFF ROAD CORK IRELAND
TEL.: +353 21 4964133 FAX.: +353 21 4964464 E.MAIL: postmaster@ftco.ie Web Site: www.fehilytimoney.com

Directors: D.B. Fehily BE CEng FIEI MICE MCWEM MIHT MCIArb MConsEI E. Timoney BE CEng FIEI MICE MCWEM MConsEI D. O'Sullivan BE CEng MIEI
G. O'Sullivan BE CEng MIEI W. Quirke Dip Ag Company Secretary: A. Keohane Associate: D. Egan MSc.

Registered in Dublin, Ireland, Fehily Timoney & Co. Ltd. Number 180497 Registered Office: Core House, Pouladuff Road, Cork. VAT Registration Number: IE 6580497 D





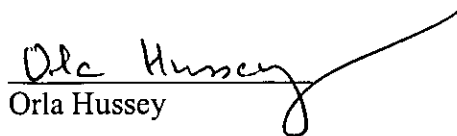
Page 2

Note: Final turbine numbers and layout are currently under review. However it is estimated that there will be approximately 30 turbines.

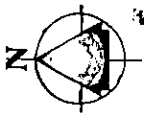
The EIS will address the various aspects of the environment on which the development may have an impact. These will include ecology, noise, landscape, electromagnetic interference, material assets, water, and geology. Any comments regarding the proposed development should be received by Friday 7th September 2001 for consideration.

If you have any questions, please contact me.

Yours sincerely


Orla Hussey

Encl.



PROPOSED LACKAGH WINDFARM SITE
Ordnance Survey Ireland Licence no. EN 0001200 © Government of Ireland

Comhairle Chontae Liatroma

Leitrim County Council

Áras an Chontae,
Carrick-on-Shannon,
Co. Leitrim.

Phone: (071) 9620005
Fax: (071) 9621982
Website: www.leitrimcoco.ie

Accounts Payable
(071) 9650439

Arts Office
(071) 9650490

Civil Defence
(071) 9650492

Community and
Enterprise
(071) 9650429

Community
Wardens
(071) 9641667

County Managers
Office
(071) 9650465

Environment
Hotline
1890 205 205

Finance Section
(071) 9650410

Fire Service
(071) 9650402

Higher Education
Grants
(071) 9650463

Housing Section
(071) 9650426

Human Resources
(071) 9650460

Motor Taxation
(071) 9650431

Planning Section
(071) 9650450

Rates/Revenue
Section
(071) 9650416

Register of Electors
(071) 9650461

Roads Section
(071) 9650420

Stores
(071) 9650424

Veterinary
Inspector
(071) 9640735

Water Services
(071) 9650451

Water Services
Hotline
1890 302 302

THIS MATTER IS BEING DEALT WITH BY

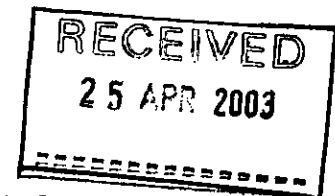
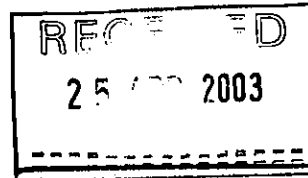
071 9650450

EXT. No. _____

Date:
22nd April 2003

Our Ref:
03/301

Your Ref:



Applicant: Airtricity Develpments (Ireland) Ltd
Agent: C/o Eugene O' Neill Architects

At Taisce
Tailors Hall
Back Lane
Dublin 8

A Chairde

Airtricity Develpments (Ireland) Ltd has applied on 07/04/2003 for **PERMISSION** for to construct a windfarm consisting of 31 wind turbines of 60m hub height with associated transformers, a 110 kV electrical substation including pylon, control building serviced by a wastewater treatment system and percolation area, a 60m high wind monitoring mast, construction and upgrading of site entrances, site trackways and associated works at Lackagh, Dergvone, Buckhill, Barr, Larkfield and Gortermone (Drumahaire By.), Co. Leitrim. This application is accompanied by an Environmental Impact Statement (EIS).

A copy of the application form, site map and Environmental Impact Statement submitted with same is enclosed herewith for your attention.

Any submission or observation made to the Planning Authority in relation to this application within a period of 5 weeks from the date of receipt the application **09/05/2003**- will be taken into account by the Authority in making its decision on the application.

Submissions or observations received outside of this period cannot be considered and will be returned.

If you make a submission or observation in relation to this application you will be notified of this Planning Authority's decision on the application at the time of issue.

Is mise, le meas,

J. Barry

ARDOIFIGEACH FEIGHMIUCHAIN

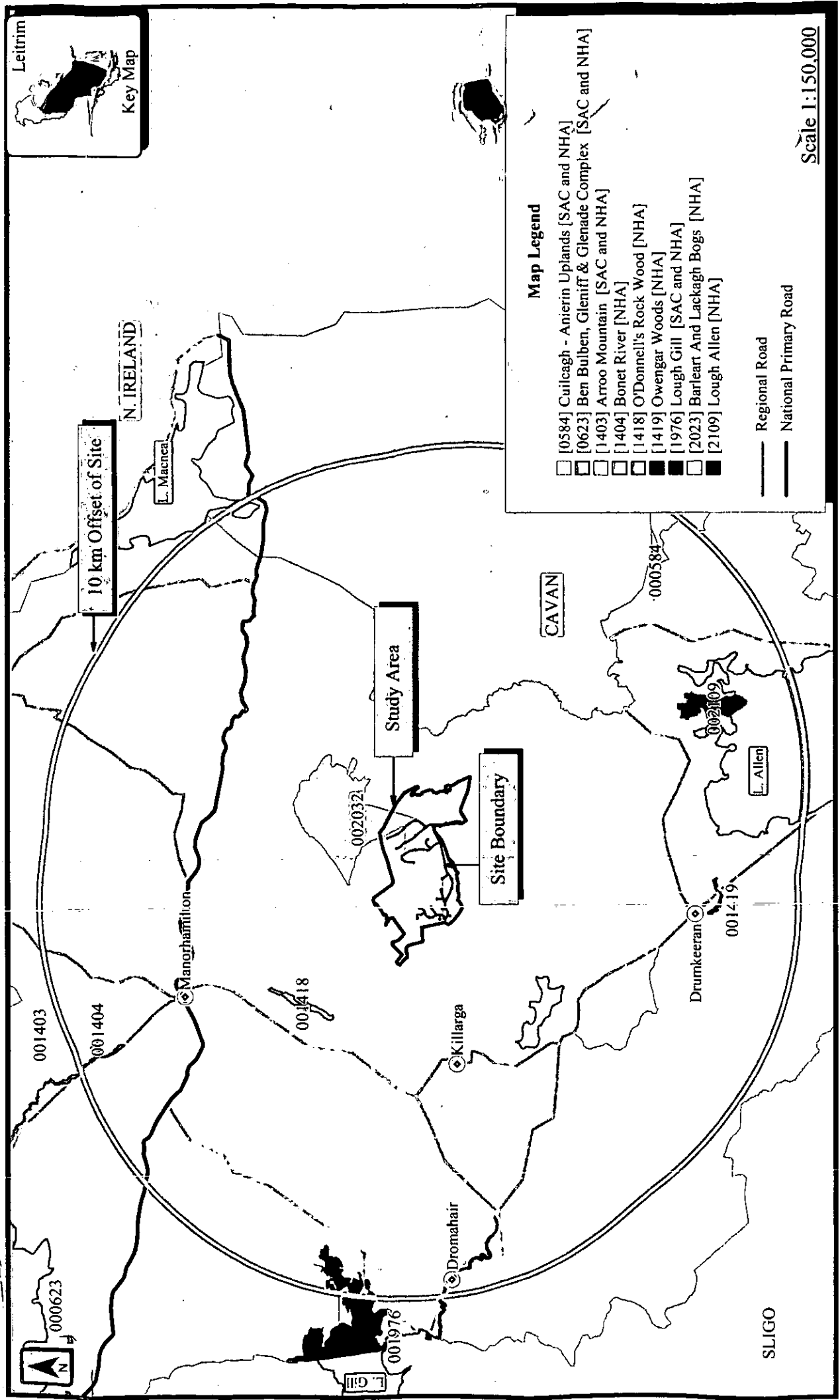
EIS No: 2074

Any of the larger
maps unable to
be included in
this EIS may be
viewed on
hardcopy if
necessary.

Contact ENFO for details on how to view these files.

Email: info@enfo.ie

Phone: 01 888 3910



Fehily Timoney & Company Natural Heritage Areas and Special Areas of Conservation within 10 km of Site Figure 8.1

PLEASE NOTE THAT ALL INVALID APPLICATIONS WILL BE RETURNED

03/301

LEITRIM COUNTY COUNCIL PLANNING APPLICATION FORM

Aras an Chontae, Carrick-on-Shannon, Co. Leitrim
Tel No.: 078 50450 Website Address: www.leitrimcoco.ie
Fax No.: 078 50467 E-mail: planning@leitrimcoco.ie

Please read Explanatory Guide for completing the application and answer all questions fully. Please use BLOCK CAPITALS and tick (✓) appropriate boxes.

1. Type of Permission Sought:

- A. **Permission** ☒
B. **Permission for Retention** ☐
C. **Outline Permission** ☐
D. **Permission Following the Grant of Outline Permission** ☐

In the case of D. above, state the Planning Register Reference No. or Outline Permission

REF P. 03/301

2.(a) Name of applicant(s) (full first name(s) must be given): AIRTRICITY DEVELOPMENTS (IRELAND) LTD

Full address of applicant: NATIONAL MANAGEMENT CENTRE, CLONARD
SANDYFORD, Dublin 16, IRELAND

Tel No: 01 2130400

E-Mail address (if Any): info@airtricity.net

(b) Where applicant at (a) above is a Company registered under the Companies Acts, 1963-1999, state:

The names of the Company Directors LOUIS FITZGERALD, JOHN LAVERY
PAUL DOWLING, MARTIN McADAM

Registered Address of the Company 8/10 MAN STREET, BLACKROCK CO DUBLIN

Companies Office Registration Number 331742

3. Name and address of person (if any), acting on behalf of the applicant: EUGENE O NEILL ARCHITECT

FLYNNS TERRACE Sligo

Tel No: 071 60424

E-Mail address (if Any): eugeneoneill@eircom.net

4. Name and address to which all correspondence and notices relating to the application are to be sent:

EUGENE O NEILL ARCHITECTS, FLYNN'S TERRACE, Sligo

Tel No. 071 60424

5. Name and address of person responsible for preparation of plans: FAMILY, TIMONEY + COMPANY

CORE HOUSE, POWLADUFF ROAD CORK

Tel No. 021 4964133

6. Applicant's legal interest in the land or structure: (please tick appropriate box)

Owner ☐ Tenant ☐ Prospective Buyer ☐ Other ☒ - Give Details:

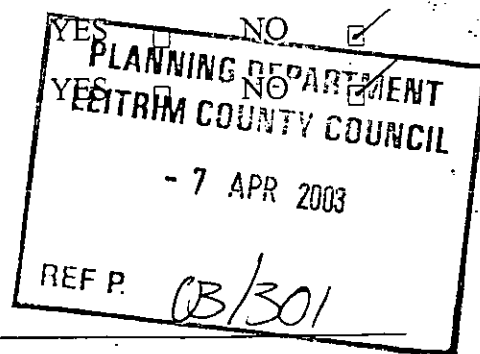
LEASE agreement between owner and Applicant

7. If the applicant is not the owner, state name and address of owner: SEE ATTACHED

Letters of consent For 3 owners names and addresses.

PLEASE NOTE THAT ALL INVALID APPLICATIONS WILL BE RETURNED

8. Location, townland or postal address of land or structure concerned: LACKAGH, DERGUONE, Buckhill BARR, LARKFIELD and GORTERMONE (DRUMAHARE BY)
9. Has any previous planning application been made in respect of the land/structure: YES ☐ NO ☒
If YES, state Planning Register Reference No.(s) _____
10. Describe the nature and extent of the proposed development: WIND FARM CONSISTING OF 31 WIND TURBINES 60M HEIGHT WITH ASSOCIATED TRANSFORMERS, A 110KV SUBSTATION INCLUDING PYLON, CONTROL BUILDING SERVED BY WASTEWATER TREATMENT SYSTEM AND PERCOLATION AREA, 60M HIGH WIND MONITORING MAST CONSTRUCTION AND UPGRADING OF SITE ENTRANCES, SITE TRACKWAYS AND ASSOCIATED WORKS
11. Describe existing use(s) of land/structure: AGRICULTURAL
12. In regard to applications for a dwelling or dwellings, including flats or apartments, please indicate the proposed occupancy of the development (please tick):
For applicants own use ☐ For sale ☐ For letting ☐ Other ☐
Please Specify Not Applicable
13. If application is for retention, please indicate:
(a) Date commenced: _____ (b) Date completed: _____
- 14(a) Area of land space (in hectares) to which the application refers: 62.49 HECTARES.
(Note: 1 hectare = 2.471 acres)
- (b) Where the application relates to a building or buildings indicate:
(i) Gross floor space of any existing building(s) Not Applicable M²
(ii) Gross floor space of the proposed works SEE ATTACHED SCHEDULE M²
(iii) The number of houses (if any) to be provided: _____
15. For applications for material change of use or for the retention of any such change of use, state:
(a) The existing use Not Applicable
(b) The proposed use Not Applicable
(c) Nature and extent of any such proposed use Not Applicable
16. Does the proposal involve:
(a) Demolition of a habitable house
(b) Change of use of an existing habitable dwelling
- 17(a) Indicate source of water supply:-
Public Mains ☐ New Bored Well ☒ Existing Well ☐
Group Water Scheme - See 17(b) ☐ Other Source ☐
If other, give details: _____
- (b) Name of Group Scheme: Not Applicable



• **Note:** The written consent of the Trustees of the Group Scheme must be submitted with the application.

PLEASE NOTE THAT ALL INVALID APPLICATIONS WILL BE RETURNED

18. (a) Indicate method of sewage disposal:

New septic tank ☐ Sewage Treatment system ☒ Existing septic tank ☐

Public sewer ☐ Other ☐ If other, give details: _____

(b) If new septic tank or sewage treatment system is proposed, are certified results of trial hole, percolation test and site suitability assessment submitted in accordance with the appropriate EPA

Waste Water Treatment Manual? YES ☐ NO ☒

19. Indicate method of surface water collection and disposal: Open channel + SURFACE WATER DRAINS FROM HARDSTANDINGS to STREAMS ON SITE.

20. Does the development consist of or comprise the carrying out of works to a Protected Structure or a Proposed Protected Structure? YES ☐ NO ☒

21. Does the development comprise or is it for the purposes of an activity in relation to which an Integrated Pollution Control Licence or Waste Licence is required? YES ☐ NO ☒

22. Is the development of a class requiring the preparation of an Environmental Impact Statement prescribed in Schedule 5 to the Planning Regulations, 2001? YES ☒ NO ☐

If yes, an EIS should accompany this application

23. In the case of an application for permission for the development of houses or of houses and other development, to which Section 96 of the Act applies, specify how the applicant proposes to comply with a condition referred to in sub-section 2 of that section to which the permission, if granted, would be subject: Not Applicable

24. Newspaper Notice: (i) Name of Newspaper IRISH EXAMINER

(ii) Date of Publication of Notice 7 APRIL 2003

25. Date Site Notice was erected 3 APRIL 2003

26. (a) Fee enclosed € 2981.20

(b) Indicate method of payment:

Cash ☐ Cheque ☒ Money Order ☐

Postal Order ☐ Bank Draft

PLANNING DEPARTMENT	
LEITRIM COUNTY COUNCIL	
- 7 APR 2003	
OFFICE USE ONLY	
Fee Paid	€
Receipt No.	<u>03/301</u>
Date:	

27. (a) Class of Development (See scale of fees):- Class No. 4 + 13

(b) Basis of calculation of fee: SEE ATTACHED SCHEDULE

28. Consents relating to access and development which encroaches on land not owned by the applicant. (See No. 28 Explanatory Guide) SEE LETTERS OF CONSENT FROM LANDOWNERS

I/We the undersigned, certify that the information given on this form is correct.

Signed Frank Quinn For EUGENE O'NEILL Date: 7 April 2003
ARCHITECT

8. ECOLOGY

8.1. Introduction

A wind farm is proposed for a Leitrim plateau which is unnamed on the O.S. maps, although Lackagh is the townland occupying the highest ground, and Lackagh Lough one of the major named features. The greater part of the area under consideration lies within Lackagh and Dergvone townlands. The central 1 sq. km. grid reference is H9232, and the area of interest is about 6 sq. km. Lackagh is relatively isolated from other hills, and the conifer afforestation which occupies the lower slopes to 250-300 metres almost surrounds the site. The proposal covers land above about 350 metres – the summit being generally around 440 metres.

This part of the study was commissioned to investigate the possible areas of conflict between the development and wildlife interests.

8.1.1. Consultation

Dúchas informed the study team that the area under consideration is being proposed as a candidate Special Area of Conservation, and supplied the following comment.

Re. Lackagh/Barlear:-

“This site is important because it is an intact high altitude site not affected by erosion (a significant attribute in itself !) and supporting excellent examples of wet heath and mountain blanket bog habitats that are little modified by grazing and consequentially distinguished by well-developed and species-rich, heather, lichen and bryophyte, communities. It is also a location for rare species *Vaccinium vitis-idaea* and *Vaccinium oxycoccus*. It is among the best and least disturbed montane heath/bog sites in the northern half of the country and being therefore a significant representative of its type is worthy of the highest protection status”.

BirdWatch Ireland and The Irish Peatland Conservation Council were also contacted in the process of compiling this EIS. Neither organisation held any detailed information on the site, but stated that it is believed that White-fronted Geese *Anser albifrons flavirostris* visit the lakes and bogs in winter. This is an Annex 1 species under the EU Birds Directive.

A full list of species mentioned in the EIS or recorded on the site visits is given in Appendix F along with some additional species in the Dúchas records for the wider area.

A list of the Natural Heritage Areas (NHAs) and Special Areas of Conservation (SACs) are presented in Figure 8.1.

8.2. Methodology

The whole site was walked several times, at different stages from early to late summer. Habitats were noted, as were areas of degraded habitat on which developments could be sited with minimal loss to the intact vegetation. Although the habitats identified carry with them the implication of species that use or could use the site, where individual species of significance were seen, they were noted. What was immediately apparent was that the site was subject to some significant environmental degradation:

- 1) Zones of erosion, where peat had largely disappeared down to bedrock. This was largely due to wind erosion on exposed ridges, followed by water erosion.
- 2) Areas where peat cutting and sheep grazing had degraded the blanket bog or wet heath.

The ground survey was complemented with use of aerial photography. This allowed precise mapping, at large scale, of the habitats and degraded areas identified on the ground.

The habitats encountered are presented in Figure 8.2 and in photographs 1-12. The photographs are presented in Appendix F. A map showing the photograph locations is also included in Appendix F.

8.3. Description of Existing Environment

Flora

The Habitat Types used are those defined in the Heritage Council's guide⁵⁰. Although Upland Blanket Bog PB2 is the general condition, variations in peat depth and stability allow areas to be classified as Wet Heath HH3 and Eroding Blanket Bog PB5. It could be argued that some areas conform to the description of Dry Silaceous Heath HHI and Montane Heath HH4, but these can generally be treated within the other headings. Craggs are classified as Exposed Silaceous Rock ERI, small peaty pools are Dystrophic Lakes PB1, and the larger lakes with rock beds are Acid Oligotrophic Lakes PB2. The boundaries between the main bog habitats are not always sharp, and some areas are mosaics of more than one habitat which cannot usefully be further subdivided. However, the precise siting of turbines and layout of roadways will take these finer details into consideration. The whole of the site is included as unmodified high level montane type blanket bog in Hammond (1981)⁵¹.

Blanket Bog

Most of the flat areas and gentler slopes are covered by blanket bog. There are five main areas.

- 1) The highest is above the 440 m. contour ending more or less at the location of the test mast.
- 2) East and south of Lough Strand towards Boleybrack.
- 3) At the next layer down, a good blanket bog covers most of the gentle slope NW of Lackagh Lough.
- 4) At a similar level on the other side of the site, the area south of Lough Kip.
- 5) On the low hill south-west of Lackagh Lough in a relatively restricted zone on the crest and eastern slopes.

Deer Sedge *Tricophorum cespitosum* is the dominant species, but the other ubiquitous bogland plants were all frequent or abundant – Cross-leaved Heath *Erica tetralix*, Heather *Calluna vulgaris*, Round-leaved Sundew *Drosera rotundifolia*, Common Cottongrass *Eriophorum angustifolium* and Hare's-tail Cottongrass *E. vaginatum*. One species largely confined to high altitude bogs, Fir Clubmoss *Huperzia selago* was also present. Some small bog pools, now described as Dystrophic Lakes, are present, although no specialized vegetation was noted in the ones examined. These are mainly on the eastern side of the hill.

This blanket bog would probably have once occupied all of the summit plateau, but erosion has removed much of it leaving a thin and patchy peat cover surrounding the core area of intact bog, with many peat hags, and tussocks of the moss *Racomitrium lanuginosum*.

Wet Heath

Where the peat is shallower, but still intact, the vegetation is described as Wet Heath. This occupies most of the area between Loughs Strand and Lackagh, and parts of the area NW of the long crag marked on some maps as Lackagh Rocks. There is considerable variation, and some of the area might be better described as Dry Silaceous Heath. Many of the same plants are present as on the bog, but the balance is different, with Deer Sedge being less dominant, and Heather more so. There is also the addition of Crowberry *Empetrum nigrum*, Bilberry *Vaccinium myrtillus* and Heath Bedstraw *Galium saxatile*. Crowberry is a high altitude species, usually occurring where peat thins out on summits.

At lower altitude, the heath has been severely damaged by mechanical peat extraction and overgrazing. In the areas just above the end of the roadways, the surface is largely bare, with patchy colonisation by Heath Rush *Juncus squarrosus* and the alien moss *Campylopus introflexus*. Other mosses occurring commonly throughout the wet heath and blanket bog habitats include the bog-mosses *Sphagnum capillifolium*, *S. cuspidatum*, *S. papillosum* and *S. palustre*.

Above Lackagh Lough is a slope which is dominated by scattered boulders. The underlying geology is Millstone Grit of Carboniferous age, but these boulders are not necessarily all of exposed bedrock, as at least some quartzite was identified - presumably a glacial erratic. The vegetation here is dominated by deep Heather with relatively abundant Bilberry and Wavy Hair-grass *Deschamsia flexuosa*, which is especially noticeable on the ungrazed boulder tops, along with the moss *Sphagnum capillifolium*.

Eroding Blanket Bog

Zones of stress on the bog have developed erosion. These occur mostly on the summit, and along some exposed ridges. Other areas include cols or valleys where wind or water can exert more than the normal pressure. The form of erosion here is mainly the development of peat hags - isolated tables of peat with caps of vegetation and bare sides. Between the hags bare rock is usually exposed, with a thin coating of unconsolidated peat in the process of being washed downstream. Where grazing pressure has not added to the problem, Common Cottongrass has frequently colonised, giving some hope that the erosion may be arrested.

Exposed Silaceous Rock

The Lackagh Rocks referred to above, other crags at a lower level to the NW of them, and crags east of Lough Kip and south of Lough Strand, all come under the category of Exposed Silaceous Rock ERI. The abundant rocks scattered through the heath above Lackagh Lough also host a similar vegetation. The rock summits are usually capped with Bilberry, and in places its rare relative Cowberry *Vaccinium vitis-idaea*. Shade-loving species normally associated with woodlands are found in crevices. These include Greater Wood-rush *Luzula sylvatica* and Broad Buckler-fern *Dryopteris dilatata*. Most notably, the relatively rare filmy ferns *Hymenophyllum wilsonii* and *H. tunbrigense*, are both abundant on the western crags, with the latter also present on the eastern ones.

Fauna

Blanket bog, particularly in mountain areas, is largely devoid of birds in winter. One notable exception is the White-fronted Goose. Although not confirmed by any recorded observation, there are "persistent rumours of White-fronted Geese visiting the lakes and bog". There is a flock of over 100 birds based on Lough Allen⁵² which could easily have the Lackagh site within its home range.

At any season of the year, most of the bird species that are present are dispersed over large territories, and are not readily seen. This site is one which could support Red Grouse *Lagopus lagopus* at all seasons and, although no birds were seen, droppings were widespread.

In summer, three scarce raptor species could all be present. Hen Harrier *Circus cyaneus* was seen on one visit, and likely uses the site in conjunction with the surrounding forests. Peregrine *Falco peregrinus* is well established in Leitrim, and a breeding pair were seen on the forested slopes of the mountain. It is highly likely that the higher ground is used by these birds. The presence of Merlin *Falco columbarius* is more problematical, although the habitat is right.

Golden Plover *Pluvialis apricaria* was seen – a flock of 31 birds in the wet heath at lower altitude, which when disturbed, flew high over the summit and appeared to be considering landing on the bog there when finally lost from view. This flock was made up mostly of birds in adult plumage, but at least two of the birds were in the plumage of recently fledged young.

The commonest species on mountain habitats are Meadow Pipit *Anthus pratensis* and Sky Lark *Aluada arvensis*, both of which were usually within sight or hearing on the summer visits (June-July). Up to five Ravens *Corvus corax* were seen – presumably a family party. These are scavengers with very large territories.

Lackagh Lough had a colony of breeding Common Gulls *Larus canus* with about 20 adults seen in June 2000 (all had left by mid-July), and one or two pairs of Teal *Anas crecca* were breeding in lakes in the area.

Droppings of the Irish Hare *Lepus timidus hibernicus* were frequently seen, although the animal itself escaped observation.

Detailed surveying of all insect groups is beyond the scope of this report, but the presence of members of the better known groups – the Lepidoptera (butterflies and moths) and Orthoptera (dragonflies and damselflies) - were noted. Several species of lepidoptera were seen, although the only butterflies were likely to be strays from outside the area. The Common Heath moth *Ematurga atomaria* was abundant, at about 1 per ten square metres throughout in June. This would give an estimated population on the site of about 600,000. In July, none were seen. A large dragonfly, the Four-spotted Chaser *Libellula quadrimaculata* was seen at several locations on the deeper areas of bog.

8.4. Evaluation

Flora

The blanket bog is the most important habitat in that Active Blanket Bog is a priority habitat under the EU Habitats Directive. As all of the area here is also above 300 meters, it qualifies as upland or montane bog which is in shorter supply than its lowland equivalent, but also less well surveyed. Its occurrence on the site would have been greater in the past, but erosion has probably nibbled at the edge of the main area over many years.

Blanket Bog is the major category of semi-natural vegetation in Ireland. It is largely confined to Ireland and Scotland. Traditionally – i.e. before the 1950s - cultivation and peat cutting whittled away at the edges. But the destruction of the habitat was on a fairly long time-scale, and hand-cutting of peat progressed on such a very narrow front across the bog that recovery to something akin to the original quickly took place in its wake. Since the 1950's, the introduction of mechanised systems of peat cutting, and the afforestation of large tracts of bogland soils has brought about a major decline in the areas of relatively natural blanket bog vegetation. The Natural Heritage Areas survey by the National Parks and Wildlife Service has found that there has been a loss of 82% of the original cover of blanket bog in Ireland, leaving 143,248 ha of European conservation importance.⁵³ In addition, greatly increased sheep numbers on the hills has increased erosion, in some areas to the point of destruction.

Dúchas have records of Cranberry *Vaccinium oxycoccus* a species normally associated with the raised bogs of the midlands, and a rare lichen *Cladonia portentosa*. Other rare plant species found in surveying for this project were confined to the rock habitat, but the presence of these species, the relatively good condition of the bog and heath habitats due to low grazing pressure, and the location in Leitrim, where there is not much good upland peat habitat, have all been considerations in the proposal by Dúchas to designate the area as a candidate SAC.

Fauna

Red Grouse has a circumpolar distribution within the boreal zone, but the race present in Ireland is a distinctive one confined to Britain and Ireland. While still abundant in Scotland and northern England, it has become very scarce in Ireland. Being a game species it can be shot, but only under controlled circumstances, and shooting is not believed to be a threat in comparison with habitat loss or degradation.

Peregrine, Merlin, Hen Harrier and Golden Plover require conservation measures under Annex 1 of the EU Birds Directive (Council Directive of 1 April 1979 on the conservation of wild birds 79/409 EEC). Hen Harrier joins the Red Grouse and 16 other species on the Red List of the Most Threatened Species in Ireland⁵⁴. Golden Plover had been on an earlier version of this list⁵⁵ but has now been dropped to the amber list of species of medium conservation concern due to lack of information.

The Greenland race of the White-fronted Goose is confined to Scotland and Ireland in winter. As we have around half the world population in Ireland, this is also an Annex 1 species on the Birds Directive.

The Common Gull, despite its name, is a relatively scarce breeding bird, with small colonies mainly on lake islands in mountainous areas of the north and west⁵⁶. This particular colony was not previously known.

The Irish Hare is a distinctive race of the Blue or Mountain Hare which elsewhere in Europe dons a white coat in winter. Our race is distinct in other ways, but is not threatened and is listed in the Irish Red Data Book⁵⁷ mainly because the race occurs in only one country.

All of the insects noticed are common and widespread. A list of the species encountered on site or most likely present are listed in Table 8.1.

Table 8.1: Conservation Status of vertebrates probably or definitely present

Species	Birds Directive Annex 1	BirdWatch Red List	Red Data Book
---------	-------------------------------	-----------------------	------------------

Species Present

Red Grouse		<input type="checkbox"/>	
Golden Plover	<input type="checkbox"/>	<input type="checkbox"/>	V
Irish Hare			II

Species Probably Present

White-fronted Goose	<input type="checkbox"/>		
Hen Harrier	<input type="checkbox"/>	<input type="checkbox"/>	E
Merlin	<input type="checkbox"/>	<input type="checkbox"/>	R
Peregrine	<input type="checkbox"/>		

Key: ☐ Listed
 E Endangered
 V Vulnerable
 R Rare
 II Internationally Important

8.5. Impact of the Development

Flora

Most of the ecological impact of a wind farm derives from the access roads rather than from the turbines themselves. Carving through a habitat, they reduce its value by much more than the absolute loss of the area involved. Fragmentation of a large area into several smaller ones may have some potential serious consequences for flora and fauna.

Fauna

Birds have the potential to suffer from the same disruption and fragmentation of habitat that affects vegetation. The potential of the area to provide food and nesting opportunities should not be affected for any of the bird species concerned, but access to the habitat is another matter, as this could involve collisions.

The direct threat to birds from collisions has had much greater publicity than habitat loss. Indeed there are several well documented examples of major bird kills from wind farms. In California, they account for 39 Golden Eagle deaths each year from a total population in the state of only 500 pairs.⁵⁸ In Spain, thousands of migrating White Storks and large birds of prey are thought to be at risk from a badly sited development, resulting in a major international controversy.⁵⁹ However, large soaring birds like storks and eagles do not occur in any numbers in Ireland. The conditions pertaining in California and Spain are also quite different.

Some evidence has now emerged from research in Lower Saxony, in Germany, that Golden Plover recognise a safety area around turbines of about 350 - 500 metres.⁶⁰ This translates into an area of 140-210 ha. around a 12 turbine site, which is unavailable to them. However, there is no suggestion that this can be assumed to reflect the way Golden Plover will behave on their breeding grounds. One can only speculate that as a rare bird found only in large areas of open bogland, a hillside with turbines will cease to be an ideal habitat.

It must be assumed that the same could also apply to other species, even if that assumption is restricted to those which are known to be timid, and/or are dependent on large areas of relatively undisturbed natural habitat. In this case, the most likely to be implicated would be the Red Grouse - with Merlin and Hen Harrier coming next.

Work in Orkney⁶¹ has been quoted as evidence that Red Grouse can cope with wind farms on their territories. But in fact steady numbers of Red Grouse and severely declining numbers of Golden Plover at the study site in Orkney mean little, as the impact of the wind turbines was masked by major vegetational changes on the study sites. Also the study was conducted on two sites, one of which was a control, and the other was adjacent to, but apparently not actually on the site of the development. Another ongoing study at Rigged Hill in Northern Ireland has not recorded the return of Red Grouse as breeding birds since the construction of the wind farm there, although birds have returned in winter.

Red Grouse are "heavy" birds which fly at high speed, but are unlikely to reach the height of the rotor blades. They would in any case have become familiar enough with the obstacles before any flight might bring them within reach. But recent studies in Scotland by RSPB and the Game Conservancy Trust have shown that Red Grouse are killed on fences in significant numbers. A direct extrapolation from fences to turbines is not possible.

There is a possible risk to the two main songbirds of mountain habitats. Being birds of open habitats with no natural song perches, Skylarks and Meadow Pipits display in the breeding season by flying high to advertise their presence in song. Skylarks sing on the ascent: Meadow Pipits on the descent. In their song flight, Skylarks will always, and Meadow Pipits will often reach the height of the rotor blades.

Secondly, Meadow Pipits in particular often indulge in aerial chases. During these, their flight path is highly erratic. The risk of reaching the level of the blades is less than during the song flight, but the risk of flying into a blade if they should be in the same air space is much greater.

Ravens are highly intelligent birds which will assess carefully any new phenomenon in their territories. It might be hoped that they will avoid contact with the blades.

The predatory birds, Peregrine and Merlin, hunt at high speed and an invisible object would pose a serious threat to them. But Merlins hunt low over the ground and should probably stay well below the level of the blades, except on a normal flight when they would probably not be dangerously distracted. If a Peregrine should be actively hunting a victim in the vicinity of a moving rotor blade, it would be seriously at risk. The stationary object would probably be no threat, but a Peregrine would not naturally expect something like a rotor blade to be moving.

White-fronted Geese are heavy, relatively unmanoeuvrable birds, and collisions with the turbines are a distinct possibility - particularly if they were flying in cloud or at night, when they would not see the moving blades, or even the turbine towers themselves, until it was too late to avoid a collision.

Having said all that, there is still little evidence that collision is a major problem in the Irish upland environment. This is partly because of a lack of monitoring on the existing wind farms, but also because of the very low population densities of birds present. The impact on insects or mammals is likely to be related only to habitat loss.

The Common Gulls are likely to suffer disturbance in the breeding season during the construction period, but will probably not be affected once the development is operational.

8.6. Mitigation of the Impact

Flora

The layout of the site is of crucial importance in minimising the impact of the development on vegetation. A key consideration emanating from the process of drafting this EIS is that it is proposed that no turbines are sited on the main areas of Blanket Bog or Wet Heath.

The recommended access routes are as follows:-

Following the existing roadway to the edge of the site, the access will be extended through the damaged wet heath. Note: A route through the main boulder-strewn area of dry heath is not desirable, and probably not very practical.

As a result, the route will extend south around the boulders as it is the least damaging route and allows access to the eastern summit area. East of Lough Strand are two ridges of eroded peat on which roads could be made with little change to the status quo. This area is also suitable for siting turbines. The extension of the site southwards in Dergvone is more difficult, but the strip includes areas of eroded bog, which would not be seriously damaged by development. These areas are shown on Figure 8.2.

In any mountain or peat environment, there are general measures, which can be taken to restrict the level of damage sustained.

- The design of the roadways will be such that it prevents them becoming channels for drainage. Where traversing peat of more than minimal thickness, roads will be floated on fabric mats. This should avoid damage to adjacent areas from sidecasting peat, and will minimise drainage and erosion. Sidecasting in general is not acceptable as it spreads the impact of roadways to a considerably greater area than is necessary.
- All work will be confined to pre-determined working areas, which should largely be the area to be finally occupied by the turbines and the access roads. Where possible, these will be the areas that are already eroded.
- Where possible, the scrow of vegetation, excavated surface peat and mineral subsoil will all be stockpiled separately on protective matting, or on a cleared area within one of the heavily eroded areas of peat hags. It will then be used to restore damaged surfaces as quickly as possible after excavation. If stockpiles remain on an intact bog surface for too long, they will kill the vegetation.
- The use of the good bog for spoil disposal will be avoided, and suitable locations for dumping found elsewhere, preferably completely off-site. The best use of surplus peat would be to infill erosion channels among the peat hags.
- Access to parts of the bog not needed for track or turbine siting will be restricted as much as possible. They should be regarded as out-of-bounds to both men and machinery, as it will take very little trampling or tracking to make a permanent impact on the bog - breaking up the surface, and starting runnels which will lead to erosion.
- Vehicles should be refuelled off site where possible

Fauna

Avoidance of work in the breeding season (or winter, if White-fronted Geese should be present) is desirable. However, weather is likely to determine the working period, so the general measures listed above are the main line of defence against disturbance to birds.

Once operational, floodlighting or lights on the rotor blades may be advantageous for birds at night, but it is difficult to estimate if the advantage of this would outweigh the negative impact of lighting up a remote mountain top. This is unknown territory, and there is no clear evidence yet on how successfully birds like White-fronted Geese will deal with wind farms.

8.7. Summary

The site for the proposed wind farm straddles two main habitats:

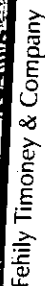
- Upland Blanket Bog and
- Wet/Dry Heath.

Both are listed in Annex 1 of the EU Habitats Directive, with active Blanket Bog being a priority habitat. Habitat loss and fragmentation is the most important problem to be addressed regarding the proposed wind farm at Lackagh.

Areas of degraded habitat suitable for the location of turbines, or the construction/laying of roadways, have been identified, and a preferred route chosen which would minimise damage to the habitats.

Two bird species protected under the EU Birds Directive were present on the site during survey visits, and others are likely to use it at times. A number of mitigation measures have been presented to reduce the impact of the construction work on birds using the site.

Once operational, the potential for the area to provide food and nesting for birds should not be affected but there is potential for collisions with turbines. However there is little evidence that collision is a major problem in the Irish uplands. This is due to the lack of monitoring on existing wind farms and low population densities of birds present.



1:25,000 Habitats Map showing proposed access Trackways

ENVIRONMENTAL IMPACT STATEMENT

FOR

A PROPOSED WIND FARM

AT

**LACKAGH/DERGVONE/BUCKHILL BARR/ LARKFIELD/GORTERMONE
(DRUMAHAIRE BY.)**

CO. LEITRIM

NON-TECHNICAL SUMMARY

Volume 1 of 3

User is Responsible for the Revision Status of this Document


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1. INTRODUCTION

1.1. The Applicant

Airtricity Developments (Ireland) Ltd is the applicant for the proposed wind farm.

1.2. The Development

The development will comprise the installation of 31 turbines (60 m hub height, 80 m blade diameter), and their associated transformers, a 110kV substation compound, a 60 m permanent wind monitoring mast and a 50 m temporary wind monitoring mast (for which a separate planning application is being made).

1.3. The Consultants

Fehily Timoney & Company (FTC) is a Cork-based consultancy specialising in environmental engineering and science. FTC is well established as the leading consultant in wind farm development in Ireland.

The ecology and ornithology reports have been prepared by Gaia Associates.

The archaeology reports have been prepared by North Western Archaeological Services.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1. The Site

For the purpose of the environmental impact statement, the 'site' shall refer to the total area within the ownership boundary. The development area refers to the areas occupied by the access roads, turbines, hardstanding areas, wind monitoring masts, substation compound etc.

The site is located almost equidistant between Manorhamilton, Killarga, Drumkeeran and Dowra on the Lackagh uplands. The site covers an area of approximately 809 ha of bog/marsh.

It is accessed off the R280 via a number of country roads approximately 6 km south of Killarga approaching from the north or approximately 4 km north of Drumkeeran approaching from the south. The surrounding land use supports areas of commercial forestry.

The site location and layout maps are presented in Figures 1 and 2.

2.2. The Need for the Proposed Development

The proposed development is needed to meet increasing energy requirements, meet national targets on renewable energy and reduce harmful emissions to atmosphere from other power generation sources.

2.3. Site Selection and Alternatives Considered

A number of other sites considered for a wind farm development were eliminated in the process of developing this EIS, as the landscape was deemed unsuitable for this type of development.



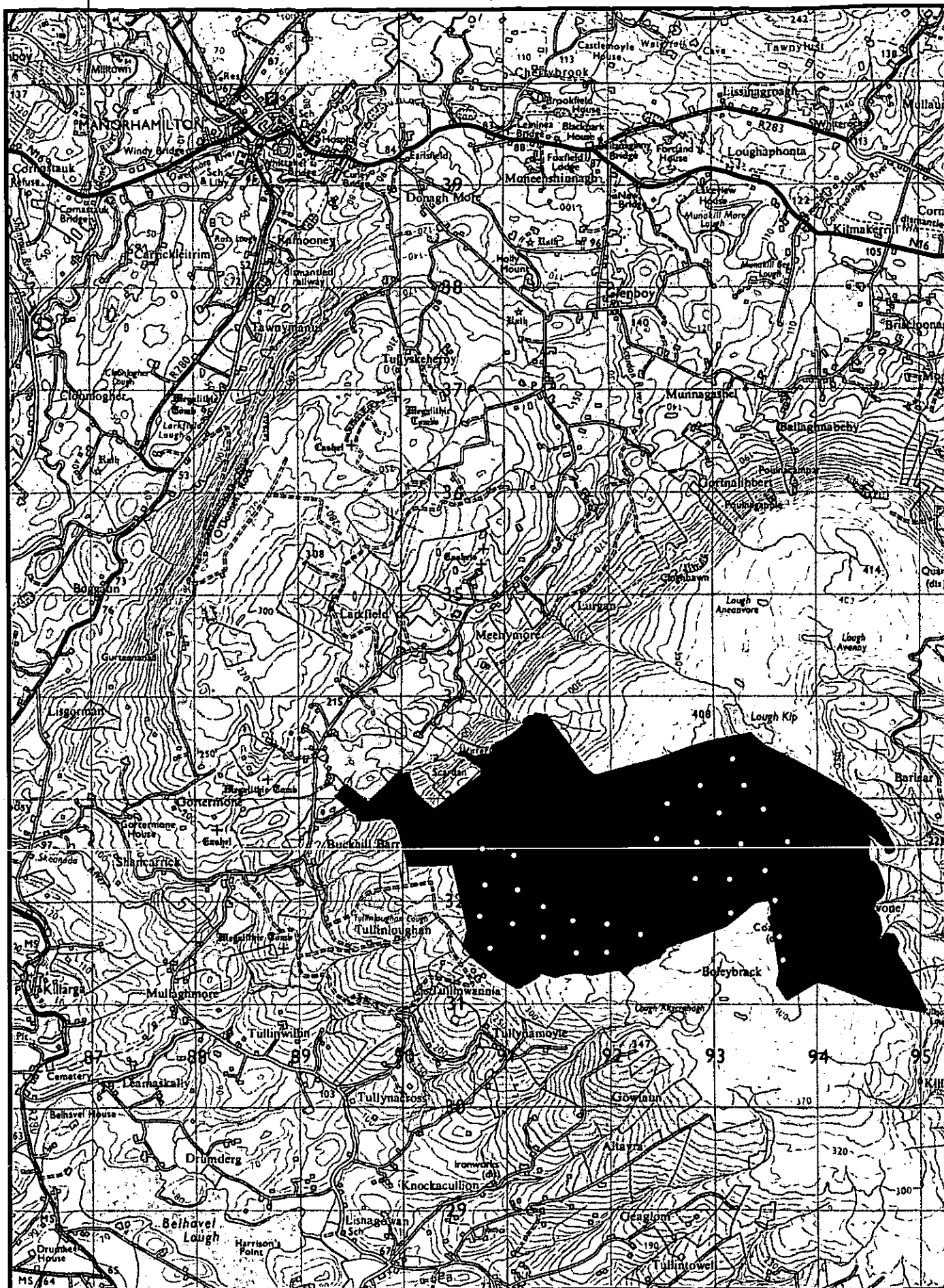
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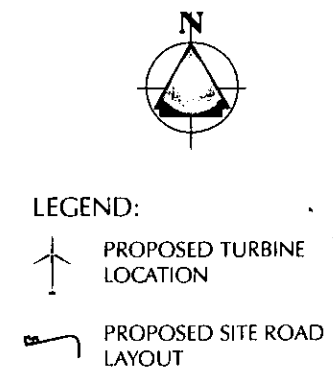
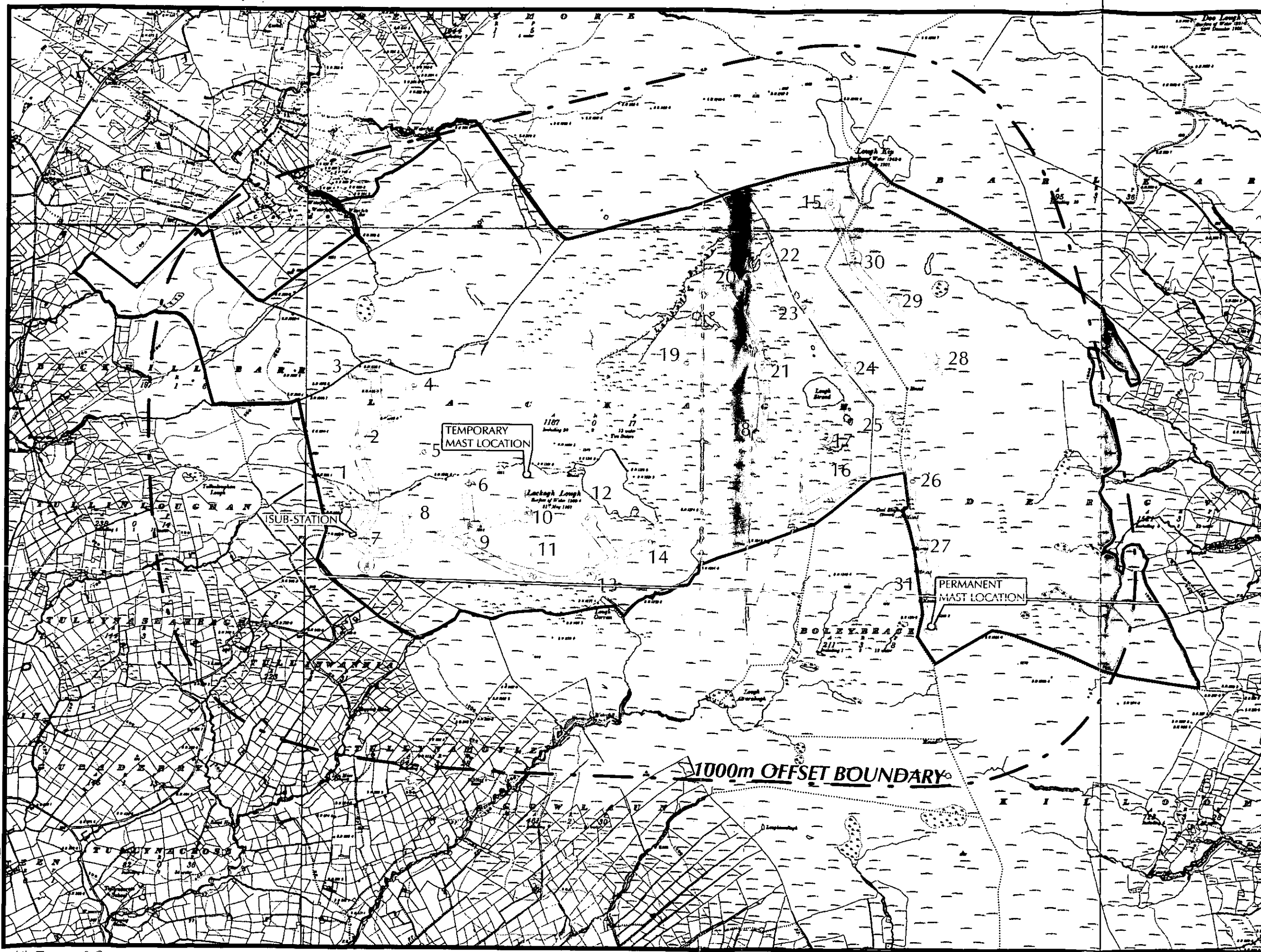
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Fehily Timoney & Company

1:50,000 Site Location Map

Figure 1



3. LANDSCAPE - IMPACTS AND MITIGATION

3.1. Introduction

A zone of visual influence map was constructed as part of the development of this EIS which showed locations from where some or all of the wind turbines could potentially be seen. This is shown in Figure 3.

From this map, viewpoint locations from which the wind farm was visible were identified. Computer-generated superimposition of the wind farm turbines onto photographs taken from these viewpoints allowed the visual impact of the development to be readily appraised.

The overall conclusion from Figure 3 is that the wind farm will be highly visible at distances of less than 10 km.

3.2. Impacts on the Landscape as a Whole

Approximately 1 % of the total site area will be used through the construction of site tracks and hardstanding. The site can continue to be used for rough grazing as it is at present once a programme is implemented to address some overgrazing. There will be no significant impacts on land surrounding the site other than from a visual perspective.






The extent of visibility of the wind farm is shown on the zone of visual influence map in Figure 3.

However the zone of visual influence map does not address intervening features such as land cover or buildings which may screen some turbines. The zone of visual influence was also taken at blade tip which is a worst case scenario. With increasing distance from the site, it will be less likely to see turbine blades. Hence Figure 3 shows a worst case scenario.

The actual visual impact was assessed by the use of a number of photomontages which were taken from key locations around the site. These included commuting routes, amenity areas, nearest towns/villages and areas used by hillwalkers/cyclists.



LEGEND:

-  Proposed Turbine Location
-  Area in which 1-7 turbines are visible
-  Area in which 8-15 turbines are visible
-  Area in which 16-23 turbines are visible
-  Area in which 24-31 turbines are visible

1:80,000 ZONE OF
 VISUAL INFLUENCE

Figure 3

3.3. Proposed Mitigation Measures

No matter where wind turbines are sited, they will generally be visible from some location. However the visual relationship between the wind farm and skyline varies as a viewer moves and varies under different weather conditions.

Deliberate screening will not be effective in general, and attempts to hide or camouflage the turbines will not be possible for this type of development.

4. HUMAN BEINGS - IMPACTS AND MITIGATION

The closest inhabited dwelling to the Lackagh wind farm is located approximately 1.5 km from the nearest turbine.

The main impacts of the development are discussed below.

4.1. Impacts and Mitigation – Noise

Noise monitoring was carried out as part of the drafting of this EIS to determine existing noise levels at four selected noise-sensitive locations. All locations were over 1 km away from the nearest turbine near the closest residences to the site. The main sources of noise were typical countryside sounds of farm animals and bird song. The sound of traffic and farming activities was also audible.

During the construction period of the wind farm, the principal sources of noise will be excavation machinery and construction traffic. However, the overall impact from noise emissions associated with the construction phase will be minimal and of short duration.

During the operational period, the principal source of noise will be the movement of the blades through the air. It is anticipated that as the wind speed increases, noise from the turbines will eventually be dampened by noise from the wind.

The main text of this EIS demonstrates that the predicted noise from the wind farm at the nearest residences are within the relevant noise guidelines. The conclusion is that there will be no appreciable noise impacts on any dwelling close to the site.

4.2. Impacts and Mitigation – Electromagnetic Interference

Sometimes wind farms cause interference by the rotor blades reflecting communication signals, effecting items such as mobile phones or TV reception. In a small number of instances, the blades may also physically block signals.

As part of the process of undertaking this EIS, the design of the wind farm was modified to avoid interfering with the transmissions between Truskmore and Bencroy which are used by ESB, RTE and Esat Digiphone. The revised design was confirmed by these bodies as not likely to disrupt transmissions.

4.3. Impacts and Mitigation – Shadow Casting

Wind turbines can produce a shadow casting effect on residents living in close proximity. This is caused by the rotor blades intercepting sunlight at certain times of the day or year causing the blades to cast moving shadows on effected residences living in close proximity to the turbines.

For the Lackagh wind farm, shadow casting will not be a problem due to the significant distance to the nearest occupied dwellings to the development. The closest dwelling is at a distance of over 1.5 km, which is well away from the proposed development.

4.4. Impacts and Mitigation - Land use

The site covers an area of approximately 809 ha of bog/marsh. The surrounding land use supports areas of commercial coniferous forestry and some grazing, mainly sheep.

Approximately 1 % of the site area will be used for the construction of access road ways, hard standings and the foundations for the turbines. On decommissioning of the wind farm, the site will be allowed to re-vegetate naturally.

4.5. Impacts and Mitigation-Tourism

Tourism in the area consists of hillwalking, cycling, boating and fishing.

There is no evidence to suggest that wind farms detract tourists from an area. It is not considered likely that mitigation measures are necessary in this respect, or if so, what those might be.

4.6. Impacts and Mitigation-Reflected Light

In some daylight conditions, bright sunlight falling on the turbines will reflect, and at a distance may cause the turbines to appear to be shining. This is a minor effect, but could draw attention to the turbines highlighting their visual effect.

The use of semi-matt paint significantly reduces potential for light reflecting from the turbines. Additional mitigation measures are not required.

4.7. Impacts and Mitigation – Traffic

The traffic route for the construction of the wind farm and for any ongoing site maintenance work will most likely be along the R280 to Killarga where it will turn on to a county road to the site.

The main traffic impacts will occur during the construction phase. Movement of loads during off-peak hours, provision of on-site parking facilities and traffic control during transportation of heavy loads will be applied. Once commissioned the impact of the operation of the wind farm on traffic will be negligible.

4.8. Impacts and Mitigation – Cultural Heritage

The only archaeological features found on site were delisted; that is, they are perceived to be potentially un-archaeological in nature based on a visual inspection. There are a number of other archaeological features in the vicinity of the site. A comprehensive list is presented in the Appendix section of the main report.

The ground disturbance associated with the construction of the wind farm may have an impact on unrecorded or buried archaeological artefacts, if any are present. A qualified archaeologist will therefore be employed to monitor ground disturbance subject to advice from Duchas. Any archaeological site discovered during construction will be fully excavated.

The proposed development does not impact on any upstanding recorded archaeological monuments, although the proposed development may affect some monuments found on site. These monuments are unlikely to be of archaeological significance.

The closest recorded archaeological feature is located outside the site and will not be impacted by the development.

A minimum buffer zone of 10m will be established around these sites and around the sites located within the site boundary.

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5. ENVIRONMENTAL ASPECTS – IMPACTS AND MITIGATION

5.1. Impacts and Mitigation – Flora, Fauna and Mammals

The site consists mainly of upland blanket bog and wet heath. One protected bird species and rare plant species were found on site. No rare animal species were found.

The turbine layout and site tracks have been located to minimise the impact on sensitive areas of the site. The remainder of the site will be preserved without change.

5.2. Impacts and Mitigation – Geology and Hydrogeology

The bedrock of the site consists of sandstone and shale covered by wet heath and blanket bog. The geological area underlying the majority of the site is classified as a locally important water bearing region which supplies domestic and agricultural water supplies in the local area. The main source of abstraction is from Lackagh Lough which will cease with the introduction of the North Leitrim Water Scheme.

The development will have little impact on geology or hydrogeology. In the construction phase, diesel will be stored at the site in a bunded container thus containing any potential leaks.

5.3. Impacts and Mitigation –Surface Water

There are a number of mountain lakes in the area. These include two large lakes (Lough Kip and Lackagh Lough), two smaller lakes (Lough Strand and Lough Carran) and a number of unnamed lakes or pools. A number of streams drain these lakes and surrounding areas in a radial pattern to the rivers in the surrounding valleys.

The construction of the wind farm will cause only a minor change in water flow within the site due to rainfall from the hardstanding areas. However, the main streams draining the site will accommodate an increased water flow. There will also be a limited increased sediment loading to the streams and potential concrete spills. During construction, best practice construction guidelines will be employed to minimise these impacts.

5.4. Impacts and Mitigation – Climate and Air

The long-term weather patterns at the site reflect regional conditions affecting the Leitrim area. These patterns are predominantly low fronts from the west and south west in winter months. More settled conditions prevail during the summer months.

The development of the wind farm will have a positive impact on the climate. The generation of 'green' electricity will result in an avoidance of greenhouse gas emissions that would otherwise occur from fossil fuel power generating plants.

No mitigation measures are required.

6. INTERACTIVE IMPACTS AND CONCLUSION

The development of this wind farm will have positive and negative impacts upon the receiving environment.

6.1. Positive Impacts

Besides avoiding the production of harmful pollutants, wind energy is an indigenous, secure, and sustainable resource, unlike energy derived from fossil fuels, which provide 98% of Ireland's energy needs. The development of wind energy therefore offers an alternative power source which has no such impacts.

The development of wind energy projects in rural areas provides an increased income for landowners as well as investors, as the utilisation of their land is diversified. For the Lackagh wind farm it is proposed that local communities will benefit from a 1% share in the gross revenue of the wind farm. Financial benefits will be accrued by local contractors engaged in the construction of the wind farm. Leitrim County Council will also benefit from rates received from the development.

6.2. Negative Impacts

Although wind turbines are an environmentally beneficial approach to power generation, they may be perceived by some persons as an unwelcome visual intrusion into the landscape.

Other negative interactions may include short-term disturbances during the construction of the proposed wind farm. Audible noise from the turbines under weather conditions of predominately or relatively low wind speed and a wind direction towards the nearest residences may also impact sometimes.

6.3. Interaction between Different Environmental Aspects

The interactions of all environmental factors indicate an overall positive development capable of providing a clean, renewable and sustainable energy source for the region. The main impacts on human beings such as noise, shadow casting and visual impact has been discussed in the main report and appropriate remedial measures are presented where necessary.

The overall conclusion of this EIS is that the site is suitable for the proposed development.



ENVIRONMENTAL IMPACT STATEMENT

FOR A PROPOSED WIND FARM AT

LACKAGH/DERGVONE/BUCKHILL

BARR/LARKFIELD/GORTERMONE (DRUMAHIRE BY.)

CO. LEITRIM

MAIN REPORT

VOLUME 2 OF 3

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February 2003



ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM AT
LACKAGH/DERGVONE/BUCKHILL BARR/LARKFIELD/GORTERMONE
(DRUMAHIRE BY.)
CO. LEITRIM

MAIN REPORT

VOLUME 2 OF 3

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
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PREAMBLE

"You see, we should make use of the forces of nature and should obtain all our power in this way. Sunshine is a form of energy, wind and sea currents are manifestations of this energy. Do we make use of them? Oh no! We burn forests and coal, like tenants burning down our front door for heating. We live like wild settlers and not as though these resources belong to us."

Thomas A. Edison, 1916.

Airtricity Developments (Ireland) Ltd wishes to develop a wind farm at Lackagh, Co. Leitrim. Irish Government policy demands that we increase the capacity of electricity generation through renewable energy. Ireland is obliged also under the Kyoto Protocol to limit green house gas emissions and wind energy represents one of the most immediate options for doing this.¹

Ireland has a huge potential energy source in wind power. Strong Atlantic frontal systems flowing across the country provide Ireland with enough wind power to potentially supply 19 times Ireland's electricity requirements from onshore resources alone.²

Ireland currently depends largely on fossil fuels for its energy needs. Native fossil fuel energy sources such as natural gas and peat represent around 8% of current energy use. Hence 86% of our energy comes from imported fossil fuels.³ This percentage is predicted to increase as our indigenous fossil fuel energy supplies deplete and energy demand increases. Hydropower represents around 5% of current power generation capacity.⁴

The Irish energy industry will derive the following benefits from the development of wind energy:

- security of energy supply
- reduced reliance on fuel imports
- increased investment
- higher employment rates during construction and maintenance
- less pollution
- reduction in greenhouse gases

The site that is the subject of this environmental impact assessment (ELA) is located in the townlands of Lackagh, Dergvone, Buckhill Barr, Larkfield and Gortermone (Drumahaire By.) Co. Leitrim. The site is suitable for a wind farm due to:

- its suitability with regard to good wind speeds
- proximity to a suitable grid connection
- good access to the site
- minimal likely impacts on the surrounding environment.

The wind farm will have an electrical capacity of up to 90 MW, and will comprise 31 turbines (60 m hub height, 80 m blade diameter) and will not exceed 100 m total height.

Fehily Timoney & Co. (FTC) prepared this environmental impact statement (EIS) for Airtricity Developments (Ireland) Ltd in support of a planning application to Leitrim County Council.

The Applicant

Airtricity Developments (Ireland) Ltd is the applicant for the proposed wind farm.

The Consultants

Fehily Timoney & Company (FTC) is a Cork-based consultancy specialising in civil and environmental engineering and environmental science. FTC is the leading consultancy in wind farm development in Ireland.

The company has established a professional team specialising in wind farm development. This team has the support of an additional 40 engineers and scientists.

Mr Ralph Sheppard of Gaia Associates, Donegal has prepared the ecology and ornithology reports.

North Western Archaeological Services, Co. Leitrim prepared the archaeological component of the EIS.

EIS Structure

An EIS was required to be undertaken as the proposed development falls within category 3(i) of the Fifth Schedule Part II of the Planning and Development Regulations 2000 (S.I. No. 600 of 2001) "*Energy Industry – Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output of greater than 5 megawatts*".

The EIS was prepared using the "grouped format structure" as recommended in the "*Guidelines on the Information to be Contained in Environmental Impact Statements*"⁵ and "*Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)*"⁶. These documents were published by the Environmental Protection Agency (EPA).

Using the grouped format structure, this EIS is prepared in a format that examines each topic as a separate section. Each section refers to the relevant topic using the following standard structure:

- the existing environment
- impacts of the proposed development
- mitigation measures

The EIS is submitted in three volumes:

- Volume 1: Non-Technical Summary
- Volume 2: Main Report
- Volume 3: Appendices

The non-technical summary provides an overview of the work presented in the main body of the EIS. It is a shortened and simplified version of Volume 2 but contains all the relevant key information presented in a non-technical format.

The main body of the EIS is developed from the Sixth Schedule of the Planning and Development Regulations 2001 and is ordered in accordance with the following topic headings:

- description of the proposed development
- human beings
- geology and hydrogeology
- surface water
- climate and air
- ecology
- landscape and visual impact

- land use
- material assets
- electromagnetic interference
- interaction of the foregoing

The appendices to the report contain the following information:

Appendix A	Executive Summary of the publication "Strategy for the Intensification of Wind Energy Development"
Appendix B	Executive Summary of the National Climate Change Strategy
Appendix C1	Information Pack Sent to Interested Parties and Replies Received
Appendix C2	Correspondence with Telecommunications Companies
Appendix C3	Correspondence with Dúchas
Appendix C4	Correspondence with other Parties
Appendix D	Copy of Advertisement and Newsletter Promoting Information Day
Appendix E1	Comprehensive Archaeological Report
Appendix E2	Summary of National Monuments Legislation
Appendix E3	Classification of Archaeological Sites
Appendix E4	Archaeological Plates
Appendix F	Additional Ecological Data

1. INTRODUCTION

1.1. Policy and Legislation

Global warming is not an irrelevant abstraction. It brings countless physical changes - from more intense heat waves, more severe droughts, and ice melting to more powerful storms, more destructive floods, and rising sea level. These changes in turn affect not only such obvious aspects as food security and the habitability of low-lying regions, but also the species composition of local ecosystems.

Agriculture is particularly vulnerable to climate change. For example, in the summer of 1988, record heat and drought in the American Midwest caused the U.S. grain harvest to drop below national consumption levels for the first time in history.

Ireland has just experienced a particularly warm winter. September 2001 was the warmest September on record. August and October temperatures in 2001 were each the second warmest on record.⁷

While no one unusual climate event can be said to be caused by global warming, the scientific evidence is clear that the general pattern shows the widespread effects of greenhouse gas production. Climate change policy and renewable energy policy are vital tools in combating global warming.

1.1.1. Global Policy

The burning of fossil fuels results in the release of greenhouse gases such as carbon dioxide (CO₂). These gases contribute to the phenomenon of climate change.

In January 2001, the Intergovernmental Panel on Climate Change (IPCC) released the "*IPCC WGI Third Assessment Report*."⁸ This report was approved by IPCC member governments including Ireland.

The report states that there is now a greater understanding of climate change and a scientific consensus of its causes. Its findings included the following:

- an increasing body of observations gives a collective picture of a warming world and other changes in the climate system
- confidence in the ability of models to project future climate has increased
- emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate in future years
- there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities
- human made climate change will persist for many centuries

In the past ten years a number of international conferences have been held in relation to these issues. Examples are the inter-governmental meetings in Rio de Janeiro (1992) and Kyoto (1997).

Rio de Janeiro Conference (1992)

At the 1992 United Nations Conference on the Environment and Development held in Rio de Janeiro, 154 countries signed a UN climate convention. These countries agreed to adopt measures to reduce greenhouse gas (particularly carbon dioxide) emissions.

Kyoto Protocol (1997)

Following the World Summit Conference held in Kyoto, Japan in 1997, nations who signed the Protocol agreed to take actions to control, reduce or limit their emissions of the six main greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride).

The Kyoto Protocol (1997) developed from the United Nations Framework Convention on Climate Change, 1992 (UNFCCC). The Kyoto Protocol imposes binding targets to be achieved in the period 2008 - 2012:

- a 5% overall reduction in the emission of greenhouse gases in developed countries
- an 8% reduction below 1990 levels within the EU; with Ireland's contribution being a limit of 13% above 1990 levels.

Johannesburg Summit (2002)

At the recent Johannesburg summit on sustainable development, a number of commitments and targets were made with regard to renewable energy. These included commitments to:

- Substantially increase the global share of renewable energy sources.
- The phasing out of harmful subsidies in the energy markets.

Russia also announced at the summit that they would sign the Kyoto Protocol, which will allow this to enter into force.

Ratification by countries emitting 55% of greenhouse gases will bring the Protocol into force. Ireland ratified the Kyoto Protocol in May 2002. Despite the current US position on the Kyoto Protocol, the EU is firmly committed to meeting its obligations. This commitment is indicated by the agreements reached at the Bonn Climate Conference in July 2001 and at Marrakech in November 2001. Ratification by the EU, Russia and Japan would be sufficient to bring the Protocol into force.

1.1.2. European Union

EU White Paper on Renewable Sources of Energy

Europe currently meets less than 6% of its energy requirements from renewable energy and relies on imports to meet 50% of its energy requirements. The European Commission's White Paper "*Energy for the Future: Renewable Sources of Energy*"⁹ sets out a strategy to obtain 12% of energy in the EU from renewable sources by 2010.

Campaign for Take Off

Campaign for Take-Off¹⁰ (CTO) is the EU's Action Plan for the implementation of the White Paper. It sets a target for the development of 10,000 MW of wind energy development by 2010. The CTO sees this as being only 25% of the total possible wind energy development by that time. The CTO does not consider that public financing is necessary for the remaining 30,000 MW installed capacity if reasonable access is guaranteed for wind farms to European electricity grids. The CTO considers that additional assistance is only required for the less favourable or unconventional alternative energy sources.

The CTO sees its goals as being funded primarily by the private sector. The CTO will require assistance from the policy developments of member states.

Encouraged by recent trends in the industry, the European Wind Energy Association (EWEA) not only believes this target to be realistic, but has increased its target of 40,000 MW wind energy by 2010 to 60,000 MW.

EU Directive on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market

This Directive was adopted in September 2001. It acknowledges that the potential for the exploitation of renewable energy sources is currently underused in the EU. The EU recognises the need to promote renewable energy sources as a priority measure given that their exploitation contributes to environmental protection and sustainable development. In addition this can also:

- create local employment
- have a positive impact on social cohesion
- contribute to security of supply
- make it possible to meet Kyoto targets more quickly

The promotion of electricity produced from renewable energy sources is a high community priority and constitutes an important part of the package of measures needed to comply with the Kyoto Protocol.

The Renewable Energy Directive requires all Member States to set national indicative targets for the consumption of electricity produced from renewable sources. Ireland's target is 13.2% electricity from renewable energy by 2010.

These national indicative targets should be consistent with the commitment accepted by the Community regarding the Kyoto Protocol.

1.1.3. Irish Energy Policy

Because of the rapid expansion of the Irish economy, the ESB is under pressure to meet existing and projected power demands. 2% of Ireland's energy requirements (6% of electricity) is met using renewable resources. The majority of this energy comes from hydroelectric schemes. There are currently 21 wind farms in Ireland, contributing 155 MW to the national grid. Ireland's wind regime is one of the best in Europe, with the potential to supply nineteen times its own electricity requirements.¹¹

Irish Greenhouse Gas Emissions

In “*Ireland’s Environment – a Millennium Report*,”¹² the EPA identifies climate change as one of the most serious environmental problems presently facing Ireland. It states that “European governments accept that climate change is the gravest threat to the world’s sustainable development, public health, and future prosperity, and that it requires immediate counter-measures”.

In a report published by the EPA in August 2000, “*Emissions to Air – 1990 to 1998*,”¹³ it is stated that Ireland’s emissions were already higher in 1998 than the limits agreed for 2010 under the Kyoto Protocol. The EPA stated that the major contributory factor was a 30% increase in carbon dioxide emissions since 1990. Ireland could be faced with stiff fines from the EU for a breach of targets.

Recent forecasts from the Department of the Environment estimate that net emissions of carbon dioxide will have increased by 35 - 40% in the period 2008–2010 based on a business as usual scenario. This is approximately three times the target agreed at Kyoto, based on current figures.

Ireland therefore needs to utilise renewable sources of energy if Ireland is to sustain current rates of economic development. Wind energy can provide a sustainable and economically viable method to meet the country’s energy needs which also meet Kyoto targets.

In the period 2008-2012, Ireland’s Kyoto commitment is to limit the net growth in emissions to 13% above 1990 levels. A recent ESRI study, ‘The Growth in Energy Demand in Ireland’¹⁴ has found that Ireland’s renewable energy targets as previously defined will not be sufficient, even if attained, to enable us to meet our national obligations per the Kyoto Protocol.

Comparing 1990 and projected 2015 figures, forecasted greenhouse gas emissions are expected to increase by approximately 24% far in excess of our Kyoto target (assuming that 10% of electricity is generated by renewables by 2010).

Green Paper on Sustainable Energy

In the 1999 Green Paper on Sustainable Energy,¹⁵ a target of 500 MW renewable energy development by 2005 was set. The Green Paper expects this target mainly to be met by wind energy. This target is to be further increased for the period up to 2010. Also, the Green Paper made a firm commitment to encouraging local involvement in renewable energy development.¹⁶

The Renewable Energy Strategy Group was established as a result of the Green Paper. The Group's recommendations to develop the energy industry are included in the "*Strategy for Intensifying Wind Energy Deployment*"¹⁷. This included a restatement of the commitment to facilitating local involvement in renewable energy schemes. An executive summary of the Strategy for Intensifying Wind Energy Deployment is presented in Appendix A.

Alternative Energy Requirement Competition

Until February 2000, the primary means of selling electricity from a wind farm was the Alternative Energy Requirement (AER) Competition. AER is a competitive tendering process run by the Department of Public Enterprise. AER 1 (1994) and AER 3 (1997) were relevant to wind energy. AER 5 was announced in May 2001, and applications were accepted between 23rd and 30th November 2001.

A quota for each renewable energy technology was defined in advance (240 MW wind energy in the case of AER 5), and competitors were invited to bid for contracts. While certain other technical and commercial factors are examined, contracts are normally awarded to the lowest bidder and then the next, until the quota is filled. Contracts to supply the Public Electricity Supplier (PES) are for a 15 year duration.

The results of AER 5 were announced in February 2002. Competitors were invited to bid for the partially index linked price per kWh. Winning bids ranged from 4.547 to 4.812 cents/kWh for projects in the large wind category (above 3 MW). In the small wind category (projects up to 3 MW), winning bids ranged from 4.723 to 5.297 cents/kWh.

Electricity Market Deregulation

The available market in Ireland has expanded with deregulation of the electricity market in February 2000. Green energy suppliers can sell electricity to all consumers. This electricity is produced using renewable forms of energy as its primary source, including electricity from wind farms. Brown (fossil fuel generated) electricity suppliers can sell only to the large industrial users, which make up 40 % of the electricity market at present.

National Climate Change Strategy

The National Climate Change Strategy¹⁸ was published on 2nd November 2000 by the Department of the Environment. It states that

"the maximisation of renewables capacity is essential towards meeting our Kyoto Protocol target..."

The cost of renewable energy compared with the cost of energy derived from fossil fuels will fall with the introduction of carbon/energy taxes and the emissions trading systems.

The Executive Summary of the National Climate Change Strategy is provided in Appendix B.

1.1.4. Benefits and Costs of Wind Energy

Benefits of Wind Energy Development

The benefits of wind energy include the following:

- provision of much needed electrical capacity
- zero greenhouse gas emissions to the atmosphere; thereby contributing towards attainment of Kyoto targets
- abatement of other pollutants and environmental protection
- reduction of energy importation
- use of indigenous resources
- security of energy supply
- improvement of the balance of payments
- energy price stability
- contribution to sustainable development

Costs of Wind Energy Development

The costs associated with wind energy include both economic and environmental costs and are described below.

Economic Cost

The cost of wind energy is influenced by technical factors such as the wind speed at the site, wind turbine availability and price, position of the turbines and the cost of finance. The cost of generating electricity from wind is made up primarily of the capital cost of building the wind farm itself. The operational costs are low.

Wind energy is probably the least expensive method of generating electricity in Ireland in terms of real costs, because it has low external costs and does not receive the subsidies paid to fossil fuel providers. If 12% of Ireland's electricity requirement can be sourced from indigenous resources, an annual saving on fuel payments would be over €63 million per year.

Environmental Cost

The environmental costs of a wind farm include landtake, possible habitat loss, noise and visual impacts. In general, it is found that visual impact is the primary concern. These topics are discussed in greater detail in the following chapters.

1.1.5. Public Attitudes to Wind Energy

Throughout the development of wind energy technology, public attitudes towards clean and renewable energy generation have been surveyed regularly. In America and Europe public support has strengthened for cleaner and “greener” energy production.

In Ireland, the Irish Wind Energy Association (IWEA) commissioned a survey by Drury Research, published in 1999¹⁹. The survey found that:

- 67% of respondents agreed that the Government should support the development of wind energy in Ireland
- 93% of those aware of wind energy are in support of its development
- wind, solar, hydro and wave power rank highest in terms of their perceived environmental friendliness;
- when asked to rank forms of energy in terms of their environmental friendliness, wind power attracted the highest mean score
- perceived disadvantages of wind power were much more likely to centre around its ability to provide a continuous power supply, rather than any perceived unsightliness.

On the whole, the conclusion is that the public favours the development of renewable energy in combination with increased energy efficiency to meet energy needs.

In a research summary of independent studies in the UK which canvassed individuals living close to an existing or proposed site, every study was found to demonstrate that the overwhelming majority of residents in areas with a wind project favour wind power, both in theory as a renewable energy source and in practice in their areas. While wind energy was, in general, highly supported, areas with a wind farm had an even higher support rate. An average of 8 out of 10 people supported their local wind farm.²⁰ Other surveys had similar results including surveys in Wales,²¹ the Netherlands,^{22,23} Sweden²⁴ and North America.^{25,26}

1.2. Development Policy

1.2.1. County Development Plan

The Leitrim County Development Plan²⁷ addresses renewable energy in Section 2.8 and Appendix L of the County Development Plan.

Section 2.8 “Energy” states:-

“The provision of electrical power installations and wind and water generated sources of energy will receive appropriate consideration by the Council. The Council recognises the importance of environmentally friendly energy generation”.

Appendix L “Energy Wind and Water Generated Sources” states the following:-

“In respect to wind farm energy generation the Authority will require detailed information to Environmental Impact Assessment standard in submissions on large scale installation proposals with significant environmental impact”.

“The Authority in their assessment, will have regard to visual impact, noise, electromagnetic interference, ecological impact, safety, land use and construction impact. Control conditions attaching to any grant of Permission may include requirements on safety, location with respect to skylines, unit design and colour, blade rotation and turbine positioning, power lines and access roads, acoustical design and noise levels, electromagnetic interference suppression, flicker control, ecology, archaeology, geology and heritage preservation”.

“Proposals in or close to Areas of Outstanding Natural Beauty and High Visual Amenity, urban settlements, Natural Heritage Areas, archaeological sites and other protected areas will require the highest standard of documentation and a complete justification”.

Other key areas of the County Development Plan which are relevant to the proposed wind farm development are found in Section 2.11 “Amenities”. They are listed as follows:-

“It will be the Council’s policy to protect the areas designated in Appendix D against development or activities which would endanger their preservation and to promote selected sites for educational or amenity purposes”.

“The Council’s policy will be to operate systems of planning control related to landscape quality and development pressure”

Regarding areas of outstanding natural beauty and areas of high visual amenity, the County Development Plan states that;

“The Council’s aim is to preserve and enhance as far as is practicable these areas by the operation of special controls over development and by careful management”.

“It is the Council’s aim to protect from intrusive development and enhance by the removal of items of dereliction the views and prospects listed in Appendix C”.

The Draft Leitrim County Development Plan 2003-2009 was also consulted.

In the introductory section of the County Development Plan, it states that:

“In upland and exposed areas pressure is increasing for the development of wind farms”.

Under Strategic Goals it states its intent:

“To support energy generation from renewable resources where practicable and appropriate” and “adopt the precautionary principle in respect of development proposals where significant environmental impacts are involved”.

Under the Electricity Generation and Transmission Section of the Utility Services, it states:

“The Council recognises the potential of the county for generating electricity by means of wind farms and is favourably disposed towards their development subject to the position of the environment and visual amenity”.

“In considering wind farm applications the council will be guided by the advice and guidance given by the landscape character assessment”.

Under a Vision for the Future of County Leitrim, it states:

“The council will facilitate the development of a diverse and vibrant local economy while protecting and enhancing the environment and the natural archaeological, built and cultural heritage. The development and use of land over the next six years will be guided so that the county develops in a sustainable manner”.

“As lifestyles change, so land uses will also change. The Councils role is to manage this change, ensuring important wildlife species and habitats are conserved, features of heritage interest protected, water courses and groundwater safeguarded from pollution and the beauty of the landscape maintained and enriched while at the same time aiming to reserve the population decline and underpin the social and economic base of rural communities”.

Under the Urban and Rural Settlement Policies, it states:

- Development Proposals should avoid impacting on heritage areas SAC's and candidate SAC's, proposed NHAs and on or adjacent to National Monuments
- Other environmentally sensitive areas (flood plains)
- Protected views and prospects
- The shore line and ridge line of hills
- The distinctiveness of the character of the landscape.

“The Council recently commissioned a Landscape Character Assessment (LCA) of the whole county which will be available from the Council.....the Council will be guided by this LCA in determining a planning application and facilitating development”.

The concerns of the Planning Authority are addressed in the relevant sections of the EIS. On the whole, the greatest impact of the development is on the visual amenity of the area. This is discussed more fully in Chapter 9 Landscape and Visual Impact.

The Sligo (1999-2004) and Cavan County Development Plans (1996) were also consulted in the development of this EIS.

1.2.2. Sligo County Development Plan

Alternative energy sources are addressed in Section 5.3 on the Sligo County Development Plan.

“The Council recognise the importance of environmentally acceptable energy generation from wind and water sources”.

With respect to wind farm proposals, it outlines the detailed information to be contained in an EIS. It also states the following:-

“Proposals (for wind farms) in or close to proposed Sensitive Rural Landscapes, proposed Natural Heritage Areas, Special Areas of Conservation, visually vulnerable areas, scenic routes, archaeological sites or urban settlements will generally be discouraged”.

1.2.3. Cavan County Development Plan

Renewable energy resources are discussed in the Development Strategy “Other Environmental Policies” section of the Cavan Development Plan.

“County Cavan is a suitable location for zone forms of renewable energy sources, wind energy for example. The Planning Authority generally favours the development of alternative energy sources in the county provided certain criteria are met. Wind turbines can have adverse environmental impacts in the form of visual intrusion, noise generation effects and electromagnetic interface and possible detrimental effects on traffic, ecology, heritage, archaeology and public safety”.

Schedule 18 “Scenic Routes” of the Development Plan states the following:-

“It will be the policy of the Planning authority to regulate development that would seriously obstruct and detract from views of high scenic value from designated scenic routes.”

“It is the Planning Authority’s policy to maintain and protect the natural landscapes visual character which is recognised to be of an exceptionally high amenity value. These upland landscapes of west Cavan are open and exposed, unenclosed and vulnerable to insensitive development.”

Any of the above areas within the Zone of Visual Influence of the proposed wind farm will be discussed in greater detail in Chapter 9, Landscape and Visual Impact.

1.2.4. Other Relevant Policy and Strategy Documents

Local Authorities have been using the Department of the Environment Guidelines²⁸ to assist in the consideration of planning applications for wind farms. These guidelines were published in 1996, being prepared to facilitate planning authorities in dealing with the increased number of wind farm planning applications. These were written as a result of the ESB approved offers of Power Purchase Agreements under the Alternative Energy Requirement, AER1.

Since the guidelines were published, a number of other Government strategies and initiatives (described above) have taken place. These policy statements provide a completely new framework within which proposals for renewable energy developments can be assessed. For example, the report on the "*Strategy for Intensifying Wind Energy Deployment*" prepared by the Renewable Energy Strategy Group addresses such issues as grid connections, markets, development scale and planning issues.

1.3. Need for the Proposed Development

Several government documents identify the development of renewable energy, including wind energy, as a primary strategy in implementing national energy policy. The need for the proposed development is driven by the following:

- urgent need for increased capacity to generate electricity and strengthen the local transmission network
- national renewable energy targets
- commitment to limit greenhouse gas emissions under the Kyoto protocol.

1.4. Alternatives to Proposed Development

1.4.1. Site Selection Methodology/Selection Criteria

Generally, there is a well established and widely used methodology for the selection of sites for the development of wind farms. The methodology is based on a screening process, involving the application of certain key criteria. The screening process and the analysis require substantial financial resources from the developer.

The key criteria used in the screening process are as follows:

Wind Speed: there must be a strong probability that wind speeds consistent with the economic development of a wind farm are available. Experience shows that unless a site is at a relatively high elevation or near the coast at a lower elevation, it is unlikely that economic wind speeds are present.

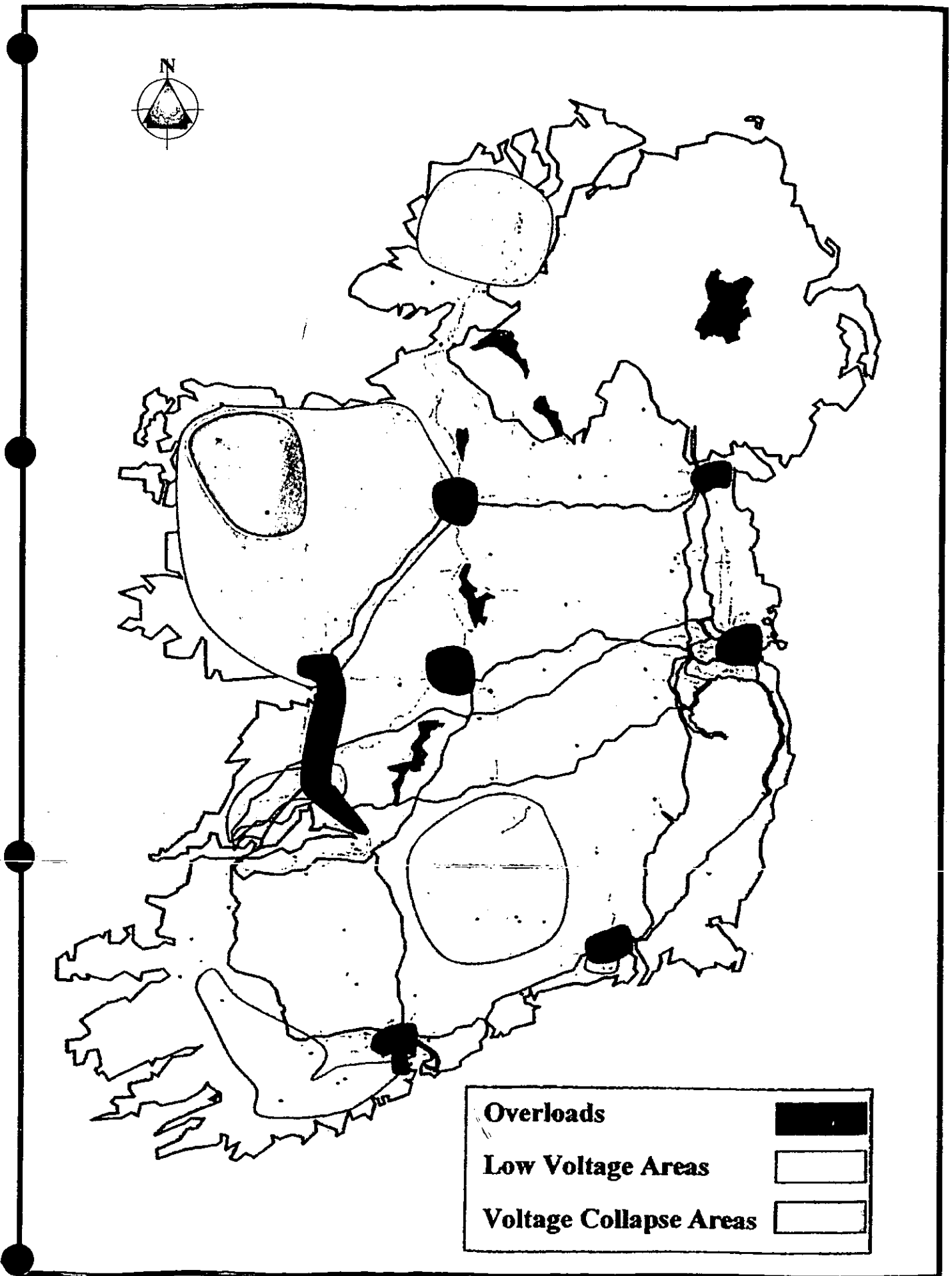
The windspeeds at the proposed site are very good ²⁹ and make a wind farm in this area very economically effective.

Proximity to the National Grid: having identified sites with a suitable wind speed, the grid connection options must then be ascertained. The proposed site must be near a 38 kV line, a 110 kV line, or an ESB substation in order to be economically viable. Also, proximity to a suitable point in the distribution network reduces the length of grid interconnection lines, which minimises the environmental impact.

The capacity of the proposed Lackagh wind farm is approximately 90 MW. The route and source of connection have not yet been finalised. Consultation is ongoing with the ESB. Generally the ESB will not commit themselves to precise construction routes and available capacities until planning permission is obtained. Alternatively the developer may commission a study at a considerable cost prior to submission of the planning application. This cost is often prohibitive at an early stage in the planning process. Diversified and distributed generation is required to serve local needs and provide local support to the electrical infrastructure. Private sector initiative in developing wind energy, a natural resource, does lead to significant investment in the electricity grid.

A report prepared by the Western Commission³⁰ states:-

“The perception of the relative remoteness of the western region has delayed investment in electricity infrastructure without adequate infrastructure the western region cannot compete for mobile investment and the growth potential of existing business may be prepared”. A map showing electrical network problems in Ireland is presented in Figure 1.1.



Planning Designation: Sites meeting the preceding criteria are then examined with regard to their planning designation. Areas designated as particularly scenic (which very often coincide with upland or coastal areas where high wind speeds are to be found) are generally eliminated from the selection process.

There are a number of areas around the site which are listed in the County Development Plan under the following designations:-

- Outstanding Natural Scenery
- Areas of High Visual Amenity
- Outstanding Views and Prospects

These are discussed in greater detail in Chapter 9 Landscape and Visual Assessment.

Environmental Designations: the location of a proposed site in an area with an environmental designation does not necessarily preclude wind farm development, in theory. However, it is for the developer to establish a lack of impact upon whatever factor has caused a particular area to be designated. There is an extra expense to be incurred in this case, and an increased risk of being refused planning permission.

The Lackagh wind farm site is proposed as a candidate Special Area of Conservation as outlined in Chapter 8 Ecology. Dúchas are considering designating the site. See correspondence in Appendix C.

In response to Dúchas concerns, the design of the development has been adjusted. This is in order to avoid siting turbines and proposed road layouts in sensitive locations.

Dúchas' national and regional officers have also assisted in the review of the final layout in consultation with Airtricity, FTC and Gaia Associates, the ecological consultant used for the EIS. This involved an initial site visit to review the proposed layout. Following this visit, Dúchas concerns were further addressed and a revised layout presented for comment. A Dúchas regional officer reviewed the final layout during a subsequent site visit. A hard copy of the layout drawing was also forwarded to Dúchas. These meetings and all correspondence are included in Appendix C of this report. The development of the final layout is discussed in detail in Section 1.4.3 Alternative Wind Farm Design.

Accessibility: sites that are inaccessible must be eliminated. If there are no existing access roads, and the terrain is very difficult, the cost of providing access can render the site uneconomic for development. The extent of excavation required for the construction of access roads in difficult terrain could have negative visual and other impacts.

Furthermore, the road access to the area in which the site is located must be assessed. Extensive works to upgrade such routes may be prohibitive in cost, and may in any case be unacceptable to the local authority.

Access to the Lackagh wind farm will be along the R280 from Manorhamilton heading south. Taking the first exit to the east beyond the graveyard at Killarga, the construction traffic will travel along a county road to Tullynacross before taking a minor road to the north. This road leads to access trackways to the site.

Other Issues: Other matters that may affect the suitability of a proposed wind farm site at an early stage are proximity to forestry, telecommunications, dwellings, and land availability.

Forestry

Coniferous forestry plantations located on the lower slopes of Lackagh (250-300 m) almost surround the site. However the turbines will be located away from the forestry.

Telecommunications

The nearest major telecommunications facilities to the site are located at Truskmore (transmitter) approximately 21 km to the northeast and Bencroy (receiver) approximately 14 km to the south east. RTE, Esat Digiphone and ESB transmit between Truskmore and Bencroy. In the original design, a number of turbines were originally sited within the path of the beam. After consultation with the above companies, the turbines were relocated and the issue was resolved. This issue is discussed in more detail in the pre-submission consultation Section 1.5 and in Chapter 12, Electromagnetic Interference.

Dwellings

There are no occupied dwellings within 1 km of the site boundary. Six others are located between 1 to 2 km. The impact of the wind farm at these locations is discussed in Chapter 3, Human Beings.

Land Availability

Although the site area is considerable (over 800 ha), only approximately 300 ha can be utilised for the wind farm development. This is discussed in Section 1.4.3 below and in Section 1.5.

1.4.2. Alternative Sites

A number of alternative sites have been considered in the county for wind farm development. The outcome of this process is discussed below.

Site Considered	Reason for Rejection
Sramore (near Dromahair)	Leitrim Planner indicated it would not be acceptable
Aghagrania (near Drumshanbo)	Too low for a commercially viable wind farm
Mullinasella (Mulnasillagh) Aghacashel, Ballinamore	Too low for a commercially viable wind farm
Site on Slieve Anierin	In a Natural Heritage Area (NHA)

Other alternative site locations include offshore and lowland areas. These are discussed as follows:-

Offshore Wind Farm Locations

Since the signing of the foreshore lease that will allow for the construction of the Arklow Banks project, it is apparent that some believe future development in the wind industry in Ireland should concentrate solely on offshore projects.

However, the following points must be emphasised -

- The Arklow Banks project will be built in a phased manner over 4-5 years, commencing in 2003, assuming that the Government provides a number of support measures. In the absence of these measures, construction in 2003 is not certain.
- *Airtricity* has proposed to Government that the National Grid be extended out to Arklow Banks. The terms under which it may be possible to connect to the grid are as yet uncertain.

- Compared with onshore developments, offshore wind projects need higher initial investment. Capital costs are 30-50% higher than their onshore equivalents, due to costs incurred in relation to physical turbine support structures, grid-connection, plant transportation and installation.
- Land based wind farms are also needed to balance the higher capital and operational costs and longer construction times of offshore wind farms. There are also more operational difficulties encountered during maintenance of the wind farm. A particular difficulty with offshore wind farm development is inclement weather.
- Ireland will have to continue to invest in both land-based and offshore wind farms to provide a commercially feasible, economically efficient and operationally viable supply of electricity from renewable sources and to ensure balanced and secure renewable electricity generation capacity.
- To date, the Irish government has not made any commitment to support the development of offshore wind farms.

Lowland Vs Upland Wind Farm Locations

High wind speeds (in excess of 8.5 m/s) are only available in areas of high elevation (i.e. above 200 m) or in certain coastal areas.

To be economically viable, a wind farm must be located in an area of high wind speed. This is because currently prices offered to wind energy producers in Ireland (under the AER V competition) are significantly lower than those offered to producers on the continent.

As a result Irish wind farms must generate more power than other European wind farms to be economically viable. Thus they need to be located on sites of higher average windspeeds.

There are also no grants or tax credits for building wind farms in Ireland. Hence the lowlands of Ireland which have correspondingly lower windspeeds are generally not viable for wind farm developments.

1.4.3. Alternative Wind Farm Design

The original design of the wind farm consisted of 48 turbines of 80 m hub and 80 m diameter blades. The turbines were sited to accommodate the minimum spacing between the turbines in zig-zag rows throughout the site. See Figure 1.2.

However as the environmental impact assessment process progressed, a number of concerns were uncovered and the layout evolved accordingly.

The key changes to the layout were in response to telecommunications and environmental concerns. These are discussed below.

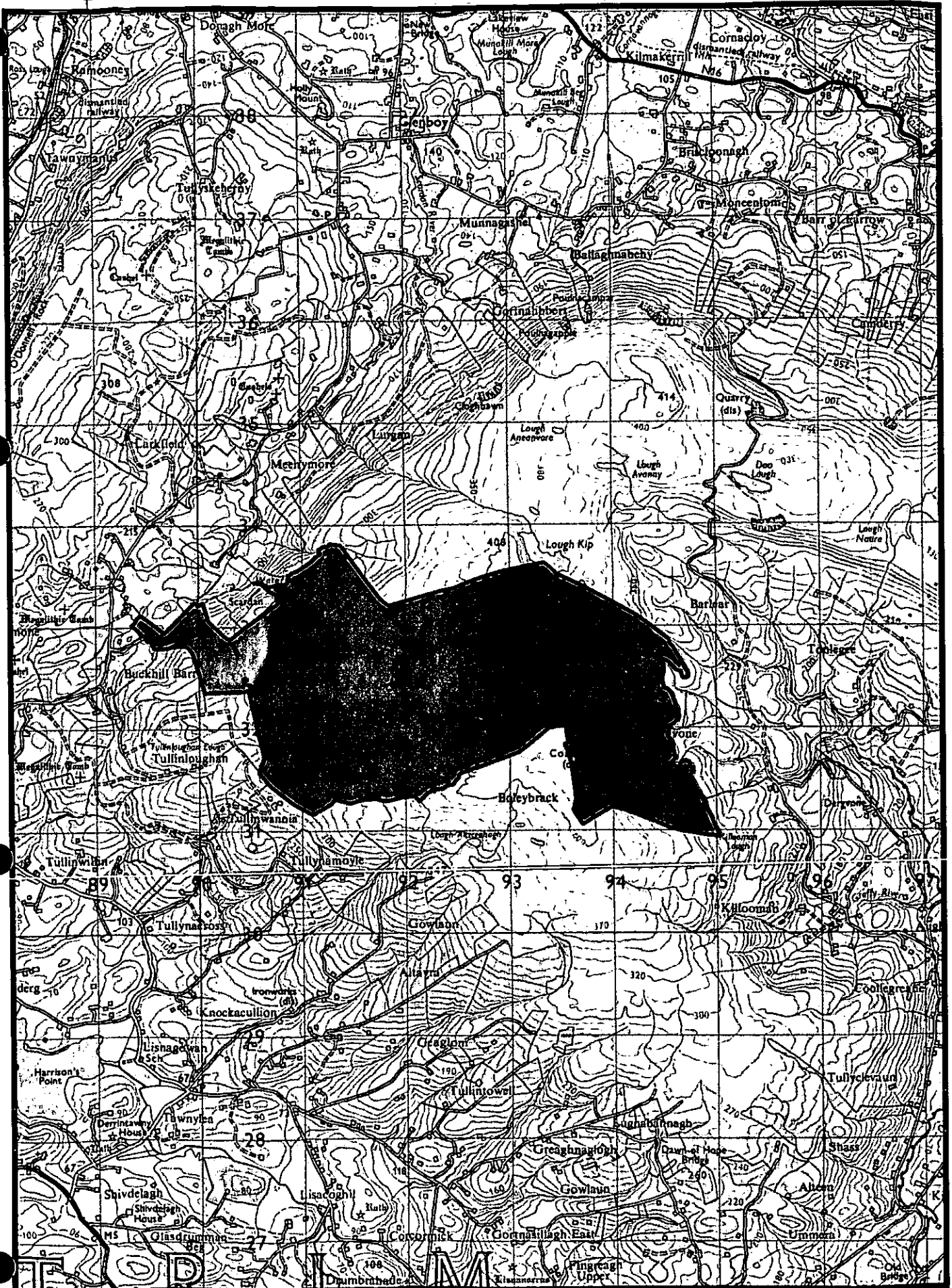
Telecommunications

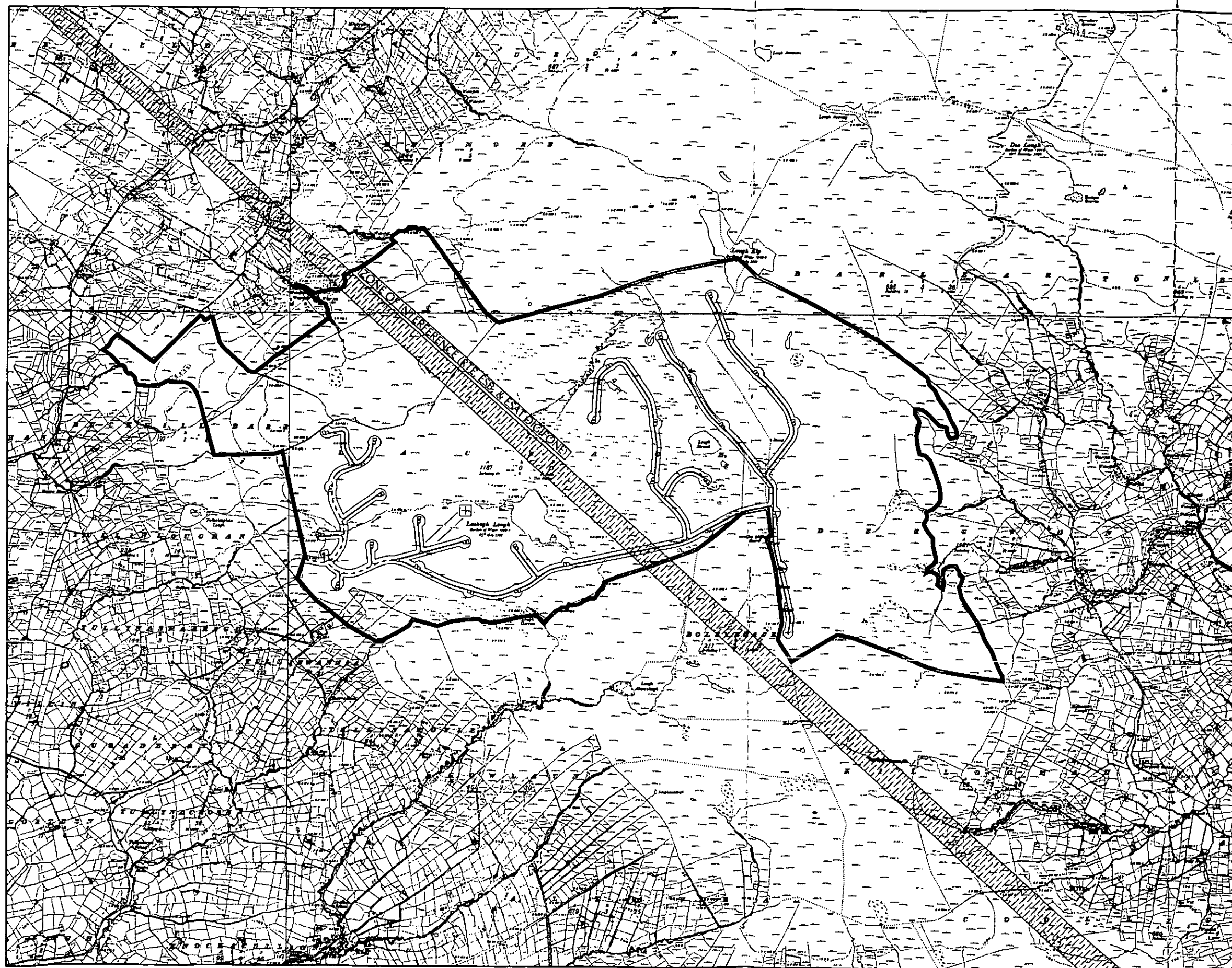
A number of turbines were directly within the line of the transmission beams for RTE, Esat Digiphone and ESB between Truskmore and Bencroy. The pathway of all 3 beams from the telecommunications providers were superimposed on a map. The need for adequate spacing from each beam caused the original layout design to be amended. All turbines were removed from the zones of interference. See Figure 1.3.

Environmental

Gaia Associates carried out an assessment of the site for ecology and ornithology. From an ecological perspective, a number of areas of the site were identified as being suitable for turbines and access roads. Other areas were excluded from further consideration due to the sensitivity of the ecological habitats. See Figure 1.4. An optimum turbine layout was therefore determined using the available area in which it was possible to site the turbines without unacceptable impacts.

On reviewing the revised layout during a site walkover, Dúchas expressed concern on the possible impact of the turbines and site roads on the hydrology of the site. An FTC hydro geologist undertook an onsite assessment of the hydrology over a two-day site visit and amendments were made to a few turbine locations and access tracks. Details of the hydrological investigation and changes incorporated are discussed in detail in Chapter 5, Surface Water. A copy of the revised layout was presented to Dúchas personnel at a follow-up site walkover. No further changes were made to the layout. See Figure 1.5.



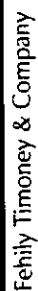


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TELECOMMUNICATION CONSTRAINTS TO THE DEVELOPMENT

SCALE 1:25000

FIGURE 1.3



1:25,000 Environmental Constraints to the Development

1.4.4. Alternative Sources Of Energy

If wind farms are not developed, the demand for electricity will be met by fossil fuel power stations. This will contribute to greenhouse gas and pollutant production, as described in Chapter 6, Climate and Air.

1.5. **Pre-Submission Consultation**

In the course of the preparation of this EIS, a number of organisations and individuals were consulted by FTC. A list of those concerned, and a copy of the letter and accompanying map sent to them is provided in Appendix C. Replies from interested parties are provided in Appendix C.

Consultation with local authority officials began on 11th April 2000 when Airtricity visited the planning department of Leitrim County Council to discuss the proposal for a wind energy facility at Lackagh. Two sites were presented for consideration (Lackagh and Sramore). The Lackagh site received a more favourable response.

A second meeting was arranged with the Leitrim planners on the 13th February 2002. It was attended by FTC, Airtricity and by an Airtricity appointed planning consultant. The draft EIS was presented and a number of draft photomontages and a zone of visual influence map were given to the planners for review. Access to the site and grid connection was the main areas raised by the planners. These were addressed by Airtricity and are covered in this EIS document.

A third meeting was arranged for the 27th February 2002 and was attended by Airtricity, the Airtricity planning consultant and a Leitrim County Council planner. The key outcome of this meeting was that additional photomontages were requested from Aughrim post office, Killarga, near Doo Lough and Drumkeeran (with views towards Belhavel Lough).

A fourth meeting was arranged with the Leitrim Planners for the 13th February 2003. It was attended by Airtricity and an Airtricity appointed Planning Consultant. The outcome of this meeting was as follows:

- additional site notices locations were requested;
- additional details to be shown on the site map; and
- stakes to be put at the locations of the proposed turbines and photomontages to be presented for the temporary meteorological mast.

These items were agreed by Airtricity and the relevant amendments were carried out.

Pre-submission consultation with a number of interested parties began on the 16th August 2001.

From the comprehensive list of consulted bodies, the following expressed concern about aspects of the proposed development:-

- Dúchas
- RTE
- Esat Digiphone
- ESB
- Teagasc
- An Taisce
- The Irish Peatland Conservation Council

Dúchas

Dúchas expressed concern regarding the potential impact of the development on the site. The site was considered to be of high ecological importance and would most likely be designated for its conservational value. The key concerns raised by Dúchas were the impact of site roads and turbines on the hydrology of the site and the issue of overgrazing.

FTC Response

The concerns of Dúchas have been addressed in Section 1.4.3 above.

The areas of concern with respect to overgrazing have been identified by the landowners as areas where turf cutting has taken place in the past. They have agreed to enter into a reasonable sheep management regime along the lines of those proposed by Teagasc. The developers will also undertake to engage soil drainage and ecology experts draw up a peatland conservatory and restoration programme, within the area used for the wind farm, should full planning permission be granted.

All relevant correspondence is presented in Appendix C.

RTE, ESB, Esat Digiphone

On reviewing the original layout sent in the pre-submission consultation, these parties stated the proposed development would significantly interfere with their transmissions between Truskmore and Bencroy as the transmission beams were passing through the centre of the site where turbines were located.

FTC Response

The ecologist has carried out extensive investigations at the site and identified areas of degraded habitat suitable for turbines and site roads. This will have a minimum impact on the sensitive bogland on site.

The developers will also undertake to engage soil drainage and ecology experts draw up a peatland conservatory and restoration programme, within the area used for the wind farm, should full planning permission be granted.

Consultation within the Wider Community

The developer of the project also engaged in consultation within the wider community. An information day was held in the Drumkeeran Heritage Centre from 2-9 pm on the 13th November 2001 and was attended by Airtricity and FTC personnel. Aspects of the proposed wind energy project were presented on display and information leaflets summarising the proposed development were available to take away.

The information day was advertised in the local shops and church for a number of days before the event. However, the information day attendance from the general public was low. It is felt that the low attendance can be attributed to the familiarity of the locals to wind farms. A wind farm on Corry Mountain is clearly visible from the Heritage Centre. A copy of the advertisement and newsletter are presented in Appendix D.

1.6. Scoping

The determination of issues to be investigated in this EIS arose from:-

- the requirements of the relevant legislation of Development Control at the EIS process
- meetings with Leitrim County Council Planning Department
- site visits
- experience gathered by FTC in the preparation of the EIS's for similar projects
- meetings and consultation with Dúchas
- consultation with ESB, RTE and Esat Digiphone

No topic was scoped out of this EIS.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The nature of the existing site, potential impact of the development thereon and proposed mitigation measures are presented below.

For the purposes of this EIS, the 'site' shall refer to the total area within the ownership boundary. The development area refers to the areas occupied by the access roads, turbines, hardstanding areas, wind monitoring masts, substation compound etc.

2.1. Existing Site Setting

The site for the proposed wind energy facility is located in north county Leitrim. The county is divided from north to south into 2 distinctive topographical areas. The northern half is characterised by mountains and large lakes with deep glacial valleys. The southern half is characterised by drumlins and a number of small lakes.

The proposed Lackagh wind farm is located almost equidistant between Manorhamilton, Killarga, Drumkeeran and Dowra. It is accessed off the R280 via a number of county roads approximately 6 km south of Killarga approaching from the north or approximately 4 km north of Drumkeeran approaching from the south. The site location is shown on Figure 2.1

Additional details regarding access to the site are provided in Section 3 Traffic.

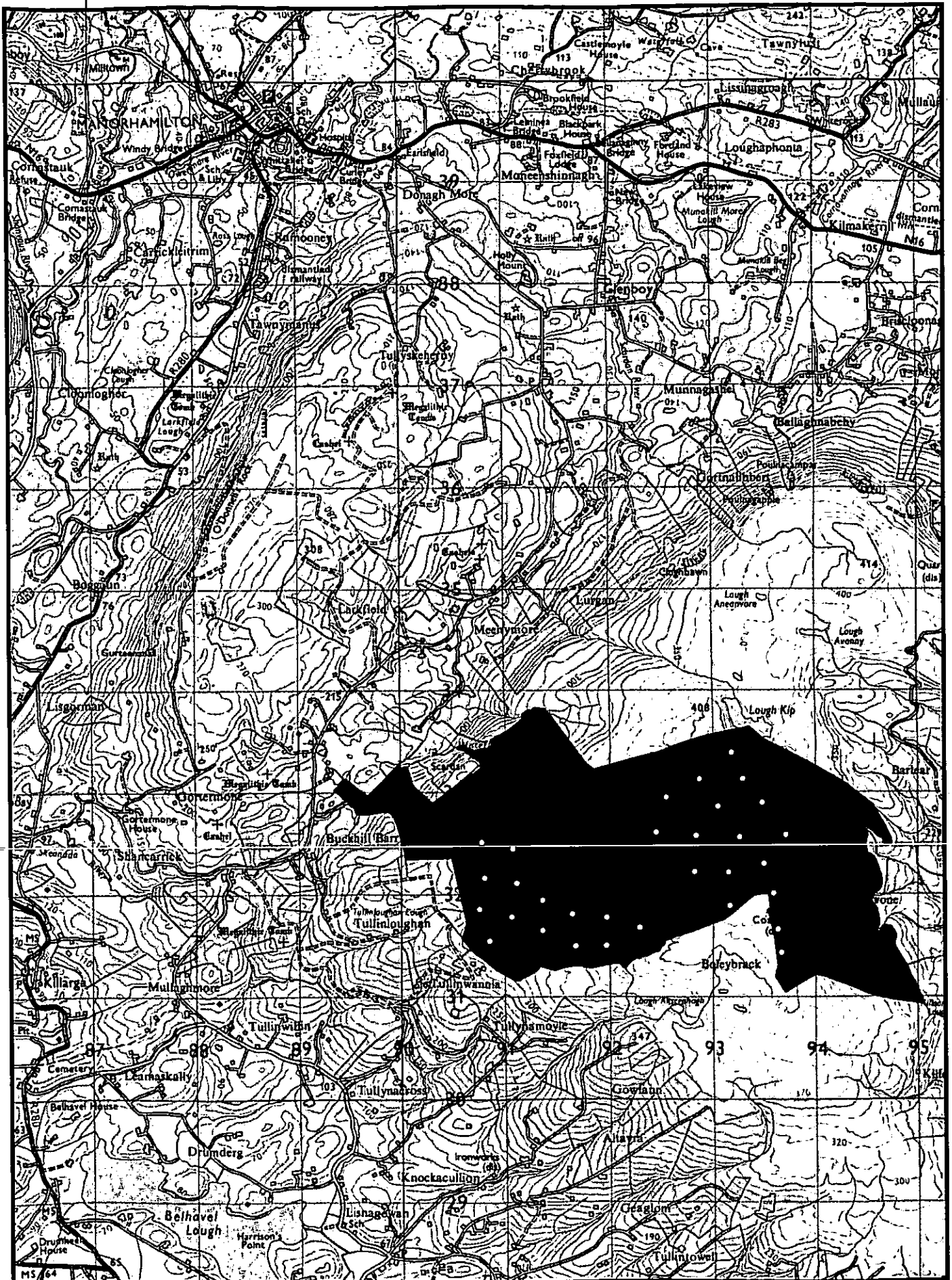
The total area considered was approximately 809 ha of bog/marsh as shown in Figure 2.2. However, following consultation with a number of parties on environmental and telecommunication issues, the available site area was reduced to 300 ha approximately.

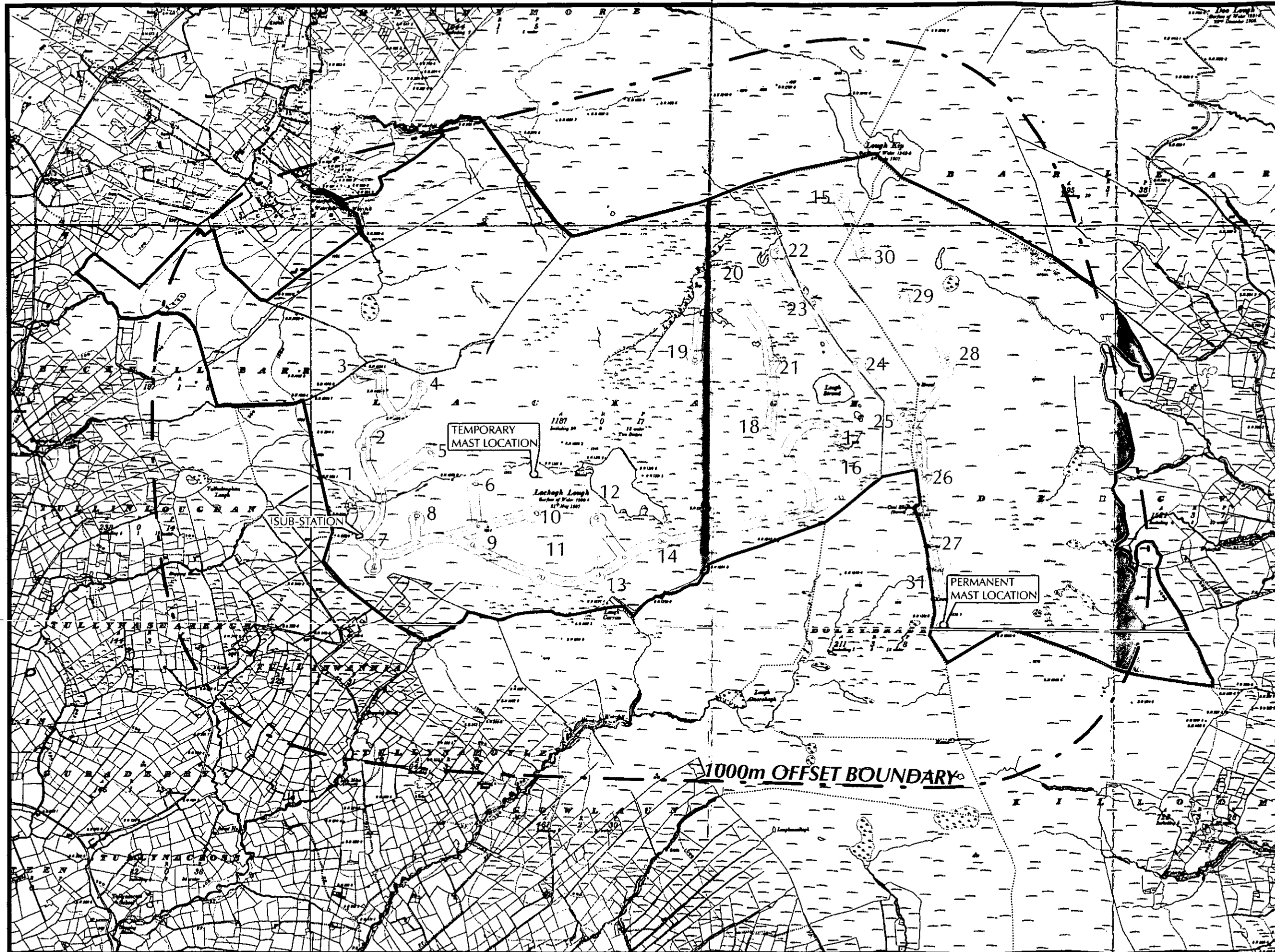
The bulk of the site lies on a plateau of highest elevation being 449 m OD.

There are 4 lakes on site. These are Lough Strand, Lackagh Lough, Lough Carran and part of Lough Kip. A number of tributaries also rise on site and flow to the valleys below. These are discussed in greater detail in Section 5, Hydrology.



The towns of Drumkeeran and Manorhamilton are located 7.5 km to the south and 6 km to the north respectively. The village of Killarga is located 6 km to the west, Dowra and Aughrim 5-6 km to the east respectively and Tawnylea 4 km to the south.

The two large urban centres closest to the site are Sligo, which is 23 km to the west and Enniskillen 31 km to the north east.





LEGEND:

-  PROPOSED TURBINE LOCATION
-  PROPOSED SITE ROAD LAYOUT

Chapters 3 to 13 of this document discuss the environmental aspects of the existing site and environs.

2.2. Description of the Development

The development will comprise:

- 31 turbines
- a substation compound
- internal site tracks
- a temporary (50 m) meteorological mast (subject to a separate planning application)
- a permanent (60 m) meteorological mast.

A grid connection will also be constructed. This will be subject to a separate planning application by the ESB.

2.2.1. Turbines

The development will include 31 turbines with the following specifications:

- 60 m hub height
- 80 m diameter blades
- not greater than 100 m in total height

A scaled drawing of a turbine is submitted as part of the planning application.

The proposed turbines will be of the generic three bladed, tubular tower models with horizontal axis. The rotor blades are bolted to the central hub, which is connected to a gearbox located in the nacelle.

The nacelle holds the:

- generator
- electrical components
- control unit of the turbine

Earthing and isolation protect these components from lightening strikes. The nacelle is covered by a polyester hood made from reinforced glass fibre. The hood is sound insulated to ensure minimal noise emissions.

The blades of modern wind turbines are made of glass fibre reinforced polyester. They typically turn at between 18 and 26 revolutions per minute (rpm). The number of turns depends on the wind speed and make of turbine.

Start-up is generally achieved at a wind speed of around 4 m/s, with optimum power generation at approximately 12 to 16 m/s. The turbines generally shut down at wind speeds greater than 25 m/s but some machines are designed to operate at up to 30 m/s.

The yaw mechanism turns the nacelle and blades into the wind, and is controlled by sensors that monitor wind direction.

The tower of the turbine is a conical steel tube, with triple paint finish. It is delivered to the site in three sections. The first section is bolted onto the steel base, which is cast into the concrete foundation (15 m x 15 m). The second section is bolted to the first and the third bolted to the second. The base of the towers is typically around 3.5 m in diameter, tapering to approximately 2.5 m, where it is attached to the nacelle. The first floor of the tower is approximately 2 m above ground level. It is accessed by a galvanised steel staircase and steel hatch door.

The first floor houses the control unit. From the first floor, an internal ladder leads up to the nacelle. There is one intermediate floor between the tower base and the nacelle. Personnel access to the turbine towers and nacelles meets all safety regulations. For security purposes, the main gate to the site will be kept locked except during maintenance or caretaking duties.

The transformer will be located just outside the tower. Transformers, by their nature, generate substantial amounts of heat through electrical losses. This heat must be dissipated in some fashion. External unit transformers are 'naturally-cooled', which means that they rely on the ambient conditions to dissipate the general heat. Maintenance can be carried out by electrically disconnecting the transformer, unbolting the holding down bolts and lifting it off the plinth.

Each turbine will generate electricity at a voltage in the range 440 to 690 volts, depending on the machine chosen. The transformer will step up the voltage to 10 or 20 kV. An underground cable to the onsite substation will interconnect the turbines.

The turbines are multiply coated to protect against corrosion. They are off-white or light grey in colour to blend into the skyline. These colours minimise the visual impact, as recommended by the following guidelines on wind energy development:-

- Department of the Environment – *“Wind Farm Development – Guidelines for Planning Authorities”*
- The Scottish Office Environment Department - *PAN 45*; Department of the Environment Welsh Office – *PPG22*
- Countryside Council for Wales – *“Policy on Wind Turbines”*

To ensure efficiency in wind energy capture, turbines are spaced apart, generally with a minimum distance of 4 blade diameters.

2.2.2. Meteorological Masts

A permanent meteorological mast will be erected on site as part of the proposed wind farm. This will consist of a narrow lattice tower of approximately 60 m in height. Two anemometers and two wind vanes will be mounted at 30 m and 60 m above ground level. These instruments will be connected to a locked data logger near the base of the mast. The location of this new meteorological mast is shown in the detail plan drawings that accompany this application.

A 50 m temporary meteorological mast will also be erected on site. This mast will consist of a narrow lattice with guy wire support, which will monitor wind speed prior to the construction of the wind farm. A separate planning application is being made for this temporary mast. It will be erected for a period of three years from the date of granting of planning permission. At the end of this time, the mast will be removed.

2.2.3. Substation

Underground cables will link each turbine to the on site 110 kV substation. The substation will consist of a control room and fenced compound that will house electrical equipment. A two metre high security fence will surround this area. The construction of the control room and electrical components will comply with ESB specifications.

2.2.4. Internal Site Roads and Hardstanding

The internal site roads will be approximately 4.5 m wide along straight sections and wider at turns and will permit access for construction and maintenance vehicles during the operational phase. The internal site road layout is shown in Figure 2.2.

Alignment of roads has been designed to minimise the impact to hydrology of the site. The road design will minimise excessive runoff that would otherwise impact on flora and fauna. This is discussed in further detail in Section 5, Surface Water.

A hardstanding area of approximately 15 m x 20 m level will be created adjacent to each turbine location. This area will accommodate a crane during the assembly of the turbine. Occasionally it will serve as a maintenance zone.

2.2.5. Grid Connection

It is prohibitively expensive for a developer to commission a detailed study of the route and type of connection to the national grid prior to the granting of Planning Permission. This is because a detailed survey would require negotiations with landowners regarding access to lands and rights of way etc. As a result, detailed studies on the grid connection in addition to the detailed design and surveying needed, generally only take place after Planning Permission has been granted.

2.3. **Project Construction**

When all requisite planning permission and a grid connection are obtained, activity on site will begin with the construction of :

- the site entrance
- internal site roads
- hardstanding areas.

Any necessary improvements or modifications to the public roads used for access to the site by the cranes and haulage vehicles will be agreed with Leitrim County Council. Areas along the public road/site access route that may need modification are identified and discussed in Section 3, Traffic.

Hardstanding areas will be prepared for the cranes, turbines and building foundations when the internal site roads reach the turbine sites and substation. The site drainage system along the site roads will be constructed as the road advances. When complete, the trenching and laying of underground cables will begin.

It is anticipated that each turbine will take 1 to 2 days to erect requiring the assistance of two cranes. Once complete, the electrical connections will be made. The construction of the onsite substation will be ongoing at this stage, along with the work on the grid connection.

Along with the work on the grid connection, the turbines will be tested and commissioned.

2.3.1. Material Requirements

Road building material will be sourced locally. Some material for site roads may be sourced on site. If so this will reduce significantly the material requirements for road construction and the need for new roads will be kept to a minimum. There will be approximately 11.25 km of new internal site roads constructed, and approximately 16,275 m² of hardstanding. It is estimated that approximately 20,000 m³ of stone and crushed rock will be required.

The foundations for the turbines are critical, and require good quality stone. It is estimated that 2,232 m³ of crushed rock will be required to complete the turbine foundations. This may be an overestimate if competent bedrock is encountered at shallow depths.

The amount of concrete required is estimated at up to 6,696 m³ to complete the foundations for:

- 31 turbines with associated transformers
- meteorological masts
- onsite substation
- foundations for the various electrical components.

Since each concrete truck has an 8 m³ capacity, 837 truckloads will be required. A summary of the construction traffic and estimates is provided in Table 3.7.

Other building materials required include the following:

- Blocks, sand and cement, roofing material, such as for the substation control house
- Bedding sand (2,812 m³, approximately) for the underground cables
- 2m high security fencing for around the substation

The plant associated with the construction phase will consist of the following:

- 4 track excavators (with rock breakers)
- 1 tractor and trailer with cable laying jig
- 2 cranes
- 2 site dump trucks
- Water tank and
- Petrol/diesel powered generator.

Fuel consumption during the construction phase is estimated at 100,000 litres.

2.3.2. Temporary Site Structures and Facilities

During the construction phase, it will be necessary to provide temporary facilities for the construction personnel. Facilities will include the following:

- the site office and canteen will be of Portacabin type construction
- toilet facilities will be a Portaloo
- it is not intended to construct a septic tank on site
- electrical power will be provided by petrol/diesel powered generators
- bottled water will be used for potable supply
- a water dispenser will supply water used for other purposes
- Temporary oil storage will be in 110% bunded containers.

2.3.3. Construction Traffic

The volume of construction traffic associated with the proposed development is discussed in Section 3.3.2.

2.3.4. Wastes Generated during Construction

The wastes/spoils likely to be generated during the construction phase will include the following:

- Excavated material emanating from any road cuts and foundations will be used on site for hardstanding and embankments
- Cut-offs from building material. This material will be taken off site for re-use (where appropriate), recycled (in the case of copper and other metal cut-offs), or taken to a licensed landfill facility
- Domestic type waste generated by contractors. This material will be collected on site, stored in an enclosed skip, and disposed of at a licensed landfill facility

2.4. Operation and Lifespan

Servicing will be conducted in accordance with the service contract with the turbine manufacturer or service company. The operation of the wind farm will be monitored remotely. A caretaker will oversee the day to day running of the wind farm.

The expected physical lifetime of the turbines is at least 25 years from the date of commissioning. After this time, the developer will decide whether to replace or decommission the turbines. Such a decision would be made on economic and technical grounds that are impossible to forecast so far in advance.

2.5. Decommissioning

On decommissioning, cranes will disassemble each turbine. All the component parts are unbolted and removed from the site. This is a relatively straightforward process. The foundations will be removed or covered over and allowed to revegetate naturally. Since the need for new site track construction is kept to a minimum, it will be allowed to revegetate naturally. As the turbine bases, hardstanding areas and site roads have been sited away from ecologically sensitive areas, it is anticipated that rehabilitation of the site will be easily accomplished.

2.6. Conclusions on Description of the Proposed Development

The proposed wind farm will impact on the local community and on various aspects of the environment. These impacts are both positive and negative and are of short or long-term duration. Sections 3 to 13 describe the environmental impact. For each aspect considered, the existing environment is described, the potential impacts identified and mitigation measures proposed to minimise these potential impacts.

3. HUMAN BEINGS

The human beings in the vicinity of the site, potential impact of the development thereon and proposed mitigation measures are presented below.

3.1. Human Beings in the Existing Environment

The proposed wind energy project is located in a rural setting at a location currently used for grazing sheep. Historically, the site was also used for turf cutting. In addition to agricultural practices, the surrounding lands are used for commercial forestry plantations and wind farms.

There are 3 operational wind farms in County Leitrim. These are at Spion Kop and Corry Mountain in Arigna, and at Black Banks in Drumkeeran. The Black Banks development was granted planning permission for an extension to its wind farm. Another development for Corry Mountain (Carrick on Shannon) was also granted planning permission.

The population in the vicinity of the site is low. The nearest inhabited dwellings are listed in Table 3.1 which also provide distances to the nearest turbine. The house locations are also shown in Figure 3.1. There are no dwellings within 1 km of the nearest turbine.

Table 3.1: List of Inhabited Dwellings within 3 km of the Site

Dwelling No.	Approximate Distance to Nearest Turbine (metres)
H1	2,781
H2	2,829
H3	2,340
H4	2,176
H5	1,997
H6	1,968
H7	1,851
H8	1,462
H9	1,472
H10	1,989
H11	2,283



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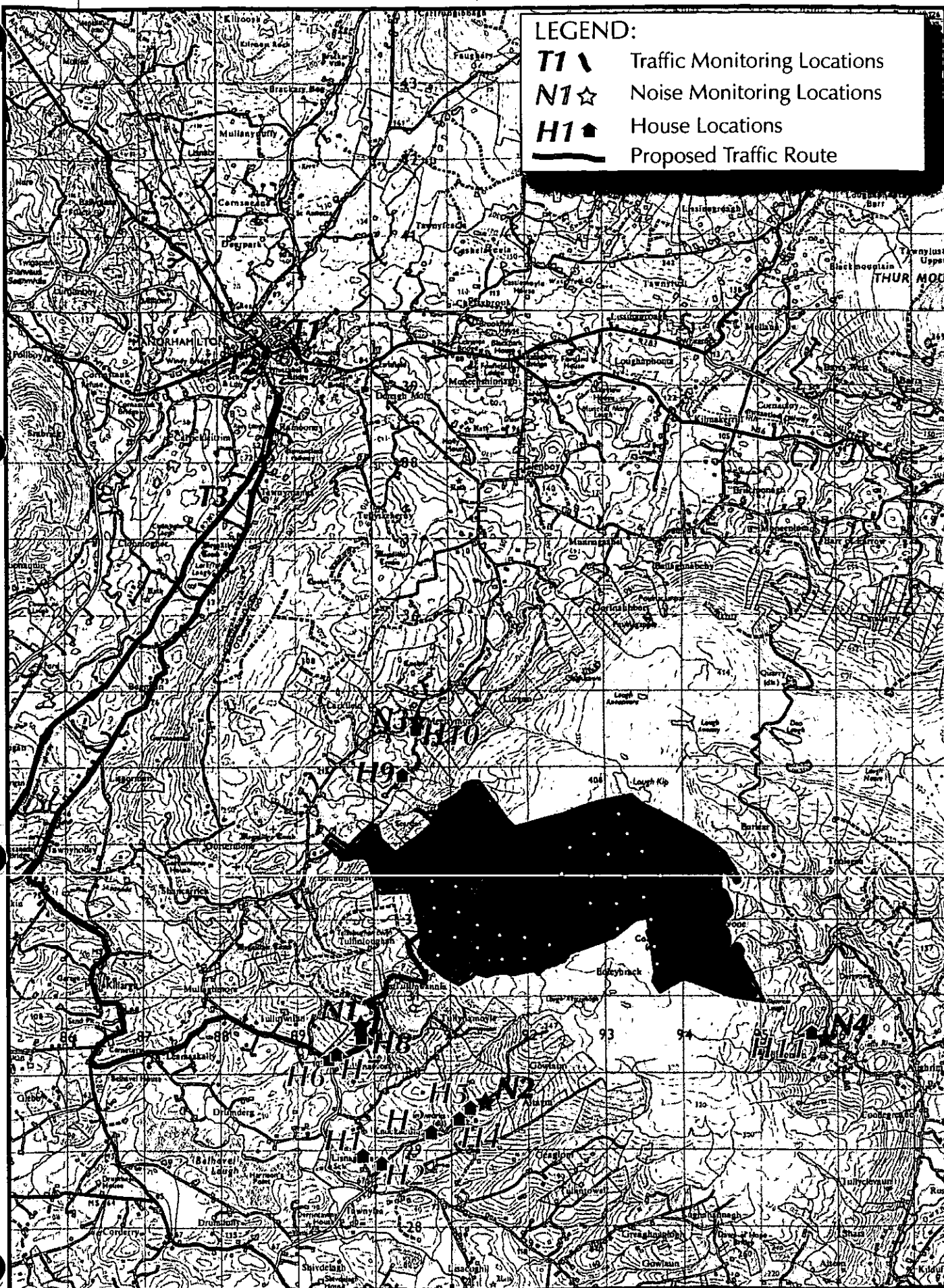
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LEGEND:

- T1** \ Traffic Monitoring Locations
- N1** ☆ Noise Monitoring Locations
- H1** ▲ House Locations
- Proposed Traffic Route



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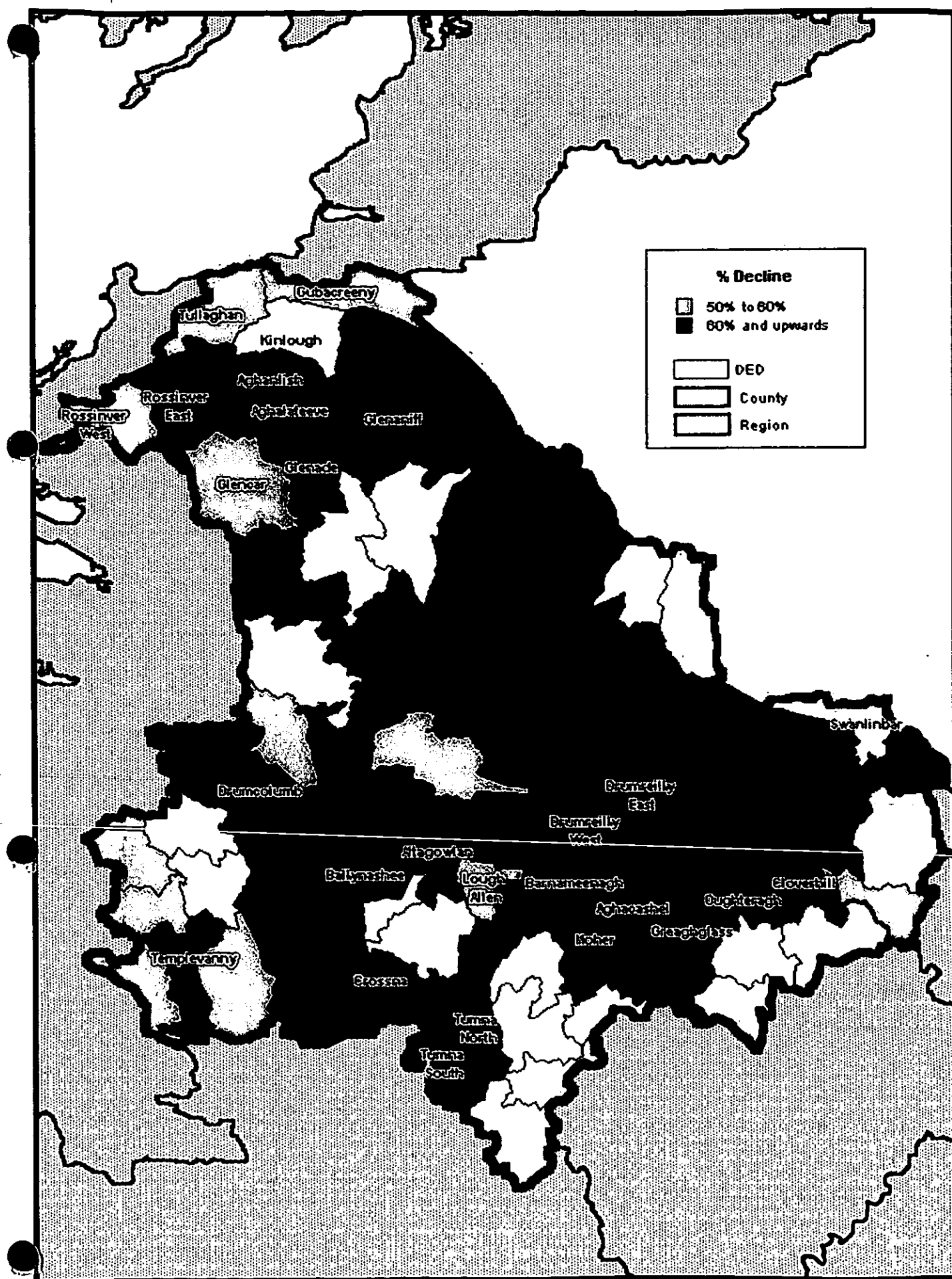
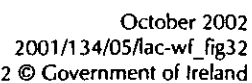
1:75,000 Noise Monitoring & Traffic count locations
including proposed Traffic route

Figure 3.1

The closest inhabited dwelling identified is located approximately 1.5 km from the nearest turbine (House No. 8). There are a large number of unoccupied and derelict houses/farmsteads in the vicinity of the site. The more densely populated areas in the vicinity of the site are Manorhamilton to the north (6 km), Drumkeeran to the south (7 km), and Dromahair to the west (12 km).

Leitrim has been included in the Clar (Ceantair Laga Ard Riachtanais) programme. The programme was set up by the Department of Agriculture, Food and Rural Development in October 2001 targeting 16 specific areas of the country which have suffered the greatest population decline since 1926. Priority investments, which will be eligible for funding, will cover infrastructure, social and community services.

The landcover and landuse for the area around the site is such that non intensive agriculture is the principal activity for the area. North Leitrim also receives up to 50% more rainfall than areas in the south of the county (Leitrim County Development Plan). This also influences the landuse and will have an indirect impact on the population distribution for the county. The population decline in the Leitrim area is shown in Figure 3.2.



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Population Decline in the Leitrim, Sligo, Cavan, & Roscommon area

Figure 3.2

The main potential effects of the wind farm development on humans need to be examined in an EIS. These are as follows:

- noise
- visual impact
- health and safety issues

There may be also a short-term impact on local traffic while the turbines are transported. Material assets such as archaeology etc. are also of concern to the local community and are discussed in Section 12, Material Assets.

3.1.1. Noise in the existing environment

Noise monitoring was carried out on the 18th and 21st June 2001 to determine existing background levels. Four noise-sensitive locations were selected in the vicinity of the site. Monitoring was carried out using a Bruel and Kjaer sound level meter – Type 1. The instrument was fitted with a ½ inch diameter microphone and calibrated in accordance with *BS 4142: 1997*. The microphone was mounted on a tripod at 1.5 m above ground level. It was fitted with a windshield and placed at least 3.5 m from any reflecting surfaces. In accordance with the standard, calm weather conditions are required to avoid spurious effects on the microphone, particularly at low frequencies. Monitoring was carried out at wind speeds of less than 5 m/s for this reason.

The instrument was set up to record the L_{Aeq} , L_{AF10} and L_{AF90} percentiles simultaneously. The noise levels recorded over 30 minute intervals for daytime noise and 15 minutes for night time noise are summarised in Table 3.2 and Table 3.3 below.

Table 3.2: Noise Levels at Monitoring Locations- Day time noise

Monitoring Point	Location	L_{Aeq} dB(A)	L_{AF10} dB(A)	L_{AF90} dB(A)
N1	Near closest residence along access road to site	42	41	34
N2	Near closest residence to the south	38	36	31
N3	Along road junction to nearest residence to the north west	44	38	30
N4	Near closest residence to the east	42	37	34

Table 3.3: Noise Levels at Monitoring Locations- Night time noise

Monitoring Point	Location	L _{Aeq} dB(A)	L _{AF10} dB(A)	L _{AF90} dB(A)
N1	Near closest residence along access road to site	35	37	32
N2	Near closest residence to the south	33	35	28
N3	Along road junction to nearest residence to the north west	36	41	29
N4	Near closest residence to the east	36	39	32

L_{Aeq} - Equivalent continuous A-weighted sound pressure level, in decibels determined over a time interval.
L_{AF10} - A-weighted sound pressure level obtained when using a time weighting "F" that is exceeded 10% of the time.
L_{AF90} - A-weighted sound pressure level obtained when using a time weighting "F" that is exceeded 90% of the time. This parameter is often used to express the background noise level at a measurement location

L_{Aeq} is the average noise level recorded over the sampling period. The closeness of the L_{Aeq} value to either the L_{AF10} or L_{AF90} indicates the relative impact of the intermittent sources and their contribution.

L_{AF10} refers to those noise levels in the top 10 percentile of the sampling interval. It is the level that is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features on locally generated noise. L_{AF10} usually gives an indicator of the level of traffic.

L_{AF90} refers to those noise levels in the lower 90 percentile of the sampling interval. It is the level that is exceeded for 90% of the measurement period. It will therefore exclude intermittent features such as traffic. L_{AF90} is used to estimate the background level.

Noise monitoring location N1 was sampled on the 18th June 2001. The average windspeed ranged from 3.5-4 m/s. Due to adverse weather conditions and high windspeeds it was not possible to carry out monitoring at the other selected locations until the 21st June. The wind speeds averaged 2-3.5 m/s on this day. The predominant wind direction was from the south west. Night-time noise measurements were also carried out on the night of the 21st June 2001.

3.1.2. Description of Noise Monitoring Locations

Noise monitoring locations are presented in Figure 3.1. The following is a summary of the noise monitoring points and noise sources recorded at these locations.

N1(H8) – Closest residence along access road to site

This monitoring location was taken along the access road to the site in close proximity to the nearest occupied residence (H8) to the south west of the site. This location will be impacted to the greatest extent as it is along the proposed route of access to the site and hence will be used by construction traffic.

Daytime Noise

The dominant noise source was rural environmental noise. Bird song and rustling of the wind in the trees and shrubs were intermittent noise sources. The sound of water flowing in a nearby stream was a constant source of noise for the duration of the sampling period. There was a very small element of traffic noise due to a passing car entering the driveway of the house. A small plane could be heard flying in the distance. The wind speed at the time of monitoring was between 3.5-4 m/s. The wind direction was from the south west.

Night-time Noise

The sound of birds was audible in nearby trees. There was a gentle rustling of wind in the trees and shrubs and sound of water in a nearby stream. There were no other audible noise sources. The wind speed was approximately 3m/s.

N2(H5) – Closest residence to the south

Daytime Noise

This location is representative of noise near the nearest residence to the south of the site (H5). The monitoring location was set back approximately 100 m from the house to avoid disturbing dogs around the residence. The main noise sources were from birds and the sounds from a nearby stream. The wind speed at the time of monitoring was between 3-3.5 m/s.

Night-time Noise

The wind speed at the time of monitoring was 3 m/s. The sound of dogs barking occasionally was audible. The sound of a shed door rattling where the dogs were contained and a distant passing car was also audible.

N3(H10) – Along the road junction near the closest residence to the north west

Daytime Noise

This monitoring location was at a road junction leading to two residences in the lower valley to the north west of the site. It was also the closest residence to the monitoring point (H10). Bird song and distant farm machinery operating for the duration of the sampling were consistent noise sources. The sound of wind rustling in the vegetation was also audible. Other than a mini bus entering one of the residences during the sampling period, there was no additional passing traffic. Wind speed was less than 3 m/s during the monitoring.

Night-time Noise

The main noise source was from a gentle rustling of the wind in the trees and shrubs. There were no other audible sounds during the monitoring. The wind speed was 2.5m/s.

N4(H11) – Closest residence to the east

Daytime Noise

Noise was monitored at the driveway entrance to the nearest residence (H11) to the east of the site. This residence is located along the eastern slope of Lackagh away from the majority of the turbines which will be located along the western slope. The main noise sources were from birds singing and the sounds from a nearby stream. The sound of conversation from local farmers passing along the road and a dog barking was also audible. The wind speed was approximately 3m/s for the duration of the sampling period.

Night-time Noise

The sound of farm animals was audible in the nearby fields. There was a gentle rustling of wind in the trees and shrubs. Bird calling was heard in the distance. The wind speed was 2.5 m/s.

3.1.3. Traffic in the existing environment

The site is located in an area accessed by a trackway constructed by the landowner and via county roads. County roads from the site join the regional route, the R280, to the west and south west of the site at a distance of approximately 6 km. The nearest national route, the N16, is the main arterial route for traffic commuting between Sligo and Enniskillen and is located approximately 6 km to the north.

The National Roads Authority (NRA) and the Roads Department of Leitrim County Council have conducted traffic counts from the main roads around the site. It is anticipated that the construction traffic will travel along part of these routes to the site.

The NRA carried out traffic surveys along the N16 in 1999 and 2000. The traffic count in 1999 was taken from the junction at Rainbow Ballroom between Manorhamilton and Blacklion on the approach to Manorhamilton (T1). The existing annual average daily traffic (AADT) for the N16 road was 2,699 vehicles per day. The traffic counted comprised of 2,294 cars and 405 heavy goods vehicles (HGVs). A traffic survey was also conducted in 2000 at the crossroads in Manorhamilton leading to Kinlough (T2). The count comprised 1,438 cars and 337 HGVs AADT.

The Roads Department of Leitrim County Council conducted a traffic survey on the R280 approximately 2 miles south of Manorhamilton (T3). The traffic count comprised 1217 cars and 135 HGVs.

The traffic monitoring points are presented in Figure 3.1.

3.1.4. Socio Economics

North Leitrim is sparsely populated. The primary sources of income and employment are from agriculture and employment in the local towns. This has already been outlined further in Section 3.1. Under the Employment and Industry section of the draft 2002 County Development Plan it states that:

“The Council believes that the location of the County in the north west and on the border has traditionally militated against the economic development of the county and is committed to working with neighbouring counties and regional authorities and assemblies including cross border bodies in addressing this disadvantage”

“Agriculture remains the principle employment sector in the county, notwithstanding its declining economic importance. The industry is characterised by small land holdings”.

“Until very recently Leitrim has been unsuccessful in developing a strong industrial and commercial base. Poor access, poor infrastructure, lack of a prosperous agricultural industry and a weak urban structure have all militated against the development of industrial and other commercial developments”.

3.1.5. Tourism

“Leitrim has tremendous potential to develop a significant tourism industry. Despite some of the most spectacular scenery, excellent angling and boating opportunities, the county has lagged behind other parts of the county in developing tourism”.³¹

In recent years great progress has been made especially in the promotion of the Shannon and more recently the development of the Shannon-Erne Waterway.

Tourism in the area consists mainly of fishing, cycling, boating and hillwalking activities. There are a number of areas of outstanding natural beauty in the vicinity of the site which are listed in the County Development Plan. The closest are located at Doon Lake, Lough Gill and their environs. The closest areas of high visual amenity are O Donnell's Rock, north west of the site (5 km) and Lough Allen and environs immediately to the south of the site (7 km). See Figure 3.3 for locations of scenic views and other tourist areas in the site vicinity.

Along the County Road 245 immediately south west of Belhavel Lough there are outstanding views and prospects towards the Lough (as listed in the County Development Plan). There will also be views of the site from this area. The viewing distance is approximately 4 km. There are a number of other view and prospect areas around the site but the viewing direction is away from the site. These areas are discussed in greater detail in Chapter 9, Landscape and Visual Impact.

A long distance walking route, the “Leitrim Way” runs from south east to north west around the site at a distance of approximately 2 km from the site boundary. The Arigna Miners Way and Historical Trail passes to within 4 km of the site. This walking route extends over 118 km through North Roscommon, East Sligo and Mid Leitrim. It encompasses a walking route to Bencroy to the south and Piaybank and St Bridgids Trail to the north. These northern routes will take walkers on a route parallel to the proposed wind farm for approximately 2.5 km.

The Shannon-Erne Waterway links Upper and Lower Lough Erne in Northern Ireland to the Shannon River creating Europe's longest navigable leisure waterway (750 km).

Since the canal opened in 1994 on average 15,000 visitors per year have passed through the waterway. It is calculated that the impact of this on the region has created 300 sustainable jobs.

The Kingfisher Cycle trail and Tour de Humbert Trails are cycling routes which take in the Leitrim countryside around the site. The Kingfisher Cycle trail runs to the east of

Lough Allen in a north-south direction passing through Drumshanbo and Dowra and in to Blacklion. The closest distance to the site is approximately 7 km.

The Tour de Humbert trail passes from Dromahair to Killarga, Drumkeeran and Drumshanbo. At Killarga, the cycle trail passes to within 5 km of the site.

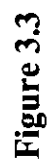
3.2. Potential Impact of the Development on Human Beings

3.2.1. Noise

The impact of noise on residents in the vicinity of wind farms has been a matter of perceived concern in the past. As a result of improvements in technology, however, the noise generated by the operation of turbines has decreased substantially.

Potential noise sources from the wind farm that could affect human beings include:-

- plant operations during internal site road construction
- construction traffic to and from the site during construction
- crane operation while erecting the turbines
- operation of the turbines once the site is commissioned



Potential Impact of Construction

The construction phase of the project will be of moderate duration, anticipated to last 6 to 9 months. The noise generated by construction activity will not create a significant nuisance in the area. Any potential nuisance will be relatively short, and highly localised and will occur during the construction phase only. Further, the distance of the development from housing will also provide a mitigating effect for construction generated noise. Once commissioned, the main source of noise from the development will be from the wind passing the turbine blades.

Potential Impact of Wind Farm Operation

Once commissioned, the main source of noise from the development will be from the wind passing the turbine blades. However, this will also not impact on the nearest dwellings to the site.

There are two forms of noise that may originate from wind turbines – mechanical and aerodynamic noise. The swishing sound from the turbine blades as they move through the air is aerodynamic noise. This has been substantially reduced over time, due to lower blade rotation speeds and improvements in blade design.

Potential mechanical noise could originate from the gearbox and generator in the nacelle. Technological developments in engineering practices mean that mechanical noise is no longer considered to be an issue. Furthermore, the turbine locations have also been optimised to reduce noise impact on neighbouring residences.

Figure 3.4 shows comparative noise levels from different sources. It indicates the sound of a wind farm in operation was less than that from a busy office. This figure was generated in 1994 and, since then developing technology has caused noise levels from wind turbines to decrease substantially.

Figure 3.4: Comparative Noise Levels³²

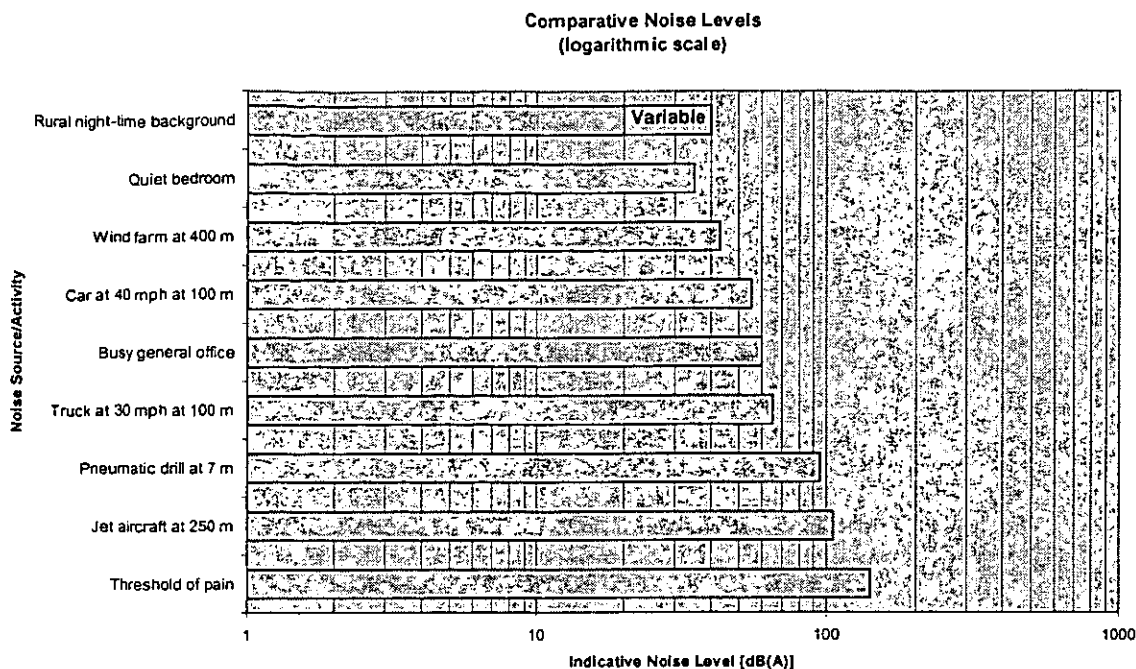
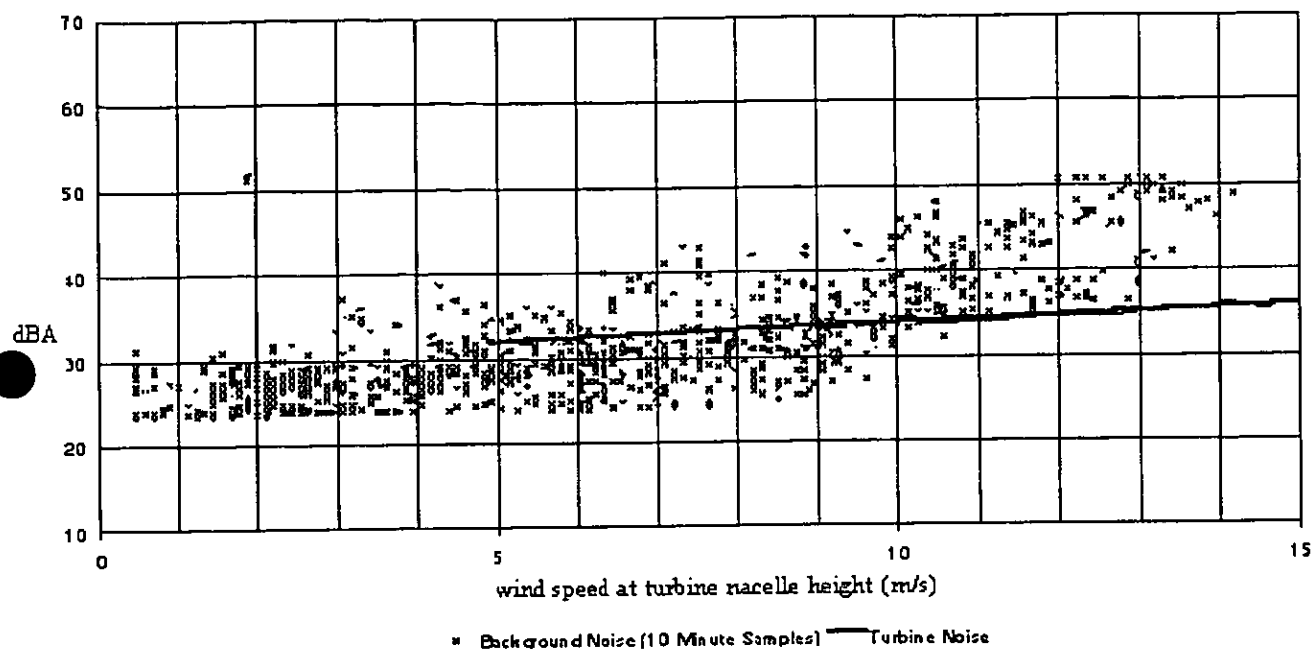


Figure 3.5 shows that at low wind speeds (less than 5 m/s) background noise is audible. There is no noise from the turbines as they only start up at 4 – 5 m/s. On start-up, the turbine noise is higher than background noise, as can be seen from the graph. However, it should be noted that the level of noise generated at such a low wind speed is also low. Above 8 – 12 m/s, background noise begins to exceed turbine noise. Therefore, it is within the range 4 – 8 m/s that turbine noise is most audible.

Figure 3.5: Background Noise and Turbine Noise Vs Wind Speed



Noise Guidelines

A variety of noise guidelines for wind farms are now available. However some of the earlier publications and particularly the limits set down in them are now somewhat out of date. In addition, not all of the limits set take account of the fact that receptors become acclimatised to a particular level of background noise and that what is important is that no significant increase should occur. This means that fixed noise limits are now considered less appropriate than an approach which considers the additional effect of the development over and above background levels.

The UK Wind Turbine Noise Working Group Guidelines³³ are the most up to date and relevant guidelines applicable to wind turbine noise.

The UK Wind Turbines Noise Working Group (WTNWG) recommend that:

- The current practice of controlling wind turbine noise by the application of noise limits at the nearest noise sensitive properties is the most appropriate approach. It is also considered that absolute noise limits applied at all wind speeds are not suited to wind farms in typical UK locations and that limits set relative to the background noise are more appropriate in the majority of cases.
- Noise from the wind farm should be limited to 5 dB (A) above background for both day and night time, except where background levels are very low. It should be noted that this limit applies to the noise from the wind farm only and not to the total ambient noise with the wind farm operating.

Noise limits would apply up to 12 m/s (10 m height) on the assumption that, even in the most sheltered areas, if the wind farm can meet the conditions at lower wind speeds, it is unlikely to be a problem in higher winds. In high winds, bangs and clatters from existing noise sources (such as galvanised farm sheds) and gusts of wind are likely to be more disturbing than the wind farm noise.

- The report considers that a margin of 5 dB (A) will offer a reasonable degree of protection to both the internal and external environment without unduly restricting the development of wind energy, which itself has other environmental benefits. A noise level increase of 3 dB (A) is barely detectable by the human ear. An increase of 5 dB (A) is detectable but barely noticeable to the active listener.³⁴
- This margin may be too stringent where background noise levels are very low, which would prove very restrictive for the development of wind energy. It is not necessary to restrict wind turbine noise below certain lower fixed limits in order to provide a reasonable degree of protection to the amenity.
- Separate lower fixed limits are recommended for day and night time. The reason given is that during the night, the protection of external amenity is less important, and the emphasis should be on preventing sleep disturbance.
- An appropriate fixed limit for the night time is 43 dB (A). This limit is derived from the 35 dB (A) sleep disturbance criteria. An allowance of 10 dB (A) has been made for attenuation through an open window and 2 dB subtracted to account for the use of L_{A90S} rather than L_{AeqS} . A lower daytime limit was recommended.

FTC believes that the day and night time limit in this guidance document is sufficient for reasonable protection of amenity for neighbouring dwellings.

Other guidelines examined were:

- Irish Planning Institute: "*Planning Guidelines for Wind Energy*" (1995)
- Department of the Environment: "*Wind Farm Development - Guidelines for Planning Authorities*" (1996)
- Environmental Protection Agency: "*Integrated Pollution Control Licence Requirements*"

Irish Planning Institute Guidelines³⁵

The Irish Planning Institute (IPI) "Planning Guidelines for Wind Energy" recommends that maximum noise levels at the nearest noise sensitive properties and all other such properties within a specific radius of the development (say 1 km) may be required.

The following are suggested:

- a) 40 dB(A) L_{Aeq} at a wind speed of 5 m/s at hub height of nearest machine.
- b) 45 dB(A) L_{Aeq} at a wind speed of 8 m/s at hub height of nearest machine.

These limits correspond well to the WTNWG lower fixed limit of 45 dB (A) less 2 dB as discussed above. However, they make no allowance for the masking effect of existing background noise, where this occurs. Furthermore, they do not take into account ambient background levels which exist prior to the development occurring.

Department of the Environment Guidelines

The Department of the Environment (DoE) publication "Wind Farm Development – Guidelines for Planning Authorities"³⁶ recommends that "noise levels should not exceed 40 dB(A) at any dwelling house". Again they do not consider natural background levels of noise which pre-date the development.

Environmental Protection Agency

Under the Integrated Pollution Control Licence requirements³⁷, the EPA recommends total noise levels from all sources of L_{AeqT} ¹ 45 dB (A) at night, and L_{AT} ² 55 dB (A) during the day, at sensitive locations such as dwellings, buildings or area of high amenity at which the absence of noise at nuisance levels is required for its proper enjoyment. Although they do not take account of background levels, they are higher than the IPI and DoE proposed limits.

¹ L_{AeqT} is the equivalent continuous sound level over a specified measuring period, T.

² L_{AT} is the equivalent continuous A-weighted sound pressure level during a specified time interval, plus specified adjustments for tonal character and impulsiveness of the sound, where this applies.

The EPA publication also states that where the background noise levels are very low, lower noise limits may be more appropriate. It does not give any guidance as to what these levels should be.

3.2.2. Predicted Noise Effects

To determine the impact, if any, of the proposed wind farm on the nearest residences, a wind farm noise prediction model was run using the Wind Farm Release 3.3 wind farm modelling package. The noise model is based on a Danish model on noise from windmills.³⁸ The noise calculation module determines noise levels over the site map region and at the house locations specified.

The noise prediction model was run on the assumption that there are no tonal components to the noise emissions from the turbines. A line of sight between the turbines and buildings is also assumed, and terrain height data is not considered in the calculation. Thus the model assumes a worse case scenario.

For modelling purposes, a worse case sound power level of 104 dB(A) was used. These levels were calculated by the turbine manufacturer using empirical measurements taken at a reference wind speed of 8 m/s and at a height of 10 m above ground.

The noise contours generated are shown in Figure 3.6 which also shows the nearest residences to the site (H1 to H11) see also Table 3.1. Individual noise predictions were also made at each occupied dwelling. These results are presented in Table 3.4 and Table 3.5.



LEGEND:

N3☆ Noise Monitoring Locations

9▲ House Locations

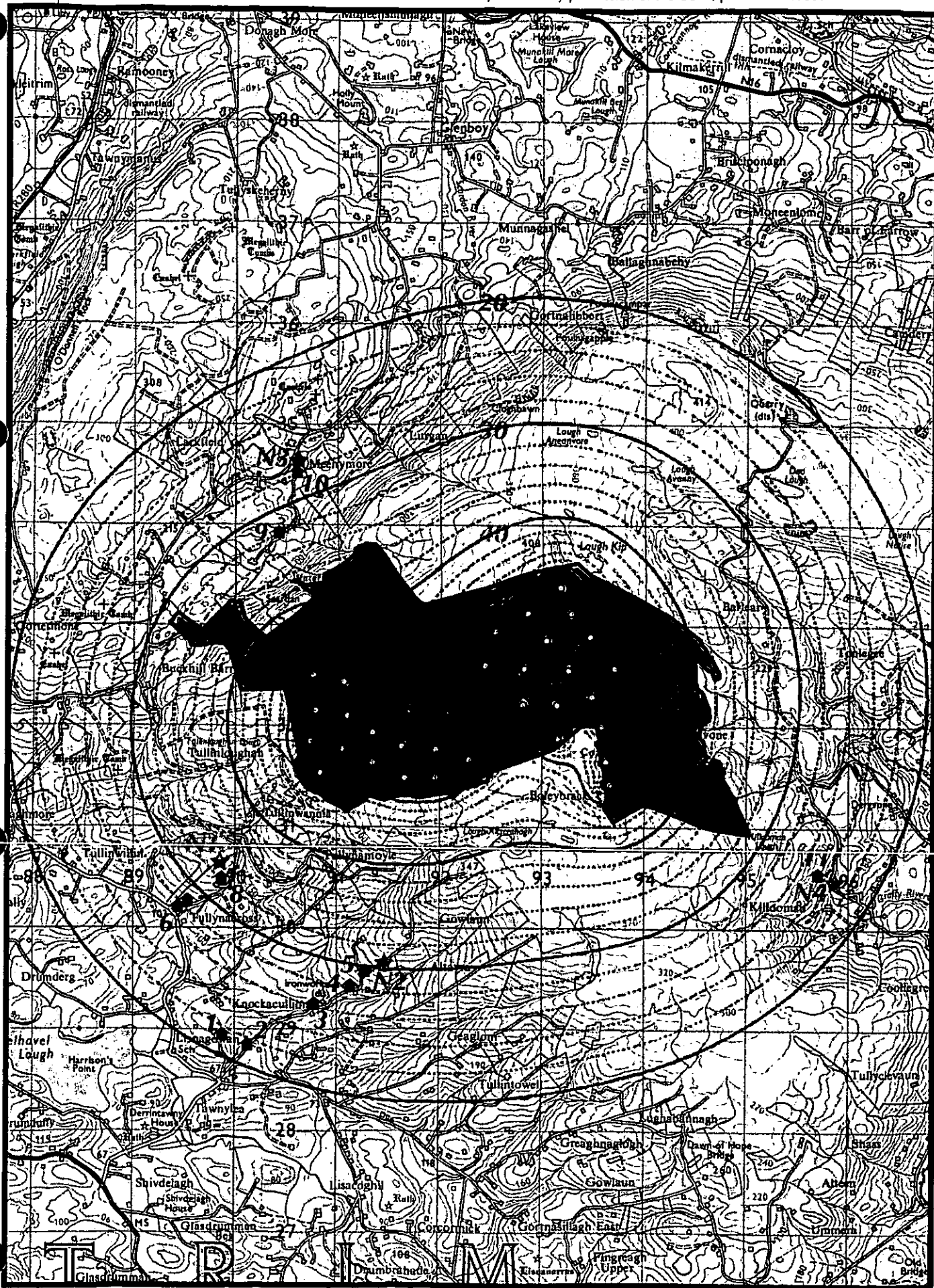
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1:50,000 Noise Contour Map

Figure 3.6

Table 3.4: Predicted noise outputs at nearest residences (dB(A)) Day Time

Dwelling No. / Noise Location	Predicted existing noise from Turbine	Ambient Noise (L_{Aeq})	Predicted Ambient Noise (L_{Aeq})	Existing Background Noise (L_{AF90})	Predicted Background Noise (L_{AF90})
H1*	21	38	38	31	31
H2*	21	38	38	31	31
H3*	26	38	38	31	32
H4*	28	38	38	31	33
H5/N2	29	38	38	31	33
H6*	27	42	42	34	35
H7*	28	42	42	34	35
H8/N1	32	42	42	34	36
H9*	32	44	44	30	34
H10/N3	28	44	44	30	32
H11/N4	24	42	42	34	34

* Noise monitoring was not carried out at these locations. Results (L_{Aeq} and L_{90}) from the nearest locations to the development where monitoring was carried out were used in the table above. This gives an indication of the predicted impact of noise at the remaining residences around the site.

Table 3.5: Predicted noise outputs at nearest residences (dB(A)) Night Time

Dwelling No. / Noise Location	Predicted existing noise from Turbine	Ambient Noise (L_{Aeq})	Predicted Ambient Noise (L_{Aeq})	Existing Background Noise (L_{AF90})	Predicted Background Noise (L_{AF90})
H1*	21	33	33	28	29
H2*	21	33	33	28	29
H3*	26	33	33	28	30
H4*	28	33	34	28	31
H5/N2	29	33	34	28	31
H6*	27	35	36	32	33
H7*	28	35	36	32	33
H8/N1	32	35	37	32	35
H9*	32	36	37	29	34
H10/N3	28	36	37	29	31
H11/N4	24	36	36	32	32

* Noise monitoring was not carried out at these locations. Results (L_{Aeq} and L_{90}) from the nearest locations to the development where monitoring was carried out were used in the table above. This gives an indication of the predicted impact of noise at the remaining residences around the site.

The tables show that the predicted noise at any of the residences is lower than noise generated from other sources which already exist in the locality. Although the tables show that a small increase in predicted noise will occur overall, it must be borne in mind that such small changes have no significant affect on overall noise levels.

This phenomenon is summarised in Table 3.6 which illustrates that increases of up to 6 decibels will not be significant. As can be seen from Tables 3.4 and 3.5, only increases of 1-2 decibels are likely from the operation of the Lackagh wind farm.

Table 3.6: Likely Impact Associated with Change in Noise Level

Change in Sound Level (dB)	Subjective Reaction	Impact
<3	Imperceptible	Negligible
3 – 5	Perceptible	Slight/Marginal
6 – 10	Up to a doubling of loudness	Significant
11 – 15	Over a doubling of loudness	Substantial
>15	--	Severe

The overall impact of the turbine noise is predicted to be greatest at residence H9, where the background noise level is expected to increase by 4 dB during daytime measurements. This represents a slight/marginal noise impact, with the noise from the wind farm being perceptible. The predicted background noise levels at 3 residences (H4, H5 and H10) are expected to rise by 2 dB based on the model output. An increase of 2 dB is generally deemed to have a negligible impact on the existing noise levels.

During night time it is also likely that H9 will be most impacted. The background noise is predicted to increase by up to 5 dB which will be perceptible and potentially cause a marginal noise impact.

However it should be appreciated that the model predicts a worst case scenario when all the turbines are operating and does not consider the fact that this dwelling is located in a valley of considerably lower elevation to the turbines. Hence it will be sheltered significantly. Also at night time background noise levels are lower as daily activities have finished and people are most likely to be indoors (22:00 to 08:00). The attenuation of noise inside buildings will also result in a significantly lower impact.

Nighttime background noise is also predicted to increase by up to 3 dB at residences H4, H5 and H8 which may be perceptible and result in a slight impact. However the levels are within the acceptable guidelines.

3.3. Traffic

3.3.1. Transport of Oversized Loads

It is estimated that approximately 217 HGV loads will be required to transport the 31 towers, blades and nacelles to the site, assuming each tower arrives in three sections. The construction traffic will not lead to traffic congestion. Because the loads are oversized, this will require co-ordination with the local authority and Gardaí.

Typically a Garda escort will accompany the oversized loads to the final destination and will travel ahead of the load to ensure the progress of transportation is as smooth as possible. A truck with flashing orange light and banner warning of wide/long vehicle will also accompany the oversized goods. All local authorities and Gardaí will be informed in advance of the goods movement and proposed routes through their counties/areas of passage.

As the cranes are classified as oversized loads, their movements will require traffic control. A number of traffic routes were assessed to determine an optimum route from the port of delivery to the site.

It is proposed that construction traffic will travel along the R280 as far as Killarga from where it will follow a County road to the site.

The proposed route was discussed in advance with Leitrim County Council Roads Department. Figure 3.1 shows the proposed route.

However, the final decision will not be made until further discussions are held between the Roads Department of Leitrim County Council, the developers, and the transport contractor.

Following selection of the transport route, if any road modifications are required, they will be agreed with Leitrim County Council and paid for by the developer.

3.3.2. Construction Traffic

There will be an increase in local traffic during the construction phase of the project. Staff, including plant operators, electricians, engineers and tradespeople will commute to and from the site each morning and evening. It is estimated that as many as 30 workers may be on site during times of maximum activity. If it is assumed that each travels separately, 30 vehicles will use the local access roads. Intermittent deliveries of building material will also take place.

Although this will increase local traffic numbers, it will not create any traffic congestion. The volume of construction traffic likely to be associated with the proposed development is given in Table 3.7 below.

Local traffic is likely to increase due to on-lookers as the turbines are erected. This increase will probably occur at weekends, but will be intermittent. It is not considered likely to create any significant impact on local traffic.

Noise from construction is addressed in Section 3.2.1.

Once commissioned, the site may provide employment for 1 part time worker.

Table 3.7: Construction Traffic Estimates

Construction Item	Maximum Number/Volume Required	Associated Traffic	Comment
Towers	31	93 loads	Assumes three sections per tower and one section per load
Nacelle	31	31 loads	
Blades	93	Max of 93	It is customary to have only 1 blade per load.
Tower Bases	31	31 loads	Assumes one per truck load
Electrical Components	Varies	31 loads	Transformers, switch gear, cable, etc.
Concrete	6,700m ³	837	Assumes 8m ³ load capacity
Stone & Crushed Rock	20,070m ³	1,000	Assumes no stone or crushed rock are used from the site. This value will be lower if sourced on site.
Bedding Sand	2,812m ³	351	Assumes 0.25 m ³ /m run used
Building Material	Varies	62 loads	Blocks, sand, cement, roofing, fencing, steel reinforcement, etc.
Crane	2	4	150 tonne crane and 400 tonne crane
Employees	30	30	Traffic estimate per day/every day. Will vary depending on activities
Fuel	100,000L	100	An oil tanker may visit the site each week for re-fuelling. Minor quantities of oil may be stored on site.
Plant	7	7	See Section 2.3.1.

3.3.3. Health and Safety

The wind farm will be designed, constructed, operated and decommissioned in accordance with the:-

- Safety, Health & Welfare at Work (Construction) Regulations 2001
- The Safety, Health & Welfare at Work Act 1989
- The Safety, Health & Welfare Work (General Application) Regulations 1993
- The Safety, Health & Welfare (General Application) (Amendments) Regulations 2001
- UK and Irish best practice guidelines

Aspects of the development will present health and safety issues. These are discussed as follows:

Construction Health and Safety

- traffic safety during the transport of oversized loads to the site
- lifting of heavy loads overhead using cranes
- working with electricity during commissioning
- working at heights
- general construction site safety (e.g., slip/trip, moving vehicles etc.).

A Construction Stage Health and Safety Plan covering all aspects of the construction process will deal more fully with these and other related issues.

Safety procedures will be developed based on the specific hazards at the site. These procedures will apply to the entire site area, including the turbines and the substation. A safety officer and the operators of the wind farm will constantly review safety procedures. Remote monitoring systems will keep track of all operations on the wind farm and regular safety audits will be carried out on site to ensure the safety of all personnel working on or visiting the wind farm.

There may also be a concern for visitors to the site both during the construction phase and the operation phase. It is not feasible to erect a security fence around the entire construction site due to the site size and terrain. After construction, the substation compound will be surrounded by a security fence as will the transformers at each turbine location. Access to the site during the construction phase will be restricted as far is reasonable practicable. It should be noted that the wind farm will be located on private land, to which members of the public have no right of access.

Operational Health and Safety

During operation, access to the wind farm will be the same as it was to the farmland prior to construction. Access to the site and turbines is very safe for people and animals. There are no new fences or barriers restricting access other than the security fence around the compound of the substation.

Access to the turbines is through a hatch door at the base of the structure. This will be locked at all times and restricted to competent persons.

It is not anticipated that the workings of the turbines will present any danger to the public. The components of a wind turbine are expected to last 25 years and are equipped with a number of safety devices to ensure safe operation during their lifetime:

- A vibration sensor will detect if a turbine starts shaking and will turn the affected turbine off.
- There are other sensors in the nacelle to check the operation of the turbine.
- The rotor blades are also tested statically by applying weight to bend the blades and dynamically by testing the blade's ability to withstand fatigue from repeated bending more than 5 million times.
- The proposed turbines also have two independent fail-safe brake mechanisms to stop the turbine. The aerodynamic breaking system is the main braking system. Mechanical braking serves as a backup system. This is in addition to the yawing and blade pitch mechanisms.

The electric generator of a wind turbine will generate electromagnetic energy that will be propagated in the vicinity of the machine. As part of its quality control, testing is required prior to sale to ensure that it meets the required European standard with regard to level of emissions (EN 55011) and immunity to interference (EN 61000).

The rigorous safety checks imposed on the turbines during design, construction and commissioning should ensure the risks imposed to humans are negligible. The health and safety record of the wind energy industry worldwide is exceptionally good. Wind energy has the best safety record of any form of power production.³⁹

Health Effects of Avoiding Fossil Fuel Power Production⁴⁰

"Death, Disease and Dirty Power - Mortality and Health Damage Due to Air Pollution from Power Plants," by the US Clean Air Task Force is a report commissioned to quantify the health impacts of fine particle air pollution, commonly known as soot, from power plants, as well as the expected benefits of policies that would reduce fine particle pollution from power plants. The health effects analysed include death, hospitalisation, emergency room visits, asthma attacks, and a variety of lesser respiratory symptoms.

The report reviews the contribution of power plants to fine particle pollution, and discusses policies that will reduce power plant fine particle pollution and thus save thousands of lives. Key findings include:

- Fine particle pollution from U.S. power plants cuts short the lives of over 30,000 people each year.
- In more polluted areas, fine particle pollution can shave several years off its victims' lives.
- Hundreds of thousands of Americans suffer from asthma attacks, cardiac problems and upper and lower respiratory problems associated with fine particles from power plants.
- The elderly, children, and those with respiratory disease are most severely affected by fine particle pollution from power plants.
- Metropolitan areas with large populations near coal fired power plants feel their impact most acutely - their attributable death rates are much higher than in areas with few or no coal-fired power plants.
- Power plants outstrip all other polluters as the largest source of sulphates (the major component of fine particle pollution) in the U.S.
- Approximately two thirds (over 18,000) of the deaths due to fine particle pollution from power plants could be avoided by implementing policies that cut power plant sulphur dioxide and nitrogen oxide pollution to 75 % below 1997 emission levels.

Fine particle pollution is responsible for increased risk of death and shortened life spans.

The health effects from power plant pollution in Texas and the avoided health effects with 75 % power plant pollution reduction are shown in Table 3.8. Similar statistics are unavailable for Ireland, but, with allowances being made for differences in Ireland's proportion of energy consumers, energy mix, and population density, it is expected that the report would be applicable to the situation here. 96 % of Ireland's electricity comes from fossil fuel power plants, compared to 65 % in the USA.⁴¹

Table 3.8: Health Effects of Power Plant Production³⁹

	Health Effects from Power Plant Pollution in Texas	...and Avoided with 75 % Power Plant Pollution Reduction
Mortality	1,310	805
Hospitalisations	885	534
Asthma Accident and Emergency Room Visits	382	229
Chronic Bronchitis	929	565
Total Asthma Attacks	31,700	19,100
Lost Work Days	274,000	168,000
Restricted Activity Days	1,410,000	868,000

Similar statistics are unavailable for Ireland, but, with allowances being made for differences in Ireland's proportion of energy consumers and energy mix it is expected that the report would be applicable to the situation here. 96 % of Ireland's electricity comes from fossil fuel power plants.

3.3.4. Socio-Economics

Economic Contribution to Local Community during Construction

The design, construction and operation of the wind farm will provide employment to the local community. The design and planning stage will provide employment for a number of technical consultants. This will be relatively short term.

The construction phase will provide employment for local tradespeople, labourers, and specialised contractors. Airtricity's policy is to ensure that as much of this money is spent locally as is practicable. This will have a direct short-term positive impact on the local economy.

Economic Contribution to Local Community during Operation

Rates will be paid from the development to Leitrim County Council.

The operational phase will present an opportunity for local mechanical-electrical contractors to become involved with the maintenance programme for the wind farm. It is also anticipated that the project will provide part time employment for one caretaker.

There will also be land rental income for the local landowners. In addition, Airtricity will provide 1% of the annual revenue of the wind farm to projects/development in the area.

3.3.5. Tourism

No direct studies have been carried out to show the effect of wind farms on tourism. Some tourists consider that wind farms spoil scenic views. Equally, it has been suggested that wind farms fit in extremely well with Ireland's clean, green image. Such developments help foster our image of a clean environment for tourists. The only data available comes from wind farms that find themselves an unexpected tourist attraction.

Wind farm critics suggest that the novelty value can wear off resulting in a decline in visitors. The Delabole Wind Farm in Cornwall suggests otherwise.

Delabole was the first operational wind farm in the UK ⁴². It was established in 1991, and comprises 10 turbines with a total capacity of 4 MW. Visitor numbers increased to such a level during 1999/2000 that temporary visitor facilities had to be put in place. A £7 million Gaia Energy Centre has been built to house displays about sustainability and renewable energy. The local Parish Council has even published a signposted "Windmills Walk".

Leitrim, Roscommon and Sligo County Councils have published a booklet outlining a series of walking routes aimed at tourists and hillwalkers. "*The Miner's Way and Historical Trail Map Guide*"⁴³ illustrates eleven walks, two of which go through wind farms.

One of the perceived negative aspects of wind farms is the visual impact on the landscape. There may be concerns from a tourism aspect that hillwalkers, cyclists and other tourists will find alternative routes and avoid the area.

A letter received from the Department of Tourism, Sport and Recreation stated the Department has no particular views on the development. A copy of the letter is included in Appendix C.

Overall there is no evidence to suggest wind farms have impacted upon tourism.

3.3.6. Shadow Casting

In times of direct sunshine, wind turbine blades may cast moving shadows on residences in close proximity to the turbines. At certain times of the year, the shadows from the turbine blades may periodically block sunlight entering a room thereby causing a flickering effect. This will not generally have an affect on health or safety, but may on limited occasions present a brief, minor nuisance effect for nearby neighbours.

These affects can be assessed in an EIS using a simple shadow casting model. This model calculates times throughout the year when a turbine, viewed from the window of a house, is in line with the sun.

For shadow casting to occur a number of factors must be present and a number of assumptions are made by the model. These are listed as follows:-

- The model does not consider any features that might obscure residence views of the site. These features would reduce or eliminate the potential for shadow casting
- It does not consider actual or possible sunshine hours, but assumes 100% sunshine
- It does not examine occasions when the wind direction will be parallel with the line between the sun, the turbine, and the window in question. This is a necessary prerequisite for the turbine blades to cast moving shadows across a window

However, for the Lackagh wind farm, shadow casting will not be an issue. This is because at distances greater than 1000 m, the rotor of a turbine will be too distant to cause a chopping effect on sunlight. Instead the turbine as a whole will be seen as an object with the sun behind it. Since the nearest occupied dwelling is at a distance of nearly 1.5 km from the turbines, shadow casting is not expected to be a problem at this site.

3.3.7. Reflected Light

Bright sunlight falling on the turbines will reflect and, at a distance, cause the turbines to appear to be shining. This is a minor effect, but could draw attention to the turbines highlighting their visual effect.

3.4. **Mitigation Measures**

3.4.1. Noise

To mitigate against the impacts of noise on the local community, the following mitigation measures are proposed.

Working hours at the site during the construction phase will be limited to 08.00 to 19:00 Monday to Saturday inclusive. Work on Sundays or Bank Holidays will only be conducted in exceptional circumstances or emergency. It will only happen when for example, construction is at a stage where it would be safer to work the next day to erect the nacelle rather than leave the tower upright. The weight of the nacelle will anchor the tower to the base.

In relation to operational noise impacts, the prediction model has shown that these impacts will be negligible. In any case, state-of-the-art wind turbines are specifically designed to minimise noise emissions.

Due to the remoteness of the site, it is not expected that noise from the operation of the wind turbines will pose any problem at neighbouring dwellings.

3.4.2. Traffic

To mitigate against the impacts of traffic associated with the project, the following mitigation measures are suggested:

- Provision of traffic control while oversized loads are transported to the site. Movement of oversized load will be co-ordinated with the local authorities.
- Parking facilities will be provided on site for construction traffic.
- Wherever possible, construction material will be sourced on site. They will be used for site track and hardstanding construction, and will minimise the volume of construction traffic to the site.

Regular construction vehicle traffic to and from the site will have negligible impact. Once the site is in operation, it is anticipated that the development will not generate any adverse impacts on traffic in the vicinity of the site.

Mitigation measures other than partial upgrading of sections of the local road are not deemed necessary. Any such upgrading will be agreed in advance with Leitrim County Council.

3.4.3. Health and Safety

Construction Health and Safety

A site specific health & safety statement for the construction phase of the project will be prepared by the Engineer, Procure, Construct (EPC) Contractor in accordance with the Health, Safety & Welfare at Work (Construction) Regulations 2001. This will address all issues of the construction project including:

- Site access and induction training
- general site safety
- excavations and earthworks
- compressed air
- transport, earthmoving and material handling machinery
- working at heights
- lifting appliances
- chains, ropes and lifting gear
- special provisions as to hoists
- carriage of persons and secureness of loads
- miscellaneous
- protective clothing and footwear required
- lockout/tag-out procedures for safe electrical work

For all construction beginning after 1st May 2002, FAS Safepasses will be required for all construction, delivery, and security staff. From 1st July 2002, all:

- tower crane operators
- slingers/signallers
- telescopic handler operators

will be required to have a Construction Skills Certificate Scheme (CSCS) Card. All other relevant operators will be required to have a CSCS Card by 1st June 2003. The site manager will be responsible for the implementation of procedures outlined in the safety statement. Traffic safety is discussed in Section 3.4.3.

Public safety will be addressed by restricting site access. Appropriate warning signs will be posted, directing all visitors to the site manager.

Operational Health and Safety

The substation on site will be fenced, restricting unauthorised access. The transformers will also be fenced. No new fencing will be put in place on the rest of the site, other than standard livestock fencing if required.

Adequate clearance of structures from overhead lines will be provided. In this case, all on-site electrical connections are carried by underground cable.

No avoidance/remedial/reductive measures are required for levels of electro-magnetic radiation, since these are not in any way likely to lead to health effects.

3.4.4. Socio-Economics

The development will provide employment opportunities to the local community during the construction phase. It will provide ongoing sustainable income for the developer / landowners involved. In addition, Airtricity will provide 1% of the gross revenue of the wind farm to projects in the local communities.

3.4.5. Tourism

It is not considered likely that mitigation measures are necessary in this respect, or if so, what those might be. There is no evidence to suggest that wind farm developments have an adverse effect on tourism.

3.4.6. Shadow Casting

Shadow casting will not be a problem due to the distances of the nearest occupied houses to the development. Mitigation measures are therefore not required.

3.4.7. Reflected Light

The use of semi-matt paint significantly reduces potential for light reflecting from the turbines. Additional mitigation measures are not required.

3.5. Conclusions on Human Beings

There are no occupied dwellings within 1km of the turbines and only 11 others within 3 km. Noise from the turbines will not impact significantly due to distance. Shadow casting is also not expected to occur.

There will be an increase in local traffic during the construction phase of the project. No significant, adverse effects are anticipated, although the movement of oversized loads will require careful co-ordination with An Garda Síochána and the local authority. There will be no long-term effects on traffic.

Mitigation measures will be put in place to minimise health & safety impacts. These are not considered to be significant. In terms of socio-economics, the development is expected to have a positive impact. The wind farm is expected to have a neutral effect on tourism in the area, although it may be positive. Reflected light from the turbines, or shadow flicker caused by shadows of the rotating blades on the windows of nearby houses is not considered likely to be a problem.

The main impact will be visual which is not easily remedied due to the nature of wind farms on areas of elevated terrain.

Rates paid to Leitrim County Council will be the main positive aspect of the development.

4. GEOLOGY

The geology and hydrogeology of the site, potential impact of the development thereon and proposed mitigation measures are presented in this section.

4.1. Geology and Hydrogeology in the Existing Environment

The site proposed for development is located on the Lackagh Hills, which are part of the Lough Allen Uplands.

The rocks underlying the site form part of the Carboniferous Shales rock sequences in North Leitrim. These comprise various sandstone and shale formations. The sandstone formations have been classified as locally important aquifers and the shale formations as poor aquifers. The bedrock geology is described from the Geological Survey of Ireland's Bedrock Geology Sheet 7 (Sligo - Leitrim).

The glacial sediments in the area were deposited during the last cold stage of the Quaternary period.

The dominant soil association in the area is Blanket Peat (High Level), which is within the Mountain and Hill physiographic division.

The profiles of this soil association vary in depth from 1 to 2 m but average 1.2 m⁴⁴. They are characterised by a highly humified lower layer, the degree of humification decreasing towards the surface. The Blanket Peat has been eroded in parts of the site and in these areas boulders, which were transported during glaciation, are exposed.

4.2. Potential Impacts of the Development on Geology and Hydrogeology

The area of the site on which civil works will take place, relative to the entire site is minor. It is therefore concluded that the proposed development will have no significant impact on the geology or hydrogeology of the area.

When the wind farm is under construction there is a potential for diesel spills or leaks that might impact on ground water quality. Oil spills may occur when:

- fuel could be stored on site for plant machinery during the construction phase
- small quantities of oil will be used in cooling the transformers during the operation phase

4.3. Mitigation Measures

Airtricity proposes that vehicles will be refuelled by tanker once a week during construction. This should assist in avoiding any requirement for tanks on site.

Diesel used on site during construction will be stored in a suitable tank (steel/plastic) of good integrity. The storage tank will be bunded to 110% of the tank capacity. This precautionary measure will ensure that all leaks or spills are contained.

The transformers used in the on-site substation may be oil cooled and will be located on bunded concrete pads. If a leak occurs, oil will be contained and cleaned up as part of regular site maintenance. Any such oil spillage would be small.

4.4. Conclusions on Geology/Hydrogeology

The proposed development will have negligible impact on geology or hydrogeology.

5. SURFACE WATER

The surface water on the proposed site, potential impact of the development thereon and proposed mitigation measures are presented below.

5.1. Existing Surface Water

The hydrology of the site was assessed from available maps and published data. A number of site visits were also carried out to determine site hydrology and assess the potential impacts of the wind farm development on changes in water movement. These changes were considered to be potentially significant as they might have subsequent impacts on ecology. This was an issue raised by Dúchas during the consultation process. The site layout and design has been revised from the original layout to address these concerns. Correspondence from Dúchas is provided in Appendix C.

The proposed wind farm site is located on a mountain plateau, known as Boleybrack Mountain, at an elevation of between 300 m OD and 450 m OD. The area above the 400 m contour line covers an area of 3 km² approximately. This terrain is rough and undulating. As discussed in Section 8 (Ecology), it is covered by a variety of habitats namely blanket bog, heath and degraded areas of the aforementioned habitats. There are also a number of lakes and pools within the proposed wind farm site. The habitats that have developed at Lackagh have come about due largely to the hydrology, geology, climate and topography.

There are a number of mountain lakes in the area of the proposed development. These include two large lakes (Lough Kip and Lackagh Lough), two smaller lakes (Lough Strand and Lough Carran) and a number of unnamed lakes or pools. A number of unnamed streams drain these lakes and surrounding areas in a radial pattern to the rivers in the surrounding valleys.

Lough Kip is located at the north-east extremity of the site. It covers an area of approximately 20 ha. It is drained to the north-west by a tributary to the Scardan River. The Scardan joins with the Owenmore River, which in turn joins with the Bonet River near Manorhamilton. See Figure 2.1. There is no flow data available for the stream draining Lough Kip. Based on site observations, it is considered that flashier flow dominates in this stream, and others draining the mountain.

Lackagh Lough is located towards the centre of the site. It covers an area of 15 ha. It is drained by an unnamed stream, which flows in a westerly direction directly into Belhavel Lough.

Rainfall at the site is estimated based on rain gauge data available from Drumkeeran, the nearest rainfall gauging station. The average annual rainfall is estimated at 1,248 mm. Monthly averages are provided in Chapter 6, Climate and Air. This station is located at an elevation of 110 m OD. This is 300 m lower than the site, so it can be expected that rainfall will be higher at the site.

There is a high run-off co-efficient associated with the soil/peat at the site. A run-off co-efficient of 0.5 is used. This is considered a conservative estimate for the run-off for this site. Given the surface area of the site (8.09 km^2), the estimate average annual run-off is estimated at 5 million m^3 (or $13,830 \text{ m}^3/\text{day}$ average). This run-off is distributed among numerous small streams.

At the time of the site visits, the soil was saturated such that rainfall occurring was observed to flow overland in a planar fashion until encountering streams. The run-off co-efficient is essentially pipe-flow. These streams were visible only where the peat cover had collapsed, which has occurred in a number of places.

On the south western side of the site, where the site tracks are located, surface water flow is directed along track-side channels.

Erosion was noted in a number of locations along the streams. Peat has been eroded to bedrock and the peat banks at the streams' sides generally show cracking and the formation of hags. Erosion of peat on the whole, however, is localised.

Blanket Bog Formation

The formation of this type of bog began at the end of the Midlandian Late-Glacial Period (the last glaciation, 10,000 years before present). In Ireland, initially, peat formation was confined to shallow lakes and wet hollows, areas that would show an infilling sequence from open waters to fen and acid peat. Pollen and macrofossil evidence shows that forest once occurred under almost all areas of the country now covered by blanket peat, except for these lakes and hollows. However, from about 7,000 years ago, with the clearance of forest by human activity in some areas, blanket bog began to develop from these plateaux and hollows, extending to sloping areas. Approximately 4,000 years ago, the climate became wetter, and the surface soils of exposed deforested areas underwent leaching of iron. The mobilised iron precipitated out at a lower level, where it formed an impermeable iron pan. This hydrogeological cut-off resulted in the soil above becoming waterlogged, an environment that promoted the large-scale development of blanket peats.

The hydrology of blanket bog is controlled by its structure. By weight, a blanket bog may be composed of up to 85% water. Dead *Sphagnum* fragments hold this volume of water. The bog consists of two layers:

1. The Acrotelm:

This is the top layer of the bog. It consists of live, upright stems of *Sphagnum* mosses, and is no more than 30-50 cm deep. Water flow on this layer is very rapid, approaching typical surface water flow levels. The water table is usually at a few centimetres depth, within this layer, a level at which it remains for 95% of the time.

2. The Catotelm:

This layer is beneath the acrotelm, and consists of an amorphous mass of collapsed *Sphagnum* stems and fragments. Water movement in this layer is very slow, typically <1m/day. Most incident rainwater is stored in the catotelm, where it seeps vertically downwards over a period of weeks to months.

The blanket bog is a mineral-poor habitat because it is fed solely by rainfall. Much rainfall collects on, or is held close to the surface of the bog through the sponge-like action of *Sphagnum*, but a considerable amount of water runs off the bog, either directly or through an internal drainage system within the bog. On a blanket bog, a system of surface drains lead to swallow holes (entrances to underground drains). Such systems are distinguishable by the presence of numerous plants that are not found on the bog, a reflection of the increased nutrient load of the drains.

5.2. Potential Impacts of the Development on Surface Water

5.2.1. Operation

Overall, the development of the access tracks and the construction of the turbine bases will cause an increase in run-off from a rain storm event. This would increase the peak flow to the numerous streams draining the site. The increase in run-off results from a change in the surface run-off coefficient due to turbine foundations and road construction. However, the percentage change is quite small, as the following calculation shows:-

- New tracks will be approximately 11.25 km approximately in total length and 4.5 m wide. Approximately 1.3 km of existing trackway will be used. Hence the total area will be = 5.6 ha
- The turbine foundation area that includes the crane pad is 525 m² and, as 31 turbines are proposed for this project they will cover a total of 1.6 ha
- The total catchment area that is subject to an increase in run-off coefficient is approximately 7.2 ha.
- The change in run-off coefficient will be an increase from 0.5 to 1.0

5.2.2. Construction

The intensity of a rain storm event with a return period of five years is 35 mm/hr with a duration of 40 minutes. At present, this produces a total runoff of 39 m³/s for the catchment of 809 ha. This is distributed between many streams. The increased run-off from new roads and hardstanding will be 0.35 m³/s (or 1% increase on runoff)

The quality of surface water could be affected during the construction activity from:

- the increase of sediment load to streams
- the potential spillage of oil and diesel stored on site for plant equipment
- the release of cement to watercourses during concrete pours for foundations.

These potential negative impacts from these sources will only occur during the construction phase. This phase will be of relatively short duration.

5.3. Mitigation Measures for Surface Water

To mitigate against the potential impacts on the blanket bog and other habitats on-site changes were made to the site design which involved the relocation of turbines and alignment of site tracks. Initially, the ecology report was used to identify areas of degraded bog and degraded heath. These areas were then considered for the siting of turbines. Areas of undisturbed habitats were avoided.

Turbines were sited in areas of degraded habitats at a desk-study level. The only additional criterion used was minimum separation distances needed between turbines. Using this layout plan, the site was walked to assess each proposed location and determine the optimum alignment for the site tracks. Turbines were relocated from the original layout for the following general reasons:-

- turbines were moved closer to existing site tracks
- turbines were moved to locations along eroded streambeds to allow the construction of tracks with minimum impact to undisturbed bog or heath
- turbines were moved away from the immediate catchment of lakes
- tracks were aligned along degraded heath and bog

Table 5.1 summaries the reasoning for the siting of each turbine and track.

Table 5.1: Reasoning for Turbine Siting

Turbine No.	Comment
1 and 2	Located close to/adjacent to existing site track.
3 and 4	Located along cut-away bog sections in area of degraded bog.
5	Located along a degraded stream channel in area of degraded bog.
6	Located in area of degraded bog. Access track is spur from proposed track along turf bank cut to rock.
7, 8 and 9	Located close to existing track in area of degraded bog.
10	Located in area of degraded bog. Access track follows edge of turf bank cut to top of rock.
11, 12, 13 and 14	Located in area of degraded bog. Access track follows the contour of the mountain.
16	Located in partially degraded heath. Access track follows toe to rocky crag.
17 to 21	Located in area of partially degraded bog/heath. The access road follows erosion channel along much of its alignment.
23 to 27 and 31	Located along a line of degraded bog and rocky outcrop.
15 and 28 to 30	Located along line of degraded heath.

The main potential impact associated with this development is the possible change in water flow from the site by the construction of the access tracks linking the turbines. It is common practice to place tracks parallel (or nearly so) to contours thereby minimising road gradients. Drainage ditches are then constructed on the up-slope side to catch any water before it crosses the track. Where tracks are located on soft ground or peat which is less than 2 m thick, it is usual practice to excavate to a solid sub-base (bedrock typically) prior to track construction. The affect of this is that at the down-slope side of the track the peat is deprived of water input (except for direct rainfall). This results in drying and erosion of peat along the sides of the tracks. See Figure 1.5.

Further to the consideration of the siting of the turbines (and the alignment of the access tracks), the following additional mitigation measures will be adopted:-

- Construction of floating roads in areas where deep bog is encountered unexpectedly. Although deep bog has been avoided, it is possible that pockets of deep bog are present locally. To avoid disturbance to these areas, floating roads will be used. This has the added benefit of reducing the volume of spoil to be disposed of.
- The shoulders of tracks will be sloped to permit and encourage natural re-vegetation. This will reduce drying and erosion.
- Where access tracks are aligned parallel to the contours, surface water will be permitted to flow across the road in a planar fashion or in a drainage medium. This will allow for diffused water flow, thereby maintaining continued water supply to the flora on the down gradient side of the track.
- During the construction phase, best practices will be employed to minimise the release of sediment laden stormwater run-off. Tracks and turbines have been positioned at a minimum distance of 25 m from the main streams draining the site.
- Sediment traps will be put in place as the construction of site tracks and hardstanding advances. These will be placed at locations to intercept run-off to streams.
- Storage of oils and diesel on site, will be in steel or plastic tanks of good integrity and bunded to 110% of tank capacity. These fuels will only be stored on site during the construction phase, which will be of relatively short duration.

5.4. Conclusions on Surface Water

There are a large number of lakes, pool and streams within the wind farm site which may be impacted by the construction of the site tracks. The turbine layout and tracks have been located to minimise the impact on these sensitive areas. Site roads and hardstanding areas will be constructed so that water will be permitted to flow laterally retaining current water flow patterns.

6. CLIMATE AND AIR

The climate and air in the existing environment, potential impact of the development thereon and proposed mitigation measures are presented below.

6.1. Climate and Air in the Existing Environment

The long-term weather patterns at the site reflect regional conditions affecting the Leitrim area. These patterns are predominantly low fronts from the west and south west in winter months. More settled conditions prevail during the summer months.

Clones is the nearest synoptic station to the site and lies approximately 60 km away to the east. The two nearest rainfall stations are located at Manorhamilton and Drumkeeran. The locations are approximately 8 km to the north and south of the site.

Table 6.1 below displays the monthly and annual rainfall averages for the period 1951 to 1990 taken from Manorhamilton, Drumkeeran and Clones. Data from 1971 to 2000 is currently being prepared by Met Eireann.

Table 6.1: Monthly and Annual Rainfall Averages

	Clones	Manorhamilton	Drumkeeran
Distance and direction from site	60km E	8.5km NNE	7.7km SE
January	90.7	147	129
February	67.5	101	92
March	77.2	98	92
April	56.4	86	73
May	67.4	86	86
June	67.7	92	87
July	60.4	112	91
August	85.0	118	105
September	83.1	133	115
October	96.7	141	120
November	85.5	157	128
December	90.6	168	134
Annual	928.4	984	1248

(1961 – 1990)⁴⁵

Table 6.2: Clones Monthly and Annual Mean and Extreme Values (1962 – 1991)⁴⁶

TEMPERATURE (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean daily max.	6.7	7.1	9.2	11.6	14.5	17.2	18.6	18.3	16.0	13.1	8.9	7.4	12.4
Mean daily min.	1.3	1.3	2.1	3.4	5.7	8.6	10.4	10.1	8.3	6.5	2.9	2.2	5.2
Mean	4.0	4.2	5.7	7.5	10.1	12.9	14.5	14.2	12.1	9.8	5.9	4.8	8.8
Absolute max.	13.1	14.0	20.6	21.9	25.4	28.1	30.5	27.5	23.5	22.1	16.2	14.8	30.5
Absolute min.	-12.4	-9.0	-9.8	-4.2	-3.7	0.5	4.1	1.5	-0.2	-3.0	-6.6	-10.4	-12.4
Mean no. of days with air frost	10.4	9.2	6.8	3.3	0.6	0.0	0.0	0.0	0.0	0.8	6.5	8.6	46.1
Mean no. of days with ground frost	16.7	14.9	13.4	11.5	6.3	1.5	0.2	0.8	2.1	4.4	12.9	14.3	98.9
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	90	89	87	82	78	79	82	85	88	90	91	91	86
Mean at 1500UTC	85	78	73	68	67	69	70	72	75	79	83	86	75
SUNSHINE (hours)													
Mean daily duration	1.41	2.08	3.03	4.52	5.28	4.91	4.28	4.07	3.32	2.44	1.79	1.13	3.19
Greatest daily duration	7.5	9.5	11.3	13.4	15.3	16.0	15.7	13.5	11.7	9.3	8.5	6.7	16.0
Mean no. of days with no sun	13	8	6	4	2	2	3	3	5	7	10	14	77
RAINFALL (mm)													
Mean monthly total	90.7	67.5	77.2	56.4	67.4	67.7	60.4	85.0	83.1	96.7	85.5	90.6	928.4
Greatest daily total	27.1	27.1	33.5	24.9	26.9	30.4	37.5	45.6	27.6	76.8	34.8	35.1	76.8
Mean no. of days with 0.2 mm	21	16	19	16	17	17	17	19	18	20	19	20	218
Mean no. of days with 1.0 mm	16	12	14	12	13	12	12	14	14	15	14	15	164
Mean no. of days with 5.0 mm	7	5	6	4	5	5	4	6	6	6	6	7	66
WIND (knots)													
Mean monthly speed	9.8	9.6	10.1	8.5	8.0	7.2	6.9	6.9	7.5	8.5	8.5	9.4	8.4
Max. gust	83	81	73	63	60	57	53	55	87	68	71	75	87
Max. mean 10 minute speed	54	51	45	40	35	36	32	37	50	40	42	47	54
Mean no. of days with gales	1.2	0.8	0.9	0.2	0.2	0.1	0.0	0.0	0.2	0.3	0.3	0.5	4.8
WEATHER (mean no. of days with...)													
Snow or sleet	7.1	6.4	4.9	2.0	0.4	0.0	0.0	0.0	0.0	0.1	2.0	4.2	26.9
Snow lying at 0900UTC	4.7	2.5	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.4	10.8
Hail	1.2	1.9	3.9	3.0	1.7	0.4	0.1	0.1	0.3	0.7	1.2	1.0	15.5
Thunder	0.1	0.1	0.1	0.3	1.1	1.6	0.9	0.8	0.4	0.1	0.0	0.1	5.7
Fog	5.1	4.4	2.7	2.9	2.0	2.0	2.3	4.7	5.2	5.1	5.7	4.7	46.8

Wind measurements taken from the meteorological station at Clones show the prevailing wind is from a south westerly direction and wind speed is over 4.3 m/s. The elevation of the meteorological mast at Clones is 154 m asl. The elevation of the site at Lackagh is between 300 m and 450 m. Due to the site's elevation and exposed nature of the landscape, the expected wind speeds will be higher. The Irish Wind Atlas⁴⁷ also indicates the site location is in an area of high wind speeds making it suitable for wind farm development.

6.2. Potential Impacts of the Development on Climate and Air

The wind energy project will generate electricity that would otherwise be generated by fossil fuel burning power stations.

Emissions of greenhouse gases and other pollutants to the atmosphere are avoided in wind farm use. The exact amount of avoided emissions depends on which power plants are displaced by wind energy. In most of Europe this would correspond to coal burning plants, a situation likely to continue for some years yet. Table 6.3 shows the emissions generated from coal, oil and gas powered plants versus wind energy generation. Coal-combustion plants are the major emitters of pollutants, particularly CO₂, a major greenhouse gas. There are no atmospheric emissions from wind energy generation.

The following factors are assumed in these calculations:

- 37.5% capacity factor,
- 10% losses caused by the electrical and wake effects,
- 90% availability of wind power.

For comparative purposes, 90 MW of electricity generation were used in the calculation as it is expected the proposed Lackagh wind farm will have this generation capability.

Table 6.3: Annual Emissions for the Generation of 90 MW of Electricity (t)⁴⁸

Technology	Coal (tonnes)	Coal + FGD*, low NO _x burner (tonnes)	Oil (tonnes)	Gas (tonnes)	Wind (tonnes)
Stack Emissions					
Carbon dioxide	199902-234848	208487-234848	160559-179730	91063-100649	0
Carbon monoxide	7-31	7-34	0-31	0-7	0
Sulphur dioxide	2460-3579	45-358	291-2908	0	0
Nitrogen oxides	112-1006	45-224	179-828	78-157	0
Methane	0-2	0-2	2-7	25-31	0
Particulates	45-112	45-112	0-89	0	0
Waste Products			0	0	
Ash	12973-39812	7828-51443	0-22	0	0
Gypsum	0	5144-6710	0-5592	0	0

* Flue gas desulphurisation

The EPA in their Environment in Focus 2002 report have identified climate change in Ireland resulting from greenhouse gas emissions as being one of the most serious environmental problems facing Ireland at the present time.⁴⁹ The release of greenhouse gases such as carbon dioxide from the burning of fossil fuels is a known contributor to global warming, as are methane and nitrous oxide which are mostly associated with agriculture. Total combined Irish emissions of these three main greenhouse gases on a Global Warming Potential (GWP) basis amounted to 53.4 million tonnes of CO₂ equivalent in 1990. This increase by 24% to 66.3 million tonnes of CO₂ equivalent in 2000. This increase is clearly driven by CO₂ emissions but the combined methane and nitrous oxide contribution remains significant at 34% of the total. Avoided emissions of nitrogen oxides, sulphur dioxide and carbon dioxide will have a positive impact on climate and air quality.

6.3. Mitigation Measures

The impact of the proposed wind farm on the climate will be wholly beneficial. No mitigation measures are required.

6.4. Conclusions on Climate and Air

On a global scale, the benefits of the Lackagh wind farm to the climate of Ireland are significant as demonstrated by the reduction in greenhouse gases and other pollutants from wind energy production.

7. CULTURAL HERITAGE

7.1. Introduction

The following is a summary of a comprehensive report, prepared by North West Archaeological Services Ltd., for Fehily Timoney & Company and forms the cultural heritage portion of an Environmental Impact Statement. The full report is presented in Appendix E.

The main purpose of this part of the study was to assess the impact of the proposed development on the receiving archaeological environment. This was achieved by identifying all known recorded archaeological sites as well as identifying any new areas of archaeological potential that may be impacted by the proposed wind farm development. Once identified, the objective was to propose ameliorative measures to ensure the safeguarding of all archaeological monuments, features, deposits or finds of antiquity.

Comprehensive archaeological and historical research was carried out of the proposed development site. Field survey work was also conducted to identify both known and any previously unrecorded archaeological sites, features and upstanding buildings.

7.2. The Archaeological and Historical Landscape

The proposed development site is located in the parish of Killarga and barony of Drumahaire, Co. Leitrim. The development site is situated south-east of Manorhamilton and north of Drumkeeran, in north-east Co. Leitrim with the village of Killarga located to the west. The site is accessed from the R280 north of Drumkeeran. The site is located north-east of Tawnylea crossroads, off the R280 with access to the development site via Lackagh townland located north-east of Tawnylea. The proposed Wind Farm is located within predominately mountainous countryside with panoramic views provided of the surrounding countryside to the south, south-west, south-east, east and north-west.

The surrounding landscape was well settled during prehistory and history with two known *DELISTED* archaeological sites identified from within in the proposed development area including SMR LE016:001 and SMR LE016:002 respectively (Figures 7.1-7.3). These sites are referred to as “*Mounds*” on the 3rd edition 6” Ordnance Survey map (1910) and are possibly associated with previous coal mining in the area. Disused coal shafts/pits are indicated on both the 1st and 3rd edition 6” Ordnance Survey maps 1837 and 1910 respectively located in close proximity to the above “mounds”.

DELISTED archaeological sites refer to sites that are perceived to be potentially un-archaeological in nature through subsequent field survey by *Dúchas* recommended archaeologists. However, delisting is based upon cursory field inspection only. Full excavation can only determine the full nature of a site. Subsequently, *Dúchas*-The Heritage Service recommend avoidance of such monument types where possible.

There are numerous recorded archaeological monuments in the surrounding landscape, indicating occupation throughout prehistory including two megalithic monuments. These include SMR LE015:108/01 (court tomb) located c.1500m south-west of the south western site boundary in Mullaghmore townland [Drum By.] and SMR LE015:062 (court tomb) located c.500m north-west of the north western site boundary in Gortermone (Drumahaire By.) townland. In Tullynamoyle townland SMR LE016:003 (standing stone) is located c.640m south of the southern site boundary. There are three recorded castles including SMR LE012:033 located c.740m north of the northern site boundary in Meenymore townland; SMR LE015:109 located c.1200m south-west of the south western site boundary in Tullinwillin townland and SMR LE015:060 located c.1130m north-west of north western site boundary in Gortermone (Drumahaire By.) townland. There are two recorded souterrains including SMR LE012:033/02 located c.740m north of the northern site boundary in Meenymore townland and SMR LE015:060/02 located c.1130m north-west of the north western site boundary in Gortermone (Drumahaire By.) townland. There are two recorded enclosures including SMR LE015:129 located c.1600m south-west of the south-western site boundary in Tullynacross townland and SMR LE015:108/02 located c.1500m south-west of the south western site boundary in Mullaghmore townland. See Figures 7.1-7.3.

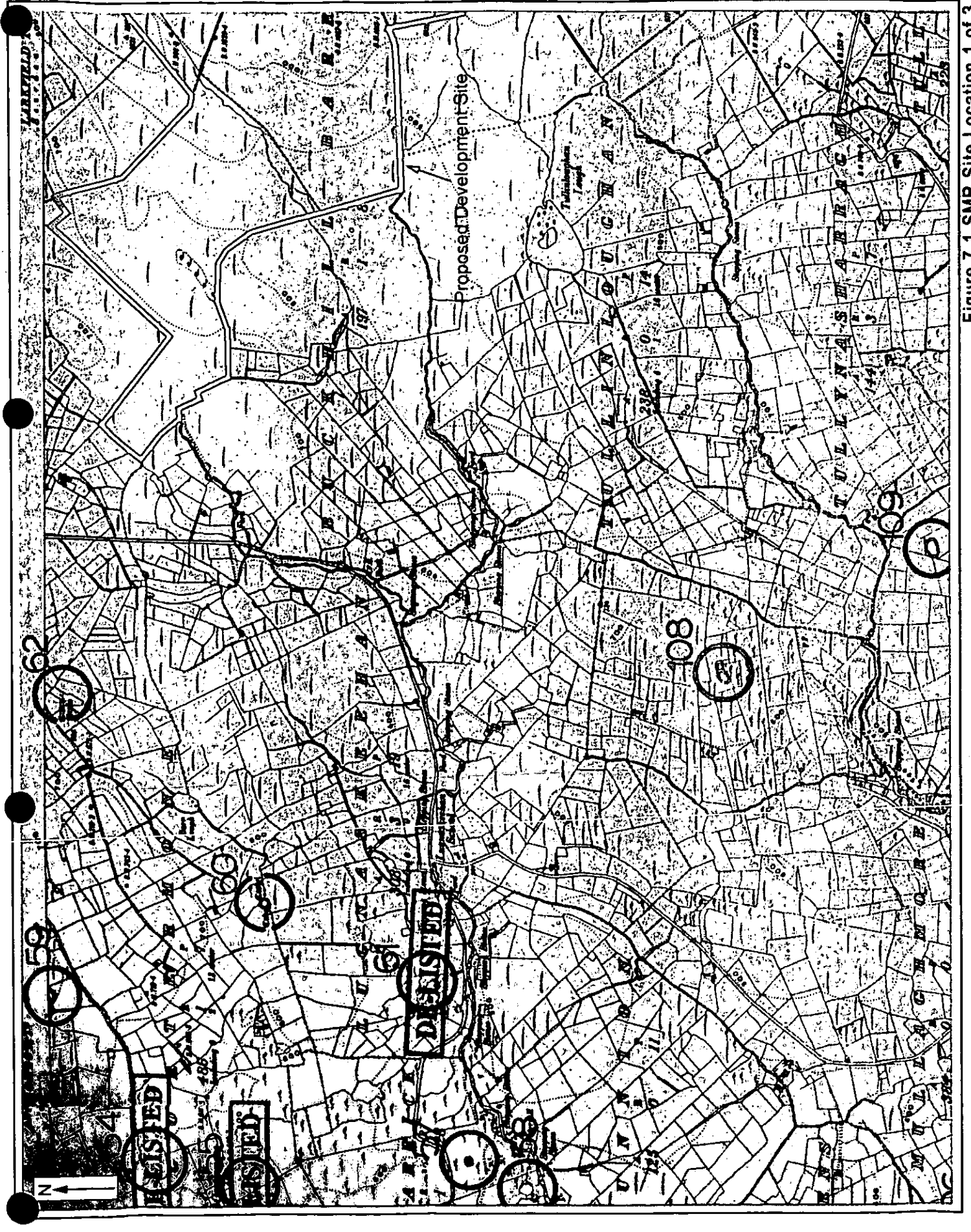


Figure 7.1 SMR Site Location 1 of 3

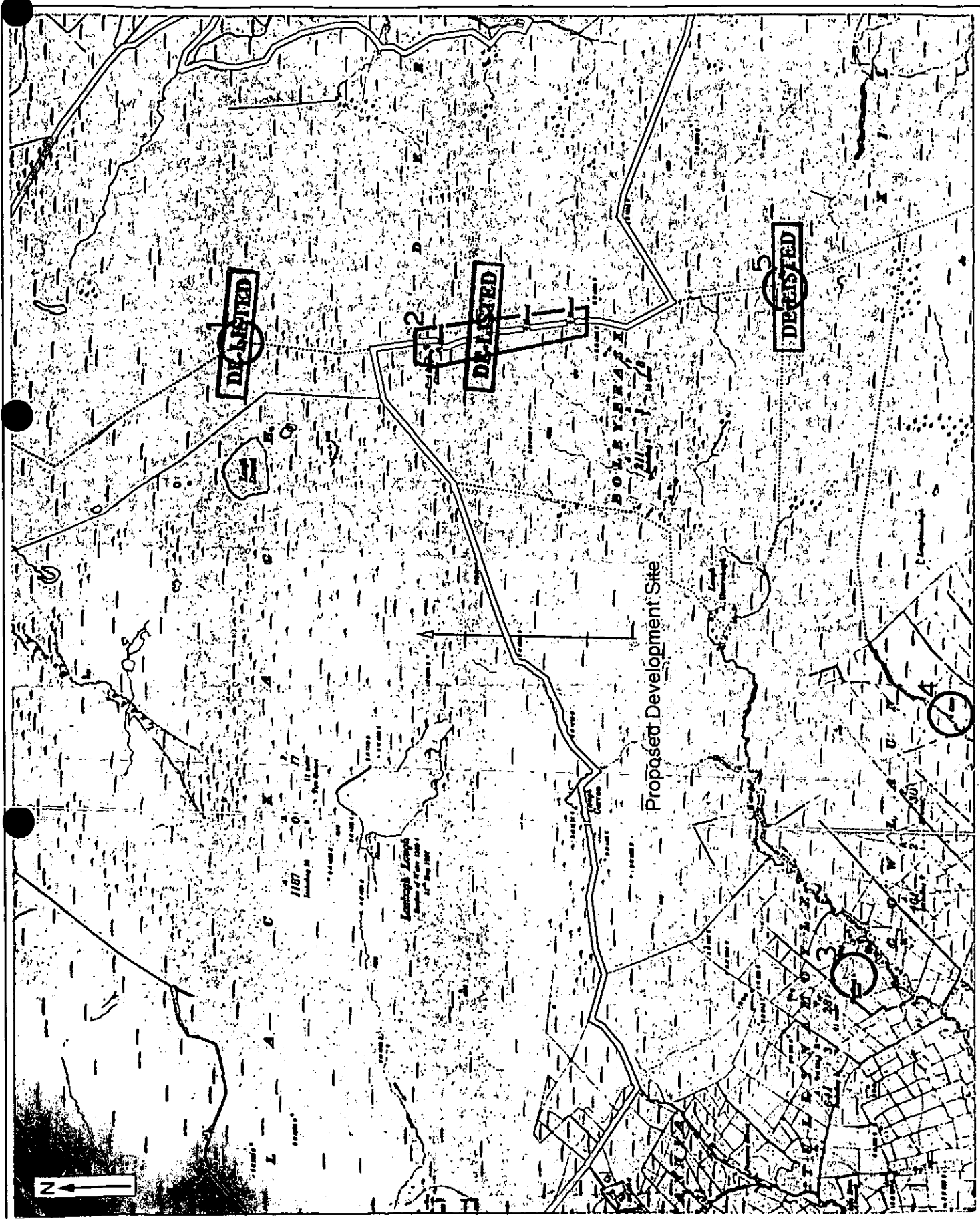


Figure 7.2 SMR Site Location 2 of 3

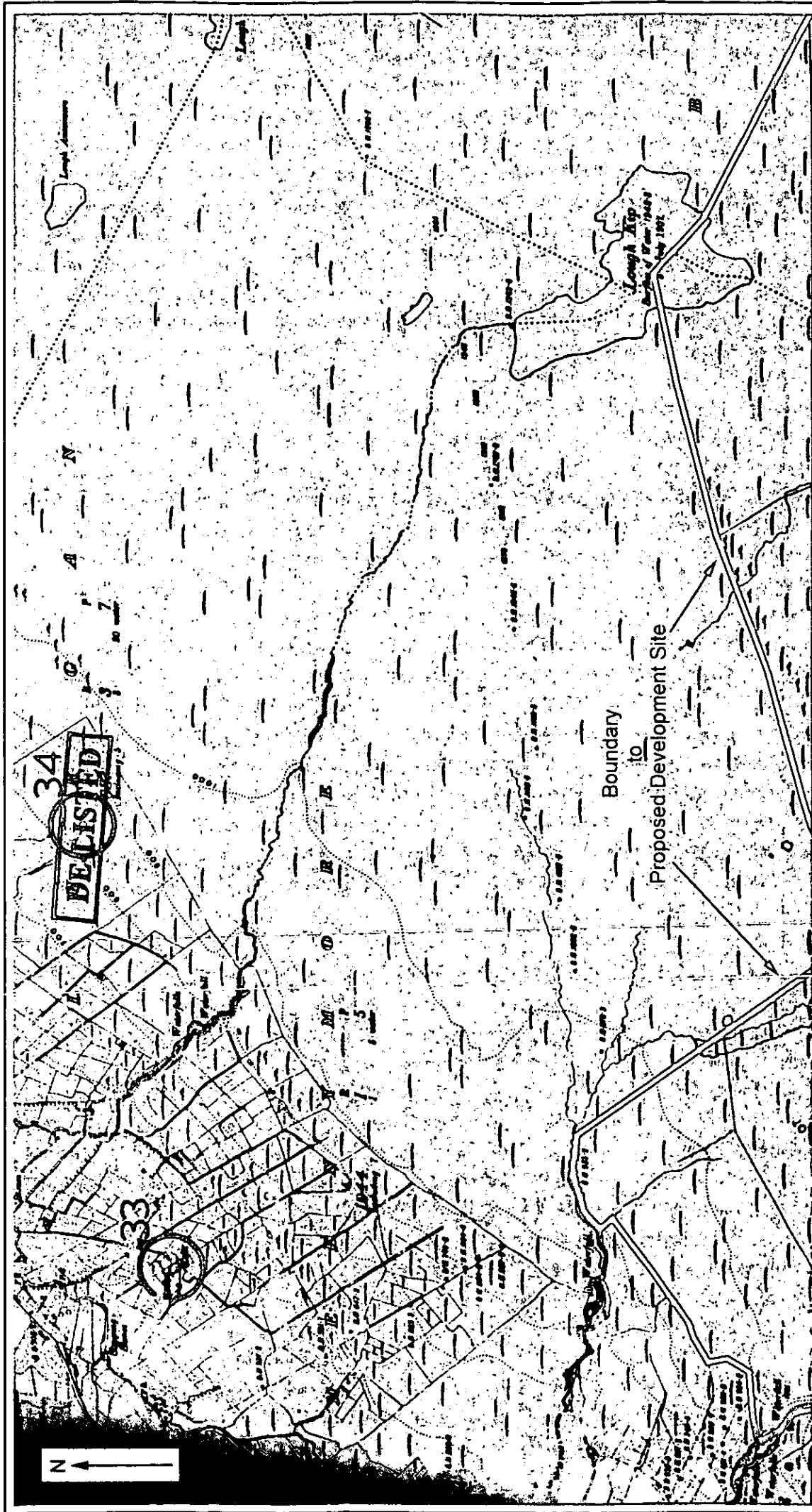


Figure 7.3 SMR Site Location 3 of 3

A history of iron working is known from the parish of Killarga. The site of a disused ironworks is located north-east of Tawnylea outside the proposed development area to the south-west. Between 1852 to 1858 ironstone was mined on the south-west slopes of the Glenfarne Plateau. The ironworks consisted of two large blast furnaces, a steam-engine and engine house and ancillary buildings. Iron from the area was used in the construction of a cannon which was used in the Crimean War. In addition, the "*Ha'penny Bridge*" in Dublin is constructed from iron from the area. Coal mining is also well attested to in the area with disused coal shafts/pits evident on historical maps as well as a disused 'bell-pit' and 'adits' (horizontal shafts) identified during field inspection located within the proposed development area between T25 and T27 respectively. See Figure 1.5 for the site layout map.

There were no stray finds recorded from the proposed development area within Lackagh townland. The closest recorded archaeological sites within the proposed development site are outlined below.

Sites and Monument Record

SMR No.	LE016:001
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	180m SW of T28 300m SE of T24 220m NE of T25

Within Proposed Development Site

Suggested Impact	Negligible Impact
Description	N/A

SMR No.	LE016:002
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	90m S of T26 T27 located within zone of archaeological potential T31 located within zone of archaeological potential

Within Proposed Development Site

Suggested Impact	Possible Minor Impact
Description	N/A

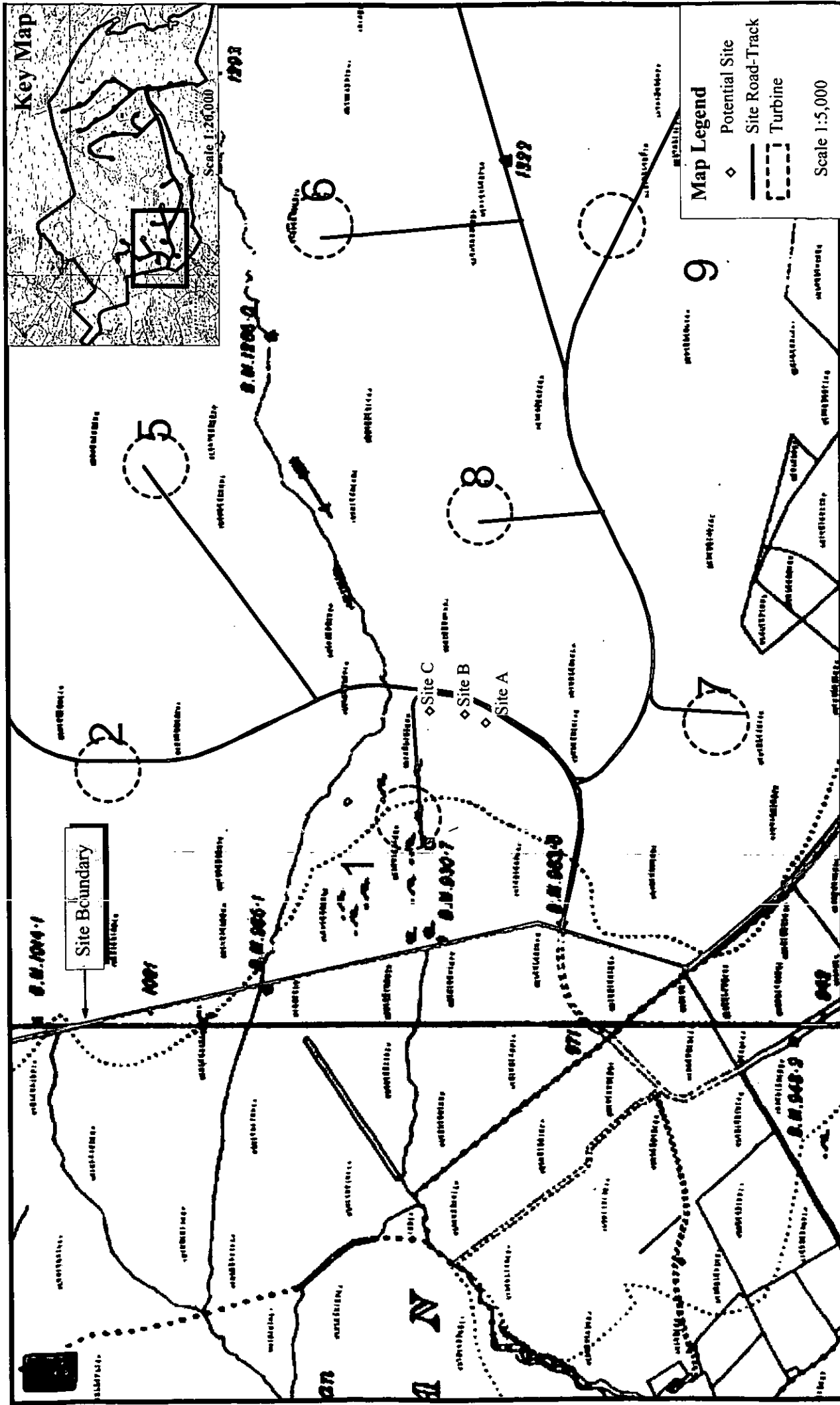
7.3. Field Inspection

The proposed development site was inspected in the field on February 25th and March 5th, 2002 in an attempt to locate any low-visibility archaeological sites and to identify any areas of possible archaeological potential in which previously unrecorded features may exist. The inspection was also carried out to assess the nature of any upstanding remains on the site. The proposed access roads and proposed positions of wind turbines T1 to T13 were inspected on February 15th 2002 while the remainder of the turbine sites and associated access routes were inspected in the field on March 5th 2002. The area to be developed was under ankle high rushes and coarse grass during the period of the field inspection.

The field inspection was conducted from west to east following in numerical order of the layout of the wind turbines. Thus the field survey is described in ascending order starting at T1 and finishing at T31, with the exception of T15, the proposed location of which has been moved to north of T30. Most of the proposed wind turbine positions were marked by wooden pegs and these were located using a site map and compass. In the case of those positions that did not have pegs the approximate position of the wind turbine was estimated.

An existing gravel track is to be used to access the proposed development site. From the gate at the boundary of the site of the proposed development it heads eastwards uphill before meeting a fork. The left fork levels out and heads to the north and the proposed locations of wind turbines T1-T5. The right fork continues uphill to the east and the proposed locations of wind turbines T6-T31.

A number of potential archaeological features were identified through field inspection. These are located west of the left fork of the existing track near the proposed location of wind turbine T1. Site A and Site B comprise small sub-oval, stone constructions while Site C comprises a large platform of boulders. While these features may be archaeological in nature, they do not resemble any known archaeological classification and are likely early modern in date. See Figure 7.4.



7.4. Potential Impacts of the Development on Cultural Heritage

The proposed development does not impinge upon any upstanding, recorded archaeological monuments. However, the proposed development will affect a number of *delisted* archaeological monuments (SMR's LE012:034, LE016:001 and LE016:002. As these monuments have been delisted, they are unlikely to be of archaeological significance. Furthermore, field inspection revealed that these sites are probably associated with early modern coal mining activities conducted throughout the area in antiquity.

The north-western site boundary of the proposed development is located c.500m SE of the closest recorded archaeological monument, LE015:062 (Court Tomb) and hence, the development site is located well outside the zone of archaeological potential for the court tomb.

In addition, there were no stray finds identified from the proposed development site or from adjacent townlands in the vicinity of the proposed development site. The nearest stray find, dating to the Bronze Age period (2300 BC to 600 BC), is recorded from the townland of Larkfield to the north-west of the proposed wind farm development.

A number of potential archaeological features have been identified in the field including: (*Sites A-C* respectively).

- Site A* Stone construction 1
- Site B* Stone construction 2
- Site C* Platform of boulders

These three features were identified to the west of the left fork of the existing track before it reached the proposed location of wind turbine T1 (See Figure 7.4 and Plates 7.2 to 7.4 of Appendix E). Two small, sub-oval, stone constructions are present at the base of the steep bank created by the construction of the track.

It must be stated that given the nature of the proposed development, a visual impact on the surrounding archaeological landscape is to be expected. The term *archaeological landscape* refers to the cumulative visible remains of prehistoric and historic settlement in a given area. The nature and location of the proposed development means the turbines will be visible from a considerable distance. However, the density of archaeological monuments in the surrounding area is not high, with no evidence that the turbines will have an impact on the intervisibility of major monuments. The nearest significant cluster of archaeological monuments, comprising mostly enclosures and ringforts, is located circa 2km to the west of the proposed development site, around Killarga village extending north towards Manorhamilton.

7.5. Mitigation Measures

With regard to the proximity of the proposed wind turbines to the *delisted* archaeological site mentioned above, it is unlikely that they are of archaeological significance. The sites appear to represent waste product associated with prior mining activity in the area. However, while the likelihood of uncovering archaeology in these locations is diminished, it is recommended that avoidance of these sites is adhered to with a minimum of a 10m buffer zone maintained around these sites within which no development should take place. In the event that avoidance cannot be maintained of these features, archaeological testing should occur in advance of any ground disturbance.

In respect of the potential archaeological features identified during field inspection, it is suggested that these sites (*Site A* and *Site B*-Stone Constructions; *Site C*-Platform) be avoided with a suggested minimum 10m buffer zone established around these sites. In the event that avoidance cannot be maintained of these features, archaeological testing should occur in advance of any ground disturbance.

Subsequently, with regard to the whole proposed Wind Farm development, the possibility of previously unrecognised archaeological features with no surface expression surviving beneath the ground should always be borne in mind. Such features would only be revealed during earthmoving and ground preparation works, including topsoil removal. For this reason, it is recommended that given the size and nature of the proposed wind farm development and its proposed access routes, comprehensive archaeological testing should be carried out in advance of all ground disturbance. This will ensure that any sub-surface archaeological features will be recognised and that adequate measures can be taken to ensure their full preservation *in situ* or excavation and recording as deemed necessary.

Any changes to the existing route will be referred to and checked by an appropriately qualified archaeological consultant, prior to any on site works. Dúchas-The Heritage Service will be notified of any major changes to the proposed route.

The developer notes National Monuments legislation (See Appendix E), which states that in the event of the discovery of archaeological finds or remains, Dúchas and the National Museum of Ireland should be notified immediately. The developer undertakes to allow for and fund whatever archaeological works may be needed on the site, if any remains should be noted after topsoil has been removed.

These, and any further recommendations regarding the site will be subject to discussion with and approval from the Planning Authority and Dúchas

A comprehensive archaeological report is presented in Appendix E.

9. LANDSCAPE AND VISUAL IMPACT

This section describes the existing landscape, the visual character of the site and its surrounds. The potential of impact of the development on the surroundings is also described. The description of the area is based on survey information and analysis carried out on site. Information regarding the vegetation in the locality is derived from field observations which was discussed in Section 8.

9.1. Introduction

The term landscape refers primarily to the visual appearance of the land. This includes such attributes as shape, form and colour. It covers their interaction to create specific patterns and pictures that are distinctive to particular localities. However, the landscape is not purely a visual phenomenon. This is because its character relies closely on its physiography and its history. In addition to the scenic and/or visual dimension, there are a whole range of other dimensions to landscape, including the following;

- geology
- topography
- soils
- ecology
- archaeology
- landscape history
- land use
- buildings and settlement
- architecture
- cultural associations
- human beings.

This section deals with all of the above. It outlines how they may determine the landscape and visual characteristics of the locality. It includes any environmental effects that the proposed development might have on the landscape.

Potential adverse impact on the landscape remains the most critical factor facing wind farm development. In deciding on the acceptability and suitability of a proposed wind farm, the landscape *character*, *sensitivity*, and *value* must each be assessed:

- *Landscape character* can be established for an area where there is visual distinctiveness and identity through a continuity of similar characteristics.
- *Landscape sensitivity* concerns the extent to which a landscape can accommodate change without unacceptable loss of existing character or interference with values.
- *Landscape values* can be described as the environmental or cultural benefits that are derived from various landscape resources. These resources may include physical and visual components as well as image of the landscape.

9.2. Description of the Landscape

The proposed site is situated in an area consisting predominantly of blanket bog, heath and eroded areas of both habitats.

The surrounding lands are utilised for commercial forestry plantation, turf cutting (historically), agriculture and wind farms.

The most critical factor facing wind farm development is the potential adverse impact on the landscape. Leitrim County Council commissioned a Landscape Character Assessment for the County. The report has categorised the landscape into fourteen distinctive character areas and gives guidance on the management of these landscapes and advice on how new developments can be facilitated without negatively impacting on the landscape.

"Pending its adoption the existing standards for regulatory development will apply, (including the designated Areas of Outstanding Natural Beauty and high visual amenity, however it is envisaged that these standards (and designated areas) will be superseded by the Landscape Character Assessment Report"⁶².

9.2.1. Landscape Character

The landscape character can be divided into three distinct units:

- physical characteristics of the landscape
- image units
- visual characteristics of the landscape

These are described below.

Landscape character types may be identified according to factors such as elevation, scale, degree of enclosure, degree of ruggedness, unspoilt nature of the land, predominant landcover and proximity to the coast. The landscape character type at the proposed site may be broadly described as moorland plateau.

Physical Characteristics of the Landscape

The physical characteristics of the landscape are influenced by the following:

- geology
- elevation
- land use
- vegetation
- climate
- soils
- field pattern
- settlements
- structures

These in turn combine to create the landform and landcover, resulting in a physically distinct landscape.

The landform is developed from the spacial and formal arrangement of landscape components, reflecting geological and geomorphological history.

The landcover comprises vegetation, water bodies or rivers, and includes buildings and human settlements.

For the purpose of this EIA, only landscape within a 10 km radius of the site was reviewed.

Landform

The landform at the site comprises a flat topped mountain underlain by shale and capped by hard sandstone. The landforms to the east consists of moorland plateaus and steep hills. Undulating drumlin lowlands and glens extend north east from Lough Allen as far as Benbo and around the uplands supporting the site.⁶³

Landcover

The dominant soil is blanket bog, heath and degraded areas of both habitats. The blanket bog is generally found on the flat areas and on gentle slopes. Wet and dry heath is found where peat is shallow between Lough Strand and Lackagh Lough and to the north west of the site.

Exposed silaceous rocks are found in areas called Lackagh Rocks, to the north west of Lackagh Rocks and to the east of Lough Kip. Laterally impersistent coal deposits found in the Lackagh Hills were mined to serve the ESB power station (now closed).

Part of the northern area of the site is a NHA (Barlear and Lackagh bogs). There will be no development in this area.

The surrounding landcover consists of heath and natural grassland. Blanket bog dominates the upper slopes with some forestry plantations and lowland farmland in areas of lower elevation. There are a number of NHAs and SACs around the site (within a 10 km study radius). These are located at Lough Allen (NHA), Cuilcagh-Anierin Uplands (SAC and NHA), Bonet River (NHA), Lough Gill (SAC and NHA), and Owengar Woods (NHA).

Water bodies form a significant landcover in the area. The landscape is dotted with lakes with four on site; Lough Strand, Lackagh Lough, Lough Kip and Carran Lough.

Belhavel Lough is over 2 km to the south west, and approximately 5 km to the west are Carrigeencor Lough and Lough Anarry. Numerous small lakes have formed in the valley between Boleybrack and the Cuilcagh Mountains. Bonet River flows by the west of the site and the Diffagher River to the south west. Finally, the largest lake, Lough Allen is located to the south-southeast at an approximate distance of 7 km.

Image Units

The identification of image units as an aid to an assessment of landscape character can be used to determine if a physical feature in a landscape acts as a major focal point. A visual field may result from the spatial dominance of that feature and the perceptual association of the surrounding landscape with it. As a result, a distinct image and identity is created.

The perceived image of the landscape is one of a remote rural upland area.

Settlement in the area is low adding to the naturalness of the landscape. Evidence of manmade activities are present in the form of a kiln from a disused iron works immediately to the south and old coal mines to the east of the site. Commercial forestry is the main man made activity in the landscape.

The lower slopes support a number of small houses/outhouses and derelict buildings. The field pattern on the lower slopes is also more defined and this adds to a sense of enclosure.

The visual characteristics are used to establish the extent of the landscape that is viewed in the wider community. The landscape has been divided into a number of image units. The visual characteristics of these are described below.

The visual impact of the Lackagh Hills is high due to their elevation and location directly north of Lough Allen on the lowlands and directly north of 2 regional roads, the R280 and R207 running in a north-south direction to the east and west of Lough Allen.

9.2.2. Landscape Sensitivity

Once the landscape character has been identified, the next step is to determine its sensitivity. The sensitivity of a landscape is the measure of its ability to accommodate change or intervention. It must not suffer unacceptable effects on its character or its value.

The assessment of landscape sensitivity can be structured according to the following three key criteria:

- importance
- vulnerability
- substitutability

Landscape Importance

Importance of the landscape can be assessed according to degree of importance (whether low, medium or high) and level of importance (whether local, regional, national or international).

Degree of importance can be determined according to the following key indicators:

- representativeness
- uniqueness
- aesthetic quality
- place identity
- cultural heritage
- symbolism
- presence of water
- accessibility
- socio-economics

A landscape character assessment has identified the area in which the site is contained as part of the Boleyback Uplands. This area has its own defining characters which separate it from the surrounding landscape although there are a number of other upland areas in the vicinity of the site.

The site is proposed for designation (pSAC) due to the status of the upland blanket bog (a priority habitat under the EU Habitats Directive) and the presence of a rare plant species (*Vaccinium vitis-idaea*/*vaccinium oxycoccus*). See Section 8.1.1.

The site is not located in an area of Outstanding Natural Beauty or Area of High Visual Amenity given in the Leitrim County Development Plan and Draft 2003 - 2009 County Development Plan. The closest scenic amenity area is over 5 km from the site. This is discussed in Section 9.3.3.

Because the area around the site is lowly populated, there is a sense of isolation and tranquillity. The landscape is relatively unspoilt, although the integrity of the landscape has been impacted by manmade developments. This includes disused coal mines, the iron work and commercial forestry plantations around the site. A number of wind farms to the south west of the site also add to the man made appearance of the landscape.

The surrounding area is mostly associated with the recreational use of the lands for cycling, walking, fishing and boating. This attaches a social importance to the landscape as it serves to bring people together for various activities.

Culturally there are no listed sites or monuments within the site but a number of monuments are recorded around the site. The nearest is a court tomb, approximately 500 m to the north west of the site. The site contains 3 delisted monuments. It is not believed that they belong to the archaeological era.

Landscape Vulnerability

A key consideration in the process of evaluating sensitivity is whether there is now or will be in the future enough landscape value in terms of quality and quantity. The focus here is on establishing the thresholds of acceptable change, by identifying the current situation as well as trends such as a threat and whether there is a need for improvement.⁶⁴

Areas listed in the County Development Plan for designation would be important consideration for vulnerability.

The relevant areas for consideration are as follows;

- Natural Heritage Area
- Areas of Outstanding Natural Beauty and Areas of High Visual Amenity
- Outstanding Views and Prospects
- Monuments and areas of Archaeological Interest

The site is part of an area proposed as a candidate Special Area of Conservation. This is based on the relatively intact mountain blanket bog and wet heath areas supporting species rich plant communities. A small part of the northern area of the site overlaps a small part of an NHA called the Lackagh and Barlear bogs. There will be no turbines or access roads in this area of the site.

The closest area of scenic importance is O'Donnell's Rock. The nearest turbine is at a distance of approximately 3 km. There are also views and prospects from over Belhavel Lough with a viewing direction towards the site area. Visibility will be high also from areas of high elevation such as Benbo, Thur Mountain and from around Lough Allen. These areas are discussed under the Tourism section of Chapter 3. See also Figure 3.3.

Scenic areas listed in the Sligo County Development Plan were also assessed for vulnerability. With the exception of the environs of Lough Gill, all other scenic areas are outside the 10 km study area.

The Cavan County Development Plan was also reviewed. Only one scenic route is within the 10 km study area. This is from along the R200 from Dowra to the intersection with the R202. Only the initial part of this route is within 10 km from the site. The visibility from this route is discussed in Section 9.4.3.

In terms of landscape vulnerability, the proposed development does not impinge upon any upstanding, recorded archaeological monuments.

Substitutability of the Site

Substitutability is an estimation of the possibility for substituting the value of the land by another, which provides the same benefits and functions at the same location or elsewhere. At present the monetary value of the land is poor. Historically the site was used for turf cutting and presently it is used for rough grazing. The proposed development will allow sheep to use the land for grazing purposes as before as less than 1% will be used for the development. The site is very suitable in terms of wind speed also which would make the proposal a viable entity.

Summary of Landscape Sensitivity

The greatest impact of the development will be from a visual perspective. The hydrological and ecological sensitivities of the landscape have been addressed in Chapters 5 and 8 respectively.

Turbines are visible elements in the landscape based on their overall structure (100 m) and location in areas of high elevation. The site is located in an exposed area and hence there will be a high visibility in the landscape from the wind farm. This is discussed in detail in Section 9.4.3.

9.2.3. Landscape Value

Landscape values can be described as the environmental or cultural benefits including services or functions that are derived from various landscape attributes. These attributes may be the components and image of the landscape already established in the assessment of landscape character or sensitivity.

Landscape values introduce a subjective qualifying and potentially constraining influence on the development, which would involve landscape change. The evaluation of the landscape provides the basis for considering the acceptability of alteration.

There is a sense of tranquillity and isolation associated with the site. The landscape also appears unspoilt from a distance. However historic turf cutting activities on the site, overgrazing by sheep and the forestry plantations in the lands surrounding the site lower its aesthetic value at closer distances.

The site is not listed in the County Development Plan for its scenic value, although there are a number of scenic areas within 10 km radius of the site adding to the aesthetic value of the wider landscape.

The value of the landscape lies in its recreational activities including fishing, boating, hillwalking and cycling. Two wind farms are also visible from the site. These add to the landscape value by utilising the landscape and elevation thereof for generating electricity.

9.3. Potential Impact on the Landscape

9.3.1. Scope of Impacts

The development will inevitably have some impact on the landscape and visual character of the surrounding areas. Perception of this impact is subjective, depending on the viewer's opinion of renewable energy. Changes will arise primarily from the construction of 31 wind turbines. These changes will have their greatest impact on residents living in close proximity to the wind farm and on users of the public roads, walking routes/trails from where the turbines are visible.

9.3.2. Impact Assessment

The scope of this assessment took the form of:

- desktop studies
- a zone of visual influence was mapped in a 20km x 18km area around the site
- site visits
- wire frame views of the site were created from a number of viewpoints in the landscape
- photomontages of some of these viewpoints

9.3.3. Desk Study

A desktop study was undertaken to review the Leitrim County Development Plan 1997 – 2002 and Draft 2003 – 2009 County Development Plan pertaining to the study area of the wind farm.

Planning applications were also examined, to determine whether wind farms are planned for locations in the vicinity of the site. There are currently 3 operational wind farms in the county at Arigna (2 wind farms) and Drumkeeran (1 wind farm including an extension). Corry Mountain in Carrick on Shannon was also granted permission for an 8 turbine wind farm. There are no current wind farm planning applications in Leitrim County Council at the time of writing this EIS (June 2002).

Designations cited in the 1997-2002 Leitrim County Council Development Plan and draft 2002 County Development Plan were also reviewed within a 10 km radius of the site. As part of this review, the following were investigated;

- Visual Amenities and Outstanding Views and Prospects
- Designated areas (NHAs, SPAs, SACs), national monuments and listed buildings.
- Walking Routes

Visual Amenities and Outstanding Views and Prospects

The County Council have set out the following policy in relation to Visual Amenity:

"The Council's policy will be to develop Amenity schemes in selected areas; maintain to a high standard those already existing; operate systems of Planning control related to landscape quality and development pressure; and facilitate economic ventures deriving from local enterprise projects based on visitor servicing."

In relation to Areas of Outstanding Natural Beauty and Areas of High Visual Amenity the County Development Plan states;

"The Council's aim is to preserve and enhance as far as is practicable these areas by the operation of special controls over development and by careful management. It will be the Council's policy to protect those areas listed in Appendices A and B (of the Development Plan)"

This site is not located in an Area of Outstanding Natural Beauty nor in an Area of High Visual Amenity. The closest areas of outstanding natural beauty within 10 km radius of the site are:-

- Doon Lake and environs
- Lough Gill and environs

These lakes are just at the 10 km limit of the study area.

Areas of high visual amenity within 10 km of the site are:-

- Thur Mountain
- Benbo
- Donnell's Rock and
- Lough Allen and environs

The visibility of the wind farm from these areas is discussed in Section 9.5.

In relation to Outstanding Views and Prospects, it is the Council's aim to:-

“protect from intrusive development and enhance by the removal of items of dereliction the views and prospects listed in Appendix C (in the Development Plan).

There are nine views and prospects within 10km of the site. These are listed as follows;

View towards Lough McNea from County Roads 185 and 192
View towards Benbo Mountain from County Road 136
View of Benbo, Thur and Dough Mountains from the R280
View towards Carrigeencor Lake from County Roads 162 and 164
View from O Donnell's Rock
View towards Lough Gill from the R286
View of Creevelea Abbey from the R286
View towards Belhavel Lake from County Road 245
View of Lough Gill from Carrickanurroo (County Road 153)

However, only one of these views is towards the proposed development. This is the viewpoint overlooking Belhavel Lake (View 19) from the county road 245. This is presented in photomontage format. See Figure 9.8.

Designated areas (NHAs, SPAs, SACs), national monuments and listed buildings

The designated areas within 10 km of the site are listed as follows

Barlear and Lackagh Bogs
Bonet River (NHA)
Lough Gill (SAC and NHA)
Owengar Woods (NHA)
Lough Allen (NHA)
Cuilcagh-Anierin Uplands (SAC and NHA)

A small part of the northern area of the site is contained within the Barlear and Lackagh Bogs. See Figure 8.1.

There are a number of Delisted archaeological monuments on site. The closest is located at a distance of 90 m from turbine location No. 26 and will possibly be impacted to a minor extent by the development. There are also a number of monuments around the site but these will not be effected by the development. See Section 7 and Appendix E for a detailed report.

Walking Routes

There are a number of long and short distance walks in the vicinity of the site. These are discussed in Section 3.1.5 Tourism.

9.3.4. Zone of Visual Influence Map

A zone of visual influence map (ZVI) was prepared using the following:

- an Ordnance Survey contour map of the 20 km x 18 km study area
- a Discovery Series map 1:50,000
- RESoft Wind Farm modelling software (Version 3.1)

For further details on the ZVI see Section 9.5 and Figure 9.1. The map indicates areas where turbines are theoretically visible in the landscape.

9.3.5. Site Visits

A number of site visits were conducted between 18th and 20th June 2001 for the following reasons:

- to visually evaluate the site and its surrounds
- determine the visibility of the site from a number of viewpoints in the landscape
- to take photographs for the purpose of creating photomontages
- to carry out environmental field work including noise monitoring, investigation of potential shadow casting and determination of the nearest occupied houses to the site.

9.3.6. Wireframe and Photomontage Views

RESoft Wind Farm software was used to create a number of wireframe views from a selection of viewpoints. Photomontages were created with photographs taken from these same locations.

9.4. **Features of the Proposal Affecting the Landscape**

Aspects of the proposed development, which can impact on the landscape, are discussed as follows:

9.4.1. Turbines

The greatest environmental changes associated with the development will be the physical presence of turbines and the actual movement of the blades. Wind turbines are visible elements in the landscape by nature of their function. They must be sited to harness the power of the wind, which is inevitably at locations of high elevation.

A detailed description of the turbines is given in Section 2.2.1 while the visual impact is discussed further in Section 9.5. Due to the elevation of the terrain and overall height of the turbines, the visual impact of the development is high.

The turbines will be painted to reduce glare during strong sunlight. Under typical Irish skies, off-white turbines can look attractive on a sunny day, and create a lesser contrast with more usual cloudy skies.

The turbines are most visible during clear weather conditions and are difficult to see in cloudy conditions. They are also visually unobtrusive at a distance.

9.4.2. Site Infrastructure

Both the construction and operational stages of the wind farm will give rise to an impact on the landscape.

The development will comprise the installation of the following:

- 31 turbines and associated transformers
- monitoring mast(s)
- onsite substation
- internal site tracks.

A grid connection will also be constructed.

The 60 m meteorological mast will be constructed with a narrow lattice tower. It will contain two anemometers to measure wind speed and two wind vanes to measure wind direction. The mast will be bolted onto a small concrete foundation.

A temporary meteorological mast will also be erected. This will be 50 m elevation and will be used to monitor wind speed prior to construction.

The onsite substation will be constructed to ESB specifications. It will consist of a control room and fenced compound to house electrical equipment. The fence will be two metres high.

The site roads have been located along eroded streambeds to minimise impact on undisturbed bog or heath. Degraded bog and heath were also used for siting tracks.

9.4.3. Extent of Visibility

From distances greater than 10 km and up to 20 km from the site, wind farm turbines tend to be discernible only in exceptional visibility conditions, or when highlighted as a visual focus. Further, at these distances, it is generally only the turbine towers that are seen, as the blades are very difficult to see due to their movement.

Visual impact may occur by intrusion on or obstruction of a particular view, and may be viewed as positive, neutral or negative. It can be rated as follows:

little/none	arises where the proposal is adequately screened by existing landform, vegetation or built environment.
low	arises where views affected by the proposal form only a small element in the overall panorama.
moderate	arises where an appreciable segment of the panorama is affected or where there is an intrusion into the foreground.
high	arises where the view is significantly affected, obstructed or so dominated by the proposal as to form the focus of attention.

Of greater importance than the extent of visibility in determining visual impact is the nature of the visibility, i.e. how a wind farm is seen within a landscape. Both the extent of visibility, and the sensitivity of the landscape which it may affect, must be assessed in order to come to a fuller understanding of the visual impact from a particular view.

Skylining

While the issue of developments like bungalows breaking the skyline has been of concern to some local authorities, it has been found in those areas that have had wind farm developments that similar rules are not necessarily suitable.

In "The Landscape Impact and Visual Design of Wind farms,"⁶⁵ Stanton states that "the location of a wind farm on the skyline is often avoided in the UK in the belief that this will reduce its visual impact. The location of turbines beneath the skyline may, however, actually heighten visibility due to the contrast of wind turbine colour, and because the visual relationship between the wind farm and the skyline varies as a viewer moves, and in different weather conditions.

The location of a wind farm is as much about symbolic expression than purely 'looks.' It is about honestly portraying a form in direct relation to its function and our culture; by compromising this relationship, a negative image of attempted camouflage can occur."

While a controversial statement at that time (1996), planners in local authorities familiar with wind energy projects have in recent years stated that skylining is no longer an issue of such concern to them as it once was.

Wind turbines seen against a backdrop of a hill or mountain are visible over a smaller area, but are highlighted due to their movement and because, as discussed, the visual relationship between the wind farm and the backdrop varies as a viewer moves. Wind turbines against the skyline tend to blend against the sky much more easily than they can against the land. While this makes them visible over a larger area, the nature of the visibility is greatly reduced.

Further, it fits better with the public's perception of wind turbines. Something that appears useful is far more readily accepted than a development that appears compromised and therefore not useful.

9.5. Extent and Nature of Visibility

9.5.1. Introduction

The zone of visual influence map (ZVI) was produced from a digital terrain tile obtained from the Ordnance Survey of Ireland and the ReSoft wind farm modelling programme. This tile provided a study area of 20 km x 18 km area around the site.

The model was generated using turbines of 60 m hub heights and 80 m diameter blades. This is the proposed size of turbine to be used for the wind farm. The mapping represents a worst case situation for visual impact as it only considers topographic data and does not take into account vegetation and small scale topographic screening.

The ZVI file was superimposed on the 1:50,000 scale ordnance survey of the North of Ireland for display. This showed the theoretical visibility of the site within a selected study area around the site.

There is scope for screening and filtering views from points within the wider landscape. Intervening features which can act as screens and filters are as follows:

- woodland
- hedgerows
- topographic features less than 10m in height
- buildings.

Roads and tracks, which fall within the ZVI, can also be well screened by hedges, other vegetation, buildings and local topography which to reduce the viewing opportunity. This is demonstrated using a series of photomontages.






A colour code has been applied to the ZVI map to identify and measure the extent of visibility of the turbines. The visibility is measured at the blade tip (100 m). Figure 9.1. shows a copy of the ZVI.

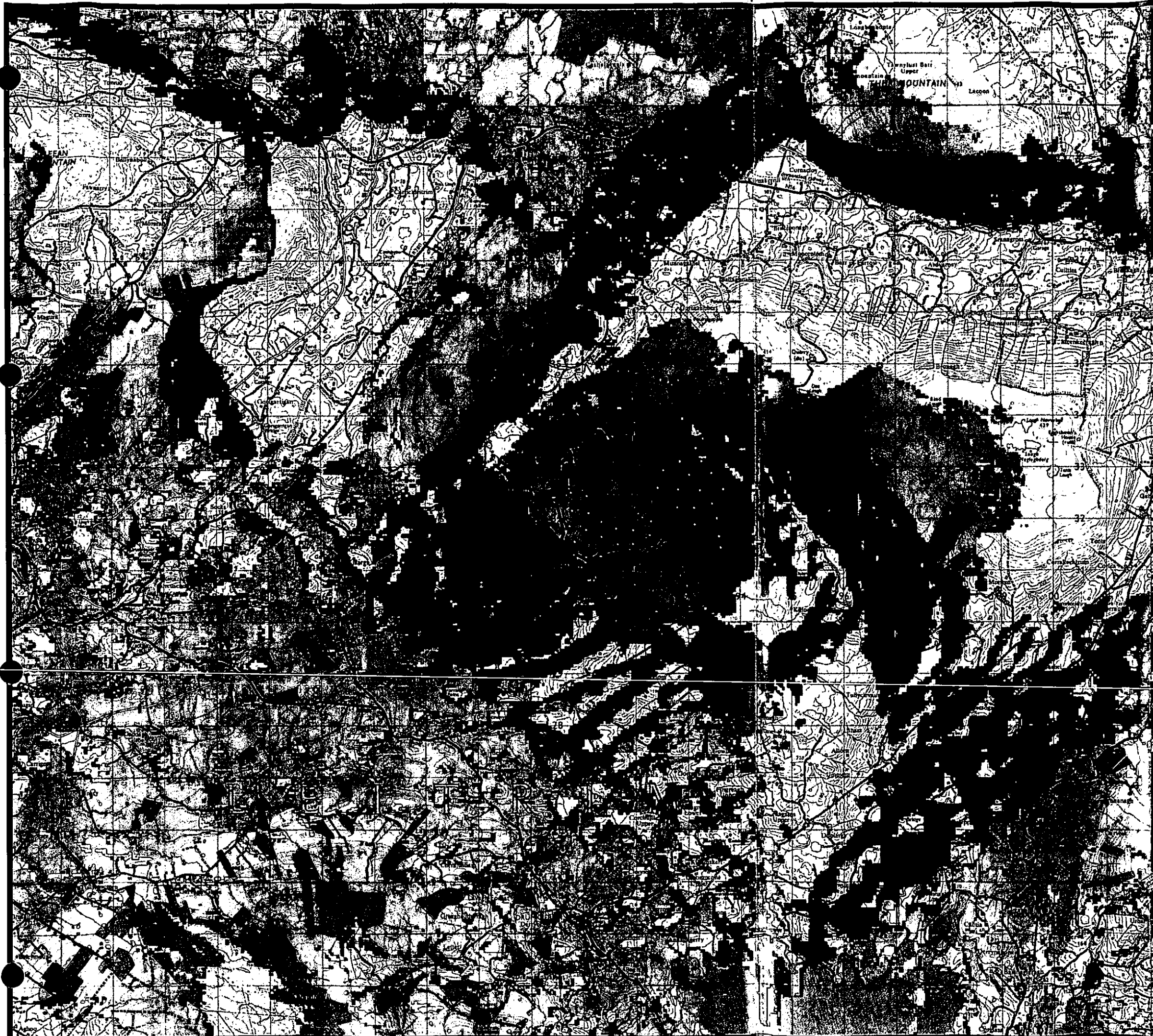
24 – 31 turbines visible	pink
16 – 23 turbines visible	blue
8 – 15 turbines visible	green
1 – 7 turbines visible	purple

Where no turbines are visible, no colour change is applied.



LEGEND:

-  Proposed Turbine Location
-  Area in which 1-7 turbines are visible
-  Area in which 8-15 turbines are visible
-  Area in which 16-23 turbines are visible
-  Area in which 24-31 turbines are visible



1:80,000 ZONE OF
 VISUAL INFLUENCE

Figure 9.1

The visual impact of the proposed wind farm is discussed under the following headings:

- Visual Amenities and Outstanding Views and Prospects
- Walking Routes
- Commuting Routes

Visual Amenities and Outstanding Views and Prospects

One view, referred to as V19 in the County Development Plan will be visually impacted by the proposed development. This is the view over Belhavel Lough taken from the county road 245. A photomontage was created from this location and is presented as Viewpoint 6 (Figure 9.8). The photomontage concurs with the ZVI in this instance. The remaining view and prospect areas around the site within the ZVI are away from the viewing direction of the site and are therefore not discussed further.

Lough Gill, Glencar Lake and environs, Keelogyboy Mountain, and Copes Mountain are the closest scenic areas to the proposed development from County Sligo. However, only the environs of Lough Gill are within the ZVI of the development (taken from a 10 km study area). The ZVI indicates that there will be some areas where visibility is high. A photomontage was taken from Dromahair over 2 km from Lough Gill. Although the ZVI indicates the wind farm will be highly visible, the photomontage shows that all the turbines will be screened by vegetation. Also at this distance the turbines appear very small and are easily screened from view. This is demonstrated in Figure 9.6.

The closest scenic areas to the proposed development from County Cavan are listed below.

- The R200 from Dowra heading east to the intersection with the R202
- County Road 139 from Blacklion to Glangelvin.

Scenic viewpoints SV1 to SV5 (as listed in the County Development Plan) are also the closest viewing areas to the site and are located in areas of high landscape value.

- SV1 is from the N16 over Lough McNean and the western shoreline. These views are away from the site.
- SV2 is from the R200 over Lough McNean. This view is away from the site.
- SV3 is from County road 139 over Lough McNean. This view is away from the site.

- SV4 is from Dunmakeever viewing south and west over Glangevlin and upland valleys Bellavalley Gap to North Leitrim Mountains. Viewing also north to County road 141 enclosing Cuilcaghs. There is a 360-degree panoramic view from here. This view will take in the site.
- SV5 is from Bellavally Gap off the R200 viewing over Lough Brackey and beyond. There is a 360-degree panoramic view from here. This view will take in the site.

With the exception of the initial part of the route along the R200 from Dowra heading east wards, all other scenic areas are outside the 10 km study area. This is not to say that the wind farm or parts thereof will not be visible in these areas particularly from the panoramic views from SV4 and 5. However at this distance the turbines will appear very small in the landscape. This is evident from the viewpoint taken at Dromahair over 10 km from the site.

Walking routes and trails

The following walking routes and trails are fully described in Section 3.1.5 Tourism.

The ZVI indicates that there is high to moderate visibility along approximately 60% of The Leitrim Way and no turbines are visible along the remainder of the route-north of Doo Lough to outside Glenboy. The Leitrim Way passes to within 2 km of the nearest turbine.

The Miners Way is not visually impacted along the majority of its route. South of Drumkeeran and for approximately 1.5 – 2 km north of Drumkeeran the ZVI indicates high visibility. The Miners Way passes to within 6 km of the proposed turbines and also through another wind farm.

The Kingfisher Trail is approximately 7 km to the east of the site. Theoretical visibility is high/moderate over most of this route included in the ZVI.

Visibility is also high along the stretch called O'Donnell's Rock Walk which is over 3.4 km from the nearest turbine.

Commuting routes

The nearest national route, the N16, runs in an east west direction 6 km to the north of the site. The ZVI indicates that visibility will be high on the stretch of road between Manorhamilton and the junction with the R283. Theoretical visibility decreases past this point and there will be no view of the turbines beyond where the road crosses the Camavannoge River.

The regional route, R280, to the west of the site will be most visually affected by the proposed development. Twenty-four to thirty-one turbines are theoretically visible for the majority of this route south east of the site.

From along the R287 and R289 outside Dromahair, visibility is very high. The ZVI indicates that between 24 and 31 turbines are theoretically visible along most of the R287 and all of the R289. At Belhavel Lough, the R289 route links with the R280 while the R287 links with the R280 approximately 2 km north of Killarga. As stated above, visibility is very high from along the R280.

Visibility is very high along the R200 for about 2 km outside Drumkeeran and increases on the approach to Dowra. Between both villages there are intermittent views of the site.

Visibility is high along the R207 north of Dowra. This route extends beyond the zone of influence map.

Photomontages were created for viewpoints from third class roads to the west, south west and north west (Viewpoints 2, 4, 5, and 6). Visibility is very high from 2 of the 4 locations selected.

It must be emphasised that the ZVI represents worst case visibility as it does not consider landcover or buildings, which can screen turbines.

The nature of visibility is more important than the extent of visibility. This is shown by the way a wind farm is viewed in the landscape. Both the extent of visibility, and the sensitivity of the landscape which it may affect, must be assessed. This helps the understanding of the visual impact from a particular viewpoint.

9.5.2. Visual Impact from Selected Viewpoints

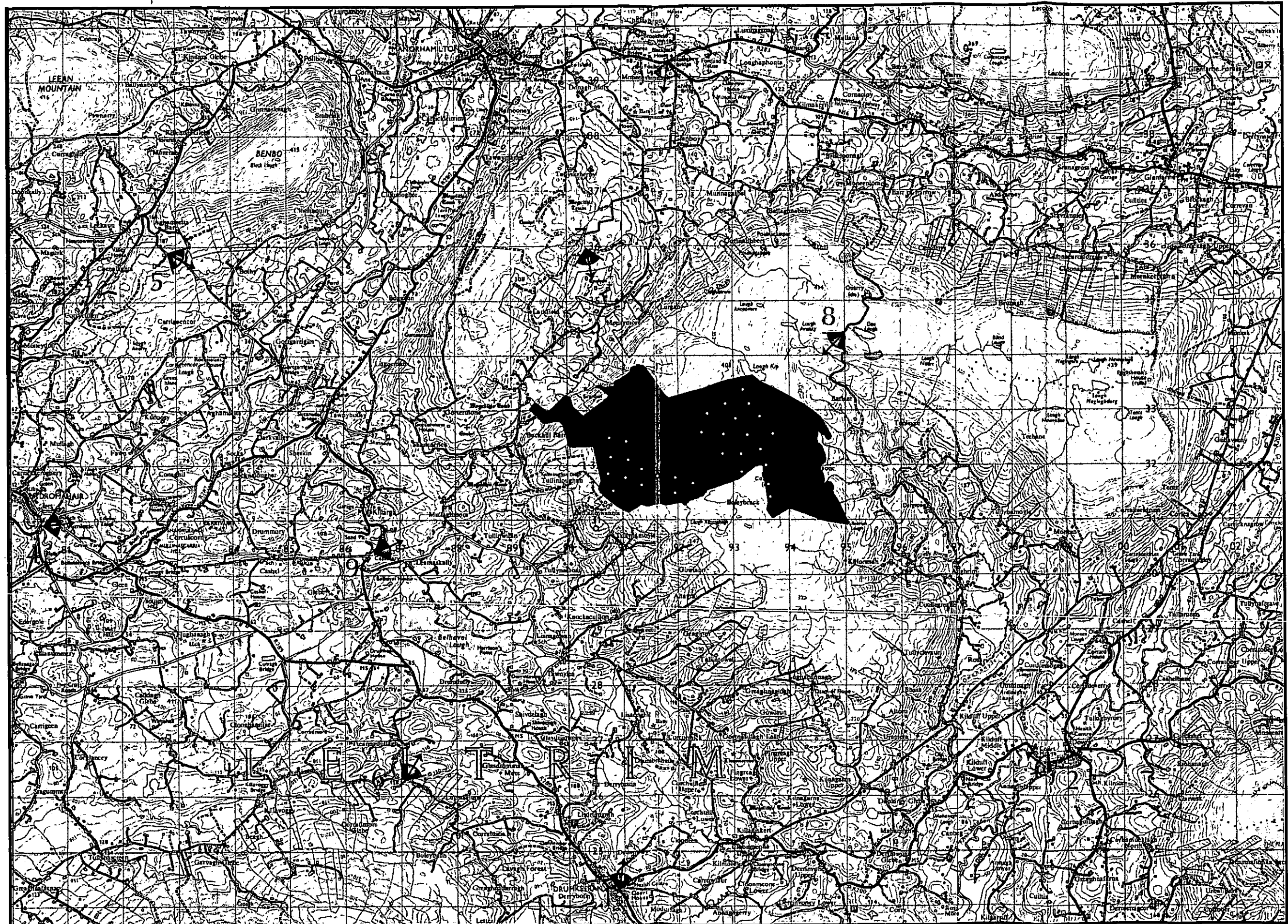
A number of viewpoints were selected from which the extent and nature of the turbine visibility can be evaluated. These are presented in photomontage, and wire frame view formats taken over the 2 km, 5 km and up to 10 km ranges and beyond. The viewing locations were selected in consultation with Leitrim County Council Planning Depart

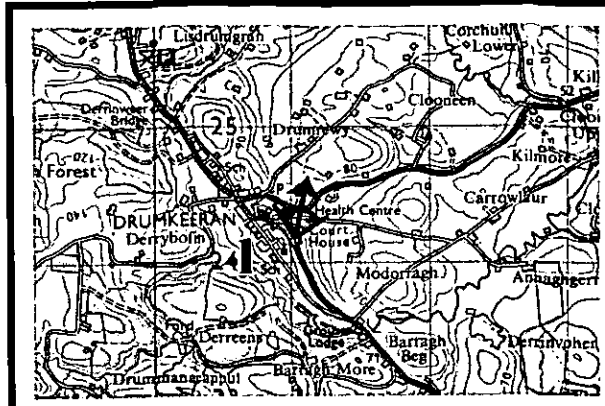
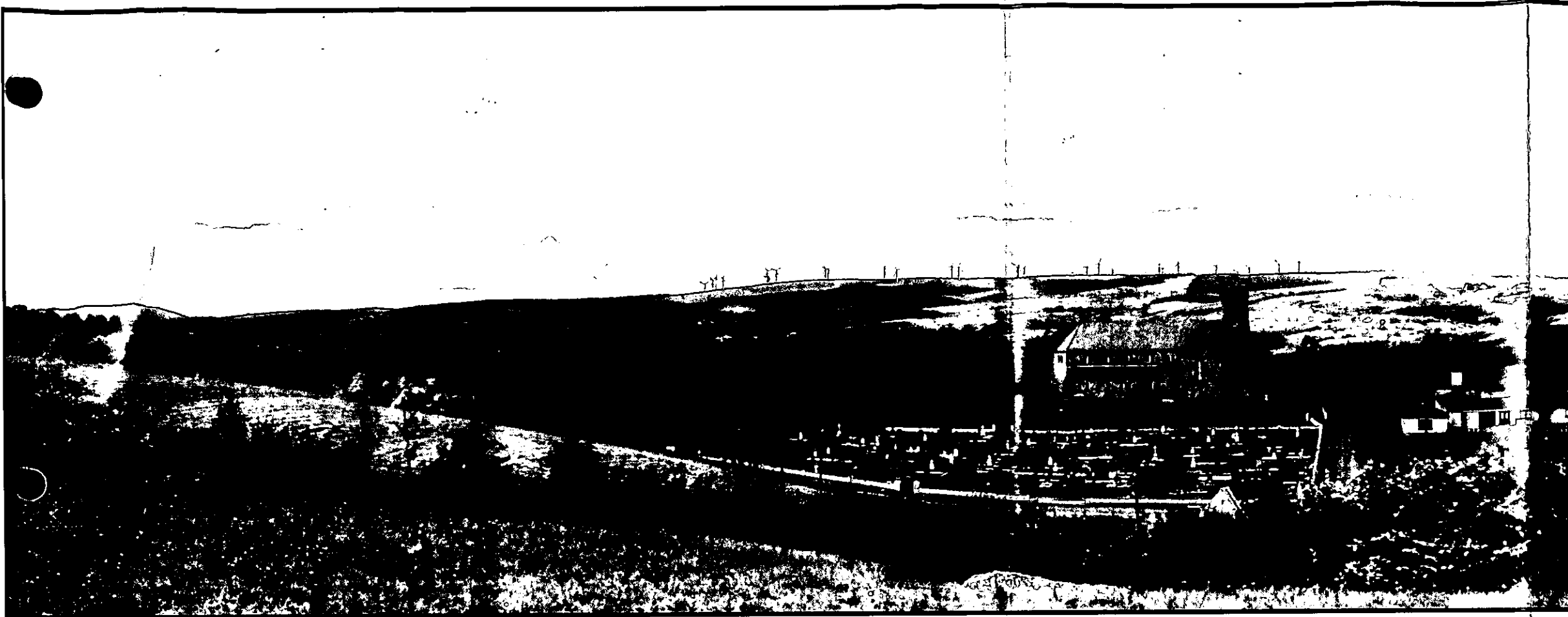
A photograph from Aughrim post office was also requested, however it was not possible to see the site from this area due to screening around the post office and adjacent surrounds. Also there were no defining landscape features with which to line up the wind farm.

The location of the viewpoints is presented in Table 9.1. A viewpoint location map is presented in Figure 9.2.

Table 9.1: Description of Viewpoints

Number	Location	National Grid Coordinates	Direction of View	Viewpoint Type	Distance to nearest turbine (km)	Number of turbine tips visible	Number of turbine hubs visible
1	Drumkeeran Amenity Area	190959E, 324272N	North	Village	7.26	31	28
2	Kingfisher Trail outside Dowra	198722E, 326502N	North west	County road	7.08	0	0
3	Intersection of N16 and R283 outside Manorhamilton	191857E, 339383N	South south east	National primary road	6.34	6	4
4	Dromahair	180540E, 330898N	East	Village	10.25	0	0
5	Boihy	182838E, 335937N	East	County road	8.64	28	28
6	Belhavel Lough	187089E, 326313N	North east	County road	6.44	29	26
7	O'Donnel Rock Walk	190633E, 335960N	South east	Mountain track	3.45	25	19
8	Doo Lough	195010E, 334440N	South west	Mountain track	2.11	19	17
9	Killarga	186610E, 330420N	North east	Pathway	4.37	2	1





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Notes:

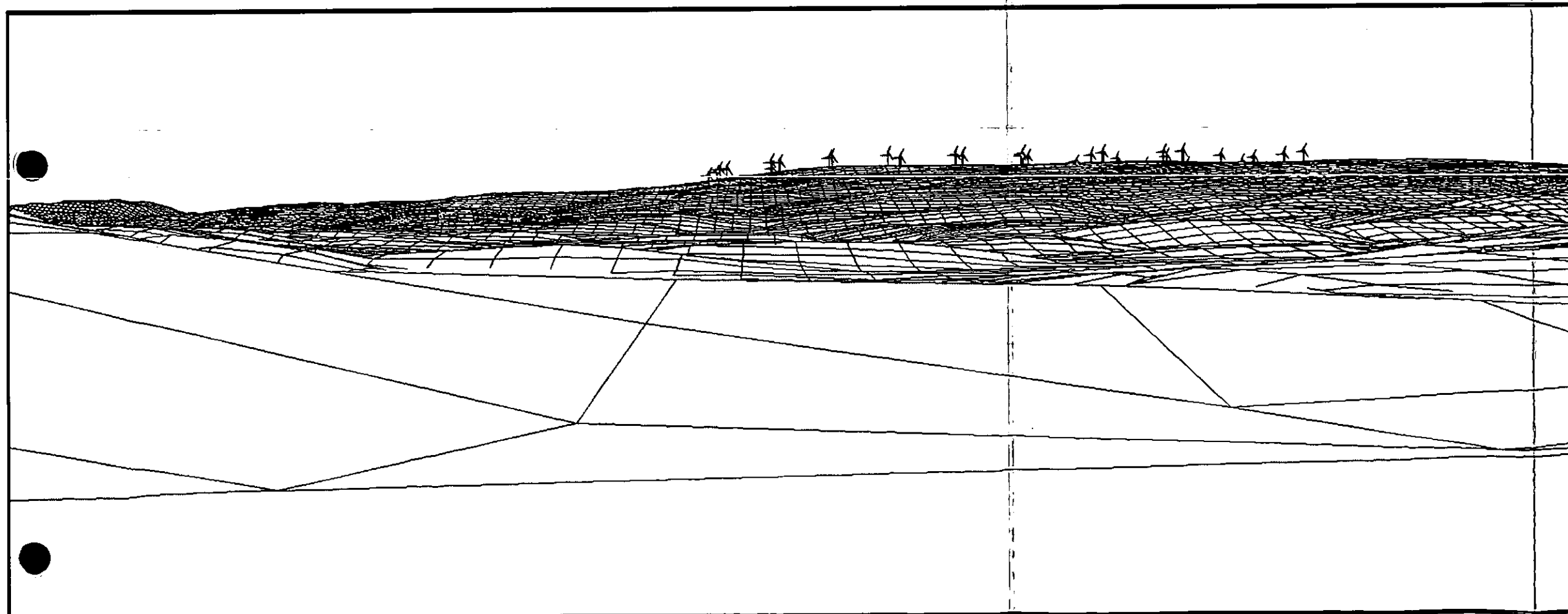
Tip height = 100m
Included Angle = 76°
Camera height = 1.5m
Pitch Angle = 0.9°

Grid reference: 190959 E, 324272 N
Distance: 7.26km (To nearest turbine)
Elevation: 922m
Number of tips visible: - 31
Number of hubs visible: - 28

Revision B - Issue for Planning
Date of Issue - October 2002
Photomontage and Wireframe
Prepared by
Fehily Timoney and Company,
Core House,
Pouladuff Road, Cork



AG/OK
2001/134/05/lac-wf_fig93



VIEW No. 1
From
Drumkeeran Amenity Area

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.3

Viewpoint 1: View from Drumkeeran Amenity Area

This viewpoint was taken from a picnicing area along the R280 at Drumkeeran Amenity Area facing north towards the proposed development. The landscape is typical of a rural upland country landscape. The hills in the background are gently sloping to the south and appear plateau like on top. They are a dominant feature in the background. Forestry plantations are very visible to the west and south. O'Donnell's Rock is visible to the far west of the viewpoint. The church dominates the middle ground as does the graveyard and adjacent school, reflecting man's influence on the landscape.

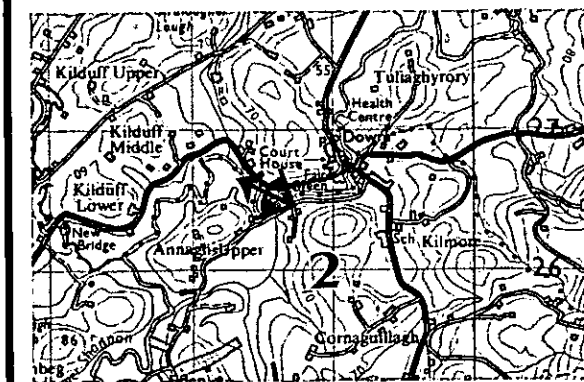
Visual Impact

The ZVI map (Figure 9.1) indicates that from this viewpoint visibility is high. The photomontage concurs with this finding showing 28 turbine hubs and 31 tips. There is no screening due to the exposed nature of the landscape and the elevation at this viewpoint location.

The nearest turbine is located at a distance of 7.3 km. The photomontage represents two snapshot views of the site which have been overlapped. The combined snapshots show the entire site and some of the surrounding lands to get a feel for the site setting which is important in the evaluation of the visual impact of the wind farm.

The turbines have been artificially darkened to contrast with the grey skies on the horizon. In reality it is likely that they would be hidden from view by low cloud cover. On clear days, visibility will be very high and the visual impact will accordingly be significant.

The viewing direction is away from the road. It is anticipated that the greatest impact will be from the layby/picnicing area where there will be greater viewing opportunity. The overall impact is high.



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Notes:

Tip height = 100m

Included Angle = 76°

Camera height = 1.5m

Pitch Angle = 3.2°

Grid reference: 198722 E, 326502 N

Distance: 7.08km (To nearest turbine)

Elevation: 52m

Number of tips visible: - 0

Number of hubs visible: - 0

Revision B - Issue for Planning

Date of Issue - October 2002

Photomontage and Wireframe

Prepared by

Fehily Timoney and Company,

Core House,

Pouladuff Road, Cork



AG/OK

2001/134/05/lac-wf_fig94

VIEW No. 2

From

Kingfisher Trail Outside Dowra

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.4

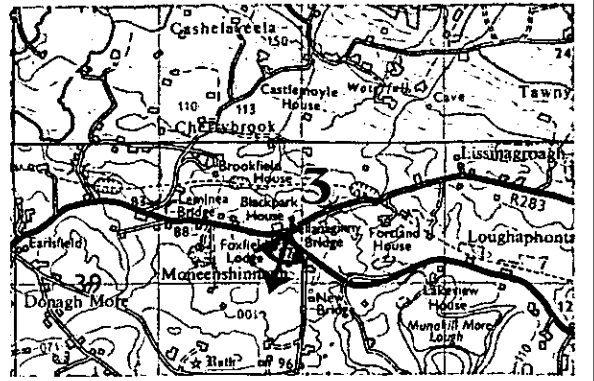
Viewpoint 2: View from Kingfisher Trail outside Dowra

This viewpoint was taken from the Kingfisher Cycling Trail approximately 1km from Dowra village and viewing towards the wind farm. Landform is flat in the foreground and sloping towards the middle and background.

Landcover is typical of rural countryside with agricultural land clearly divided into fields by trees and shrubs. A large corrugated shed can be seen in the middleground of the photo with a dwelling to the left of it slightly hidden by trees. Pockets of commercial coniferous forestry can be seen in the background. Telecommunication poles along the nearest slope to the east of the viewpoint add to the manmade impact on the landscape. Only 1 house is visible in the viewpoint.

Visual Impact

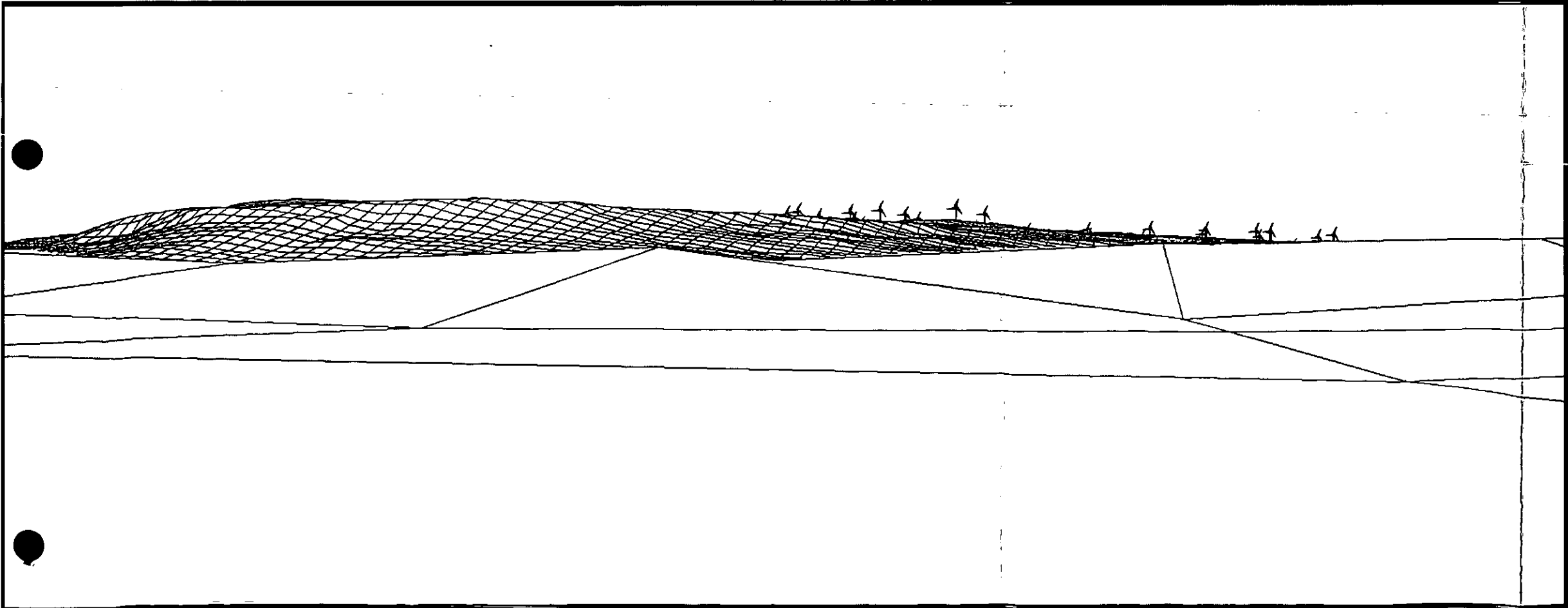
The ZVI indicates that up to 23 turbines will be visible from this viewpoint. However most of these turbines are visible as blade tips only and are screened by trees and shrubs. The scenic quality of the landscape is low and the viewing direction is away from the road. The overall impact is low.



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Notes:
Tip height = 100m
Included Angle = 90°
Camera height = 1.5m
Pitch Angle = -2.1°

Grid reference: 191857 E, 339383 N
Distance: 6.335km (To nearest turbine)
Elevation: 90m
Number of tips visible: - 6
Number of hubs visible: - 4



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Photomontage and Wireframe
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AG/OK
2001/134/05/lac-wf_fig95



VIEW No. 3
From
N16 at Fork in Road
Outside Manorhamilton

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.5

Viewpoint 3: View from N16 at Fork in Road Outside Manorhamilton

This view was taken from the N16/R283 intersection approximately 3 km east of Manorhamilton. The view faces south east towards the site. The foreground is dominated by hedgerow marking the field boundaries. Telegraph poles can be seen in the middleground crossing the field of view and run along a third class road. Beyond the hedge defining the side of the road a small mound identified as a rath can be seen. The near horizon is broken with trees, shrubs and telegraph poles. The site dominates the background although it is obscured from view to the east and west by trees.

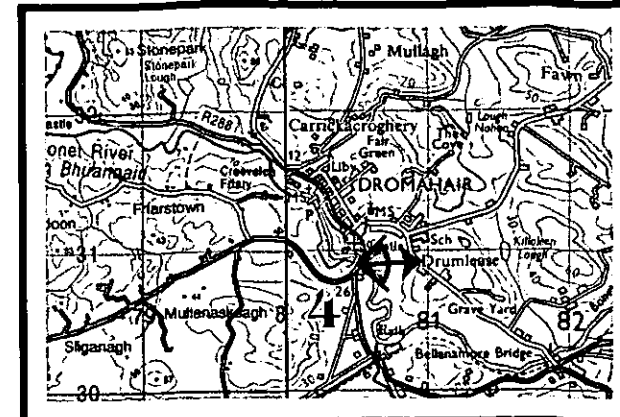
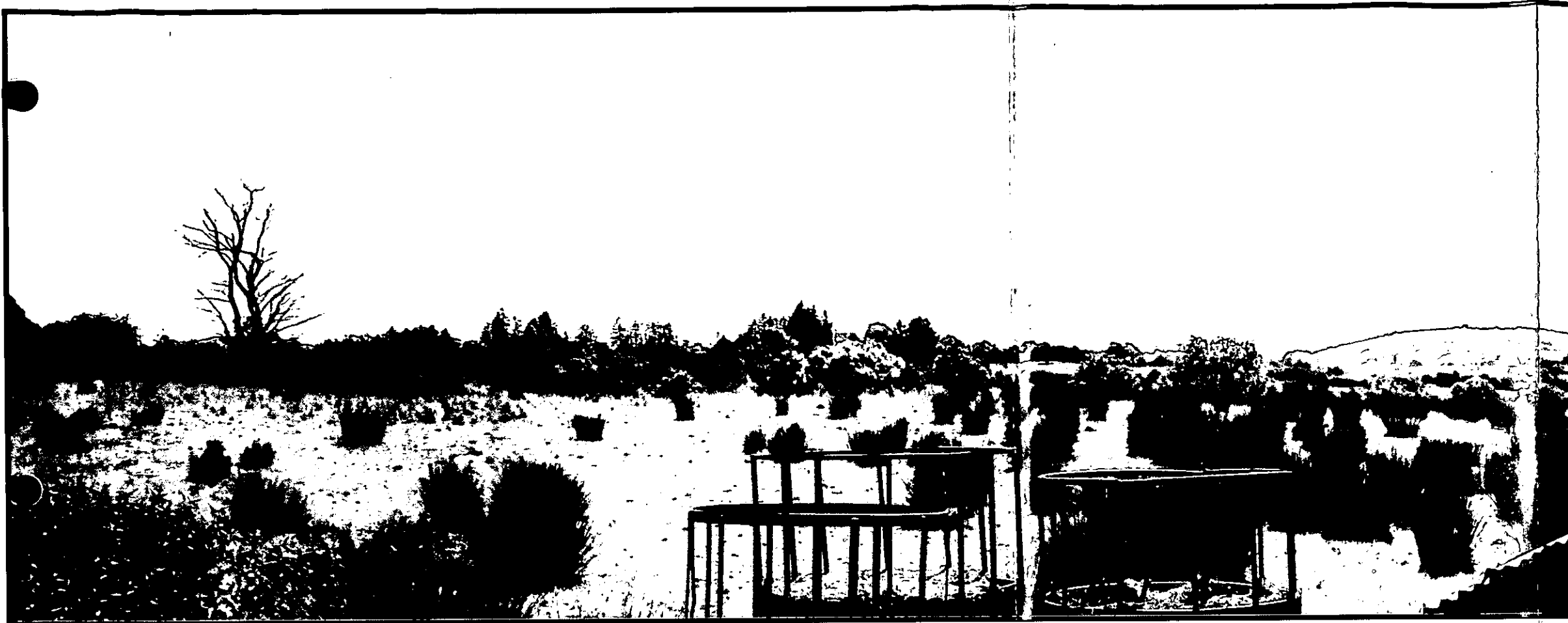
The overall view is one of overgrown grassland and shrubbery with larger trees marking the field boundaries.

Visual Impact

The ZVI indicates that visibility is very high. However the land cover minimises the visual impact as the majority of turbines are hidden by trees. The nearest turbine is at a distance of over 6 km.

Two hubs and 4 blade tips are visible on the far horizon. The near horizon is effectively broken by the trees. This helps mitigate the effect of the turbines on the far horizon. The direction of view is also away from the main road, the N16 and the R233.

The viewpoint presented is a combination of 2 snapshot views of the site. All the site is not taken in one field of vision as seen by the human eye. This also contributes to the low visual impact of the development. The scenic quality of the landscape is also low. The overall impact of the development is low.



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Notes:

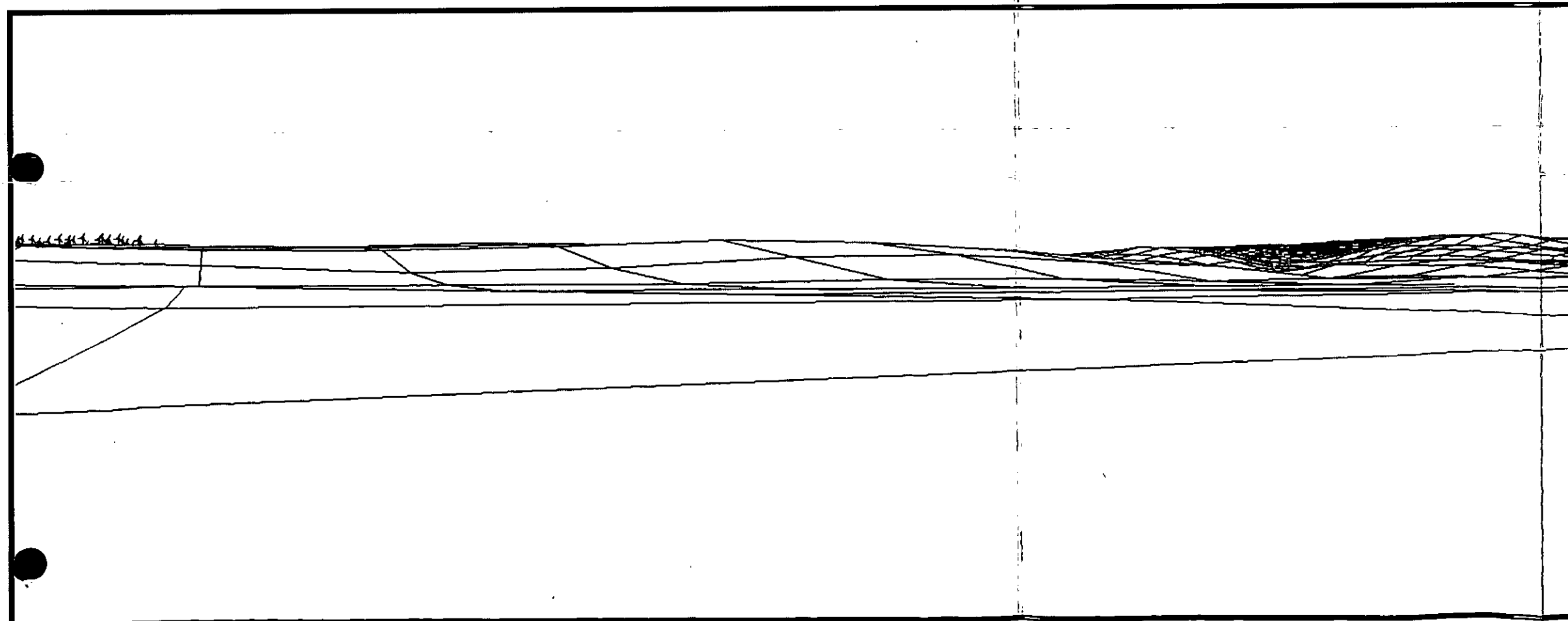
Tip height = 100m
Included Angle = 95°
Camera height = 1.5m
Pitch Angle = 2.9°

Grid reference: 180540 E, 330898 N
Distance: 10.245km (To nearest turbine)
Elevation: 28m
Number of tips visible: - 0
Number of hubs visible: - 0

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2001/134/05/lac-wf_fig96



VIEW No. 4
From
Dromahair

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

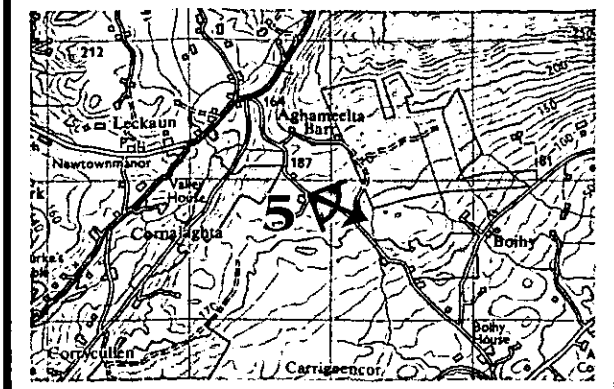
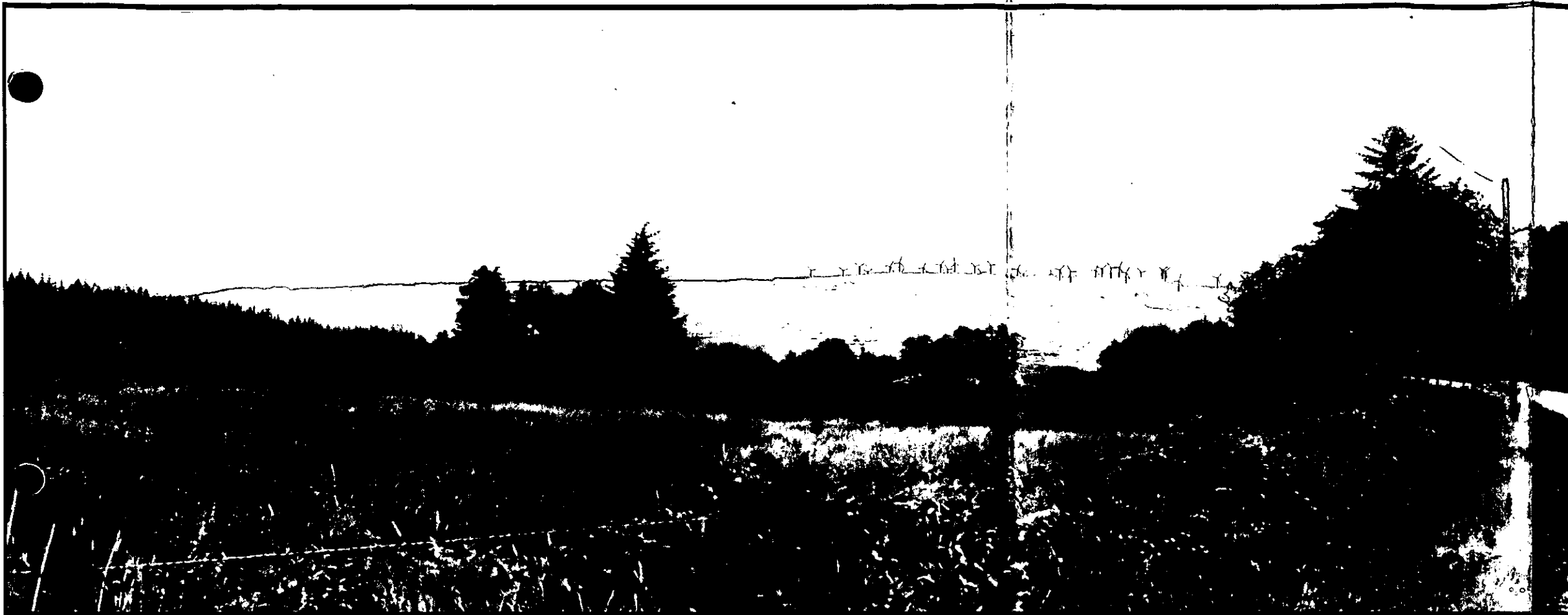
FIGURE 9.6

Viewpoint 4: View from Dromahair

This viewpoint was taken from the main street in Dromahair looking east towards the site. The foreground is dominated by low quality agricultural land. A feeding area for cattle or sheep also indicates land use. A number of tufts of rough grass indicates boggy land. An isolated dead tree to the west of the viewing direction contrasts with the surrounding low lying vegetation. The viewpoint is taken from an area of high elevation and hence the hills in the background appear relatively low lying. No housing or other buildings are visible as the view was taken on the outskirts of Dromahair along the R288.

Visual Impact

The proposed turbines are hidden from view by vegetation the scenic quality of the viewpoint is low the visual impact of the wind farm is negligible.

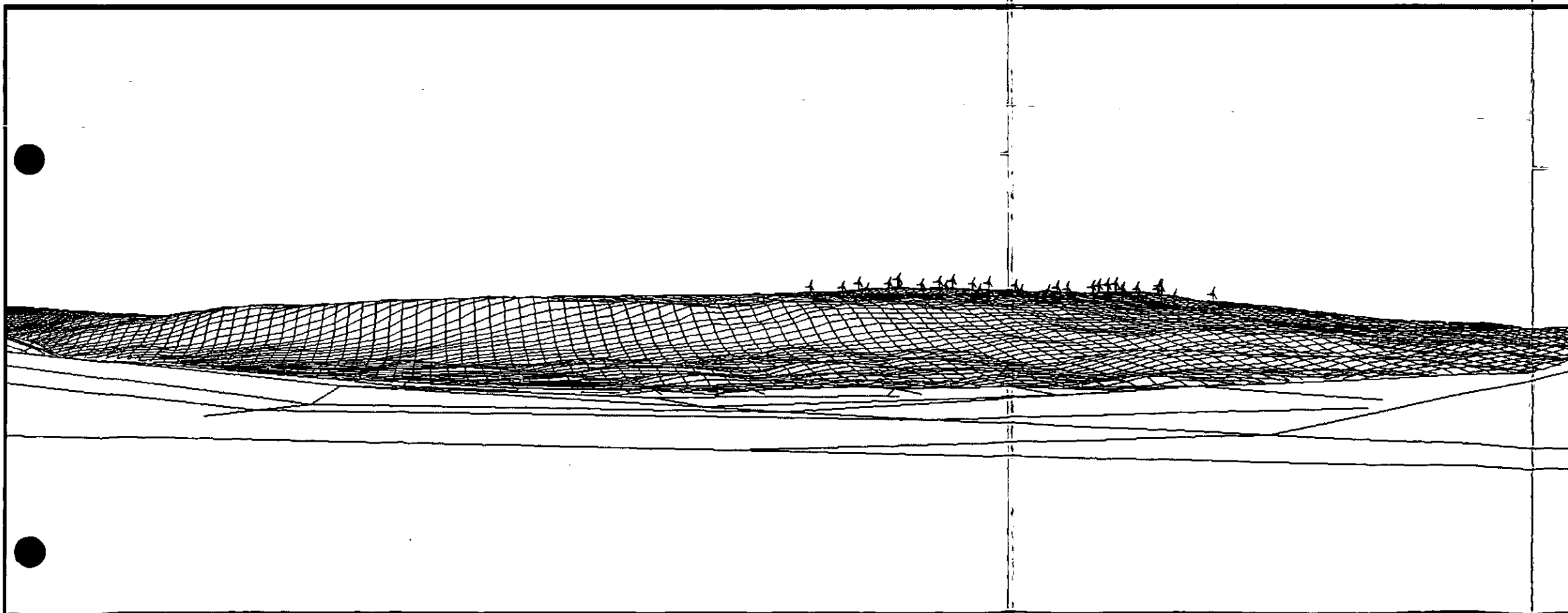


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Notes:

Tip height = 100m
Included Angle = 75°
Camera height = 1.5m
Pitch Angle = 0°

Grid reference: 182838 E, 335937 N
Distance: 8.635km (To nearest turbine)
Elevation: 174m
Number of tips visible: - 28
Number of hubs visible: - 28



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Prepared by
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2001/134/05/lac-wf_fig97

VIEW No. 5
From
Boihy

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

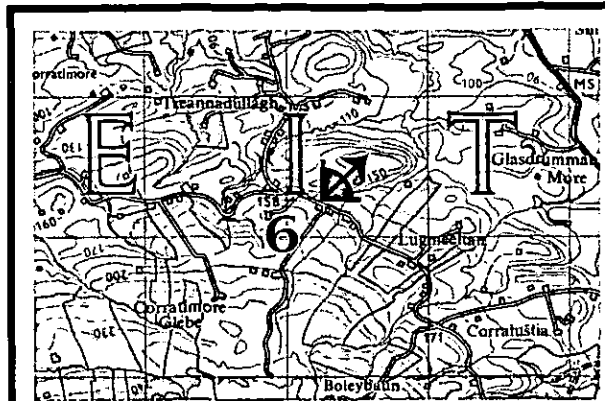
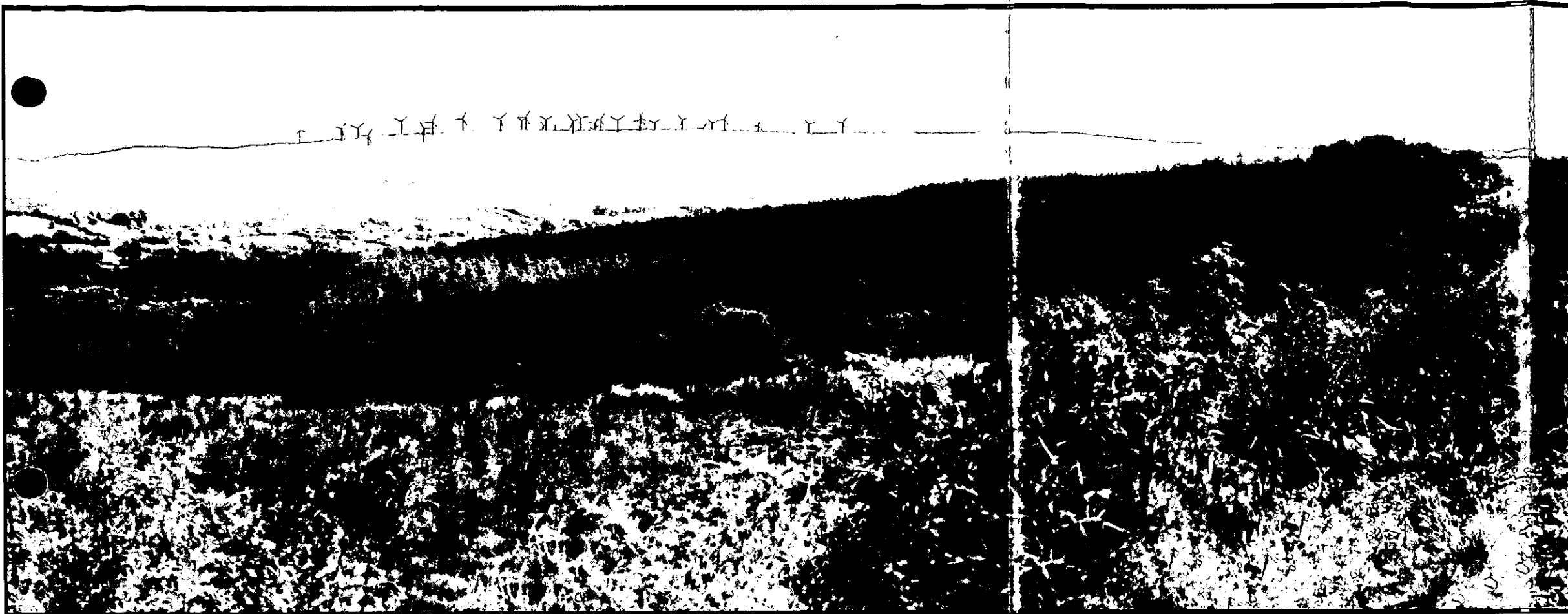
FIGURE 9.7

Viewpoint 5: View from Boihy

This viewpoint was taken from a third class road near Boihy to the west of the site. It is used to access houses along the road and as a short cut for travelling between Sligo and Leitrim. The view consists of a meadow in the foreground gently sloping downwards and adjacent to a coniferous plantation sloping away from the foreground into a valley that is not visible in the picture. A number of colourful shrubs add to the scenic quality of the viewpoint. The land on the opposite side of the valley slopes gently upwards forming a flat-topped ridge which disappears to the east and west of the view.

Visual Impact

The site is very visible from this viewpoint due to its elevation and lack of screening. Twenty eight turbine hubs and tips are visible. The nearest turbine is approximately 8.6 km. At this distance, the turbines are contained to over one third of the hill and would be captured within one snapshot view of the site. A second snapshot view was taken to take in the surrounding countryside and to give a feeling of size to the hill on which the site is located. The road from which this viewpoint was taken is not listed in the County Development Plan for views and prospects, although the view is one of pleasant countryside. The orientation of view is along the road with clear views of the site. The visual impact combined with the relatively pleasant setting results in an overall high impact.

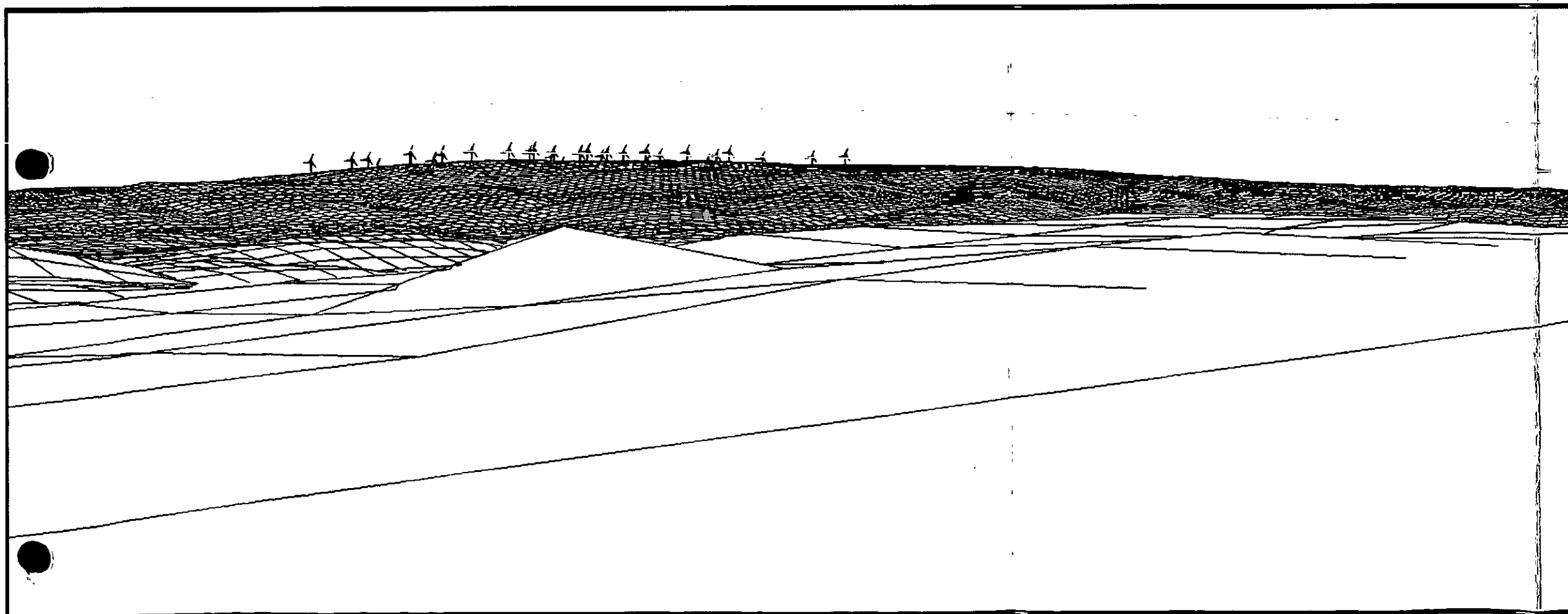


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Notes:

Tip height = 100m
Included Angle = 86°
Camera height = 1.5m
Pitch Angle = -5.4°

Grid reference: 187089 E, 326313 N
Distance: 6.44km (To nearest turbine)
Elevation: 156m
Number of tips visible: - 29
Number of hubs visible: - 26



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2001/134/05/lac-wf_fig98

VIEW No. 6
Over
Belhavel Lough
from County road 245

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.8

Viewpoint 6: View from Over Belhavel Lough from County Road 245

This viewpoint is located on a minor country road to the south west of the site. A coniferous plantation runs through the mid-ground, with scrub vegetation in the foreground. Belhavel Lough is located to the west of the viewpoint. This viewpoint is listed in the County Development Plan for views and prospects and referenced to as V19.

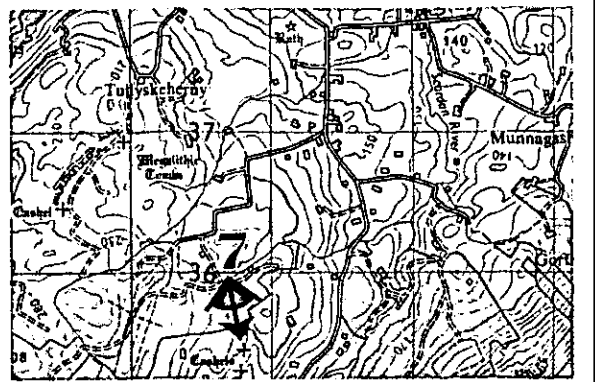
The Lackagh Hills dominate the horizon. There are no houses in the foreground but in the valley below a number of houses/farmsteads are visible.

Visual Impact

There are clear views of the wind farm due to the elevation of the viewpoint and lack of screening. Twenty six hubs are clearly visible along the crest of the hill.

The closest turbine is at a distance of approximately 6.4 km.

There are a number of houses located along this road which will have clear views of the site. This viewpoint is listed for views and prospects in the County Development Plan. Since the development would be clearly visible from this location, the overall impact is very high.

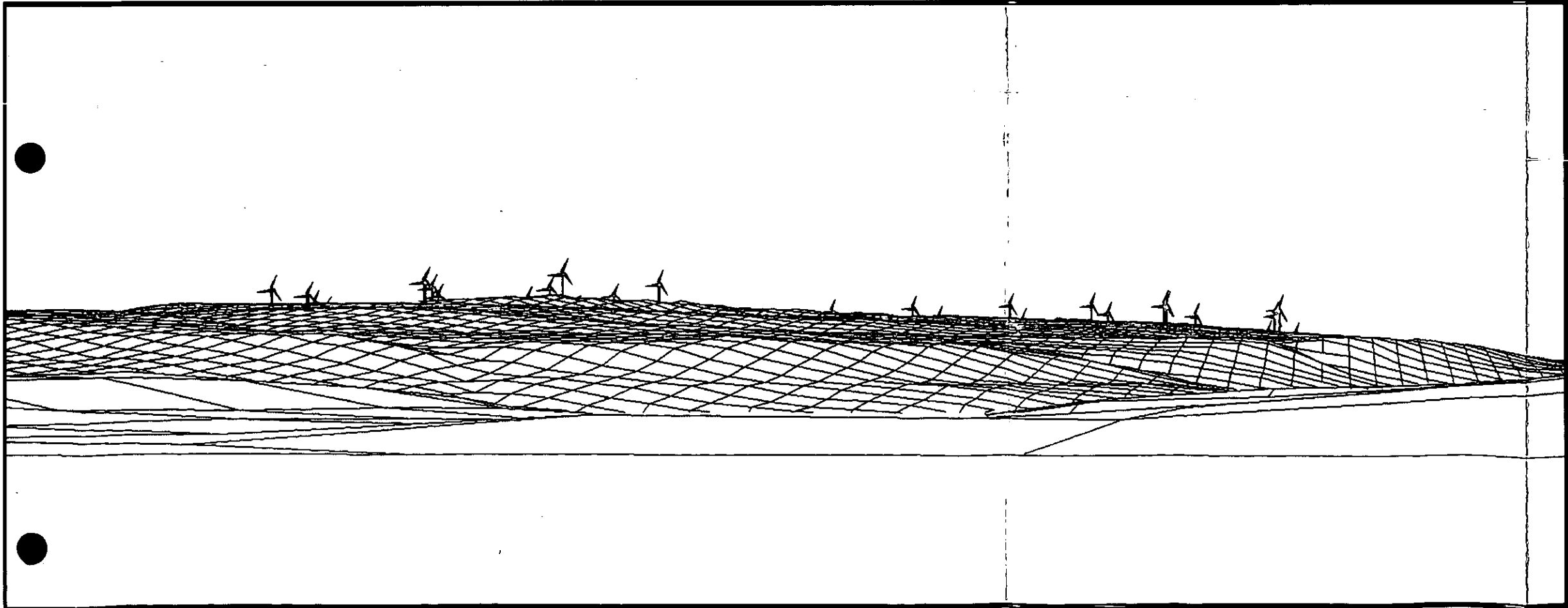


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Notes:

Tip height = 100m
Included Angle = 86°
Camera height = 1.5m
Pitch Angle = -3.8°

Grid reference: 190633 E, 335960 N
Distance: 3.45km (To nearest turbine)
Elevation: 214m
Number of tips visible: - 25
Number of hubs visible: - 19



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AG/OK
2001/134/05/lac-wf_fig99

VIEW No. 7
From
O' Donnell's Rock Walk

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.9

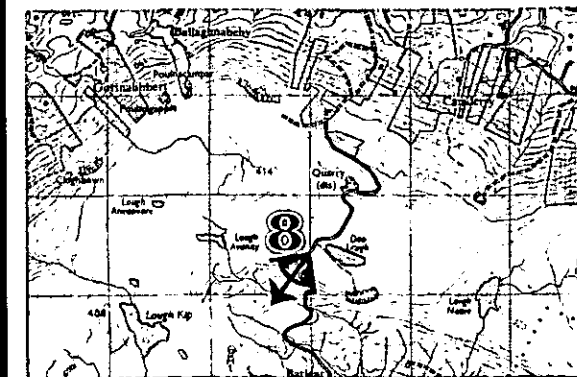
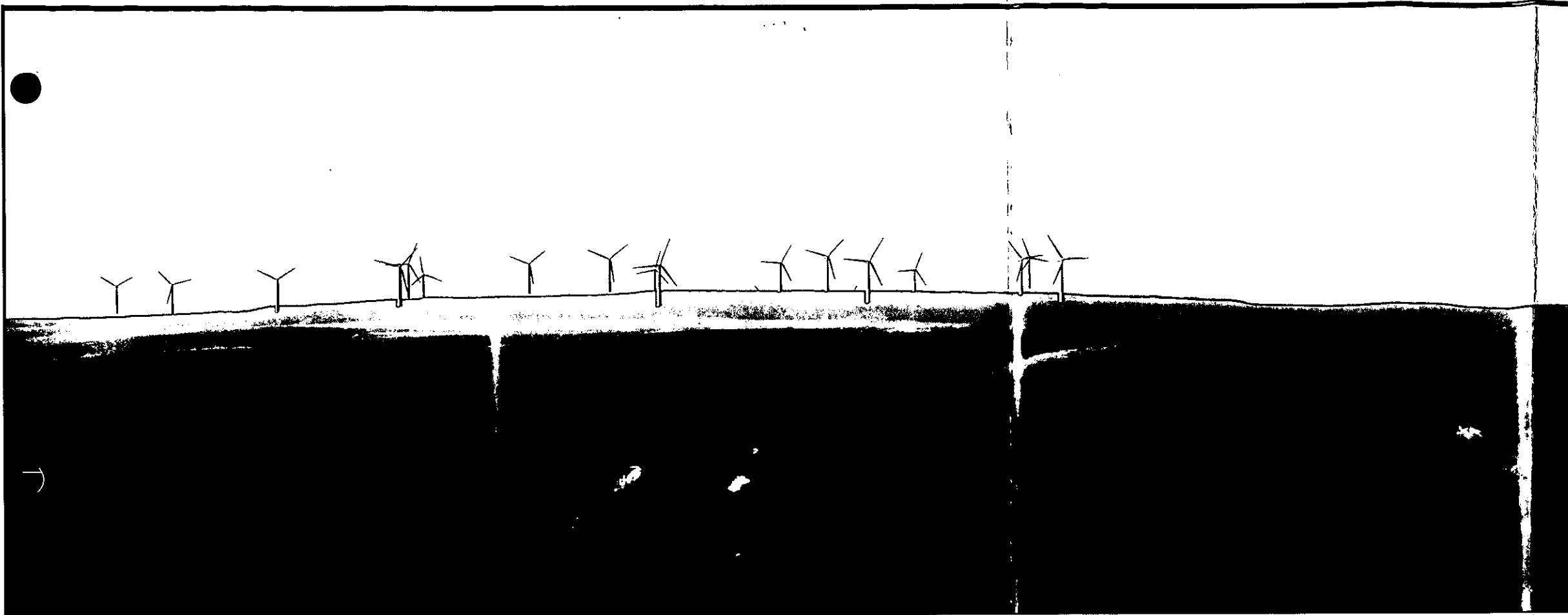
Viewpoint 7: View from O'Donnell's Rock Walk

This photomontage was taken from O'Donnell's Rock Walk. The foreground is very overgrown with long grasses and various bushes. Some forestry plantations are also visible on the lower slopes. The hills in the background appear almost plateau like.

Visual Impact

The viewpoint was taken at a distance of 3.4 km to the nearest turbine. The turbines are very visible due to the elevation and lack of screening. Nineteen turbine hubs and the blade tips of 25 turbines visible.

The viewpoint consists of over two snapshot views of the site. One angle of view captured by the human eye was insufficient to take in the entire site. The scenic quality of the landscape is low/moderate. The route is mainly used by walkers travelling along the O'Donnell's Rock Walk. The road is fairly impassable for vehicles and would require 4 wheel drive capabilities. The greatest visual impact would be on the walkers. The overall impact is moderate.

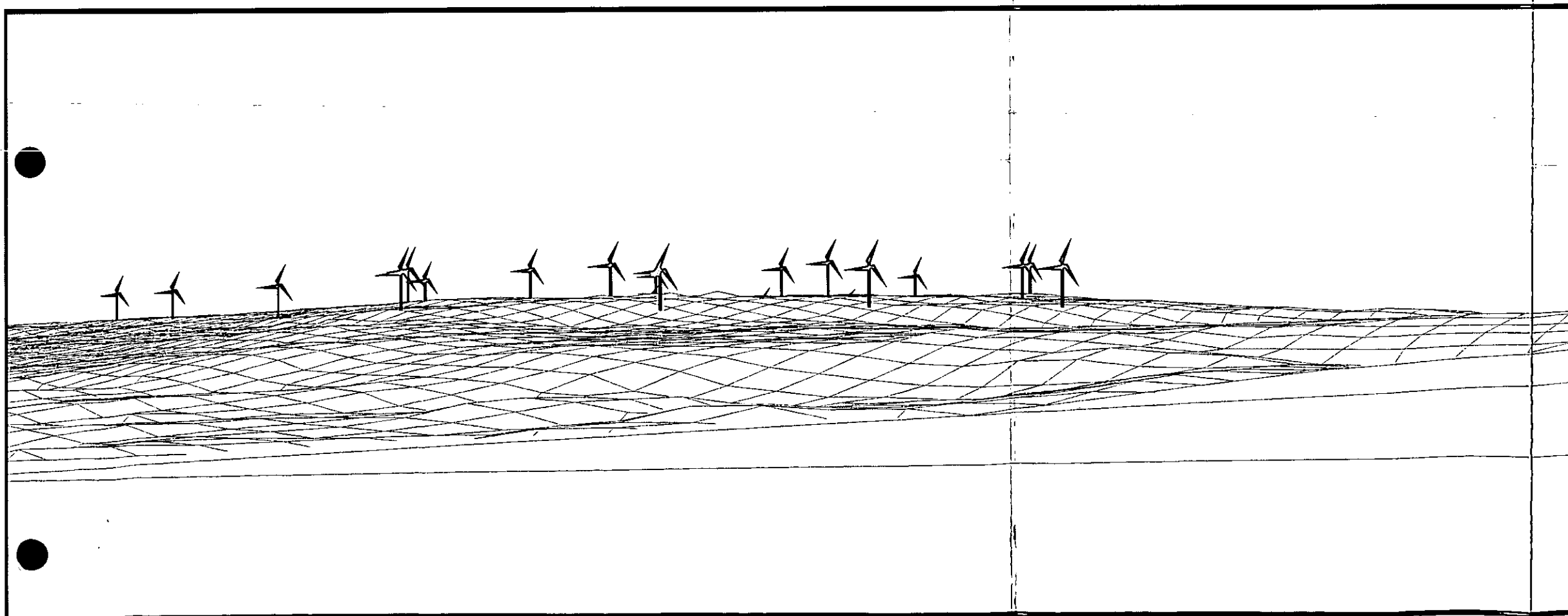


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Notes:

Tip height = 100m
Included Angle = 76°
Camera height = 2m
Pitch Angle = 0.6°

Grid reference: 195010 E, 334440 N
Distance: 2.11km (To nearest turbine)
Elevation: 373m
Number of tips visible: - 19
Number of hubs visible: - 17



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Photomontage and Wireframe
Prepared by
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2001/134/05/lac-wf_fig910

VIEW No. 8
From
Doo Lough

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

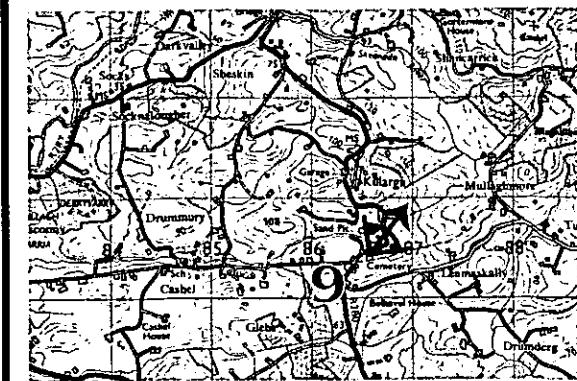
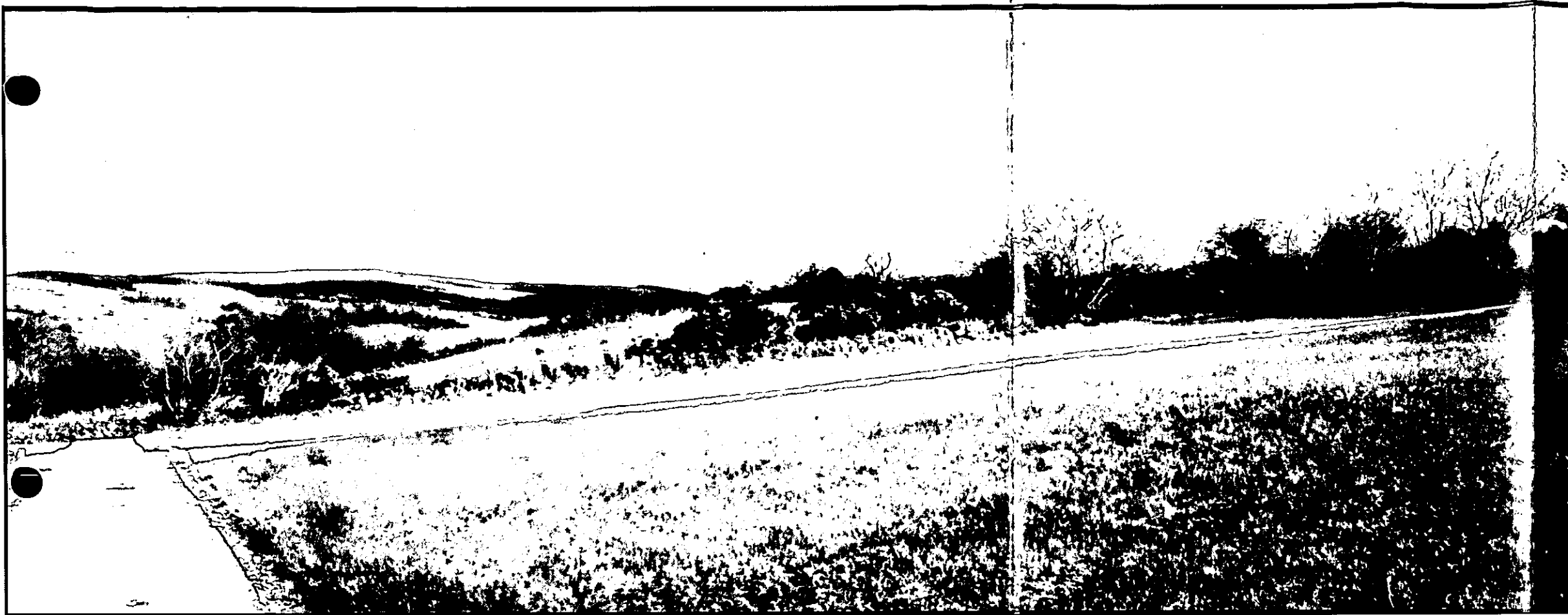
FIGURE 9.10

Viewpoint 8 View from Doo Lough

This viewpoint was taken near Doo Lough facing south west towards the proposed development. The foreground comprises poorly drained soils with low lying vegetation typical of upland bog and wet heath. The elevation of the viewpoint is 373 m and takes in the surrounding landscape at a similar elevation. From this location the landscape appears sloping downwards to the middle ground before rising again towards the background. The landscape levels off to form a plateau in the background.

Visual Impact

The viewpoint is taken from over 2 km from the nearest turbine and shows how the wind farm will appear in the landscape. Seventeen hubs and the blade tips of 19 turbines are visible from this location. There is no scope for screening and the turbines dominate the landscape. This route is along the Leitrim Way walking route and is only accessible by walkers. The visual impact is very high but the overall impact is moderated by the remote nature of the viewpoint.



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Notes:

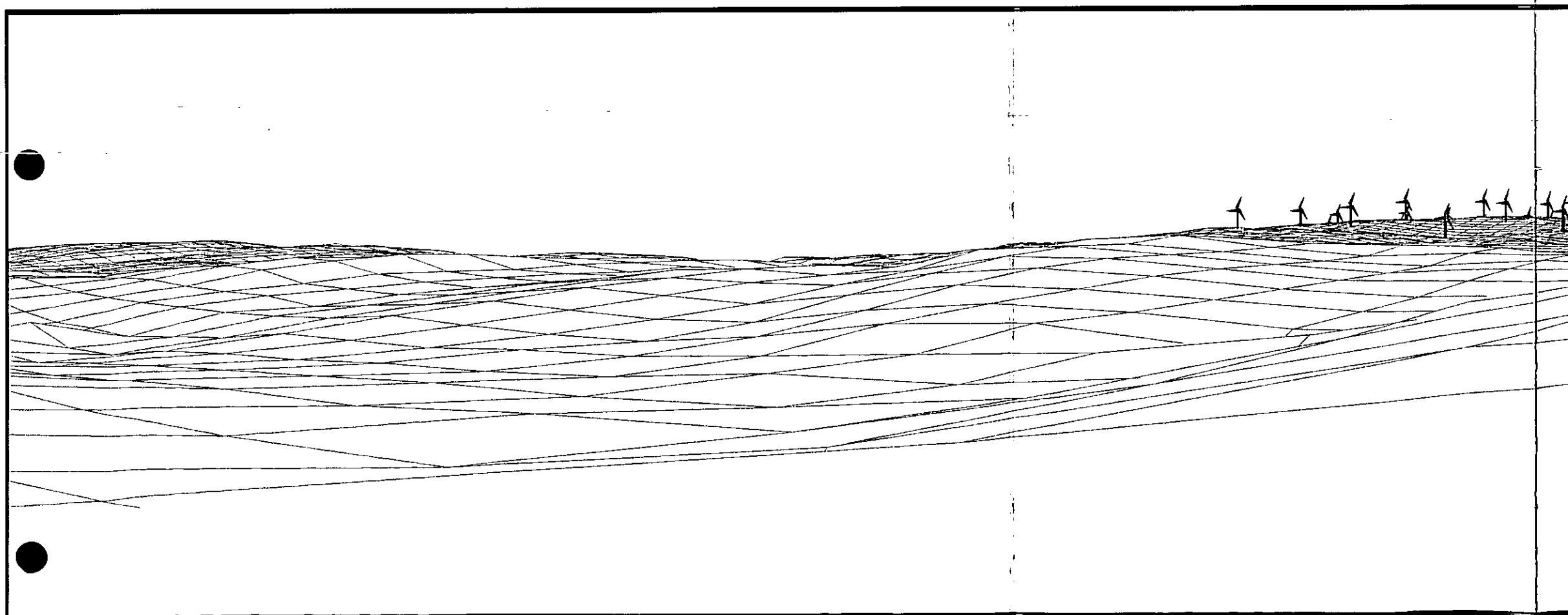
Tip height = 100m
Included Angle = 74°
Camera height = 2m
Pitch Angle = 1.1°

Grid reference: 186610 E, 330420 N
Distance: 4.373km (To nearest turbine)
Elevation: 89m
Number of tips visible: - 2
Number of hubs visible: - 1

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Date of Issue - October 2002
Photomontage and Wireframe
Prepared by
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AG/OK
2001/134/05/lac-wf_fig911



VIEW No. 9
From
Killarga

ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM SITE
AT LACKAGH, Co. LEITRIM

FIGURE 9.11

Viewpoint 9 View from Killarga

This viewpoint was taken from the cemetery at Killarga. The view is in a north-eastern direction towards the site. The foreground shows part of the graveyard grounds. Distant gently sloping hills planted with conifers extend to the background.

Visual Impact

The visual impact is minimal as the turbines are screened by trees and the cemetery wall. It may be possible to see glimpses of the turbines through gaps in the trees particularly in clear skies during the months of low foliage. The view is typical of a rural area. There are no remarkable or defining features in the photograph. The overall impact of the development is therefore negligible.

Mitigation of Visual Impact

It is impossible to introduce specific features to mitigate against the visual impact of a wind farm. For example, deliberate screening will not be effective in general, and attempts to hide or camouflage the turbines will be futile. Locating turbines below the skyline can cause a certain amount of mitigation, as they will be visible over a smaller area. However visibility may be heightened due to the contrast of the wind turbine colour and the landscape. Also the visual relationship between the wind farm and skyline varies as a viewer moves and varies under different weather conditions.

A number of general issues must be considered in the development of a wind farm to mitigate against unnecessary visual impact.

- Semi-matt non-reflective finishes will be used on all turbine structures.
- Blades will all rotate in the same direction.
- Electrical cabling will be laid underground within the site.
- Electrical cabling will not be laid across any undisturbed, wet ground, and will run along the route of site tracks where appropriate.
- New site tracks will be kept to a minimum.
- Site tracks will not be surfaced.
- Local material, where suitable, will be used for the construction of site tracks. Where not found to be suitable, material will be chosen so as to minimise contrast with the surrounding landcover.
- Construction and maintenance of adequate site track drains, culverts and silt traps will be essential to prevent erosion.
- Existing trees, hedgerows, or scrub will be preserved as far as possible; otherwise reinstatement will take place.
- Landscaping of the site and reinstatement of vegetation will take place after construction without undue delay.
- Buildings in the substation compound will be faced in a traditional finish of a sympathetic nature.
- The compound will be screened with trees or other suitable vegetation.
- In general, a high standard of design and maintenance will be applied to the substation compound, turbine surrounds, and site tracks; and
- The site will be kept tidy and litter free at all times, and generally kept orderly and well maintained.

9.6. Conclusions on Landscape and Visual Impact

The viewpoints chosen represent different levels of visual impact taken from different viewing locations and distances around the site. The extent of visibility of the wind farm from each location discussed above generally concurs with the ZVI. The exception is that the ZVI cannot account for vegetation or buildings and hence only portrays the maximum number of turbines that might be visible, and not the number actually visible. The photomontages, therefore, represent more realistic images of how the wind farm will be viewed in key areas in the region.

The proposed development is located in an area of mountainous upland to the north of Lough Allen. The site is not located in any area of outstanding natural beauty, although it will be visible from a number of these areas. However there is only one view and prospect listed in the County Development Plan viewing towards the site. This is the view over Belhavel Lough which is presented in photomontage viewpoint 6. The visual impact was assessed from a number of areas where the wind farm was potentially very visible. Priority was given to areas important for recreational use and from along the main commuting routes. These were the Kingfisher Cycle Trail, Leitrim Way, O'Donnell's Rock Walk, Drumkeeran amenity area, Dromahair and along the main road on the outskirts of Manorhamilton and from off the R280 at Killarga.

Although the wind farm development is large, the landscape is considered sufficiently robust to accommodate such development. Only 300 ha of the 800 ha available land bank would be utilised for the development. The suitability of the landscape is also evident by number of other wind farm developments in the area.

10. LAND USE

The landuse in the existing environment, potential impact of the development thereon and proposed mitigation measures are presented below.

10.1. Land Use in the Existing Environment

The majority of the site is covered with blanket bog and wet and dry heath. The current use of the site is for rough grazing. There are no recreational uses of the site, as it privately owned. Figure 10.1 shows the existing landuse in the vicinity of the site.

There are no official public rights of way in the vicinity of the site. The site is not contained within any of the following government schemes:-

- Special Area of Conservation (SAC), or
- Special Protection Area (SPA).

Dúchas is considering designating the Boleybrack Mountain as an SAC. The form and extent of designation has yet to be determined. Dúchas have been consulted from an early stage in the development, have participated in a site walkover and have been given copies of a revised layout which addresses their concerns. Relevant correspondence is reproduced in Appendix C.

There are no listed archaeological or heritage buildings on the site. There are a number of archaeological sites and monuments around the site.

The surrounding lands within 10 km of the site boundary are utilised for mainly grassland with some commercial forestry located around the site. Bog and marsh extend from the site to the north and south.

There are no hospitals, schools, hotels or guesthouses within 1 km of the site. The closest inhabited dwelling is located approximately 1.5 km from the nearest turbine. Six occupied dwellings are located between 1-2 km from the site, with a further five between 2-3 km. There are a large number of derelict houses and farmsteads in the vicinity of the site. The Leitrim area has been largely de-populated in recent times.

10.2. Potential Impacts on Land Use

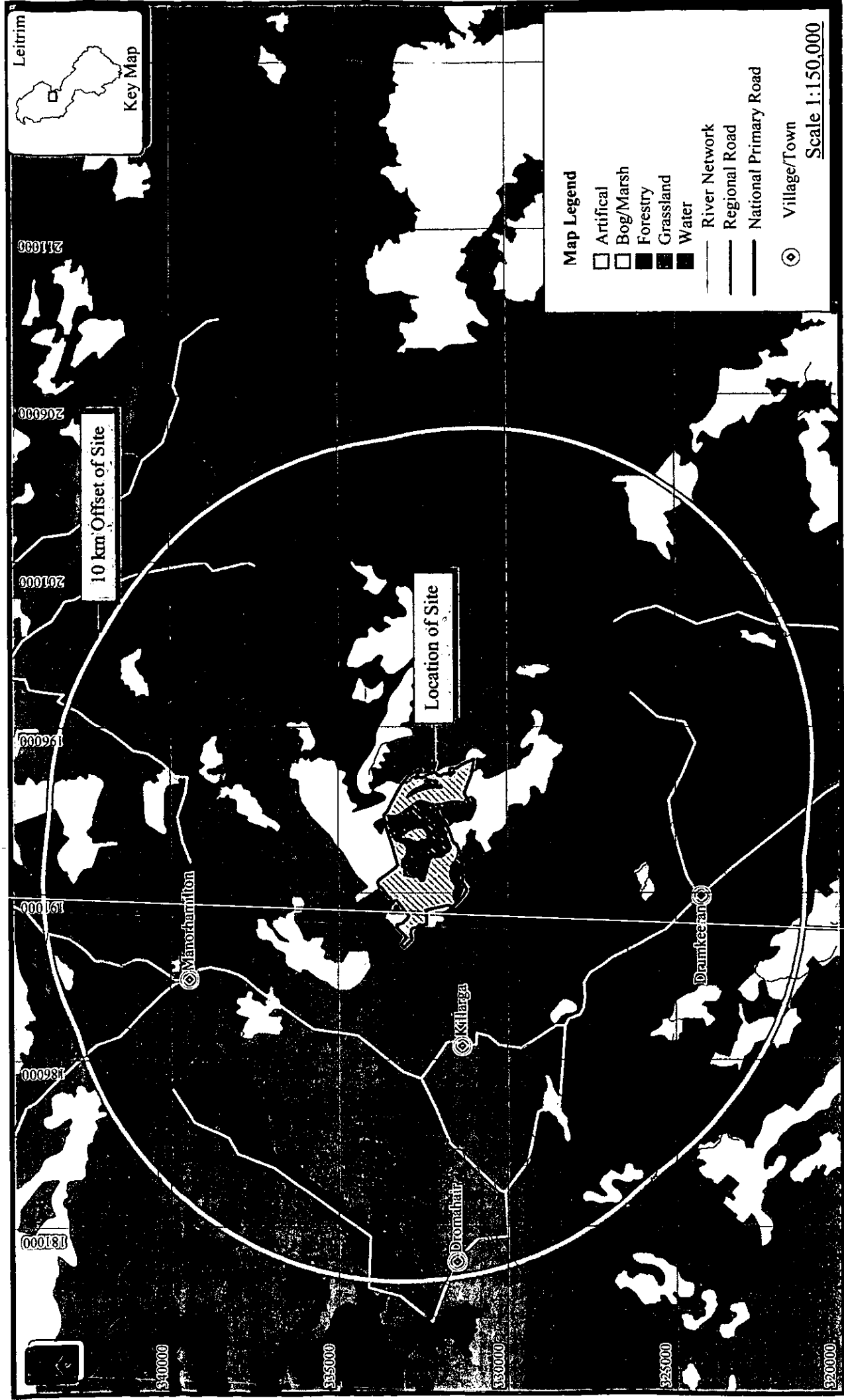
The development is to be sited within an exposed rural upland landscape and will not impact upon adjacent land uses, such as commercial forestry. Use of any areas of uninterrupted blanket bog will be kept to a minimum.

Originally it was proposed to construct a larger scale wind farm at the site with up to 50 turbines. However based on discussions with RTE, ESB, Esat Digiphone and Dúchas, the development was considerably scaled down.

Less than 1% of the site area will be used for site tracks, turbine bases and hardstanding. The use of this area is not considered significant.

The layout has also been modified to minimise the impact on the sensitive land cover. The landowners also agreed to enter into a reasonable sheep management regime should the planning application be approved.

There will be no significant impacts on land surrounding the site.



10.3. Mitigation Measures

Maximum use of the existing site tracks will be made. The areas cleared for new tracks and hardstanding will be kept to a minimum.

As part of the drainage from the site, rainfall will be allowed to run freely over road surfaces, no drainage ditches will be dug. This will cause minimum disruption to the natural hydrology of the site.

The site roads and hardstanding areas will also be located in areas of low sensitivity.

Utilised land on site will be allowed to revegetate naturally when the wind farm will be decommissioned.

Grazing guidelines will be incorporated and active site management carried out to minimise the impact on badly eroded areas.

10.4. Conclusions on Land Use

Sheep can continue to graze on most parts of the site once the issue of overgrazing is addressed.

11. MATERIAL ASSETS

The material assets in the existing environment, potential impact of the development thereon and proposed mitigation measures are presented below.

11.1. Existing Material Assets

Existing material assets include the wind energy resource and the electricity resource. In addition, there are a number of archaeological, architectural and cultural heritage resources. The latter 3 are discussed in Chapter 7 Cultural Heritage

11.1.1. Wind Energy Resource

Wind energy has the following attributes:

- it is probably Ireland's biggest viable resource.
- it is the country's biggest energy resource.
- it is clean, renewable and sustainable as a means of electricity generation.
- it is one of the most cost-effective energy options for reducing global warming.
- it does not result in the creation of any dangerous waste products.

The site of the proposed development is located in an area suitable for wind farm development. It is in an exposed upland area, with good predicted windspeeds. The site area can accommodate 31 turbines. These can contribute up to 80 MW of renewable energy generation.

11.1.2. Electricity Resource

The ESB predict that an extra 1000 MW approximately, of additional generating capacity will be required by 2006. This prediction is based on the current situation and is necessary to meet the growing demand.

11.1.3. Material Resources

Historically, the area around the site was used for coal and iron mining. However, these activities are not longer viable.

11.2. **Potential Impacts of the Proposed Development on Existing Material Assets**

Impacts will be on the wind resource and somewhat on land use. Electricity capacity will be increased and a supplementary income will be provided for those involved.

11.2.1. Use of Finite Resources

Wind energy reduces harmful atmospheric emissions. It is an indigenous, secure and sustainable resource. Fossil fuel energy in comparison, is ultimately unsustainable. Current rates of use of fossil fuels are far greater than the rate at which these fuels are naturally created. While new sources of such fuels are continually discovered, these resources are finite. As these energy sources are depleted, they will accordingly become more expensive. The development of wind energy slows down this depletion, and offers an alternative power source. Wind power development contributes to security, and diversity of energy supply.

11.2.2. Land Use

The wind farm development will make alternative use of land currently used for rough grazing. Some overgrazing is evident and may have led to erosion of sensitive habitats. However, it is believed that most of the erosion was caused by turf cutting over the years. Sheep can still continue to use the site once a management programme or guidelines are followed.

11.2.3. Supplementary Income

The development of the wind energy project will provide an increased income for the landowner, as the utilisation of the land is diversified.

There will also be an increase in rates paid to Leitrim County Council which can be used for local services and infrastructure.

Local communities will also benefit from a share in the gross revenue.

11.2.4. Electricity

It is clearly necessary to increase Ireland's capacity to generate electricity. The proposed wind farm will help achieve this goal. It could supply the electricity needs of up to 80,000 households.

11.3. **Mitigation Measures**

There are no mitigation measures required.

11.4. **Conclusions on Material Assets**

At present the site area and surrounds has a low return on material assets. The proposed wind farm will directly financially benefit the landowners, local authorities and local communities.

12. ELECTRO-MAGNETIC EFFECTS

The electromagnetic communication systems in the existing environment, potential impact of the development thereon and proposed mitigation measures are presented below.

It is established that rotating blades of a wind turbine may occasionally cause interference to electro-magnetically propagated signals. While such interference can, in theory, have an impact on all forms of electromagnetic communications such as:

- satellite communications
- RADAR
- cellular radiocommunications
- aircraft instrument landing systems
- terrestrial microwave links
- television broadcasts

12.1. Telecommunication systems in the existing environment

The nearest telecommunication systems to the site are between Truskmore and Bencroy. Esat Digiphone, RTE and ESB have telecommunication systems in these areas and were contacted regarding the impact if any of the proposed development on their transmissions. Relevant correspondence is reproduced in Appendix C.

Eircom were also contacted. They indicated that the proposed wind farm will not interfere with their operations.

12.2. Potential Impacts of the Development on Electro Magnetic Signals

Interference to a communication system from a wind farm can have three forms:

- electromagnetic interference (EMI) emanating from the turbines
- signal scattering as a result of the obstruction presented by the blades, an effect that mimics the presence of a lower power source operating from the location of the wind turbine
- signal obstruction as it passes through the area swept by the rotating blade

12.2.1. Potential Impacts of Electro-Magnetic Interference

An electric generator or motor will generate electromagnetic energy that will be propagated in the vicinity of the machine, and in this regard a wind turbine is no exception. Like all electrical equipment, testing is required prior to sale to ensure that it meets the required European standard with regard to level of emissions (EN 55011) and immunity to interference (EN 61000). Prior to installation, such tests will have been carried out on the wind turbine, and so it is not expected that EMI will pose any difficulties. Measurements carried out at existing wind farms in Denmark and the UK have shown that no electromagnetic radiation could be detected outside the turbines.

12.2.2. Potential Impacts of Signal Scattering

Large wind turbines can act as sources of re-radiation, producing delayed 'ghost' signals that are modulated in amplitude by the rotation of the blades. The amplitude of the re-radiated signals will be greatest when the plane in which the blades rotate is orientated so that the angle of incidence and reflection are equal. This is called the 'specular reflection' condition. Because the blade of the wind turbine will turn into the wind about a vertical axis, specular reflection may occur for some proportion of the time.

12.2.3. Potential Impacts of Signal Obstruction

If a wind turbine turns through 90° from the specular reflection condition, it will act as an obstruction in the path of the wanted signal and will, in general, simply reduce the wanted field strength. While this effect is less significant than the generation of delayed signals in causing picture degradation, it is one that needs to be avoided in the case of point to point networks.

At the start of the development of this EIS, RTE, ESB and Esat Digiphone reported that the proposed layout and turbine dimensions would interfere with transmissions. To assist with the development of a revised layout, the line of sight of the beam was disclosed by each Telecommunication Company and guidelines given regarding acceptable distances from the beam for the siting of turbines. A revised layout was determined based on the information disclosed and forwarded to each company for review. Letters have been received (Appendix C) stating the revised layout will not interfere with the telecommunications activities of these 3 bodies. See Figure 1.3.

12.3. Mitigation Measures

No further mitigation measures are required. The impact has been mitigated by changes in layout which have been agreed with RTE, Esat Digiphone and ESB. These have been described in Section 1.4.3 Alternative Design. Relevant correspondence on this matter is reproduced in Appendix C.

12.4. Conclusions on Electromagnetic Effects

The site of the wind farm is directly in the path of telecommunications at Truskmore-Bencroy. The revised layout will not interfere with telecommunications in the area. Electromagnetic impacts will be negligible.

13. INTERACTION OF THE FOREGOING

Wind energy has the following attributes:

- it is a clean, renewable and sustainable means of electricity generation.
- it is one of the most cost effective energy options for Irish conditions.
- it is cost effective in the reduction of climate change.
- it does not result in the creation of any harmful waste products.

The development of this wind farm at Lackagh will have positive and negative impacts on the receiving environment. The interactions and interdependencies between the environmental impacts as discussed in the preceding chapters are addressed in this section.

13.1. Positive Interactive Impacts

Wind energy avoids the production of harmful pollutants. It is an indigenous, secure, and sustainable resource, unlike energy derived from fossil fuels that provide 94% of Ireland's energy needs. New sources of fossil fuels are continually discovered, but these resources are finite, and will deplete over time. The development of wind energy offers an alternative power source.

Wind energy is a significant resource available in Ireland. It could potentially add to the security and diversity of the national energy supply in Ireland. Wind energy makes a positive economic contribution by:

- not being subject to the price fluctuations that continually affect fossil fuels.
- lessening our dependence on fossil fuel imports.
- ensuring security of supply of electricity.

The local climatic conditions at Lackagh are very suitable for such a development. The proposed site is situated in an open, and upland mountainous area. The site is subject to sustained wind levels.

The wind resource is a material asset for the local area, and the proposed development will allow the wider local community to benefit from a share in any profit from the wind farm.

The development of wind energy projects in rural areas provides an increased income for local authorities (from rates paid for the development), for landowners due to diversification of landuse increasing their income source and also for investors. Financial benefits will be accrued by local contractors engaged in the construction of the wind farm.

The ESB presently finds it difficult to supply peak electricity on demand. This wind farm will be able to assist in making up identified shortfalls. The ESB identified that approximately 1000 MW additional generating capacity will be necessary by 2006.

13.2. Negative Interactive Impacts

Wind turbines are an environmentally benign approach to power generation. However, they may be perceived as an unwelcome intrusion into the landscape by some. Inevitably, some locations will be subject to visual impact that is difficult to mitigate.

It may also be perceived that the amenity of the area for hillwalking, cycling, boating and fishing will be impacted. Potential noise and shadow casting can also be of concern. However as demonstrated, these issues are mitigated by distance of the turbines to the nearest residences and to amenity areas.

13.3. Conclusions on the Interaction of the Foregoing

This EIS concludes that Lackagh is a suitable site for the proposed development. The main benefits can be summarised as being:

- environmental benefits
- return on investment benefits
- local community benefits
- the environmental impact is low

The developer of this proposed wind farm has expressed an explicit commitment to the process of developing sustainable energy sources in Ireland. This commitment furthers national and international policy on climate change, and on the development of renewable energy sources.

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ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED WIND FARM AT
LACKAGH/DERGVONE/BUCKHILL
BARR/LARKFIELD/GORTERMONE (DRUMAHIRE BY.)

CO. LEITRIM

APPENDICES
VOLUME 3 OF 3

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APPENDIX A

Executive Summary of the “Strategy for the Intensification of Wind Energy Development”

Executive Summary

The Renewable Energy Strategy Group was formed in November 1999 by Mr. Joe Jacob, T.D., Minister of State at the Department of Public Enterprise. The Group's terms of reference were set out in the September 1999 Green Paper on Sustainable Energy. This Green Paper reflected the Government's concerns about the need for domestic action to deal with the problem of climate change due to rising world emissions of greenhouse gases.

The principal focus of the Group's work in the initial 6 months, has been to develop a strategy for the increased contribution of onshore wind energy to electricity generation. In this period, the Group has examined many aspects of, and constraints to, the further deployment of wind energy. It is envisaged that the implementation of this strategy will assist the Department in delivering on the national targets up to 2005 for wind energy as set out in the *Green Paper on Sustainable Energy*, and inform future decisions regarding targets for the period 2005 – 2010.

The principal conclusion of the Group was that three key elements, *Electricity Market*, *Electricity Network* and *Spatial Planning*, need to be integrated into a plan led approach to wind energy deployment. Arising from the Group's deliberations, a number of recommendations are proposed under these headings. The recommended strategy, which hinges on this approach, is designed to meet the targets set for deployment of renewable energy at least cost.

The recommended plan-led approach sees spatial planning considerations as crucial in determining suitable areas where wind farms may be accommodated. These decisions should be informed by the availability of the resource (wind), the strength of the electricity networks, and landscape and other planning considerations. The locations thus identified should then determine the appropriate grid infrastructure required. Within the context of the agreed planning framework, the market mechanisms chosen should aim to minimise the cost of achieving the target deployment of wind energy.

Electricity Market

A major obstacle to the rapid deployment of wind energy is the uncertainty about the future of this market. The aim of the market mechanisms recommended in this report is to minimise unnecessary uncertainty and to provide a framework in which new operators will compete to provide the required generating capacity at minimum cost to future energy consumers.

For potential suppliers the stop-go nature of the tendering process, the administrative cost of tendering, and uncertainty about future policy all add to cost.

It is recommended that, in the short term, the market mechanism should concentrate on facilitating the development of capacity that has or can obtain the necessary authorisations, in particular planning permission, in years 1 or 2. Currently full planning permission has been awarded to wind farms with a combined installed electricity generating capacity of over 155 MW, not including AER III wind farms. An additional number with a combined installed capacity of over 160 MW are currently at various stages within the planning process. It is estimated that a further 215 MW are in the advanced stages of preparation for a planning application. To place this in context, the Green Paper target for all renewable energies is 500 MW by 2005.

Large Scale Developments

The market mechanism (AER V) recommended for the short term is to offer 15 year contracts for projects which have planning permission, the necessary licences and authorisations from CER and accredited certification. It is recommended that the price be based on projects delivered in the AER III competition corrected to allow for payment of the charges and levies introduced and approved by CER and the absence of AER III grants and linked to the Consumer Price Index. Essentially this will offer terms comparable to those arrived at through the competitive tendering process of AER III. It is recommended that this mechanism be available for 24 months to allow projects to enter and pass through the planning stages and to avail of the opportunity, in addition to the current projects with planning permission.

The Group feels that large scale wind farms should be encouraged to achieve efficient deployment of wind energy, and to avoid a proliferation of grid connections. In this regard, it is recommended that the project maximum size cap and ownership restrictions be removed.

The expected outcome from this scheme is an offer of power purchase agreements for large scale wind farms with a combined installed capacity of 160 MW within the 24 month period. This mechanism will be reviewed after 12 months to assess progress.

By offering a fixed price for a specified period the level of uncertainty, and related costs for promoters, will be reduced. By basing the price on that arrived at through a competitive tendering process the cost of provision will be minimised. Because of the speed of technical change in the industry it will only be appropriate that this price be held fixed for a limited period – 24 months – before a new price is determined through a competitive process.

Small Scale Developments

It is further recommended that a Small Scale Renewable Energy Scheme be maintained. The primary aim of this scheme is to encourage smaller scale projects in order to facilitate community based schemes. This provision is aimed at increasing public acceptance of wind energy and demonstrating the technology's potential to contribute to social cohesion and regional development.

It is recommended that for small-scale wind farms, the project size allowable be capped at, say, 2.5 MW and the price related to the small scale wind farm section within AER III (again corrected and linked to the Consumer Price Index, as in the case of the AER III contracts). In addition, because this scheme will be more expensive than the mechanism for deploying larger scale wind farms, there will be an overall cap of 40 MW for this scheme over the 24 month period.

Liberalised Market

In addition to these specialised market mechanisms, wind farms will be able to avail of the opportunities offered by the liberalisation of the electricity market. However indications are that such projects may suffer from an initial lack of confidence among support players, in particular banks, in the early trading stages of the green electricity market. Accordingly, the Group recommends that the Department of Public Enterprise bring forward proposals for an interim period and for a limited amount of capacity to assist projects aimed at that market in securing loans to finance their developments. The purpose of such proposals is to reassure lenders of a continued revenue stream from the wind farm for a limited period of, say, 8 years.

Signals to the market

The Group identified the uncertainty about future offers to the market as a key contributor to bottlenecks. This uncertainty has resulted in projects being submitted prematurely swamping planning authorities and the ESB's departments responsible for grid connection. Recent experience has seen ten applications for every one authorised. It is therefore recommended that a clear signal be sent out to the market that the Government is seriously committed to the target on deploying wind energy and that, as a result, a further round of offers will be held in the future on a competitive tendering basis (AER VI). The Group further recommends that, based on currently available information, the model comprising AER V and AER VI continue as a rolling programme into the medium term.

Review

It is recognised however, that the above medium term recommendations may be overtaken by a number of related developments. EU driven liberalisation in other sectors suggests there will be rapid development of binding (EU) competition and regulatory rules as the electricity market develops into a liberalised single market. Measures to meet the challenge facing Ireland and the EU by emission targets agreed under the Kyoto Protocol are likely to have a significant impact on wind energy deployment. Experience with trading green electricity in the liberalised electricity market will also provide a valuable insight into what may be required. The proposed EU Directive on the Promotion of Electricity from Renewable Energy sources in the internal market may also bring specific conditions on which types of market mechanism are allowable. Similarly the Guidelines on the application of state aid rules for environmental protection are due to be revised. In light of this, it is recommended that the Department of Public Enterprise carry

out a review mid way through the short term programme, i.e. during month 12, and at regular intervals thereafter, in order to determine the best possible route.

Electricity Network

The Group examined the electricity network from two perspectives, individual connections to the network (grid connections) and the ability of the network as a whole to accommodate increasing amounts of wind generated electricity. With regard to *grid connections*, in the context of delivering additional electricity generating capacity from wind energy, there is a serious shortage of capacity on the network. With regard to the *capacity acceptance*, the delivery of wind generated electricity poses challenges to the network which can limit the amount of such electricity acceptable while maintaining system security.

Grid Connection

The strategy recommended centres on facilitating grid upgrading in an efficient strategic manner. In the short term, it is recommended that funding available under the National Development Plan be invested in upgrading the distribution and transmission networks where a bottleneck exists. The priority locations for upgrading will depend on perceived demand (number of wind farms likely to be built) and planning considerations (projects with planning permission). As the projects come on stream, the cost of this infrastructural investment should be recovered through the pricing mechanism and should be recycled to support further infrastructural development.

In the medium to long term, it is recommended that greater integration with the spatial planning process should determine upgrading of the Distribution and Transmission networks, with information on resource availability and existing network strength as information inputs. It is recommended that the above mechanism for upgrading of the distribution and transmission networks be then carried out as in the short term (with the cost being recouped through appropriate user charges).

In addition, where strategic sites are identified for wind energy and where additional transmission infrastructure is required this grid upgrading should be funded under the National Development Plan. Once built however, this network extension will be available to all generators in a non-discriminatory fashion in line with national policy, and will not be reserved for wind farms.

Capacity Acceptance

The challenges to the network in accommodating wind generated electricity is a phenomenon which has yet to be fully researched. It is recommended that appropriate research studies be carried out in the short term to ensure that this does not become a constraint to reaching current and likely future targets for wind energy penetration. These studies are required in order to assess the likely impact of accelerated deployment and

the resulting growing proportion of wind generated electricity on the system as a whole. The current targets to 2005 indicate this proportion will grow from 1% currently to 7% by the end of 2005. It is assumed that the necessary prediction tools, controls and information systems can and will be developed to accommodate this accelerated deployment. In the event of this not being the case, it is noted that the Commission for Electricity Regulation, in granting licences to generate electricity, must have regard for system security.

A necessary outcome of such research will be to provide clear signals for the impacts and cost implications of new deployment targets in the period 2005 – 2010.

Spatial Planning

In the area of spatial planning, experience to date shows that the planning process is supportive generally of wind energy but emphasises a need for greater cohesion between energy policy and environmental / planning policy.

The key recommendation of the Group is that a more plan led approach to wind farm development be adopted. This process involves identifying areas which are deemed suitable or unsuitable for wind energy development, under the following categories

- Strategic areas – these key areas are deemed to be eminently suitable for wind farm development and should be reserved for such purposes.
- Preferred areas – these areas are suitable for wind farm development and should normally be granted planning permission unless specific local planning circumstances would support a decision to refuse permission in the context of the development plan.
- Areas open for consideration – applications for planning permission will be treated on their merits with the developer having a clear responsibility to demonstrate why the development should be granted permission.
- No-go areas – these areas are identified as particularly unsuitable for wind farm development.

The above areas may be identified by Local Authorities or on a regional or national basis and should all be incorporated into Local Authority development plans. In this way, the plan led approach should identify where wind energy should be developed. From this, appropriate market mechanisms may be determined and appropriate locations for investment in the grid infrastructure. The approach needs to be informed by the existing grid infrastructure, cost effective upgrade options and wind speeds for the areas identified. Planning instruments, which are currently being developed through legislation, will be utilised to facilitate this approach.

The process recommended to achieve this is as follows:

1. Issue a letter of invitation to Local Authorities from the Minister for Public Enterprise and the Minister for the Environment and Local Government, pointing to the benefits to Local Authorities of wind farms in their area such as the rates, possibility of investment in wind farms themselves and the possibility of cheaper electricity (through supplying their own electricity needs with wind energy)
2. Local Authorities identify areas which are deemed preferred and open for consideration in the Local Authority area in the context of wind farm development. Strategic areas and no-go areas may also be identified, if deemed appropriate by the Local Authority.
3. The appropriate Council is advised on the areas on a provisional basis
4. The Local Authorities then submit maps containing these areas to the Renewable Energy Information Office to advise on the wind energy resource and the network strength for accommodating wind energy in these areas, following consultation with ESB, IWEA, etc.
5. A revised map of areas deemed preferred, open for consideration, strategic and no-go, as appropriate, is then produced by each Local Authority which is sufficiently broad to allow for wind energy development without creating a situation where difficulties with land availability would create potential bottlenecks.
6. The Local Authority then proceeds to incorporate this into its development plan.

It is recommended that the above process begin immediately. This will assist in providing guidance on individual proposals for planning permission to developers, local communities, the Local Authorities themselves and, in the event of an appeal, An Bord Pleanála.

The Group welcomes the preparation of Guidelines for Local Authorities on Landscape and Landscape Assessment. In carrying out such assessments, it is recommended that Local Authorities take into account wind farm developments. As part of the characterisation of the landscape it is recommended that Local Authorities determine, in parallel, the sensitivity of different landscape character types to different kinds of wind energy development. This will involve assessing landscape quality, sensitivity, robustness and capacity.

It is recommended that the Renewable Energy Information Office develop an integrated resource map specific to the needs of Planning Authorities, the network operator and wind farm developers. Because of its importance to other recommendations, it is further recommended that its production be completed as soon as possible. This map should be updated regularly and made available, in particular, to all Local Authorities.

It is recommended that objective research be undertaken of public objections to previous planning consent applications and subsequent attitudes to successful projects to inform a comprehensive information campaign by the Renewable Energy Information Office for

the purpose of informing and improving the public perception of wind farm developments.

It is further recommended that the Department of the Environment and Local Government revise and update their guidelines, *'Wind Farm Development – Guidelines for Planning Authorities'* to take account of recent developments, including the recommendations in this Strategy. In particular, it is important to incorporate the system and process, as recommended above.

In the medium term, it is recommended that the process outlined above should continue in an iterative manner and that as it develops, appropriate market mechanisms and grid upgrading plans for wind energy be informed by it.

APPENDIX B

Executive Summary of the National Climate Change Strategy

NATIONAL CLIMATE CHANGE STRATEGY IRELAND

October 2000

EXECUTIVE SUMMARY

International Context

Climate change is identified as the most significant and threatening global environmental problem facing humanity today. Global consensus has recognised that cuts of up to 70% in global emissions are needed over the next century in order to stabilise concentrations in the atmosphere at twice the pre-industrial level. The impacts of climate change on Ireland will be significant, but will be more damaging on many countries which are least able to afford to take action or adapt.

As a first step towards tackling this threat, the United Nations Framework Convention on Climate Change (UNFCCC) required developed countries to put in place policies and measures with the objective of returning emissions of greenhouse gases to 1990 levels by the end of the decade. However, in recognition of the need to take more substantial action, developed countries agreed legally binding targets in Kyoto in 1997, to reduce global emissions of six greenhouse gases by 5.2% in the period from 1990 to 2012. The EU will reduce emissions by 8% overall.

Irish Target

As part of the EU target, Ireland has agreed to limit the growth in greenhouse gas emissions by 13% above 1990 levels. Without the action set out in this Strategy, it is projected that net annual emissions would increase by 37.3%. Reductions of emissions of 13.1 million tonnes (Mt) CO₂ equivalent on this projected figure will be required to meet the national target.

Sources of Irish Emissions

The main greenhouse gas in Ireland is carbon dioxide (CO₂), mainly arising from the burning of fossil fuel in transport, heating and electricity generation. Irish emissions of other greenhouse gases, including methane (CH₄) and nitrous oxide (N₂O) are proportionately higher than other countries, and emissions from the agriculture sector were 35% of all greenhouse gas emissions in 1990, the highest of all sectors. Emissions from the transport sector are forecast to have the largest increase (by 180%) by 2010.

Strategic Framework for Action

This Strategy provides a framework for achieving greenhouse gas emissions reductions in the most efficient and equitable manner while continuing to support economic growth and to prepare Ireland for the more ambitious commitments that will be required after 2012. It requires action to be taken in all sectors, as early as

possible and in a sustainable manner. The Strategy is based on the fundamental principles of sustainable development which are set out in *Sustainable Development: A Strategy for Ireland*, and takes account of the need to protect economic development and competitiveness.

Guiding Principles

The Strategy recognises that the burden for the Kyoto commitment period and beyond must be borne equitably within the economy. The criteria to achieve this include: -

- 4 the requirement to promote sustainable development,
- 4 maximisation of economic efficiency, including a preference for the use of "no regret" and least cost measures,
- 4 achievement of sectoral equity (relative costs and effort, achievement of reductions across the economy),
- 4 protection of economic development and competitiveness (market based instruments, exploitation of new markets and opportunities),
- 4 generating an impetus for early action.

Reductions of emissions will be achieved through an integrated approach, using the full range of instruments and policy options. These include: -

- 4 the use of economic instruments (including taxation and emissions trading) with broad sectoral and/or cross-sectoral application,
- 4 a broad range of policies and measures tailored specifically to relevant sectors,
- 4 a vigorous and appropriate pursuit of common and coordinated policies and measures implemented at EU and wider international levels, and,
- 4 participation in international emissions trading.

Summary of the measures

The key measures in the Strategy are: -

cross-sectoral market based instruments, including: -

- 4 **taxation** – Appropriate tax measures, prioritising CO₂ emissions, will be introduced from 2002 on a phased, incremental basis across a broad range of sectors in a manner that takes account of national economic, social and environmental objectives.
- 4 Ireland will participate in the pilot EU **emissions trading** scheme and in **international emissions trading**.

In the **energy** sector: -

- 4 Measures supportive of ceasing of coal use at Moneypoint by 2008 and fuel switching towards less carbon intensive fuels.
- 4 An expansion of renewable energy.
- 4 Maximisation of CHP.
- 4 An enhanced demand side management programme under the Irish Energy Centre.

In the **transport** sector: -

- 4 Fuel Efficiency Measures
 - 4 further rebalancing of VRT and annual motor tax to favour more fuel-efficient cars,
 - 4 fuel economy labelling for all new cars,
 - 4 fuel switching and efficiency for the public transport and State vehicles.
- 4 Modal Shift Measures
 - 4 increased use of public transport through additional investment in public transport to improve existing suburban bus and rail facilities and to develop new facilities.
- 4 Demand Management
 - 4 setting fuel taxes at appropriate levels to limit the rate of increase in overall fuel consumption and to progressively reduce the incentive for purchase of fuel for foreign vehicles in the State,
 - 4 development of integrated traffic management,
 - 4 achieving higher residential densities; restrictions on out of town retail units.

In the **industrial, commercial and services** sector: -

- 4 Market instruments, including targeted taxation measures and emissions trading.
- 4 Negotiated agreements with industry, with the option for firms complying with agreements to reduce their tax burden.
- 4 The examination of investment support from the perspective of greenhouse gas emissions.
- 4 Expansion of Irish Energy Centre programmes.
- 4 Specific measures to tackle industrial gases e.g. agreement on the use of alternatives.

In the **agriculture** sector: -

- 4 A reduction in CH₄ from the national herd, equivalent to a reduction in livestock numbers by 10% below 2010 projected levels; an appropriate balance will be maintained between direct reductions in stock numbers and intensification of other measures, including a prioritised research programme (including feeding programmes, additives, probiotics, engineering and finishing cattle at a younger age) to identify means of reducing emissions per animal.
- 4 Strengthened relationship between agriculture and forestry policy in REPS, to promote additional forestry plantation at farm level.
- 4 Development of short-rotation biomass and anaerobic digestion of animal wastes for energy generation.
- 4 Use of nitrogenous fertiliser will be reduced by 10% below expected 2010 levels, supplemented by other measures (including use of slow release inhibitors, efficient management of slurry and dirty water) to reduce N₂O emissions from soils.
- 4 Best practice guidelines will be developed to encourage changing farming practices.

In the **forestry** sector, measures to enhance carbon sinks will be supported by: -

- 4 Review of the forestry programme to ensure full achievement of planting target and the intensification of the programme.
- 4 Research programme to maximise sequestration potential of forestry.

In the **built environment and residential** sector: -

- 4 Improved spatial and energy use planning - (Residential Density Guidelines, the National Spatial Strategy, Strategic Planning Guidelines).
- 4 More efficient new buildings - Building Regulations will be reviewed to reduce energy use in new housing by up to 20% in 2002 with further reductions in 2005.
- 4 Sustainable building will be encouraged through adjustment of the New House Grant to require that standards of energy efficiency are met, and support for low energy projects in all categories of housing.
- 4 Improved efficiency of existing building through education and awareness programmes to promote domestic energy efficiency, changing the fuel mix in households, energy efficiency rating for housing.
- 4 For pre-1991 building stock, energy rating will be introduced; in the case of local authority housing schemes to upgrade the stock will address energy efficiency and have a focus on alleviating fuel poverty where appropriate.

Local Authorities are identified as having an important cross-sectoral role at local level, including in partnership with Local Energy Agencies. Local authorities will be encouraged to adopt best international practice as developed through international networks, and will develop appropriate performance indicators of their progress in reducing emissions. Measures in the **waste sector** will be in accordance with the national policy framework set out in *Changing Our Ways*. Waste generators will pay the full cost of waste collection, treatment and disposal, including the development of charges for household and commercial waste. The implementation of Waste Management Plans by local authorities will be vigorously pursued.

Implementation of Strategy

Government and relevant State Agencies will immediately undertake the necessary work to implement the measures, overseen by a high level inter-Departmental group. Comhar has been asked to support implementation by identifying means of securing necessary changes in behaviour. Progress will be assessed regularly by the Minister for the Environment and Local Government, and the Strategy will be subject to biennial review.

Quantified Indicative Reductions Proposed in Strategy

ENERGY

Fuel Switching to Gas	4.15 Mt CO ₂
Moneypoint	3.4 Mt CO ₂
Oil	0.75 Mt CO ₂
CHP	0.25 Mt CO ₂
Renewables	1.0 Mt CO ₂
Efficiencies	0.1 Mt CO ₂
DSM	0.15 Mt CO ₂
Total	5.65 Mt CO₂

TRANSPORT

Vehicle Efficiency Improvements	0.77 Mt CO ₂
Fuel Measures (displace bunkering)	0.9 Mt CO ₂
VRT, Taxes	0.5 Mt CO ₂
Labelling	0.1 Mt CO ₂
Public Transport Measures	0.15 Mt CO ₂
Traffic Management	0.2 Mt CO ₂
Freight	0.05 Mt CO ₂
Total	2.67 Mt CO₂

BUILT ENVIRONMENT & RESIDENTIAL

Building Regulation Standards	0.25 Mt CO ₂
Existing Buildings	0.4 Mt CO ₂
Fuel Mix	0.25 Mt CO ₂
Total	0.9 Mt CO₂

INDUSTRY, COMMERCIAL, SERVICES

"No regrets"/low cost energy efficiency gains	0.75 Mt CO ₂
Up to £75 tonne CO ₂ efficiency measures	0.25 Mt CO ₂
Process Substitution for Cement	0.5 Mt CO ₂
Industrial Gases	0.5 Mt CO ₂ equivalent
Commercial and Services	0.175 Mt CO ₂
Total	2.175 Mt CO₂ equivalent

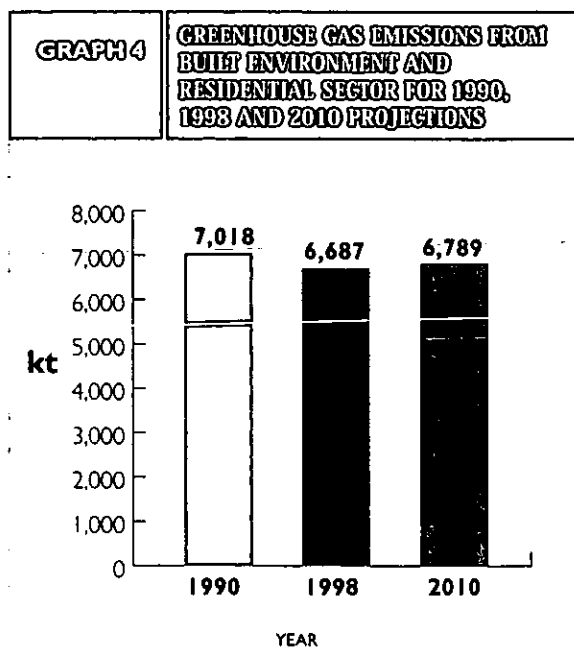
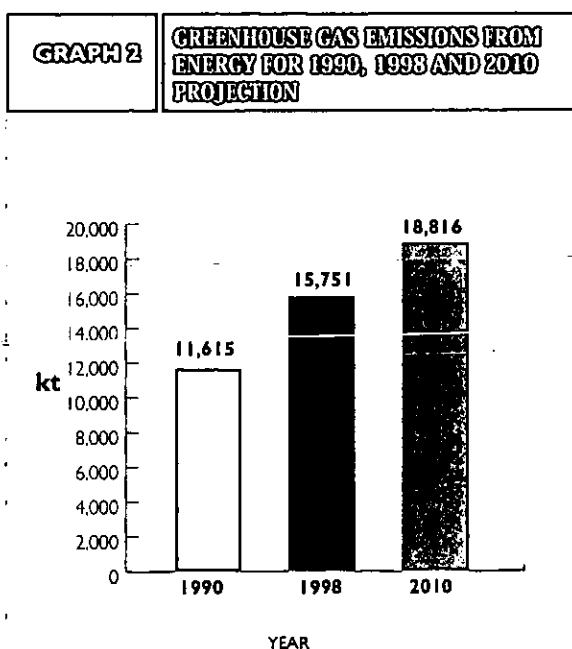
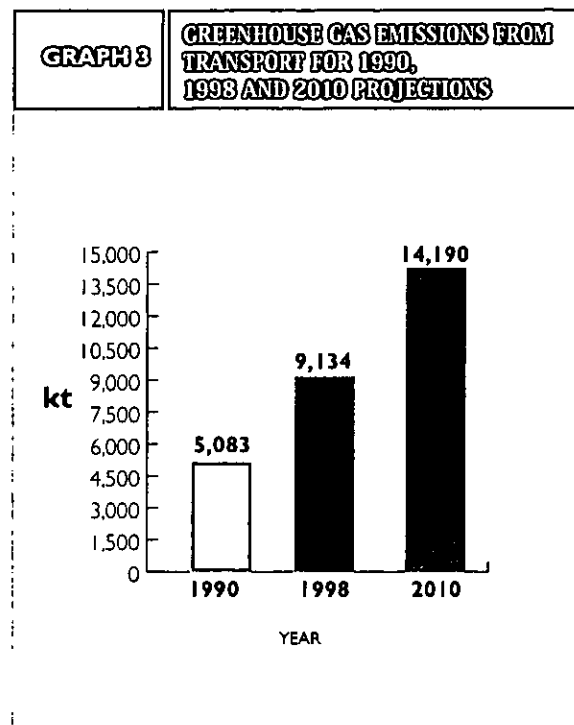
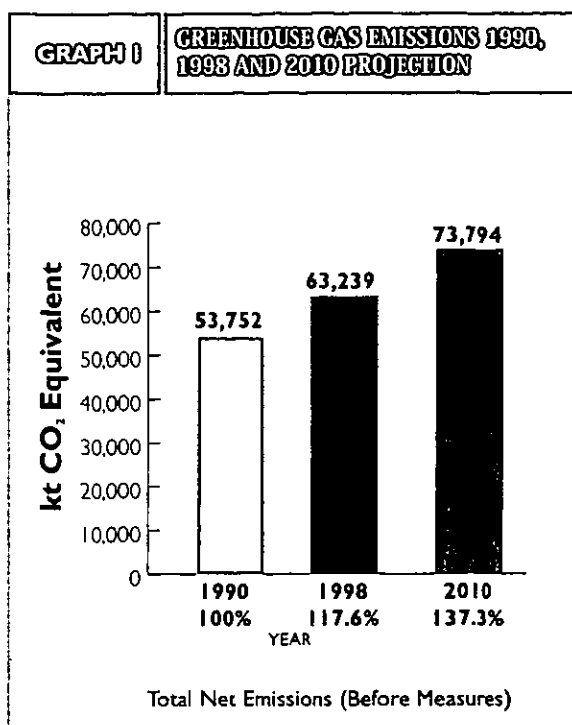
AGRICULTURE

Reduction of CH ₄ from national herd of which Feeding Regimes	1.2 Mt CO ₂ equivalent 0.5 Mt CO ₂ equivalent
Fertiliser Use	0.9 Mt CO ₂ equivalent
On-Farm Forestry Sequestration	0.25 Mt CO ₂
Manure Management	0.06 Mt CO ₂ equivalent
Total	2.41 Mt CO₂ equivalent

SINKS (Additional Sequestration) 0.76 Mt CO₂ equivalent

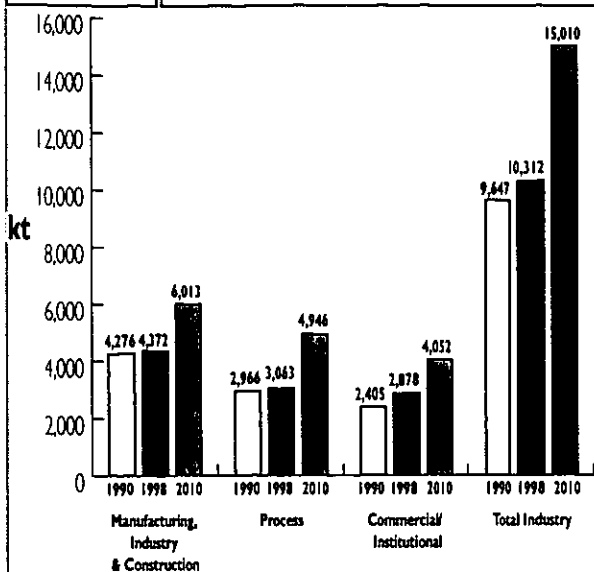
WASTE 0.85 Mt CO₂ equivalent

OVERALL TOTAL 15.415 Mt CO₂ equivalent



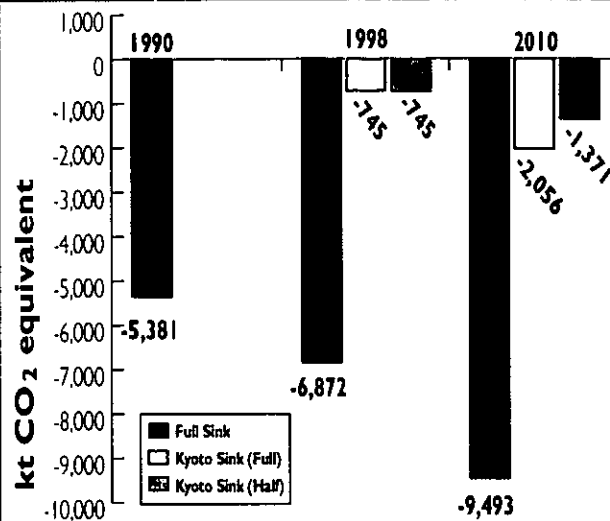
GRAPH 5

GREENHOUSE GAS EMISSIONS FOR INDUSTRY, COMMERCIAL AND SERVICES SECTOR FOR 1990, 1998 AND 2010 PROJECTIONS



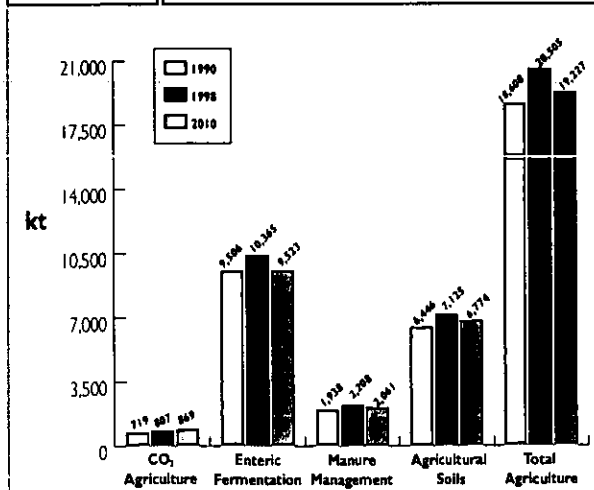
GRAPH 7

FORESTRY SEQUESTRATION (TOTAL SEQUESTRATION, AND UNDER KYOTO PROTOCOL) FOR 1990, 1998 AND 2010 PROJECTIONS



GRAPH 6

BREAKDOWN OF GREENHOUSE GAS EMISSIONS FROM AGRICULTURE (fossil fuel combustion (CO₂), Agriculture ruminants (Enteric Fermentation), manures, and soils (Agricultural Soils) FOR 1990, 1998 AND 2010 PROJECTIONS



Sources of Irish Carbon Dioxide Emissions

Sectoral Breakdown CO ₂	1990		1998		2010	
Energy Industries	11,057	35.0%	15,047	37.6%	18,250	35.5%
Residential	6,752	21.4%	6,447	16.1%	6,470	12.6%
Transport	4,961	15.7%	8,768	21.9%	13,645	26.6%
Industry & Const	3,833	12.1%	3,917	9.8%	4,030	7.8%
Commercial/Instit	2,314	7.3%	2,775	6.9%	3,975	7.7%
Ammonia Production	989	3.1%	1,058	2.6%	1,058	2.1%
Cement	750	2.4%	1,000	2.5%	3,000	5.8%
Agri/Forestry/Fishing	660	2.1%	752	1.9%	835	1.6%
Lime Production	191	0.6%	192	0.5%	75	0.1%
Solvents	67	0.2%	71	0.2%	36	0.1%
Totals	31,575	100.0%	40,028	100.0%	51,373	100.0%

Source: EPA

Sources of Irish Methane Emissions ('000 tonnes CO₂ equivalent)

Sectoral Breakdown CH ₄	1990		1998		2010	
Enteric Fermentation	9,506	74.1%	10,365	76.0%	9,523	78.2%
Waste	1,780	13.9%	1,594	11.7%	1,131	9.3%
Manure Management	1,294	10.1%	1,478	10.8%	1,385	11.4%
Fugitive Emissions	127	1.0%	85	0.6%	39	0.3%
Residential	85	0.7%	55	0.4%	25	0.2%
Transport	37	0.3%	48	0.3%	76	0.6%
Commercial/Instit	4	0.0%	4	0.0%	4	0.0%
Industry & Const	3	0.0%	3	0.0%	2	0.0%
Agri/Forestry/Fishing	1	0.0%	1	0.0%	1	0.0%
Energy Industries	0	0.0%	0	0.0%	0	0.0%
Totals	12,836	100.0%	13,631	100.0%	12,185	100.0%

Source: EPA

Sources of Irish Nitrous Oxide Emissions ('000 tonnes CO₂ equivalent)

Sectoral Breakdown N ₂ O	1990		1998		2010	
Ag Soils	6,446	71.0%	7,125	70.8%	6,774	69.7%
Nitric Acid	1,036	11.4%	812	8.1%	812	8.4%
Manure Management	644	7.1%	731	7.3%	676	7.0%
Energy Industries	431	4.7%	620	6.2%	527	5.4%
Residential	182	2.0%	186	1.8%	294	3.0%
Industry & Const	117	1.3%	124	1.2%	60	0.6%
Commercial/Insttit	86	1.0%	99	1.0%	73	0.8%
Transport	85	0.9%	318	3.2%	469	4.8%
Agri/Forestry/Fishing	58	0.6%	54	0.5%	34	0.3%
Totals	9,084	100.0%	10,068	100.0%	9,719	100.0%

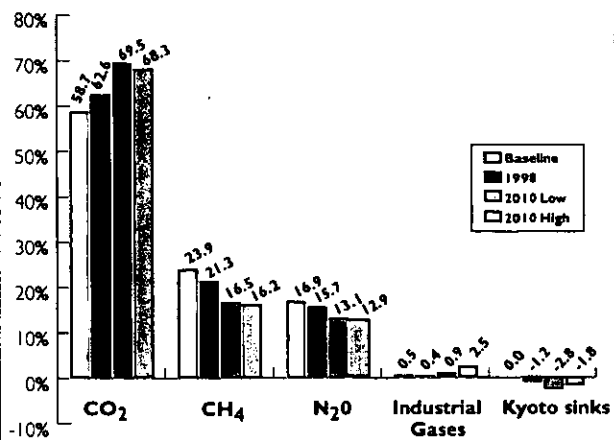
Source: EPA

Total National Emissions and Sequestration '000 tonnes CO₂ equivalent)

	CO ₂	CH ₄	N ₂ O	HFC PFC SF ₆	Total Emissions	Emissions Index	Sinks (Kyoto basis)	Net Total	Net Index
Base Year	31,575	12,936	9,085	256	53,752	100.0%	0	53,752	100.0%
1998	40,028	13,631	10,069	256	63,984	119.0%	-745	63,239	117.6%
2000	42,675	13,139	9,630	799	66,243	123.2%	-991	65,252	121.4%
2005	47,210	12,940	9,692	1,342	71,184	132.4%	-1,523	69,660	129.6%
2010 Low	51,373	12,185	9,720	672	73,950	137.6%	-2,056	71,894	133.8%
2010 High	51,373	12,185	9,720	1,885	75,163	139.8%	-1,369	73,794	137.3%

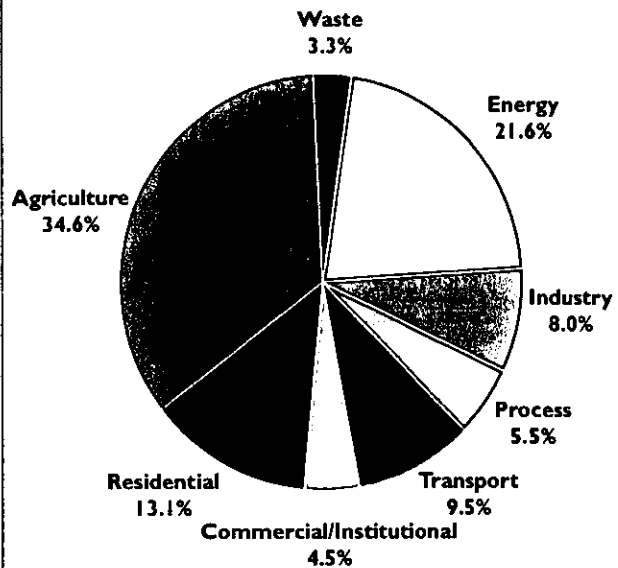
GRAPH 8

BREAKDOWN OF EMISSIONS BY GAS ON GWP BASIS, 1990, 1998 AND 2010 PROJECTIONS



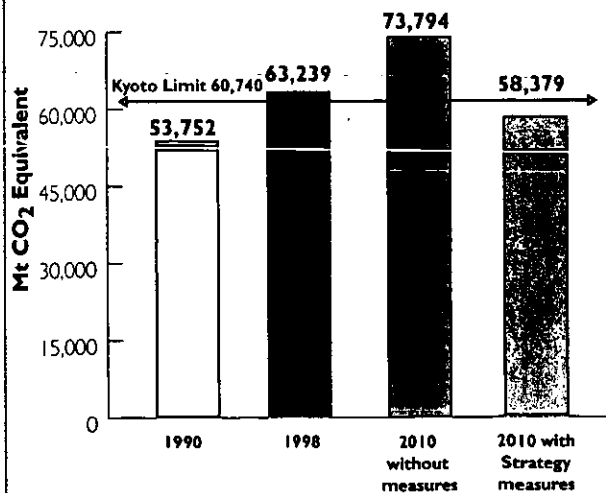
GRAPH 10

SECTORAL BREAKDOWNS OF EMISSIONS FOR 1990



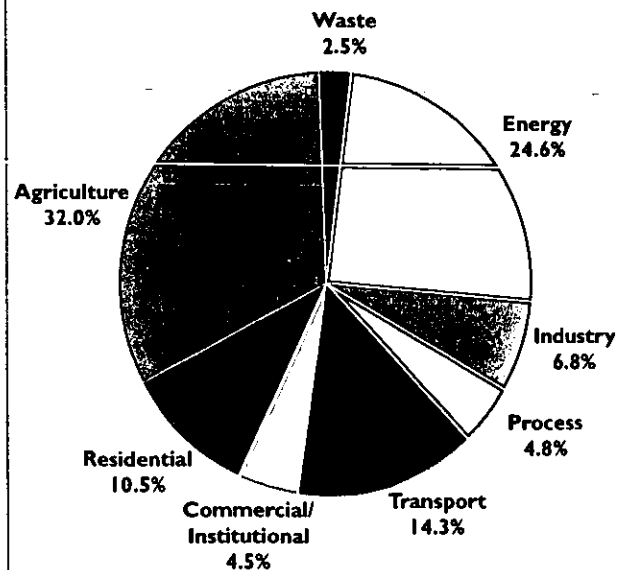
GRAPH 9

IMPACT OF STRATEGY ON ACHIEVEMENT OF KYOTO TARGET



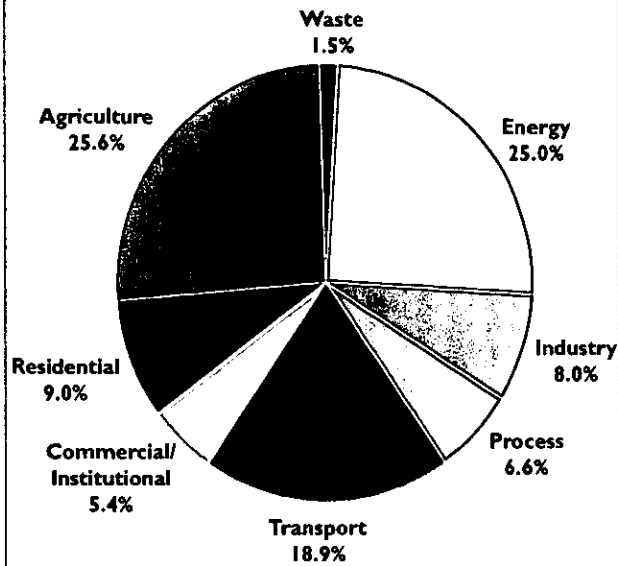
GRAPH 11

SECTORAL BREAKDOWNS OF EMISSIONS FOR 1998



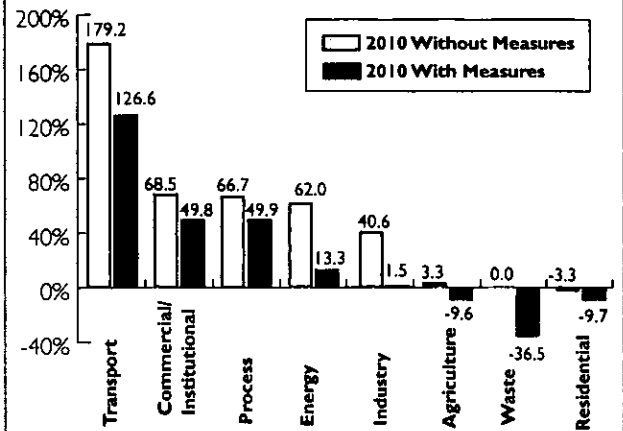
GRAPH 12

SECTORAL BREAKDOWNS OF EMISSIONS FOR 2010 PROJECTIONS (WITHOUT MEASURES)



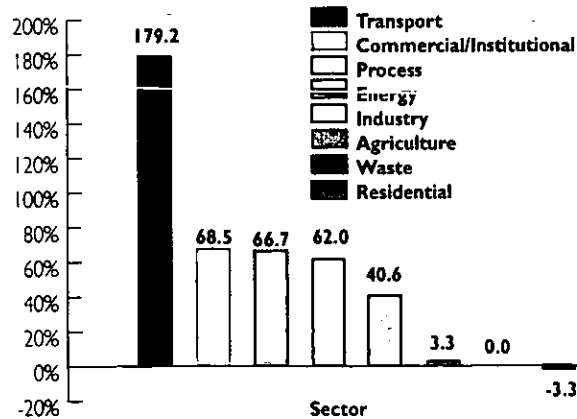
GRAPH 14

PERCENTAGE CHANGE IN EMISSIONS WITH AND WITHOUT MEASURES 1990 - 2010 FOR EACH SECTOR



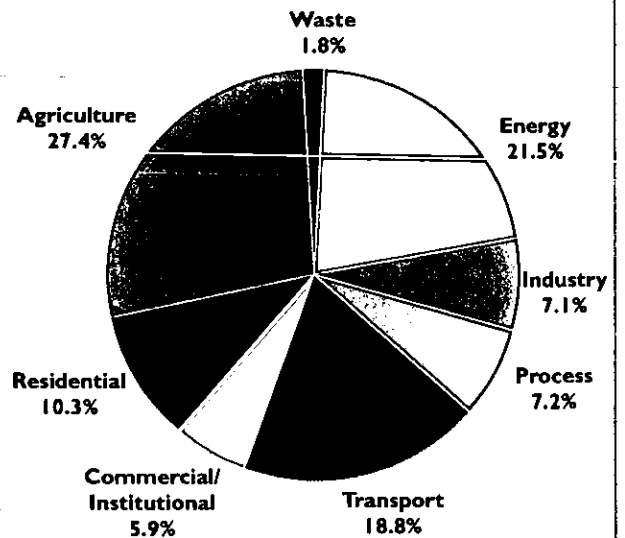
GRAPH 13

PERCENTAGE INCREASE IN EMISSIONS BY SECTOR 1990 - 2010 (WITHOUT MEASURES)



GRAPH 15

SECTORAL BREAKDOWN OF EMISSIONS WITH THE STRATEGY MEASURES FOR 2010.



APPENDIX C1

Information Pack sent to Interested Parties

Our Ref.: Q:\2001\134\05\Let009\OH

«Title»«FirstName» «LastName»
«JobTitle»
«Company»
«Address1»
«Address2»
«Address3»
«City»

16th August 2001

RE: Wind Energy Project at Lackagh, Co. Leitrim

Dear «Salutation»

eirtricity Developments Ltd. have retained Fehily Timoney & Co. (FTC) to prepare an Environmental Impact Statement (EIS) for a proposed wind energy project at Lackagh, north Co. Leitrim. The EIS will accompany the planning application for the development to be submitted to Leitrim County Council. As part of the EIS process, consultation with interested parties is sought. A brief description of the development is provided herein. Any comments or concerns regarding the development can be submitted to FTC for consideration in the preparation of the EIS.

Location

The site is located in a rural area approximately 6km south of Manorhamilton, and is primarily used for rough grazing. A map showing the location of the site is attached.

Proposed Development

The proposed development will consist of the following:

- wind turbines with an overall height not exceeding 100m;
- internal site access roads;
- site compound to include control building, electrical pylon, transformer and other electrical hardware; and
- connection to the ESB grid.

Continued .../...

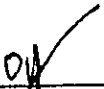
Page 2

Note: Final turbine numbers and layout are currently under review. However it is estimated that there will be approximately 30 turbines.

The EIS will address the various aspects of the environment on which the development may have an impact. These will include ecology, noise, landscape, electromagnetic interference, material assets, water, and geology. Any comments regarding the proposed development should be received by Friday 7th September 2001 for consideration.

If you have any questions, please contact me.

Yours sincerely



Orla Hussey

Encl.



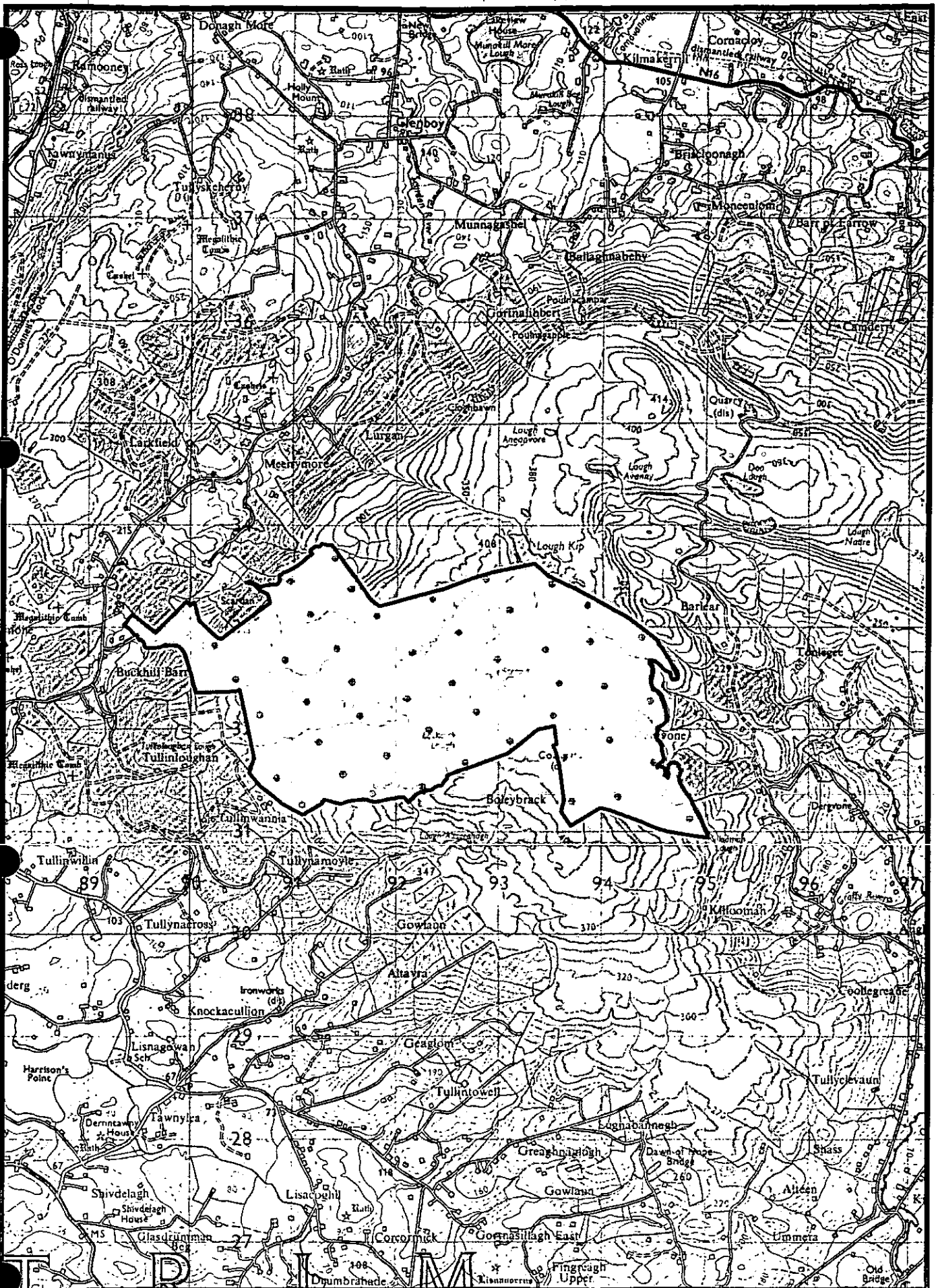
REVISION A

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January 2002

2001/134/05/lac-wf_fig12



Fehily Timoney & Company

1:50,000 Original Turbine Layout

Figure 1

RTE

Network Group,
Annexe 8
RTE
Donnybrook
Dublin 4.

Ms. Orla Hussey,
Fehily Timoney & Company,
Core House,
Pouladuff Road,
Cork.

Your ref. Q:\2001\134\05\Let009\OH

Subject Wind Energy Project at Lackagh, Co. Leitrim

September 12th 2001

Dear Ms. Hussey,

FEHILY TIMONEY & Co.	
Received by	
Date	17 SEP 2001
Action	Date
Distribution	OH
Job No:	
Correspondence No:	19 (b)
Comment:	

Subsequent to our telephone conversation of last week, I enclose two maps indicating the beam centreline of our microwave radio link between Baile na Meeltoge and Truskmore. As you can see, it passes over the proposed location of the wind energy project at Lackagh. In order that the integrity of the radio link be maintained, RTE would require that an obstruction free channel of 100m radius about the beam centreline be maintained. Referring to the digital terrain map, the line of shoot between the two blue circles marked on the beam centre-line indicates the area of concern to us.

Please note that these maps are indicative only and that the exact location of the obstruction free channel would need to be established on-site [by means of theodolite measurement or similar device].

In line with our telephone conversation, I assume that the above is agreeable to you. I would be much obliged if you would confirm to me in writing that the above is acceptable to you and that the wind energy project site layout will be such that an obstruction free channel, as outlined above, will be maintained.

I would like to re-iterate RTE's objection to the development as planned as this will jeopardise RTE's network and would leave us with no alternative but to lodge the strongest possible objection to the planning authority. However, I feel that if we can co-operate in the manner outlined above, we should be able to arrive at a conclusion mutually satisfactory to both parties.

As requested the co-ordinates of the points of interest are as follows:

Baile na Meeltoge
Truskmore
South Eastern point of concern
Northern Western point of concern

~~XXXXXXXXXX~~ ~~XXXXXXXXXX~~
~~XXXXXXXXXX~~ ~~XXXXXXXXXX~~
~~XXXXXXXXXX~~ ~~XXXXXXXXXX~~
~~XXXXXXXXXX~~ ~~XXXXXXXXXX~~

Title	First Name	Last Name	Job Title	Company	Address1	Address2	Address3	City	Salutation
Mr	Paul	Galvin	Site and Habitats Protection,	Birdwatch Ireland,	Rutledge House,	8 Lonford Place,	Monkstown	Co. Dublin	Mr Galvin
Ms	Tercasa	Langford	Development Application Section	Duchas - The Heritage Service,	Third Floor,	7 Eli Place	Dublin 2		Ms Langford
Mr.	Stephen	Carleton,	Radio & Satellite Division,	Eircom,	Room 175, Block C,	St. Stephen's Green West,	Dublin 2		Mr Carleton
Ms.	Cathriona	Douglas,	National Parks and Wildlife,	Duchas - The Heritage Service,	7 Ely Place,	Dublin 2			Ms Douglas
Mr.	Sylvester	Murphy,	Secretary,	Department of Agriculture, Food & Rural Development,	Johnstown Castle Estate,	Co. Wexford			Mr Murphy
Mr	Thomas	Tobin		Department of the Marine & Natural Resources,	Lesson Lane,	Dublin 2			Mr Tobin
Mr.	Fionn	O'Grada,	Department of Tourism, Sport & Natural Resources,	Kildare Street,	Dublin 2				Mr O' Grada
Ms.	Emer	Sheehan	Frequency Coverage & Planning Department,	Radio Teilifis Eireann,	Donnybrook,	Dublin 4			Ms Sheehan
Ms	Louise	Dufficey	Campaigns Manager	Irish Wildlife Trust,	107 Lower Baggott Street	Dublin 2			Ms Dufficey
Mr.	Martin	Towey,	Corporate Policy Planning,	Irish Aviation Authority,	Aviation House,	Hawkins Street,	Dublin 2		Mr Towey
Mr	Brendan	McGuire	Senior Executive Officer	North Western Fisheries Board,	Ballyshannon	Co. Donegal			Mr McGuire

Title	First Name	Last Name	Job Title	Company	Address1	Address2	Address3	City	Salutation
Mr	Philip	Geoghegan	Chairman	An Taisce	Tailors Hall	Backlane	Dublin 8		Mr Geoghegan
Mr.	John	Lec,	Head of Centre,	Tcagasc Environmental Research Centre,	Johnstown Castle,	Co. Wexford			Mr Lec
Mr	Paddy	Matthews	Planning Officer	National Heritage Council	Rothe House	Kilkenny			Mr Matthews
Mr.	Pat	McKeown,	Eircell	Blackthorne House,	Bracken Road,	Sandyford Industrial Estate,	Dublin 2		Mr McKeown
Ms.	Louise	Byrne,	Esat Digifone Ltd.,	Digifone House,	76 Lower Baggot Street,	Dublin 2.			Ms Byrne
Mr.	Pat	Wall,	General Manager,	NTL,	Unit 9,	Willsborough,	Clonsaugh Industrial Estate,	Dublin 17	Mr Wall
Ms	Grainne	McLaughlin	In House Council	Chorus	3050 Lake Drive	City west Digital Park	Co. Dublin		Ms McLaughlin

Our Ref: Q:/2001/134/05/Let010/MT

«Name»
«Company»
«Address1»
«Address2»
«Address3»

11th September 2001

RE: Additional Information for a Proposed Wind Farm at Lackagh, Co. Leitrim.

«Salutation»

Please find the attached map of the Lackagh Wind Farm Site showing a worst case layout consisting of 48 turbines. It is anticipated that the final turbine number will be considerably lower (approximately 30).

The turbines will:

- Be 3 bladed tubular tower type models;
- Most likely be composed of glass fibre reinforced polyester;
- Rotate at 18-38 RPM; and
- Be of approximate dimensions 60m hub and 80m blade.

Since the final turbine number and layout has not been finalised, your input will help avoid siting turbines in areas which would interfere with your transmissions from Truskmore to Bencroy. I would appreciate if you could make a cross (x) at every turbine which may potentially cause interference and return the map to me. Alternatively if you provide a direct line of sight from your transmitter to receiver I will be able to eliminate turbines along its path (allowing 50m offset from this line).

Please do not hesitate to contact me should you have any further queries. I look forward to hearing from you in due course.

Yours sincerely,

Orla Hussey

Encl.

Name	Company	Address1	Address2
Mr. Ciaran Sinclair,	RTE,	Donnybrook,	Dublin 4.
Mr. Colin Hicks,	Esat Digifone,	76 Lower Baggot Street,	Dublin.
Mr. Dave Lawson,	ESB,	Lower Fitzwiliam Street,	Dublin 2.

APPENDIX C2

Correspondence with Telecommunications Companies

Our Ref: Q:/2001/134/05/Let010/MT

Mr. Ciaran Sinclair,
RTE,
Donnybrook,
Dublin 4.

11th September 2001

RE: Additional Information for a Proposed Wind Farm at Lackagh, Co. Leitrim.

Dear Mr. Sinclair,

Please find the attached map of the Lackagh Wind Farm Site showing a worst case layout consisting of 48 turbines. It is anticipated that the final turbine number will be considerably lower (approximately 30).

The turbines will:

- Be 3 bladed tubular tower type models;
- Most likely be composed of glass fibre reinforced polyester;
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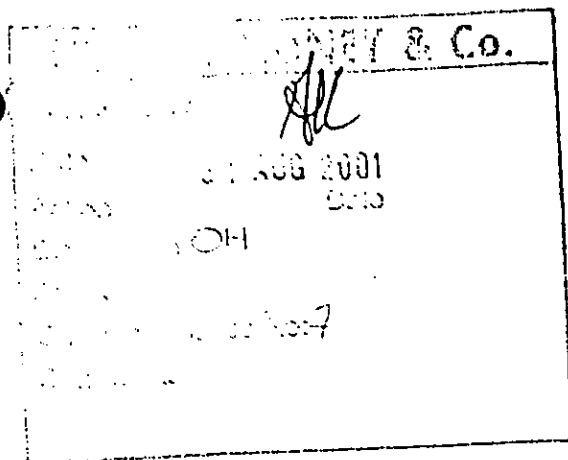
Please do not hesitate to contact me should you have any further queries. I look forward to hearing from you in due course.

Yours sincerely,

Orla Hussey

Encl.

04



RTE

Network Group,
Annexe 8
RTE
Donnybrook
Dublin 4.

Ms. Orla Hussey
Fehily Timoney & Company
Core House
Pouladuff Road,
Cork

Your ref. Q:\2001\134\05\Let009\OH

Subject Wind Energy Project at Lackagh, Co. Leitrim

August 29th 2001

Dear Ms. Hussey,

Thank you for your letter of August 16th on the above subject which Emer has passed on to me.

A preliminary study would suggest that the proposed development at Lackagh may present problems to RTE in that the development lies directly in the line of sight of our microwave transmission link between Baile na Meeltoge and Truskmore.

The Baile na Meeltoge to Truskmore transmission link carries RTE's feed to the transmitter site at Truskmore, which in turn distributes TV (RTE1, Network 2, TG4, TV3) and Radio (Radio 1, FM2, RnaG, Lyric FM and Today FM) signals primarily to Counties Sligo, Donegal, Leitrim, Roscommon and Mayo. The approximate population coverage 365,000 people i.e approx. 10% of national coverage.

As you can appreciate, RTE is anxious that the present level of coverage to these subscribers be maintained.

In order to evaluate this issue more definitively we would require further details of the planned development. The following information in particular would be useful:

- Location of all planned turbines
- Height of all planned turbines
- Rate of blade rotation
- Blade composition (metal, fiber-glass, carbon-fiber, etc)
- Blade Diameter
- Details of any stay wires/cables which may be used

I would be much obliged if you could furnish me with the above information, along with any further details you may deem appropriate to assist our evaluation.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Ciaran Sinclair', written over a horizontal line.

Ciaran Sinclair
Microwave Links Network Manager
RTE

Maps cannot be included for confidentially reasons

Please feel free to contact me if you have any queries,

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Ciaran Sinclair', written over a horizontal line.

Ciaran Sinclair
Microwave Links Network Manager
RTE

Mr. Ciaran Sinclair,
Microwave Links Network Manager,
RTE,
Donnybrook,
Dublin 4.

21st January 2002

RE: Revised Lackagh Wind Farm Layout

Dear Mr. Sinclair,

Please find the revised layout for the proposed Lackagh wind farm. Your concerns regarding some turbine locations and potential interference to the telecommunication signals have been addressed and turbines are not sited within the zones of interference.

Yours sincerely,

Orla Hussey

Encl.

200113405

RTE Network Division

Radio Telefís Éireann

Baile Átha Cliath 4, Éire
Teileafón 01 208 2348
Facsimhír 01 208 3090

Dublin 4, Ireland
Telephone 01 208 2348
Telefax 01 208 3090

Ms. Orla Hussey
Fehily Timoney & Company
Core House
Pouladuff Road
Cork

Your ref. Q:\2001\134\05\Let019\BT
RE: Revised Lackagh Wind Farm Layout
February 25th 2002

FEHILY TIMONEY & Co.	
Received by	
Date	27 FEB 2002
Action	Date
Distribution	CH
Job No:	
Correspondence No:	16
Comment:	

Dear Ms. Hussey,
the Frequency Planning Department of RTE Network Division would like to inform you,
that we won't envisage any interference from the proposed Lackagh wind farm to the
current RTE services given the "interference-free" corridor with the co-ordinates:

~~200113405\Let019\BT~~

~~200113405\Let019\BT~~

is kept clear from any installations.

The locations are given in NGR with error of $\pm 50m$.

Best regards,
Alexander Krasnozhen,
Frequency Planning Engineer,
Network Division, RTE,
Donnybrook, Dublin 4.
Ph. 01-2082770
Fax 01-2083090
e-mail: Alex.Krasnojen@rte.ie

RTE

Our Ref: Q/2001/134/05/Let010/MT

Mr. Colin Hicks,
Esat Digifone,
76 Lower Baggot Street,
Dublin.

11th September 2001

RE: Additional Information for a Proposed Wind Farm at Lackagh, Co. Leitrim.

Dear Mr. Hicks,

Please find the attached map of the Lackagh Wind Farm Site showing a worst case layout consisting of 48 turbines. It is anticipated that the final turbine number will be considerably lower (approximately 30).

The turbines will:

- Be 3 bladed tubular tower type models;
- Most likely be composed of glass fibre reinforced polyester;
- Rotate at 18-38 RPM; and
- Be of approximate dimensions 60m hub and 80m blade.

Since the final turbine number and layout has not been finalised, your input will help avoid siting turbines in areas which would interfere with your transmissions from Truskmore to Bencroy. I would appreciate if you could make a cross (x) at every turbine which may potentially cause interference and return the map to me. Alternatively if you provide a direct line of sight from your transmitter to receiver I will be able to eliminate turbines along its path (allowing 50m offset from this line).

Please do not hesitate to contact me should you have any further queries. I look forward to hearing from you in due course.

Yours sincerely,

Orla Hussey

Encl.

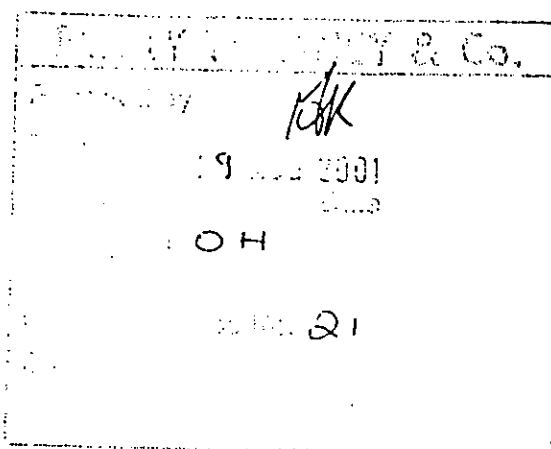
OU

2001 1311 05
LAC-UP

Esat
Digifone™

Fehily Timoney and Co.,
Core House,
Pouladuff Rd.,
Cork.

27/8/2001



• Esat Digifone Limited
Digifone House
76 Lower Baggot Street
Dublin 2, Ireland
Telephone +353 1 6095000
Fax +353 1 6095010
www.digifone.com

Re: Proposed Windfarm at Lackagh, Co. Leitrim.

Dear Orla,

Esat Digifone has undertaken a study of the above development proposed by Eirtricity. It would appear that from your current proposals, there would be a considerable impact to our network in the area surrounding the proposed windfarm.

The position in which you propose to locate the windfarm would appear to obstruct Esat Digifone's licensed high capacity transmission network backbone.

Obstructing these links would place a large number of our BTS transmitting stations in the north and north west area out of service. The overall effect would be extremely detrimental to Esat Digifone's network in the entire Northern region of the country.

Based on the above, Esat Digifone is forced to rigorously object to your proposed development.

I would suggest a meeting between Esat Digifone and Eirtricity to facilitate further discussion on this matter.

Best regards,

Colin Hicks

Colin Hicks,
Transmission Network Engineer,
Esat Digifone.

01-6095067

Directors:
J.S. Hill (UK);
A. Johansen (Norwegian);
B. Kopperud (Norwegian);

B.J. Moloney;
B. Timmons (UK);
M. Walsh

Registered in Ireland
No. 234895

Our Ref: Q:\2001\134\05\Lct011\BT

Mr. Colin Hicks,
Transmission Network Engineer,
East Digiphone,
76 Lower Baggot Street,
Dublin 2.

18th September 2001

RE: Line of transmission through proposed Lackagh Wind Farm

Dear Mr. Hicks,

Further to our recent telephone conversation please find a discovery series map showing the area of interest with respect to telecommunications in the area.

I have hypothetically marked turbines in this area and would appreciate if you could circle in red or block out in red the proposed turbine locations which you feel may cause interference to your signals.

Yours sincerely,

Orla Hussey

Encl.

CU

Mr. Colin Hicks,
Transmission Network Engineer,
Esat Digiphone,
76 Lower Bagin Street,
Dublin 2.

21st January 2002

RE: Revised Lackagh Wind Farm Layout

Dear Mr. Hicks,

Please find the revised layout for the proposed Lackagh wind farm. Your concerns regarding some turbine locations and potential interference to the telecommunication signals have been addressed and turbines are not sited within the zones of interference.

Yours sincerely,

Orla Hussey

Encl.

Digifone™

200113405

Fehily Timoney and Co.,
Core House,
Pouladuff Rd.,
Cork.

FEHILY TIMONEY & Co.	
Received by	<i>182-</i>
Date	31 JAN 2002
Action	Date
Distribution	DH
Job No:	
Correspondence No:	16
Comment:	

28/02/2002

Re: Proposed Windfarm at Lackagh, Co. Leitrim.

Dear Orla,

Esat Digifone has undertaken a study of the above development proposed by Eirtricity. It would appear that from the current proposals there will be no impact on our microwave transmission link network in the area surrounding the proposed windfarm. However it is essential that any modifications, revisions or expansion to the proposed development are highlighted with Digifone for further investigation.

We appreciate that you brought the above matter to our attention as developments such as the above can have a large impact on the licensed point to point links in our network.

Best regards,



Colin Hicks,
Transmission Network Engineer,
Esat Digifone.

Our Ref: Q:/2001/134/05/Let010/MT

Mr. Pat Prior,
ESB,
Castle Street,
Sligo.

31st August 2001

RE: Wind Energy Project at Lackagh, Co. Leitrim.

Dear Mr. Prior,

eirtricity Developments Ltd. have retained Fehily Timoney & Co. (FTC) to prepare an Environmental Impact Statement (EIS) for a proposed wind energy project at Lackagh, north Co. Leitrim. The EIS will accompany the planning application for the development to be submitted to Leitrim County Council. As part of the EIS process, consultation with interested parties is sought. A brief description of the development is provided herein. Any comments or concerns regarding the development can be submitted to FTC for consideration in the preparation of the EIS.

Location

The site is located in a rural area approximately 6km south of Manorhamilton, and is primarily used for rough grazing. A map showing the location of the site is attached.

Proposed Development

The proposed development will consist of the following:

- wind turbines with an overall height not exceeding 100m;
- internal site access roads;
- site compound to include control building, electrical pylon, transformer and other electrical hardware; and
- connection to the ESB grid.

Cont'd.....

Page 2

Note: Final turbine numbers and layout are currently under review. However it is estimated that there will be approximately 30 turbines.

The EIS will address the various aspects of the environment on which the development may have an impact. These will include ecology, noise, landscape, electromagnetic interference, material assets, water, and geology. It is understood that ESB transmits from Truskmore to Bencroy. Any information on the line of sight between these areas which may potentially be impacted by turbines will be greatly appreciated. This information will be used to determine final turbine layout.

If you have any questions, please contact me.

Yours sincerely

Orla Hussey

Encl.

Our Ref: Q:/2001/134/05/Let010/MT

Mr. Dave Lawson,
ESB,
Lower Fitzwilliam Street,
Dublin 2.

11th September 2001

RE: Additional Information for a Proposed Wind Farm at Lackagh, Co. Leitrim.

Dear Mr. Lawson,

Please find the attached map of the Lackagh Wind Farm Site showing a worst case layout consisting of 48 turbines. It is anticipated that the final turbine number will be considerably lower (approximately 30).

The turbines will:

- Be 3 bladed tubular tower type models;
- Most likely be composed of glass fibre reinforced polyester;
- Rotate at 18-38 RPM; and
- Be of approximate dimensions 60m hub and 80m blade.

Since the final turbine number and layout has not been finalised, your input will help avoid siting turbines in areas which would interfere with your transmissions from Truskmore to Bencroy. I would appreciate if you could make a cross (x) at every turbine which may potentially cause interference and return the map to me. Alternatively if you provide a direct line of sight from your transmitter to receiver I will be able to eliminate turbines along its path (allowing 50m offset from this line).

Please do not hesitate to contact me should you have any further queries. I look forward to hearing from you in due course.

Yours sincerely,

Orla Hussey

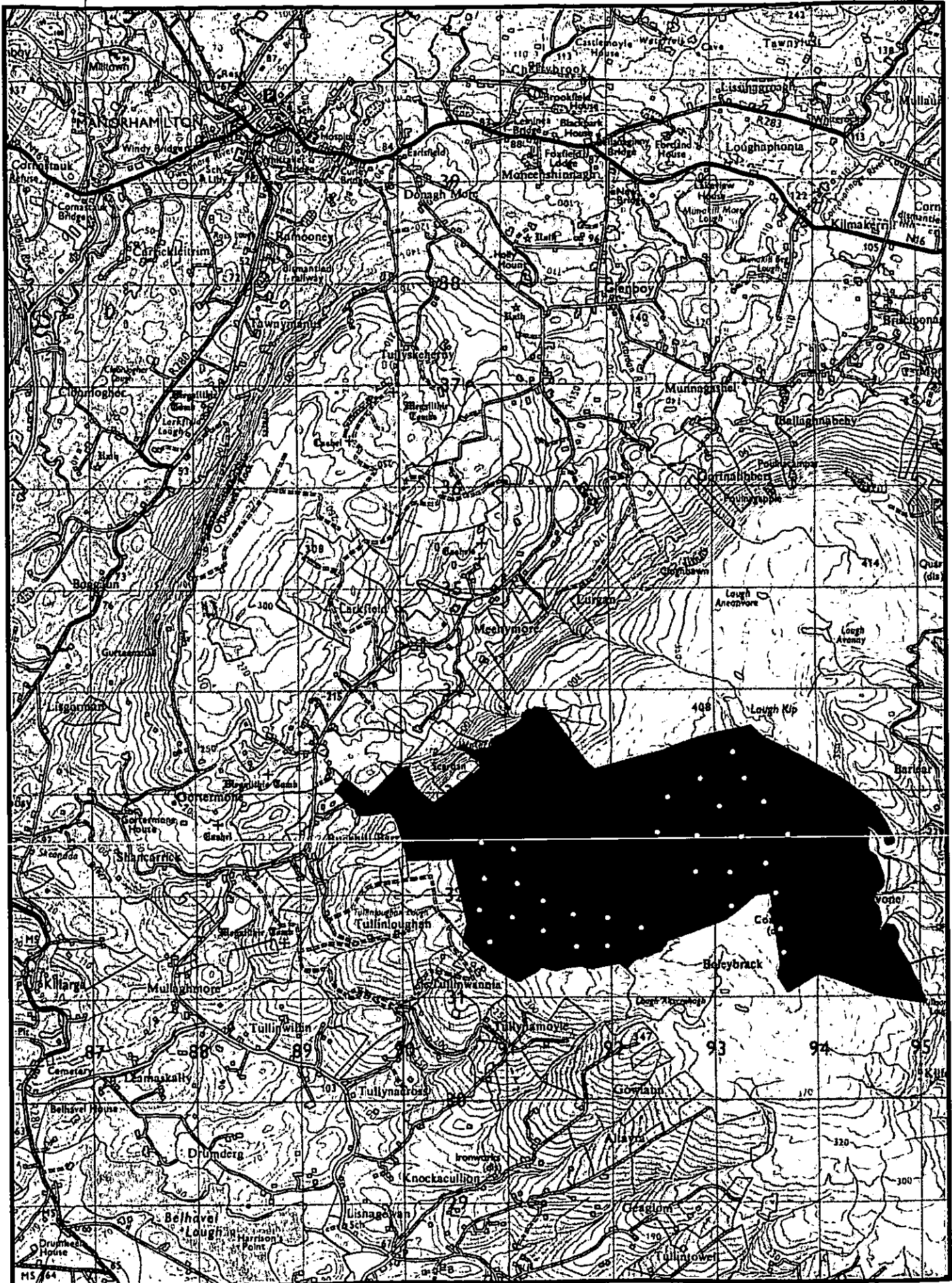
Encl.

OU



REVISION C
AC/OK

October 2002
2001/134/05/lac-wf_fig21
Ordnance Survey Ireland Licence no. EN 0001202 © Government of Ireland
& Reproduced by permission of the OSNI, permit no. 20069



Fehily Timoney & Company

1:50,000 Site Location Map

Figure 2.1

Mr. David Lawson,
ESB,
Lower Fitzwilliam Street,
Dublin 2.

21st January 2002

RE: Revised Lackagh Wind Farm Layout

Dear Mr. Lawson,

Please find the revised layout for the proposed Lackagh wind farm. Your concerns regarding some turbine locations and potential interference to the telecommunication signals have been addressed and turbines are not sited within the zones of interference.

Yours sincerely,

Orla Hussey

Encl.

Electricity Supply Board



Telecoms

39 Merrion Square, Dublin 2, Ireland.
Phone: 353-1-676 5831 Fax: 353-1-702 7981 Website: www.esb.ie

Orla Hussey
Fehily Timoney & Co Headquarters
Core House
Pouladuff Road
Cork,
Ireland

FEHILY TIMONEY & Co.	
Received by	S
Date	21 MAR 2002
Action	Date
Distribution	OH
Job No:	
Correspondence No:	12
Comment:	

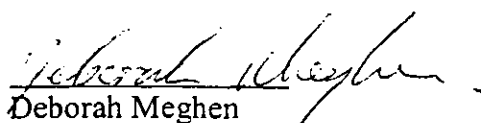
Date 19th March 2002

Re: Windfarm Layout at Lackagh Co. Leitrim in respect to ESB communications system between Bencroy in Co. Leitrim to Truskmore in Co. Sligo.

Dear Ms Hussey

Following your submission of the windfarm layout at Lackagh Co. Lietrim to ESB Telecoms, the layout proposed is adequate to provide clearance for the ESB radio beam to pass without interference. The layout is to include a path 700m wide, 350m either side of the ESB line of sight from ESB Radio site at Bencroy to ESB Radio site at Truskmore.

Yours sincerely


Deborah Meghan
ESB Telecoms



Paul Lynch
Fehily Timony & Company.
Consultants in Engineering and Environmental Sciences.
Core House
Pouladuff Rd.,
Cork

Radio & Satellite Division

Room 1.74
Block C
St Stephen Green West,
Dublin 2
Tel +353 1 7018137
Fax +353 1 8288
www.eircom.ie
farthurs@eircom.ie

10-September-2001

Dear Mr. Lynch,

Thank you for your inquiry on the interference potential of your proposed wind farm development in Lackagh, Co. Leitrim.

Having examined the layout you have sent, I have determined that the proposed layout as shown does not pose an interference risk to the eircom microwave network.

If the layout is altered in anyway, please contact me with the revised layout for approval.

Best of luck with the development.

I'm at +353 (0)87 6620420 if you want any further information

Yours sincerely

Fergal Arthurs
Fergal Arthurs

FEHILY TIMONEY & Co.	
Received by	<i>[Signature]</i>
Date	20 SEP 2001
Action	Date
Distribution	<i>[Signature]</i>
Job No:	
Correspondence No:	7
Comment:	



200113405
LAC-WF.

Private & Confidential

Ms. Orla Hussey,
Fehily Timoney & Company,
Core House,
Pouladuff Road,
Cork.

Blackthorn House
Bracken Road
Sandyford Industrial Estate
Dublin 18

Tel +353 1 203 7662
Fax +353 1 203 7629
Mobile +353 87 2618554

22 August 2001

Your ref: Q\2001\134\05\Let009\OH

RE: Wind energy project at Lackagh, Co. Leitrim.

Dear Ms. Hussey,

Eircell does not see the proposed development as outlined having any negative impact on our network.

On the contrary however we may well be interested in colocating an Eircell Radio Transmitter Basestation at the windfarm, presumably the development will include a mast for anemometers and communications.

We have similarly colocated with windfarms in the past and believe this to be mutually beneficial as it strengthens the planning application.

I would be much obliged if you could convey this to the developers and if this is agreeable in principle we might arrange a site visit to assess suitability.

Yours sincerely

Colm Scully
Radio Planning Engineer
Eircell Radio Networks

FEHILY TIMONEY & Co.	
Received by	
Date	24 AUG 2001
Initial	
Communication	OH
Job Ref	
Correspondence No	8
Comments	

Registered in Ireland at
Unit 9 Richview Office Park Clonskeagh
Dublin 14 Ireland
Number 326967
VAT Reg no IE 6346967G
www.eircell.ie

APPENDIX C3
Correspondence with Duchas



Duchas The Heritage Service

An Roinn Ealaíon, Oidhreachta, Gaeltachta agus Oileán
Department of Arts, Heritage, Gaeltacht and the Islands

Fehily Timoney
Core House,
Pouladuff Road,
Cork

August 17th 2001

Re: Q:\2001\34\05\Let009\OH

Dear Ms. Hussey,

Thank you for the information regarding the proposed wind energy project at Lackagh, Co. Leitrim. Eiricity have already been in touch with Duchas regarding the project, and a meeting has been arranged on the site for August 30th with the developers and Duchas staff.

We intend to have detailed comments in relation to the planning application. However, the date by which you are requesting information regarding comments on for the EIS, i.e. Friday 7th September, does not allow adequate time for Duchas to address all the aspects of concern.

I would therefore kindly request that this date be extended to allow time for adequate discussion and exchange of information between all interested parties.

Yours sincerely,

Daran Dunnells (filling in for Caitriona Douglas until September 3rd, 2001)

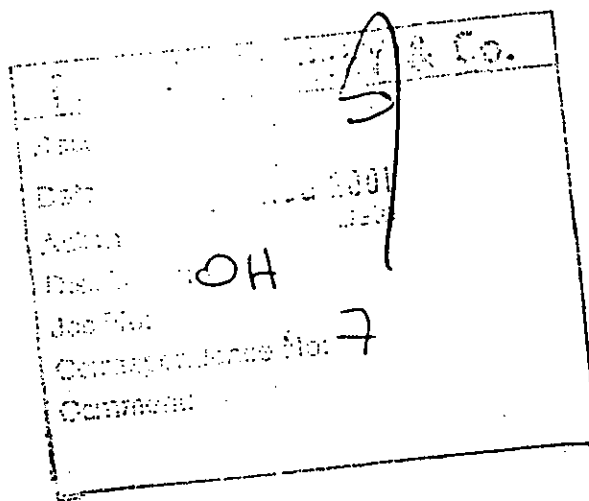
Páirceanna Náisiúnta &
An Fiaidhúla

7 Plás Ely
Baile Átha Cliath 2
Éire



National Parks &
Wildlife

7 Ely Place
Dublin 2
Ireland
Tel. +353 1 662 2300
Lo Call 1890 321 421
Fax +353 1 662 0283
email duchas@indigo.ie
Web www.heritageireland.ie



Our Ref.: Q:\2001\134\05\Let016\AM

Mr. Dave Duggan,
Duchas,
Glenveigh National Park,
Church Hill,
Letterkenny,
Co. Donegal

30th October 2001

RE: Proposed Wind Farm at Lackagh, Co. Leitrim

Dear Mr. Duggan,

I have been instructed by Mr. Seamus Herron to forward to you an initial site layout plan for a proposed wind farm in Lackagh, Co. Donegal. This drawing shows:

- the ecological habitats as delineated by Mr. Ralph Sheppard;
- proposed turbine locations;
- proposed turbine access tracks; and
- exclusion areas for telecommunications.

The turbine locations and access tracks have been sited to minimise impact to the hydrology of the site. If you have any queries, please contact the undersigned.

Yours sincerely,

Dan Keohane

CC: Mr. Seamus Herron, Welchtown, Ballybofey, Co. Donegal

Encl.



**An Roinn Ealaíon, Oidhreachta,
Gaeltachta agus Oileán**
Department of Arts, Heritage,
Gaeltacht and the Islands

Dúchas
The Heritage Service

Páirceanna Náisiúnta & An Fiadhúlra
National Parks & Wildlife



Páirc Náisiúnta Ghleann Bheatha,
Min an Lábháin, Leitir Ceanainn,
Co. Dhiún na nGall, Éire.
Glenties National Park, Churchill,
Letterkenny, Co. Donegal, Ireland.

Teileafon +353 74 37090/37262
Facsaimhír +353 74 37072
Web www.heritageireland.ie

Mr Seamus Herron
Eirricity
Project Co-ordinator
Welchtown
Ballybofey
County Donegal

13th November 2001

RE: Pre-planning Enquiry. Proposed Wind Farm at Lackagh County Leitrim

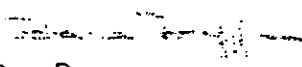
Dear Mr Herron

Further to site visit to Lackagh by Dúchas regional management and field staff, and representatives of Eirricity Ltd. and their consultants on the 30th August, and my subsequent site meeting with you on 12th November. We have examined the details presented by you at the pre-planning stage including your site layout plan for turbines and access roads. We note that Eirricity has prepared this plan in consultation with your ecologist and hydrologist.

I understand that you hope to advance to planning application stage possible before the end of the current year, or early next year. The EIS should include details of all of the issues discussed above, including a hydrology report.

At this pre-planning application stage, the key issues relating to Dúchas regional management have been identified in consultation with Eirricity. We expect that the planning authority will refer this application to Dúchas for assessment.

Yours sincerely


Dave Duggan
Deputy Regional manager

Dúchas,
Development Application Service,
6 Ely Place,
Dublin 2

28th November 2001

RE: Wind Farm Project at Lackagh, Co. Leitrim

Dear Sir/Madam,

eirtricity Developments Ltd. have retained Fehily Timoney & Co. (FTC) to prepare an Environmental Impact Statement (EIS) for a proposed wind farm at Lackagh, Co. Leitrim. We understand that the EIS will accompany the planning application for the development to be submitted to Leitrim County Council.

Resulting from pre-planning consultation with Dúchas, *eirtricity* has modified the site layout. The areas of concern to Dúchas are hydrology and ecology. The new layout has been designed to minimise impact on both. A site map showing the new layout is attached.

The proposed development will consist of:

- 31 wind turbines with an overall height not exceeding 100m;
- internal site access tracks;
- site compound; and
- connection to the ESB grid.

Cont'd..

The EIS will include a hydrology report as requested by Dochas in correspondence to Mr. Seamus Herron, dated 13th November 2001. If you have any further comments, please contact the undersigned.

Yours sincerely

DK
Dan Keohane

Encl.

c.c.	Mr. David Duggan	Dúchas, Glenveigh National Park, Church Hill, Letterkenny, Co. Donegal
	Ms. Caitriona Douglas	Dúchas, 7 Ely Place, Dublin 2
	Mr. Donal O'Brollachain	<i>eirtricity</i> , National Management Centre, Clonard, Sandyford, Dublin 16
	Mr. Seamus Herron	Welchtown, Ballybofey, Co. Donegal.



**An Roinn Ealaíon, Oldhreachta,
Gaeltachta agus Oileán**
Department of Arts, Heritage,
Gaeltacht and the Islands

Dúchas
The Heritage Service

Rannóg na nIarratas Forbartha
Development Applications Section



7 Piás Ely, Baile Átha Cliath 2, Éire
7 Ely Place, Dublin 2, Ireland

Teileafón +353 1 647 3000
Facsimhír +353 1 678 8116
Glao Áitiúil 1890 474 847
E-mail devapps@ealga.ie
Web www.heritageireland.ie

21st December 2001.

Donal O Brollachain,
Eirtricity,
Sandyford,
Dublin 16.

Re. Proposed Eirtricity Wind Power Development at Lackagh, Co. Leitrim.

Dear Donal,

With reference to the above project and your request for the comments of this Department in relation to the potential impacts of the proposed development, I have outlined below the ecological value of the site:

The site of the above wind-farm development proposal at Lackagh lies within the boundaries of a mountain habitat complex of high ecological importance known as Boleybrack Mountain.

This upland currently incorporates a proposed Natural Heritage Area (NHA) known as Barleart and Lackagh Bog. However Boleybrack Mountain in its entirety is also likely to be designated due to its extremely high nature conservation value.

The attached map shows the location and approximate boundaries of the Boleybrack site. A set of 6 " maps showing the precise boundary of the site is enclosed.

Boleybrack Mountain comprises an extensive upland, which includes excellent areas of wet and dry heath, blanket bog and bog pools or dystrophic lakes, as well as a number of oligotrophic lakes. All of these habitats are listed for protection under the EU Habitats Directive. Other habitats of conservation value occurring on Boleybrack include orchid-rich wet meadows, rush / sedge pastures with flush vegetation and acid grassland. A number of rare plant species have also been recorded on this site.

Boleybrack Mountain also provides habitat for several bird and animal species of high priority for conservation. Among the bird species recorded at the proposed Lackagh development site are Snow Bunting, Red Grouse, Snipe, Raven, Golden Plover and Hen Harrier (a number of these species are listed on the EU Birds Directive). The Irish Hare is also recorded at Lackagh.

Dúchas is required to ensure the protection of wildlife species and important nature conservation areas and in this context it is likely that Boleybrack Mountain will be designated for protection. Dúchas has officially informed Cavan and Leitrim Co. Councils of the importance of the site and of the intention to designate it (see copies of information issued to Councils attached). The exact form of this designation has yet to be decided.

It is recommended that before an application is made for planning permission, a full Environmental Impact Assessment (E.I.S.) be completed and fully evaluated. This E.I.S. should also assess the archaeological potential of the area. This Department would be pleased to comment on said E.I.S. prior to an application being made for planning permission.

If you require any further information regarding this site, or any related matter, please contact this Department.

Mise le meas,

Pat Gilheaney

Development Applications Section.



YOUR GREEN ELECTRICITY PARTNER

Pat Gilheaney
Development Applications Section
Dúchas
7 Ely Place
Dublin 2.

2 January 2002

National Management Centre
Clonard
Sandyford
Dublin 16
Ireland

Tel: + 353-1-213 0400
Fax: + 353-1-213 0444
www.eirtricity.ie

Re. Proposed Wind Farm at Lackagh, Co. Leitrim

Dear Mr. Gilheaney,

Thank you for your letter of 21 December last and enclosures.

I was very surprised to get your letter as I have not requested any comments from your Department on the potential impacts of the proposed development.


As you may know, we have asked Fehily Timoney and Co. Core House, Pouladuff Road, Cork. To carry out an Environmental Impact Study on this site.

I would appreciate knowing if your letter is a response to the Fehily Timoney letter of 28th November last addressed to your Section asking for comments on the proposed windfarm, based on a layout arrived at following site visits with David Duggan and Ralph Sheppard, the ecologist employed by Fehily Timoney on this project.

During the course of this study, we have visited the site with David Duggan, your Deputy Regional Manager covering Co. Leitrim (working from Glenveagh) on a number of occasions.

One other matter that puzzles me slightly are the copies of letters to Planning Officers in Co. Cavan and Leitrim. I noticed that these copies are not signed nor are they on headed Dúchas paper. Perhaps you could clarify this.

Yours sincerely


D. O Brollachain
Project Manager
Tel. (01) 213 0413

cc. Fehily Timoney & Co. Cork
David Duggan, Dúchas, Glenveagh, Co. Donegal
Seamus Herron, eirtricity, Donegal

Dúchas,
Development Application Service,
6 Ely Place,
Dublin 2

24th January 2002

RE: Wind Farm Project at Lackagh, Co. Leitrim

Dear Sir/Madam,

eirtricity Developments Ltd. have retained Fehily Timoney & Co. (FTC) to prepare an Environmental Impact Statement (EIS) for a proposed wind farm at Lackagh, Co. Leitrim.

We submitted a proposed site layout and brief project description to Duchas in correspondence dated 28th November 2001. To date we have received no response from Duchas. Our environmental impact assessment is nearing completion and it is intended to submit a planning application to Leitrim County Council in early February 2002. A response from Duchas prior to submission would be greatly appreciated.

Yours sincerely

Dan Keohane

Encl.

c.c.	Mr. David Duggan	Dúchas, Glenveigh National Park, Church Hill, Letterkenny, Co. Donegal
	Ms. Caitriona Douglas	Dúchas, 7 Ely Place, Dublin 2
	Mr. Donal O'Brollachain	<i>eirtricity</i> , National Management Centre, Clonard, Sandyford, Dublin 16
	Mr. Seamus Herron	Welchtown, Ballybofey, Co. Donegal.
	Mr. Eugene O'Neill	Flynn's Terrace, Silgo



An Roinn Ealaíon, Oldhreachta,
Gaeltachta agus Oileán

Department of Arts, Heritage,
Gaeltacht and the Islands

Dúchas

The Heritage Service

Rannóg na nIarratas Forbartha
Development Applications Section

7 Plás Ely, Baile Átha Cliath 2, Éire
7 Ely Place, Dublin 2, Ireland

Teileafón +353 1 647 3000
Facsimhír +353 1 678 8116
Glao Áitiúil 1890 474 847
E-mail devapps@ealga.ie
Web www.heritageireland.ie

5th February 2002.

Dan Keohane,
Fehily Timoney and Company
Core House,
Pouladuff Road,
Cork.

FEHILY TIMONEY & Co.	
Received by	<i>HT</i>
Date	06 FEB 2002
Action	Date
Distribution	<i>DK</i>
Job No:	
Correspondence No:	<i>4</i>
Comment:	

Re. Proposed Eirtricity Wind Power Development at Lackagh, Co. Leitrim.

Dear Dan,

With reference to the above proposed project, previous correspondence and contacts, I would like in the first instance, to apologise for any confusion that may have arisen to date in relation to the position of Dúchas, The Heritage Service of this Department regarding the project and the ecological value of the site where it is proposed. In the interest of clarity, I am outlining below the manner under which we propose to evaluate the proposed project and its potential effect on the area involved and where possible to assist you in your work. In addition, the Development Applications Section of Dúchas will act as a focal point for all future correspondence in relation to the project.

The ecological value of the site is as I outlined to Donal O Brollachain of Eirtricity, in my letter of 21st December 2001. I understand that you are currently completing an Environmental Impact Statement (E.I.S.) on the proposed development and Dúchas will be pleased to comment on said E.I.S. when it is completed and if requested, before a planning application is submitted to Leitrim County Council. By making such comment on completion of the E.I.S. we will be in a better informed position to fully evaluate the potential effects of the project and provide you with the best possible assistance and guidance. In addition to the E.I.S. examining the potential effects of the project on the ecological value of the site, it is assumed that it will also address any impacts the development may have on the archaeological potential of the area. This would include an assessment of the impacts on the archaeology present in rivers, lakes or streams in the catchment area along with the impact of the construction of the turbines, access routes and new roadways. All such surveys should be undertaken by a suitably qualified archaeologist and be licenced to Dúchas under the National Monuments Acts 1930-1994. This Department will not be in a position to determine if the project can proceed without causing significant damage to the site until the EIS and any mitigation measures proposed have been fully evaluated. You will be aware that this Department will also be obliged, by statutory remit, to comment and where appropriate offer recommendations to Leitrim County Council, if and when a planning application is submitted to that body.

I trust the above is of assistance, but should you have any queries please do not hesitate to contact me.

Yours sincerely,

Pat Gilheaney
Pat Gilheaney
Development Applications Section.



**An Roinn Ealaíon, Oidhreachta,
Gaeltachta agus Oileán**
Department of Arts, Heritage,
Gaeltacht and the Islands

Dúchas
The Heritage Service

Rannóg na Níarratas Forbartha
Development Applications Section



200113405
7 Plás Ely, Baile Átha Cliath 2, Éire
7 Ely Place, Dublin 2, Ireland

Teileafón +353 1 647 3000
Facsimhír +353 1 678 8116
Glao Áitiúil 1890 474 847
Web www.ealga.ie

Our Ref: G2002/471

Ms Orla Hussey
Fehily Timoney & Co
Consultants in Engineering & Environmental Sciences
Core House
Pouladuff Road
Cork

FEHILY TIMONEY & Co.	
Received by	AK
Date	25 APR 2002 Date
Action	
Distribution	01+
Job No:	
Correspondence No:	14
Comment:	

Re: Aerial Photograph of the Proposed Lackagh Wind Farm, Co. Leitrim

Dear Ms Hussey

I wish to acknowledge receipt of your letter and aerial photograph dated 22 April 2002.

The aerial photograph and a copy of your letter has been forwarded to Ms Judith Keleman, Regional Ecologist, Duchas for her attention.

Should you have any further queries regarding this matter, please contact the undersigned.

Yours sincerely

Mairead O'Boyle
Mairead O'Boyle
Development Applications Section
24 April 2002

APPENDIX C4

Correspondence with Other Parties



Our Ref: T-21-11-6B

Your Ref: Q:/2001/134/05/Le 009011
FEHILY TIMONEY & Co.

10 September, 2001

Ms. Orla Hussey,
Fehily Timoney & Co,
Core House
Pouladuff Road,
Cork City.

FEHILY TIMONEY & Co.	
Received by	<i>[Signature]</i>
Date	12 SEP 2001
Time	Date
CH	
Correspondence No:	
Comment:	

Dear Ms. Hussey

Re: Wind Energy Project at Lackagh, Co. Leitrim

I refer to your letter of 16 September, 2001. This Department has no particular views or objection to the proposal. It is noted that the EIS will address various aspects of the environment on which the development may have an impact.

Yours sincerely

Fionn Ó Gráda

Fionn Ó Gráda

Tourism Development Policy

Tel: (01) 6313872 (Lo-Call / VPN Ext. 3872), Fax: (01) 6313853

E-mail: Fionn_O'Grada@tourism-sport.irlgov.ie

2001 136 05
Lackagh under



IRISH AVIATION AUTHORITY
ÚDARÁS EITLIÓCHTA NA hÉIREANN

31 August 2001

AVIATION HOUSE, HAWKINS STREET, DUBLIN 2, IRELAND
TEL: (01) 671 8655 FAX: (01) 679 2934
WEB SITE: www.iaa.ie

Ms. Orla Hussey
Fehily Timoney & Company
Core House
Pouladuff Road
Cork

Wind Energy Project at Lackagh, Co. Leitrim

Dear Ms. Hussey

I refer to your query of 16 August 2001 concerning a proposed wind energy project at Lackagh, Co. Leitrim. I wish to advise you that it is unlikely that the proposed development would have adverse consequences for the safety of air navigation provided that development complies with any aeronautical lighting and positional data requirements specified by the Irish Aviation Authority at the planning application stage.

Yours sincerely

Martin Towey
Corporate Policy and Planning

FEHILY TIMONEY & Co.	
Received by	<i>JK</i>
Date	04 SEP 2001
Action	Date
Cost	OH
Comments	
Communication No:	5
Comments	

REGISTERED OFFICE: AVIATION HOUSE, HAWKINS STREET, DUBLIN 2, IRELAND
REGISTERED NO. 211082



BOARD OF DIRECTORS:
SEAN J. CLARKE (CHAIRMAN), BRIAN D. McDONNELL (DEPUTY CHAIRMAN),
ANNE LESTER, TOM QUINN, WILLIAM MCCABE, KATHLEEN DALY, PAUL COUGHLIN,
MICHAEL DUFFY, DONALD J. DOWLING



20113105

**Environmental
Research Centre**

JOHNSTOWN CASTLE
Wexford, Co. Wexford, Ireland
Tel: 053-42888 Fax: 053-42213
Tel. Int: +353-53-42888
www.teagasc.ie

28th August, 2001

Ms. Orla Hussey
Fehily, Timoney & Company
Core House
Pouladuff Road
Cork

Re: Wind Energy Project at Lackagh, Co. Leitrim

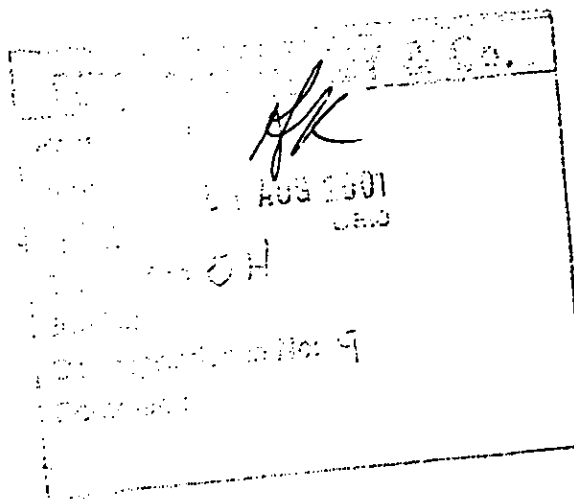
Dear Ms Hussey

In response to your letter of August 16th 2001 it would appear that the proposed development will be located in a land area of low agricultural potential. Under the circumstances, the main negative impact would be interference with the aesthetics and possible wildlife value of the land/landscape. Apart from visual intrusion, noise nuisance could be relevant for persons living in the vicinity

Yours sincerely,

A handwritten signature in black ink, appearing to read "John Lee", written over a horizontal line.

John Lee
Head of Centre





DEPARTMENT OF
Office of the Minister for Agriculture, Food and Rural Development, Dublin 2.

Oifig an Aire Talmhaíochta, Bia agus Forbartha Tuaithe, Baile Átha Cliath 2.

JOHNSTOWN CASTLE ESTATE
CO. WEXFORD

17 August 2001

Ms Orla Hussey
Fehily Timoney & Company
Core House
Pouladuff Road
Cork

Proposed Wind Energy Project at Lackagh, Co. Leitrim

Dear Ms Hussey,

I acknowledge receipt of your letter of 16 August 2001 in relation to the proposed wind energy project at Lackagh, Co. Leitrim

Yours sincerely,

Sylvester Murphy
Sylvester Murphy
Environment Section.

Fehily Timoney & Co.	
From: Mr	21 AUG 2001
Action:	12:40
Distribution:	OU
Job No:	
Correspondence No:	6
Comment:	



AN TAISCE

THE NATIONAL TRUST FOR IRELAND

The Tailors' Hall Back Lane Dublin 8 Telephone 01 4541786

FEHILY TIMONEY & Co.

Received by

AK

Date

14 MAR 2002

Action

Info

Execution

OH

AND No:

Correspondence No:

15

541786 Fax 01 4533255

Ms. Orla Hussey,
Fehily Timony and Company,
Consultants in Engineering and Environmental Sciences,
Corehouse,
Pouladuff Road,
Cork.

March 12th, 2002.

Re.: Wind Energy Project at Lackagh.

Dear Ms. Hussey,

Thank you for your letter of the 16th August, 2001, requesting comment on this project. We would welcome the provision of appropriately site wind energy projects in Ireland, provided that sites of significant landscape or natural heritage quality are not adversely affected.

In this case the site is part of a plateau running in an arc over towards Monesk in County Cavan, we consider that it is one of the most significant areas of blanket bogs and plateau lakes in Ireland and, therefore, warrants SAC status. However, we note from the map that there is extensive forestry in this area and in order to consider the appropriateness of this site for a wind energy project we would require further data. I look forward to hearing from you.

Yours sincerely,

Ian Lumley,
Heritage Officer, An Taisce.

Our Ref.: Q:\2001\134\05\Let025\AM

Mr. Ian Lumney,
Heritage Officer,
An Taisce,
Tailors Hall,
Backlane,
Dublin 8.

9^h April 2002

RE: Proposed Wind Farm at Lackagh, Co. Leitrim

Dear Mr. Lumney,

Thank you for your correspondence of the 12th March 2002 regarding the above wind energy project. I understand you are concerned with the potential impact of the development on the bogland and plateau lakes at Lackagh.

We believe our contracted ecologist Mr Ralph Sheppard (Gaia Associates) has addressed these concerns. He has carried out extensive investigations at the site and identified areas of degraded habitat suitable for turbines and site roads. This will have a minimum impact on the above sensitive habitats.

We have also consulted with Dúchas at an early stage. National and regional officers attended a site visit with two airtricity personnel (Donal O'Brollachain and Seamus Herron) and myself as environmental consultant. Our ecologist Mr Ralph Sheppard (GAIA) also attended. Following the site visit, we addressed Dúchas concerns and revised the layout. I attach a copy for your attention.

I trust the above is to your satisfaction. Please do not hesitate to contact me should I be of further assistance.

Yours sincerely,

Orla Hussey

Encl.

LAC-WF_emailin(DK)re IPCC

Orla Hussey
From: Dan Keohan
Sent: 21 August 2001 12:29
To: Orla Hussey
Subject: FW: Dan Keohane - Boleybrack Hill, Co Leitrim

-----Original Message-----

From: Siobhan Lawson
Sent: 20 August 2001 17:05
To: Dan Keohan
Subject: FW: Dan Keohane - Boleybrack Hill, Co Leitrim

-----Original Message-----

From: ipcc [SMTP:info@ipcc.ie]
Sent: 20 August 2001 01:10
To: postmaster@ftco.ie
Subject: FAO: Dan Keohane - Boleybrack Hill, Co Leitrim

Dear Dan,

IPCC are aware that Fehily Timoney & Co have been commissioned by Eirtricity to carry out an EIS for a windfarm on Boleybrack Mountain - Co Leitrim.

IPCC would like to be consulted in the preparation of this study considering our interest in the conservation of the boglands within this important upland area.

Looking forward to hearing from you soon.

Yours sincerely,

Patrick.

Patrick Crushell
Conservation Officer

Irish Peatland Conservation Council
119 Capel Street
Dublin 1
Ireland

Tel & Fax +353-1-8722397
Tel +353-1-8722384
e-mail: bogs@ipcc.ie
web: www.ipcc.ie

Action for Bogs & Wildlife

Our Ref.: Q:\2001\134\05\Let026\AM

Mr. Patrick Crushell,
Irish Peatland Conservation Council,
Capel Chambers,
Capel Street,
Dublin 1.

9th April 2002

RE: Proposed Wind Farm at Lackagh, Co. Leitrim

Dear Mr. Crushell,

In response to your email of the 20th August 2001 to my colleague Mr Dan Keohane, I understand you are concerned with the potential impact of the proposed wind farm development on the bogland at the site.

We believe our contracted ecologist Mr Ralph Sheppard (Gaia Associates) has addressed these concerns. He has carried out extensive investigations at the site and identified areas of degraded habitat suitable for turbines and site roads. This will have a minimum impact on the above sensitive habitats.

We have also consulted with Duchas at an early stage. National and regional officers attended a site visit with two airtricity personnel (Donal O'Brollachain and Seamus Herron) and myself as environmental consultant. Our ecologist Mr Ralph Sheppard (GALA) also attended. Following the site visit, we addressed Duchas concerns and revised the layout. I attach a copy for your attention.

I trust the above is to your satisfaction. Please do not hesitate to contact me should I be of further assistance.

Yours sincerely,

Orla Hussey

Encl.

APPENDIX D

Copy of Advertisement and Newsletter Promoting Information Day

INFORMATION DAY

PROPOSAL
TO BUILD A
WIND FARM

AT

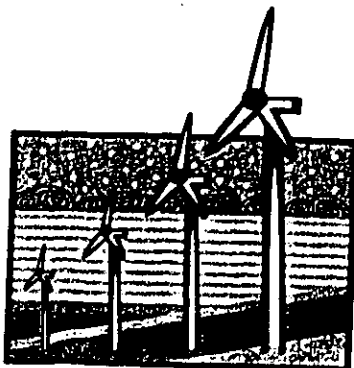
LACKAGH.

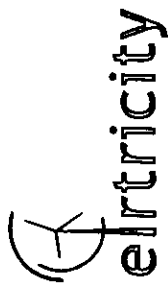
TUESDAY 13 NOVEMBER

14.00—21.00

IN

DRUMKEERAN
HERITAGE CENTRE

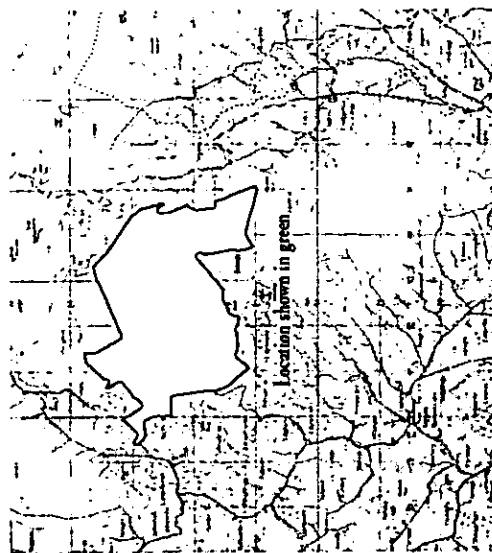




YOUR GREEN ELECTRICITY PARTNER

Lackagh Wind Farm, Co. Leitrim.

It is proposed to build a wind farm to generate electricity at Lackagh. There will be about thirty turbines, access roads and a substation on land owned and worked by the Irvins and Joe Jeiters. The approximate location of the wind farm is shown on the map.



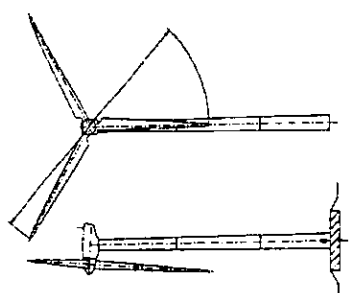
Location shown in Green

Why harness the wind?

Since the Middle Ages, the wind has been used in Ireland as a source of local energy source to produce flour and to pump water. In response to the pollution caused by burning fossil fuels (coal, peat, gas, oil) wind energy is now being used to generate electricity locally in a safe and environmentally friendly way. This reduces the need to burn fossil fuels.

What will the turbines look like?

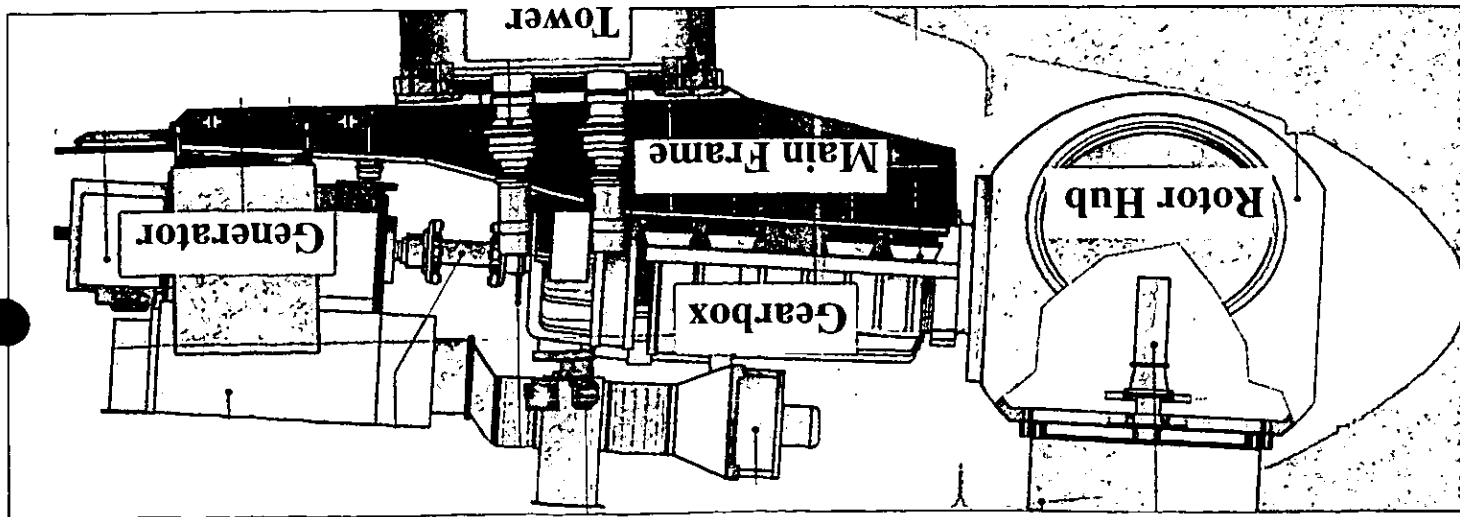
Each turbine will be up to 65m high and have three blades each up to 40m long. The turbines will be spaced about 400m apart and connected by a small track. The wind farm will also have a small control building and substation. About 3% of the site will be covered by roads and foundations.



How does a wind turbine work?

The power of the wind rotates the blades of the turbine which drives a generator to produce electricity. The generator produces electricity at 690 volts which is then stepped up through transformers to the national grid voltage. It is transported along electric cables similar to those which supply industrial premises. On average, each turbine will provide enough electricity for approximately 1,000 homes.

The Elements in the Turbine



APPENDIX E1
Comprehensive Archaeological Report

**Proposed Wind Farm Development
at
Lackagh Townland,
Co. Leitrim**

**EIS
Archaeology**

Appendix E

On behalf of
Fehily Timoney & Company,
Consultants in Engineering & Environmental Sciences

Proposed Wind Farm Development
at
Lackagh Townland,
Co. Leitrim

EIS
Archaeology

Appendix E

On behalf of
Fehily Timoney & Company,
Consultants in Engineering & Environmental Sciences

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- 1.2 Methodology
- 1.3 The Receiving Environment
 - 1.3.1 Sites and Monuments Record
 - 1.3.2 Topographical Files of the National Museum of Ireland
 - 1.3.3 Special Areas
 - 1.3.4 Archaeological and Historical Background
 - 1.3.5 Placenames
 - 1.3.6 The Archaeological Landscape
 - 1.3.7 General History
 - 1.3.8 Cartographic Sources
- 1.4 Field Inspection
- 1.5 Visual Impact on Archaeology
- 1.6 Potential Impacts of the Development on Cultural Heritage
- 1.7 Mitigation Measures

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- Plate 7.9 T12 looking SSE
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- A4 SMR Site location map
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- A8 1st Edition 6" Ordinance Survey Map (1837)
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- A10 3rd Edition 6" Ordinance Survey Map (1910)
- A11 3rd Edition 6" Ordinance Survey Map (1910)
- A12 3rd Edition 6" Ordinance Survey Map (1910)
- A13 Potential Archaeological features

Cultural Heritage in the Existing Environment

1.1 Introduction

This report, prepared for Fehily Timoney & Company, Consultants in Engineering & Environmental Sciences, forms the cultural heritage portion of an Environmental Impact Statement which outlines the archaeological issues and impacts in respect of a proposed Wind Farm at Lackagh Townland, Co. Leitrim.

Cultural Heritage is defined as:

“those aspects of the environment which are valued because of their age, history, beauty or tradition which include the following:

- archaeology;
- Architecture;
- history;
- landscape and garden design;
- folklore and tradition;
- structures, features and other landmarks;
- language and dialect;
- religion and beliefs;
- settlements”.

The main purpose of the study is to assess the impact on the receiving archaeological environment and to propose ameliorative measures to safeguard any buildings, features, monuments or finds of antiquity.

The proposed development site lies south-east of Manorhamilton and north of Drumkeeran, in north-east Co. Leitrim with the village of Killarga located to the west of the development site. The proposed development site is accessed from the R280 north of Drumkeeran. Turning north-east off the R280 to Tawnylea crossroads with access to the development site via Lackagh townland located north-east of Tawnylea. The proposed Wind Farm is located within predominately mountaineous countryside with panoramic views provided of the surrounding countryside to the south, south-west, south-east, east and north-west.

The proposed Wind Farm development involves the construction of thirty one no. wind turbines and associated access roads within the proposed development site.

The wind turbines are grouped into two clusters (Figure A1):

- (i) The western cluster comprising fourteen no. wind turbines located to the west of Lackagh Lough including T1-T14
- (ii) The eastern cluster comprising seventeen no. wind turbines located to the east of Lackagh Lough centred around Lough Strand including T15-T31 respectively

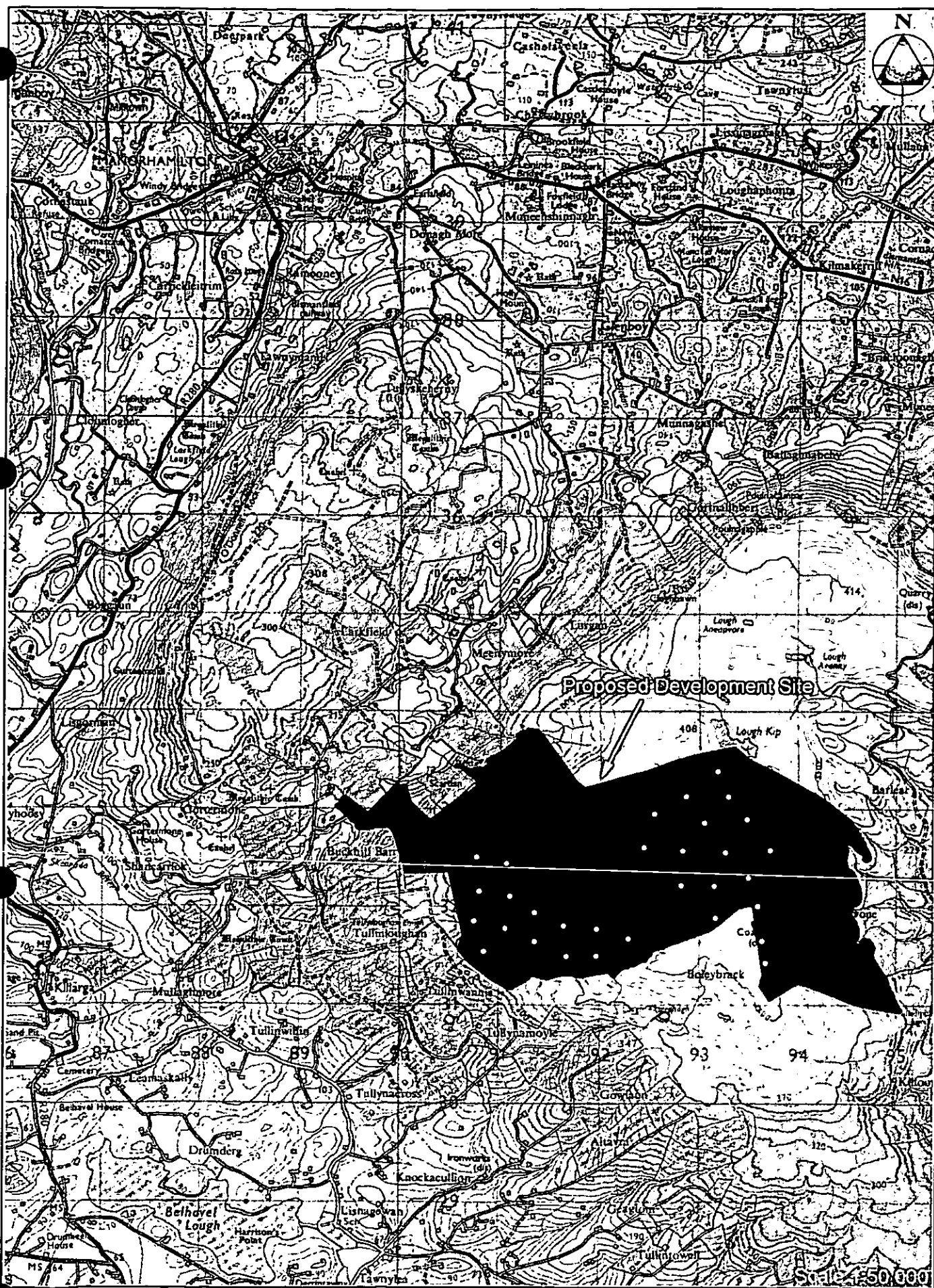


Figure A1 Site Location

The wind turbines will measure approximately 100m high with a foundation area measuring 15m by 10m and excavated to a depth of 1.50m. Each turbine will have a 60m hub and 80m blade diameter. Some of the associated access routes to the proposed wind turbines are already existing. Both existing and all proposed new access routes are indicated on the site layout map. The proposed access routes will measure approximately 4.5 m wide.

The construction of these routes will involve excavation down to a hard foundation and covered by a hardcore gravel surface.

The proposed wind turbines will be connected via a system of underground cables located along the proposed access routes. These in turn will be linked via an underground cabling system to a substation located near the site entrance.

The area to be developed was under ankle high rushes and coarse grass during the period of the field inspection on February 25th and March 5th 2002.

1.2 Methodology

The report is based on an archaeological and historical desk study and field inspection. The desk study availed of the following sources:

Sites and Monuments Record

The primary source of information for the desk study is the Sites and Monuments Record (SMR) of *Dúchas*-The Heritage Service, Department of Arts, Heritage, Gaeltacht and the Islands. The SMR records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs.

This is based on a comprehensive range of published and publicly available documentary and cartographic sources. The information held in the SMR files is read in conjunction with constraint maps (published at reduced 6" scale). The SMR is constantly updated and is the first stage in the preparation of a national archaeological survey, with inventories also published at an interim stage. The SMR (as revised in the light of fieldwork) formed the basis for the establishment of the statutory Record of Monuments and Places (RMP) pursuant to Section 12 of the National Monuments (Amendment) Act 1994 (*Appendix E2*).

Each of the sites shown on the accompanying 6" O.S. map (Figures A2-A4) is surrounded by a proposed *Area of Interest*; this indicates a zone around the known extant remains in which related archaeological features are likely to occur, and simply suggests a zone of archaeological potential. Each site, together with its *Area of Interest*, is represented to scale. The *Classification of Archaeological Sites* outlined in *Appendix E3* outlines the implications of proposed development on the archaeological landscape according to similar type sites. Each site has a corresponding *SMR Number*. For example, site 80 on sheet 18 in Co. Sligo is written SL018:080. From the 6" Ordnance Survey maps, a list of the archaeological sites in the surrounding landscape or *Receiving Environment* and their proximity to the proposed wind farm development was compiled.

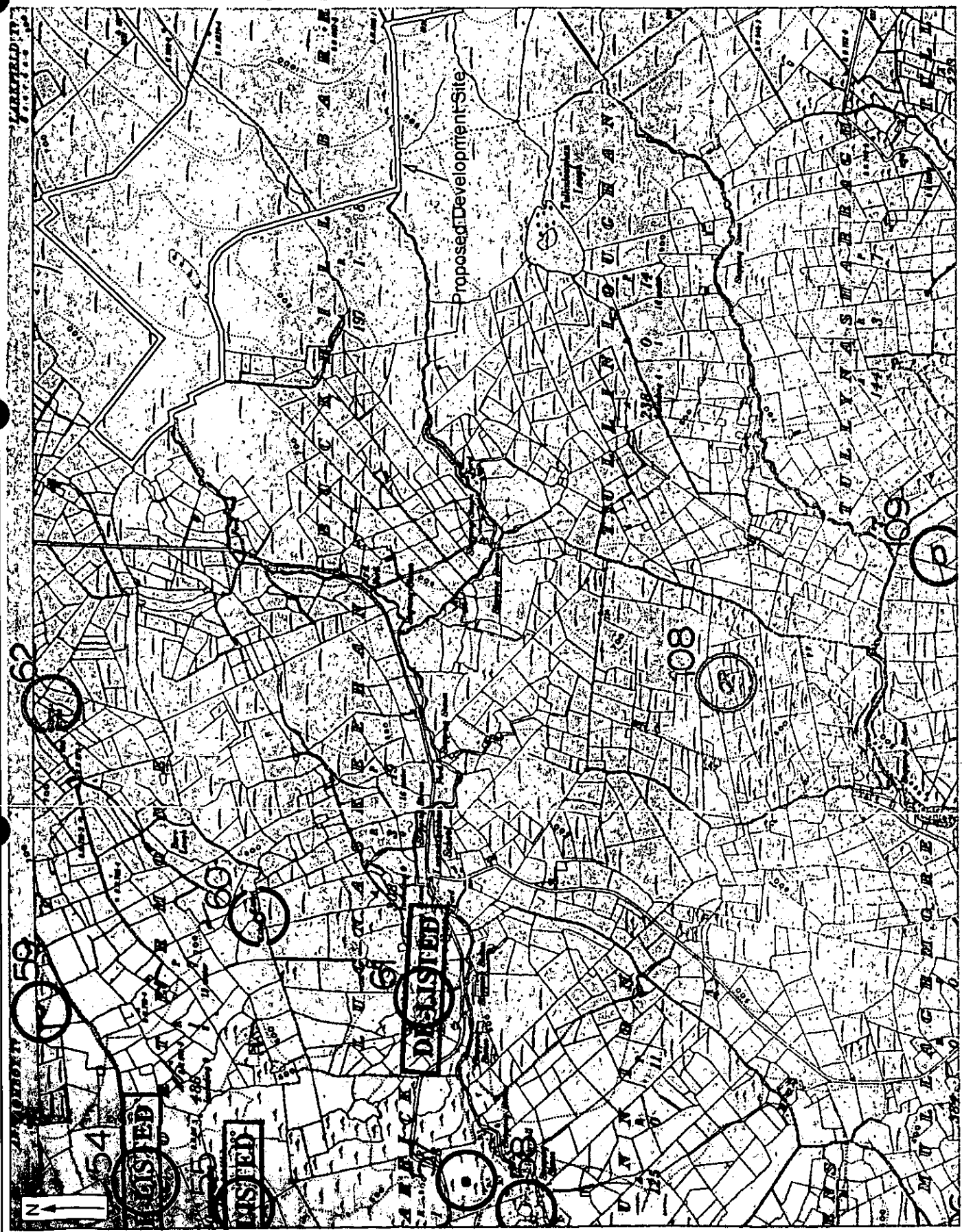


Figure A2 SMR Site Location 1 of 3

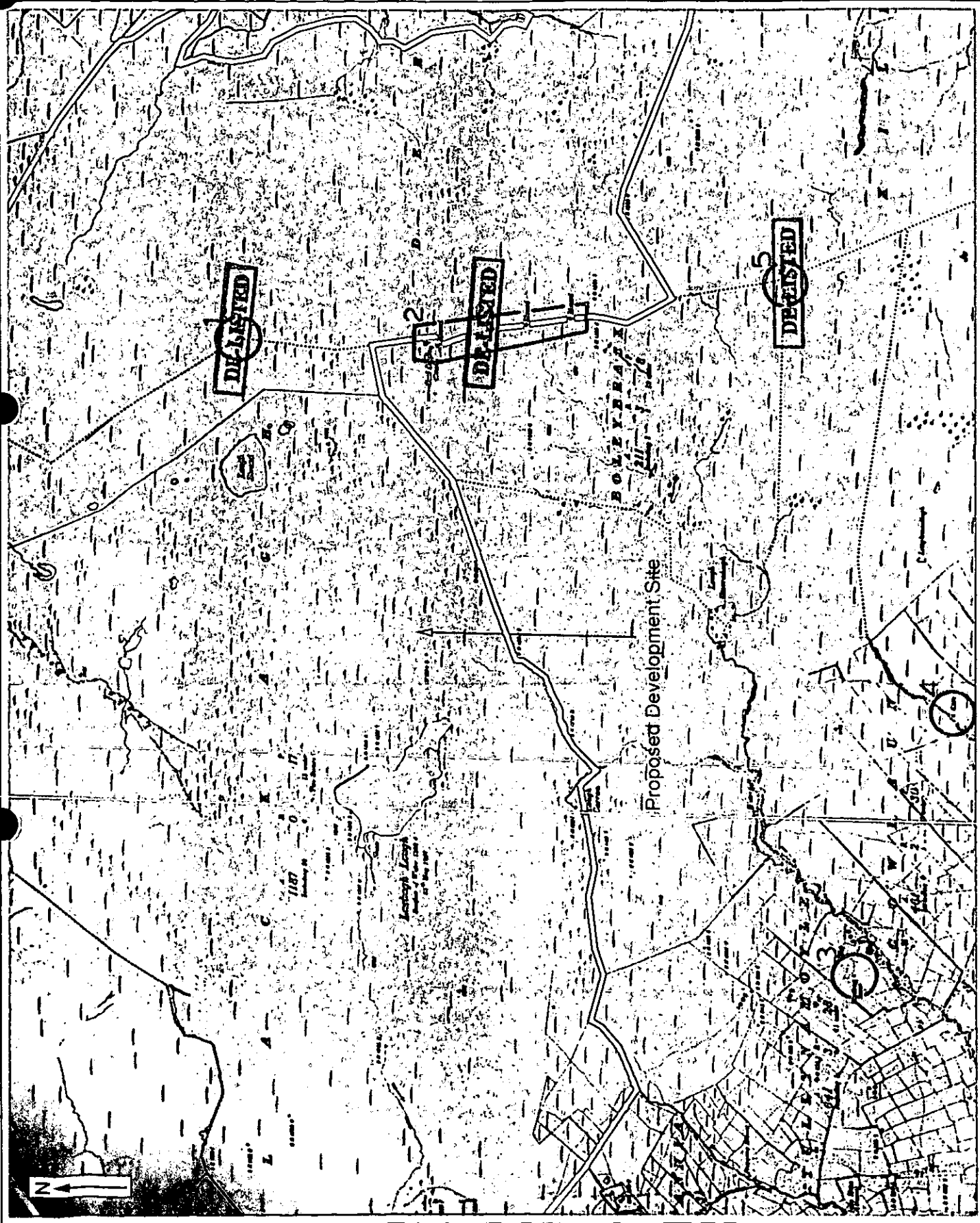


Figure A3 SMR Site Location 2 of 3

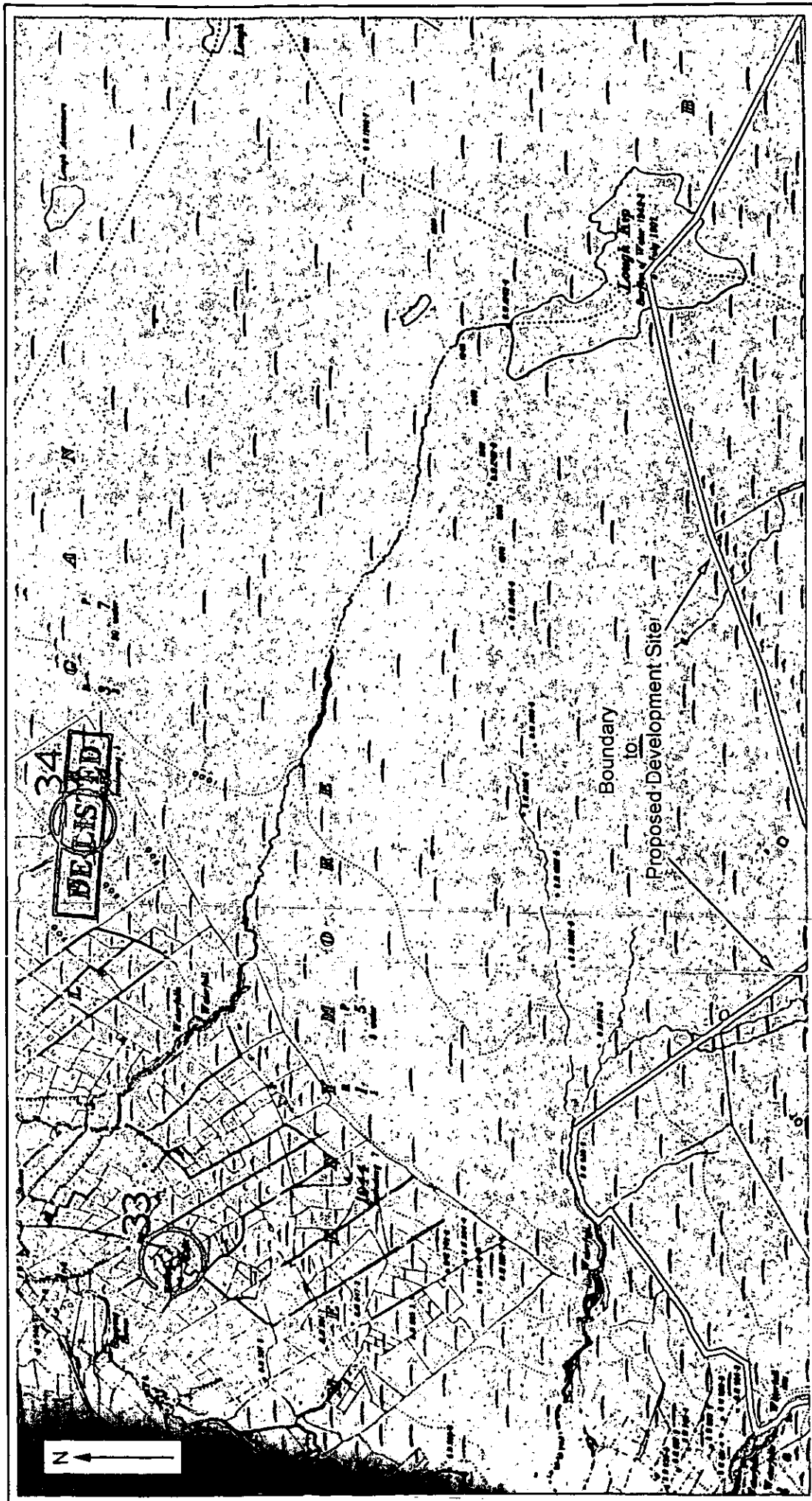


Figure A4 SMR Site Location 3 of 3

The Topographical Files of National Museum of Ireland

The National Museum of Ireland (NMI) is the repository of the national collection of archaeological objects built up over a century with new additions added regularly. The Irish Antiquities division of the NMI has in its care a large paper archive including records, reports and other material from the late eighteenth century to the present day. The Topographical files identify recorded stray finds in the Museum archive which are provenanced to townland. The files on finds, which have been donated to the State in accordance with National Monuments legislation, sometimes include reports on excavations undertaken by NMI archaeologists earlier in the twentieth century, including 6" co-ordinates for the precise find spot and detailed descriptions on the finds themselves.

Leitrim County Council: County Development Plan 1997-2002

Leitrim County Development Plan 1997-2002, in accordance with existing legislation, outlines policies for the preservation and protection of buildings and other structures of historic, architectural or artistic interest, archaeology and the conservation of particular landscapes (such as NHA's, SAC's, SPA's) with regard to both urban and rural areas. These policies attempt to create a framework within which sustainable development can take place while simultaneously protecting, preserving and enhancing the characteristic built heritage and the natural environment. Central to this is the preservation of landscape character and aesthetics.

"The purpose of the Plan is to define the planning and development framework within which the Council's primary functions as infrastructure creator and environment protector can operate in pursuit of the securement of sustainable development".

(Leitrim County Development Plan 1997-2002, 4)

Documentary Sources

Documentary and literary references were also consulted. The compilation of this report involved an in depth examination of a series of 6" Ordnance Survey maps for the area and a detailed review of the associated historical maps of the area. The research and enclosed map extracts are derived from The Map Library, Trinity College Library, Dublin (Figures A5-A12).

Field Survey

A field inspection was undertaken to assess current and previous land use, identify any potential unrecorded features with little surface expression as well as inspecting any upstanding buildings within the boundaries of the proposed development site.

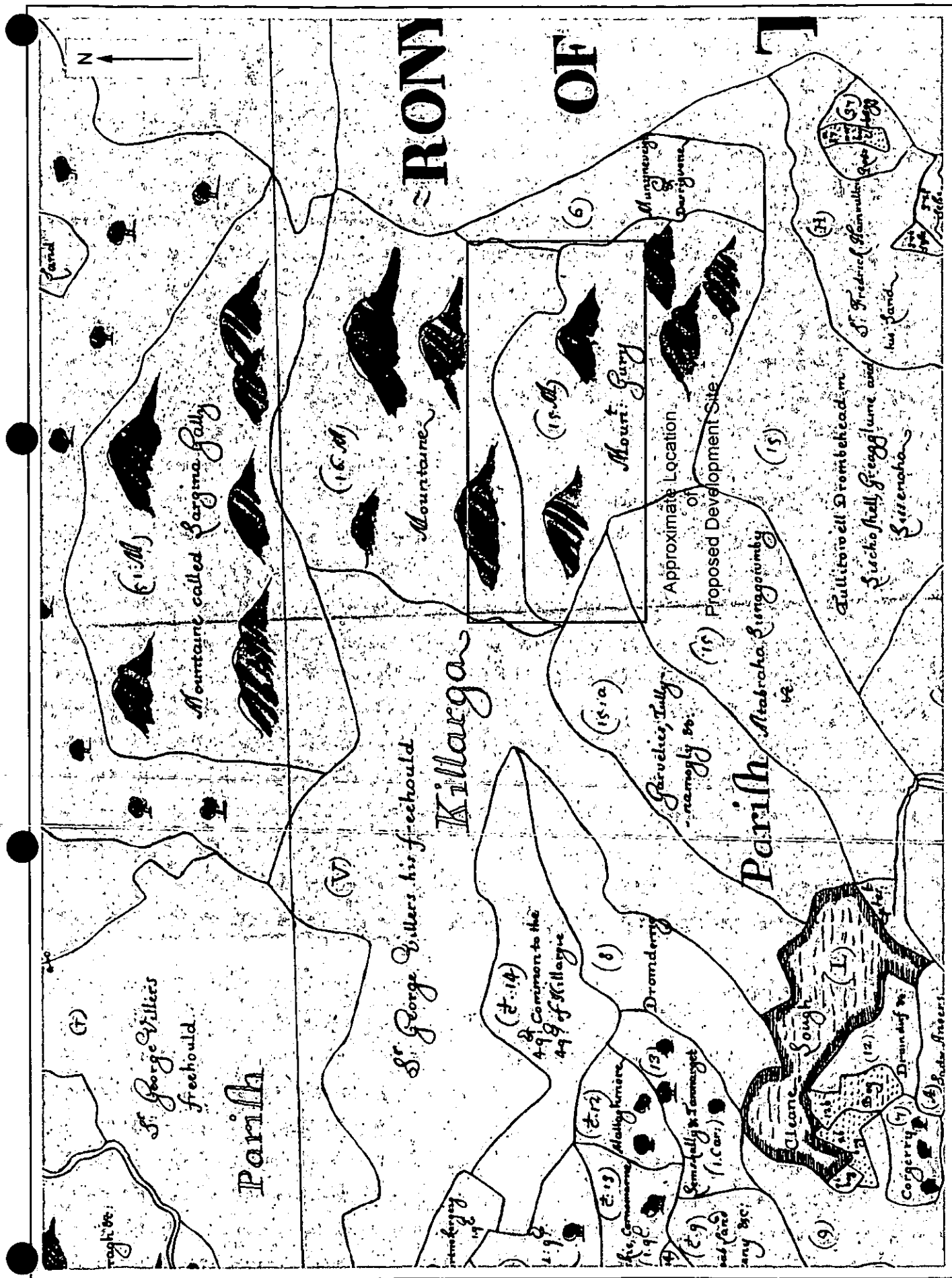


Figure A5 Down Survey Map c.1656

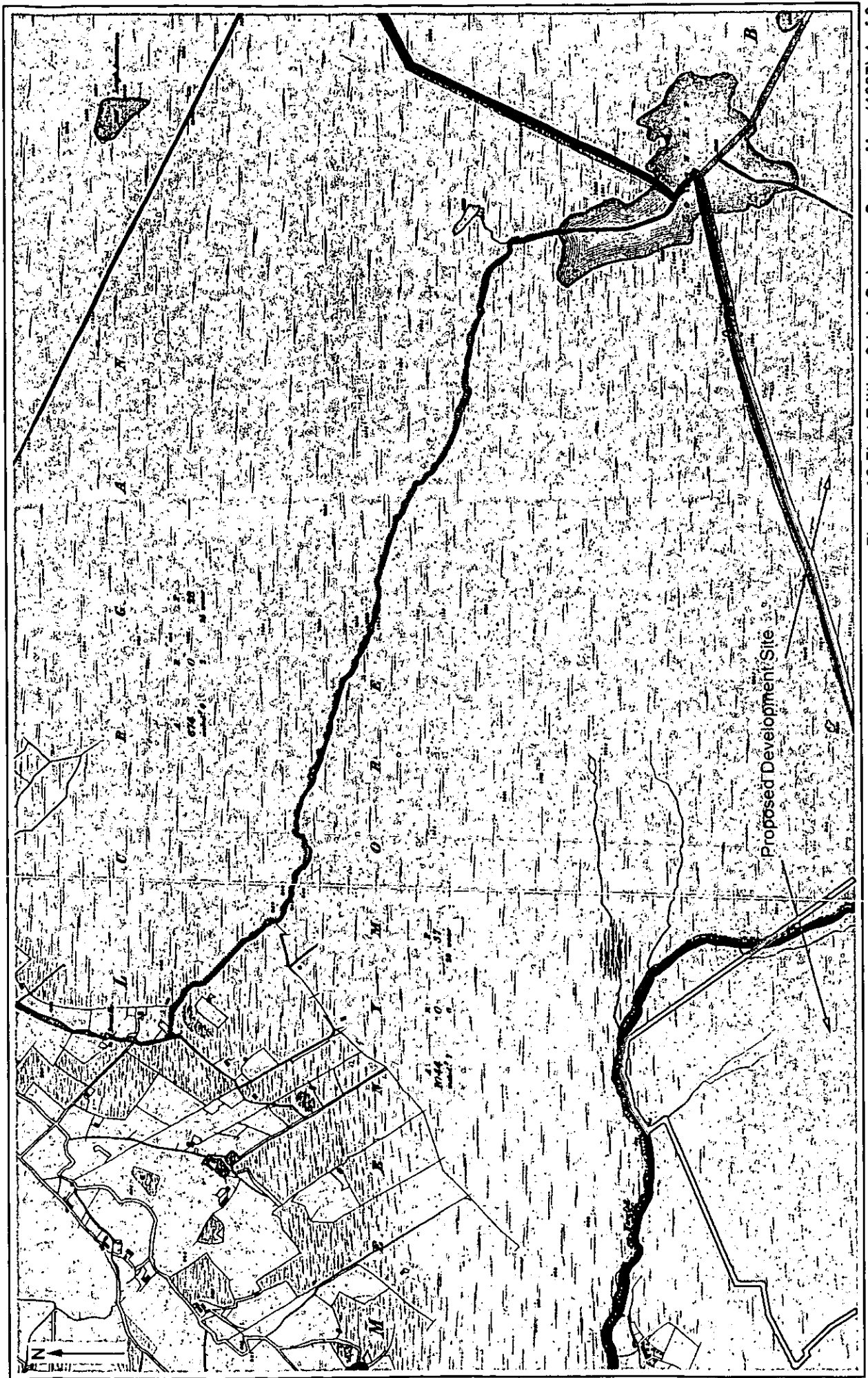


Figure A6 First Edition 6 Inch Ordnance Survey Map (1837) 1 of 3

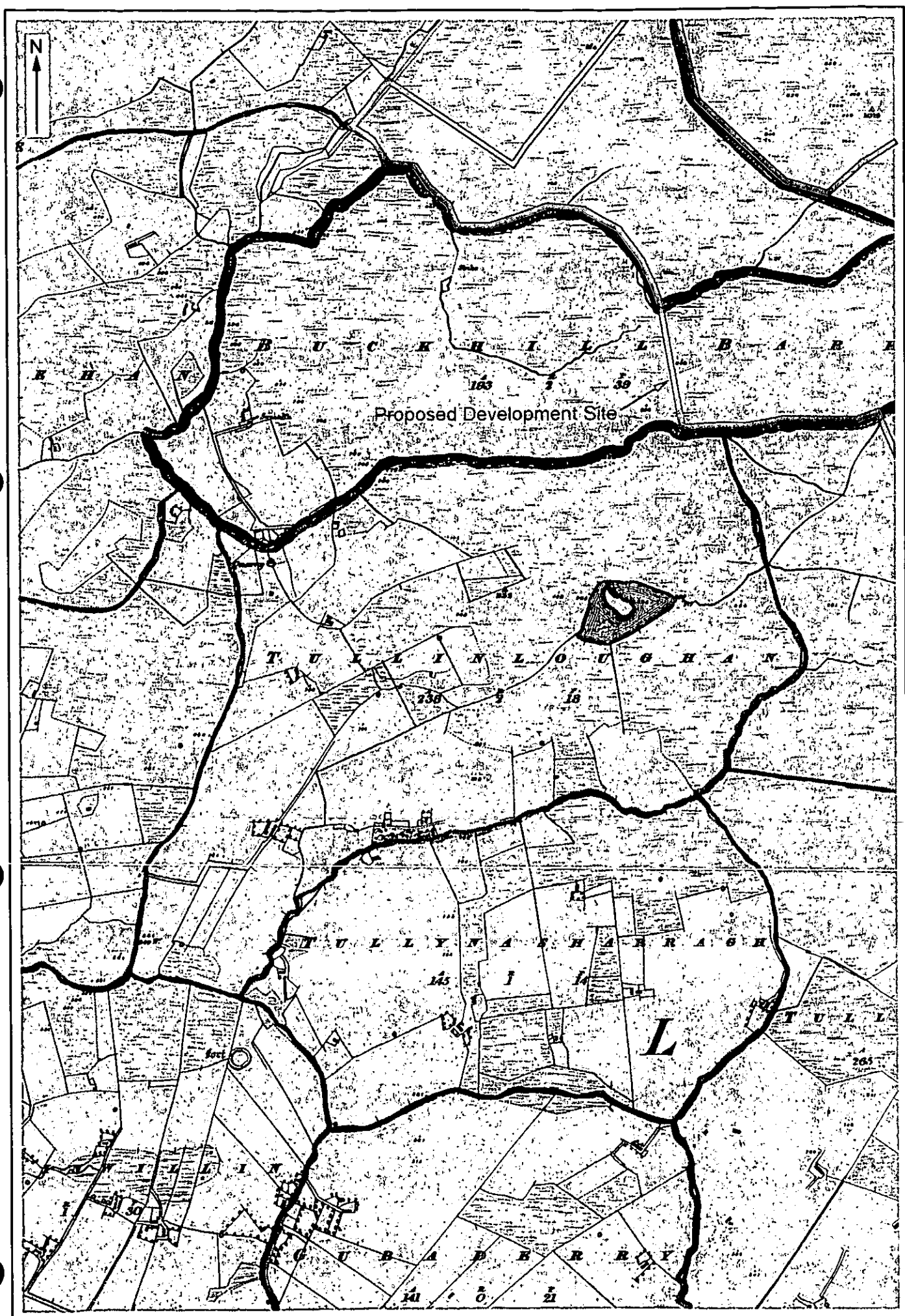


Figure A7 First Edition 6 Inch Ordnance Survey Map (1837) 2 of 3

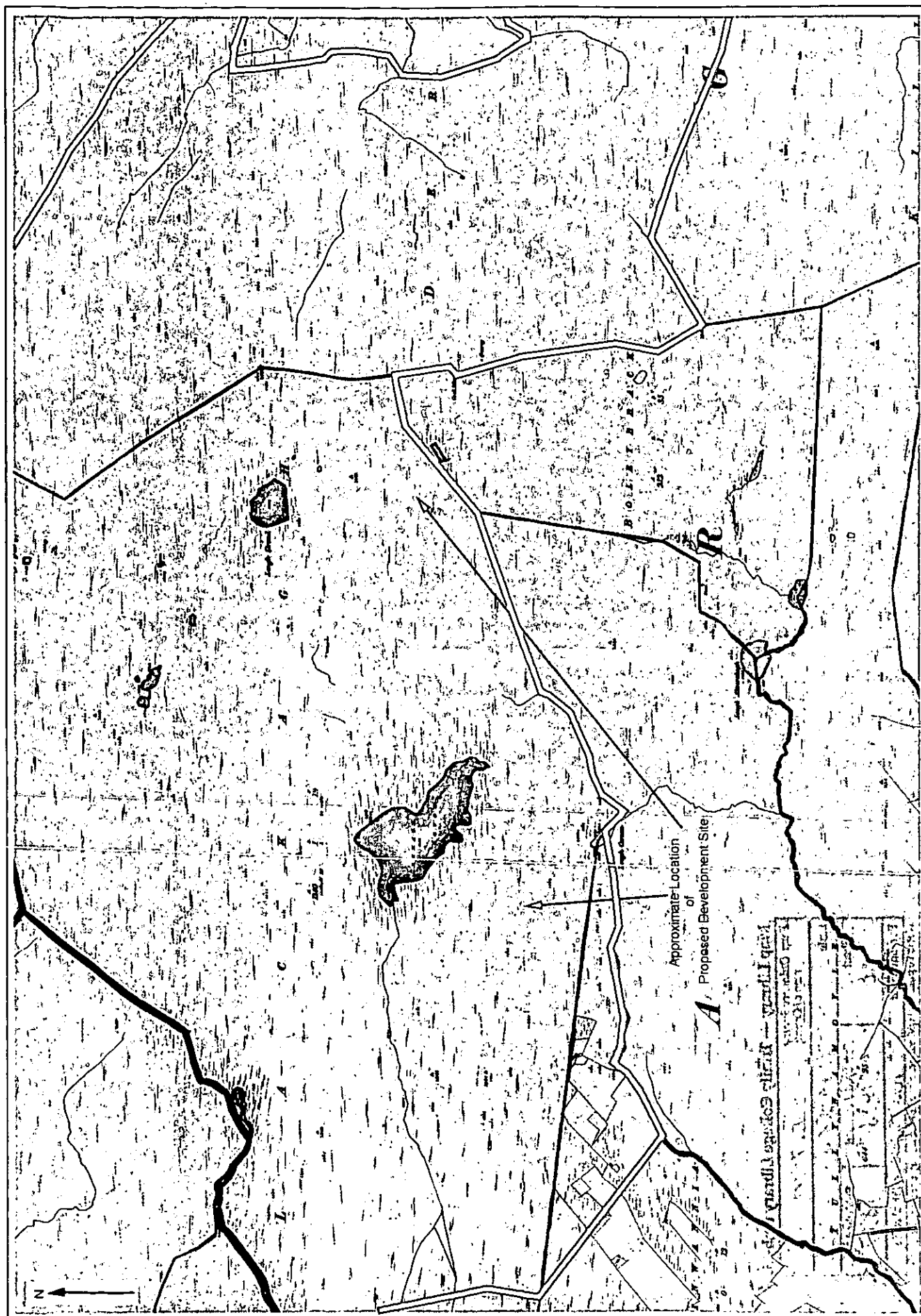


Figure A8 First Edition 6 Inch Ordnance Survey Map (1837) 3 of 3

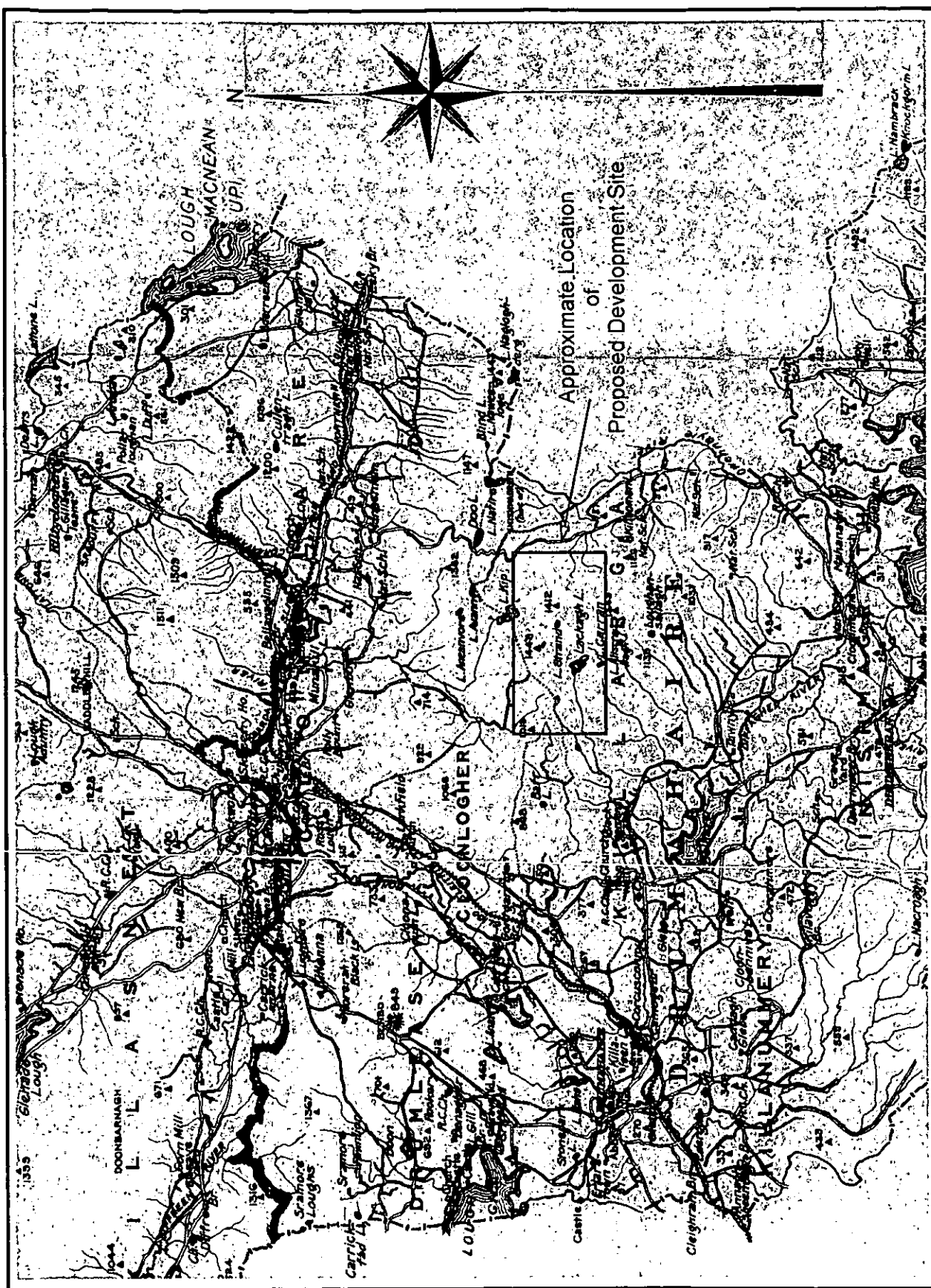


Figure A9 After L.J. Richards Company (1901)

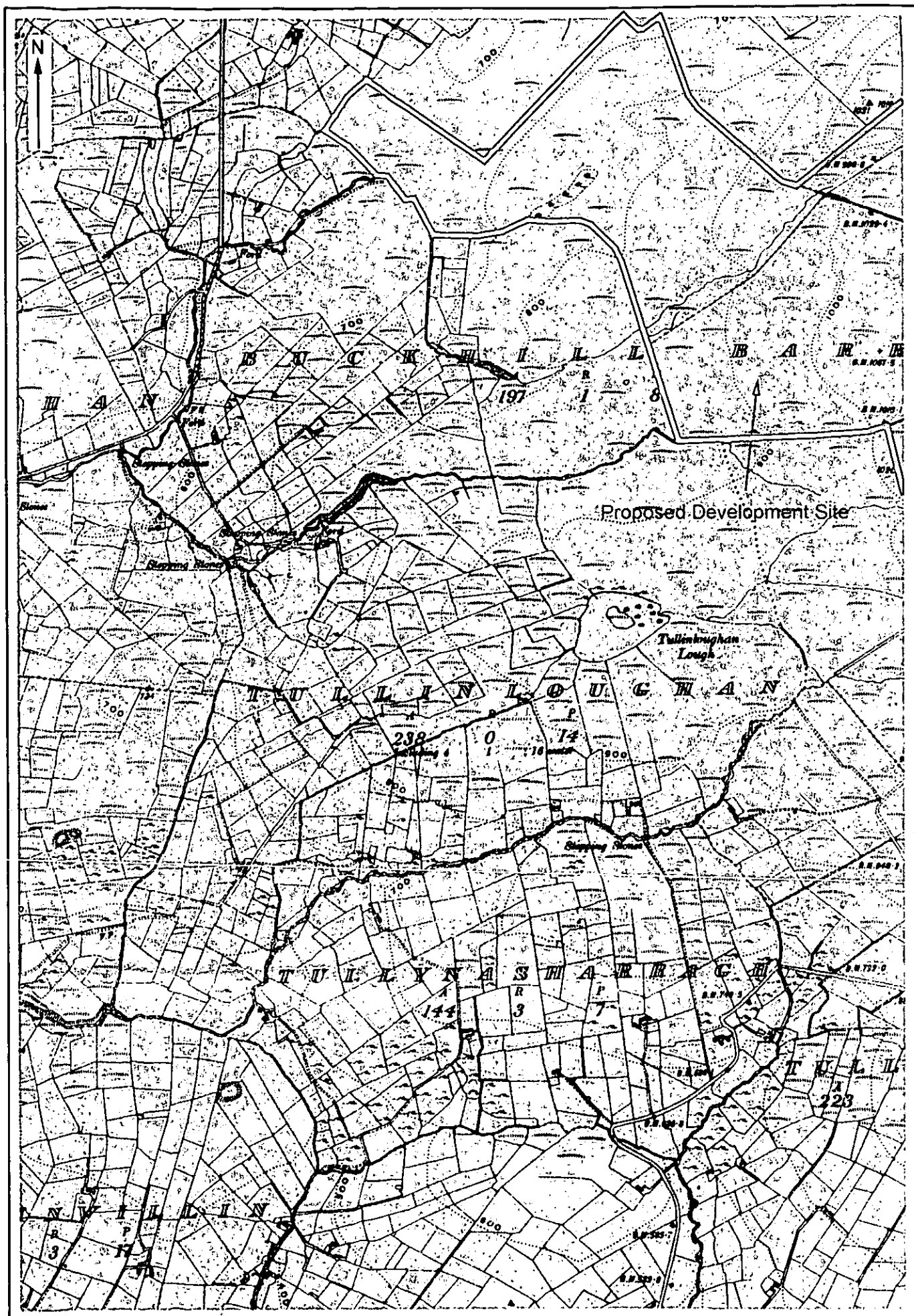


Figure A10 Third Edition 6 Inch Ordnance Survey Map (1910)

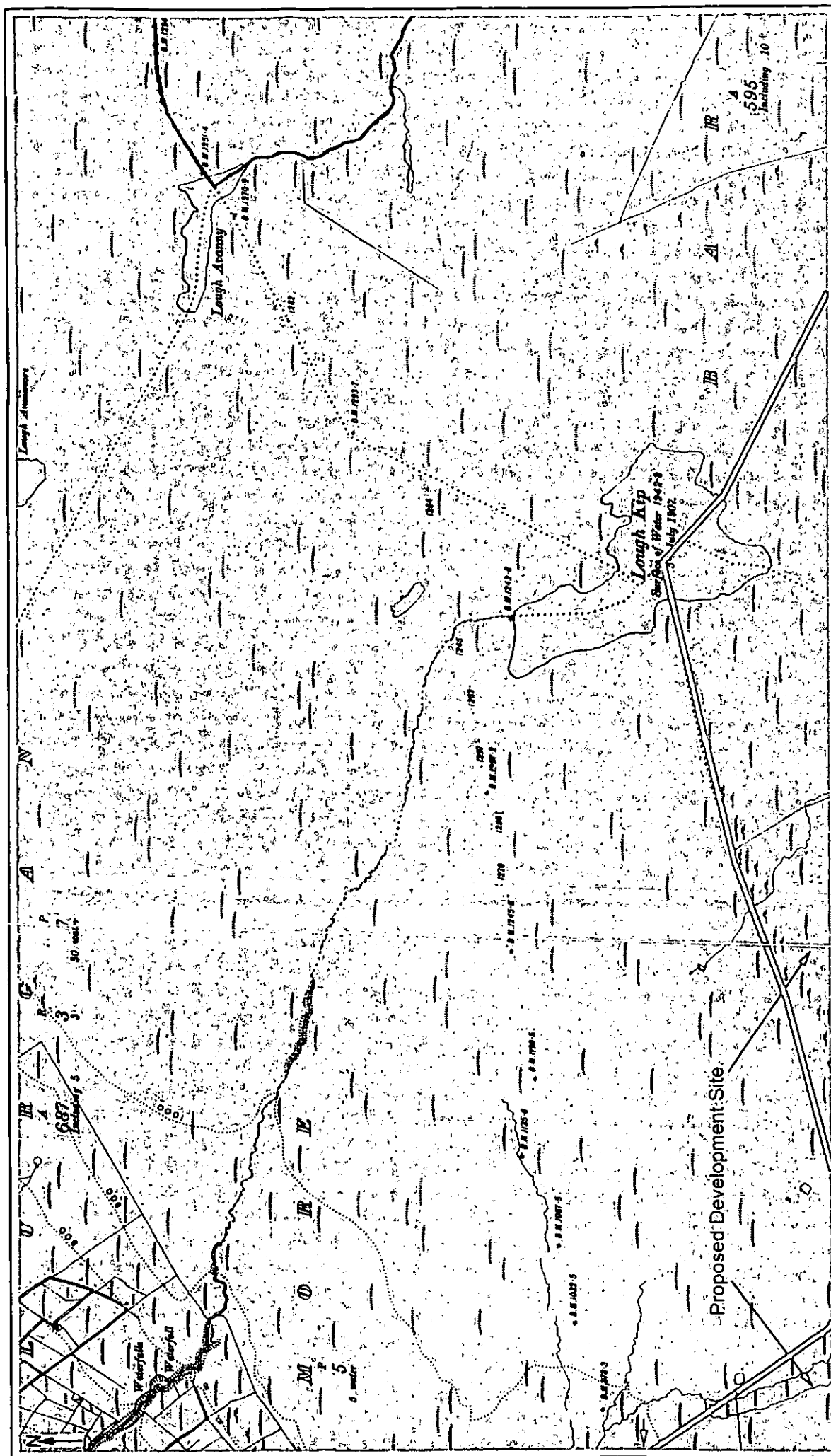


Figure A11 Third Edition 6 Inch Ordnance Survey Map (1910)

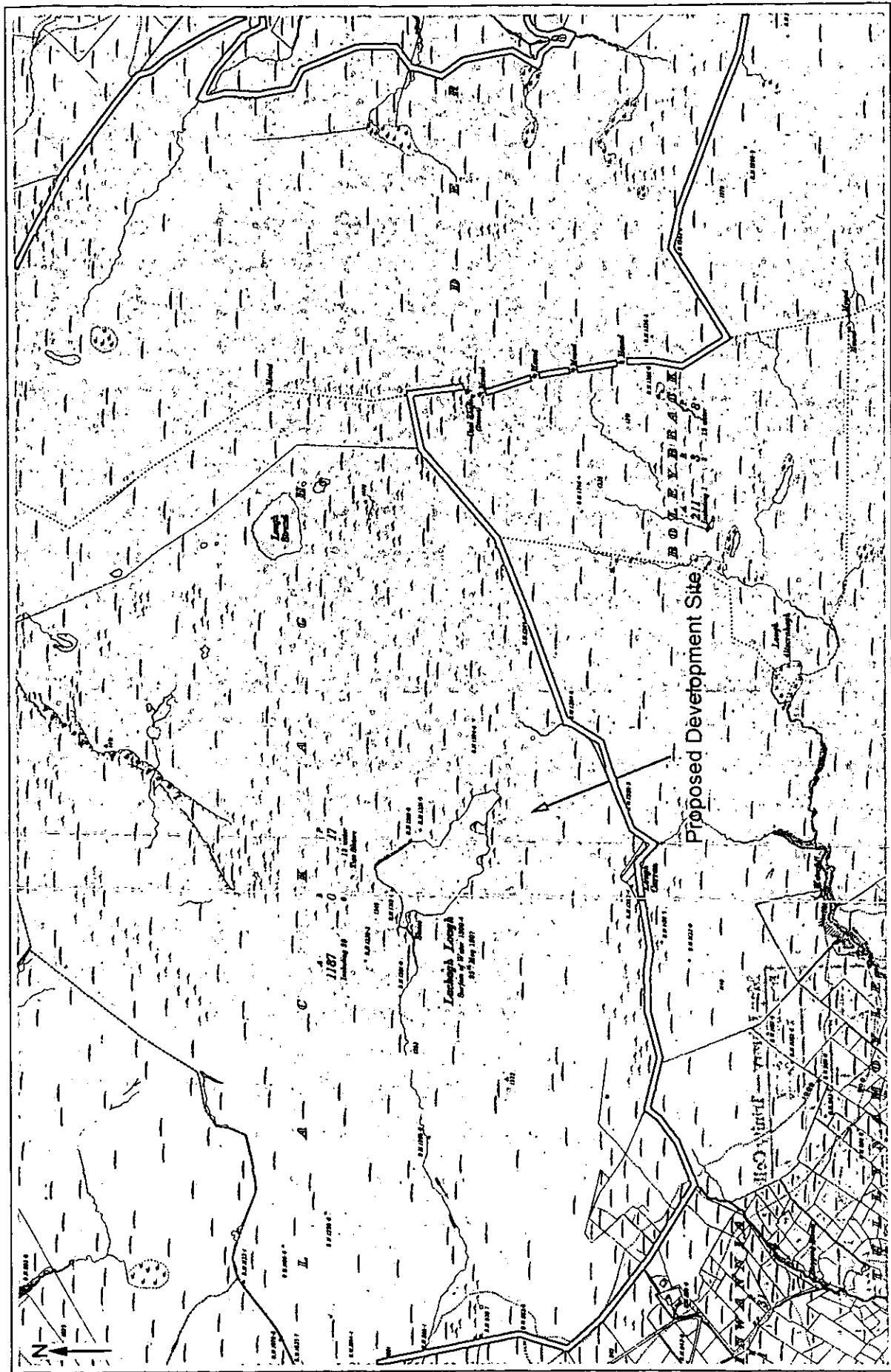


Figure A12 Third Edition 6 Inch Ordnance Survey Map (1910)

1.3 The Receiving Environment

Sites and Monument Record

The following is a list of the recorded archaeological sites in the vicinity of the proposed wind farm site read in conjunction with the Methodology section above. The sites have been read in a clockwise direction from the north. The distances of the proposed wind turbines to the closest recorded archaeological monuments have been calculated and outlined below *where applicable*. In the remaining instances, the distances of the surrounding archaeological monuments to the perimeter of the proposed development site are noted. The archaeological sites are spread across three 6" Ordnance Survey sheets including Sheets 12, 15 and 16 respectively. The recorded archaeological monuments have been designated into zones in relation to their proximity to the proposed wind farm development (Figures A2-A4).

DELISTED archaeological sites refer to sites that are perceived to be potentially un-archaeological in nature through subsequent field survey by *Dúchas* recommended archaeologists. However, delisting is based upon cursory field inspection only. Hence full excavation can only determine the full nature of a site. Subsequently, *Dúchas*-The Heritage Service recommend avoidance of such monument types where possible.

(A) *In Excess of 500m*

SMR No.	Site Type	Location
LE012:033	Cashel and Souterrain	c.740m N of N site boundary
LE012:034	DELISTED	c.1050m N of N site boundary
LE012:035	DELISTED	c.1430m NE of T15
LE016:004	Cairn	c.960m S of S site boundary
LE016:003	Standing Stone poss.	c.640m S of S site boundary
LE015:129	Enclosure	c.1600m SW of SW site boundary
LE015:109	Cashel	c. 1200m SW of SW site boundary
LE015:108	Court Tomb and Enclosure	c.1500m SW of SW site boundary
LE015:060	Cashel and Souterrain	c.1130m NW of NW site boundary
LE015:062	Court Tomb	c.500m NW of NW site boundary

(B) *Within 300m*

SMR No.	Site Type	Location
LE016:005	DELISTED	260m S of S site boundary

(C) *Located Within Proposed Development Area*

SMR No.	Site Type	Location
LE016:001	DELISTED	180m SW of T28
	"	300m SE of T24
	"	220m NE of T25
LE016:002	DELISTED	T27 located within buffer zone
	"	T31 located within buffer zone
	"	90m S of T26

The following is a detailed description of the above archaeological sites within and surrounding the proposed Wind Farm development:

SMR No.	LE012:033/01-02
Townland	Meenymore
Barony	Drumahaire
Parish	Cloonclare
Site Type	01: Cashel and 02: Souterrain
NGR	19108/33470
Altitude	500'-600'
Classification	C
Area of Interest	30m
Distance	c.740m N of N site boundary
Suggested Impact	N/A
Description	<p>The site does not appear on the 1st edition 6" Ordnance Survey map 1836 but does appear on the 3rd edition 6" O.S. map 1910.</p> <p>Situated on a little plateau overlooking a stream to the east which flows off to the north. Overlooked by a small knoll c.50m to the west.</p> <p>The area had been forested but the forest has recently been cleared. Some of the trees on the site had fallen over creating a mess especially on the northern and eastern perimeter.</p> <p>The site was overlaid by a drystone built field wall which does not exactly correspond to the perimeter of the cashel. Most of the interior is level except that it falls away to the stream at the south-east. The external dimensions are 25m N-S, 25m E-W. The wall is really only a stony scarp and is particularly jumbled in the south-east quadrant. Just at the top of the scarp down to the south-east, two lintels of a souterrain can be seen. One of these is inaccessible but its height is 1.40m. The passage runs ESE-WNW (110°-290°).</p> <p>(OPW Field Report 04/10/'94)</p>
References	<p>"Site No. 25. Td. Meenymore. O S 6" Sheet Co-ordinates, 12: E 5.2cm N 13.4cm. National Grid Co-ordinates: G 9108 3469. O D: 500'-600' Internal diameter: E-W 20m, N-S 25.50m.</p> <p>This poorly preserved cashel is situated in the midst of a coniferous forest. It is marked on the 3rd edition of the 6" O S map as an irregularly shaped cashel with a 'cave'. The wall which forms the enclosure is not continuous, it comprises several walls which are set at various angles, some of them extend outside the limit of the cashel. The wall, the internal north section of which is seen in plate Xxis, survives to a maximum height of 1m and width of 1.50m. Some lengths are composed of orthostats with intervening crude drystone walling, while others were roughly made with stones alone. There is a souterrain in the south-west quadrant, surrounded by a small hillock. Two large lintels overlap to form the roof of the entrance and the interior is built of drystone walling.</p>

There is also a stone lined pit, 0.80m x 0.60m x 0.30m deep, in the south-

east quadrant with 4 stones arranged in a circular pattern around it".

(OPW Report, no date)

"1) 2) Cashel and Souterrain in Meenymore. Land of John Teeley. Little but the foundation stones of the cashel wall now remain. Enclosure of 25 yds diameter. Souterrain has two passages with small entrances to each. The entrances lie beside each other in the centre of the cashel enclosure. One passage is 3' wide and c.5' high, uncemented walls with overhead flag lintels. This is the passage which is supposed to join with that from the cashel (3) (4) in the land of John McMorow 1/4 of a mile away".

(OPW Topographical Files 1943 (ITA Survey))

SMR No.	LE012:034
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	c.1050m N of N site boundary
Suggested Impact	N/A
Description	N/A

SMR No.	LE012:035
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	c.1430m NE of T15
Suggested Impact	N/A
Description	N/A

SMR No.	LE016:004
Townland	Altavra
Barony	Drumahaire
Parish	Killarga
Site Type	Cairn
NGR	19231/33014
Altitude	900'-1000'
Classification	C
Area of Interest	30m
Distance	c.960m S of S site boundary

**Suggested Impact
Description**

N/A

The site does not appear on the 1st edition 6" Ordnance Survey map, 1836 but does appear on the 3rd edition 6" O.S. map 1910.

Situated on eastern edge of the ravine of a stream which flows down to south and south-west. Wide view south-west but obscured by trees on all sides as site is in narrow strip which remains unforested.

The site is intact but damaged. A cavity has been dug into the centre of it.

The ravine to the west is c.4m deep and the site is located at the very edge. This is a circular cairn (diameter 10.50m). There is an oval hollow in the centre (dimensions 3.60m ENE-WSW, 4.30m NNW-SSE, depth 1m-1.50m). The mound is flush with the slope of the hill on up slope sides east and north; [it] is 40cm high at SSE and 1.40m high at WSW. The stones are football size or larger and there is no grass cover on the mound except at the edges. There is no [illegible] or cist in the centre and no structural stones are visible. The cairn is possibly an antiquity but has a rather fresh appearance. There is a house ruin of the 19th century located c.50m to the south-west, and other houses farther down the slope. There are some [illegible] in stones about the base of the mound and some measure up to 50cm x 40cm x 15cm.

(OPW Field Report 14/08/'91)

SMR No.	LE016:003
Townland	Tullynamoyle
Barony	Drumahaire
Parish	Killarga
Site Type	Standing Stone possible
NGR	19145/33046
Altitude	700'-800'
Classification	C
Area of Interest	20m
Distance	c.640m S of S site boundary
Suggested Impact	N/A
Description	<p>The site does not appear on the 1st edition 6" Ordnance Survey map, 1836 but does appear on the 3rd edition 6" O.S. map 1910.</p> <p>Situated on a general slope down to south but on local slope down to west.</p> <p>The site is located in the middle of a coniferous forest. The site consists of hard stone, close grained stone, possibly a sandstone or more likely since it is white, a granite. It is a square sectioned stone orientated NE-SW (30°-210°) with dimensions of 1.02m x 0.18m-0.21m. It has a maximum height of 1m achieved towards the southern end.</p> <p>There are some fractures about the point but it is hard to say if it is ancient work and it does not involve major reshaping of the stone.</p> <p>(OPW Field Report 15/08/'91)</p>

SMR No.	LE015:129
Townland	Tullynacross
Barony	Drumahaire
Parish	Killarga
Site Type	Enclosure
NGR	18973/32986
Altitude	200'-300'
Classification	C
Area of Interest	30m
Distance	c.1600m SW of SW site boundary
Suggested Impact	N/A
Description	<p>The site does not appear on the 1st edition 6" Ordnance Survey map 1836 but does appear on the 3rd edition 6" O.S. map 1910.</p> <p>Situated on a slight knoll on a general slope down to south and south-west where there is a view of a corner of Belhavel Lough. Drumlins c.500m to south-west and west; a ridge lies c.500m east-south. The site has heavy growth on the scarp defining the site.</p>

There are [illegible] ridges running across the site orientated 115°-295°, but they are not visible outside the fort. The site is currently a raised platform defined by the scarps (dimensions 26.30m NW-SE, 20m NE-SW). The scarp varies in height from virtually nothing at the north-east to 1.50m at the south-west. However, across the centre of these scarps an interrupted horizontal line of stones can be seen. These are possibly the outer edges of a stone clad ringfort wall. Support for this interpretation occurs at the north-east where both inner and outer faces of a bank are in evidence, creating a bank which is 1.40m wide. This creates external dimensions of 30m NW-SE and 24m NE-SW. There is no trace of a fosse and I doubt if there ever was one. There is no evidence for an original entrance. The interior is slightly domed and on the north-west and north, the site is slightly [illegible] by the field fence for a length of 16m.

(OPW Field Report 15/08/'91)

SMR No.	LE015:109
Townland	Tullinwillin
Barony	Drumahaire
Parish	Killarga
Site Type	Cashel
NGR	18913/33102
Altitude	500'-600'
Classification	C
Area of Interest	30m
Distance	c.1200m SW of SW site boundary
Suggested Impact	N/A
Description	<p>The site appears on the 1st edition 6" Ordnance Survey map 1836 and on the 3rd edition 6" O.S. map 1910. Situated at the eastern end of a ridge orientated 60°-240°. Slightly higher ground to the south-west. Land slopes down to the east where there is a river valley. Land further to the east rises steeply and is forested. Only the foundations survive. The ground is rough with heather, moss and rough grass.</p> <p>The site is exactly as marked with regard to neighbouring stone wall boundaries. The site is an oval area (internal dimensions 39m E-W, 29.70m N-S). It is defined by one course of a stone wall (width 1m-1.50m) which is mossed except the E-SW area where some of the stones are longer than the usual football size and are laid length wise with the long axis pointing towards the interior. The wall is rather disturbed at the west end. There is no entrance. There is an angle in the wall at 335° where it meets the line of a field wall. There is also a bit of an angle at the east end of the northern stretch. It looks in fact as if the enclosure has been squeezed into by the line of the field wall.</p>

In the interior there are the possible remains of a house site. It has low walls, interrupted and uncertain in large measure (external dimensions 10m SE-NW, 4.30m NE-SW). Running north-east from this [is] a line of stone flags, standing on end (length 7.40m). There are [four] stones, some leaning over. They look like slabs of bedrock that got upended. They are not a straight alignment or a megalithic tomb of and sort. The slabs can be 0.60m to 1.50m long and up to 0.50m high. Due west of the house site at a distance of 11m is a cairn (diameter 4m, height 0.40m).

(OPW Field Report 16/08/'91)

SMR No.	LE015:108/01-02
Townland	Mullaghmore [Drum. By.]
Barony	Drumahaire
Parish	Killarga
Site Type	01: Court Tomb and 02: Enclosure
NGR	18881/33155
Altitude	600'-700'
Classification	B
Area of Interest	50m
Distance	c.1500m SW of SW site boundary
Suggested Impact	N/A
Description	The site does not appear on the 1 st edition 6" Ordnance Survey map, 1836 but does appear on the 3 rd edition 6" O.S. map 1910.

Situated in the middle of a coniferous forest, and probably on the top of a hill.

The site is in an atrocious condition. It has been planted with conifers which are 7-8m high with more seedlings.

Surprisingly the planting hasn't altered the shape of the site. The court is more or less as reported in the *Megalithic Survey*. Certainly the line of stones defining the court is readily identifiable although there may gaps. The rear chamber of the gallery is still visible although a line of trees intervenes the chamber and the court. A local man told me that many of the trees failed so presumably more were planted, although they probably refrained from planting the court.

To the north-west of the court tomb there is a rough oval enclosure congruent with the cairn. It is defined by a slight scarp on the north and west, away from the cairn with dimensions of 24m NE-SW, 16.50m NW-SE. It is undoubtedly later than the cairn and may have altered its shape.

The site was very hard to find in the forestry and no path has been left open in its vicinity.

(OPW Field Report 16/08/'91)

References

"Enclosed is a cairn in a fair state of preservation. The Chamber A is 18' long and 6' wide, formerly roofed. E and F being two of the roofing flags now lying displaced. B and D are two raised platforms with a fosse laid about 3' below the level of the platforms. C is probably the remains of an oval forecourt measuring 30' each way, and was apparently never enclosed in the cairn (Notes supplied by Mr Henry Morris, 01/07/38)".

(National Museum of Ireland Topographical Files)

"XI. Horned Cairn in Mullaghmore Townland, Parish of Killarga. Marked as two adjacent earthworks on the 6 in. O.S. Map Sheet 15, Co. Leitrim. 29 —" E. 6 3/8" S. Altitude 675 ft.

This fine horned cairn is situated on the summit of a large round hill commanding a most extensive view, extending

from Lough Allen on the south east to the sea at Sligo Bay on the west. This cairn was discovered by Mr Henry Morris, and it was he who kindly pointed out its site to us. Dr. Adolf Mahr in his Presidential Address to the Prehistoric Society (1937) mentions this horned cairn at Mullaghmore as being not yet verified (p. 426), but on his map (p. 339) he inadvertently transposes its site with that of the Horned Cairn at Kilnagarns Lower.

The cairn itself is of most peculiar design, being apparently two joint cairns forming as it were one complete whole. Moreover these two cairns are not in line with each other; the south-west cairn lies south-west and north-east while the east cairn lies west and east. The O. S. map makes the south-west cairn oval (see Map, Fig. 3), but it is doubtful if this were really the case. It was the larger of the two cairns.

At the north-east end of the west, or south-west cairn there is a burial chamber 25 ft. long which appears to lie E.N.E and W.S.W. At its south-west end it has been unroofed for a space of 6 or 7 ft., while the remainder of the chamber is entirely buried in cairn stones, though one side stone has been disturbed. Some stones which are probably roof stones lie in disorder on the top of the chamber and outside it, so it is impossible to say whether or not the chamber is divided by any partitions (see Plate XVIII., Fig. 3). The portal stones which measure respectively 3 ft. 5 ins. and 3 ft. 2 ins. in height form the entrance from a horned forecourt approximately 32 ft. deep by 32 ft. wide. See rough Plan XI, Fig. 1.

The East Cairn

Both portals and horns are contained within the east cairn, which measures, from the outside of the portals to the eastern kerb, about 68 ft. in length, while the south-west cairn measures about 110 ft. from the inside of the portal stones to the western kerb. The portal stones are about 1 ft. 5 ins. and 1 ft. 3 ins. thick, which makes the total length of both cairns together some 180 ft. Eleven orthostats survive in the North Horn and nine remain in position in the South Horn. The Northern Horn is very straight, the Southern one being less so, but the general appearance of the forecourt is somewhat stirrup shaped (see Plate XIX, Fig. 1 and Plan XI). The Northern Horn bears a striking resemblance in shape to the horned Forecourt at *Cashtal-yn-Ard*, Isle of Man, but there are five burial chambers while here the exact number is unknown. The Southern Horn recalls the forecourt at *Clady Halliday*, Co. Tyrone, but there are three chambers. It is also of interest to compare this forecourt with half the oval central courts of the long Cairns at the Deepark and at Creevykeel, Co. Sligo. But at Mullaghmore though the distance from the portal to the eastern kerb measures 68 ft., no trace can be seen of the horns having continued to form an oval central court, with an entrance passage at the south side or east end. Instead the south horn undoubtedly terminates in a row of upright stones at right angles to the horn with a row of smaller stones immediately behind it. This forms a revetment, and beyond the North Horn there would seem to be traces of two corresponding rows of Cairn Stones

which may have formed a rather similar sort of revetment, but this is far from certain. The east cairn would thus have been divided into two halves, the west half comprising the portal, horned forecourt, and east end of the heaped cairn, and the eastern half consisting apparently of a flat sealing of cairn stones stretching to the eastern kerb. The east and west cairns were each surrounded by a low kerb or peristalith, which intersect in line with the portal stones of the chamber. It is impossible to establish the original width of the south-west cairn. But is doubtful it were really oval. Much of its south-east edge has been removed to form a field wall, but it measures 67 ft. from the centre of the burial chamber to its northern edge. The O.S. Map shows the east cairn to be some 60 to 70 ft. in width and its length in the centre must be about 70 ft. This double cairn though disturbed in some places is remarkably intact in others, and it is quite possible that west of the main chamber there may be further chambers burial cists still buried in the cairn".

(Richardson P. & Lowry-Corry D. 1940 "Some further Megalithic Discoveries" in *JRSAI* vol. 70 pp. 178-180)

"26. Mullaghmore. O. S. 15:8:1 (76.0cm, 44.3cm). Shown as two adjoining mounds. Not named. OD 600'-700'. G 889 317. Fig. 44. Plate 25.

Court-Tomb

The monument is situated on top of a large rounded hill about 1 1/2 mile east of Killarga village. The site commands an extensive panoramic outlook across drumlin country from Sligo bay and Knocknarea towards the north-west to Keshcorran and the Bricklieve Mountains in the south-west and around to Lough Allen towards the south-east. Much of the rolling hill country in the vicinity of the tomb was under cultivation until relatively recent times and the valleys sheltered small farmsteads now largely ruined and deserted. Large tracts of land in the vicinity, including the hill on which the monument stands were recently planted with young trees.

The monument is well preserved but deeply embedded in the boggy ground. Its main axis is approximately NE-SW. It consists of a long cairn, enclosing at its more eastern end a deep U-shaped court, leading to a gallery which is largely concealed by peat and overlying debris. Though the greater part of the cairn is still present, beneath the surface, the hummocky nature of the ground makes reliable definition impossible. The presence of a stone fence to the south and forestry drains at the north and west adds to the difficulty of interpretation. However, the cairn is certainly long-at least 30m, and possibly up to 40m-and the general indications are that it was widest at the court end and tapered towards the south-west. The cairn is shown on the O. S. 6" map as two distinct conjoined mounds and accepted as such by Richardson and Lowry-Corry but this interpretation does not seem to be borne out by the surface evidence.

The court is about 9m long east-west, 9.60m wide at the north-east and narrows to about 7m wide at a point 1m in front of the entrance to the gallery. Both arms of the court

are well defined by orthostats, ten stones being in the position at the north and nine at the south. These average 0.95m in length, 0.25m in thickness and 0.50m in height. The court stone flanking the displaced entry jamb at the north is 1.05m high and rises 0.45m higher than the jamb. Two loose stones along the line of the southern arm of the court are probably displaced orthostats. The more easterly of these lies prostrate and is 0.95m in maximum dimension. The other, which rests against the second court stone, beyond the entrance to the gallery, is 1.15m in maximum dimension. A stone, 0.70m long, 0.20m thick and 0.40m high, set at right angles to the outermost stone of the southern arm of the court, may mark the articulation of the court with the façade.

The entrance[s] to the gallery is between two court stones which serve also as entrance jambs. The jamb at the north is twisted out of position. It is 0.85m long, 0.45m thick and 0.75m high. The southern jamb is 1.05m long, 0.40m thick and 0.50m high. Westwards from the entrance, for a distance of about 5.00m, the gallery is completely concealed by debris. One slab here (shown on plan) at the south, appears to be a corbel *in situ*. It measures 1.25m by 1m and 0.20m thick. Beyond the debris three orthostats, forming the western end of the gallery, are exposed. The sidestone at the north is at least 2.20m long, 0.35m thick and 0.80m high. A displaced stone, 1.45m in maximum dimension, lying at its eastern end, and another, 1.20m in maximum dimension, lying beyond it to the south, may be corbel stones. The backstone is 1.80m long, 0.40m thick and 0.90m high. The gallery measures 7.50m long and is about 1.70m wide at the east. The number of chambers in the gallery cannot be determined but the length suggests two, or less likely three".

(De Valera and O' Nuallain 1972 "Survey of the Megalithic Tombs of Ireland" pp. 67-68)

SMR No.	LE015:060/01-02
Townland	Gortermone [Drum By.]
Barony	Drumahaire
Parish	Killarga
Site Type	01: Cashel and 02: Souterrain
NGR	18820/33272
Classification	C
Area of Interest	30m
Distance	c.1130m NW of NW site boundary
Suggested Impact	N/A
Description	No details in file.

SMR No.	LE015:062
Townland	Gortermone [Drum. By.]
Barony	Drumahaire
Parish	Killarga
Site Type	Court Tomb
NGR	18874/3323
Altitude	600'-700'
Classification	B
Area of Interest	50m
Distance	c.500m NW of NW site boundary
Suggested Impact	N/A
Description	<p>The site does not appear on the 1st edition 6" Ordnance Survey map, 1836 but does appear on the 3rd edition 6" O.S. map 1910.</p> <p>Situated on a slope down to the south, just above a flat boggy area.</p> <p>The area around the site is planted with conifers (height 1m-1.50m).</p> <p>The conifers are not planted in a triangular area around the visible stones of the monument with a minimum clear area of c.3m. The tomb is exactly as recorded by the <i>Megalithic Survey</i> and has not altered in any way.</p> <p>(OPW Field Report)</p>

References

"25. Gortermone. O.S. 15:4:1 (75.4cm, 60.1cm). 'Giant's Grave' O.D. 600'-700' G 887 333.

Court-Tomb

The monument lies some two miles north-east of Killarga village. It is situated on a low ridge, near the head of a little valley at the southern end of the Tullysheherry uplands. Eastwards from the site the ground falls for about 200 yards to the floor of the valley and then rises to the desolate, boggy heights of the Lackagh hills. About 200 yards westwards from the monument a low rocky ridge forms the skyline. Much of the land in the area is wet and rush-grown but provides some grazing for sheep and cattle. Some small trees grow in sheltered places.

The monument is very ruined. The principal features consists of the remains of a gallery about 6m long and 2m wide, orientated roughly north-south, with the entrance at the north. A line of four stones (hatched on plan) north-west of the entrance may represent the arm of a court but two stones here are set at an unusual angle. There are no traces of a mound visible around the structure.

A tall pillar-like jamb stands at the eastern side of the entrance to the gallery. It measures 1m by 0.70m and is 1.60m high. Opposite this is a low stone, 0.80m by 0.50m and 0.35m high, which could be the stump of a second jamb but this stone is not certainly *in situ*. The gap between the two stones is 0.65m. Immediately south of these is a displaced stone 0.50m in maximum dimension. Both sides of the gallery are represented by two orthostats. The more northerly stone on the eastern side is 1.20m long, 0.30m thick and 0.80m high, and the stone next to

this is 1.65m long, 0.30m thick and 0.65m high. At the opposite end of the gallery the stone at the north is 1m long, 0.40m thick and 0.40m high. The southern end of the gallery consists of two stones, 0.15m apart, which may be fragments of a single split stone. That at the east is 1.05m long, 0.40m thick and 0.70m high and the other is 1m long, 0.45m thick and 0.90m high.

The outermost stone of the presumed court is approximately 6m from the entrance to the gallery. It leans to the west and is 1.20m long, 0.65m thick and 0.95m high. The stone next to this is 0.45m by 0.20m and 0.15m high. The two stones closest to the gallery are set lengthways and at right angles to the normal setting of court orthostats. The more northerly of the two is 0.70m by 0.30m and 0.40m high and the other is 1.25m by 0.45m and 0.75m high. About 1m eastwards from these is a displaced prostrate stone, 1.35m in maximum dimension. A small point of stone at its north end is 0.10m high.

The remains of the monument are insufficient to permit classification with certainty but the tomb is very probably of the Court-tomb class and an interpretation as such would be in accordance with the existing evidence. The court appears to have been of somewhat unusual construction but the court at Keadew East (Ro. 2) may be analogous".

(De Valera and O' Nuallain 1972 "*Survey of the Megalithic Tombs of Ireland*" pp. 66-67)

"X. Horned Cairn on Gortermone Townland, Parish of Killarga. Marked on the 6 in. O.S. Map Sheet 15, Co. Leitrim, as 'Giant's Grave' 291/2" E. 1/8" S. Altitude 690 ft. This megalithic structure is much ruined but it would appear to be the burial chamber of a horned Cairn lying N.N.E. and S.S.W. and with a forecourt of somewhat peculiar shape (see Plan X, Fig. 1 and Plate XVIII, Fig. 2). The burial chamber, which in its present condition appears to be 21 ft. long and 6 ft. wide, is decidedly imperfect, and it would seem as if two stones from each side wall must be missing (see Ground Plan). The side stones vary in height from 1 ft. 3 ins. to 3 ft. and the stones which close the S.S.W. end are 2 ft. 6 ins and 3 ft. in height. One horn of the forecourt remains and is 25 ft in length. No trace can be seen of the opposite horn; there is however N.N.E. of the S.E. wall of the chamber a very large standing stone 5 ft. 6 ins. in height, on which there are two bullaun marks. Owing to the extremely ruined condition of the chamber, it is impossible to determine with any degree of certainty what function, if any, was served by this remarkable stone, or if the chamber was so irregular in shape that this stone could either have been the portal stone or the base of the missing horn. Three other stones lying in the forecourt are apparently broken stones which probably belonged to the chamber.

It is of interest to compare this forecourt with that of the large cairn at Clontygora, Co. Armagh, a ground plan of which was published in the *Proceedings and Reports of the Belfast Natural History and Philosophical Society* for 1936-7, and again in the *Ulster Journal of Archaeology*, 3rd Series, Vol. 2, part 2, July 1939, p. 164 in a very

interesting paper by Mr Oliver Davies on the "*Horned Cairns of Sardinia*", in which he compares these Horned Cairns with those of the North of Ireland.

At Gortermone little trace is left of the cairn itself, which has very likely been used to build the surrounding field walls, and perhaps some neighbouring farm buildings. There are several standing stones in the vicinity".

(Richardson P. & Lowry-Corry D. 1940 "Some further Megalithic Discoveries" in *JRSAI* vol. 70 pp. 177-8)

SMR No.	LE016:001
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	180m SW of T28 300m SE of T24 220m NE of T25
Suggested Impact	<i>Within Proposed Development Site</i> Negligible Impact
Description	N/A

SMR No.	LE016:002
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	90m S of T26 T27 located <i>within zone of archaeological potential</i> T31 located <i>within zone of archaeological potential</i>
Suggested Impact	<i>Within Proposed Development Site</i> Possible Minor Impact
Description	N/A

SMR No.	LE016:005
Townland	N/A
Barony	N/A
Parish	N/A
Site Type	DELISTED
NGR	N/A
Classification	N/A
Area of Interest	N/A
Distance	260m S of S site boundary
Suggested Impact	N/A
Description	N/A

Topographical Files of National Museum of Ireland

The following is a list of stray finds taken from the Topographical Files of the National Museum of Ireland and provenanced to townland read in conjunction with the methodology section above.

The proposed Wind Farm development is located principally within the townland of Lackagh, Co. Leitrim as well as the townlands of Boleybrack, Buckhill Barr, Meenymore and Dergvone, Co. Leitrim. There were no stray finds identified from these townlands or from the adjacent townlands of Barlear to the north-east, Gowlaun to the south, Tullinloughan to the west, Tullinwannia to the south-west, Tullynamoyle to the south-west or Tullynasharragh to the west.

The nearest stray find dating to the Bronze Age period (2300 BC to 600 BC) is recorded from the townland of Larkfield to the north-west of the proposed development site as follows:

Townland	Larkfield
Parish	Drumahaire
Barony	Cloonlogher
County	Leitrim
Reg. No.	1941:330
Find(s)	Bronze Spearhead
Acquisition	Purchased together with other objects from Mr Henry Morris, 161 Howth Road, Dublin
Description	Remarkable for long stem and wide wings, loops outside blade, no rivet holes. Found on the top of Larkfield mountain near Manorhamilton, Co. Leitrim. Presented to me by Capt. White, Newtownmanor.

Special Areas

Specifically, section 2.11.6 of the Development Plan deals with "**Natural Heritage Areas**":

"It will be the Council's policy to protect the areas designated in Appendix D against development or activities which would endanger their preservation and to promote selected sites for educational or amenity purpose".

(Leitrim County Development Plan 1997-2002, 15)

Section 2.11.7 "**Visual Amenities**" and section 3.3 "**Preservation of Amenities**" of the Leitrim County Development Plan 1997-2002 outlines the Council's policy regarding the preservation and enhancement of the environment under the following headings:

Sections 2.11.7e and 3.3.4	Monuments and Areas of Archaeological Interest
Sections 2.11.7f and 3.3.5	Buildings of Architectural and Historical Interest

"The Council's policy will be to develop Amenity schemes in selected areas; maintain to a high standard those already existing; operate systems of planning control related to landscape quality and development pressure; and facilitate economic ventures deriving from local enterprise projects based on visitor servicing".

(Leitrim County Development Plan 1997-2002, 16)

In addition:

"As a general rule new development in these areas not directly associated with the needs of agriculture will be resisted. Where exceptions are permitted the highest standards of design, landscaping and compatibility must be satisfied".

(Leitrim County Development Plan 1997-2002, 21)

The following were examined for the purposes of this report in relation to the proposed development site:

- Appendix D Natural Heritage Areas*
- Appendix E Monuments of Archaeological Interest*
- Appendix E/1 Monuments of Special Archaeological Interest*
- Appendix F/1 Buildings of Architectural or Historical Interest-List One*
- Appendix F/2 Buildings of Architectural or Historical Interest-List Two*
- Appendix M Archaeology*

Appendix L specifically outlines development in respect of "Energy, Wind and Water generated sources":

"In respect to wind-farm energy generation the Authority will require detailed information to Environmental Impact Assessment standard in submission on large scale installation proposals with significant environmental impact.

The Authority, in their assessment, will have regard to visual impact, noise, electro-magnetic interference, ecological impact, safety, land use and construction impact. Control conditions attaching to any grant of permission may include requirements on safety, location with respect to sky lines; unit design and colour; blade rotation and turbine positioning; power lines and access roads; acoustical design and noise levels; electro-magnetic interference suppression; flicker control; ecology; archaeology; geology and heritage preservation.

Proposals in or close to Areas of Outstanding Natural Beauty and High Visual Amenity, urban settlements, Natural Heritage Areas, archaeological sites and other protected areas will require the highest standard of documentation and a complete justification".

(Leitrim County Development Plan 1997-2002, 47)

Placenames**County**

Leitrim "or in Irish *Liatroim* meaning 'grey ridge'. The county name is that of the village, close to the river Shannon, which marks the county border. The 'ridge' would be the rising ground east of Leitrim".

(Room 1994, 83)

"*Lia/liath* means simply 'grey' and can go before the noun it qualifies in compounds as well as after it. It appears before its noun in Leitrim, Cos. Down and Leitrim, *Liatroim* or *Liath Dhroim*, 'Grey Ridge'.

(Flanagan & Flanagan 1994, 110)

"Many placenames in Ireland incorporate the word *druim* which literally translates to 'back'. In this context *druim* would signify a natural ridge in the land; e.g. *Druim fhada* would mean 'Long ridge'. In some areas the 'd' sound softened over the years to a 't' sound. This is the case with Leitrim, the full name of which derives from *Liath-dhruim* meaning 'Grey ridge'. It is now spelt *Liatroim* or Leitrim in the English".

(Connors 2001, 61)

Barony

Drumahaire "What kind of malignant beings formerly tormented the people of Drumahaire in Leitrim, it is now impossible to tell; and we should be ignorant of their very existence if our annalists had not preserved the true form of the name-*Druim-da-ethiar* [*Drum-a-ehir*; Four Masters], 'the ridge of the two air-demons' (*ethiar*, pron. *Ehir*, 'an air-demon').

(Joyce 1995 ed., vol. i, 194)

Parish

Killarga or in Irish '*Cill Fhearga*' meaning 'St. Fearga's church'.

(Room 1994, 73)

Townlands

Lackagh "Lackagh or in Irish *Leacach* meaning 'place of flagstones'.

(Room 1994, 81)

Boleybrack "Boley or in Irish *Buaile* meaning 'summer pasture'.

(Room 1994, 29)

Buckhill Barr "'Barr' or hill top".

(Flanagan & Flanagan 1994, 27)

Meenymore "The word *mín* [meen] signifies fine or smooth, and it has several other shades of meaning. Topographically it is often applied to a green spot, comparatively smooth and fertile, producing grass and rushes, on the face of a mountain, or in the midst of coarse rugged hilly land. It is used all over Ireland, but is far more common in Donegal than in any other part of the country. There are upwards of 230 townlands whose name begin with this word, in the anglicised form of *meen*, about 150 of which appear in Donegal alone, 36 in the rest of the Ulster counties, and something over 40 in the other three provinces".

(Joyce 1995 ed. vol. ii, 536, 400)

Dergvone no placename derivation found.

The Archaeological Landscape

What follows is a chronological overview of the main time periods in Irish prehistory and history with specific references to the archaeological sites found within and in the vicinity of the proposed wind farm development.

The Neolithic 4500 BC to 2300 BC

The dawn of the Neolithic Period in Ireland heralded the introduction of agriculture and associated forest clearance. It was likely introduced by colonists from Britain and the continent, who gradually replaced/assimilated the indigenous Mesolithic population. Neolithic farmers practised small scale mixed agriculture with an emphasis on livestock including cattle, sheep and pigs. Crops appear to have fulfilled a secondary role and included mainly wheat and barley. Despite the advent of agriculture, forest resources such as wild pig, red deer and hazel nuts remained an important aspect of the Neolithic economy. Pollen evidence suggests that forest clearance began initially at a small scale but eventually became widespread by around 4000 BC. By the end of the Neolithic Period most of the island was inhabited, with settlement focused on higher ground and hill slopes where the forests were thinner and thus easier to clear and the soils lighter and easier to till (Aalen 1978, 53-58).

Settlement data from the Neolithic is quite scarce, with the archaeological record for the period being overwhelmingly dominated by monumental structures, most of which are mortuary related. Known as Megalithic tombs, these monuments are found all over Ireland and are divided into four main types, court, passage, portal and wedge tombs, all of which have specific characteristics and distributions throughout the country. There are two megalithic monuments recorded in the vicinity of the proposed development area. These include SMR LE015:108/01 located c.1500m south-west of south western site boundary in the townland of Mullaghmore [Drum By.] and SMR LE015:062 located c.500m north-west of north western site boundary in the townland of Gortermone.

Court tombs have a markedly northern distribution particularly in the counties of Mayo, Sligo and Donegal as well as in Counties Down and Louth. Their name is attributed to the 'court-like' area from which access is gained to the tomb chamber. The tomb or gallery is built of orthostats with long straight sides revetted by large upright orthostats and covered by a cairn (O' Kelly 1989, 86-87). The excavation of these tombs have revealed deposits of both cremated and unburnt human bones, although cremated remains predominate. They often contained the remains of a number of individuals in addition to animal bones and artefacts including primarily pottery.

The Bronze Age 2300 BC to 600 BC and The Iron Age 600 BC to 400AD

These periods constitute the later half of the prehistoric period in Ireland. Their occurrence is based primarily upon the introduction of metal working technology to Ireland, copper and bronze initially followed by iron.

Whereas forest clearance in the Neolithic was characterised by small scale, sporadic episodes, followed by lengthy periods of forest regeneration, The final Neolithic and Early Bronze Age landscape shows signs of widespread deforestation associated with the growth of blanket bog in upland areas and the colonisation and clearance of lowland areas (Aalen 1983, 365). This is mirrored by the distribution of sites dating to this period. As in the previous period, many of the sites dating to the Bronze Age were related to mortuary functions and include cist burials, alone or in cemeteries, cairns, barrows, ring barrows and ring ditches.

Standing stones constitute a common feature of the Irish landscape and are found throughout the country. They consist of upright stones, 1m to 3m in height and are difficult to date precisely as their excavation very rarely reveals any related features which may yield datable material. However, they are commonly believed to be features of the Late Neolithic/Bronze Age although examples dating to later periods are certainly known. In fact they are still being erected today for use as cattle scratchers. Their function is similarly ambiguous. Some have been found associated with Bronze Age burials and megalithic tombs but most have no related archaeology and may very likely have been used as markers of territorial divisions (O'Kelly 1989, 228). Standing stones occurring in alignments and circles are also well known in Ireland and may have been used to mark astronomical events and/or were used for ritual purposes. There is one standing stone recorded from the study area including SMR LE016:003 located c.640m south of southern site boundary in the townland of Tullynamoyle to the south of the development site.

The Iron Age represents the final stage of Ireland's prehistory and one of the most enigmatic. Beginning with the introduction of iron technology around 600 BC and ending with the introduction of Christianity in the 5th century AD, the Iron Age is characterised by the general absence of known settlement types, burial forms and pottery in addition to the uniqueness of the period in comparison to its contemporaries in Britain and on the Continent and in general, its apparent continuity with Late Bronze Age (Cooney and Grogan 1994, 200-202; O'Kelly 1989, 245). All of this evidence runs contrary to the popular image of the Irish Iron Age as the time in which Ireland became "Celtic", with the invasion of successive waves of people from the continent as is outlined in the Mythological Cycles (O'Kelly 1989, 252-255). There is no archaeological evidence for a large scale population intrusion during this period and the major external influence on Ireland may have been Roman-Britain (Cooney and Grogan 1994, 200-202).

The Early Christian Period AD 400 to AD 1167

The beginning of this period is marked by the coming of St. Patrick and the introduction of Christianity to Ireland and the end by the Anglo-Norman invasion. The Early Christian Period is often viewed as Ireland's Golden Age and is characterised by the construction of numerous ecclesiastical sites including churches, monasteries and round towers in addition to a flourishing of knowledge, writing and art.

Ringforts and their stone counterparts, cashels, constitute the most common of all monuments in the Irish landscape with numbers in excess of fifty thousand. They consist of circular enclosures 25m to 60m in diameter bounded by earthen banks or stone walls and an external ditch. They occur in all areas throughout the country with nearly every townland having one or more example. They are commonly believed to have been enclosed farmsteads with internal structures for habitation and likely held livestock as well. However, the excavation of ringforts often reveal no internal structures and thus many were likely used primarily for holding livestock. A common feature associated with ringforts and cashels are souterrains. These are man-made underground passages and chambers frequently found within ringforts. They are also found in association with other early medieval sites such as promontory forts, open settlements and ecclesiastical sites (Edwards 1996, 29). There are two suggested functions for souterrains: (i) they acted as a place of refuge and (ii) utilised for storage (Ibid, 30). The excavation of ringforts often reveal no internal structures and thus many were likely used primarily for holding livestock. There are three cashels recorded from the study area including SMR LE012:033 located c.740m north of northern site boundary in the townland of Meenymore; SMR LE015:109 located

c.1200m south-west of south western site boundary in the townland of Tullinwillin and SMR LE015:060 located c.1130m north-west of north western site boundary in the townland of Gortermone.

In addition, there are two souterrains known from the study area including SMR LE012:033/02 located c.740m north of northern site boundary in the townland of Meenymore and SMR LE015:060/02 located c.1130m north-west of north western site boundary in the townland of Gortermone. Both of these sites are associated with cashels. Likewise, the ringforts, cashels and *crannogs* of the Early Christian Period may in fact date to earlier periods. Precise dates for these sites will only be obtainable through excavation. Many of the other, less well defined sites including enclosures and earthworks may date from the Early Christian Period or earlier. There are two enclosures recorded from the surrounding landscape to the proposed development including SMR LE015:129 located c.1600m south-west of south western site boundary in Tullynacross townland and SMR LE015:108/02 located c.1500m south-west of south western site boundary in the townland of Mullaghmore, Co. Leitrim.

General History

"With the fall of the Brehon power in North Connaught came the great divider Sir John Perrott who formed the present County Leitrim. He was then Lord deputy in Ireland and entering into agreement with the Bishops of Kilmore and Ardagh, as well as the following secular rulers; O' Rourke of Dromahaire, O' Connor, MacRannall of Muintir Eolais and Tadhg Óg McClancy of Dartry, he enforced and defined the boundaries of the future County which he called Leitrim.

He completely ignored the ancient divisions, for what now comprises Leitrim was previously Breifne Ui Ruairc, part of McGuire's territory, Muintir Eolais of the Reynolds Clan bordering on Longford and McClancy's country as far as the Drowes river. Perrott also did not include all Breifne Ui Ruairc in the new county, for O' Rourke's territory extended right up to Glan Gap in the Cuilceagh Mountains and down to meet McGuire's Fermanagh at the present Blacklion village.

Two large divisions of what is now North Leitrim were Muintir Kenny lying between Lough Allen and the Roscommon border and Clan Fearmaighe which comprised all the wide valley of the present Glenfarne. The ancient ruling family of Glenfarne were of the Maccagadhain Clan. The *Annals of the Four Masters* tell us that Gillapatrik MacCagadhain, Chief of Clann Fearmaighe died in 1217. But no trace of the family now remains in Glenfarne.

The old territory of Glenfarne is twice mentioned in the *Annals*: 'In 1349 great war arose between Ruaidhre O' Connor Sligo and Feargal McDermott. Mac Dermott assembled the foreigners and Gaedheal of all Connaught and the Cineal Conaill of Donegal so that Ruaidre was forced into Glenfarne where the foreigners and Gaedheal could do nothing to him and they had to leave him there and retire when he burned the greater portion of *Magh Luirg* after them'. A second reference occurs under the date 1388 in the *Annals*, 'Hostilities and a great war broke out between the Clann Donough and O' Rourke about the right to the district of Clann Fearmaighe'".

(Ó' Rúnaí 1996, 64-65)

The proposed wind farm development is located within the western portion of what is known as the "Glenfarne Plateau", in the parish of Killarga and the barony of Dromahaire:

"The Glenfarne Plateau is U-shaped with its base facing north-west abutting the O' Donnell's Rock area. Its highest points attain 400m/1300ft over large areas though the

plateau nowhere reaches 450m/1500ft providing long views in all directions. The higher ground is protected by a bulwark of low cliffs or by ramparts of sandstone boulders above which the ground is firm".

(Herman 1993, 48-51)

In the early 1990's much of the south-west portion of the plateau was covered by forestry plantations with forest tracks providing access to the area. The "*Two Sisters*" refers to two rocks, "large compared to the others around and appearing as if they formerly constituted one really massive boulder that has been cleft in twain" (Herman 1993, 51). On the way north-east of Tawnylea to the development site, the site of a disused ironworks is noted:

"From 1852 to 1858 ironstone was mined on the south-west slopes of the Glenfarne Plateau. The ironworks consisted of two large blast furnaces, a steam-engine and engine house and ancillary buildings. The enterprise went bankrupt in 1859 as did another company on the same site shortly after. This latter company used local turf for smelting, a native fuel. A cannon constructed here saw service in the Crimean War. In addition, the "*Ha'penny Bridge*" in Dublin is constructed from iron made in these works".

(Herman 1993, 51)

The parish of Killarga or '*Killarge*', '*Killargue*' is quite mountainous with many scenic views:

"There are two portions of the parish especially rich in scenic views. The one is, that stretch of mountain known as O' Donnell's rock and in Larkfield townland quite close to the main road into Manorhamilton, a mile away. The second portion is that stretch of mountain with further down the valley the pleasing water-sheet, Lough Belhavel. Its title is french; its original name was Lough Clean. This lake is unusual in that it sends water from opposite ends.

Limestone is the predominant formation in this parish. Around Killarge village the formation is drift covered carboniferous limestone. Here there are very many of those peculiar hog-backed hills or drumlins-which render tillage so difficult. O' Donnell's Rock in Larkfield is carboniferous limestone, in spots peat covered with slight drift on its northern slope. It has caves. Caves also in Boggaun mountain. Leaca townland and adjacent mountain areas are of carboniferous limestone. There are traces of coal, some surface seams with many slips and faults. There are tunnel-like caves in Shancarrick in James Kelly's land. Caves are limestone with much water action".

(I.T.A. Topographical and Genral Survey, 1)

Samuel Lewis in *The Topographical Dictionary of Ireland* describes the parish of Killargy during his travels in 1837 as follows:

"Killargy, a parish, in the barony of Dromahair, county of Leitrim, and province of Connaught, 4.50 miles (S.W. by S.) from Manorhamilton, on the road to Carrick-on-Shannon; containing 4409 inhabitants of which number 110 are in the village. This parish, including a portion of Lough Clean, or Belhovel Lake, comprises 13,898 statute acres, of which 10,912 are apportioned under the tithe act. The land is generally good, and chiefly under tillage; the system of agriculture is improved; there is no waste land, except that what affords either turbary or indifferent grazing, but there is a large portion of bog; there are some quarries of good limestone both for building and for agricultural uses. Fairs for livestock are held at Belhovel on Feb. 2nd, March 25th, Whit Monday, Aug. 15th, Sept. 8th and Dec. 26th. The living is a vicarage, in the diocese of Kilmore, and in the patronage of the Bishop, to whom the rectory is appropriate: the tithes amount to £60, of which £40 is payable to the bishop and £20 to the vicar. The church, towards the erection of which the late Board of First Fruits granted a loan of £1000, is a neat edifice, built in 1820. The glebe-house, towards which the same Board, in 1815, gave £100 and lent £600, is a good residence; and the

glebe comprises 288 acres. In the R. C. divisions this parish is the head of a union or district comprising also part of the parish of Clonlogher; the chapel is situated in the village. About 400 children are taught in four public schools, and there are three private schools, in which are about 220 children".

(Lewis 1837 (Reprint 1995), 126)

Cartographic Sources

A detailed examination of the 6" Ordnance Survey maps was carried out for the area along with a review of the associated historical maps available for the site (Figures A6-A9).

(Note: The Ordnance Survey map coverage is not very good for this area of County Leitrim. The 2nd edition 6" map (1883) was not available for photocopying at the time of research. In addition, sheet 16-1 for Co. Leitrim (1:2,500) O.S. map was never published by the Ordnance Survey of Ireland. The 1:2,500 scaled O.S. map was inspected for the purposes of this report. However, due to the size of the development the map was not reproduced in this report).

The earliest historical map portraying the area is illustrated by the Down Survey map c.1656 denoting the parish of Killarga in County Leitrim. See Figure A5. However, no detail is gained of the parish with only mountains shown. Hence no details can be gleaned about land use or occupation for the proposed development site within the parish of Killarga from the earliest mapping of County Leitrim. The western portion of the parish of "Killarga" is referred to under the ownership of "Sr. George Villers: his freehold" while the eastern portion of the parish is referred to as "Mountaine called Sargina Gally" and "Mount Gury" with "Munyneveigh & Darrigvone" (now Dergvon townland) depicted to the east. Belhavel Lough is illustrated to the south-west and referred to as "Cleane Lough". Tullynamoyle townland is located directly north-east of Belhavel Lough and referred to as "Garvelies, Tullynamoyly" while Altavra townland is located adjacent to Tullynamoyle townland in the south-east and referred to as "Altabraha Lisnagoivmby".

References

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- Lewis S. 1837 *The Topographical Dictionary Of Ireland* vols. i, ii and iii
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- Ó' Rúnaí L. 1996 *From Rosclogher to Rooskey: The Leitrim Story*
- Room A. 1994 *A Dictionary of Irish Place-Names*

Field Inspection

The proposed development site was inspected in the field on February 25th and March 5th, 2002 in an attempt to locate any low-visibility archaeological sites and to identify any areas of possible archaeological potential in which previously unrecorded features may exist. The inspection was also carried out to assess the nature of any upstanding remains on the site. The proposed access roads and proposed positions of wind turbines T1 to T13 were inspected on February 15th 2002 while the remainder of the turbines sites and associated access routes were inspected in the field on March 5th 2002.

A total of 31 no. wind turbines and related access roads are proposed, covering a substantial area of the western Glenfame plateau centred on Lackagh townland.

Due to the nature of the terrain across the proposed development site, field numbers were not ascribed. The following description is rather based upon the location of each individual turbine and its associated access road in its individual setting.

The field inspection was conducted from west to east following in numerical order the layout of the wind turbines. Thus the field survey is described in ascending order starting at T1 and finishing at T31, with the exception of T15, whose proposed location has been moved to north of T30 (Figure A1). Most of the proposed wind turbine positions are marked by wooden pegs and these were located using a site map and compass. In the case of those positions that did not have pegs the approximate position of the wind turbine was estimated. The wind turbines are generally spaced at intervals of 300m.

Field Survey (Plates 7.1-7.20)

Existing Access Track (Plate 7.1)

An existing gravel track is to be used to access the proposed development site. From the gate at the boundary of the site of the proposed development it heads eastwards uphill before meeting a fork. The left fork levels out and heads to the north and the proposed locations of wind turbines T1-T5. The right fork continues uphill to the east and the proposed locations of wind turbines T6-T31. One wind turbine is located directly on the track and does not require the construction of further access roads, T2.

Three features were identified to the west of the left fork of the existing track before it reached the proposed location of wind turbine T1 (Plates 7.2-7.4). While these features may be archaeological in nature, they do not resemble any known archaeological classification and are likely early modern in date. Two small, sub-oval, stone constructions are present at the base of the steep bank created by the construction of the track. The stones were covered in lichen in contrast to stones obviously displaced when the track was constructed.

Site A Stone construction 1 measures approximately 5m by 3m on a N-S axis. The whole outline is complete with no apparent entrance and on the eastern side a very roughly coursed wall survives five courses high and measuring approximately 1m high (Plate 7.2). The enclosure is approximately 44m to the south of the point where the large stream indicated on the O.S. map crosses the track.

Site B Stone construction 2 is located approximately 6m to the south of Enclosure 1 and measures 7m by 5m on a similar N-S axis (Plate 7.3). At the southern extent a curving line of stones indicates its limits. Around the remainder of the perimeter the stones are more intermittent though some of them are very large (up to 0.60m long) notably on the north-western side. Larger gaps exist on the west and east sides and either may indicate a possible entrance.

Site C A large platform of boulders is located 25m to the north of stone construction 1 on the western side of the track. This appears distinct from the track and is a fairly level collection of boulders, many greater than 1m in size. It extends for up to 10m on a north-south axis. In contrast to stones displaced in construction of the track, lichen is present on these boulders (Plate 7.4).

These sites are shown on Figure A13.

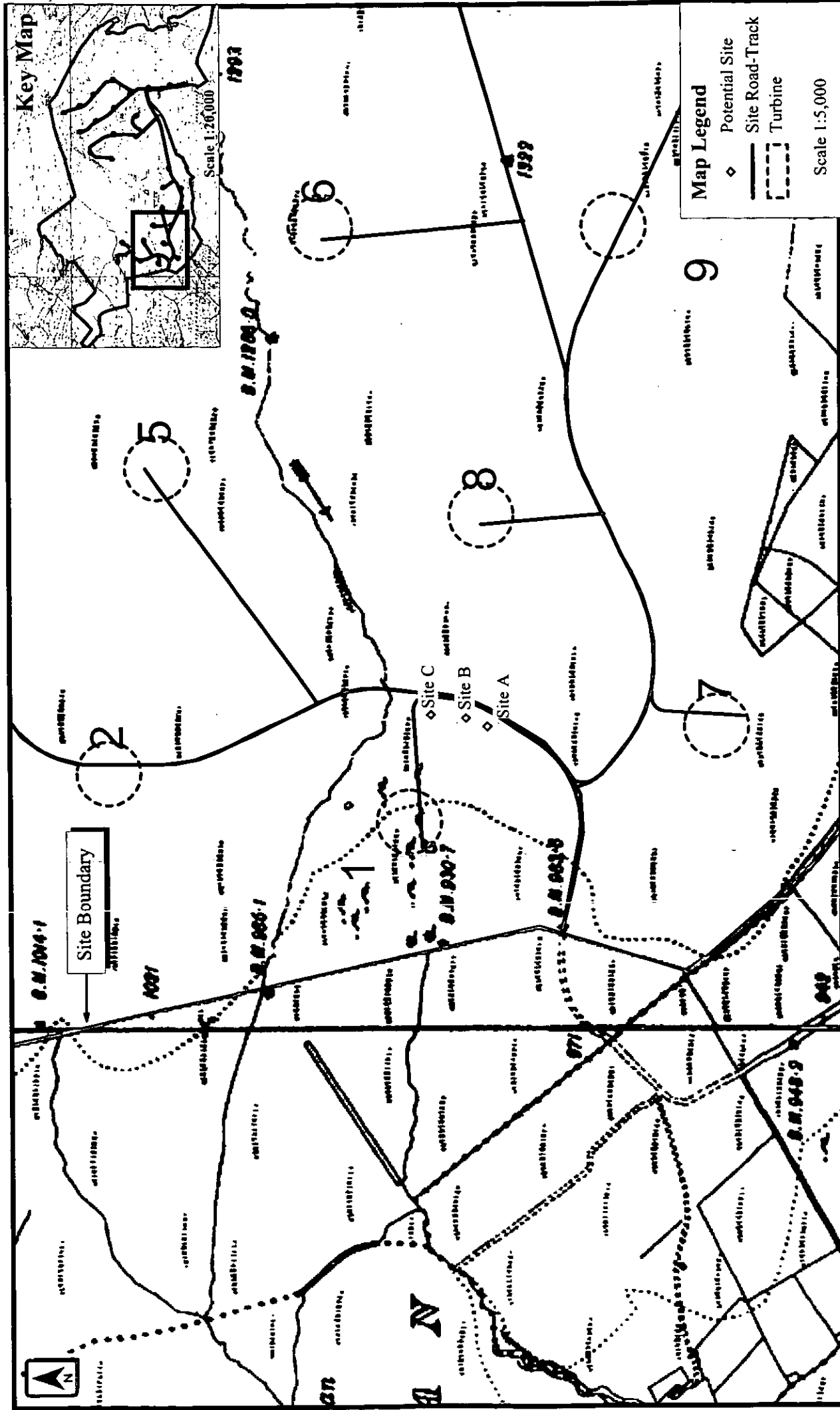


Figure A.13

Potential Archaeological Sites

Fehily Timoney & Company

Wind Turbine T1 (Plate 7.5)

The access to the proposed location of Turbine T1 is located close to the above-mentioned platform of boulders, to the south of the point where the stream crosses the track. It follows a steep slope of rough grazing and rushes to an area of scree, which is the proposed location of the wind turbine at about 300m O.D. A small derelict cottage is on the same slope to the north of the stream and the proposed location of the wind turbine. There was no peg at this location.

Wind Turbine T2

Access to the proposed location of the wind turbine T2 is gained along the existing track. A level platform on the western side of the track appears to have been cleared at the time of its construction and is the proposed location of the turbine. There was no peg at this location.

Wind Turbine T3 (Plates 7.6)

The gravel track ends further to the north and the line of the proposed access road crosses an abandoned area of turf extraction until it meets an eroded channel where the proposed access route to wind turbine T4 continues to the east. The eroded channel is followed down slope to the north. At a point just before a stream it turns to the west and crosses an area of heather, sedge and occasional moss to the proposed location of wind turbine T3. There was no peg at this location. The stream just to the north is the townland boundary between Lackagh and Buckhill Barr and approximately 50m of the base of a boundary wall survives on an island created by the stream. It is of dry-stone construction with occasional large stones and is mostly overgrown with heather.

Wind Turbine T4

The proposed access route continues eastwards then veers northwards and down slope to an area of heather and sedge on the edge of a bog. The proposed location of wind turbine T4 is at about 360m O.D.

Wind Turbine T5

The proposed access to the wind turbine is from the left fork of the existing gravel track to a point less than 100m to the north of the stream. The proposed route then follows a degraded channel upslope to the edge of intact bog, which is the proposed location of T5.

Wind Turbine T6

The proposed access to the wind turbine is to the end of the right fork of the existing gravel track, continuing for approximately 100m eastwards before turning to the north across an area of abandoned turf extraction to the edge of intact bog where T6 is to be located.

Wind Turbine T7 (Plate 7.7)

The proposed location of T7 is accessed from the right fork of the existing gravel track. At a point approximately 100m from the fork in the existing track, a proposed route leads down slope to the south across an area of grass, moss and rushes with occasional boulders to the proposed location of the wind turbine. There was no peg at this location.

Wind Turbine T8

This is accessed from the same branch of the existing gravel track. At a point more than 300m from the fork, a proposed route heads northwards across an area of grass, moss and rushes to the proposed location of T8. There was no peg at this location.

Wind Turbine T9 (Plate 7.8)

The proposed access route for this wind turbine and all subsequent turbines (except T10) uses the right branch of the existing gravel track. At the end of the existing track a proposed route heads to the south east across an area of grass, moss and rushes. The proposed location of T9 is approximately 150m from the end of the existing gravel track at about 380m O.D.

Wind Turbine T10

The proposed access route is the same as that for T6 as far as the point where this turns to the north. The proposed route continues to the east across an area where turf has been extracted to rock, then a wet area of heather and sedge. T10 is located approximately 450m from the end of the existing gravel track on the area of heather and sedge.

Wind Turbine T11

The proposed route for this turbine continues to the south-east from T9 across ground that becomes wetter with more moss and heather. The proposed location of the turbine is approximately 375m to the south-east of T9 on ground with similar vegetation.

Wind Turbine T12 (Plate 7.9)

The proposed access route continues to the east, then veers to the north-east at the proposed location of T13 (see below) across an area of heather and occasional moss. At approximately 150m north-east of T13, a partially degraded channel in the heather extending to the north-west for over 200m, leads to the proposed location of T12 at over 400m O.D. Lackagh Lough is visible approximately 100m away to the north-east from the proposed location of this wind turbine.

Wind Turbine T13 (Plate 7.10)

The proposed location of this turbine is in an area of mostly heather with outcropping rocks to the south which extend to a small peak to the south-west.

Wind Turbine T14 (Plate 7.10)

The proposed route continues upslope to the north-east from the junction of the proposed track to T12, then veers to the east. The vegetation is mostly heather with occasional clumps of moss. T14 is to be located on an area of slightly higher ground overlooking an area of bog to the east at about 400m O.D. Lackagh Lough is partially visible approximately 100m away to the north.

Wind Turbine T15

The proposed location of this turbine has been moved to the north of T30. It will be discussed in sequence following T30 (see below).

Wind Turbine T16 (Plate 7.11)

The proposed route from T14 to T16 continues to the east then veers to east-northeast for approximately 900m. It descends to skirt the edge of an area of bog, then ascends a boulder-strewn scarp and follows a fairly level shelf near the top of a crag at around 430m O.D. The shelf near the top of the crag is covered in heather with occasional grasses. T16 is to be located near the eastern most limit of this shelf. A prominent crag with a triangulation point is visible to the north. The proposed route to T26 continues to the east-northeast across an area of bog.

Wind Turbine T17 (Plate 7.12)

The proposed access to wind turbines T17-T21 is from a branch off the proposed track between T14 and T16. The proposed branch turns to the north approximately 150m before reaching T16 and ascends through degraded bog and heather to a gently sloping plateau at over 440m O.D. A proposed branch turns to the north-east then south-east towards T17 through an area of heather, occasional moss and boulders. T17 is proposed to be located in an area of heather, grasses and moss to the north of the prominent crag with the triangulation point.

Wind Turbine T18

The proposed track continues to the north across an area of heather and boulders to the proposed location of T18. There was no peg at this location.

Wind Turbine T19 (Plate 7.13)

The proposed location of this wind turbine is at the end of this particular branch after it passes the proposed locations of T20 and T21. The proposed route continues to the north after T18 and skirts the area of bog at the centre of the plateau, turning to the west then south. The proposed location of T19 is in an area of partially eroded bog to the west of the bog on the plateau. A small mast is visible to the north.

Wind Turbine T20

The proposed access route from T21 turns to the north-west following the northern limit of the bog at the centre of the plateau. A crag defining the north-western extent of the plateau is present to the north and west. The above-mentioned mast is present in the vicinity.

Wind Turbine T21

The wind turbine is to be located in an area of partially eroded bog to the north of T18 on the eastern side of the bog at the centre of the plateau. The small mast is visible to the north-west. There was no peg at this location.

Wind Turbine T22

The proposed location of this wind turbine is at the northern end of a proposed branch track to serve the proposed locations of T22-T25. The proposed route extends approximately 50m north of the proposed location of T26, follows a linear area of degraded bog and a stream which heads north, then north-west, after the proposed location of T25. The proposed location of T22 is in an area of bog and eroded bog through which a stream is flowing to the north-west in a channel. There was no peg at this location.

Wind Turbine T23 (Plate 7.14)

The proposed location of this wind turbine is to the south-east of T22 to the west of the same channel. The remains of a boundary fence are indicated by occasional metal poles inserted into the rock that is exposed in places.

Wind Turbine T24

The bog that the proposed route crosses between T23 and T24 becomes more eroded with bare rock more consistently exposed. Metal fence poles are present and it is possible that this area of exposed rock was created by a route to the abandoned mine workings to the south. The proposed location of T24 is immediately to the east of this eroded channel.

Wind Turbine T25 (Plate 7.15)

The proposed location of this wind turbine is to the south-east of T24 on a continuation of the exposed rock channel, close to the point where the rock outcrops. Heather, sedge, grasses and moss are all present in this area. A proposed route to T28 -T30 and T15 heads to the north-east from this point.

Wind Turbine T26 (Plate 7.16)

The proposed location of this wind turbine is approximately 50m south of the point at which the proposed track from T16 turns to the north towards T25. The proposed route crosses an area of heather towards abandoned mine workings to the south of the proposed turbine location. There are other probable mine workings just to the east of the proposed track between T25 and T26. This consists of a circular depression of approximately 5m in diameter, up to 1m deep, with a low mound of broken flat stones to the east and south. It has the appearance of a bell pit. This location is not recorded on the O.S. map in contrast to other mine workings in the area.

Wind Turbine T27 (Plates 7.17-7.18)

The proposed track continues to the south from T26 and crosses heather before reaching a recorded area of mine workings. These comprise three adits (horizontal shafts) and associated mounds of shattered flat stone (Plate 7.17). The entrances all face east along the base of outcropping rock on an N-S axis. There are also circular depressions similar to the one mentioned above. It is possible that there are two phases of mining in this area; an earlier phase represented by bell pits and a later phase by adits.

Approximately 20m to the south of the southernmost adit there is a small cairn of approximately 3m in diameter (Plate 7.18). This differs from mounds associated with the mine workings in that although comprised of flat stones, they are more weathered and have much more lichen indicating greater antiquity.

The location of T27 is on a mound of shattered stones probably associated with the mining. The proposed track continues to the south towards the proposed location of T31 (see below).

Wind Turbine T28

The proposed track from T25 heads to the north-east across heather then downhill to a fairly level natural shelf with a NW-SE axis at about 410m O.D. The land drops away sharply to the east from this shelf and the proposed location of T28 is in an area of heather and occasional moss. There was no peg at this location.

Wind Turbine T29 (Plate 7.19)

The proposed track follows the natural shelf to the north-west. The vegetation continues as heather and moss. The proposed location of T29 is similar to that of T28 and overlooks lower ground to the east.

Wind Turbine T30

The proposed track continues to the north-west along the natural shelf to the proposed location of T30 in an area of heather, grass and occasional rock. There was no peg at this location. The proposed track continues to the north-west towards the proposed location of T15.

Wind Turbine T31

The proposed track from T27 continues to the south along the ridge of outcropping rock. Further mounds of shattered stones associated with mining are present along this ridge and at the proposed location of T31.

Wind Turbine T15 (Plate 7.20)

The proposed location of this wind turbine has been moved to the north of T30. The natural shelf continues to the north-west at about 410m O.D. and the proposed location is in an area of grass overlooking Lough Kip to the east. There was no peg at this location.

Visual Impact on Archaeology

It must be stated that given the nature of the proposed development, a high visual impact on the surrounding archaeological landscape is to be expected given the height of the proposed wind turbines. However, the nearest significant cluster of archaeological monuments, comprising mostly enclosures and ringforts is located circa 2km to the west of the proposed development site, around Killarga village extending north towards Manorhamilton.

Given the proposed height of the wind turbines (100m) they are likely to be visible throughout the surrounding archaeological landscape.

1.4 Potential Impacts of the Development on Cultural Heritage

The proposed development does not impinge upon any upstanding, recorded archaeological monuments. However, the proposed development will affect a number of *delisted* archaeological monuments (SMR's LE012:034, LE016:001 and LE016:002; Figures A2-A4). As these monuments have been delisted, they are unlikely to be of archaeological significance. Furthermore, field inspection revealed that these sites are probably associated with early modern coal mining activities conducted throughout the area in antiquity.

The north-western site boundary of the proposed development is located c.500m south-east of the closest recorded archaeological monument, LE015:062 (Court Tomb) and hence is located well outside the zone of archaeological potential for the court tomb.

In addition, there were no stray finds identified from the proposed development site or from adjacent townlands in the vicinity of the proposed development site. The nearest stray find, dating to the Bronze Age period (2300 BC to 600 BC), is recorded from the townland of Larkfield to the north-west of the proposed wind farm development.

A number of potential archaeological features have been identified in the field including: (*Sites A-C* respectively; Figure A13).

Site A Stone construction 1

Site B Stone construction 2

Site C Platform of boulders

These three features were identified to the west of the left fork of the existing track before it reached the proposed location of wind turbine T1 (Plates 7.2-7.4). Two small, sub-oval, stone constructions are present at the base of the steep bank created by the construction of the track.

It must be stated that given the nature of the proposed development, a high visual impact on the surrounding archaeological landscape is to be expected given the height of the proposed wind turbines (100m). The nearest significant cluster of archaeological monuments, comprising mostly enclosures and ringforts, is located circa 2km to the west of the proposed development site, around Killarga village extending north towards Manorhamilton, Co. Leitrim.

1.5 Mitigation Measures

With regard to the proximity of the proposed wind turbines to the *delisted* archaeological site mentioned above, it is unlikely that they are of archaeological significance. The sites appear to represent waste product associated with prior mining activity in the area. However, while the likelihood of uncovering archaeology in these locations is diminished, it is recommended that avoidance of these sites is adhered to with a minimum of a 10m buffer zone maintained around these sites within which no development should take place. In the event that avoidance cannot be maintained of these features, archaeological testing or monitoring should occur in advance of any ground disturbance.

In respect of the potential archaeological features identified during field inspection, it is suggested that these sites (*Site A* and *Site B*-Stone Constructions; *Site C*-Platform) be avoided with a suggested minimum 10m buffer zone established around these sites. In the event that avoidance cannot be maintained of these features, archaeological testing or monitoring should occur in advance of any ground disturbance.

Subsequently, with regard to the whole proposed Wind Farm development, the possibility of previously unrecognised archaeological features with no surface expression surviving beneath the ground should always be borne in mind. Such features would only be revealed during earthmoving and ground preparation works, including topsoil removal. For this reason, it is recommended that given the size and nature of the proposed Wind Farm development and its proposed access routes, comprehensive archaeological testing should be carried out in advance of all ground disturbance. This will ensure that any sub-surface archaeological features will be recognised and that adequate measures can be taken to ensure their full preservation *in situ* or excavation and recording as deemed necessary.

Any changes to the existing route will be referred to and checked by *North West Archaeological Services Ltd.*, prior to any on site works. *Dúchas*-The Heritage Service will be notified of any major changes to the proposed route.

The developer's attention is drawn to the National Monuments legislation which states that in the event of the discovery of archaeological finds or remains, *Dúchas*-The Heritage Service, Department of Arts, Heritage, Gaeltacht and the Islands and the National Museum of Ireland should be notified immediately. The developer should make provision to allow for and fund whatever archaeological works may be needed on the site, if any remains should be noted after topsoil has been removed.

These, and any further recommendations regarding the site will be subject to discussion with and approval from the Planning Authority and *Dúchas*-The Heritage Services, Department of Arts, Heritage, Gaeltacht & The Islands.

Shirley Markley March 25th, 2002

APPENDIX E2

Summary of National Monuments Legislation

Summary of National Monuments Legislation

All archaeological sites have the full protection of the National Monuments Legislation (Principal Act 1930 and Amendments: 1954, 1987, 1994 and Heritage Act 1995).

In Amendment of Section 2 of the Principal Act in the National Monuments (Amendment Act 1987) the definition of a national monument is specified as:

“any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections,

any artificial cave, stone or natural product, whether forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position,

any, or any part of any, prehistoric or ancient—

- (i) tomb, grave or burial deposit, or
- (ii) ritual, industrial or habitation site,

and

any place comprising the remains or traces of any such building, structure or erection, any cave, stone, or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...”

These definitions have been further clarified and extended under the provisions of the Heritage Act 1995:

“archaeological object” means any chattel whether in a manufactured or partly manufactured or an unmanufactured state which by reason of the archaeological interest attaching thereto or of its association with any Irish historical event or person has a value substantially greater than its intrinsic (including artistic) value, and the said expression includes ancient human, animal or plant remains;

“archaeology” means the study of past human societies, either as a whole or of various aspects of them, through the material remains left by those societies and the evidence of their environment, and includes the study of, searching and prospecting for—

- (a) archaeological objects
- (b) monuments
- (c) buildings, or parts of any buildings, habitually used for ecclesiastical purposes
- (d) landscapes
- (e) seascapes
- (f) wrecks
- (g) climatological, ecological, geological or pedological factors which may be relevant to the understanding of past human societies or the distribution or nature of any of the foregoing

The definition of heritage buildings:

"heritage building" includes any building, or part thereof, which is of significance because of its intrinsic architectural or artistic quality or its setting or because of its association with the commercial, cultural, economic, industrial, military, political, social or religious history of the place where it is situated or of the country or generally, and includes the amenities of any such building;

The definition of heritage landscapes:

"landscapes" includes areas, sites, vistas and features of significant scenic, archaeological, geological, historical, ecological or other scientific interest;

The definition of "monument" is as in the National Monuments Amendment Act 1987, above.

Under section 14 of the Principal Act (1930):-

"It shall be unlawful....

to demolish or remove wholly or in part or to disfigure, deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned (a licence issued by the Office of Public Works National Monuments Branch),

or

to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance...."

Under Amendment to Section 23 of the Principal Act:-

"A person who finds an archaeological object shall, within four days after the finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum..."

The latter is of relevance to any finds of objects or archaeological features made during a watching brief.

In the 1994 Amendment of Section 12 of the Principal Act (Amendment Act 1994) all the sites and 'places' recorded by the Sites and Monuments Record of the Office of Public Works are provided with a new status in law. The new status provides protection to the listed sites which is equivalent to that accorded to 'registered' sites (Section 8-(1), National Monuments Amendment Act 1954) as follows:

"The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the State.

The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of the county drawn up and publish in a prescribed manner information about when and where the lists and maps may be consulted.

In addition, when the owner or occupier, (not being the Commissioners) of a monument or place which has been recorded, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having the notice".

The Heritage Council

This body has been instated under the provisions of the 1995 Heritage Act "to propose policies and priorities for the identification, protection, preservation and enhancement of the national heritage including monuments, archaeological objects, heritage objects, architectural heritage, landscapes...."

..."The Council may co-operate with and provide assistance and advice to any person or body, including a public authority in respect of any matter which is related to the performance of its functions as it considers desirable".

APPENDIX E3
Classification of Archaeological Sites

Classification of Archaeological Sites

EPA Impacts	Impact Level	Criteria for EIS	Category	Status	Implications
Profound or Significant, (negative effect only)	Severe	Reserved for adverse effects only. Applies where mitigation would be unlikely to remove such effects. The effects are generally but not exclusively associated with sites and features of international or national importance	A	National Monument	Sites must be avoided
Significant Impact, (positive or negative)	Major	Important considerations at a national to regional level, if adverse it has the capacity to become a key component in the structuring of the project. Mitigation measures are unlikely to remove all effects upon the affected communities or interests	B	Nationally important site or very rare in the archaeological record	Sites must be avoided
	Moderate	Represents issues where mitigation measures and detailed design work may ameliorate/enhance some of the consequences upon affected interests. If adverse they are important but not likely to be key decision makers on the EIS. The effects can be mitigated against	C	Extensive, well preserved sites (ringforts, castles, churches, graveyards, burial mounds, holy wells), not necessarily rare in the archaeological record	Sites should be avoided, if possible. All archaeological investigation work should take place pre-development well in advance of construction
			D	Sites similar to those in category C, but not as well preserved or extensive	Avoidance is recommended. If not an option, full archaeological excavation ensuring preservation by record, would be required. Archaeological work should be conducted at the pre-development stage
			E	Historic Building Sites, post 1700AD, Industrial buildings and/or structures	Archaeological/Architectural building survey, sites are assessed by survey, photographic and historic record. To take place at the pre-construction and/or construction phase
			F	Low visibility sites/features i.e. fulachta fiadh, souterrains, lithic scatters	Monitoring prior to the construction phase. If archaeological material is found excavation or avoidance can then be cited
	Minor	Not significant in the decision making process. Can be of relevance to the subsequent design of the project	G	Sites of sites, destroyed or delisted, marked on the OS, or known from documentary sources	Area needs to be archaeologically assessed in the field. Sometimes monitoring is required during the construction phase
	Unknown		UC	Sites of possible archaeological potential but of unquantified extent and significance	Trial excavation for a detailed assessment would be required and a full excavation may be recommended. To take place pre-construction
Neutral or Slight Impact	Not Significant	The forecasting framework cannot envisage any effects on the environment	N/A	N/A	An area of archaeological potential must be observed around all sites

APPENDIX E4
Archaeological Plates



Plate 7.1 Existing access track and stone constructions (Sites A-C) looking east



Plate 7.2 Site A: Stone construction 1 looking west



Plate 7.3 Site B: Stone construction 2 looking south-west



Plate 7.4 Site C: Platform looking south-west



Plate 7.5 T1 looking west



Plate 7.6 T3 looking west



Plate 7.7 T7 looking west

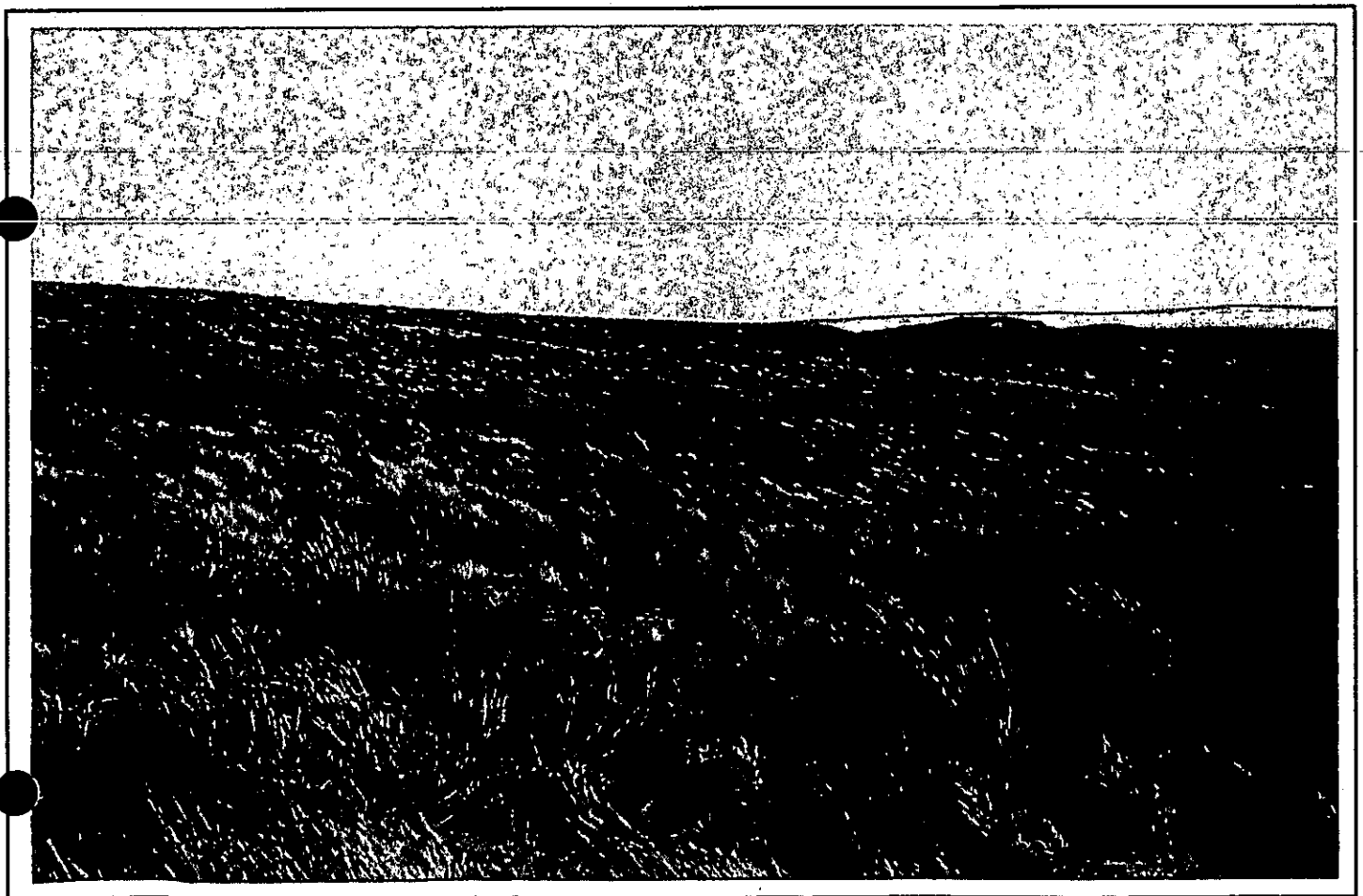


Plate 7.8 T9 looking west



Plate 7.9 T12 looking SSE

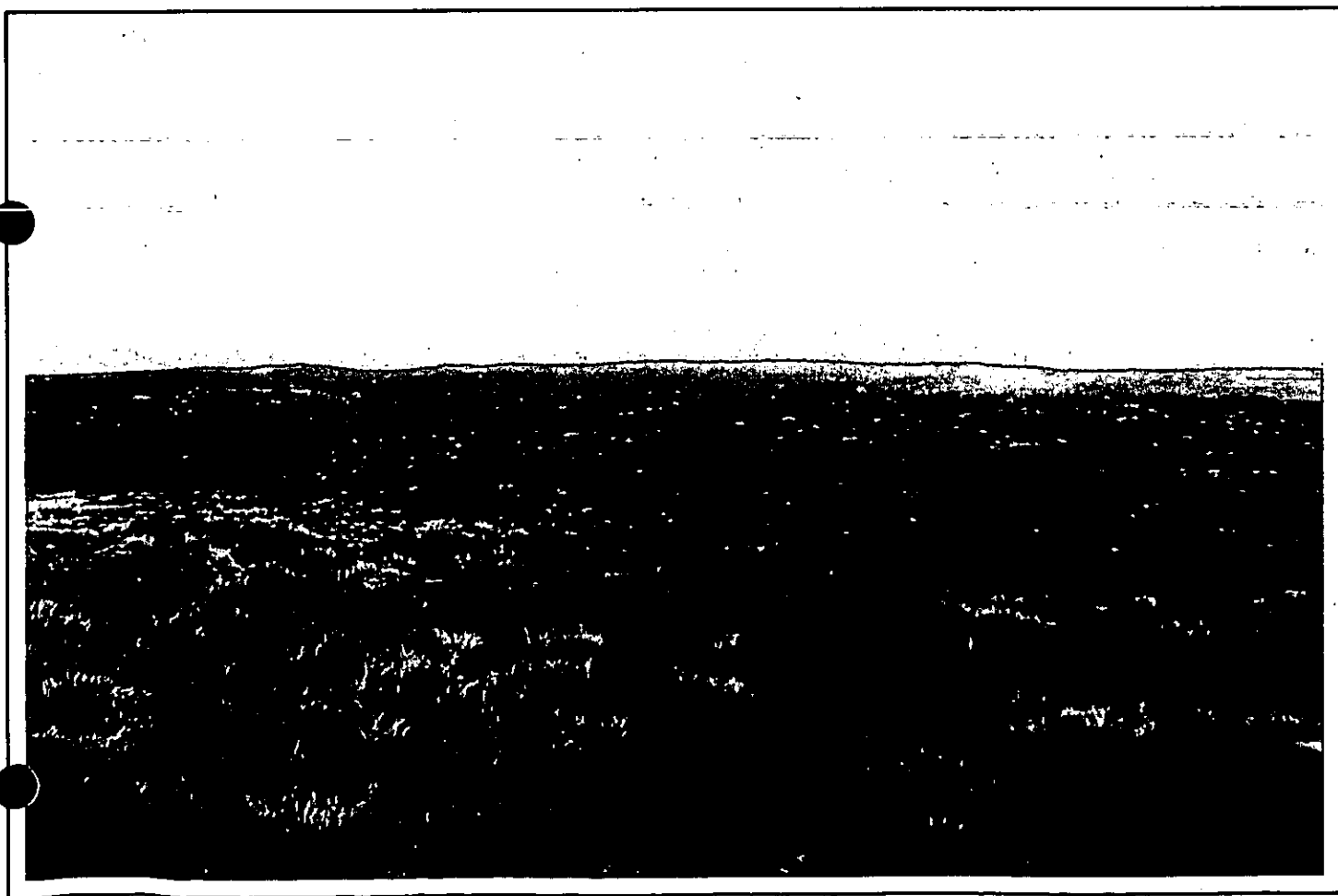


Plate 7.10 T13-T14 looking ENE

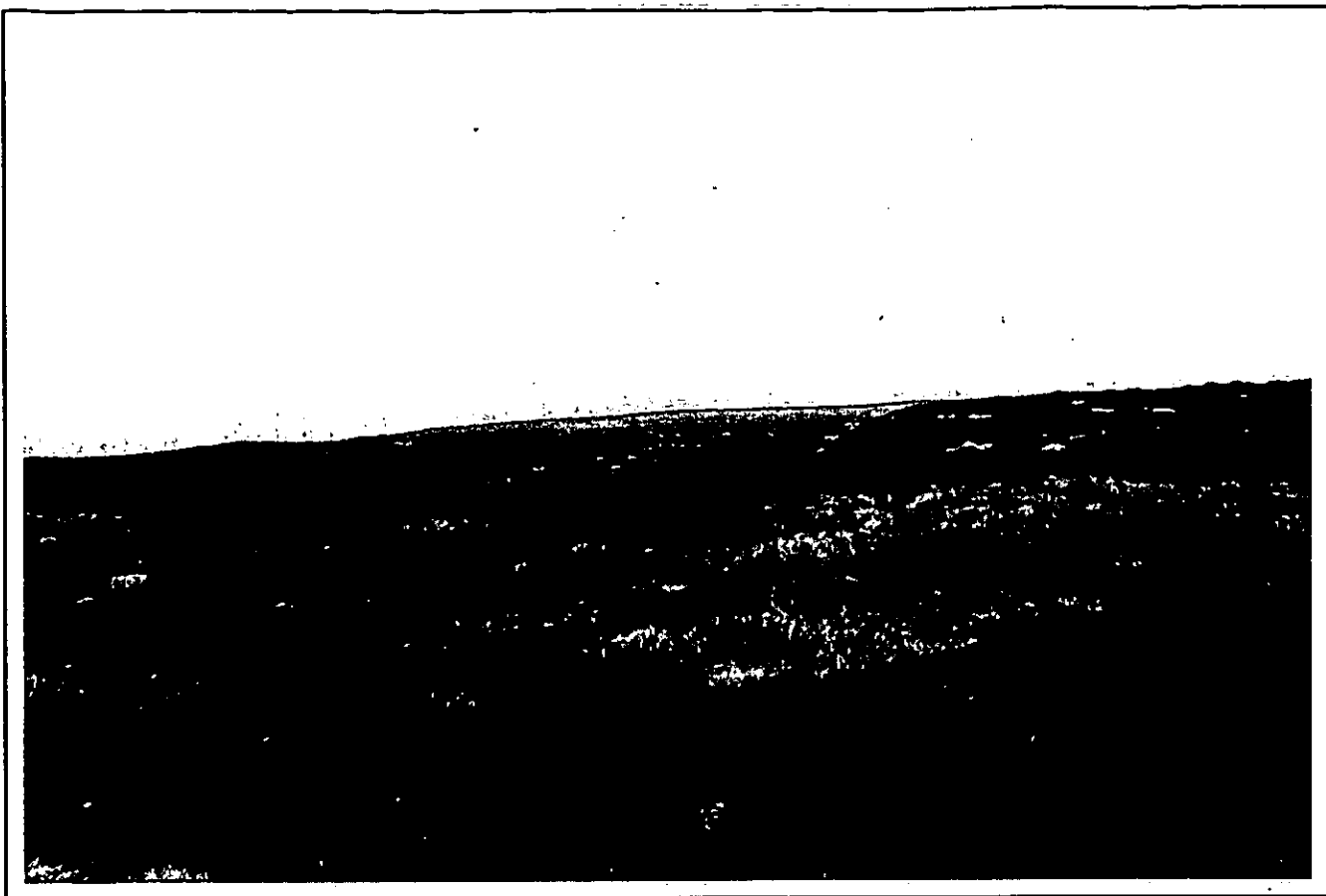


Plate 7.11 T14-T16 looking west

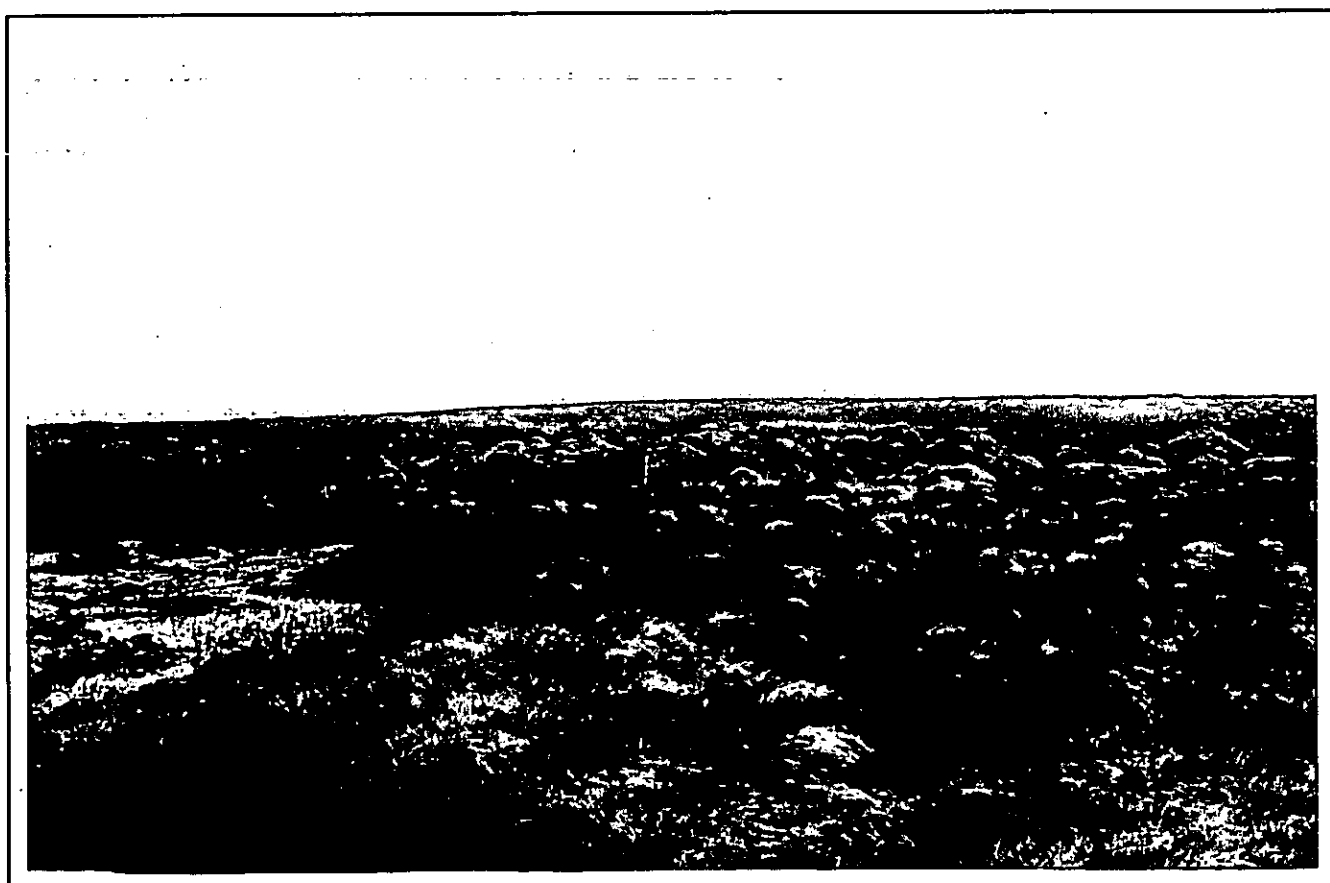


Plate 7.12 T17 looking north



Plate 7.13 T19 looking north

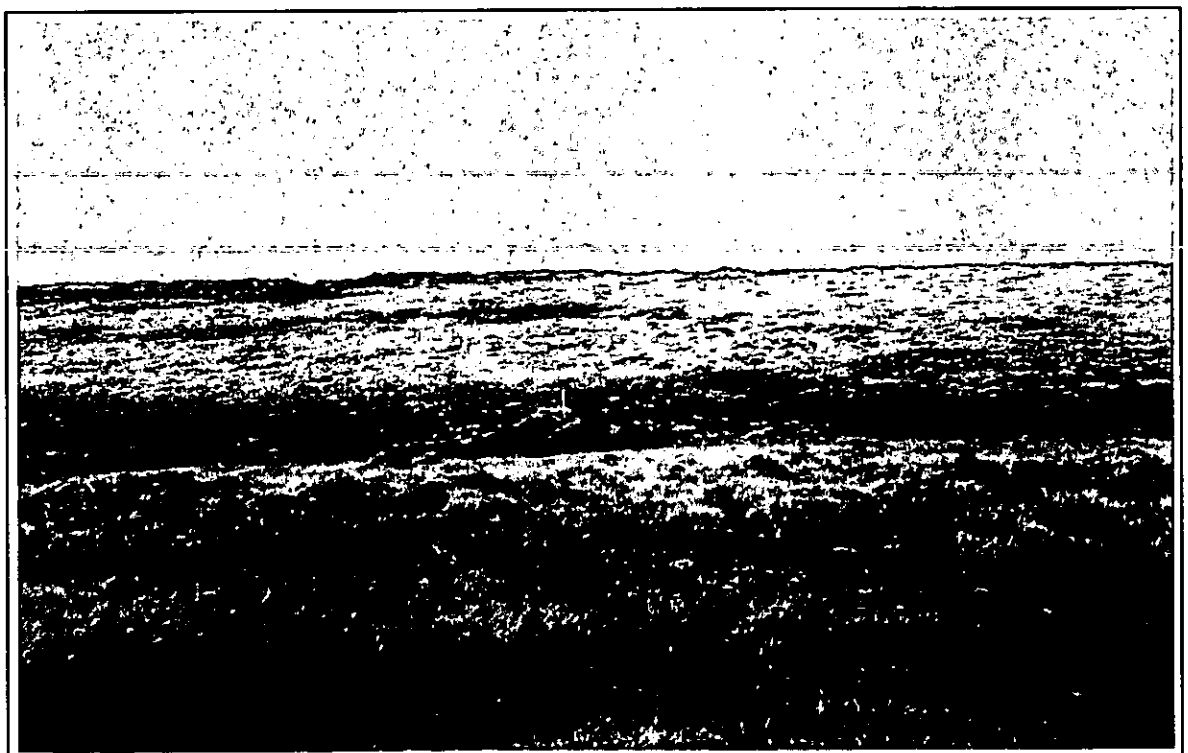


Plate 7.14 T23 looking east

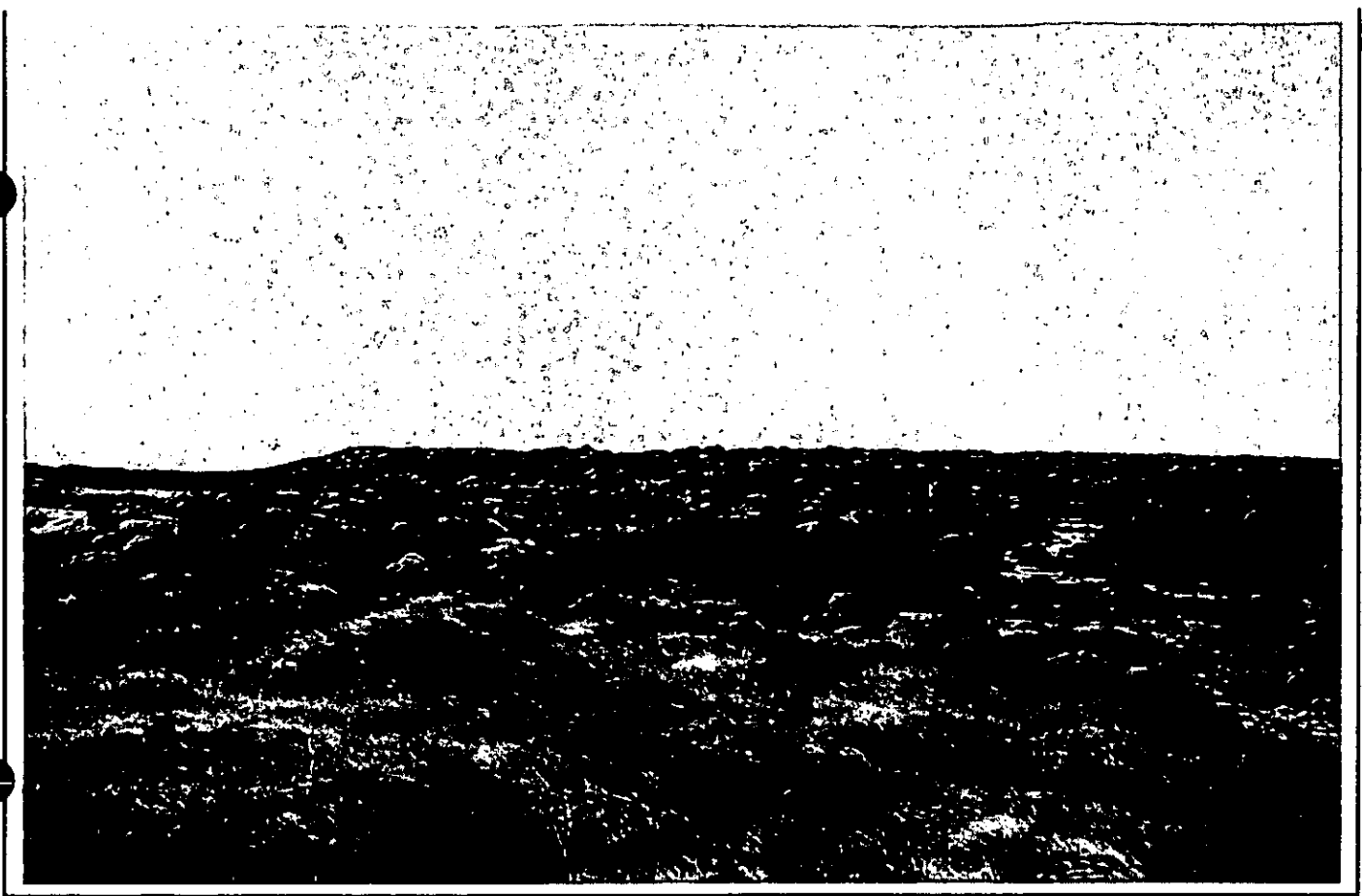


Plate 7.15 T24-T25 looking south

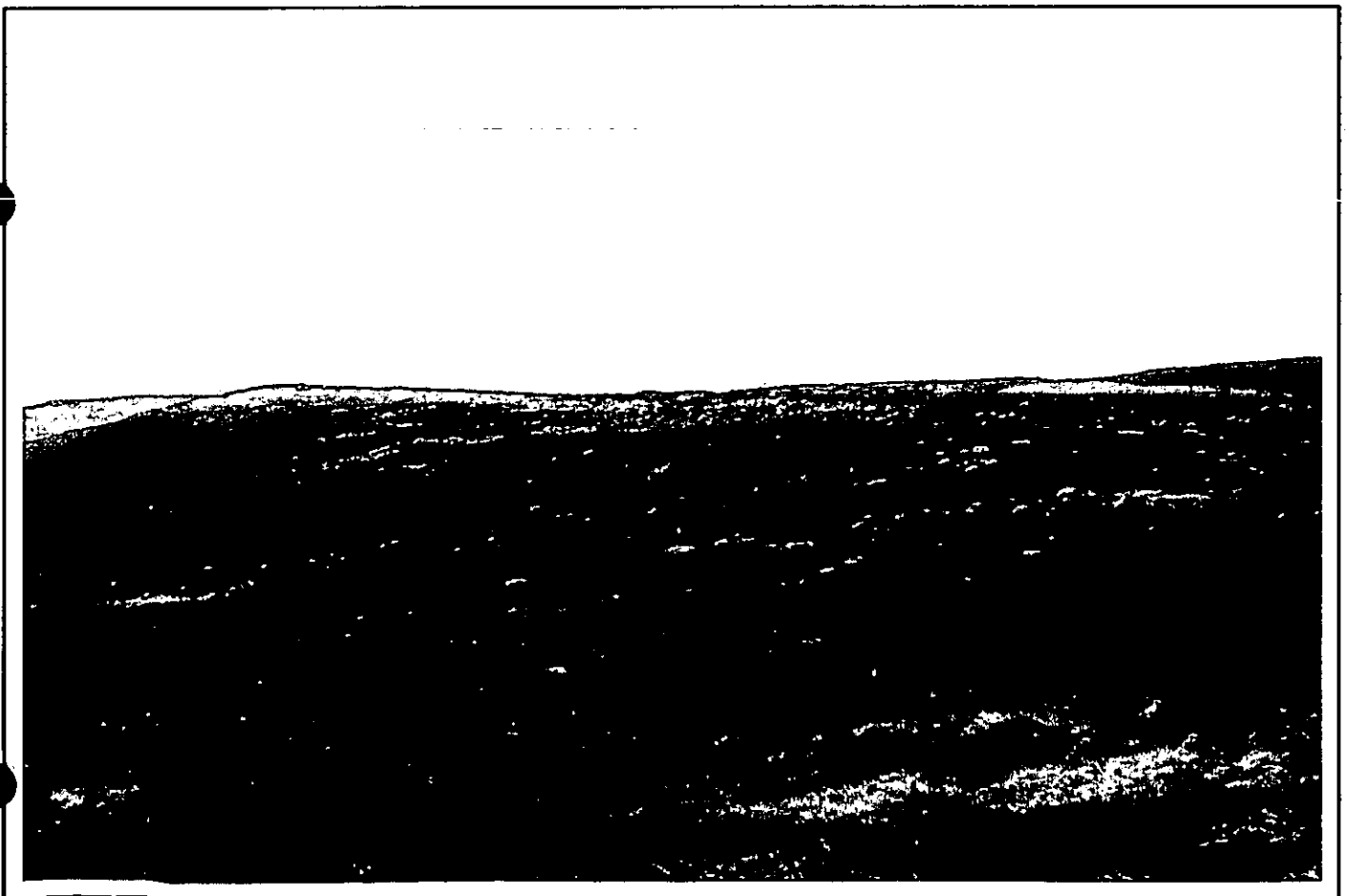


Plate 7.16 T26 looking south

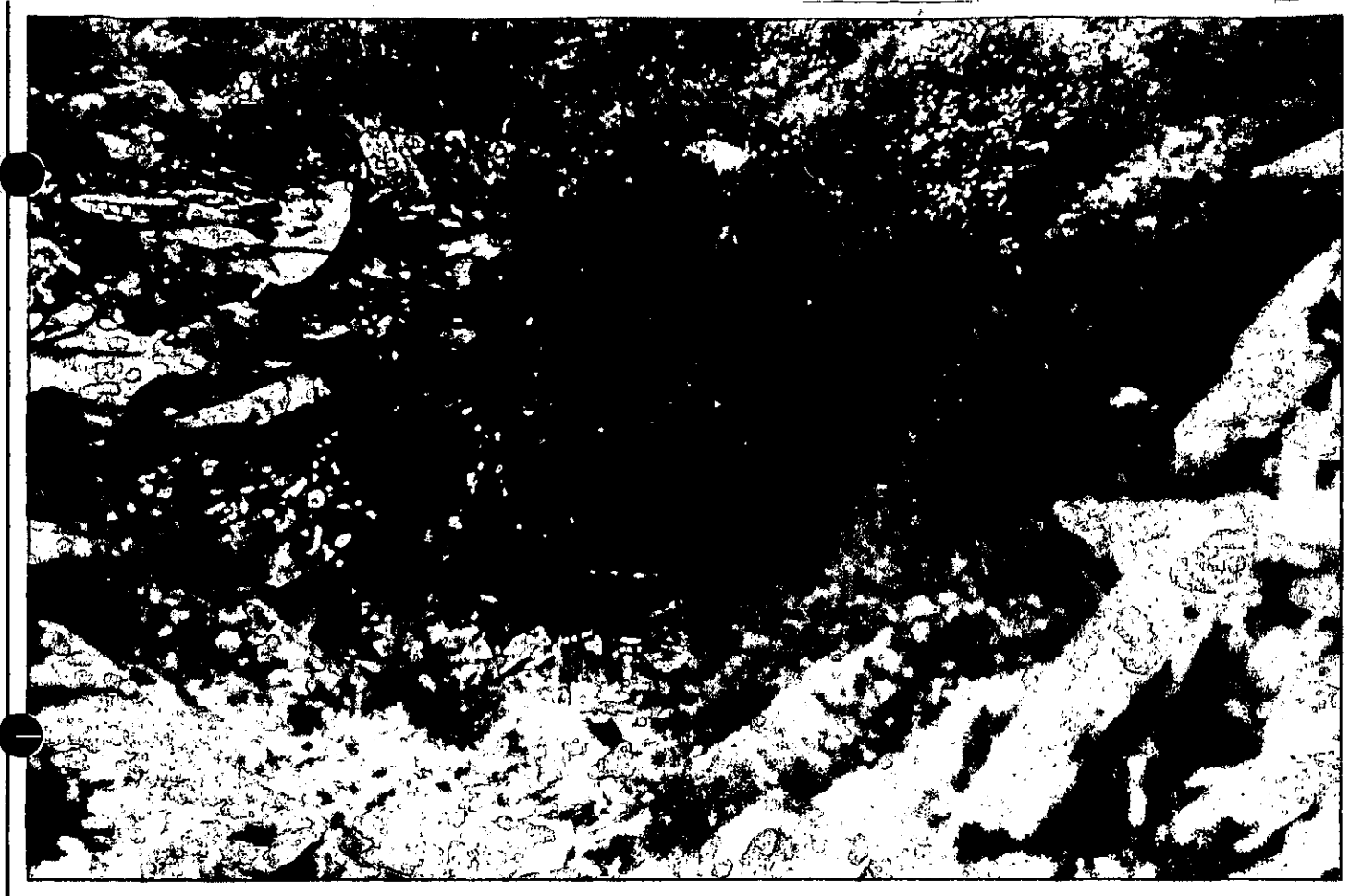


Plate 7.17 Middle mining adit looking west



Plate 7.18 Cairn; T26-T27 looking south

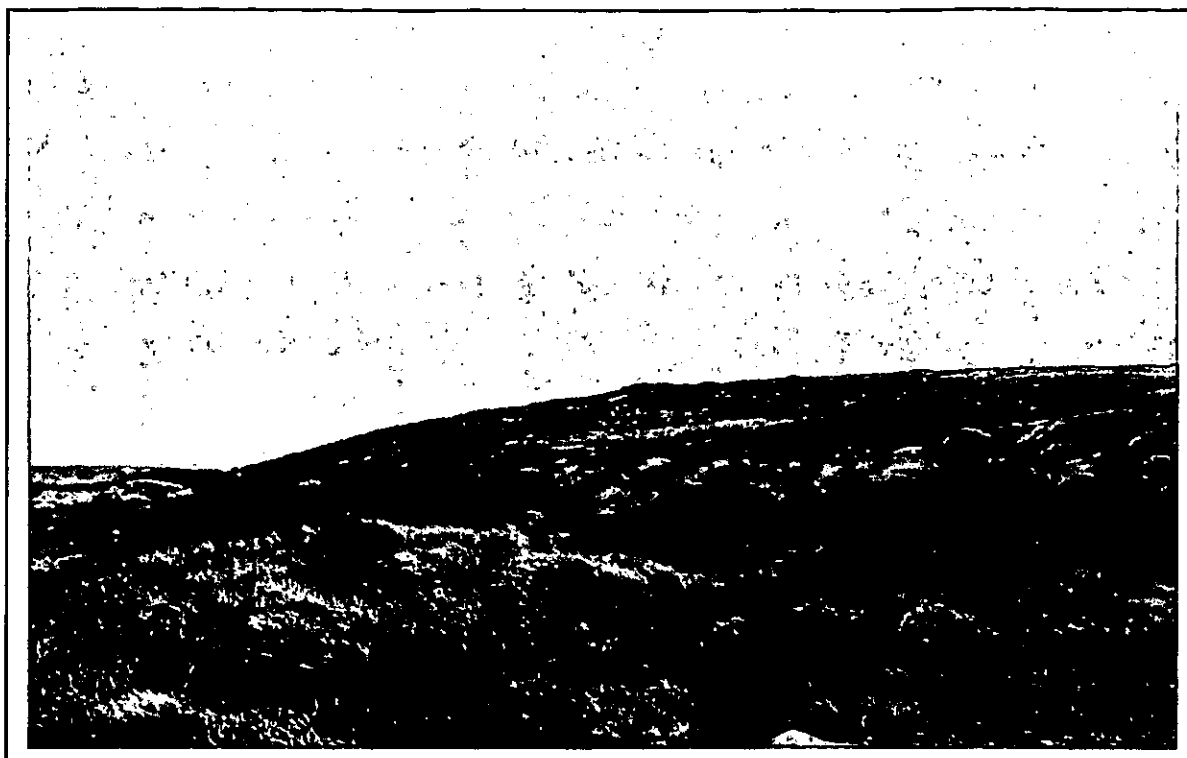


Plate 7.19 T29 looking south

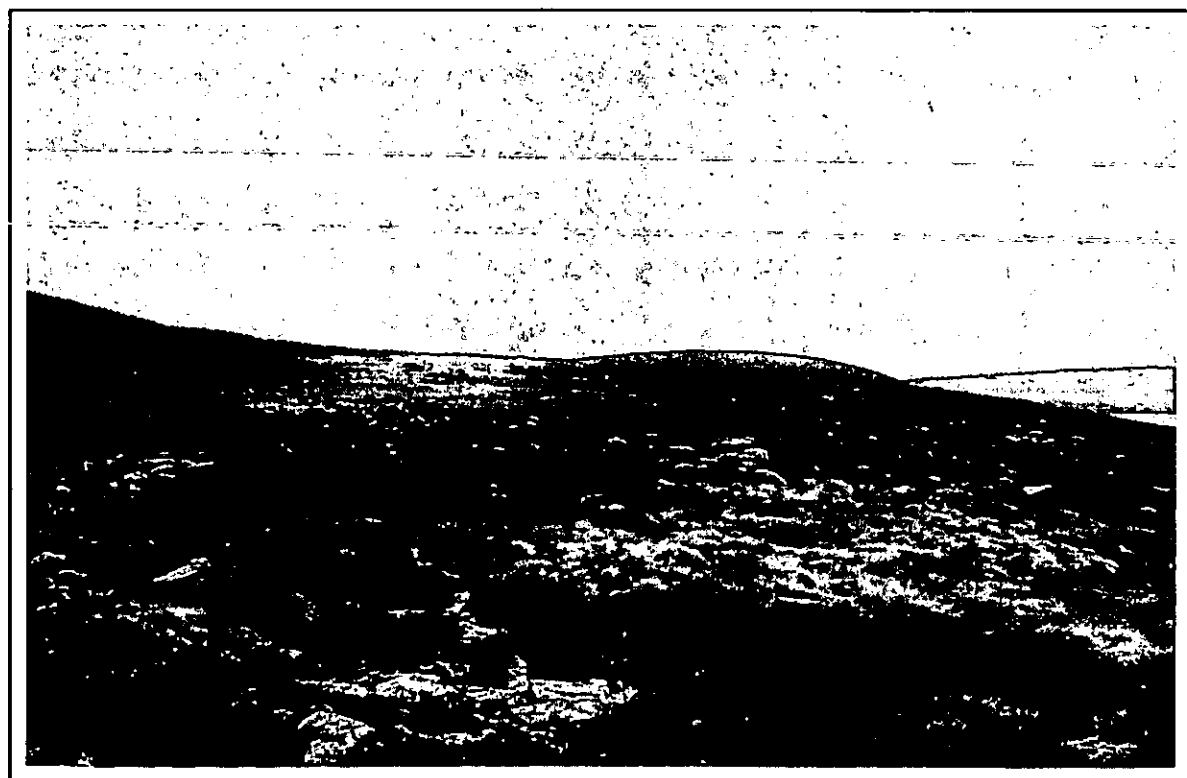


Plate 7.20 T30-T15 looking north

APPENDIX F
Additional Ecological Information

Scientific Name	Common Name	Rocks	Wet Heath	Blanket Bog
FLOWERING PLANTS AND FERNS				
<i>Erica cinerea</i>	Bell Heather		1	1
<i>Vaccinium myrtillus</i>	Bilberry	1	1	
<i>Narthecium ossifragum</i>	Bog Asphodel		1	1
<i>Menyanthes trifoliata</i>	Bog-bean		1	
<i>Dryopteris dilatata</i>	Broad Buckler-fern	1	1	
<i>Juncus bulbosus</i>	Bulbous Sedge			
<i>Carex panicea</i>	Carnation Sedge			
<i>Eriophorum angustifolium</i>	Common Cottongrass		1	1
<i>Vaccinium vitis-idaea</i>	Cowberry	1		
<i>Vaccinium oxycoccus</i>	Cranberry			
<i>Erica tetralix</i>	Cross-leaved Heath		1	1
<i>Empetrum nigrum</i>	Crowberry		1	
<i>Trichophorum cespitosum</i>	Deer-sedge		1	1
<i>Carex dioica</i>	Dioecious Sedge			
<i>Huperzia selago</i>	Fir Clubmoss		1	1
<i>Luzula sylvatica</i>	Greater Woodrush	1		
<i>Blechnum spicant</i>	Hard Fern	1	1	1
<i>Eriophorum vaginatum</i>	Hare's-tail Cottongrass		1	1
<i>Galium saxatile</i>	Heath Bedstraw		1	
<i>Juncus squarrosus</i>	Heath Sedge		1	1
<i>Calluna vulgaris</i>	Heather	1	1	1
<i>Dactylorhiza maculata</i>	Heath-spotted Orchid	1	1	
<i>Nardus stricta</i>	Mat-grass			
<i>Molinia caerulea</i>	Purple Moor-grass			1
<i>Drosera rotundifolia</i>	Round-leaved Sundew		1	1
<i>Carex echinata</i>	Star Sedge		1	1
<i>Potentilla erecta</i>	Tormentil		1	1
<i>Hymenophyllum tunbrigense</i>	Tunbridge Filmy-fern	1		
<i>Deschamsia flexuosa</i>	Wavy Hair-grass	1	1	
<i>Hymenophyllum wilsonii</i>	Wilson's Filmy-fern	1		
LOWER PLANTS				
<i>Campylopus introflexus</i>			1	
<i>Cladonia portentosa</i>				
<i>Hylocomium splendens</i>				
<i>Hypnum jutlandicum</i>			1	
<i>Plagiothecium undulatum</i>		1		
<i>Pterozium schreberi</i>		1		
<i>Polytrichum commune</i>			1	

Scientific Name	Common Name	Rocks	Wet Heath	Blanket Bog
<i>Pseudoscleropodium purum</i>		1		
<i>Racomitrium lanuginosum</i>		1		
<i>Sphagnum auriculatum</i>			1	
<i>Sphagnum capillifolium</i>		1	1	1
<i>Sphagnum cuspidatum</i>			1	1
<i>Sphagnum palustre</i>			1	
<i>Sphagnum papillosum</i>				1
<i>Sphagnum recurvum</i>				
<i>Sphagnum subnitens</i>				
<i>Sphagnum tenellum</i>				
		15	27	17
BIRDS				
<i>Larus canus</i>	Common Gull	1		1
<i>Aquila chrysaetos</i>	Golden Eagle			
<i>Pluvialis apricaria</i>	Golden Plover		1	
<i>Circus cyaneus</i>	Hen Harrier			
<i>Anthus pratensis</i>	Meadow Pipit	1	1	1
<i>Falco columbarius</i>	Martin			
<i>Falco peregrinus</i>	Peregrine			
<i>Corvus corax</i>	Raven		1	1
<i>Lagopus lagopus</i>	Red Grouse		1	1
<i>Alauda arvensis</i>	Skylark	1	1	1
<i>Anas crecca</i>	Teal	1		1
<i>Ciconia ciconia</i>	White Stork			
<i>Anser albifrons flavirostris</i>	White-fronted Goose			
		4	5	6
MAMMALS				
<i>Lepus timidus hibernicus</i>	Irish Hare		1	1
INSECTS				
<i>Ematurga atomaria</i>	Common Heath	1	1	1
<i>Libellula quadrimaculata</i>	Four-spotted Chaser			1

Photograph No. 1: Lackagh Lough from the east (upper side)

Wet heath on near shore. Blanket Bog on skyline, eroding to the right.



Photograph No. 2: Wet Heath east of Lackagh Lough

Looking north to area with much Exposed Silaceous Rock



Photograph No. 3: Looking across Blanket Bog between Lough Strand (left) and unnamed lake to South East

Towards eroded ridge east of the two lakes.



Photograph No. 4: Eroding Blanket Bog on Summit Area

Looking toward the main area of intact Blanket Bog



Photograph No. 5: Overgrazed and Machine Cut Bog suitable for Development
Looking west to Tullinloughlan Lough



Photograph No. 6: Heath with Isolated Exposed Siliceous Rock Habit
Blanket Bog in background. Looking SW along the NW slopes.



Photograph No. 7: Wet Heath with Rocks in Middle Zone

Looking NE along NW slopes. Upper and lower zones both Blanket Bog.



Photograph No. 8: Western (lower) Line of Craggs

Exposed siliceous rock habitat.



Photograph No. 9: Upper Craggs (Lackagh Rocks)
Exposed siliceous rock habitat.



Photograph No. 10: Eroded Ridge South of L. Kip



Photograph No. 11: Eroded Ridge of L. Strand



Photograph No. 12: Two Dystrophic Lakes on Bog North of L. Strand (Acid Oligotrophic Lake)

Looking east from edge of highest level across deep Blanket Bog.
Erosion on ridge beyond lakes just visible.

