1 INTRODUCTION

1.1 Introduction

This Environmental Impact Statement (EIS) has been prepared by McCarthy Keville O'Sullivan Ltd. on behalf of Bord na Móna Powergen Ltd., which intends to apply to An Bord Pleanála for planning permission to construct a wind energy development and all associated infrastructure at Cloncreen and adjacent townlands, Co. Offaly, as listed in Table 1.1 below.

Table 1.1 Townlands within which the Proposed Development occurs

Townland
Proposed Wind Farm Development including Grid Connection & Site Access
Cloncreen
Clongarret
Esker More
Rathvilla or Rathclonbracken
Ballinrath
Ballynakill
Ballykilleen
Additional Proposed Transport Route Works Areas
Ballina
Ballinagar

The proposed wind energy development will encompass 21 No. wind turbines up to a tip height of 170 metres. The application meets the threshold for wind energy set out in the Seventh Schedule of the Planning and Development Act 2000, as amended, and is therefore being submitted directly to An Bord Pleanála in accordance with Section 37E of the Planning and Development Act 2000, as amended.

The proposed wind farm site is located at Cloncreen bog in eastern Co. Offaly, approximately 4.5 kilometres southwest of Edenderry at its nearest point. The villages of Clonbullogue and Rhode are located approximately 2.0 kilometres southeast and 7.0 kilometres northwest of the site respectively.

Cloncreen is a single peat production bog unit within the Bord na Móna Derrygreenagh peat production bog group, regulated under the Environmental Protection Agency (EPA) IPC Licence No. P503-01 (Bord na Móna Allen Peat Ltd.). The land-use/activities within the proposed development site comprise a mix of active peat extraction, bare cutaway peat, re-vegetation of bare peat, former borrow pit area, telecommunications (a 40-metre mast) and wind measurement (a single 100-metre meteorological mast). The southern section of the site is traversed by the existing 110 kV Thornsberry/Cushaling electricity transmission line and associated pylons. There are also a number of Bord na Móna rail lines that pass through the bog facilitating the transportation of milled peat and ash and a small canteen area for employees known as the 'tea centre'.

Land-use in the immediate surrounding area comprises a mix of agriculture, commercial forestry, cutaway peatlands and energy production including Edenderry Power Plant and Mountlucas wind farm. There is also an EPA-licenced ash repository (Licence No. W0049-02, Bord na Móna Energy Ltd.) used for disposal of ash from the power plant.

Edenderry Power Plant is currently co-fired with a mix of peat and biomass and is located directly east of the Cloncreen site. The operational Mountlucas wind farm is located 4.2 kilometres to the west of the Cloncreen site. Mountlucas comprises 28 no. turbines, with a total maximum power output of 84 Megawatts (MW), and has been in operation since 2014.

1.1.1 Guidance and Legislation

McCarthy Keville O'Sullivan Ltd. were appointed as Environmental Consultants on this project and commissioned to prepare an EIS which fulfils the requirements set out by the Environmental Protection Agency (EPA) in the *'Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002) and Schedule 6 of the Planning and Development Regulations 2001, relating to the information to be contained in an EIS. Regard has also been had to the Advice Notes on Current Practice in the Preparation of EIS (EPA, 2003) and to *'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment'*, published by the Department of the Environment, Community and Local Government (DECLG) in March 2013. Relevant considerations under the *'Wind Energy Development Guidelines for Planning Authorities'* (DOELG, 2006) have also been taken into account.

The EPA is currently revising the *'Guidelines on the Information to be Contained in Environmental Impact Statements'* and the '*Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)'*. The draft guidelines and advice notes (September 2015) are currently at draft stage following consultation which closed in October 2015. Cognisance of these draft guidelines have also been taken into account in compiling this EIS.

The *' Wind Energy Development Guidelines for Planning Authorities'* (2006) are also currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *'Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* in relation to noise, proximity and shadow flicker (December, 2013). A consultation process in relation to the document is currently being undertaken by DECLG. In advance of the updated Wind Energy Development Guidelines being published, the noise and shadow flicker predictions presented in this EIS therefore also consider the current consultation guidance with regard to the proposed development.

This EIS will accompany the planning application for the proposed development to be submitted to An Bord Pleanála. On 22nd July 2016, An Bord Pleanála determined that the proposed development met the requirements for Strategic Infrastructure Development (SID) under Section 37b of the Planning and Development Act, 2000 as amended.

This EIS has been prepared in line with the requirements of the amended Environmental Impact Assessment (EIA) Directive 2014/52/EU which came into force on the 15th May 2014 and Directive 2011/92/EU of 13th December 2011 on the assessment of the effects of certain public and private projects on the environment. Member States have until 16th May 2017 to transpose the amended EIA Directive into national legislation.

1.2 The Applicant

The applicant for the proposed development is Bord na Móna Powergen Ltd., a subsidiary of Bord na Móna plc. Bord na Móna plc is a publically owned company,

originally established in 1946 to develop and manage some of Ireland's extensive peat resources on an industrial scale, in accordance with government policy at the time.

Bord na Móna's lands extend to approximately 80,000 hectares in total and are located mainly in the Irish midlands. In 2011, Bord na Móna published a *'Strategic Framework for the Future Use of Peatlands'*, which reviews and assesses the land bank resource, identifies key issues and considers options for future land-use. The Strategy recognises that the potential for the development of wind energy as an after-use of cutaway peatlands is significant. Bord na Móna has since conducted a detailed site selection exercise to identify the optimal site for development of a large-scale wind energy project. The result of that exercise indicated that a significant number of sites within the Bord na Móna landbank would meet the relevant criteria, with Cloncreen bog being identified as the optimal site for the proposed development. The assessment of the suitability of sites for this type of development is an ongoing process within Bord na Móna Powergen Ltd. and is subject to technical, commercial, national and local plan and policy influences.

Bord na Móna Powergen currently manages and operates a portfolio of thermal and renewable assets, namely Edenderry Power Plant a peat/biomass generating unit, Cushaling peaking plant, Bellacorick, Mountlucas and Bruckana wind farms, and the Drehid landfill gas facility. Included in this portfolio of assets is Mountlucas Wind Farm, comprising 28 No. wind turbines, which is located approximately four kilometres west of the Cloncreen site and has been in operation since 2014.

1.3 Brief Description of the Proposed Development

The proposed development comprises the construction of 21 No. wind turbines and all associated works. The proposed turbines will have a blade tip height of up to 170 metres. The applicant is seeking a ten-year planning permission. The full description of the proposed development, as per the public planning notices, is as follows:

i. 21 No. wind turbines with an overall blade tip height of up to 170 metres and all associated hard-standing areas.
ii. 1 No. borrow pit.
iii. 1 No. permanent Anemometry Mast up to a height of 120 metres.
iv. Provision of new site access roads and associated drainage.
v. 1 no. 110 kV Electrical substation, which will be constructed at one of two possible locations on site: either Option A in Ballykilleen townland or Option B in Cloncreen townland. The electrical substation will have 2 no. control buildings, associated electrical plant and equipment, and waste water holding tank.
vi. 2 No. temporary construction compounds, one of which will be located in the townland of Esker More and the other at one of two possible locations: either Option A in Ballykilleen townland or Option B in Cloncreen townland.
vii. All associated underground electrical and communications cabling connecting the turbines to the proposed substation at either Ballykilleen or Cloncreen townland.
viii. All works associated with the connection of the proposed wind farm to the national electricity grid, which will be either to the existing Cushaling substation via underground cable (Option A) or to the existing Thornsberry/Cushaling 110 kV line via overhead line (Option B).
ix. Demolition of existing canteen 'tea centre' building.
x. Removal of existing telecommunications mast.
xi. Removal of existing meteorological mast.

xii. New access junctions, improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and construction access, including: temporary upgrade of R420/R402 junction, temporary road widening at 1 no. location on R402 in Ballinagar, upgrade of R402/L1003 junction, road upgrade along the L1003 and new construction phase site entrance, and upgrade of existing site entrance on R401.

xiii. All associated site development works.

The site of the proposed development measures 960 hectares. The maximum proposed permanent footprint of the proposed development measures 40.1 hectares, which represents approximately 4% of the primary study area.

The planning application for the proposed wind farm includes for all necessary connections to the electricity grid. All elements of the proposed project, including grid connection, have been assessed as part of this EIS.

The planning application includes 2 No. substations and associated grid connections; however, only one substation and associated grid connection will ultimately be constructed. The proposed wind farm will connect to the grid via one of the following methods:

- **Option A**: construction of a 110 kV substation in the eastern section of site, to connect to existing 110 kV Cushaling substation at Edenderry Power Plant. Connection will be via underground cable approx 1.7km in length, located within Bord na Móna lands and curtilage of the public road.

Or

- **Option B**: construction of a 110 kV substation in southern section of site, to connect to existing 110 kV Thornsberry/Cushaling electricity transmission line, located within the site. Connection will be via two short sections of overhead line, (less than 0.1km).

Both substations and grid connection options have been assessed as part of this EIS.

1.4 Need for the Proposed Development

1.4.1 Renewable Energy Targets

In the context of increasing energy demand and prices, uncertainty in energy supply and the effects of climate change, our ability to harness renewable energy such as wind power plays a critical role in creating a sustainable future.

The Department of Environment, Heritage and Local Government has set a target for Ireland of 40% of total electricity consumption to come from renewable resources by 2020, as part of an overall renewable energy target of 16%. This target forms part of the Government's strategy to make the green economy a core component of its economic recovery plan for Ireland. It is envisaged that wind energy will provide the largest source of renewable energy in achieving this target. To achieve the target of 40% of total electricity consumption coming from renewable sources will require the installation of 3,931 Megawatts (MW) of wind farm projects in Ireland by 2020.

EU countries have agreed on a new 2030 Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. These

targets aim to help the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reductions target. The specific targets include at least a 27% share of renewable energy consumption.

Looking beyond 2020, Ireland will therefore have to meet even more demanding climate change and renewable energy supply obligations in order to play its part in achieving the European climate and energy ambitions. In addition, Ireland currently has one of the highest external dependencies on imported sources of energy, such as coal, oil and natural gas. The development of additional indigenous wind energy generating capacity will not only help to reduce carbon emissions but will also improve Ireland's security of energy supply.

The proposed project will be capable of providing power to approximately 33,007 households every year. See detailed calculations in Section 3.3.1.6 of this EIS.

1.4.2 Reduction of Carbon Emissions

This production of renewable energy will assist in achieving the Government's and EU's stated goals of ensuring safe and secure energy supplies, promoting an energy future that is sustainable and competitively priced to consumers whilst combating energy price volatility and the effects of climate change. The recently published Energy White Paper in 2015 outlines an ambitious Greenhouse gas reduction target of between 80% to 95% out to 2050. Furthermore, if national carbon emissions targets are divided out amongst each county, each Local Authority may be responsible for meeting its own targets. In addition to a reduced dependence on oil and other imported fuels, the generation of electricity from wind power by the proposed development will displace between approximately 2.2 to 4.2 million tonnes of carbon emissions from the largely carbon-based traditional energy mix, depending on the methodology used (based on the SEM Mid-Merit Plant, EU-Fossil Fuel Comparator (FFC) and 'Load Following' Combined Cycle Gas Turbine Plants, as described in section 9.2 of this EIS).

1.4.3 Economic Benefits

'The Value of Wind Energy to Ireland' report, published by Pőyry in March 2014, states that growth of the wind sector in Ireland could support 23,850 jobs (construction and operational phases) by 2030. If Ireland instead chooses to develop no more wind, then by 2030 the country will be reliant on natural gas for most of our electricity generation, at a cost of €671 million per annum in fuel import costs.

At a Regional Level, the proposed development will help to supply the rising demand for electricity, resulting from renewed economic growth, in the Midlands region. The EirGrid report *'All-island Generation Capacity Statement 2016 – 2025'* (SONI & EirGrid, 2016) notes that with a return to electricity demand growth in recent years and strongly positive economic predictions for the next decade, electricity demand forecasts are high over this time. During construction, additional employment will be created in the region through the supply of services and materials to the wind farm.

The proposed development will also have a number of long-term and short-term benefits for the local economy. The proposed development will represent an investment of approximately €110 million in the local area, with approximately €30 million of the total cost relating to on-site works, relying heavily on local contractors and suppliers.

The project will create up to 120 jobs during the construction phase which is expected to last 18 to 24 months. In addition to this, there will also be income generated by local employment from the purchase of local services. On a long-term scale, the proposed

development will create up to six jobs during the operational phase relating to the maintenance and control of the wind farm.

The proposed wind farm also creates an opportunity to generate real tangible benefits for the local community who may not have a direct involvement in the project. It is proposed to deliver these benefits through a Community Gain Scheme, which will invest approximately €1.88 million in the local community over the life of the project. Bord na Móna Powergen Ltd. currently oversees two existing Community Gain Schemes for the Mountlucas and Bruckana Wind Farms. In addition to the Community Gain Scheme, two additional schemes in relation to the proposed Cloncreen wind farm are being explored with the local community. These are a Near Neighbour scheme and a Community Ownership Scheme. Further details on proposed local and community benefits are presented in Section 3.4 of this EIS.

1.5 Purpose and Scope of the EIS

The purpose of this EIS is to document the current state of the environment in the vicinity of the proposed development site and to quantify the likely significant effects of the proposed development on the environment. The compilation of this document served to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative effects arising from the proposed development.

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by An Bord Pleanála, from the Environmental Impact Statement (EIS) accompanying the planning application. The EIA is the assessment carried out by the competent authority, which includes an examination that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive 2011/92/EU (as amended), the direct and indirect effects of the proposed development on the following:

a) human beings, flora and fauna,
b) soil, water, air, climate and landscape,
c) material assets and the cultural heritage, and
d) the interaction between the factors mentioned in paragraphs (a), (b) and (c).

The EIS submitted by the applicant provides the relevant environmental information to enable the EIA to be carried out by the competent authority. The information to be contained in the EIS is prescribed by statutory regulation.

1.6 Structure and Content of the EIS

1.6.1 General Structure

This EIS uses the grouped structure method to describe the existing environment, the potential effects of the proposed development thereon and the proposed mitigation measures. Background information relating to the proposed development, scoping and consultation undertaken and a description of the proposed development are presented in separate sections. The grouped format sections describe the effects of the proposed development in terms of human beings, flora and fauna, soils and geology, water, air and climate, noise, landscape, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this EIS are as follows:

- Introduction
- Background to the Proposed Development
- Description of the Proposed Development
- Human Beings
- Flora and Fauna
- Ornithology
- Geology and Soils
- Hydrology and Hydrogeology
- Air and Climate
- Noise
- Landscape
- Cultural Heritage
- Material Assets
- Interactions of the Foregoing

The EIS also includes a Non-Technical Summary, which is a condensed and easily comprehensible version of the EIS document. The non-technical summary is laid out in a similar format to the main EIS document and comprises a description of the proposed development followed by the existing environment, effects and mitigation measures presented in the grouped format.

1.6.2 Description of Likely Significant Effects

As stated in the *'Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002), an assessment of the likely effects of a proposed development is a statutory requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential effects requires that potential significant effects are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the effect.

The classification of effects in this EIS follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- *'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'* (EPA, 2003)
- *'Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002)

Table 1.2 presents the glossary of impacts as published in the EPA guidance documents. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of effects associated with a proposed development on the receiving environment. The use of standardised terms for the classification of effects ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIS, as advised in *'Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002). The consistent application of terminology throughout the EIS facilitates the assessment of the proposed development on the receiving environment.

Table 1.2 Classification Terminology (EPA, 2002/3)

Characteristic	Type	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	A change which does not affect the quality of the environment.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences.
	Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An impact that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Profound	An impact which obliterates sensitive characteristics.
Duration	Short-term	Impact lasting one to seven years
	Medium-term	Impact lasting seven to fifteen years
	Long-term	Impact lasting fifteen to sixty years
	Permanent	Impact lasting over sixty years
	Temporary	Impact lasting for one year or less
Type	Cumulative	The addition of many small effects to create one larger, more significant, impact
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant impact is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

Each effect is described in terms of its quality, significance, duration and type, where possible. A 'Do-Nothing' effect is also predicted in respect of each environmental theme in the EIS. Residual effects are also presented following any effect for which mitigation measures are prescribed. The remaining effect types are presented as required or applicable throughout the EIS.

1.7 Project Team

1.7.1 Project Team Responsibilities

The companies and staff listed in Table 1.3 were responsible for completion of the EIA of the proposed development. Further details regarding project team members are provided below.

The EIS project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation of this EIS are summarised in Section 1.7.2 below. Each chapter of this EIS has been prepared by a competent expert in the subject matter. Further details on project team expertise are provided in the Statement of Authority at the beginning of each impact assessment chapter.

Table 1.3 Project Team

Consultants	Principal Staff Involved in Project	EIS Input
McCarthy Keville O' Sullivan Ltd. Block 1 GFSC Moneenageisha Road Galway	Brian Keville Michael Watson Jimmy Green Lorraine Meehan Pat Roberts Dervla O' Dowd Barry O'Loughlin Susan Doyle Evelyn Sikora Dr. John Staunton Owen Cahill James Newell	EIS Project Managers, Scoping and Consultation, Preparation of Natura Impact Statement, EIS Sections: ▪ 1. Introduction ▪ 2. Background to the Proposed Development ▪ 3. Description of the Proposed Development ▪ 4. Human Beings ▪ 5. Flora & Fauna ▪ 6. Ornithology ▪ 9. Air & Climate ▪ 11. Landscape & Visual ▪ 13. Material Assets (non-Traffic) ▪ 14. Interaction of the Foregoing
Hydro Environmental Services 22 Lower Main Street Dungarvan Co. Waterford	Michael Gill David Broderick Grainne Barron	Flood Risk Assessment, Drainage Design, Preparation of EIS Sections: ▪ 7. Soils & Geology ▪ 8. Hydrology & Hydrogeology
Applied Ground Engineering Consultants (AGEC) The Grainstore Singletons Lane Bagnelstown Co. Carlow	Gerry Kane Paul Jennings	Preparation of Peat Stability Assessment & Peat Management Plan

Consultants	Principal Staff Involved in Project	EIS Input
AWN Consulting The Tecpro Building Clonshaugh Business & Technology Park Dublin 17	Damian Kelly Dermot Blunnie	Baseline Noise Survey, Preparation of EIS Section 10: Noise and Vibration
Tobar Archaeological Services Saleen Midleton Co. Cork	Annette Quinn Miriam Carroll	Preparation of EIS Section 12: Cultural Heritage
Alan Lipscombe Traffic and Transport Consultants Claran, Headford, Co. Galway	Alan Lipscombe	Swept Path Analysis, Preparation of EIS Section13: Material Assets - Traffic and Transport

1.7.2 Project Team Members

1.7.2.1 McCarthy Keville O'Sullivan Ltd.

Brian Keville B.Sc. (Env.)

Brian Keville has over 15 years' professional experience as an environmental consultant having graduated from the National University of Ireland, Galway with a first class honours degree in Environmental Science. Brian was one of the founding directors of environmental consultancy, Keville & O'Sullivan Associates Ltd., prior to the company merging in 2008 to form McCarthy Keville O'Sullivan Ltd. Brian's professional experience has focused on project and environmental management, and environmental impact assessments. Brian has acted as project manager and lead-consultant on numerous environmental impact assessments, across various Irish counties and planning authority areas. These projects have included large infrastructural projects such as roads, ports and municipal services projects, through to commercial, mixed-use, industrial and renewable energy projects. The majority of this work has required liaison and co-ordination with government agencies and bodies, technical project teams, sub-consultants and clients.

Michael Watson, MA; MCIWM

Michael Watson has over 15 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geog from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent Cork based private environmental & hydrogeological consultancy. Michael's professional experience includes managing Environmental Impact Assessments on behalf of clients in the wind farm, waste management, commercial and industrial sectors nationally. These projects have required liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael has significant experience in the EPA Industrial Emissions, IPPC and Waste licensing regimes managing licence applications and subsequent regulatory compliance on behalf of clients in the waste and industrial sectors. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth.

Jimmy Green BA, MRUP; MIPI
Jimmy Green holds the position of Senior Planner in McCarthy Keville O'Sullivan and has a wide range of experience in project management and coordination, planning research, analysis, and retail planning. Jimmy has extensive planning experience in both the public and private sectors having worked as an Assistant Planner in Donegal County Council and subsequently as both an Executive and Senior Executive Planner in Galway County Council prior to joining private practice in October 2004. Since moving into the private sector he has provided consulting services to a wide range of private and public sector clients, and his experience includes planning application project management, environmental impact assessment preparation, retail impact assessment, development potential reporting, preparation of linguistic impact statements and submissions to Development Plans/Local Area Plans. Jimmy has a Bachelor of Arts Degree in Human and Physical Geography from National University Ireland Galway and a Masters in Regional and Urban Planning from University College Dublin. Jimmy is also a corporate member of the Irish Planning Institute.

Lorraine Meehan B.Sc. (Env.)
Lorraine Meehan graduated from NUI Galway in May 2006 with a first class honours degree in Environmental Science. Lorraine has gained extensive experience with McCarthy Keville O'Sullivan since joining the company shortly after graduating, working primarily on Environmental Impact Assessments and Strategic Environmental Assessments. Lorraine has acted as Project Manager on numerous Environmental Impact Statements, Constraints & Feasibility Reports and Site Selection Reports for a wide range of projects, including renewable energy projects, roads, power lines and municipal services projects, and large-scale commercial, mixed-use and residential developments. Lorraine has also completed the Introduction, Background to the Proposed Development, Description of the Proposed Development, Human Beings, Air and Climate, Landscape, and Telecommunications sections of these EISs, in addition to numerous site constraints and layout maps, and has coordinated the scoping and consultation exercises with the relevant statutory and non-statutory bodies.

Pat Roberts B.Sc. (Env.)
Pat Roberts joined MKO (then Keville & O'Sullivan Associates) in 2005 following completion of a B.Sc. in Environmental Science. Prior to joining the company, Pat worked extensively in Ireland, the USA and UK as a tree surveyor, having previously worked with The National Trust in Cornwall for three years. He also has over five years' practical conservation experience working both as a volunteer and employee in National Parks in Texas, Utah and at Exmoor National Park in the UK. Patrick has worked as project manager and ecologist on over 150 ecological assessments completed by the company to date, including a wide range of work within sensitive ecological areas. He has extensive experience of on-site supervision of construction and civil engineering works and has worked closely with construction personnel at the set up stage of construction sites in the design systems to prevent environmental damage.

Dervla O'Dowd B.Sc. (Env.)
Dervla graduated with a first class honours B.Sc. in Environmental Science from NUI, Galway in 2005 and joined Keville O'Sullivan Associates in the same year. Dervla has gained extensive experience in the project management and ecological assessment of the impacts of various infrastructural projects including wind energy projects, water supply schemes, road schemes and housing developments nationwide and has also been involved in the compilation of Environmental Impact Statements, with emphasis on sections such as Flora & Fauna, and acted as EIS coordinator on many of these

projects. Dervla has also provided site supervision for infrastructural works within designated conservations areas and has also been involved in the development of environmental/ecological educational resource materials. Currently, Dervla is responsible for coordinating ecological work required on major infrastructural projects, with emphasis on wind energy projects.

Barry O'Loughlin B.Sc. (Env), M.Sc.
Barry O'Loughlin is an experienced ecologist with over seven years' professional experience in the area of ecological consultancy. He holds a B.Sc. in Environmental Science from NUI Galway (2008) and a Master's degree in Applied Ecology, from University College Cork (2010). Prior to joining McCarthy Keville O'Sullivan as Project Ecologist in March 2015, Barry worked as a Senior Project Ecologist in an environmental and engineering firm based in Cork and worked as a project ecologist for over four years in Co. Kerry where he led and managed a wide range of development projects including wind farms, overhead and underground electricity transmission projects, quarry and ancillary developments, flood relief schemes, road schemes, etc. He has undertaken extensive habitat surveys and mapping for large scale development led and conservation led projects nationwide.

Barry possesses a broad range of experience in habitat survey and mapping, flora and bryophyte identification, ornithological survey and monitoring, wetland inventory surveys, peatland assessments, baseline ecological surveys, Geographical Information Systems (GIS), report compilation, mammal surveys, nature conservation studies and ecological monitoring. He is a regular contributor to the Irish Wetland Bird Survey (IWeBS) with BirdWatch Ireland (BWI) and The Irish Hen Harrier Winter Roost Survey with NPWS.

Susan Doyle B.Sc., M.Sc.
Susan is a qualified assistant ecologist with McCarthy Keville O'Sullivan. She completed her primary degree in Zoology at Trinity College Dublin and went on to complete her Masters in Ecological Assessment at University College Cork. Susan has extensive field survey skills, including vegetation relevés of vascular plants and bryophytes, habitat identification and mapping, winter and breeding bird survey, bat survey, small mammal survey, terrestrial invertebrate and freshwater macroinvertebrate sampling and animal radiotracking. Susan is trained in the ecological applications of GIS, MapInfo and statistics programmes used in the analysis and interpretation of ecological data. She also has experience in Annex I habitat quality assessment, Phase 1 habitat survey, Ecological Impact Assessment and Appropriate Assessment (including Natura Impact Statements).

Evelyn Sikora BA, MPLAN, MIPI
Evelyn Sikora graduated as from Edinburgh College of Art with a degree in Landscape Architect and also holds a Masters in Planning and Sustainable Development from University College Cork (2010). She has worked as a Landscape Architect on a range of projects including commercial, residential and recreational projects and has also experience in planning projects relating to employment, recreation and natural heritage. Evelyn has completed the Landscape and Visual Impact Assessment for numerous wind farm projects, ranging from single-turbine developments to large-scale projects of up to 50 turbines. Evelyn is a Corporate member of the Irish Landscape Institute.

John Staunton PhD, B.Sc. (Env.)
John Staunton joined McCarthy Keville O'Sullivan Ltd. in October 2014 following completion of a PhD and B.Sc. in Environmental Science. His main duties include input

into EISs and other reports, ecological surveys, planning and literature searches, landscape impact assessment and site visits. John has proven report writing, presentation and interpersonal skills and can work well with large interdisciplinary teams. Prior to joining the team at MKO, John developed many project design, field, laboratory, data analysis and writing skills during his PhD research and research assistant positions.

Owen Cahill B.Sc., M.Sc.
Owen Cahill joined MKO as an Environmental Engineer in October 2013. Owen completed a Master's Degree in Environmental Engineering at Queens University Belfast, following his primary degree in Construction Management. Owen brings considerable experience to his role having previously worked for a Belfast-based environmental consultancy and large-scale building and civil engineering contractors in the West of Ireland. Owen has gained considerable experience in Hydrogeology, Renewable Technologies, Water & Wastewater Engineering, Contaminated Land, Waste Management & Engineering Hydrology. Owen previously worked as an Environmental Technician with Pentland MacDonald, Environmental Consultancy specialising in contaminated land and as a Site Engineer with O' Malley Construction based in Co. Galway.

James Newell
James holds the position of CAD and Information Technology Technician with MKO since joining the Company in May 2006. Prior to joining MKO, he worked as a graphic designer and illustrator for over eight years. In recent years James' role has extended to include all wind farm visual modelling completed by the company. He is proficient in the use of MapInfo GIS software in addition to AutoCAD and other design and graphics packages.

1.7.2.2 Hydro Environmental Services Ltd.

Michael Gill
Michael Gill is an Environmental Engineer with over ten years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIA/EIS assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions.

David Broderick
David Broderick is a hydrogeologist with over seven years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland working mainly on groundwater and source protection studies David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has completed numerous geology and water sections for input into EIAs for a range of commercial developments.

Grainne Barron
Grainne is an environmental scientist and prepares all HES graphics using a variety of mapping and illustration software (AutoCAD, ArcGIS, Mapinfo etc). She has a keen eye for detail and colour and can apply her knowledge and experience to create aesthetic and creative graphical output for all types of projects.

1.7.2.3 AGEC Ltd.

The geotechnical aspects of the report, which will be incorporated into the Geology & Soils and Hydrology & Hydrogeology sections of the EIS, will be completed by AGEC Ltd. AGEC has extensive experience in the production of Peat Stability Assessments for wind energy developments. AGEC provides specialist geotechnical engineering and engineering geology advice to local authorities, contractors and consultants, particularly for infrastructure projects forming part of the National Development Plan and also for private commercial and residential developments as they move on to sites with more complex ground conditions.

Gerry Kane
Gerry Kane joined AGEC as a Geotechnical Engineer in 2008. Gerry graduated from IT Carlow in 2008 with a BEng (Hons) degree in Civil Engineering. Gerry is a Geotechnical Engineer with over seven years' experience in geotechnical design and analysis, supervision and interpretation of ground investigations, foundation & earthwork design, supervision of construction of bulk earthworks and structure foundations, slope stability analysis, desk studies and walkover surveys. Previous and current experience in the wind energy field has included work for wind farm developments in Ireland, Northern Ireland, Scotland, Wales and England. This work has covered Peat Stability Assessment Reports, Soils and Geology Chapters of EIS's, site assessments for wind farm developments and the investigation of peat failures at wind farm sites.

Paul Jennings
Paul Jennings is a Senior Geotechnical Engineer and Director of AGEC with over 25 years' experience of design and construction of sub-surface structures, foundations, earthworks, infrastructure and earth-retaining structures; planning, supervision and interpretation of ground investigation; and providing expert geotechnical advice and reporting. Paul has particular experience in providing expert advice for slope stability problems, soft ground engineering, infrastructure, deep-excavations and forensic investigation of landslides.

1.7.2.4 AWN Consulting Ltd.

Damian Kelly
Damian Kelly (Principal Acoustic Consultant) holds a B.Sc. from DCU and a M.Sc. from QUB. He has over 15 years' experience as an acoustic consultant and is a member of the Institute of Acoustics. He has extensive knowledge in the field of noise modelling and prediction, having developed many of the largest and most complex examples of proprietary noise models prepared in Ireland to date. He has extensive modelling experience in relation to wind farm, industrial and road infrastructure projects. He is a sitting member of the committee of the Irish Brach of the Institute of Acoustics.

Dermot Blunnie
Dermot Blunnie (Acoustic Consultant) holds a MSc in Applied Acoustics and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. He is also an associate member of the IOA. He has extensive knowledge in aspects of environmental surveying, modeling and impact assessment, particularly for wind energy developments.

1.7.2.5 Tobar Archaeological Services

Tobar Archaeological Services is a Cork-based company entering its ninth year in business. They offer professional nationwide services ranging from pre-planning assessments to archaeological excavation, and cater for clients in state agencies, private and public sectors.

Tobar's Directors, Annette Quinn and Miriam Carroll, are licensed by the Department of the Environment, Heritage and Local Government to carry out excavations in Ireland and have carried out work directly for the National Monuments Services of the Department of the Environment, Heritage and Local Government. Tobar Archaeological Services has a proven track record and extensive experience in the wind farm industry from EIS stage through to construction stage when archaeological monitoring is frequently required.

1.7.2.6 Alan Lipscombe Traffic and Transport Consultants

Alan Lipscombe (B.Eng. Hons.) MIHT

In January 2007 Alan Lipscombe set up an independent traffic and transportation consultancy providing advice for a range of clients in the private and public sectors. Prior to this Alan was a founding member of Colin Buchanan's Galway office having moved there as the senior transportation engineer for the Galway Land Use and Transportation Study. Since the completion of that study in 1999, Alan has worked throughout the West of Ireland on a range of projects including: major development schemes, the Galway City Outer Bypass, Limerick Planning Land-Use and Transportation Study, Limerick Southern Ring Road Phase II, cost benefit analyses (COBA) and various studies for the NUI Galway. Before moving to Galway in 1997, Alan was involved in a wide variety of traffic and transport studies for CBP throughout the UK, Malta and Indonesia. He has particular expertise in the assessment of development related traffic and transport modelling and is an accomplished analyst who has experience of a wide variety of modelling packages and methods.