

# Environmental Impact Statement

Proposed Wind Farm Development at  
Cloncreen & Adjacent Townlands, Co. Offaly

Volume 1: Non-Technical Summary  
& Environmental Impact Statement

**BORD<sup>NA</sup>MÓNA**  
Naturally Driven



Planning & Environmental Consultants

## DOCUMENT DETAILS

**Client:** Bord na Móna Powergen Ltd.

**Project title:** Cloncreen Wind Farm EIS, Co. Offaly

---

**Project Number:** 150504

**Document Title:** Volume 1: Non-Technical Summary and Environmental Impact Statement

**Doc. File Name:** 150504 – EIS – 2016.10.27 - F

**Prepared By:** McCarthy Keville O’Sullivan Ltd.  
Planning & Environmental Consultants  
Block 1, G.F.S.C.  
Moneenageisha Road, Galway



### Document Issue:

Rev	Status	Issue Date	Document File Name	Author(s)	Approved By:
01	Final	27.10.2016	150504 – EIS – 2016.10.27 - F	LM, JS, JH, ES, PH	MW

# Table of Contents

## Volume 1: Non-Technical Summary & Environmental Impact Statement

<b>NON-TECHNICAL SUMMARY</b> .....	<b>i</b>
<b>1 Introduction</b> .....	<b>1-1</b>
1.1 Introduction.....	1-1
1.1.1 Guidance and Legislation.....	1-2
1.2 The Applicant .....	1-2
1.3 Brief Description of the Proposed Development .....	1-3
1.4 Need for the Proposed Development.....	1-4
1.4.1 Renewable Energy Targets.....	1-4
1.4.2 Reduction of Carbon Emissions.....	1-5
1.4.3 Economic Benefits .....	1-5
1.5 Purpose and Scope of the EIS .....	1-6
1.6 Structure and Content of the EIS .....	1-6
1.6.1 General Structure .....	1-6
1.6.2 Description of Likely Significant Effects.....	1-7
1.7 Project Team .....	1-9
1.7.1 Project Team Responsibilities .....	1-9
1.7.2 Project Team Members .....	1-10
<b>2 Background to the Proposed Development</b> .....	<b>2-1</b>
2.1 Energy Policy and Targets .....	2-1
2.1.1 Renewable Energy .....	2-1
2.1.2 EU Policy.....	2-1
2.1.3 National Policy .....	2-2
2.2 Climate Change Policy and Targets.....	2-5
2.2.1 The Impacts of Climate Change.....	2-5
2.2.2 Greenhouse Gas Emission Targets.....	2-6
2.2.3 National Climate Change Policy .....	2-8
2.3 Strategic Planning Context .....	2-9
2.3.1 National Spatial Strategy 2002 – 2020.....	2-9
2.3.2 Draft National Planning Framework .....	2-10
2.3.3 Draft Renewable Electricity Policy and Development Framework.....	2-11
2.3.4 Regional Planning Guidelines for the Midlands Region 2010 – 2022.....	2-11
2.3.5 Offaly County Development Plan 2014 – 2020 .....	2-13
2.3.6 Wind Energy Strategy for County Offaly Methodology Statement 2014.....	2-15
2.3.7 Other County Development Plans.....	2-16
2.4 Selection of the Optimum Site .....	2-17
2.4.1 Selection of Candidate Sites .....	2-17
2.4.2 Site-Specific Assessment .....	2-17
2.4.3 Site Selection Results .....	2-18
2.5 Site Design, Constraints and Facilitators Methodology .....	2-21

2.5.1	Site Layout.....	2-21
2.5.2	Constraints Mapping .....	2-21
<b>2.6</b>	<b>Site of the Proposed Development .....</b>	<b>2-22</b>
2.6.1	Site Location.....	2-22
2.6.2	Site Access .....	2-22
2.6.3	Physical Characteristics of Site and Surrounding Lands.....	2-22
<b>2.7</b>	<b>Planning History .....</b>	<b>2-23</b>
2.7.1	Study Area .....	2-23
2.7.2	Applications in the Vicinity of the Proposed Wind Farm Site .....	2-24
2.7.3	Other Wind Farm Sites Within 20 Kilometres .....	2-29
<b>2.8</b>	<b>Alternatives.....</b>	<b>2-31</b>
2.8.1	Introduction .....	2-31
2.8.2	Alternative Sites .....	2-32
2.8.3	Alternative Land-uses.....	2-32
2.8.4	Alternative Turbine Numbers and Model .....	2-34
2.8.5	Alternative Layouts .....	2-34
2.8.6	Alternative Transport Route and Site Access.....	2-36
<b>2.9</b>	<b>Scoping and Consultation .....</b>	<b>2-37</b>
2.9.1	Scoping .....	2-37
2.9.2	Scoping Responses .....	2-37
2.9.3	Pre-Planning Meetings .....	2-54
2.9.4	Public Consultation .....	2-54
<b>2.10</b>	<b>Cumulative Impact Assessment .....</b>	<b>2-58</b>
2.10.1	Methodology for the Cumulative Assessment of Projects .....	2-59
2.10.2	Projects Considered in Cumulative Assessment.....	2-59
<b>3</b>	<b>Description of the Proposed Development .....</b>	<b>3-1</b>
3.1	Introduction.....	3-1
3.2	Development Layout .....	3-2
3.3	Development Components.....	3-2
3.3.1	Wind Turbines .....	3-2
3.3.2	Site Roads.....	3-7
3.3.3	Borrow Pit .....	3-8
3.3.4	Sand and Stone Requirements .....	3-9
3.3.5	Peat Management Plan.....	3-11
3.3.6	Electricity Substations .....	3-13
3.3.7	Wind Farm Control Buildings .....	3-14
3.3.8	Underground Cabling.....	3-14
3.3.9	Grid Connection.....	3-15
3.3.10	Anemometry Mast .....	3-15
3.3.11	Temporary Construction Compounds.....	3-15
3.3.12	Junction Accommodation and Public Road Works .....	3-16
3.3.13	Site Activities .....	3-18
<b>3.4</b>	<b>Community Benefit Proposal.....</b>	<b>3-20</b>
3.4.1	Background .....	3-20
3.4.2	Cloncreen Community Benefit.....	3-21
<b>3.5</b>	<b>Access and Transportation .....</b>	<b>3-22</b>
3.5.1	Site Entrances .....	3-22
3.5.2	Turbine and Construction Materials Transport Route .....	3-23

3.5.3	Traffic Management .....	3-23
<b>3.6</b>	<b>Site Drainage.....</b>	<b>3-24</b>
3.6.1	Introduction .....	3-24
3.6.2	Existing Drainage Features .....	3-24
3.6.3	Drainage Design Principles .....	3-25
3.6.4	References .....	3-25
3.6.5	Drainage Design.....	3-26
3.6.6	Borrow Pit Drainage.....	3-31
3.6.7	Cable Trench Drainage .....	3-31
3.6.8	Site and Drainage Management .....	3-32
3.6.9	Drainage Maintenance .....	3-32
<b>3.7</b>	<b>Construction Management.....</b>	<b>3-33</b>
3.7.1	Construction Timing.....	3-33
3.7.2	Construction Sequencing.....	3-33
3.7.3	Construction Phase Monitoring and Oversight .....	3-35
<b>3.8</b>	<b>Construction Methodologies.....</b>	<b>3-35</b>
3.8.1	Turbine Foundations .....	3-35
3.8.2	Site Roads and Crane Pad Areas .....	3-37
3.8.3	Grid Connection Cable Trench.....	3-37
3.8.4	'Tea Centre' Demolition .....	3-39
3.8.5	Meterological Mast Disassembly.....	3-40
3.8.6	Telecommunications Mast Disassembly .....	3-40
<b>3.9</b>	<b>Operation.....</b>	<b>3-41</b>
<b>3.10</b>	<b>Decommissioning.....</b>	<b>3-41</b>
<b>4</b>	<b>Human Beings .....</b>	<b>4-1</b>
4.1	Introduction.....	4-1
4.2	Receiving Environment .....	4-1
4.2.1	Methodology .....	4-1
4.2.2	Population .....	4-1
4.2.3	Employment and Economic Activity.....	4-4
4.2.4	Land-use .....	4-6
4.2.5	Services .....	4-7
4.3	Tourism .....	4-8
4.3.1	Tourist Numbers and Revenue .....	4-8
4.3.2	Tourist Attractions .....	4-9
4.3.3	Tourist Attitudes to Wind Farms.....	4-9
4.4	Public Perception of Wind Energy .....	4-11
4.4.1	Scotland and Ireland Survey .....	4-11
4.4.2	Sustainable Energy Ireland Survey.....	4-12
4.4.3	Local Consultation .....	4-14
4.5	Health Effects of Wind Farms .....	4-14
4.5.1	Health Effect Studies .....	4-14
4.5.2	Turbine Safety .....	4-18
4.5.3	Electromagnetic Interference.....	4-18
4.6	Property Values .....	4-18
4.7	Shadow Flicker .....	4-20
4.7.1	Background .....	4-20

4.7.2	Guidance.....	4-22
4.7.3	Shadow Flicker Prevention and Prediction Methodology .....	4-23
4.7.4	Shadow Flicker Assessment Criteria .....	4-23
4.7.5	Shadow Flicker Assessment Results .....	4-27
4.7.6	Shadow Flicker Mitigation Strategies.....	4-34
<b>4.8</b>	<b>Residential Amenity .....</b>	<b>4-36</b>
<b>4.9</b>	<b>Likely and Significant Effect and Associated Mitigation Measures .....</b>	<b>4-37</b>
4.9.1	'Do-Nothing' Scenario.....	4-37
4.9.2	Construction Phase.....	4-37
4.9.3	Operational Phase.....	4-41
4.9.4	Cumulative Impact Assessment .....	4-47
<b>4.10</b>	<b>Conclusion.....</b>	<b>4-48</b>
<b>5</b>	<b>Flora and Fauna .....</b>	<b>5-1</b>
<b>5.1</b>	<b>Introduction.....</b>	<b>5-1</b>
5.1.1	Statement of Authority.....	5-2
5.1.2	Relevant Legislation.....	5-3
5.1.3	Relevant Guidance .....	5-5
<b>5.2</b>	<b>Methodology.....</b>	<b>5-5</b>
5.2.1	Desk Study.....	5-5
5.2.2	Fieldwork.....	5-6
5.2.3	Methodology for Assessment of Effects .....	5-12
<b>5.3</b>	<b>Description of the Baseline Environment.....</b>	<b>5-14</b>
5.3.1	Scoping and Consultation .....	5-14
5.3.2	Desk Study.....	5-22
5.3.3	Field Assessment.....	5-29
<b>5.4</b>	<b>Likely and Significant Effects on Flora and Fauna .....</b>	<b>5-49</b>
5.4.1	Do-Nothing Effect .....	5-49
5.4.2	Effects on Designated Areas.....	5-50
5.4.3	Effects on Receptors of Local Importance (Lower Value).....	5-50
5.4.4	Effects on Key Ecological Receptors .....	5-58
5.4.5	Cumulative Effects .....	5-63
<b>5.5</b>	<b>Mitigation Measures .....</b>	<b>5-64</b>
5.5.1	Mitigation by Avoidance.....	5-64
5.5.2	Construction and Environmental Management Plan (CEMP) .....	5-65
5.5.3	Habitats Flora and Fauna.....	5-65
5.5.4	Water Quality.....	5-67
5.5.5	Invasive Species .....	5-67
<b>5.6</b>	<b>Residual Effects on Key Ecological Receptors (KERs) .....</b>	<b>5-68</b>
<b>5.7</b>	<b>Conclusion.....</b>	<b>5-71</b>
<b>6</b>	<b>Ornithology.....</b>	<b>6-1</b>
<b>6.1</b>	<b>Introduction.....</b>	<b>6-1</b>
6.1.1	Background .....	6-1
6.1.2	Legislation and Policy Context.....	6-2
6.1.3	Professional Competency of Authors .....	6-4
<b>6.2</b>	<b>Methodology.....</b>	<b>6-4</b>

6.2.1	Desk Studies and Consultation .....	6-4
6.2.2	Field Surveys .....	6-5
6.2.3	Assessment Methodology .....	6-9
<b>6.3</b>	<b>Desktop Review and Consultation .....</b>	<b>6-14</b>
6.3.1	Consultation Response .....	6-14
6.3.2	Desktop Review .....	6-15
6.3.3	Identification of Target Species .....	6-25
<b>6.4</b>	<b>Results and Discussion .....</b>	<b>6-27</b>
6.4.1	Field Surveys .....	6-27
<b>6.5</b>	<b>Evaluation .....</b>	<b>6-44</b>
6.5.1	Bird Sensitivity Mapping Tool.....	6-44
6.5.2	Species Evaluation Criteria.....	6-44
<b>6.6</b>	<b>Likely and Significant Effects.....</b>	<b>6-52</b>
6.6.1	Construction Phase.....	6-52
6.6.2	Operational Phase.....	6-67
6.6.3	Decommissioning Phase.....	6-84
6.6.4	Assessment of Cumulative Effects .....	6-84
6.6.5	Do-Nothing Effect .....	6-89
<b>6.7</b>	<b>Mitigation Measures .....</b>	<b>6-89</b>
6.7.1	Mitigation at the Design Stage .....	6-89
6.7.2	Mitigation During Construction, Operation and Decommissioning .....	6-90
6.7.3	Summary of Effects.....	6-93
<b>6.8</b>	<b>Monitoring.....</b>	<b>6-93</b>
<b>6.9</b>	<b>Statement of Significance .....</b>	<b>6-93</b>
<b>7</b>	<b>Soils and Geology .....</b>	<b>7-1</b>
<b>7.1</b>	<b>Introduction.....</b>	<b>7-1</b>
7.1.1	Background and Objectives .....	7-1
7.1.2	Relevant Legislation.....	7-1
7.1.3	Relevant Guidance .....	7-1
<b>7.2</b>	<b>Schedule of Works .....</b>	<b>7-2</b>
7.2.1	Desk Study.....	7-2
7.2.2	Baseline Mapping and Site Investigations .....	7-2
7.2.3	Impact Assessment Methodology.....	7-2
<b>7.3</b>	<b>Existing Environment.....</b>	<b>7-5</b>
7.3.1	Site Description and Topography.....	7-5
7.3.2	Soils and Subsoils – General .....	7-5
7.3.3	Soils and Subsoils – Substation (Option A and Option B) .....	7-7
7.3.4	Soils and Subsoils – Proposed Borrow Pit .....	7-7
7.3.5	Bedrock Geology .....	7-9
7.3.6	Geological Resource Importance .....	7-9
7.3.7	Geological Heritage and Designated Sites .....	7-9
7.3.8	Peat Stability Assessment .....	7-10
<b>7.4</b>	<b>Characteristics of the Proposed Development.....</b>	<b>7-13</b>
<b>7.5</b>	<b>Likely Significant Effects &amp; Mitigation Measures .....</b>	<b>7-14</b>
7.5.1	Do-Nothing Scenario.....	7-14
7.5.2	Worst Case Scenario .....	7-14
7.5.3	Likely Significant Effects and Mitigation Measures .....	7-14

7.5.4	Operational Phase.....	7-19
7.5.5	Decommissioning Phase.....	7-19
7.5.6	Cumulative Impacts .....	7-19
7.5.7	Conclusion.....	7-19
7.5.8	Summary.....	7-20
<b>8</b>	<b>Hydrology and Hydrogeology .....</b>	<b>8-1</b>
<b>8.1</b>	<b>Introduction.....</b>	<b>8-1</b>
8.1.1	Background and Objectives .....	8-1
8.1.2	Relevant Legislation.....	8-1
8.1.3	Relevant Guidance .....	8-2
<b>8.2</b>	<b>Methodology.....</b>	<b>8-3</b>
8.2.1	Desk Study.....	8-3
8.2.2	Site Investigations .....	8-3
8.2.3	Impact Assessment Methodology.....	8-4
<b>8.3</b>	<b>Receiving Environment .....</b>	<b>8-5</b>
8.3.1	Site Description and Topography.....	8-5
8.3.2	Water Balance .....	8-5
8.3.3	Regional and Local Hydrology .....	8-6
8.3.4	Site Drainage .....	8-6
8.3.5	Flood Risk Assessment Overview .....	8-9
8.3.6	Surface Water Quality .....	8-11
8.3.7	Cloncreen Bog Outfall Water Quality Monitoring .....	8-15
8.3.8	Hydrogeology.....	8-18
8.3.9	Groundwater Vulnerability .....	8-19
8.3.10	Groundwater Hydrochemistry.....	8-19
8.3.11	Water Framework Directive Water Body Status & Objectives .....	8-19
8.3.12	Groundwater Body Status .....	8-19
8.3.13	Surface Water Body Status .....	8-20
8.3.14	Designated Sites and Habitats .....	8-20
8.3.15	Water Resources .....	8-21
8.3.16	Receptor Sensitivity.....	8-22
8.3.17	Assessment of Changes in Site Runoff Volumes.....	8-22
8.3.18	Development Interaction with the Existing Bog Drainage Network.....	8-25
8.3.19	Proposed Drainage Management .....	8-25
<b>8.4</b>	<b>Likely Significant Effects and Mitigation Measures.....</b>	<b>8-26</b>
8.4.1	Overview of Impact Assessment Process.....	8-26
8.4.2	Construction Phase Potential Effects.....	8-28
8.4.3	Operational Phase Effects .....	8-37
8.4.4	Decommissioning Phase.....	8-39
8.4.5	Do-Nothing Scenario.....	8-39
8.4.6	Worst-Case Scenario .....	8-39
8.4.7	Cumulative Impacts .....	8-39
8.4.8	Conclusion.....	8-41
<b>9</b>	<b>Air and Climate.....</b>	<b>9-1</b>
<b>9.1</b>	<b>Air Quality.....</b>	<b>9-1</b>
9.1.1	Background .....	9-1
9.1.2	Air Quality Standards .....	9-1
9.1.3	Air Quality Zones .....	9-4



9.1.4	Existing Air Quality .....	9-4
9.1.5	Likely Significant Effects and Associated Mitigation Measures.....	9-6
<b>9.2</b>	<b>Climate .....</b>	<b>9-9</b>
9.2.1	Climate Change and Greenhouse Gases .....	9-9
9.2.2	Climate and Weather in the Existing Environment .....	9-11
9.2.3	Calculating Carbon Losses and Savings from the Proposed Development ....	9-13
9.2.4	Likely Significant Effects and Associated Mitigation Measures.....	9-14
<b>9.3</b>	<b>Cumulative Assessment .....</b>	<b>9-16</b>
<b>10</b>	<b>Noise and Vibration .....</b>	<b>10-1</b>
<b>10.1</b>	<b>Introduction.....</b>	<b>10-1</b>
10.1.1	Statement of Authority .....	10-2
<b>10.2</b>	<b>Fundamentals of Acoustics.....</b>	<b>10-2</b>
<b>10.3</b>	<b>Guidance Documents and Adopted Criteria.....</b>	<b>10-4</b>
10.3.1	Construction Phase .....	10-4
10.3.2	Operational Phase .....	10-5
<b>10.4</b>	<b>Receiving Environment .....</b>	<b>10-16</b>
10.4.1	Choice of Measurement Locations .....	10-16
10.4.2	Measurement Periods.....	10-23
10.4.3	Personnel and Instrumentation .....	10-23
10.4.4	Procedure .....	10-24
10.4.5	Consideration of Wind Shear.....	10-24
10.4.6	Results.....	10-25
<b>10.5</b>	<b>Likely Significant Effects and Mitigation Measures.....</b>	<b>10-31</b>
10.5.1	Construction Phase Potential Effects .....	10-31
10.5.2	Operational Phase Potential Effects .....	10-37
<b>10.6</b>	<b>Remedial or Reductive Measures .....</b>	<b>10-65</b>
10.6.1	Construction Phase .....	10-65
10.6.2	Operational Phase .....	10-66
10.6.3	Decommissioning Phase .....	10-67
<b>10.7</b>	<b>Summary of Likely Significant Effects .....</b>	<b>10-67</b>
10.7.1	Do Nothing Scenario.....	10-68
10.7.2	Construction Phase .....	10-68
10.7.3	Operational Phase .....	10-68
10.7.4	Vibration.....	10-69
10.7.5	Cumulative Effects .....	10-69
<b>10.8</b>	<b>Monitoring.....</b>	<b>10-69</b>
<b>11</b>	<b>Landscape and Visual.....</b>	<b>11-1</b>
<b>11.1</b>	<b>Introduction.....</b>	<b>11-1</b>
11.1.1	Statement of Authority.....	11-1
11.1.2	'Do-Nothing' Scenario .....	11-1
11.1.3	Proposed Development Description.....	11-1
11.1.4	Scoping Responses .....	11-2
11.1.5	Pre –Planning Meetings.....	11-4
<b>11.2</b>	<b>Methodology and Assessment Criteria.....</b>	<b>11-4</b>
11.2.1	Guidelines .....	11-4

11.2.2	Baseline Landscape and Visual Information .....	11-5
11.2.3	Assessment of Potential Impacts .....	11-7
<b>11.3</b>	<b>Wind Farm Development Guidelines and Landscape Policy Context .....</b>	<b>11-9</b>
11.3.1	DoEHLG ‘Wind Energy Development Guidelines’ (2006) .....	11-9
11.3.2	Offaly County Development Plan 2014 – 2020 .....	11-12
11.3.3	Kildare County Development Plan 2011 – 2017 .....	11-17
11.3.4	Westmeath County Development Plan 2014 – 2020.....	11-22
11.3.5	Laois County Development Plan 2011 – 2017.....	11-24
<b>11.4</b>	<b>Landscape Character .....</b>	<b>11-24</b>
11.4.1	General Landscape Context of the Proposed Development .....	11-24
11.4.2	Physical Landscape Unit.....	11-27
<b>11.5</b>	<b>Indications of Landscape Value .....</b>	<b>11-32</b>
11.5.1	Landscape Value .....	11-32
<b>11.6</b>	<b>Views to and From Site .....</b>	<b>11-32</b>
11.6.1	Views from the Site .....	11-33
11.6.2	Views towards the Site.....	11-35
<b>11.7</b>	<b>Visibility of the Proposed Development .....</b>	<b>11-37</b>
11.7.1	Cumulative Visibility - Other Wind Farms .....	11-37
11.7.2	Cumulative Visibility - Non-Wind Developments .....	11-37
11.7.3	Zone of Theoretical Visibility: Methodology.....	11-38
11.7.4	Description of ZTV Maps .....	11-39
11.7.5	Route Screening Methodology - Roads .....	11-41
11.7.6	Viewpoint Locations/ Viewshed Reference Points .....	11-46
<b>11.8</b>	<b>Landscape and Visual Impact Assessment Methodology .....</b>	<b>11-48</b>
11.8.1	Assessing Landscape Effects .....	11-48
11.8.2	Assessing Visual Effects .....	11-50
11.8.3	Assessing Cumulative Landscape and Visual Effects .....	11-52
<b>11.9</b>	<b>Likely and Significant Effects &amp; Associated Mitigation Measures.....</b>	<b>11-52</b>
11.9.1	Viewpoint Assessment and Photomontage Booklet .....	11-53
11.9.2	‘Do Nothing’ Scenario .....	11-79
11.9.3	Construction Phase Effects .....	11-80
11.9.4	Operational Phase Effects .....	11-88
<b>12</b>	<b>Archaeology and Cultural Heritage .....</b>	<b>12-1</b>
<b>12.1</b>	<b>Introduction.....</b>	<b>12-1</b>
12.1.1	Statement of Authority .....	12-1
12.1.2	Proposed Development .....	12-1
12.1.3	Site Location and Topography.....	12-1
12.1.4	Statutory Context.....	12-5
<b>12.2</b>	<b>Methodology.....</b>	<b>12-10</b>
12.2.1	Desktop Assessment.....	12-11
12.2.2	Geographical Information Systems.....	12-13
12.2.3	Field Inspection .....	12-13
<b>12.3</b>	<b>Existing Environment.....</b>	<b>12-14</b>
12.3.1	Archaeological Heritage.....	12-14
12.3.2	Architectural and Cultural Heritage .....	12-51
<b>12.4</b>	<b>Likely Significant Effects and Mitigation Measures.....</b>	<b>12-67</b>
12.4.1	Types of Effects .....	12-67

12.4.2	Magnitude of Effects.....	12-67
12.4.3	Construction Phase Potential Effects: Direct .....	12-67
12.4.4	Construction Phase Potential Effects: Indirect .....	12-73
12.4.5	Operational Phase Potential Effects: Direct .....	12-73
12.4.6	Operational Phase Potential Effects: Indirect .....	12-73
12.4.7	Do-Nothing Scenario.....	12-83
12.4.8	Worst-Case Scenario .....	12-83
12.4.9	Cumulative Effects .....	12-84
12.4.10	Decommissioning Phase .....	12-85
<b>12.5</b>	<b>Conclusion.....</b>	<b>12-86</b>
<b>13</b>	<b>Material Assets .....</b>	<b>13-1</b>
<b>13.1</b>	<b>Traffic and Transport .....</b>	<b>13-1</b>
13.1.1	Introduction.....	13-1
13.1.2	Receiving Environment .....	13-3
13.1.3	Existing Traffic Volumes .....	13-4
13.1.4	Proposed Development and Traffic Generation .....	13-6
13.1.5	Construction Traffic Design Vehicles .....	13-9
13.1.6	Traffic Effects During Construction and During Operation.....	13-10
13.1.7	Route Assessment .....	13-18
13.1.8	Provision for Sustainable Modes of Travel.....	13-23
13.1.9	Likely and Significant Effects and Associated Mitigation Measures .....	13-23
<b>13.2</b>	<b>Telecommunications and Aviation .....</b>	<b>13-26</b>
13.2.1	Introduction.....	13-26
13.2.2	Background.....	13-27
13.2.3	Preventing Electromagnetic Interference.....	13-28
13.2.4	Aviation and Parachuting Activities - Response.....	13-31
13.2.5	Likely Significant Effects and Associated Mitigation Measures .....	13-32
<b>14</b>	<b>Interaction of the Foregoing.....</b>	<b>14-1</b>
<b>14.1</b>	<b>Introduction .....</b>	<b>14-1</b>
<b>14.2</b>	<b>Effect Interactions .....</b>	<b>14-2</b>
14.2.1	Human Beings.....	14-2
14.2.2	Flora and Fauna .....	14-3
14.2.3	Ornithology.....	14-4
14.2.4	Soils and Geology.....	14-5
14.2.5	Air and Climate / Noise.....	14-5
14.2.6	Landscape .....	14-5
<b>14.3</b>	<b>Mitigation and Residual Effects.....</b>	<b>14-5</b>

## REFERENCES

### SEE FURTHER VOLUMES:

Volume 2	Photomontage Booklet
Volume 3	Appendices 2-1 to 6-7
Volume 4	Appendices 7-1 to 13-1