



INTERNATIONAL

Industrial Emissions Licence Review for Lough Ree Power Station and the Derraghan Ash Disposal Facility, Co. Longford

The Electricity Supply Board (ESB)

Environmental Impact Assessment Report (EIAR)
(previously referred to as an Environmental Impact
Statement)

for inspection purposes only.
Consent of copyright owner required for any other use.

Document No.:QS-000214-01-R460-010

Date: March 2019

ESB International, One Dublin Airport Central, Dublin Airport, Cloghran, Co. Dublin, Ireland.

Phone +353 (0)1 703 8000

www.esbinternational.ie

For inspection purposes only.
Consent of copyright owner required for any other use.

This page is left intentionally blank

For inspection purposes only.
Consent of copyright owner required for any other use.

File Reference:	Proposed increase in capacity at Derraghan Ash Disposal Facility, Co. Longford	
Client Recipient:	/ ESB	
Project Title:	Industrial Emissions Licence Review for Lough Ree Power Station and the Derraghan Ash Disposal Facility, Co. Longford	
Report Title:	Environmental Impact Assessment Report (EIAR)	
Report No.:	QS-000214-01-R460-010	
Volume:	Main EIAR 2 of 4	
Prepared by:	Mairéad Hogan	Date:18 December 2017
Title:	Senior Environmental Consultant	
Verified by:	Helen O'Keeffe	Date:18 December 2017
Title:	Senior Planner	
Approved by:	Paddy Kavanagh	Date:18 December 2017
Title:	Senior Team Leader	

Copyright © ESB International Limited

All rights reserved. No part of this work may be modified, reproduced or copied in any form or by any means, graphic, electronic or mechanical, including photocopying, recording, taping or used for any purpose other than its designated purpose, without the written permission of ESB International Limited.

Template Used: T-020-001-ESBI Report Template

Change History of Report

Date	New Revision	Author	Verified by	Approved by	Summary of Change
March 2019	1	Oonagh Duffy	Paddy Kavanagh	Jim Fitzpatrick	Updated for submission to the EPA for the IE licence review

Table of Contents

1	Introduction	1
1.1	Purpose of the EIAR	1
1.2	Background	3
1.3	Overview of the published Derraghan Ash Disposal Facility Development EIAR 2017	5
1.4	The Proposed Development (the IE Licence Review Application) Requirement	7
1.5	Relevant Legislation	10
1.6	The Form and Content of an EIAR	12
1.7	The EIAR for the Proposed Development	13
1.8	Difficulties Encountered in the EIA Process	25
2	Need for the Proposed Development	26
2.1	The ADF	26
2.2	The Need to alter Condition 5.5	27
3	Alternatives Considered	29
3.1	Alternative to Ash Landfilling	29
3.2	Thermal Plume Alternatives Considered	36
3.3	Conclusion on Alternatives	44
4	Description of the Proposed Development	46
4.1	The Proposed Development	46
4.2	Existing LRP Station	47
4.3	The ADF Site and increase in the Disposal Capacity	48
4.4	Operation & Maintenance	50
4.5	Characteristics of the Proposed Development	50
4.6	Note on Baseline for the Proposed Development	51
4.7	Material Uses and Emissions from the proposed development	52
4.8	Site Closure and Remediation	54
4.9	Associated Activities - Peat Supply to LRP Station	54
4.10	Potential Future Proposed Development at the LRP Station and ADF	56
5	Population and Human Health	57

5.1	Introduction	57
5.2	Methodology	57
5.3	Receiving Environment	58
5.4	Impacts of the Development	62
5.5	Mitigation	64
5.6	Residual Impacts	64
5.7	'Do Nothing' Scenario	65
5.8	Interaction of the Foregoing	65
6	Biodiversity	66
6.1	Introduction	66
6.2	Methodology	67
6.3	Receiving Environment	71
6.4	Impacts of the Development	86
6.5	Mitigation	107
6.6	Residual Impacts	114
6.7	'Do Nothing' Scenario	114
6.8	Interaction of the Foregoing	115
6.9	Conclusion	115
7	Surface Water	116
7.1	Introduction	116
7.2	Methodology	116
7.3	Receiving Environment	117
7.4	Impacts of the Development	132
7.5	Mitigation	141
7.6	Residual Impacts	145
7.7	'Do Nothing' Scenario	146
7.8	Interaction of the Foregoing	147
8	Land, Soils, Geology and Hydrogeology	148
8.1	Introduction	148
8.2	Methodology	148
8.3	Receiving Environment	149
8.4	Impacts of the Development	166

8.5	Mitigation	170
8.6	Residual Impacts	173
8.7	'Do Nothing' Scenario	173
8.8	Interaction of the Foregoing	174
9	Climate, Air Quality and Noise	175
9.1	Introduction	175
9.2	Methodology	175
9.3	Receiving Environment	177
9.4	Impacts of the Development	192
9.5	Mitigation	206
9.6	Residual Impacts	208
9.7	Do Nothing	209
9.8	Interaction of the Foregoing	209
10	Material Assets	210
10.1	Introduction	210
10.2	Methodology	210
10.3	Receiving Environment	211
10.4	Impacts of the Development	213
10.5	Mitigation	216
10.6	Residual Impacts	217
10.7	'Do Nothing' Scenario	217
10.8	Interaction of the Foregoing	217
11	Landscape and Visual	218
11.1	Introduction	218
11.2	Methodology	218
11.3	Study Area	224
11.4	Receiving Environment	225
11.5	Impacts of the Development	235
11.6	Mitigation	237
11.7	Residual Impacts	237
11.8	'Do Nothing' Scenario	237
11.9	Interaction of the Foregoing	237

12 Cultural Heritage	237
12.1 Introduction	237
12.2 Methodology	238
12.3 Study Area	240
12.4 Receiving Environment	240
12.5 Impacts of the Development	265
12.6 Mitigation	269
12.7 Difficulties Encountered in Compiling Information	269
12.8 Residual Impacts	269
12.9 References	269
13 Interaction of Impacts	272
13.1 Assessment Methodology	272
13.2 Cross Media Impacts	272
14 Vulnerability of the Proposed Development	275
14.1 Vulnerability to risk of major accidents and/or disasters	275
Acronyms	283

For inspection purposes only
Consent of copyright owner required for any other use.

List of Plates

Plate 7-1 Typical Under Cell Drainage Detail	124
Plate 7-2 Typical Anchor Trench Detail	125
Plate 7-3 Typical Leachate Pipework Detail	126
Plate 9-1 Ireland Greenhouse Gas Emission 2015*	180
Plate 9-2 Air Quality Zones in Ireland	182
Plate 9-3 Summary of Noise Monitoring Survey Results 2017.....	203
Plate 9-4: Greenhouse Gas Emissions 1990 and 2017 by sector	204
Plate 9-5 Ash wagon of a rail bogey with ash buckets and a hydraulically controlled lid	206
Plate 12-1 Aerial view of Lanesborough Power Station in 2000.....	247

For inspection purposes only.
Consent of copyright owner required for any other use.

List of Tables

Table 1-1: Summary of Issues Raised in Scoping Responses and Relevant Reference in EIAR.....	16
Table 1-2: Impact assessment evaluation criteria.....	22
Table 1-3: EIAR Contributors	24
Table 3-1: Alternatives Considered related to Ash.....	31
Table 3-2: Alternatives Considered related to the Thermal Discharge	37
Table 4-1: Material Uses, Direct and Indirect Emissions.....	53
Table 4-2: Peat Supply Bogs Utilised to Supply LRP Station, 2018 – 2020	55
Table 5-1: National Population Statistics	58
Table 5-2: Regional Population Statistics	58
Table 5-3: Local Population Statistics.....	59
Table 5-4: Persons on the Live Register.....	59
Table 6-1: Extent of Habitats within and Adjacent to ADF	76
Table 6-2: Records from April 2017 Breeding Bird Survey	77
Table 6-3: Designated Sites within 15 km of the ADF (in order of proximity)	80
Table 6-4: Protected or Rare Flora Records from Supply Bog Study Area	84
Table 6-5: Examples of the importance of ecological receptors (NRA 2009a)	87
Table 6-6: Magnitude Definition.....	89
Table 6-7: Matrix utilised to determine impact significance.....	90
Table 6-8: Surface Water Quality Measures Associated with Peat Supply Bogs .	110
Table 7-1: Relevant WFD Water Regions.....	118
Table 7-2: Surface Water Sampling Results 2016 – SW5 and SW6	122
Table 7-3: Summary of Emissions 2016 - SW4	122
Table 7-4: Surface Water Sampling Locations	127
Table 7-5: Waterbody Risk Status.....	129
Table 7-6: Derraghan ADF Mitigation Measures.....	142
Table 7-7: Mitigation Measures Associated with the Peat Supply Bogs.....	144
Table 8-1: Generalised Geology.....	150
Table 8-2: Summary of GSI Well Data	151
Table 8-3: Groundwater Wells Monitored	153
Table 8-4: Summary of General Geology	154
Table 8-5: Summary of Local Well Data	156

Table 8-6: Catchment Management Plans Groundwater Risk Summary	159
Table 8-7: Supply Bogs and Associated Characteristics.....	163
Table 8-8: LRP Station Current Mitigation Measures.....	170
Table 8-9: Derraghan ADF Mitigation Measures.....	171
Table 8-10: Control Measures Applicable to Bord na Móna Bogs.....	172
Table 9-1: Emission limit values and monitoring requirements according to P0610-02 Licence	184
Table 9-2: Annual Emissions to Air for 2014, 2015, 2016	185
Table 9-3: EPA Air Quality Monitoring Nitrogen Oxides (NOx) Zone D.....	187
Table 9-4: EPA Air Quality Monitoring Sulphur Dioxide (SO2) Zone D	188
Table 9-5: EPA Air Quality Monitoring Carbon Monoxide (CO) Zone D	188
Table 9-6: EPA Air Quality Monitoring Ozone Zone D	189
Table 9-7: EPA Air Quality Monitoring Particulate Matter (PM10) Zone D	189
Table 9-8: EPA Air Quality Monitoring Particulate Matter (PM2.5)	190
Table 9-9: B.3 Noise Emissions	191
Table 9-10: Emission limit values according to E Licence P0610-02	192
Table 9-11: Annual emissions to air for the periods 2014, 2015, 2016.	193
Table 9-12: Ireland's Transboundary Gas Emissions 2013	198
Table 9-13: LRP Generation Station- Transboundary Gas Emissions 2016	199
Table 11-1: Landscape Value and Sensitivity.....	219
Table 11-2: Magnitude of Landscape Impacts.....	220
Table 11-3: Impact Significance Matrix.....	221
Table 11-4: Magnitude of Visual Impact	224
Table 12-1: Archaeological Inventory – LRP Station	252
Table 12-2: Archaeological Inventory – ADF Site	253
Table 12-3: List of Protected Structures within LRP Station Study Area	263
Table 12-4: List of NIAH Structures within LRP Station Study Area.....	263
Table 12-5: List of NIAH Structures within ADF Study Area	264
Table 12-6: Descriptive Criteria for Cultural Heritage Impacts	265
Table 13-1: Potential Interaction of Significant Environmental Impacts.....	274
Table 14-1: Risk Classification Table Likelihood.....	276
Table 14-2: Risk Classification Severity Table – Consequence*	277
Table 14-3: Risk Assessment.....	279

This page is left intentionally blank

For inspection purposes only.
Consent of copyright owner required for any other use.

1 Introduction

1.1 Purpose of the EIAR

This Environmental Impact Assessment Report (EIAR) has been prepared in response to a Request for Further (RFI) information from the Environmental Protection Agency (EPA) in relation to an application by the Electricity Supply Board (ESB) to the EPA for an Industrial Emissions (IE) Licence Review in relation to existing IE licence P0610-02 for the ESB power station in Lanesborough (Lanesboro) - known as Lough Ree Power (LRP). In accordance with its EPA IE Licence P0610-02, the LRP station generates electricity through thermal combustion of peat. The IE licence covers both generation and ash disposal facility activities. The existing ADF exclusively accepts ash exclusively from LRP.

This EIAR is an updated version of that submitted to Longford County Council for planning permission to increase the capacity of the existing Ash Disposal Facility (ADF) at Derraghan, Co. Longford. That EIAR (the Derraghan Ash Disposal Facility Development EIAR 2017) was submitted to the EPA as part of the IE licence review application in May 2018.

In 2002 planning approval for an ash disposal facility capable of receiving 550,000 tonnes was received under the original application for the station (Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref. PL14.125540). This however would not meet projected disposal demand to the end of 2020, the planning termination date of the station and therefore a planning application to increase the ADF capacity by an additional 130,000 tonnes was made to Longford County Council and subsequently granted by the planning authority (Planning ref. 17/320). This will ensure that the ADF can function as the dedicated ash disposal site for the operational life of the power station, (to the end of 2020) as was envisaged when it was developed. This additional capacity can be provided within the footprint of the existing ADF and no additional footprint is required to be developed.

As a result of the requirement to increase the capacity of the ADF and in line with EPA Guidance for Licenses on Request for Alterations to the installation/facility (EPA, 2014) ESB applied to the EPA on 28th May 2018 for a review of IE Licence P0610-02.

Other requested alterations submitted for agreement of the EPA as part of the IE licence review application included:

- New site plan reference numbers;
- Removal of condition in relation to use of the Ringlemann Chart;
- Potential relocation of a groundwater monitoring well at the station;
- Site licence boundary provided;
- Provision of revised coordinates of groundwater (GW) monitoring well GW5 at the ADF; and
- An outline of previously agreed changes with the EPA.

These requirements were detailed in Attachment-1-1-Reason for Licence Review submitted to the EPA as part of the IE licence application available on the EPA website at <http://www.epa.ie/terminalfour/ippc/index.jsp> .

At the time of submission of the current IE Licence review application a technical amendment (TA) request was ongoing in relation to Condition 5.5 of the current LRP IE Licence P0610-02, which relates to the LRP station cooling water thermal plume discharge temperature condition. This technical amendment request was subsequently withdrawn in June 2018 and the proposed alteration to Condition 5.5 was submitted as supplementary information under this IE Licence review application (P0610-03).

This updated EIAR has been prepared to support the IE licence review application to the EPA for LRP including the increased capacity at the ADF and the requested alteration to Condition 5.5.

It should be noted that a separate Planning Application to transition LRP station from peat fuel to biomass has also been made to Longford County Council in 2019, (see Planning Reference Number 19/38). The application is accompanied by an Environmental Impact Assessment Report and a report under the Habitats and Birds Directives. This proposed future development will see the transition of LRP station from firing solely on peat to firing on sustainable biomass through a transition stage between 2020 and 2027 and solely firing on biomass thereafter. The application for the proposed transition to biomass development indicates that the LRP station would remain in operation post 2020 with peat continuing to be provided by Bord na Móna from their peat supply bogs until the end of the transition period. Peat deliveries would occur mainly by rail as at present with periodic road deliveries also. Sustainable biomass would be sourced from both indigenous and international sources with final delivery to LRP by road transport. There would be no change to the current plant infrastructure other than that associated with biomass storage on site. A just in time delivery system for biomass will be in operation utilising the station's existing fuel handling system. To allow operational flexibility biomass storage in the form of a concrete slab area with movable alpha bloc walls and a conveyor system for internal delivery of biomass to the existing fuel handling system will be provided. A separate pellet storage silo and pellet handling system will also be provided. The continued operation of LRP would also require the provision of additional ash disposal and an increased footprint and capacity of the ADF beyond 2020 has also been applied for.

For completeness, the continued operation of the station and ADF post 2020 as it transitions to biomass from peat with subsequent firing solely on peat has been assessed as a cumulative impact in each relevant section in this updated EIAR.

A separate application for an IE Licence review will be made to the EPA at a future date in relation to the transition of LRP station from peat fuel to biomass as outlined above.

1.2 Background

LRP Station was developed pursuant to a 2002 grant of planning permission (Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref. PL14.125540), on lands adjacent to the former Lanesborough Generating Station. That application was accompanied by an Environmental Impact Statement (EIS). Planning permission was granted for the LRP station and its associated Ash Disposal Facility (ADF) in 2002. This permission ceases to have effect on 31st December 2020.

LRP station and its associated ADF operates in line with the EPA IE Licence P0610-02 which was originally issued in 2002 as P0610-01.

The ADF was designed and consented as an integral part of the LRP Station development, to dispose of ash over the operational life of the power station. The EIS that accompanied the original application assumed an ash content for the supply bogs and, on that basis it was considered that 550,000 tonnes of ash would require disposal during the operational life of the station to the end of 2020 with an engineered facility comprising 12 landfill cells. The ADF which is managed and operated by Bord na Móna for ESB has been developed in cells as per the EPA Licence conditions and in accordance with the Landfill Operational Plan. However since its development it has handled marginally higher volumes of ash than expected due to the variable ash characteristics of the peat and has reached its capacity. The ash currently being produced is being placed in the ADF based on a recent Technical Amendment to the existing licence (P0610-02). Currently cells 1-7 are filled and Cell 8 will be partially filled. While the ADF is permitted in planning terms to accept ash until the end of 2020, it will reach 550,000 tonnes prior to that date. It is anticipated that with the disposal requirements of the LRP Station for 2019 and 2020 are in the order of an additional 130,000 tonnes. This ash volume would be 130,000 tonnes over and above the previously permitted disposal of 550,000 tonnes, as permitted under the previous planning permission - Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref. PL14.125540. In addition Schedule A, Table A.1 in Licence No. P0610-02 also states the total permitted landfill capacity at the ADF being 550,000 tonnes.

As result of the above in December 2017 planning permission was sought to extend the capacity of the ADF by 130,000 tonnes over and above the 550,000 tonnes. Planning permission was granted for this increase by Longford County Council on 28 March 2018 (Planning ref. 17/320).

As a result of the requirement to increase the capacity of the ADF and in line with EPA Guidance for Licenses on Request for Alterations to the installation/facility (EPA, 2014) ESB applied to the EPA on 28th May 2018 for a review of IE Licence P0610-02.

On the 27 July 2018 supplementary information in relation to the proposed alteration to Condition 5.5 of the existing IE licence P0610-02 which was previously subject to a technical amendment request to the EPA was provided for consideration of the EPA as part of the current IE licence review P0610-03.

In accordance with Section 83(2A) of the EPA Act 1992, as amended, the EPA as part of its consideration of the IE licence application made a determination whether the application should be made subject to an Environmental Impact Assessment (EIA). On the 9 October 2018 the EPA issued an EIA Screening Determination are detailed below:

EIA, as respects the matters that come within the functions of the Agency, is required for the activity to which the above licence application relates due to the following reasons:

Having considered the information provided by the applicant, it has been determined that the proposed activity constitutes a project to which the EL4 Directive applies and is likely to give rise to significant effects on the environment by virtue of its nature, size and location.

The activity/changes to the activity exceeds the following threshold in Schedule 5 of the Planning and Development Regulations 2001 as amended:

11. Other Projects

(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule.

On the 9 October 2018 the EPA issued a request for further information (RFI) in relation to ESB's Industrial Emissions (IE) licence (P0610-02) review application for Lough Ree Power (LRP) station as follows;

An updated EIAR¹ that addresses the entire activity at Lough Ree Power, including all proposed changes as indicated in the licence review application. The EIAR should be conducted in accordance with the Guideline on the Information to be contained in Environmental Impact assessment Report 2017 (EPA).

On the 20 December 2018 the EPA issued a second RFI in relation to the IE licence review application for LRP. Request number 4 and 5 of that RFI are as follows;

"4. Please provide the EIS submitted with the original application (P0610-01) in 2001 and identify and describe any other significant effects not identified in that EIS.

5. EIAR:

a) To assess the competency in the team who prepared the EIAR, provide details on their qualifications, experience and any other credentials as outlined in the EPA Draft Guidelines on the Information to be contained in Environmental Impact Assessment reports, August 2017.

¹ Environmental Impact assessment Report

- b) *Provide details on the expected significant effects on the environment deriving from the vulnerability of the project (power station, ash disposal landfill and supply bogs) to risk of major accidents and/or disasters including those caused by climate change and a description of any mitigation measures. It is noted that a flood risk assessment was submitted only for the ash disposal landfill in the application.*
- c) *A description of the likely direct and indirect significant effects of the project (power station, ash disposal landfill and supply bogs) on the environment from, inter alia:*
 - i. *From the ongoing harvesting of peat on the supply bogs;*
 - ii. *The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);*
 - iii. *The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;*
 - iv. *The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change*

This updated EIAR forms a further response to RFI no. 1 and a response to RFI no. 2. This updated EIAR is intended to assist the EPA as part of its consideration of this IE licence review application P0610-03.

An Appropriate Assessment (AA) Screening determination was also issued to ESB by the EPA on December 20th 2018; the determination was made based on the project's hydrological connectivity and the distance to European sites. This determination concluded:

"That the activities are not directly connected with or necessary to the management of any European site and that it cannot be excluded, on the basis of objective information, that the activities, individually or in combination with other plans or projects, will have a significant effect on any European site and accordingly determined that an Appropriate Assessment of the activities is required, and for this reason determined to require the applicant to submit a Natura Impact Statement."

An Natura Impact Statement (NIS) has also been prepared as part of this IE licence Review and in response to the above, see **Appendix 6.1**.

1.3 Overview of the published Derraghan Ash Disposal Facility Development EIAR 2017

As mentioned above this EIAR is an updated version of the 2017 EIAR which related principally to the Derraghan Ash Disposal Facility Development. The updated EIAR reflects the IE Licence Review application which relates to the entire licensed facility

activities, that is the operation of the thermal station and the operation of its associated waste disposal facility.

The 2017 EIAR which was submitted as part of the ADF planning was drafted to assess the potential impacts from the increased capacity of the LRP ADF without changing the planning permitted and EIS assessed footprint of the ADF. It is important to highlight that while permission was sought to increase the overall capacity of the ADF the ash will be disposed of in cells that lie within the 2002 permitted landfill footprint by completing Cell 8 and within Cells 9 and 12. The disposal activity will cease at the end of 2020 - a duration that is in-line with the overall original/ parent planning permission for the LRP Station.

In addition to assessing the potential impacts from the increased capacity at the ADF an assessment of the potential indirect impact was also undertaken as part of this 2017 EIA. The 2017 assessment included those indirect impacts associated with the LRP station and the peat supply bogs.

The Derraghan Ash Disposal Facility Development EIAR was drafted in line with the most recent EIA Directive (2014/52/EU) and the EPA draft Revised Guidelines on Information to be Contained in EIS. However, it is noted that since the submission and subsequent grant of planning and licence revision application the European Union (Planning and Development) (Environmental Impact Assessment) Regulation 2018 S.I. No. 296 of 2018 have been published (31 July 2018).

1.3.1 The Scoping Process undertaken for the Derraghan Ash Disposal Facility Development EIA 2017

The requirement to undertake EIA derives from European Communities Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC) and from Directive 2011/92/EU (as amended by Directive 2014/52/EU, referred to as the Amended EIA Directive). Although the 2014 Directive had not been enacted into Irish Legislation at the time of lodgement of the planning application an EIAR was prepared and submitted with the application. A Screening assessment under the EU Habitats regulations was also submitted with the application.

In the preparation of the EIAR for the Derraghan Ash Disposal Facility Development, a detailed EIA Screening and Scoping Request was prepared with regard to the EPA draft Revised Guidelines on Information to be Contained in EIS, EPA (2015). A copy of the EIA Screening Report and Scoping Request is contained within Volume 4 - Appendix 1-1 of the EIAR submitted to the EPA as part of the IE Licence review application. This EIS Screening and Scoping Request set out ESB's proposed approach to the scoping of the EIAR. In May 2017, this was circulated to consultees through an informal pre-planning consultation process, carried out in compliance with the EPA Guidelines. Responses were received from five of the twelve consultees – The Irish Peatland Conservation Council; the Environment Section of Roscommon County Council; the Planning Section of Roscommon County Council; the EPA and the Planning Section of Longford County Council. The conclusions from this scoping process were as follows:

- This EIAR was to be prepared for the proposed development;
- The range of environmental topics included in the EIAR would be:
 - Population and Human Health
 - Biodiversity
 - Water
 - Climate and Air Quality
 - Material Assets
- The range of environmental topics which were scoped out of the EIAR as part of the planning application would be:
 - Lands & Soils
 - Air Quality incl. Noise
 - The Landscape
 - Cultural Heritage

The assessment completed at the scoping stage concluded that the proposed development would not give rise to impacts on the scoped out aspects listed above that materially differ from those identified and permitted under the existing EIS from 2001.

1.4 The Proposed Development (the IE Licence Review Application) Requirement

1.4.1 The Applicant

A Licence review is sought by the Electricity Supply Board (ESB) who hold the Industrial Emissions (IE) licence, for the LRP facility.

ESB was established in 1927 as a statutory corporation in the Republic of Ireland under the Electricity (Supply) Act 1927. ESB operates across the electricity market: from generation, through transmission and distribution to supply.

1.4.2 LRP and the ADF

LRP is located on the eastern banks of the River Shannon in the settlement of Lanesborough in County Longford. It is operated and owned by the ESB. It is a strategic electricity generating station, with a net capacity of 100 MWe and contributes to the security of the national energy supply and to the national and local economies.

LRP generates electricity by thermally combusting milled peat. Bord na Móna supply that peat from existing bogs as licensed by the EPA. The existing ash disposal site is a dedicated facility associated with LRP. Bord na Móna also manages the ADF.

1.4.3 The Existing Development related to IE Licence Activity 1

The primary IE licence activity at the site is as follows:

the production of energy in combustion plant the rated thermal input of which is equal to or greater than 50MW,

The power station covers approximately 36 hectares (ha) and is adjacent to the site of former Lanesborough Generating Station, which operated as a peat burning power station from the early-1960s until its closure in 2004. The station comprises a single boiler/turbine unit with an electrical output of 100 MW Peat Supply to LRP Station.

The peat that fuels the LRP is harvested by Bord na Móna at a number of supply bogs. These activities are regulated by the EPA under Industrial Pollution Control (IPC) Licence Registration Numbers:

- P0501-01 (Derrygreenagh Group),
- P0502-01 (Blackwater Group),
- P0503-01 (Allen Group) and
- P0504-01 (Mountdillon Group).

It is noted that many private operators also operate within the same area as Bord na Móna, however, their peat harvesting activities are generally not licensed by the EPA.

No physical or operational changes are proposed to the LRP station site or its licenced activity (i.e. the production of energy in combustion plant the rated thermal input of which is equal to or greater than 50MW) under this IE licence review beyond those works permitted under the existing licence.

1.4.4 Requested Condition change to Condition 5.5 related to IE Activity 1

Lough Ree Power was designed to operate with a once through cooling water systems with abstraction from and discharge to the River Shannon under P0610-02. This cooling water discharge is conditioned under Condition 5.5 as follows:

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional areas of the river at any point.

At the time of submission of the original IE Licence review application a technical amendment request was ongoing in relation to Condition 5.5 of the current LRP IE Licence. This technical amendment request was subsequently withdrawn and an alteration to Condition 5.5 has now been proposed under this IE Licence review application. The proposed alteration to Condition 5.5 is as follows;

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing

*zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point **where such exceedances would result in contravention of the EPA Act and in particular cause significant environmental pollution to the receiving waters.***

No physical or operational changes are proposed to the LRP station site or its licence activity under this requested change of Condition 5.5.

1.4.5 The Existing and Proposed Development related to IE Licence Site Activity 2

The other licence activity related to the LRP station is as follows:

the recovery or disposal of waste in a facility, within the meaning of the Waste Management Act, 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required,

The ADF was designed and consented as an integral part of the LRP Station development, to dispose of ash over the operational life of the power station. The EIS that accompanied the original application assumed an ash content for the supply bogs and, on that basis it was considered that 550,000 tonnes of ash would require disposal during the operational life of the station to the end of 2020 with an engineered facility comprising 12 landfill cells. The ADF which is managed and operated by Bord na Móna for ESB has been developed in cells as per the EPA Licence conditions and in accordance with the Landfill Operational Plan.

It is proposed to increase the capacity of the existing ADF and facilitate the disposal of an additional 130,000 tonnes of peat ash. This proposed increase received planning permission in March 2018 and was subject of an EIAR.

The ash will be disposed of in cells that lie within the permitted landfill footprint – completing Cell 8 and within the permitted Cells 9 and 12, all of which are clearly shown on the original planning application drawings. The development of these cells is permitted under the existing planning permission, and were subject of EIA at the time permission was granted. This application simply seeks permission for the additional quantities of ash to be accepted into the site and disposed of within these cells.

The requirement for additional ash disposal capacity arose in 2018 when the permitted 550,000 tonnes was reached. As the IE licence review process is ongoing a Technical Amendment was sought and approved (Technical Amendment C to P0610-02) by the EPA to allow the temporary storage of ash at the ADF.

The disposal activity will take place in accordance with the current planning permission over approximately 220 months ceasing at the end of 2020 - a duration that is in-line with the overall parent permission for the LRP Station. No other works are required to facilitate the acceptance of the additional ash, as all ancillary

developments – the access road, entrance etc. will continue to operate as permitted by that parent permission.

The proposed development will take place on lands located wholly within the existing ADF site. The proposed disposal activity is confined to existing Cell 8 and permitted Cells 9 and 12.

The ADF site is located approximately 10 km from the LRP Station as shown in **Volume 3 - Figure 1.1: LRP Station & ADF Site Location Map** in a remote rural area located approximately 1 km south of the R392 (Lanesborough to Ballymahon) Road. Lanesborough is located approximately 9 km to the northwest, and Ballymahon is located approximately 11 km to the southeast.

The site is served by a dedicated access way from the R392, and also by a railway line privately owned and operated by Bord na Móna. This railway links the LRP and ADF sites, facilitating the transfer of both peat and ash into, and out of, the power station. It is also utilised by other Bord na Móna rail traffic not associated with the ash site.

The surrounding area is characterised by tracts of cutaway bog land, scrub woodland and mixed farmland. Adjoining bog land is commercially harvested for peat on an on-going basis. Opposite the site entrance, to the north of the R392, the Irish Society for the Prevention of Cruelty to Animals (ISPCA) operates an animal centre – the only non-farming activity noted in the area.

Within the wider area, the landscape is predominantly rural, with small residential farms creating a relatively uniform pattern of low hedgerows and bank-enclosed fields. Rural residences are also dispersed throughout the area either clustered around original farms or as roadside ribbon development.

1.4.6 Other requested alterations

There are some other requested alterations to the current IE Licence for agreement with the EPA however these other request in relation to the IE licence review are minor or administrative in nature, see further detail in Chapter 4.

1.5 Relevant Legislation

1.5.1 The Basis for Environmental Impact Assessment

1.5.1.1 European Law

The requirement to undertake EIA derives from European Communities Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC) and from Directive 2011/92/EU (as amended by Directive 2014/52/EU, referred to as the Amended EIA Directive).

The Amended EIA Directive introduced changes to the manner in which environmental impact assessment is completed. This Directive is enacted into Irish Legislation through the European Union (Planning and Development) (Environmental

Impact Assessment) Regulations 2018, S.I. 296 of 2018². This change was after the submission of the most recent planning EIAR and the current licence revision application.

Under the Directive and Regulations, projects of a type specified in Annex I of the Directive automatically require EIA. Annex II of the Directive allows for the screening of projects for EIA on a case-by-case basis, with the relevant national authority having the discretion to identify specific project types to which this applies. Those projects are screened against criteria laid down in Annex III of the Directive, namely:

- Characteristics of the project;
- Location of the project; and
- Type and characteristic of the potential impact.

1.5.1.2 Irish Law

In Irish legislation, Section 172 of the Planning and Development Act (as amended) establishes the requirement for EIA, stating:

'An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either—

(a) the proposed development would be of a class specified in—

(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—

(I) such development would exceed any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either—

(I) such development would exceed any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

Or

(b)(i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not exceed the relevant quantity, area or other limit specified in that Part, and (ii)

² <https://www.housing.gov.ie/planning/legislation/si-no-296-2018-european-union-planning-and-developmentenvironmental-impact>

the planning authority or the Board, as the case may be, determines that the proposed development would be likely to have significant effects on the environment.'

The classes of development where an EIA is mandatory are set down in Regulations. In addition, Schedule 5 sets out thresholds for projects, and if that threshold is exceeded an EIA must be carried out. These are mandatory requirements.

Finally where a project is of a type listed in the regulations but does not meet or exceed the applicable threshold then the likelihood of the project having significant effects on the environment – as considered against a range of prescribed criteria, must be assessed.

1.5.2 Referenced Guidance

The following EPA guidelines inform the EIA process:

- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (September 2003);
- EPA Guidelines on the Information to be Contained in Environmental Impact Statements (March 2002);
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (Draft August 2017); and
- Advice Notes for Preparing Environmental Impact Statements (Draft September 2015).

1.6 The Form and Content of an EIAR

1.6.1 Legislative Requirements

Directive 2014/52/EU and S.I. 296 of 2018 introduces the term *environmental impact assessment* report (EIAR) rather than *environmental impact statement* (EIS) as previously used.

The Directive requires that the EIAR provides:

"A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge."

Article 3 states that the EIA shall:

"identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

- (c) *land, soil, water, air and climate;*
- (d) *material assets, cultural heritage and the landscape;*
- (e) *the interaction between the factors referred to in points (a) to (d).*

Article 5 states that an EIAR should contain, at least:

- (a) *a description of the project comprising information on the site, design, size and other relevant features of the project;*
- (b) *a description of the likely significant effects of the project on the environment;*
- (c) *a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
- (d) *a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
- (e) *a non-technical summary of the information referred to in points (a) to (d); and*
- (f) *any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

Annex VI requires that *'the description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the project. The description should take into account the environmental protection objective established as Union or member State level which are relevant to the project.'*

1.6.2 Provisions for EIA Scoping

Scoping is a process that determines the particular issues which need to be examined in an EIAR. As outlined in the EPA Guidance, the process of EIA scoping can be informal or formal.

1.7 The EIAR for the Proposed Development

1.7.1 EIA Screening

In the preparation of the 2017 EIAR, a detailed **EIA Screening and Scoping Request** was prepared. A copy of the Screening Report and Scoping Request is attached in **Volume 4 - Appendix 1-1**.

That report screened the proposed development to determine whether an EIA is required, having regard to Directive 2011/92/EU as amended by Directive 2014/52/EU, and existing national legislation and guidance. It concluded that the

proposed development was of a type referred to under two classes of Schedule 5 of the Planning and Development Regulations, 2001-2015, namely:

Class 11(b) – being ‘other projects’ defined as

(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes.

And, Class 13 (a) – being a change or extension of an existing development defined as:

(a) any change or extension of development already authorised, executed or in the process of being executed (not being a change or extension referred to in Part 1) which would:-

(i) result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and

(ii) result in an increase in size greater than- 25 per cent, or - an amount equal to 50 per cent of the appropriate threshold, whichever is the greater.

Having regard to those criteria, the proposed development will facilitate the disposal of up to 130,000 additional tonnes of ash over a period of approximately 30 months, i.e. the average annual disposal rate will be 52,000 tonnes. The relevant threshold set out under Class 11 is 25,000 tonnes per annum. The proposed extension exceeds 50% of that threshold.

The proposed development (the ADF) was therefore subject to EIA.

The EPA as part of the IE licence review application also screened in the requirement for EIA for the IE licence review, see **Section 1.2** above.

1.7.2 EIA Scoping

The aforementioned EIS Screening and Scoping Request set out the Applicant’s proposed approach to the scoping of the EIAR. In May 2017, this was circulated to consultees through an informal pre-planning consultation process, carried out in compliance with the prevailing guidance as set out in the EPA Guidelines.

The conclusions from the scoping process were:

- This EIAR was to be prepared for the proposed development;
- The range of environmental topics included in the EIAR would be:
 - Population and Human Health
 - Biodiversity
 - Water
 - Climate and Air Quality
 - Material Assets
- The range of environmental topics which were scoped out of the EIAR would be:
 - Lands & Soils
 - Climate and Air Quality
 - The Landscape

- Cultural Heritage

The scoping opinion was issued in May 2017 to twelve consultees, namely:

- An Taisce
- Birdwatch Ireland
- Longford County Council (Environmental Section)
- Longford County Council (Planning Section)
- Roscommon County Council (Environmental Section)
- Roscommon County Council (Planning Section)
- Environmental Protection Agency (EPA)
- Friends of the Irish Environment (FoIE)
- Inland Fisheries Ireland (IFI)
- Irish Peatland Conservation Council
- National Monuments Service (NMS)
- National Parks & Wildlife Services (NPWS)

Responses were received from five of the twelve consultees – The Irish Peatland Conservation Council; the Environment Section of Roscommon County Council; the Planning Section of Roscommon County Council; the EPA and the Planning Section of Longford County Council.

Copies of the correspondence received in response to the Scoping Request are provided in **Volume 4 - Appendix 1-2 Consultation Response Letters to Scoping Request**.

These responses are summarised on **Table 1-1** below.

As part of the 2017 EIAR it was concluded that arising from the consultation process, and having regard to the responses received, the proposed approach to the drafting of the EIAR conforms with guidelines and legal requirements.

Additional EIA scoping was not undertaken for this updated EIAR however having regard to the EPA RFI's a number of aspects which were scoped out of the 2017 EIAR have been considered in this assessment, see **Chapter 8** in relation to Land and Soils, **Chapter 9** in relation to Noise, **Chapter 11** Landscape and Visual and **Chapter 12** Cultural Heritage.

Table 1-1: Summary of Issues Raised in Scoping Responses and Relevant Reference in EIAR

Consultee	Key points raised	Relevant EIAR Section
Roscommon County Council – Environment Section	No comment	n/a
Roscommon County Council – Planning Section	No comment	n/a
Irish Peatland Conservation Council	1. Refers the applicant to the IPCC's 6th Action Plan – Ireland Peatland Conservation Action Plan, 2020 2. States the IPCC do not support any project that does not recognise the need to conserve bogs as habitats. 3. Queries whether any of intact bog remnants – such as those within the Derryadd Wind Farm boundary, will be supply bogs. 4. Queries what after-use plans have been drawn up to mitigate against carbon leakage from bare peat areas.	1. The IPCC documents has been considered. 2. This EIAR is cognisant of the requirement to protect the conservation status of Annex I habitats associated with bogs in the region. This is fundamental to the assessment set out in Chapter 6 and the AA Screening Report. 3. No new supply bogs will be developed as a consequence of on-going power generation at LRP to 2020. As per Table X, the supply bogs to that period have been identified. 4. Bord na Móna's after-use rehabilitation plans has been referred to in Para. 6.5.3
Environmental Protection Agency	Having regard to the characteristics of the development the EIAR should, at a minimum: • identify, describe and assess, the direct and indirect significant effects of the project on each of the factors listed in Article 2 of Directive 2014/52/EU; • have regard to the requirement of the draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports • have regard to the topics contained in the EPA's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), September 2003, Project Type 2 and 32; • satisfy the requirements of Directive 2014/52/EU.	Compliance with the regulatory and advisory frameworks is set out in Paras. 1.5 and 1.6.

Consultee	Key points raised	Relevant EIAR Section
Longford County Council – Planning Section	Confirmation that the Council is satisfied with the information submitted and all relevant information has been included.	EIAR has been prepared in-line with the circulated Scoping Report as set out in Paras. 1.6.

For inspection purposes only.
Consent of copyright owner required for any other use.

1.7.3 The EIAR

As defined in legislation this EIAR is a statement of the effects, if any, which the proposed development, if carried out, would have on the environment.

The proposed development includes the existing LRP station and the acceptance and disposal of 130,000 tonnes of peat ash at the existing ADF. The EIAR describes the construction and operation of the ADF, though it is noted that the construction of those cells will be as described, and permitted, under (Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref. PL14.125540).

With regard to the IE licence review a request to alter Condition 5.5 is also requested. This condition request has been assessed as part of this EIAR. In addition any impact from the existing station have been assessed.

In order to ensure that any environmental impact assessment of the development has regard to the indirect effects of the proposed activity, the EIAR also assesses the indirect environmental impacts associated with the associated peat harvesting.

1.7.4 EIAR Structure

It comprises four volumes, namely:

- **Volume 1: Non- Technical Summary**
- **Volume 2:** The EIAR comprising the following chapters:
 - Chapter 1 Introduction
 - Chapter 2 Need for the Proposed Development
 - Chapter 3 Alternatives Considered
 - Chapter 4 Description of the Proposed Development
 - Chapter 5 Population and Human Health
 - Chapter 6 Biodiversity
 - Chapter 7 Surface Water
 - Chapter 8 Land, Soil, Geology and Hydrogeology
 - Chapter 9 Climate, Air Quality and Noise
 - Chapter 10 Material Assets
 - Chapter 11 Landscape and Visual
 - Chapter 12 Cultural Heritage
 - Chapter 13 Interaction of Impacts
 - Chapter 14 Vulnerability of the Proposed Development

The figures and appendices in bold above are additional or have been updated since the original EIAR provide to the EPA as part of this IE review and have been provided to the EPA as part of this updated EIAR and RFI response.

An updated NTS has also been prepared and submitted to the EPA.

- **Volume 3: Figures**
 - Figure 1.1: LRP Station & Derraghan ADF Site Location Map
 - Figure 1.2: Derraghan ADF Site Layout Map
 - Figure 1.3: Location of Bord na Móna Supply Bogs
 - **Figure 1.4 Station Site Map**
 - Figure 6.1: Habitats within Derraghan ADF boundary
 - Figure 6.2: SACs, SPAs, NHAs & pNHAs within 15 km of Derraghan ADF
 - Figure 6.3: SACs & SPAs within 15 km of Supply Bogs
 - Figure 6.4: NHAs & pNHAs within 15 km of Supply Bogs
 - Figure 7.1: Derraghan ADF Receiving Watercourse – Waterbody Status
 - Figure 7.2: Derraghan ADF Receiving Watercourses
 - Figure 7.3: Derraghan ADF Drainage Schematic
 - Figure 7.4: Surface Water Sampling Locations at Derraghan ADF
 - Figure 7.5: General Location of LRP Station Lanesborough
 - Figure 7.6: LRP Station Surface Water Sampling Locations
 - Figure 8.1: Boreholes Locations at Derraghan ADF
 - Figure 8.2: LRP Station & Derraghan ADF – Soils Formation
 - Figure 8.3: LRP Station & Derraghan ADF – Bedrock Formations
 - Figure 8.4: LRP Station & Derraghan ADF – Aquifer Classification
 - Figure 8.5: LRP Station & Derraghan ADF – Ground Water Vulnerability
 - **Figure 8.6: Supply Bogs and groundwater Bodies**
 - **Figure 8.7: Supply Bogs and Groundwater vulnerability**
 - **Figure 8.8: Supply Bogs and extractive industry Pressures**
 - **Figure 8.9: Supply Bogs and Groundwater Bodies Status**
 - Figure 10.1: Transportation Infrastructure
 - **Figure 12.9: Cultural Heritage Site LRP**
 - **Figure 12.10: Cultural Heritage Site ADF**
- **Volume 4: Appendices**
 - Appendix 1-1 EIS Screening and Scoping Request
 - Appendix 1-2 Consultation Response Letters to Scoping Request

- **Appendix 3-1 Thermal Plume Abatement**
- **Appendix 6-1 Appropriate Assessment Screening Report and Natura Impact Statement.**
- Appendix 6-2 Ecology Photos
- Appendix 7-1 Engineering Drawings
- Appendix 7-2 Water Framework Directive Status, Risks & Objectives – Peat Supply Bogs
- Appendix 7-3 Flood Risk Assessment
- Appendix 8-1 Environmental Site Assessment Report
- **Appendix 8-2 Details of the Supply Bogs**
- **Appendix 8.3 EPA IPC Conditions**
- **Appendix 12.1 Archaeological Monuments**
- **Appendix 12.2 Archaeological Monuments Description**
- **Appendix 12.3 Architectural Heritage**

1.7.5 The EIAR Study Area

The study area comprises:

- LRP Station and its immediate environs; (Refer to **Volume 3 - Figure 1.4: Station Site Layout Map**),
- ADF and its immediate environs (Refer to **Volume 3 - Figure 1.2: Derraghan ADF Site Layout Map**); and
- Those peat bogs from which material will be sourced to fuel the LRP Station for the duration of the permission (Refer to **Volume 3 - Figure 1.3: Location of Bord na Mona Supply Bogs**).

1.7.6 Impact Assessment

As required by Annex IV (of the Directive), the EIAR provides a description of the likely significant effects of the project on the environment resulting from, inter alia:

- a) the construction and existence of the project, including, where relevant, demolition works;
- b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources.
- c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
- d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

- e) the cumulation of effects with other existing and/ or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
- f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
- g) the technologies and the substances used.

The description of the likely significant effects include the direct effects and indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project.

The project baseline has been assessed where appropriate against the general criteria set out in **Table 1-2** below as set out in the EPA guidelines on the information to be contained in environmental impact assessment reports. In some cases specific assessment criteria adopted from the EPA guidelines such as those developed by the National Road Authority have been used, such as those used to assess biodiversity impacts.

It should be noted that the significance of the effect can have different meanings for different topics and this is reflected in individual sections.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 1-2: Impact assessment evaluation criteria

Quality of Effects	
Positive Effect:	A change which improves the quality of the environment
Neutral Effect:	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative Adverse Effect:	A change which reduces the quality of the environment
Significance of Effects	
Imperceptible Effect:	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effect:	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant Effect	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Extent/Context of Effects	
Extent	The size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	The extent, duration, or frequency in terms of conforming or contrasting with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency of Effects	
Momentary effects	Effects lasting from seconds to minutes
Brief effects	Effects lasting less than a day
Temporary effects	Effects lasting less than a year
Short-term Effects:	Effects lasting one to seven years.
Medium-term Effects:	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects (Impact):	Effects lasting over sixty years
Reversible Effects:	Effects that can be undone, for example through remediation or restoration
Frequency of Effect	How often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

Types of Effects	
Indirect Effects	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
Cumulative Effect:	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects
‘Do-Nothing Effects’:	The environment as it would be in the future should the subject project not be carried out.
‘Worst Case’ Effects:	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects:	When the full consequences of a change in the environment cannot be described.
Irreversible Effects:	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects:	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects:	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SO _x and NO _x to produce smog).

1.7.6.1 Cumulative Impact Assessment

Cumulative impact assessment is addressed in the individual chapters.

1.7.6.2 Transboundary Impact Assessment

Consideration has been had to any transboundary impacts that may arise as a result of the proposed development, see **Chapter 9** of this EIAR.

1.7.7 The EIAR Team

This EIAR has been prepared by a team led by ESB International with input provided as detailed in **Table 1-3**.

Table 1-3: EIAR Contributors

EIAR Topic	Main Contributor	Experience (Years) & Qualifications
EIAR Co-ordination	Mairead Hogan, Senior Environmental Consultant, ESB International	18 Yrs, BA, MSc, DipEnvEng PMP
Population and Human Health	Claire Whiteway, Senior Environmental Consultant, ESB International Dr. Paddy Kavanagh, Senior Team Leader Planning & Environmental, ESB International	9 Yrs, MSc, Beng Civil (Hons), Ceng MIEI 37 Yrs, PhD, BSc
Biodiversity	Geoff Hamilton, Senior Ecologist, ESB International	13 Yrs, BA MSc MCIEEM
Water – Surface Water	Rory McGowan, Consultant Engineer, ESB International	10 Yrs, MSc, Beng
Water - Groundwater	Ann Marie Casey, Senior Consultant & Contaminated Land Specialist, ESB International Michael Gill, Hydro Environmental Services Ltd.	19 Yrs, B.Sc, M.Sc, C.Sci, C.Env CIWEM 12 Yrs, BA, BAI, Dip Geol., MSc, MIEI
Climate & Air Quality	Dr. Paddy Kavanagh, Senior Team Leader Planning & Environmental, ESB International	37 Yrs, PhD, BSc
Material Assets	Claire Whiteway, Senior Environmental Engineer, ESB International, ESB International	9 Yrs, MSc, Beng Civil (Hons), Ceng MIEI
Land and Soils Air The Landscape Cultural Heritage	Mairead Hogan, Senior Environmental Consultant, ESB International Dr. Paddy Kavanagh, Senior Team Leader Planning & Environmental, ESB International Helen O'Keeffe, Senior Planner, ESB International	18 Yrs, BA, MSc, DipEnvEng PMP 37 Yrs, PhD, BSc 37 Yrs, PhD, BSc 18 Yrs, BE, MRUP MSc
Cumulative Impacts and Interaction of Impacts	All contributors	See above

EIAR Topic	Main Contributor	Experience (Years) & Qualifications
Updated EIAR 2019 coordination and inputs	Dr. Paddy Kavanagh, Manager Planning & Environmental, ESB International	37 Yrs, PhD, BSc
	Oonagh Duffy Senior Consultant and Team Leader Environment	10 Yrs, Bsc, MSC, CEnv. CWEM MCIWEM
Cultural Heritage	Martin Byrne, Byrne Mullins and Associates	30+ Yrs, BA, MA, Dip EIA Mgmt
Landscape	Richard Barker, Macroworks	21 Yrs, MLA, PG Dip BA Environ

1.8 Difficulties Encountered in the EIA Process

There were no particular difficulties encountered in the production of the EIAR.

The surveys, assessments and information that form the basis of this EIAR are based on the design of the proposed development as described in **Chapter 4**. The design has been developed to a stage that allows the Competent Authority to assess the EIAR in order to make a determination to grant or refuse the application.

While more detailed information will be required to inform procurement and construction, no design changes will be permitted that will have the potential to undermine the basis of assessment of the environmental impacts undertaken in this EIA and similarly in accordance with Articles 6(3) (Screening for Appropriate Assessment) and 6(4) (Appropriate Assessment) of the Habitats Directive, as appropriate.

2 Need for the Proposed Development

This chapter of the EIAR outlines the need for the proposed development. The proposed development for the purpose of planning permission was considered as the increased capacity at the ADF. This updated EIAR for the purpose of the IE review application takes account of the existing LRP station and ADF, the increased capacity at the ADF and the requested alteration to Condition 5.5. There are no physical or operational changes proposed at the existing LRP station. This chapter specifically outlines the need for the increase of capacity at the ADF and the need to alter Condition 5.5.

2.1 The ADF

The existing ADF was developed pursuant to the grant of planning permission issued under Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref. PL14.125540. It was designed to dispose of peat ash arising from the combustion of peat at the LRP Station.

The ADF is currently operated in accordance with the LRP Station's IE Licence P-0610-02. Condition 3.13 of that licence requires a Landfill Operational Plan to be approved by the EPA and implemented. To date this has been carried out in accordance with the plan and no significant environmental issues have arisen.

Bord na Móna are contracted by ESB to develop and operate the ADF. The Bord na Móna Engineering Department, ensure that the facility was developed and is operated in accordance with the approved Specified Engineering Works and approved Landfill Operational Plan required under the IE Licence P-0610-02.

2.1.1 Peat Ash Volumes Arising

The ADF was designed and consented as an integral part of the LRP Station. The LRP Station was designed with a 100 MWe gross capacity (91 MWe net exported capacity) and was anticipated to burn approximately 0.88 million tonnes of milled peat and produce approximately 35,000 tonnes of ash per annum. That calculation assumed a number of conditions would prevail, namely:

- The LRP Station would commence operations in 2004 and it would continue for a period of 15 years;
- The station would operate 24 hours per day, 365 days per year;
- The typical dry ash content of the peat was approximately 3 % to 8 %; and
- The ash would be conditioned by the addition of up to 15 % water prior to transport to the ADF.

On this basis it was assumed that 550,000 tonnes of ash would require disposal in the period ending on 31st December 2020. This indicative limit was stated in the planning application and accompanying documentation including public notices.

However, the physical extent of the permitted landfill was larger and the permitted footprint was capable of accommodating a higher volume of ash.

2.1.2 The Need for Increased Disposal Capacity

Since its development the ADF has handled marginally higher volumes of ash than expected at the time the original planning permission was granted. This has arisen because of the variable ash characteristics of the peat.

Due to the current rates of deposition, the disposal at the site will exceed 550,000 tonnes. To facilitate power generation continuing in accordance with the current planning until the end of 2020, the disposal requirements of the LRP Station between now and 31st December 2020, must be planned for.

The ESB estimates up to 130,000 tonnes of ash will be produced in that period. This ash can be accommodated within the permitted footprint of the ADF and utilising the existing infrastructure and services on the site.

It is noted that Planning permission (Planning ref. 17/320) was granted for this increase by Longford County Council on 28 March 2018.

2.2 The Need to alter Condition 5.5

The current Condition 5.5 is as follows:

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional areas of the river at any point.

The proposed Condition 5.5;

*Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point **where such exceedances would result in contravention of the EPA Act and in particular cause significant environmental pollution to the receiving waters.***

Power Generation with the associated thermal cooling water discharge has been ongoing to the Shannon River at Lanesborough since the late 1950's when an electricity generating station utilising peat as a fuel was first constructed. These original plants had a thermal cooling water discharge of up to 185MWth. In 2004 the existing thermal generating station was replaced by Lough Ree Power which is a BAT compliant peat combusting generating station.

Lough Ree Power was designed to operate with a once through cooling water systems with abstraction from and discharge to the river Shannon under P0610-01(2002). The thermal cooling water load discharge for this plant is 135MWth which is significantly less than the thermal load from the original plants at Lanesborough.

Under condition 6.9 of the original LRP licence (P0610-01) it stipulated that no effluent shall be discharged which results in a temperature increase at the edge of the mixing zone of greater than 1.5°C in the receiving system.

A Licence review was completed in Sept 2013, following legislative changes in relation to the Landfill Directive and European Communities Environmental Objectives (Surface Water) Regulations (and Groundwater Regulations also). The revised Licence P0610-02 (2013) included the same thermal condition but also established an additional mixing zone requirement in relation to temperature in Condition 5.5. This additional requirement states that the mixing zone shall not exceed 25% of the cross sectional area of the river at any point.

However, no detailed definition of the mixing zone was included in the licence. Following this new requirement the licensee conducted in river Thermal Plume surveys in 2014 as per the requirements of the IE Licence. Subsequently, following the submission of the 2014 Thermal Plume Survey report, Compliance Investigations CI00930, CI00896 and CI001709 were opened. CI00930 and CI00896 were closed out in 16/07/2015 and 14/11/18 respectively, CI001709 was opened on the 14/11/18 and remains open. The ESB have actively engaged with the Office of Environmental Enforcement (OEE) over this period of time in relation to this compliance investigation. In February 2019 a response was issued to the OEE of the EPA on CI001709; this is included in **Appendix 3.1** of this EIAR. This report outlined the options investigated in relation to addressing the thermal plume issue; see also **Chapter 3** of this EIAR.

Since 2014 ESB has conducted bathymetric surveys, several fish surveys, biological surveys, thermal surveys and continuous temperature monitoring assessments in conjunction with literature reviews and risk assessments with respect to migratory fish species. As a consequence of this work and following the various inputs by internal and external experts ESB is of the opinion that the stations cooling water discharge is not having a significant environmental impact on its environs or causing a potential barrier to migratory fish passage. However, the station under certain prevailing conditions such as low river flow, has difficulty in meeting the strict interpretation of the Condition 5.5. ESB has undertaken a number of studies (as presented in this EIAR and the Synthesis Report provided to the EPA as part of the IE Licence review application) to demonstrate that the thermal plume is not having a significant environmental impact. Therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats arising from the thermal cooling water load to the River Shannon. This proposed amendment will allow LRP to demonstrate to the satisfaction of the Agency that it is compliant with its environmental obligations.

3 Alternatives Considered

This chapter of the EIAR describes the alternatives to the proposed development that have been considered in relation to the disposal of ash and the thermal cooling water.

3.1 Alternative to Ash Landfilling

Alternatives considered in relation to the landfilling of the ash are:

- Do nothing;
- Seek an alternative licenced disposal site; and
- Develop an alternative disposal site.

3.1.1 Alternative 1 - Do Nothing

The 'Do Nothing' option would mean there would be no increase in the disposal capacity of the ADF. As ash is produced as a by-product of the power generation activity, the failure to secure additional authorised capacity would undermine the viability of the LRP Station and likely necessitate the shutdown of LRP Station which would have immediate socio economic impacts on the region through loss of direct and indirect employment and financial contributions to the local economy.

3.1.2 Alternative 2 - Seek an Alternative Licenced Disposal Site

The ESB could enter into a commercial arrangement for the disposal of ash at an alternative licenced site. The planning status of this arrangement would be questionable given that the parent permission for LRP Station is inherently linked to the power generation and ash disposal sites. The disposal at an alternative site would give rise to more significant haul distances as the ADF site is the closest licensed disposal site to the LRP Station. This could give rise to more traffic movements when compared to the more favourable option of disposal in a local engineered landfill site, namely the Derraghan ADF using an existing light rail infrastructure.

3.1.3 Alternative 3 - Develop an Alternative Licenced Disposal Site

It is possible to develop an external landfill site. This would likely necessitate the development of a greenfield site. Again traffic movements to the new licence disposal site would likely result in longer haulage routes than to the existing ADF facility. In planning and environmental terms the duplication of the infrastructure for a second landfill site is less desirable than fully utilising the existing facility and infrastructure.

3.1.4 Summary of Alternative Assessment and Impacts in relation to the ADF

The key considerations in assessing the alternatives in relation to the ADF are provided in **Table 3-1 Alternatives Considered**. This includes an assessment of all

topics for comparison purposes - even though those that were scoped out of the previous EIAR as potential impacts were considered to be very minor.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 3-1: Alternatives Considered related to Ash

Subject Area	Alternatives Considered			
	The Proposed Development (ADF Capacity increase aspect)	Alternative 1 - Do Nothing	Alternative 2 - Alternative Licenced Disposal Site	Alternative 3 - Develop an Alternative Licenced Disposal Site
Population and Human Health	The existing landfill would continue to be used for ash deposition with some potential for impact on human health from fugitive dust. With good engineering practice and dust control measures dust impacts would be unlikely given the remote nature of the landfill. Ash would continue to be delivered by rail to the landfill site in covered wagons. Noise would be generated from landfill operations and ash delivery by rail. However, the level of impact would be low given the remote location of the site. There would be continued socio-economic benefit from the continued operation of the existing ash landfill.	The existing landfill would close and be decommissioned. There would be no potential for impact on human health. There would be no noise associated with the landfill other than vehicle noise from occasional post closure aftercare visits. However, the site is remote and this is unlikely to cause a problem. There would be a socio economic impact in the area with loss of employment as the Lough Ree Power station would also likely close.	Ash would need to be transported to an alternative landfill licenced site. The nearest licenced waste landfill is Drenth, a distance of approximately 104 km from LRP in contrast to the current ash disposal facility approximately 10km away. The licenced landfill site would likely require planning permission and/or a change in landfill operational licence from the EPA to take ash into the landfill. This could result in delays leading to the closure of the LRP Station with the associated socio economic impacts. This would lead to increased road traffic and associated noise in the general area as ash would no longer be transported by the existing rail system. It is likely that ash	The benefit of using the existing already developed landfill site with rail access would not be realised. The development of a new landfill site would require full planning permission which would be unlikely to be obtained while the existing ADF has capacity to serve LRP Station. LRP Station would therefore close with consequent socio-economic impacts. Unless an alternative landfill site would be accessible to the existing rail network either a new rail network would need to be constructed or road transportation would be required. Both of these options would have potential for impact on human health.

Subject Area	Alternatives Considered			
	The Proposed Development (ADF Capacity increase aspect)	Alternative 1 - Do Nothing	Alternative 2 - Alternative Licenced Disposal Site	Alternative 3 - Develop an Alternative Licenced Disposal Site
			would be transported significantly longer distances – such as to the Drehid landfill facility in County Kildare. There would be localised socio economic impacts as operations at the existing landfill cease. Economic benefits would transfer to the zone of influence associated with another licenced site.	
Biodiversity	There would be no increase in the footprint of the ash landfill and there would therefore be no requirement for any additional land take. Hence, there would be no loss of habitat from utilising the existing footprint.	The landfill would close as would the associated power generation plant at LRP Station. There would be minor biodiversity gain from the closure and restoration of the landfill and decommissioning of the power plant. It should be noted that this will occur in any event upon final closure of the landfill and plant, under the requirement of the EPA IE Licence for the operation.	Potential impacts on biodiversity would occur from increased transport of ash material by road to an identified licenced landfill site.	There would be a loss of biodiversity at the footprint of any new proposed landfill site and if rail transport is required, biodiversity would also potentially be impacted along the development of any new rail corridor.
Water - Surface Water	The Licenced landfill would continue in operation in	Closure of the landfill would be in accordance with the IE Licence for	Transportation of ash by road to a new licenced facility would	The construction of a new landfill would pose significantly greater

Subject Area	Alternatives Considered			
	The Proposed Development (ADF Capacity increase aspect)	Alternative 1 - Do Nothing	Alternative 2 - Alternative Licenced Disposal Site	Alternative 3 - Develop an Alternative Licenced Disposal Site
	accordance with the requirements of the IE Licence issued by the EPA. The footprint of the landfill will also not change hence no impact on surface water would be expected.	the site and specifically in accordance with the Closure Restoration and Aftercare Management Plan. There would be no significant risk to surface water quality.	pose a potential for water quality contamination along the transport route. It could also pose a potential at the licenced landfill site due to the changed nature of landfill material (ash) to be deposited.	potential impact to surface water due to the size and scale of the required operations.
Water - Groundwater	As per the surface water the licenced landfill would continue to operate under the conditions of the EPA IE Licence for the facility. The existing landfill is lined and completed cells are capped to ensure no potential for leachate to access groundwater.	Closure of the landfill would be in accordance with the IE Licence for the site and specifically in accordance with the Closure Restoration and Aftercare Management Plan. There would be no significant risk to groundwater quality.	Deposition of ash into an existing ash landfill would pose potentially different risks to the groundwater body beneath the landfill, associated with the ash metal content and would be dependent on the landfill design and compliance with the landfill directive.	The construction of a new landfill would pose significantly greater potential impact to groundwater due to the size and scale of the required operations to construct it. This would entail ground excavation into potential groundwater aquifer strata and potential for leachate generation if not properly designed and constructed
Climate and Air	The existing landfill would continue in operation with associated potential for fugitive dust emissions during operation. Greenhouse gas emissions from rail transport of the ash and landfill machinery fuel combustion would continue to	Following closure of the landfill there would be no potential for loss of air quality due to fugitive dust emissions arising from landfill operations and transport of the ash. Climate emissions from rail transport fuel combustion would	Transport of ash by road to an existing licenced landfill site would increase potential for fugitive dust emissions along the transport route. Greenhouse gas emissions would also increase from	The development of a new ash landfill site would result in potential impacts on air quality from fugitive dust emissions during construction and operation as further cells were developed. There would also be associate greenhouse gas

Subject Area	Alternatives Considered			
	The Proposed Development (ADF Capacity increase aspect)	Alternative 1 - Do Nothing	Alternative 2 - Alternative Licenced Disposal Site	Alternative 3 - Develop an Alternative Licenced Disposal Site
	occur. GHG emissions from LRP Station would also continue under the EU Emissions Trading Scheme. Minor noise impact from the ash transportation and landfill activity which takes place in a remote location	cease as would emissions form the LRP Station if this closed also. No noise impact will occur.	combustion of fossil fuels by transport vehicles. GHG emissions from LRP Station would also continue under the EU Emissions Trading Scheme. Some additional noise impact at the existing landfill due to ash transport and additional landfilling operations.	emission from transportation of ash to the new facility. GHG emissions from LRP Station would also continue under the EU Emissions Trading Scheme. Noise impact introduced into a green field environment
Material Assets	There would be no additional land take required. An additional 130,000 tonnes of ash will be deposited in the proposed development with no change in the footprint of the ash disposal area. The landfill will be capped with a geo-synthetic clay liner, approximately 40,000 m² and a capping soil layer to 1 m depth (approximately 40,000 m³ of peat). The geo-synthetic clay liner will be imported as required to line	No additional tonnage of ash would be deposited on site and the existing landfill would be closed and capped.	If additional waste disposal cells were required at an existing licenced landfill then this would likely require additional land take to accommodate the waste and the likely import of additional materials to create embankments. A landfill liner and capping layer would also be required which would require importation to site also. Additional land take may be required.	Additional land take would be required (approximately 4 hectares). Significant earthworks would be required to form embankments, drainage layers and liner layers to construct the landfill. If these were not available on site they would need to be imported. The final landfill would also be capped with a geo-synthetic clay liner, approximately 40,000 m² and a capping soil layer to 1 m depth. Material for this would

Subject Area	Alternatives Considered			
	The Proposed Development (ADF Capacity increase aspect)	Alternative 1 - Do Nothing	Alternative 2 - Alternative Licenced Disposal Site	Alternative 3 - Develop an Alternative Licenced Disposal Site
	and fill cells. The peat capping layer is available on site from peat and subsoil excavated to create the cells.			also require to be imported to site.
Material Assets - Transport	Ash is currently transported in closed ash wagons to the existing ash area 10 km away. There is only minor impact on road traffic at one level crossings.	Ash transportation would cease. There would be no impact on road traffic.	Ash would need to be transported by road, a distance of approximately 10.4 km to the nearest licenced landfill (approximately 6,500 truckloads). There would be an impact on road traffic	Ash would need to be transported by road, to a newly develop licenced landfill (approximately 6,500 truckloads). There would be an impact on road traffic
Cultural Heritage	No archaeological impact as identified in the EIAR and subsequent operation of the landfill.	No potential for archaeological impact to occur	No archaeological impact as identified in the EIAR and subsequent operation of the landfill. If additional land take is required then potential for archaeological impact exists	Higher potential for archaeological impact on a greenfield site.
The Landscape	The proposed development will have no additional impact than that previously assessed, and permitted, under the existing planning permission.	The ADF will close. There will be no different landscape impact other than that permitted under the parent planning permission.	There would be a landscape impact on a different receiving environment, as per that permitted by its relevant planning permission.	There would be a landscape impact on a different receiving environment – namely a greenfield site, as a new site would have to be developed for the ADF subject to a new planning permission.

3.2 Thermal Plume Alternatives Considered

In order to address compliance investigation (CI001079) from the EPA in December 2018 relating to the thermal plume an assessment of alternatives was carried out. This was issued to the EPA enforcement division (OEE) in early 2019 and is provided as **Appendix 3.1** to this updated EIAR.

A number of options to minimise the impact of cooling water discharge on receiving waters were identified and their assessment is summarised as follows:

1. **Option 1:** Extract an additional 4m³/s of cooling water from the Shannon adjacent to the current cooling water (CW) intake, mix it with the cooling water from the plant and discharge it to the cooling water outfall location.
2. **Option 2:** Extract an additional 4m³/s of lake water from Lough Ree and discharge it to the cooling water outfall location to reduce thermal load input.
3. **Option 3:** Increase natural river flow to the cooling water channel by the removal of part of the headland located just above the cooling water discharge point.
4. **Option 4:** Extend the cooling water outfall to Lough Ree and disperse the cooling water through a diffuser system in the lake to reduce thermal load into the Shannon River.
5. **Option 5:** Use of Air Cooled Heat Rejection (ACHR) units, dry systems.
6. **Option 6:** Use of Forced Draft Cooling Towers (air to water, wet systems).
7. **Option 7:** Replace Existing Condenser and CW Systems with New Air Cooled Condensers (ACC).
8. **Option 8:** Construct cooling ponds for outflow water to dissipate thermal cooling water load.
9. **Option 9:** Cooling pond with spray system to dissipate thermal cooling water load.
10. **Option 10:** Construct second pass cooling loop in CW/Condensing system.

Table 3-2 provide as summary of the feasibility of the above ten options considered.

Table 3-2: Alternatives Considered related to the Thermal Discharge

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
1 Extract an additional 4m³/s of cooling water from Shannon, mix with cooling water from plant and discharge to cooling water outfall location	No	Yes	Yes	Mathematical modelling of the potential impact of this scenario was undertaken under low (95 percentile) flow conditions and indicated that the thermal plume cooling water footprint would be altered. It would quickly impact across the entire river section due to the increased hydraulic load from the increased discharge. The temperature level of the cooling water outfall would decrease but would not be below 1.5°C above ambient and significantly more than 25% of the cross sectional area of the entire river section would be impacted. Furthermore, during a very dry summer such as 2018, when Shannon flows were at the 99 percentile value, the extraction of an additional 4 m³/s at Lanesborough is not likely to have been feasible. Irrespective of cost the measure will not achieve the level of plume abatement required to meet the requirements of the existing Condition 5.5 of the IE Licence.
2 Extract additional 4m³/s of lake water from Lough Ree and discharge to cooling water outfall to reduce thermal load input	No	No	Yes	Mathematical modelling of the potential impact of this scenario was undertaken under low (95 percentile) flow conditions and indicated that the thermal plume footprint would be altered. It would impact across the entire river section due to the increased hydraulic load forcing it to the main channel side. The temperature level of the cooling water outfall would again decrease but would not be below 1.5°C above ambient. More importantly more than 25% of the cross sectional area of the entire river section would still be impacted. With this option, the impact on the Lough Ree ecology is unknown and would take significant time to evaluate. At LRP, a new pump house and the installation of piping underwater in the Shannon and in Lough Ree would be required. There would also be very significant engineering costs required to make this option operational.

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
				Irrespective of cost, which is prohibitive, mathematical modelling indicates that this option will not achieve the level of plume abatement required to meet the requirements of the existing Condition 5.5 of the IE Licence, there would be no benefit derived from implementing this option and it was deemed unfeasible.
3 Increase natural flow into cooling water discharge channel by removing headland above discharge point	No	NA	Yes	Furthermore, the cost of this measure would render the plant economically unviable. Mathematical modelling of the potential impact of this scenario was undertaken under low flow (95 percentile) conditions. It should be noted that creating a channel in the reed bed upstream of the outfall also results in a portion of the simulated thermal plume flowing northwards and under certain wind conditions could result in discharged cooling water reaching the cooling water intake. The mathematical modelling indicates that this option will not achieve the level of plume abatement required to meet the requirements of the existing Condition 5.5 of the IE Licence. There would be no benefit derived from implementing this option and it was deemed unfeasible.
4 Extend cooling water outfall by pipe to Lough Ree and discharge it to lake to reduce thermal load into Shannon River.	Yes	No	Yes	This option is potentially feasible but it would require significant study and design to identify the optimum location for thermal load discharge and dispersion and would require long term environmental surveys to determine the potential impact on the ecology of Lough Ree. At LRP a new pump house and the installation of piping underwater in the Shannon and in Lough Ree would be required. Given that the current planning permission expires in 2020, no solution would be in place before that date. The option would entail significant capital investment requirement. The cost of this measure would render the plant economically unviable.

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
5 Install an Air Cooled Heat Rejection (ACHJ) Unit , dry system	No	No	Yes	The ACHR units would require a large footprint area within or adjacent to the plant with engineering tie in requirements to the plants cooling water system and with realignment of existing services and electrical infrastructure. Feedback from ACHR equipment vendors with respect to the application of this technology to LRP concluded that during summer conditions, at the time when abatement is required, the air cooled heat exchangers are unlikely to work to the required level due to “Approach to Dew Point”. Note: Dew point is the temperature to which air must be cooled to become saturated with water vapour. The Approach to Dew Point issue for the ACHR heat exchangers is caused by humidity in air preventing heat exchange at air temperatures close to the 27 °C temperature of the water and the 20 °temperature that the CW water needs to be when it leaves the CW outfall in order to meet the EPA requirements. Primarily this is when the air temperature is higher than 20° and humidity is also high. As a result of the problems caused by “Approach to Dew Point”, the ACHR design will not achieve the required temperature reduction in the event that abatement of the thermal plume load is required. The option to install an Air Cooled Heat Rejection Unit will not technically deliver the reduction in temperature in the cooling water required. This option would also entail significant capital investment requirement. The cost of this measure would render the plant economically unviable.
6 Forced draft cooling towers (air to water, wet systems)	Yes	No	Yes	This option has a significant environmental risk as it directly employs Shannon River water inside of the cooling towers; thereby requiring an additional extraction. The use of thermally heated river water in a direct interface with air can also promote Legionnaires’ disease. In order to eliminate the disease potential, the water has to be treated and this chemical

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
				additive treatment would have a significant impact on the river water quality impacting negatively on the ecology of the river system. The forced draft cooling system requires the installation of fans in individual cells to produce the forced draft. The resultant parasitic loading of the fans would impact on the overall efficiency of the plant. The Forced Draft Cooling system will achieve the required thermal load reduction and it has a similar footprint as the ACHRs. But, it will require significant engineering works and site alterations. It would require the moving of power lines. It would lose a significant amount of the cooling water to vapour even with an extra vapour capture condensing equipment. The additional vapour capture condenser may use a significant amount of power. Forced draft cooling would require harsh chemical treatment of the cooling water with potentially significant potential impact on the receiving water quality. This option would also entail significant capital investment requirement. The cost of this measure would render the plant economically unviable.
7 Replace the existing plant condenser system with Air Cooled Condensers (ACCs)	Yes	No	Yes	Replacing existing Condensers with ACCs would achieve the required cooling but poses significant risks, as it requires demolition of the existing plant condenser system and rebuilding which will have various unknown risks, plant impacts and costs. ACC systems have the same “Approach to Dew Point” problems as the ACHR equipment have and will reduce overall plant efficiency. Changing the condenser system is likely to have a significant impact on the overall plant efficiency. This option would also entail very significant capital investment requirement. The cost of this measure would render the plant economically unviable.

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
8 Construct cooling ponds for outflow water	Yes	No	Yes	A Cooling Pond system will require diversion of the cooling water directly to the cooling ponds. This cooling system evaporates water directly to the air in order to cool the water – resulting in a water loss to vapour. Such a solution, considering the LRP thermal cooling water load, would require approximately 40 Hectares of land for ponds which is more land than is currently available to ESB. Obtaining 40 Hectares from third parties, rights of way and land leases in order to lay the pipe, obtaining planning and the cost of these agreements are unknown and are significant risk items. Vaporisation of most of the cooling water is also a high potential risk as it will ultimately reduce the return flow to the Shannon River. This option would also likely result in the creation of a heavily modified water body downstream of the cooling water abstraction point with implications under the EU Water Framework Directive. The cost of this measure would render the plant economically unviable.
9 Cooling Ponds with Spray System	Yes	No	Yes	As with Option 8, this option may require more land than ESB currently owns. ESB owns 6.4 Hectares at LRP that may be available to be used for ponds, although subject to further study it is anticipated that this area may not be sufficient to create the vapour spray ponds. In scenarios of high wind, the water spray may be blown away from the ponds resulting in water loss and ultimately a reduction in volume returned to the river. Significant water loss to the atmosphere may occur reducing the return flow to the Shannon River. This solution employs Shannon River water as the spray, requiring additional extraction. The use of river water in a direct interface with air, may again promote Legionnaires' disease requiring harsh chemical treatment in the form of an additive to the river water. The addition of these chemicals may impact negatively of the ecology of the river system.

Option	Technically Viability i.e. meets requirement of Condition 5.5	Economically Viable	Potential for negative Environmental Impacts	Discussion
				This option has a large potential environmental risk as it can vaporize and eliminate the cooling water in large amounts and at the right conditions it has an even higher risk of vaporizing most, if not all, of the river water. Such concerns compound the problems associated with the normal cooling pond design. This option consumes significant power used to pump the water in the ponds and to create the vapour spray increasing the house load on the plant. The cost of this measure would render the plant economically unviable.
10 Install second pass cooling loop in the CW system	No	No	Yes	It may not be possible to retrofit this kind of installation within the existing design of condenser. This would entail significant design calculations to balance the condenser sizing and layouts. From the assessment carried out by ESB this process would not provide any significant improvement in thermal abatement. The solution would not provide any improvement in the total thermal outflow. This option would require a major rebuild and redesign of the existing condenser system, the risks imposed by the rebuild would be very high. Installation of a second pass cooling loop would not achieve the requirement of the existing Condition 5.5 of the IE Licence. This option would also entail significant capital investment requirement. The cost of this measure would render the plant economically unviable.

The analysis of the above options which included river modelling, technical requirements (including footprint of abatement equipment, operational effectiveness, and tie in issues to the existing station), cost benefit and planning timeline requirements concluded that measures 1 to 10 listed above variously:

- are technically infeasible for the location
- are prohibitively expensive.
- could not be implemented in time, with the requirement for planning being a major constraint.
- could have a potential negative impact to the environment including the River Shannon

As a result, none of these measures are feasible to meet thermal cooling water load discharge abatement requirements at Lough Ree Power. A further Option, **Option 11**, also looked at the potential reuse of the thermal cooling water load for alternative purposes such as district heating or thermal drying of wet biomass for the renewable heat industry for example. This option would require an auxiliary water supply system with associated ancillary plant from the CW outfall piping that can then be rerouted to third party service pipes.

Due to the size of the adjacent community and minimal industry in the community, there are currently insufficient alternate heat uses available in the vicinity of the plant to utilise thermal cooling water load effectively. The opposing seasonal requirements of thermal plume abatement and typical third party heating processes such as district heating poses additional constraints. The demand for District Heating is generally lowest during the summer months which is when the flows in the Shannon receiving waters tend be lowest. ESB could make provision for use of the Cooling Water discharge for an auxiliary water supply system with associated ancillary plant at the LRP site boundary for the use by a third party. This would be unlikely to occur during the lifetime of the current station planning permission.

3.2.1 Other Considerations

The possibility of reducing the operational level of the station (reducing capacity of electricity generation) to reduce thermal load to achieve the temperature and mixing zone requirements was also examined.

However, given the close relationship between thermal load, plume size and river flow, the possibility of mitigating the thermal discharge to achieve the current Condition 5.5 of the IE Licence through the reduction of station load is considered to be cost prohibitive with respect to operating the station on a commercial basis.

Using flow and load information currently available, two potential preliminary reduction scenarios were identified to achieve Condition 5.5 as it stands. These are as follows:

- i. Station off load when flow is less than a target trigger value throughout year
- ii. Station off load when flow is less than a target trigger value in Summer months but operating at 46 MW (rather than 100MW) when flow is less than the target trigger outside the summer months.

To achieve Condition 5.5 significant curtailment of electricity generation would be required during reduced river flow periods to the extent that LRP would no longer be viable to operate on a commercial basis and would cease to operate. Such a loss of generation capacity of the magnitude arising from the implementation of these reduction measures would have serious implications for the viability of the station and would result in significant impact on associated activities, particularly peat supply and the socio economics of the midlands region.

Electricity generation on the site would cease with the resultant loss of direct and indirect employment and economic activity to the Midlands Region. The closure of the LRP Station and ADF, with the associated cessation of peat supply for electricity generation at LRP would ultimately see an immediate termination of all employment at the site and associated peat harvesting and delivery activities.

This scenario would entail the loss of all jobs directly associated with the LRP Station and ADF aside from security, decommissioning and closure activities. This scenario would also lead to the loss of indirect and induced jobs supported by the LRP Station and ADF. There would be immediate significant and long term loss of employment in LRP and in indirectly associated activities such as the fuel supply operations and routine maintenance activities. There would also be a loss of economic contribution to the local authority.

On an ongoing basis, it is proposed to schedule the timing of annual station maintenance works and associated outages (two/three weeks in duration) in summer months to align with periods when river flows are known to be typically very low.

3.3 Conclusion on Alternatives

The proposed increase in the capacity of the existing ADF allows for the full utilisation of the existing site. This utilises the existing landfill footprint and existing ash transportation mechanism with no requirement for additional land take or road transportation. This guarantees power generation at LRP Station can continue for the duration of the current planning. This is the preferred alternative in relation to landfilling of ash.

A wide range of technical options to reduce the thermal cooling water load to the River Shannon were examined and no technically feasible or cost effective options were identified which would allow the station to meet its current Condition 5.5 of the IE Licence under low flow conditions. Curtailment of electricity generation during key periods was also considered but would render the station uneconomic to operate leading to closure and immediate significant socio economic impacts.

Following the Technical Guidance approach on mixing zones and ecological and fish assessments undertaken to date in February 2018 and presented in the ESB Report "Lough Ree Power Thermal Discharge Synthesis Report", it was concluded that no overall significant impact on the receiving water bodies occurs into which the thermal cooling water discharges take place. As a result of these findings and to ensure that discharge from the facility is compliant with IE Licence P0610-02, in May 2018, as

part of the review process for LRP IE Licence P0610-02, a request to amend Condition 5.5 was submitted to the EPA as part of this IE licence review.

For inspection purposes only.
Consent of copyright owner required for any other use.

4 Description of the Proposed Development

4.1 The Proposed Development

The requirement for the LRP IE licence review originated from the proposed increase capacity of the ADF. It is proposed to increase the capacity of the existing ADF and facilitate the disposal of an additional 130,000 tonnes of peat ash to the 31st December 2020, when the power station is due to cease generation activities based on the current planning.

In addition to the above a request to alter Condition 5.5 has been requested. The current Condition is as follows:

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional areas of the river at any point.

The proposed condition alteration is as set out below ;

*Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point **where such exceedances would result in contravention of the EPA Act and in particular cause significant environmental pollution to the receiving waters.***

Other requested alterations to the current IE Licence for agreement with the EPA include:

- New site plan reference numbers;
- Removal of condition in relation to use of the Ringlemann Chart;
- Potential relocation of a groundwater monitoring well at the station;
- Site licence boundary provided;
- Provision of revised coordinates of groundwater (GW) monitoring well GW5 at the ADF; and
- An outline of previously agreed changes with the EPA.

These other requests in relation to the IE licence review are minor or administrative in nature and are not considered further in this EIAR. This proposed increase at the ADF and the requested alteration to Condition 5.5 is the subject of this updated EIAR and are considered under the “proposed development” .

As this EIAR is related to a IE licence review in addition to assessing the potential impacts from the above, the proposed development assessed under this EIAR includes an updated assessment of potential impacts associated with the continued operation of the LRP station to the end of 2020 in line with its current planning permission. This was previously assess under the original 2001 EIS for LRP Station.

The potential indirect impacts from the peat supply bogs to LRP are also assessed.

4.2 Existing LRP Station

The LRP station covers approximately 36 hectares (ha) and is adjacent to the site of the former Lanesborough Generating Station, which operated as a peat burning power station from the early-1960s until its closure in 2004.

The station comprises a single boiler/turbine unit with an electrical output of 100 MW and its main features are as follows:

- Main building housing fluidised-bed boiler and 100 MWe (megawatt electric) rated turbo-alternator unit.
- Fuel handling system comprising peat wagon tipplers, screens, conveyors and an intermediate peat storage (IPS) facility.
- Water treatment plant (WTP) for processing of water prior to its storage and use in the boiler.
- Cooling water system, comprising a pump house, inlet and outlet culverts and outfall, for condenser cooling.
- Flue gas system comprising cyclone separators and bag filters for removal of peat ash from exhaust gases.
- Chimney (base diameter 7 m, height 80 m) for discharge of exhaust gases to the atmosphere.
- Ash handling system comprising conveying systems and storage silos.
- Oil tank for storage of auxiliary fuel.
- Storage facilities for limestone lime and sand.
- Generator transformers, high voltage switchgear, and unit and house transformers.
- Supporting facilities including the following:
 - administration offices
 - fire protection system
 - auxiliary cooling water system
 - fuel oil pump house
 - diesel generator
 - chemicals storage tanks
 - chemical laboratory (limited wet analysis is undertaken)
 - workshop and stores

The structural form of the station buildings is conventional structural steel supported on reinforced concrete foundations. Gantries and walkways for access to plant and equipment are constructed of stainless/galvanised steel open grating type flooring. These are supported on steel beams and columns. External walls comprise profiled metal cladding and roofs are constructed of profiled metal decking on purlins spanning between rafters.

The LRP Station has a net electrical output of 100MWe and produced approximately 776,197 MWh of electricity in 2016 under its Public Service Obligation (PSO). The

AEM~(Co2-EUETS) states the total peat consumption was 889,134 tonnes and approximately 65m³ of light fuel oil in 2016³.

The station operates under its EPA IE Licence P0611-02. No changes are proposed to the station or its operations as part of this IE licence review.

4.2.1 Alteration of Condition 5.5

Under the IE licence cooling water is abstracted from the River Shannon and is used to condense the steam generated to spin the turbines and generate electricity. Water is returned to the river via discharge culverts. The outfalls are located approximately 200m downstream of the intake and approximately 160m upstream of Lanesborough Bridge. There are no physical or operational changes required or proposed in relation to the requested alteration of Condition 5.5.

Existing Condition 5.5 is as follows:

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional areas of the river at any point.

The proposed Condition 5.5;

*Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.50C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point **where such exceedances would result in contravention of the EPA Act and in particular cause significant environmental pollution to the receiving waters.***

4.3 The ADF Site and increase in the Disposal Capacity

The requirement for additional ash disposal capacity was identified and planning permission sought in 2017. The original permitted 550,000 tonnes was reached in January 2019. As the IE licence review process is ongoing a Technical Amendment was sought and approved (Technical Amendment C to P0610-02) by the EPA to allow the temporary storage of ash at the ADF.

The additional 130,000 tonnes of ash (the subject of this EIAR) will be disposed of in cells that lie within the previously permitted landfill footprint. The remainder of Cell 8 will be filled and the new Cells 9 and 12 will be constructed and filled. As per the EPA requirement, completed cells will be managed in accordance with the operational plan and be capped within 2 years of being filled.

³ Lough Ree Power Station - PO610-02 - AER 2016

The footprint of the existing ADF which will facilitate the increase in capacity is as shown on **Volume 3 - Figure 1.2: Derraghan ADF Site Layout Map**.

For clarity it is noted that no additional land will be developed, in excess of that permitted under the existing planning permission.

During this time existing site services and infrastructure – including the vehicular access way, surface water drains, leachate collection system and railway network will be used. No other works are required to facilitate the acceptance of the additional ash.

4.3.1 Proposed Phases of Activity

The ADF element of the proposed development will be carried out in accordance with the established and permitted operations at the site. These operations take place in the context of the existing IE Licence for LRP Station.

The proposed development includes the acceptance and disposal of an additional 130,000 tonnes of peat ash at the existing ADF. While the EIAR describes the construction and operation of the ADF it is noted that the construction of those cells will be as described, and permitted, under (Longford County Council Reg. Ref. 01/115; An Bord Pleanála Reg. Ref.PL14.125540) and as required by the EPA IE Licence and its required and approved Landfill Management Plan.

4.3.2 Cell Construction

The proposed cells will be constructed in-line with prevailing guidance provided by the EPA and in-line with the terms of the IE licence for the site and the existing permission for that site.

When each cell is first being commissioned, the floor and sides of the cell are excavated, prepared and lined (on the base and sides) with a geo-synthetic clay liner. The liner is placed in sections with ash stockpiled for spreading on the base as the remainder of the floor liner is placed. Any leachate from the temporarily lined area is contained during these works. In addition, the sides of the embankments are lined to 1 m height when the base of the cell is lined and the embankments are lined to full height when the cell is operational. All future cells will be constructed to this same standard.

4.3.3 Disposal Activity at the ADF

The EPA's IE Licence P0610-02 requires the ADF to be fully in compliance with the EU Landfill Directive (Directive 1999/31/EC on the landfill of waste) and the Landfill Operational Plan which must incorporate all relevant requirements of the Directive regarding the design, construction, operation and aftercare management of the landfills.

The ash will be brought from LRP Station to the ADF site by means of a rail line, in-line with the current operating regime. Typical movements of ash between LRP

Station and the ADF site will comprise two to three locomotive runs per day resulting in up to six movements across the level crossing traversing the R392.

On-site, the location of the off-loading area within the ADF will be dependent on which cell is operational and access will be arranged by the relocation of the temporary rail tracks on the site. Tracks will be aligned so the ash can be tipped from the rake into each cell where it will be spread, compacted and levelled by a front-end loader to prevent any ponding of water on the surface. Once the cell is full, it will be covered with a top liner and a 1 m deep peat capping layer which seals the cell.

Each cell will be separated from the adjoining cells by inter-cell embankments and by external embankments. Leachate will be drained from each cell and will be recirculated or pumped to the existing leachate storage lagoon.

There are two discrete waste streams which will be disposed of at the ADF.

- **Fly ash** is removed from the flue gases by bag filters and conveyed to an ash silo. The ash is transported from LRP Station to the ADF by rail in an ash rake. Each rake comprises a locomotive pulling 10 to 12 wagons each of which carries two covered ash buckets. Before being loaded into the wagons the ash has 15 to 30 % of moisture added; and each wagon has a hydraulically controlled lid to prevent dust during the journey from LRP Station to the ADF.
- The combustion of peat gives rise to the production of a relatively small volume of **bottom ash**. It is removed from the combustion chamber and conveyed to a small bottom ash silo on the LRP site. It is transferred from the silo by a sealed vacuum system to a skip mounted on a rail bogey and transported to the ADF, also by means of the rail line.

4.4 Operation & Maintenance

LRP Station operates an Environmental Management System (EMS) certified to ISO14001:2015. The management of the environmental aspects of the LRP Station site including the ADF complies with this EMS under ISO14001 and IEL 610-02 as well as the stations environmental policy and in compliance with the Best Available Techniques (BAT) under the Large Combustion Plant Directive Bref document.

As part of the Environmental Management Programme, objectives and targets are set to deal with all potential emissions from LRP Station including the ADF. The guiding principle in the operation of the ADF is to deposit ash with due care to safety and the environment in compliance with all relevant regulations.

In addition the landfill is operated in accordance with the EPA approved Landfill Operational Plan prepared as part of the IE Licence compliance requirements.

4.5 Characteristics of the Proposed Development

The following are the key characteristics of the proposed activity:

- No changes are proposed to the station or its operations as part of this IE licence review;
- The alteration of Condition 5.5 will not require any physical or operational changes to the station;
- The proposed activity (ash disposal and thermal cooling water load discharge) will only take place for the duration of the parent permission as set down in Condition No. 2 of PL14.125540, i.e. 31st December 2020;
- The overall LRP development will remain compliant with planning permission issued under PL14.125540 and all the planning conditions attached to that. Specifically Condition Nos. 15, 16 and 17 will continue to be complied with;
- There will be no physical change to the ADF cell structure as permitted by PL14.125540;
- The ADF will continue to exclusively accept ash from LRP Station;
- There will be no intensification of activity at the ADF;
- There will be no increase in the levels of rail or planning approved road traffic as a consequence of the proposed development;
- There will be no change in the physical appearance or extent of the ADF as the approved landscaping plan will not be affected by the additional ash deposition;
- There will be no increase in the plant required on site or the noise generated;
- There should be no increase in the volume of leachate produced due to the increased volume of ash as cells are capped as they are filled; and
- The continued deposition of ash will still be subject to an EPA IE Licence.

In summary the proposed development is a continuation of the long-established and authorised activity that has been ongoing on the site for in excess of 15 years.

As the activity has been ongoing for such a prolonged period and the site is highly monitored – primarily through the IE Licence, the environmental effects are well understood. Therefore the characteristics of the receiving environment; the characteristics of the permitted activity; and the potential environmental impacts of the development, are fully understood and can be reliably assessed. This provides invaluable information that is reflected in this EIAR.

4.6 Note on Baseline for the Proposed Development

Planning permission for LRP Station ceases on the 31st of December 2020. The baseline used for the purpose of this assessment is with the operational station and AFD in place and in use.

4.7 Material Uses and Emissions from the proposed development

Material uses and emissions arise both directly associated with the ash landfill area and indirectly from the generation of electricity at LRP Station and the Bord na Móna peat harvesting operations to deliver peat to the stations. A summary of typical material uses, based on the Annual Environmental Report for 2016 submitted to the EPA and data provided by Bord na Móna in respect of the peat supply bogs is provided in **Table 4-1** herein.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 4-1: Material Uses, Direct and Indirect Emissions

Parameter	Reference Year - 2016
Landfill - Direct Materials	
Peat Ash disposed to landfill	32,178
LRP Generation Station- Materials	
Total Energy Generated (MWHrs)	776,197
Total Energy Consumed (MWHrs)	87,732
Fossil Fuel Consumption (Light Fuel Oil in cubic metres)	65
Public water supply (cubic metres)	3125
Non-hazardous Waste Generated (tonnes ash to landfill)	32,178
Hazardous Waste Generated (tonnes)	7.78 (6.1 tonnes recycled 1.68 tonnes incinerated off site)
LRP Generation Station- Emissions to Air	
Sulphur Oxides (SO _x /SO ₂)	280.59
Nitrogen oxides (NO _x /NO ₂ tonnes)	562.15
Particulate Matter (PM ₁₀ tonnes)	16.92
Carbon Dioxide (CO ₂ tonnes)	856,330
Ammonia (NH ₃ tonnes)	10.2
Carbon Monoxide (CO tonnes)	55.4
Nitrous Oxide (N ₂ O tonnes)	47.1
Non-methane volatile organic compounds (NMVOC tonnes)	2.64
Polycyclic Aromatic Hydrocarbons PAH Kg)	0.58
LRP Generation Station- Emissions to Water	
Total Nitrogen(kg)	151.5
Total Phosphorous (kg)	2.35
Indirect Materials Peat Abstraction Bogs*	
Peat (tonnes)	879,699
Peat harvesting area (hectares)	12,492
Gas oil use in harvesting and transport operations (litres)	1,760,000
Indirect Emissions Peat Abstraction Bogs*	
CO ₂ equivalent emissions from peat areas including stockpiles (tonnes)	76,819
CO ₂ equivalent emissions from harvesting and transport of peat to LRP and transport of ash to landfill.	4,712

*Data supplied by Bord na Móna

4.8 Site Closure and Remediation

Planning permission for LRP Station ceases on the 31st of December 2020. Upon the cessation of power generation and disposal activities, the closure requirements outlined in the prevailing planning and licensing consents, and as required by the EPA, will be adhered to. Specifically, the EPA approved Decommissioning Management Plan (DMP) and Closure, Restoration and Aftercare Management Plan (CRAMP) as required by Section 10.2 of the IE Licence will be implemented. At that time the requirement for ash disposal will cease, therefore the ADF site will cease to accept ash and close in-line with a remediation plan.

4.9 Associated Activities - Peat Supply to LRP Station

The LRP Station is fuelled by peat provided by Bord na Móna. This peat will be harvested under licence from a discrete number of supply bogs. In order to ensure that any environmental impact assessment of this proposed development has regard to the indirect effects of the associated activity, this EIAR includes an assessment of the induced indirect environmental impacts associated with the peat harvesting operations.

The peat that fuels the LRP is harvested by Bord na Móna at a number of supply bogs. These activities are regulated by the EPA under Industrial Pollution Control (IPC) Licence Registration Numbers:

- P0501-01 (Derrygreenagh Group),
- P0502-01 (Blackwater Group),
- P0503-01 (Allen Group) and
- P0504-01 (Mountallion Group).

It is noted that many private operators also operate within the same area as Bord na Móna, however, their peat harvesting activities are generally not licensed by the EPA.

The locations of the bogs that will continue to supply milled peat to LRP Station up to the end of 2020 are presented in **Volume 3 - Figure 1.3: Location of Bord na Móna Supply Bogs**. The bog areas are listed in **Table 4-2**.

Milled peat production and supply to LRP Station provides direct employment to approx. 250 staff, including 118 permanent Bord na Mona employees and 132 seasonal Bord employees. In addition, the provision of central services, such as IT, HR, engineering, procurement and finance, provides employment for approximately 15 central staff. Peat supplied to LRP Station is currently and will continue to be sourced from those bogs listed under the aforementioned IPC Licence Registration Numbers - P0501-01, P0502-01, P0503-01 and P0504-01. There is sufficient remaining capacity in the bogs that are currently, or have recently, been in production to supply peat to LRP Station up to the end of 2020.

No new peat supply bogs are being developed as a consequence of this proposed development. Therefore, the consideration of induced indirect effects associated with the supply of milled peat destined to LRP Station, as detailed in this EIAR, is

restricted to activities within the catotelm layer of the bogs, which contains dead plant material, (as distinct from the acrotelm, which comprises the active growing plant layer on the surface of the bog).

Table 4-2: Peat Supply Bogs Utilised to Supply LRP Station, 2018 – 2020

	Area (hectares)
Derrygreenagh Bog Group - P0501-01	
Derryhinch	336
Drumman	1120
Toar	445
Ballybeg	836
Ballivor	654
Carranstown	306
Bracklin	755
Rossan Bogs	353
Daingean Bog	646
Allen Bog Group - P0503-01	
Esker	571
Clonad	447
Ballykean	453
Mountlucas	1229
Blackwater Bog Group - P0502-01	
Boughill	426
Castlegar	518
Derryfadda	611
Gowla	664
Killaderry Bog	502
Mountdillon Bog Group - P0504-01	
Derraghan	290
Derryadd 1	657
Derryadd 2	328
Derryadd 3/Lough Bannow	757
Derryshannoge	453
Killashee	111
Derrycashel	388
Granaghan	213
Derryarogue	905
Mountdillon	594
Begnagh	265
Clooneeny	389
Erenagh	93
Moher	263
Cloonshannagh	495
Derrycolumb	456
Derrymoylin	386
Edera	282
Coolcraff	412

	Area (hectares)
Coolnagun	669
Milkernagh	629
Clontuskert Bog	221

4.10 Potential Future Proposed Development at the LRP Station and ADF

As outlined, Planning permission for LRP Station ceases on the 31st of December 2020. Upon the cessation of power generation and disposal activities, the closure requirements outlined in the prevailing planning and licensing consents, and as required by the EPA, will be adhered to. However, it is acknowledged that ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. Peat usage as a fuel would reduce immediately from 2020 and would be phased out by the end of 2027 under the future proposed development. Peat would continue to be harvested and supplied by Bord na Móna to the station until the end of 2027. The station thermal cooling water load would be unchanged and would continue to discharge to the River Shannon at Lanesborough.

This future proposed development will comprise four distinct elements:

- the continued and on-going operation of the existing generating station and the associated ADF beyond the previously permitted date of 31st December 2020 (Longford Co. Co. Reg. Ref. 01/115; An Bord Pleanála Ref. PL14.12554 and Longford Co. Co. Reg. Ref. 17/320);
- the phased transition of the LRP Station to firing exclusively on renewable biomass. The transition to 100% biomass will comprise initial phases of co-firing characterised by the combustion of reducing volumes of peat and associated reduction in carbon dioxide emissions;
- the development of fuel management and handling facilities on the LRP Station site to facilitate the change in fuel type; and
- the development of additional landfill capacity at the existing dedicated ADF, to accept additional ash from LRP Station.

As part of this process planning permission is being sought from Longford County Council and an EIAR and NIS has been produced to assess and potential impacts as a result of that planning application.

In addition assuming a successful outcome from the planning application for the future propose development a new IE licence review will be required in relation to LRP Station and ADF.

Changes are not currently being requested to the LRP IE Licence under this licence review application in relation to the future proposed development. However, potential cumulative impacts with this proposed development and the future proposed development outlined above have been assessed as part of this EIAR.

5 Population and Human Health

5.1 Introduction

This chapter of the EIAR considers the potential impacts relating to Population and Human Health from the proposed development.

The indirect impacts associated with the supply of peat fuel to LRP Station, as they relate to Population and Human Health, are also considered.

5.2 Methodology

In order to inform this chapter a desk-based assessment of publically available information has been undertaken. This information has been used to evaluate potential impacts of the proposed development in relation to economic activity, land-use, employment, settlement patterns, social patterns and human health.

Information used in the preparation of this chapter has been sourced from the following:

- Lanesborough New Peat Station EIS (2001)
- Central Statistics Office, Preliminary Report for the 2016 Census
- Central Statistics Office, Census 2011 – This is Ireland, Highlights from Census 2011 (2012)
- Central Statistics Office, Preliminary Report for the 2011 Census
- Central Statistics Office, Live Register
- Census 2016 SAPMAP Viewer (<http://census.cso.ie/popbysa/> accessed 26th June 2017)
- Census 2011 SAPMAP Viewer (<http://census.cso.ie/sapmap/> accessed 26th June 2017)
- Midlands Regional Authority, Regional Planning Guidelines for the Midlands Region 2010 to 2022
- Longford County Development Plan 2015 – 2021
- Longford County Council, Online Planning Enquiry System (<http://www.eplanning.ie/LongfordCC/searchexact> accessed 26th June 2017)

5.2.1 Study Area

The study area considered in relation to Population and Human Health includes the station site and the ADF footprint and the immediate surrounding townlands and small areas of Aghamore, Lanesborough, Derraghan Beg, Derraghan More, Ledwithstown and Cashel East.

For the consideration of indirect impacts the study area also includes the associated peat harvesting.

5.3 Receiving Environment

The receiving environment for the proposed development is within the footprint of the original station and ADF previously subject to EIA in 2002. The proposed development site and activities are unchanged since that original application; however the baseline for the assessment of impacts with respect to human beings has changed since then.

5.3.1 Economic Activity

The demographic profile of the receiving environment is outlined in this section with specific reference to the Central Statistics Office (CSO) small areas such as Lanesborough, Ledwithstown and Cashel East, within which the proposed development is proposed. In addition the employment profile for County Longford is outlined.

At a national level the 2016 census identified a total population of 4,761,868 for the entire state compared to 4,588,252 in 2011 and 4,239,848 in 2006 as illustrated by **Table 5-1**.

Table 5-1: National Population Statistics

Location	Census 2006	Census 2011	Census 2016	% Change 2006 - 2011	% Change 2011 – 2016
State	4,239,848	4,588,252	4,761,868	8.2	3.8

At a regional level the 2016 census identified a total population of 2,634,403 for Leinster compared to 2,504,814 in 2011 and 2,295,123 in 2006 as illustrated by **Table 5-2**.

Table 5-2: Regional Population Statistics

Location	Census 2006	Census 2011	Census 2016	% Change 2006 - 2011	% Change 2011 – 2016
Leinster	2,295,123	2,504,814	2,634,403	9.1	5.2

LRP Station and the ADF are located within County Longford. The station is located within the electoral division (ED) of Rathcline and the ADF is located within the ED of Cashel East. The peat supply bogs are located within Counties Offaly, Galway, Roscommon, Meath, Westmeath and Longford.

At a local level the 2016 census identified a total population of 40,873 for County Longford and of 485 for the small areas of Ledwithstown and Cashel East, within which areas the proposed development is proposed.

The county population is the second smallest in Ireland, followed only by County Leitrim. However, as illustrated by **Table 5-3**, the population target of 39,392 for County Longford in 2016 (Regional Planning Guidelines for the Midland Region, 2010

– 2022) was achieved. The population target identified by the same document is 41,392 for County Longford by 2022.

Table 5-3: Local Population Statistics

Location	Census 2006	Census 2011	Census 2016	% Change 2006 - 2011	% Change 2011 – 2016
Longford	34,391	39,000	40,873	13.4	4.8
Lanesborough - Ballyleague	1,112	1,377	1,454	23.8	5.6
Small Areas (Ledwithstown & Cashel East)	n/a	501	485	n/a	-3.2
Rathcline ED	1,289	1,428	1,443	10.8%	1.1%
Cashel East ED	312	323	302	3.5	-6.5%

In accordance with the live register information despite a decrease of 0.3 % in the number of people unemployed at state level between April 2017 and May 2017 there was a slight increase (0.2 %) in the number of people unemployed in the midland region. Annually, between May 2016 and May 2017, there was a 14 % decrease in the level of unemployment at state level and a decrease of 15 % in the Midland Region.

The 2016 census results identified Longford town as experiencing the highest unemployment rate amongst the large towns in Ireland, with a rate of 30.6 % unemployment, compared to 19.6 % experienced at state level. In 2011 the unemployment rate for the Lanesborough – Ballyleague area was 21.3 % compared to a national average of 19 %.

Table 5-4: Persons on the Live Register

Region	Midland			State		
Age Group	All Ages	Under 25 Years	25 Years and Over	All Ages	Under 25 Years	25 Years and Over
April 2017	21,568	2,895	18,673	263,417	29,725	233,692
May 2017	21,607	2,970	18,637	262,702	30,253	232,449
Monthly Change	39 (0.2%)	75 (3%)	-36 (-0.2%)	-715 (-0.3%)	528 (2%)	-1,243 (-1%)
May 2016	25,397	3,594	21,803	306,822	37,662	269,160

Region	Midland				State	
May 2017	21,607	2,970	18,637	262,702	30,253	232,449
Annual Change	-3,790 (-15%)	-624 (-17%)	-3,166 (-15%)	-44,120 (-14%)	-7,409 (-20%)	-36,711 (-14%)

5.3.1.1 Employment

The LRP Station currently directly employs 41 ESB staff. An additional 245 permanent and seasonal Bord na Móna employees are involved in the fuel supply to the station and the management of the ADF facility.

5.3.2 Tourism

Lanesborough - though located in County Longford, lies close to the border with County Roscommon. Areas of Counties Leitrim, Galway and Westmeath are also in the wider vicinity of Lanesborough. There were 25,000 foreign visitors to County Longford in 2016 generating a revenue of €8 million. That year, there were 52,000, 49,000 and 107,000 foreign visitors to Counties Roscommon, Leitrim and Westmeath respectively. These visitor numbers and corresponding levels of revenue are in direct contrast to Galway that had a total of 1,449,000 visitors for the same time period and generated a revenue of €455 million⁴.

The settlement of Lanesborough is situated on the River Shannon which itself forms part of Fáilte Ireland's recent tourism initiative "Ireland's Hidden Heartlands"¹¹, a parallel initiative to the Wild Atlantic Way and Irelands Ancient East.

Existing tourism, amenity and recreational activities at Lanesborough and in the surrounding area currently take place in an operating environment of an existing electricity generating station with all its associated activity.

Buildings of interest and heritage sites in Lanesborough and its surrounding area include St John's Church of Ireland, one of the oldest buildings in Lanesborough, dating back to the 5th Century, having been rebuilt in 1861; and 2km from the town of Lanesborough, overlooking Lough Ree, the ruins of Rathcline Castle which, having been built around the 9th Century.

Leisure and recreational activities in the study area include:

River based activities - Leisure and recreational activities in Lanesborough associated with the River Shannon / Lough Ree and their immediate surrounds include river cruising, boating, angling, bird watching and swimming.

Cruising is a popular activity on the River Shannon and there is a marina on the opposing Ballyleague side of the Shannon to the north of the LRP Station. The stretch

⁴ Regional Tourism Performance in 2016 (Revised March 2018), Fáilte Ireland.

of the River Shannon between Lanesborough and Rooskey is a long established angling centre, offering opportunities for coarse fishing⁵.

Walking and Cycling Routes - There are a number of walking and cycling routes in the wider environs of the LRP Station and ADF. The 'Commons North – Woodland Walk' is a 4.5km shoreline and woodland walk starting from Lanesborough, approximately 0.5km to the west of the LRP Station¹⁶. The Pound Bog Walking Trail, in Tullyvrane, off the Ballymahon Road is also in close proximity to Lanesborough⁶.

To the east of Ballymahon are the Newcastle Wood 'Church Walk' and Wandering Walk' which are 5km and 2km in length respectively. The Longford Town Sli route is a 2.6km Circular route in Longford Town, while the Longford Clondra Greenway is a 16km cycle/walking route which travels along the old Royal Canal spur from Longford to the Royal Canal proper. It crosses the N63 on a number of occasions and the closest part of the trail is approximately 10km to the east of the LRP Station. Culnagore Wood is woodland suitable for walking on the shore of Lough Ree and is located some 5km south west of the ADF.

5.3.3 Land-use

The LRP Station is located in the town of Lanesborough on an existing brownfield site located on the banks of the River Shannon. As well as the town of Lanesborough, typical land use in proximity to LRP Station includes pastoral farmland and the callows associated with the River Shannon.

LRP Station is situated on a site where power generation is the established land-use since 1958. The site accommodates structures and activities typical of an electricity generating station - including fuel (peat) storage and handling areas and plant; the generation station itself; and a range of ancillary services including water treatment and management systems, offices and administration area.

The proposed development at the ADF is located on the site of the currently operational ADF; granted permission in 2002 and developed in 2004 under the ownership of Bord na Móna. The current site consists of an area of 30.2 ha located on an existing landfill and cut away bog site at a distance of approximately 10 km from LRP. The site is located approximately 9 km from Lanesborough, located to the north west of the site, and approximately 11 km from Ballymahon, located to the south east of the site.

The area generally consists of rural landscape with small residential farms and rural residences. Opposite the entrance to the ADF, to the north of the R392 regional road, is an ISPCA centre which is notable as the only other apparent non-farming activity in the area.

⁵ Discover Ireland: <https://www.discoverireland.ie/Activities-Adventure/the-river-shannon-lanesboro-to-rooskey/9824>

⁶ <http://loughree.ie/activities/walking/>

In accordance with the Development Plan Lanesborough and Ballymahon are both classed as Tier 4 local service towns. No zoning is identified in the Development Plan for the study area.

5.4 Impacts of the Development

This section considers and assesses the potential impact of the proposed development with regards to Population and Human Health.

5.4.1 LRP Station

There are no physical or operational changes proposed to the LRP station as part of this proposed development (the IE licence review). The potential impacts of the proposed development in relation to LRP station, in the context of Population and Human Health, include the following:

- Ongoing economic activity at the station;
- Ongoing energy security; and
- Continued land-use of the site for energy supply purposes.

For each of these impacts of this development the impacts continue to be as outlined in the original EIS prepared for station operations in 2001.

The continued use of LRP station will facilitate continued employment and energy security in addition to the continued use of the land for energy supply purposes. Impacts are considered to be **positive, significant and short term** due to the continued provision of employment and the continued contribution to Ireland's energy security.

The original assessment did not consider these impacts to require mitigation measures and it is not considered that any of these indirect impacts are associated with the need for mitigation measures as part of this development.

There are no anticipated impacts to Population and Human Health as a result of the proposed alteration of Condition 5.5.

Aspects related to human health are covered in **Chapter 9** Climate, Air Quality and Noise, **Chapter 7** Surface Water and **Chapter 8** Land, Soils, Geology and Hydrogeology of this EIAR. .

5.4.2 Derraghan ADF

The ongoing operation of the ADF is required in order to facilitate continued operation of LRP and as such is an integral part of the power stations viability.

Continued operation of the ADF will result in the continued employment of the seven (7) people directly employed as a result of the ADF.

There are no identified amenities within the immediate area of the ADF facility and therefore no impacts on amenities are anticipated.

The proposed development will not result in any change to the existing land-use of the site. As specified the current site is located on an existing landfill and cut away bog. There will be no change to electricity supply, water usage and the foul sewage system at the ADF as a result of the increase in the capacity.

No sensitive receivers (i.e. hospitals, schools or rehabilitation centres) have been identified within the immediate vicinity of the ADF. Day to day operations of the ADF are not anticipated to significantly change from the operations ongoing since the original development of the ADF and as such the ISPCA centre, opposite the entrance to the ADF, is not anticipated to be negatively impacted by the development.

The ash proposed to be landfilled as a result of the combustion of peat is not classed as a hazardous material. It will not be a source of gas, odour or microbial emissions to the atmosphere. Neither is it a food source for birds or vermin. Control measures are in operation at the ADF in relation to dust, see **Chapter 9**.

In conclusion, the impacts associated with the ADF are considered to be **positive, slight and short term** due to the continued provision of employment.

No negative impacts are anticipated in relation to land-use or tourism.

Aspect related to human health are covered in **Chapter 9** Climate, Air Quality and Noise, **Chapter 7** Surface Water and **Chapter 8** Land, Soils, Geology and Hydrogeology.

5.4.3 Indirect Impacts - Peat Supply to the LRP Station

There are a number of peat supply bogs which are used to facilitate operations of LRP Station. The peat supply bogs are currently operating in accordance with EPA IPC Licence Reg. No.'s P0501-01, P0502-01, P0503-01 and P0504-01 under the control of Bord na Móna Energy Ltd.

The indirect impacts of the development in relation to the peat supply bogs, in the context of Population and Human Health, include the following:

- Ongoing economic activity at the bogs;
- Ongoing energy security; and
- Continued land-use of the bogs for peat extraction purposes.

Indirect impacts relating to the ongoing extraction of peat for the purposes of the ongoing operation of LRP Station will include continued employment as a result of peat extraction operations at the bogs and continued energy security as a result of the fuel supply to LRP Station. The continued use of the bogs for peat extraction purposes will remove opportunities to consider the use of the bogs for other land-use purposes. Impacts are considered to be **positive, significant and short term**.

No new bogs will be used for the peat extraction and therefore there will be no change to established land-use at these bogs. The impact will therefore be **neutral**.

As peat extraction is an established activity and will only be supplied to LRP Station from bogs currently licenced and in production it is not considered that the continued

supply of peat poses a threat to any tourism, amenities or recreation. No impact is predicted.

5.4.4 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to Population and Human Health, have been assessed.

As stated in Section 1.1 of this EIAR ESB have recently applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The continued operation of the station beyond 2020 will facilitate continued employment and energy security as a result of LRP Station operations in addition to the continued use of the land for energy supply purposes. The cumulative impact will therefore be positive, significant and medium term in the midlands region.

The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to Condition 5.5 do not require any physical or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. It has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated.

Potential impacts in relation to the transition the LRP station from peat to exclusively firing with biomass are assessed in the published EIAR for that future proposed development and will be subject to a future IE Licence review.

5.5 Mitigation

No specific mitigation is required in the context of Population and Human Health as discussed by this chapter. Mitigation measures with respect to the ongoing operation of the ADF and the LRP station will result from the mitigation measures associated with Biodiversity, Surface Water, Groundwater, Climate & Air Quality and Noise as detailed by the other relevant chapters of this EIAR.

5.6 Residual Impacts

It is not considered that the proposed development will have any significant environmental impacts on Population and Human Health and no specific mitigation is required in the context of Population and Human Health. No residual impacts are anticipated.

5.7 'Do Nothing' Scenario

Under the 'Do Nothing' scenario, storage or disposal of ash at the ADF would cease by the end of 2019 when the Technical amendment that allows the temporary storage of ash at the ADF would cease. As discussed in Chapter 2 the station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 and therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration to Condition 5.5 is not granted this would have serious implications for the viability of the station and the station would likely cease operation

In the event of the do nothing scenario, the LRP Station would face decommissioning of the power station earlier than the current planning permission requires. Should closure of the ADF and decommissioning of the power station occur the impacts, in relation to Population and Human Health, would include the immediate loss of all employment of people directly and indirectly employed by the Station and the ADF as well as loss of employment at the associated Bord na Móna peat supply bogs. This impact would be **negative, significant and medium term** on socio economics as insufficient time for a just transition to alternative employment opportunities would not exist.

In addition, impacts would include a loss of energy security for the state.

5.8 Interaction of the Foregoing

Impacts relating to Population and Human Health have the potential to be impacted by other environmental aspects including Water, Climate & Air Quality and Material Assets, see **Chapter 13**.

6 Biodiversity

6.1 Introduction

This chapter of the EIAR presents an assessment of biodiversity which predicts the potential impacts on the surrounding environment arising from the proposed development.

Ecological surveys were undertaken to identify habitats and species present within the development site and assess the potential impacts of the development and future operational phases of the ADF on local biodiversity. The text also considers areas designated for nature conservation.

This chapter also specifies mitigation measures to reduce adverse potential impacts on biodiversity, where appropriate. Hydrological / water quality impacts are considered in **Chapter 7 - Surface Water** and **Chapter 8 – Land, Soils, Geology and Hydrogeology**.

The potential for indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to biodiversity, are also considered.

A standalone Screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) has also been produced, in accordance with the requirements of the EU Habitats Directive and the European Communities (Birds and Habitats) Regulations 2011, which considers designated sites within the potential zone of impact of the proposed capacity increase at the ADF site and those potentially affected by the proposed alteration to Condition 5.5 and should be read in conjunction with this chapter. Refer to **Volume 4 - Appendix 6-1 Appropriate Assessment Screening Report and Natura Impact Statement**.

6.1.1 Legislative Context

Directive 2011/92/EU on the assessment of certain public and private projects on the Environment as amended by Directive 2014/52/EU of the of the European Parliament and of the Council (“the EIA Directive”) requires that the EIAR provides:

“A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.”

It is noted that if the LRP Station were to close in 2020 then there would no longer be any emissions to the River Shannon upstream of Lough Ree or to atmosphere as currently occurs under its IE Licence. There would be no foregoing impacts from the station and the ecological baseline would reflect this fact.

Specifically with respect to biodiversity, Article 3 of the EIA Directive states that the EIA shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on biodiversity,

with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC, and the interaction of impact should also be considered.

The Wildlife Acts, 1976 to 2018, is a group of Acts and Amendments (Wildlife Act 1976 (39/1976), Wildlife (Amendment) Act 2000 (38/2000), Wildlife (Amendment) Act 2010 (19/2010), Wildlife (Amendment) Act 2012 (29/2012) and Heritage Act 2018). This legislation provides the principal mechanism for wildlife conservation in Ireland and outlines protection for species of conservation significance. Consideration must be given in the planning and development of projects (or in relation to works associated with existing infrastructure) to species of flora and fauna that are protected by national or international legislation or that are considered to be rare in a national or international context. Under the Wildlife Acts (as amended), it is an offence to damage or disturb a protected species and its habitat (including breeding and resting places). Separately, the Flora Protection Order (2015) provides protection for a suite of vascular plant, moss, liverwort, lichen and stonewort species. This legislation makes it illegal to cut, uproot or damage a listed species in any way or to alter, damage or interfere in any way with their habitats. The EU Habitats Directive 92/43/EEC provides legal protection for habitats and species of European importance through the establishment of a network of designated conservation areas known as the Natura 2000 Network. The Natura 2000 network includes sites designated as Special Areas of Conservation (SAC) under the EU Habitats Directive and Special Protection Areas (SPA) designated under the EU Birds Directive 79/409/EEC (as amended by 2009/147/EC). These are collectively referred to as 'European Sites'.

The Habitats Directive was initially transposed into Irish national law in 1997, with the European Communities (Natural Habitats) Regulations, SI 94/1997. These Regulations have since been amended by SI 233/1998 & SI 378/2005. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate and replace the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010. Part XAB of the Planning and Development Act 2000 (as amended) presents the obligation to carry out a Screening for Appropriate Assessment and, where necessary, an Appropriate Assessment. The requirements for an Appropriate Assessment are set out under Article 6(3) and 6(4) of the Habitats Directive, and are presented in detail in the Screening for Appropriate Assessment and Natura Impact Statement (these are provided in a standalone document, but are also provided as an Appendix to this EIAR; refer to **Appendix 6.1**).

Article 10 of the Habitats Directive recognises the importance of ecological coherence in protecting European Sites and requires Member States to protect landscape features that are of major importance for wild flora and fauna through land use planning and development.

6.2 Methodology

6.2.1 Desktop Review

A desktop review was carried out to identify features of ecological importance within the ADF site and its immediate environs.

The potential for impacts on nature conservation interests has been assessed in light of habitats and the species that are likely to be affected by the proposals. In addition to the EPA guidance referenced in Chapter 1, the approach takes into account the following guidance:

- Fossitt, J. (2000) A Guide to Habitats in Ireland. Heritage Council, Kilkenny;
- Smith, G. F., O'Donoghue, P., O'Hara, K. and Delaney, E. (2011) Habitat Survey Guidelines: A Standard Methodology for Habitat Survey and Mapping in Ireland. Heritage Council, Kilkenny;
- Chartered Institute of Ecology and Environmental Management (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal, 2nd edition.
- Institute of Ecology and Environmental Management (2006) Guidelines for Ecological Impact Assessment;
- National Roads Authority (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes;
- National Roads Authority (2006) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes;
- National Roads Authority (2006) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes;
- National Roads Authority (2006) Guidelines for the Treatment of Bats during the Construction of National Road Schemes; and
- Countryside Bird Survey Fieldwork Guidelines (BirdWatch Ireland and National Parks and Wildlife Service).

The desktop review for this proposed development comprised the following elements:

- The identification of all sites designated for nature conservation (under the EU Habitats Directive, EU Birds Directive and the Irish Wildlife (Amendment) Act 2000) within 15 km of the study area (i.e. the Derraghan ADF, LRP Station and respective supply bogs), and subsequent review of all associated Site Synopses and Conservation Objectives documents as appropriate. This encompasses Special Areas of Conservation (SAC's), Special Protection Areas (SPA's) for birds (both internationally important) and Natural Heritage Areas, designated and proposed (of national importance) (NHA's);
- An examination of contemporary and historic aerial imagery for the ADF site and its surroundings to determine broad habitat types and successive land use change;
- A review of the Environmental Impact Assessment Report, Natura Impact Statement and supporting ecological reports for the proposed Derryadd Wind Farm, Co. Longford;
- A review of a suite of reports relevant to aquatic biodiversity, including Inland Fisheries Ireland (IFI) fish survey reports, the EPA water quality monitoring

database and associated reports, the Shannon RBMP 2009-2015, the Lough Ree and Upper Shannon WMU Action Plans 2009-2015 and The River Basin Management Plan for Ireland 2018-2021 (Department Housing, Planning, Community and Local Government (DHCLG) (17th April, 2018);

- A review of the Bord na Móna Biodiversity Action Plan 2016-2021, baseline ecological studies and data (including a baseline ecology report produced on behalf of Bord na Móna as part of provisional studies to inform the EIA process for Bord na Móna peat supply activities;
- The compilation of publicly available biodiversity data for the ADF site and its environs, as distributed via the National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC) websites;
- An appraisal of the BirdWatch Ireland Irish Wetlands Bird Survey (I-WeBS) database; and
- A review of local flora distribution data via the CD-ROM version of the New Atlas of British and Irish Flora (Preston et al., 2002⁷) and cross-referencing of the data with the Flora (Protection) Order 2015 and the Irish Red Data Book (Wyse-Jackson et al. 2016⁸).

The relevant Development Plan under the Planning and Development Act, 2000 is the Longford County Council Development Plan 2015-2021. Section 6.2.2 of the Development Plan (Natural Heritage and Biodiversity) has been reviewed as part of this biodiversity assessment.

6.2.2 Field Surveys

6.2.2.1 Derraghan ADF

Field surveys were carried out in October 2016 and April 2017; the latter visit was primarily to supplement the first with a breeding bird survey. The purpose of these assessments was to identify all habitats in the receiving environment, create a comprehensive species list and to accurately map out the nature and extent of all habitats onsite. The habitats within the site were defined in relation to the habitat classification scheme published by the Heritage Council in A Guide to Habitats in Ireland (Fossitt, 2000). Habitat mapping follows Smith et al. (2011).

Terrestrial mammal surveys were undertaken during the course of the habitat surveys previously described. The aims of the surveys were to determine the types of mammals using the ADF site and adjoining habitats. The overall ADF site was surveyed on foot while transects through the undeveloped cells to the east and west of the leachate lagoon were walked and any mammal tracks or signs e.g. holts, dens, scat etc. were noted.

⁷ Preston, C. D., Pearman, D., Dines, T. D., & Botanical Society of the British Isles. (2002). New atlas of the British & Irish flora: An atlas of the vascular plants of Britain, Ireland, the Isle of Man and the Channel Islands. Oxford University Press.

⁸ Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service

The national bat landscape suitability map hosted by the NBDC was reviewed. Given the low overall landscape suitability for bat species in general and the absence of mature trees within the transitional woodland at the site which could provide roosting habitat, no specific bat surveys have been carried out.

All bird species identified during the field surveys were recorded. Most passerine species detected were present in areas of woodland, scrub and open recolonising ground.

The conservation status of each bird species recorded by the study was assessed. 'Birds of Conservation Concern in Ireland' (BoCCI) (Colhoun et al. 2013⁹) are classified into three separate lists, namely Red listed species of high conservation concern, Amber listed species of medium conservation concern and Green listed species of no conservation concern. The EU Birds Directive (79/409/EEC) also has a list of high priority bird species, known as Annex I listed species.

Previous surveys have also been carried out by Bord na Móna Ecologists at the Derraghan Bog site immediately surrounding the ADF, with associated habitats and species being recorded during 2010 surveys. Previous mammal surveys carried out for the original development of the ADF and for ongoing harvesting activities at Derraghan bog have also been consulted as part of this assessment.

6.2.2.2 LRP Station

A flora and fauna survey was undertaken at the site of the LRP Station in 2000 by Eleanor Mayes, Consultant Ecologist, as part of the EIA for the redevelopment of the site. This study found that the LRP Station was to be built largely on agricultural land of low ecological value adjoining the original power station. As there will be no changes to the footprint or activities at the LRP Station as a consequence of the proposed alteration to Condition 5.5, no additional terrestrial surveys at the LRP Station site in the context of this EIAR were deemed necessary.

Specific surveys undertaken by and on behalf of ESB and ESBI in relation to aquatic ecology in the River Shannon in the locality of Lanesborough with reference to the LRP cooling water discharge have been carried out between 2014 and 2017 (ESBI/ASU 2018). These studies comprise discrete assessments of macrophytes, diatoms, macroinvertebrates and fish, as well as continuous temperature monitoring and thermal cooling water plume modelling.

Vantage point-based wintering bird surveys broadly based on Scottish Natural Heritage guidelines (2014) were carried out along the bank of the River Shannon immediately east of LRP station (and around the northernmost bay of Lough Ree), as well as adjacent habitats were carried out in December 2016, January 2017 and February 2017, with a follow up survey undertaken in January 2018.

6.2.2.3 LRP Supply Bogs

LRP Station is supplied by peat sourced from four bog groupings, distributed around the north midlands. Baseline ecology surveys have been carried out by the Bord na

⁹ Colhoun, K. & Cummins, S. (2013) Birds of Conservation Concern in Ireland 2014–2019. Irish Birds 9: 523-544.

Móna in-house ecology team in the last decade, with supplementary information being provided by commissioned sub-consultant ecologists. Draft rehabilitation plans of the respective bogs have been prepared, with land-use mapping for the supply bog estate also being created and updated as necessary. It should be noted that these draft plans may be subject to change

6.2.3 Study Area

6.2.3.1 Derraghan ADF

The study area for the consideration of impacts on biodiversity associated with the proposed capacity increase and ongoing operation of the ADF is limited to the footprint of the existing ADF, Cells 8, 9 and 12, which are within the immediate environs of the ADF.

6.2.3.2 LRP Station

Indirect environmental impacts relate to the ongoing operation of LRP Station under the proposed alteration to Condition 5.5 as described in Chapter 4. The study area for LRP Station relates to the plant itself, its immediate terrestrial environs and the River Shannon from which it abstracts and discharges cooling water.

6.2.3.3 LRP Supply Bogs

Indirect environmental impacts associated with the operation of the ADF and LRP Station relate to the ongoing supply of peat fuel to LRP Station as described in Chapter 4. These bogs are distributed across Counties Longford, Offaly, Westmeath, Meath, Galway and Roscommon and supply the power station via road and rail connections.

6.3 Receiving Environment

6.3.1 Derraghan ADF

6.3.1.1 General description of site

The ADF is located on Bord na Móna peatland, large areas of which are still actively being harvested for peat; bare peat directly abuts the eastern boundary of the ADF.

The habitats at the ADF can be broadly delineated into the following main areas:

- The active ash deposition cells and associated areas of artificial and bare ground;
- Filled and capped ash deposition cells with colonising vegetation;
- Blocks of scrub which transition into woodland of varying levels of maturity;
- Surrounding areas of active peat harvesting comprising bare peat fields; and
- Standing and running water in settlement ponds and drains.

A large proportion of the existing ADF footprint comprises a combination of spoil and bare ground where there is active ash deposition or capping works underway. Re-

colonising bare ground also occurs, where capping has been completed or where temporary works have led to some clearance of surface vegetation; these latter areas display a heterogeneous coverage of ruderal grasses and low height herbaceous species. These already disturbed habitats are likely to be of low ecological value and make up the entire footprint of cells 8 (to be filled) and 9 (to be developed).

To the immediate south and west of the active ADF, where historic peat extraction has ceased, secondary origin bog woodland and transitional scrub has become established on the footprint of cell 12. Such habitat is typically dominated by stands of downy birch and oak (typically 6 - 8 m in height) with an understory of ivy, bramble and occasional bracken. This habitat corresponds to birch (bog) woodland (WN7 in the Fossitt Classification) and lacks the ground *Sphagnum* cover necessary to correspond to Annex 1 bog woodland (91D0) habitat; as such, it is not considered to be a habitat subject to protection under the Habitats Directive. Such secondary bog woodland encompasses a total area of approximately 105 ha within the Derraghan Bord na Móna property. Areas of scrub also lie on the periphery of this woodland and are in the process of transitioning to immature woodland. The development of cell 12 would require the clearance of 0.87 ha of comparable woodland habitat. This would represent a net loss of less than 1 % of comparable secondary bog woodland at the Derraghan site.

A large drain runs in a north-south direction immediately east of the leachate lagoon. The banks of this drain are dominated by ruderal grasses and bramble, while the channel itself displays a very slow flow rate, containing a significant amount of in stream vegetation.

The open areas (bare and re-colonising ground) within the site footprint are generally likely to be of low ecological value, but may be used for foraging by Irish hare, badger and fox, which are all known to occur at the site; there is the potential for a number of bat species to also occur and feed in this area. Birds of prey may also hunt for small mammals over the site. The drains on site have potential to support amphibians (i.e. common frog and smooth newt). The bog woodland and associated scrub is likely to provide nesting habitat for a range of passerine bird species, as well as potentially providing cover for features such as badger setts. There are no expansive areas of open water in close proximity to the site which may support breeding or wintering waterbirds.

The habitats presently found at the site are further described in Section 6.3.1.2. A detailed habitat map is presented in **Volume 3 - Figure 6.1: Habitats within Derraghan ADF boundary**.

6.3.1.2 Habitats

The habitats currently occurring in and around the ADF site are described below and are subsequently summarised in **Table 6-1** and mapped in **Volume 3 - Figure 6.1: Habitats within Derraghan ADF boundary**.

Photographs of habitats occurring the site and key features are included in **Volume 4 - Appendix 6.2 Ecology Photos**.

Recolonising bare ground (ED3)

Recolonising bare ground (ED3) habitat at the site is predominantly associated with the closed cells (1-3) in the northern section of the ADF. These have not been actively re-seeded and are at varying stages of natural recolonization, occurring in a heterogeneous mosaic with areas of spoil and bare ground. Cell 9, which was subject to advance works some time ago has been relatively undisturbed in recent years and now comprises patchy areas of recolonising vegetation. The bounding berms of the ADF also fall under this category.

Species occurring are common of recolonizing ruderal vegetation and comprise creeping buttercup (*Ranunculus repens*), coltsfoot (*Tussilago farfara*), creeping thistle (*Cirsium arvense*), cat's ear (*Hypochaeris radicata*), silverweed (*Potentilla anserina*), tormentil (*Potentilla erecta*), ribwort plantain (*Plantago lanceolata*), birds-foot trefoil (*Lotus corniculatus*), yarrow (*Achillea millefolium*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), Yorkshire fog grass (*Holcus lanatus*), bent grass (*Agrostis* spp.) and smooth sowthistle (*Sonchus oleraceus*). Wetter areas in cell 9 contain stands of soft rush (*Juncus effusus*) and yellow iris (*Iris pseudoacorus*).

Vegetation cover varies within the ED3 areas, ranging from 50% to 90%, but the sward height remains relatively low.

Clearance of dense bramble (*Rubus fruticosus* agg.) scrub around the leachate lagoon was also undertaken during winter 2016/2017. Early recolonisation of this area was underway at the time of April 2017 site survey.

The broadleaved component of the recolonizing vegetation has some potential in the future to act as a nectar resource for invertebrates, but as the habitat is still at a relatively early stage of recolonisation.

It is currently considered to be of **Local importance (lower value)**.

Spoil and bare ground (ED2)

There are currently extensive areas of spoil and spare ground at the ADF, located on cells 4 through 8.

Such areas are present where ash is wetted and piled for landfilling, as well as where the storage area is not yet capped or being worked in advance of accepting ash in the next available cell.

There is minimal vegetation occurring in these areas due the regularity of disturbance, though very occasional single specimens of dock, coltsfoot, Yorkshire fog and cocksfoot grass (*Dactylis glomerata*) do occur.

The access track entering the ADF site from the north comprises compacted hard standing and is also classified as bare ground.

This habitat is of negligible ecological value.

Dry meadows and grassy verges (GS2)

Linear strips of grassy habitat have developed around the site, predominantly associated with the access track verges and along the rail line which runs parallel to the western boundary of the ADF.

These grassy areas comprise bent grasses, Yorkshire fog and false-oat grass, as well as yarrow, ox-eye daisy (*Leucanthemum vulgare*), clovers, ribwort plantain and cat's ear. Where they adjoin blocks of scrub of woodland, these habitats have a more transitional character and comprise rosebay willowherb (*Chamerion angustifolium*), bramble and small specimens of rowan (*Sorbus aucuparia*), downy birch (*Betula pubescens*) and willows (*Salix* spp.). Common dog violet (*Viola riviniana*) also occurs in areas of less dense sward associated with the hard standing areas between the sleepers along the rail line.

This habitat is considered to be of **Local importance (lower value)**.

Bog woodland (WN7)

Land to the west and south of the ADF is dominated by a former peat harvesting area which is being progressively naturally colonised. The broader habitat in the northwest section of Derraghan Bog is best described as a transition between scrub and birch woodland (WN7) at varying stages of development, depending on when peat harvesting ceased in each site sub-compartment.

Within the planning footprint of the ADF, this woodland is dominated by birch with interspersed specimens of willow as well as other trees species including rowan, Scot's pine (*Pinus sylvestris*), blackthorn (*Prunus spinosa*), oak (*Quercus* spp.), hawthorn (*Crataegus monogyna*) and holly (*Ilex aquifolium*). The ground flora is dominated by ivy (*Hedera helix*) and bramble, but also comprises raspberry (*Rubus idaeus*), hard fern (*Blechnum spicant*), tormentil, wild strawberry (*Fragaria vesca*), broad buckler fern (*Dryopteris dilatata*), male fern (*Dryopteris filix-mas*), herb Robert (*Geranium robertianum*) and Hart's tongue fern (*Asplenium scolopendrum*), which all occur in relatively low densities.

The prevalent ground conditions within the woodland appear to comprise relatively dry subsoil, with minimal occurrence of any *Sphagnum*; this is indicative of the absence of prolonged wet soil conditions. Base-level ground cover is instead dominated by leaf litter and associated humus. The moss *Polytrichum commune* is frequent throughout the woodland.

While the canopy of the woodland block reaches up to between 10 and 12 m, no thinning or other active management of the trees has taken place and the vast majority of the trees are slender in nature.

The fringes of the woodland are evidently more transitional in nature and correspond better to Scrub (WS1), comprising small willows and some European gorse (*Ulex europaeus*). Ling heather (*Calluna vulgaris*) also occurs along the woodland rides.

The Bord na Móna Rehabilitation Plan for Derraghan Bog notes that the bog woodland is becoming more diverse with time. The woodland areas outside the ADF planning footprint are classed as Biodiversity Areas in the current Bord na Móna land use maps.

This bog woodland is considered to be of moderate ecological value. It is directly contiguous with the other areas of bog woodland at Derraghan which are classed as Bord na Móna Biodiversity Areas.

While the areas of woodland within the ADF development boundary are not included with the Bord na Móna Biodiversity Areas, the habitat is directly comparable and can be considered of **County Importance**.

Scrub (WS1)

As previously noted, habitat which is transitioning from scrub into woodland is located on the fringes on the woodland blocks. There are also patches of willow and bramble scrub along the eastern side of the ADF parallel to the railway line, as well as more extensive areas to the north of the ADF.

This habitat is inherently of generally low ecological value, but may provide some habitat connectivity between the bog woodland and surrounding habitats. It is therefore considered to be of **Local importance (Lower value)**.

Drainage Ditches (FW4)

There is a large drainage ditch running south between the leachate lagoon and cell 10, the sides of this ditch slope steeply to a depth of approximately 4 m. There is a small amount of water in the base of the ditch (depth approximately 15 cm). The ditch sides have been colonised by grasses (cocksfoot, Yorkshire fog, bent grasses), coltsfoot, bracken (*Pteridium aquilinum*) and bramble.

The base of the ditch is regularly choked with Bog pondweed, with occasional specimens of yellow iris and soft rush. Flow appears to be slow and incoming water originates from a pipe close to the southern edge of cell 7. The drain runs south for approximately 460 m before discharging to a large drain running along the northern edge of the active harvesting area of Derraghan Bog.

The drain potentially has some inherent ecological value for amphibians, though none were recorded here during the field surveys. It is considered to be of **Local importance (Lower value)**.

Other artificial lakes and ponds (FL8)

A leachate storage lagoon is located east of the undeveloped cell 12. This is lined with an impermeable membrane and contains standing water which is alkaline in nature. There is no aquatic vegetation.

The lagoon has negligible ecological value.

Reed and large sedge swamps (FS1)

A very small stand of reeds has developed in a waterlogged area in the north of cell 9. Common reed (*Phragmites australis*), reedmace (*Typha latifolia*) and yellow iris are present. A larger area has developed outside the ADF planning boundary at the southern edge of the bog woodland where it abuts the bare peat harvesting area. This wetland will not be impacted by the proposed development of the ADF.

Given the very minor extent of this habitat, it is considered to be of **Local importance (Lower value)**.

Table 6-1: Extent of Habitats within and Adjacent to ADF

Habitat Type	Habitat Code	Area (ha)
Dry meadows and grassy verges	GS2	5.5
Re-colonising bare ground	ED3	6.1
Spoil and bare ground	ED2	16.5
Other artificial lakes and ponds	FL8	0.15
Reed and large sedge swamps	FS1	0.2
Scrub	WS1	7.8
Bog woodland	WN7	17.2
Habitat Type	Habitat Code	Length (m)
Drainage ditch	FW4	460

6.3.1.3 Fauna

Terrestrial Mammals

The Derraghan Bog site was previously surveyed for mammals in 2001 (to inform the original development of the ADF) and in 2010 / 2011 (to inform the Bord na Móna Rehabilitation Plan for the Mount Dillon Bog Group¹⁰).

The 2001 survey found direct evidence of rabbit and badger in the ADF site and noted that foxes and rodents were also likely to make some use of the site. Additional species considered likely to be present were hedgehog, pygmy shrew, field mouse, stoat, and possibly bank vole. The 2010 / 2011 surveys also found evidence of pine marten.

The 2016 / 2017 surveys undertaken for this report again found evidence of badger feeding within the woodland areas. A concerted search undertaken during the April 2017 survey did not reveal the presence of any active setts within the ADF planning footprint. Several probable badger trails were observed along the edge of the woodland block. It is conceivable that a sett is located in the woodland blocks west of the ADF development boundary, with foraging badgers commuting through the woodland and across a narrow strip of milled peat to the agricultural pasture 100 m to the east of the ADF.

Irish hare was directly observed on areas of recolonising ground during the 2016 and 2017 site visits. A pine marten scat was found on the eastern edge of the site, while fox scats were recorded regularly around the fringes of the woodland. Bord na Móna operatives on-site have also reported having seen mink within the ADF site boundary. Mammal populations occurring in the environs of the ADF are considered to be of **Local Importance (higher value)**.

¹⁰ Bord na Móna (2017) Mount Dillon Bog Group Rehabilitation Plan.

Bats

Surveys for bat species undertaken on behalf of Bord na Móna at other cutaway bog sites have shown that open areas of bog have low potential to support bats and most records are associated with linear features along the margins including hedgerows and scrub.

In the vicinity of the ADF site, foraging bats could be expected to occur over the areas of bog woodland and transitional scrub as well as along the more open rides between such blocks. Areas of standing water may attract invertebrates and ridges may also be foraged over by bats. The commonest species recorded in surveys of midland bog habitats are soprano pipistrelle, common pipistrelle and Leisler's bats.

Based on the habitat survey findings, there are no trees within the bog woodland with potential to act as bat roosts. There is a disused works building in the north of the Derraghan Bog site which potentially could be utilised as a roost; this building is located approximately 1.4 km north of the ADF boundary. Bat populations potentially foraging/commuting over the ADF site are considered to be of **Local Importance (higher value)**.

Amphibians and Reptiles

Common frog was directly observed during the 2016 / 2017 surveys in wetter areas along the bog woodland rides. No reptiles (e.g. common lizard) have been recorded on site.

Previous Bord na Móna surveys have recorded Common newt in an unused silt pond associated with the disused works buildings in the north of the Derraghan Bog site, located approximately 1.4 km north of the ADF. Amphibian populations potentially associated with habitats within the ADF development boundary are considered to be of **Local Importance (higher value)**.

Invertebrates

Grassy and predominantly re-colonised areas provide a minor nectar resource to the local invertebrate population. Small tortoiseshell and small copper butterflies have been recorded around the broader Derraghan Bog site during previous surveys undertaken on behalf of Bord na Móna. Invertebrate populations potentially associated with habitats within the ADF development boundary are considered to be of **Local Importance (higher value)**.

Birds

The closest Natura 2000 site designated for birds is Lough Ree SPA, located approximately 4 km to the south.

The breeding bird survey undertaken during April 2017 recorded the following species within and adjacent to the ADF site boundary; refer to **Table 6-2**.

Table 6-2: Records from April 2017 Breeding Bird Survey

Species	Status (BoCCI, Annex)	Habitat associated with record
Robin	Amber	Bog woodland & scrub

Species	Status (BoCCI, Annex)	Habitat associated with record
Wren	Green	Bog woodland & scrub
Blue tit	Green	Bog woodland & scrub
Great tit	Green	Bog woodland & scrub
Pied wagtail	Green	Recolonising ground
Blackbird	Green	Bog woodland
Song thrush	Green	Bog woodland
Goldfinch	Green	Treelines at road entrance to ADF site
Wood pigeon	Green	Flew over site
Rook	Green	Flew over site
Greenfinch	Amber	Treelines at road entrance to ADF site
Pheasant	Green	Low scrub along rail line
Chiffchaff	Green	Bog woodland & scrub
Willow warbler	Green	Bog woodland & scrub
Dunnock	Green	Bog woodland
Stonechat	Amber	Scrub & heather adjacent to peat harvesting area
Snipe	Amber, Annex II(I)	Flushed from wet area at southern extent of bog woodland.
Skylark	Amber, Annex II(II)	Over open recolonizing ground
Meadow pipit	Red	Over grassy area to northeast of ADF
Lesser black-backed gull	Amber	Flew over site
Magpie	Green	Scrub
Kestrel	Amber	Over open recolonizing ground

Grey heron, Whitethroat, Grasshopper warbler, Swift and Swallow are also known to utilise the Derraghan Bog site. The Bord na Móna Rehabilitation plan for the site also notes that in 2011 the NPWS Conservation Ranger for the area reported a pair of barn owls utilising the Derraghan Bog site for feeding and potentially breeds in the locality; there are no suitable barn owl roost sites within the ADF development boundary. Woodcock is known from the adjacent Derryadd Bog and may also occur in woodland / scrub habitats at Derraghan.

The overall Mountdillon grouping of Bord na Móna bogs was subject to extensive bird surveys between 2015 and 2018, to inform the EIAR and NIS for the proposed Derryadd Wind Farm (Tobin Consulting Engineers, 2019), the southwestern boundary of which is located 500 m from the ADF. The proposed wind farm boundary comprises broadly similar habitats to those surrounding the ADF. Surveys

encompassed both winter and summer surveys, with transect and vantage point methodologies applied as appropriate. These surveys indicated that the Mountdillon bog group supports a relatively diverse range of bird species that is typical of the habitats associated with Bord na Móna supply bogs.

With regard to species of conservation concern (i.e BoCCI Red-listed or EU Birds Directive Annex 1-listed), the following species were recorded at or adjacent to the Derryadd Wind Farm site:

Wintering species: Black-headed gull (Red-listed), curlew (Red-listed), golden plover (Red-listed, Annex 1-listed), Greenland white-fronted goose (Annex 1-listed), grey wagtail (Red-listed), hen harrier (Annex 1-listed), herring gull (Red-listed), kingfisher (Annex 1-listed), lapwing (Red-listed), merlin (Annex 1-listed), meadow pipit (Red-listed), peregrine falcon (Annex 1-listed), redshank (Red-listed), whooper swan (Annex 1-listed) and wigeon (red-listed).

Breeding species: Black-headed gull (Red-listed), Common tern (Annex 1-listed), curlew (Red-listed), golden plover (Red-listed, Annex 1-listed), hen harrier (Annex 1-listed), lapwing (Red-listed), little egret (Annex 1-listed), merlin (Annex 1-listed), meadow pipit (Red-listed), peregrine falcon (Annex 1-listed), quail (Red-listed) and woodcock (Red-listed).

The Derryadd Wind Farm ecological reports conclude that the overall Mountdillon bog grouping has a bird assemblage typical of the habitats present. The 2017/18 ornithology report specifically notes that although Hen Harrier were noted to utilise the site for foraging, no roost was located during the Hen Harrier Roost Surveys. Whooper swan records associated with the environs of Derraghan Bog related only to commuting flocks passing over the site.

The habitats at the ADF (predominantly the bog woodland habitat) are considered to be of **Local Importance (higher value)** to resident and wintering birds.

6.3.1.4 Protected or Rare Species

Known records of protected or rare species occurring in Irish Grid square N06 were supplied by the NPWS Scientific Unit. Of the records supplied, only pine marten and smooth newt were associated with Derraghan Bog. The Red Data List (Wyse Jackson et al. 2016) plant species Blue Fleabane (*Erigeron acer*) is known from quarry sites south of Lanesborough village; this is known to occur along railway embankments in other Bord na Móna bogs and, by inference, has the potential to occur along such railways at the Derraghan site.

There are no known legally protected plant species (Flora (Protection) Order 2015) occurring in the locality of the ADF.

6.3.1.5 Designated Sites

As previously noted, the ADF is located adjacent to an area which is still actively being harvested for peat; bare peat directly abuts the eastern boundary of the ADF. Other habitats at the site are of secondary origin on cutaway bog. Consequently, there is an overall absence of intact bog or other undisturbed natural habitats. The ADF site is not part of any site designated for nature conservation. The closest

European Site to the ADF is Lough Ree SAC / SPA, located approximately 4 km to the south.

A standalone AA Screening and Natura Impact Statement has also been produced, in accordance with the requirements of the EU Habitats Directive and the European Communities (Birds and Habitats) Regulations 2011, which considers designated sites within the potential zone of impact of the proposed activities at the ADF site and should be read in conjunction with this EIAR chapter (See **Volume 4 – Appendix 6-1**). Designated sites within 15 km of the ADF are presented in **Table 6-3**.

Table 6-3: Designated Sites within 15 km of the ADF (in order of proximity)

Site code	Designated site	Distance from ADF
1448	Forthill Bog NHA	2.5 km
1444	Derry Lough pNHA	2.7 km
440	Lough Ree SAC/pNHA	3.1 km (6.5 km along hydrological pathway)
4064	Lough Ree SPA	3.1 km (6.5 km along hydrological pathway)
1819	Lough Bawn pNHA	3.1 km
1821	Cordara Turlough pNHA	3.3 km
2103	Royal Canal pNHA	3.6 km
449	Lough Bannow pNHA	4.2 km
448	Fortwilliam Turlough SAC/ pNHA	4.3 km
1443	Lough Slawn pNHA	4.4 km
/ 1450	Mount Jessop Bog SAC/ NHA	8.1 km
2072	Lisnarriagh Bog NHA	11.2 km
447	Derrymore Bog pNHA	11.4 km
4101	Ballykenny-Fisherstown Bog SPA	11.7 km
1818	Lough Forbes Complex SAC/ pNHA	11.7 km
442	Brown Bog SAC/pNHA	11.9 km
602	Corbo Bog SAC/ pNHA	12.1 km

The proximity of the ADF to the aforementioned designated sites is mapped in **Volume 3 - Figure 6.2: SACs, SPAs, NHAs & pNHAs within 15 km of Derraghan ADF**. The Lough Ree SAC and SPA are hydrologically connected to the drain to the south of the ADF, via the Derrymacar outfall drain, flowing through Lough Derrymacar to Lough Ree.

6.3.2 LRP Station

6.3.2.1 Habitats and species

A flora and fauna survey was undertaken at the site of the LRP Station in 2000 by Eleanor Mayes, Consultant Ecologist, as part of the EIA for the redevelopment of the site. The majority of the station footprint is heavily modified, mainly comprising artificial surfaces and buildings. The site directly abuts the River Shannon north of Lanesborough.

The former ash disposal site for the original power station to the northwest of the site is currently dominated by rough grassland and peripheral scrub. These habitats provides marginal nesting opportunities for breeding birds. A decommissioned blending bunker to the west of the station is used by roosting jackdaws. Peregrine falcon has been known to breed on the power station structure, but there have been no records of such activity in recent years (E. Dennehy, pers. comm.).

Mammal activity around the site is very limited. Badger and otter foraging activity has been recorded in the semi natural habitats outside the northern boundary of the power station property and in the riparian cover along the adjacent shore of the River Shannon.

Bat surveys carried out in September 2016 by Bat Eco Services found that bat activity at the site was low. Some very occasional feeding or sheltering behaviour inside the aforementioned decommissioned blending bunker was recorded.

6.3.2.2 Protected or Rare Species

LRP Station is located in the same Irish Grid square as the ADF, for which known records of protected or rare species occurring in Irish Grid square N06 were supplied by the NPWS Scientific Unit (refer to Section 6.3.1.4). None of the records supplied were associated with the locality of LRP Station.

The 2001 EIS for the power station notes that surveys in 1996 recorded the rare marsh pea (listed in the Irish Red Data Book) in wet carr woodland outside the northern boundary of the power station site. This species was not recorded during the 2001 EIS surveys.

There are no known legally protected plant species (Flora (Protection) Order 2015) occurring in the locality of the power station.

6.3.2.3 Designated sites

Designated sites within a 15 km radius of LRP Station (and its respective supply bogs) are presented in **Volume 3 - Figure 6.3: SACs and SPAs within 15 km of Supply Bogs** and **Volume 3 - Figure 6.4: NHAs & pNHAs within 15 km of Supply Bogs**. A summary of each site is provided in **Volume 4 - Appendix 6-3: Designated Site Summaries**.

6.3.3 LRP Supply Bogs

Peat supplied to LRP by Bord na Móna is sourced from a specific number of supply bogs as outlined in Chapter 4. Bord na Móna have prepared land use maps for this suite of bogs which comprise broad habitat associations found at each site.

Peat extraction is carried out under licence from the EPA. All of the supply bogs are currently compliant with the requirements of their respective licences.

A summary of the ecological receptors typically associated with Bord na Móna supply bogs is presented below, based on the desktop review of ecological studies carried out in the respective bog groupings.

6.3.3.1 Biodiversity associated with LRP Peat Supply Bogs

Habitats

The respective LRP supply bogs feature a suite of bog types including those currently in full commercial production, recolonising areas on which peat harvesting has ceased and other areas of undisturbed high bog.

The majority of the footprint of most of the supply bogs relates to commercial production and comprises bare peat – classified as Spoil and bare ground ED2. These are generally of low ecological value, but may support some bird species (see below).

Complex mosaics of cutover bog (PB4) occurs on the periphery of most of the active peat harvesting sites and can often be associated with private turf-cutting activities. Compartments of unharvested raised bog (PB1) can occur, though these are often fragmented; some parts can conform to the EU Habitats Directive Annex 1 habitat “Degraded raised bogs still capable of natural regeneration (7120)”. It is not envisaged that there will be any requirement to expand harvesting activities into these intact or degraded raised bog areas.

Recolonising vegetation of varying degrees of maturity occurs on cutaway bog which has been taken out of commercial production; the level of colonisation is dependent on the date of cessation of harvesting and subsequent water levels at the respective sites. In many areas, recolonizing habitats are primarily made up of birch-dominated scrub (WS1) and pioneering poor fen communities (Poor fen and flush PF2). Such fen communities comprise rushes (*Juncus effusus*, *Juncus bulbosus*), and common cottongrass (*Eriophorum angustifolium*). More permanently waterlogged areas may develop stands of emergent aquatic vegetation (Reed and large sedge swamps, FS1) comprising common reed, bottle sedge (*Carex rostrata*), reedmace and common club-rush (*Schoenoplectus lacustris*). Silt ponds (classified as artificial lakes and ponds FL8) can also develop similar emergent communities.

Grassland communities can develop on areas of cutaway bog, varying from dry (GS1 and GS2) to wet (GS4) grassland. Sweet vernal grass (*Anthoxanthum odoratum*) and cocksfoot dominated in the former, with the latter being predominantly colonised by dominated by purple moorgrass (*Molinia caerulea*) and rushes. Secondary heath communities (Dry siliceous heath HH1) develop in drier cutaway areas, with ling heather generally dominant. These cutaway areas progressively transition through scrub (WS1) towards climax vegetation of bog woodland dominated by downy birch and willow, with a varying component of other tree species including ash (*Fraxinus excelsior*), holly, hazel (*Corylus avellana*), rowan, oak and sycamore (*Acer pseudoplatanus*), though Bord na Mona data indicates that these latter component species remain relatively rare on cutaway bogs.

A range of other semi-natural and artificial habitats are also associated with the peat harvesting activities, such as railway embankments composed of hard standing which can provide a dry habitat supporting plants associated with neutral or calcareous soils which are generally rare in the midlands. These habitats are known to support rare plants including red-listed and protected Basil Thyme (*Clinopodium acinos*) and red-listed Blue Fleabane (*Erigeron acer*).

Birds

As noted, the bare peat fields are of low ecological value in general, but are known to support roosting or resting Golden Plover (listed on Annex I of the EU Birds Directive) and Lapwing (Red-listed).

In some instances, wintering flocks of whooper swan occur on harvesting areas where there are temporary areas of standing water; such occurrence would be periodic through the winter months, with flocks alternating between feeding and roosting sites (Boland et al, 2010). Patches of recolonising vegetation on cutaway fields provide foraging areas while the birds also use the sites for roosting. Such feeding areas of recolonising vegetation would be infrequent and spatially restricted in habitats dominated by bare peat.

Peregrine falcon and Merlin (also Annex I species) also associate with bare peat areas, where they roost or perch on peat piles or tree stumps and may hunt Golden Plover. Wintering hen harrier may roost in the wider midlands area and potentially hunt over the supply bogs. Sparrowhawk (Amber-listed) is likely to frequent transitional scrub and bog woodland habitats found, while kestrel (also Amber-listed) and buzzard which breed in adjacent areas may forage over the bog sites in spring and summer. The bog woodland areas may also provide breeding habitat for woodcock (Red-listed).

The recolonizing habitats associated with areas of cutaway bog provide breeding habitat for a range of bird species, including the ubiquitous passerine species associated with the Irish rural landscape, as well as the red-listed meadow pipit and the amber-listed, skylark, stonechat, swallow, linnet and sand martin. Red-listed barn owl are also known to breed in sites adjacent to the supply bogs and may hunt over open areas. Breeding wetland birds (e.g. snipe, lapwing, ringed plover, teal, little grebe and mute swan) may also be supported by areas of permanent and ephemeral standing water. The Bord na Móna Community Conservation Project at Ballydangan Bog in Co. Roscommon focuses on improving the habitat for red grouse (Red-listed) and has also increased the importance of the site to curlew (Red-listed).

Mammals and other species

Several protected mammal species occur regularly at the respective supply bog sites. Irish hare is common at the bog sites, with badger also utilising the mosaic of habitats which occur between the bogs and the surrounding agricultural habitats. Otter is well distributed in the midlands and can be expected to occur along minor watercourses and possibly drains where it can successfully forage. Pine marten is widespread in the locality and would be expected to occur in association with well-developed bog woodland and adjacent blocks of forestry. Other ubiquitous species such as pygmy shrew, hedgehog and Irish stoat could also be expected to occur.

Surveys for bat species undertaken on behalf of Bord na Móna at cutaway bog sites have shown that open areas of bog have low potential to support bats and most records are associated with linear features along the margins including hedgerows and scrub. A number of species have been recorded in relatively low densities, namely common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, brown long-eared bat, Natterer's bat and whiskered/Brandt's bat.

Common lizard, smooth newt and common frog are associated with a number of sites. Invertebrate diversity is variable depending on the levels of recolonizing vegetation or intact bog adjacent to supply bogs, though some rare species do occur (see Section 6.3.3.2).

6.3.3.2 Protected or Rare Flora

Known records of protected or rare flora species occurring within a 70 km x 100 km boundary comprising the respective LRP supply bogs were supplied by the NPWS Scientific Unit.

Table 6-4 presents the species listed on the Flora (Protection) Order (2016) or the Ireland Red List No. 10 (Wyse Jackson et al. 2016) which have been recorded in the aforementioned area.

Table 6-4: Protected or Rare Flora Records from Supply Bog Study Area

Latin name	Common	Red List 2016	FPO 2015
<i>Agrostemma githago</i>	Corncockle	Y	
<i>Alopecurus aequalis</i>	Orange Foxtail	Y	Y
<i>Amblystegium humile</i>	Constricted Feather-moss		
<i>Bromus racemosus</i>	Smooth Brome	Y	
<i>Calamagrostis epigejos</i>	Wood Small-reed	Y	Y
<i>Cardamine impatiens</i>	Narrow-Leaved Bitter-Cress	Y	Y
<i>Cephalanthera longifolia</i>	Narrow-Leaved Helleborine	Y	Y
<i>Clinopodium acinos</i>	Basil Thyme	Y	Y
<i>Ephemerum cohaerens</i>	Clustered Earth-moss		Y
<i>Erigeron acer</i>	Blue Fleabane	Y	Y
<i>Eriophorum gracile</i>	Slender Cottongrass	Y	Y
<i>Frangula alnus</i>	Alder Buckthorn	Y	
<i>Galeopsis angustifolia</i>	Red Hemp-nettle	Y	Y
<i>Gnaphalium sylvaticum</i>	Heath Cudweed	Y	Y
<i>Groenlandia densa</i>	Opposite-Leaved Pondweed	Y	Y
<i>Hamatocaulis vernicosus</i>	Varnished Hook-moss		Y
<i>Hordeum secalinum</i>	Meadow Barley	Y	Y
<i>Hyoscyamus niger</i>	Henbane	Y	
<i>Juncus compressus</i>	Round-Fruited Rush	Y	
<i>Lamiastrum galeobdolon</i> <i>subsp. montanum</i>	Yellow Archangel	Y	
<i>Lolium temulentum</i>	Darnel	Y	
<i>Hypopitys monotropa</i>	Yellow Bird's-nest	Y	
<i>Anacamptis morio</i>	Green-winged Orchid	Y	
<i>Orthilia secunda</i>	Serrated Wintergreen	Y	
<i>Papaver hybridum</i>	Rough Poppy	Y	Y
<i>Polystichum lonchitis</i>	Holly-fern	Y	
<i>Pyrola media</i>	Intermediate Wintergreen	Y	

Latin name	Common	Red List 2016	FPO 2015
<i>Pyrola rotundifolia subsp. rotundifolia</i>	Wintergreen	Y	
<i>Rorippa islandica</i>	Northern Yellow-Cress	Y	
<i>Saxifraga hirculus</i>	Marsh Saxifrage	Y	Y
<i>Scandix pecten-veneris</i>	Shepherd's-needle	Y (Probably extinct)	
<i>Scheuchzeria palustris</i>	Rannoch-rush	Y (Probably extinct)	
<i>Silene acaulis</i>	Moss Champion	Y	
<i>Betonica officinalis</i>	Betony	Y	
<i>Vicia lathyroides</i>	Spring Vetch	Y	
<i>Vicia orobus</i>	Wood Bitter-vetch	Y	Y
<i>Viola persicifolia</i>	Fen Violet	Y	

6.3.3.3 Designated sites

Designated sites within a 15 km radius of the peat bogs that supply LRP Station are presented in **Volume 3 - Figure 6.3: SACs and SPAs within 15 km of Supply Bogs** and **Volume 3 - Figure 6.4: NHAs & pNHAs within 15 km of Supply Bogs**. A summary of each site is provided in **Volume 4 - Appendix 6.3 Designated Site Summaries**.

6.3.3.4 Bord na Móna Biodiversity Action Plan

Bord na Móna has implemented a strategy for responsible peatland management through the development of the *2016-2021 Biodiversity Action Plan* (BAP).

The BAP comprises 5 key objectives, namely:

1. Carry out all works in line with best practice guidelines and relevant legislation across all Bord na Móna bogs;
2. Monitor biodiversity areas and identify and survey further biodiversity hotspots within Bord na Móna bogs;
3. Develop and promote best practice in terms of rehabilitation for all Bord na Móna bogs to stabilise former peat production areas and enhance biodiversity;
4. Raise awareness and create and greater appreciation of the biodiversity and natural heritage of Bord na Móna cutaway and associated lands; and
5. Monitor the progress of the Bord na Móna Biodiversity Action Plan.

Each objective comprises a suite of actions and key indicators of success.

6.4 Impacts of the Development

This assessment considers the likely significant effects on the environment arising in relation to biodiversity, including the secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the proposed development.

The ADF site is currently used as an ash landfill facility (capped), ash landfill facility (active) and disturbed areas managed in advance of landfilling amounts to 10 ha. The current area of bog woodland and scrub within the footprint of cell 12 equates to 0.87 ha. The developed footprint of the ADF presently consists of capped landfill with recolonizing bare ground and active landfill (exposed bare ground with ash mounds). Habitats outside the ADF development boundary comprise bog woodland and transitional scrub to the west and north and bare peat harvesting fields to the south and east.

The main potential impacts from the expansion of capacity of the at the ADF will be:

- Direct impact on the bog woodland and scrub currently colonising the footprint of cell 12;
- Potential indirect impacts on water quality downstream of the ADF resulting from construction activities and operational surface water discharges;

The main potential impacts associated with the ongoing operation of LRP Station under the proposed alteration to Condition 5.5 are:

- Potential indirect impacts to water quality in waterbodies receiving operational discharges associated with the ongoing operation of LRP Station and the associated harvesting of peat from the respective supply bogs to 2020.

6.4.1 Valuation of ecological receptors

Ecological receptors in Ireland comprise designated conservation sites, specific species (or associated assemblages, populations and communities) as well as habitats, both terrestrial and aquatic. The determination of the significance of an impact is generally determined by the context of a proposed project and by a combination of objective and subjective concerns. Impact significance is therefore assessed in the context of the importance of an ecological receptor and the nature, magnitude and duration of the impact that a project may have upon it.

The determination of the significance of an impact is generally determined by the context of a proposed project and by a combination of objective and subjective concerns. The National Road Authority's valuation of ecological features at different geographical scales (NRA, 2009a) was implemented as part of this impact assessment. This *geographic frame of reference* categorizes ecological features as being of:

- *International importance*
- *National importance*
- *County importance*

- *Local importance (higher value)*
- *Local importance (lower value)*

It should also be noted that the proportion of a known feature impacted at county scale (i.e. 1% of the known or estimated population in a given county) is measurably different from that impacted 'at national scale' (i.e. 1 % of the known or estimated national population).

Examples of the above ecological valuation criteria are presented in NRA (2009a) and are summarised in **Table 6-5**.

Table 6-5: Examples of the importance of ecological receptors (NRA 2009a)

Ecological importance	Examples
International	– 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. – Proposed Special Protection Area (pSPA). – Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). – Features essential to maintaining the coherence of the Natura 2000 Network. – Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. – Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. – Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). – World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). – Biosphere Reserve (UNESCO Man & The Biosphere Programme). – Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). – Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). – Biogenetic Reserve under the Council of Europe. – European Diploma Site under the Council of Europe. – Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National	– Site designated or proposed as a Natural Heritage Area (NHA). – Statutory Nature Reserve. – Refuge for Fauna and Flora protected under the Wildlife Acts. – National Park. – Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. – Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.

Ecological importance	Examples
	– Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive
County	– Area of Special Amenity. – Area subject to a Tree Preservation Order. – Area of High Amenity, or equivalent, designated under the County Development Plan. – Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. – Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. – County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. – Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. – Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local (higher value)	– Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; – Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. – Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; – Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local (lower value)	– Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; – Sites or features containing non-native species that are of some importance in maintaining habitat links.

6.4.2 Magnitude of impacts

Ecological impacts can be categorised and assessed in a number of ways; based on EPA (2017) for the purposes of this EIAR, they can be considered to be:

- **positive**, i.e. a change which improves the quality of the environment.
- **neutral**, i.e. a change that does not affect the quality of the environment.
- **negative**, i.e. a change which reduces the quality of the environment. It is noted that a negative impact, even if initially considered to be significant, can be sufficiently minimised or eliminated by the adoption of appropriate mitigation measures.

The characteristics of an impact may also be described in terms of the following aspects:

- **direct** versus **indirect** (e.g. direct impacts may occur as a result of a loss of a species or habitat from land take, while indirect impacts may occur as a result of transmission of impacts along a hydrological connection);
- **extent** (e.g. physical footprint of a development);
- **duration** (with reference to EPA (2017), see Chapter 1, a temporary impact lasts <1 year; short-term impact lasts 1-7 years, medium-term impacts last 7-15 years, long-term impacts last 15-60 years; permanent impacts last >60 years);
- **timing** and **frequency** (e.g. arising from scheduling and duration of project construction/operation); and
- **reversibility**.

Impacts may also be **cumulative**, wherein the addition of many small impacts to create one larger, more significant impact, and **synergistic**, wherein the resultant impact is of greater significance than the sum of its constituents.

These factors are assessed together to determine the overall magnitude of the impact on the respective ecological receptors, and on the integrity of the site that supports them. Magnitude is then classified in one of four levels, based on the criteria presented in **Table 6-6**.

Table 6-6: Magnitude Definition

Magnitude	Definition
High	An irreversible or long-term impact on the integrity of a site or conservation status of a habitat, species assemblage/community, population or group, which, if adverse, is <u>likely</u> to threaten its sustainability (or if beneficial, is likely to enhance its conservation status).
Medium	A medium to long-term impact on the integrity of a site or conservation status of a habitat, species assemblage/community, population or group, which if adverse, is <u>unlikely</u> to threaten its sustainability (or if beneficial, is likely to be sustainable but is unlikely to enhance its conservation status).
Low	A short-term impact on the integrity of a site or conservation status of a habitat, species assemblage/community, population or group that is within the range of variation normally experienced between years.
Negligible	A temporary impact on the integrity of a site or conservation status of a habitat, species assemblage/community, population or group that is within the normal range of annual variation.

6.4.3 Significance of impacts

Impact significance is an index of the value of an ecological receptor in the context of the potential impact upon it, as informed by professional judgement. For the

purposes of this EIAR, an impact matrix is implemented which relates the aforementioned variables and generates a significance class for the respective impacts (see **Table 6-7**), ranging from **imperceptible** to **profound** (with reference to EPA (2017)), namely:

- **Imperceptible:** An effect capable of measurement but without significant consequences.
- **Not significant:** An effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Slight:** An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate:** An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- **Significant:** An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- **Very Significant:** An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
- **Profound:** An effect which obliterates sensitive characteristics

Table 6-7: Matrix utilised to determine impact significance

		Magnitude of impact			
		High	Medium	Low	Negligible
Value of ecological receptor	International	Profound or Very significant	Significant	Moderate	Slight
	National	Significant	Moderate	Slight	Slight
	County	Moderate	Slight	Slight	Not significant
	Local	Slight	Slight	Not significant	Not significant
	Negligible	Not significant	Not significant	Not significant	Not significant or Imperceptible

It should also be noted that the CIEEM (2018) EclA (Ecological Impact Assessment) guidance document notes that for the purpose of EclA, a “*significant effect*” is an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’...or for biodiversity in general.” This guidance subsequently defines a significant effect as “an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a positive or negative ecological effect that should be given weight in judging whether

to authorise a project...A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission.” For the purposes of this EIAR, the measure of significance will specifically relate to the EPA (2017) guidelines to more readily facilitate the direct comparison of impacts between topics.

6.4.4 Derraghan ADF

There is no change to the permitted footprint of the ADF. The change is in relation to an increase of capacity by 130,00 tonnes within the existing footprint. Within the permitted footprint, there will be a requirement for the clearance of the existing habitats to facilitate the construction and operation of the remaining cells.

6.4.4.1 Direct Impacts

Potential impacts on habitats and species occurring within the ADF site (in the absence of mitigation) are described below. In general, it is worth noting that restored landfill sites may provide good examples of semi-natural and diverse habitats (Gilbert & Anderson 1998).

Bog woodland (WN7)

Clearance of circa 0.87 ha of bog woodland and fringing scrub habitats will be required to facilitate the expansion of capacity at the ADF, namely the development of the permitted cell 12. It is envisaged that felling would be subject to the requirements of the Forestry Act 2014 and the Forestry Regulations 2017 (SI No 191 of 2017). While the bog woodland has not been thinned from a timber perspective, the standing crop of trees may have some timber or biomass value; this will influence the method of clearance to be implemented (i.e. felling in advance of ground clearance, or more direct bulldozing of the existing trees).

This bog woodland is not within a designated site (SAC, SPA, NHA or nature reserve), is of secondary origin, is relatively dry and does not correspond to any Annex I habitats. However, the woodland has some inherent ecological value, and would be likely to increase in floral diversity as it matures further. The woodland is also of importance to nesting passerine birds and to foraging terrestrial mammals.

Ground clearance to open an additional cell would require the removal of just under 1 % of existing bog woodland within the broader Derraghan bog site.

However, the woodland forms part of a dynamic recolonising ecosystem on cutover bog that has been permanently removed from the peat harvesting resource. Comparable secondary bog woodland also extends north, east and south of the ash disposal area, encompassing a total area of approximately 105 ha within the Derraghan Bord na Móna property. Areas of scrub also lie on the periphery of this woodland and are in the process of transitioning to immature woodland. It is expected that these transitional scrub habitats at Derraghan (which lie within the Bord na Móna Biodiversity Area boundary) will mature into comparable woodland within 5 years.

While the development of the cell would result in the permanent loss of bog woodland within the ADF boundary, this will be naturally compensated for by the natural

transitioning of scrub to woodland which is occurring on a widespread nature on the Derraghan Bog site as a whole. The net loss of bog woodland habitat in the overall Derraghan Bog site is therefore considered to be temporary. As such, impacts are considered to be **Direct, Short-term, Slight Negative**.

Scrub (WS1)

Scrub habitat on the periphery of the bog woodland described above is in the process of transitioning to immature woodland. This habitat would be expected to re-establish rapidly around the peripheries of disturbed areas, and any impact is therefore considered to be temporary and classed as **Direct, Short-term, Slight Negative**.

Spoil and bare ground (ED2)

These habitats are of low ecological value. The bare ground at the active landfill area is by its nature transitional and will naturally recolonize in due course. The more permanent roads on the site will remain in place, and there will be no change to their location. Impacts will be **Direct, Neutral, Short-term and Not Significant** on these habitats.

Drainage ditches (FW4) / Artificial lakes and ponds (FL8)

The large drainage ditch east of the leachate lagoon will not be altered by the proposals. Consequently, the small amount of ephemeral aquatic habitat at the base of the ditch will be unaffected and there will be **No Impact** on this habitat.

By contrast, the leachate lagoon has minimal ecological value due to the elevated pH of the stored leachate. There will be no alteration to the footprint of the lagoon. Consequently there will be **No Impact** on this habitat.

Reed and large sedge swamps (FS1)

The very small ephemeral stand of reeds which has developed in the north of cell 9 will be permanently lost as a result of the development of the cell. This habitat is of secondary origin and has arisen from waterlogging of disturbed areas. The loss of this habitat is considered to be a **Direct, Permanent, Slight Negative** impact. However, the more extensive reed stand at the southern end of the bog woodland will be unaffected and consequently there will be no impact by the ADF development.

Terrestrial mammals

No breeding sites (badger setts, fox dens, tree cavities suitable for pine marten etc.) were recorded within the ADF development footprint for the mammal species occurring within the site. Consequently, **No Impact** to the breeding sites of any terrestrial mammals is predicted.

The clearance of a woodland block at cell 12 will slightly reduce the foraging resource for badger, but in the broader context of the surrounding mosaic of habitats, this is not considered to be significant. It is expected that the capped ADF cells, once recolonized by vegetation, will develop a soil invertebrate resource that may expand the foraging resource for the local badger population; this is considered to be a **Neutral Impact** overall. In relation to barrier effects of the development of an ash cell, the leachate lagoon already creates a short linear barrier parallel to cell 12 and consequently it is not expected that any badgers commuting from the bog woodland

to the west to the agricultural land to the east would be negatively impacted, as they must already travel around this feature.

Similarly, any pine martens traversing or foraging within the ADF site would also not be affected by the minor loss of habitat.

It is expected that the existing ADF cells, once capped and recolonized by vegetation, will also provide a slightly larger foraging resource for the Irish hare; this is a **Direct, Long-term, Slight Positive Impact**.

Bats

As previously noted, the proposal would require the removal of just under 1 % of existing bog woodland and associated scrub which may provide foraging habitat for the local bat population. As the bog woodland forms part of a dynamic recolonising ecosystem on cutover bog that has been permanently removed from the peat harvesting resource, it is expected that the overall habitat value to bat populations in the locality will improve in the medium term. There are no suitable bat roosting opportunities of note within the ADF site. Consequently, it is considered that there will be an **Imperceptible Impact** on local bat populations.

Amphibians and Reptiles

As there will be no net loss of aquatic habitats at the site, there will be no decline in potential breeding habitat for amphibians. Consequently, it is considered that there will be **No Impact** on local amphibian populations.

Breeding Birds

The bog woodland which will require clearance for the development of the ADF cell provides breeding habitat for a suite of common passerine species. Clearance of the vegetation will take place outside of the bird breeding season (March 1st to August 31st), consequently there will be no disturbance to breeding birds.

The net loss of available woodland breeding habitat would be less than 1 % of the existing bog woodland at the broader Derraghan Bog site. Additionally, it is expected that the transitional scrub habitats on the periphery of the remaining woodland resource at Derraghan (which lie within the Bord na Móna Biodiversity Area boundary) will mature into comparable woodland within 5 years. While the development of the cell would result in the permanent loss of this small block of woodland habitat suitable for breeding birds within the ADF boundary, this will be naturally compensated for by the natural transitioning of scrub to woodland which is occurring on a widespread nature on the Derraghan Bog site as a whole. As such, impacts to the local breeding bird population are considered to be **Direct, Short-term, Slight Negative** in nature.

The progressive recolonisation of the successively capped ADF cells may provide additional breeding habitat for skylark and meadow pipit. Additionally, it is likely to be utilised by small mammals for feeding, in turn providing an improved localised feeding resource for birds of prey such as the amber-listed kestrel and red-listed barn owl. This can be construed as a **Direct, Long-term, Slight Positive Impact**.

Wintering Birds

Wintering bird surveys undertaken for the Mountdillon bog grouping do not indicate the occurrence of any significant flocks of wintering birds close to the ADF site. Wintering golden plover are known to occur regularly in the wider locality, roosting on bare peat fields (2014 / 15 records relate to the adjacent Derrycolumb and Derryadd Bogs). The development of the ADF will not impinge on such wintering flocks and the potential impact is considered to be **Imperceptible**.

Overwintering snipe (amber-listed) may occur on woodland rides within the ADF boundary and may be displaced by the clearance of woodland required at the site. However, there is a large resource of comparable habitat within the overall Derraghan Bog site, and consequently the impact to wintering snipe is considered to be **Imperceptible**.

The loss of relatively small amounts of habitat due to the development would not be expected to have any significant impacts on the populations of any of the common passerine bird species that currently frequent the site and all would be expected to retain a presence in the immediate area.

Designated Sites

All designated sites (SAC, SPA, NHA, pNHA) within 15 km of the Derraghan ADF were identified. There are no designated sites in the immediate locality of the ADF boundary. **No direct impacts** to any such sites are therefore envisaged.

6.4.4.2 Indirect Impacts

The primary potential indirect impact pathway from the ADF relates to surface water arising from within the footprint of the site, which then flows into the local sub-catchment of the Newtown Flannigan River.

Surface water discharges from the ADF via a main drain that leads to a Bord na Móna piped outfall to the south of the site. This piped outfall flows in a south westerly direction to a pumping station. From here it is pumped into the Derrymacar outfall drain flowing into Newtown Flannigan river which flows into Lough Derrymacar and then to Lough Ree (comprising the Lough Ree SAC and SPA).

All cells are capped within two years of completion and the capping of the cell with an impermeable liner will prevent the ingress of water thereby preventing the generation of further leachate once the cell has been capped. A leachate recirculation regime is utilised to deal with leachate generated on the site. The leachate arising within the site is recycled through the deposited ash (refer to **Chapter 7 Water - Surface Water**). No leachate is discharged from the facility and the existing IPC licence issued by the EPA does not permit the discharge of any leachate to surface waters.

There is no apparent significant indicator that identifies the existing ADF as a major source of surface water contamination locally; surface water arising from the ADF site enters a wider drainage system that is joined by water from many other peat drains before it is pumped to any major natural watercourse.

With reference to potential air pollution, the peat ash is not a source of air emissions of sulphur, nitrogen or carbon oxides. Due to the measures detailed in the EPA approved Landfill Operational Plan for the ADF, airborne dust from the ash disposal area will continue to be minimised, and will have no significant impact on air quality.

Designated sites

Following the rationale presented above, no indirect impacts to water quality in Lough Ree SAC and SPA or other designated sites are envisaged from the ongoing operation of the ADF.

Annex 1 bird species, which are Special Conservation Interests for a number of SPAs in the midlands, may occur transiently in the locality of the ADF. Wintering bird surveys undertaken for the Mountdillon bog grouping (which comprises Derraghan bog) do not indicate the occurrence of any significant flocks of wintering Annex 1 bird species close to the ADF site. Wintering golden plover are known to occur regularly in the wider locality, roosting on bare peat fields (2014 / 15 records relate to the adjacent Derrycolumb and Derryadd Bogs). The development of the ADF will not impinge on such wintering flocks and the potential impact is considered to be imperceptible. Annex-1 listed birds of prey historically recorded within a 5 km radius of the site (peregrine falcon, merlin, hen harrier (winter)) are also not expected to be significantly impacted by the development and operation of the ADF cells and the associated change in habitat.

6.4.5 LRP Station and the proposed alteration of Condition 5.5.

LRP Station operates in accordance with the IE Licence P0610-02 issued by the EPA. Condition 4.3, Condition 5 and Schedule B5 of the licence sets and controls emission limits for emissions to waters. Under this licence cooling water is abstracted from the River Shannon and is used to condense the steam generated to spin the turbines and generate electricity. Water is returned to the river via discharge culverts. The outfalls are located approximately 200 m downstream of the intake and approximately 160 m upstream of Lanesborough Bridge.

The current Condition 5.5 states that:

“Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 15°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point”.

The proposed alteration to Condition 5.5 under the IE Licence Review, is as follows:

*Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point **where such exceedances would result in contravention of the EPA Act and in particular cause significant environmental pollution to the receiving waters.***

6.4.5.1 Direct Impacts

There will be no changes to the footprint of LRP Station, its operation or to any terrestrial habitats associated with the site. As with any operational industrial facility, there is the potential for accidental leaks and spills of potentially polluting substances (e.g. oils, etc.) to impact on adjacent habitats. Such impacts would be considered to be local, temporary and moderate/significant. However, the risk of such impacts is considered minimal through station design and the implementation of control measures conditioned as part of the existing IE Licence P0610-02, including fitting of high liquid level alarms on all pumps sumps, storage tanks and the lagoon; the provision of spill kits and adsorbent materials; and site inspections and maintenance. The IE Licence Review does not propose to alter any Conditions relating to on-site pollution control measures. As a consequence, no direct impacts will occur.

6.4.5.2 Indirect Impacts

Emissions arising from the LRP Station (including atmospheric and aquatic) are controlled under the existing IE Licence P0610-02. With the exception of Condition 5.5, it is not proposed to alter any Conditions relating to site discharges.

Aquatic ecology

Potential impacts to aquatic ecology could arise from the operational cooling water discharge from LRP Station; the current operational impacts of the discharge are considered in a Synthesis Report (ESBI/ASU (2018), provided to the EPA as part of the IE application). The impacts of the cooling water discharge under the proposed alteration to Condition 5.5 are assessed in Section 7.4.2. In summary, based on comprehensive aquatic ecology studies undertaken in relation to the cooling water discharge and associated thermal plume, it is concluded that the cooling water outfall is not currently having a significant negative impact on the local fisheries ecology of the River Shannon. As the proposed alteration to Condition 5.5 will not result in any operational change in the cooling water discharge, the absence of significant negative impacts is expected to persist.

Other species

The continued use of the power station environs by peregrine falcon, as well as the occurrence of otter and badger in the locality, is evidence that continued operations at the plant will not have a significant impact on the utilisation of the surrounding environment by these species.

Designated sites

Based on a review of the aforementioned Synthesis Report (ESBI/ASU, 2018), it is not envisaged that the cooling water discharge as currently operating is likely to be having a significant effect on the water-dependent qualifying interests of Lough Ree SAC.

While the entire open waterbody of Lough Ree is designated as an SPA, surveys undertaken by ESBI between 2016 and 2018 indicated that the closest recorded significant wildfowl aggregation to the LRP station is associated with the shallow bay between Culliagh and Ballyclare, 2 km to the west of the power station. This bay would be unaffected by the thermal plume; indirect impacts to Lough Ree SPA

therefore also not predicted. Indirect impacts to other Designated Sites are also not envisaged.

6.4.6 Indirect Impacts - Peat Supply to LRP Station

The continued use of the ADF is contingent on the ongoing operation of the LRP Station and by association, the continuing harvesting of peat from the respective supply bogs as described in **Chapter 4**.

6.4.6.1 Direct Impacts

To maintain peat supply to the LRP Station to 2020, there will be ongoing peat harvesting activities at the supply bogs listed in **Table 4-2**. Some small areas of cutover bog (partially re-vegetated with pioneer vegetation) at Ballivor may be re-activated for harvesting purposes; these areas are considered minor in the overall context of the Bord na Mona peat production footprint. Similar development of such areas is already underway at Derrymoylin. However, there will be no requirement for the development of any new raised bog areas within the supply bog estate. Consequently there will be no direct impact to any currently undisturbed raised bog habitats. By restricting future works to areas in current production and production related sectors, direct impacts on the main ecological interests within the sites have been avoided. Best practice and standard environmental protection measures employed at the respective supply bogs are presented in **Section 6.5.3**.

The habitats affected directly by the future extraction of peat comprise mainly bare peat in fields which are in current production and localised areas of pioneering cutaway habitats in areas recently out of production. The pioneering habitats are generally dominated by poor fen communities with rushes (*Juncus effusus*) and bog cotton (*Eriophorum angustifolium*) and / or developing birch scrub. Bare peat and pioneer vegetation cutaway habitats are widespread habitats and are rated, at most, as Local Importance (lower value). The impact by continued peat extraction in these habitats is rated as not significant.

Bare peat fields associated with the respective supply bogs provide roosting areas for Golden Plover, a species listed on Annex I of the EU Birds Directive. Peregrine and Merlin are known to perch or rest on peat ridges or stumps in the open fields. These species are also listed on Annex I of the Directive. The continued harvesting of peat will provide ongoing suitable bare peat habitat for these important species and, in this respect, is a positive impact. Similarly, the maintenance of the railway network from the supply bogs ensures the continuance of dry calcareous substrates along these corridors, which rare plants such as blue fleabane are dependent upon, and would otherwise not be found in peatland habitats.

6.4.6.2 Indirect Impacts

Potential indirect impacts arising as a result of the ongoing peat harvesting at the respective supply bogs are related to ongoing drainage and discharges occurring at each bog.

Habitats and species

Under the current planning permission for LRP Station, peat extraction from Bord na Móna supply bogs will continue until 2020 as described in **Chapter 4**.

During this period, Bord na Móna will not be expanding harvesting activities into any intact or degraded raised bog area. Consequently there will be no indirect impact to any currently undisturbed raised bog habitats. By restricting future works to areas in current production and production related sectors, indirect impacts on the main ecological interests within the sites will be avoided.

The habitats affected by the continued harvesting of peat comprise mainly bare peat in fields which are in current production and localised areas of pioneering cutaway habitats in areas recently out of production. The pioneering habitats are generally dominated by poor fen communities with rushes (*Juncus effusus*) and bog cotton (*Eriophorum angustifolium*) or drier areas (typically former peat ridges) comprising developing stands of birch scrub. Bare peat and pioneer vegetation cutaway habitats are widespread habitats and are rated, at most, as **Local Importance (lower value)**. The impact by continued peat extraction in these habitats is rated as **Direct, Not Significant, Negative** and **Medium-term**, as following cessation of harvesting, similar habitats can be expected to re-establish naturally or as a result of specific measures implemented under rehabilitation plans.

Activities associated with peat supply can generate noise via the operation of mobile machinery comprising harvesters, tractors and staff vehicles, as well as the operation of the narrow gauge railway network with associated small diesel locomotives and wagons. Peat extraction typically only occurs during daylight hours, without any artificial lighting other than vehicular lights and minimal lighting at staff workshops. Noise emissions during peat extraction are limited by the respective IPC licensing regimes.

Peat harvesting areas within the Bord na Móna estate are of low ecological value in general, but are known to support a number of Annex 1 bird species which are Special Conservation Interests of a number of SPA and NHA sites in the Midlands. Golden plover may roost or rest on bare peat fields. Wintering flocks of whooper swan may occur on harvesting areas where there are temporary areas of standing water found in association with recolonizing surface vegetation upon which the flocks forage. Peat production typically takes place over the summer months, from May until September and consequently there is minimal potential for harvesting to overlap with the presence of wintering bird flocks (including special conservation interest species for SPAs in the midlands which may roost or forage on sites outside the respective SPA boundaries). Peregrine falcon and merlin also associate with bare peat areas, where they roost or perch on peat piles or tree stumps and may hunt golden plover. Ongoing peat harvesting is considered to have a **Neutral Impact** upon these bird species. No SACs or SPAs are considered to be within the Zone of Influence of noise or lighting at the respective supply bogs.

The progressive reduction in the peat harvesting operations will facilitate widespread natural vegetative recolonization of large expanses of cutover bog (outside the targeted rehabilitation measures prescribed in the Bord na Móna rehabilitation plans for the respective bog groupings) which will lead to the development of a mosaic of habitats with increased ecological value compared to the extant bare peat fields.

Aquatic ecology

Potential indirect impacts also arise as a result of ongoing drainage and discharges occurring at each supply bog. The majority of the bogs that supply LRP are located within water body catchment areas of Moderate / Poor Status. The Ireland River Basin Management Plan 2018 – 2021 notes that *“Peat extraction has been identified as causing a significant risk to ecological status in 119 water bodies, which represents 8% of all water bodies that have been identified as At Risk [...] Of these, 115 are rivers, 3 are lakes and 1 is groundwater. The environmental impacts generally relate to suspended solids, ammonia and hydromorphological alterations. There is evidence that high levels of ammonia are being released from peat-extraction activities during the draining process and, along with suspended solids, may be causing ecological impacts in receiving water bodies”*

A review of the Bord na Móna AERs and EPA Inspection Report for the period 2015-2017 indicates that the majority of sites reported no breaches with suspended solids Emission Limit Values (ELV) and compliance with Threshold Limit Values (TLV) for ammonia over this period. In addition all sites related to peat supply for LRP have been subject to EPA inspection over the last two years with corrective actions identified as required. Monitoring data collected by Bord na Móna at a number of supply bogs in recent years indicates a downward trend in ammonia concentrations as peat extraction continues, and this is in-line with downwards trends previously submitted to the EPA in 2013. The monitoring has established that the most relevant influencing variable on Ammonia is rainfall and the trend analysis indicates linkage between high rainfall events and ammonia concentrations. In this scenario, it is expected that the assimilative capacity of the respective receiving waters will be increased during these periods of high rainfall.

Impacts on aquatic ecology as a result of water quality pressures from the continued operation of the LRP supply bogs *in the absence of mitigation* are considered to be **Indirect Moderate Negative** and **Medium-term**.

Designated sites

Potential indirect impacts to designated sites occurring as a result of the ongoing extraction of peat from the respective LRP supply bogs are determined as:

- Hydrological impacts on Qualifying Interest habitats due to ongoing drainage required to facilitate peat harvesting activities.
- Impacts on water quality (due to silt and ammonia release to surface waters) arising as a result of peat harvesting activities.
- Under certain conditions, peat supply activities have the capacity to generate airborne dust. Harvesting is typically the stage wherein most dust is generated. Deposition of peat dust on adjacent sensitive habitats is considered to be a potential impact.

A GIS-based proximity analysis of the respective LRP supply bogs undertaken to inform this assessment indicated that a number of supply bog IPC licence boundaries overlap or are adjacent to a number of designated sites; as a result of practical

constraints, harvesting of peat does not typically extend to these boundaries, so this is considered a conservative estimate of the extent of the respective active harvesting areas. A 100 m external buffer from the IPC boundaries was utilised for this exercise, however, it should be noted that Bord na Mona have commenced investigations on a number of sites to determine appropriate buffers between designated sites and actual production area boundaries to mitigate against any potential dust and hydrology impacts. Actual production area boundaries generally have greater separation distance from designated sites when compared to IPC boundaries.

A number of designated sites were identified by the above analysis, and an impact assessment for these respective sites is presented in **Table 6-8** below.

Garriskil Bog SAC is located 200 m south of the Coolnagun supply bog (i.e just outside the aforementioned 100 m buffer analysis); there is an intervening corridor of improved agricultural grassland which is transected by the Dublin to Sligo rail line. A review of aerial imagery of the site indicates that the outer 200 m periphery inside the northwestern boundary of the SAC comprises wet and rank grassland as well as scrub habitats. Consequently, the Qualifying Interest raised bog habitats of the SAC are approximately 400 m from the harvesting area associated with Coolnagun Bog. Given this separation distance and the intervening agricultural habitat and rail line, it is envisaged that potential hydrological impacts upon Garriskil Bog SAC are considered to be negligible.

Peat extraction has the potential to release silt particles and potentially aqueous ammonia to surface waters under typical rainfall conditions and drainage regimes; these inputs have the potential to negatively impact upon the ecology of receiving waterbodies as a consequence of increased turbidity, sediment deposition and chemical change.

A number of designated sites have a direct hydrological connection to at least one LRP supply bog discharge point, these are also identified in **Table 6-8**. While there is a direct hydrological connection between the respective supply bogs in the Blackwater bog grouping and the River Shannon Callows SAC and Middle Shannon Callows SPA, the large intervening distance and dilution factor occurring along the course of the River Suck and at the confluence with the River Shannon means that impacts arising from upstream bog discharges will be **negligible**.

Table 6-8: Potential impacts upon Designated Sites

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
Lough Ree SAC	Direct hydrological connection between SAC and Bord na Móna peat supply bog(s) (discharges and drainage)	Potential impacts on the designated site may arise as a result of: • Emissions to surface waters leading to impacts on water quality within or upstream of the Lough Ree SAC. • Excavation of peat leading to hydrological impacts on adjacent habitats within the Lough Ree SAC. Aquatic discharges from the respective supply bogs in the River Shannon/Lough Ree catchment have the potential to reduce fish biomass as a result of siltation and chemical content (i.e. Ammonia). In the absence of mitigation, this could have an effect on the broader otter population in the catchment. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
Lough Ree SPA	Direct hydrological connection between SPA and Bord na Móna peat supply bog(s) (discharges and drainage)	Potential impacts on the designated site may arise as a result of: • Emissions to surface waters leading to impacts on water quality within or upstream of the Lough Ree SPA. Aquatic discharges from the respective supply bogs in the River Shannon/Lough Ree catchment have the potential to reduce foraging resources for bird flocks as a result of increased turbidity leading to lower aquatic vegetation productivity. Similarly, fish biomass in the Shannon catchment may also be negatively affected by siltation and ammonia inputs; this may impact upon piscivorous species. In the absence of mitigation, this could have an effect on population numbers and distribution of bird species associated with the SPA. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
River Suck Callows SPA	Close spatial proximity and direct hydrological connection between SPA and Bord na Móna peat supply bogs	Potential impacts on the designated site may arise as a result of:

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
	(discharges and drainage)	• Excavation of peat leading to hydrological impacts on adjacent habitats within the River Suck Callows SPA. • Emissions to surface waters leading to impacts on water quality within or upstream of the Suck River Suck Callows SPA. Aquatic discharges from the respective supply bogs in the River Suck catchment have the potential to reduce foraging resources for bird flocks as a result of increased turbidity leading to lower aquatic vegetation productivity. Similarly, fish biomass in the River Suck catchment may also be negatively affected by siltation and ammonia inputs; this may impact upon piscivorous species. In the absence of mitigation, this could have an effect on population numbers and distribution of bird species associated with the SPA. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact. Ongoing peat harvesting has the potential to lead to drying of peripheral remnant bog habitats as a result of localised drainage and the resultant localised fall in the water table in such areas. Drying out of such peripheral habitats has the potential to reduce the suitability and availability of such habitat to species associated with the SPA, such as Golden Plover. A review of aerial imagery of these intercepts indicate that only a very minor proportion relate to peripheral areas of remnant bog between the existing peat harvesting areas and the aforementioned callows habitats. The NPWS Natura 2000 data form notes that 10% of the SPA coverage relates to bog habitat. The aforementioned intercept areas form a non-significant proportion of this 10% bog area. Additionally, several areas are adjacent to peat harvesting fields recently or soon to be taken out of production and are in the process of (or will be) recolonising as cutaway bog habitats that may be utilised by bird flocks associated with the SPA such as golden plover whooper swan. Consequently, ongoing peat harvesting activities are considered to result in a Negligible Indirect Medium-term Negative impact.

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
River Boyne and River Blackwater SAC	Direct hydrological connection between SAC and Bord na Móna peat supply bog (discharge)	Potential impacts on the respective Qualifying Interests may arise as a result of: Emissions to surface waters leading to impacts on water quality in the surface water catchment of the River Boyne and River Blackwater SAC. There is potential for surface water run-off from to result in negative impacts on lamprey, salmon and otter occurring within the River Boyne and River Blackwater SAC as a consequence of reductions in water quality. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
River Boyne and River Blackwater SPA	Direct hydrological connection between SPA and Bord na Móna peat supply bog (discharge)	Potential impacts on kingfisher may arise as a result of: Emissions to surface waters leading to impacts on water quality in the surface water catchment of the River Boyne and River Blackwater SPA. There is potential for surface water run-off from to result in negative impacts on kingfisher occurring within the River Boyne and River Blackwater SPA as a consequence of reductions in water quality. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
River Barrow and River Nore SAC	Close spatial proximity and direct hydrological connection between SAC and Bord na Móna peat supply bog (discharge)	Potential impacts on the respective Qualifying Interests may arise as a result of: Emissions to surface waters leading to impacts on water quality in the River Barrow and River Nore SAC. There is potential for surface water run-off from bog to the River Barrow to result in negative impacts upon lamprey, salmon, crayfish and otter occurring within the River Barrow and River Nore SAC as a consequence of reductions in water quality. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
Lough Derravaragh SPA	Direct hydrological connection between SPA and Bord na Móna peat supply bog (discharge)	Potential impacts on the respective Qualifying Interests may arise as a result of: Emissions to surface waters leading to impacts on water quality in the Lough Derravaragh SPA. There is potential for surface water run-off from bog to the River Inny to result in negative

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
		impacts upon the SCI species of the SPA (Whooper Swan, Pochard, Tufted Duck and Coot) as a consequence of reductions in water quality. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
Lough Iron SPA	Direct hydrological connection between SPA and Bord na Móna peat supply bog (discharge)	Potential impacts on the respective Qualifying Interests may arise as a result of: Emissions to surface waters leading to impacts on water quality in the Lough Derravaragh SPA. There is potential for surface water run-off from bog to the River Inny to result in negative impacts upon the SCI species of the SPA (Whooper Swan, Wigeon, Teal, Shoveler, Coot, Golden Plover and Greenland White-fronted Goose) as a consequence of reductions in water quality. In the absence of mitigation, this is considered to be a Moderate Indirect Medium-term Negative impact.
Suck River Callows NHA	Close spatial proximity and direct hydrological connection between NHA and Bord na Móna peat supply bogs	The NPWS site synopsis for the NHA notes that <i>"There are extensive areas of peat-cutting by Bord na Móna along the boundaries of the site and a large area of callow and esker has been recently planted with forestry. Damaging activities associated with these landuses include habitat loss and drainage throughout the site and burning of the high bog. These activities have all resulted in the loss of habitat and damage to the hydrological status of the raised bog, and pose a continuing threat to its viability"</i>. In the absence of mitigation, ongoing peat harvesting along the periphery of this NHA is expected to constitute a Moderate Indirect Medium-term Negative impact.
Annaghbeg Bog NHA	Close spatial proximity and direct hydrological connection between NHA and Bord na Móna peat supply bog	The NPWS site synopsis for the NHA notes <i>"Damaging activities associated with these landuses include drainage throughout the site and burning of the high bog. All these activities have resulted in the loss of habitat, damage to the hydrological status of the site, and pose a continuing threat to its viability"</i>. From a review of the aerial imagery of the site, the above impacts relate to third-party sod turf production along the western edge of Annaghbeg Bog. While a large area of Annaghbeg Bog is within the IPC licence

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
		boundary of the Castlegar Bog property, this area has never been developed for milled peat; the closest milled peat harvesting area is located 750 m to the northeast of Annaghbeg Bog NHA. As a consequence of this separation distance, hydrological impacts to this designated site arising due to milled peat harvesting activities are considered to be negligible. In the absence of mitigation, ongoing peat harvesting along the periphery of this NHA is expected to constitute a Imperceptible Indirect Medium-term Negative impact.
Daingean Bog NHA	Close spatial proximity and direct hydrological connection between NHA and Bord na Móna peat supply bog	The NPWS site synopsis for the NHA notes that “<i>Current landuse on the site consists of a small coniferous plantation on cutover at the south-easterly margin of the high bog. Most of the cutover areas around the bog have been reclaimed for agriculture. Drainage associated with these activities and with old areas of peat-cutting, are severely drying out the bog, and have resulted in loss of habitat and damage to the hydrological status of the site, and pose a continuing threat to its viability</i>”. In the absence of mitigation, ongoing peat harvesting along the periphery of this NHA is expected to constitute a Moderate Indirect Medium-term Negative impact.
Castle Ffrench East Bog NHA	Close spatial proximity and direct hydrological connection between NHA and Bord na Móna peat supply bog	The NPWS site synopsis for the NHA notes that “<i>Current landuse on the site consists of agriculture and mechanical peat-cutting to the north and north-west. Damaging activities associated with these landuses include drainage and burning. There is very little new drainage on the high bog, but large portions of the bog are being burnt at regular intervals with dead hummocks and burnt Ling Heather evident. These activities have resulted in loss of habitat and damage to the hydrological status of the site, and pose a continuing threat to its viability. However the site is quite wet and some bog moss (Sphagnum spp.) regeneration is occurring and this will probably improve if burning stops</i>”. The synopsis also highlights the fact that the raised bog habitats on site are showing signs of active regeneration. Given the apparent absence of impacts to the site from

Designated Site	Proximity to impact sources & potential impact pathway	Impact Assessment
		current peat harvesting activities, it is envisaged that such activities through the transition period will have a Slight Indirect Negative Medium-term impact.

A number of pNHAs in close proximity to the respective supply bogs were also identified, the majority of which have a superseding SAC designation (refer to **Table 6-8**). The outstanding pNHAs are as follows:

- Lough Bannow pNHA relates to a small wetland complex 2 km east of Lanesborough; the NPWS site synopsis notes that there is very little standing water left, and the site does not receive any discharges from the ADF or any peat supply bogs. Drainage in the locality has the potential to influence the hydrological regime at the site.
- Derry Lough pNHA relates to a small wetland approximately 7 km northwest of Ballymahon which is progressively transitioning to woodland. The NPWS site synopsis notes that the water table is dominated by levels in Lough Ree. Ongoing peat harvesting at Derrycolumbkille Bog is not expected to significantly impact upon this site.
- Lough Bawn pNHA is a relatively small site composed of raised bog, fen, wet and dry woodland and freshwater marsh habitats situated 2 km west of Keenagh in Co. Longford. Historically, the water table has dropped by a large degree, though the site currently comprises diverse fen which is relatively unaffected by adjacent peat harvesting.
- Royal Canal pNHA relates to the channel and bankside habitats of the Royal Canal; number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The terrestrial habitats will be unaffected by peat harvesting and there are no drainage discharges from the respective supply bogs along the course of the canal. No impacts to this pNHA are envisaged.
- Grand Canal pNHA relates to the channel and bankside habitats of the Grand Canal; number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The terrestrial habitats will be unaffected by peat harvesting and there are no drainage discharges from the respective supply bogs along the course of the canal. No impacts to this pNHA are envisaged.

Supply bog impact assessment and licensing

Bord Na Móna commenced work in 2017 on preparing Environmental Impact Assessments on all of its peatlands including AA, where necessary, in anticipation of the new streamlined licensing system for large-scale peat extraction (> 30ha) that

came into operation pursuant to the European Union (Environmental Impact Assessment)(Peat Extraction) Regulations 2019 on the 25th January 2019. It is expected that as part of this EIA and licensing process, site-specific measures for each supply bog will be developed to further reduce the potential for ecological impact of ongoing peat harvesting, in respect to both local habitats of ecological importance (e.g. raised bog remnants) and designated sites within the Zones of Influence of the respective supply bogs. Supply bogs which are not licensed by the EPA will not be utilised as fuel sources for LRP Station as all Bord na Móna production bogs are licensed. Consequently, potential ecological impacts arising from peat supply to LRP Station will be effectively minimised through the EPA licensing process.

6.4.7 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to biodiversity, have been assessed.

ESB has applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to Condition 5.5 do not require any physical or operational changes to the LRP Station. The proposed development at the ADF during the proposed biomass transition will require an expansion in the footprint of the ADF; clearance of up to 10 ha of bog woodland and fringing scrub habitats will be required to facilitate the sequential development the new ADF cells south of the existing permitted ADF footprint. There will be no physical change to the existing ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage. The continued operation of the station beyond 2020 will result in the continuation of discharges from the station including the cooling water discharges. There are a number of measure in place to mitigate the potential impacts from operational discharges and it has been determined that the thermal plume is not having a significant impact on aquatic ecology therefore it has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated.

Potential impacts in relation to the transition of the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that proposed future project.

6.5 Mitigation

6.5.1 Derraghan ADF

The primary potential impacts of the increase in capacity under the permitted development of the ADF are considered to be local in nature and are identified above as;

- Loss of bog woodland habitat;

- Loss of nesting habitat to birds (with gain for some species);
- Loss of foraging habitat for mammals and other terrestrial species (with gain for some species); and
- Temporary disturbance or displacement of species such as birds and bats.

Measures are outlined which mitigate against the aforementioned local impacts; no additional mitigation measures specifically relating to designated sites or habitats and species protected under the Habitats and Birds Directives respectively are proposed.

The ADF will continue to fully comply with the requirements of its IE Licence P0610-02. Current operational landfill methods will continue including wetting of material as ash is landfilled, working one cell at a time.

Work will predominantly take place during daylight hours only. Lighting of the ash cells will only be necessary during the winter months, when it will be limited to use between the hours of 4.00 pm and 5.30 pm.

Mitigation measures for habitats on site are as follows:

- No vegetation outside the ADF planning boundary will be removed or disturbed as part of the proposed works;
- Any vegetation clearance to develop the remaining cells (primarily relating to cell 12) will take place during September to February inclusive (outside the bird breeding season) to avoid disturbance to birds using the bog woodland and associated scrub for nesting;
- Should the period between woodland clearance and the construction of the new cell (surface stripping, berm construction etc.) facilitate the colonisation of the site by ruderal vegetation, the area will be surveyed in advance of cell construction to confirm the absence of ground-nesting birds; and
- The overall extent of low ecological value bare ground will be minimised by the successive opening and capping of cells within the ADF.

The mitigation measures outlined above will ensure that associated bog woodland outside the ADF boundary (Bord na Móna Biodiversity Areas) will not be affected by the ADF development. The loss of less than 1 ha of bog woodland (of which there is a considerable and expanding resource to the west) should be considered in the context of the progressive development of open vegetated habitat on the capped cells which adds heterogeneity to the local landscape and can provide foraging habitat for a number of mammal species occurring at the site; this is of particular value to mosaic species such as badger.

The bog woodland habitat to be removed has the potential to be used by breeding badger and may also be used by other mammals including pine marten and fox.

- A pre-construction survey will be carried out prior to the development of cell 12 to confirm the continuing absence of any badger setts (or other mammal resting places) within this cell. If a new sett is encountered, a specialist ecological consultant will be engaged to plan and implement the exclusion of badgers from the sett, under license from NPWS;

- Work will predominantly take place during daylight hours only. Lighting of the ash cells will only be necessary during the winter months, when it will be limited to use between the hours of 4.00 pm and 5.30 pm.
- Mammal-proof fencing around the existing leachate lagoon will be maintained during works to ensure exclusion of animals and eliminate the risk of drowning.

Mitigation measures for bats are as follows:

- No additional lighting will be installed at the ADF site.
- As lighting of the active ash cells will only be used during the winter months (between the hours of 4.00 pm and 5.30 pm), this relates to the bat hibernation season and no specific mitigation is deemed necessary.

Mitigation measures for habitat loss and disturbance inside the ADF boundary also relate effectively to breeding birds. Mitigation measures proposed for bats are also applicable to barn owls.

As previously noted, the prescribed mitigation measures will ensure that associated bog woodland outside the ADF boundary (Bord na Móna Biodiversity Areas) will not be affected by the ADF development. The woodland habitat breeding resource for birds will therefore only be temporarily affected to a very minor degree.

With reference to wintering birds, the ADF will remain well screened to the west, south and east by the extant areas of bog woodland. This ensures that any construction activities occurring during the winter months are not likely to disturb any potential flocks of wintering birds occurring on the bare peat areas beyond the ADF boundary.

Appropriate management of the recolonising habitat on the capped cells can add heterogeneity to the local landscape and can provide breeding and foraging habitat for a number of bird species occurring in the locality of the site, including skylark, meadow pipit, kestrel and barn owl.

As previously noted, the IE Licence Review does not propose any changes to the operational activities at the ADF, which will continue to fully comply with the requirements of the existing IE Licence P0610-02.

Apart from the clearance of cell 12, there will be no net increase of operational activities at the site (the north and east sector of the ADF will become progressively less active as the ash infilling progresses towards the southwest corner). No specific additional mitigation measures are therefore proposed.

6.5.2 LRP Station

Beyond the existing environmental control measures conditioned under the existing IE Licence P0610-02, as presented below, no specific mitigation is proposed for the ongoing operation of the power station.

Surface water– IE Licence environmental control measures

- Monitoring of all surface water discharges in line with IE Licence requirements;
- Oil interceptors which are checked and cleaned regularly;
- Storage tanks, chemical stores, transformers, barrels and containers are kept in permanent or temporary bunds;
- Discharges to greenfield runoff rates;
- Certified Environmental Management System (EMS) including but not limited to the following procedures:
 - Oil Spill Response Plan; and
 - Emergency Procedures for Chemical, Fire or Crisis.
- Oil spill equipment is available on site;
- Monitoring is carried out on the River Shannon up and downstream of discharge points biannually for the following parameters:
 - Temperature;
 - Chlorine;
 - Suspended Solids;
 - Dissolved Solids;
 - Ortho-phosphate (as P);
 - Sulphate; and
 - Heavy Metals.
- Frequent inspections of settlement ponds are carried out.

Noise mitigation – IE Licence control measures

While it is noted in **Section 6.5.1** that significant noise-related disturbance to SCI species is not predicted, noise-related mitigation measures will continue to be implemented during the operational phase (as conditioned under IE Licence P0610-02); Daytime dB(A) LAeq (15 minutes) will be limited to 55 dB while night-time dB(A) LAeq (15 minutes) will be limited to 45 dB. There are no proposed changes to the normal operational noise of the LRP Station from the main generating plant itself.

6.5.3 LRP Peat Supply Bogs

A broad series of existing environmental protection measures are provisioned by the IPC licencing regime for the respective supply bog groupings, as regulated by the EPA. These are outlined in **Table 6-8** and also in **Chapter 7 Water - Surface Water** (Mitigation). The implementation and ongoing review of these measures at the supply bogs is a condition of the respective licenses.

Table 6-8: Surface Water Quality Measures Associated with Peat Supply Bogs

Potential Impact Type	Measure
Surface Water Quality	All drainage water from all bog lands in the licensed area is discharged via an appropriately designed silt pond treatment arrangement

Potential Impact Type	Measure
	Silt ponds serving operational bogs shall be cleaned as a minimum twice a year, once before ditching and once before harvesting, and more frequently as inspections may dictate
	Drainage manholes are protected and maintained free of excessive peat
	Headlands are kept clean and free of excessive loose peat
	All new manholes and outfalls are set well back from turning grounds, drivers of bog plant do not turn short (over drains) at headlands
	Harrows, millers, ridgers do not drag loose peat onto manholes or into drains, outside harrow spoons are directed away from drains
	Silt run-off, while piping or ditching, is minimised
	Outfalls are controlled to minimise silt discharge during cleaning operations
	Drains are ditched in dry weather
	While ditching, outfalls are blocked and ditch towards outfall
	Outlets from stockpile field drains are blocked during stockpile loading
	Field drains adjacent to stockpiles are cleaned as soon as practicable after stockpile loading
	Adequate room is allowed for rail bed beside Peco stockpiles
	All fields that have been milled are ridged at the end of the production season
	All fields liable to winter flooding have been cleared of milled peat or re-compacted at the end of the production season
	Continued implementation of Bord na Móna Energy Limited's programme of improvements

Additionally, Bord na Móna is implementing a programme of rehabilitation (drain blocking, rewetting, vegetation) plans in order to stabilise former peat production areas and enhance biodiversity. The rewetting of former peat production areas and the development of wetland habitats will inevitably reduce potential for loss of suspended solids to the drainage network and ultimately to the Shannon river system, Boyne river system and Barrow river system.

In addition, the National Peatlands Strategy sets out high level actions to be undertaken to ensure peat production does not have a detrimental impact on water quality, and to ensure that peatlands can contribute positively to achieving the objectives of the WFD. These actions are:

- *“For all peatland related activities, it should be demonstrated that they do not, either individually or in-combination with other activities, adversely impact on the environmental objectives of the WFD, associated daughter Directives and national regulations.*

- *Peatland related activities should not significantly alter the environmental supporting conditions for Natura 2000 sites such that these cause a failure of the conservation objective for that designated habitat and by inference cause a risk of the WFD environmental objectives relating to protected areas not being met."*

These actions are subsequently noted in the RBMP for Ireland, which identifies the following principal actions to address potential impacts on water caused by peatland harvesting:

- *The Minister for Housing, Planning and Local Government intends to make regulations as soon as possible¹¹ that will require the EPA to carry out EIA for all existing and new large-scale peat extraction (>30ha) as part of its examination of IPC license applications for the activity. When these regulations are made, proposals will be developed for public consultation relating to a new regulatory regime that will bring smaller-scale commercial peat extraction ($\leq$ 30ha) under a new local authority licensing system incorporating EIA and AA, as necessary, and enforcement powers.*
- *The DCHG, together with the Peatlands Strategy Implementation Group, will oversee the implementation of the National Peatland Strategy and the first national management plan for Ireland's raised-bog Special Areas of Conservation (SACs) network. The principal aims of these are:*
 - *To provide a long-term framework within which all of the peatlands in the State can be managed responsibly in order to optimise their social, environmental and economic contribution to the well-being of this and future generations*
 - *In the case of the National Raised Bog Special Areas of Conservation Management Plan 2017–2022, to specifically set out a roadmap for the long-term management, restoration and conservation of protected raised bogs in Ireland*
- *Bord Na Móna will implement its Sustainability 2030 Strategy and Biodiversity Action Plan 2016–2021, which addresses the long-term rehabilitation of its cutaway bogs.*
- *By 2021, Bord Na Móna will rehabilitate an additional 25 peatlands covering approximately 9,000ha. This is subject to several assumptions, including the availability of cutaway bogs for rehabilitation.*
- *The EPA has identified this priority issue as the subject of a research proposal for inclusion in its 2018 research call. The proposal involves evaluating mitigation strategies for improving water quality from drained peatlands. The*

¹¹ European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 – S.I. No. 4 of 2019

project proposal, if selected, is intended to integrate with the ongoing mitigation trials being undertaken by Bord Na Móna.

Furthermore, Bord Na Móna has set out action plans for the long-term rehabilitation of cutaway bogs, acknowledging obligations under the Water Framework Directive and the Habitats and Birds Directive. The Bord Na Mona Sustainability 2030 Strategy and Biodiversity Action Plan 2016-2021 are built around the commitment from Bord Na Móna to cease harvesting energy peat by 2030. Some key Bord Na Móna objectives under this Biodiversity Action Plan, include:

- Trialling ammonia attenuation/retention opportunities in cutaway peatlands;
- Developing a map of ecosystem goods and services for Bord Na Móna lands;
- Adding to the raised bog network under the Bord Na Móna Raised Bog Restoration programme;
- Develop best practice guidelines relating to rehabilitation and restoration of a range of peatland types; and
- Control and monitoring of invasive species.

The draft Mount Dillon Bog Group Rehabilitation Plan (Bord na Móna 2015) has been developed under Condition 10 of IPC Licence P0504. The plan comprises site-specific rehabilitation plans for each of the Mount Dillon Bog Group areas. The Derraghan Bog site-specific plan outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. The plan notes that cutaway bog at the site is still developing naturally and typical colonisation and development of pioneer cutaway habitats is continuing. When larger units come out of production, then it may be feasible to block single outfalls, without affecting other production areas and enhancing wetland development.

The plan notes that there is potential for the creation of extensive wetlands at Derraghan Bog and at least 30 % of the site (production areas) is likely to become wetland. Water pumps located on the site are needed to prevent flooding at present and water-levels over this area could be raised easily by decommissioning these pumps. Raising the water-levels would increase the extent of wetland cover within the natural basins that have been created from peat production. Large areas of deeper lakes are likely to form with associated reed beds and wetland vegetation in the shallower areas. The remaining areas on the site would be likely to develop into birch-dominated bog woodland. The plan envisages that wetlands should account for approximately 32 % of the site into the future with Birch woodland accounting for the other 63 % of the site. Remediation of silt ponds and watercourses where required is also proposed.

This plan will deliver an expansion of biodiversity areas at the Derraghan Bog site which will easily compensate for the aforementioned impacts associated with the development of the ADF, which are predominantly temporary in nature.

6.6 Residual Impacts

Residual impacts are defined as those remaining after mitigation measures have been implemented. Generally, a proposed development adequately considers the ecological issues into its design, so that its impacts on the existing environment are minimised to an acceptable level of slight residual impacts. Occasionally, where significant impacts cannot be avoided or reduced, the consequences of significant residual impacts in light of planning policies and legislation should be considered. Significant residual environmental effects may be offset by appropriate compensatory measures nearby/elsewhere (IEEM, 2006).

Based on a review of the proposed mitigation measures described above, it is concluded that the development of the ADF, which is located in a dynamic recolonizing site, will have no residual negative impacts. Furthermore, the continued operation of LRP Station under the proposed alteration to Condition 5.5 will also have no significant residual impacts.

6.7 'Do Nothing' Scenario

The EIS which accompanied the 2001 planning applications for the LRP Station and the Derraghan ADF sought permissions to dispose 550,000 tonnes of peat ash at the ADF in order to serve the power station up to 31st December 2020.

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. At that time LRP Station would face decommissioning of the power station without the means of continuing to dispose of peat ash at the ADF.

The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

Should closure of the ADF and decommissioning of the power station occur, the impacts in relation to Biodiversity would entail the cessation of development of disposal cells and the implementation of the Closure, Restoration and Aftercare Management Plan which requires capping of the landfill; these areas would progressively recolonise with ruderal vegetation and potentially transition to scrub.

In the absence of the cooling water discharge to the River Shannon upstream of Lough Ree, it is envisaged that there would be a measureable, but non-significant positive change in the key ecological indicators downstream of the discharge. However, local feeding and reproductive conditions for cyprinid fish may also be reduced in the absence of a thermal discharge due to the overall lower water temperatures immediately downstream of LRP Station as a result.

An associated overall reduction in peat harvesting from the surrounding Bord na Móna supply bogs would also occur, though it should be noted that several supply bogs also supply West Offaly Power and Edenderry Power stations and are also used

for the supply of peat for other end uses (horticultural peat etc.). Where such situations arise, peat harvesting would be likely to continue in its current state.

However, any areas permanently taken out of production could be expected to revert to scrub and bog woodland or to wetlands, depending on the hydrological regime present.

6.8 Interaction of the Foregoing

Impacts relating to Biodiversity have the potential to be impacted by other environmental aspects including Water and Climate. This is addressed in **Chapter 13**.

6.9 Conclusion

Loss of a small compartment (<1 ha) of secondary bog woodland habitat at the ADF as part of its existing planning permission site is unavoidable, but it is envisaged that transitional scrub habitat in other parts of the Derraghan Bog Biodiversity Area will quickly mature and compensate for this loss. The capping and recolonisation of the ADF cells has the potential to lead to improved habitat heterogeneity at the site, which is beneficial to some species. Furthermore, the continued operation of LRP Station under the proposed alteration to Condition 5.5 will also have no impacts upon aquatic ecology.

Continuing to work within the requirements of an updated IE Licence will ensure that there are no impacts arising from the future operation of LRP Station and ADF to local ecological receptors and also to Natura 2000 sites in the region.

7 Surface Water

7.1 Introduction

This chapter of the EIAR presents an assessment of surface water which predicts the potential impacts on the surrounding environment arising from the proposed development.

It is noted that the proposed capacity change to the ADF will be located within the same site which was subject to EIA in 2002, with the same prevailing surface water conditions and within the same context for the assessment of impacts on water. The proposed development is identical to the development assessed under that EIA.

In addition the potential for environmental impacts associated the supply of peat fuel to LRP Station, as they relate to surface water are also considered.

7.2 Methodology

As well as considering the relevant EPA guidance, as used in the preparation of this EIAR, the following sources and publications were utilised in the preparation of this chapter;

- Water Framework Directive, Shannon International River Basin Management Plan 2009 – 2015
(http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plan%202009%20-%202015/ShIRBD%20RBMP%202010/);
- Water Framework Directive, Consultation documentation on the Draft River Basin Management Plan for Ireland 2018 – 2021;
- River Basin Management Plan for Ireland 2018 – 2021;
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. 272 of 2009);
- Local Authority Water Services Training Group Guidance, Procedures and Training on the Licensing of Discharges to Waters and to Sewer for Local Authorities (2011);
- Environmental Protection Agency (EPA), WFD Status Geodatabase (all waterbodies); and
- Environmental Protection Agency (EPA), Envision Online maps <http://maps.epa.ie/InternetMapView/mapviewer.aspx>.

7.2.1.1 River Shannon Temperature Monitoring

Irish Hydrodata have undertaken five (boat based) thermal plume surveys along the River Shannon at the LRP Station between August 2014 and July 2016.

In addition since August 2016 there is an ongoing programme of continuous temperature monitoring and assessment at a number of fixed points in the Shannon River at Lanesborough. As part of this continuous monitoring programme monthly reports are issued to the EPA on the findings.

7.2.1.2 Aquatic Ecology Surveys

Further details of the aquatic ecology surveys undertaken in relation to the thermal plume are contained within the Synthesis Report provided to the EPA as part of the IE application. In summary the following surveys were undertaken:

- Aquatic Services Unit (ASU), UCC undertook biological surveys in 2014, 2015 and 2016 which covered the following:
 - Diatoms;
 - Macrophytes; and
 - Macroinvertebrates.
- ESB Fisheries undertook six fyke net surveys at Lanesborough in August 2016, October 2016, February 2017, November 2017, December 2017 and November 2018.

7.3 Receiving Environment

The proposed development is located within Hydrometric Area 26 in the Upper Shannon catchment (WFD code:26C and 26E) and falls within three sub catchments, two related to the upper Shannon (SC_080 and SC_090) and the Bilberry sub catchment (SC_010).

The station is located within Shannon (Upper)_010, Shannon (Upper)_110 and the Lough Bannow Stream_010 River Sub Basins. The ADF is located within the Ledwithstown_010, Drumnee_010 and Lough Bannow Stream_010b River Sub Basins see **Table 7-1**.

For inspection purposes only. Consent of copyright owner required for any other use.

Table 7-1: Relevant WFD Water Regions

Water Region	LRP Station	ADF
Hydrometric Area	26	
Catchment	Upper Shannon 26C Upper Shannon 26E	
Sub Catchment	Shannon[Upper]_SC_080 (26C_1) Shannon[Upper]_SC_090 (26E_6) (downstream)	Shannon[Upper]_SC_080 (26C_1) Bilberry_SC_010 (26E_1)
River Sub Basin	Shannon (Upper)_100 Shannon (Upper)_110 Lough Bannow Stream_010	Ledwithstown_010 Drumnee_010 Lough Bannow Stream_010
WFD Waterbody ¹²	River Shannon (Shannon Upper_100) Lough Ree Lough Bannow Stream (Lough Bannow Stream_010)	Drumnee (Drumnee_010) Ledwithstown (Ledwithstown_010) also known as Newtownflanigan stream Lough Derrymacar

The ADF is located in the Shannon River Basin and the site ultimately enters Lough Ree via Derrymacar Lake. LRP Station itself from which the ash is generated is located at Lanesborough on the River Shannon immediately north of Lough Ree.

Directive 2000/60/EC (the Water Framework Directive) was adopted by the European Parliament and Council in 2000. The aim of the Water Framework Directive (WFD) is to prevent the deterioration in the existing status of waters (including the maintenance of “High Status” where it exists) and to ensure that all waters, with some limited exceptions, achieve at least “Good Status” by 2015.

The European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended by the European Communities (Water Policy) (Amendment) Regulations, 2005, transposed the WFD into Irish law establishing eight River Basin Districts (RBDs), including the Shannon River Basin District, on the island of Ireland for the co-ordinated management of water resources. Water bodies were delineated into groundwater, river, lake, transitional and coastal water bodies and, in accordance with the requirements of the WFD, an analysis of the characteristics and impact of human activity on each RBD was undertaken. This analysis provided an assessment of the likely condition of all water bodies and established a baseline for identifying future priority actions for subsequent stages in the river basin planning approach.

¹² Not all WFD waterbodies within the river sub basin are listed only those of relevance to the assessment.

The Shannon International River Basin Management Plan (SIRBMP) 2005-2015 for the receiving waterbody, the River Shannon (Water Body Code IE_SH_26_4162), classifies the river as being of overall Poor Status. The overall objective of the SIRBMP is to restore the river to Good Status by 2021.

Lough Ree (Lake Water Body Code IE_SH_26_750a) has been classified as of Moderate Status. The ADF is located in the catchment of this lake. The overall objective of the SIRBMP is to restore the status of the lake by 2021.

Currently the 2nd cycle of river basin management planning is underway and the second cycle River Basin Management Plan 2018 - 2021. It sets out a new approach to river basin management planning stating that *“Ireland is now taking a single river basin district approach with a much improved evidence base to underpin decision making, at both national and local level. The approach to public consultation and engagement has also been greatly strengthened”*

The new “Irish River Basin District” will be a single RBD for the entire country described as follows:

“is been broken down into 46 catchment management units. These units are, in the main, based on the hydrometric areas in use by authorities – with, for example, the River Shannon being sub-divided on the basis of the catchments of its major tributaries. The 46 catchment management units have been broken down further into 583 sub-catchments”.

The Shannon River and Lough Ree will form part of the new “Irish River Basin District”.

Consultation on the draft second cycle River Basin Management Plan for Ireland 2018 to 2021 concluded at end of August 2017 and the plan was subsequently published in April 2018. The objectives set out in the second cycle plan remain the same.

7.3.1 EPA ENVISION Mapping

An examination of the EPA ENVISION database (<http://gis.epa.ie/Envision/>) indicates that there are no water quality monitoring locations on the local bog drains, or on the small first and second order streams (Derrmannny and Newtown Flannigan streams) within the sub-basin or at Derrymacar Lough.

No waterbody status has been assigned to either of the small feeder streams or Derrymacar Lough itself, (indicated as unassigned by the EPA). The water Framework Directive risk scores for the Newtown Flannigan river (referenced as SH-ShannonUpper_BilberryTrib_1Derrymachar Lough) is indicated as “expected to achieve good status”.

Lough Ree into which Derrymachar Lough discharges is assigned a lake water body status of Moderate. The Lake Water Quality is indicated as being Oligotrophic/Mesotrophic. See **Volume 3 - Figure 7.1: Derraghan ADF Receiving Watercourse – Waterbody Status** for an overview of the waterbody status for each receiving watercourses.

7.3.2 LRP Station

There are no physical or operational changes proposed to the LRP station as part of this IE licence review.

The LRP Station including the ADF currently operates under the Environmental Protection Agency (EPA) Industrial Emissions (IE) licence P0610-02. LRP Station and the ADF Point Source Surface Water (PS-SW) existing discharges (as detailed in the IE licence) are as follows:

- PS-SW1¹³- Condenser Cooling Water
- PS-SW2 – Screen Wash Water
- PS-SW3 – Boiler Blowdown
- PS-SW4 – Neutralised Water Treatment Effluent
- PS-SW5 & PS-SW6 – Surface water drainage
- ADF- SW1 – Surface water drainage – It is noted that no leachate is discharged from the ADF and the existing IE licence issued by the EPA does not permit the discharge of any leachate to surface waters. Therefore ADF-SW1 is no longer monitored as part of the IE licence requirements.

Water is abstracted from the River Shannon for the power plant processes including the provision of cooling water. It is this returned cooling water that acts as the principal aqueous discharge from the existing LRP Station (PS-SW1). The LRP Station discharges approximately 135MWth (Megawatts of thermal load) to the river Shannon when on full load. This consists of a flow through the condenser of 4.5 m³/s with a temperature rise of approximately 8°C.

Condition 5.5 of the Industrial Emissions (IE) Licence for the station specifically relates to the thermal discharge from the station and states that:

Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5 °C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point.

LRP Station is connected to the local sewer network and the ADF is served by an onsite proprietary wastewater treatment system (Puraflo system). Both the LRP station site and the ADF are connected to the public water mains.

7.3.2.1 EPA Monitoring Results

The EPA monitors the River Shannon approximately 225 m downstream of the power station main cooling water discharge at (Station No. RS26S021600). The EPA recorded the biological water quality at this location as poor (Q2-3). The EPA monitor

¹³ These are the EPA IE licence Emission Point Reference number as it appears on the LRP IE licence P0610-02

the biological Q value index at the bridge across the Shannon River in Lanesborough, Site Code RS26S021600, Ballyleague Bridge. This location is less than 230m downstream from the thermal cooling water discharge. This site, is both a Surveillance and Operational monitoring site under the WFD river water monitoring programme. Biological Q values at this location recorded since 2004 are consistently Q3 or Q3-4. The WFD status 2010-2015 for the river water body at this location is indicated as “Poor” (EPA Envision database <http://gis.epa.ie/Envision/>). In accordance with the requirements of the IE Licence P0610-02, ESB produce an Annual environment Report (AER). Surface water quality results are taken at three, locations (SW4, SW5 and SW6 as per **Volume 3 - Figure 7.6: LRP Station Surface Water Sampling Locations**). Surface water drainage samples, SW5 and SW6, were taken at the settlement pond and neutralised water treatment effluent taken at SW 4.

The results from the surface water sampling at SW5 and SW6 are summarised in **Table 7-2**. Trigger levels are set by the station under EPA guidance. The highest result recorded for each licenced parameter is tabulated. Licenced parameters pH and conductivity are taken on a monthly basis with all other parameters taken quarterly. All recorded values for each parameter were in compliance with the licence conditions and no impacts on the receiving water are foreseen from these discharges.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 7-2: Surface Water Sampling Results 2016 – SW5 and SW6

Licenced Parameter	Measure Value	Unit of Measurement	Monitoring Date	Trigger Value	Compliance with License
pH	8.82	pH units	October	9.12	Yes
Conductivity	612	µS/cm@25oC	February	762	Yes
Total Dissolved Solids	365	mg/l	September	1000	Yes
Mineral Oils	1	mg/l	All recorded months	5	Yes
Suspended Solids	7.5	mg/l	September	262	Yes
Ammonia (as N)	0.5	mg/l	November	0.92	Yes
COD	32.80	mg/l	September	169	Yes
Fats, Oils and Greases	1	mg/l	All recorded months	n/a	Yes
Total Nitrogen	1	mg/l	All recorded months	n/a	Yes

A summary of the water quality results taken at SW4, neutralised water treatment effluent, is presented in **Table 7-3**. The highest result recorded for each licenced parameter is tabulated. All recorded values for each parameter were in compliance with the licence conditions and no impact on the receiving water is foreseen from this discharge location.

Table 7-3: Summary of Emissions 2016 - SW4

Licenced Parameter	Measure Value	Unit of Measurement	Monitoring Date	Annual Emission for 2016 (kg)	ELV	% change +/- from previous reporting year
Ammonia (as N)	0.884	mg/l	November	2.68	1	- 22
BOD	4.88	mg/l	February	23.70	14	37
Suspended Solids	12.5	mg/l	June	44.38	50	-84
Mineral Oils	10	mg/l	February, May,	0.09	N/A	-95

Licenced Parameter	Measure Value	Unit of Measurement	Monitoring Date	Annual Emission for 2016 (kg)	ELV	% change +/- from previous reporting year
			September, November			
COD	27.6	mg/l	February	198.00	N/A	26.9
Total Phosphorous	293	mg/l	September	2.35	N/A	74
Total Nitrogen	23.2	mg/l	September	151.44	N/A	25.36
Total Dissolved Solids	6070	mg/l	June	47,264.00	20000	6

The sampling and analysis undertaken by ESB shows that it is in compliance with its IE Licence requirements.

7.3.3 Derryaghan ADF

LRP Station ADF is located in the Upper Shannon Catchment in Hydrometric Area 26, in the sub-basin Ledwithstown_010. It is located within an area of cutaway Bord na Móna commercial peatland located at Derraghan Bog. The surface water regime on site utilises the pre-existing open drainage network available on site. Surface water discharges from the site via a main drain that leads to a Bord na Móna piped outfall to the south of the site. This piped outfall flows in a south westerly direction to a pumping station. Before entering the pumping stations all flows pass through a silt pond. From here it is pumped into the Derrymacar outfall drain flowing into Newtown Flannigan river which flows into Lough Derrymacar and then to Lough Ree, part of the Shannon system. See **Volume 3 - Figure 7.2: Derraghan ADF Receiving Watercourse** for further details.

The existing main drain runs in a south-easterly direction through the site and is piped where it runs under the existing cells. The open drain enters a piped drain north of completed Cell No. 1 which continues under Cells No's. 1, 4 and 7 before re-entering the original open drain south of cell 7. The main drain exits the ESB site ownership boundary at the south of the site. The drain continues in a south – westerly direction across Bord na Móna commercial peatland via a number of settlement lagoons. The open bog drainage network terminates in a pumping station located approximately 750 m south west of the existing ADF. At the pumping station water is pumped up through a 300 mm diameter rising main into a 450 mm pipe and then subsequently into a 600 mm diameter pipe adjacent to the pump. Pumped water then flows through

this pipe by gravity to the outfall drain. The size of the pumping chamber is approximately 3 m x 3 m and the pump operates on a float switch all year round. The pump sump base is approximately 39.25 m OD and the float switch operates in the range of 40.8 m OD (on) to 40.4 m OD (off). The invert of the receiving drain is 42.5 m OD. This means that there is approximately 2.1 m lift in water levels from the pumping station to the outfall drain. From here it is pumped to the Derrymacar River, flowing through Lough Derrymacar to Lough Ree. See **Volume 3 - Figure 7.3: Derraghan ADF Drainage Schematic** for site drainage scheme.

In order to control groundwater and surface water levels during cell construction, under cell drainage is installed beneath the floor of each cell. The under cell drainage typically comprises of a 225 mm diameter slotted pipe within a trench. See **Plate 7-1** for typical trench detail. This technique is proposed in the new ash cells.

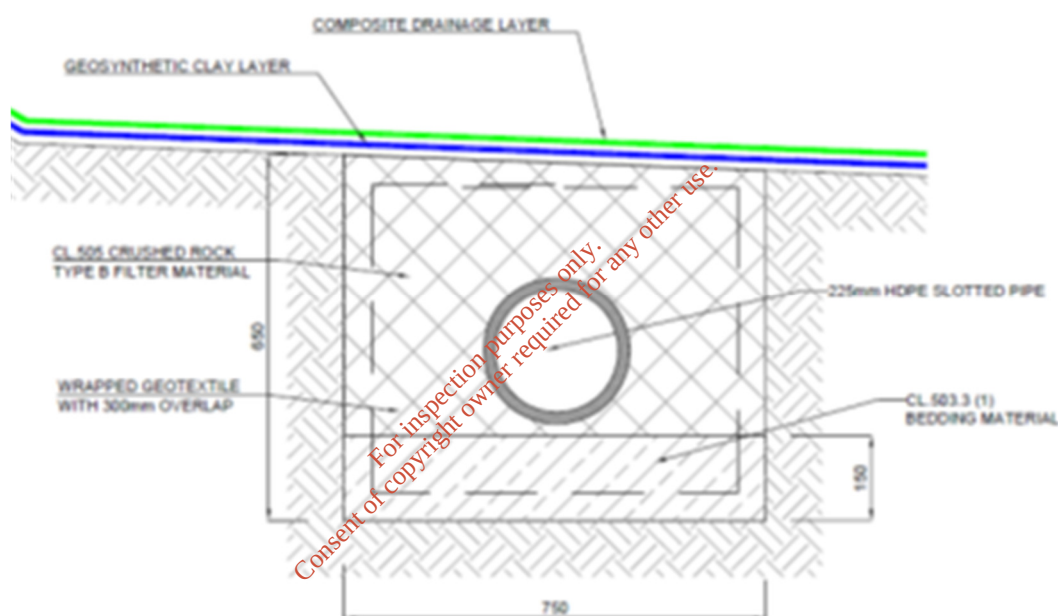


Plate 7-1 Typical Under Cell Drainage Detail

The undercell drainage pipework discharges into the main piped drain running under cells 1, 4 and 7 and discharges from site using the same open drainage network as the surface water discharge. The base of all cells are lined with a geo-synthetic clay liner and overlain with a composite drainage layer. It is proposed that cells 8, 9 and 12 discharge into the same land drain.

The finished ash levels in the filled cells are covered with a geo-synthetic clay liner and a composite drainage layer and capped with a 1 m deep layer of peat to prevent the ingress of surface water into the completed cell. Surface water from the completed cells collects in an anchor trench constructed at the top of the external cell embankments. The finished surface of the cells is domed to prevent ponding on the cell and to ensure runoff enters the anchor trench drains. See **Plate 7-2** for typical anchor trench detail.

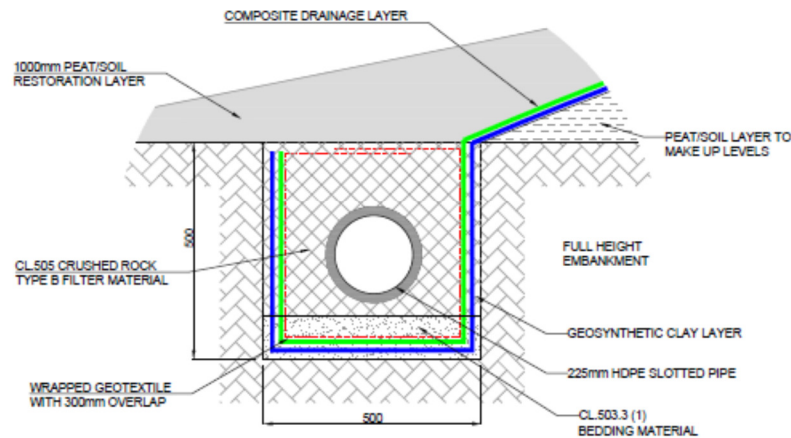


Plate 7-2 Typical Anchor Trench Detail

The anchor trenches are constructed to form a ring enclosing the completed cell. The anchor trench pipes discharge via gravity to a number of open drains outside the cell footprints which ultimately enter the main drain that runs through the centre of the site. This system will continue to be implemented in the proposed cells.

7.3.3.1 Leachate Discharges

A leachate collection system is installed in the floor of each cell to collect and contain rainwater entering the cell during the ash filling stage and any residual leachate contained within the cell upon permanent capping of the cell. As the ash is placed semi-dry and wetted to prevent dust and aid compaction, it absorbs a considerable amount of water.

The base of Cell No.1 to 6 have been lined with a geo-synthetic clay liner and a composite drainage layer and this liner extends up the embankment to a height of 1 m above the cell floor. Cell No. 7 has been lined to the full height of the embankment with the geo-synthetic clay liner and this will be the case for all future cells. Cells No. 1 - 6 have been completed and capped with geo-synthetic clay liner and an upper layer of peat. Leachate recovery from these cells is expected to reduce overtime as surface water is now excluded from these cells. High density polyethylene pipes are installed in the base of the cells and these pipes discharge to a leachate collection manhole located in the lowest corner of each cell. The leachate is pumped out of the leachate collection manholes once the leachate reaches a level of 0.8 m above the cell floor level. See **Plate 7-3** for typical leachate collection detail.

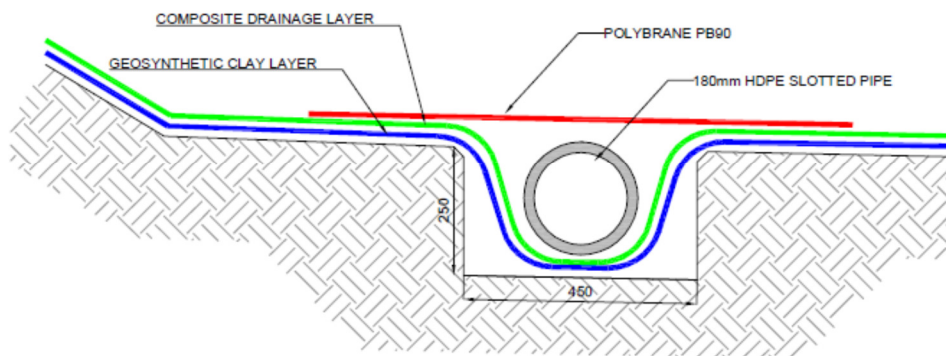


Plate 7-3 Typical Leachate Pipework Detail

No leachate is discharged from the facility and the existing IPC licence issued by the EPA does not permit the discharge of any leachate to surface waters. All cells are capped within two years of completion and the capping of the cell with an impermeable liner will prevent the ingress of water thereby preventing the generation of further leachate once the cell has been capped. A leachate recirculation regime is utilised to deal with leachate generated on the site.

Within each leachate collection manhole, a submersible pump is installed. The submersible pump is controlled using a float switch to ensure leachate levels within the manhole do not exceed 1 m and when a level of 0.8 m of leachate is reached in any manhole the submersible pump is activated and the leachate pumped out of the manhole.

Currently, leachate generated in the leachate manholes is pumped via an over ground network of 100 mm diameter pressure pipes to Cell No. 7. The leachate is then absorbed by the ash currently being deposited in Cell No. 7. Leachate is distributed across the ash with the discharge of the pipe monitored and moved at regular intervals to prevent ponding of leachate on the surface.

On occasion, if rainfall levels are particularly high and leachate levels in cell No. 7 rise to 0.8 m, the leachate is pumped from the leachate collection manhole in Cell No. 7 to the leachate lagoon. A submersible pump has not yet been installed in Cell No. 7 and this pumping is carried out using a mobile pump. During periods of dry weather, the leachate is removed from the lagoon by tanker and sprayed onto uncapped ash cells to facilitate evaporation and aid dust suppression. Details of the proposed leachate collection pipes, over ground leachate pipes and leachate collection manholes are shown on **Volume 4 - Appendix 7-1 Engineering Drawings (No. PG.LRP.DR.01.006 Site Services Schematic)**.

A leachate monitoring system has been recently installed and this allows for the remote monitoring of the levels of leachate in each leachate collection manhole. Each manhole is fitted with a high level alarm system which activates when the leachate level reaches 0.9 m. In the event of a system failure (i.e. a pump fails etc.), a text message notification is sent to the site operators to inform them that there is an issue.

Once this message is received, the issue is investigated and resolved immediately to ensure that the relevant cell remains in compliance with licence conditions.

The monitoring system also records the pump starts and stops and allows for the calculation of an estimate of the volumes of leachate produced in each cell. Currently there is no leachate on Cell Nos. 4, 5 and 6. Cells 1 and 2 have minimal levels of leachate and leachate is pumped from Cell No. 3 on a regular basis.

7.3.3.2 Wastewater Discharge

Foul water produced from the toilets and vehicle wash down area within the ADF site are directed towards two systems.

Toilets located onsite are directed towards a proprietary wastewater treatment system (Puraflo system). The Puraflo system treats Suspended Solids and Biochemical Oxygen Demand (BOD) to less than 15 mg/l.

Wastewater produced from the wheel wash station is collected in a near-by underground tank. Runoff from the tank is collected in a drainage channel and directed towards the underground tank. The tank which has a flashing alarm system to indicate when it is full, is emptied via a tanker. The tanker spreads the wastewater over the operational cells where it enters the leachate management closed system. No wastewater is discharged from site. No changes to this system is proposed in the development of the new ash cells.

7.3.3.3 Surface Water Quality

Leachate and surface water samples were taken at the ADF on 19th May 2017 by Hydro Environmental Services (HES). The samples were taken at three different locations as per **Table 7-4** and illustrated in **Volume 3 - Figure 7.4: Surface Water Sampling Locations at Derraghan ADF**.

Table 7-4: Surface Water Sampling Locations

Sample ID	Location	Easting (ITM)	Northing (ITM)
A	Sample of Leachate from sump in Cell 1	606,471	762,880
B	Surface water sample from drain to south of ADF	606,691	762,628
C	Surface water sample from lagoon to south of existing ADF	606,728	762,523

- HES's report found that **Sample A** contained elevated concentrations of calcium, potassium and sodium. The analysis of the leachate sample shows

no detections of PAHs, MTBE, BTEX, VOCs, SVOCs, or Hydrocarbons. The ammonia concentration in the leachate was 0.31 mg/L as N. Elevated sulphate and chloride concentrations were also recorded in the leachate at 1,358.5 mg/L SO₄, and 1539.1 mg/L Cl.

- Results for **Sample B** showed elevated concentrations of iron and manganese at 3,175 µg/L and 253 µg/L respectively. The ammonia concentration recorded in the surface drain was 3.9 mg/L as N. This is consistent with naturally occurring groundwater concentrations. Elevated sulphate and chloride concentrations were recorded in the drain water at 380.9 mg/L SO₄, and 540.6 mg/L Cl. The analysis of the drain water sample shows no detections of PAHs, MTBE, BTEX, VOCs, SVOCs, or Hydrocarbons.
- Finally, the lagoon surface water samples (**Sample C**) shows no detections of iron and manganese, but elevated concentrations of calcium (156.7mg/L), potassium (509.3 mg/L) and sodium (560.6 mg/L). The ammonia concentration recorded in the lagoon was <0.03 mg/L as N. Elevated sulphate and chloride concentrations were recorded in the lagoon water at 622.6 mg/L SO₄, and 872.7 mg/L Cl. The analysis of the lagoon water sample shows no detections of PAHs, MTBE, BTEX, VOCs, SVOCs, or Hydrocarbons.

7.3.4 Water Supply Sources

There is one public water supply within the study area, the Lanesborough Public Drinking Water Supply. This supply is sourced from three boreholes, two at Lisrevagh about 5km from LRP and a borehole located within the former Lanesborough power station site.

7.3.5 Known Environmental Pressures¹⁴

There is one IE Licence within the study area and this is associated with the LRP Station (including the ADF) itself and one surrendered IPPC licence associated with the former Lanesborough Power Station. The Shannon (Upper) Catchment Assessment 2010-2015 (HA 26C) identified that elevated temperatures resulting from an industrial discharge is the main issue of concern regarding Shannon (Upper)_100.

Irish Water operate a Waste Water Treatment Plant (Licence no. D0229-01) in Ballyleague townland west of the study area. The Ballyleague Wastewater Treatment Plant (WWTP) discharges to Lough Ree (downstream of the LRP discharge point) and this discharge point is located within the study area.

Bord na Móna operate peat extraction under IPC licence no P0504-01. This is associated with the Mountdillion Group. The bog resources within the Mountdillion

¹⁴ Discharges, Integrated Pollution Control/Industrial Emissions Licenced Facilities and Urban Wastewater Treatment Plants

group are used for the production of milled peat which is used to supply the LRP generating station.

LRP Station is connected to the local sewer network and public water mains. The ADF is also connected to a public main water supply and is served by an onsite proprietary wastewater treatment system (Puraflo system).

The recently published catchment summary, the Shannon (Upper) Catchment Assessment 2010-2015 (HA 26C), recognised “elevated temperatures resulting from an industrial discharge is the main issue of concern regarding Shannon (Upper)_100”.

The risk category of each waterbody is outlined in **Table 7-5** in addition to the known pressures.

Table 7-5: Waterbody Risk Status

Waterbody (WFD name)	WB Code	Risk Category	Pressure
River Shannon	IE_SH_26S021600	At risk	Extractive Industry Hydromorphology Invasive Species Industry
Lough Ree	IE_SH_26_750a	At risk	Invasive Species Urban Waste Water
Lough Bannow Stream	IE_SH_26L720100	Review	Not reported
Drumnee	IE_SH_26D080850	Review	Extractive Industry
Ledwithstown	IE_SH_26L840850	Review	Extractive Industry
Lough Derrymacar	IE_SH_26_638	Review	Extractive Industry

7.3.6 Ecological Designations

There are a number of European and nationally designated sites within 15 km of the LRP Station and the ADF. Further details of all the designated areas are included in **Chapter 6: Biodiversity**. Sites within close proximity and off relevance to this surface water assessment are as follows:

- Lough Ree Special Area of Conservation (SAC) site code: 000440;
- Lough Ree Special Protection area (SPA) site code: 004064; and
- Lough Ree proposed National Heritage Areas (pNHA) site code: 000440.

7.3.7 Aquatic Ecology including Fisheries

It is noted that the waterbodies are not Salmonid Rivers under the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. 293 of 1988).

Further details of the baseline in relation to aquatic ecology and fisheries within the study area is detailed in the Synthesis Report provided to the EPA as part of the IE Licence review application) and **Section 7.4.1.1**. In summary ten species of fish where recorded in the River Shannon at the LRP Station dominated in terms of species and numbers by coarse fish and eel whereas brown trout and pollan (salmonids and coregonids) were generally represented by small and very small numbers respectively, with just a single pollan (*Coregonus atumnalis*) recorded, in October 2016.

7.3.8 History of Flooding and Flood Risk Assessment

With reference to the OPW National Flood Hazard Mapping database (www.floodmaps.ie) which contains records and locations of historic flood information, two past flood events were identified within the study area around the station site but there is no record of any flood events at the ADF.

As part of the Shannon Catchment Flood Risk and Management Study (CFRAMS) the station which lies within Unit of Management (UoM) 25/26 featured within the Predictive Flood Maps published in June 2016.

Predictive fluvial flood extent maps indicate that in the event of severe flood conditions flood waters from the River Shannon will likely encroach on the southwestern part of the property boundary during the 1% and 0.1% Annual Exceedance Probability (AEP) flood event. Also, flood waters from the Derryloughbannow encroach on a small section of the station site. However, flood extent mapping illustrates that the flood zones do not encroach on the proposed work areas.

After discussions with LRP staff, it appears that there has been some localised flooding to the north of the station site. It is thought that a culvert on the Derryloughbannow backed up and caused the river to inundate an undeveloped area within the station boundary. The extent and frequency of the flooding is not known.

The ADF did not form part of the mapping for the CFRAMS. The OPW prepared a Preliminary Flood Risk Assessment (PFRA) map for the area of the LRP ADF and as can be seen from this map the site is outside all of the predicted flood event areas and is not located close to an area considered as a Probable or Possible Area for Further Assessment. There is no record of any flood events at the site, or in the vicinity of, the ADF site.

7.3.9 Peat Supply Bogs

There are a number of waterbodies associated with these existing supply bogs. Many of the waterbodies in the vicinity of the bogs that supply LRP are of unassigned status and where ecological status is assigned this ranges from bad to good. A number of waterbodies within proximity to the peat supply bogs are considered “at risk” of not achieving their WFD objectives. Many of these waterbodies are considered to be under significant pressure from the extractive industry. Many of the waterbodies are also at risk from other significant pressure including agriculture, hydromorphology,

industry, urban waste water. A number of waterbodies have more than one significant pressures.

All the Bord na Móna supply bogs are licenced by the EPA and there are a number of conditions stipulated under each licence in order to provide for the protection of the environment by way of control, limitation, treatment and monitoring of emissions.

The IPC licences were granted in 1999 however over the period of 2012 to 2013 the IPC Licences that supply the LRP Station were subject to a technical amendment in accordance with the requirements of the European Communities Environmental Objectives (Surface Water) Regulations 2009 as amended. As a result of this process a number of modifications to the relevant conditions of the Bord na Móna licences were subsequently made through a technical amendment to the licence. This included a revised Surface Water Discharge Monitoring Programme which was submitted to the EPA in 2013 and is currently being implemented by Bord na Móna. The programme comprises a review of the existing measures in place, an assessment of the baseline conditions of the peat production areas and the receiving waters, an assessment of the effectiveness of silt pond control measures and implementation of a silt pond upgrade programme (Bord na Móna, 2016).

A review of the (Annual Environmental Reports (AERs) and the EPA Inspection Report for the period 2015-2017 was undertaken for the purpose of this assessment. The majority of sites reported no breaches with suspended solids ELVs and compliance with Threshold Limit Values (TLV) for ammonia over this period. In addition all sites related to peat supply for LRP have been subject to EPA inspection over the last two years with correction actions identified as required.

Draft rehabilitation plans of the respective bogs have been prepared by Bord na Móna and submitted to the EPA for approval as part of the respective bog grouping IPC licences, see further detail of this and the Bord na Móna Biodiversity Action Plan in **Chapter 6**.

The second River Basin Management Plan published in 2018 identified peat extraction as posing a significant risk to ecological status objectives in 119 waterbodies. Of these 119 waterbodies, 46 (or 39%) are in areas that have peatland owned by Bord na Móna. The RBMP relates environmental impacts to suspended solids, ammonia and hydromorphological alterations (DHPLG, 2018). Of the 119 water bodies where peat extraction and associated drainage works have been identified as a significant pressure, 6 are expected to meet their WFD objectives by 2021. (None of these is associated with Bord na Móna peatlands). A further 62 water bodies are expected to meet their WFD objectives by 2027. (Of these, 21 are associated with Bord Na Móna peatlands.) Another 51 water bodies are expected to meet their WFD objectives after 2027. (Of these, 25 are associated with Bord Na Móna peatlands). There are a number of principle actions proposed in the published RBMP to address these pressures at a strategic scale.

7.4 Impacts of the Development

7.4.1 LRP Station

7.4.1.1 Proposed alteration of Condition 5.5

There are no physical or operational changes proposed to the LRP station as part of this proposed development. The proposed alteration to Condition 5.5 is considered below.

LRP Station operates in accordance with the IE Licence P0610-02 issued by the EPA. Condition 4.3, Condition 5 and Schedule B5 of the licence sets and controls emission limits for emissions to waters.

Condition 5.5 states that:

“Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 15°C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point”.

Under this licence cooling water is abstracted from the River Shannon and is used to condense the steam generated to spin the turbines and generate electricity. Water is returned to the river via discharge culverts. The outfalls are located approximately 200 m downstream of the intake and approximately 160 m upstream of Lanesborough Bridge. The location of the cooling water intake and thermal cooling water discharge is shown in **Volume 3 Figure 7.5: General location of LRP Station Lanesborough.**

The principal aqueous discharge from the power station to the Shannon River is the thermal cooling water discharge. Thermal cooling water discharges have the potential to impact on the aquatic ecology of the river system directly, including fish species through potentially creating a barrier to migratory fish species, outside of the mixing zone. The current station discharges approximately 135 MWth to the River Shannon when on full load. This consists of a flow through the condenser of 4 m³/s with a temperature rise of approximately 9.5 °C. The flow through the condenser will vary slightly depending on the level of the River Shannon with a corresponding variation in the rise in temperature.

It should be noted that there has been continuous production of electricity on an adjacent site at Lanesborough, discharging thermal cooling water to the River Shannon, since 1958 when a 20 MW unit was commissioned. The station was extended in 1966 and again in 1983. The installed capacity in 1983 was 85 MW and this discharged a thermal load to the River Shannon of approximately 185 MWth which is significantly higher than the current discharge load. It consisted of a flow through the condenser of 5.5 m³/s with an approximately 9.5 °C temperature rise when on full load. This 1983 station was licenced by the EPA in May 2002 (P0629) and was decommissioned in 2003 with the licence subsequently surrendered.

Under peak load operation, the thermal load reduction to the Shannon River resulting from the decommissioning of the old power station and its replacement by the newer more thermally efficient current station, is approximately 27% thereby substantially reducing the potential impact from thermal cooling water load to the river at this

location. The continued operation of LRP station to 2020 will not result in a change in the current thermal load discharge to the river at normal operating regimes.

In compliance with Condition 6.21 of the existing IE Licence requirements, in-river thermal and biological surveys to identify the extent of the thermal plume and its potential impacts on the aquatic ecology of the receiving water have been carried out by the Aquatic Services Unit of UCC and Irish Hydrodata Limited under the management of ESBI. Aquatic ecology and fisheries studies were carried out between 2014 to 2016 with subsequent continuous in-river temperature monitoring and profiling in the period 2016 and 2017.

Fish surveys have also been undertaken during this period by ESB Fisheries (Doherty, D., 2017) who manage the salmon stock on the Shannon system and by IFI (2016). These were compared with an earlier fish survey carried out by IFI in 2010 as part of the Water Framework Directive fish monitoring programme.

The Aquatic Services Unit, UCC also prepared a literature review and risk assessment for migratory fish species on behalf of ESB at the request of the EPA.

Although the thermal monitoring studies are on-going as part of the licence requirement, the results to date have been used to assess the potential ecological impact of the thermal plume by the independent aquatic ecologist (Aquatic Services Unit, 2016;). Biotic communities sampled and analysed for composition and abundance during the aquatic ecology survey were: (i) aquatic macrophytes; (ii) benthic diatoms; and (iii) benthic macroinvertebrates.

The aim of the ESB fisheries study was to survey the area within the plume and external to the plume of the cooling water outfall point located at the LRP Station and to compare this to the IFI surveys of 2010¹⁵ and 2016¹⁶. The objective was to see if there was any difference in fish populations between the warmer water areas below the outfall point and along the thermal plume areas and into the cooler non-thermal plume affected Shannon waters. The ESB Fish studies were carried out for three sampling periods (two in 2016 and one in 2017) using fyke netting at a series of survey points upstream and downstream of the outfall. In 2016, IFI carried out a comprehensive fish assessment as part of the Water Framework Directive monitoring programme. All data was submitted to the EPA. The potential for impact on the aquatic ecology and fish species based on the reports submitted to the EPA is detailed further in Chapter 6 but is summarised below.

¹⁵ Inland Fisheries Ireland (2010) Sampling Fish for the Water Framework Directive Rivers 2010 – Shannon International River Basin District. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

¹⁶ Kelly, F.L., Matson, R., Delanty, K., Connor, L., O'Briain, R., Gordon, P., Corcoran, W., McLoone, P., Connor, L., Coyne, J., Morrissey, E., Cierpal, D., Rocks, K., Buckley, S., Kelly, K., McWeeney, D. and Puttharee, D. (2017) Sampling Fish in Rivers 2016. National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Biotic communities

Macrophytes: There were some upstream/downstream differences detected in the aquatic macrophyte communities present in relation to the thermal discharge location, but the effects of hydromorphological impacts could not be separated from other pressures. There were no fundamental changes in the macrophyte species composition between 2016 and previous years. Factors such as depth; light; flow; turbidity and drainage / dredging seem likely the strongest determinant of species distribution at the Lanesborough sites.

Diatoms: There was a clear relationship between increased water temperature downstream of the thermal discharge and decreased ecological status classification according to diatom communities. Ecological status declined from 'High / Good' at upstream sites, to 'Moderate' just downstream of the outfall, persisting 'Moderate' for up to 415 m, then returning back to Good Status at the next sampling point, 580 m downstream of the discharge location.

Macroinvertebrates: The study concludes that there is no indication from the data that the thermal discharge is unequivocally impacting the distribution or densities of most macroinvertebrate species, which appear more affected by river hydromorphology. The benthic study noted that Asian clam occurred at higher densities at sampling sites within the outfall canal experiencing on average elevated temperatures, suggesting that this species is locally enhanced by the thermal discharge. However it also notes that this effect is spatially confined. Zebra mussel was more prevalent in cooler water outside the outfall canal.

Based on a review of the above findings by the independent aquatic ecologist, it is concluded that the cooling water outfall is not having a significant effect on the local benthic ecology of the River Shannon.

Fisheries

The ESB fisheries study found perch, roach, bream, roach-bream hybrids, eel, tench, pike, gudgeon, trout and pollan in the sampled sites along the River Shannon near Lanesborough. No juvenile nor adult salmon were recorded at any sampling site. This is consistent with the findings of Inland Fisheries Ireland as part of the Water Framework Directive (WFD) fish assessments carried out in 2010¹⁵ and in the subsequent WFD Fish survey in 2016¹⁶. The study found that whilst a range of species of various age cohorts were captured, the higher densities of fish were found within the warmer water sections of the river for each of the three discrete sampling periods.

The typical Shannon silver eel (migratory phase of the eel lifecycle), migration period occurs for the period October to December each year. However, in late 2016 and early 2017, due to low river levels, the eel migration season was shown to be protracted to cover the period January - April 2017. Therefore, the silver eel captured during the last fyke net survey period was representative of the Shannon 2016/2017 silver eel migration.

The fisheries study presents an analysis of the River Shannon salmon census data for the 2016/2017 season, which indicates that the vast majority of the wild salmon

(n=1,153), which entered the upper Shannon catchment in 2016 do so during the period when the thermal plume is greatest. However, it is noted that the thermal plume at LRP Station is located in a riverine section of the Shannon whereas it is considered likely that migrating salmon will continue to inhabit the cooler and deeper waters of Lough Derg until late summer before ascending further upstream.

It is known that the warm water discharge suits various species of fish. This is aptly demonstrated by the large number of coarse fish angling activity along the eastern bank which attracts much angling activity. This survey shows that cyprinids such as perch, roach, bream, roach-bream hybrids and pike all appear to favour the warm water stretch downstream of the outfall. This increased concentration of coarse fish species has the potential to provide an increased localised feeding resource for otter.

Based on a review of the above findings and the detailed literature review and risk assessment for migratory species, it is concluded by the independent aquatic ecologist that the cooling water outfall is not having a significant negative impact on the local fisheries ecology of the River Shannon.

In conclusion, it can be stated that the thermal plume discharge is not having a significant impact on the status of the waterbodies in the Shannon system.

Invasive species

The exotic invasive species Zebra mussel and Asian clam are known to occur in the River Shannon. Trial dredging was carried out by IFI in 2015 to assess the feasibility of Asian clam eradication. The report from this trial recommends that a further extensive control programme would not be advisable. It stressed that any control programme would also increase the risk of spreading the clam to other catchments particularly in the absence of a safe disposal site in the locality. Strict bio-security conditions are currently in place for anglers who wish to fish in the outfall canal.

Chemical dosing

In addition to the thermal load, chemical dosing of the cooling water is carried out in order to eliminate the accumulation of organic deposits on the condenser tubes. Sodium hypochlorite is added intermittently to each condenser to give a residual of 0.1 ppm chlorine as Cl₂.

Boiler blowdowns also comprise discharges of high purity boiler water in which accumulation of impurities has arisen. The existing boilers are operated on a low solids regime and blowdowns are required only up to 10 times per year. Blowdown water contains small amounts of phosphate, caustic soda and ammonia, and the volume of each blowdown is approximately 20 m³.

High purity water is required for use in the boilers. Water is abstracted from three on-site wells and requires treatment prior to use. The full treatment cycle consists of sand filtration, degassing, anion and cation removal by ion exchange resins and a common mixed bed unit.

The regeneration of the ion exchange resins is by sulphuric acid and caustic soda. This results in alternate acidic and basic waste streams which are treated for pH correction prior to discharge.

Since 2014 ESB has conducted bathymetric surveys, several fish surveys, biological surveys, thermal surveys and continuous temperature monitoring assessments in conjunction with literature reviews and risk assessments with respect to migratory fish species. It is concluded that the stations cooling water discharge is having a **negative, not significant and short term** impact on the River Shannon and Lough Ree, see also **Chapter 6**.

7.4.1.2 Water Treatment – Effluent from LRP

Water is treated using exchange resins for use in the stations boiler feed. Regeneration of these resins is made using sulphuric acid (H_2SO_4) and caustic soda (NaOH). Regeneration is typically carried out twice per week with about 90 m³ of effluent per regeneration. Effluent is neutralised before discharge to the surface water system.

Condensing boiler-water is also treated using ion exchange resins and regeneration of these is carried out once per year, with up to 300 m³ of effluent per regeneration. Over half of this effluent will be de-ionised water used in the clean-up and rinsing of the resins after regeneration. Elevated levels of suspended solids will arise for short periods during polisher clean-up.

The regeneration of ion exchange resins results in alternate acidic and basic waste streams. All wastewater flows are collected in a neutralisation sump where they are mixed, monitored for pH and neutralised by addition of sulphuric acid or sodium hydroxide until a pH of 6 - 9 is achieved. This sump is automatically controlled to discharge only at a pH of 6 - 9 and will shut down if the pH is outside this range.

As is the case at present, because the effluent will be neutralised prior to discharge, it will have **negative, not significant and short term** impact on the Lough Bannow Stream, River Shannon and Lough Ree.

7.4.1.3 Water Treatment – Foul

A foul network system within the site collects all foul produced within LRP Station and discharges to a collection sump. From this sump the sewage is pumped to Longford County Council's treatment plant. There is no impact anticipated to surface waterbodies area result of foul water discharges.

7.4.1.4 Storm Water

A drainage network within the LRP Station site collects run-off from the roofs, paved areas, from controlled discharges from bunds to the bulk storage tanks and from transformed bunds.

Clean runoff is discharged through a series of 150 mm diameter land drains into a local drain to the east of the site. From here this drain flows north and connects with the Derryloughbannow to the north of the site. The Derryloughbannow discharges into the River Shannon.

Dirty water within the LRP is collected within the drainage network and passes through Class 1 interceptors located throughout the site. A settlement pond to the north of the site is also utilised. The pond discharges through a Class 1 interceptor into a 600 mm diameter pipe which flows into the Derryloughbannow and into the

River Shannon. No change to the drainage system within LRP Station is proposed.

Surface water discharges are monitored for flow, temperature, pH, conductivity, Suspended Solids, Total Dissolved Solids, Ammonia and Orthophosphate. Mineral Oils, Petroleum Range Organics, Diesel Range Organics and Oils, Fats and Greases are monitored at different intervals throughout the year. In addition the storm water discharge is visually inspected on a daily basis at the settlement pond.

Due to existing control at the station potential impact are **negative, not significant and short term** on the Lough Bannow Stream, River Shannon and Lough Ree.

7.4.2 Derraghan ADF

7.4.2.1 Construction Phase

There is no change to the permitted footprint of the ADF. The change is in relation to an increase of capacity by 130,000 tonnes within the existing footprint. The construction of the ADF cells requires excavation of peat and subsoil to approximately 45.5 m OD and the formation of embankments. The excavated peat layer will be stored temporarily on site and used for landfill capping and embankment landscaping. Excavated subsoil is generally used to construct the cell embankments.

During the excavation there is a potential for the following impacts to occur to surface water:

- Loss of suspended solids arising from run off bare earth excavated areas;
- Loss of suspended solids from spoil storage areas;
- Build-up of silt in on downstream substrates blanketing stream bottoms and excluding aquatic ecology; and
- Loss of oils and hydrocarbons from construction vehicles.

A geo-synthetic clay liner will be placed in the excavation. The depth is generally the base depth of the excavation at which the ADF liner is placed. This will involve the excavation of up to 3.9 m in peat and subsoil to facilitate placement of the liner. However, if rock or cobbles are encountered it will be necessary to remove these to provide a suitable surface for the liner. In this case, these areas will be backfilled with suitable material sourced on site. Also there will be localised excavation underneath the cell to lay a pipe for under-cell drainage. This development will result in a permanent removal of peat from the area of excavation. The majority of excavated peat and subsoil will, however, be side casted and landscaped in the immediate area.

Potential impact on Lough Derrymacar and the Ledwithstown (also known as Newtownflanigan stream) are **negative, not significant and short term**.

7.4.2.2 Operational Phase

The potential for surface water quality impact during the operational phase arises mainly from any potential leachate from the ash landfill area. In discussions with the EPA surface water quality monitoring at the ADF, which was undertaken under the

original licence at the outfall from the holding lagoon, was discontinued as all leachate collected is pumped back onto the ash landfill.

All landfilled cells are lined with a geo-synthetic clay liner to prevent leachate loss from the landfill. Completed cells have also been capped with geo-synthetic clay liner and peat layer to prevent ingress of rain water. Existing leachate within the closed cells is collected and pumped for use on the operational part of the ash landfill but this volume is reducing and will ultimately cease.

The new cells required for the additional landfill capacity will be constructed with full geo-synthetic clay liner in place and leachate will be collected and recycled on site.

Although recent surface water monitoring found high concentrations of iron, manganese, sulphate, chloride and ammonia in the drain from the ADF area, historical data indicates that these may be naturally present in the drainage system and are likely natural to the local geochemistry.

There is no apparent significant indicator that identifies the existing ADF as a major source of surface water contamination locally. Surface water runoff from the site flows into a silt pond, and discharges into the local peat bog drainage system network as discharge flow after treatment. The latter is not a significant concern, and it enters a wider drainage system that is joined by water from many other peat drains before it is pumped to any major natural watercourse.

The ammonia concentration in the drain is also consistent with the natural groundwater concentrations. While elevated sulphate and chloride concentrations were recorded in the drain water, there were no detections of PAHs, MTBEs, BTEX, VOCs, SVOCs or hydrocarbons.

Based on the above assessment and all available soils, leachate and surface water quality dataset, the risk posed to current or future site operatives at the ADF or to the environment based on the current and proposed site use as an ADF is considered to be low. Therefore the potential impact on Lough Derrymacar and the Ledwithstown (also known as Newtownflanigan stream) are **negative, not significant and short term**.

7.4.3 Decommissioning Phase

Under Condition 9 of the existing IE Licence P0610-02 a Decommissioning Management Plan (DMP) and Closure Restoration and Aftercare Management Plan (CRAMP) has been prepared by ESB and approved by the EPA. The Station and the ADF will be fully decommissioned in accordance with these plans. Potential impacts are **negative, not significant and short term**.

7.4.4 Indirect impacts - Peat Supply to the LRP Station

It should be noted that no new bog areas will be developed for peat harvesting operations and peat will be harvested from existing supply bogs only, which are currently licenced and controlled by the EPA.

There is potential for indirect impacts to occur to surface waters from the peat supply bogs to LRP Station. However, these are regulated in accordance with the conditions of IPC Licence Registration Numbers P0501-01 (Derrygrenagh Group), P0503-01 (Allen Group), P0502-01 (Blackwater Group) and P0504-01 (Mount Dillon Group).

Water Treatment / Drainage

Typical drainage on the peat production bogs consists of parallel man-made drains at 15 m centres. Production of peat is undertaken in the peat fields between each drain. The drains have been constructed to flow towards the nearest watercourse where they discharge via settlement ponds. The settlement ponds typically discharge through piped outfalls into the nearby watercourse. Silt ponds are inspected fortnightly and maintained bi-annually. Excavation and maintenance of drains is undertaken using disc ditchers, comprising rotating cutting discs.

Surface Water Quality

The peat production areas that supply peat to LRP are located within the catchment area of the Eastern River Basin District (River Boyne), the South Eastern River Basin District (River Barrow) and the Shannon International River Basin District (Shannon Upper, River Suck).

Water quality status, risks and objectives for the water bodies receiving discharges from the peat production bogs have been sourced from the EPA and are tabulated in **Appendix 7-2 Water Framework Directive Status, Risks and Objectives - Peat Supply Bog**. As illustrated in **Appendix 7-2** the majority of the bogs that supply LRP are located within water body catchment areas of Moderate / Poor Status. While there are a number of pressures affecting river water quality in this area, the SIRBDMP 2009 – 2015 does identify peat harvesting as one of the contributing pressures. A second River Basin Management Plan is expected to be published in 2017.

Further to reviews of the IPC Licences for the Derrygrenagh, Blackwater, Allen and Blackwater Groups (P0501, P0502, P0503 and P0504), trigger levels for Ammonia and COD were introduced in August 2013, requiring Bord na Móna to notify the EPA if limits are exceeded.

Impacts on water resources related to the supply bogs from the continued operation of the LRP Station under their IPC Licences are considered to be **indirect, negative, not significant and short term** with the implementation of existing control measures required under the IPC Licence and ongoing enforcement of the IPC Licence conditions by the EPA.

7.4.5 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to surface water, have been assessed.

ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to condition 5.5 do not require and physical

or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. The continued operation of the station beyond 2020 will result in the continuation of discharge from the station including the cooling water discharges. There are a number of measure in place to mitigate the potential impacts from operational discharges and it has been determined that the thermal plume is not having a significant impact therefore it has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects are anticipated. In relation to the the transition of the LRP station from peat to exclusively firing with biomass potential cumulative impact in relation to the thermal plume are considered **negative, not significant and medium to long term**.

Potential impacts in relation to the transition the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that proposed future development.

7.4.6 Flood Risk Assessment (FRA)

7.4.6.1 Ash Disposal Facility

A Flood Risk Assessment (FRA) was undertaken for the proposed development (the ADF) at the time as the planning red line boundary encompasses the ADF, see **Appendix 7.3** of the Derraghan Ash Disposal Facility Development EIAR.

There are no physical changes proposed to the station therefore no flood risk assessment for the station was required or undertaken for the Derraghan Ash Disposal Facility Development EIAR.

7.4.6.2 LRP Station

A desktop assessment showed that there is no significant risk of flooding to Lough Ree Power Station. The desktop assessment was based on “The Department of Environment, Heritage and Local Government guideline document to Planning Authorities in relation to Flood Risk Management”. The assessment considered the following:

- Risk of flooding to the proposed development from flood flow from neighbouring watercourses.
- Risk of flooding due to direct rainfall.
- Risk of flooding from groundwater.
- Impact of the presence of the proposed development on the existing flood risk regime at its proposed site. The impacts addressed under this heading comprise:
 - The impact of surface water runoff from the development on the flow regimes in neighbouring watercourses.
 - Loss of floodplain.
- Review of data on recorded historic floods
- Local knowledge

From a review of available mapping it can be concluded that the existing station is not at a risk of flooding from fluvial, pluvial or groundwater flooding. However, from speaking to station staff there has been some localised flooding to the north of the station site. It appears that a culvert on the Derryloughbannow backed up and caused the river to inundate an undeveloped area within the stations boundary. No flooding of any of the stations infrastructure was reported.

It is reasonable to conclude that the station lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management. The power station site will not increase the current flood risk in the catchment.

7.5 Mitigation

7.5.1 Derraghan ADF

The new landfill cells required to accommodate the additional ash will be constructed in accordance with the existing planning permission; in-line with good engineering practice and in accordance with the details submitted to the EPA for approval as specified in Condition 3.13.4 of the IE Licence. In addition specific mitigation set out in **Table 7-6** will be implemented.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 7-6: Derraghan ADF Mitigation Measures

Stage	Potential Impact	Mitigation Measure
Construction	Chemical and fuel oil spills/leaks	All temporary tank and drum storage areas shall be bunded. Adequate supply of containment booms and suitable absorbent material to contain and absorb any spillage or leak maintained at the ADF. Once used, the absorbent material shall be disposed of at an appropriate facility. Designated vehicle refuelling points will be implemented where vehicles can be refuelled in a controlled environment. Once construction is completed the impermeable liner will be installed to ensure bare areas within the cell structures are no longer exposed to potential erosion by rainfall events to minimise loss of suspended solids.
Operational	Leachate leak from the engineered leachate containment system	Landfill operation will be carried out in accordance with the Landfill Operational Plan required under 3.13.1 of the IE Licence and approved by the EPA. Capping of each cell when full to capacity to minimise the volume of leachate generated. Impermeable liner and good modern design in accordance with landfill directive (Council Directive 1999/31/EC) requirements which includes a leachate alarm and pumping facility. Monthly, quarterly and annual groundwater monitoring and reporting to EPA as directed by the EPA License monitoring requirements.
Decommission	Leachate overtopping the cell liner through excessive infiltration of surface water.	Monitor groundwater for capping failure and in accordance with the closure and aftercare management plan (CRAMP) for a period of 10 years following closure as agreed with the EPA.

7.5.1.1 LRP Station

No additional mitigation measures, other than existing controls and compliance with the limits regulated by the EPA, are considered necessary in terms of effluent emissions from LRP Station.

7.5.1.2 Peat Supply to the LRP Station

Derrygreenagh, Blackwater, Allen Groups and Mountdillion of Bogs are regulated by the EPA under IPC Licences Registration No's. PO501-01, PO502-01, PO503-01 and PO504-01. The following mitigation measures see **Table 7-7** are conditioned under the IPC licencing regime, as regulated by the EPA.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 7-7: Mitigation Measures Associated with the Peat Supply Bogs

Potential Impact Type	Mitigation Measure
Surface Water Quality	All drainage water from all bog lands in the licensed area is discharged via an appropriately designed silt pond treatment arrangement
	Silt ponds serving operational bogs shall be cleaned at a minimum twice a year, once before ditching and once before harvesting, and more frequently as inspections may dictate
	Drainage manholes are protected and maintained free of excessive peat
	Headlands are kept clean and free of excessive loose peat
	All new manholes and outfalls are set well back from turning grounds, drivers of bog plant do not turn short (over drains) at headlands
	Harrows, millers, ridgers do not drag loose peat onto manholes or into drains, outside harrow spoons are directed away from drains
	Silt run-off, while piping or ditching, is minimised
	Outfalls are controlled to minimise silt discharge during cleaning operations
	Drains are ditched in dry weather
	While ditching, outfalls are blocked and ditch towards outfall
	Outlets from stockpile field drains are blocked during stockpile loading
	Field drains adjacent to stockpiles are cleaned as soon as practicable after stockpile loading
	Adequate room is allowed for rail bed beside Peco stockpiles
	All fields that have been milled are ridged at the end of the production season
	All fields liable to winter flooding have been cleared of milled peat or re-compacted at the end of the production season
Flood Risk	Continued implementation of Bord na Móna Energy Limited's programme of improvements
	All silt ponds prone to flooding will be de-silted by 1 st November of each year. Excavated sludge will be removed for disposal to a location outside the flood plain
	All silt ponds serving operational bogs will achieve the following minimum performance criteria (flood periods excepted): Maximum flow velocity < 10 cms-1 Silt design capacity of lagoons, minimum 50m ³ per net ha of bog serviced
	All fields liable to winter flooding will be cleared of milled peat or re-compacted at the end of the production season
	Continued implementation of Bord na Móna Energy Limited's rehabilitation plans for former peat production bogs

In the second cycle River Basin Management for Ireland 2018 – 2021 peat extraction has been identified as a significant risk to ecological status objectives in 112 waterbodies (10% of all waterbodies that have been determined as being at risk). The environmental impacts generally relate to suspended solids, ammonia and hydromorphological alterations. There is therefore potential for surface water run-off associated with peat extraction activities to adversely impact on surface water quality downstream of discharge points, if it is not managed effectively. However, discharges from the bogs that supply fuel to LRP Station are regulated and controlled by the EPA under the IPC licensing regime. All licences have been examined and revised by the EPA in line with the objectives of the Water Framework Directive.

In addition specific actions have been identified in the draft second cycle River Basin Management Plan 2018 – 2021:

- The Minister for Housing, Planning, Community and Local Government intends to enact regulations in 2017 to enhance assessment and control of licenced peat harvesting activities, both those controlled by the EPA and under a new Local Authority System for smaller peat extraction activities.
- The Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs will oversee the implementation of the Peatland Strategy the principal aim of which is to provide a framework for determining and ensuring the most appropriate future use of cutover and cutaway bogs.
- Bord na Mona will implement its Sustainability 2030 Strategy and Biodiversity Action Plan 2016-2021 which addresses the long-term rehabilitation of its cutaway bogs.
- Bord na Mona, in conjunction with the EPA, will assess measures to mitigate the generation and impact of ammonia where this is identified as a significant risk.

Bord na Móna is implementing a programme of rehabilitation (drain blocking, rewetting, vegetation) plans in order to stabilise former peat production areas and enhance biodiversity. The rewetting of former peat production areas and the development of wetland habitats will inevitably reduce potential for loss of suspended solids to the drainage network and ultimately to the Shannon river system, Boyne river system and Barrow river system.

7.6 Residual Impacts

7.6.1 Derraghan ADF

With the implementation of good engineering practice and mitigation measures during construction there will not be any significant residual risk to surface waters.

During the operational phase of the landfill, due to the internal closed circular system of the leachate management system onsite no discharges into the local watercourses are expected. Rain falling on the closed capped cells is distributed into the local watercourse through a separate system which includes toe drains and a piped system. This water is of an acceptable level to discharge into the local network. It is

not considered that the proposed development will have any significant environmental impacts on the local surface water regime.

Post operational phase the landfill will be closed restored and managed in accordance with the CRAMP approved by the EPA. No residual impact will occur to surface waters.

7.6.2 LRP Station

The potential impact on the receiving water of contributions from LRP Station will continue to be controlled under the IE Licence issued to the plant. Any additional requirements will be addressed through Technical Amendment or an IE Review process as appropriately determined by the EPA.

7.6.3 Peat Supply to the LRP Station

Once peat harvesting operations have been finished bare peat areas in the supply bogs will undergo a programme of rehabilitation including rewetting and revegetation. Potential loss of suspended solids and potential for ammonia generation will reduce ultimately to natural background levels.

Residual impacts are defined as those remaining after mitigation measures have been implemented. Generally, a proposed development adequately considers the surface water issues into its design, so that its impacts on the existing environment are minimised to an acceptable level of slight residual impacts. Occasionally, where significant impacts cannot be avoided or reduced, the consequences of significant residual impacts in light of planning policies and legislation should be considered. Significant residual environmental effects may be offset by appropriate compensatory measures nearby/elsewhere (IEEM, 2006).

Based on a review of the proposed mitigation measures described above, it is concluded that the development of the ADF, will have no residual negative impacts.

7.7 'Do Nothing' Scenario

The EIS which accompanied the 2001 planning applications for LRP and the ADF sought permissions to dispose 550,000 tonnes of peat ash at the ADF in order to serve the power station up to 31st December 2020.

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. At that time LRP Station would face decommissioning of the power station without the means of continuing to dispose of peat ash at the ADF.

The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

Should closure of the ADF and decommissioning of the power station occur, the impacts in relation to Surface Water would entail the cessation of surface water discharges and development of disposal cells; there would be no additional impact to surface water. An associated overall reduction in peat harvesting from some surrounding Bord na Móna supply bogs would also occur. This impact is considered to be **positive, not significant and long term**.

7.8 Interaction of the Foregoing

Impacts relating to Surface Water have the potential to be impacted by other environmental aspects including Groundwater and Biodiversity. This is addressed in **Chapter 13**.

For inspection purposes only.
Consent of copyright owner required for any other use.

8 Land, Soils, Geology and Hydrogeology

8.1 Introduction

This chapter of the EIAR assesses the impacts with respect to land, soils and hydrogeology, for the proposed development.

The proposed increase in capacity at the ADF will be located within the same site which was subject to EIA in 2002, with the same prevailing groundwater conditions and within the same context for the assessment of impacts on water. The proposed development is identical to the development assessed under that EIA.

In addition, the potential indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to ground water are also considered.

8.2 Methodology

A desk study of the proposed development site and surrounding area was largely completed prior to the undertaking of the site survey and walkover assessment. The desk study involved collecting relevant geological, hydrological and hydrogeological and meteorological data for the area.

The following sources and publications were utilised in the preparation of this chapter:

- Environmental Protection Agency database (www.epa.ie);
- Environmental Protection Agency – “Envision” Map Viewer (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive “WaterMaps” Map Viewer (www.wfdireland.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 12 (Geology of Longford and Roscommon). Geological Survey of Ireland (GSI, 2003); and
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).

The desk study also included consultation with existing reports and documents including:

- Ash Deposition Facility (ADF), Derraghan, Co. Longford Phase 2 – Environmental Assessment Report for existing ADF, Final Report, Ref P1395-1-0100, 19 July 2017 by Hydro Environmental Services (HES);
- Lough Ree Power Generating Station IE License P0610-02 Annual Environmental Reports by ESB (2013-2016);
- “Lough Ree Power Station and Ash Disposal Facility – Site Investigation: Factual Report” by Causeway Geotech (May 2017);
- “ESB Lough Ree Power Hydrogeological Assessment” completed by AECOM (June, 2015);

- “ESB Lough Ree Power Further Environmental Assessment 2015” completed by AECOM (November, 2015);
- “Water Framework Directive Groundwater Monitoring Programme, Lanesborough – ESB” by EPA (August 2011);
- “Water Framework Directive Groundwater Monitoring Programme, Lanesborough – Lisreevagh BHs” by EPA (August 2011);
- “Environmental Exit Audit: Networks Area, Former ESB Power Generating Station, Lanesborough, Co. Longford” completed by URS (November, 2009);
- “Lanesborough New Peat Power Station Project Environmental Impact Statement” by ESBI International (February 2001);
- “Conceptual Ground Water Model For Ground Water And Solute Transport Model For A Proposed Ash Disposal Area At Lanesborough, Co. Longford” by O’Neill Ground Water Engineering (January 2001);
- “Lanesborough Peat Station New Ash Disposal Area Site Investigation” completed by Glover Site Investigations Ltd (November 2000);
- “New Peat Fired Generating Station and Ash Landfill at Lanesborough, Investigation of Soil and Groundwater” by ESBI (November, 2000); and
- “Site Investigation at Lanesborough Generating Station” by Irish Geotechnical Services Ltd. (IGSL) (November 1998).

8.3 Receiving Environment

8.3.1 LRP Station

The station is located on an existing brownfield site located on the banks of the River Shannon, in the village of Lanesborough. The station is located on the regionally important karst aquifer. There is therefore potential for impact on the karst aquifer to occur from the power station. As an active power generation station, there is a potential from ongoing site activity including fuel oil storage, chemical storage, former ash disposal facilities to impact the underlying hydrogeology. The ADF landfill receives ash from the LRP Station as a waste from the fuel combustion process.

8.3.1.1 LRP Station Geology

According to GSI mapping, the development site contains a number of soil types (www.gsi.ie). The shallow soil includes glacial and fluvial soils which vary in extent and depth across the LRP Station. The most common soil type within the station site is cutover / cutaway peat (Cut) which is mapped over the north-eastern half of the power station site. The south-western half is divided by an area mapped as deep well drained mineral soils derived from mainly basic parent material (BminDW) and area mapped as made ground and mineral alluvium along the western boundary of the station by the River Shannon. However given the continued use over the past 16 years as a power generating station, the shallow soils can be considered made ground due to the existing infrastructure on site including the former and current plant building locations, roads, utilities and former ash ponds.

Several phases of ground investigation have been completed at the LRP Station site over the years. **Table 8-1** below presents the generalised geology reported during previous site investigations undertaken between 1998 (IGSL, 1998) and 2017

(Causeway 2017). A cross section is presented in **Volume 4 - Appendix 8.1 Environmental Site Assessment Report** (HES 2017).

Table 8-1: Generalised Geology

General Geology	Depth (meters below ground level)	Description
Made Ground	0.3-3.7	Peat Ash in ash disposal areas Silty gravelly Clay with cobbles and boulders (possibly reworked Clay). Clay interbedded with Ash and Sand ash disposal areas.
Peat	2.7 – 4.70	Brown pseudo-fibrous Peat with thin lenses of clay in places.
Gravelly Clay	0.1-10.60	Silty Gravelly Clay with some cobbles and boulders
Sandy Silt	2.55 -8.0	Sandy Silt with gravel fragments of Limestone
Silty Gravel	4.0-10.30	Silty sandy Gravel
Rock Head	1.70 - 7.80	Confirmed Limestone Rock Head

**Gravelly Clay, Sandy Silt and Silty Gravel was inconsistently encountered across the site attributable to glacial environment in which it was laid down.

8.3.1.2 Bedrock Geology

The GSI Sheet No. 12, Bedrock Geological Map of Central Ireland identifies the underlying bedrock geology as Dinantian Upper Impure Limestone (DUIL) comprising Visean Limestone and Shale (VIS). The depositional environment is shallow water. The Limestone is known to be fractured and karstified in places, however the extent and degree of the karstification has not been determined.

8.3.1.3 Hydrogeology

The Visean limestone which is mapped to underlie the LRP Station is classified by the GSI as a Regionally Important Aquifer – Karstified (conduit) (Rkc). This is part of the Funshinagh GWB, the same GWB as underlying the LRP Station ADF see **Volume 3 - Figure 8-4: LRP Station & Derraghan ADF – Aquifer Classification**. Diffuse recharge occurs over the entire GWB via rainfall percolating through the subsoil. Karstic features such as swallow holes and collapse features provide the means for point recharge in this bedrock. Groundwater in this water-body generally shows a rapid response to recharge. Due to the high level of interaction between groundwater and surface water in karstic aquifers, microbial pollution can travel quickly from the surface into the groundwater system. The normal filtering and protective action of the subsoil is often bypassed in karstic aquifers due to the number of swallow holes, dolines and large areas of shallow rock (GSI 2003). There are no local mapped karst features that may cause groundwater flooding, however there is a cluster of karst features identified by the GSI, including springs and enclosed depressions, located approximately 2.5 km southwest of the site.

8.3.1.4 Groundwater Wells

A review of available information on groundwater abstraction wells, including the GSI database, was undertaken to identify any such wells within or in close proximity to the station.

The GSI database identified 3 abstraction wells within 500 m of the station, see **Table 8-2**. The closest well to the development site, 2025NWW107, is approximately 50 m to the west of the station towards the Shannon River.

A much deeper second well (2025NWW114 / 2000PUB1009) is present close to this well and is used to supply potable water to the local area. This well together with 2 wells at Lisreevagh collectively abstract, when productive, approximately 4000 m³/day providing potable water to the local area. These three abstraction wells are managed by Irish Water however no details in relation to water quality are available.

A groundwater Zone of Contribution (ZOC) has not been fully defined for this well due to the karastic nature of the bedrock as well as its proximity to the river Shannon which likely hydraulically connected to the well. The EPA have identified a ZOC which encompasses LRP Station, Lanesborough town and the wide area to the south and southwest of the site. Anecdotal evidence indicates this well is currently not operational due to a bacterial issue identified in the water quality.

A second abstraction well is located approximately 480 m to the north east of the site and is registered for agricultural and domestic use.

Table 8-2: Summary of GSI Well Data

GSI Name	Type	Total Depth (m)	Depth to Bedrock (m)	Drill Date	Easting	Northing	Use	Estimate Distance From LRP Station
2025N WW107	Borehole	22.5	6.1	December 30 1989	200830	269580	Industrial	50m
2025N WW114	Borehole	n/a	100	December 30 1989	200850	269500	Public Supply	50m
2025N WW104	Borehole	24.8	6.1	December 30 1989	201750	269770	Agricultural and Domestic	480m

In addition to the GSI wells, there are three onsite abstraction wells installed in the limestone bedrock which are used as required to supply non-potable water to the power station.

Under European Union (Water Policy) (Abstractions Registration) Regulations 2018, it is obligatory to register with the EPA, new and existing abstractions of groundwater greater than 25 m³/s. It is not currently a statutory requirement to register or report an abstraction well below this value. Consequently, there may be other unregistered wells locally.

8.3.1.5 Aquifer Vulnerability

Aquifer vulnerability maps produced by the GSI are based on the type and thicknesses of subsoils (glacial sands, gravels, tills or clays, peat and alluvial silts

and clays), and the presence of karst features. It is considered that bedrock aquifers are most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes.

All land area is assigned one of the following groundwater vulnerability categories: Rock near surface or karst (X), Extreme (E), High (H), Moderate (M) and Low (L).

Aquifer vulnerability for the development site is classified by GSI as being (H) – High Vulnerability status due to the highly permeable alluvial deposits overlying the bedrock. This is demonstrated in **Volume 3 - Figure 8.5: LRP Station & Derraghan ADF – Ground Water Vulnerability**.

8.3.1.6 Geological Heritage Sites

A review of the GSI mapping to identify sites of geological heritage within surrounding area indicated that there are no geological heritage sites in the vicinity of LRP Station.

8.3.1.7 Geo-Hazards

According to the GSI on-line database, the landslide susceptibility has been classified as low. There are no identified landslide records for the immediate area.

8.3.1.8 Groundwater Quality

Groundwater monitoring is undertaken on an annual basis at the LRP Station site as part of the IE Licence requirement and reported to the EPA in the Annual Environmental Report. Groundwater quality monitoring is undertaken in accordance with the EPA IE licence P0610-02 for the site at borehole locations GW-01 and GW-02.

In 2017, additional site investigation boreholes were drilled from which groundwater samples were collected from groundwater monitoring wells installed at the LRP Station. An analysis of the groundwater monitoring data at LRP Station compared to the Groundwater Threshold Values (GTVs) in the European Communities Environmental Objectives (Groundwater) Regulations, 2010, (S.I. No. 9 of 2010) where available indicates the following:

- One exceedance of sodium metal concentration GTV at a former monitoring location designated as ESB GW8 (Old). This location is outside the IE Licence station boundary and is located close to the Shannon River. It is not normally monitored. There were no exceedances of the GTV for sodium at any other monitoring location.
- No exceedance of PAH limit values were detected
- No exceedance of pesticide limit values were detected
- No exceedance of Aliphatics limit values were detected
- No exceedance of Aromatics limit values were detected
- With respect to other physico-chemical parameters elevated levels of Sulphate were detected in BH01/17 and GW08 located in the LRP Station (554.6 and 587.6 mg/l as SO₄).

A Baseline Report has been provided to the EPA as part of the IE Licence Review application. This report provides information in relation to Article 22(2) of the IED as follows:

- information on the present use and, where available, on past uses of the site; and
- where available, existing information on soil and groundwater measurements that reflect the state at the time the report is drawn up or, alternatively, new soil and groundwater measurements having regard to the possibility of soil and groundwater contamination by those hazardous substances to be used, produced or released by the installation concerned.'

8.3.2 The ADF

The ADF is an engineered landfill currently comprising 7 No. cells complete with a geo-synthetic clay liner (GCL) at the base of each cell. The GCL consists of sodium bentonite clay, supported by geotextiles, which forms another hydraulic barrier, to prevent leachate migration to groundwater. The landfill is subdivided into cells which are filled sequentially. The GCL is overlain with a composite drainage layer (CDL), which collects any leachate generated. The CDL falls to a leachate collection drain at one end of each cell, which transfers leachate to a leachate monitoring manhole. Collected leachate in the leachate sump (in each cell) is either pumped over the ash as a means of dust suppression and compaction or pumped to the lined lagoon using an electrical submersible pump for temporary holding. The site does not have a licence to discharge leachate to a local surface waterbody.

As each cell reaches capacity, the cell is capped with a low permeability GCL. In turn the GCL is covered with a minimum thickness of local peaty soils. As a result of the cell capping, leachate production at the ADF will eventually cease.

Both site investigation and groundwater quality monitoring boreholes have been installed as part of the development history of the Derraghan ADF site.

Site investigation commenced in 2000 with groundwater sampling at eight boreholes (BH01, BH02, BH03, BH04, BH5, BH6, BH7 and BH8), see **Volume 3 - Figure 8.1: Boreholes Locations at Derraghan ADF**. Four wells were converted to groundwater monitoring wells (GW03, GW04, GW05, GW06). Groundwater quality monitoring is undertaken in accordance with the EPA IE licence P0610-02 for the site at borehole locations GW3-GW6 and reported in the AER of the station, these boreholes are coincident with BH01 (GW03), BH04 (GW-04), BH06 (GW-05) and BH08 (GW-06) which were installed in 2000.

In 2017, additional site investigation boreholes were drilled in 2017 from which groundwater samples were collected from groundwater monitoring wells installed at BH03/17, BH04/17, BH5A/17, BH06A/17. Groundwater at GW4, GW5 and GW6 were also monitored as part of the 2017 programme. A summary of groundwater wells monitored in 2000, to comply with the sites IE Licence requirements and in 2017 for groundwater quality is provided in **Table 8-3**.

Table 8-3: Groundwater Wells Monitored

Borehole Excavation Year - 2000	IE Compliance Licence Monitoring well ID	2017 Water Monitoring wells
BH01	GW-03	BH03/17

		BH04A/17
BH02	-	BH05A/17
BH03	-	BH06A/17
BH04	GW-04	GW-04
BH05	-	
BH06	GW-05	GW-05
BH07	-	
BH08	GW-08	GW-06

The locations of the monitoring wells are provided in **Volume 3 - Figure 8.1: Boreholes Locations at Derraghan ADF**

Water quality based on data recorded is provided in the groundwater Environmental Site Assessment Report completed by HES, provided in **Volume 4 - Appendix 8.1 Environmental Site Assessment Report**.

8.3.2.1 ADF Geological setting

According to Geological Survey of Ireland (GSI) mapping, the topsoil for the ADF site is cutover / cutaway peat (www.gsi.ie). The mapped subsoil type (www.gsi.ie) for the ADF site is cutover raised peat. A subsoil map of the area is shown in **Volume 3 - Figure 8-2: LRP Station & Derraghan ADF – Soils Formations**.

The EIS produced in 2001 identified the underlying geology as Carboniferous Navan Group, locally important Argillaceous Limestone. The GSI have subsequently updated the regional geology maps. The GSI maps now show the underlying bedrock geology of the ADF site differs on the north and south of the site, see **Volume 3 - Figure 8.3: LRP Station & Derraghan ADF – Bedrock Formation** showing the bedrock of the local area.

GSI Sheet No. 12, Bedrock Geological Map of Central Ireland, indicates that the northern section of the ADF site is underlain by the Carboniferous Navan Group, specifically the Meath Formation (ME). The ME formation includes Dinantian (early) Sandstones, Shales and Limestones (DESSL). The bedrock geology underlying the southern portion of the site is mapped as Dinantian undifferentiated Limestones (DPBL) comprising Visean limestones (VIS). The GSI maps indicate this limestone encompasses large areas of east Galway and Roscommon including the LRP Station.

There are no bedrock outcrops within the ADF site. There is a mapped fault line that crosses the ADF site in a northeast-southwest manner where the geology of the site changes.

Table 8-4 below presents the generalised geology reported during previous site investigations undertaken between 1998 and 2017.

Table 8-4: Summary of General Geology

General Geology	Depth (meters below ground level)	Description
Peat*	0.0 – 5.0	Brown pseudofibrous Peat
Gravelly Clay	3.9 -17.00	Silty Gravelly Clay with cobbles and boulders
Sandy Gravel**	5.0-13.10	Sandy Gravel with cobbles and fine to medium Sand
Rock Head	3.2 - 16.60	Limestone***

* Peat was not encountered in one borehole (Causeway Site Investigation, 2017, location LRA BH02/17) located to the south of the proposed development. **Sandy Gravel was inconsistently encountered across the site attributable to glacial environment in which it was laid down. *** In Causeway site investigation undertaken in 2017, a grey siltstone was reported by the driller at the time of drilling in BH3A at 5.70mbgl. Due to coring techniques, a sample of this rock was not collected, though it is considered likely that the rock may be Limestone.

8.3.2.2 Hydrogeology

Shallow groundwater is present in the soils above the bedrock. Due to the nature and extent of this groundwater, this water is not classified as an aquifer by the GSI.

The Meath Formation which is mapped to underlie the northern section of the ADF site, is classified by the GSI as a Locally Important Aquifer, having bedrock which is moderately productive only in local zones (LI). The bedrock is part of the Inny Groundwater Body (GWB). Diffuse recharge occurs over this entire GWB via rainfall soaking through the subsoil. Overall the flow direction is likely to be towards Lough Ree in the southwest of the GWB, see **Volume 3 - Figure 8.4: LRP Station & Derraghan ADF – Aquifer Classification**.

The Visean limestone which is mapped to underlie the southern section of the ADF site is classified by the GSI as a Regionally Important Aquifer – Karstified (conduit) (Rkc), see **Volume 3 - Figure 8.4: LRP Station & Derraghan ADF – Aquifer Classification**. This is part of the Funshinagh GWB, the same GWB as underlying the LRP Station site. Diffuse recharge occurs over the entire GWB via rainfall percolating through the subsoil. Karstic features such as swallow holes and collapse features provide the means for point recharge in this bedrock. Groundwater in this body generally shows a rapid response to recharge. Due to the high level of interaction between groundwater and surface water in karstic aquifers, microbial pollution can travel quickly from the surface into the groundwater system. The normal filtering and protective action of the subsoil is often bypassed in karstic aquifers due to the number of swallow holes, dolines and large areas of shallow rock (GSI 2003). There are no local mapped karst features that may cause groundwater flooding, however there is a cluster of karst features identified by the GSI, including springs and enclosed depressions, located approximately 3.8 km west of the site.

Overall groundwater (bedrock) flow will likely be towards Lough Ree but the highly karstified nature of the bedrock means that locally, groundwater flow directions can be variable. At the ADF site, the groundwater flow is likely to follow the topography of the area, flowing from north to south-southwest towards Lough Ree.

OGE (2001) report shallow groundwater (overburden) flow direction in the area of the ADF is in a south direction. This is based on water level data collected on 8th November 2000. AECOM (2015) shallow groundwater flow direction was determined as west-southwest. This was with the exclusion of GW05 as this well is screened in bedrock and the remainder of the wells are screened in the groundwater present in the overburden.

Water level dip data taken prior to the 2017 groundwater sampling event was used to assess the shallow groundwater flow direction and confirmed groundwater flow is towards the south-southwest (HES 2017), illustrated on **Figure F** presented in **Volume 4 - Appendix 8-1 Environmental Site Assessment Report**. The groundwater gradient is calculated to be approximately 0.01 which is relatively gentle and consistent with the local topography (HES 2017).

8.3.2.3 Aquifer Vulnerability

The GSI defines groundwater aquifer vulnerability as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Aquifer vulnerability maps produced by the GSI are based on the type and thicknesses of subsoil (glacial sands, gravels, tills or clays, peat and alluvial silts and clays), and the presence of karst features. It is considered that bedrock aquifers are most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes.

All land area is assigned one of the following groundwater vulnerability categories by the GSI: Rock near surface or karst (X), Extreme (E), High (H), Moderate (M) and Low (L).

Aquifer vulnerability for the development site is classified by GSI as being (L) – Low Vulnerability status, becoming moderate to high northwest of the site. This is demonstrated in **Volume 3 - Figure 8.5: LRP Station & Derraghan ADF – Ground Water Vulnerability**. This classification suggests an overburden thickness at the site of greater than 10 m of low permeability soil, as illustrated in the cross section **Figure 2** presented in **Volume 4 - Appendix 8-1 Environmental Site Assessment Report**. A firm to stiff clay is encountered across the site at depth between 3.7 m bgl and 17 m bgl and acts as an aquitard which retards the movement of groundwater from the shallow overburden to the underlying bedrock aquifer.

8.3.2.4 Groundwater Wells

A review of available information on groundwater abstraction wells, including the GSI database, was undertaken to identify any such wells within or in close proximity to the ADF site.

GSI wells database did not identify any wells within 500 m of the ADF site. The closest well to the **Table 8-5**.

Table 8-5: Summary of Local Well Data

GSI Name	Type	Total Depth (m)	Depth to Bedrock (m)	Drill Date	Easting	Northing	Use
----------	------	-----------------	----------------------	------------	---------	----------	-----

2025NWW100	Borehole	42.4	0.6	Unknown	208910	263100	Unknown
------------	----------	------	-----	---------	--------	--------	---------

Under European Union (Water Policy) (Abstractions Registration) Regulations 2018, it is obligatory to register with the EPA, new and existing abstractions of groundwater greater than 25 m³/s. It is not currently a statutory requirement to register or report an abstraction well below this value. Consequently, there may be other unregistered wells locally.

8.3.2.5 Geological Heritage Sites

GSI mapping was reviewed to identify sites of geological heritage within surrounding area. There is no evidence of any site in the immediate area of the ADF site identified as suitable for protection. The nearest geological heritage site is the Corlea Trackway (Code: LD006) located approximately 3.5 km east of the ADF site.

8.3.2.6 Geo-Hazards

According to the GSI on-line database, the landslide susceptibility has been classified as low. There are no identified landslide records for the immediate area.

8.3.2.7 Soil & Groundwater Quality

There are no known areas of soil contamination (with the exception of the cells containing the peat ash) on the site. The site is subject to regulatory monitoring by the EPA under the conditions detailed in the IE License P0610-02 whereby the sites activities and impacts to the natural environment are monitored and controlled. As part of this monitoring, shallow groundwater quality was the subject of a review in 2014-2015 for parameters including ammonia, pH, Iron, arsenic and hydrocarbon concentrations in the shallow groundwater. Specialist environmental consultants AECOM were commissioned to assess the source and nature of these elevated parameters. Two separate reports were produced and submitted to the EPA in 2015.

In summary, AECOM concluded that the on-site sampling methodology was the cause of historical variations in reported groundwater metal concentrations as groundwater samples were not filtered on site; possible erroneous data entry may have been responsible for previous sampling data results; and that Iron and ammonia concentrations from leachate analysis completed on an ash sample (from the ADF) indicate they were both below laboratory detection limits. This indicates that ash leachate is not the cause of elevated iron and ammonia data at ADF groundwater monitoring points.

A further review of the soil and groundwater quality was completed in 2017 (HES 2017) which looked at all available data including site setting, historical and recent groundwater quality data as well as surface water quality data. The following are the main conclusions of this assessment which is presented in **Volume 4 - Appendix 8-1 Environmental Site Assessment Report**.

- Groundwater sampling was undertaken in November 2000, prior to any operation of the ADF. This was part of the baseline assessment of the ADF site for the EIS which was submitted in February 2001 with the planning application for the LRP [power station] and ADF at that time. The results have been compared to the EPA Interim Guideline Values (IGV) for groundwater,

the groundwater regulation values (S.I. No. 9 of 2010) and the drinking water regulations (S.I. No. 122 of 2014). Of note are elevated concentrations of arsenic, manganese, ammonia (as NH₄), and total and faecal coliforms. There were no iron detections above lab limits in any of the groundwater sampled at that time. These data indicate that arsenic, manganese and ammonia are naturally high in the area of the site, and result from the local subsoil and bedrock geochemistry. Detections of arsenic, manganese, zinc, selenium and aluminium are attributed to natural background conditions underlying the site confirmed by the leachate testing undertaken on natural soils across the site, up-gradient conditions and typical groundwater conditions in peatland environments;

- AERs (2012-2016) for the site identified recurring exceedances of threshold levels in groundwater in relation to low pH, iron, ammonia, hydrocarbons and arsenic;
- The low detections of hydrocarbons have reduced to concentrations below detection limits for 2015 and 2016 AERs, suggesting no connection to the operation of the ADF. In 2017, no detections of hydrocarbons were recorded;
- Soil data collected at that time were within general soil quality standards for metals in Irish soils. The low levels of pH are common in peatland environments due to decay of peat;
- The HES 2017 report reviewed soil data and concluded that no significant man made contamination is present at the site;
- A Generic Quantitative Risk Assessment (GQRA) was undertaken to assess potential risk to the site workers and the environment from continued use of the site as an ADF. This assessment concluded that the risk to site workers from the current use of the site is deemed to be low. It further concluded that there is no significant indicator that identifies the existing ADF as a source of groundwater contamination and that the environmental risk posed to the groundwater by use of the site as an ADF is considered to be low; and
- Soil analysis data sampled in 2017 as part of the extensive site investigation works at the ash disposal facility site demonstrated, no significant man made contamination at the site with reported concentrations being below the laboratory detection limits for PAHs, MTBE, or BTEX. No exceedance of the generic risk based screening criteria (S4ULs) were recorded for the existing commercial end-use of the site and therefore the risk to human health from the current use of the site is deemed to be low.

In addition Ammonia concentrations in GW03 and GW04 are increasing based on historical data analysis. However GW03 is up-gradient of the ADF, and GW04 is reported as across gradient of the ADF, and these increases are not related to the operations at the ADF.

8.3.3 Peat Supply Bogs

There are a number of groundwater bodies associated with these existing supply bog as shown in **Figure 8.6** and detailed in **Appendix 8.2**. The GSI data indicates that

the supply bogs are underlain by Regionally Important (Karstified) and Locally Important (Moderately productive) aquifers, see **Appendix 8.2**.

Figure 8-7 indicates the groundwater vulnerability of the Bord na Móna peat supply bogs based on the GSI groundwater vulnerability mapping. The GSI data and mapping indicates that groundwater vulnerability beneath the peat supply bogs is largely classed as low to moderate with very small areas classed as High, Extreme and X (rock near the surface, 0.2 hectares of Derraghan bog for example), see **Appendix 8.2**.

A review of the recently published, (December 2018), WFD Catchment Management Plans, <https://www.catchments.ie/>, for catchments relevant to the peat supply bogs was undertaken. Relevant data with respect to risks posed to groundwater bodies have been extracted with respect to the groundwater bodies beneath the peat supply bogs and is summarised as follows in **Table 8-6**.

Table 8-6: Catchment Management Plans Groundwater Risk Summary

Catchment Management Plan	Risk to Groundwater
Boyne Catchment Assessment 2010-2015 (HA 07)	The groundwater bodies At Risk are being impacted primarily by agriculture. In addition, Trim groundwater body is also being impacted by domestic waste water. IE_EA_G_066 and IE_EA_G_083 are impacted by waste from waste disposal facilities; whereas IE_EA_G_029 is impacted by an industrial site
Barrow Catchment Assessment 2010-2015 (HA 14)	The significant pressure affecting the IE_SE_G_005 groundwater body is the licenced industrial facility P0247-01. The key concern is trichloroethylene (TCE)
Lower Shannon (Brosna) Catchment Assessment 2010-2015 (HA 25A):	There is one At Risk groundwater body which relates to the drainage of Clara Bog
Upper Shannon (Lough Ree) Catchment Assessment 2010-2015 (HA 26E)	There are no At Risk groundwater bodies within the catchment
Shannon (Upper) Catchment Assessment 2010-2015 (HA 26C)	The significant pressure affecting the Carrick on Shannon groundwater body IE_SH_G_048 is diffuse agriculture where concentrations of phosphate are an issue in the At Risk surface water bodies

Catchment Management Plan	Risk to Groundwater
Upper Shannon (Suck) Catchment Assessment 2010-2015 (HA 26D)	There are no At Risk groundwater bodies within the catchment
Upper Shannon (Inny) Catchment Assessment 2010-2015 (HA 26F)	There is an At Risk groundwater body Derravarragh (IE_SH_G_077) which is potentially being impacted by agriculture; and another groundwater body IE_SH_G_261 which is At Risk of being impacted by industry, (Industrial Facility (P0690-01))

In terms of environmental pressure on groundwater from peat extraction only one groundwater body has been identified as being at risk from such extractive activities in the Irish River Basin Management Plan 2018-2021¹⁷. The groundwater body (IE-SH_G-039) at risk from the extractive industry has been identified (source <https://www.catchments.ie/maps/>) as being associated the Clara Bog SAC which is a groundwater dependent terrestrial ecosystem. The location of this with respect to the peat supply bogs serving LRP is shown on **Figure 8.8**. None of the LRP peat supply bogs are located on this groundwater body and therefore do not contribute to the identified extractive industry pressure acting on it.

The WFD status for all the groundwater bodies within close proximity to peat production bogs (50m buffer zone) are tabulated in **Appendix 8.2** also. All of the groundwater bodies in the vicinity of the bogs that supply LRP are at Good status, see **Appendix 8.2** and **Figure 8.10**.

The Bord na Móna supply bogs are licenced by the EPA and there are a number of conditions stipulated under each licence in order to provide for the protection of the environment by way of control, limitation, treatment and monitoring of emissions, see extract of Condition 6 and 9 in **Appendix 8.3**. With respect to groundwater, Condition 9 specifically addresses groundwater protection relating to the Bord na Móna workshop areas where potential for groundwater contamination exists.

Over the period of 2012 to 2013 the IPC Licences for peat bogs that supply the LRP Station were reviewed by the EPA in accordance with the requirements of the European Communities Environmental Objectives (Groundwater) Regulations 2010 and as amended. Resulting from this a number of modifications to the relevant conditions of the Bord na Móna licences were subsequently made through a technical amendment to the licence.

An examination of the IPC Licences for the peat supply bogs indicates that there is no groundwater monitoring requirement in the IPC Licences covering the peat supply bogs to LRP Station.

¹⁷ River Basin Management Plan for Ireland 2018 – 2021, page 41.

The RBMP (River Basin Management Plans) relates environmental impacts to suspended solids, ammonia and hydro-morphological alterations (DHPLG, 2018) principally to surface waters and this issue is addressed in Chapter 8. There are a number of principle actions proposed in the published RBMP to address these pressures at a strategic scale as follows:

1. *"The Minister for Housing, Planning, Community and Local Government intends to make regulations in 2017 as soon as possible that will require the EPA to carry out EIA for all existing and new large-scale peat extraction (> 30ha) as part of its examination of IPC license applications for the activity. When these regulations are made, proposals will be developed for public consultation relating to a new regulatory regime that will bring smaller-scale commercial peat extraction ($\leq$ 30ha) under a new local authority licensing system incorporating EIA and AA, as necessary, and enforcement powers.*
2. *The DCHG¹⁸, together with the Peatlands Strategy Implementation Group, will oversee the implementation of the National Peatland Strategy and the first national management plan for Ireland's raised-bog Special Areas of Conservation (SACs) network.*
3. *The Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs will oversee the implementation of the Peatland strategy the principal aim of which is to provide a framework for determining and ensuring the most appropriate future use of cutover and cutaway bogs.*
4. *Bord na Móna will implement its Sustainability 2030 Strategy and Biodiversity Action Plan 2016-2021 which addresses the long-term rehabilitation of its cutaway bogs.*
5. *By 2021, Bord Na Móna will rehabilitate an additional 25 peatlands covering approximately 9,000ha. This is subject to several assumptions, including the availability of cutaway bogs for rehabilitation.*
6. *The EPA has identified this priority issue as the subject of a research proposal for inclusion in its 2018 research call. The proposal involves evaluating mitigation strategies for improving water quality from drained peatlands. The project proposal, if selected, is intended to integrate with the ongoing mitigation trials being undertaken by Bord Na Móna."*

Following the evaluation of the EPA's 2018 Research Calls, the EPA has awarded the following project: **Strategies to improve Water quality from Managed Peatlands¹⁹**.

The key objectives of the project are as follows:

- 1) To improve our understanding of the hydrology, hydrogeology, water balances and nutrient exports from drained and extracted peatlands.

¹⁸ Department of Culture, Heritage and the Gaeltacht.

¹⁹ Awarded to University College Dublin (Principal Investigator - Florence Renou-Wilson), see <http://www.epa.ie/researchandeducation/research/epafunding/researchawards/>

- 2) To investigate the impacts and pressures on water quality (chemistry, aquatic biota and hydromorphology) arising from the drainage and mining of peatlands by identifying contaminants pressure zones and assessing the significance and extent of these environmental impacts vis-à-vis Water Framework Directive and Flood Directive targets.
- 3) To evaluate environmental protection measures in order to develop best practices guidelines by appraising and developing a) robust water purification methods and b) sustainable land-use management practices including restoration/rewetting and after-use of cutaway/cutover bogs.
- 4) To integrate solutions to prevent/reduce water pollution with local rehabilitation plans and examine their potential synergy with other climate change -biodiversity measures.
- 5) To review and develop hydrological models for cutaway peatlands in order to predict the impacts of peatland drainage and peat extraction on downstream flooding, hydrograph peaks and environmental flows and thus to assess expected pollution levels in affected streams.

This is an EPA research project in which Bord na Mona will provide some assistance and collaboration.

In addition, Bord Na Móna commenced work in 2017 on preparing Environmental Impact Assessments on all of its peatlands including AA, where necessary, in anticipation of the new streamlined licensing system for large-scale peat extraction that (> 30ha) that came into operation pursuant to the European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 on the 25th January 2019.

The Strategic Environmental Assessment (SEA) undertaken for the RBMP has determined that the above proposed measures will have broadly positive effect on the water environment.

Table 8-7: Supply Bogs and Associated Characteristics

Bog Name	General Geology (Bedrock)	Aquifer Productivity	Groundwater Vulnerability	Groundwater Body	Groundwater Status	Groundwater risk
Derryhinch	Dinantian limestone	Locally Important	Low/Moderate	Athboy	Good	Probably not at risk
Drumman	Dinantian limestone	Locally Important	Low/Moderate/High	Athboy	Good	Probably not at risk
Toar	Dinantian limestone	Locally Important	Low/Moderate/High	Athboy, Clara	Good	Probably not at risk/ (Partially) Probably at risk
Ballybeg	Dinantian limestone, Volcanic	Locally Important	Low/Moderate	Athboy, Daingean, Trim	Good	Probably not at risk/ (Partially) Probably at risk
Ballivor	Dinantian Limestone	Locally Important	Low/High	Athboy	Good	Probably not at risk
Carranstown	Dinantian Limestone	Locally Important	Low/High	Athboy	Good	Probably not at risk
Bracklin	Dinantian Limestone and Calcareous shale	Locally Important	Low/Moderate	Athboy	Good	Probably not at risk
Rossan	Waulsortian Limestones	Locally Important	Moderate/High	Athboy	Good	Expected to achieve good
Daingean	Dinantian limestone (Lucan formation)	Locally Important	Low/Moderate/High	Daingean	Good	Probably not at risk / Expected to achieve good
Boughhill	Dinantian limestone (Visean formation)	Regionally Important	Moderate	Suck South	Good	At Risk
Killaderry	Dinantian limestone (Lucan formation)	Locally Important	Low/Moderate	Suck South	Good	At Risk
Derryfadda	Dinantian limestone (Visean limestone, Lucan formation)	Locally Important	Low	Suck South	Good	At Risk
Castlegar	Dinantian limestone (Visean limestone)	Regionally Important	Low/Moderate/High/Extreme	Suck South	Good	At Risk
Gowla	Dinantian limestone (Lucan formation)	Locally Important	Low	Suck South	Good	At Risk
Killaderry Bog	Dinantian limestone (Lucan formation)	Locally Important	Low/Moderate/High/Extreme	Suck South	Good	At Risk
Esker	Dinantian limestone	Locally Important	Low/Moderate	Rhode	Good	At Risk

Bog Name	General Geology (Bedrock)	Aquifer Productivity	Groundwater Vulnerability	Groundwater Body	Groundwater Status	Groundwater risk
Clonad	Dinantian limestone	Locally Important	Low/Moderate	Rhode/Daingean/Geashill	Good	At Risk/Probably at risk
Ballykeane	Dinantian limestone	Regionally Important/Locally Important	Low/ Medium	Rhode/Portlaoise	Good	At risk
Mountlucas	Dinantian limestone	Regionally Important/Locally Important	Low/Moderate/High	Rhode	Good	At risk
Derraghan	Dinantian Limestone, calcareous sandstone (Meath formation)	Regionally Important/Locally Important	Low/Moderate/High	Inny/Funshinagh	Good	At Risk/Probably at risk
Derryadd 1	Dinantian Limestone (Visean Limestone)	Regionally Important	Low/Moderate	Inny/Funshinagh	Good	At Risk/Probably at risk
Derryshanoge	Dinantian Limestone (Visean Limestone)	Regionally Important/Locally Important	Low/Moderate	Inny/Funshinagh	Good	At Risk/Probably at risk
Kilashee	Dinantian Limestone (Visean Limestone)	Regionally Important	Low/Moderate/High	Funshinagh	Good	At Risk
Derryadd 2	Dinantian Limestone (Visean Limestone)	Regionally Important/Locally Important	Low/Moderate	Funshinagh	Good	At Risk
Derryadd3/Lough Bannow	Dinantian Limestone (Visean Limestone)	Regionally Important/Locally Important	Low/Moderate/High	Inny	Good	Probably not at risk
Derrycashel	Dinantian Limestone (Visean Limestone)	Regionally Important	Low	Funshinagh	Good	At Risk
Granaghan	Dinantian Limestone, sandstone, shale (Moathill Formation)	Locally Important	Low/Moderate/High	Curraghroe	Good	Probably not a Risk
Derryarogue	Dinantian Limestone (Visean Limestone)	Regionally Important	Low/Medium	Funshinagh	Good	At Risk
Mountdillon	Dinantian Limestone (Argillaceous Limestone)	Regionally Important/Locally Important	Low	Curraghroe	Good	Probably not a Risk
Begnagh	Dinantian Limestone (Visean Limestone)	Regionally Important	Low	Newtown Forbes	Good	At Risk

Bog Name	General Geology (Bedrock)	Aquifer Productivity	Groundwater Vulnerability	Groundwater Body	Groundwater Status	Groundwater risk
Clooneeny	Dinantian Limestone, sandstone, shale (Moathill Formation)	Regionally Important/Locally Important	Low/Medium	Newtown Forbes/Longford Ballinalee	Good	At Risk/Probably at risk
Erenagh	Dinantian Limestone, sandstone, shale (Visean Limestone, Moathill Formation)	Locally Important	Low	Curraghroe	Good	Probably not a Risk
Moher	Dinantian Limestone (Visean Limestone)	Regionally Important	Low/Moderate/High	Funshinagh	Good	At Risk
Cloonshanagh	Dinantian Limestone (Ballysteen Formation)	Regionally Important/Locally Important	Low/Moderate	Curraghroe/Funshinagh	Good	Probably not at risk/ (Partially) Probably at risk
Derrycolumb	Dinantian limestone (Visean limestone, Lucan formation)	Regionally Important/Locally Important	Low/Moderate	Inny/Funshinagh	Good	At Risk/Probably at risk
Derrymoylin	Dinantian Limestone (Ballysteen Formation)	Locally important	Low	Kilglass Dromod/Curraghroe	Good	Probably not at risk
Edera	Dinantian Limestone	Locally important	Low/Moderate	Inny	Good	Probably not at risk
Coolcraff	Dinantian limestone (Lucan formation)	Locally important	Low/Moderate	Inny	Good	Probably not at risk
Coolnagun	Dinantian limestone (Lucan formation)	Locally important	Low	Inny	Good	Probably not at risk
Milkernagh	Dinantian limestone (Lucan formation)	Locally important	Low/Moderate	Inny	Good	Probably not at risk
Clontuskert Bog	Dinantian Limestone (Visean limestone, Argillaceous Limestones, Ballysteen Formation)	Regionally Important/Locally Important	Low/Moderate/High/Extreme	Funshinagh/Curraghroe	Good	At Risk

8.4 Impacts of the Development

8.4.1 LRP Station

There are no physical or operational changes proposed to the LRP station as part of this IE licence review. The proposed alteration to Condition 5.5 will not impact on land, soils and hydrogeology.

As an active power generation station, there is a potential from ongoing site activity including fuel oil storage, chemical storage, former ash disposal facilities to impact the underlying hydrogeology. The “worst case” impact to the groundwater would be considered **negative, significant and short to medium term** due to its use as drinking water in the local area as well as some process water supply to the power station. However there are a number of control measure in place as part of the Station EMS and the IE licence. In addition there are two groundwater monitoring points and the station site. Samples are analysed for a suite parameters as required in Schedule C.4 of the IE licence. See further detail of control measures in **Section 8.5.1.1**.

As part of the IE licence application a Baseline Report has been provided to the EPA as part of the IE Licence Review application. Reference should be made to this Baseline Report, Attachment-4-8-3-Complete Baseline Report of the IE Licence Application.

8.4.2 Derraghan ADF

The proposed development will involve the increased deposition of ash into the existing active ADF to accommodate the continued disposal of peat ash from LRP Station. The potential effects of this aspect of the proposed development are shown herein.

8.4.2.1 Peat and Subsoil Excavation

During construction stage, excavation of peat and subsoil will be required for construction of the proposed two additional cells to approximately 45.5 m OD. This depth is generally the base depth of the excavation at which the ADF liner is placed. This will involve the excavation of up to 3.9 m in peat and subsoil to facilitate. However, if rock or cobbles are encountered it will be necessary to remove these to provide a suitable surface for the liner. In this case, these areas will be backfilled with suitable material sourced on site. Also there will be localised excavation underneath the cell to lay a pipe for under-cell drainage. This development will result in a permanent removal of peat in the area of excavation. The majority of excavated peat and subsoil will, however, be side casted and landscaped in the immediate area.

During the operational stage, suitable excavated peat, is generally used to cover the geo-synthetic capping layer and composite drainage layer on previously constructed cells that are filled with ash and capped. The excavated subsoil is generally used to construct the cell embankments of future cells or temporarily stockpiled in a suitable location to be used in future embankment construction.

The closure and long term aftercare management of the ADF is controlled under the EPA license which includes a Decommissioning Management Plan (DMP) and a Closure, Restoration and Aftercare Management Plan (CRAMP) for the ADF (QS-

000139-01-R105-009 dated 12th October 2016) and subject to annual review by the EPA. The main objectives of these plans are to decommission, render safe or remove for disposal/recovery any soil, subsoil, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution to the satisfaction of the EPA. Subject to EPA approval, these plans will be amended and extended to include the proposed development.

There is no evidence of a significant adverse impact on the groundwater quality as a result of the continued use of the current ADF which involved the excavation of a much larger volume of peat and subsoil.

The excavation of peat and subsoils to facilitate the proposed development is permanent and irreversible (when the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost due to the excavation of the peat) but likely to have a **neutral impact, of imperceptible significance in the short to long term** on the underlying hydrogeology.

Peat ash leachate will not be generated during the construction phase and so will not have an impact.

Leachate will be generated during the operational stage, during which the landfilling of peat ash will result in the generation of leachate which settles at the base of each cell. Although each cell is lined, there is the potential for leachate to leak from the engineered leachate containment system and impact the underlying soil, shallow groundwater in the overburden and bedrock aquifer.

Once each cell is full, the cell will be capped, preventing rain ingress. This in turn prevents the generation of leachate. However, there is a potential risk that at the decommissioning stage, once the leachate containment system is no longer active, leachate persists within the cell and potentially overtop the cell liner through excessive infiltration of surface water.

As part of the CRAMP, EPA monitoring requirements, impacts to the environment including impacts to soil, underlying shallow groundwater and bedrock aquifer are monitored for a period of 10 years following closure.

A comprehensive review completed in 2017 (HES 2017) of available groundwater monitoring data, did not identify any significant impacts to shallow groundwater or bedrock aquifer as a result of the existing ADF. This together with the operational monitoring and long term monitoring after closure means that it is unlikely that the proposed development will have a significant impact.

There is no evidence of a significant or adverse impact on the groundwater quality as a result of the continued use of the existing ADF. The type of impact is considered “do nothing” whereby the development will not affect the future hydrogeological environment in the short to long term. However in the “worst case scenario”, where leachate leaks into the shallow groundwater and migrates to the underlying bedrock aquifer, this would be considered to be **negative, moderate to significant, short term** given the very high importance of the Regional aquifer.

8.4.2.2 Contamination of Soil and Shallow Groundwater by Leakages and Spillages of Potentially Polluting Substances

The potential for direct impacts to the environment is typically highest during the construction stage due to the increased number of personnel and construction stage vehicles working at the site. As a result of the increase in site activity and presence of potentially polluting substances (foul water, fuel oils etc.), there is a potential for accidental leaks or spills to impact on the groundwater. However, the impact is expected to be **negative, temporary and slight to moderate** in nature. The potential impact will be mitigated through design and implementation of control measures including provision of spill kits, absorbent materials etc.

During the course of the operational stage, the ash is tipped from the train wagons and is placed in the cells using low bearing pressure tracked earthmoving plant. The ash is placed semi-dry and is wetted to control potential dust emissions. A tractor drawn spray tanker or fixed spray system is used in wetting the ash to aid compaction and further prevent dust nuisance. This machinery is the same as is currently used on the active ADF and there is no evidence of a significant impact. Similar to the construction stage, control measures will be implemented which mitigate the impact such as fuel storage bunds, spill kits etc. **Section 8.5** outlines similar proposed mitigation measures for the ADF element of the proposed development. It therefore unlikely that the this will result in a significant impact.

Minimal fuel storage will be required during the decommissioning stage. The development of the ADF doesn't involve construction of permanent structures (with the exception of the two cells) and restoration will therefore not necessitate demolition and removal of buildings. Some vehicles may attend site as part of the aftercare monitoring program, however the volume of traffic would be negligible so any impact is considered unlikely.

There will also be no increase in frequency in the train runs bringing waste ash from the station and the ADF as the operation of the station will remain the same. There is no evidence of impact to groundwater from the train wagons and it is not considered that the train runs associated with the ADF element of the proposed development will result in a significant impact.

There is no evidence of a significant or adverse impact on the groundwater quality as a result of fuel oil or chemical storage from the continued use of the existing ADF. However in the "worst case" scenario, where fuel oil leaks into the shallow groundwater and migrates to the underlying bedrock aquifer, this would be considered to be **negative, imperceptible and temporary** in duration on the underlying hydrogeology.

Mitigation measures that will be put in place to eliminate or reduce them and the residual impacts are discussed in **Section 8.6** herein.

8.4.3 Indirect Impacts - Peat Supply to LRP Station

Bord na Móna has been commercially harvesting peat in Ireland since its foundation by the Irish Government in the 1930's. Bord na Móna currently supplies approximately 3.8 million tonnes of milled peat per annum to three peat-fired power

plants, including LRP Station. The bogs that will supply peat fuel to LRP Station to 2020 are currently, or have recently been, in production. As such, the upper acrotelm layer (which includes living plants) has been completely removed. The remaining, deeper peat layer (which contains dead plant material) is harvested by Bord na Móna and supplies peat fuel to LRP Station.

Refer to Chapter 4, Table 4-2 which presents details on the bogs which supply peat to LRP Station, their size and the associated EPA Licence governing the environmental monitoring and management requirement for each bog.

Impacts on water resources related to the supply bogs from the proposed are considered to be **indirect, short term, negative, and negligible** with the implementation of existing control measures required under the IPC Licence and ongoing enforcement of the IPC Licence conditions by the EPA.

8.4.4 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to Land, Soils, Geology and Hydrogeology, have been assessed.

ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to condition 5.5 do not require any physical or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure or footprint as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights.

The continued operation of the station beyond 2020 will result in further cells being constructed at the ADF with an increase in its footprint. Additionally, new biomass storage facilities will be constructed at LRP station in the form of a concrete slab and pellet storage and handling facility. This will entail construction activities such as soil excavation, concrete formation and site drainage with potential to impact if not properly mitigated. Potential impacts in relation to the transition the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that future proposed development. That EIAR is publicly available on the Longford County Council planning website. A full assessment of the potential impact of that proposed development was undertaken and appropriate mitigation identified and included in the EIAR. It has been concluded that no significant negative impacts will occur from that future development and therefore no cumulative impacts will occur.

No significant impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated.

8.5 Mitigation

8.5.1.1 LRP Station

The station is managed under EPA IE licence P0610-02 which enforces control measures to mitigate against potential risk to groundwater. No additional mitigation measures, other than compliance with the limits regulated by the EPA, are considered necessary in terms of groundwater. **Table 8-8** present the main mitigation measures which are implemented to protect groundwater at the station as detailed in the Licence.

Table 8-8: LRP Station Current Mitigation Measures

Potential Impact Type	Mitigation Measure
Groundwater Quality	All tank, container and drum storage areas shall be rendered impervious to the materials stored therein.
	Bunds shall be designed having regard to Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (2004).
	All tank and drum storage areas shall, as a minimum, be bunded.
	All drainage from bunded areas shall be treated as contaminated unless it can be demonstrated to be otherwise.
	All drainage from bunded areas shall be diverted for collection and safe disposal unless it can be deemed uncontaminated.
	All inlets, outlets, vent pipes, valves and gauges must be within a bunded area.
	All tanks, containers and drums shall be labelled to clearly indicate their contents
	The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage at the installation. Once used, the absorbent material shall be disposed of at an appropriate facility.
	The licensee shall maintain oil separators at the installation:
	All pump sumps, storage tanks, lagoons or other treatment plant chambers from which spillage of environmentally significant materials might occur in such quantities as are likely to breach containment or separators, shall be fitted with high liquid level alarms or oil detectors as appropriate.
	The provision of a catchment system to collect any leaks from flanges and valves of all over ground pipes used to transport material other than water shall be examined.

8.5.2 Derraghan ADF

No additional mitigation measures, other than existing controls and compliance with the limits regulated by the EPA, are considered necessary in terms of groundwater. The proposed ash cells will be constructed with the same drainage system as the current cells.

Table 8-9 details mitigation measures which will be implemented to minimise the impact to the groundwater.

Table 8-9: Derraghan ADF Mitigation Measures

Stage	Potential Impact	Mitigation Measure
Construction	Chemical and fuel oil spills/leaks	All temporary tank and drum storage areas shall be bunded. Adequate supply of containment booms and suitable absorbent material to contain and absorb any spillage or leak maintained at the ADF. Once used, the absorbent material shall be disposed of at an appropriate facility. Designated vehicle refuelling points will be implemented where vehicles can be refuelled in a controlled environment.
Operational	Leachate leak from the engineered leachate containment system	Impermeable liner and good modern design in accordance with landfill directive (Council Directive 1999/31/EC) requirements which includes a leachate alarm and pumping facility. Capping of each cell when full to capacity to minimise the volume of leachate generated. Monthly, quarterly and annual groundwater monitoring and reporting to EPA as directed by the EPA License monitoring requirements.
Decommissioning	Leachate overtopping the cell liner through excessive infiltration of surface water	Monitor groundwater for capping failure and in accordance with the closure and aftercare management plan (CRAMP) for a period of 10 years following closure. As agreed with the EPA.

8.5.2.1 Peat Supply to the LRP Station

The Bord na Móna bog groups which supply LRP Station (Derrygreenagh, Blackwater, Allen Groups and Mountdillion) are regulated by the EPA under IPC Licences Registration No's. 501, 502, 503 and 503 respectively. No additional mitigation measures, other than compliance with the control measures regulated by the EPA, are considered necessary in terms of hydrogeology. **Table 8-10** details the control measures conditioned under the IPC licencing regime, as regulated by the EPA protective of groundwater.

Table 8-10: Control Measures Applicable to Bord na Móna Bogs

Potential Impact Type	Control Measure
Groundwater Quality	Effective spill/leak management of mobile fuelling units.
	Replacement (and remediation where necessary) of all underground fuel tanks.
	There shall be no other emissions to water of environmental significance.
	All tank and drum storage areas shall be rendered impervious to the materials stored therein. In addition, tank and drum storage areas shall, as a minimum be bunded,
	Drainage from bunded areas shall be diverted for collection and safe disposal.
	The integrity and water tightness of all the bunding structures and their resistance to penetration by water or other materials stored therein shall be tested and demonstrated by the licensee to the satisfaction of the Agency and shall be reported to the Agency within eighteen months from the date of grant of this licence and every two years thereafter.
	The loading and unloading of fuel oils shall be carried out in designated areas protected against spillage and leachate run-off. While awaiting disposal, all materials shall be collected and stored in designated areas protected against spillage and leachate run-off.
	With the exception of roof water, all surface water discharges from workshop areas shall be fitted with oil interceptors.
	An inspection for leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be carried out weekly.
	The licensee shall undertake a programme of testing and inspection of underground fuel pipelines to ensure that all underground fuel lines are tested at least every three years.
	The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage.
	The licensee shall maintain a log of bi-annual inspections of all rail and tractor transported fuelling units. These inspections as a minimum should record any damage or leaks or flaws in rolling stock that could result in accidental spillage.
	The licensee shall ensure that a documented Emergency Response Procedure is in place which shall address any emergency situation which may originate on-site. This Procedure shall include provision for minimising the effects of any emergency on the environment
	A maintenance/cleaning log for all oil interceptors and septic tanks shall be maintained. This log shall also record the observations made during weekly inspections of all oil interceptors and bi-annual inspections of septic tanks.

8.6 Residual Impacts

8.6.1 Derraghan ADF

With the implementation of the construction methodology and control measures, it is expected that there will be no significant residual impacts on the groundwater or soils in the ADF area.

8.6.2 LRP Station

With the implementation of the requirements of the IE Licence for the LRP Station and continued good engineering practice on the site, it is expected that there will be no significant residual cumulative impacts to the karst groundwater body beneath the ADF and power station site.

8.6.3 Peat Supply to the LRP Station

Implementation of the EPA IE Licences for the operation of peat extraction at the Bord na Móna peat supply bogs serving LRP Station will ensure that the groundwater bodies at these location will remain at “Good” status and no cumulative or indirect significant residual impacts will occur.

8.7 ‘Do Nothing’ Scenario

The EIS which accompanied the 2001 planning application for LRP and the ADF sought permissions to dispose 550,000 tonnes of peat ash at the ADF in order to serve the power station up to 31st December 2020.

Under the ‘Do Nothing’ scenario storage or disposal of ash at the ADF would cease by the end of 2019. At that time LRP Station would face decommissioning of the power station without the means of continuing to dispose of peat ash at the ADF.

The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

Should closure of the ADF and decommissioning of the power station occur there would be therefore limited potential for groundwater impact to occur other than spillages or leaks of hydrocarbons associated with the demolition equipment. An associated overall reduction in peat harvesting from some surrounding Bord na Móna supply bogs would also occur.

This impact is considered to be **positive, not significant and long term**.

8.8 Interaction of the Foregoing

Impacts relating to Groundwater have the potential to be impacted by other environmental aspects including Surface Water and Biodiversity. This is addressed in **Chapter 13**.

For inspection purposes only.
Consent of copyright owner required for any other use.

9 Climate, Air Quality and Noise

9.1 Introduction

This chapter assesses the potential impacts on air and climate arising from the proposed development.

This chapter also considered the potential impact on the noise environment as a result of the proposed development. It is noted again that there are not physical changes or operational changes proposed at the station site.

In addition, the potential indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to climate, air quality and noise are also considered.

9.2 Methodology

The approach to the assessment of Climate and Air Quality comprised a desk based review of publicly available documentation relating to climate change as well as data and documentation relating to the EPA IE Licence P0610-02 and Landfill Operational Plan relating to LRP ADF. As well as considering the relevant EPA guidance, as used in the preparation of this EIAR, the following sources and publications were utilised in the preparation of this chapter:

- Met Éireann Data;
- Lough Ree Power Station IE Licence & Amendments;
- Lough Ree Power Station Annual Environmental Reports (2014, 2015 and 2016);
- EPA Air Quality in Ireland Report 2017, Indicators of Air Quality
- European Environment Agency – Air Quality in Europe -2017 Report
- Community Climate Change Consortium for Ireland (<http://www.c4i.ie/>); and
- A Summary of Climate Change for Ireland, 1981 – 2010.

In relation to noise a review on the ongoing noise monitoring undertaken at the station in line with the IE licence requirement was undertaken.

9.2.1.1 Air Quality Modelling of LRP air emissions

Modelling of the impact of air emissions on the receiving environment has been undertaken by AWN Consulting as part of the future proposed development as detailed in **Section 4.10**. The contribution of both current licenced and proposed BAT emissions from the facility to off-site levels of release substances was assessed and the location and maximum of the worst-case ground level concentrations for each compound identified.

The proposed BAT emission limit values are set out in the EU Commission decision on BAT conclusions²⁰. These emission limit values will likely be introduced by the EPA into a future IE Licence for the station. Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulatory model AERMOD (Version 16216r) and the methodology outlined in the policy and technical guidance notes, LAQM.PG(16) and LAQM.TG(16), issued by UK Department for Environment, Food and Rural Affairs(1-5). The assessment of air quality is carried out using a phased approach as recommended by the UK Department for Environment, Food and Rural Affairs (2). The dispersion modelling study consisted of the following components:

- Review of emissions data and other relevant information needed for the modelling study;
- Summary of background NO₂, SO₂, PM₁₀/PM_{2.5}, hydrogen chloride, hydrogen fluoride and mercury concentrations;
- Dispersion modelling of released substances under the following scenarios:
 - Permitted emission concentrations of pollutants as per existing IED Licence P0610-02 (hereafter Maximum Existing Scenario).
 - Permitted emission concentrations of pollutants as per proposed BAT limit values which will be implemented as part of the plants transition to exclusive firing with biomass (hereafter Maximum Proposed Scenario).
- Sensitivity Scenario assessment of cumulative impact in event of simultaneous emissions from PS-A1 (Main Stack) and PS-A2 (Auxiliary Boiler).
- Presentation of predicted ground level concentrations of released substances;
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality limit values.
- Air quality impacts from traffic and transport were also assessed using the DMRB Traffic Model.

The report on modelled outputs is provided in **Appendix 9.1**.

²⁰ • COMMISSION IMPLEMENTING DECISION (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants

9.3 Receiving Environment

9.3.1 Climate

Ireland's climate is influenced primarily by the Atlantic Ocean with the warm North Atlantic Drift having a marked influence on sea temperatures. As a result Ireland does not experience extremes of temperature as experienced by many other countries at similar latitude. The maritime influence is strongest near the Atlantic coasts and decreases with distance inland. Winters tend to be cool and windy, while summers, are mostly mild and less windy. Typically air temperatures inland normally reach 18 to 20°C during summer days, and about 8°C during wintertime (refer to <https://www.met.ie/climate-ireland/climate-of-ireland.asp>).

The ADF and LRP Station are located in the Midlands, which comprises mainly a flat landscape with extensive bog and peatlands dominated by the River Shannon system.

The nearest meteorological station is Birr, County Offaly - although this has not been in operation since 2009. However, Met Éireann provide an historical record of meteorological parameters for the period 1979 – 2008 for this station, (<https://www.met.ie/climate-ireland/1981-2010/birr.html>). This is in line with the requirements of the World Meteorological Organization (WMO), which recommends that climate averages are computed over a 30 year period of consecutive records. The period of 30 years is considered long enough to smooth out year to year variations. Met Éireann reference 1981 to 2010 as the baseline period for day-to-day weather and climate comparisons. The current WMO global baseline period for use in climate change research is 1961-1990. In summary mean daily minimum temperature at this station is 6.2°C with a mean of daily maxes of 13.5°C and an overall mean temperature of 9.8°C. An absolute maximum temperature of 30.8°C has been recorded in this period and an absolute minimum of -14.6°C. Mean daily sunshine duration is 3.2 hours with a maximum recorded of 15.7 hours.

The total mean annual rainfall over the period is 845.7 mm with the greatest daily total at 59.1 mm.

Wind speeds in the area are mainly in a south-westerly direction with a mean monthly wind speed of 6.7 knots (12.4 km/hour) and a maximum gust of 59.2 knots (109.6 km/hour) recorded.

Met Éireann also operate a climatological station at Mount Dillon, which is just north of Lanesborough, since 2014. The average rainfall from records at this station is given as 1047.1mm and mean temperature as 9.40C for the period 2014 – May 2017.

9.3.2 Climate Change Projections

Global warming, and the management of emissions with the potential to contribute to global warming, is increasingly important on a national and international basis. Global warming has numerous potential implications for Ireland's environment.

Met Éireann indicates that the average air temperature has risen by approximately 0.8°C in the last 100 years, with much of the warming occurring towards the end of

the 20th century, and all seasons are warmer. This has manifested as seasonal changes with the start of the growing season for certain species, now up to 10 days earlier with an observed decrease in the number of days with frost and increase in the number of warm days (days over 20°C).

All seasons are projected to be significantly warmer (1 to 1.5°C) by mid-century, this will lead to a further increase in the length of the growing season, with a knock-on effect on natural ecosystems which have evolved gradually to suit our climatic conditions.

Met Éireann records indicate that over the last 30 years or so rainfall amounts have increased by approximately 5%, and there is some evidence of an increase in the number of days with heavy rain in the west and northwest. Due to greater uncertainty in the prediction of rainfall, climate projections indicate that overall rainfall amounts in Ireland might decrease slightly, summers are likely to become drier while winters may be wetter especially in the west and north.

Met Éireann state that changes in the Irish climate regime will be incrementally small and barely noticeable on a year to year basis, and will occur against the background of natural climate variability. Declining Arctic sea ice may also affect regional weather patterns which could result in periods of colder weather for Ireland. The probability of occurrence of extreme weather events is expected to increase.

The Met Éireann led study *Ireland's Climate: the road ahead* (2013) carried out global climate model simulations as part of Ireland's contribution to the science underpinning the IPCCs AR5. The Irish study modelled projections for climate change in Ireland indicated the following:

- The observed warming over the period 1981-2010 is expected to continue with an increase of ~1.5 degrees in mean temperatures by mid-century; the strongest signals are in winter and summer. Highest daytime temperatures are projected to rise by up to 2 degrees in summer and lowest night time temperatures to rise by up to 2-3 degrees in winter.
- Milder winters will, on average, reduce the cold related mortality rates among the elderly and frail but this may be offset by increases due to heat stress during summer.
- Winters are expected to become wetter with increases of up to 14% in precipitation by mid-century with summers becoming drier (up to 20% reduction in precipitation). The frequency of heavy rainfall events during winter may increase by up to 20%.
- Changes in precipitation are likely to have significant impacts on river catchment hydrology, such as increased flow and level during higher rainfall events and prolonged periods of low water level in drier summers.
- An overall increase (0-8%) in the energy content of the wind for the future winter months and a decrease (4-14%) during the summer months.
- A small decrease in mean wave heights is expected around Ireland by the end of the century, while in winter and spring, storm wave heights are likely to increase.

- Expected increases in temperature will further affect the ecology such as that of Irish butterflies, in particular.
- Chapter 7 of the Met Éireann led study considers some additional potential impacts of a warmer climate on Irish Wildlife stating that:

“Spring warming in recent years has had a significant impact on Irish wildlife by advancing the timing of key phenological phases of a wide range of organisms, including trees, birds and insects.”

Increased atmospheric levels of greenhouse gases are now widely recognised as the leading cause of climate change. This is borne out by the most recent findings of the Inter Governmental Panel on Climate Change’s (IPCC) Assessment Report 5 (AR5).

The most important long lived greenhouse gases are CO₂, N₂O, and Methane (CH₄). CO₂ arises from a range of sources including the combustion of fossil fuels. According to the EPA, agriculture remains the single largest contributor to overall greenhouse gas emissions in Ireland (2015 data), at 33.1% of the total, followed by transport at 19.8% and energy at 19.7%. Refer to **Plate 9-1**. Projections indicate increasing CO₂ emissions in the agriculture and transport sector to 2020. The EPA’s Report “Ireland’s Greenhouse Gas Emission Projections 2016 – 2035” indicates that CO₂ emissions from the energy sector will continue to fall to 2020 (the end of the current planning permission for LRP) as greater penetration of renewable energy (wind, waste to energy, biomass, solar) on the grid occurs, however increased emissions from the agriculture and transport sectors will occur during this period. Post 2020 and up to 2035 emissions will increase in nearly all sectors including energy due to increasing demand and economic growth but is projected to decrease in the agriculture and waste sectors.

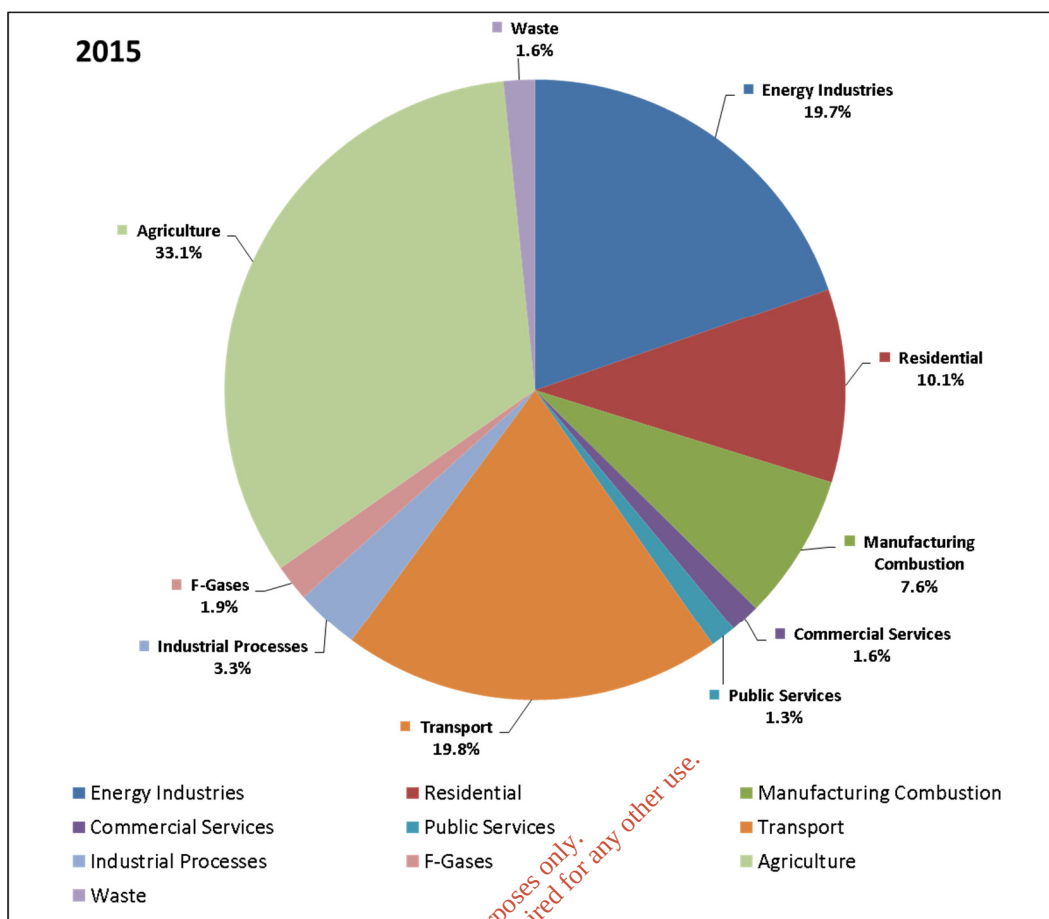


Plate 9-1 Ireland Greenhouse Gas Emission 2015*

*<http://www.epa.ie/pubs/reports/air/air-emissions/ghgemissions/>

9.3.3 Air Quality Standards

To protect human health, vegetation and ecosystems, EU Directives have been adopted which set down air quality standards for a wide variety of pollutants. The current standards are contained in the CAFE Directive (2008/50/EC) (European Parliament (EP) and Council of Europe (CEU), 2008) and the Fourth Daughter Directive (EP & CEU, 2004). These Directives also include rules on how Member States should monitor, assess and manage ambient air quality.

The CAFE Directive is an amalgamation of the Air Quality Framework Directive and its subsequent first, second and third daughter Directives.

The CAFE Directive was transposed into Irish legislation by the *Air Quality Standards Regulations 2011* (S.I. No. 180/2011). It replaces the *Air Quality Standards Regulations 2002* (S.I. No. 271/2002), the *Ozone in Ambient Air Regulations 2004* (S.I. No. 53/2004) and S.I. No. 33/1999 *Environmental Protection Agency Act, 1992 (Ambient Air Quality Assessment and Management) Regulations*. The Fourth Daughter Directive was transposed by the *Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009* (S.I. No. 58/2009).

EU legislation on air quality (CAFE) requires that Member States divide their territory into zones for assessment and management purposes. Ireland is divided into four such zones (refer to Figure 9-2 in the Air Quality Standards Regulations (2015)). The zones were amended on 1st January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). Zone A is the Dublin conurbation, Zone B is the Cork conurbation, Zone C other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, and Balbriggan. Zone D, principally rural, is the remaining area of Ireland.

In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment. It prepares an Air Quality Report based on data from 31 monitoring stations and a number of mobile air quality monitoring units. The EPA as the National Reference Laboratory for Air, coordinates and manages the monitoring network. Monitoring stations are located across the country. The EPA provides real time air quality data on its website (www.epa.ie/air/quality/).

Air quality standards have been developed and incorporated into Irish statute in order to protect both human health and the ambient environment. These standards are based on International agreements, which identify performance standards and limit the generation of air quality pollutants at a regional, national and global level.

For inspection purposes only. No other use.
Consent of copyright owner required for any other use.

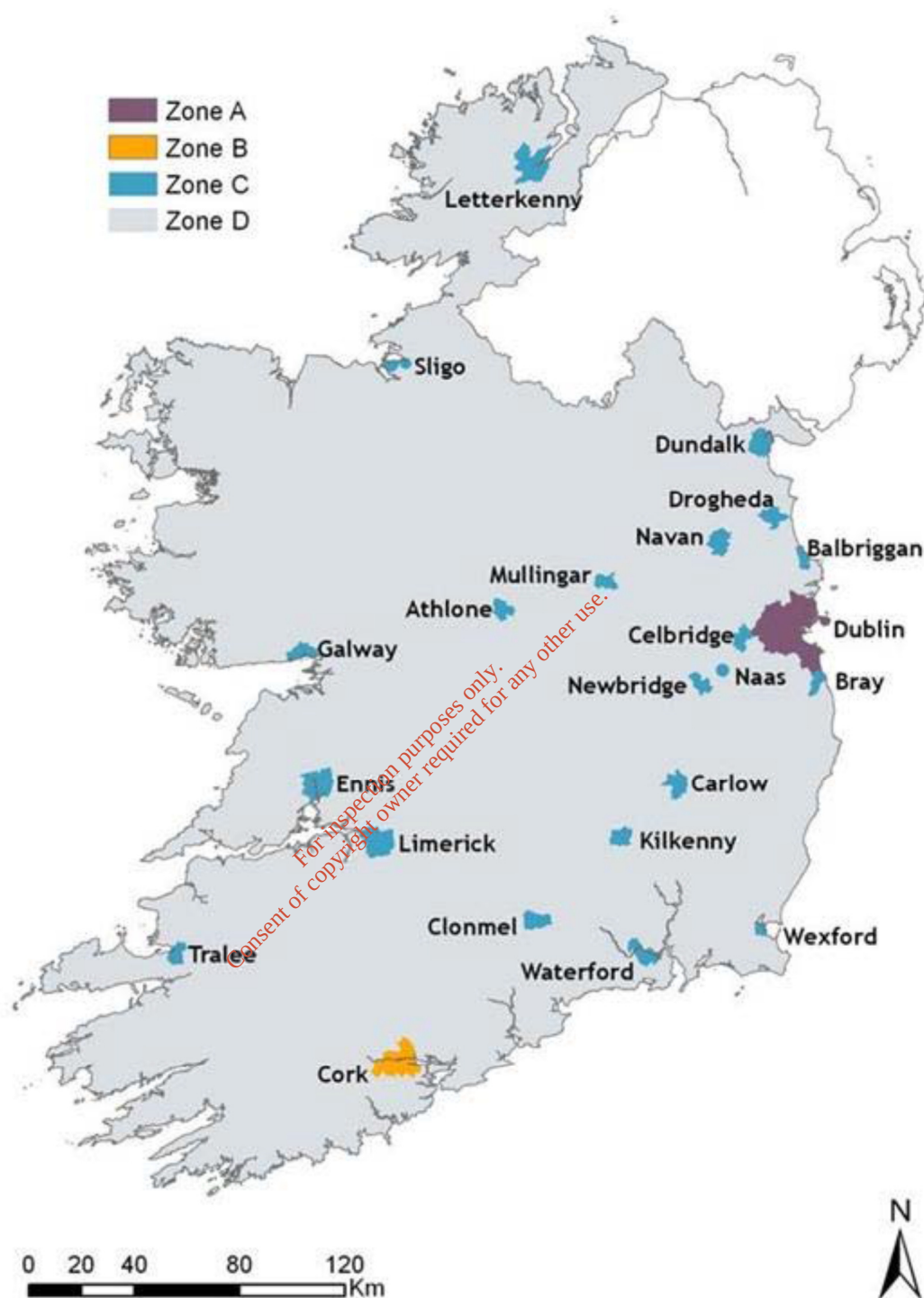


Plate 9-2 Air Quality Zones in Ireland

(Source: Air Quality in Ireland 2015, EPA)

9.3.3.1 EPA Air Quality Zone

The LRP station and ADF is located in the air quality management area Zone D as defined by the EPA in accordance with EU air quality legislation. Background air

quality data for Zone D was obtained from the EPA report on Air Quality in Ireland 2015– Indicators of Ambient Air Quality (2016) and air quality bulletins as published periodically by the EPA and assessed against the Air Quality Standards Regulations 2011 (S.I. No. 180/2011) which transpose the requirements of the Clean Air for Europe (CAFE) Directive (2008/50/EC).

Ash is not a source of gas or odour therefore there are no air emissions emitted from the ADF. Dust from the transportation and handling of ash are discussed in this chapter. Indirect climate impacts from LRP Station and the fuel source used at the plant are discussed.

9.3.3.2 Dust Deposition Standards and Guidelines

Currently in Ireland there are no statutory limits for dust deposition. Dust particles in the ambient environment is pervasive, however localised increases in dust particles is usually associated with exposure of soil surfaces, usually through human activities associated with agricultural practices or construction. Whether dust deposition becomes an issue for the general public is a subjective issue and depends on a variety of factors including the sensitivity of nearby locations, the repetitive nature of any dust deposition occurring and the nature of the dust particulate itself. It is because of these variances and the subjectivity of the issue that there are no statutory limits. The focus for dust control and emissions is on minimising the potential for a nuisance occurring in the first instance and implementing good site practices where practicable.

In recent years the TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring has become the most commonly used method. This method is advocated by both the EPA and the Department of Communications, Climate Action & Environment (DCCA). This method involves determining a mass dust deposition rate per unit area over a given time period, using a direct collection pot to standardise dimensions of either glass or plastic. The system benefits from being a direct collection method i.e. less transferring of material and consequent reduction in sampling errors. This method is defined as an internationally recognised standard and has been adopted by the EPA as the method of choice for licensed facilities.

The TA Luft/VDI 2119 recommended threshold guideline value is 350mg/m²/day. Below this threshold guideline value dust deposition problems are considered less likely. This is the recommended threshold value normally stipulated by local authorities and the EPA in conditions attached to development consent and Waste Licences.

9.3.4 LRP Station

Emissions to air from LRP Station are subject to IE Licence P0610-02 limits. The licence sets out emission limit values (ELVs) not to be exceeded and a schedule of monitoring requirements. These requirements are shown in **Table 9.1**.

In addition, the station operates in accordance with its Greenhouse Gas Emission permit No. IE-GHG068-10379-3 issued by the EPA. The Greenhouse Gas Emissions

Permit authorises the holder to undertake named activities resulting in emissions of specified greenhouse gases from the listed emission points. It also contains requirements that must be met in respect of such emissions, including monitoring and reporting requirements, refer to:

<http://www.epa.ie/pubs/reports/air/etu/permit/electricitysupplyboardghg068.html>.

Table 9-1: Emission limit values and monitoring requirements according to P0610-02 Licence

P0610-02 Schedule	Emission Point Ref. No.	Location	Parameter	ELV	Monitoring
Schedule B	PS-A1	Boiler Stack	Oxides of sulphur Nitrogen oxides (as NO ₂) Dust	200 mg/m ³ 200 mg/m ³ 20* mg/m ³	
Schedule B	PS-A2	Auxiliary Boiler Stack	Oxides of sulphur Nitrogen oxides (as NO ₂) Dust	1700 mg/m ³ 300 mg/m ³ 20* mg/m ³	
Schedule B	Dust Deposition	At locations to be agreed by the agency	Dust	350 mg/m ² /day	
Schedule C	PS-A1	Boiler Stack	Sulphur dioxide Nitrogen oxides (as NO ₂) Dust Oxygen Temperature Pressure Water vapour content	-	Continuous Continuous Continuous Continuous Continuous Continuous Continuous**
Schedule C	PS-A2	Auxiliary Boiler Stack	Carbon monoxide Nitrogen oxides (as NO ₂) Sulphur dioxide Dust	-	Annually Annually Annually Annually
Schedule C	Ambient monitoring	At locations to be agreed by the agency	Dust	-	Monthly

*Technical Amendment B to Industrial Emissions Licence.

**The continuous measurement of water vapour content shall not be necessary, provided that the sampled exhaust gas is dried before the other parameters are continuously analysed.

The annual emissions of the licenced pollutants are reported in the station Annual Environmental Reports, see **Table 9-2**.

LRP Station has adhered to the emission limits to air over the past three years with minor exceptions. A small number of minor incidents relating to air have been reported during this period. These include breaches of ELVs and monitoring equipment functioning. These incidents have all been resolved and the likelihood of reoccurrence is considered to be low.

Table 9-2: Annual Emissions to Air for 2014, 2015, 2016

Emission Point Ref. No.	Location	Parameter	Annual emission tonnes (2016)	Annual emission tonnes (2015)	Annual emission tonnes (2014)
PS-A1	Boiler Stack	Oxides of sulphur	280.59	298	316.4
		Nitrogen oxides (as NO ₂)	562.15	546	475
		Dust	16.92	6.1	10.4
		Carbon Dioxide	856,330	852,264	788,708

9.3.5 Ambient Air Quality

Clean air is of particular importance to the Irish population's general health and wellbeing. The benefits of a clean natural environment play an important role in reducing the burden of chronic disease. Ireland is fortunate in having a good quality of air relative to other EU Member States as evidenced by the most recent EPA report *Air Quality in Ireland 2015 - Key Indicators of Ambient Air Quality*.

The most recent EPA Air Quality report provides an overview of air quality in Ireland for 2016, based on the data obtained from 30 monitoring stations that form the National Ambient Air Quality Monitoring Network as assessed against legislative limits and target values for the protection of health and vegetation/ecosystems. Concentrations observed were also compared to the World Health Organisation (WHO) air quality guideline values. It includes an assessment of the following pollutants: NO_x, SO₂, CO, ozone, particulate matter (PM₁₀, PM_{2.5} and black smoke), benzene and VOC, heavy metals and polycyclic aromatic hydrocarbons. The EPA Air Quality Report 2016 highlights the following:

- No levels above the EU limit value were recorded at any of the ambient air quality network monitoring sites in Ireland in 2016
- WHO guideline values were exceeded as follows:
 - Ozone at 7 monitoring sites
 - Particulate Matter PM₁₀ at 11 monitoring sites (24hr WHO guideline)
 - Particulate Matter PM_{2.5} at 9 monitoring sites (24hr WHO guideline)
 - Particulate Matter PM_{2.5} at 2 monitoring site (annual WHO guideline)
- EEA reference levels were exceeded as follows
 - PAH at 4 monitoring sites
- The dioxin survey 2016 shows levels recorded remain consistently low in the Irish Environment.

The report summary indicates a growing understanding of the links between air quality and human health. Although air quality is compliant with EU legislative

requirements there are exceedances of the WHO standards which gives cause for concern. The European Environment Agency (EEA) has estimated that air quality and predominantly particulate matter (PM_{2.5}) arising from the use of solid fuels such as wood, coal and peat for home heating is responsible for 1,510 premature deaths in Ireland in 2014. Transport is also identified as a significant contributor to air emissions with increasing concern over agricultural related emissions.

With respect to large combustion plants such as LRP Station for example the report in its conclusion acknowledges such emissions are well controlled and regulated under the Industrial Emissions Licensing system enforced by the EPA:

“Emissions from large industrial activities are well regulated through the industrial and waste licensing regimes and further downward pressure on emissions will be realised through ongoing implementation of the European Industrial Emissions Directive (IED) and associated Best Available Techniques requirements of the IED.”

Challenges remain in reducing levels of particulate matter predominantly sourced from the burning of fossil fuels in domestic appliances in Ireland and it is likely that future air quality standards in Europe will reflect those of the World Health Organisation (WHO).

A summary of background air quality for the main pollutants such as NO_x, SO₂, CO, PM₁₀ and PM_{2.5} as assessed by the EPA for Zone D is provided in **Table 9-4 to Table 9-8**. The appropriate limit values as derived from the EU CAFE Directive (2008/50/EC) and as transposed into Irish legislation [S.I. No. 180/204] are also provided for comparative purposes.

Air quality in Zone D areas is generally very good with low concentrations of pollutants such as NO₂, SO₂, Particulate Matter 10 microns in size (PM₁₀), Particulate Matter 2.5 microns in size (PM_{2.5}) and Carbon Monoxide (CO).

Table 9-3: EPA Air Quality Monitoring Nitrogen Oxides (NOx) Zone D

Limit Threshold Values for NOX as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				Summary Statistics For Hourly NOX Concentrations In Ireland In 2016	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	$\mu\text{g}/\text{m}^3$	
Human Health	One hour	$200 \mu\text{g}/\text{m}^3$	18 hours per year	Annual Mean	Range 3.7 – 17.3 ¹
Human health Calendar year 40 $\mu\text{g}/\text{m}^3$	Calendar year	$40 \mu\text{g}/\text{m}^3$		Median	9.5 ²
Alert	One hour	$400 \mu\text{g}/\text{m}^3$		Hourly Max	884 ³
Vegetation	Calendar year	$30 \mu\text{g}/\text{m}^3$			
Upper assessment threshold for human health	Calendar year	$32 \mu\text{g}/\text{m}^3$			
Lower assessment threshold for human health	Calendar year	$26 \mu\text{g}/\text{m}^3$			

- 1) Reported range of annual Mean values: (Emo Court, Enniscorthy, Castlebar and Kilkitt)
- 2) Median is the highest reported for the above four stations (Enniscorthy)
- 3) Highest hourly max reported for Enniscorthy

Table 9-4: EPA Air Quality Monitoring Sulphur Dioxide (SO₂) Zone D

Limit Threshold Values for SO ₂ as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				Summary Statistics For Hourly SO ₂ Concentrations In Ireland In 2016 Zone D	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	µg/m ³	
Human Health	One hour	350 µg/m ³			
Human health	One day	125 µg/m ³	3 days per year	Annual Mean	1.8 – 2.5 ¹
Alert	One hour	500 µg/m ³		Median	1.9 ²
Vegetation	Calendar year	20 µg/m ³		Hourly Max	43.1 ³
Upper assessment threshold for human health	One day	75 µg/m ³	3 days per year	Daily Max	18.5 ⁴
Lower assessment threshold for human health	One day	50 µg/m ³	3 days per year		

- 1) Reported range of annual Mean values: Enniscorthy, Kilkitt and Shannon Estuary
- 2) Highest reported Median for above stations
- 3) Highest hourly max (Enniscorthy)
- 4) Highest daily max (Enniscorthy)

Table 9-5: EPA Air Quality Monitoring Carbon Monoxide (CO) Zone D

Limit Threshold Values for CO as set out in the 2008 CAFE Directive & S.I. No. 180 Of 2011				Summary Statistics For Rolling 8 hour CO Concentrations In Ireland In 2016 Zone D	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	mg/m ³	
Human health	8 Hour Average	10 mg/m ³	-	Annual Mean	0.6 ¹
Upper assessment threshold for human health	8 Hour Average	7 mg/m ³	-	Median	0.6 ²
Lower assessment threshold for human health	13 Hour Average	5 mg/m ³	-	Hourly max	4.1 ³

- 1) Enniscorthy only
- 2) Enniscorthy only
- 3) Enniscorthy only

Table 9-6: EPA Air Quality Monitoring Ozone Zone D

Air Quality Limit Values for ozone set out in the 2008 CAFE Directive And S.I. No. 180 Of 2011				Summary Statistics For Rolling 8 hour Ozone Concentrations in Ireland in 2016 Zone D	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	$\mu\text{g}/\text{m}^3$	
Human health	Daily maximum 8-hour mean	120 $\mu\text{g}/\text{m}^3$	25 days per year averaged over 3 years	Annual Mean	Range ¹ 49.8 – 71.8
Vegetation	AOT40 accumulated over May-July	18,000 $\mu\text{g}/\text{m}^3$ averaged over 5 years		Median	73.3 ²
LTO health	Daily maximum 8-hour mean	120 $\mu\text{g}/\text{m}^3$		Max. 8 Hour	124.9 ³
LTO vegetation	AOT40 accumulated over May-July	6,000 ($\mu\text{g}/\text{m}^3$).h		Number of days greater than 120	1 ⁴
				Average AOTO40	Range ⁴ 1372 -7622

1) Reported range of annual Mean values: Kilkitt, Mace Head, Castlebar, Valentia and Emo Court

2) Highest reported Median (Mace Head)

3) Highest reported Max hourly (Kilkitt)

4) Range across all five stations

Table 9-7: EPA Air Quality Monitoring Particulate Matter (PM10) Zone D

Air Quality Limit and Target Values for PM10 as set out by The CAFE Directive And S.I. No. 180 Of 2011				Summary Statistics For Daily PM10 Concentrations In Ireland In 2016	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	$\mu\text{g}/\text{m}^3$	
PM10 limit value	One day	50 $\mu\text{g}/\text{m}^3$	Not to be exceeded on more than 35 days per year	Annual Mean	Range ¹ 8.1 – 17.3
PM10 limit value	Calendar year	40 $\mu\text{g}/\text{m}^3$		Median	14.6 ²
Upper assessment threshold	One day	35 $\mu\text{g}/\text{m}^3$	Not to be exceeded on more than 35 days per year	Daily Max	87.9 ³
Lower assessment threshold	One day	25 $\mu\text{g}/\text{m}^3$	Not to be exceeded on more than 35 days per year	Number of days greater than 50	7 ⁴

1) Reported range for 4 stations Reported range of annual Mean values: Castlebar, Claremorris, Enniscorthy and Kilkitt

2) Highest Median reported (Enniscorthy)

3) Highest daily max (Enniscorthy)

4) Enniscorthy

Table 9-8: EPA Air Quality Monitoring Particulate Matter (PM_{2.5})

Air Quality Limits and Target Values for PM _{2.5} as set out by The CAFE Directive And S.I. No. 180 Of 2011				Summary Statistics For Daily PM _{2.5} Concentrations For Ireland In 2016	
Objective	Reference Time Period	Limit or Threshold value	No. of Allowed Exceedances	µg/m ³	
PM_{2.5}, target value	Calendar year	25 µg/m ³	To be met by 1 January 2010	Annual mean	Range ¹ 6 – 12
PM_{2.5}, limit value	Calendar year	25 µg/m ³	To be met by 1 January 2015	Median	10 ²
PM_{2.5}, limit value²	Calendar year	20 µg/m ³	To be met by 1 January 2020	Daily max	56.6 ³
Upper assessment threshold	Calendar year	17 µg/m ³			
Lower assessment threshold	Calendar year	12 µg/m ³			
PM_{2.5} exposure concentration obligation.		20 µg/m ³	To be met by 1 January 2015		
PM_{2.5} exposure reduction target	0 - 20 % Reduction in exposure (depending on the average exposure indicator in the target reference year) to be met by 2020				

1) Reported range of annual Mean values: Claremorris and Longford

2) Highest Median reported (Longford)

3) Highest daily max reported (Longford)

9.3.5.1 Heavy Metals

Heavy metals (lead, Arsenic, Cadmium and Nickel) concentrations were all below the annual limit or target values in Zone D. Previous EPA Air Quality in Ireland Report (2015 for example) noted that domestic fuel burning emissions in rural areas was the main source of particulate matter and poly-aromatic hydrocarbons (PAH). Trends indicated in the 2017 Report continue to indicate low levels of heavy metals with some concern for PAH. Levels of particulate matter in some smaller towns for example are similar or higher than those in cities, where bituminous coal is banned.

9.3.5.2 European Environment Agency Air Quality in Europe Report 2017

In addition the European Environment Agency – Air Quality in Europe – 2017 Report identified air pollution as the single largest health risk in Europe but also indicates that air quality in Ireland is substantially better than the European average. The EEA report presents an updated overview and analysis of air quality in Europe from 2000 to 2015 and reviews the progress made towards meeting the European air quality standards. It indicates that Ireland complied with the air quality European limit values

including PM_{10} and $PM_{2.5}$ and the stricter WHO limits for the latter also, during the observation period. The Report also indicates that premature deaths across Europe arise from air pollution with an estimated 1,660 premature deaths occurring in Ireland from existing levels of $PM_{2.5}$ (1,480), Nitrogen Dioxide (160) and Ozone (20) with predictions based on the lowest concentrations used to calculate the health impacts of a pollutant in a baseline scenario (the counterfactual concentration (C_0)).

9.3.6 Noise

The existing LRP Station and ADF operate under an IE Licence P0610-02 issued by the EPA, which requires annual noise monitoring at specific noise sensitive locations to be undertaken and results reported to the Agency. Schedule B.3 of the licence sets out the following limits.

Table 9-9: B.3 Noise Emissions

Daytime dB(A) LAeq (15 minutes)	Night-time dB(A) LAeq (15 minutes)
55 ^{Note 1}	45 ^{Note 1}

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity of any noise-sensitive location

Noise monitoring is undertaken yearly at three locations during day, evening and night time in the vicinity of the LRP station to verify compliance or otherwise with the noise emission limits, in accordance with the guidelines set out in Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

Noise levels are not monitored at the ADF given the nature of the activities and remote nature of the site.

This noise monitoring report has been provided to the EPA as part of the IE licence review application as Attachment-7-1-3-3-Rec Env Report_Noise.

9.4 Impacts of the Development

This assessment considers the likely significant effects on the environment arising in relation to Climate, Air Quality and Noise, including the secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the proposed development.

9.4.1 LRP Station

No physical or operational changes are proposed to the LRP station site or its licence activity under this IE licence review.

LRP is a thermal combustion energy generation plant fired on peat fuel. Combustion of solid fuel of this nature will result in releases of carbon dioxide, sulphur oxides, nitrogen oxides and dust to the atmosphere. Emissions to air from LRP are licensed by the EPA (IE Licence P0610-02) which sets emission limits based on the EU Industrial Emissions Directive (EU Directive 2010/75/EC). The licence sets out emission limit values (ELVs) not to be exceeded and a schedule of monitoring requirements for the boiler stacks (PS-A1 and PS-A2). The ELVs are shown in **Table 9-10**.

Greenhouse gas emissions from LRP are accounted for under the European Union Emission Trading Scheme.

Table 9-10: Emission limit values according to IE Licence P0610-02

P0610-02 Schedule	Emission Point Ref. No.	Location	Parameter	ELV
Schedule B	PS-A1	Boiler Stack	Oxides of sulphur Nitrogen oxides (as NO ₂) Dust	200 mg/m ³ 200 mg/m ³ 20* mg/m ³
Schedule B	PS-A2	Auxiliary Boiler Stack	Oxides of sulphur Nitrogen oxides (as NO ₂) Dust	1700 mg/m ³ 300 mg/m ³ 20* mg/m ³
Schedule B	Dust Deposition	At locations to be agreed by the agency	Dust	350 mg/m ² /day

*Technical Amendment B to Industrial Emissions Licence.

LRP Station has adhered to the emission limits to air over the past three years with minor exceptions. A small number of minor incidents relating to air have been reported during this period. These include breaches of ELVs and monitoring equipment functioning which were addressed under existing procedures for such incidents. The incidents have all been resolved and the likelihood of reoccurrence is considered to be low.

The IE Licence requires the station to prepare and submit an Annual Environmental Report (AER) to the EPA summarising emission data. The AER Reports are publicly available on the EPA website (<http://www.epa.ie/licensing/>). Data relating to air emissions from the main boiler stack (PS-A1) have been extracted from the reports for the period 2014 - 2016 and presented in **Table 9-11**.

Table 9-11: Annual emissions to air for the periods 2014, 2015, 2016.

Emission Point Ref. No.	Location	Parameter	Annual emission tonnes (2016)	Annual emission tonnes (2015)	Annual emission tonnes (2014)
PS-A1	Boiler Stack	Oxides of sulphur	280.59	298	316.4
PS-A1		Nitrogen oxides (as NO ₂)	562.15	546	475
PS-A1		Dust	16.92	6.1	10.4
PS-A1		Carbon Dioxide	856,330	852,264	788,708

Continuous monitoring of the stack emission is in place and allows early detection of any equipment failure which can give rise to a fugitive emissions. These are therefore, rapidly identified, noted to the EPA and addressed immediately limiting any potential impact.

Although minor breaches in the ELVs have occurred these have not significantly impacted air quality in the vicinity of the plant.

Under the current planning permission licensed emissions of SO₂, NO_x, and dust will continue until the end of December 2020. In addition to the ELVs set out in **Table 9-11** above a maximum flow volume of 392,000 Nm³ per hour is allowed for PS-A1 and 17,900 Nm³ per hour for PS-A2.

The station operating in compliance with its current IE Licence emission limits or in compliance with the requirements of the new BAT conclusions will have **an imperceptible impact on the receiving environment in the short term** is anticipated.

Transportation of ash from the station could also generate airborne dust but transport occurs in covered wagons and ash is dampened down to minimise dust release. The impact from this operation would be **slight negative, localised, occur during the lifetime of the plant and not significant**.

Air emissions from LRP Station will continue to be controlled under the IE licence as issued by the EPA. The impact can therefore be stated to have a likely **slight negative impact in the short term**.

The proposed alteration to Condition 5.5 will have no effect on the air quality in the study area.

9.4.1.1 Human Health

Ambient air quality legislation designed to protect human health and the environment is generally based on assessing ambient air quality at locations where the exposure of the population is significant relevant to the averaging time of the pollutant. In 2018 an air dispersion modelling was completed for LRP, see **Appendix 9.1**. The

modelling results were compared to the existing national air quality standards and also the more stringent World Health Organisation Standards. In summary the modelling report predicts the following:

All predicted ambient pollutant concentrations (including background) are in compliance with the relevant limit values. The results indicate that the ambient ground level NO₂ concentrations (including background) reach 19% of the maximum 1-hour limit value (measured as a 99.8th%ile) and 28% of the annual limit value at the worst-case off-site receptor. Ambient ground level SO₂ concentrations (including background) reach 13% of the maximum 1-hour limit value (measured as a 99.7th%ile) and 9% of the maximum 24-hour limit value (measured as a 99.2nd%ile) at the worst-case off-site receptor. Ambient ground level PM₁₀ concentrations (including background) reach 25% of the maximum 24-hour limit value (measured as a 90.4th%ile) and 30% of the annual limit value at the worst-case off-site receptor. Ambient ground level PM_{2.5} concentrations (including background) reach 29% of the annual EU limit value at the worst-case off-site receptor. When compared against the more stringent WHO limit values, ground level PM_{2.5} concentrations (including background) reach 73% of the annual WHO limit value and 32% of the maximum 24-hour WHO limit value (measured as a 99th%ile) at the worst-case off-site receptor.

The results for the plant operation demonstrate that ambient pollutant concentrations (including background) are well below the applicable air quality limit values at all off-site receptors designed to protect human health. The impact on Human Beings from air emissions controlled under the station's IE Licence will continue for the duration of operation of the station but therefore be imperceptible in terms of impact.

9.4.1.2 Climate Change

The most significant greenhouse gas implicated as a driver of climate change is carbon dioxide (CO₂). Carbon dioxide is emitted from the station arising from the combustion of peat fossil fuel. The quantity varies depending on the operational level of the station with outage periods due to annual or planned maintenance operations. As indicated in table 9-11 above LRP emits circa 856 thousand tonnes of CO₂ annually arising from the combustion of peat fuel. The proposed development will continue to see a similar level of CO₂ emitted to the atmosphere on an annual basis to the end of 2020 at which time the station will cease operations and greenhouse gas emissions from the combustion of peat fuel will no longer occur. The impact on climate will therefore be **negative, moderate in nature and of short duration**.

Post closure of the plant minor emissions of greenhouse gases will occur due to fuel use in decommissioning of the station and ADF. The impact on climate change will be **negative, minor in nature and of very short duration**.

9.4.2 Derraghan ADF

Air quality

The landfill footprint will be developed in cells over a 2 year period and such development will cease on the expiry of the current planning permission in December 2020. There will be potential for minor temporary short term impacts on air quality

arising from construction transport and construction related activity, including those associated with the construction of landfill cells and the importation and deployment of synthetic clay liner. These potential impacts relate to construction and transport vehicle emissions and localised potential for dust generation. An **imperceptible, short term** impact is anticipated.

The principle potential impact to air quality and human health during operation will arise from dust generation, which could give rise to potential impact on localised air quality for brief periods. It should be noted however, that the ADF is in a remote location with very limited potential for impact on human beings due to the absence of housing in the general area. During the construction and capping of the cells, there will be site preparation and construction activities, both of which have the potential to generate dust. There is therefore some potential for local air quality to be impacted by dust during the construction phase. Dust generated by construction activity can give rise to local nuisance. However, the impact of this will depend largely on climatic factors. For example the potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations.

Transportation of ash by rail can also give rise to localised dust impacts from fugitive emissions.

The primary air quality issue related to construction is dust potentially arising from the following general construction activities:

- Earth moving and excavation equipment including handling and storage of soils and subsoil material, geo-synthetic liner, drainage and capping material;
- Vehicle movement over hard dry surfaces on the site;
- Vehicle movement over surfaces off site contaminated by muddy materials brought off the site, and
- Transport of ash materials by rail to the ADF and placing and compacting ash in the cell structures within the ADF.

Dust deposition is usually highly localised to areas of activity, with dust particles falling to the ground within several hundred metres of the source. Dust emissions do not cause long term or wide spread changes to local air quality.

The majority of the releases are likely to occur during the normal construction working hours. However, in the instance of exposed soil produced from significant earthwork activities, there is potential for short term dust generation to occur 24 hours per day depending on weather conditions.

Particulate matter can remain suspended in the atmosphere for a longer period and can be transported over a wider area than dust, by wind. It is potentially small enough to be drawn into the lung during breathing, which in sensitive members of the public could cause an adverse reaction. However, given the general good air quality in the Zone D area construction route and relatively short duration of

construction activity at any one location no significant impact from particulate matter is expected. Typical sources of particulate matter during the construction phase are similar in nature to those that give rise to dust. Particulate matter is also released from the engines of site plant, such as compressors, generators etc. whilst they are running.

Therefore, occasionally, increased and perceptible localised emissions may occur. There may also be occasions when mechanical breakdown of site plant could cause short term releases of excess particulate matter and short term release may also occur during start up. However with good construction and mitigation practices and ensuring compliance with the EPA approved Landfill Operational Plan dust will not impact significantly on air quality. Therefore an **imperceptible impact on the receiving environment in the short term** is anticipated. The operational phase of the ADF is due to terminate under the current planning permission in December 2020.

Impacts on Climate

There will be some greenhouse gas emissions from construction equipment but these will be minor and the impacts on climate change during the construction phase will be not-significant.

Impacts of Climate on the Development - Increased Precipitation

Although heavy rainfall events are frequent across the country climate predictions indicate these events could occur with greater frequency. The principal impact that can occur on the ADF from increased frequency of rainfall events is flood risk. A Flood Risk Assessment for the development has been prepared and included in **Volume 4, Appendix 7-3**. As per the 2009 Planning Guidelines climate change has been factored into consideration for flood risk assessments. The flood risk assessment concluded that the site lies outside all flood zones even allowing for climate change effects.

Impact on Human Health

Impacts on Human Health could potentially arise from dust generation during the construction of the landfill and from noise associated with the construction activities. These impacts would be **imperceptible and temporary in nature** and would be confined to the construction sites within the existing ADF footprint.

9.4.2.1 Decommissioning Phase

The ADF will be decommissioned in accordance with the EPA approved CRAMP. All open cells will be capped with an impermeable barrier, a drainage layer, and a final peat capping layer and subsequently revegetated. There will be no potential for atmospheric emissions once the closure and restoration is concluded.

9.4.3 Transboundary Impacts

Transboundary air pollutant emissions in Ireland are reported annually to the European Commission under the National Emissions Ceiling Directive and to the UNECE under the Convention on Long-Range Transboundary Air Pollution. These

pollutants are responsible for long-range transboundary air pollution such as acidification, eutrophication and ground-level ozone pollution.

The Directive (EU) 2016/2284 (new National Emissions Ceilings Directive) on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (old NEC Directive) entered into force on the 31st of December 2016. It requires the submission of an emission inventory by 15th February 2017 and every year thereafter. This new legislative act harmonises the reporting obligations to the European Union under the Convention on Long Range Transboundary Air Pollution (CLRTAP).

The EPA now reports data on five key air pollutants, nitrogen oxides (NO_x), sulphur dioxide (SO₂), non-methane volatile organic compounds (NMVOCs), ammonia (NH₃) and particulate matter of 2.5 microns or less (PM_{2.5}) to the European Commission as required under the new legislation. Mandatory reporting of Carbon Monoxide (CO), the heavy metals Cadmium (Cd), Mercury (Hg) and Lead (Pb), persistent organic pollutants (POPs) – (Polycyclic Aromatic Hydrocarbons (PAHs), dioxins/furans, Polychlorinated biphenyls (PCBs), Hexachlorobenzene (HCB)), PM_{2.5} and PM₁₀ is required annually.

The most recent inventory emission submitted to the European Commission by the EPA²¹ indicates that emissions of three of the five main air pollutants increased - ammonia, nitrogen oxides and non-methane volatile organic compounds. The report summarises the emission inventory as follows:

- Ireland exceeded its emission ceilings for nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOCs) for all years since 2010 and the emission ceiling for ammonia (NH₃) in 2016.
- 2016 is the first year for which the EPA has reported an exceedance for ammonia, although the EPA's Air Pollutant projections have indicated for some time that it was likely to occur if animal numbers continued to rise.
- As was the case for the 2015 Inventory, Ireland will seek to use the flexibilities allowed in Article 5(1) of the Directive, as national total emissions of NO_x and NMVOC are non-compliant with reduction commitments due to updating inventories in accordance with scientific knowledge.
- Emissions of sulphur dioxide (SO₂) continue to decrease. These were well below the required EU emission limits, substantially due to the use of lower sulphur content fuels in electricity generation and transport.
- Particulate matter (PM_{2.5}) emissions declined in 2016. Future emissions will depend largely on the quantity and quality of solid fuel used in the residential and commercial sectors.

²¹ EPA, Ireland's Transboundary Gas Emissions. 1990-2016, March 2018

The submission also shows Ireland exceeding its 2010 NO_x and VOC ceilings for all years since 2010, see Table 9-12. VOC emissions are above the national emission ceiling primarily due to the inclusion of a new source category (emissions from manure management in agriculture). NO_x emissions have been consistently above the national emission ceiling.

The emissions of SO₂ from industrial sources decreased by 92 % from 1990 while the emissions in the transport sector decreased by 96.7 %. Total SO₂ emissions in 2010, and all subsequent years, are compliant with the 2010 ceiling. Power stations are one of the principal sources of SO₂ emissions, contributing 27 % to the total in 2016. Emissions in the power generation sector sectors have decreased by 96.4 % since 1990.

The principal source of NO_x emissions comes from the transport sector, which mainly consists of road transport, contributing approximately 41 % of the total in 2016 with agriculture the second largest at 29.6 %. Power generation contributed 7.5 %, in the same period. NO_x emissions in Ireland have decreased by 38.7 % between 1990 and 2016. An increase in NO_x emissions in recent times, leading to levels in excess of the national emission ceiling limits, is attributed to transport, industry and agricultural sources.

The agriculture sector accounts for virtually all (99 %) of ammonia emissions in Ireland. Grasslands ultimately receive the bulk of the 40 million tonnes (Mt) of animal manures produced annually in Ireland along with approximately 300,000 tonnes of nitrogen in fertilisers. A proportion of the nitrogen in these inputs is volatilised into the air as ammonia.

The main sources of VOC emissions in Ireland are from manure management in agriculture and solvent use, which combined produce 83.3 % of the annual total in 2016. Emissions from stationary combustion of fossil fuels across all sectors; power stations, residential, commercial and agriculture account for 11.27 % of national total VOC emissions. Transport emissions account for almost 4.9 % of national total emissions of VOC, mainly from exhaust and fugitive releases from gasoline vehicles.

Table 9-12: Ireland's Transboundary Gas Emissions 2013

	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling
kt	SO ₂		NO _x		VOC		NH ₃	
2010	28.257	42	82.395	65	91	55	108.9	116
2011	26.68	42	73.399	65	88.724	55	104.873	116
2012	25.191	42	75.873	65	88.204	55	105.905	116
2013	25.393	42	76.542	65	90.001	55	107.758	116
2014	16.891	42	104.142	65	106.114	55	108.312	116
2015	15.004	42	104.393	65	106.403	55	111.121	116

	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling	National Total Emission	National Emission Ceiling
2016	13.766	42	107.300	65	108.25	55	116.700	116

Direct transboundary impacts are associated with emissions of SO₂, NO_x, VOC and NH₃ from LRP Station. Quantities of transboundary pollutants are reported annually to the EPA in the stations Annual Environmental Report; these are provided in **Table 9-13**.

In terms of potential transboundary gas emissions from the ADF there is only minor potential for such impacts from the ash disposal area itself principally from sulphur oxides and NO_x from the combustion of fossil fuel related to the ash transport and landfilling activities.

Table 9-13: LRP Generation Station- Transboundary Gas Emissions 2016²²

Transboundary Gas	Tonnes/annum
Sulphur Oxides (SO _x /SO ₂)	257
Nitrogen oxides (NO _x /NO ₂ tonnes)	368
Ammonia (NH ₃ tonnes)	8.7
Carbon Monoxide (CO tonnes)	47.3
Nitrous Oxide (N ₂ O tonnes)	40
Non-methane volatile organic compounds (NMVOC tonnes)	2.3
Particulate Matter (PM ₁₀)	28
Polycyclic Aromatic Hydrocarbons (PAH)	0.0005

Indirect emissions of transboundary gases also occur from peat harvesting operations and transport of the peat with the peat supply bogs releasing up to an estimated 12 tonnes of nitrous oxide annually.

LRP Station operates in accordance with its IE Licence which sets emission limits for SO_x, NO_x and particulate matter and is subject to the EU Commissions Best Available Techniques requirements which will continue to tighten emission limits through IE Licence reviews and amendments implemented by the EPA. Emissions of transboundary gases will continue to arise from the station until 2020 and will cease thereafter.

²² Annual Environmental Report, 2017, (www.epa.ie)

9.4.4 Indirect Impacts - Peat Supply to LRP

Greenhouse gas emissions from the peatlands used to supply peat to LRP Station are counted under land use change and forestry emissions (IPC Sector 5). The peat supply bogs do not function as active carbon sinks as they have been drained and are bare of vegetation. Emissions of greenhouse gases CO₂, CH₄ and N₂O can arise from the active peat production surface areas and milled peat stockpiles through the oxidative loss of carbon.

Estimates of greenhouse gas losses have been made based on the area extent of peat bogs serving LRP and using the IPCC Supplementary Guideline for Wetlands (Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands. Intergovernmental Panel on Climate Change, 2013²³, Tier 1) emissions for boreal zone (i.e. sub-arctic) and temperate wetlands in peat production as follows:

• Carbon dioxide	2.8 tonnes CO ₂ -C/ha/yr
• Methane - peat surface	0.0061 tonnes CH ₄ /ha/yr
• Methane – ditches	0.542 tonnes CH ₄ /ha/yr
• Nitrous oxide	0.00047 tonnes N ₂ O /ha/yr

Using these values and a drained bog area of approximately 12,699 hectares to supply peat to LRP the estimated annual greenhouse gas emissions are equivalent to 127,492 tonnes of CO₂, 758 tonnes of CH₄ and 12 tonnes of N₂O annually.

It should be noted that this is a worst case scenario where the total Bord na Móna ownership area of the peat bogs has been used rather than the actual peat extraction areas. As some of the bogs provide peat to other electricity generating stations the percentage area serving LRP has been used in the calculations.

An estimate of greenhouse gas emissions from stockpiles of milled peat serving LRP, based on annual average supply of milled peat fuel taken from the stations AER reports of 883,917 tonnes/annum, has been made using measurements of CO₂, CH₄ and N₂O from uncovered milled peat stockpiles in Finland (annual total CO₂-equivalent emission of 15,772 kg CO₂eq/m²/yr)²⁴ indicates an annual emission of approximately 44,323 tonnes of CO₂eq.

Peat production, loading and transport

Gas oil is used to provide motive power for peat harvesting, loading and transportation by narrow gauge railway or by road. An estimated 1.75 million litres of gas oil is used annually in tractors, hydraulic excavators, locomotives and road vehicles to transport the peat to LRP station. Based on SEAI²⁵ published net calorific

²³ IPCC 2014, 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, Hiraishi, T., Krug, T., Tanabe, K., Srivastava, N., Baasansuren, J., Fukuda, M. and Troxler, T.G. (eds). Published: IPCC, Switzerland.

²⁴ Alm, J. et al. Emission factors and their uncertainty for the exchange of CO₂, CH₄ and N₂O in Finnish managed peatlands. Boreal Environmental Research 12: 191-209, Helsinki, 2007

²⁵ Martin Howley and Mary Holland, Energy Policy Statistical Support Unit, Energy-Related Emissions in Ireland, CO₂ emissions from fuel combustion 2016 Report, SEAI

emission values for gasoil of 10.161 kWh/l of and 0.000264 tonnes of CO₂/kWh an estimated 4,713 tonnes of CO₂ will be emitted per annum to the end of 2020.

It should be noted that peat harvesting to supply LRP Station will cease in 2020 as the station will no longer be in operation under its current planning permission, however, greenhouse gas losses will continue from the bare peat areas whereas milled peat will no longer be stockpiled. However, greenhouse gases losses from the bare peat areas will only continue where the peatlands have not been decommissioned and rehabilitated (rewetted). Bord na Móna's decommissioning and rehabilitation plans are ongoing and will run in parallel with the reduction in peat supply to LRP thereby reducing the potential for greenhouse gas losses from these areas

Some of these supply bogs also supply the ESB West Offaly Power Station and the Bord na Móna Edenderry Power Station hence the emissions from the supply bogs themselves do not arise solely from their use associated with LRP. West Offaly Power station will close under its existing planning in 2020 also with Edenderry Power Station scheduled to close in 2023 under its current planning. Long term options for the use of the peat supply bogs are in consideration by Bord na Móna and include options such as site use for renewable energy (wind and solar). Rehabilitation of the supply bogs is also a requirement of their respective IPC Licences and will be implemented by Bord na Móna.

There is also potential for peat dust generation during the harvesting and stockpiling operations, which if uncontrolled could give rise to nuisance outside the peat harvesting areas. However, Bord na Móna operates their harvesting operations under their environmental management system which included for dust control measures using best industry practice

9.4.5 Noise Impacts

9.4.5.1 Noise Impact Assessment Construction (applicable to the ADF only)

Noise will be generated by equipment used in the construction of cells, in the moving and deposition of ash materials at the landfill and in final capping of the cells. It will also be generated by transport of ash to the site by rail which occurs infrequently. Noise generated by these activities will be very localised and as the ADF is located remotely from dwellings will not impact on human health. Both construction and operational noise will also be of short duration and confined to normal working hours reducing any potential impact.

9.4.5.2 Noise Impact Assessment Station Operation

The prevailing environmental conditions with respect to noise would still apply. The IE Licence P0610-02 imposes a noise limit that applies to the operation of the station. The IE Licence review will not affect the existing noise regime or operation within these noise limits.

Compliance operational noise monitoring is undertaken annually by an independent noise consultant at agreed Noise Sensitive Locations and in accordance with the EPA's' Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). Operational noise limits for the current station operations are set out in NG4 as follows:

- Daytime (07.00 to 19.00): 55 dB LAr,T;
- Evening Time (19.00 to 23.00) 50 dB LAr,T;
- Nighttime (23.00 to 07:00) 45 dB LAeq,T

Compliance monitoring indicates that the station is fully compliant with the noise limits as set out in the EPA's NG4 Noise Guidance document.

The conclusion of the 2017 noise monitoring at the station is as follows:

In conclusion to the measurement and assessment of environmental noise as a result of the operation of the Lough Ree Power Station, it has been concluded that the specific noise level from the Power Station at each measurement location remains below the day, evening and night time limits as outlined in IEL Number P0610-02.

While measured LAeq levels at measurement locations have been shown to be in excess of day, evening and night time IEL limits on occasion; such levels are not attributable to the Lough Ree Power Station. Such measured levels were observed to be largely attributable to road traffic, particularly along the N63.

Due to the constant nature of noise emanating from the Power Station, the LA₉₀ statistical noise indicator, typically used to determine the background noise level at a location, was used to depict the specific noise level from the Power Station. It can be seen from Table 2²⁶ above that all measured LA90 values are below the day, evening and night time noise limits outlined in IEL P0610-02 for each period.

By viewing the 1/3rd octave band noise spectrums for day, evening and night time measurements at both measurement locations, it was concluded that the specific noise from the Power Station is not deemed to be tonal in character. During the noise measurement survey, there were no individual noise events or impulsive noises audible from the Power Station.

The day, evening and night time noise limits as set out in IEL P0610-02 for Lough Ree Power Station have not been breached at the nearest noise sensitive locations by the noise emanating from the facility. It is therefore concluded that Lough Ree Power Station at Lanesborough, County Longford is considered to be demonstrating compliance with the noise limits outlined for the Power Station in IEL P0610-02.

²⁶ Table 2 from the noise report is replicated below in Plate 9-3

Location	Meas	Start Time	Period	Duration	L _{Aeq}	L _{A90}	L _{A10}	L _{Amax}	L _{Amin}
					dB	dB	dB	dB	dB
NSL1	Meas003	25/04/2017 17:46	Day	00:30:00	52.1	47.4	55.0	69.8	44.8
	Meas007	25/04/2017 21:15	Eve	00:30:00	50.2	47.6	52.1	63.3	45.3
	Meas011	26/04/2017 00:27	Night	00:30:00	44.7	42.7	46.5	65.5	40.7
NSL2	Meas002	25/04/2017 17:05	Day	00:30:00	69.6	49.9	74.4	84.8	43.3
	Meas006	25/04/2017 20:41	Eve	00:30:00	67.8	46.6	72.6	84.2	42.7
	Meas010	25/04/2017 23:55	Night	00:30:00	58.5	42.3	48.8	81.9	40.1
NSL3	Meas001	25/04/2017 16:30	Day	00:30:00	68.1	48.0	73.2	86.2	43.3
	Meas005	25/04/2017 20:07	Eve	00:30:00	67.2	46.2	70.9	85.2	42.4
	Meas009	25/04/2017 23:00	Night	00:30:00	61.0	42.3	61.2	83.6	40.1

Table 2: Summary of Noise Monitoring Survey Results

Plate 9-3 Summary of Noise Monitoring Survey Results 2017

This noise monitoring report has been provided to the EPA as part of the IE licence review application as Attachment-7-1-3-3-Rec Env Report_Noise.

9.4.6 Cumulative Impact

As set out in Section 1.7.6.1 above, the potential cumulative impacts of the proposed development with respect to population and human health, have been assessed. It has been concluded that no significant cumulative impacts associated with the proposed development and any identified plans or projects, are anticipated.

9.4.6.1 Greenhouse Gas Emissions

Greenhouse gas emissions and transboundary emissions are cumulatively produced by other fossil fuel power generation plants including West Offaly Power Station and Edenderry Power Station and other sectors. Ireland's greenhouse gas emissions in 2017 are shown in **Plate 9-4** Plate 9-4: Greenhouse Gas Emissions 1990 and 2017 by sector below.

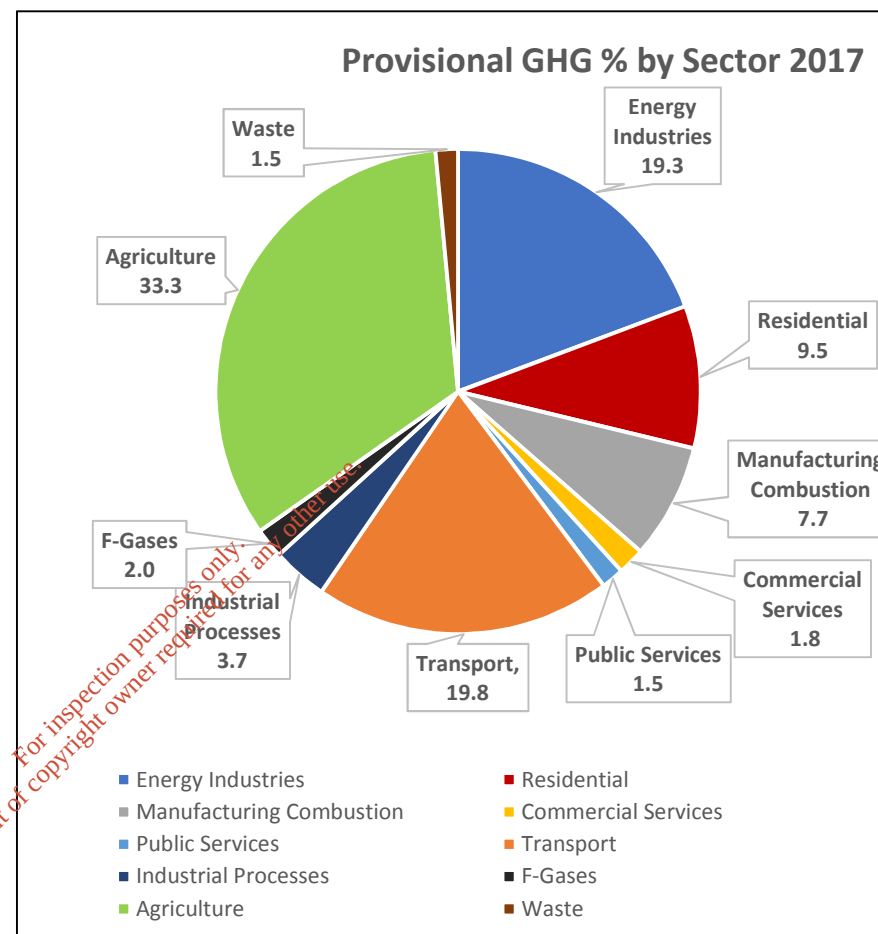
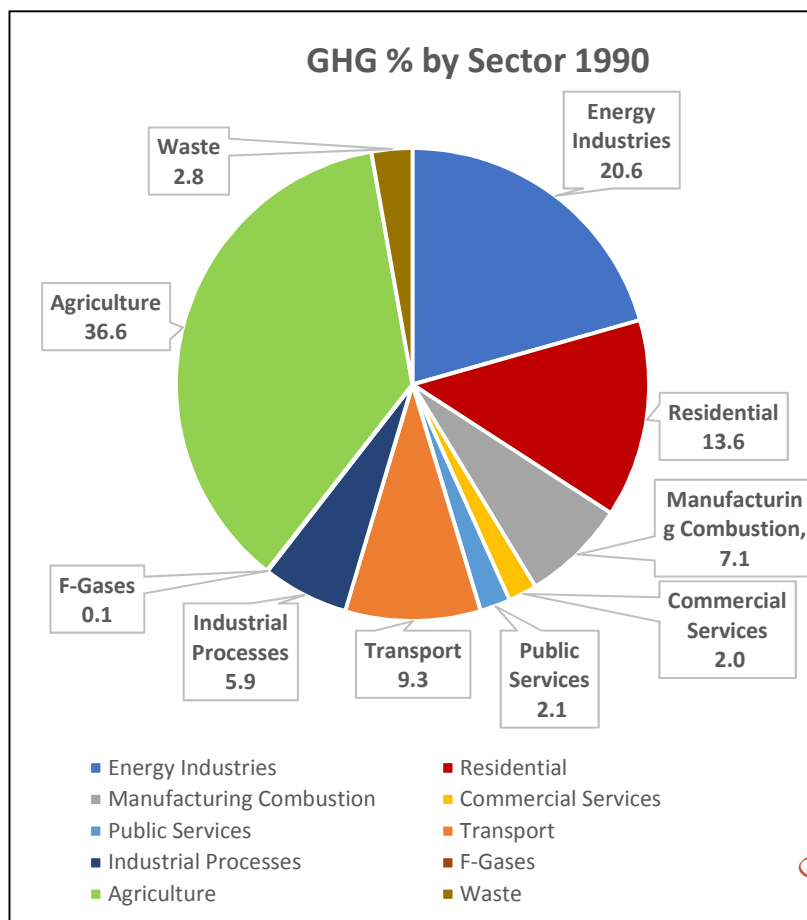


Plate 9-4: Greenhouse Gas Emissions 1990 and 2017 by sector ²⁷

²⁷ EPA December 2018, Ireland's Provisional Greenhouse Gas Emissions 2017, December 2018

ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to Condition 5.5 do not require and physical or operational changes to the LRP Station. The continued future operation of the station beyond 2020 will result in further cells at the ADF being developed with potential for air quality impact arising from construction and operational activities post 2020. In addition the LRP station would continue to operate in accordance with its IE Licence or revised Licence as determined by the EPA and would continue to emit CO₂ to the atmosphere contributing to greenhouse gases in the atmosphere which are linked to climate change. The quantity of CO₂ generated would reduce significantly from 2020 and would cease with respect to peat fuel from the end of 2027 on. Peat would be replaced by sustainable biomass which is regarded as Carbon zero but there would still be emissions of greenhouse gases from its transportation. Overall the station would become a low carbon dispatchable renewable energy generating station displacing carbon intensive fossil fuels in electricity generation. There would continue to be controlled emissions of SO_x, NO_x and dust from peat fuel combustion and biomass combustion in accordance with the stations IE Licence or any revised licence. Modelling of such emissions indicates that no significant impact on human health would occur from the proposed operation of the plant during and post transition to biomass. The continued emission of CO₂ to the end of 2027 would be significant and negative in the short term as the station transitions to biomass but would be significantly positive in terms of reducing greenhouse gases in the medium term post 2027.

There would be no new peat supply bogs brought into operation to allow the continued operation of the station post 2020 and greenhouse gas emissions from the existing supply bogs would continue to occur. Rehabilitation of the peat supply bogs would be delayed as the bogs would continue in operation until 2027 and any reduction in greenhouse gas emissions arising from rehabilitation of the bogs would be delayed also.

9.4.6.2 Noise

As outlined ESB have applied for permission to transition the station to biomass. Potential impacts in relation to the transitioning the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that future proposed development. As part of the future development noise will continue to be emitted from the station and ADF site. A noise impacts assessment and modelling exercise has been undertaken for the future proposed development as there will be a change to the noise environment as a result of the biomass use however the station will still be subject to the requirements of NG4 . There are no anticipated cumulative impacts between the proposed development and the future proposed development.

9.5 Mitigation

9.5.1 Mitigation of dust emissions

The main potential for impact relates to dust emissions during the construction and operational phase of the ADF aspect of the proposed development. The main mitigation is the implementation in full of the requirements of the Sites IE Licence with respect to management of the landfill and in particular the implementation of the Landfill Operational Plan as required by the licence and approved by the EPA.

Construction will follow good engineering practice to ensure minimisation of potential release of dust from the site during this phase.

The IE Licence Condition 3.13 sets out the requirements for the ADF. The development of the landfill is strictly controlled by the EPA through the licence with prior approval of specified engineering works required before implementation. This includes the requirement to develop and implement a Landfill Operational Plan to the satisfaction of the EPA for all active, closed and restored landfill cells and landfilling activities at the installation.

The key Mitigation set out in the Landfill Operational Plan with respect to dust control is as follows:

- 15 – 18% moisture will be added to the ash as it is dispensed from the ash silo at the LRP station into the ash wagons, and
- The ash wagons are covered with hydraulically controlled lids as can be seen from **Plate 9-5**. The ash wagon lids will remain closed at all times during transportation of ash from LRP to the ADF.



Plate 9-5 Ash wagon of a rail bogey with ash buckets and a hydraulically controlled lid

- A further 15% of moisture is added to the ash as it is deposited and levelled in the cell at the ADF. This water / leachate will be deployed using a tractor and slurry tanker.
- Water / Leachate will be sprayed on the deposited ash at regular intervals to prevent dust during dry summer weather.

Water / Leachate required for dust suppression will be sourced from the following:

- The leachate collected in the monitoring manhole may be spread over the ash.
- A recirculation pump (ITT Flygt N3127180 487 Impeller 5.9kW motor) has been installed in the leachate lagoon. This pump is capable of recirculating leachate from the lagoon to the cell through 450m of 4" lay flat hose. Leachate is also removed from the lagoon by tanker and recirculated over uncapped cells as a dust suppression method.
- A borehole well and pump has been installed. This will be used as a water source during the dry summer months when the ash will absorb considerable amounts of water due to evaporation.

The Landfill Operational Plan also sets out procedures for operation during adverse weather conditions. The landfill will be developed on a cell by cell basis with each cell being capped by an impermeable barrier layer, a drainage layer and soil layer within two years of the cell being filled.

The final closure of the landfill will be in accordance with the Closure, Restoration and Aftercare Management Plan prepared in accordance with Condition 10. 2 of the IE Licence and approved by the EPA.

The measures described in the Landfill Operational Plan are 'good practice' measures and are designed to ensure that the construction activities do not generate excessive dust or particulate material release. Employment of such measures will ensure that no significant dust effects occur during construction, operation or decommissioning and closure.

Indirect releases of dust from LRP Station and the peat supply bogs are controlled under their respective EPA Industrial Emission Licence conditions.

9.5.2 Mitigation of greenhouse gas and transboundary emissions

The indirect impacts of greenhouse and transboundary gases SO₂, NO_x, VOCs and NH₃ are controlled under the Industrial Emissions licences issued by the EPA to Lough Ree Power and to Bord na Móna for their peat harvesting operations. These set emission limit values which must be complied with and which are derived from the European Commission's publications on Best Available Techniques to limit emissions from large combustion plants and for other land use activities.

Emissions of CO₂ are controlled under the European Emission Trading Scheme (ETS). Carbon emissions from LRP Station is accounted for in the pan EU Emissions Trading Scheme (ETS). The ETS is a cap and trade scheme, established in 2005, that restricts CO₂ emissions from the major emitting sectors in Europe. It was established under Directive 2003/87/EC and its amendments and is implemented in Ireland under S.I. 490 of 2012 and amendments and S.I. No. 261 of 2010 and amendments. It is a mandatory requirement for power generators such as Lough Ree Power to participate in the scheme.

Under the ETS scheme Lough Ree Power operates under a GHG emission permit (IE_GHG068_10379_3), issued by the Environmental Protection Agency, which

allows it to operate and emit CO₂ surrendering a certificate for each tonne of CO₂ emitted. The total number of carbon credits in the scheme is set at EU level and is set at a level which aims to reduce CO₂ emissions progressively to 43% below 2005 levels by 2030 in line with the EU Council 2030 climate and energy policy framework. With the ETS, the EU has predetermined how many credits are available for each year and so this establishes how much carbon can be emitted across the EU in any year while maintaining a trajectory to the overall target of the scheme.

9.5.3 Mitigation of Noise

No additional mitigation above existing station and the ADF control measures are required, these control measure include:

- The boiler is enclosed;
- The blow-down tank has acoustic tank lagging and a vent silencer;
- Steam Valves are fitted with silencers;
- Rail & road noise:
 - Maintenance schedule to keep vehicles in good condition.
 - Ash transport limited to daytime hours (0:800 hrs to 22:00 hrs).
 - Reduced locomotive speed.
 - Enforcement of speed as per speed cameras.
- Annual noise monitoring conducted.

9.6 Residual Impacts

In terms of dust no significant impacts are predicted following the implementation of good construction practice and implementing the mitigation measures set out in **Section 9.5** above.

During adverse weather condition some residual impacts will occur, dependent on wind speed and turbulence during construction and operation, however, it is likely that the impact will be localised in the area immediately surrounding the source and will be of short duration and temporary in nature.

Additional impacts on climate will arise in terms of greenhouse gas emissions from the combustion of peat at the LRP generating plant, from the harvesting and transport of peat and from the exposed peat areas of the supply bogs due to oxidation of peat and release of methane and oxides of nitrogen. These impacts will continue in the case of thermal combustion of peat and its harvesting and transport specifically for LRP until 2020 under the current planning permission and ETS scheme and then will cease. Release of greenhouse gases will continue from the bare peat areas specifically used to supply peat to LRP post harvesting. This may be offset by the future development of renewable energy projects on these sites and also through the long term rehabilitation of these areas.. Rehabilitation of the peat supply bogs is an ongoing process by Bord na Móna and as areas are revegetated CO₂ losses will reduce. Under the proposed development direct CO₂ emissions from the station operation will cease at the end of 2020 except for minor emissions associated with decommissioning and demolition.

9.7 Do Nothing

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. At that time LRP Station would face decommissioning of the power station without the means of continuing to dispose of peat ash at the ADF.

The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

Should closure of the ADF and decommissioning of the power station occur all deliveries of peat fuel would cease and no peat harvesting associated with deliveries to LRP Station would continue. The station would be decommissioned and demolition would take place in accordance with its DMP and existing planning permission requirements generating minor greenhouse gas emissions and dust emissions during this process. The ADF would be closed in accordance with its CRAMP. There would be no significant air emissions once the plant closure occurs.

9.8 Interaction of the Foregoing

During the construction and operational phase, Climate and Air Quality impacts will be associated with the construction activities of the proposed development and indirectly through road traffic impacts when peat is required to be transported by road to LRP Station as permitted in the existing planning permission, during harvesting seasons as a result of inclement weather conditions.

10 Material Assets

10.1 Introduction

This chapter assesses the potential impacts on Material Assets arising from the proposed development.

This chapter of the EIAR considers potential impacts of the proposed development on the infrastructure, roads and traffic conditions within and surrounding the study area.

In addition, the potential indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to Material Assets are also considered.

10.2 Methodology

In order to inform this chapter a desk-based assessment has been undertaken with consideration for the location of the proposed development and publically available information. This information has been used to evaluate potential impacts of the proposed development in relation to built services, roads and traffic.

Information used in the preparation of this chapter has been sourced from the following:

- Lanesborough New Peat Station EIS (2001);
- Road Safety Authority Road Collision online database (www.rsa.ie/RSA/Road-Safety/Our-Research/Collision-Statistics/Ireland-Road-Collisions/ accessed 27th June 2017); and
- Longford County Development Plan 2015 – 2021.

10.2.1 Study Area

The LRP Station is located within the townlands of Aghamore and Lanesborough and the ADF and is located within the townlands of Derraghan More and Derraghan Beg, in County Longford.

It is noted that there are no physical or operational changes proposed to the LRP station. LRP station is accessed via the N63.

The study area considered in relation to Material Assets includes the LRP station and ADF footprint and the immediate surrounding infrastructure.

The increased capacity in the ADF is located on the site of the currently operational ADF; granted permission in 2002 and developed in 2004 under the ownership of Bord na Móna. The current site consists of an area of 30.2 ha located on existing bog land at a distance of approximately 10 km from LRP Station. The site is located approximately 9 km from Lanesborough town, located to the north west of the site, and approximately 11 km from Ballymahon town, located to the south east of the site.

Access to the ADF is from the R393 regional road which travels in a predominantly north west to south east direction connecting the towns of Lanesborough, where LRP station is located and Ballymahon.

For the consideration of indirect impacts the study area also includes the supply bogs which facilitate station operations.

10.3 Receiving Environment

The receiving environment for the increase in capacity at the ADF is within the footprint of the original ADF assessed by EIA undertaken as part of the decision to grant permission in 2002. The receiving environment for the LRP station remains the same. The proposed development site and activities are unchanged since that original application; however the baseline for the assessment of impacts in particular with respect to traffic has changed since then.

10.3.1 Settlements

As outlined by **Section 10.2.1** LRP Station is located within Lanesborough and the ADF is located approximately 9 km from Lanesborough and approximately 11 km from Ballymahon. Both Lanesborough and Ballymahon are classed as Tier 4 local service towns by the Development Plan with no zoning for either of those settlements which encompasses the ADF area.

10.3.2 Renewable Resources

Appendix 4 of the Longford Development Plan 2015 – 2021 (Development Plan) identifies the location of aquifers and aquifer buffer zones in County Longford. In the vicinity of Lanesborough there are three (3) public boreholes identified with a fourth identified in the Newtowncashel area. The GSI database identified 3 abstraction wells within 500 m of the station, see Chapter 8, **Table 8-2**. The closest well to the development site, 2025NWW107, is approximately 50 m to the west of the station towards the Shannon River. A much deeper second well (2025NWW114 / 2000PUB1009) is present close to this well and is used to supply potable water to the local area. This well together with 2 wells at Lisreevagh collectively abstract, when productive, approximately 4,000 m³/day providing potable water to the local area. These three abstraction wells are managed by Irish Water.

None of these boreholes are located within the immediate vicinity of the ADF development.

10.3.3 Major Utilities

The station currently has an installed capacity of 100 MWe and is capable of exporting c. 91MWe to the National grid. LRP Station is connected to the National grid via five 110kV lines and one 38kV line.

The LRP Station was commissioned in 2004. Existing utilities and services include;

- Electricity: LRP station is primarily self-sufficient in terms of power demands. However when the station is off load, power is imported through the 110KV

network. In addition there is a 10 kV back up supply. This only supplies a power capacity in the region of 1MW and is only used for light, heat and power within the station itself and cannot be used to run any plant.

- Telecommunications: This is provided via fibre from nearby 110Kv station.
- Wastewater Services: LRP Station discharges to the Lanesborough Town sewerage scheme.
- Water supply and surface water drainage: The station itself is served by the public water supply with abstraction of water from the Shannon for the purpose of condensing, cooling of plant and manufacture of water for steam cycle.

There are no known major utilities located within the ADF. Services to which the ADF is connected include the following:

- Three phase electricity;
- Satellite broadband; and
- Mains water.

10.3.4 Transportation Infrastructure

The transportation infrastructure identified by this section is illustrated by **Volume 3 - Figure 10.1: Transportation Infrastructure**.

10.3.4.1 Roads

LRP station is located within Lanesborough which is located on the N63 national secondary road, at its junction with the R371 (at Ballyleague) and the R392 (at Lanesborough).

Access to the ADF is via an existing access road located on the south side of the R392 regional road. This road consists of a two-way road with a single lane in either direction and an 80 km/h posted speed limit.

Another regional road, the R398, is also located within approximately 1.2 km of the site entrance. The R398 intersects with the R392 at its southern end and the R397 regional road at its northern end. It is also a two-way road with a single lane in either direction and an 80 km/h posted speed limit.

The L1155 local road is located within approximately 1.3 km of the site access. The L1155 intersects with the R392 at its northern end and the L11556 local road at its southern end. It is a two-way unmarked local access road.

An assessment of the information available on the Road Safety Authority (RSA) website has been undertaken and between the years 2010 and 2013 a total of 17 incidents occurred on the R392 with no incidents recorded on the R398 or L1155 in the vicinity of the R392. No information since 2013 is currently available from the RSA.

Of those incidents one (1) was recorded adjacent to the ADF rail crossing which consisted of a single vehicle minor incident.

10.3.4.2 Rail

There is an existing Bord na Móna rail line which provides a connection between LRP Station and the ADF. This private Bord na Móna rail link between LRP Station and the ADF is the primary mechanism for the transport of ash from LRP Station to the ADF site.

The rail system interacts with the public road network at the following locations:

- One (1) no. level crossing with the R392 adjacent to the ADF site entrance;
- One (1) no. rail underpass beneath the R398 regional road;
- One (1) no. rail underpass beneath the N63 national secondary road; and
- Two (2) no. rail underpasses beneath local roads in Lanesborough.

Additionally, there is one (1) no. level crossing with the private access road which serves the ISPCA, located opposite the ADF on the northern side of the R392.

10.3.5 Ownership and Access

This EIAR has been prepared on behalf of ESB who are the owners of the LRP and ADF site in accordance with IE Licence P0610-02. Bord na Móna are contracted by ESB for the operation of the ADF and for delivery of peat fuel to the station.

Access to the ADF is via a private access road which runs in a southerly direction from the R392 regional road, approximately 0.2 km south east of Lanesborough.

10.3.6 Tourism and Recreational Infrastructure

Detail in relation to tourism in the vicinity of the station and the ADF are detailed in Chapter 5.

10.4 Impacts of the Development

This assessment considers the likely significant effects on the environment arising in relation to materials assets, including the secondary, cumulative, transboundary, short term, medium term and long term permanent and temporary, positive and negative effects of the proposed development.

10.4.1 LRP Station and alteration to Condition 5.5

There are no physical or operational changes proposed to the LRP station as part of this IE licence review. The potential impacts of the proposed development in relation to LRP Station, in the context of Material Assets, include the following:

- Ongoing use of utilities;
- Ongoing use of the potable water borehole location at the station; and
- Continued traffic impacts relating to the operation and staffing of the station.

For each of these impacts of this development the impacts continue to be as outlined in the original EIS prepared for station operations in 2001. At that time the use of the foul sewer utility for station operations was not considered to require any mitigation measures. The use of the water borehole was not considered to be associated with significant impacts and a commitment to protect and maintain the supply was stated. Traffic impacts were considered in the context of the capacity of the surrounding road network and were also not considered to require mitigation measures.

The original assessment did not consider these impacts to require mitigation measures and it is not considered that any of these indirect impacts are associated with the need for mitigation measures as part of this development.

Traffic impacts are anticipated to continue as outlined by the original EIS prepared for station operations in 2001, which assessed impacts in the context of the capacity of the surrounding road network, and are not considered to require mitigation measures.

10.4.2 Derraghan ADF

The increase in capacity at the ADF is not anticipated to introduce any new impacts on the aquifers and aquifer buffer zones identified by the Development Plan. None of the boreholes identified by the Development Plan are located within the immediate vicinity of the ADF development.

10.4.2.1 Settlements

The increase in capacity at the ADF is not anticipated to impact on the functionality or sustainable growth and development of either Lanesborough or Ballymahon, the settlements located in closest proximity to the ADF. Neither of the settlements are impacted by the continued access requirements to the ADF aside from minor vehicle movements through the settlements by staff accessing the ADF.

10.4.2.2 Transportation Infrastructure

No alterations to the existing access from the N63 are proposed to facilitate the ongoing operation of the station. The existing requirements for access relate to the station operational staff, routine maintenance vehicles and periodic delivery of peat by road in accordance with the original EIS prepared for the development. The previous EIS (February 2001) outlined an average number of 47 deliveries by road per day and a maximum number of 63 per day. No alterations to the existing access from the R392 are proposed to facilitate the increase in capacity at the ADF. Additionally, no additional usage of the existing access is proposed beyond the current usage levels for the ongoing ADF operations. The existing requirement for access for approximately 10 vehicles to and from the site each day (20 movements in total) is anticipated to continue for this development.

Due to the low volume of continued traffic movements combined with the use of an existing access and insignificant incident history, no additional significant direct impact on the current functionality of the surrounding road infrastructure is anticipated as a result of continued operation of the ADF or LRP station.

Accordingly a full traffic assessment has not been completed for the purposes of this EIAR as the development is not considered to trigger any of the typical requirements for full traffic assessment.

No alterations to the existing Bord na Móna rail infrastructure are proposed to facilitate the proposed development. There is no interaction with public roads at the underpass locations however continued interaction between rail and road operations will occur at the R392 level crossing and at the private access road crossing.

While the proposed developed seeks to increase the volume of ash disposal to the ADF site there is no increase proposed for the frequency of rail deliveries of ash to the site. Deliveries are anticipated to continue to occur two to three times per day with up to 12 no. rail carriages transported per delivery.

During rail operations, at level crossings, the road is closed for a period of two minutes to allow for the rail crossing. This closure will occur during each rail delivery and during the return of the empty rail carriages. This closure duration and frequency is not considered to be associated with any significant impacts on the surrounding transportation infrastructure.

As with road considerations a full traffic assessment for the rail interaction has not been completed for the purposes of this EIAR as the development is not considered to trigger any of the typical requirements for full traffic assessment.

10.4.2.3 Major Utilities

No additional utilities are proposed for this development. Neither are any changes proposed to the existing major utilities located within the ADF.

10.4.2.4 Ownership and Access

The increase in capacity at the ADF is not anticipated to impact on ownership of the ADF site.

The existing access requirements, which consist of approximately 20 staff movements to and from the site each day, are anticipated to continue at the ADF. It is not anticipated that there will be any increase in the number of existing movements made as a result of increase in capacity at the ADF.

Access to the ADF will continue to be via the private access road from the R392 with no new built services required to facilitate the development.

10.4.2.5 Tourism and Recreational Infrastructure

It is not anticipated that there will be any significant impacts on tourism infrastructure by the increase in capacity at the ADF .

10.4.3 Indirect Impacts - Peat Supply to the LRP Station

The peat supply bogs that supply LRP are currently operating in accordance with EPA IE Licence Reg. No.'s P0501-01, P0502-02, P0503-03 and P0504-04 under the control of Bord na Móna Energy Ltd.

The indirect impacts of the development in relation to the peat supply bogs, in the context of Material Assets, include the following:

- Ongoing use of a non-renewable resource (peat); and
- Ongoing traffic impacts relating to the road haulage of peat from the supply bogs to LRP Station.

Indirect impacts relating to the ongoing extraction of peat for the purposes of the ongoing operation of LRP Station are outlined by the relevant chapter (Chapter 6 Biodiversity) of this EIAR including mitigation measures for same as relevant.

Peat will continue to be delivered to LRP Station via the existing rail and road network.

10.4.4 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to material assets have been assessed.

As outlined in Section 1.1 of this EIAR, ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to Condition 5.5 do not require any physical or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. It has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated. The proposed development and the future proposed development will not run concurrently and the future proposed development will be subject to its own IE licence review.

Potential impacts in relation to the transition of the LRP station from peat to exclusively firing with biomass are assessed in the published EIAR for that future proposed development.

10.5 Mitigation

No specific mitigation is required in the context of Material Assets as discussed by this chapter.

Mitigation measures with respect to the ongoing operation of the station and the ADF will result from the mitigation measures associated with Biodiversity, Surface Water, Ground Water and Climate and Air Quality as detailed by the other relevant chapters of this EIAR.

10.6 Residual Impacts

It is not considered that the proposed development will have any significant environmental impacts on Material Assets and no specific mitigation is required in the context of Material Assets.

10.7 'Do Nothing' Scenario

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. At that time LRP Station would face decommissioning of the power station earlier than the current planning permission requires without the means of continuing to dispose of peat ash at the ADF.

As noted in Chapter 2 the station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

Should decommissioning of the power station occur the LRP Station would be decommissioned in accordance with the current Decommissioning Management Plan (DMP) and the ADF will be closed in line with existing Closure and Restoration and Aftercare Management Plan (CRAMP) as required. Following site decommissioning the generating station would undergo demolition in accordance with current planning requirements.

In term of major utilities there would be a loss of energy supply due to the loss of existing generating infrastructure, potential impacts would be considered **negative, moderate and short term**. Other material asset such as groundwater would no longer be needed potential impact is considered to be **positive, slight and short term**.

In the do-nothing scenario, the traffic movements related to the LRP Station will no longer be on the local road network. In addition decommissioning would include the termination of the use of the existing Bord na Móna rail infrastructure which connects to the ADF to LRP Station. Accordingly the stopping times anticipated for traffic on the R392 and the local road where there are existing rail level crossings would no longer be experienced and there would be a minor reduction in the traffic utilising the R392 for access to the ADF. Potential impacts would be considered **positive, slight and short term**.

10.8 Interaction of the Foregoing

Impacts relating to Material Assets have the potential to be impacted by other environmental aspects including Population and Human Health, see **Chapter 13**.

11 Landscape and Visual

11.1 Introduction

This chapter assesses the potential impacts on Landscape and Visual arising from the proposed development.

In addition, the potential indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to Landscape and Visual are also considered.

The LVIA report describes the landscape context of the proposed development and assesses the likely landscape and visual impacts on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to assessing effects of a Development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or; Visual Intrusion (interruption of a view without blocking).

Cumulative landscape and visual impact assessment is concerned with additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

This LVIA uses methodology as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (updated draft 2017) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (2017);
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (2013).

11.2 Methodology

Production of this Landscape and Visual Impact Assessment involved:

- A desktop study to establish an appropriate study area, and relevant landscape and visual designations in the Longford County Development Plan 2015-2021 and the Roscommon County Development Plan 2014-2020, as well as other sensitive visual receptors. In addition, Fáilte Ireland's

“Guidelines on the treatment of tourism in an Environmental Impact Statement” was consulted. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposal;

- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape impact of the development as a function of landscape sensitivity weighed against the magnitude of the landscape impact;
- Assessment of the significance of the visual impact of the development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact. This aspect of the assessment is supported by photomontages prepared in respect of the selected viewpoints.

11.2.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a proposed development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts;
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (“LCA”) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in **Table 11-1**.

Table 11-1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.

Sensitivity	Description
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the Application Site boundary that may have an effect on the landscape character of the area. **Table 11-2** refers.

Table 11-2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 11-3.

Table 11-3: Impact Significance Matrix

Sensitivity of Receptor					
Scale/Magnitude	Very High	High	Medium	Low	Negligible
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in orange are considered to be 'significant impacts' in EIAR terms.

11.2.1.1 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the proposed development will be assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

11.2.1.2 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each VRP:

1. **Susceptibility of Receptors** - In accordance with the Institute of Environmental Management and Assessment ("IEMA") Guidelines for Landscape and Visual Assessment (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are;

- "Residents at home;

- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;*
- *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area; and*
- *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened”.*

Visual receptors that are less susceptible to changes in views and visual amenity include:

- *“People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and*
- *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life”.*

2. **Recognised scenic value of the view** (County Development Plan designations, guidebooks, touring maps, postcards etc.). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;
3. **Views from within highly sensitive landscape areas.** Again, highly sensitive landscape designations are usually part of a county’s Landscape Character Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
4. **Primary views from dwellings.** A proposed Development might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates, has been influenced by the desire to take in a particular view. This might involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;

5. **Intensity of use, popularity.** This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;
6. **Connection with the landscape.** This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;
7. **Provision of elevated panoramic views.** This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
8. **Sense of remoteness and/or tranquillity.** Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
9. **Degree of perceived naturalness.** Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
10. **Presence of striking or noteworthy features.** A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory, headland, lough or castle;
11. **Historical, cultural and / or spiritual significance.** Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
12. **Rarity or uniqueness of the view.** This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;
13. **Integrity of the landscape character.** This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
14. **Sense of place.** This considers whether there is special sense of wholeness and harmony at the viewing location; and
15. **Sense of awe.** This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. No relative importance is inferred by the order of listing in the **Table 11-4** below. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

11.2.1.3 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity.

The magnitude of visual impacts is classified in **Table 11-4**.

Table 11-4: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene.
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity.
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene.
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene.

11.2.1.4 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used earlier in respect of landscape impacts (Table 11-3).

11.3 Study Area

There are no physical changes proposed to the LRP Station and no physical alteration required as a result of the proposed change to Condition 5.5. The study area for the station is also the existing baseline i.e. the station footprint and immediate environs.

It is anticipated that the ADF capacity change is likely to be difficult to discern as it will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights.

In the interests of a comprehensive appraisal, a 4km radius study area is used in this instance, as it is highly unlikely that any significant impacts could give rise beyond this distance.

11.3.1 Peat Supply to Lough Ree Power Station Study Area

While outside the site boundaries, peat is exclusively supplied to the LRP Station from Bord na Móna and harvested, under licence, from a defined number of existing supply bogs as follows:

- P0501-01- Derrygreenagh Group;
- P0502-01- Blackwater Group;
- P0503-01- Allen Group; and
- P0504-01- Mountdillon Group.

The peat will principally be delivered to the station by rail, with some road deliveries, and it will be handled using existing plant facilities.

11.4 Receiving Environment

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape and visual context brought about by the development will be assessed.

A description of the landscape context of the proposed application site(s) and wider study area(s) is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and, lastly, public amenities and facilities. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e. places and transport routes from which viewers can potentially see the proposed development.

11.4.1 Landform and Drainage

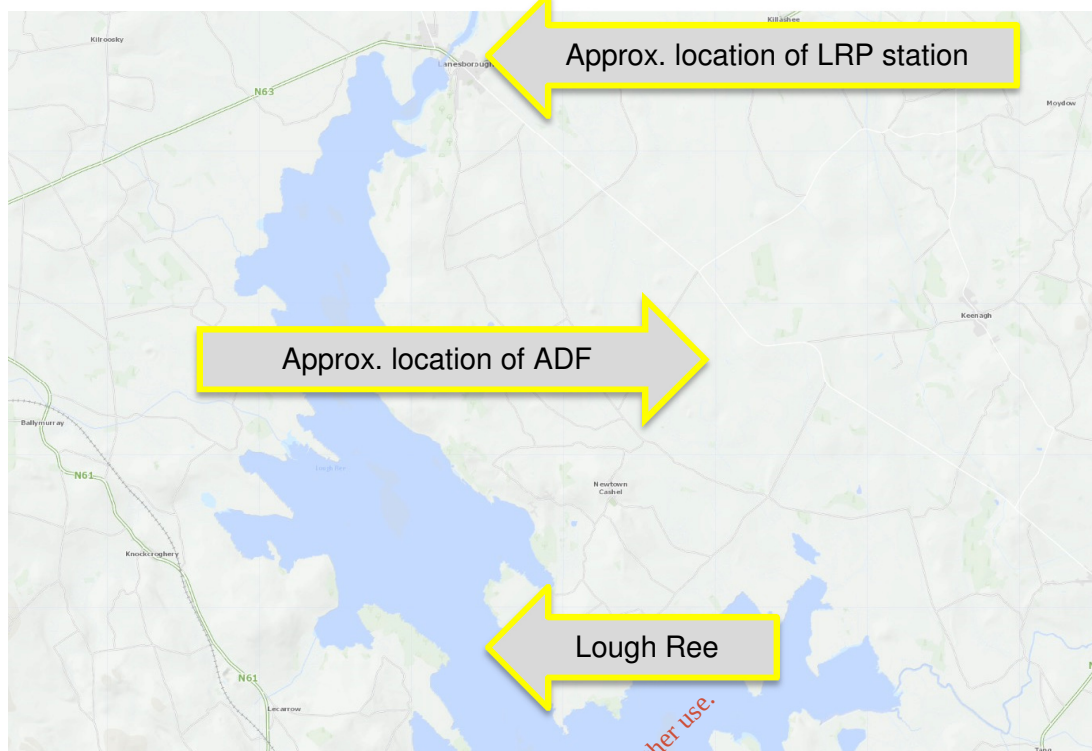


Figure 11.1: overview of principle drainage patterns of study areas (Source: map.geohive.ie)

The LRP and the associated ADF are located in western County Longford, with overlaps across the Shannon to County Roscommon (to the west). Representative of the broader county, the study areas are characterised by ostensibly flat (or imperceptibly sloping) landscapes that largely undulate between 40m AOD and 50m AOD, with some hilltops in the southwest exceeding 80m AOD.

The Shannon is the principal watercourse within the study area, which borders the western edge of the power station, before flowing into Lough Ree south of Lanesborough. Lough Ree is the second largest lake on the Shannon, with an estimated surface area of 105 km². Lough Ree comes within 6km east, southeast and south of the ADF. Approx. 4km east of the ADF runs the Royal Canal. Within 3km of both sites are multiple smaller watercourses angling towards the Shannon/Lough Ree. These include Lough Bannow Stream, which enters the Shannon immediately north of the LRP Station, and its tributaries the Gorteengar and the Leherly. There are no known natural watercourses within the 600m of the ADF site.



Figure 11.2: The Shannon from the bridge connecting Lanesborough and Ballyleague

11.4.2 Vegetation and land use

Low-lying, exploited bog/peatland makes up the lion's share within the vicinity of the ADF, while pastoral farmland and callows are more prevalent near Lanesborough, and along the east bank of Lough Ree.

Much of Derraghan Bog around the ADF site has been drained and cultivated extensively over the last century - and intensively for peat in recent decades by Bord na Móna. Since peat production has ceased, approx. half of this area has regenerated in scrub. According to Corrine 2012 Level 3 Description data, the site makes up a combination of 'Transitional woodland scrub' and 'Peat bogs.' While there is coniferous forest found in the ADF study area, it is mostly occupied by pasture, peat bog and transitional woodland scrub. Owing to the scale and intensity of peat harvesting across some parts of the study areas, it is a highly-modified, post-industrial landscape.



Figure 11.3: Typical pastoral field within the study area.

The proposed increased capacity of the ADF which will be located within the existing footprint of the ADF, operated by Bord na Móna, that is currently made up of transitional scrub/immature trees in its western half, and exploited peat land in its eastern half. The ADF is an engineered site and comprises of a number of lined landfill cells, each of which have been, or are in the process of being, filled, sealed and capped. It is accessible via a c.1.3km roadway linking the site with the R392 from Lanesborough to Ballymahon, as well as being served by a dedicated Bord na Móna rail-line that links the station and the ADF sites.



Figure 11.4: Regenerating exploited peat land approx. 1km northwest of the site

The LRP Station is an existing industrial power station site that is located adjacent to the east bank of the River Shannon, by the village of Lanesborough. The site accommodates structures and activities representative of many power stations. These includes fuel/peat storage, handling areas and plant, as well as a range of ancillary services, such as water treatment and management systems, offices and administration area.

According to Corrine 2012 Level 3 Description data, the site consists of “Industrial and commercial units,” while bordering a “stream course” (i.e. the Shannon) to its west, pastures to its north and east, and an “urban fabric” (i.e. Lanesborough) to its south. An extensive, exploited peat bog is located within 700m to the east. Bord na Móna supply peat to the station primarily via a dedicated private railway, which links the peat supply bogs and the on-site fuel storage and handling areas, but also by road transport.

11.4.3 Centres of population and houses

The chief settlement in the area is Lanesborough, a small village of approx. 1,300 inhabitants on or near the east bank of the River Shannon. To be more detailed, Lanesborough is on the County Longford (east) side of the river, and Ballyleague is across the bridge on the County Roscommon (west) side of the Shannon.

Across the rural spread of the remainder of the study area, a number of residences also occur along the R392 regional road and on quieter third class roads such as the Rathcline Road in the south of LRP study area, as well as small settlements, such as Newtown Cashel (3-4km southwest of the ADF site).

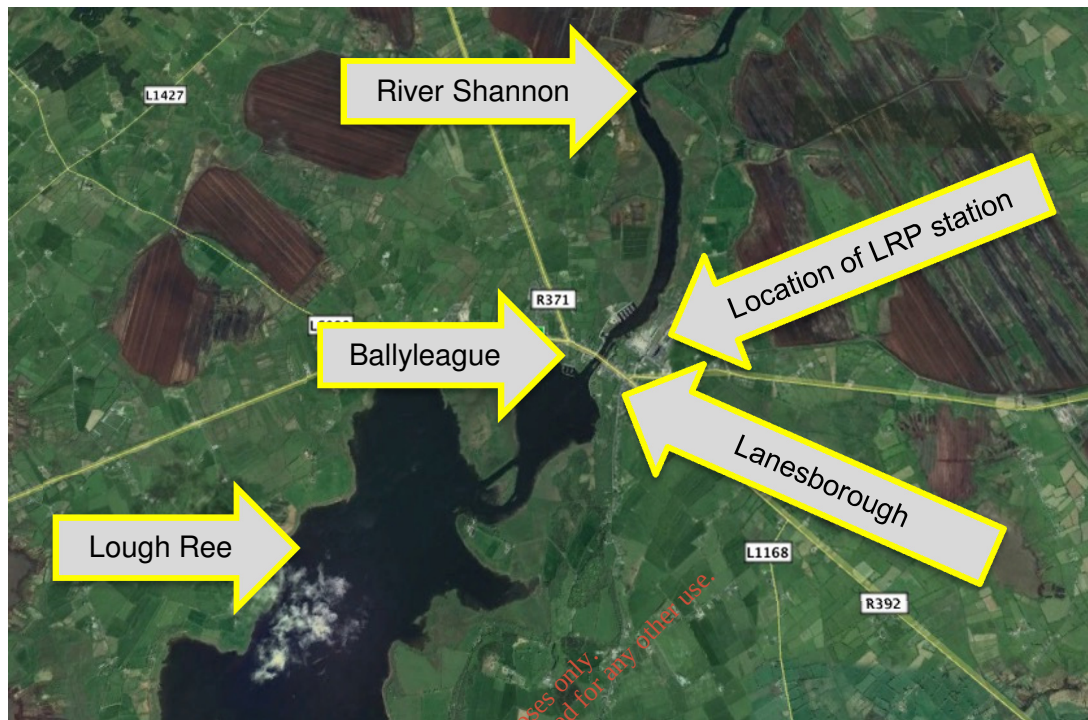


Figure 11.5: Context of settlement and major watercourses in the vicinity of the LRP Station (Source: Google Earth Pro - 2018 capture).

11.4.4 Transport routes

Lanesborough is located on the N63 national secondary road, at its junction with the R371 (at Ballyleague) and the R392 (at Lanesborough). While there are no trains, the town is served by three Bus Eireann routes. Within the ADF study area, the R392, which runs within 530m to the site's northeast, and the R398 are the principal roads. Otherwise, both study areas are populated by third class roads or laneways.

The Shannon was once the major transport route in this part of the country. Consistent with Bord na Móna owned/operated bogs elsewhere in the midlands, across much of the bogs in the study areas, small-scale industrial railways criss-cross the landscape, some of which ultimately connect with the LRP Station.

11.4.5 Public amenities and facilities

Since 2016, Lanesborough has been the location of the Taste of the Lakelands Food Festival, which attracts thousands of visitors over one weekend each autumn. South of the town, a recreational area has recently been developed on the banks of the Shannon that is largely used for walking by residents in the locality.

As the LRP western site boundary accounts for approx. 270m of the River Shannon's east bank, the existing plant is highly visible from both river banks at this location, as well as at least 500m north and south. The River Shannon is the most renowned

public amenity and tourist attraction in the locality; one which attracts thousands of visitors every year. According to Fáilte Ireland's "Guidelines on the treatment of tourism in an Environmental Impact Statement:"

"Tourism can be affected both by the structures or emissions of new developments as well as by interactions between new activities and tourism activities – for example the effects of high volumes of heavy goods vehicles passing through hitherto quiet, scenic, rural areas. Tourism can be affected by a number of the characteristics of the new project such as: New Developments, Social Considerations, Land-uses and Activities.

"New Developments – will the development stimulate or suppress demand for additional tourism development in the area? If so, what type, how much and where? Marinas, golf courses, other major sporting facilities as well as theme parks and larger conference facilities can all stimulate the emergence of new accommodation, catering and leisure facilities often within an extensive area around a new primary visitor facility. Extensive urbanisation and large scale infrastructure as well as certain processing and extractive industries all have the potential to suppress demand for additional tourism – but usually only in the immediate locality of the new development. It should be noted however, that some types of new or improved large scale infrastructure – such as roads – can improve the visitor experience – by increasing safety and comfort or can convey a sense of environmental responsibility – such as wind turbines."

11.4.6 Landscape Planning Context

11.4.6.1 Longford County Development Plan 2015-2021

The Longford County Development Plan (2015-2021) incorporates landscape and visual policies. Section 6.1.1 of the Development Plan 'Landscape Character Assessment' provides a brief summary of that assessment, which is contained in full in Annex 4 of the development plan).

Longford Landscape Character Assessment

The Longford Landscape Character Assessment divides the County into 7 no. geographically distinct Landscape Character Units (LCUs). The proposed development is contained within Landscape Character Unit 6: Peatlands, but the study area for both LRP and ADF overlaps into segments of Landscape Character Unit 3: Shannon Basin/Lough Ree (refer to **Figure 11.6** below).

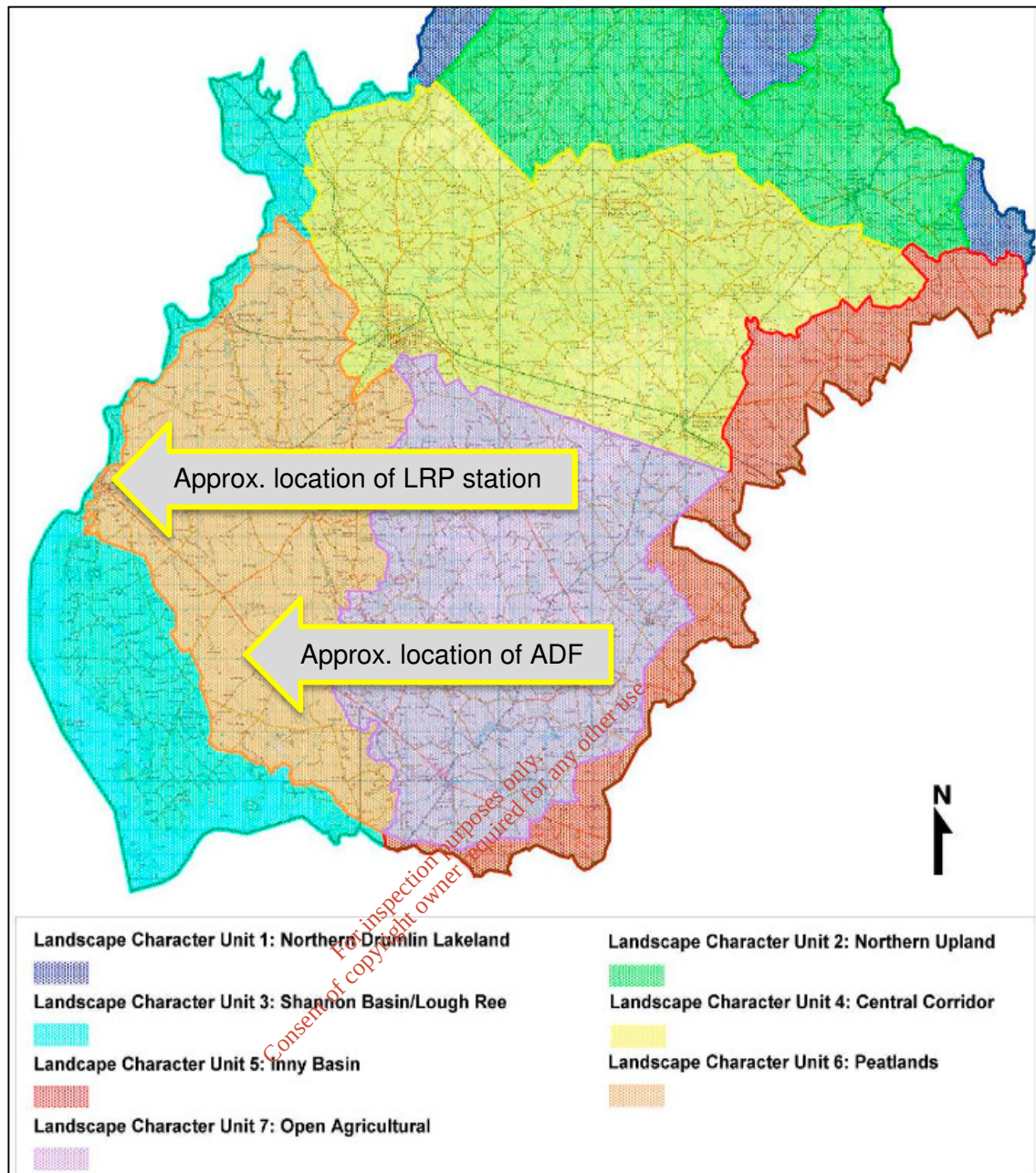


Figure 11.6: Landscape Character Units of County Longford

Landscape Character Unit 6: Peatlands

According to the Landscape Character Assessment:

Landcover:

“Located in the western half of the County, this area is dominated by extensive tracts of raised bog interspersed with mixed forestry and areas of scrubby vegetation. The topography is notably flat, with the majority of the land lying below the 50m contour line. This, when combined with the limited vegetation cover and extensive peat land cover mean that views are available across wide areas throughout the unit...”

Settlement pattern:

“The settlement pattern in this unit tends to be less dispersed and more focused into the designated towns and villages than other areas, given the difficult nature of the terrain ... Historically an important fording point of the Shannon, Lanesboro declined in strategic importance with the development of Athlone to the south. The Regional Planning Guidelines for the Midlands have recognised this strategic location and role, designating Lanesboro as a local Service town in the urban hierarchy of the region, to provide local level retailing, social and leisure facilities...”

Industry and services:

“The ESB power station at Lanesboro dominates the landscape of the area for a considerable distance, particularly at night time. Much of the industrial development in this unit is planned adjacent to the power station where it is anticipated that the landscape impact will be limited... The area has a strong industrial history in terms of the historical harvesting of peat and the transport of the finished product along the Royal Canal. The landscape impacts of this history are manifested in the industrial architecture and archaeology that abounds throughout the area.”

Landscape Sensitivity:

*“The visual sensitivity of the landscapes in this unit are generally **LOW**, as their flat nature allows development to be accommodated with minimum screening needed to achieve integration into its surrounds.*

*“In environmental terms, sensitivity can be generally termed **MEDIUM to HIGH** due to the limited capacity of the receiving environment to cater for additional effluent loading.”*

Landscape Character Unit 3: Shannon Basin/Lough Ree

The LRP site is within 100m of this unit, with a sizeable proportion of its study area also within this unit. While the ADF site is located at least 1.5km away from this landscape character unit, the most south-eastern realm of its study area enters it. Consequently, the characteristics of this Landscape Character Unit are worth observing. Extracts of this unit's characteristics that are of relevance to the two study areas include:

Landcover:

“This unit has large amounts of water cover with inland marshes, bogland and tracts of deciduous forestry in the northern section around Lough Forbes. Land cover becomes less diverse travelling south of Lanesboro on the western shores of Lough Ree, with poorly drained agricultural land forming the majority of the landcover in the area.”

Topography:

“Lough Ree is interspersed with several small, uninhabited islands and the predominantly flat landscape provides for panoramic vistas across the lake at numerous locations.”

Settlement pattern:

"The only significant settlement in the unit is Newtowncashel, a small village located in an elevated position commanding extensive views over the lake. Permission has been sought for approximately 30 houses in the village in the recent past."

Agriculture:

"Agriculture in the area is, in a similar vein to the majority of the County, extensive in nature."

Recreation and Amenity:

"Access to and awareness of water courses and water bodies tends to be restricted in this area, given the limited road network in the vicinity and landcover barriers such as forestry and wetlands ... An extensive amenity area has been developed south of Lanesborough, which is extensively used as a walking route by locals and has been zoned for further amenity related uses under the Lanesboro Local Area Plan."

Landscape Sensitivity:

*"The sensitivity of the landscapes in this unit range from **MEDIUM** - along the south-eastern border of the unit - to **HIGH** sensitivity - along the shores of the lake, islands, the riverbanks, and in the vicinity of the Aquifer."*

Longford County Council have listed some general landscape policies in subsection 6.1.1 of the County Development Plan and these are as follows:

LCA 1: *It is the policy of the council to protect and enhance the County's landscape, by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the existing landscape. Proposed developments, where located within or adjacent to sensitive landscapes (as defined in the assessment), may be required to provide a landscape report detailing how the proposal will impact on the landscape and mitigation measures to be taken where necessary to address negative impacts. Proposed developments, which have detrimental impact on the landscape will not normally be permitted.*

LCA 2: *Longford County Council recognises the diverse and unique landscape character of the County, and as such, landscape conservation areas may be designated in order to achieve its objective of protecting and enhancing the County's landscape. Physical development shall not adversely impact on areas designated as visually important/sensitive under this section.*

LCA 3: *It is the policy of the Council to preserve views and prospects as illustrated on the accompanying map as part of Appendix 6 and as listed in the following tables. Views are divided into full and intermittent in order to differentiate areas where scenic views may be partial or absent along a particular route. The following table lists the routes (as numbered on the map) and lists the townlands through which they pass for identification purposes.*

Designated Views and Prospects, Scenic Routes

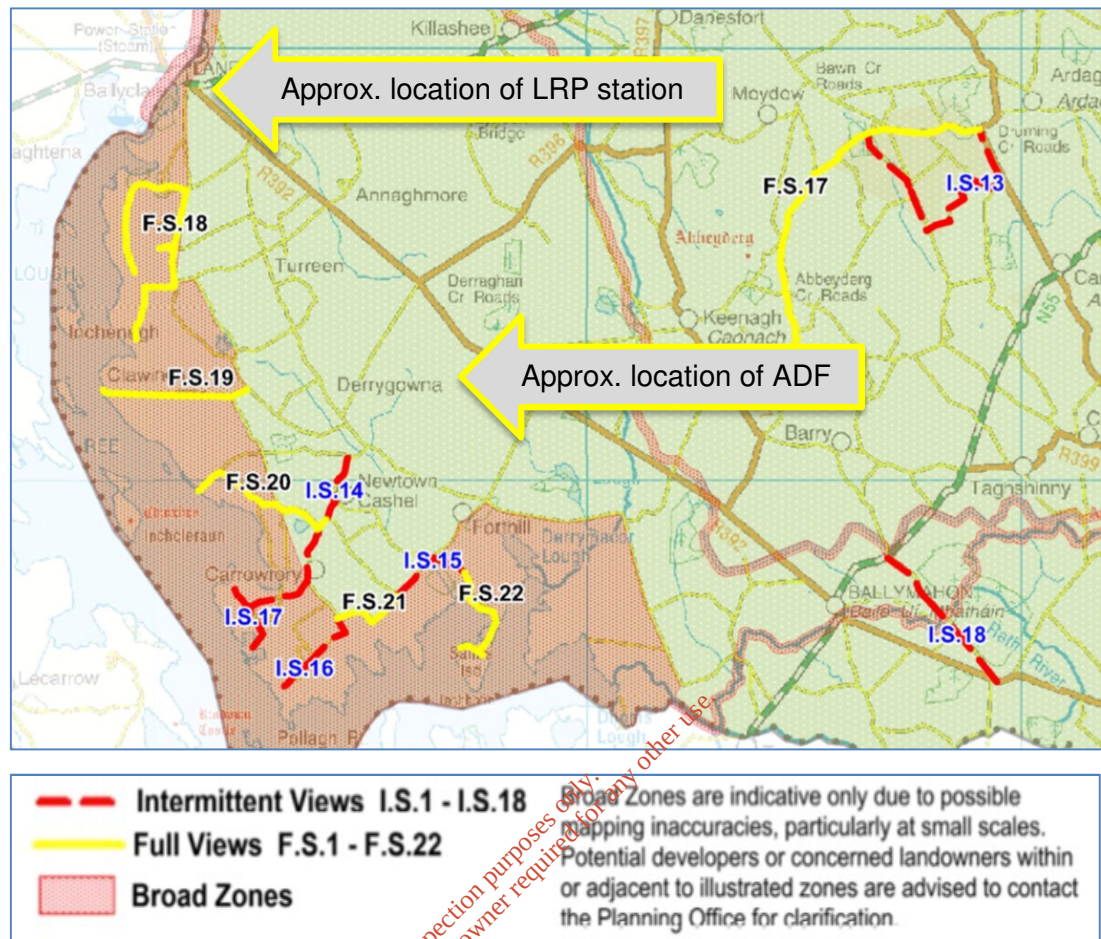


Figure 11.7: Approximate location of site in relation to protected views in the western section of Longford County (Source: Appendix 6 of Longford Development Plan)

According to Appendix 6 of the Development Plan, there are a number of designated views in the eastern parts of the county (seen **Figure 11.7** above). However, owing to orientation of these views, all of these are of little relevance to the applicant site and the Proposed Development.

14.4.6.2 Roscommon County Development Plan 2014 - 2020

As the LRP study area encompasses parts of County Roscommon, its CDP has been reviewed for potentially relevant designated/protected views/routes towards the site. As a result, just one such viewpoint is of potential relevance to the site of the proposed development. This is located within close proximity to the LRP station area. Viewpoint 7 is the start/end of a designated scenic route along N63 “with views to south overlooking Lough Ree.” However, as can be seen below in **Figure 11.8**, the LRP site is to the east/northeast of this scenic route, so is not relevant to this or any other designated scenic views within Roscommon.



Figure 11.8: Designated viewpoint listed in the Roscommon CDP.

14.4.6.3 National Parks & Wildlife Service (NPWS)

According to the NPWS, the designations relevant to the LRP study area (none of which come within 150m of the LRP site boundary) are as follows:

- Special Protection Areas (SPA): Lough Ree SPA (Site Code 004064).
- Special Areas of Conservation (SAC): Lough Ree SAC (Site Code 000440).
- Proposed Natural Heritage Areas (pNHA): Lough Ree pNHA (Site Code 000440).

According to the NPWS, the designations relevant to the ADF study area, all of which are more than 2.4km from the site boundary, are as follows:

- Natural Heritage area: Forthill Bog NHA (Site code 001448).
- Special Areas of Conservation (SAC): Lough Ree SAC (Site Code 000440).
- Special Protection Areas (SPA): Lough Ree SPA (Site Code 004064).
- Proposed Natural Heritage Areas (pNHA): Lough Ree pNHA (Site Code 000440).

11.5 Impacts of the Development

11.5.1 LRP Station and proposed alteration to Condition 5.5 Alteration

There are no physical changes proposed to the LRP Station and no physical alteration required as a result of the proposed change to Condition 5.5. Given there are no changes to the receiving environment or in the characteristics of the proposed

activity and development, the proposed development will not give rise to impacts on the landscape or visual receptors that materially differ from those identified and permitted under the existing EIS from 2001. Therefore there are no impacts anticipated to landscape and Visual aspects from the IE licence Review at the LRP station site when compared to the existing development baseline.

11.5.2 Derraghan ADF

The proposed development will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. There will be no change in the physical appearance of the ADF once deposition activities cease as the landscaping plan will not be affected by the additional ash deposition.

Given there are no changes to the receiving environment or in the characteristics of the proposed activity and development, the proposed development will not give rise to impacts on the landscape or visual receptors that materially differ from those identified and permitted under the existing EIS. Therefore there are no impacts anticipated from the IE licence Review at the ADF station site.

11.5.3 Indirect Impacts - Peat Supply to the LRP Station

Associated with the on-going generation activity at LRP Station, there will be an on-going demand for milled peat as a fuel source. It is unlikely that there are additional indirect effects arising as a consequence of these activities insofar as they relate to the Landscape or visual receptors.

11.5.4 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to Landscape and Visual have been assessed.

ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. This proposed future development will require additional cells at the existing ADF. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to Condition 5.5 do not require and physical or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. It has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated.

Potential impacts in relation to the transition the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that future proposed development.

11.6 Mitigation

No specific mitigation is required in the context of Landscape and Visual as discussed by this chapter.

11.7 Residual Impacts

It is not considered that the proposed development will have any significant environmental impacts on the landscape or in respect of visual receptors and no specific mitigation is required.

11.8 'Do Nothing' Scenario

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

In the event of the do nothing the LRP Station would face decommissioning of the power station earlier than the current planning permission requires without the means of continuing to dispose of peat ash at the ADF. Should closure of the ADF and decommissioning of the power station occur the EPA approved Decommissioning Management Plan (DMP) and Closure, Restoration and Aftercare Management Plan (CRAMP) as required by Section 10.2 of the IE Licence will be implemented. It is not considered that any of the landscape and visual impacts of the 'do nothing' scenario will be significant.

11.9 Interaction of the Foregoing

Impacts relating to Landscape have the potential to be impacted by other environmental aspects including Population and Human Health. This is addressed in Chapter 13.

12 Cultural Heritage

12.1 Introduction

This chapter assesses the potential impacts on Cultural Heritage arising from the proposed development.

In addition, the potential indirect environmental impacts associated with the supply of peat fuel to LRP Station, as they relate to Cultural Heritage are also considered.

Cultural Heritage is defined by UNESCO as "the legacy of physical artefacts and intangible attributes of a group or society that are inherited from past generations,

maintained in the present and bestowed for the benefit of future generations” (www.unesco.org/new/en/cairo/culture/tangible-cultural-heritage). Cultural Heritage includes all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area.

12.2 Methodology

The Cultural Heritage study consists of the results of the paper survey and the field inspection. In addition, limited monitoring of geotechnical site investigations (Trial Pit excavations) was also undertaken.

12.2.1 Paper Survey

The Paper Survey comprised documentary, cartographic and aerial photographic research using the following principal sources:

- Record of Monuments and Places – Counties Longford and Roscommon (RMP)
- Sites and Monuments Record of the Archaeological Survey of Ireland (SMR) – www.archaeology.ie
- Topographical Files of the National Museum of Ireland
- Annual Archaeological Excavations Bulletin – www.excavations.ie
- Aerial Photographic Archive of the Geological Survey of Ireland
- Cartographic Archive of the Ordnance Survey of Ireland – www.osi.ie
- National Inventory of Architectural Heritage – Survey of the Architectural Heritage of Counties Longford and Roscommon (NIAH) – www.buildingsofireland.ie
- Documentary and cartographic sources in Longford County Library (see Section 13.9)
- Longford County Development Plan 2015-2021 (LCDP)
- Roscommon County Development Plan 2014-2020 (RCDP)
- Placenames Commission – www.logainm.ie
- Heritage Council Heritage Maps – www.heritagemaps.ie

In addition, the following reports were also consulted:

- *Survey of the Raised Bogs of County Longford. Irish Archaeological Westlands Unit – Transactions: Volume 1 (A. Moloney, D. Jennings, M. Keane & C. Mc Dermott). 1993.*

- *Proposed Power Station at Lanesborough and Ash Repository at Derryaghan, Co. Longford – EIS prepared by ESBI, February 2001 (Cultural Heritage Chapter prepared by Byrne Mullins & Associates)*
- *Preliminary Draft on Mitigation Strategy for Archaeological Areas Listed as Non-Priority for 2000 – Mount Dillon Bog, Co. Longford and Blackwater Bog, Co. Offaly. Report prepared for Bord na Móna by Noel Dunne, 2000*
- *Report on the Archaeological Re-Assessment of Derraghan Bog, Derraghan More, Mountdillon Works, Co. Longford. Report prepared for Bord na Móna by Jane Whitaker, ADS Ltd, September 2002*
- *Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna (2012)*
- *Report on Archaeological Monitoring at the Bord na Móna Ash Disposal Facility, Derraghan More, Co. Longford. Report prepared for Bord na Móna by Ger Dowling & Richard Clutterbuck, AMS Ltd, September 2018*

12.2.2 Field Inspection

From the preceding paper survey, a list of cultural heritage sites/sites of cultural heritage potential was compiled for inspection. The subject lands (LRP Station & ADF Sites) and a c. 1000m area surrounding the boundaries of such lands was assessed for the presence of archaeological monuments by reference to map and aerial photographic sources.

Field surveys of the subject lands were undertaken in January and February 2017. This included a surface reconnaissance survey of the exposed peat surfaces in the area of the existing ADF site, together with an examination of the exposed section of open drains, cut through in-situ remnant peat deposits, as well as the exposed faces of areas of previous cut-way/harvesting. However, in many cases the drains were partially overgrown as were a number of surface areas.

12.2.3 Monitoring of Geotechnical Site Investigations

Monitoring of geotechnical site investigations (Trial Pit excavations) was undertaken in late January and early February 2017. In terms of the LRP Station, this focused on the existing disused Ash Disposal Area in the north-western area of the overall facility lands and areas to the immediate south of such; these were the only areas of the Site Investigations that not had been subject to previous archaeological monitoring (see **Section 12.4.2.4**); all trial pits located associated with the ADF site were monitored. The results of the monitoring are discussed below in **Section 12.4.2.5**.

12.3 Study Area

12.3.1 Lough Ree Power (LRP) Station and Ash Disposal Facility (ADF)

The Cultural Heritage study comprises the results of a survey and evaluation of selected sites of archaeological, architectural and historical potential within, and up to 1km surrounding the subject the proposed development areas. The proposed development areas comprise the existing LRP Station Site at Lanesborough and the associated ADF at Derraghan More and Derraghan Beg, as shown **Figure 1.1** in **Chapter 1** of this EIAR.

The overall LRP facility is located to the north of the village of Lanesborough and to the east of the River Shannon. The existing facility comprises a power station and associated infrastructure operated by ESB Generation, together with peat delivery and storage facilities operated by Bord na Móna. The vehicular access to the LRP Station is from the N63, to the northeast of the village of Lanesborough and a former Ash Disposal area is located on the western side of the power station facility, comprising an area of artificially raised ground covered in grass, with occasional trees and bushes. The general area is characterised by extensive raised bogs divided by eskers and isolated drumlins. The immediate area of the LRP Station is generally one of relatively moderate pastureland, subdivided into small fields, with localised low-lying marshy areas, together with peat bogs areas on the western shore of the River Shannon and to the east and south of the village of Lanesborough.

The existing ADF is located in the townlands of Derraghan More and Derraghan Beg, c. 8km to the southeast of LRP Station facility. It is accessed from the R392 road by means of an access road with an adjacent industrial rail line operated by BnM. It includes completed ash disposal cells, capped with peat and grass, one operational cell, together with associated embankment. The general area surrounding the ADF is characterised by extensive raised bogs, divided and interspersed by eskers and isolated drumlins, which form a chain of bogland which extends, on both sides of the River Shannon. The area of the subject development is within the Derraghan Bog System, part of the Mount Dillon Works and harvesting in the area to the immediate south is on-going. The lands between the R392 road and the LRP ADF comprise agricultural pasture lands, with the ADF area situated in bog land. In general, much of the southern area is planted with trees and a former industrial railway corridor runs along the western boundary.

12.4 Receiving Environment

12.4.1 General Historical Background

12.4.1.1 Lanesborough – Historical Background

The LRP Station is located in the townlands of Aghamore and Lanesborough, the civil parish and barony of Rathcline (O.S. 6" Map – Longford Sheet 17). The name Aghamore derives from the Irish Achadh Mór – a 'large plain of field' (Placenames Commission – www.logainm.ie).

At a crossing point on the river Shannon where it enters Lough Ree. Lanesborough was formerly known as Athleague or Ballyleague (AFM vol. 1, 1063, 1109; vol. 3,

200) and Joyce (1871, 343) translates *Béal Átha Liag* as the mouth of the ford of the stones. It occupied a strategic border location on the river Shannon between the early medieval kingdoms of Connacht and Midhe and the modern counties of Longford and Roscommon. Records indicate that a causeway (CH-5A) was constructed across the river in 1000 (AFM, sub 1000; Ann. Clon., sub 994), while bridges (cliathdroichid) (CH-5B) were built in the mid-12th century (AFM, sub 1140 and 1154; Ann. Clon., sub 1132). In 1172 Walter de Lacy began to build a castle but it was not completed because Cathal Crobderg O Conchobair, King of Connacht, forced him to abandon it (AFM; ALC; Ann. Clon., sub 1220). The castle (CH-4B) built in 1227 by the Irish Justiciar Geoffrey de Marisco (Ann. Conn.; AFM) may have been built on or close to its site. The latter castle appears to have been the spur to the development of a village, for a charter of borough status was granted before 1235 (MacNiocaill 1977, 55). Upon Walter de Lacy's death in 1241, Lanesborough was inherited by John de Verdon (Othway-Ruthven 1968b, 411-13). Its situation made it vulnerable and in 1271 Aedh O Conchobair attacked and destroyed the castle (Ann. Conn.; AFM; AU). In 1284 Theobald de Verdon was granted a charter to hold a weekly market (Cal. doc. Ire. vol. ii, 532). Whatever urban developments occurred probably fell victim to the political and economic difficulties of the early 14th century. The failure of the Anglo-Norman settlement is recorded in the 1332 partition of the lands of Theobald de Verdon. After his death Henry Ferrers, husband of Isabella de Verdon, was granted '18 carucates of land in the town of Ballilegge alias Beallalegge, now extended at no value because the land is waste and uncultivated for lack of tenants' (Othway-Ruthven 1968, 435).

The next references date to the late 16th and early 17th centuries: in 1572 Athleague was attacked by a rebellious faction of the Clanrickard Burkes, suggesting that the area was under the control of the English (Bradley et al. 1985, 26). Sir Patrick Barnewell, who built a 'fair and strong fort and house' (CH-4A) in the late 16th or early 17th century (Cal. S.P. Ire., 1611-14, 51), probably on the site of the levelled castle (CH-4B), was granted a licence in 1616 to hold a market and two fairs (Cal. pat. rolls Ire., Jas I, 304). In 1617/8 Thomas Rotherham was granted the 'castle and fort of Ballyleigg otherwise Bealaleig, and 300a ... lying about said castle, and next adjoining to the river Shannon' (ibid, 360). Gerald Murtagh received a grant of the lands of Ballyleague in 1620 as part of the plantation of Longford and he was also granted a licence to hold a market and a fair (ibid, 482). In 1664 the lands of Ballyleague, then held by Sir George Lane, were erected into the manor of Lanesborough and the town was constituted a free borough (Bradley et al., 1985, 26). The Down Survey (1655-6) map of Rathcline barony (**Figure 12.1**) depicts a small clustered settlement around the 'Fort of Ballyleage' and a church (CH-3C) on the E side of the Shannon and 'Ballyleag Castle' (CH-6), in county Roscommon, on the W bank. In 1682 Nicholas Dowdall noted that the town had 'fine stonehouses and very fair Church stately beautified within and with a Tall Steeple and Church Yard walled about' (Gillespie and Moran 1991, 208). A late-17th-century map of the town (NLI MS 8646/8) depicts the church, annotated 'old church', castle, an enclosed orchard and a cluster of low houses with centrally placed chimneystacks on the S side of a road leading down to a bridge (CH-5B). A large stone building on the SE side of the town is named the 'Lime house' and there is a mill to the NE of the bridge.



Figure 12.1 Extract from Down Survey Map 1655-6

The extent of the 13th-century Anglo-Norman borough and its exact whereabouts are unknown. The 17th-century plantation settlement may overlie it but there is also a possibility that a formal medieval settlement was never established at this location. It may have been on the west bank of the Shannon, in the vicinity of Ballyleague castle (CH-6) in county Roscommon (Bradley et al. 1985, 29). The 17th-century borough appears to have been quite small, it consisted of one main street aligned NNW-SSE with long property plots extending off both sides of it. It may have functioned as a garrison town controlling the bridge (ibid, 26, 29). No traces of any 17th-century buildings are evident in the modern streetscape, and the castle (CH-4B) and fort (CH-4A) have been levelled.

A number of 'ram-rod' roads leading from the town are indicated by Taylor and Skinner (**Figure 12.2**) and are likely to be of eighteenth century date, while many of the other 'evolved' roads may be of earlier date. In the late eighteenth century a short canal was constructed along the west side of the River Shannon. It incorporated a single set of lock-gates to overcome a 0.5m fall in the river. A lock-keepers house straddled the canal just below the bridge. A harbour was added in 1830 and this was incorporated into the Shannon Navigation Scheme of the 1840s, when the canal was removed; the river was dredged out and new quay walls constructed. The Scheme led to a small expansion of the town.



Figure 12.2 Extract from Taylor & Skinner's Maps of the Roads of Ireland, Surveyed 1777

Lewis (1837) notes that the parish of Rathcline, including the 'market and post-town' of Lanesborough, had a population of 3036. He further notes that the parish 'comprises 8099 statute acres, as allotted under the tithe act: the land is of indifferent quality; not more than one-third is under tillage, the remainder is in pasture; the surface is tolerably level, and there is a considerable tract of bog, in which are found oak and fir trees, which are used by the poor in roofing their houses. Limestone abounds and is quarried for building and for agricultural uses, and a speckled black and white marble is also found and made into mantel-pieces. The chief seats are Rathcline, the residence of L. White, Esq.; Clonbonney, of G. Davys, Esq.; and Mount Davis, of the Misses Davis. The weaving of linen is carried on in several parts of the parish, and great quantities of frieze are also made; there is a considerable trade in corn and eggs, for which the Shannon affords every facility. A very large fair for horses, cattle, and sheep is held on the 12th of February at Lanesborough. Within the limits of the parish is the small island of Inchenough, or Inchiana, comprising about 50 acres of land, with 6 houses and 35 inhabitants. The living is a vicarage, in the diocese of Ardagh, and in the patronage of the Bishop; the rectory is impropriate in R. C. and R. Armstrong, Esqrs. The tithes amount to £393. 10., of which £262. 6. 8. is payable to the impropiators, and £131. 3. 4. to the vicar; the glebe comprises 30 acres, valued at £45 per annum. The church, a spacious edifice, was erected at the expense of the Lanesborough family, in 1678, on part of the site of the ancient church in Lanesborough, which was called the abbey and is said to have been built by St. Patrick in the 4th century. The R. C. parish is co-extensive with that of the Established Church: the chapel is large and has a tower at the west end; a small house is also appropriated as a chapel of ease. There are five private schools, in which are about 300 children. Near the ruins of the castle are those of the ancient church, said to have been destroyed from the opposite bank of the Shannon; part of

the steeple is yet standing, and the cemetery is still used by the Roman Catholics. In one of the walls of the castle was a marble tablet with a very ancient inscription in the Irish character; from the hill at the base of which these ruins are situated is a very extensive and interesting view’.

The topographical layout of the village of Lanesborough and immediate environs in 1837 are illustrated in **Figure 12.3**, which indicates that the lands along the eastern shore of the River Shannon, immediately north of Lanesborough, were low-lying and marshy but that much of the remain lands particularly to the north and east, were in agricultural use. The Ordnance Survey Namebooks of 1838 note that the townland of Aghamore was held under deed fee forever by Luke White.



Figure 12.3 Extract from O.S. 6-inch map of 1837 – Longford Sheet 17 (Lanesborough and Environs)

12.4.1.2 Generation Plant – Historical Background

The topographical nature of the site on which the Power Generation Plant facility is now situated in 1837 is further illustrated in **Figure 12.4**, superimposed on a modern aerial photograph. This illustrates that the overall extent of the facility subdivided into agricultural fields, with an associated trackway leading north from the town. Griffith's Valuation of 1855 notes that the generation facility lands were largely owned, at that time, by Luke White, and plots were leased by Catherine Rourke, Thomas Connell, John Costelloe and James Clarke.



Figure 12.4 1837 O.S. Map superimposed on Modern Aerial Photograph showing extent of Generating Facility

The topographical nature of the generating facility in 1914 is illustrated in **Figure 12.5**, superimposed on a modern aerial photograph. This indicates that very little change to the lands had occurred since 1837, except for additional field subdivision, with the northernmost field enlarged by the removal of subdivisions.

The original Lanesborough Power Station was commissioned in 1958 (**Plate 12.1**). At the time it was built, Lanesborough station an initial capacity of 20MW and at its peak in the 1980s and 1990s, it had a generating capacity of 85 MW, and was considered to be the most cost effective and efficient peat fired electricity generating station in Ireland. Lanesborough station consisted of three main developments:

- Station A: 20 MW electrical, commissioned in 1958 and fired by sod peat, this unit was decommissioned in 1982 after running for 114,328 hours.
- Station B: 40 MW electrical, commissioned in 1966 and fired by milled peat. This unit was decommissioned in 2004.
- Station C: 45 M W electrical, commissioned in 1983 also fired by milled peat. This unit was decommissioned in 2003.

Each unit consisted of a boiler and a turbine/generator. The turbine drove the generators to produce electricity at 10.5 kV, which was fed through an underground

cable to a transformer where it was stepped up to 110 kV for transmission to the national grid. The station was decommissioned in 2004, and demolished in 2007 when it was replaced by the existing Lough Ree Power Plant, which was commissioned in 2004.

Johnson (1997, 135; 145) notes that a 3ft gauge railway line was opened in the Mount Dillon Group of Bogs in 1948. The system was used to take sod peat to Lanesborough 'A' Power Station where it was left in reception sidings. ESB's own locomotives would then collect these wagons and take them to the unloading point. Following the closure of Lanesborough 'A' Power Station, the railway line to the station was lifted. Subsequently, milled peat was supplied directly by BnM.



Figure 12.5 1914 O.S. Map superimposed on Modern Aerial Photograph showing extent of Generating Facility



Plate 12-1 Aerial view of Lanesborough Power Station in 2000

12.4.1.3 Ash Disposal Facility (ADF)

The existing ADF is located in the townland of Derraghan More in the civil parish of Cashel and the barony of Rathcline (O.S. 6" Map – Longford Sheet 22). The name while Derraghan derives from the Irish An Doireachán – the ‘underwood’ or ‘woody place’ (Placenames Commission – www.logainm.ie).

The topographical nature of the ADF site in 1837 is illustrated in **Figure 12.6**, with the townland boundaries marked in red. There are no structures or field boundaries indicated on the bog-lands.

Lewis (1837) notes that the parish of Cashel was 4 ½ miles (S.) from Lanesborough and contained 5087 inhabitants. He further notes that the “parish is situated on the river Shannon, and on the road from Lanesborough to Ballymahon, and contains 10,420 statute acres, as applotted under the tithe act: the land is principally under tillage, but there is some marsh land and several thousand acres of bog in the northern and eastern parts of the parish. The substratum is limestone, of which there are some good quarries. The seats are Newpark, the residence of Capt. W. J. Davys, and a small seat belonging to Sir G. R. Fetherston, Bart., of Ardagh. The living is a vicarage, in the diocese of Ardagh, and in the patronage of the Archbishop of Tuam, as diocesan: the rectory is impropriate in Messrs. Armstrong, lessees of Lord Fauconberg: the tithes amount to £664. 13. 11., of which £443. 3. 2. is payable to the impropiators, and £221. 10. 9. to the incumbent...The R. C. parish is co-extensive with that of the Established Church; there are seven private schools in the parish, in which 220 boys and 154 girls receive instruction”.



Figure 12.6 1837 O.S. Map superimposed on Modern Aerial Photograph showing extent of existing ADF Site

Griffith's Valuation of 1855 notes that the ADF lands formed part of the landholding of Robert P. O'Reilly, M.D. (Derraghan More) and of Viscount Lordon and Col. Henry White (Derraghan Beg) Lawder, and all leased to various tenants. Likewise, no structures or boundaries are indicated within, or in the immediate environs of the ADF site in 1914 – **Figure 12.7**



Figure 12.7 1914 O.S. Map superimposed on Modern Aerial Photograph showing extent of existing ADF Site

Peat harvesting on the Mount Dillon Group of Bogs commenced in the mid-1940s originally for the production of horticultural products and subsequently for the production of sod and milled peat to fuel the original Lanesborough Power Station. Johnson (1997, 135; 145) notes that a 3ft gauge railway line was opened in the Mount Dillon Group of Bogs in 1948, as discussed above in Section 12.4.1.2.

12.4.2 Archaeological Heritage

Archaeology is the study of past societies through their material remains and the landscapes they lived in. "The archaeological heritage consists of such material remains (whether in the form of sites and monuments or artefacts in the sense of moveable objects) and environmental evidence" (DoAHG 1999, p9).

12.4.2.1 Statutory Protections

The statutory and administrative framework of development control in zones of archaeological potential or in proximity to recorded monuments has two main elements:

- (a) Archaeological preservation and licensing under the National Monuments Acts and
- (b) Development plans and planning applications under the Planning Acts.

- **National Monuments Acts 1930 - 2004**

Section 12 (1) of the National Monuments (Amendment) Act, 1994 provides that the Minister for the Environment, Heritage and Local Government shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect to each county of the State. This is referred to as the 'Record of Monuments and Places' (RMP), and monuments entered into it are referred to as 'Recorded Monuments'.

Section 12(3) of the National Monuments (Amendment) Act 1994 provides for the protection of monuments and places in the record, stating that

"When the owner or occupier (not being the Minister) of a monument or place which has been recorded under subsection (1) of this section 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 Minister and shall not, except in the case of urgent necessity and with the consent of the Minister, commence work for a period of two months after having given the notice.

- **Longford County Development Plan 2015-2021**

The following relevant Archaeological Heritage Policies are set out in Section 6.2 of the Plan:

- HER 5 Any proposed development which may impact on the integrity and/or setting of any monuments, sites, objects or areas of archaeological, cultural, architectural, historical or heritage importance under the protection of this Development Plan and/or the Department of the Arts, Heritage and the Gaeltacht shall be referred to the relevant section of the DoAHG for observations/comment prior to a grant of permission/approval being obtained.
- ARC 1 It is an objective of the Council to protect known and unknown archaeological areas, sites, structures, monuments and objects in the County. In this regard, development in the vicinity of recorded monuments shall be referred to the Department of the Arts, Heritage and Gaeltacht for comment and these considered in the assessment of any application for development. In general, development within a 20m radius of a recorded monument will not be permitted and proposed development within 75 metres discouraged (subject to other policies contained within this Plan).
- ARC 2 It is an objective of the Council to protect the integrity of the settings of archaeological areas, sites, structures, monuments and objects in the County.
- ARC 5 It is the policy of the Council to presume in favour of the physical preservation in-situ of archaeological remains and their settings, where appropriate, feasible and in accordance with the proper planning and sustainable development of the County. The approach will be favoured in

these circumstances as the most appropriate means of protecting the heritage of the County, in accordance with government policy.

- ARC 6 It is the policy of the Council to strictly control development proposals on unzoned lands which may be detrimental to, any area, site, structure, monument or object of archaeological significance, or detract from, its interpretation and setting. In this regard, the Planning Authority shall seek an assessment - to be carried out by a licensed archaeologist - of developments which may impact on a national or recorded monument, the designated zone of archaeological importance surrounding any monument or other site of archaeological significance within the County. Development will only be permitted where the Council, in consultation with the DoAHG, considers it acceptable as per the assessment and subject to any necessary mitigation measures proposed to prevent adverse impact on the monument and/or its settings.
- ARC 9 In securing the preservation of the archaeological heritage, the Planning Authority will have regard to the recommendations of the DoAHG, both in respect of whether or not to grant Planning Permission and in respect of the condition to which permission would, if granted, be subject.
- ARC 10 Where necessary, the Planning Authority may impose, through the Development Management Process, conditions to safeguard that adequate measures are taken to identify and mitigate the archaeological impacts of any development, including where required the completion of a licensed excavation.

Note: The RMP for County Longford was published in 1996. Consequently, all monuments discovered since the publication are not RMP Sites but are subject to protection under Objective ARC 1 of the County Development Plan 2015-2021, as set out above.

12.4.2.2 Relevant Archaeological Inventory

LRP SITE

There is one previously identified monument (SITE CH-1) of archaeological interest/potential located within the **LRP Site**; it is listed below in **Table 12.1** and its location is illustrated in **Figure 12.9** – this monument is not listed in the present RMP. Given the historical background to Lanesborough, a Zone of Archaeological Potential (ZAP) has been established for the town (SITE CH-2), the extent of which is illustrated in **Figure 12.9**; although the extent of the ZAP does not include for any area of the LRP Site, it is included in the defined Cultural Heritage Study Area (**Section 12.3.1**) associated with the LRP Site. SITES CH-3, CH-4 and CH-5 are located within the ZAP. SITE CH-3 comprises six individual features (CH-3A – CH-3F;), all but two of which (CH-3E & CH-3F) of which are listed in the present RMP, although two, CH3A and CH3D are now classified as Redundant Records and will not be included in any future update to the RMP. SITE CH-4 comprises two individual features (CH-4A & CH-4B), as does SITE CH-5 (CH5A & CH5B), all of which are included in the present RMP. Furthermore, there is a tower house (SITE CH-6)

located across the River Shannon in Ballyleague, Co. Roscommon but within the defined Study Area. All monuments within the defined study area (**Section 12.3.1**) associated with the LRP Station are listed below in **Table 12-1**.

ADF SITE

There are nine previously identified individual/clusters of monuments of archaeological interest/potential located within the defined study area (**Section 12.3.1**) associated with the **ADF Site**, as listed below in **Table 12-2**. SITE CH-7 comprises thirteen individual monuments/features, SITE CH-10 comprises a total of six and SITE 13 comprises thirty-one. Two of the monuments – SITES CH-35 & CH-36 were discovered in 2018 during monitoring of peat removal works associated with the development of an additional ash disposal cell. The locations of the monuments are illustrated in **Figure 12.10**.

The monument classifications are further expanded in **Appendix 12.1** and the monuments are briefly described in **Appendix 12.2**.

The following abbreviations/codes are used in relation to **Table 12-1** and **Table 12-2**.

Site No.: Individual site number assigned to site with respect to the defined study area.

SMR No.: Individual number assigned to site in the Sites and Monuments Record of the Archaeological Survey of Ireland

ITM: International Transverse Mercator Grid Reference

Classification: Brief nature of the archaeological site as listed in the RMP

RMP: Listed in the Record of Monuments and Places for Counties Longford and Roscommon

LCDP: Listed in the Longford County Development Plan

RCDP: Listed in the Roscommon County Development Plan

Distance: Distance from monument to closest element of proposed development

Table 12-1: Archaeological Inventory – LRP Station

Site No.	SMR No(s).	ITM	Townland	Classification	Protection	Distance
CH-1	LF017-031	600975 769458	Aghamore	Burnt Pit	LCDP	100m
CH-2	LF017-003		Aghamore Lanesborough Knock Commons North	Historic Town	RMP; LCDP	200m
CH-3A	LF017-003009	600786 769286	Lanesborough	Gateway	LCDP	350m
CH-3B	LF017-003010	600805 769283	Lanesborough	Armorial Plaque	LCDP	350m
CH-3C	LF017-003004	600802 769269	Lanesborough	Church	RMP; LCDP	350m
CH-3D	LF017-003005	600805 769265	Lanesborough	Architectural Fragment	RMP; LCDP	350m

Site No.	SMR No(s).	ITM	Townland	Classification	Protection	Distance
CH-3E	LF017-003006	600803 769263	Lanesborough	Graveslab	RMP; LCDP	350m
CH-3F	LF017-003007	600814 769259	Lanesborough	Cross	RMP; LCDP	350m
CH-4A	LF017-003011	600531 769305	Lanesborough	Castle	RMP; LCDP	600m
CH-4B	LF017-003002			Fort		
CH-5A	LF017-003003	600503 769380	Lanesborough Ballyleague	Ford	RMP; LCDP	700m
CH-5B	LF017-003001		River Shannon			
CH-6	RO037-004	600372 769590	Ballyleague	Castle	RMP; RCDP	750m

Table 12-2: Archaeological Inventory – ADF Site

Site No.	SMR No(s).	ITM	Townland	Classification	Protection	Distance
CH-7	LF022-055001	606457 763351	Derraghan More	Class 3 Togher	RMP; LCDP	500+m
	LF022-055002	606473 763338		Class 3 Togher	RMP; LCDP	500+m
	LF022-055003	606391 763528		Class 3 Togher	RMP; LCDP	500+m
	LF022-055004	606433 763404		Class 3 Togher	RMP; LCDP	500+m
	LF022-055005	606369 763581		Class 3 Togher	RMP; LCDP	500+m
	LF022-055006	606280 763256		Class 3 Togher	RMP; LCDP	500+m
	LF022-055007	606510 763232		Class 3 Togher	RMP; LCDP	500m
	LF022-055008	606565 763187	Derraghan More	Class 1 Togher	RMP; LCDP	200m
	LF022-055009	606412 763412	Derraghan More	Class 3 Togher	RMP; LCDP	500+m
	LF022-099	606454 763393		Class 2 Togher	LCDP	500+m
	LF022-100	606425 763436		Class 3 Togher	LCDP	500+m
	LF022-103	606600 763158		Post-Row	LCDP	500+m
	LF022-105	606629 763073		Platform	LCDP	500+m
CH-8	LF022-013	606880 763150	Derraghan More	Ringfort - Rath	RMP; LCDP	450m
CH-9	LF022-098	607060 762332	Derraghan More	Platform	RMP; LCDP	400m
CH-10	LF022-060001	607737 761814	Derrymany	Class 3 Togher	RMP; LCDP	1100+m
	LF022-060002	607692 761861		Class 3 Togher	RMP; LCDP	1100+m
	LF022-060003	607690 761914		Class 3 Togher	RMP; LCDP	1100m
	LF022-060004	607766 761914		Class 3 Togher	RMP; LCDP	1100+m
	LF022-060005	607798 761843		Class 3 Togher	RMP; LCDP	1100+m
	LF022-060006	607774 761758		Class 3 Togher	RMP; LCDP	1100+m
CH-11	LF022-015	607605 762547	Derraghan Beg	Ringfort - Rath	RMP; LCDP	800m
CH-12	LF022-059	607968 762152	Derraghan Beg	Class 3 Togher	RMP; LCDP	130m

Site No.	SMR No(s).	ITM	Townland	Classification	Protection	Distance
CH-13	LF022-101	607325 763515	Derraghan More	Unclassified Togher	LCDP	1000+m
	LF022-102	607343 763505		Unclassified Togher	LCDP	1000+m
	LF022-104	607278 763544		Unclassified Togher	LCDP	1000+m
	LF022-125	607375 763692	Derryglogher	Post-Row	LCDP	1000+m
	LF022-126	607376 763502		Unclassified Togher	LCDP	1000+m
	LF022-127	607360 763510		Unclassified Togher	LCDP	1000+m
	LF022-128	607342 763522		Class 2 Togher	LCDP	1000+m
	LF022-129	607340 763519	Derraghan More Derryglogher	Class 3 Togher	LCDP	1000+m
	LF022-130	607323 763531		Class 3 Togher	LCDP	1000+m
	LF022-131	607329 763518		Redundant Record	LCDP	1000+m
	LF022-056001	607380 763543	Derryglogher	Class 2 Togher	RMP; LCDP	1000+m
	LF022-056002	607363 763501		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056003	607409 763594		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056004	607431 763645		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056005	607443 763664		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056006	607402 763629		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056007	607402 763629		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056008	607414 763650		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056009	607421 763678	Derraghan More	Class 3 Togher	RMP; LCDP	1000+m
	LF022-056010	607369 763491		Class 3 Togher	RMP; LCDP	1000m
	LF022-056011	607239 763530		Class 3 Togher	RMP; LCDP	1000+m
	LF022-056012	607254 763511	Derryglogher	Redundant Record	LCDP	1000+m
	LF022-056013	607409 763680		Class 3 Togher	LCDP	1000+m
	LF022-056014	607388 763660		Class 3 Togher	LCDP	1000+m
	LF022-056015	607388 763601		Class 3 Togher	LCDP	1000+m
	LF022-056016	607409 763482		Class 3 Togher	LCDP	1000+m
	LF022-056017	607379 763520		Class 3 Togher	LCDP	1000+m
	LF022-056018	607359 763511		Class 3 Togher	LCDP	1000+m
	LF022-056019	607359 763531		Class 3 Togher	LCDP	1000+m
	LF022-056020	607419 763505		Class 3 Togher	LCDP	1000+m
	LF022-056021	607391 763503		Class 3 Togher	LCDP	1000+m
CH-14	N/A	606839 762695	Derraghan Beg	Possible Togher	N/A	70m

Site No.	SMR No(s).	ITM	Townland	Classification	Protection	Distance
CH-15	N/A	606782 762786	Derraghan More	Possible Platform	N/A	100m

12.4.2.3 Recorded Archaeological Artefacts

The Topographical Registers of the National Museum of Ireland note that two artefact discoveries have been reported within the defined study area of the LRP Site, both from the River Shannon. These are:

- NMI Reg. No: E.185.14 – Polished Stone Axe
- NMI Reg. No: 1935.538 – Decorated Bronze Spearhead

There are no reported artifactual discoveries listed in the Registers with respect to the defined study area associated with the ADF site; however, reference is made to an archaeological investigation undertaken by the Museum in 1957 (Ref: I.A. 32/57), under the direction of Etienne Rynne (See **Section 12.4.2.4** below and **Appendix 12.2 – SITE CH-7 (LF022-055008)**).

12.4.2.4 Relevant Archaeological Investigations

A search undertaken of the Archaeological Excavations Bulletin (www.excavations.ie) indicates that three licensed archaeological investigation has been undertaken within the defined study area of the LRP Station, as follows:

- A programme of archaeological monitoring was undertaken with respect to the construction of the Lough Ree Power Facility in 2002 (Licence NO.: 02E0452). Such monitoring was initially carried out by Niall Gregory, and subsequently, Caroline Powell, ADS Ltd. A burnt pit was uncovered and subsequently excavated – See SITE CH-1 (Appendix 13.2)
- Limited archaeological monitoring of ground reduction works associated with the construction of a small extension to the eastern side of the community hall was undertaken in 2002 by Chris Read, North-West Archaeological Services Ltd (Licence No: 02E0762). Work had begun on-site before the archaeologist was contacted and involved the demolition of an existing extension and the removal of its foundation. All other aspects of the proposed development were monitored. No archaeological features or finds were revealed.
- A programme of archaeological monitoring was undertaken by Edel Ruttle, TVAS (Ireland) Ltd (Licence No: 09E0365) within the town of Lanesborough. Nothing if archaeological interest or potential was uncovered.

One licensed archaeological investigation has been undertaken within the defined study areas of the ADF Site, as follows:

- Archaeological excavations of four trackways was undertaken in 2001 by Ellen O'Carroll, ADS Ltd (Licence NO: 01E0697) part of the 2001 Bord na Móna (BnM) Mitigation Project. This area of bog has undergone previous surveys, excavations and reassessments by the Irish Archaeological Wetland Unit in 1991 and by ADS Ltd in 1999. These sites were recorded in 1999 as brushwood and roundwood

togher, hurdles and worked wood in situ. At this point they were already substantially milled out, so by the time mitigation began it was difficult to distinguish several sites from each other. Four separate sites were excavated. One definite togher was excavated which was, for the most part, in a good state of preservation. It consisted primarily of longitudinal roundwoods, with some brushwood and twigs infilled between the roundwoods. It was very compact and was three to four layers deep in places. It was traced along the BnM field surface for c. 60m in a north-east/south-west direction. The remaining sites, which were in a poor state of preservation, appeared to radiate out in different directions from this substantially constructed togher.

Two cuttings that measured 3m by 5m were placed over the roundwood and brushwood togher (99DR0001a). A 2m by 2m cutting was placed over 99DR0005a. A cutting measuring 2m by 2m incorporated the excavation of site 99DR0007 and 8a.

The first cutting was located beside a drain as the site (99DR0001a), which had been cut obliquely by the drain, could be seen protruding from the drain face. The site was located in well-humified Sphagnum peat with inclusions of reeds (*Phragmites* spp) and white sedge-type material. The upper surface of this site was constructed of c. 30 relatively large roundwood timbers and some brushwood placed longitudinally along the line of the togher in a north-east/south-west direction. The roundwoods were compacted together and formed the main body/walking surface of the togher. At the western edge of the togher there were concentrations of brushwood, twigs and some tree roots. The brushwoods averaged 0.03m in diameter and were slightly disturbed by milling. The substructural elements of this togher were very similar to the upper surface layer. They were composed of roundwoods and brushwood between which was a compact collection of smaller brushwood. It appears that this site may have been constructed using layers of similar wood and that is why there was no definite super- or substructure noted. The track, as revealed in this cutting, measured 3m in maximum width and 0.15m in maximum depth. It consisted of layers of brushwood and roundwood compacted together to form a stable walking surface across the bog.

The second cutting was located approximately 1m south-west of the first and revealed a continuation of the same togher. This sighting was also exposed in that it had been cut by a BnM drain. It was composed of over 60 brushwood and 10–20 larger roundwood elements, exposed on the field surface. The orientation of these elements appeared to be mainly longitudinal, running in a north-east/south-west direction, along the line of the site. There was some milling damage on the upper surfaces of the roundwood but bark was present on nearly all the wood pieces. Milling had also disturbed the arrangement of the brushwood and roundwood. The site measured 3.5m in width and was over 0.3m deep in this cutting. No pegs or transverse supports were recorded in either of the cuttings.

The third cutting was placed along the western side of Cutting 2 as it was noted that a site (DR0005a) radiated out from this cutting towards the western edge of this bog. The brushwood associated with this site was exposed on the field

surface prior to excavation and as a result the wood was broken up and had been extensively damaged. The peat surrounding the wood was dark brown in colour and was well humified. It contained a lot of grassy sedge material with inclusions of reed materials and tree roots.

This brushwood site measured 2m in maximum width and was traced for a length of 3m. The site was badly disturbed on the western side of the cutting in comparison to the eastern half, where there was some structure evident. The site appeared to be composed of c. six roundwoods, 0.06–0.15m in diameter, and numerous pieces of brushwood as well as several outlying fragments. The diameter of the brushwood ranged from 0.02m to 0.05m. Fifty per cent of the elements ran transversely and 50% were placed longitudinally. The wood was not very compact, which may have been due to heavy damage from milling. Roots were dispersed throughout the cutting. Wood was scattered around this site and exposed all over the field surface. After the field surface was shovel-scraped it appeared that the site exposed in the cutting continued in a south-eastern and southern direction. It appears to have been a junction of tracks from various directions leading towards the substantial roundwood and brushwood together exposed in Cuttings 1 and 2.

The fourth cutting (99DR0007 and 8A) excavated was 10m to the west of Cutting 3 on the next BnM field surface. The site, which was similar in appearance, was composed of brushwood (60%), twigs (38%) and fragments of roundwoods (2%). The elements were densely restricted to the south-east corner of the cutting, spaced 0.04–0.25m apart. The brushwood varied in diameter from 0.01m to 0.03m and up to 0.5m in length. The twigs varied between 0.01m and 0.02m.

The majority of the elements were orientated in a north-west/south-east direction. The roundwoods were laid above the brushwood and twigs and were orientated east–west. The brushwood was laid at 0.06–0.12m intervals and the twigs were used as a packing between the brushwood to make the structure more stable. Seven twig pegs were noted. As at Cutting 17, numerous tree roots were spread throughout the cutting. This cutting was extended on the opposite (east) side of the drain. It measured 2.5m by 1m, and after excavation seven roundwoods and over 50 brushwoods were exposed. The site was covered in peat at this location and therefore the true composition of the structure was uncovered here. It consisted of roundwoods (30%) and brushwood (70%) and some twigs. The roundwoods, which were laid on top of the brushwood, measured 0.06–0.12m in diameter and up to 1.3m in length. The brushwood, which measured 0.02–0.05m in width, was located under and between the roundwoods. The site measured 2.2m in maximum width and was traced for a length of c. 4m.

- As noted above in **Section 12.4.2.4**, limited archaeological investigations were undertaken in 1957 by Etienne Rynne, National Museum of Ireland, of a Toghra (road) in the townlands of Derraghan More and Derrygowna. Four trenches were excavated (marked by green circles in **Figure 12.8**). This roadway (L 960m; D 1.25m) consisted of large transverse oak planks, supported by longitudinal runners and secured by pegs; the orientation was recorded as approximately east-west and it was noted that areas of sticky clay appeared to have been

purposely laid between the longitudinal timbers (av. diam. 0.1m). Large transverse planks (av. dims. L 3.6m; Wth 0.15m; D 0.2m) were laid across the longitudinal timbers and were held in place with sharpened stakes or pegs. The monument was subsequently included in the RMP (Ref: LF022-055008; part of SITE CH-7 (**Table 12.1**)) and its location and extent with respect to the existing ADF is illustrated in **Figure 12.8**. Although largely destroyed by peat-milling, excavations in 1989 by Raftery (1990, 37-41) exposed a surviving portion of the togher (L 14m; Wth 4.5m max.). The structure appeared to be broadly similar to that described previously but with concentrations of brushwood (D 0.45m max.) more evident in the substructure; the orientation was recorded as ENE-WSW – see **Appendix 12.2; SITE 7**).

- A programme of archaeological monitoring undertaken by AMS Ltd was undertaken on a phased basis from July – September 2018 in advance of the development of the additional ash disposal cell (Cell 9) at the ADF Site (Dowling & Clutterbuck, 2018). The work was undertaken as part of development works designed to increase the capacity of the existing facility, through the construction of additional engineered landfill cells. Two potential archaeological sites (possible timber trackways/platforms – SITES CH-14 & CH-15 (**Appendix 12.2**)) were identified in one of the areas targeted for peat extraction. No examples of woodworking or tool marks were identified amongst the exposed wood fragments. Both possible sites were back-filled with peat and fenced-off; a surrounding buffer zone was also put in place to ensure their continued preservation. Apart from these, no definite archaeological sites were encountered, and nothing of archaeological or potential archaeological significance was identified in any of the other work areas (Cell 9).



Figure 12.8 Recorded Extent of Togher (LF022-055008) on 1957 with respect to existing ADF (from www.heritagemaps.ie)

12.4.2.5 Results of Geotechnical Site Investigations

A programme of Geotechnical Site Investigations (GSI) was undertaken at the site, in 2017 and this included the excavation of Trial Pits and Slit Trenches, as well as Bore-Hole investigations. The results of such investigations are summarised as follows:

Seven Trial Pit excavations were monitored within the former Ash Depository and lands to the east of the former blender bunker located within the existing LRP Facility. There were no indications of in-situ peat deposits at the bases of any of the trial pits.

Eleven Trial Pit excavations were monitored at the ADF site. The 'in-situ' peat remnant deposits in this area ranged from 0.40m (TP1/17) to 2.5m (TP03/17).

12.4.2.6 Archaeological Potential of Study Area/Receiving Environment

The siting preferences of particular monument types are well documented. Broadly speaking, the general landscape of the study area offers a potential setting for additional sites and remains as follows:

- There is significant archaeological potential associated with Raised Bog. Tomlinson (2011, 170-77) notes that raised bogs have accumulated across post-glacial time, originating in lakes or low-lying hollows left in the landscape, where drainage was obstructed by irregular glacial deposits and where high water tables ensured widespread flooding. As water table and lake levels fell, reed swamps

formed and peat accumulated. Eventually, the peat and its perched water table was elevated above the surrounding land so that no mineral water entered the bog; the vegetation changed to species tolerant on low nutrient conditions and associated with bog fed only by rainwater. The peat continued to expand upwards, taking the water table with it and acidic raised bogs were produced. Open lakes and reed swamps of the post-glacial period began to give way to fen vegetation 9,000 years ago and raised bog had overgrown most fens about 7,000 years ago. Following the Ice-Age 10,000 years ago, Mesolithic communities settled along the shores of lakes which preceded the raised bogs, As the open water receded gradually, replaced successively by reed-swamp fen and finally bog, such early settlements became covered by the bogs, and by the Bronze-Age, only small fen-fringed lakes remained, many of which became sacred and subject to votive offerings of weapons and ornaments. By 500BC agricultural settlement focussed on the edges of the bogs, which were drier than before, and provided spring grazing. Wooden trackways were constructed across the bogs to link the various settlements/communities. Ochre deposits at seepage points in the bogs were exploited and smelted to produce iron. In the Early Medieval Period, isolated bog margins were settled by ascetic ecclesiastics. Rapid increases in population after the seventeenth century led to widespread exploitation of raised bogs for fuel. Consequent archaeological remains can exist both under and within raised bog complexes. In addition, as noted by Lynch (1991, 28) “exceptional powers of preservation make wetlands a unique archaeological resource. The oxygen-free conditions prevailing in the waterlogged peat mean poor microbial activity, which in turn allows for almost complete preservation of organic materials”. Consequently, there is potential for features such as field walls and prehistoric burial and settlement sites to be sited under bogs and for well-preserved artefacts, especially organic materials – arrowheads and axe-heads with intact wooden handles, clothing such as woollen caps and cloaks, ‘bog-butter’ - to be recovered from close to the surfaces of intact bogs. In addition a growing number of human bodies – with skin, hair etc. relatively intact – have been recovered from raised bogs in recent years.

- The subject lands and surrounding landscape offer many opportunities for the location of Fulachta Fiadh (prehistoric cooking sites). These sites are location specific, generally located close to streams and rivers or in wet marshy areas, and sometimes occur in groups.
- The former flood plains of larger watercourses, such as the River Shannon, provided a fertile, well-irrigated and relatively flat landscape suitable for agricultural practices from the earliest times of Irish farming (from c. 4000 BC onwards).
- Rivers and waterways have always attracted human activity for a variety of reasons, as a source of water to their use as a means of transport, as a source of energy and for their spiritual, religious or ritual associations. They also act as depositories for archaeological artefacts.

12.4.3 Inventory of Architectural Heritage

12.4.3.1 Introduction

Architectural heritage has several definitions and meanings for people. A useful rule of thumb (which is actually the legal situation) is set out in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 which provides the following definition:

- a) structures and buildings together with their settings and attendant grounds, fixtures and fittings,
- b) groups of such structures and buildings, and
- c) sites, which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

A rich architectural heritage has survived to the present day in County Longford. While there are impressive demesne features and large houses in the County, much of the County's architectural heritage has come from vernacular traditions with local craftsmen sometimes borrowing from the traditions of classical architecture to construct buildings that met local needs. This rich architectural heritage contributes enormously to the overall built environment and, indeed, helps to give it definition in terms of place and character for those that live and work in the county as well as those who visit there.

Section 51 of the Planning and Development Act, 2000 (as amended) requires a Development Plan to include a record of structures. These structures form part of the architectural heritage of the County and are to be protected. Each Local Authority draws up this list, referred to as the Record of Protected Structures (RPS), in which each structure is given a reference number and is a constituent part of the County/City/Town Council Development Plan.

● Longford County Development Plan 2015-2021

The following relevant objectives with respect to Architectural Heritage are contained in Section 6.2.3 of the Development Plan:

- ARCH 2 It is an objective and policy of the Council that all development should be appropriate to its setting in the landscape or townscape, and should respond to and reinforce local character and heritage. This will ensure that high quality environments are either maintained or created by development
- ARCH 6 It is policy of the Council that proposals for development to structures included as part of the National Inventory of Architectural Heritage (DoEHLG) and any updated version, maintain and enhance the character of these structures

In addition, the following relevant policies with respect to the RPS are included in the Plan (Section 6.2.3.1):

- RPS 1 It is the policy of the Council to ensure the protection of structures included in the Record of Protected Structures generally and in particular by:

Site No.	RPS No.	ITM	Townland	Site Name	Classification	Distance
CH-16	303	600857 769035	Lanesborough	N/A	House	600

- Controlling development which would alter the character of protected structures and proposed protected structures.
- Monitoring the condition of protected structures and proposed protected structures to identify those endangered by neglect, vandalism or unauthorised development and taking appropriate action.
- Preventing the endangerment of protected structures in the Council's ownership.

RPS 2 It is the policy of the Council to issue Declarations as to the type of works that would affect the character of a protected structure and therefore require planning permission

RPS 5 It is the policy of the council that applications for development where a protected structure or its setting is likely to be materially affected, will require an assessment in accordance with provisions of Chapter 6 of the Architectural Heritage Protection Guidelines, issued by the DoEHLG (2004 or subsequent update). Planning Applications of this nature will be referred to the DoAHG development applications unit and other relevant statutory bodies for comment. Any comments received from these bodies shall be taken into account in the consideration of the application.

RPS 6 It is Council Policy to encourage the rehabilitation, renovation and reuse of existing older buildings/ buildings of architectural merit where appropriate in preference to their demolition and redevelopment.

12.4.3.2 Protected Structures

Structures listed in the RPS are normally referred to as 'Protected Structures'.

LRP SITE

There is one structure (CH-16) listed in the RPS of the Longford County Development Plan 2015-2021 as being located within the subject study area associated with the LRP Station. This is also listed as being of architectural interest by the National Inventory of Architectural Heritage (NIAH) and rated of regional importance. The structure is listed below in **Table 12-3** and its location is indicated in **Figure 12.9**. It is described in **Appendix 12.3**

Table 12-3: List of Protected Structures within LRP Station Study Area

ADF SITE: There are no structures listed in the RPS as being located within the study area associated with the ADF Site.

12.4.3.3 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht. It was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. It is intended that the NIAH will provide the basis for the recommendations of the Minister for Culture, Heritage and the Gaeltacht to the planning authorities.

LRP SITE

There are a total of nineteen structures of Architectural Heritage interest listed by the non-statutory NIAH as being located within the subject study area (**12.3.1**) associated with the LRP Site. One of these (CH-16) is also included in the Record of Protected Structures (RPS) of the Longford County Development Plan 2015-2021, as listed above in **Table 12-3**, while another, SITE CH-18, is listed in the Archaeological RMP (SITE CH-5; **Table 12.1**). SITES CH-28, CH-29, CH-30 and CH-31 have been demolished; likewise, CH-28 has been demolished, although one associated tippler is presently located to the east of CH-27; CH-31 has been converted. The sites are listed below in **Table 12-4** and their locations (existing and former) are indicated in **Figure 12.9**. They are described in **Appendix 12.3**.

Table 12-4: List of NIAH Structures within LRP Station Study Area

Site No.	NIAH Reg. No.	ITM	Townland	Classification	Rating	Distance
CH-17	13310022	N/A	Lanesborou gh	Housing Estate	Regional	500m
CH-18	13310001	600503 769383	Lanesborou gh	Bridge	Local	550m
CH-19	A:13310003 B:13310004	600558 769347	Lanesborou gh	Houses	Regional	525m
CH-20	13310002	600606 769309	Lanesborou gh	Gates	Regional	500m
CH-21	13310005	600627 769245	Lanesborou gh	House	Regional	475m
CH-22	13310008	600802 769155	Lanesborou gh	Gates	Local	480m
CH-23	13310009	600897 769097	Lanesborou gh	Parochial House	Regional	500m
CH-24	13310010	600922 769090	Lanesborou gh	Church	Regional	500m
CH-25	13310011	600973 769032	Lanesborou gh	Garda Station	Local	550m
CH-26	13310007	600807 769279	Lanesborou gh	Church	Regional	350
CH-27	13310017	600988 769600	Aghamore	Building Miscellaneo us	Local	0M

Site No.	NIAH Reg. No.	ITM	Townland	Classification	Rating	Distance
CH-28	13310016	600835 769462	Aghamore	Building Miscellaneous	Local	N/A
CH-29	13310015	600824 769379	Aghamore	Chimney	Regional	N/A
CH-30	13310021	600769 769327	Aghamore	Building Miscellaneous	Local	N/A
CH-31	13310018	600771 769358	Aghamore	Workshop	Local	180m
CH-32	3310014	600761 769406	Aghamore	Power Station	Regional	N/A
CH-33	13310020	600753 769377	Aghamore	Substation	Local	200m
CH-34	13310019	600721 769368	Aghamore	Building Miscellaneous	Local	200m

ADF SITE

There are two structures listed by the NIAH as being located within the study area (12.3.1) associated with the ADF Site. These are listed below in **Table 12-5** and their locations are indicated in **Figure 12.10**. They are described in **Appendix 12.3**.

Table 12-5: List of NIAH Structures within ADF Study Area

Site No.	NIAH Reg. No.	ITM	Townland	Classification	Rating	Distance
CH-35	13402201	607399 763980	Derryglogher	House	Local	1100m
CH-36	13402202	607482 762879	Derraghan Beg	House	Regional	700m

12.5 Impacts of the Development

The following **Table 12-6** (from EPA, 2017, Table 3.3) provides the baseline criteria used to describe the impacts (effects) that the proposed development will have on Cultural Heritage Sites, Structures and Features.

Table 12-6: Descriptive Criteria for Cultural Heritage Impacts

Quality of Effects	Positive Effects A change which improves the quality of the environment Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. Negative/adverse Effects A change which reduces the quality of the environment
Significance of Effects	Imperceptible An effect capable of measurement but without significant consequences. Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences. Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. Profound Effects An effect which obliterates sensitive characteristics
Extent and Context of Effects	Extent Describe the size of the area, the number of sites, and the proportion of a population affected by an effect. Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions
Probability of Effects	Likely Effects The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.

	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency of Effects	Momentary Effects Effects lasting from seconds to minutes Brief Effects Effects lasting less than a day Temporary Effects Effects lasting less than a year Short-term Effects Effects lasting one to seven years. Medium-term Effects Effects lasting seven to fifteen years. Long-term Effects Effects lasting fifteen to sixty years. Permanent Effects Effects lasting over sixty years Reversible Effects Effects that can be undone, for example through remediation or restoration Frequency of Effects Describe how often the effect will occur.

12.5.1 Lough Ree Power (LRP) Station

Historical, Archaeological and Architectural Heritage: The general historical background, Archaeological and Architectural Heritage at the station site is discussed above in **Section 12.4.1.2, Section 12.4.2** and **Section 12.4.3** above. There are no physical changes proposed to the LRP Station site and no physical alterations required as a result of the proposed change to Condition 5.5. Given there are no changes to the receiving environment or in the characteristics of the proposed activity and development, the projected development will not give rise to impacts on the Cultural heritage that materially differ from those identified and permitted under the existing EIS from 2001. Therefore there are no impacts anticipated from the proposed development at the LRP station site.

12.5.2 Ash Disposal Facility (ADF)

12.5.2.1 Construction Phase

Historical, Archaeological and Architectural Heritage: The general historical background to the ADF development area is discussed above in **Section 12.4.1.2**. In summary, there are no significant historical events associated with the proposed development area which have the ability to be impacted upon by the construction of the proposed development. Consequently it is considered that there are no predicted direct impacts with respect to Historical Heritage with regard to the proposed development within the ADF area. Therefore

there are no impacts anticipated from the IE licence Review at the LRP station site. The effect can be stated as **Neutral**.

The general archaeological background to ADF is discussed above in **Section 12.4.2.2**. This additional capacity at the ADF can be provided within the footprint of the existing ADF. The ADF was subject to a programme of archaeological monitoring undertaken by AMS Ltd was undertaken on a phased basis from July – September 2018 in advance of development of an additional ash disposal cell (Cell 9) at the ADF Site (Dowling & Clutterbuck, 2018). Two potential archaeological sites (possible timber trackways/platforms – SITES CH-14 & CH-15 (**Appendix 12.2**)) were identified in one of the areas targeted for peat extraction. No examples of woodworking or tool marks were identified amongst the exposed wood fragments. Both possible sites were back-filled with peat and fenced-off; a surrounding buffer zone was also put in place to ensure their continued preservation. Apart from these, no definite archaeological sites were encountered, and nothing of archaeological or potential archaeological significance was identified in any of the other work areas (Cell 9).

It is considered that there are no predicted direct impacts to any previously recorded archaeological monuments by the proposed increased capacity at the ADF. The effect can be stated as **Neutral**.

There are no structures listed in the Longford County Development Plan (RPS) as being located within the study area associated with the ADF Site. Consequently, it is considered that no direct impacts to structures of architectural heritage interest will occur. The effect can be stated as **Neutral**.

12.5.2.2 Operational/Post-Construction Phase

There are no extant monuments or structures of historical, archaeological or architectural heritage interest located within, or in the immediate environs of the subject development area at the ADF Site. Given the above, it is considered that the various proposed extension to the capacity of the ADF Site, will not cause any adverse visual impact to the setting or general views of, or from, any archaeological monuments or architectural heritage structures and that no predicted visual impacts will occur with respect to historical, archaeological or architectural heritage relating to the operational/post-construction phase of the development at the ADF Site. The effect can be stated as **Neutral**.

12.5.2.3 Decommissioning Phase

It is not considered likely that any impacts will occur with respect to the decommissioning phase of the proposed development.

12.5.3 Indirect Impacts - Peat Supply to Lough Ree Power Station

The peat supply to the LRP Station is provided directly by Bord na Móna from existing bogs/peatlands that are presently being harvested. Such harvesting works is the subject to a *Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna* (2012). Bord na Móna employ a Project Archaeologist to advise them on all aspects of archaeology relating to its estate and assists in the development of a post-survey archaeology strategy for its peatlands. In terms of the proposed development, matters pertaining to archaeology within the harvesting areas are solely the remit of Bord na Móna.

The transport of peat to the LRP Station and ash to the ADF Site will be by means of the existing Bord na Móna railway network, as well as the public road network. These are well developed routes that do not require any improvements to the existing infrastructure, particularly along the existing road network. Consequently it is considered that the continued use of these transport routes will not cause any direct or indirect (visual) impacts to any items of Cultural Heritage interest.

12.5.4 Cumulative Impacts

The potential cumulative impacts of the proposed development with respect to Cultural Heritage have also been assessed.

ESB have applied for permission to extend the use of the LRP station and associated ADF beyond 2020 and to transition the LRP station from peat to exclusively firing with biomass. The elements requested under this IE licence review i.e. the increased capacity at the ADF and proposed change to condition 5.5 do not require any physical or operational changes to the LRP Station. The proposed development at the ADF will be located within the existing footprint of the ADF. There will be no physical change to the ADF cell structure as permitted by Planning Permission Licence PL01/115 in terms of site coverage and heights. It has been concluded that no significant negative cumulative impacts associated with the proposed development and any identified plans or projects including the transition of the LRP station from peat to exclusively firing with biomass, are anticipated.

Potential impacts in relation to the transition the LRP station from peat to exclusively firing with biomass are assessed in the EIAR for that future proposed development.

12.5.5 Do-Nothing Scenario

Under the 'Do Nothing' scenario storage or disposal of ash at the ADF would cease by the end of 2019. The station under certain prevailing conditions has difficulty in meeting the strict interpretation of the Condition 5.5 therefore ESB is proposing an amendment to the current licence conditions, to enable the licensee to demonstrate with agreement from the Agency that the station is having no significant environmental impact on its receiving waters and its habitats. If this alteration is not granted this would have serious implications for the viability of the station.

In the event of the do nothing the LRP Station would face decommissioning of the power station earlier than the current planning permission requires without the means of continuing to dispose of peat ash at the ADF. Should closure of the ADF and decommissioning of the power station occur the EPA approved Decommissioning Management Plan (DMP) and Closure, Restoration and Aftercare Management Plan (CRAMP) as required by Section 10.2 of the IE Licence will be implemented.

In terms of Cultural Heritage, no impacts (direct or visual) will occur at the LRP Station. Likewise, no direct impacts to previously recorded items of Cultural Heritage interest will occur at the ADF Site.

12.6 Mitigation

12.6.1 Lough Ree Power Station & ADF Site

As noted above it is considered that there are no predicted impacts and consequently it is considered that no mitigation measures are required.

12.7 Difficulties Encountered in Compiling Information

No difficulties were encountered with respect to the undertaking of the 'paper survey' or monitoring of the geotechnical site investigations. Likewise, no difficulties were generally encountered with respect to the undertaking of fieldwork, although in some areas of the ADF site edges to a number of drains were partially flooded and overgrown; likewise some surface areas of remnant bog were partially overgrown, while an area to the immediate south of the existing ADF comprised dense tree and undergrowth cover.

12.8 Residual Impacts

It is not envisaged that any negative residual effects will occur with respect to Cultural Heritage as a result of the proposed development.

12.9 References

- Aalen, F.H.A, Whelan, K & Stout, M. 1997. *Atlas of the Irish Rural Landscape*. Cork University Press.
2011. *Atlas of the Irish Rural Landscape* (Revised & Expanded Second Edition), Cork University Press.
- AFM - *Annals of the kingdom of Ireland by the Four Masters from the earliest period to the year 1616*, ed. and trans. John O'Donovan (7 vols., Dublin, 1851; reprint New York, 1966)
- Barry, M. 1985. *Across deep waters: bridges of Ireland*. Frankfort Press, Dublin.
- Barry, T.B. 1987. *The Archaeology of Medieval Ireland*. Routeledge, London and New York.
- Bateman, J. 1883. *The Great Landowners of Great Britain and Ireland*. Harrison, London.
- Bence-Jones, M. 1988. *A Guide to Irish County Houses*. Constable, London.
- Bradley, J., Halpin, A. and King, H. 1985 *Urban archaeological survey - county Longford*. Unpublished report commissioned by the Office of Public Works, Dublin.
- Burnell, T. 2006. *The Anglicised words of Irish Placenames*. Nonsuch Publishing, Dublin.
- Colin Buchanan & Partners. *Waterways Corridor Study 2004 – A study of the area surrounding Lanesborough to Shannonbridge*. Heritage Council, Kilkenny.

- DoAHGI. 1999. *Framework and Principles for the Protection of the Archaeological Heritage*. Stationery Office, Dublin.
- Doran, L. 2004. 'Medieval Communication Routes through Longford and Roscommon and their associated Settlements', *PRIA*, 104C, 3, 57-80.
- Dowling, G & Clutterbuck, R. 2018. *Report on Archaeological Monitoring at the Bord an Móna Ash Disposal Facility, Derraghan More, Co. Longford*. Unpublished report prepared for BnM.
- Dunne, N. 2000. Preliminary Draft on Mitigation Strategy for Archaeological Areas Listed as Non-Priority for 2000 – Mount Dillon Bog, Co. Longford and Blackwater Bog, Co. Offaly. Unpublished Report prepared for BnM
- Edwards, N. 1990. *The Archaeology of Early Medieval Ireland*. Batsford Ltd., London.
- Giacometti, A & Duffy, S. 2008. *Longford Industrial Heritage Survey*. Arch-tech Ltd for Heritage Council and Longford Co. Co.
- Gibson, P.J. 2007. *Heritage Landscapes of the Irish Midlands*. Geography Publications, Dublin.
- Griffith, R. 1855. *General Valuation of Rateable Property of Ireland – King's County Dublin*.
- Flanagan, D. & Flanagan, L. 1994. *Irish Place Names*. Gill & Macmillan, Dublin.
- Halpin, A & Newman, C. 2006. *Ireland: An Oxford Archaeological Guide*. Oxford University Press.
- Killanin, Lord. & Duignan, M.V. 1989. *The Shell Guide to Ireland*. McGraw-Hill Ryerson, Montreal (Revised & Updated edition by P. Harbison).
- Lewis, S. 1837. *A Topographical Dictionary of Ireland*. 2 Vols. Lewis & Co., London.
- Maloney, A, Jennings, D, Keane, M & McDermott, C. 1993. *Survey of the Raised Bogs of Longford*. Crannog Publications.
- McDermott, C & Moore, C. 2010. *Corlea Trackway: Iron Age Roads in the County Longford Peatlands*. Archaeology Ireland Heritage Guide No: 50, Wordwell Ltd.
- O'Reilly, B. 2011. 'Hearth and Home: the vernacular house in Ireland from c. 1800'. *PRIA*, Section C, Vol. 111C, pp. 193-215
- Rafferty, B. 1996. *Trackway Excavations in the Mount Dillon Bogs, Co. Longford, 1985-1991*. Crannog Publications
- Rynne, C. 2006. *Industrial Ireland, 1750-1930. An Archaeology*. Collins Press, Cork.

Swift, M. 1999. *Historical Maps of Ireland*. Parkgate Books, London.

Taylor, G & Skinner, A. 1778. *Taylor and Skinner's Maps of the Roads of Ireland, Surveyed 1777*.

Waddell, J. 1990. *The Bronze Age Burials of Ireland*. Galway University Press.

Whitaker, J. 2002a. *Report on the Archaeological Reassessment of Derraghan Bog, Derraghan More, Mount Dillon Works, Co. Longford*. Unpublished report prepared for BnM

2002b. *Peatland Excavations 2001-2002: Mount Dillon Group of Bogs, Co. Longford*. Report prepared by ADS Ltd for BnM

For inspection purposes only.
Consent of copyright owner required for any other use.

13 Interaction of Impacts

In addition to the requirement to describe the likely significant effects of the proposed development on specific environmental topics, the assessment of interactions of those effects is also required. This Chapter addresses the main interactions between different environmental aspects potentially impacted by the proposed development.

13.1 Assessment Methodology

Cumulative impacts including intra project cumulative impacts have been considered throughout the environmental impact assessment process and are discussed in each relevant chapter. A summary of the significant cross media interactions that were considered as part of the assessment is provided herein.

13.2 Cross Media Impacts

A summary table of the interactions and inter-relationships considered are presented in **Table 13-1**. Each aspect of the environment which is considered in the appropriate sections of the EIAR is cross-tabulated against all other aspects that have also been considered.

13.2.1 Population and Human Health

Impacts relating to population and human health have the potential to be impacted by other environmental aspects such as Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual and Cultural Heritage. Human beings require high quality water and high air quality for everyday life and also for recreational purposes. Quality of life can also be impacted by noise and traffic.

13.2.2 Biodiversity

Impacts relating to Biodiversity have the potential to be impacted by other environmental aspects including Water and Climate. There are many water dependent habitats and species requiring good to high quality of surface water and groundwater to support and maintain their natural habitat. These could be impacted by the operations and potential emissions from the ADF and indirectly from the power station and peat harvesting operations.

13.2.3 Surface Water

Impacts relating to Surface Water have the potential to be impacted by other environmental aspects including Population and Human Health, Groundwater and Biodiversity.

13.2.4 Land, Soil, Geology and Groundwater

Impacts relating to Groundwater have the potential to be impacted by other environmental aspects including Population and Human Health, Biodiversity and Surface Water.

13.2.5 Climate, Air Quality and Noise

Impacts relating to Climate have the potential to impact human beings through increase rainfall and flood risk. Impacts to Air Quality from dust, greenhouse gas emissions and noise can also impact on Human Health and Biodiversity.

13.2.6 Material Assets

Impacts relating to Material Assets have the potential to be impacted by other environmental aspects including Population and Human Health and Climate and Air.

13.2.7 Landscape

Impacts relating to Landscape and Visual have the potential to be impacted by other environmental aspects including Population and Human Health, Biodiversity and Cultural Heritage.

13.2.8 Cultural Heritage

Impacts relating to Cultural Heritage have the potential to be impacted by other environmental aspects including Population and Human Health and Landscape and Visual.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 13-1: Potential Interaction of Significant Environmental Impacts

Interactions	Population & Human Health	Biodiversity	Surface Water	Land, Soils, Geology & Hydrogeology	Climate, Air Quality & Noise	Materials Assets	Landscape & Visual	Cultural Heritage
Population & Human Health			✓	✓	✓	✓	✓	✓
Biodiversity			✓	✓	✓			
Surface Water	✓	✓		✓				
Land, Soils, Geology and Hydrogeology	✓	✓	✓					
Climate, Air Quality and Noise	✓	✓				✓		
Materials Assets	✓				✓			
Landscape and Visual	✓							✓
Cultural Heritage	✓						✓	

✓ Interaction

14 Vulnerability of the Proposed Development

14.1 Vulnerability to risk of major accidents and/or disasters

This section describes the expected significant effects on the environment arising from the vulnerability of the LRP Station and ADF to risks of major accidents and/or natural disasters. This assessment is carried out in compliance with the EIA Directive which states the need to assess:

“the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned.”

As set out in the EIA guidance there are two considerations, namely:

- The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;
- The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).

Based on the requirements of the EIA Directive, this assessment determines:

- The relevant major accidents and/or natural disasters, if any, that the proposed development could be vulnerable to;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures (the ‘Control Measures’) that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

14.1.1 Assessment Methodology

The scope and methodology presented in the following sections is based on the provisions of the EIA Directive, the draft EPA Guidelines, department guidance namely A Framework for Major Emergency Management²⁸ and professional judgement.

It is further based on the understanding of the existing facility (both the Station and the ADF), their design, their established operation and the nature of the proposed development. Where a risk is identified, it is considered in the context of the baseline environment – i.e. the existing scenario having regard to all permitted development and whereby the Station and associated ADF ceases operation at the end of 2020 and the site are appropriately decommissioned and remediated.

Step 1 – Risk identification – identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during any stage of the proposed development. In accordance

²⁸ A Guide to Risk Assessment in Major Emergency Management, Guidance Document 1 (DEHLG, 2010).

with the relevant Guidance, risks are identified in respect of the project's potential vulnerability to disaster risks; and (2) potential to cause accidents and/or disasters. The risk identification exercise has been completed to identify the most likely risks associated with major accidents and/or natural disasters. For the purposes of that analysis, major accidents or natural disasters are hazards that have the potential to affect the proposed development. These include accidents that occur both during construction and operational phases. Risk identification has had regard to the following:

- The Environmental Liabilities Risk Assessment (ELRA) undertaken for the existing Station (ESB, 2016); and
- The risk assessment analysis of the environmental aspects of the station undertaken as part of the stations certified EMS.
- Flood Risk assessment undertaken for the proposed development (ESBI, 2018).

Step 2 – Assign Likelihood of Risk – A reasonable approach has been taken to risk assessment whereby any risk from or to the proposed development is considered in term of extremely unlikely to very likely. The likelihood ratings that have been applied are as set out in **Table 14-1**.

Table 14-1: Risk Classification Table Likelihood

(Source: A Framework for Major Emergency Management Guidance, Document 1: A Guide to Risk Assessment in Major Emergency Management, January 2010)

Ranking	Likelihood	Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation's worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Step 3 Risk Classification – is an assessment of that risk based on standardised classification of likelihood. This assessment is carried out having regard to the operational procedures in place – including the safety procedures and environmental controls that are in place – noting the licensed status of the sites. The consequence rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the

major accident and/or disaster. The consequence ratings that have been applied are as set out below, see **Table 14-2**.

Table 14-2: Risk Classification Severity Table – Consequence*

Rank	Consequence	Impact	Description
1	Minor	Life, Health, Welfare	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.
		Environment	No contamination, localised effects
		Infrastructure	<€0.5M Euros
		Social	Minor localised disruption to community services or infrastructure. (<6 hours).
2	Limited	Life, Health, Welfare	Single fatality; limited number of people affected, potential for serious injury with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Support through local arrangements.
		Environment	Simple contamination, localised effects of short duration.
		Infrastructure	€0.5-3M
		Social	Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support.
		Environment	Simple contamination, widespread effects or extended duration
		Infrastructure	€3-10M
		Social	Community only partially functioning, some services available.
4	Very serious	Life, Health, Welfare	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated
		Environment	Heavy contamination, localised effects or extended duration
		Infrastructure	€10-25M Community functioning
		Social	Community functioning poorly, minimal services available

Rank	Consequence	Impact	Description
5	Catastrophic	Life, Health, Welfare	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.
		Environment	Very heavy contamination, widespread effects of extended duration.
		Infrastructure	>€25M
		Social	Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

* Source: A Framework for Major Emergency Management Guidance, Document 1: A Guide to Risk Assessment in Major Emergency Management, January 2010)

Step 4 – Assign Risk Significance – based on the assessment of likelihood and severity, the risk matrix is developed. This allows for the evaluation of the risk.

Likelihood	5	Very likely					
	4	Likely					
	3	Unlikely					
	2	Very unlikely					
	1	Extremely Unlikely					
Severity			1	2	3	4	5
			Minor	Limited	Serious	Very Serious	Catastrophic

14.1.2 Assessment Results

Table 14-3 outlines the risk assessment undertaken.

Table 14-3: Risk Assessment

Risk	Description of Potential Hazard	Uncontrolled Risk			Control Measure	Controlled (Residual) Risk		
		Likelihood	Severity	Risk		Likelihood	Severity	Risk
Fire	- Health and safety risk. - Contamination of surface waters from fire water release. - Potential contamination of air.	3	3		- Procedures in place include: - SMS 10.2 Procedure the Event of Fire - EMS 10.1-03 – Accident prevention procedure - EMS 10.1-01 – Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency - EMS 9.1-04 – Procedure for Maintenance of Power Plant to Minimise Environmental Impacts - Measures in place include: - Sprinkler/Deluge system: On main rising belt, turbines, etc. - Smoke detection system on turbines and at CW pump-house. - All transformers have a deluge system. - Fire extinguishers, Fire-fighting Foam. - Dry and wet risers. - Provision of emergency service response from local county council. - Fire safety evacuation drills & training.	2	2	
Explosion on the LRP Station Site	Excess dust and potential risk of explosion.	3	4		- Procedures in place include: - SMS 10.2 Procedure the Event of Fire - EMS 10.1-03 – Accident prevention procedure - EMS 10.1-01 – Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency - EMS 9.1-04 – Procedure for Maintenance of Power Plant to Minimise Environmental Impacts - Measures in place include: - Station Explosion Protection Document (EPD) forms a crucial part of the Safety Management System for the station - Explosion vents (relief hatches) installed throughout the fuel handling system to allow for pressure release without structural failure in the event of a pressure excursion. - Scheduled regular maintenance to prevent dust accumulation - Sprinkler/Deluge system: On main rising belt, turbines, etc. - Smoke detection system on turbines and at CW pump-house. - All transformers have a deluge system. - Fire extinguishers, Fire-fighting Foam. - Dry and wet risers. - Provision of emergency service response from local county council. - Fire safety evacuation drills & training.	2	3	
Flooding (During Operation)	- Risk of flooding plant. Flooding could occur to low lying areas of the plant along the riverbank area - Risk of planting causing flooding to nearby properties or land - Health and safety risk	2	2		From review of available predictive mapping and historic records it can be concluded that the existing station is not at a risk of flooding from fluvial, pluvial or groundwater sources. However, from speaking to station staff there has been some localised flooding to the north of the station site. It appears that a culvert on the Derryloughbannow backed up and caused the river to inundate an undeveloped area within the stations boundary. No flooding of any of the stations infrastructure was reported. It is reasonable to conclude that the station lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management.	2	2	

Risk	Description of Potential Hazard	Uncontrolled Risk			Control Measure	Controlled (Residual) Risk		
		Likelihood	Severity	Risk		Likelihood	Severity	Risk
					- In relation to the ADF this is located in Flood Zone C and therefore has a low risk of flooding. In addition the risk of pluvial and groundwater flooding are considered minimal and the design and operation of the facility will ensure there is no increased flood risk elsewhere due to the proposed development. - The proposed development is therefore considered to be in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines. - Drainage Design			
Spillage, Leaks or Releases	- Contamination of surface water drainage system - Contamination of groundwater - Aldehydes and gases which may be emitted by the biomass fuels building up to toxic concentrations within enclosed storage spaces such as silos.	4	1-4 ²⁹		- Procedures in place - EMS 11.2-04 – Procedure for Testing of Bunds & Safety Shower Checks - EMS 10.1-06 – Oil Spill Response Plan - EMS 10.1-01 – Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency - EMS 9.1-04 – Procedure for Maintenance of Power Plant to Minimise Environmental Impacts. - Oil interceptors - All bulk chemical storage tanks are bunded. - Procedures are in place for unloading operations. - Inspection procedures are in place to check adequacy of bunds. - Oils stored in drums are located in a designated oil storage area designed to accommodate leaks and spills.	2	2	
ADF Liner Failure	Contamination of groundwater	3	3		- Operational Plan- Operational Plan For Lough Ree Power Ash Disposal Facility Licence Register Number: P0610-02 (BnM, 2014) - IE Licence Monitoring	2	2	

²⁹ It is noted that the degree of risk is variable depending on substance spilled, the scale and the location of the spill.

14.1.3 Indirect Risk - Peat supply Bogs

In terms of the peat supply bogs the major risk has been identified as fire risk. Bord na Móna are committed to the implementation and maintenance of systems to ensure in so far as is practicable, the prevention of bog fires. These measures include:

- employee fire prevention and awareness training,
- provision of firefighting equipment on machines and in buildings,
- implementation of fire watch procedures during production periods,
- fire patrols during periods of high fire risk,
- restriction of smoking to designated areas,
- promotion of public awareness regarding bog fires,
- liaison with local landowners/ fire service to prevent burning on adjacent properties,
- provision of fire warning signage,
- control of public access and employee vigilance.
- A fire prevention and firefighting policy is in place for the peat production bogs.

14.1.4 Flood Risk Assessment (FRA)

14.1.4.1 Ash Disposal Facility

A Flood Risk Assessment (FRA) was undertaken for the proposed development (the ADF) at the time as the planning red line boundary encompasses the ADF, see Appendix 7.3 of the Derraghan Ash Disposal Facility Development EIAR.

14.1.4.2 LRP Station

There are no physical changes proposed to the station therefore no flood risk assessment for the station was required or undertaken for the Derraghan Ash Disposal Facility Development EIAR.

For the purpose of this EIAR a desktop assessment of the LRP site was undertaken. This showed that there is no significant risk of flooding to Lough Ree Power Station. The desktop assessment was based on “The Department of Environment, Heritage and Local Government guideline document to Planning Authorities in relation to Flood Risk Management”. The assessment considered the following:

- Risk of flooding to the proposed development from flood flow from neighbouring watercourses.
- Risk of flooding due to direct rainfall.
- Risk of flooding from groundwater.
- Impact of the presence of the proposed development on the existing flood risk regime at its proposed site. The impacts addressed under this heading comprise:
 - The impact of surface water runoff from the development on the flow regimes in neighbouring watercourses.
 - Loss of floodplain.
- Review of data on recorded historic floods
- Local knowledge

From review of available OPW predictive mapping it can be concluded that the existing station is not at a risk of flooding from fluvial, pluvial or groundwater flooding for the scenarios considered. However, from speaking to station staff there has been some localised flooding to the north of the station site. It appears that a culvert on the Derryloughbannow backed up and caused the river to inundate an undeveloped area within the stations boundary. No flooding of any of the stations infrastructure was reported.

It is reasonable to conclude that the station lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management.

For inspection purposes only.
Consent of copyright owner required for any other use.

Acronyms

AA	Appropriate Assessment
ADF	Ash Disposal Facility
AOD	Above Ordnance Datum
BAP	Biodiversity Action Plan
BminDW	Basic Mineral Well Drained soil
BnM	Bord Na Mona
BOCCI	Birds of Conservation Concern of Ireland
BOD	Body Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CDL	Composite Drainage Layer
CDP	County Development Plan
CH	Cultural Heritage
CIEEM	Chartered Institute of Ecology and Environmental Management
COD	Chemical Oxygen Demand
CRAMP	Closure, Restoration and Aftercare Management Plan
CSO	Central Statistics Office
DDECLG	Department of Environment, Community and Local Government
DeSSL	Dinantian Sandstone, Shales and Limestone
DMP	Decommissioning Management Plan
DoAHG	Department of Culture, Heritage and the Gaeltacht
DoEHLG	Department of Housing, Planning and Local Government
DPBC	Dinantian undifferentiated Limestone
DUIL	Dinantian Upper Impure Limestone
EEC	European Economic Community
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
ELRA	Environmental Liabilities and Risk Assessment
EMS	Environmental Management System
EPA	Environmental Protection Agency

ESB	Electricity Supply Board
ESB G&WM	Electricity Supply Board - Generation & Wholesale Markets
ESBI	Electricity Supply Board International
EU	European Union
FoIE	Friends of the Irish Environment
FRA	Flood Risk Assessment
GCL	Geo-synthetic Clay Layer
GQRA	Generic Quantitative Risk Assessment
GSI	Geological Survey of Ireland
GWB	Groundwater Body
Ha	Hectare
HES	Hydro Environmental Services
HR	Human Resources
IE	Industrial Emissions
IED	Industrial Emissions Directive
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IPC	Industrial Pollution Control
IPC	Integrated Pollution and Control
IPS	Intermediate Peat Storage
ISPCA	Irish Society for Prevention of Cruelty to Animals
IT	Information Technology
I-WeBS	Irish Wetlands Bird Survey
km	Kilometre
km/h	Kilometre per hour
LI	Local Zones
LCA	Landscape Character Area
LCDP	Longford County Development Plan
LIA	Landscape Impact Assessment
LRP	Lough Ree Power
LVIA	Landscape and Visual Impact Assessment

m	Metre
ME	Meath Formation
mm	Millimetre
MTBE	Methyl Tert-butly Ether
MWe	Megawatt electric
MWHrs	Megawatt Hours
MWth	Megawatt Thermal
NaOH	Caustic Soda
NBDC	Natural Biodiversity Data Centre
NHA	Natural Heritage Areas
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMI	National Museum of Ireland
NMS	National Monuments Service
NPWS	National Parks and Wildlife Services
NRA	National Roads Authority
OD	Ordnance Datum
PAH's	Polycyclic Aromatic Hydrocarbons
pH	Potential of Hydrogen
pNHA	Proposed National Heritage Area
ppm	Parts Per Milliom
PSO	Public Service Order
RAB	Regulatory Asset Base
RBD	River Basin District
RCDP	Roscommon County Development Plan
Rkc	Regionally important aquifer
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
SAC	Special Areas of Conservation
SIRBMP	Shannon International River Basin Management Plan
SMR	Sites and Monuments Record
SPA	Special Protection Areas

SRBD	Shannon River Basin district
SVOC's	SemiVolatile Organic Compounds
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIA	Visual Impact Assessment
VIS	Visean Limestone Shale
VOC's	Volatile Organic Compounds
VRP	Visual Receptor Point
WFD	Water Framework Directive
WTP	Water Treatment Plant
ZAP	Zone of Archaeological Potential
ZOC	Zone Of Contribution

For inspection purposes only.
Consent of copyright owner required for any other use.