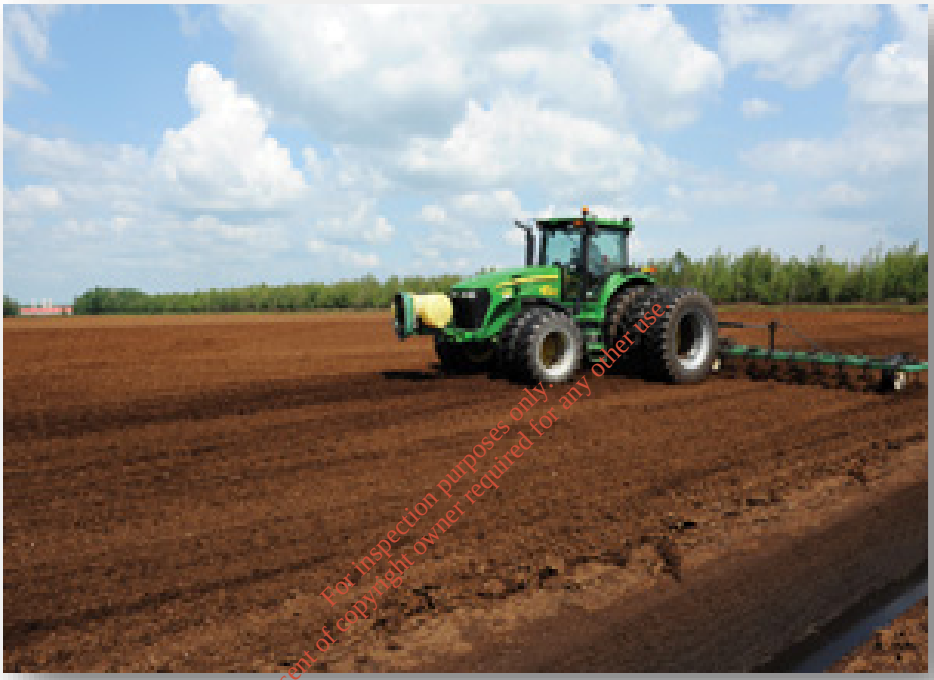
Westland Horticulture Ltd.

Peat Harvesting Operations at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole and Finnea, County Westmeath



Volume I

Environmental Impact Assessment Report (EIAR)

Update 2020

March 2020

ENVIRONMENT ISO 14001:2004 NSAI Certified
HEALTH & SAFETY OHSAS 18001:2007 NSAI Certified
QUALITY ISO 9001:2008 NSAI Certified

OES Consulting
Dublin Newry
LoCall 1890 130 007 www.oes.ie

Control Sheet

Document Title:	Environmental Impact Assessment Report (EIAR) – Update 2020	**Document No.**	1182-11-02

Rev	**Description**	**Originator**	**Reviewer**	**Change**	**Date**
01	Issue Version	S Maher	Peadar O'LOUGHLAN	2020 Update to EIAR	20.03.2020

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Volume I
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NON-TECHNICAL SUMMARY

INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared by OES Consulting on behalf of Westland Horticulture Ltd. (Westland) as part of an application for an Integrated Pollution Control Licence in respect of the company's peat harvesting operations on lands at Lower Coole, Mayne, Ballinealoe and Clonsura near the villages of Coole and Finnea, County Westmeath (the "site").

The total land area covered by the operation is approx. 252ha. The land mainly comprises existing drained cutaway bog.

The preparation of an EIS was requested by the Environmental Protection Agency (EPA) in support of the company's application for a (then IPPC) Licence. The application (Register Number P0914-01), originally submitted on March 12, 2010, was subjected to a screening exercise carried out by the EPA in January 2013, which determined that the activity fell within a particular class[1] of development, namely "*Peat extraction which would involve a new or extended area of 30 hectares or more*" and because it purportedly fell into that class of development, an environmental impact assessment of the activity was therefore required.

Westland commissioned the preparation of an EIS to facilitate the (then IPPC) licencing process and having regard to Section 83(2A) of the EPA Acts 1992 – 2012.

The EIS thus prepared, was submitted to the EPA on July 31, 2013. The EPA notified Westland on September 17, 2013, that the period by which the Agency would issue a proposed determination (on the licence) would be extended to January 24, 2014. This was subsequently amended by the EPA to May 23, 2014.

On May 21, 2014, the Agency notified Westland that, having regard to the existence of judicial review proceedings concerning whether planning permission is required, it would defer any further consideration of the license application pending the conclusion of judicial review proceedings.

The European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 (S.I. No. 4 of 2019) came into effect January 25, 2019 and Westland were notified by the Agency on April 16, 2019 that, having regard to the provisions of SI No 4 of 2019, its application for an IPC licence was deemed to have been made on January 25, 2019.

This EIAR has been prepared in accordance with the EPA Advice Notes and Guidelines for the preparation of EIARs. Consultation with a number of bodies was completed as part of the assessment process.

PROJECT DESCRIPTION

Peat is harvested from the lands during the drier months of April through to September, weather permitting. The operation comprises of four main operations including breaking up of the surface layer with a tractor and harrow, turning of the loosened peat to facilitate drying, ridging and drawing followed by stockpiling on site for subsequent transportation off site during the months of January through to June for further processing at Westland facilities in Ireland and the UK.

Sedimentation basins are used for treatment of surface water run-off from the activity in accordance with industry norms and the draft EPA BATNEEC Guidance Notes for Peat Extraction, 1996.

Westland has a detailed Environmental Management System (EMS) which is independently audited and accredited to ISO 14001. This system is based on continual improvement and will be updated to implement the requirements of the IPC Licence on issue.

Westland are committed to developing and implementing a Rehabilitation Plan for the site which will form part of a Closure Plan likely to

[1] Class 2 of Part 2 of Schedule 5 of the Planning and Development Regulations 2001 – 2012

be required as part of any licensing/consent regime.

Key aims of the Rehabilitation Plan are to enhance biodiversity and to ensure that the ecological and hydrological functioning of surrounding habitats of importance is left entirely unaffected. The plan will be developed taking account of the need to restore ecosystem functions such as carbon sequestration.

REASONABLE ALTERNATIVES

The activity is an established existing operation. Guidance produced by the EPA and at EU level provides direction in interpreting the requirements for the evaluation of alternatives however these documents are written with proposed as opposed to existing activities in mind. In terms of alternative processes, the operation uses tractors and basic agricultural type equipment. Accordingly, there is little in the way of reasonable alternative processes. Sedimentation basins used for treatment of surface water run-off are considered best practice. Rehabilitation proposal have been developed based on current best practice have been developed and are expected to be updated into the future in line with emerging developments in the area.

Although not directly relevant to the existing activity on site, it is noted that Westland is a leading member of The Growing Media Initiative established in 2007 in the UK to pave the way to achievement of the UK government's policy of reduced peat in horticultural products. The company is also a member of DEFRA's Sustainable Growing Media Panel and is working towards establishing new sustainability criteria. The company horticultural product line is currently ca. 70% peat free and Westland will remain a key player in changing consumer behaviour regarding the use of peat and peat free products.

ASSESSMENT OF IMPACTS

POPULATION & HUMAN HEALTH

The existing settlements in closest proximity to the peat milling operations and associated site works are Finnea and Coole. Coole is located approximately 1.5km to the east of the southern peat harvesting site and Finnea is located approximately 3.5km northwest of the northern peat harvesting site. Castlepollard is the largest town in close vicinity to both sites and lies approx. 6km east from the southern site and 8km from the northern site. Recent population statistics for Coole in 2011 was 253 persons and Finnea in 2006 was reported to be 316 persons.

The predominant land-use around the Coole and Clonsura sites is agriculture, with peat harvesting and extraction also predominant.

The Coole is defined as a "Rural Centre" (Tier 5) in the Westmeath Co. Development Plan (WMCDP) 2014-2020. A key objective for Rural Centres is the provision of Provide sustainable rural employment and community services, with specific sectors identified as Agriculture, horticulture, forestry, tourism, energy production, rural resource-based enterprises and the food sector. The 2020-2026 plan is currently being prepared. Finnea is not specifically covered under the WMCDP 2014-2020

The local community services at both Coole and Finnea are not impacted by the peat harvesting, nor are the main tourist attractions of the local area as these are not in the immediate vicinity of the sites. Walking and angling amenities along the River Inny is not affected by the peat harvesting and any additional mitigation with regard to sedimentation which can indirectly affect amenity is outlined under the Soils, Geology and Hydrology section of this NTS.

Westland currently employs three permanent and six seasonal workers in total at both sites combined. In addition, the company uses hauliers to transport the peat as required to Westland facilities in Ireland and the UK for

further processing. Overall, the economic impact in terms of provision employment is considered to be both a direct and indirect imperceptible to slight positive impact.

BIODIVERSITY

The existing environment was assessed in terms of:

- Designated Sites;
- Habitats and Vegetation;
- Plant Species;
- Birds, and,
- Mammals.

The existing peat harvesting sites at Coole and Clonsura do not lie within any sites designated or under consideration for designation for nature conservation. The nearest designated site is Lough Bane pNHA which is located adjacent to the north of the Clonsura site. This site is deemed to be of national importance. There are a number of important water bird sites in the wider landscape surrounding the existing peat harvesting sites including Lough Derravarragh SPA, 1.2 km to South.

Following the habitat survey of the site in June 2013, the different habitat types were identified and mapped. At Coole, the habitats present within the site include cutover bog, raised bog, drainage ditches, re-colonising bare ground, dry meadows and grassy verges, improved agricultural grassland and Scrub. Conifer plantation, and bog woodland occur within the immediate surroundings of the existing peat harvesting site while the western edge of the site is bounded by the Inny River.

The areas of remnant raised bog at Coole have been adversely impacted by past drainage activities as indicated by the absence of good quality bog vegetation. It is probable that the remnant raided bog habitat will continue to deteriorate due to the drainage effects of the peat milling operations throughout the adjacent works area. This impact is deemed to be a long-term negative impact of minor significance.

At Clonsura, the main habitats present within the site include cutover bog, raised bog, dystrophic lake and poor fen mosaic, drainage ditches and dry meadows and grassy verges.

The remaining raised bog and associated dystrophic lake are cut off from the main harvesting area by an existing drain (referred to as the Clonsura Stream in the EIAR).

The drain/stream now also acts as a hydraulic (*i.e.* no flow) boundary separating the remnant raised bog and the harvesting area and therefore further removal/draining of peat within the harvesting area will have negligible to no impact on the adjacent remnant raised bog. The dystrophic lake has its own localized surface water catchment and is therefore considered to be unaffected.

There appears to be no drainage connection to Lough Bane from the Clonsura harvesting site and no potential impacts for ongoing operations are predicted. There is little or no groundwater input into the lake.

No red book rare or protected plant species were recorded within the sites during the course of field surveys and it is concluded that rare or protected plant species are most unlikely to occur within the sites.

The bird surveys conducted at the Coole and Clonsura sites concluded that no birds of high conservation interest or those qualifying bird species of designated SPA sites in the surroundings, are dependent on the habitats present within the existing peat harvesting sites.

No rare or threatened mammal species have been confirmed on site. Species that are protected under national and international legislation that are likely to occur include Irish Hare. Based on the habitats present it is concluded that the sites are likely to be of relatively low value to mammals.

The potential significant impacts on terrestrial ecology are direct impacts e.g. habitat loss, and secondary impacts/indirect impacts e.g. disturbance to mammals and birds, and designated sites.

As the existing activities are to be confined within the footprint of the area currently used for peat harvesting there is no additional direct habitat loss foreseen and no impact expected. Likewise, the peat harvesting activities are unlikely to cause any additional disturbance to bird and mammal population's resident in the area.

Once peat harvesting activities cease on the sites, the rehabilitation plan will be updated as part of the Closure Plan to be agreed with the EPA in line with best available science and techniques at that time, and will be fully implemented. Key aims are detailed earlier in this NTS.

The potential impacts of ongoing peat harvesting assessed (direct, indirect and cumulative) on terrestrial ecology are considered to be secondary, short to medium term, and imperceptible to minor in significance.

Conservation Services Ltd. prepared an assessment of the impacts both potential and actual on aquatic ecology in the vicinity of the sites. The study assessment methodology involved desk-based study and field surveys including habitat assessment for salmonids, Annex II species and coarse fish, biological water quality assessment and invertebrate sampling upstream and downstream of the sites. Field studies were carried out between May 31 and June 3, 2013.

An assessment of aquatic flora was made.

The water bodies assessed were the Inny River and the River Glore, as well as streams in the immediate vicinity of the site named in the EIAR as the Mayne Stream and the Clonsura Stream/S1.

The main report (EIAR Vol II, Attachment 5) comprehensively details the habitat in relation to fisheries and Annex II species however one of the main findings of the assessment conducted by Conservation Services Ltd is that there is no indication, from the biological water quality assessment carried out, of a significant impact from Westland operations on biological water quality in the main channel of the Inny. Nevertheless, the presence of deep, soft, highly mobile peaty silt throughout the entire section of the Inny River assessed (i.e. from upstream of the Clonsura peat harvesting area as far downstream as Lough Derravarragh) seems likely to be due to a significant extent to anthropogenic factors. Taking into account the depositing substrate, the invertebrate fauna at all sites assessed (both upstream and downstream of the peat harvesting areas which are the subject of this EIAR) merit a Q-rating of Q3-4 indicating slightly polluted conditions (Biological quality is rated on a five point scale known as the Q Value system. A value of 1 is poor, and a value of 5 is excellent).

If Westland operations have contributed at all to the peat/silt in this section of the Inny, (which cannot be concluded from the results of the present survey), it is clear that this contribution is insufficient to cause perceptible additional impact on biological water quality over and above the impact already caused by activities in the catchment upstream. Importantly, biological water quality assessment of the Glore River and the Mayne and Clonsura Streams indicates no difference in biological water quality upstream and downstream of the peat harvesting areas.

The potential impacts of the watercourses in the absence of existing mitigation measures were considered to be:
- Pollution with suspended solids.
- Pollution with nutrients associated with suspended solids and in water draining from peat harvesting area.
- Pollution with other substances such as fuels, lubricants, waste water from site toilet and wash facilities, etc.
- Hydrological impact due to changes in the flow rates of streams/rivers.

Mitigation measures outlined as part of the assessment are currently implemented on site to prevent suspended solids pollution of the watercourses etc. and include measures for

settlement of suspended solids and airborne dust minimisation. Conservation Services recommend a limit of 25mg/l for discharges from the settlement basins.

Wind breaks of trees will also be planted along the banks of the Inny River as a further dust minimisation precautionary measure.

As all existing mitigation measures continue to be fully implemented, the on-going residual impact on aquatic flora, fauna, and fish life will be insignificant.

LAND (SOILS, GEOLOGY AND HYDROLOGY)

The lands are overlain by cutover peat. Limestone gravels and tills are the predominant mineral subsoils outside the sites. In terms of bedrock, the sites are underlain by the Lucan Formation. Peat depths at the Coole site ranged from between 0 to 7.15m with the average depth of peat being 3.16m. At Clonsura, the peat depths ranged from 0.67m to 7.8m with the average depth of peat being 4.78m.

Both the Coole and the Clonsura sites have parallel running peat drains that are spaced approximately every 12 meters on the bog surface for surface water runoff removal. Surface water runoff collected in these drains is conveyed via a manhole or sump to a headland drain, from where it flows into a larger boundary drain and then onto sedimentation basins for retention and controlled discharge. The parallel running bog surface drains are only approximately 1.5m deep and therefore do not intercept the mineral subsoil underlying the peat. The larger boundary drains are generally deeper and were noted to regularly intercept the mineral subsoils. Water hydrochemistry results indicated groundwater seepage into these drains.

The Clonsura site has 4 no. sedimentation basins, two of which discharge into the Glore River upstream of the Inny River and two which discharge into the Inny River via the Clonsura Stream/S1. The Coole site has 7 no. sedimentation basins, five of which discharge directly into the Inny River and two which discharge into the Mayne Stream upstream of the Inny River.

The majority of the Clonsura site discharges into the Clonsura Stream/S1 which drains into the Inny River, with the exception of a section on the western boundary of the site, which drains into the River Glore. Based on drainage outfalls from the bog, the site can be divided into approximately 13 no. sub-catchments. A number of these catchments do not drain to settlement basins, although the elongated headland drains and associated sumps act as a quasi-sedimentation basin. This has previously been identified in the IPPC license application.

The Coole site drains into the Inny River, either directly, or indirectly via the Mayne stream. Based on the site walkovers between June 10 and June 25, 2013 and inspection of drainage outfalls from the bog, the site can be divided into approximately 9 no. sub-catchments. A number of these catchments do not drain to settlement basins although the elongated headland drains and associated sumps act as a quasi-sedimentation basin. This has previously been identified in the IPPC license application.

Notwithstanding the above, it is not considered that the existing operation is significantly affecting water quality on the basis of historical monitoring results of both the Inny River and the discharges. Furthermore, a conservative assimilative capacity assessment conducted indicates that there is adequate capacity in the River Inny for the loadings.

<u>Lough Bane Drainage & Dystrophic Lake</u>

Based on the walkover survey and the topographic survey, the catchment to Lough Bane is relatively small with no input from streams noted. The elevation of the lake bed is approximately 3 – 4m lower than the ground level of the adjacent Clonsura harvesting area. Input to the lake is most likely from direct rainfall landing on the water body and runoff from the adjacent land. The hydrochemistry also indicates that the lake is fed by rainfall with little or no input from mineral

groundwater flows. The unnamed small dystrophic lake also appears to be an isolated feature with a localised surface water catchment.
In terms of drainage connections between the harvesting area and Lough Bane there appears to be no connection. The presence of a perimeter boundary drain means that there is no runoff from the harvesting area into Lough Bane. This also applies for the dystrophic lake.

A number of mitigation measures are proposed, some of which are already implemented on site mainly in relation to reducing suspended solids and potential hydrocarbon contamination. In addition, precautionary measures including a monitoring programme with piezometers to verify the findings of the assessment with regard to impact on Lough Bane, remnant bog and the dystrophic lake are proposed.

Overall and taking account of existing and proposed mitigation measures where relevant the following can be concluded:

- There are no expected impacts on the hydrology/water quality of nearby designated sites e.g. Lough Derravarragh, Lough Bane & Garriskil Bog.
- There is considered to be a negligible to no impact on remnant raised bogs and also on groundwater quality as a result of activities.
- There is considered to be a negative, slight/negligible, high probability and long-term impact on the water quality of the Inny River.
- There is considered to be a negligible, high probability, long-term impact on the Inny River flood levels.

NOISE AND VIBRATION

Noise monitoring undertaken in June 2013 during harvesting activities indicate that noise levels are low and do not cause impact. The surrounding areas could be described as having "low background levels" in accordance with the definition provided in the EPA's "*Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)".*

The assessment of noise impact on the nearest NSLs considered the possibility of activities occurring closer to some of the NSLs than on the day of monitoring. The assessment also considered the potential impact of transportation of peat off-site during the months of January to June and particularly on NSLs located on the L57671 at Clonsura.

Overall, it is concluded that the activities carried out by Westland do not currently impact in terms of noise and vibration on existing NSLs in the areas of Coole and Clonsura. The activity is typical of the soundscape of the area i.e. agricultural with the exception of the use of articulated trucks on a seasonal basis. However, this is not considered likely to give rise to noise nuisance or significant impact.

There are no sources of vibration associated with the activity and therefore the potential for impact does not arise.

AIR QUALITY

Existing ambient air quality at the two sites is likely to be good and well within Air Quality Standards, based on the monitoring results observed in 2020 at stations representative of rural conditions (Zone D).

Nuisance dust was identified as the main potential significant effect on ambient air quality in the area from peat harvesting. The nearest sensitive receptors to the two sites, are residential properties located well outside the site boundaries and the harvesting areas. Westland employs a number of mitigation measures to ensure that the impact of localised dust generated as result of peat harvesting is kept to a minimum (these are also relevant to minimising air-borne dust to the Inny River).

Overall, the effect of the operation on ambient air quality is, and is expected to continue to be insignificant.

CLIMATE

The impact of the peat harvesting in terms of climate change and greenhouse gas (GHG) emissions were examined in detail in the EIAR.

It is noted that harvesting of peat disturbs the natural cycle of carbon in peatlands. The contribution of peatlands to GHG balances depends on the environmental and geographic conditions, type and age of the peatland and land-use. In addition, there will also be emissions from fuel consumption of associated machinery and transport of materials.

The carbon cycle of peat use for horticultural purposes includes fluxes of GHGs from all stages of the process are shown below. Note: Steps 2, 3 and 4 only apply to Westland's activities:

1. Initial stage - undisturbed peatland;
2. Preparation of peatland for peat harvesting;
3. After-use of cutaway peatland;
4. Redistribution of peat for horticultural use with carbon sequestration as part of plant growth.

The two study areas combined equate to approximately 252 hectares, just 0.002% of the total peatland area of Ireland. Using figures from studies done in Ireland on GHG fluxes associated with peat harvesting it has been estimated that the carbon emissions from the study sites equate to between 479-882 CO_2-C Tonnes yr^{-1}, which, if compared to the estimated annual emission figure of 1.14Mt for the Republic of Ireland from peat extraction etc. is just 0.04-0.07% of this figure.

Overall, the impact of Westland's on-going activity is therefore considered to be having an imperceptible negative impact on climate.

The emissions are insignificant in the overall context of CO_2 emissions from peat workings in other areas of surrounding lands and Ireland in general, where peat has been harvested and extracted. Furthermore, the material harvested is not combusted. Notwithstanding this Westland are, and will, implement mitigation measures including a rehabilitation plan which will include for the restoration of ecosystem services such as carbon sequestration. As noted earlier, the company is also a member of the Growing Media Initiative with objectives to continuously reduce peat in products over the coming years.

CULTURAL HERITAGE

No Recorded Monuments lie within the study area under review. Several ringforts are located at distance of *c.* 1km to the east of the Coole site on higher ground. A crannog is located in Lough Bane, *c.* 190m east of the Clonsura site. An ancient wooden trackway (togher/bog road) was identified in the course of field inspection extending across the Coole site. The trackway was previously identified in 2005 and subject to partial archaeological excavation in 2006. The trackway is not a Recorded Monument hence it has been subject to on-going disturbance from operations and today much of its former length has disappeared. The main draining of the peatlands in the 1980s would have initially compromised the preservation of the togher.

The long-term survival of an organic feature, such as the wooden trackway within a drained bog, is vulnerable to altered drier environmental conditions. The only available option is to archaeologically record the salient features of the find and this has already been done.

LANDSCAPE AND VISUAL

Lands at Coole and Clonsura form part of the long-standing, peat workings, which is commonplace in the wider surrounds. The use and activity is established and an acknowledged aspect of the landscape context. While the Clonsura site is strongly screened, neither site is especially visible even from the higher ground at Coole.

The existing harvesting activities on the site are considered to be of generally low landscape and visual significance and of low landscape and visual sensitivity, with the greatest

sensitivity limited to the interface with the corridor of the Inny River.

The existing sites and their continued development are considered to have a slight to moderate negative impact on the landscape and visual characteristics of the area. This arises in that the activity is *altering the character of the environment in a manner that is consistent with existing and emerging trends*.

There are no significant effects on listed views.

Nevertheless, the visually homogenous nature of the exposed peatland (and coniferous plantations in wider area) is in notable contrast to the more diverse mosaic of the semi-natural background landscape. Accordingly, the existing landscape buffer along the river will be maintained.

The principal opportunity for beneficial landscape and visual improvement lies in the final rehabilitation of the sites. This plan will include specific measures aimed at enhancing the landscape and visual characteristics of the sites as well as the other key aims listed earlier in this NTS.

MATERIAL ASSETS – TRAFFIC AND ROADS

OES commissioned Abacus Transportation Surveys to conduct traffic counts in 2013 at four locations on the surrounding road network to both sites including at two access points to the Coole site (off the R395 and the L1826 to Multyfarnham) one access off the R394 to the Clonsura site and at one location on the R396 to Abbeylara. The traffic surveys were designed to obtain data of existing traffic levels on the surrounding roads. Survey locations were revisited in 2020 to facilitate an update of the data.

The overall traffic counts between the hours 07.00 -19.00 hrs) for all the roads were found to be relatively low and likely to be below the design capacity of the roads. The percentage of site traffic of the overall counts was found to be very low. However, the main time of significant activity on the roads arising as a result of the activity occurs during the period of January to June when peat is loaded from the stockpiles to articulated trucks arriving to the sites via the R395, R394 and the L1826 from the south, east and west. Loaded trucks then depart to the north via the R394 at Clonsura before connecting to the N55 and via the R396 at Coole also eventually connecting to the N55.

The assessment concluded that the site traffic during the loading period is likely to be in the region of 7 - 9% and 7 -10% of the design capacity of the regional roads and the Multyfarnham Road respectively.

Accordingly, the assessment conducted indicates that traffic associated with either the Coole or Clonsura site does not exceed any thresholds including sub-thresholds set out by the NRA to warrant a full Traffic and Transportation Assessment (TTA).

In terms of safety considerations, the existing junctions are well established for over 20 years. In terms of safety records, the Road Safety Authority's website was consulted for statistics on accidents close to the existing site junctions. The accident rates were found to be extremely low over a 6-year period. Accordingly, the existing activity is not considered to be causing a road safety hazard.

It is concluded that the traffic arising from the Coole and Clonsura sites, does not have a significant effect on existing traffic flows or on the surrounding road network.

Chapter One
General

1.0 Introduction

OES Consulting was originally retained by Westland Horticulture Ltd (Westland) to prepare an Environmental Impact Assessment Report (EIAR) in respect of the company's peat harvesting operations on Lands at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole & Finnea, County Westmeath.

Attachment 1, containing Figure 1.1 illustrates the location of the lands. Attachment 2, Plates 1.1 and 1.2 illustrate the aerial photographs of the two sites and surrounding areas.

The preparation of an EIAR was requested by the Environmental Protection Agency (EPA) in support of the company's application for a (then IPPC) Licence. The application (Register Number P0914-01), originally submitted on March 12, 2010, was subjected to a screening exercise carried out by the EPA in January 2013, which determined that the activity fell within a particular class[2] of development, namely "*Peat extraction which would involve a new or extended area of 30 hectares or more*" and because it purportedly fell into that class of development, an environmental impact assessment of the activity was therefore required. The EIS thus prepared, was submitted to the EPA on July 31, 2013.

The EPA notified Westland on September 17, 2013, that the period by which the Agency would issue a proposed determination (on the licence) would be extended to January 24, 2014. This was subsequently amended by the EPA to May 23, 2014. On May 21, 2014, the Agency notified Westland that, having regard to the existence of judicial review proceedings concerning whether planning permission is required, deferred any further consideration of the license application pending the conclusion of judicial review proceedings. The judicial review proceedings concluded on 7 December 2018.

The European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 (S.I. No. 4 of 2019). S.I. No 4. of 2019 came into effect January 25, 2019 and Westland were notified by the Agency on April 16, 2019 that, having regard to the provisions of SI No 4 of 2019, the application for an IPC licence was deemed to have been made on January 25, 2019. Furthermore, the Agency required that Westland provide additional information to progress the application, specifically:

(i) an update of the Environmental Impact Statement received having specific regard to the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment;
(ii) updated maps identifying the area to which the application relates;
(iii) a screening for Appropriate Assessment and state whether the activity, individually or in combination with other plans or projects, is likely to have a significant effect on a European Site(s), in view of best scientific knowledge and the conservation objectives of the site(s). Where it cannot be excluded, on the basis of objective scientific information, following screening for Appropriate Assessment, that an activity, either individually or in combination with other plans or projects, will have a significant effect on a European Site, provide a Natura Impact Statement, as defined in Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477 of 2011). Among other matters the NIS should assess the potential impacts on water quality arising from emissions of ammonia.

[2] Class 2 of Part 2 of Schedule 5 of the Planning and Development Regulations 2001 – 2012

This document comprises an update of the Environmental Impact Statement (EIS) submitted on July 31, 2013, the update having been made with specific regard to the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

The previously submitted Environmental Impact Statement (EIS) has been updated to reflect changes introduced by Directive 2014/52/EU, specifically:

Document now renamed as Environmental Impact Assessment Report (EIAR)
Update to section dealing with Alternatives, to reflect consideration of "reasonable alternatives"
Addition of "Land" as a topic
Chapter on "Human Beings" amended and replaced by "Population & Human Health"
Chapter of "Flora and Fauna" amended and replaced by "Biodiversity"
Chapter on Climate Change amended and now addresses impacts of climate change **on** the activity.
Risks to human health, cultural heritage and the environment due to accidents or disasters have also been addressed.

The document has also been further updated to reflect changes in certain topics due to, for example:

- *Update to Central Statistics Office (CSO) data*
- *Publication of updated water quality framework reports of the catchment*
- *Implementation of new County Development Plan*
- *Availability of current water quality/flow data*
- *Further work and investigation on archaeological features on site since preparation of the EIS in 2013.*

These changes are reflected where appropriate within the relevant Chapters throughout the document.

1.1 Brief Description of the Activity

The peat harvesting activities are located on lands in the townlands of Lower Coole, Mayne, Ballinealoe & Clonsura near the villages of Coole & Finnea close to Castlepollard in County Westmeath ("the Lands").

The lands are spilt into four parcels totalling 252ha and referred to as the Coole site and the Clonsura site. The larger site is at Coole (164ha) and accounts for approx. 65 % of the total landbank.

Attachment 1, containing Figure 1.1 illustrates the location of the lands. Attachment 2, Plates 1.1 and 1.2 illustrate the aerial photographs of the lands and surrounding areas.

Although separate, the Lands are all managed by the same Peat Harvesting Manager and are operated by the same plant and the same Peat Harvesting operatives.

The production of milled peat comprises of a number of operations involving the use of tractors and other equipment, typically within the months of April to September.

The operation is intrinsically weather dependent and therefore peat milling operations are only undertaken when the weather is warm and dry. The operations of milling, harrowing, ridging and harvesting are repeated for each crop and are collectively described as a cycle. Depending on weather, the number of cycles during a season can range between approximately 4 and 12.

Harvested material is stockpiled for subsequent transportation off site for further processing prior to placing on the market in a range of horticultural products.

1.2 Peat Harvesting Chronology and Legislative Context

In general terms, development of the area, including clearance and drainage of the lands to facilitate peat harvesting, predate the implementation of statutory planning controls in October 1st, 1964.

It is understood that peat harvesting operations on the Lands originally commenced in the late 1950s. The Lands were then further drained and developed by Bord na Mona in 1982. Westland took over occupation of the Lands in the mid-1990s with the aim of producing milled peat for use in the horticultural industry.

In 2009 Westland applied for and obtained a licence to discharge to surface water from Westmeath Co Council (File Ref. ENV/W01/2009, issued under the Local Government (Water Pollution) Acts 1977 and 1990 and the Local Government (Water Pollution) Regulations, 1978 and 1992).

In 2010, Westland applied to the Environmental Protection Agency (EPA) for a (then IPPC) licence (Reg No. P0914-01) under Class 1.4.0. - *Minerals and Other Materials – the harvesting of peat in the course of business which involves an area exceeding 50 hectare*s. An Appropriate Assessment Screening and Natura Impact Statement was prepared and submitted to the Agency by way for a request for further information in respect of the Application in 2011.

The application to the EPA entailed the preparation of an Environmental Impact Statement (EIS) which was requested by the Agency after screening for EIA, and which was lodged by Westland in 2013.

Over the period of the last number of years, there has been a determined effort to create a new regulatory regime for peat harvesting in Ireland , which finally resulted in January of this year in the publication of two sets of statutory instruments – European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 (S.I. no 4 of 2019) and Planning and Development Act 2000 (Exempted Development) Regulations (S.I. no 12 of 2019) - whereby ongoing peat extraction was once again made exempt from planning permission and instead an obligation to apply to the EPA for a new IPC Licence was introduced.

Together those two statutory instruments became known as the Peat Harvesting Regulations, and they replaced the planning consent regime for peat extraction by allowing peat harvesting operations greater than 30 ha in size obtain consent for ongoing operations from the EPA.

In April 2019, the EPA wrote to Westland confirming that it regarded Westland as having complied with S.I. No.4 of 2019 European Union (Environmental Impact Assessment) (Peat Extraction) Regulations 2019 in so far as an application for a Licence had been made.

Those Regulations were in place from January 25 2019, and under which the Applicant in this case lawfully continued to operate, until the issuing of the Order of the High Court of Simons J dated last Friday October 18 2019 (2019 No.222 J.R.), which found them to be contrary to EU Law.

However, in the course of the challenge to the Peat Regulations, Westland stopped all peat harvesting activities on the Lands once it was decided that a stay should be placed on ongoing activities on an interim basis. That stopping of activities on the Lands took place on July 22, 2019.

The position therefore at law at this point in time, and until /unless a new legislative regime is successfully put in place, ongoing peat extraction activity will require to be assessed under EIA (and AA where appropriate) through the planning regime, and specifically through the means of leave to apply for substitute consent.

1.3 Overview of Existing Site

1.3.1 Site Location and Area

The peat harvesting activities are located on lands in the townlands of Lower Coole, Mayne, Ballinealoe & Clonsura near the villages of Coole & Finnea close to Castlepollard in County Westmeath. The land is spilt into four parcels totalling 252ha and referred to as the Coole site and the Clonsura site throughout the rest of this EIAR. The larger site is at Coole (164ha) and accounts for approx. 65 % of the total landbank.

The site location is shown on Attachment 1, Figure 1.1. Aerial photographs depicting both site locations are contained in Attachment 2, Plates 1.1 and 1.2. A topographical survey done for the Coole and Clonsura sites and immediate surrounds are shown in Attachment 1, Figures 1.2 and 1.3.

1.3.2 Features of the Site and Surrounding Lands

The peat harvesting activities are located on lands in the townlands of Lower Coole, Mayne, Ballinealoe & Clonsura near the villages of Coole & Finnea close to Castlepollard in County Westmeath.

The land is spilt into four parcels totalling 252ha and referred to as the Coole site and the Clonsura site. The larger site is at Coole (164ha) and accounts for approx. 65 % of the total landbank.

Both sites can be described as drained cutaway bogs (formerly raised bog) and are typical of the landscape in the area. Refer to Attachment 2, Plates 1.1 and 1.2. There is some remnant bog on the Coole and Clonsura sites, and a dystrophic lake present on the Clonsura site. The Coole site is more open and visual from the surrounding road network, notably from the R395 from Coole to Edgeworthstown running along the eastern boundary of the larger landbank and from the local road L1826 running along the southern boundary from Coole to Multyfarnham. Forestry bounds the site to the west and the Inny River to the north and west. The topography is relatively flat with the elevation of the site ranging between approximately 60mOD and 65mOD (Ordnance Datum Malin Head). Topographical surveys done for the Coole and Clonsura sites and immediate surrounding areas are shown in Attachment 1, Figures 1.2 and 1.3 respectively.

The Clonsura site is completely surrounded by forestry to the north, west and east with dense vegetation and higher ground to the south/southeast of the site thus completely enclosing it. The Inny River runs along the western site boundary. The elevation of the site ranges between approximately 60mOD and 66mOD.

The surrounding lands are mainly used by other companies/individuals engaged in peat harvesting activities at Coolcraff, Milkernagh, Coolnagun and Shrubbywood and for agricultural purposes. The local roads feature a number of detached residential dwellings.

Both sites contain a small hardstand area for the location of container units to house office and kitchen facilities and temporary toilet facilities. There are also designated stockpiling areas for peat, close to access points, but set away from the Rivers Inny and Glore. The location of stock piles for the Coole and Clonsura sites are shown in Attachment 1, Figures 2.1 and 2.2 respectively.

Operations are served by sedimentation basins located on the perimeters of each of the sites. Sedimentation basins are a commonly used, well established, internationally used method of removing suspended solids from peatland runoff[3]. Locations of sedimentation basins on the Coole and Clonsura sites are shown in Attachment 1, Figures 2.3 and 2.4 respectively.

1.3.3 Access

The main access to the Coole site is off the R395 from Coole to Edgeworthstown. There are a number of secondary accesses off this regional road to the site. The site is also directly accessed off the county road L1826 running between Coole and Multyfarnham. Two loading areas are located along this road.

The Clonsura site is accessed off the R394 from Castlepollard to Finnea via a small country road L57671 serving the bog, a cluster of eight dwellings and agricultural lands. See Attachment 1, Figures 2.5 and 2.6 for local roads and access arrangements to the Coole and Clonsura sites.

1.3.4 Site Services

Water for the portable toilets and the kitchen is delivered and stored on the sites in storage tanks. A generator is used on site to supply electricity.

There are no underground or overhead service lines associated with the Lands.

1.4 Consultation & Scoping for the Environmental Impact Statement

A Scoping Document was issued in May 2013 which set out an overview description of the existing operations together with a proposed approach to assessing the impact of the activity on environmental topics as specified under Annex IV of Directive 2011/92/EU.

The purpose of the Scoping Document is to ensure that the main potential effects of the activity are identified.

The Scoping Document was issued to the following bodies in May 2013:

- EPA
- Westmeath County Council
- An Bord Pleánala
- Office of Public Works
- Health Service Executive (Dublin Mid Leinster)
- Department of the Environment, Community and Local Government
- Department of Agriculture, Food and the Marine
- Department of Communications, Energy and Natural Resources
- Department of Enterprise, Jobs and Innovation
- Department of Arts, Heritage and the Gaeltacht
- Department of Transport, Tourism and Sport
- National Parks and Wildlife Service (NPWS)

[3] Kløve, B. 1997. Comparison and development of ditch structures (bed pipe barriers) in reducing suspended solids concentration in waters flowing from peat mining sites. Boreal Env. Res. 2: 275–286. ISSN 1239-6095

- Fáilte Ireland Environment Unit
- Health and Safety Authority
- Inland Fisheries Ireland
- The Heritage Council
- Teagasc
- National Road Authority
- Met Eireann
- Geological Survey of Ireland
- Service providers
- Coillte
- Bird Watch Ireland
- An Taisce – the National Trust of Ireland
- The Irish Wildlife Trust
- Irish Peatland Conservation Council
- The Peatlands Council

Responses, contained in Attachment 3, have been received in writing from the following bodies as a result of the May 2013 consultation:

- EPA
- Westmeath County Council
- An Bord Pleánala
- National Road Authority
- An Taisce
- Irish Peatland Conservation Council
- The Peatlands Council
- Department of Arts, Heritage and the Gaeltacht
- Department of Agriculture, Food and the Marine
- Health Service Executive (Dublin Mid Leinster)
- Fáilte Ireland Environment Unit

Table 1.1 overleaf summarises the main comments received.

In addition, the response from the NPWS and IFI to previous consultations conducted by OES during the preparation of the Natura Impact Statement (submitted to the EPA in February 2011), have been taken account of. Copies of correspondence are enclosed within Attachment 3.

Consultation meetings on scoping of the assessments were held with Westmeath County Council and the EPA.

Table 1.1 Summary Points of Consultation Received

Consultee	Date of Response	Summary Points & Action Completed or Proposed
Environmental Protection Agency (EPA)	21/5/ 2013	The EPA had no comments or objections regarding the Scoping Document for the (then) EIS and the assessments proposed therein.
Westmeath County Council (WCC)	20/6/2013	WCC commented as follows that the (then) EIS should consider any impacts direct and indirect (past, on-going and future) of the activity on: Human Beings, Fauna and Flora, Soil, Water, Air, Climatic Factors, Landscape, Material Assets, including the Architectural and Archaeological Heritage and Cultural Heritage, and the inter-relationship between the factors. -The (then) EIS should take account of all ecological sensitivities and of the likely environmental effects of the activity on the receiving environment. -It should consider the status of the activities under planning acts and legal implications of same. -Relevant Development Plan Policies should be reviewed, as should all the 'in combination' and 'cumulative effects' of the activities within the zone of influence of the peat harvesting, including: • Direct habitat loss; • Raised bogs of European priority habitat quality should not be destroyed; • Impacts on water quality and the Inny River, including impacts on Lough Derravarragh SPA, NHA and Garriskil Bog SPA, SAC, and designated wetland sites infrastructure (e.g. roads, power supply or waste water disposal); • Impacts of peat harvesting (including existing and future operations) on the roads network in area-routes, loading and frequency; • Impacts of long-term dewatering operations, and consequences for water-dependent habitats within zone of influence of peat extraction; • Impacts on archaeological heritage; • Socio economic impacts; • Impacts on tourism and tourism potential;

Consultee	Date of Response	Summary Points & Action Completed or Proposed
		• Impacts on water quality including construction; • Impacts to water quality influencing vegetation; and input of nutrients; • Impacts on hydrological processes; • Impacts on habitats; • Impacts on / disturbance to protected species; • Review and consider the sites conservation restoration potential; • Impacts on /potential effects on bird populations in the wider area; • Impacts in relation to air & climate emissions, and, • Impacts resulting from emissions connected with construction traffic and dust generated from disturbed ground during dry periods. ***Action: The impacts listed above are addressed in the various sections dealing with specific topics, where relevant.*** ***Comment: Reference to the scope of the EIAR and planning issues can be found in the preceding Sections 1.0 and 1.2 of this EIAR.***
An Bord Pleánala	27/05/2013	No comments were raised regarding the (then) EIS Scoping Document.
Health Service Executive (Dublin Mid Leinster)	19/06/2013	No comments were raised regarding the (then) EIS Scoping Document.
Department of Agriculture, Food and the Marine	09/07/2013	A suggestion was made to consider any likely impacts of the proposed peat harvesting operations on agriculture/agricultural activities on the locality as part of the (then) EIS. ***Action: Agriculture is considered within Section 4.1 which deals with socio-economic impacts***
Department of Arts, Heritage and the Gaeltacht and National	05/06/2013 Previous correspondence received during the	Acknowledgement was made of the Scoping Document submitted but no comments or objections were thereafter sent on by the Department of Arts, Heritage and the Gaeltacht. In 2010 the NPWS gave the following comments in December 2010:

Consultee	Date of Response	Summary Points & Action Completed or Proposed
Parks and Wildlife Services (NPWS)	preparation of the Natura Impact Statement document 22/12/2010	• Highlighted the presence of natural watercourses in proximity of the proposed development sites particularly the Inny River and the potential impacts of the proposed project on species of high conservation concern including Otter, Kingfisher, Lamprey species and White-clawed crayfish, all of which may occur along this watercourse. • Highlighted the qualifying interests of Lough Derravarragh SPA and potential for impacts of the proposed development on water quality. • Recommended reviewing information from available data sources on the extent of peat siltation in Lough Derravarragh SPA. ***Action: The above comments have been taken into account and are dealt with in Sections 4.2 – Terrestrial Ecology and 4.3 – Aquatic Ecology.***
Fáilte Ireland	28/05/2013	Fáilte Ireland commented that the *'Guidelines for the treatment of tourism in an EIS'* should be taken into account in preparing the (then) EIS. ***Action: The above guidelines have been taken into account, where relevant, in Section 4.1 which deals with socio-economic impacts.***
Inland Fisheries Ireland (IFI)	Previous correspondence received during the preparation of the Natura Impact Statement document 31/12/2010	The IFI gave the following comments in December 2010: • Highlighted the importance of the Inny River for brown trout and salmon and the sustainable management of these species under the Shannon Salmon Restoration Project. • Highlighted the presence of two species (Lamprey and Crayfish) listed on Annex II of the EU Habitats Directive along the Inny River. • Expressed concerns over the discharge of peat siltation to the Inny River and the impacts of this on aquatic species (invertebrates, fish, Annex II species etc). Recommended

Consultee	Date of Response	Summary Points & Action Completed or Proposed
		implementing mitigation and control measures during the operation phase with regard to fuel storage, pump operations, peat stockpiles etc. • Recommended carrying out routine maintenance inspections during the operation phase of the proposed project. ***Action: The above issues are dealt with in Sections 4.3- Aquatic Ecology and 4.4 – Soils, Geology and Hydrology.***
National Road Authority	28/05/2013	The NRA general guidelines for the preparation of an (then) EIS which could affect the National Roads Network should be taken into account when preparing the (then) EIS. ***Action: The above guidelines have been taken into account, where relevant, in Section 4.10 which deals with traffic impacts.***
An Taisce – the National Trust of Ireland	27/06/2013	An Taisce submitted the following comments/issues: • A request to made to view the Appropriate Assessment; • Consultation with Friends of the Irish Environment was suggested. ***Action: A link to the NIS available on the EPA website was sent to An Taisce.*** ***Comment: Cognisance of the published views of the Friends of the Irish Environment has been taken account of.***
Irish Peatland Conservation Council (IPCC)	24/06/2013	The IPCC submitted the following comments/issues: • Highlighted the location of the proposed development sites in relation to designated areas in the surroundings including Lough Derravarragh SPA and Lough Bane pNHA.

Consultee	Date of Response	Summary Points & Action Completed or Proposed
		• Highlighted the presence of Otter (*Lutra lutra*), Stoat (*Mustela erminea*) and Fallow Deer (*Dama dama*) within the 10 km square (N37 & N47) in which the proposed development sites occur. • Recommended undertaking an eco-hydrological study of the sites. ***Action: The above issues have been taken into consideration and any mitigation required is included in Sections 4.2 and 4.3 dealing with Terrestrial Ecology and Aquatic Ecology respectively. Section 4.4 addresses impacts to Soils, Geology and Hydrology and interactions with ecological functioning have been assessed.***
The Peatlands Council	10/06/2013	A reply was received from the Peatland Council acknowledging the receipt of the Scoping Document and noting that the report would be circulated to members. However, no comments were submitted since by the Peatlands Council.

The EIAR addresses the impact of existing and future activities where relevant on the environment.

The EIAR endeavours to address all significant direct, indirect, secondary, cumulative, short, medium and long term, temporary, permanent, positive and negative impacts of existing and future activities where relevant.

1.5 The Environmental Impact Assessment Report (EIAR)

1.5.1 General Guidance

The EIAR has been prepared in accordance with the requirements of the EIA Directive 2014/52/EU and SIS No 282 of 457 of 2012, namely the EU Environmental Impact Assessment) (IPPC) Regulations 2012 of the EU (Environmental Impact Assessment) (IPPC) (No.2) Regulations 2012

The following Environmental Protection Agency (EPA) documents and relevant best practice guidelines have been taken into account:

- “Guidelines on the information to be contained in Environmental Impact Assessment Reports” (draft, May 2017).
- "Advice notes on current practice in the preparation of Environmental Impact Statements" (draft, September 2015);
- “Guidelines for Planning Authorities and An Bord Pleánala Carrying out Environmental Impact Assessment” Department of the Environment, Community and Local Government (2018).

1.5.2 Structure of the Environmental Impact Statement

The structure of this EIAR adopts a sequence as follows:

- A non-technical summary;
- General Description of the EIAR and how it relates to the development;
- Description of the Development, Need and Planning Context;
- Alternatives Considered based on environmental impacts;
- Impacts – incorporating baseline data and specialist findings;
- Interactions.

In the description of the impacts of the activity the following attributes of the receiving environment and their interactions are described which include the amendments introduced through the transposition of EIA Directive 2014/52/EU:

- Population and Human Health;
- Biodiversity
- Land, Soils, Geology and Hydrology;
- Noise and Vibration;
- Air Quality;
- Climate;
- Cultural Heritage;
- Landscape and Visual;
- Material Assets;
- Traffic and Transportation;
- Major Accidents
- Interaction of Impacts

Accordingly, throughout the document, the impacts of the proposed development are dealt with under each of the above headings in the following way:

- A brief **Introduction** to the section;
- An outline of the Study Assessment and Methodology employed in undertaking the specialist assessment;
- A description of the receiving Existing Environment relevant to the environmental topic under consideration;
- A description of the Characteristics of Actual and Potential Future Impacts of the Activity on the receiving environment;
- A description of the reductive or Existing and Proposed Mitigation Measures and/or Factors that are currently or will be employed to reduce or eliminate any significant environmental impacts identified;
- Conclusions including description of the Residual Impact of the activity/development. Residual impacts are the remaining impacts that are occurring as a result of existing measures or will occur after any proposed mitigation measures have taken effect.
- A description of Interaction with other Environmental Attributes;
- Details of any Monitoring required;
- Details of any Reinstatement required;
- Difficulties Encountered in undertaking the assessment.

Supporting documentation, where relevant, is appended to the document.

1.5.3 Methodology

Assessment of the Effects – Evaluation Criteria

The assessment of effects has been undertaken in accordance with best practice, legislation and guidance notes. The significance criteria as set out in the EPA Guidelines and Table 1.2 below have mainly been used throughout this EIAR unless otherwise stated in the methodology for each chapter and/or specialist reports in the Attachments.

Table 1.2 Assessment Criteria

Significance Level	Criteria
Profound	An impact which obliterates sensitive characteristics
Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Slight	An impact, which causes noticeable changes in the character of the environment without affecting its sensitivities.
Imperceptible	An impact capable of measurement but without noticeable consequences.

As per the EPA Guidelines, impacts are considered as being negative, neutral or positive in nature. Impacts are also considered as being direct, indirect and/or cumulative, as appropriate. Duration of impact is considered as being:

- Temporary (up to one year);
- Short-term (from 1 to 7 years);
- Medium-term (7 to 15 years);
- Long-term (from 15 to 60 years); or

- Permanent (in excess of 60 years).
-

1.5.4 Project Team

OES Consulting undertook the preparation of the EIAR in collaboration with members of the following project team:

- Brady Shipman Martin, Landscape & Visual Specialists;
- Dr. Maurice Hurley Archaeological Services, Cork – Archaeological Assessment;
- Tim Coughlan BA, IAC Archaeology - Archaeological Assessment
- Wetland Surveys Ireland Ltd. – Biodiversity (Terrestrial Ecological and Bird Survey);
- Conservation Services Ireland Ltd – Biodiversity (Aquatic Ecology), and,
- Hydro Environmental Ltd – Soils, Geology and Hydrology.

1.5.5 Abbreviations

The following abbreviations may be used throughout this document.

AAR	Average Annual Rainfall
ADS Ltd	Archaeological Development Services Limited
AOT40	Accumulated amount of ozone over threshold value of 40 parts per billion
AQS	Air Quality Standard (S.I. No. 244 of 1987)
BAT	Best Available Technique
BATNEEC	Best Available Technique Not Entailing Excessive Cost
BC	Before Christ
Board	An Bord Pleánala
BOD	Biological Oxygen Demand
BS	British Standard
BWI	Bird Watch Ireland
C	Carbon
c.	circa
$CaCO_3$	Calcium Carbonate
CAFÉ	Clean Air For Europe (European Directive 2008/50/EC)
CDP	County Development Plan
CEC	Council of the European Community
CFB	Central Fisheries Board
CH_4	Methane
CO	Carbon monoxide
COD	Carbonaceous Oxygen Demand
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CSO	Central Statistics Office
dB(A)	A-weighted decibels
DAHG	Department of Arts, Heritage and the Gaeltacht
DED	District Electoral Division
DEFRA	Department of Environment Food and Rural Affairs
DEHLG	Department of Environment, Heritage & Local Government
DHM	Dissolved Humic Materials
EC	European Community
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Statement
EMS	Environmental Management System

EPA	Environmental Protection Agency
ER	Effective Rainfall
EU	European Union
FSC	Forestry Stewardship Council
GHGs	Greenhouse Gases
GSI	Geological Survey of Ireland
GWB	Groundwater Body
h	Hour
ha	Hectare
HES	Hydro Environmental Services
HGV	Heavy Goods Vehicle
HSE	Health Service Executive
Hz	Hertz
IBEC	Irish Business and Employers Confederation
IFI	Inland Fisheries Ireland
IPC	Integrated Pollution Control
IWT	Irish Wildlife Trust
kg	Kilogram
km	Kilometre
kph	Kilometre per hour
kW	KiloWatt
l	Litre
L_{Aeq}	A-weighted equivalent continuous level
LAP	Local Area Plan
m	Metre
m^2	Square metre
m^3	Cubic metre
maOD	metres above Ordnance Datum
mg	Milligram
min	Minute
mm	millimetre
Mtonnes	Million Tonnes
N	Nitrogen
NBDC	National Biodiversity Data Centre
NGR	National Grid Reference
NM	Noise Monitoring Location
NPWS	National Parks & Wildlife Service
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
N_2O	Nitrogen Oxide
NRA	National Roads Authority
NSL	Noise Sensitive Location
NSS	National Spatial Strategy
OD	Ordnance Datum
OPW	Office of Public Works
P	Phosphorous
PCUs	Passenger Car Units
PAH	Polyaromatic Hydrocarbons
p.e.	Population Equivalent
PE	Potential Evaporation
pNHA	proposed Natural Heritage Area

PM	Particulate Matter
PO_4	Ortho-phosphate
RBMP	River Basin Management Plan
RMP	Records of Monuments and Places
RSA	Road Safety Authority
SAC	Special Area of Conservation (under EU Habitats Directive)
SB	Sedimentation Basin
SHRBD	Shannon River Basin District
SPA	Special Protection Area (under EU Habitats Directive)
s	Second
S.I.	Statutory Instrument
SO_2	Sulphur dioxide
t	Tonne (metric)
TP	Total Phosphorous
TTA	Traffic and Transport Assessment
TSL	Traffic Survey Location
µg	Microgram
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VOCs	Volatile Organic Compounds
WCC	Westmeath County Council
WFD	Water framework Directive
WESTLAND	Westland Horticulture Limited
WSI	Wetland Surveys Ireland
yr	year

1.6 Guide to the Document

This document comprises an Environmental Impact Statement (EIAR) in respect of the existing and future peat harvesting activities carried out by Westland on lands in Co. Westmeath. The document has been structured to facilitate a clear presentation of the activity, the potential 'loads' on the environment and the response to these loads. Accordingly, the remainder of the document is set out as follows:

Chapter Two - **Description of the Peat Harvesting Activities**
This section describes the activity in order to facilitate identification of environmental impacts of the peat harvesting activities.

Chapter Three – Reasonable Alternatives Considered
It is a statutory requirement that a detailed evaluation of reasonable alternatives is undertaken within the Environmental Impact Assessment process.

Chapter Four - Impacts on the Environment
Chapter Four comprises a synthesis report on the assessment of environmental impacts, together with an evaluation of their significance and a description of any ameliorative measures, existing or proposed, to minimise impacts.

Chapter Four also takes into account the interactions between the various environmental attributes.

Chapter Two
Description of the Activity

2.0 Introduction

This chapter describes the activity in terms of detailing the main processes carried out, drainage and treatment of runoff, stockpiling of harvested peat, access, traffic generated and service supplied. The hours of operation and temporary facilities in place are also described.

2.1 Description of the Activity

The lands in County Westmeath comprise of 4 separate holdings situated in the town lands of Mayne, Ballinealoe & Lower Coole. The Coole site is located approximately 1.5km west of the village of Coole Co. Westmeath, and approximately 14km east of Edgesworthstown, Co. Longford while the Clonsura site is located approximately 3.5km south of the village of Finnea, and approximately 5km north of the village of Coole, Co. Westmeath. The total land area covered by the operation is approx. 252ha., the Coole site is 163ha and Clonsura site is 89ha.

Although separate, the bogs are all managed by the same Peat Harvesting Manager and are operated by the same plant and the same Peat Harvesting operatives.

Westland are Members of the Growing Media Initiative and have developed alternative peat free material for their products which also influences the amount of peat harvested now and more so into the future.

2.2 Site Operations

The production of milled peat comprises of a number of operations involving the use of tractors and other equipment, typically within the months of April to September.

The operation is intrinsically weather dependent and therefore peat milling operations are only undertaken when the weather is warm and dry. A flow diagram indicating the process is shown below. The operations of milling, harrowing, ridging and harvesting are repeated for each crop and are collectively described as a cycle. Depending on weather, the number of cycles during a season can range between 4 and 12.

2.2.1 Milling

Milling is undertaken at the start of the season by a tractor and harrow to cut and loosen up the fresh layer of peat from the surface as shown in Attachment 2, Plate 2.1. Production of milled peat is carried out on the drained bogs intermittently during the months of April to September and in periods of good drying weather.

The milled peat is then left to air dry usually over a period of a few days.

2.2.2 Drying and Harrowing

The crop is rotated mechanically using a harrow during the drying stage to facilitate even drying. The harrow loosens up the pore structure and exposes a fresh layer of peat to the air. The number of rotations is dependent on the climatic conditions and moisture in the crop.

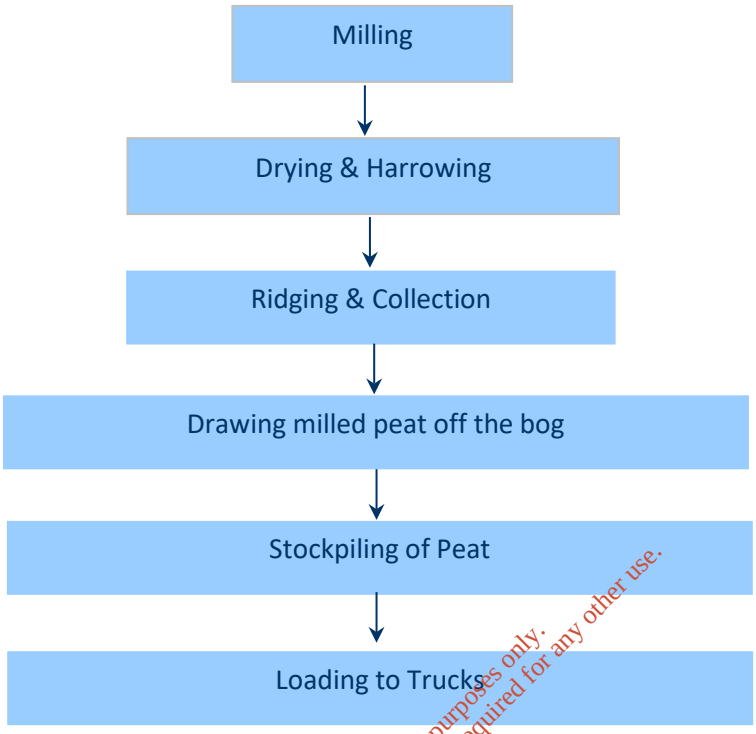
A harrow comprises turning equipment which is towed behind a tractor. The spoons turn down the dry surface of the peat layer and expose the wet peat underneath to the sun and air to assist the drying process. Refer to Attachment 2, Plate 2.1.

2.2.3 Ridging

Once the peat has reached the target water content, it is collected into ridges or drills. This is done with a ridger, a machine consisting of a series of blades in the shape of a V which span out horizontally.

The blades are towed by a tractor and push the peat to the centre of the ridge. Refer to Attachment 2, Plate 2.2.

Flow Diagram of Operations



2.2.4 Collection & Stockpiling

The dried fresh peat is lifted from the worked areas of the bog by a harvester, placed in trailers and moved using the tractors to the designated stockpiling areas onsite, situated close to road access points, where it is compacted into layers to prevent dust emissions, and is stored for transportation off the site. Refer to Attachment 2, Plates 2.3 and 2.6.

There are seven designated stockpile locations at Coole and a further three at Clonsura. The locations of the designated areas for stockpiling are shown on Attachment 1, Figures 2.1 and 2.2. Peat mounds can vary in height depending on the volume of peat being stockpiled and can extend to a maximum of 10 – 12m in height.

2.2.5 Transportation

The stockpiled peat is transported off site for further processing to Westland facilities in Ireland and UK by contracted hauliers. This activity generally occurs within the early months of the year but can continue into June.

2.3 Structures on Site and Services

There are no permanent structures on site. Container units are placed on hardcore areas just off the main access to each site providing a temporary office and kitchen area. Temporary portable toilets are provided on site. Refer to Plates 2.5 to 2.7 depicting the access areas.

Generators are used to provide electricity and water is drawn to the sites and stored in containers for use in the toilets and for handwashing.

Diesel is used for the generators and the refuelling of tractors. It is stored in self bunded (double skinned) tanks on site.

At the Coole site, there are a number of concrete staging areas adjacent to the road network where trucks can be loaded up with peat.

There is only one access route into the Clonsura site. This can be described as a lane which is tarmacked in places but is mainly hardcore. Trucks are loaded from this route within the bog. Refer to Attachment 2, Plate 2.7.

The activity does not generate solid waste. Small quantities of general refuse (mixed municipal waste) and packaging are generated by personnel when on site and such waste is removed from site for disposal at local civic amenity sites as appropriate.

2.4 Access and Traffic Generation

The Coole site is accessed off a number of points on the R395 from Coole to Edgeworthstown and the L1826 to Multyfarnham. Both roads eventually then link to the M4/N4.

The Clonsura site is accessed from a county road off the R394 from Castlepollard to Finnea. This route links to the N55 to Cavan.

Unladen articulated trucks (13 – 18 tonne) are contracted by Westland to transport peat from the lands to Westland facilities in Ireland and UK for further processing. Laden trucks from Clonsura head north via the N55. Laden trucks from the Coole site use the R396 from Coole to Abbeylara to access the N55.

An average of 8 – 14 trucks will be loaded per day when loading operations are occurring typically during January to June each year. Trucks are not always loaded every day during this period and loading will occur at only one site at a time.

During the harvesting period, tractors are brought to site and remain for the duration (April to September) and are then removed off site. Up to 6 tractors will be stationed at each site. Other traffic generated during this period arises from up to 6 seasonal workers and 3 permanent employees working on the sites.

2.5 Bog Maintenance Operations

Each year harvesting operations remove a thin layer of peat thereby slowly lowering the level of the surface. To maintain an effective drainage network, the drains have to be reprofiled and lowered, a process referred to as “ditching”. Ditching is normally undertaken after production in the autumn and again prior to production in the spring. The ditcher machine is lowered into the drain and removes peat from the bottom and sides of the drain. The peat or spoil removed is transferred to an unworked part of the site where it dries and hardens. Fields are also shaped with graders or screw levellers to permit run-off of rainwater and good collection of the milled peat layer during production.

At the end of harvesting season, bog maintenance activities associated with preparing the lands for winter periods – winterisation – takes place. These activities include:

- Removal of loose material from all production areas (collected by machinery);
- Cleaning of all internal ditches (drains) from end to end;
- Cleaning of all manholes on all ditches;

- Profiling all fields to create a camber from the edge of the ditches. Remove all related material and spoil;
- Removal of stockpiles of harvested material from the lands;
- Cleaning of all silt ponds are and store all spoil to prevent flow off of the bog;
- Cleaning of all outfalls and remove any loose material; and
- Adjustment of the height of the outfalls so that the water can flow slowly through the ponds depositing any peat before leaving the bog in a controlled manner.

2.6 Drainage and Pollution Control Arrangements

Westland maintains surface water drainage ditches every 12 meters (approximately) to provide adequate conditions for peat harvesting. Surface runoff and soil pore water collected from the peat fields by gravity is treated in sedimentation basins prior to discharge to adjacent watercourses, see Attachment 2, Plates 2.8 and 2.9 for example of sedimentation basins.

Occasionally pumping of peat water occurs on the Coole site and pumped water is passed through the sedimentation basins and into the natural watercourses at a controlled rate, as is the case with surface water that flows by gravity.

Water collected in each of the drainage ditches is conveyed to a headland drain, from where it flows into a large perimeter drain and onto the sedimentation basins for further treatment. Large particles can be removed by damming water up into the drainage ditches causing suspended particles to settle to the bottom of the ditches.

Westland has 4 No. sedimentation basins installed at the harvesting site at Clonsura. Two basins discharge to the River Glore 500m upstream of the Inny River while the remaining two discharge to a channel (S1or the Clonsura Stream) running through the northern portion of the site prior to discharge to the Inny River. A further sedimentation basin is required at Clonsura and this has been identified in the license application to date.

There are 7 No. sedimentation basins at Coole which discharge directly to the Inny River. Attachment 1, Figure 2.2 illustrates the location of the sedimentation basins.

All of the sedimentation basins installed and operated by Westland have been designed with due regard to the 'Draft BATNEEC Guidance Note for the Extraction of Peat' and to Agency accepted standards on IPC peat harvesting sites throughout Ireland.

In addition to Agency requirements on sedimentation basin design, the basins have been compared against more detailed Finnish design guidelines developed from a study commissioned by the '*Central Finland Regional Environment Centre'* between 2002-2004 on 'Furthering of Implementation of New Methods Developed for Water Treatment at Peat Harvesting Areas'.

The discharges from the sedimentation basins are controlled by an adjustable weir on the outlet from each sedimentation basin. This allows Westland to limit or stop all discharges from the sites. Once the silt basins reach capacity, water will start to back up in the perimeter drains, drainage ditches and peat harvesting land banks and in effect this gives Westland the potential to retain water within the sites for long periods if required. Attachment 2, Plate 2.10 illustrates a weir in use.

2.7 Environmental Management System

Westland has a detailed Environmental Management System (EMS) which is independently audited and accredited to ISO 14001. This system is based on continual improvement and will be updated to implement the requirements of the IPC Licence on issue.

As part of the EMS the management and responsibility for the operation and control of all abatement/treatment systems on-site are maintained to reduce impacts on the environment.

Controls are in place for peat harvesting operations, inspection and emptying of sedimentation basins, and emergency procedures have been prepared in the unlikely event that a pollution incident occurs to minimise risk to the bog and nearby watercourses. To monitor dust emission a number of locations for Bergerhoff dust gauges have been proposed for the Coole and Clonsura sites, see Attachment 1, Figures 2.7 and 2.8 respectively.

2.8 Rehabilitation/Closure Plan

Westland are committed to developing and implementing a Rehabilitation Plan for the site which will form part of a Closure Plan likely to be required as part of any licensing/consent regime. A key aim of the Plan is to ensure that the ecological and hydrological functioning of surrounding habitats of importance are left unaffected. The plan will be developed taking account of the need to enhance biodiversity on the sites in the future and to restore ecosystem functions such as carbon sequestration.

Chapter Three
Alternatives Considered

3.0 Introduction

The 2014 EIA Directive 2014/51/EU (Article 5 paragraph 1d) outlines the requirement for "*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.*"

It is noted that Westland is a leading member of Growing Media Ireland and Growing Media Association in the UK. The company is also a member of the UK Department of the Environment, Food and Rural Affairs's (DEFRA) Sustainable Growing Media Panel and has seen the use of non-peat materials in its horticultural products rise to over 70% in 2019. Westland has contributed significantly to the development of the Responsible Sourcing programme for peat and all other materials used in the production of growing media.

Irish sphagnum peats have a high absorptive capacity and are lightweight and consistent and it is these properties that Westland hope to replicate in alternatives. In this regard, the company has successfully developed a patented technology used to process spruce to produce a lightweight fibre like alternative. The trees are sourced only from forests with FSC certification and Westland is actively involved in carbon sequestration to offset CO_2 emissions from the harvesting of peat. The company's *New Horizon* peat free compost forms a significant element of the drive to peat free and Westland envisage further significant developments in this area in 2020 and onwards.

Notwithstanding the development of alternatives, it is acknowledged that overall peat consumption is not reducing due to the growth in the horticultural market in the UK and Europe in general. The key driver will be to change consumer behaviour to accepting peat free alternatives. The company is a key player in this regard.

3.1 Guidance on Assessing Alternatives

It is understood that peat harvesting operation have been carried out on the Coole and Clonsura sites and large areas of the surrounding lands since the mid-1940s, therefore, as an existing activity it Is difficult to realistically evaluate alternatives under current Guidance.

Guidance documents produced by the Agency[4][5] provide direction in interpreting the requirements for the evaluation of alternatives. The EIA Directive 2014/52/EU requires an EIAR to contain:

'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

This equates to "A description of the reasonable relevant alternatives studied by the developer and an indication of the main reasons for the option chosen" as detailed in the Key Issues Consultation Paper issued by the Department of Housing, Planning, Community and Local Government (DHPCLG) on the administrative provisions in advance of transposition of the Directive into Irish Law on 2nd May 2017.

[4] Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency, 2017 (Draft)
[5] Advice Notes for Preparing Environmental Impact Statements, Environmental Protection Agency, 2015

The 2017 Guidelines issued by the EPA[6] (page 36) focus the assessment of alternatives on a number of key issues including:

1. 'Do-Nothing' Alternative

The range of alternatives can include a 'do-nothing' alternative where appropriate. This examines trends currently occurring at the site, for example likely land use changes or other interventions, the likely effects of climate change, and the significance of these changing conditions. It can be particularly useful when assessing effects caused by projects which themselves are designed to alleviate environmental or infrastructural problems, e.g. waste treatment facilities, flood relief projects, road building, etc.

2. Alternative Locations

Some locations have more inherent environmental sensitivities than others. Depending on the type of project and the range of alternatives which the developer can realistically consider, it may be possible to avoid such sites in favour of sites which have fewer constraints and more capacity to sustainably assimilate the project. It can be useful to ensure that a range of options, that may reasonably be available, are included in the evaluation.

3. Alternative Layouts

Alternative layouts can often be devised to consider how different elements of a proposal can be arranged on a site, typically with different environmental, as well as design implications.

4. Alternative Designs

Many environmental issues can be resolved by design solutions that vary key aspects such as the shape of buildings or the location of facilities. Where designers are briefed at an early stage on environmental factors, these can be considered during the design development process, along with other design parameters.

5. Alternative Processes

Within each design solution there can be several different options as to how the processes or activities of the project can be carried out, e.g. the management of processes that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources.

- EPA is only concerned with projects. Many projects arise on account of plans, strategies and policies which have previously been decided upon in some instances neither the applicant nor the competent authority can be realistically expected to examine options which have already been previously determined by a higher authority.

- It is important to acknowledge that other non-environmental factors may have equal or overriding importance to the developer, e.g. project economics, land availability, engineering feasibility, planning considerations.

- The consideration of alternatives also needs to be set within the parameters of the availability of land or the need for the project to accommodate demands or opportunities which are site specific. Such considerations should be on the basis of alternatives *within* a site, e.g. design, layout.

The EPA Guidelines note that alternatives often arise as a result of consultation processes.

[6] Guidelines on the Information to be Contained in Environmental Impact Statements, Environmental Protection Agency, 2017

The foregoing discussion on the guidance available clearly indicates that the Guidance was written with proposed as opposed to existing development in mind which is the case with this activity. Notwithstanding this a brief discussion is provided below.

3.2 Reasonable Relevant Alternatives Assessed

As per Article 5(1) of the 2014 directive this section includes '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'. There are five main reasonable relevant alternatives and a preferential option that are therefore reviewed in this Chapter to comply with the EPA Guidance produced in 2002 and 2015 and the requirements of the 2014 Directive:

- Do Nothing Scenario;
- Alternative Location;
- Alternative Layout
- Alternative Design;
- Alternative Processes

A review of each of these alternatives is discussed below.

3.2.1 The 'Do Nothing' Alternative

The 'Do Nothing' alternative is this case is not applicable as the activity is established.

3.2.2 Alternative Locations

It is understood that peat harvesting operation have been carried out on the Coole and Clonsura sites and large areas of the surrounding lands since the mid-1940s, therefore, as an established existing activity, the evaluation of alternative locations is irrelevant in the context of this EIAR.

3.2.3 Alternative Layouts

Alternative layouts or uses of the land are not considered a realistic alternative for discussion in this EIAR on the basis that Westland lease as opposed to own the sites and would not be leasing it if peat could not be harvested. Therefore, the consideration of alternative uses is irrelevant in the context of this EIAR.

3.2.4 Alternative Designs

Westland is committed to the aftercare of the site and a number of strategies will be examined in conjunction with the landowner. Key objectives will be to enhance biodiversity and ensure the ecological and hydrological functioning of existing habitats of importance is unaffected. The preferred option is a matter for future approval.

3.2.5 Alternative Process

The activity can be described as similar to agricultural in nature and therefore there are no realistic alternatives to the equipment and methods used. Westland already follow best practice with regard to treatment of run-off and dust prevention. As noted in Chapter 1, an EMS is implemented on site.
It is noted that company has invested significantly in the move toward peat-free growing media and compost, to a point where approximately 70% of inputs to these products come from non-peat sources.

Chapter Four
Impacts

4.0 Introduction

This chapter of the EIAR deals with impacts of the historic existing peat harvesting activities on each of the following areas:

- Population & Human Health;
- Biodiversity - Terrestrial
- Biodiversity - Aquatic Ecology;
- Land, Soils, Geology and Hydrology;
- Noise and Vibration;
- Air Quality;
- Climate;
- Cultural Heritage;
- Landscape and Visual;
- Material Assets – Traffic and Roads
- Major Accidents
- Interaction of Impacts

4.1 Population & Human Health

4.1.1 Introduction

Human beings comprise one of the most important elements in the environment. In carrying out any peat harvesting operations, one of the principal concerns is that human beings should experience no reduction in the quality of life as a consequence of the existing peat harvesting activities carried out on the Coole and Clonsura sites.

Ultimately, all of the effects of peat harvesting on the environment may effect the health of human beings directly or indirectly and may include such matters as air quality, water quality, noise, traffic, property values, recreation and amenity and visual or landscape quality. Each effect is discussed in detail in the relevant sections of this EIAR. Accordingly, this section of the EIAR focuses on the human health and socio-economic impacts of the peat harvesting operations and associated off-site impacts such as indirect employment creation.

4.1.2 Study Assessment and Methodology

A desk study was carried out using information sourced from the following:

- The Census 2006 Final Report, Central Statistics Office (CSO);
- Census 2011- reports issued to date, Central Statistics Office (CSO);
- Census 2016- reports issued to date, Central Statistics Office (CSO);
- Employment statistics taken from the Live Register and Quarterly National Household Surveys produced by the CSO (www.cso.ie);
- Irish Business and Employers Confederation (IBEC), (www.IBEC.ie);
- Westmeath County Development Plan (CDP), 2014 - 2020
- Regional Planning Guidelines, Midland and Regional Authority, 2010-2022;
- Regional Spatial and Economic Strategy for the Eastern and Midland Region, 2019-2031
- National Development Plan 2018-2027; and,
- National Spatial Strategy 2002 – 2020.

The information collected provides an overview of the existing environment in terms of population and employment.

4.1.2.1 Competent Expertise

This chapter has been prepared by Siobhan Maher whose qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science and a Dip. Acoustics and Noise Control Engineering. Siobhan is a Member of the Institute of Acoustics (MIOA) and has over 20 years of experience carrying out environmental impact assessments.

4.1.3 Existing Environment

The existing settlements in closest proximity to the peat harvesting operations and associated site works are the small villages of Finnea and Coole. A strip of detached dwellings approaching the village of Coole lies approximately 400m east of the Coole peat harvesting site while the village centre of Coole (taken as the Post Office) is located approximately 1.5km to the east of this site. With regard to the Clonsura site, the nearest detached dwelling is located <500m away to the south while the village of Finnea is located approximately 3.5km northwest of this site. Castlepollard is the largest town in

close vicinity to both sites and lies approx. 6km east of the Coole site and approx. 8km from the Clonsura site.

Population/Demography

Census 2016 shows that Ireland's population grew by 173,613 persons to 4.76 million since 2011 (+3.8%). This trend is reflected in County Westmeath with increases in population from 2011 to 2016 of 3%, from 86,164 to 88,770.

The increase in population in County Westmeath was due to a combination of high birth rates and immigration with the largest increases during 2006-2008, however net emigration from 2009, due to the economic downturn, has resulted in a more muted rate of growth up to 2011[7].

The 2016 Census for the Coole ED, recorded a slight decrease to 239 and details are shown in Table 4.1.1 below of the trends from 1996 to 2016.

Table 4.1.1 Demographic Trends in Coole Electoral Division[8]

Coole ED	1996	2002	2006	2011	2016
Population No.	235	209	277	253	239
Actual Change Since Previous Census	6	-26	68	-24	-14
Population Change Since Previous Census	2.6%	-11.1%	32.5%	-8.7%	-5.5%

The age profile for Castlepollard during 2011 is shown in Table 4.1.2 below. According to the Census report 2011, over 65% of the population recorded in the Castlepollard area falls between the age group 18-65, which would indicate that much of the population are in the family formation age group. This is likely to be reflected in the Coole and Finnea areas.

Table 4.1.2 Population Age Profile for Castlepollard[9]

Area	Age Group (Years)			
	0-12	13-18	18+	65+
Castlepollard (persons)	190	74	788	154
Castlepollard (percentage)	16%	6%	65%	13%

Local Economy and Employment

According to the 2011 census, 32,319 people residing in Westmeath recorded their principal economic status as being "at work". The Census Returns for 2011 also records a labour participation rate for Westmeath of 61.4%. In the interim Census period between 2006-2011 the labour force increased by 6% from 38,649 to 40,956. The most recent published Quarterly National Household Survey for Q1 2013 gives a national average unemployment rate of 13.7% however this conceals substantial regional variation, ranging from 12.7% in the mid-east to over 18% in the midlands and south-east[7]. It is envisaged that similar rates apply to the study area.

The midlands region has seen a 71% decrease in the ratio of employed to unemployed people between 2006 and 2011 according to figures compiled by Teagasc[10].

The predominant land use around Coole and Finnea is agricultural, both pasture and horticultural, and peat extraction. The Coole Local Area Plan 2001-2008 and the Finnea Draft Area Plan 2011-2017 both noted that these areas have suffered from population decline and decline of traditional industries

[7] IBEC (2012) *Irish Consumer Monitor*, Irish Business and Employers Confederation, June 2012
[8] Westmeath Draft County Development Plan, 2014-2020
[9] Census Report 2011, www.cso.ie
[10] Teagasc website www.teagasc.ie

such as agriculture and peat extraction. Employment sources in Coole village are largely dominated by retail and other commercial service providers. The Coole medical clinic, situated on the site of the former St. Joseph's Orthopaedic Hospital is the major employment source in the village.

Up to date employment figures are not available from the CSO specifically for Coole and Finnea however there is data available for Castlepollard. The employment figures and employment sector profiles from the 2011 Census for Castlepollard are shown in Table 4.1.3 below.

Table 4.1.3 Employment Sectors for Castlepollard

Industry	Daytime Working Population	Percentage
Agriculture, forestry and fishing*	9	2
Building and construction	2	0.5
Manufacturing	135	30
Commerce and trade	86	19
Transport and communications	3	0.6
Public administration	20	4.3
Professional services	171	37
Other*	37	8
Total	**463**	-

* May include horticulture

The latest Live Register figures for County Westmeath in June 2013 give a figure of 10,849 persons compared to just 3,858 in June 2006, an increase of 181% in unemployment. Castlepollard also had even higher rates of unemployment with an increase of 220%[11]. The figures given in Table 4.1.4 and show the current unemployment levels nationally and in the area have slowed significantly.

Table 4.1.4 Live Register Figures Nationally and Locally

Area	Dec 2011	Dec 2012	Change (%)
Castlepollard	1,200	1,189	-0.9%
Westmeath County	10,240	10,244	-0.04%
Ireland	434,784	423,733	-2.54%

Note 1: All the above figures are taken from the Live Register, which includes part-time workers, seasonal and casual workers entitled to Jobseekers Benefit or Allowance.

It is likely that a proportion of the workforce in the Coole and Finnea area commutes to Castlepollard, Edgeworthstown and Granard on a daily basis due to the lack of any small industry or other source of employment other than that directly related to tourism or agriculture.

Services and Community

There is a concentration of development in Upper Coole, with medical, dental, physiotherapy and pharmacy services located at the Health Service Executive (HSE) clinic. Other community uses located in Upper Coole, comprise the church and school.

Finnea village provides a number of services to the residents of the village and the surrounding hinterlands. Village functions include retail, religious, educational, employment and recreational. The predominant use within the core of the village is residential with the commercial activity positioned in the south eastern end of the village including two shops and a large factory. There is also a guesthouse and a public house along the main street. The church, graveyard, community hall and school are located a substantial distance from the core of the village along the R394 and L-1771-0 respectively.

[11] Live register figures June 2006 - June 2013, www.cso.ie

Tourism, Recreation and Amenity

According to Fáilte Ireland[12], the Business Sentiment Index shows that sentiment in the industry is down owing to a number of factors including rising costs, restoration of the standard VAT rate, low priced competition and uncertainty surrounding Brexit. At present tourism is a highly competitive market and in general more and better services are advised in order to attract tourists.

In Coole village, Tullynally Castle and Gardens and Turbotstown House are visitor attractions open to the public. The village is also within easy access of Lough Derravarragh. There are also a number of B&B's in the area. Likewise, in Finnea village the rich natural environment within and close to the village has a number of attractions for visitors and those living within the county.

The main recreational activity in Finnea is walking and fishing along the River Inny. The River Inny flows from Lough Kinale under the Finnea Bridge at Finnea into Lough Sheelin in County Cavan and heads south to Lough Derravarragh. From there it flows westwards to the River Shannon which it joins at Lough Ree. The Inny is over 50km in length and when taking both banks into account the river provides in excess of 60km of good bank pike fishing. The river varies in depth from approximately 1.5 metres to over three metres but much depends on weather and water levels. The River Inny is a top-class coarse fishery and can be fished in numerous locations along its length. During site visits carried out by OES Consulting anglers were noted fishing off Float Bridge and they also fish along the river banks at the Coole site according to the Site Manager.

Principal species include roach, bream, perch and tench.[13]

A boat is not necessary with the exception of Lough Kinale, Lough Iron and Lough Derravarragh. The River Inny is also a short drive from the village of Coole so would also be considered a tourist and recreational attraction for this area.

In the future, the IFI plan to re-stock the river with salmonids which will improve the angling provided in the river.

Some of the surrounding areas including the Lough Derravarragh and Lough Sheelin areas are Areas of High Amenity. These areas consist of high scenic quality and their natural features can provide the basis for natural resource tourism such as walking, cycling, boating and fishing.

Westmeath County Council Policies

The Westmeath County Development Plan 2014-2020 has several policies and objectives relating to peatland and socio-economic themes. Work on the 2020 – 2026 Plan commenced in 2018 and the Plan is a Pre-Draft Stage. These are listed overleaf in Table 4.1.5.

[12] Fáilte Ireland (2019) *Tourism barometer*, Fáilte Ireland, September 2019
[13] www.fishinginireland.info

Table 4.1.5 Policies outlined in the Westmeath County Development Plan (2014-2020) relating to peat harvesting and socio economic themes.

Policy/ Objective Number	Westmeath County Development Plan 2014-2020 Policy
PPTL4	To plan and prepare for the future use of large industrial bog sites when peat harvesting finishes and to encourage a balanced approach to the **redevelopment** of cutaway bogs, including habitat creation.
PLLM7	To explore with the relevant agencies the future potential of cut away peatlands that may offer opportunities for habitat creation or **amenity** and recreation areas such as **community** woodlands or parklands.
PLHN1	To permit **residential development** in areas outside of the development boundaries of the settlement hierarchy subject to the following circumstances: • Persons who are actively engaged in agriculture, horticulture, forestry, bloodstock and peat industry

4.1.4 Actual and Potential Impacts of the Activity

Local Economy and Employment

The likelihood of disruption to local businesses by way of traffic and noise during the peat harvesting and site operations is extremely low, given the distance the sites are from the villages of Coole and Finnea. Traffic is dealt with in Section 4.10.

Westland currently employs three permanent and six seasonal workers in total at both sites combined. In addition, the company uses hauliers to transport the peat as required to Westland facilities in Ireland and UK for further processing. Overall, the economic impact in terms of provision employment is considered to be both a direct and indirect imperceptible to slight positive impact.

The temporal element of this impact will be influenced to a large extent by external drivers such as county policies on peat harvesting, development of replacements for peat in horticulture, consumer demand and legislation.

Human Health

Noise

A noise assessment has been undertaken to determine the impact of activities in terms of noise arising from the operation of equipment and machinery during harvesting, transport and maintenance of the peat lands. The assessment is described in detail in Section 4.5.

The assessment concluded that the activities carried out by Westland do not currently impact in terms of noise and vibration on existing NSLs in the areas of Coole and Clonsura. The activity is typical of the soundscape of the area i.e. agricultural with the exception of the use of articulated trucks on a seasonal basis. However, this is not considered likely to give rise to noise nuisance or significant effects on human health.

Air Quality, Odour & Dust

An air quality assessment (Section 4.6) has been undertaken to determine the impact on local air quality resulting from the peat harvesting activity in terms of emissions to air. Existing ambient air quality at the two sites is likely to be good and well within Air Quality Standards, based on the monitoring results observed in 2019 at stations representative of rural conditions (Zone D).

Nuisance dust was identified as the main potential impact on ambient air quality in the area from peat harvesting. The nearest sensitive receptors to the two sites, are residential properties located well outside the site boundaries and the harvesting areas. Westland employs a number of mitigation measures to ensure that the impact of localised dust generated as result of peat harvesting is kept to a minimum (these are also relevant to minimising air-borne dust to the Inny River).

Overall, the impact of the operation on ambient air quality is, and is expected to continue to be insignificant.

Public Water Supply

Water demand associated with the activity is small and met from an IBC (1000 l) which is stored on site for occasional use by employees. Owing to the small volumes of water used, a mains potable water supply is not required, and accordingly the activity will not impact on the quality of public water supplies or place pressure on the supply of local drinking water.

Services and Community
Services and community are not affected by the peat harvesting operations given the distance the sites are from the villages of Coole and Finnea and the nature of the operation which is typical of the locality. Traffic generation is addressed in Section 4.10.

Tourism, Recreation and Amenity
The main tourist attractions of the local area are not in the vicinity of the peat harvesting sites and therefore are unaffected by the activity. Walking along the River Inny is unaffected as there is a setback area from the harvesting. Furthermore, peat harvesting is a "normal" feature of this region. This is dealt with in detail in Section 4.9 dealing with the landscape and visual impact.

Siltation in the Inny occurs throughout and this may affect the fishery interest and angling along the River Inny. Section 4.3 on Aquatic Ecology deals with this aspect in detail, however, cumulatively the river receives sediment from a number of sources and the operations of Westland are insignificant in the overall context and due to the existing mitigation measures in place. It is considered that present and future operations will not affect the angling interests in the river.

There are no known rights of way through the harvesting areas which could be affected by the activity.

Westmeath County Council Policies
Westland will take account, where relevant, of the policies outlined in the Westmeath County Development Plan (2014-2020), as part of the on-going and future rehabilitation and aftercare process which the company is committed to fulfilling as part of the future licence conditions or otherwise.

4.1.5 Existing and Proposed Mitigation Measures and/or Factors
Reductive and remedial measures and/or factors relevant to impacts on human beings in terms of air, noise, visual impact and traffic are described respectively within sections 4.6, 4.5, 4.9 and 4.10 of this EIAR. There are no measures proposed specifically for socio-economic impacts.

4.1.6 Conclusions/Residual Impacts
The residual impacts are as detailed in Section 4.1.4 above and the assessment concludes that the will be no significant effects on human health or the socio economic environment arising from the activity.

4.1.7 Interaction with other Environmental Attributes
Interactions with ambient noise, air quality, landscape and visual etc. are described in the relevant sections of this EIAR.

4.1.8 Monitoring
Not applicable.

4.1.9 Reinstatement
Not applicable.

4.1.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.2 Biodiversity - Terrestrial

Biodiversity refers to the variety and variability of life on earth and, as a term is now commonly used instead of species diversity and abundance.

'Biological diversity' or biodiversity is, according to the UN Convention on Biological Diversity (BCD) defined as being the '*variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'*

Article 3 of the EIA Directive 2014/52/EU states that the environmental impact assessment 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:

(b) biodiversity, with particular attention to species and habitats protected under Directive 32/43/EEC and Directive 2009/147/EC.

Biodiversity is addressed in this EIAR by way of reference to terrestrial biodiversity (plants, animals, birds) (Section 4.2) and aquatic biodiversity (fishes, invertebrates and aquatic plants) (Section 4.3).

The potential impacts (direct, indirect and cumulative) of the activity on biodiversity including terrestrial and aquatic ecology present within the site and surroundings are qualitatively assessed in sections 4.2 and 4.3 respectively.

The potential impacts on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) have been assessed in a standalone Appropriate Assessment Screening and Natura Impact Statement (NIS) which is appended to this EIAR (**EIAR Volume II).**

4.2.1 Introduction

This chapter discusses the existing terrestrial biodiversity at and in the vicinity of the sites, the existing and potential impacts of the existing peat harvesting activity on the receiving environment and the mitigation measures that are and/or will be employed to reduce/ eliminate the impact.

The assessment is based on baseline surveys undertaken in 2013 at the time of preparation of the original EIS and which are considered unlikely to have significantly altered in the intervening period, given that both the method harvesting and area within which peat is harvested remains unchanged.

Wetland Surveys Ireland (WSI) completed the assessment and their full report is contained in Attachment 4.

The aims of the assessment were to:

- Carry out a desktop study in order to determine the previously recorded ecology of the area;
- Carry out a baseline flora and fauna survey of the peat harvesting sites and surroundings;
- Evaluate the ecology of the peat harvesting sites and surroundings and describe the impact of existing operations on existing habitats of interest;
- Identify and predict the potential direct, indirect and cumulative impacts of the continued use of the sites for peat harvesting;

- Identify existing and proposed further mitigation measures that could be potentially included in the on-going operation and decommissioning of the peat harvesting activities so as to minimise potential impacts on flora and fauna in the future.

Relevant Legislation
The following relevant legislation relates to the main legal constraints on existing peat harvesting operation in relation to terrestrial ecology:

- The European Communities (Birds and Natural Habitats) Regulations 2011 (SI 411/11)
- EIA Directive 85/337/EEC (as amended by 97/11/EC)
- The Wildlife Act 1976 and (amendment) Act 2000
- The Habitats Directive 92/43/EEC (under SI 94/97)
- The Birds Directive 79/409/EEC
- Flora (Protection) Order 1999

4..2.1.1 Competent Expertise

This chapter of the EIAR was prepared by Dr Patrick Crushell, ecologist with Wetland Surveys Ireland Ltd. Dr. Crushell (BSc Applied Ecology; MSc Environmental Resource Management, PhD Environmental Sciences, MCIEEM) received an honours degree in Applied Ecology from UCC, a Master's degree in Environmental Resource Management from UCD and defended his PhD at Wageningen University, the Netherlands. He is a Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). Dr. Crushell has been working in the area of nature conservation and ecological impact assessment for the past sixteen years. Projects that he has been involved in include wetland inventory surveys; evaluation of proposed designated sites; restoration and management of peatland habitats; baseline ecological surveys and impact assessments of various development proposals including road, quarries, wind-farms, waste facilities, arterial drainage schemes, and residential developments; during and post-construction, ecological monitoring.

4.2.2 Study Assessment and Methodology
The following study assessment methodology was undertaken by WSI:

- Desktop Review and Consultation
- Field Survey
- Evaluation of Ecological Significance
- Assessment of Impacts and Impact Significance

Desktop Review and Consultation
A desktop review was carried out to identify features of ecological importance within the existing peat harvesting sites and immediate surrounding area. Literature sources consulted by WSI are included in Attachment 4. A review of designated sites was carried out as part of the desktop study.

A scoping exercise/consultation was undertaken with various consultees (see Attachment 3 of this EIAR for all respondents). This consultation included written correspondence from OES Consulting to consultees in May 2013. Comments that were received are summarised in Chapter 1, Table 1.1. Comments from IFI and the NPWS were received in 2011 as part of the consultation undertaken for the Natura Impact Statement prepared by OES Consulting and submitted to the EPA. These comments were taken account of in the preparation of this chapter of the EIAR.

Field Surveys

Habitat and Flora Survey

A habitat survey of the site was undertaken during a number of visits in June 2013. Target notes were made on all semi-natural habitats encountered during the survey including notes on dominant vegetation, qualitative assessment of plant species diversity, vegetation structure, topography, drainage, disturbance and management. The habitats encountered on site were classified in accordance with Fossitt (2000)[14]. Methods used during the habitat survey followed best practice guidance for habitat survey and mapping as outlined in Smith et al. (2011)[15].

In addition to the habitat survey, a fauna survey was conducted to assess usage of the site by birds and mammals. Based on the physical and hydroecological characteristics of the habitats, which render them unsuitable to support more specialised groups such as invertebrate species, it was considered unnecessary to carry out more specific assessments.

Avifauna surveys

Winter season

Bird surveys were undertaken on two occasions during the winter season 2013 (February - March) to assess species composition and determine the presence of birds of conservation concern within and surrounding the existing peat harvesting sites. Surveys were undertaken from the 25th - 27th of February and 19th - 21st of March 2013. Methodology used included walkover transect surveys of the sites together with vantage point watches. Counts of water birds were also undertaken at known water bird sites in the surroundings. Table 4.2.1 lists all water bird sites in the surroundings (within 5 km) identified during a desktop review and field surveys undertaken during February and March 2013. Counts were conducted during daylight hours from suitable vantage points using binoculars and / or telescope as required. Records were made of numbers of wildfowl or wader species, presence of marked birds (leg-ringed or neck-collared), weather conditions and habitat types. During the course of the study no marked birds were recorded.

Table 4.2.1 Known water bird sites that occur within 5 km of the study area

Site Name (Main Site)	Conservation Status	National Grid Reference
Lough Bane	pNHA	N 415 770
Lough Derravarragh	SPA	N 410 680
Lough Kinale	SPA	N 390 811
Derragh Lough	SPA	N 390 710
Lough Sheelin	SPA	N 450 840

Breeding season

Bird surveys were undertaken on two occasions (February and March during the breeding season. Methodology used included walkover transect surveys together with vantage point watches (ca 1-hour duration). The aim of the vantage point watch was to determine whether birds of high conservation concern or especially sensitive species (in particular raptors and water birds) utilise

[14] Fossitt, J.A. (2000). A Guide to Habitats in Ireland. The Heritage Council. Ireland.

[15] Smith G.F., O'Donoghue, P., O'Hora, K. and E. Delaney (2011). Best practice guidance for habitat survey and mapping. The Heritage Council, Kilkenny.

the site during summer months. In addition to vantage point surveys, a walkover survey of the site to determine the species composition throughout the habitats across the site was undertaken.

The prevailing weather conditions during each survey visit are summarised in Attachment 4, Table 2. When required, binoculars were used to identify various bird species. All aural and visual registrations were recorded. Surveys were carried out under suitable weather conditions.

Mammal survey

The site was assessed in June 2013 for any evidence of mammal activity. All mammals recorded during site visits were noted. Signs and tracks of mammals are the best way of assessing a site without conducting night surveys. All signs and tracks were assessed as they were encountered in the field. Suitable mammal habitat within and surrounding the site was also noted.

Evaluation of Ecological Significance

The impact significance is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. Details of the methodology employed by WSI to evaluate ecological significance is described in further detail in Attachment 4, Section 3.1.3.

Assessment of Impacts and Impact Significance

The assessment of impacts conducted by WSI is broadly based on guidance offered by the Institute of Environmental and Ecological Management (IEEM) in the published Guidelines for Ecological Impact Assessment (2006) with reference to national guidance given in Eirgrid (2012)[16], NRA (2009)[17], Gittings (1998)[18] and EPA (2017)[19]. Impacts are discussed and assessed in relation to impact type (positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, timing and frequency.

In assessing the magnitude and significance of impacts it is important to consider the value of the affected feature as shown in Attachment 4, Tables 4 and 5 while the criteria for assessing impact type and magnitude are presented in Attachment 4, Tables 6 and 7 respectively.

4.2.3 Existing Environment

The description of the existing receiving environment in terms of terrestrial ecology has been split into the following headings:

- Designated Sites;
- Habitats and Vegetation;
- Plant Species;
- Birds, and,
- Mammals.

[16] Eirgrid (2012). Ecology guidelines for electricity transmission projects. Eirgrid, Dublin.

[17] NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).

[18] Gittings, T. (1998). Assessing the significance of ecological impacts: an ongoing framework and terminology. 8th Environmental Researchers Colloquium, RTC Sligo, 30th January to 1st February 1998, Book of Abstracts, p. 26.

[19] EPA (2017). Guidelines on the information to be contained in Environmental Impact Statements (Draft)

Designated Sites

The existing peat harvesting sites at Coole and Clonsura do not lie within any sites designated or under consideration for designation for nature conservation. Details of the designated sites that occur within 5 km of the existing peat harvesting sites are listed in Attachment 4, Table 8, while their locations in relation to the sites are shown in Attachment 4, Figure 1. The nearest designated site is Lough Bane pNHA which occurs adjacent to the north of the Clonsura site. This site is deemed to be of national importance.

There are a number of important water bird sites in the wider landscape surrounding the existing peat harvesting sites including Lough Derravarragh SPA (1.2 km to South, Lough Kinale and Derragh Lough SPA ca 1.8 km to the North-west and Lough Sheelin SPA ca 3.5 km to the North). The habitats present within the peat extraction sites are considered unsuitable for those bird species listed as qualifying interests of the SPAs. Although wintering waterfowl are known to commute between lakes and feeding sites in the surroundings, it is not considered likely that flocks utilise the on-going existing peat harvesting site when commuting between these sites. The potential impacts of the existing and on-going peat harvesting on European sites (SACs and SPAs) in the surroundings are addressed in the Appropriate Assessment Screening Report and Natura Impact Statement prepared by OES Consulting dated February 2011 (updated March 2020).

Habitats and Vegetation

General Assessment

The main habitat present within the Coole site comprises cutover bog with peat surface dominant together with a series of drainage channels traversing the site. Within this site, two parcels of former high bog are currently used for peat harvesting activities. Two small remnant raised bog areas, with intact surface vegetation occur in the north-east and south-east of the Coole area. A buffer zone, where peat is not being harvested, occurs to the west of the two main peat harvesting areas and separates them from the Inny River. The Inny River occurs west of the site. For the most part the various bogland areas within the wider study area have been developed as commercial peat extraction activities or planted with commercial conifer woodlands.

As with the Coole site, the main habitat present in the Clonsura site comprises cutover bog with bare peat dominant together with a series of drainage channels traversing the site. A buffer zone of high bog, where peat is not being harvested, occurs to the west of the main harvesting areas and separates the existing peat harvesting from the Inny River. Conifer plantation occurs to the east and north. Lough Bane a proposed Natural Heritage Area (NPWS site code: 1721) is located adjacent to the north of the Clonsura site (see Attachment 4, Figure 3.

Following the habitat survey of the site, the different habitat types were identified and mapped[14]. For the purposes of this section, habitat descriptions for the sites at Coole and Clonsura and the immediate surrounding areas are described separately and briefly in the following sections. Further details are provided in Attachment 4, Section 4.2. The habitat maps for Coole and Clonsura are presented in Attachment 4 as Figures 2 & 3 respectively.

The habitat code according to Fossitt[14] is in brackets after the habitat name. A list of all plant species recorded on site is presented in Attachment 4, Appendix 2.

Tables 4.2.2 and 4.2.3 summarise the total area of each habitat recorded within the existing peat harvesting boundary and immediate surrounding at the Coole and Clonsura sites respectively and the ecological evaluation of each habitat.

Coole

The habitats present within the site include cutover bog (PB4), raised bog (PB1), drainage ditches (FW4), recolonising bare ground (ED3), dry meadows and grassy verges (GS2), improved agricultural grassland (GA1) and Scrub (WS1). Conifer plantation (WD4), and bog woodland (WN7) occur within the immediate surroundings of the existing peat harvesting site. Plates 1 and 2 in Appendix 3 of Attachment 4 illustrate the bare peat and raised bog respectively at the Coole site.

The western edge of the site is bounded by the Inny River (FW2) (see Attachment 4, Appendix 3, Plate 3). A partially vegetated area separates the river from the peat harvesting activities. This comprises re-colonising surface peat areas with grassy vegetation. Peat sedimentation basins (FL8) occur all around the site.

Table 4.2.2 Extent and ecological evaluation of each habitat type recorded within the Coole site and its immediate surroundings

Habitat Type	Area (ha) / Length (m)	Evaluation
Cutover Bog (PB4)	163	Low ecological value
Raised Bog (PB1)	19.6	High local value
Drainage Ditches (FW4)	Unknown	Low ecological value
Recolonising bare ground (ED3)	5.2	Low ecological value
Dry meadows and grassy verges (GS2)	0.9	Low ecological value
Improved agricultural grassland (GA1)	4	Low ecological value

Clonsura

The main habitats present within the site include cutover bog (PB4), raised bog (PB1), dystrophic lake (FL1) and poor fen (PF2) mosaic, drainage ditches (FW4) and dry meadows and grassy verges (GS2). Plates 4,5 and 6 in Appendix 3 of Attachment 4 depict the bare pea, dystrophic lake and raised bog at Clonsura.

Lough Bane, a proposed Natural Heritage Area (NPWS site code: 001721), lies adjacent to the north (outside) of the existing peat harvesting site at Clonsura. It is a mesotrophic lake (FL2) surrounded by an extensive zone of transition mire (PF3) grading into birch scrub woodland (WS1). The site is of significant ecological interest as transition mire is listed on Annex I of the EU Habitats Directive. The habitat present conforms as Annex I listed habitat under the EU Habitats Directive. The lake (FL2) and transition mire habitat (PF3) habitat are deemed to be of National importance. Plate 7 in Appendix 3 of Attachment 4 illustrates Lough Bane.

Table 4.2.3 Extent and ecological evaluation of each habitat type recorded within the existing peat harvesting site at Clonsura and its immediate surroundings

Habitat Type	Area (ha)	Evaluation
Cutover Bog (PB4)	97	Low ecological value
Raised Bog (PB1)	5.6	High local importance
Dystrophic lakes (FL1) and Poor fen and flush (PF2) mosaic	0.5	High local importance
Drainage Ditches (FW4)	NA	Low ecological value
Dry meadows and grassy verges (GS2)	3.6	Low ecological value
Buildings and artificial surfaces (BL3)	0.8	Low ecological value

Plant Species

Common plant species recorded during the field survey are listed in Attachment 4, Appendix 2. During the field survey, habitats were also assessed as to their potential suitability for rare or protected plant species with reference to Preston et al (2002)[20]; Kingston, N. (2012), the Flora Protection Order 1999, Annex II of the EU Habitats Directive, NPWS rare plant database and the Irish Red Data Book[21].

No red rare or protected plant species were recorded within the sites during the course of field surveys. Based on the condition of the habitats within the existing peat harvesting sites, it is concluded that rare or protected plant species are most unlikely to occur within the sites.

Birds

Desktop Review

A review of species distribution based on winter and summer atlas records for the 10 km square (N37 & N47) (where the sites occur) was undertaken prior to field studies in February and March 2013. In addition, an assessment of whether species are likely to occur within or interact with the existing peat harvesting sites was carried out taking into consideration the habitat preferences of individual species and those habitats present within and surrounding the sites.

Winter Birds

A review of potential winter bird interest of the sites was undertaken by reviewing the likely occurrence of species listed on both BoCCI Red list[22] and on Annex I of the EU Birds Directive with reference to the winter bird atlas of Britain and Ireland[23]. It is important however to note that these atlas records were not based on complete systematic surveys of the entire country and therefore a number of species may be absent despite their known occurrence within the 10 km square. The results of this review are presented in Attachment 4, Table 12.

The results of the Coole and Clonsura winter surveys are described in detail in Attachment 4, Section 4.4.2.1 and 4.4.2.2

At the Coole site only 13 species were observed with a peak abundance of 14 individuals recorded during March 2013. No bird species of high conservation concern were observed utilising the existing peat harvesting site at Coole during February and March 2013. It is concluded that the site is of low importance to birds during winter.

At the Clonsura site only 8 species were observed during the survey with a peak abundance of 48 individuals recorded during February 2013. Based on observations recorded, it is considered that the habitats present within the existing peat harvesting site at Clonsura are of low value to birds during winter. Both Hen Harrier (EU Annex I species, Amber listed BoCCI) and Merlin (EU Annex I

[20] Preston, C.D., Pearman, D.A. & Dines, T.D. (Eds) (2002). New Atlas of the British and Irish Flora: An Atlas of the Vascular Plants of Britain, Ireland, Isle of Man and the Channel Islands - New Atlas CD-ROM. Oxford University Press, Oxford.

[21] Curtis, T.G.F. and McGough, H.N. (1988). The Irish Red Data Book. 1 Vascular Plants. The Stationery Office, Dublin.

Kingston, N. (2012) Checklist of protected & rare species in Ireland. Unpublished National Parks & Wildlife Service Report.

[22] Lynas P., Newton S.F. and J.A. Robinson (2007). The status of birds in Ireland: an analysis of conservation concern 2008-2013. Irish Birds 8: 149-166

[23] Lack, P. (1986) The Atlas of Wintering Birds in Britain and Ireland. T. & A.D. Poyser, Calton

species, Red listed BoCCI) use habitats in the surroundings, however based on the habitats present are unlikely to frequently use the site. Golden Plover (EU Annex I species, Red listed BoCCI) were recorded resting in an area of surface peat within the site and it is concluded that flocks may regularly use the area during winter.

Breeding Birds

A review of the breeding range and habitat preferences of species listed on Birdwatch Ireland's Red list[22] and on Annex I of the EU Birds Directive and their potential to breed on-site was undertaken with reference to published atlas records[24, 25]. The results of the review are presented in Attachment 4, Table 13.

Field surveys were undertaken at the Coole and Clonsura sites on two occasions during the winter season (February and March 2013) and on two occasions during the breeding season (June 2013).

The results of the Coole and Clonsura winter surveys are described in detail in Attachment 4, Section 4.4.2.1 and 4.4.2.2.

At the Coole site, only 7 species were observed, with an abundance of 13 individuals. The species poor assemblage recorded is typical of the bare peat habitat that prevails across the site. No bird species of high conservation concern were observed utilising the existing peat harvesting site during the surveys. The low abundance and poor species assemblage recorded suggests that the site is of low value to birds during the breeding season.

At the Clonsura site, 10 species were observed during the walkover survey, with an abundance of 19 individuals. The low species abundance and composition of birds recorded suggests that the habitats present within the site boundary are of low value to birds during the breeding season.

Counts at potential water bird sites in surroundings

Data from counts at water bird sites in the surroundings undertaken during the late winter season are presented in Attachment 4, Table 18. The most important water bird site in proximity to the on-going existing peat harvesting site is Lough Derravarragh SPA located 1.2 km south of the Coole site.

Analysis of I-WeBS data for the 5 year mean peak during the 2011/12 to 2015/16 period conducted at this site previously recorded 44 Whooper Swan, 417 Pochard, 459 Tufted Duck and 806 Coot. All four species are known to have undergone declines over the past ten years within the SPA. The current survey had peak counts of 17 Whooper Swans, 100 Pochard, 170 Tufted Duck and 85 Coot.

The survey was conducted during the latter part of the winter season (late February and March) and this may explain the relatively low numbers of waterbirds recorded. The optimal month for conducting water bird surveys would be earlier in the winter season when water bird numbers are often at their peak.

Status of birds of conservation concern

The most significant impact arising from peat harvesting would be the loss of rare or sensitive species. The sensitivity of a species can be defined as its ecological importance and nature

[24] Sharrock, J.T.R. (ed.) (1976) The Atlas of Breeding Birds in Britain and Ireland. T. & A.D. Poyser

[25] Gibbons, D.W., Reid, J.B. and R.A. Chapman (1993). The New Atlas of Breeding Birds in Britain and Ireland: 1988-91. T & A.D. Poyser, London.

conservation interest at the site being assessed. Sensitivity of a species is defined by whether the species is listed on Annex I of the EU Birds Directive or the BirdWatch Ireland's list of Birds of Conservation Concern (BoCCI) and whether the site contains species at nationally or regionally important numbers.

The existing peat harvesting sites are not included within any sites designated for nature conservation. Lough Derravarragh SPA occurs approximately 1.2km south of the existing peat harvesting sites. The movement of migratory waterfowl and other waterbirds from Lough Derravarragh SPA into the surroundings and the potential presence of raptors in proximity to the study were identified as the main avifaunal issues requiring investigation.

Following field surveys undertaken during both the winter and summer seasons, it was found that waders and waterfowl were not dependent on the habitats present within the existing peat harvesting sites. No movement of flocks of migratory bird species were recorded during field surveys. Hen Harrier, Merlin and Golden Plover were recorded at Clonsura during late winter. However, none of the species were found to utilise the study area on a regular basis and only during winter when minimal peat harvesting activities are undertaken at the sites. It has been determined that the habitats that occur within Lough Bane pNHA serve as a likely winter roost site for Hen Harrier.

Taking into consideration the results of the avifauna surveys conducted at Clonsura and Coole, no birds of high conservation interest or those qualifying bird species of designated SPA sites in the surroundings, are dependent on the habitats present within the existing peat harvesting sites.

Mammals

Mammal species that have been recorded from the 10 km grid square (N37 & N47) of the study area (National Biodiversity Data Centre (NBDC) 2013) were noted and are presented in Attachment 4, Table 19. These species are likely to be found in suitable habitat within the 10 km square of the study area.

Fox prints and droppings were recorded during the field survey. Hare droppings were also recorded at both sites.

The National Biodiversity Data Centre (NBDC) database (2020)[26] lists four species of bat (Soprano Pipistrelle, Common Pipistrelle, Brown long-eared bat and Daubentons bat) as having been recorded within the 10km squares (N37 & N47) of the study area. The sites are mostly un-vegetated and there is an absence of potential bat roosts or bat foraging or commuting habitat. Suitable bat habitat does occur in the form of woodland habitats in the surroundings.

No rare or threatened mammal species have been confirmed on site. Species that are protected under national and international legislation that are likely to occur include Irish Hare. Based on the habitats present it is concluded that the sites are likely to be of relatively low value to mammals.

4.2.4 Actual and Potential Impacts of the Activity

This section assesses the actual and potential future impacts of the existing peat harvesting activity on the Terrestrial Ecology at the Coole and Clonsura sites.

The potential significant impacts of the existing peat harvesting activity on Terrestrial Ecology are:

[26] https://maps.biodiversityireland.ie/Map/Terrestrial/Dataset/128

- Direct Impacts – Habitat Loss
- Secondary Impacts/Indirect Impacts

Direct ecological impacts are those that result in physical loss or degradation of a habitat. Indirect or secondary impacts are those, which contribute to the long-term decline in the quality of the habitat or feature. The potential for cumulative impacts, if relevant, is addressed by taking into account other peat harvesting facilities within the vicinity of the existing peat harvesting sites at Clonsura and Coole.

Direct Impacts - Habitat Loss
The footprint of the existing activities occurs in an area of surface peat where the surface vegetation has previously been removed. The project will involve the continued milling of peat production in these areas. Areas outside of the footprint of the existing activities will not suffer direct habitat loss.

Remnant raised bog habitat at Coole

The areas of remnant raised bog at Coole have been impacted by past drainage activities as indicated by the absence of good quality bog vegetation. It is probable that the habitats will continue to deteriorate due to the drainage effects of the peat milling operations throughout the adjacent works area. This is expected to cause a further loss of typical bog communities and the likely expansion of species indicative of dry conditions such as Heather (Calluna vulgaris).

This impact is deemed to be a long-term negative impact of minor significance.

Remnant raised bog and dystrophic lake at Clonsura

The dystrophic lake and surrounding raised bog habitats could potentially be impacted by ongoing drainage effects associated with the nearby peat milling operations at Clonsura. The habitats in this area are dependent on the water table being retained at or near the surface throughout the year. Furthermore, any future changes in topography and surface slopes could affect the ecological integrity of the area.

Hydrological assessment at the site in May and June 2013 involving walk over surveys and mapping, indicates that the lake is approximately the same elevation to that of the adjacent harvesting area. In terms of drainage connections between the harvesting area and the dystrophic lake, the presence of a perimeter boundary drain means that there is no runoff from the harvesting area into the dystrophic lake. The lake is considered to be an isolated feature with a localized surface water catchment.

Overall, it is unlikely that the remnant raised bog and lake will be significantly affected by the adjacent ongoing harvesting.

Secondary Impacts / Indirect Impacts
The operation of a peat harvesting site may have a number of secondary ecological impacts. If these impacts significantly alter the type and/or quality of the habitat, then such changes represent additional habitat losses. In the case of the existing peat harvesting site at Clonsura and Coole, secondary/indirect impacts could include:

- Disturbance (Birds and Mammals)
- Impacts to Designated Sites

Secondary impacts to ecology may also arise from hydrological impacts and impacts to watercourses. These types of impact are dealt with in Chapter 4.4 – Soils, geology and Hydrology and Chapter 4.3 – Biodiversity - Aquatic.

Disturbance (Birds and Mammals)
Disturbance from noise, human activity, traffic, and artificial light is unlikely to impact on bird and mammal populations during peat harvesting. Westland site operations involve the milling of peat during the period approximately April to September and are largely weather dependent.

Taking into consideration the results of bird surveys undertaken at the site to date, there is no evidence to support the use of the sites at Coole and Clonsura that bird species of conservation concern. The number of birds utilising the existing peat harvesting sites are low, especially during the months that most works are being undertaken (summer season). Disturbance arising as a result of operation works is therefore not considered likely to impact on the avifauna interest of the site. As the peat harvesting activities has been ongoing for some time, the avifauna populations are also likely to have become habituated to the level of disturbance associated with the works and therefore no additional disturbance impact is foreseen.

Overall, it is expected that the continued harvesting activities at Coole and Clonsura are unlikely to cause any additional disturbance to bird and mammal populations resident in the area.

Designated Sites
Potential impacts of the existing peat harvesting activities on Natura 2000 sites in the surroundings were assessed in detail in an Appropriate Assessment Screening Report and Natura Impact statement prepared by OES Consulting (OES Consulting 2011).

The screening assessment identified Lough Derravarragh as the only site that could potentially be adversely impacted by the works and therefore that a Natura Impact Statement (NIS) was required to assess the potential impacts. The NIS focused on water quality, and disturbance associated with dust and noise emissions. The NIS concluded that given the scale and nature of the peat harvesting operations, they will not have any significant negative impacts on their own, or in combination with other plans and projects on the conservation objectives of Natura 2000 sites, or annexed species, if the proposed control measures are implemented.

Decommissioning Phase
It is foreseen that decommissioning will involve the removal of any site compounds used during the operation phase of the existing peat harvesting activities. Once peat harvesting activities cease on site, the site rehabilitation /closure plan will be fully implemented. A key aim of any site rehabilitation plan will include biodiversity enhancement measures which could include the restoration of wetland habitats wherever possible and where compatible with potential future uses. A further key aim of the plan will be to ensure that the ecological and hydrological functioning of important habitats in the area is unaffected and ecosystem services such as carbon sequestration is restored. Full details of the rehabilitation /closure plan will be fully determined if and when an IPC licence is granted and a closure plan is submitted in accordance with the IPC process.

Cumulative Impacts
As there are none or no significant impacts predicted from the ongoing peat harvesting at the Coole and Clonsura sites, there will be no significant cumulative impacts with other developments, including peat harvesting sites in the surroundings. For example, there is no hydrological connection between Lough Bane and the site and therefore there cannot be a cumulative impact with other activities. The sites account for 0.2% of the overall Inny River catchment.

4.2.5 Existing and On-going Mitigation Measures and/or Factors

Mitigation Procedures for Terrestrial Ecology

Although the preceding section demonstrates that the existing and ongoing peat harvesting activities is not likely to have a significant effect on biodiversity, nonetheless this section outlines existing and where relevant, proposed mitigation measures.

Mitigation by Avoidance
Ongoing peat harvesting, as is the current case, will be restricted to the current footprint. Sensitive habitats that have been identified in the surroundings including dystrophic ponds, poor fen and flush, remnant raised bogs, natural watercourses and the habitats associated with Lough Bane pNHA should continue to be avoided as is largely the case at present. Machinery and contract personnel will avoid entry and works within these sites. The site is hydrologically sensitive and drainage works that could impact these areas will be avoided.

Stock-piling of peat takes place in designated areas within the site, away from sensitive habitats or drainage features. These measures will be continued.

Sedimentation basins are used to prevent peat siltation of watercourses in or surrounding the study area. Mitigation for likely significant effects on watercourses are dealt with in more detail in Chapters 4.3 and 4.4.

Mitigation by Reduction
As a means of reducing potential significant effects on habitats of ecological interest within the site, a Habitat Enhancement and Management Plan for the sites will be drawn up and implemented. This plan will include management measures aimed at conserving and enhancing the ecology of the remnant raised bog areas, the dystrophic lake and poor fen habitats within the site. Detailed ecological and hydrological baseline data will be used to inform the contents of the plan. The plan will also include a detailed eco-hydrological monitoring programme to monitor its success or otherwise throughout the lifetime of the peat harvesting activities. The results of this monitoring will be used to update the plan as required.

Potential impacts caused by spillages etc. are reduced by keeping spill kits and other appropriate equipment on-site. Further detail in this regard is included in Chapters 4.3 and 4.4.

Mitigation by Remedy
Refer to Decommissioning Phase, Section 4.2.4. above.

4.2.6 Conclusions/Residual Impacts
There are no expected indirect hydrological impacts on the ecology of habitats within the sites and surrounding areas that have been deemed to be of High Local and National importance e.g. Lough Derravarragh, Lough Bane, the remnant wetland (raised bog and dystrophic lake).

The continued peat harvesting is unlikely to cause any additional disturbance to bird and mammal populations resident in the area and therefore no impacts are expected.

The potential impacts assessed (direct, indirect and cumulative) are imperceptible to minor in significance.

4.2.7 Interactions with other Environmental Attributes

Impacts on Terrestrial Ecology will interact and/ or interrelate with:

- Water quality: There are clear interactions between ecological receptors and surface and ground water resources. Further measures for the protection of water quality are outlined in Chapter 2, Description and Chapter 4.4, Land (Soils, Geology and Hydrology) while impacts and mitigation for Biodiversity – Aquatic, are discussed in Chapter 4.3.

4.2.8 Monitoring

The Habitat Enhancement and Management Plan for the sites will include a detailed eco-hydrological monitoring programme to monitor its success or otherwise throughout the lifetime of the peat harvesting. The results of this monitoring will be used to update the plan as required.

4.2.9 Reinstatement

Not applicable.

4.2.10 Difficulties in Compiling Specific Information

No difficulties were encountered in compiling this section of the EIAR.

4.3 Biodiversity (Aquatic)

Biodiversity refers to the variety and variability of life on earth and, as a term is now commonly used instead of species diversity and abundance.

'Biological diversity' or biodiversity is, according to the UN Convention on Biological Diversity (BCD) defined as being the '*variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'*

Article 3 of the EIA Directive 2014/52/EU states that the environmental impact assessment 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:

(b) biodiversity, with particular attention to species and habitats protected under Directive 32/43/EEC and Directive 2009/147/EC.

Biodiversity is addressed in this EIAR by way of reference to terrestrial biodiversity (plants, animals, birds) (Section 4.2) and aquatic biodiversity (fishes, invertebrates and aquatic plants) (Section 4.3).

The potential impacts (direct, indirect and cumulative) of the activity on biodiversity including terrestrial and aquatic ecology present within the site and surroundings are qualitatively assessed in sections 4.2 and 4.3 respectively.

The potential impacts on the Natura 2000 network of sites (European sites known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) have been assessed in a standalone Appropriate Assessment Screening and Natura Impact Statement (NIS) which is appended to this EIAR (**EIAR Volume II).**

4.3.1 Introduction

This section discusses the existing environment in terms of Aquatic Biodiversity in the vicinity of the sites, the actual and potential significant effects of the existing peat harvesting activity on the receiving environment and the actual and proposed mitigation measures that are and will be employed to reduce/ eliminate impacts. The full report, complete with Figures/Maps, Plates, Appendix 1 and References was prepared by Conservation Services Ltd. and is contained within Attachment 5.

The aims of the assessment were to:

- To assess the present fishery value, invertebrate fauna, aquatic flora, biological water quality, habitat value and general ecological condition of streams and rivers in the vicinity of the peat harvesting operation to determine the existing impacts and also to provide baseline data against which any future changes can be assessed where relevant.
- To assess the general status of the streams and rivers from an ecological and fisheries perspective in the context of their wider catchment based on survey data, published sources, EPA data, and on consultation with Inland Fisheries Ireland and NPWS.
- To identify mitigation measures in addition to existing measures already implemented by Westland where existing or potential negative impacts are identified and/or predicted.

Relevant Legislation

The following relevant legislation relates to the main legal constraints on peat harvesting operation in relation to aquatic flora, fauna, habitats and fisheries:

- The Local Government (Water Pollution) Acts, (1977 to 2007, its Amendments (and associated regulations))
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 to 2019
- The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962 Fisheries Acts 1959 to 2019
- Fisheries (Amendment) Act 1999 Directive repealed
- The Freshwater Fish Directive 78/659/EEC as transposed into Irish law under E.C. (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)
- The Wildlife Act (1976 to 2018 and Amendment Act 2000)
- The Habitats Directive (92/43/EEC) as transposed into Irish law under the E.C. (Natural Habitats Regulations 1997 (S.I. No. 94 of 1997)
- Water Framework Directive (2000/60/EC)
- Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

4.3.1.1 Competent Expertise

This chapter of the EIAR was prepared by Bill Quirke BSc, MSc, MCIEEM of Conservation Services. Bill is a Freshwater Ecologist with over 30 years' experience and has carried out numerous water quality assessments, Biological Q surveys and aquatic impact assessments on a wide range of projects in Ireland.

4.3.2 Study Assessment and Methodology

The following study assessment methodology was undertaken by Conservation Services Ltd:

- A review of current legislation relating to aquatic flora, fauna, habitats and fisheries.
- A selection of water bodies and sites for assessment was found by carrying out a desk study of the watercourses occurring within 0.5km down gradient from any part of the peat harvesting operation. These were located using the 1:50,000 Discovery Series Ordnance Survey Sheet 41 and EPA mapping of streams27.
- A habitat assessment was carried out.
- A stream invertebrate sampling and biological water quality assessment was carried out and compared to the EPA biological water quality monitoring data 1971-2011 collected for the Inny River and River Glore.
- An assessment of aquatic flora was made.

Selection of Waterbodies for Assessment

The potentially affected water bodies are shown in Attachment 5, Map 1 and listed below:

1. The Inny River,
2. The River Glore,
3. The Mayne Stream - a tributary of the Inny River, and,
4. The small watercourse flowing to the south of Lough Bane and traversing the Clonsura site. Known in this report as the Clonsura Stream (or S1).

[27] EPA Map Viewer http://maps.epa.ie/internetmapviewer/mapviewer.aspx

Refer to Attachment 5, Map 1 for locations.

Habitat Assessment
The habitat assessment was carried out between 31st May and 3rd of June 2013. The stream habitat assessment was carried out on c.14km of stream/river habitat i.e. adjacent to and for at least 1km downstream of all of the peat abstraction areas. Each watercourse section assessed was examined by boat or by walking and/or wading the channel. Attachment 5, Map 3 indicates the habitat assessment locations.

Each section was assessed in terms of:

- Stream width and depth using a hand held Hawk Eye Sonar
- Substrate type
- Flow type
- Dominant bank-side vegetation
- In-stream vegetation
- Estimated degree of shade

Salmonid, lamprey, crayfish and coarse fish habitat quality was assessed, taking into account the environmental features listed above. Based on these observations and more detailed criteria outlined in Attachment 5, Sections 2.2.1 – 2.2.4, the value of each river section for the different life stages of salmonids and lamprey, crayfish and coarse fish was estimated.

Stream Invertebrate Sampling and Biological Water Quality Assessment
A total of 8 sampling sites were chosen at the upstream and downstream extremities of the main peat harvesting areas to establish a biological water quality assessment. A map of these locations is shown in Attachment 5, Map 2.

At each of these sites the aquatic invertebrates were sampled on a cross channel transect. Further details of the methodology used are given in Attachment 5, Section 2.3.

Assessment of Aquatic Flora
Submerged and floating aquatic vegetation was assessed at the 8 sampling sites (Attachment 5, Map 2). Further details of the methodology used are given in Attachment 5, Section 2.4.

Assessment of Existing and Potential Impacts
The criteria for assessing the significance of impacts on flora, fauna and fisheries are discussed in detail in Attachment 5, Section 2.5.

Guidelines Used for Classification of Importance of Freshwaters
The Guidelines Used for Classification of Importance of Freshwaters are discussed in detail in Attachment 5, Section 2.6

4.3.3 Existing Environment
The description of the receiving environment in terms of Aquatic Ecology has been split into the following headings:

- General Catchment Information;
- Fishery Value;
- Water Quality, and,
- Ecological Importance.

General Catchment Information

The Inny River is part of the Shannon River system which rises in County Meath near the town of Oldcastle and in total drains a catchment area of 1197Km². The river flows from the north-east in a south-west direction from Lough Sheelin into Lough Kinale, into Lough Derravarragh and also into Lough Iron, and finally into Lough Ree and the River Shannon, North of Athlone town. The river is described as being fast flowing and shallow between Oldcastle and Lough Sheelin. From Lough Sheelin, the Inny flows the short distance to Lough Kinale and then meanders slowly through a deep wide channel to Lough Derravarragh. The Inny was subject to an arterial drainage scheme between 1959 and 1963 by the OPW and the channel has been maintained for drainage purposes by the OPW since then.

The River Glore rises north east of Castlepollard, County Westmeath, and flows for a distance of c.14km through Lough Glore and then in a north westerly direction to the Inny River c.3km upstream of Camagh Bridge.

Fishery Value

A total of 13 fish species have been recorded in the Inny River[28]; these are bream (*Abramis brama*), roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), pike (*Esox lucius*), brown trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), European eel (*Anguilla anguilla*), roach x bream hybrids, gudgeon (*Gobio gobio*),minnow (*Phoxinus phoxinus*), stoneloach (*Barbatula barbatula*), brook lamprey (*Lampetra planeri*) and chub (*Leuciscus cephalus*). Roach was the most abundant species recorded, followed by brown trout and pike.

The full report (Attachment 5, Section 3.1.1) discusses the fishery value of Inny River, River Glore and Lough Derravarragh in more detail.

On the basis of the biological water quality and habitat assessments, the entire surveyed section of the Inny River constitutes good coarse fishing waters and fair adult trout habitat. Habitat suitable for trout spawning or as trout nursery areas was almost non-existent in the c.10 km of the Inny channel surveyed.

The upstream end of the potentially affected section of the River Glore constitutes significant trout habitat with fair–good habitat for adult fish, fair nursery habitat and poor–fair spawning habitat. Further downstream trout nursery and spawning habitat is poor. On the basis of the water quality and habitat quality data it is concluded that the River Glore is likely to constitute a significant trout nursery stream for the adjacent section of the Inny River. It is also possible that the River Glore serves as a trout spawning and nursery area for Loughs Sheelin and Derravarragh.

The surveyed sections of the Mayne Stream were found to have no significant fish habitat apart from a very short section of fair trout nursery and spawning habitat. Likewise, the surveyed section of the Clonsura Stream/S1 was deemed to have no significant fishery value.

Maps 4 -6 indicate the findings for salmonid habitat.

[28] Maguire, C., Gallagher, K. Maggs, C., Dick, J., Caffrey, J., O'Flynn, C., Fitzpatrick, U., Kelly, J. and Harrod, C. (2011) Ecological implications of the invasion of chub (*Leuciscus cephalus*) in the Inny River. STRIVE End of Project Report Prepared for the Environmental Protection Agency by School of Biological Sciences, Queen's University, Belfas, Inland Fisheries Ireland, National Biodiversity Data Centre and Envirocentre. Environmental Protection Agency

Water Quality

EPA biological water quality monitoring data 1971 – 2011 for the Inny River, and River Glore are presented in Appendix 1. Good ecological condition was found at six out of ten sites surveyed by EPA on the Inny River in 2011, a major improvement on the 2008 survey results.

While one of the two stations recording on the River Glore remained as 'Poor', the other improved significantly from 'Moderate' to 'High Ecological Status'.

EPA monitoring indicates that there has been a steady improvement in the water quality of Lough Derravarragh over the last 13 years.

Biological water quality ratings for the assessment carried out are summarised in Table 4.3.1 and are illustrated on Map 10 of Attachment 5. The Clonsura Stream/S1 was recently excavated and was therefore not suitable for biological quality assessment.

River Inny

Biological water quality assessment was carried out at four sites on the Inny. Biological quality is rated on a five-point scale known as the Q Value system. A value of 1 is poor, and a value of 5 is excellent. EPA scientists log their Q Value results and validate them every year. Taking into account the depositing substrate, the invertebrate community at all four sites merits a Q-rating of Q3-4 indicating slightly polluted conditions. There is therefore no indication from the invertebrate assessment of a significant impact from the Westland operations on biological water quality in the main channel of the River Inny at present. That having been said the presence of deep, soft, highly mobile peaty silt throughout the entire section of the River Inny assessed (i.e. from upstream of the Clonsura peat harvesting area as far downstream as Lough Derravarragh) seems likely to be due to a significant extent to anthropogenic factors. The well-developed aquatic flora is clearly adapted to these conditions; however, without historical biological data it is not possible to determine the degree to which the aquatic flora has been changed from its original condition by anthropogenic factors such as siltation. Likewise, this is the case with the macroinvertebrate fauna. The fauna recorded are adapted to the environment of soft silt substrates and abundant aquatic plants and are indicative of slight organic/nutrient pollution. However, it is possible that the invertebrate fauna is significantly influenced by anthropogenic influences on the physical habitat. If the Westland operations have contributed to the peat/silt in this section of the Inny, (which cannot be concluded from the results of the present survey), it is clear that this contribution is insufficient to cause perceptible additional impact on biological water quality over and above the impact already caused by activities in the catchment upstream.

River Glore

Biological water quality assessment sites were established on the River Glore upstream and downstream of the Coole peat harvesting area at Sites G-1 and G-2. The invertebrates at both sites merited a Q-rating of Q3-4 indicating slightly polluted conditions. There is therefore no indication from the invertebrate assessment of a significant impact from the Westland operations on biological water quality of the River Glore.

Mayne Stream

Biological water quality assessment sites were established on the Mayne Stream upstream and downstream of the Coole peat harvesting area at Sites B-1 and B-2. The invertebrates at both sites merited a Q-rating of Q3 indicating moderately polluted conditions. There is therefore no

indication from the invertebrate assessment of a significant impact from the Westland operations on the biological water quality of the Mayne Stream.

Table 4.3.1 Summarised Biological Water Quality Assessment Results

Biological Sampling Point	Waterbody	Q-Value Rating
IN-1 (Upstream Clonsura)	Inny River	Q3-4 (Slightly Polluted)
IN-2 (Downstream Clonsura)		Q3-4
IN-3 (Upstream Coole)		Q3-4
IN-4 (Downstream Coole)		Q3-4
G-1 (Upstream Coole)	River Glore	Q3-4
G-2 (Downstream Coole)		Q3-4
M-1 (Upstream Coole)	Mayne Stream	Q-3 (Moderate Pollution)
M-2 (Downstream Coole)		Q-3

Ecological Importance

Three Habitats Directive Aquatic Annex II species are found in the Inny River system:

1. Brook Lamprey (*Lampetra planeri*)
2. Atlantic Salmon (*Salmo salar*)
3. Crayfish (*Austropotamobius pallipes*)

These three species in relation to the Inny River and River Glore are discussed in further detail in Attachment 5, Section 3.1.3.

The section of the Inny River surveyed has fair habitat quality for crayfish. However, whereas crayfish are known to be present in some sections of the Inny there appear to be no records for the species in the main channel of the river from Lough Kinale to Lough Ree in the last 30 years (see Section 3.1.3 above). No crayfish were recorded in the cross channel invertebrate sampling carried out for the present report. Whether the apparent absence of crayfish from much of the main channel, while present in the tributaries, is due to anthropogenic factors such as siltation, or to natural factors such as crayfish disease, cannot be determined on the basis of existing scientific data.

Brook lamprey are known to be present in this section of the Inny River and good lamprey nursery habitat was found to be widespread in the present survey. As suitable lamprey spawning habitat was not recorded in the Inny River in the present survey it seems likely that the juvenile lamprey recorded were spawned in suitable habitat in tributary streams or in the Inny upstream of the area surveyed. The surveyed section of the Inny River is classified as of high local importance.

No crayfish were recorded at the two invertebrate assessment sites on the River Glore in the present study however it is likely they occur here.[29] [30] Data on the National Biodiversity Data

[29] King J.J., Lordan M., and Wightman G.D. (2008) Ecological Impact Assessment (EcIA) of The Effects of Statutory Arterial Drainage Maintenance Activities on Whiteclawed Crayfish (*Austropotamobius pallipes*). Series of Ecological Assessments on Arterial Drainage Maintenance No 10 Environment Section, Office of Public Works, Headford, Co. Galway.
[30] Lucey, J. and McGarrigle, M. (1987) The distribution of the crayfish Austropotamobius pallipes (Lereboullet) in Ireland Irish Fisheries Investigations Series A (Freshwater) No. 29 Roinn na Mara (Department of the Marine).

Centre website[31] show that crayfish have been recorded in the River Glore throughout the period 1977 to 2008 (https://maps.biodiversityireland.ie/Map/Terrestrial/Dataset/128) (2020) (albeit upstream of the area assessed for the present report).

Fair lamprey nursery habitat was recorded in the potentially affected section of the River Glore. As the species is known to be present in the adjacent section of the Inny River, the precautionary principle is applied and it is assumed that they are also present in the River Glore.

The surveyed sections of the River Glore and Mayne Stream are classified as of high local importance and moderate local value respectively.

The surveyed section of the Clonsura Stream/S1 had low ecological value.

Attachment 5, Maps 7 and 8 contain the findings in relation to crayfish and lamprey.

Assessment of Waters in the Vicinity of the Activity

There was a total of 11 habitat sections assessed and a habitat rating for each section, see Table 4.3.1 overleaf for a summary. These habitat sections are described in greater detail with corresponding plates in Attachment 5, Section 3.2. Locations of the habitat sections are shown on Maps 3-9 in Attachment 5.

[31] National Biodiversity Data Centre www.biodiversityireland.ie

Table 4.3.2 Summary Table of the Habitat Assessments carried out on the Inny River, the River Glore, the Mayne Stream and the Clonsura Stream/S1.

Section Name	Section Location	Waterbody	Approx. Length (m)	Salmonid Adult Habitat	Salmonid Nursery Habitat	Salmonid/Lamprey Spawning Habitat	Crayfish Habitat	Lamprey Nursery Habitat	Coarse Fish Habitat
IN-A	N40730 77666 to N40690 76802	Inny River	1200	Fair	None	None	Fair	Good	Good
IN-B	N40690 76802 to N39175 75629	Inny River	3000	Fair-Good	None-Poor	None	Fair	Good	Good
IN-C	N39429 72882 to N39358 71431	Inny River	2000	Fair	None	None	Fair	Fair-Good	Good
IN-D	N39358 71431 to N39676 68324	Inny River	3800	Fair	None	None	Fair	Good	Good
D-A	N39676 68324	Lough Derravarragh	200	Fair	None	None	Fair	Poor	Good
G-A	N41860 76215 to N41739 76333	River Glore	200	Fair-Good	Fair	Poor-Fair	Fair-Good	Fair	Fair
G-B	N41739 76333 to N40694 76759	River Glore	1400	Fair	Poor	None	Fair	Poor-Fair	Fair
M-A	N40435 70742 to N39679 71333	Mayne Stream	1100	None	None	None	Poor	Poor	Poor

Section Name	Section Location	Waterbody	Approx. Length (m)	Salmonid Adult Habitat	Salmonid Nursery Habitat	Salmonid/Lamprey Spawning Habitat	Crayfish Habitat	Lamprey Nursery Habitat	Coarse Fish Habitat
M-B	N39679 71333 to N39646 71364	Mayne Stream	40	Poor	Fair	Fair	Poor	None-Poor	None
M-C	N39646 71364 to N39364 71432	Mayne Stream	300	None	None	None	Poor	Poor	Poor
C-A	N42140 77135 to N41725 77340	Clonsura Stream/S1	600	None	Poor	None-Poor	Poor	Poor	Poor

4.3.4 Actual and Potential Impacts of the Activity

This section assesses the actual and potential futures impacts of the existing peat harvesting activity on the Aquatic Ecology of the Coole and Clonsura sites.

The potential significant effects of the peat harvesting works in the absence of existing mitigation measures or factors on aquatic ecology are:

- Pollution of watercourses with suspended solids.
- Pollution of watercourses with nutrients associated with suspended solids and in water draining from the peat harvesting area.
- Pollution of watercourses with other substances such as fuels, lubricants, waste water from site toilet and wash facilities, etc.
- Hydrological impact due to changes in the flow rates of streams/rivers.

Pollution of Watercourses with Suspended Solids

In the absence of adequate mitigation peat harvesting has potential for suspended solids contamination of surface waters. Peat soils have high erodability[32] and may be less amenable to removal by conventional Sedimentation basins unless properly sized to allow for peat particles.

Potential significant effects could include the following:

- Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel.
- Bed Load (coarse material transported along the bottom of the stream) and settled sediments can infill pools and riffles, reducing the availability and quality of rearing habitat for fish.
- Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items.
- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish.
- Siltation can make lengthy sections of watercourse unsuitable for crayfish33.
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas34.

- Suspended solids can abrade or clog the gills of salmonid fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections35.

- Deposition of silt will also promote the development of extra rooted plant productivity. This will give rise to the waterways being clogged, thus reducing the swim area for fish and their ability to feed and thrive reducing stock density. In addition, there will also be a greater tendency for river drainage to occur which will have an extremely destructive impact on the river and in particular its biology[36].

[32] Forest Service (2008) Forestry and Freshwater Pearl Mussel Requirements Site Assessment and Mitigation Measures. Department of Agriculture, Fisheries and Food
[33] Peay, S. (2000) Guidance on works affecting white-clawed crayfish. Report prepared for English Nature and the Environment Agency.
[34] Chilibeck, B., G. Chislett, and G. Norris (1992) Land development guidelines for the protection of aquatic habitat. Department of Fisheries and Oceans, Canada. Habitat management division. Ministry of Environment Lands and Parks. Integrated Management Branch.
[35] Solbe, J. (1988) Water quality for Salmon and Trout. Atlantic Salmon Trust.
[36] Shannon International River Basin District Project (2008) Peatlands Report. Shannon International River Basin District.
http://www.shannonrbd.com/pdf/peatlandsreportjul08.pdf

In the absence of adequate mitigation measures, contamination of water courses with suspended solids is one of the most significant potential effects of peat harvesting.

Nutrient Enrichment of Streams/Rivers

Two forms of phosphorus are usually found in the surface water runoff from harvested bogs; these are the dissolved soluble phosphorus, and the phosphorus removed with sediments, particularly the lighter and finer-sized particles such as humic materials in peat. Surface waters draining peat catchments are coloured due to the presence of high concentrations of dissolved organic matter. Natural decomposition of peat releases dissolved organic matter into the surface waters. Dissolved humic materials (DHM's) are naturally occurring biogenic chemicals which can impart colour to water. Research has shown that DHM may absorb phosphate in the presence of iron. Once DHM-iron phosphate complexes absorb phosphate they reduce its bioavailability to algae[37]. It has also been shown that UV light in sunlight can release the phosphorus bound to dissolved humic substances released from bogs. Therefore, a combination of dissolved humic substances from bogs and natural UV-sunlight could increase phosphate levels in freshwaters.

Whereas the proportion of phosphorus that is likely to be available from DHM is uncertain, empirical evidence indicates that most phosphorus enrichment of surface waters from peat harvesting is associated with particulate matter which can be removed using standard suspended solids removal methods. Based on a study done in 1993[38] it was estimated that the annual phosphorus load from worked bogs in the Lough Derravaragh catchment at 2.8 to 5.6 tonnes TP was relatively low, contributing approximately 2% of the total phosphorus load to Lough Derravaragh from an area of worked bog of about 20,000 ha. Treatment of surface water from cutaway bogs via peat silt lagoons as a practice commenced in the late 1990s. Data in Shannon International River Basin District Project (2008)[36] indicate that the more recent annual phosphorus loading from the worked bogs in the Lough Derravaragh catchment is in the order of 1.6 tonnes TP. The data indicate that a significant nutrient load reduction is most likely due to the installation of sedimentation basins as part of the IPC licensing process.

A Shannon River Basin District study on an actively worked peatland[36] (2008), found the concentration of Ammonium in peatland surface water runoff at the sites studied to have naturally high levels and therefore the EQS for Ammonium *proposed under the Water Framework Directive for MRP unlikely to be achieved in catchments with actively worked peatlands.* However, it should be noted that EPA water quality data do not indicate an issue with ammonia at stations close to the peat harvesting areas which are the subject of this report (See Section 4.4, Table 4.4.9).

Contamination of Streams/Rivers with other Substances

The potential exists for a range of pollutants to enter watercourses from the peat harvesting operation. For example, any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses.

- Fuels, lubricants and hydraulic fluids for equipment used on the site
- Waste from on-site toilet and wash facilities

[37] McGarrigle M. and Kilmartin, L. (1992). UV-Sensitive Phosphate in Irish Peaty Waters. A Study of Potential Effects on Freshwater Ecosystems. Environmental Research Unit.
[38] Bowman, J.J., McGarrigle, M.L. and Clabby, K.J. (1993) Lough Derg- An investigation of eutrophication and its causes. Part 1 Water quality assessment, nutrient sources, conclusions and recommendations. A report to the Lough Derg Working Party, Environmental Research Unit.

Hydrological Impacts

The Inny River and the River Glore have been subjected to arterial drainage with the associated regular maintenance dredging of channels. The main aquifer associated with the marl and bedrock under the sites is unaffected by the existing peat harvesting activities although the marl is visible in the perimeter drains where seepage of groundwater into the drains does occur. As the bogs were drained in the 1980s, the main changes to the hydrogeological regime and inputs to the rivers would have occurred then. It is therefore not likely that the existing peat harvesting activity at the Westland sites will cause significant changes in the hydrology of the Inny River or River Glore. Further detail where relevant is provided in Section 4.4 of the EIAR.

General Conclusion of Biological Water Quality Impacts

The assessments carried out for the Inny River (Attachment 5, Section 3.2) gives no indication from the macroinvertebrate assessment of a significant impact from the existing peat harvesting activities on biological water quality in the main channel of the Inny River at present. However, the presence of deep, soft, highly mobile peaty silt throughout the entire section of the Inny River assessed (i.e. from upstream of the Clonsura peat harvesting area as far downstream as Lough Derravaragh) seems likely to be due to a significant extent to anthropogenic factors. The well-developed aquatic flora is clearly adapted to these conditions; however, without historical biological data it is not possible to determine the degree to which the aquatic flora has been changed from its original condition by anthropogenic factors such as siltation. Likewise, this is the case with the macroinvertebrate fauna. The fauna recorded are adapted to the environment of soft silt substrates and abundant aquatic plants and are indicative of slight organic/nutrient pollution. However, it is possible that the macroinvertebrate fauna is significantly influenced by anthropogenic influences on the physical habitat.

If the existing peat harvesting activities have contributed to the peat/silt in this section of the Inny River, which cannot be concluded from the results of the present survey, it is clear that this contribution is insufficient to cause perceptible additional impact on biological water quality over and above the impact already caused by activities in the catchment upstream.

There is also no indication from the invertebrate assessment of a significant impact from the existing peat harvesting activities on biological water quality of the River Glore or the Mayne Stream.

As the Clonsura Stream/S1 was recently excavated by other bodies, it is not suitable for biological water quality assessment so no impact assessment could be made.

4.3.5 Existing and Proposed Mitigation Measures and/or Factors

Mitigation Procedures for Aquatic Ecology

Prevention of Suspended Solids Pollution

The potential exists for suspended solids pollution to surface waters adjacent to peat harvesting sites via direct runoff from the sites and also via airborne peat dust being blown from the peat harvesting areas during the peat milling, drying, ridging, transport and stockpiling processes.

The assessment of the adequacy of the sedimentation basins is included in Section 4.4 of the EIAR. The main mitigation measures currently applied to minimise/avoid suspended solids input to water courses are described in Section 4.4.5.

In addition, Conservation Services Ltd have recommended, and Westland have agreed, to propose a lower emission limit value for suspended solids in the discharges from the settlement ponds – 25mg/l

rather than the 35mg/l set out in the EPA BATNEEC and which has been applied to other peat harvesting sites.

25mg/l is the maximum limits set for allowable suspended solids in receiving waters in the Salmonid Regulations (1988) and applying this limit to discharges will ensure that they will have no detrimental impact on the existing aquatic flora and fauna of the receiving waters. In its submission in 2010, the IFI has stated: "*The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the River Inny would be included within this plan. In the interests of sustainability, it is imperative that all assessments carried out are cognisant of the River Inny's ability to support salmon in the future and do not impact on this plan in any negative way*."

Applying a 25mg/l limit will ensure that the discharges from the Westland peat harvesting sites will not compromise the objectives of the Shannon Salmon Restoration Project.

The following measures for reduction of airborne peat dust are already implemented but listed for completeness:

- All headlands and travel areas are and will continue to be kept free of loose peat at all times by regular ridging & harvesting.
- No harvesting equipment transportation in the designated 30-metre buffer zone adjacent to the Inny River, as is currently the case.
- The 30-metre buffer zone adjacent to the Inny River will be maintained with natural vegetation species planted.
- Traffic along headlands will be kept to a minimum and slow speeds maintained.
- At the end of season all milled peat remaining on fields will be ridged or compacted to prevent airborne dust generation or silt deposition in waterways.
- There will be no stock piling of loose peat within 100 metres of the Inny River.
- Production operations will be suspended in very windy weather.
- When harvesting the jib will be maintained low to the stockpile collection trailers.
- Road transported peat will be suitably covered (sheeted or enclosed).
- All loading stations are concreted thus trucks leaving the site are not covered in mud. Accordingly, it is not proposed to install a wheel wash.
- Equipment used on site complies with relevant vehicle emission standards (Directive 96/1/EC which deals with measures to be taken against the emission of gaseous and particulate pollutants from diesel engines).

Trees will be planted along exposed sections of the banks of the River Inny which bound the harvesting lands, and will be sufficient width, height and density to prevent significant quantities of peat dust reaching the rivers[39].

Prevention of Pollution by Nutrients and other Potential Contaminants from Peat Drainage

As likely to be stipulated by the EPA, pending their assessment and considerations of factors such as assimilative capacity of the river, BATNEEC limit values for other parameters will apply and be adhered to.

Reduction or Elimination of Contamination of the Streams with other Substances Associated with the Peat Harvesting Process

Mitigation measures in relation to the reduction or elimination of contamination of the streams with other substances such as fuels, lubricants or hydraulic oils are addressed in detail in Section 4.4, Section 4.4.5.

4.3.6 Conclusions/Residual Impacts

If all existing mitigation measures continue to be fully implemented and new measures as proposed are implemented then, the residual impact on aquatic flora, fauna, and fish life will be insignificant.

4.3.7 Interactions with other Environmental Attributes

Impacts on Aquatic Ecology will interact and/ or interrelate with:

- Water quality: There are clear interactions between ecological receptors and surface and ground water resources. Further measures for the protection of water quality are outlined Section 4.4 Land (Soils, Geology and Hydrology).
-

4.3.8 Monitoring

Proposed monitoring will be as stipulated by the EPA. Parameters analysed should include Total Phosphorus, Ammonia, COD and pH.

The EPA will stipulate the monitoring required in relation to suspended solids as part of the IPPC licensing regime. Notwithstanding this, Westland are committed to ensuring that their activity does not adversely impact on suspended solid levels in the Inny River. In this regard, the company will, as recommended in the Conservation Services report, develop and conduct a comprehensive monitoring programme in consultation with the IFI.

A dust monitoring system will be placed on the banks of the Inny River as the area of greatest environmental risk identified on site. Operations on site will be controlled to meet the dust emission discharge limits of 350mg/m²/day as stipulated by EPA. Once measurement of dust emissions has commenced a detailed report of monitoring analysis shall be compiled.

4.3.9 Reinstatement

Not applicable.

4.3.10 Difficulties in Compiling Specific Information

No difficulties were encountered in compiling this section of the EIAR.

[39] Holdwright, C. (2008) Preliminary Report on Peat Siltation in the Inny River. Shannon Regional Fisheries Board.

4.4 Land (Soils, Geology and Hydrology)

4.4.1 Introduction

This chapter discusses the impact of the peat harvesting activity on land, soils, geology and hydrology including hydrogeology. This chapter was prepared by Hydro-Environmental Services (HES) with input from OES Consulting.

The aims of the assessment were to:

- Produce a baseline study of the existing hydrological and hydrogeological environment (surface and groundwater) in the area of the peat harvesting operation;
- Identify the existing (if any) and potential impacts of the operation on surface and groundwater; and,
- Identify existing and proposed mitigation measures to avoid or reduce potential negative impacts.

The potential cumulative impact of the operation with other activities in terms of Soils, Geology and Hydrology is addressed and existing and future mitigation measures are identified where required.

Relevant Legislation

The following relevant legislation relates to the main legal constraints on peat harvesting operations in relation to Soils, Geology and Hydrology:

- European Communities (Environmental Impact Assessment) Regulations,1989 as amended.
- EU Communities (Birds & Natural Habitats) Regulations, 2011
- European Communities (Natural Habitats) Regulations,1997 as amended
- Quality of Salmonid Water Regulations, 1988
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009
- European Communities (Water Policy) Regulations, 2003 as amended
- Protection of Groundwater Regulations 1999 as amended
- Quality of Surface Water Intended for Abstraction (Drinking Water) Regulations, 2007 as amended
- Quality of Water intended for Human Consumption Regulations, 2000 as amended
- European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended

4.4.1.1 Competent Expertise

This chapter has been prepared by Michael Gill, of Hydro-Environmental Services (HES), with input from OES Consulting. HES is a specialist hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005. Michael is an Environmental Engineer with 12 years environmental consultancy experience in Ireland. He has completed numerous hydrological and hydrogeological assessments for water supplies and source protection reports across the country and he has a wide experience in general Irish hydrogeology. He has also managed EIA/EIS assessments for infrastructure projects and private residential and commercial developments.

In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/karst hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions. Michael has worked regularly with Local

Authorities, Planners and Regulators and applies his experience and knowledge, along with his well-developed project management skills to successfully implement and achieve project deliverables.

4.4.2 Study Assessment and Methodology

Relevant Guidance
This chapter of the EIAR is carried out in accordance with relevant guidance contained in the following:

- Institute of Geologists Ireland (2002): Geology in Environmental Impact Statements – A Guide;
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; and,
- Environmental Protection Agency (1996): BATNEEC Guidance Note – Class 1.4 – Extraction of Peat (Draft 3).
- "Guidelines on the information to be contained in Environmental Impact Assessment Reports" (draft, May 2017).
- "Advice notes on current practice in the preparation of Environmental Impact Statements" (draft, September 2015);
- "Guidelines for Planning Authorities and An Bord Pleanala Carrying out Environmental Impact Assessment" Department of the Environment, Community and Local Government (2018).

Desk Study
A desk study of both sites and their surrounding areas was completed by HES in advance of undertaking the walkover survey and site investigation. This involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. This included consultation with the following:

- Environmental Protection Agency (EPA) databases (www.epa.ie);
- Geological Survey of Ireland (GSI) - National Draft Bedrock Aquifer map;
- GSI - Groundwater Database (www.gsi.ie);
- GSI borehole / depth to bedrock data from Exploration and Mining Division Minerals open file data and geotechnical databases (www.gsi.ie);
- EPA / Teagasc 1:50,000 scale soils and subsoils maps and associated documentation;
- GSI Database of Geological Heritage Sites;
- The Department of Communications Marine and Natural Resources - Exploration and Mining Division website (www.minex.ie);
- Met Eireann Meteorological Databases (www.met.ie;
- National Parks and Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive "*WaterMaps*" Map Viewer (www.wfdireland.ie);
- GSI – Groundwater Body Initial Characterisation Reports; and,
- OPW's Indicative Flood Maps (www.flooding.ie).

Site Investigations
Site investigations, drainage mapping and hydrological baseline monitoring/sampling were undertaken by HES on 10th, 11th, 12th and 25th of June 2013. Investigations to complete the baseline assessment for the hydrology and hydrogeology section of the EIAR included the following:

- A walkover survey and hydrological mapping of the site and the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded, including a walkover survey of the Lough Bane area;

- A total of 103 no. gouge cores were undertaken by HES to determine the thickness of the harvested peat at both sites;
- Field hydrochemistry measurements (electrical conductivity, pH, oxygen and temperature) were taken to determine the origin of surface water flows at both sites; and,
- A total of 10 no. surface water samples were taken by HES to determine the water quality of the surface water runoff originating from the sedimentation basins and also the downstream receiving waters quality.

Existing Monitoring Data and Previous Investigations

As part of the hydrology/hydrogeology impact assessment, a number of existing data sources were reviewed and are presented in this chapter. This includes the following:

- Sedimentation basin discharge quality monitoring data (2010 – 2019);
- Assimilative capacity assessment undertaken by OES Consulting in February 2011 and updated in 2020; and,
- EPA/WFD surface water monitoring data for the Inny River.

Impact Assessment Methodology

The impact assessment methodology used is broadly in line with that set out in Chapter 1 of this EIAR although further detail is provided in the following tables.

The sensitivity of the water environment receptors was initially assessed on completion of the desk study and baseline study. Levels of sensitivity, which are defined in Table 4.4.1 overleaf, are then used to assess the potential effect that the existing activity may have on them.

Table 4.4.1 Receptor Sensitivity Criteria[40]

Sensitivity	Description
Not sensitive	Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted). Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance.
Sensitive	Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all-natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.
Very sensitive	Receptor of high environmental importance or of national or international value *i.e.* NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer.

[40] Adapted from the Scottish Environmental Protection Agency www.sepa.org.uk

The statutory criteria[41,42] for the assessment of impacts (soils/geology and water) require that likely impacts are described with respect to their extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable). Two impact characteristics, proximity and probability, are described for each impact and these are defined in Table 4.4.2 below.

Table 4.4.2 Impact Characteristics

Proximity	Direct	An impact which occurs within the area of the activity, as a direct result of the activity.
	Indirect	An impact which is caused by the interaction of effects, or off-site.
Probability	Low	A low likelihood of occurrence of the impact.
	Medium	A medium likelihood of occurrence of the impact.
	High	A high likelihood of occurrence of the impact.

In order to provide an understanding of this descriptive system in terms of the geological and hydrological environment, elements of this system of description of impacts are related to examples of actual or potential impacts on the morphology of the existing environment, as follows in Table 4.4.3.

[41] EPA (2002). Guidelines on the information to be contained in Environmental Impact Statements.

[42] EPA (2003). Advice Notes on Current Practice (in the preparation of Environmental Impact Statements). Environmental Protection Agency, Wexford.

Table 4.4.3 Impact Descriptors Related to the Receiving Environment

Type of Impact	Size of Impact	Impact Description
Negative only	Profound	Widespread permanent impact on: - The extent or morphology of a SAC. - Regionally important aquifers. - Extents of floodplains. Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Significant	Local or widespread time dependent impacts on: -The extent or morphology of a SAC / ecologically important area. -A regionally important hydrogeological feature (or widespread effects to minor hydrogeological features). -Extent of floodplains. Widespread permanent impacts on the extent or morphology of an NHA/ecologically important area, Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time dependent impacts on: - The extent or morphology of a SAC / NHA / ecologically important area. - A minor hydrogeological feature. - Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends.
Positive, Negative or Neutral	Slight	Local perceptible time dependent impacts not requiring mitigation.
Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

4.4.3 Existing Environment

Soils and Geology

Soils and Subsoils

The EPA soils map for both the Coole and Clonsura areas shows the sites to be predominately overlain by cutover peat.

The GSI subsoils map for both the Coole and Clonsura areas shows cutaway peat is predominant in the area of both sites. Limestone gravels and tills are the predominant mineral subsoils outside of the sites. Subsoils maps are shown in Attachment 1, Figures 4.4.1 and 4.4.2.

A total of 69 no. gouge cores were undertaken by HES on 10th and 11th June 2013 within the Coole site to determine peat depths and to investigate the underlying subsoil lithology (Refer to Attachment 1, Figures 4.4.3 and 4.4.4 for peat depths). Peat depths at that time ranged from between 0 to 7.15m with the average depth of peat being 3.16m. The deepest peat cover was generally found to be in area of intact peat, on the eastern portion of the Mayne townland where peat depths exceeded 6m. Within

the harvesting area peat depths tended to be greatest in the southern portion of the Coole site where the average peat depth was 3.38m, and least in the northern portion of the site where the average peat depth was 2.04m. Peat depth summary statistics for the Coole site are presented in Table 4.4.4 below. This shows that 76.8% of the gouge cores encountered peat depths between 2m to 5m. The peat tended to thin out along the northern boundary of the site. The peat at the site was found to be predominately underlain by a soft light brown SILT/CLAY with shell fragments (*i.e.* marl lake sediments).

A total of 34 no. gouge cores were undertaken by HES on 11th June 2013 within the Clonsura site (Refer to Attachment 1, Figure 4.4.4). Peat depths ranged from 0.67m to 7.8m with the average depth of peat being 4.78m. Peat depth summary statistics for the Clonsura site are presented in Table 4.4.4 below. This shows that 82.4% of the gouge cores encountered peat depths between 3m to 7m. The deepest peat cover was generally found in the central portion of the bog. The peat thickness tends to thin out along the access road to the northeast. The peat at the site was found to be predominately underlain by a soft light brown SILT/CLAY with shell fragments (*i.e.* marl lake sediments).

Table 4.4.4 Coole and Clonsura Peat Depth Summary Statistics

Coole Thickness Range (m)	Coole Distribution (%)	Clonsura Thickness Range (m)	Clonsura Distribution (%)
0 - 0.5	1.45	0 - 0.5	0
0.5 - 1.0	4.35	0.5 - 1.0	2.94
1.0 - 1.5	5.8	1.0 - 1.5	0
1.5 - 2.0	4.35	1.5 - 2.0	2.94
2.0 - 3.0	30.43	2.0 - 3.0	5.88
3.0 - 5.0	46.3	3.0 - 5.0	44.12
5.0 - 7.0	5.8	5.0 - 7.0	38.24
7.0 - 8.0	1.45	7.0 - 8.0	5.88

Bedrock Geology

The GSI bedrock map of the area shows that the Coole site is predominantly underlain by the Lucan Formation which comprises dark limestone and shale. The southwestern portion of the Coole site (less than 5%) is underlain by Dinantian Pure Unbedded Limestone (mudbank limestone).

Likewise, the GSI bedrock map shows that the Clonsura site is also underlain by the Lucan Formation. There are no bedrock exposures at either site due to the complete cover of peat. The bedrock geology map of the region is shown in Attachment 1, Figure 4.4.5.

Hydrology and Hydrogeology

The Hydrology of Raised Bogs

A cool climate and rainfall levels exceeding evaporation are the primary environmental requirements for raised bogs. Raised bogs have developed over 10,000 years since the last Ice age. The Irish landscape was characterised by glacial formations such as eskers and drumlins. These glacial deposits (low-permeability substrates) impeded free drainage and, as a consequence, numerous relatively shallow lakes were formed[43]. A high groundwater table may also impede drainage. After glaciation,

[43] Doyle, G.J. and Ó'Críodáin, C. (2003) Peatlands – fens and bogs. In: M. Otte (ed.) Wetlands of Ireland – distribution, ecology, uses and economic value, pp79-108. University College Dublin Press, Dublin

through a gradual process of terrestrialisation, the lake basins were vegetated and overtime peat deposits accumulated to fill the basin, up to the original lake water level, forming topogenous peat[43]. Waterlogging creates anaerobic conditions, slowing down the decomposition of plant material and so leading to peat accumulation. In most places in Ireland, this fen stage was superseded by a further/ continued accumulation phase which elevated the bog surface above ground-water levels to form a gently curving, domed ('raised') surface. They develop successionally from fens, or, in wet climates, by peat accumulation directly on bare substrates (paludification). Peat accumulation separates the bog from the groundwater and the bog then becomes solely rain-fed (ombrotophic). In the northern hemisphere Sphagnum mosses play an important part in the development process, due to their ability to retain water.

The acrotelm is one of two distinct layers in undisturbed peat bogs. It overlies the deeper catotelm layer. The boundary between the two layers is defined by the transition from peat containing living plants (acrotelm) to peat containing dead plant material (catotelm). The free water table on the surface of an intact bog is found within the acrotelm. The acrotelm layer on both the Clonsura site and the Coole site has been completely removed by the harvesting operation.

The water budget in natural peat systems is dominated by saturated overland flow. Due to the very low permeability of the peat and underling substrate (bedrock and / or subsoil) approximately 85-90% of the effective rainfall flows through the system as saturated overland flow towards discharges to surface watercourses. Approximately 10-15% of effective rainfall recharges diffusely and downwards into the peat. The majority of this flows down topographic gradient in the top 0.15m vegetated layer (acrotelm) towards discharges zones and surface watercourses. A small portion of the recharge flows down the hydraulic gradient into the deeper peat (catotelm) layer and then towards surface water discharge points. A smaller portion of this deeper peat water exfiltrates from the peat into the underlying subsoil and or / bedrock aquifers, and this discharge is locally variable depending on the permeability of the underlying substrate. The quantities of recharge and exfiltration will vary from peatland site to peatland site and as the Coole and Clonsura sites are hydraulically altered, these quantities are difficult to estimate.

Rainfall and Evaporation

Long term rainfall and evaporation data was sourced from Met Éireann. The long term average rainfall (1981 - 2010) recorded at Ballynacarrigy, 13km southwest of the Coole site and at Granard 8km to the northwest of the Clonsura site, is presented in Table 4.4.5.

Table 4.4.5: Local Average long term Rainfall Data (mm)

Station		X-Coord		Y-Coord		Ht (MAOD)		Opened		Closed		
Ballynacarrigy		230700		259700		N/A		N/A		N/A		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
99.5	73.3	78.6	61.2	70.1	78	75.8	86.7	77	104	94.5	101	999.7
Granard		233700		281300		N/A		N/A		N/A		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
96.7	72.6	81.9	67.3	64.6	75.8	70.9	88.1	81.1	103.1	95	102	999.1
											Average	**999.4**

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Mullingar, Co. Westmeath approximately 16km southwest of the Coole site. The long-term average PE for this station is 540mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 513mm/yr (0.95 PE).

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

Effective rainfall (ER) = Annual Average Rainfall (AAR) – Actual Evaporation (AE)
= 999.4mm/yr – 513mm/yr
ER = 486mm/yr

Regional and Local Hydrology

On a regional scale both the Coole and Clonsura sites are located in the Inny River surface water catchment which is a sub-catchment of the Lough Ree regional catchment within Hydrometric Area 26 of the Shannon River Basin District (SHRBD). Based on the EPA flow duration curve for ungauged catchments the 95%ile flow of the Inny River upstream of the Coole and Clonsura sites is reported to be 0.68m^3/s and 0.83m^3/s respectively while the 50%ile flow is reported to be 4.49m^3/s and 5.7m^3/s respectively.

A regional hydrology map is shown in Attachment 1, Figure 4.4.6.

Locally, the Clonsura site is partially bound to the west by the Inny River for approximately 800m, and to the southwest by the Glore River, which flows into the Inny River immediately west of the site. A small unnamed stream (S1or the Clonsura Stream), which divides the Clonsura bog in two sections, discharges directly to the Inny River west of the site. Lough Bane, which is a proposed NHA (pNHA) exists approximately 100m to the northeast of the Clonsura site. An unnamed small dystrophic lake also exists on the northwestern corner of the Clonsura site.

The Inny River flows southwest from the Clonsura site for 1km before meandering due west for 500m. It then flows in a north-south direction, encountering the Coole site after approximately 3.5km, and flows into Lough Derravaragh approximately 3.5km downstream of the Coole site.

The Coole site is bound to the west by the Inny River for approximately 1.8km. An unnamed stream (referred to as the Mayne Stream in this EIAR) divides the Coole site between the townlands of Ballinealoe to the south, and Mayne to the north, before discharging into the Inny River, on the western boundary of the site.

Site Drainage Overview

Both the Coole and the Clonsura sites have parallel running peat drains that are spaced approximately every 12 meters on the bog surface for surface water runoff removal. Surface water runoff collected in these drains is conveyed via a manhole or sump at the end of the drain, to headland drains from where it flows into larger boundary drains and then onto sedimentation basins for retention and controlled discharge. The parallel running bog surface drains are only approximately 1.5m deep and therefore do not intercept the mineral subsoil underlying the peat. These internal field drains are ditched as harvesting progresses. The larger boundary drains are generally deeper and were noted to regularly intercept the mineral subsoils.

The Clonsura site has 4 no. sedimentation basins, two of which discharge into the Glore River upstream of the Inny River and two which discharge into the Inny River via S1 or the Clonsura Stream. The Coole site has 7 no. sedimentation basins, five of which discharge directly into the Inny River and two which discharge into the Mayne Stream upstream of the Inny River.

Clonsura Site Drainage

The majority of the Clonsura site discharges into the Clonsura Stream/S1 which drains into the Inny River, with the exception of a section on the western boundary of the site, which drains into the River Glore. Based on drainage outfalls from the bog, the site can be divided into approximately 13 no. sub-catchments as discussed below. A site drainage map is shown in Attachment 1, Figure 4.4.7.

Sub-catchment S1 (Sedimentation Basin 1)

Drainage within sub-catchment S1 is facilitated by northeast to southwest orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 1, and subsequently discharge to the Clonsura Stream/S1, which divides the northern and southern sections of the Clonsura site. The Clonsura Stream/S1 discharges into the Inny River immediately west of the site.

Sub-catchment S2 (Sedimentation Basin 2)

Drainage within sub- catchment S2 is facilitated by northeast to southwest orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 2, and subsequently to the Clonsura Stream/S1.

Sub-catchment S3 (Sedimentation Basin 3)

Drainage within the sub-catchment S3 is facilitated by northeast to southwest orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 3, and subsequently into the River Glore, which runs parallel to the southwestern boundary of the site. The River Glore joins the Inny River, 400m west of the site.

Sub-catchment S4 (Sedimentation Basin 4)

Drainage within the sub-catchment S4 is facilitated by northeast to southwest orientated bog drains, which are spaced at 12m apart, and which flow into Sedimentation Basin 4, and subsequently to the River Glore.

Sub-catchment S5

Sub-catchment S5 drains to an elongate headland drain, which runs along the southwestern boundary of the site, before discharging to the Clonsura Stream/S1. There is no sedimentation basin in this catchment, although the elongated headland drains and associated sumps act as a quasi-sedimentation basin.

Sub-catchment S6 to S13

Sub-catchments S6 to S13, comprise the remainder of the peat harvesting site. These sub-catchments discharge into the Clonsura Stream/S1 and subsequently to the Inny River west of the site. Drainage within the catchments S7 to S9 is facilitated by northeast to southwest orientated field drains, which are spaced 12m apart while drainage in sub-catchments S10 to S13 are facilitated by north to south oriented bog drains. These catchments do not drain into any sedimentation basins prior to discharge to the Clonsura Stream/S1.

Westland are aware of the need to install additional sedimentation basins at Clonsura and this matter has already been identified as part of the IPC license application and previously as part of an application to Westmeath County Council for a surface water discharge license for the Clonsura site. As such Westland has already proposed sedimentation basin infrastructure for sub-catchments S5-S13 to be constructed (or improved in the case of S5) to bring drainage in these areas in line with the remainder of the site.

A summary of the Clonsura site sub-catchments, primary drainage features and sedimentation basin infrastructure is shown in Table 4.4.6 overleaf.

Table 4.4.6 Summary of Sub-catchments and Drainage Features at Clonsura Site

Sub-catchment	Existing Area Served (ha)	Primary Drainage Feature	Downstream Water Body	Main Catchment Area
S1	18.1	Clonsura Stream/S1	Inny River and Lough Derravaragh	Lough Ree
S2	7.4			
S3	11.4	River Glore		
S4	9.7			

Lough Bane Drainage Patterns

Lough Bane, a mesotrophic lake, which is a proposed NHA (pNHA) exists approximately 100m to the northeast of the Clonsura site boundary. The elevation of the lake bed is approximately 3 – 4m lower than the ground level of the adjacent Clonsura harvesting area. An unnamed small dystrophic lake also exists on the northwestern corner of the Clonsura site in an area of intact remnant raised bog. The dystrophic lake is approximately at the same elevation to that of the adjacent harvesting area.

Based on Ordnance Survey historical 6" and 25" mapping[44] for the area it appears that Lough Bane was approximately 50% bigger than its current plan size. The historical maps from over 150 years ago show that Lough Bane extended much further south towards the boundary of the Clonsura site. The maps also show an outfall from the southwestern end of the lake into the Clonsura Stream/S1 which passes through the Clonsura site. This outfall was located during a walkover of the site and no discharge was noted, presumably because the southern end of the lake now exists much further to the north. No other outfall from the present-day lake was noted on the day of the walkover survey.

Based on the walkover survey and the topographic survey, the catchment to Lough Bane is relatively small with no input from streams noted. Input to the lake is most likely from direct rainfall landing on the water body and runoff from the adjacent land (*i.e.* ombrotrophic). The hydrochemistry (Refer to Table 4.4.8) also indicates that the lake is fed by rainfall with little or no input from mineral groundwater flows (*i.e.* oligotrophic hydrochemistry). The unnamed small dystrophic lake also appears to be an isolated feature with a localised surface water catchment.

In terms of drainage connections between the harvesting area and Lough Bane there appears to be no connection. The presence of a perimeter boundary drain means that there is no runoff from the harvesting area into Lough Bane. This also applies for the dystrophic lake.

Coole Site Drainage

The Coole site drains into the Inny River, either directly, or indirectly via the Mayne stream. Based on the site walkover and drainage outfalls from the bog, the site can be divided into approximately 9 no. sub-catchments as discussed below. A site drainage map is shown in Attachment 1, Figure 4.4.8.

Sub-catchment S1 (Sedimentation Basin 1)

[44] Maps are dated between 1829 and 1842.

Sub-catchment S1 is located in the Coole townland, in the northern most portion of the site. It is separated from the rest of the Coole site by the Regional Road (R395) to the south. Drainage within the sub-catchment is facilitated by southeast to northwest orientated field drains, and southwest to northeast field drains, which discharge to Sedimentation Basin 1 via the northern boundary drain and subsequently into the Inny River, west of the site.

Sub-catchment S2 (Sedimentation Basin 2)

Sub-catchment S2 is located in the Mayne townland. Drainage within the catchment is facilitated by southwest to northeast orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 2 via a boundary drain, and subsequently into the Inny River.

Sub-catchment S3 (Sedimentation Basin 3)

Sub-catchment S3 is located in the Mayne townland. Drainage within the catchment is facilitated by northeast to southwest orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 3, and subsequently into the Inny River.

Sub-catchment S4 (Sedimentation Basin 4)

Sub-catchment S3 is located in the Mayne townland. Drainage within the catchment is facilitated by northeast to southwest orientated field drains, which are spaced at 12m apart, and which flow into Sedimentation Basin 4, via a boundary drain, and subsequently to the Inny River, via the Mayne stream. The Mayne Stream flows into the Inny River immediately west of the Coole site.

Sub-catchment S5 (Sedimentation Basin 5)

Sub-catchment S5 is located in the northwestern corner of the Ballinealoe townland. Drainage within the catchment is facilitated by southwest to northeast orientated field drains, which are spaced 12m apart, and which flow into Sedimentation Basin 5, via a western boundary drain, and subsequently to the Inny River west of the site.

Sub-catchment S6 (Sedimentation Basin 6)

Sub-catchment S6 is located in the Ballinealoe townland. Drainage within the catchment is facilitated by southwest to northeast orientated field drains, which are spaced at 12m apart, and which flow into Sedimentation Basin 6, via a northeastern boundary drain. Sedimentation Basin 6 discharges to the Mayne Stream and subsequently into the Inny River west of the site.

Sub-catchment S7 (Sedimentation Basin 7)

Sub-catchment S7 is located in the Ballinealoe townland. Drainage within the catchment is facilitated by southwest to northeast orientated field drains, which are spaced at 12m apart, and which flow into Sedimentation Basin 7. Sedimentation Basin 7 discharges to the Mayne Stream prior to the Inny River.

Sub-catchments S8 and S9

Sub-catchments S8 and S9 comprise the remainder of the peat harvesting lands. These catchments are located in the Ballinealoe townland. Drainage within the catchments is facilitated by southwest to northeast orientated field drains, which are spaced 12m apart, and which discharge directly to the Mayne Stream and subsequently to the Inny River west of the site.

A summary of the Coole site sub-catchments, primary drainage features and sedimentation basin infrastructure are shown in Table 4.4.7 below.

Table 4.4.7 Summary of Sub-catchments and Drainage Features at Coole Site

Sub-catchment	Existing Area Served (ha)	Primary Drainage Feature	Downstream Water Body	Main Catchment Area
S1	22.0	Inny River	Inny River	Lough Ree
S2	46.2			
S3	8.6			
S4	24.1	Mayne Stream		
S5	3.4			
S6	16.4			
S7	3.8			

The sedimentation basins infrastructure and drainage will be reviewed as there may be spare capacity within the existing system for sub-catchments S8 and S9 to be accommodated.

Flood Risk Assessment

Within the Republic of Ireland, OPW's indicative river and coastal flood map[45] was consulted to identify those areas as being at risk of flooding. No areas within the Coole or Clonsura site boundaries or within 5km downstream of both sites were identified. However seasonal flooding of a small part of the Coole site occurs during the winter period when the Inny River overtops its banks to the west of, and in the immediate vicinity of Float Bridge.

Surface Water Quality

Field Hydrochemistry

Field hydrochemistry measurements of unstable parameters, electrical conductivity (µS/cm), dissolved oxygen (mg/L), pH (pH units) and temperature (°C) were taken at various locations in surface watercourses and drainage features at both sites on 25th June 2013. The results are listed in Table 4.4.8 below.

Table 4.4.8 Field Hydrochemistry Measurements

Site	Location	Conductivity (µS/cm)	pH	Temp °C	Oxygen (mg/L)
Coole	S. Basin 1	767	8.09	13.8	8.2
	S. Basin 2	267	8.3	18.6	6.0
	S. Basin 3	179	8.2	17.4	5.01
	S. Basin 4	154	8.11	17.6	4.7
	S. Basin 6	195	7.9	4.6	4.6
Clonsura	S. Basin 1	609	7.7	14.8	6.9
	S. Basin 3	103	8.0	18.1	4.5
	Lough Bane	62	8.1	16.5	3.6
	Dystrophic lake	48	8.2	18.5	4.03

[45] Office of Public Works (OPW) www.flooding.ie

The electrical conductivity of the surface waters in the sedimentation basins ranged between 103 and 767µS/cm. The electrical conductivity values indicate that mineral subsoil groundwater makes up a varying percentage of the overall water within the sedimentation basins. Many of the main boundary drains surrounding both sites were noted to intercept the underlying mineral subsoils and therefore seepages of groundwater into the boundary drains is most likely occurring. The electrical conductivity of the water in Lough Bane and the dystrophic lake indicate that lakes are solely rainwater fed with little or no input mineral groundwater flows.

Water Framework Directive water quality monitoring data (2014 – 2018) is available for the Inny River at Camagh Bridge (Station: 0600) and the Bridge near Shrubbywood (Station: 0700).

Water quality monitoring data for the Inny River at Camagh Bridge and the Bridge near Shrubbywood are shown in Attachment 6, Appendix I, and are summarised in Table 4.4.9 below. For comparison purposes Environmental Objectives Surface Water Regulations (S.I. 272 of 2009) are shown in Table 4.4.10 below.

Table 4.4.9 Summary of WFD Water Quality Monitoring Data (2014 – 2018)

Parameter	Units	Camagh Bridge (0600)	Bridge near Shrubbywood (0700)
BOD	mg/L O_2	1.44	1.44
Ammonia (as N)	mg/L	0.056	0.061
Ortho-phosphate (as P)	mg/L	0.018	0.017

Table 4.4.10 Chemical Conditions Supporting Biological Elements*

Parameter	EQS – "Good" Status
BOD	≤ 1.5mg/l (mean), ≤ 2.6 mg/l (95%ile)
Ammonia (as N)	≤0.065mg/l (mean), ≤0.140 mg/l (95%ile)
Ortho-phosphate	≤0.035 mg/l (mean), ≤0.075 mg/l (95%ile)

* Environmental Objectives Surface Water Regulations (S.I. 272 of 2009)

Results of chemical analysis of samples collected over the 2014 to 2018 period showed all parameters to comply with the EQS for Good status waterbodies.

Sampling of the Inny River and the River Glore was also undertaken as part of the EIAR. Samples were taken immediately upstream of the Clonsura site and midway at Camagh Bridge and also at the Bridge near Shrubbywood (*i.e.* downstream). A sample of the River Glore was taken upstream of the Clonsura site. Results are shown in Table 4.4.11 below.

Table 4.4.11 Sample results for the Inny River and River Glore

Parameter	Sample ID			
	R. Glore (Upstream)	Inny R. (Upstream)	Inny R. (Downstream)	Inny R. (Midway)
Total Suspended Solids (mg/L)	3	4	3	2
Ammonia N (mg/L)	<1	<1	<1	<1
Ortho-phosphate (P) mg/L	<0.025	0.026	0.029	0.025
Phosphorus (mg/L)	<0.05	<0.05	0.11	<0.05
COD (mg/L)	16	24	23	13
BOD	2	2	2	2

For the Inny River, BOD was below the "High" status threshold limit at all sample locations. Ortho-phosphate was also below the "High" status threshold limit at all sample locations. Ammonia was less than the laboratory detection limit of 1mg/l and therefore could not be fully assessed.

Sedimentation Basin Discharge Water Quality Monitoring

Historical Monitoring by Westland

Sedimentation basin discharge water quality monitoring data (2010 – 2011) for the Clonsura (SB1 to SB4) and Coole (SB1 to SB7) sites are shown in Attachment 6, Appendix ll. Summary discharge water quality data for both sites are shown in Tables 4.4.12. Where applicable, results are compared to limits set in Council Directive (75/440/EEC), Freshwater Fish Directive (78/659/EEC) and the EPA BATNEEC Guidance Note (1996) emission limit values for discharges to surface waters set out in Table 4.4.13.

Table 4.4.12 Summary Discharge Quality Data (2010 – 2011) for both sites

	Results	BOD mg/l	COD mg/l	TSS mg/l	Ammonia NH_3-N mg/l	Total Phosphorus mg/l	pH	Settleable Solids mg/l	Colour (PtCo)
Clonsura	**Min**	1.5	19.0	0.8	0.10	0.02	5.40	<0.01	44.00
	Max	6.0	83.0	13.6	4.10	0.11	7.40	<0.01	372.00
	Avg	3.5	54.1	6.3	2.12	0.06	6.38	<0.01	222.25
Coole	**Min**	1.0	24.0	1.0	0.07	0.03	6.60	<0.01	68.00
	Max	14.4	114	16.8	4.50	0.30	7.70	<0.01	650.00
	Avg	7.4	63.5	5.1	1.86	0.09	7.18	<0.01	292.37

Table 4.4.13 EPA BATNEEC (1996) Emission Limit Values

Parameter	Limit Value
pH	6 to 9
BOD (mg/l)	25mg/L
Suspended Solids	35mg/L
Toxic units	1
Total Nitrogen (N)	15mg/L
Total Phosphorus (P)	2mg/L
Fish Tainting	No Tainting

The average of BOD for the Clonsura and Coole sites was 3.5 and 7.4mg/L respectively with the Coole site average exceeding the value of 5mg/Ll (A1 waters) set out in Council Directive 75/440/EC. Both sites were well below the EPA BATNEEC Emission Limit Value of 25mg/L for BOD.

The average of suspended solids for the Clonsura and Coole sites was 6.3 and 5.1mg/L respectively which are both below the Freshwater Fish Directive (2006/44/EC) value of 25mg/L. Both sites were below the EPA BATNEEC Emission Limit Value of 35mg/L for suspended solids.

The average of ammonia (NH_3-N) for the Clonsura and Coole sites was 2.12 and 1.86mg/L respectively with both sites exceeding the value of 1mg/L (A2 waters) set out in the Drinking Water Directive 75/440/EEC.

The average of total phosphorus for the Clonsura and Coole sites was 0.06 and 0.09mg/L respectively which is below the EPA BATNEEC Emission Limit Value of 2mg/L.

Sampling Results – June 2013

Sampling of the discharge from a number of the sedimentation basins was also undertaken by HES on 25th June 2013 as part of the preparation of the EIAR. Results are shown in Table 4.4.14 below and laboratory certificates are contained in Attachment 6, Appendix lll. The results are generally in the same range as the average 2010 – 2011 monitoring data presented above.

Table 4.4.14 Results of Sedimentation Basin Discharge Sampling at the Coole and Clonsura Sites

Parameter	EC DIRECTIVES			Sample ID					
				Coole				Clonsura	
	75/440/EEC	78/659/EEC							
	Waters Intended for Abstraction	Salmonid	Cyprinid	SB1	SB3	SB4	SB6	SB3	SB1
Total Suspended Solids (mg/L)	25(A1) * guideline	≤ 25 (O)	≤ 25 (O)	5	3	3	2	5	2
Ammonia NH4 (mg/L)	1(A2) **	1	1	<1	1.07	1.77	3.11	3.41	<1
Ortho-phosphate (P04) mg/L	-	-	-	0.046	0.057	0.031	0.038	0.035	0.07
Total Phosphorus (mg/L)	-	-	-	0.18	0.11	0.11	0.22	1.21	0.1
COD (mg/L)	30 (A3) ***	-	-	43	84	99	101	122	45
BOD (mg/L)	<3 (A1) ****	≤ 3	≤ 6	3	2	2	2	2	2

*SI 294/1989 transposed 50mg/l(A3)
** Guideline. 1.5mg/l mandatory for A2 water.
*** SI 294/1989 transposed 40mg/l (A3)
**** SI 294/1989 transposed 5mg/l (A1)

The results for all samples are all within the BATNEEC emission limit values.

Recent Sampling Results – August 2019

Additional sampling of sedimentation basin discharges was undertaken in August 2019 as part of the EIAR update. Results are shown in Table 4.4.14(a) below. The results are generally in the same range as the 2013 monitoring data presented above.

Table 4.4.14(a) Results of Sedimentation Basin Discharge Sampling at the Coole and Clonsura Sites (2019)

Sample Loc.		Coole						Clonsura (Finea)			
Parameter	Units	S 1	S2	S3	S4	S5	S 6	S 1	S2	S3	S4
Conductivity	us/cm	521	594	594	482	495	612	483	592	493	521
pH	pH	6.8	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.9	6.9
BOD	mg/l	9.5	9.75	20.2	15.25	12.25	11	13.25	17.5	9.5	12.25
TSS	mg/l	14	17	21	20	22	18	23	26	14	22
Nitrates	mg/l	0.9	0.9	1.1	1.3	1.4	1.1	1.2	1.4	0.9	1.1
Ammonia	mg/l	0.025	0.003	0.027	0.024	0.024	0.039	0.027	0.015	0.017	0.047

Total P	mg/l	0.2	0.16	0.12	0.12	0.11	0.13	0.11	0.12	1.09	0.11
Ortho P	mg/l	0.04	0.03	0.04	0.05	0.06	0.06	0.04	0.05	0.03	0.05

Available Assimilative Capacity

An assimilative capacity assessment for the Inny River was undertaken by OES Consulting in March 2011 and subsequently updated in 2019 to reflect the cumulative impact of both sites along the stretch of the River Inny between Lough Kinale & Derragh and Lough Derravarragh.

The assessment is updated in 2019 to include the calculation of resultant downstream concentrations for reach of the key parameters (based on mixing model). The assessment was undertaken using the following input parameters:

Input Parameter	Units	Value	Notes
Discharge Flow – Clonsura	m3/s	0.024	Mean daily value based on rainfall
Discharge Flow – Coole	m3/s	0.037	Mean daily value based on rainfall
River Inny Flow – Clonsura	m3/s	4.49	Median flow rate in river
River Inny Flow – Coole	m3/s	5.75	Median flow rate in river
Limit Concentration in River - BOD	mg/l	2.6	Based on EQS @ 95%-ile Good Status Waterbody
Limit Concentration in River – Ammonia	mg/l	0.140	Based on EQS @ 95%-ile Good Status Waterbody
Limit Concentration in River – Ortho P	mg/l	0.075	Based on EQS @ 95%-ile Good Status Waterbody

As discharges from the sites only occurs during period of rainfall, when flows in the river will also be influenced by runoff within the catchment, it was considered appropriate to assess the impact of average discharge flows from the harvesting sites during 50%ile flow conditions in the river. The use of the 95%-ile flow condition in the river was considered to be unduly restrictive as runoff from the site would not be expected to coincide with low river flows, due to lack of rain.

The 50%ile flow of the Inny River upstream of the Clonsura and Coole sites was taken from the EPA Hydrotool to be 4.49m^3/s and 5.75m^3/s respectively.

A summary of the available assimilative capacity is shown in Table 4.4.15 below which shows that significant capacity exists within the river to accommodate the discharges from the peat harvesting sites at both Clonsura and Coole. The available assimilative capacity at Coole is calculated based on the capacity available **after** discharges from the upstream Clonsura site are taken into account – i.e. the cumulative effect of discharges from Clonsura and Coole harvesting sites.

Table 4.4.15 Summary of the Assimilative Capacity Assessment

Upstream of Clonsura Harvesting Site	Available Assimilative Capacity (Kg/Day)	Mass Emission from Clonsura Site (Kg/Day)	As % of Available Assimilative Capacity
BOD	424	52	12%
Orthophosphate	22	2	9%
Ammonia	38	10	27%

Nitrates	504	21	4%
Suspended Solids	4849	52	1%

Upstream of Coole Harvesting Site	Available Assimilative Capacity (Kg/Day)	Mass Emission from Coole Site (Kg/Day)	As % of Available Assimilative Capacity
BOD	480	80	17%
Orthophosphate	26	3	12%
Ammonia	36	16	44%
Nitrates	646	32	5%
Suspended Solids	6210	80	1%

Hydrogeology

The Geological Survey of Ireland (GSI) classifies the dark limestones and shales of the Lucan Formation, and the Dinantian pure unbedded limestones (Mudbank Limestones) as a Locally Important Aquifer (LI –Bedrock which is generally moderately productive only in local zones). Both sites are underlain by the Inny Groundwater Body (GWB).

While no local hydrogeological data is available for this groundwater body, permeability will generally decrease rapidly with depth in this limestone and shale aquifer type. In general transmissivities will be in the range 2-20m^2/d, with median values occurring towards the lower end of the range[46]. The effective thickness of the aquifer is likely to be within 15m of the top of rock, comprising a weathered zone of 5m and a further zone of interconnected fissures of 10m below. Significantly higher permeabilities are likely to be found in fault zones and areas which have undergone structural deformation, which are associated with higher yielding wells. Aquifer storativity will be low in this bedrock unit[46].

Groundwater flow occurs mainly in faults and joints. Most groundwater flow probably occurs in an upper shallow weathered zone. Below this in the deeper zones water-bearing fractures and fissures are less frequent and less well connected. Groundwater in this GWB is generally unconfined. Local groundwater flow is towards the rivers and streams, and flow paths are usually between 30 and three hundred metres in length.

Groundwater Vulnerability

The vulnerability of the aquifer underlying both sites is rated as "Low" by the GSI[47]. Peat, which has a low permeability, overlies the Coole and Clonsura sites with an average depth of 3.16 and 4.78m respectively. The thickness of the underlying marl lake sediments is unknown.

Water Framework Directive Water Body Status & Objectives

The Shannon River Basin District (SHRBD) Management Plan was adopted by all local authorities in the RBD prior to 30th of April 2010, as stipulated in the European Communities (Water Policy) Regulations 2003 (S.I. 722 of 2003 as amended). The SHRBD Management Plan (2009 – 2015) objectives include the following:

- Prevent deterioration and maintain a high status where it already exists;

[46] Geological Survey of Ireland (2004) Inny Groundwater Body - Summary of Initial Characterisation (2004)

[47] Geological Survey of Ireland www.GSI.ie

- Protect, enhance and restore all waters with aim to achieve at least good status by 2015;
- Ensure waters in protected areas meet requirements; and,
- Progressively reduce chemical pollution.

Our understanding of these objectives is that surface waters, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed, i.e. there should be no negative change in status at all.

Groundwater Body Status

Local Groundwater Body and Surface water Body status reports are available for download[48].

The Inny Groundwater Body (GWB: IE_SH_G_110) predominantly underlies both peat harvesting sites. It is assigned 'Good Status'. 'Status' means the condition of the water in the waterbody. It is defined by its chemical status and its ecological status, whichever is worse. Waters are ranked in one of 5 classes: High, Good, Moderate, Poor and Bad[49]. This applies to both quantitative status and chemical status. The risk status is 2a (probably not at risk). The groundwater body has been subdivided beneath part of the Coole site, where a small section has been labelled as the Inny_5 Groundwater Body (GWB: IE_SH_G_115). It is also assigned 'Good Status'. The objectives for the GWB is to protect the current 'Good Status' condition. This requires that the chemical and quantitative status of both GWB's needs to be maintained.

Surface Water Body Status

The majority of the Clonsura site lies within the Glore River Surface Water Body (IE_SH_26_2976). This surface water body is assigned an overall 'Moderate Status', with a risk classification of *At Risk*.
A section on the west of the Clonsura site, and the entire Coole site exists within the Upper Shannon – Inny Catchment (HA 26F)[52]. A summary of the WFD status and objectives is shown in Table 4.4.16 below.

Table 4.4.16 Summary WFD Information for Surface Water - Catchment 26F

Water Body	Adjacent site	Status 2010 - 2015	Change	Risk Status	Date to meet EO
Inny River	Clonsura	Moderate	Unchanged	At Risk	2027
Glore River	Clonsura	Moderate	Unchanged	At Risk	2027
Inny River	Coole	Good	Improved	Not at Risk	2027
L. Derravarragh	D/S Coole	Good	Unchanged	Not at Risk	2027

The overall WFD objective of the Glore River and the Inny River is to restore water quality to 'Good Status.'

Groundwater Hydrochemistry

There are no data on groundwater hydrochemistry at either site however based on data from similar carboniferous aquifers elsewhere in the country alkalinity generally ranges from 250 to 350 mg/l (as $CaCO_3$) and hardness ranges from 380 to 450 mg/L (hard to very hard). The underlying formations largely contain calcium bicarbonate type water. Electrical conductivities in these bedrock units are high will typically range from 650 to 800 µS/cm[46].

4.4.4 Actual and Potential Impacts of the Activity

[48] Water Matters www.WFDIreland.ie
[49] Water Framework Directive (2010) Shannon River Basin Management Plan (2009-2015)
[52] Upper Shannon (Inny) Catchment Assessment 2010-2015 (HA 26F) EPA December 2018

This section assesses the actual and potential impacts of the ongoing peat harvesting activity on the Soils, Geology and Hydrology at the Coole and Clonsura sites. Potential impacts associated with future plans for rehabilitation and proposed measures for same are also identified where relevant.

The potential significant impacts which could occur as a result of the activity are:

- Water quality impacts on the Inny River;
- Water quality & hydrological impacts on Lough Bane (pNHA) & Lough Derravaragh (NHA & SPA); and hydrological impacts on Garriskil Bog;
- Hydrological impacts on intact bog remnants within the sites;
- Impacts on groundwater quality;
- Increased flood risk in downstream waters due to site discharges;
- Increased sedimentation of the river due to seasonal flooding of part of the Coole site in winter.

Water Quality Impacts on the Inny River

The discharge of surface water runoff from the harvesting sites has the potential to impact on the water quality of the downstream Inny River in terms of suspended solid input and nutrient loading (*i.e.* BOD, Ammonia and Ortho P).

Sedimentation basin discharge water quality monitoring data for the period 2010 – 2011 shows that the average suspended solid level for the Clonsura and Coole sites was 6.3 and 5.1mg/L respectively which is below the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988) limit value of 25mg/l for suspended solids.

The sedimentation basins at the Clonsura and Coole sites, which are constructed according to EPA BATNEEC (1996) guidelines, are designed for suspended solid removal and not for nutrient reduction/removal. The available water quality monitoring data indicates that the in-situ sedimentation basins are effective in removing suspended solids from the surface water discharges from the sites.

Indicative emission limit values in discharges from the sedimentation basins are tabulated below and have been used as a basis for assessing the impact on receiving waters.

Indicative Emission Limit Values

Parameter	Existing ELV	
Volume	Clonsura	Coole
	Surface water runoff - Rainfall Dependant	Surface water runoff - Rainfall Dependant
	2029 m3/d (mean rainfall)	3187 m3/d (mean rainfall)
Temperature	Ambient	
pH	6-9	
Parameter/Units	mg/l	
BOD	25	
Suspended Solids	25	
Ammonia (as N)	5	
Nitrate	10	
Molybdate Reactive Phosphate	1	

In order to assess the potential impacts of nutrient loading from the sites, an assimilative capacity assessment of the Inny River was undertaken by OES Consulting in 2011 and updated in 2019

Discharges from the peat harvesting sites arise due to surface water runoff only and therefore are rainfall dependent. The assessment therefore was undertaken on the basis of mean discharges from the sites under mean flow conditions in the receiving waters – i.e 50%-ile flow.

Resultant downstream concentrations were calculated for the water quality parameters specified under the EUROPEAN COMMUNITIES ENVIRONMENTAL OBJECTIVES (SURFACE WATERS) REGULATIONS 2009 (SI 272 of 2009), namely BOD, Ammonia and Ortho Phosphorus.

Water Quality Parameter	D/S Clonsura Harvesting Site (mg/l)	D/S Coole Harvesting Site(mg/l)	Environmental Quality Objective (EQO) Target (mg/l)	Compliant (Y/N)
BOD	1.63	1.78	<2.60	Yes
Ammonia (as N)	0.068	0.099	<0.14	Yes
Orthophosphate	0.023	0.030	<0.075	Yes
Nitrate	1.41	1.41	<2.70	Yes[1]
Suspended Solids	12.57	12.45	25.0	Yes[2]

1. Nitrate target concentration has been derived for high and good status surface waters (source 2012 EPA Integrated Water Quality Report –Monaghan Louth 2011). Mean and 95%ile nitrate target standard of for high and good status waters has been developed as 1.8mg/l and 2.7mg/l NO3 (as N) respectively.
2. European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988)

BOD

The predicted BOD concentration in the River Inny downstream of discharges from the Clonsura harvesting site has been calculated as 1.63 mg/l, which is significantly below the EQO for BOD – 2.6mg/l. Cumulative discharges from the Coole harvesting site downstream are calculated to increase the BOD by a further 0.15 mg/l to 1.78 mg/l. Combined discharges utilise 17% of the available assimilative capacity for BOD in the river Inny.

It is noted that the resultant BOD concentration in the River Inny – calculated on the basis of cumulative discharges from both Clonsura and Coole harvesting sites is fully compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

Ammonia

The predicted ammonia concentration in the River Inny downstream of discharges from the Clonsura harvesting site has been calculated as 0.068 mg/l, which is significantly below the EQO for Ammonia – 0.14 mg/l. Cumulative discharges from the Coole harvesting site downstream are calculated to increase the BOD by a further 0.031 mg/l to 0.099 mg/l. Combined discharges utilise 44% of the available assimilative capacity for ammonia in the river Inny.

It is noted that the resultant ammonia concentration in the River Inny – calculated on the basis of cumulative discharges from both Clonsura and Coole harvesting sites is fully compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

Ortho Phosphorus

The predicted Ortho-P concentration in the River Inny downstream of discharges from the Clonsura harvesting site has been calculated as 0.023 mg/l, which is significantly below the EQO for Ortho-P – 0.075 mg/l. Cumulative discharges from the Coole harvesting site downstream are calculated to

increase the Ortho-P by a further 0.007 mg/l to 0.03 mg/l. Combined discharges utilise 12% of the available assimilative capacity for Ortho-P in the river Inny.

It is noted that the resultant Ortho-P concentration in the River Inny – calculated on the basis of cumulative discharges from both Clonsura and Coole harvesting sites is fully compliant with the requirements of S.I. No. 272 of 2009 European Communities Environmental objectives (Surface waters) Regulations 2009, and accordingly not cause a significant environmental impact.

Nitrate

The predicted Nitrate concentration in the River Inny downstream of discharges from the Clonsura harvesting site has been calculated as 1.14 mg/l, which is significantly below the relevant target value of 2.7 mg/l. Cumulative discharges from the Coole harvesting site downstream are calculated not to alter the resultant nitrate concentration in the River Inny and remain constant at 1.41mg/l. Combined discharges utilise 5% of the available assimilative capacity for Ortho-P in the river Inny.

In conclusion, the proposed nitrate ELV can therefore be accommodated whilst meeting water quality objectives for the river, and accordingly not cause a significant environmental impact.

Suspended Solids

The predicted suspended solids concentration in the River Inny downstream of discharges from the Clonsura harvesting site has been calculated as 12.57 mg/l, which is significantly below the relevant target value of 25 mg/l. Cumulative discharges from the Coole harvesting site downstream are calculated to reduce slightly the resultant solids concentration in the River Inny to 12.45 mg/l (due to flow). Combined discharges utilise 1% of the available assimilative capacity for suspended solids in the river Inny.

The proposed Suspended Solids ELV can be accommodated in the River Inny whilst remaining fully compliant with the requirements of the EC (Quality of Salmonid Waters) Regulations 1989 and accordingly not cause a significant environmental impact.

Overall, the assessment shows excess available assimilative capacity at 50%ile flows, and, historical river water data does not indicate that the direct discharges could be affecting water quality. Furthermore, as evidenced in Chapter 4.3 of this EIAR dealing with aquatic ecology, there was no difference in findings when comparing upstream with downstream of the sites.

Overall, with the existing and proposed mitigation (refer to Section 4.4 5 below) the impact to water quality on the Inny River due to ongoing and future peat harvesting is considered negative, slight/negligible, high probability and long-term.

Water Quality and Hydrological Impacts on Lough Bane (pNHA) and Lough Derravaragh (NHA & SPA); and Hydrological Impacts on Garriskil Bog

Refer to the designated map in Attachment 1, Figure 4.4.9 which illustrates the locations of pNHA and SPA in the vicinity of Coole and Clonsura sites.

Lough Bane pNHA

Lough Bane, which is a proposed NHA (pNHA) exists approximately 100m to the northeast of the Clonsura site boundary. The elevation of the lake area is approximately 3 – 4m lower than the ground level of the adjacent Clonsura harvesting area.

In terms of drainage connections between the harvesting area and Lough Bane there appears to be no connection. The presence of a perimeter boundary drain within the Clonsura site means that there is no runoff from the harvesting area into Lough Bane and therefore no impacts on the water quality of the lake can occur as a result of discharges.

The presence of very low permeability lake sediments on the bed of the lake means there is little or no groundwater input to the lake. The hydrochemistry also indicates that the lake is purely rainwater fed.

No impacts on the existing lake are anticipated in terms of potential impacts on the hydrology of Lough Bane arising as a result of drainage enhancement (*i.e.* deepening) within the Clonsura site. This is due to the level of the lake being at a lower elevation to that of the adjacent peat harvesting area (approximately 3-4m).

Lough Derravaragh (pNHA & SPA)

The assimilative capacity assessment undertaken for the Inny River shows that impacts on water quality would negligible and therefore no significant impact on the water quality of Lough Derravaragh (NHA & SPA) is anticipated. The current WFD status of Lough Derravaragh is classified as "Good" and this would indicate that the water quality of Lough Derravaragh is not being impacted.

Garriskil Bog (pNHA and SPA)

Garriskil Bog is located 2km to the west of Lough Derravaragh and approximately 5km to the southwest of the Coole site. Due to the distance between the harvesting operation and Garriskil Bog there can be no impact on the peat hydrology of the bog as a result of existing of future drainage works at the Coole and Clonsura sites.

Overall, there are no impacts on the hydrology/water quality of Lough Derravaragh, Lough Bane & Garriskil Bog (proposed) designated sites.

Hydrological Impacts on Intact Bog Remnants within the Sites

Within the Clonsura site, an area of transition mire and quaking bog to the east, and poor fen and flush to the west, surround the dystrophic lake on the north-western corner of the site. Likewise, within the Coole site there are areas of remnant raised bog to the east and south-east sections of the bog, see Chapter 4.2 and Attachment 4, Figure 2 for further details.

There is no proposed harvesting of remnant raised bog at the Coole or Clonsura sites. The proposed milling operations are to be confined within the footprint of the area currently in development, however the presence of existing boundary drains running adjacent to the remnant raised bog means the hydrology of the remnant bog in close proximity to the drain is already likely to be impacted on. The boundary drain now also acts as a hydraulic (*i.e.* no flow) boundary separating the remnant raised bog and the harvesting area and therefore further removal/draining of peat within the harvesting area will have negligible to no impact on the adjacent remnant raised bog.

Impacts on Groundwater Quality

On-site waste water discharges and storage and handling of chemicals and hydrocarbons (such as fuels and lubricants) have the potential to impact on groundwater quality.

With existing and proposed mitigation outlined below in section 4.4.5 there is expected Negligible to no impact on groundwater quality.

Increased Flood Risk in Downstream Waters due to Site Discharges
Discharge of non-attenuated runoff to surface waters has the potential increase flooding downstream of the site.

However, all the sedimentation basins at both the Coole and Clonsura sites have the capacity to retain a 20-year return period storm event of 24hr duration. In addition, discharges from the sedimentation basins at the sites can be controlled by an adjustable weir height, thereby increasing the storage capacity if required. This allows the operation to limit or stop all discharges from the site if required. Once the sedimentation basins reach their high-level capacity, water will start to back up in the perimeter drains, sumps and drainage ditches and in effect this gives Westland the potential to retain water within the site for long periods if required. Also, due to the flat nature of the site and low gradient of the internal drain network, peak runoff rates from the site are likely to be greatly subdued.

The impact to Inny River flood levels is therefore considered Negligible, high probability and long-term.

Seasonal Flooding of the Coole Site
As noted in Chapter 4.3 dealing with aquatic ecology, sedimentation in the River Inny is no different upstream compared to downstream of Westland's activities. Notwithstanding this, measures currently undertaken as part of the management of the activities also serve to reduce suspended solids during flood events.

Cumulative Impact with Other Peat Harvesting Sites
The impacts on hydrology and hydrogeology described above are negligible at most. Accordingly, and in the context of other developments and peat harvesting activities in the area, Westlands activities cannot be part of a cumulative significant impact on the River Inny and other receptors.

Furthermore, in this regard the sites account for only 0.2% of the total catchment of the Inny which in total drains a catchment area of 119,700ha.

4.4.5 Existing and Proposed Mitigation Measures and/or Factors

Mitigation for Water Quality Impacts on the Inny River

Mitigation and pollution control measures include:

- Existing sedimentation basins are and will be cleaned at a minimum twice a year, once before ditching and once before harvesting, and more frequently as inspections may dictate;
- All new sedimentation basins to be installed a will have minimum 50m3 per hectare of bog serviced as per EPA BATNEEC (1996) guidelines.
- All sedimentation basins prone to flooding will be de-silted by 1st November of each year. Excavated sludge will be removed for disposal to a location outside the flood plain as is currently the case;
- Headlands are and will be kept clean and free of excessive loose peat;
- All new outfalls will be set well back from turning grounds, so that drivers of bog plant do not turn short (over drains) at headlands;
- Harrows, millers, ridgers do not and will not drag loose peat into drains;
- Ditching process occurs in dry weather and while ditching, outfalls are and will be blocked and ditched towards outfalls;
- Outlets from stockpile field drains are and will be blocked during stockpile loading;
- Field drains adjacent to stockpiles are and will be cleaned as soon as practicable after stockpile loading; and,

- All areas liable to winter flooding will be cleared of milled peat or re-compacted at the end of the production season.
- Existing natural reed beds at outfalls will be promoted where practicable.
- An existing 30 metre buffer zone of non-peat harvesting will be maintained adjacent to all land adjacent to the Inny River. This Buffer zone will be planted with a species of native vegetation suited to the peat environment.
- There will be no stock piling of loose peat within 100 metres of the Inny River.

Lough Bane Proposed Precautionary Mitigation Measures
Although not strictly required based on the assessment undertaken by HES, the following will be considered for implementation:

The depth of cutaway peat in the harvesting area adjacent to the Lough Bane pNHA boundary was measured to be approximately 5m (Refer to Attachment 1, Figure 4.4.4); and therefore as a precautionary measure to prevent potential impacts on the water level of Lough Bane, the invert of drains in this area will be kept at least 1m from the base of the peat. This is being very conservative as the presence of low permeability clays beneath the peat and Lough Bane means there is unlikely to be a hydraulic connection between the two sites.

Monitoring is proposed for both Coole and Clonsura, see Attachment 1, Figures 4.4.10 and 4.4.11. It is proposed that a peat water level monitoring network will be installed between the Clonsura harvesting area and Lough Bane pNHA. The layout of the proposed monitoring network which will comprise transects of nested piezometers is shown in Attachment 1, Figure 4.4.11. Water level monitoring will be undertaken initially on a fortnightly basis and then on a quarterly basis once equilibrium has been reached. This is also the case for Coole.

The proposed monitoring may be necessary to assist in the development of a rehabilitation/closure plan for the site and will be considered when a more detailed plan is being developed as part of the likely conditions of the IPPC licence.

Mitigation for Impacts on Groundwater Quality

Domestic Effluent and Wastewater

There is no discharge of wastewater effluent at the Coole or Clonsura sites and therefore no impacts on groundwater quality in terms of nutrient loading can occur.

Hydrocarbons Usage and Storage

Hydrocarbons are used on-site for machinery and generator refuelling.

Current mitigation measures that are employed on-site to avoid release of hydrocarbons are as follows:

- Refuelling vehicles are bunded to ensure no leaks can occur;
- An adequate supply of containment booms and or suitable absorbent material (spill kits) are kept on site at all times;
- Absorbent materials (spill kits) are held on standby in all instances of refuelling;
- A visual inspection is completed every week to ensure that there is no evidence of fuel contamination in sedimentation basins or outlets;

- Waste sent off site for recovery or disposal will only be conveyed to a licensed waste contractor, and only transported from the site of the activity to the site of disposal in a manner which will not adversely affect the environment;
- Any contaminated peat is removed and deposited in a contaminated waste container and disposed of by licensed waste hauliers;
- All pumps using fuel or containing oil will be locally and securely bunded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters;
- A bi-annual inspection is carried out of all transported fuelling systems to ensure that should record any damages leaks or flaws that could result in an accidental spillage, and,
- An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan. Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.

4.4.6 Conclusions/Residual Impacts

Overall and taking account of existing and proposed mitigation measures where relevant the following can be concluded:

- There are no expected impacts on the hydrology/water quality of nearby designated sites e.g. Lough Derravaragh, Lough Bane & Garriskil Bog.
- There is considered to be a negligible to no impact on remnant raised bogs and also on groundwater quality as a result of activities.
- There is considered to be a negative, slight/negligible, high probability and long-term impact on the water quality of the Inny River.
- There is considered to be a negligible, high probability, long-term impact on the Inny River flood levels.

4.4.7 Interactions with other Environmental Attributes

Soils, geology and hydrology will interact and/ or interrelate with the following:

- Biodiversity: There can be clear interactions between ecological receptors and water resource features. This issue is discussed above and, in more detail, where relevant in Chapters 4.3 – Biodiversity - Aquatic and Chapter 4.2– Biodiversity Terrestrial.

4.4.8 Monitoring

It is proposed that a peat water level monitoring network be installed between the Clonsura harvesting area and Lough Bane pNHA as a precautionary mitigation measure. The layout of the proposed monitoring network will comprise transects of nested piezometers. Water level monitoring will be undertaken initially on a fortnightly basis and then on a quarterly basis once equilibrium has been reached.

4.4.9 Reinstatement

Not applicable.

4.4.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.5 Noise and Vibration

4.5.1 Introduction

This section identifies the existing noise levels at the Coole and Clonsura sites, the potential impacts of operations at both sites on the existing ambient noise environment and the abatement measures that may be employed to reduce/eliminate the impact where necessary.

4.5.1.1 Competent Expertise

This chapter has been prepared by Siobhan Maher whose qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science and a Dip. Acoustics and Noise Control Engineering. Siobhan is a Member of the Institute of Acoustics (MIOA) and has over 20 years of experience providing environmental consultancy and environmental assessment services to business, industry and public sectors. Siobhan has experience in, but not limited to the areas of; noise and vibration impact assessment, building acoustics (design and standard assessment), environmental noise prediction modelling and occupational noise assessment.

4.5.2 Study Assessment & Methodology

Noise Monitoring

An initial site inspection was conducted and aerial photography reviewed in prior to site surveys in June 2013 order to identify the locations of the nearest Noise Sensitive Locations (NSLs) and to assess as to whether the receiving environment could be classified as a Quiet Area in accordance with the criteria as set out in the "*Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)"* (EPA, 2016) hereafter referred to as the EPA Guidance Note.

Noise monitoring was then conducted during a second site visit at the nearest NSLs and/or representative locations in order to characterise the existing environment and the impact of site activities. Three locations were chosen in total; - two at Coole and one at Clonsura. The monitoring locations are shown on Attachment 1, Figure 4.5.1. and Figure 4.5.2.

Owing to the timing of this update post cessation of harvesting operations, it was not possible to resurvey noise levels as no machinery or equipment was in operation post cessation. However, given that both the method of harvesting and area within which peat is harvested remains unchanged, the noise levels measured in 2013 are considered to be representative and suitable for use in the current assessment.

The survey was carried out on the 25th June 2013 during harvesting generally between the hours of 09.00 – 18.00. The activity does not operate during the evening (except between 19.00 – 20.00) and night time periods therefore monitoring was not conducted during these periods. Monitoring was conducted in accordance with the methodology where relevant, as set out in the EPA Guidance Note. The recommendations set out in the International Standards Organisation Documents ISO 1996-1:2003 and ISO 1996-2:2007 were also adhered to.

Noise measurements were made out using a BRÜEL & KJÆR 2250 Hand Held Analyser equipped with Enhanced Logging Software BZ7225. The monitoring equipment was calibrated before measurements were recorded using a BRÜEL & KJÆR sound level calibrator type 4231. The noise levels were measured using the A-weighted network, and a fast sampling interval. At all sample locations the noise metre was positioned at a minimum of 3.5 metres away from any reflecting surfaces, and mounted on a tripod 1.5 metres over ground level.

Weather conditions were ideal for noise monitoring on the 25th June with no rain and only an occasional slight breeze. Wind speeds were < 5m/sec.

Overall weather conditions prevailing during the survey were obtained from Met Eireann[50]. The weather conditions noted at Mullingar, the closest weather station to the site, are outlined in Table 4.5.1 overleaf.

Table 4.5.1 Summary of Weather Conditions (taken from Mullingar)

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Mean Wind Speed (knots)	Wind speed (m/s)	Gusts (if >= 34 knots)
25/6/2013	0	17.9	4.6	3.3	1.7	-

All measurements were as dB(A); i.e. decibels measured using the A-Weighted network, which corresponds to the frequency at which humans perceive noise. The parameters measured were as follows:

- LAEQ is the A – weighted equivalent continuous sound level – the sound level of a steady sound having the same energy as a fluctuating sound over a specified measurement period.
- LA10 is the A – weighted noise level which is exceeded for 10% of the specified measurement period. This gives an indication of the upper limit of fluctuating noise such as that from road traffic.
- LA90 is the A – weighted noise level exceeded for 90% of the measurement period and is useful in providing an indication of the background noise level experienced over the measurement period.

Fifteen-minute sampling events were conducted over a one-hour period at each monitoring location. Logging was completed at one-minute intervals. The graphs from logging are contained in Attachment 7.

Impact Prediction

Where required noise levels at the nearest NSLs were predicted in accordance with the requirements of ISO 9613-2-1996 Acoustics – Attenuation of Sound during Propagation Outdoors- Part 2 General Method of Calculation.

4.5.3 Existing Environment

Noise monitoring was conducted at the three locations described in Table 4.5.2 below. Attachment 1, Figure 4.5.1 and Figure 4.5.2 shows the monitoring locations and the nearest NSLs to the sites. In terms of NSLs the general area is characterised by detached dwellings on the roadsides. Both the Coole and Clonsura sites are enclosed to a large degree by forestry and therefore there are few NSLs located directly, or close to, the boundaries.

Table 4.5.2 Description of the Noise Monitoring Locations

Location	Description of Location
NM 1	Residential dwelling located on R395 approximately 370m east from the Coole site main entrance and 250m from the Coole site boundary.
NM 2	Within the Coole site, approx. 20 metres north from the L1826 Coole to Multyfarnham Road to the south. This location is representative of the nearest NSL to the west.

[50] Met Eireann website www.met.ie

Location	Description of Location
NM 3	Located approx. 231m from the eastern Clonsura site boundary and representative of the nearest NSL to the east. This location is approx. 483 metres from the R394 to the east.

The results of monitoring are presented in Table 4.5.3 below.

Table 4.5.3 Results of Noise Monitoring, June, 2013

Location	Time	$L_{Aeq\ 15\ mins}$ dB	$L_{A10\ 15\ mins}$ dB	$L_{A90\ 15\ mins}$ dB
NM 1	10:58 – 11:58	66	62	37
		64	60	33
		66	63	35
		66	59	34
NM 2	13:48 – 14:52	44	45	30
		41	43	29
		48	47	31
		42	44	30
NM 3	16:05 – 17:20	43	47	35
		42	45	35
		44	47	38
		40	44	34

Table 4.5.4 below describes the noise sources at each monitoring location.

Table 4.5.4 Description of Noise Sources, June, 2013

Location	Description of Noise Sources
NM 1	Location dominated by traffic noise on the R495. Approx. 75 pcus passed the noise meter during the one-hour monitoring event. Background noise in the absence of traffic consisted of bird song and a tractor working in the distance on a field approx. 200m away from location. The low background noise levels are typical of a rural environment.
NM 2	Location is set back from the road but is dominated by traffic noise on the L1826. Approximately 28 pcus passed by on the road during the hour. Background noise levels are low.
NM 3	This location was unaffected by traffic noise. The difference between the background and the LAeq can be attributed to hay making in the adjacent field where a tractor was constantly in operation in different parts of the field thus occasionally working closer to the meter. Birdsong also contributed to the noise levels recorded.

Coole

As expected, the highest noise levels were recorded at NM1 which is located beside the R395. The Coole area could not be classified as a quiet area in accordance with the Guidelines because the noise from anthropogenic sources is clearly audible at both locations monitored. However, in the absence of traffic, the background levels are low and the area can therefore be categorised as an area of low background levels.

Harvesting was on-going at the Coole site at the time of monitoring. Activities included collection of ridged peat and stockpiling. The activities involved the use of one Liebherr bulldozer for stockpiling and up to 6 tractors and trailers. Most of the activity was taking place in the centre of the site. It was not audible at any of the monitoring locations.

Clonsura
The ambient noise level at NSLs closer to the Clonsura site is lower than that recorded at NM1 as these NSLs are set back and away from the R394. Traffic noise was not audible at this location however levels would have been even lower if the grass cutting/turning for hay was not in operation. It is however considered that this noise is part of the normal soundscape for the area which is agricultural in nature.

During the survey, ridging was in operation within the northern portion of the Clonsura site. This activity was inaudible at the nearest NSL due to the distance and screening effects of the intervening undulating hills.

4.5.4 Actual and Potential Impacts of the Activity

The potential impact of the operation on the ambient noise environment arises from the following:

1. Harvesting operations occurring mainly during April to September, and,
2. Transportation of peat off-site mainly during January to June.

Harvesting
As noted in Section 4.5.3 harvesting operations were on-going at the Coole site during the survey but were inaudible at the nearest NSLs both to the east and the south. Furthermore, the activity is typical of the normal soundscape for the area; i.e. agricultural equipment is used over a large landbank. In general, the following equipment is potentially in use at each site during harvesting:

- 6 tractors;
- 1 bulldozer (used on the stockpiles);
- 9 trailers;
- 1 miller;
- 2 harrows;
- 2 harvesters (to lift peat).

No stationary equipment is employed. The tractors and the bulldozer are the main noise sources.

In addition to the measurements made at the noise monitoring locations, measurements were also made in close proximity to each noisy operation occurring at the stockpiles. The following results were recorded:

- Tractor and trailer: approx. 75dB(A) at 6m
- Liebherr digger on stockpile: approx. 78dB(A) at 6m

Most of this type of activity takes place close to the stockpile locations which are at least 200m from the nearest NSLs. Stockpiling operations also take place close to the Multyfarnham Road although this was not occurring on the day of monitoring. In the case of these locations, screening by the stockpiles and intervening topography and distance will attenuate noise propagation to the NSLs. Accordingly, the noise levels associated with stockpiling during harvesting at these locations are not anticipated to impact on existing background noise levels at the nearest NSLs. Furthermore, the activity is seasonal and intermittent. The site at Clonsura is completely enclosed and any harvesting activity is likely to be inaudible.

HGV Access
Articulated HGV's are used from January through to June to transport peat from the sites to Westland facilities in Ireland and UK for further processing.

Peat from the Coole site is loaded from stockpiles on the site off the R395 and the L1826. These trucks then pass a number of roadside receptors on their way to the R396 to Granard, Co. Longford.

Similarly, the peat from the Clonsura site is loaded and then passes the eight residential dwellings off the L57671 which links the site to the R394 from Castlepollard to Finnea. Trucks then leave north via the R394 to the N55 to Cavan.

Traffic counts are presented in Section 4.10 of this document. The number of trucks on the regional roads and the L1826 are insignificant in noise terms compared to the overall traffic on these roads even when the pcu equivalent of the articulated trucks is taken into account.

However, it is likely that the trucks temporarily elevate the ambient noise level at NSLs on the L57671 at Clonsura as this route is not normally trafficked by articulated trucks or any regular passing traffic compared to the other roads. In order to assess this impact, it is assumed that each truck gives rise to peak sound pressure level of approx. 85dB(A) at the roadside or at one-meter distance. A 60 second pass-by period is assumed for each NSL. Accordingly, the following equation is used to calculate the $L_{Aeq,\ 1\ hour}$ arising from 4 such events.

Eqn 1: $L_{Aeq,\ 1hr} = 10 \log ((t1 \times 10^{L1/10} + t2 \times 10^{L2/10})/T)$

Where t1 is 4x60secs (assumes 4 trucks within an hour)
t2 is 56 x 60 secs
L1 is 85dB
L2 is 42dB (measured ambient level)
T is 60x60secs.

Therefore, the overall $L_{Aeq,\ 1\ hour}$ is anticipated to be 73dB(A) at the roadside. Each house is set back from the roadside by at least 25m therefore the overall $L_{Aeq,\ 1\ hour}$ is anticipated to be approx. 43dB taking account of distance attenuation at 20log(r1/r2) where r1 is 1m and r2 is 25m in this instance. This is similar to the $L_{Aeq's}$ currently recorded in the area with influences from agricultural equipment. However, during quieter periods, when agricultural sources have reduced, it is likely that noise from the trucks will result in elevated ambient noise levels above background at times.

Future Post Harvesting

A detailed rehabilitation/closure plan will be designed for both sites in the future. As part of this, any impacts on the ambient noise environment arising from the rehabilitation operation will be assessed and mitigation measures derived as appropriate. Notwithstanding this, it is highly unlikely that post harvesting rehabilitation by Westland will have any significant impact on the ambient noise environment based on the plans likely to be implemented by the company. Any future development by the land owner is not within the scope of this EIAR and will, where applicable, be subject to other regulatory processes such as the planning legislative framework.

4.5.5 Existing and Proposed Mitigation Measures and/or Factors

The following mitigation measures are currently applied by Westland:

- All equipment complies with EC Directives relating to noise emissions from construction, plant and equipment used outdoors (Directive 2000/14/EC and Amending Directive 2005/88/EC transposed into Irish law as European Communities (Noise Emission of Equipment for Use Outdoors) Regulations, 2001 (S.I. 632/2001) and Amending Regulations 2006 (S.I. 241/2006). These include generators, tractors, excavators, dozers, loaders and dump trucks. All equipment should be CE51 marked.

[51] CE is an abbreviation for Conformité Européene meaning European Conformity .

- Road surfaces to, from the Clonsura site are maintained by Westland to ensure vibration and noise from operational traffic travelling over uneven surfaces is minimised.
- A Site Manager would investigate any complaints received. To date no noise complaints have been received.
- Hauliers travel at recommended speed limits for roads.

4.5.6 Conclusions/Residual Impacts

It is concluded that the activities carried out by Westland do not have a significant effect in terms of noise and vibration on existing NSLs in the areas of Coole and Clonsura. There are no other sources or development in the area with which cumulative noise impacts could occur.
The activity is typical of the soundscape of the area i.e. agricultural with the exception of the use of articulated trucks on a seasonal basis. However, this is not considered likely to give rise to noise nuisance or significant effect and can be considered to be imperceptible and temporary.

Overall, it is considered that the activity can comply with the following limit likely to be set in the EPA license as specified for areas of low background noise in Table 1 and figure 3 of NG4:

Day (07.00 to 19.00 hrs) 45dB $L_{Ar,T}$
Evening (19.00 to 23.00 hrs) 40dB $L_{Ar,T}$

Where LAr,T is the rating level i.e. the LAeq adjusted to take account of penalties for tonal and/or implusive elements which is unlikely to apply in this instance. Limits for the night time do not apply as operations are carried out mainly during the daytime period only.

4.5.7 Interaction with Other Environmental Attributes

Interactions of the impact on the ambient noise environment and the inter-relationship with human beings is described above.

4.5.8 Monitoring

It is not considered that noise monitoring should be required as part of any IPPC licensing monitoring regime for the activity.

4.5.9 Reinstatement

Not applicable.

4.5.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.6 Air Quality & Odour

4.6.1 Introduction

This section identifies and describes the existing ambient air quality at the Coole and Clonsura sites, the potential impacts of peat harvesting activities on the air quality and the abatement measures that may be employed to reduce/ eliminate the impact where necessary.

4.6.1.1 Competent Expertise

This chapter has been prepared by Siobhan Maher whose qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science and a Dip. Acoustics and Noise Control Engineering. Siobhan is a Member of the Institute of Acoustics (MIOA) and has over 20 years of experience carrying out environmental impact assessments.

4.6.2 Study Assessment & Methodology

A desk-based study and site visit was carried out in order to characterise the receiving environment and assess the potential impact of operations on the ambient air quality. The site was visited on the 26th June 2013 during harvesting operations.

The existing environment is described taking account of literature sources such as the EPA publication 'Air Quality in Ireland 2018 (Key Indicators of Ambient Air Quality)'. The relevant air quality legislation was also consulted.

Air Pollution Standards

Assessment of the significance of a particular level of pollution is made with reference to limit values established in the Air Quality Standards (AQS) Regulations, 2011 (S.I. 180 of 2011) and the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2009 (S.I. 58 of 2009).

The 2011 Regulations came into effect on 12th April 2011 and transpose the Clean Air for Europe (CAFE) Directive 2008/50/EC into Irish law. The new Regulations revoke S.I. No. 33 of 1999, S.I. No. 271 of 2002 and S.I. No. 53 of 2004. Compared to previous air quality legislation, the CAFÉ Directive and the new Regulations introduce a new limit value for $PM_{2.5}$ in addition to the existing limit values for PM_{10}, nitrogen dioxide and oxides of nitrogen, sulphur dioxide, lead, ozone, carbon monoxide and benzene. $PM_{2.5}$ has similar effects on health as PM_{10} however, $PM_{2.5}$ is a better indicator of anthropogenic (man-made) emissions than PM_{10}.

AQSs are usually based on the effects of pollutants on human health, although other factors such as effects on vegetation are sometimes taken into account. The risk posed by air pollution to vegetation and natural ecosystems is most important in places away from urban areas and compliance with critical levels for the protection of vegetation should therefore focus on places away from built-up areas. The limit values given in the 2011 Regulations for the protection of human health and vegetation are summarised in Table 4.6.1. overleaf. For each parameter in Table 4.6.1 a margin of tolerance applies, which is the percentage of the limit value by which that value may be exceeded subject to the conditions laid down in the AQS Regulations. The margin of tolerance for each parameter is also included in Table 4.6.1.

Table 4.6.1 AQS Regulations 2011 Limit Values (S.I. No 180 of 2011)

Reference Period	For the protection of:	Limit Value µg/m^3 (1)	Number of times in one year not to be exceeded	Margin of tolerance
Sulphur Dioxide				
Hourly limit value	Human health	350	24	150 µg/m^3 (43%)
Daily limit value	Human health	125	3	None
Annual Limit Value	Vegetation	20	0	None
Nitrogen Oxides				
Hourly limit value	Human health	200	18	None
Annual limit value	Human health	40	0	None
Annual Limit Value	Vegetation	30	0	None
Particulate Matter (PM_{10})				
Daily limit value	Human health	50	35	50%
Annual limit value	Human health	40	0	20%
Particulate Matter ($PM_{2.5}$)				
Annual limit value (STAGE 1)	Human health	25	0	20% on 11th June 2008, decreasing on 1st January 2009 thereafter by equal annual percentages to reach 0% by 1st January 2015
Annual limit value (STAGE 2)	Human health	20 (1) (2)	0	
Lead				
Annual limit value	Human health	0.5	0	100%
Arsenic				
Annual limit value	Human health	0.006	0	None
Cadmium				
Annual limit value	Human health	0.005	0	None
Nickel				
Annual limit value	Human health	0.02	0	None
Benzene				
Annual limit value	Human health	5	0	None
Carbon Monoxide				
Maximum daily 8-hr mean value	Human health	10,000	0	60%
Ozone				
Maximum daily 8-hr mean value	Human health	120 µg/m^3	25 (averaged over 3 years)	None

May to July	Vegetation	AOT40 (calculated from 1 ha values) 18,000 µg/m^3 h averaged over 5 years	0	None
Polycyclic aromatic hydrocarbons (PAH)				
Annual limit value	Human health	0.01	0	40%

Notes: *(1) Stage 2- indicative limit value to be reviewed by the Commission in 2013 in the light of further information on health and environmental effects, technical feasibility and experience of the target value in Member States.*
(2) Date by which this value limit is to be met: 1st January 2020.

4.6.3 Existing Environment

EU legislation on air quality requires that member states divide their territory into zones for the assessment and management of air quality. In Ireland, the following four national air quality zones are defined within the Schedule 18 of the AQS 2011Regulations:

Zone A — Dublin Conurbation
Zone B — Cork Conurbation
Zone C — Other Cities and Large Towns
Zone D — Rural Ireland

It is considered that results of monitoring for Zone D are most likely to accurately represent existing air quality at Coole and Clonsura sites.

EPA Monitoring

Since 2011, monitoring has been carried out by the EPA in a number of Zone D locations. The results were collated and analysed in order to describe Zone D sites in general. Table 5.5.2 below shows the parameters monitored by the EPA at each of the monitoring locations in zone D.

Table 4.6.2 EPA Zone D Monitoring Stations for each Parameter

Parameter	Monitoring Locations
SO_2	Kilkitt (Co. Monaghan), Shannon Town, (Co. Clare) and Shannon Estuary.
NO_2	Castlebar (Co. Mayo), Glashaboy (Co. Cork) and Kilkitt (Co. Monaghan), Shannon Town, (Co. Clare)
NO_x	Castlebar (Co. Mayo), Glashaboy (Co. Cork) and Kilkitt (Co. Monaghan), Shannon Town, (Co. Clare)
CO	Shannon Town, (Co. Clare)
Ozone	Castlebar (Co. Mayo), Glashaboy (Co. Cork) and Kilkitt (Co. Monaghan), Mace Head (Co. Galway), Valentia (Co. Kerry), Emo Court (Co. Laois).
AOT 40	Castlebar (Co. Mayo), Glashaboy (Co. Cork) and Kilkitt (Co. Monaghan), Mace Head (Co. Galway), Valentia (Co. Kerry), Emo Court (Co. Laois), Johnstown Castle (Co. Wexford) [(1)].
PM_{10}	Shannon Town, (Co. Clare), Castlebar (Co. Mayo), Longford (Co. Longford).
Black smoke	No monitoring was carried out for zone D.
$PM_{2.5}$	Longford
PAH	Kilkitt (Co. Monaghan).
Benzene	Emo Court (Co. Laois).
VOCs (benzene, toluene, ethylbenzene, m-p- & o-xylene)	No monitoring was carried out for zone D.

Parameter	Monitoring Locations
Lead, Arsenic, Cadmium & Nickel	Kilkitt (Co. Monaghan).
Mercury	Mace Head (Co. Galway).
Metal deposition (Lead, Arsenic, Cadmium & Nickel)	Valentia (Co. Kerry)

Notes: (1) Monitoring at Johnstown Castle ceased in December 2009.

The air monitoring results for Zone D with regard to each parameter listed in Table 4.6.2 are outlined in 4.6.3 below.

Table 4.6.3 Zone D Annual Average Monitoring Results for 2018 compared with the current AQSs (S.I. 58 of 2009 & S.I. 180 of 2011)

Parameter	Units	Annual Average Mean range	AQS Annual Average Limit Values for Protection of Human Health	No and Location of Exceedances
SO_2	µg/m^3	2.6	NA (daily limit:125 µg/m^3)	NA (daily limit exceedences: 0)
NO_2	µg/m^3	3 - 8	40	0
NO_x	µg/m^3	4 - 11	40	0
CO	mg/ m^3		10	0
Ozone	µg/m^3	58-75	120 (No more than 25 days)	0
AOT 40	µg/m^3	1773-5856 (period 2012-2018)	18,000 (averaged over 5 years)	0
PM_{10}	µg/m^3	9 - 15	40 (daily limit:50 µg/m^3)	0 (daily value exceedences: Castlebar (5) & Longford (11))
$PM_{2.5}$	µg/m^3	6 – 13	20	0
PAH benzo(a)pyrine	ng/m^3	0.08	1	0
Other PAHs	µg/m^3	0.01 – 0.35	NA	NA
Benzene	µg/m^3	0.4	5	0
Lead	ng/m^3	1.9	500	0
Arsenic	ng/m^3	0.1	6	0
Cadmium	ng/m^3	0.1	5	0
Nickel	ng/m^3	0.2	20	0
Mercury	ng/m^3	1.247	NA	NA
Metal deposition (Lead)	µg/m^2/day	0.6-0.75	NA	NA
Metal deposition (Arsenic)	µg/m^2/day	0.19-0.37	NA	NA
Metal deposition (Cadmium)	µg/m^2/day	0.36-0.59	NA	NA

Metal deposition (Nickel)	µg/m^2/day	0.36-0.62	NA	NA

NA = not applicable

As noted in the results shown above, sourced from the Air Quality Report 2018 (Summary Data Tables), there were no exceedances reported for the listed parameters.

Point Source Emissions to Air in the Area
The surrounding lands to the site are used for agricultural purposes (peat harvesting, tillage and grazing), and feature detached residential dwellings mainly along the roadsides. There are no industrial point source emissions affecting ambient air quality in the area.

Odour
There are no sources of odour associated with the activity.

Dust Deposition
The German TA-Luft recommends a long-term dust deposition rate (expressed as a rate in mass per unit area per day) of 350 mg/(m^2*day) for Bergerhoff Gauges, as a threshold for significant disadvantages and nuisance for non-hazardous dust. A dust deposition rate of 650 mg/(m^2*day) is recommended as a 95-percentile value for short term permissible levels.

Typically, background dust levels for a rural area would be in the range of 135 - 190 mg/(m^2*day) using a Bergerhoff Gauge. While there are Bergerhoff gauges on site to monitor dust emissions from the site, to date it has not been possible to obtain a representative result of dust deposition as the Bergerhoff gauges have been interfered with. During site visits by OES personnel, there was no evidence of nuisance dust on roads etc. arising from the activity.

Summary of Ambient Air Quality & Receptors
Overall, it is expected that the ambient air quality at the site is good and well within the AQSs shown in Table 4.6.1, based on the monitoring results observed in 2011 at stations representative of rural conditions. Nuisance dust is the main potential impact on ambient air quality in the area from agriculture and peat harvesting. The nearest sensitive receptors to the two sites, are residential properties located well outside the site boundaries and the harvesting areas. The Inny River is also a sensitive receptor to dust however the impact on aquatic ecology and water quality is dealt with in Sections 4.3 and 4.4.

4.6.4 Actual and Potential Impacts of the Activity

A significant decrease in air quality and the emission of harmful contaminants can pose a risk to the health of human beings and animals over periods of time. A decrease in air quality such as the production of harmful emissions or strong odours can also reduce the outdoor amenity.

Harvesting and Stockpiling
During the site visit of the 26th June 2013, photos were taken of harvesting activities in operation. Refer to Attachment 2, Plate 4.6.1 showing tractors with harrows attached. The weather at the time of the site visit was dry. As noted in Plate 4.6.1 localised dust clouds that disperse rapidly can occur during harvesting however this is highly unlikely to affect the nearest residential dwellings due to the distance separation of >200m and the intervening vegetated buffer zones. Westland has never received any complaints regarding dust from their operations.

Stockpiling operations are also shown in Attachment 2, Plate 2.4. As can be seen from the photo, dust is not generated during this activity. Notwithstanding the above, the company employs a number of mitigation measures to ensure that dust is minimised. These are outlined in Section 4.6.5 below.

The extent of emissions of combustion gases is limited to that arising from the tractors and the bulldozer used to compact the stockpiles.

Exhaust gases would not typically constitute a significant source of emissions and are expected to be dispersed rapidly by prevailing winds. The limit values for air-borne pollutants will not be approached as a result of machinery operation. Therefore, the impact on air quality is negligible.

There are no sources of odour associated with the activity.

Traffic Related Emissions to Air
The activity gives rise to peak levels of approximately 8 – 14 truck movements per day during the January to June season when peat is transported off site. Approximately 9 staff could also travel to site during this period. The traffic flows associated with the activity are insignificant in the context of potential impact on ambient air quality.

Future Post Harvesting
A detailed closure/rehabilitation plan will be designed for both sites in the future. As part of this, any impacts on air quality arising from the operation will be assessed and mitigation measures derived as appropriate. Notwithstanding this, it is highly unlikely that post harvesting will have any significant impact on ambient air quality.

4.6.5 Existing and Proposed Mitigation Measures and/or Factors

There are a number of dust mitigation measures listed in Section 4.3 dealing with impacts on Aquatic Ecology with relevance to minimising the impact of dust on residential receptors. The following additional mitigation factors or measures are also relevant in this regard:

- There is no stockpiling of peat within >200m from residential receptors.
- Buffer zones are maintained between residential receptors.
- A Site Manager is appointed to deal with complaints should they ever arise and also ensures that housekeeping procedures are implemented whereby adjoining roads are maintained in a mudfree and tidy condition.

4.6.6 Conclusions/Residual Impacts

Overall, after the implementation of the above mitigation measures, the impact of the operation on ambient air quality and nearby residential receptors has been shown to be, and is expected to continue to be, insignificant.

There are no other sources of emissions to atmosphere which can be considered relevant in the context of cumulative contributions in the area.

4.6.7 Interaction with Other Environmental Attributes

The other environmental factors with which ambient air impacts may interact include:

- Human Beings: Refer to above.
- Aquatic Ecology: Mitigation measures to prevent dust deposition from airborne suspended solids on the Inny River to flora and fauna are described above and in more detail in Section 4.3.

4.6.8 Monitoring

Dust deposition monitoring will be completed in accordance with the requirements of the IPPC license for the activity if and when granted.

4.6.9 Reinstatement

Not applicable.

4.6.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.7 Climate

4.7.1 Introduction

This section discusses the impact of the peat harvesting activity on the national and global issue of climate change and the need to reduce Greenhouse Gas Emissions (GHGs). The potential cumulative impact of the operation with other activities in terms of carbon dioxide emissions is addressed and existing and future mitigation measures are identified where required.

4.7.1.1 Competent Expertise

This chapter has been prepared by Siobhan Maher whose qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science and a Dip. Acoustics and Noise Control Engineering. Siobhan is a Member of the Institute of Acoustics (MIOA) and has over 20 years of experience carrying out environmental impact assessments.

4.7.2 Study Assessment and Methodology

Various national and international documents on climate change were reviewed in order to compile this section including:

- United Nations (UN) Climate Change Policy - Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) 2013
- Climate and energy priorities for Europe: the way forward, 2014
- EU Energy Transport and GHG Emission Trends to 2050, 2013
- Ireland's Greenhouse Gas Emissions Projections 2018-2040, EPA 2019

4.7.3 Existing Environment

Global Environment

Climate change is recognised as the most serious global environmental problem. While natural variations in climate over time are normal, human interference with the global atmosphere system through the emission of very substantial amounts of GHGs is causing a discernible effect on global climate. Continuing change in the global climate system is expected in the future due to further emissions of GHGs.

<u>International and EU Climate Change Policy</u>

The first United Nations (UN) convention on climate change was held in Kyoto in 1997. Ireland, as part of the EU, signed up to this agreement which originally extended until 2012. It was agreed to extend the Kyoto Agreement on climate change to 2020 at the most recent UN convention held in Doha in December 2012. Internationally binding targets were not agreed at this convention or the previous one held in Copenhagen, however the EU has ambitious targets for 2030 which, set three key objectives :

- At least 40% cuts in greenhouse gas emissions (from 1990 levels)
- At least 32% share for renewable energy
- At least 32.5% improvement in energy efficiency

The targets were set by EU leaders in October 2014, when they committed Europe to become a highly energy-efficient, low carbon economy.

Situation in Ireland

According to the EPA's report '*Ireland's Greenhouse Gas Emissions Projections 2018-2040*', which was published June 2019, Ireland projected GHG continue to grow from current levels by 0.4-1% (2020) and 6-10% (2030) depending on the level of measures implemented. Agriculture, transport and energy are the largest contributors to these levels.

According to the report, Ireland GHG emission profile is unique due to the dominance of the agricultural sector.

By 2020, transport and agriculture are projected to account for nearly 80 per cent of Ireland's emissions not accounted for under the Emissions Trading Scheme. Under the most ambitious reduction scenario, transport and agriculture emissions are projected to both increase by 12% by 2020. This scenario assumes that ambitious targets are met for renewable fuel penetration, electric vehicle rollout and targets under the Food Harvest 2020.

According to the EPA, failure to deliver on any of the measures, or a reduction in their effectiveness, will mean higher emissions levels than projected. Earlier this year, it emerged that Ireland may have to spend up to €300m over the next eight years to fulfill its obligations under these EU targets.

Carbon Emissions and Peatlands

Peatlands cover less than 3% of the world's land surface but store more carbon than is contained in the vegetation of the world's forests[52]. Peatlands can act as sinks or sources of CO_2 and CH_4 and may also be a source of N_2O. The peatlands in the northern hemisphere alone store approximately 450 billion tonnes of carbon[53]. Extraction of peat disturbs the natural cycle of carbon in peatlands. Lowering of the water table due to drainage increases the depth of aerobic peat and therefore CO_2 emissions. CH_4 emissions generally cease following drainage (which occurred in the 1980s). The contribution of peatlands to GHG balances depends on the environmental and geographic conditions, type and age of the peatland and land-use[54].

The carbon cycle of peat use for horticultural purposes includes fluxes of GHGs from all stages of the process are shown below. (Note: Steps 2, 3 and 4 only apply to Westland's activities).

5. Initial stage - undisturbed peatland;
6. Preparation of peatland for peat harvesting;
7. After-use of cutaway peatland, and,
8. Redistribution of peat for horticultural use with carbon sequestration as part of plant growth.

Irish peatlands originally covered approximately 17% (1,179,000ha) of the country's land area[55] and store an estimated 1.2 billion tonnes of carbon based on the whole Island of Ireland[56,57]. This equates to 4.4 billion tonnes of carbon dioxide (CO_2). Since 1949, most of the peat has been extracted industrially under state funded operatives using either small-scale mechanisation (e.g. tractor

[52] Matthews, E., (1984) Prescription of Land-Surface Boundary Conditions in GISS GCM II: A Simple Method Based on High-Resolution Vegetation Data Bases. NASA TM-86096. National Aeronautics and Space Administration.
[53] Gorham, E. (1991) Northern peatlands: Role in the carbon cycle and probable responses to climate warming. *Ecological Applications*
[54] Lappalainen, E. (1996) Global Peat Resources. International Peat Society. Jyskä, Finland
[55] Hammond, R. F. (1979) Peatlands of Ireland, Soil Survey Bulletin
[56] Tomlinson, R.W. (2005) Soil carbon stocks and changes in the Republic of Ireland. Journal of Environmental Management 76:77–93;
[57] Cruickshank, M.M., Tomlinson, R.W., Devine, P.M. and Milne, R. (1998) Carbon in the vegetation and soils of Northern Ireland. Proceed RIA.Vol. 98B, NO. 1:9–21

mounted hoppers) or more large-scale industrial processes (milled peat methods). Between 1990 and 2000 up to 23 Million tonnes (Mt) of soil carbon has been lost[56]. The Irish Peatland Conservation Council (IPCC) gives an estimated annual emission from peatlands in the Republic of Ireland of 1.25 Mt carbon (Mt C)[58].

Only few studies have been carried out of the GHG fluxes of peat production fields and areas associated with peat harvesting. Results from studies conducted in Ireland, Finland, Sweden and Canada are shown in Table 4.7.3 overleaf as these are countries where significant amounts of peat are extracted for energy production. The estimated remaining area of intact peatland of Ireland sequesters 0.06 Mt C per year but this is significantly offset by an emission total of 1.14 Mt C from degraded and industrial cutaway peatlands[59]. This amounts to 1.87% of total Irish greenhouse gas emissions in 2017 (60.74 million tonnes: Irelands Final Greenhouse Gas Emissions 1990 – 2017, EPA April 2019).

Table 4.7.3 Greenhouse gas fluxes (CO_2-C, CH_4-C and N_2O-N; tonnes ha-1 yr-1) from peat extraction areas (non-vegetated bare peat). Positive values indicate a flux from the peatland to the atmosphere. These figures do not include emissions from combustion. Adapted from Wilson et al (2012)[60]

Location	CO_2-C	CH_4-C	N_2O-N
	Tonnes ha^{-1} yr^{-1}	Tonnes ha^{-1} yr^{-1}	Tonnes ha^{-1} yr^{-1}
Finland[61]	2.40	0.002	0.0002
Sweden[62]	0.55–2.73	0.003–0.034[a]	-
Canada[63]	3.98[b]	-	-
Canada[64]	0.88-3.97[b]	-	-
Canada[65]	3.02	0.014	-
Sweden[66]	2.73[c]	0-0.02	0-0.016
Finland[66]	3.16	0.004	0
Ireland[67]	1.9-3.5	-0.001	-

[58] Irish Peatland Conservation Council (IPCC) website www.IPCC.ie
[59] Foss, P. J., O'Connell, C. A. and Crushell, P. H (2001) Bogs and Fens of Ireland – Conservation Plan 2005. Irish Peatland Conservation Council. Dublin
[60] Wilson, D., Renou-Wilson, F., Farrell, C., Bullock, C., and Müller, C. (2012) Carbon Restore – The Potential of Restored Irish Peatlands for Carbon Uptake and Storage, The Potential of Peatlands for Carbon Sequestration, EPA Climate Change Research Programme 2007–2013, Environmental Protection Agency, Wexford.
[61] Nykänen H., Silvola J., Alm J. & Martikainen P. J. (1996) Fluxes of greenhouse gases CH4, CO2 and N2O on some peat mining areas in Finland. In: Laiho R., Laine J. & Vasander H. (eds.), *Northern peatlands in global climate change. Proceedings of the International Workshop held in Hyytiala, Finland, 8 - 12 October 1995*. The Academy of Finland, Helsinki, pp. 141–7.
[62] Sundh I., Nilsson M., Mikkelä C., Granberg G. & Svensson B. H. (2000) Fluxes of methane and carbon dioxide on peat-mining areas in Sweden. *Ambio* 29(8): 499–503.
[63] Waddington J. M. & Warner K. D. 2001. Atmospheric CO2 sequestration in restored mined peatlands. *Ecoscience* 8(3): 359–68.
[64] Waddington J. M., Warner K. D. & Kennedy G. W. 2002. Cutover peatlands: A persistent source of atmospheric CO2. *Global Biogeochemical Cycles* 16(1): 1002, doi:10.1029/2001GB001398.
[65] Cleary J., Roulet N. T. & Moore T. R. 2005. Greenhouse gas emissions from Canadian peat extraction, 1990- 2000: a life cycle analysis. *Ambio* 34(6): 456–61
[66] Holmgren K., Kirkinen J. & Savolainen I. 2006. *The climate impact of energy peat utilisation - comparison and sensitivity analysis of Finnish and Swedish results.* IVL Swedish Environmental Research Institute.
[67]Wilson D., Alm J., Riutta T., Laine J., Byrne K. A., Farrell E. P. & Tuittila E.-S. 2007a. A high resolution greens area index for modelling the seasonal dynamics of CO2 exchange in vascular plant peatland communities. *Plant Ecology* 190: 37–51, DOI 10.1007/s11258-006-9189-1.

Location	CO_2-C	CH_4-C	N_2O-N
	Tonnes ha^{-1} yr^{-1}	Tonnes ha^{-1} yr^{-1}	Tonnes ha^{-1} yr^{-1}
Finland[68]	1.89-11.18	0.054	
IPCC[69]	0.2-1.1[d]	0	0.001-0.002

a - Includes emissions from drainage ditches,
b - May–August period only,
c - Includes emissions from stockpiles,
d - IPCC default emission factor for nutrient poor and nutrient rich industrial peatlands (CO_2-C and N_2O-N) and for drained organic soils (CH_4-C).

Westmeath County Council Policies

The Westmeath County Development Plan (2014-2020) has several policies and objectives relating to peatland and climate. These are listed in Table 4.7.4.

Table 4.7.4 Policies outlined in the Westmeath County Development Plan (2014-2020) relating directly and indirectly climate.

Policy/ Objective Number	Westmeath County Development Plan 2014-2020
PPTL5	To exercise control of peat extraction, both individually and cumulatively, which would have significant impacts on the environment.
OPTL6	To support the preparation of a Sustainable Holistic Management Plan for the future use of the Industrial Peatlands in the county, and which also recognises the role of peatlands in **carbon sequestration**.

Westmeath Co Council are currently in the process of preparing the Draft County Development Plan covering the period 2020 – 2026 and it is envisaged that the Draft Plan will outline the Authority's commitment to integrating climate change across a range of policy objectives including energy use, transport and infrastructure, sustainable development, recreation and tourism.

4.7.4 Actual and Potential Impacts of the Activity

CO_2 emissions are released as a result of current activities due to disturbance of the surface by harrowing during the harvesting period and also by ditching resulting in the exposure of more peat layers to the atmosphere.

It is difficult to quantify the exact emissions that occur annually as a result of Westland's activities however using the figures for Ireland shown in Table 4.7.3 it can be estimated that the carbon emissions from the study sites equate to between 479-882 CO_2-C Tonnes yr^{-1}, which, if compared to the estimated annual emission figure of 1.14Mt for peatlands in the Republic of Ireland[59] is just 0.04-0.07% of this. In comparison, 2017 greenhouse gas emissions from Irish agriculture account for 33.3%

[68] Alm J., Shurpali N. J., Minkkinen K., Aro L., Hytönen J., Laurila T., Lohila A., Maljanen M., Martikainen P. J.,Mäkiranta P., Penttilä T., Saarnio S., Silvan N., Tuittila E.-S. & Laine J. 2007a. Emission factors and their uncertainty for the exchange of CO2, CH4 and N2O in Finnish managed peatlands. *Boreal Environment Research* 12: 191–209.
[69] Penman J., Gytarsky M., Hiraishi T., Krug T., Kruger D., Pipatti R., Buendia L., Miwa K., Ngara T., Tanabe K. & Wagner F. 2003. *Good practice guidance for land use, land use change and forestry*. Published for the IPCC by the Institute for Global Environmental Strategies. Hayama, Japan.

of the national emissions[70], which are estimated at 60.74 million tonnes (Irelands Final Greenhouse Gas Emissions 1990 – 2017, EPA April 2019). Emissions from Westland activities amount to 0.0008% to 0.0015% of the national figure.

Overall, the impact of Westland's on-going activity is therefore considered to be having an imperceptible negative impact on climate.

The emissions are insignificant in the overall context of CO_2 emissions from peat workings in other areas of surrounding lands and Ireland in general, where peat has been harvested and extracted. Furthermore, the material harvested is not combusted. Notwithstanding this Westland are, and will, implement mitigation measures as detailed in Section 4.7.5 below to address CO_2 emissions.

In addition to the emissions arising from peat disturbance there is the potential for both direct and indirect emissions of GHGs from the machinery used, the shipping of produce to other countries and the end use of the peat product, in this case the horticulture sector. However, this is insignificant in the overall context.

In relation to the policies outlined in the Westmeath County Development Plan (2014-2020), these mainly are concerned with encouraging renewable forms of energy into the future. Preparation of a sustainable holistic management plan for the future use of industrial peatlands, with recognition of carbon sequestration, is also listed as a policy. Westland will take cognisance of WCC's policies in the Site Rehabilitation/Closure Plan which will be developed for the sites and as required as a condition of IPC Licences in general.

4.7.4.1 Vulnerability of the activity to Climate Change and the Risk of Major Accidents

The activity development is not vulnerable to the potential impacts associated with climate change such as flooding. As concluded in Section 4.4 above, the proposed development site is not at risk of flooding and is not located within a Flood Zone. Owing to the elevations of the lands at ca 60mAOD, the risk of coastal flooding due to sea level rise is not considered to be a risk.

Owing to the flat topography of the lands, the risk of landslides or peat slippage is considered to be low. Similarly, review of the Irish National Seismic Network (INSN) there is no evidence of seismic activity due to earthquakes or quarry blasting within ca 50kms of the lands.

The activity does not involve the use of any materials which could give rise to a major accident hazard on the lands.

4.7.5 Existing and Proposed Mitigation Measures and/or Factors

Westland are members of the Growing Media Initiative[71] and are members of the Sustainable Growing Media Task Force.[72] They have developed patented technology for producing a peat alternative using wood from FSC forests. Currently the company has replaced peat content in its products by over 70%.

The company is committed to aftercare of the bogs and will develop a detailed rehabilitation/closure plan which may involve re-wetting of the bog which will halt CO_2 emissions from peat exposure. The

[70] Website of the Department of Agriculture, Food and the Marine http://www.agriculture.gov.ie/ruralenvironment/climatechangebioenergybiodiversity/agriculturereclimatechange/
[71] The Growing Media Initiative http://www.growingmedia.co.uk/page.php?pageid=424
[72] The Sustainable Growing Media Task Force http://www.defra.gov.uk/peat-taskforce/

plan will be subject to further field studies and liaison with the landowner to develop the best approach for future use. This plan may commence in the short term and be staged up to completion of peat harvesting.

The company is also actively involved in carbon sequestration projects to offset existing emissions from peat harvesting.

In the future, Westland plan to set targets for CO_2 emission reductions and sequestration and will conduct an annual carbon audit and report.

4.7.6 Conclusions/Residual Impacts

The impact on climate change as a result of future peat harvesting in the context of national emission levels and emissions from all peat harvesting in Ireland is considered negligible.

4.7.7 Interactions with other Environmental Attributes

The environmental factors with which climate interacts include:

- Ecology: Climate change can impact on habitats and species however given the scale of emissions from the sites as described above it is considered that a discussion on this is outside the scope of this EIAR.

4.7.8 Monitoring

None required.

4.7.9 Reinstatement

The Rehabilitation/Closure Plan will address CO_2 sequestration.

4.7.10 Difficulties Encountered in Compiling this Information

The figures for emissions are estimated based on available research.

4.8 Cultural Heritage

4.8.1 Introduction

This section discusses the existing archaeological and cultural heritage value of the site and the actual and potential future impacts of the existing peat harvesting activities on this resource. Suitable mitigation measures are also recommended to reduce/ eliminate any potential impacts during the existing peat harvesting activities. The full report, complete with Figures, Plates, Appendices (1 & 2) and References was prepared by Dr. Maurice Hurley and is contained within Attachment 8.

The site was subsequently revisited between 2014 and 2018 by Tim Coughlan of Irish Archaeological consultancy (IAC), the most recent assessment under license (Ref.: 18E0518) being to ascertain the current status of two previously identified Road Class 1 Toghers (WM002-038 & WM002-039) which have been recorded at the site.

4.8.1.1 Competent Expertise

This chapter of the EIAR was prepared by Dr. Maurice Hurley and Tim Coughlan of IAC.

Dr Maurice Hurley is a qualified archaeologist with 35 years of experience as a professional archaeologist. Maurice studied archaeology in University College Cork (UCC) having been awarded both a BA and MA in field of archaeology. He was also presented with an Awarded Doctorate of Literature (D.Litt) by the National University of Ireland in 2007 based on published works. He specialises in the Archaeology/Cultural Heritage components of Environmental Impact Assessments and in urban archaeology, where he has particular expertise on the complex interface between development and archaeology in the planning process.

Tim Coughlan BA is an Associate Director of IAC Archaeology. Tim graduated from UCD with a degree in Archaeology and Classics. With over 24 years' experience in Irish Archaeology and a licenced director since 1995, Tim is one of the leading field archaeologists and project managers in the country, with extensive experience in excavation and the management of archaeological projects in both the private and public sectors.

Tim joined IAC in 2000. In his role as Senior Archaeologist Tim has responsibility for liaising with clients, engineers, main contractors and design teams, and landowners, and managing and programming all onsite and offsite works for staff, and the works of all subcontractors.

Tim has particular strengths in the management, organisation, execution and delivery of large and medium scale excavation and post-excavation projects. His extensive Project Management experience includes the M9/N10 Phase 4 Knocktopher to Powerstown project. The project was 65km long and works included the excavation of 330,000sq.m of test trenches and the excavation of 108 archaeological sites using a team of 350 archaeologists.

Tim, who has excavated extensively in urban medieval Dublin, has published articles and chapters in a number of monographs and journals. He has given lectures to the Friends of Medieval Dublin Society on the results of significant excavations he carried out at Anglo-Norman Back Lane/Lamb Alley and medieval ecclesiastical site and cemetery on Stephen's Street.

4.8.2 Study Assessment and Methodology

The following study assessment methodology was undertaken:

- The Record of Monuments and Places (RMP) for Co. Westmeath was consulted for the relevant area.
- The topographical files held by the Irish Antiquities Divisions, National Museum of Ireland were consulted.
- All available archaeological cartographic and historical literature for the area was consulted. Framework *and Principles for the Protection of Archaeological Heritage,* (Depth of Arts, Heritage, Gaeltacht and the Islands, 1999), Excavation summaries (I. Bennett ed.) and www.excavations.ie.
- Vertical aerial photographs and all editions of the Ordnance Survey maps for the area were examined.
- The Westmeath Development Plan (2008-2014) and the Westmeath Draft Development Plan (2014-2020).

The bogs at the Coole and Clonsura sites were examined by field-walking/inspection in June 2013 and subsequently in 2018. For the purposes of this study, the bogs are divided into numbered units for ease of reference;

- The Coole Site - unit 1 had east-west drains, unit 2 had north-south drains and unit 3 had east-west drains.
- The Clonsura Site - unit 1 had northeast-southwest drains and unit 2 had north-south drains.

All the bogs were systematically walked and each drain was visually examined. The drains provide regular section faces through the bogs.

At the time of inspection the surface had been removed from all the bogs under review and the existing peat harvesting activities were on-going. All of the drains were accessible; each drain was *c.* 1m wide and 12m apart with slightly 'V' shaped profiles, varying from 2m-4m in depth, with a sump of approximately 1.5m x 1.5m (on plan) prior to discharge to the headland drains. The weather was dry and sunny at the site of site inspection and the water level in the drains was relatively low.

Several of the monuments in the vicinity were also visited. Most of the monuments in the higher ground to the east of the Coole site are ringforts located above the 70mOD contour (Attachment 8, Figures 2 & 3). The nearest monument to the Clonsura site is a crannog located on what is now the drier margins of Lough Bane but was once (and now in periods of wet weather) lacusterine.

4.8.3 Existing Environment

The description of the receiving environment in terms of cultural heritage has been split into the following headings:

- Site Location;
- General History of the Area and its Archaeological Monuments;
- List of Archaeological Sites in the Vicinity, and,
- Historic Landscape.

Site Location

The sites are located on lands at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole & Finnea, County Westmeath. The units numbered units 1-3 for the Coole site and units 1-2 for the Clonsura site are examined in more detail below.

The Coole Site, Coole Townland Unit 1 **(Attachment 8, Plates 1-3)**
Unit 1 is an irregular rectangular area, bounded on the south by the R395, on the west by lands flanking the Inny River and on the north and east by an area of regenerating vegetation (Attachment 8, Plate 2) flanked by forestry. The bog drains run east-west (Attachment 8, Plate 1). The peat was consistent and homogenous but in some place's concentrations of round-wood branches and twigs (mostly Birch and Hazel) was apparent. No pattern of depth of distribution was obvious and it is likely that the wood is of natural origin and not deposited by the hand of man (i.e. non archaeological). In one area a spread of mineral soil/silt was apparent on the surface (Attachment 8, Plate 3). This appears to be derived from the presence of a high point in the underlying geology of the mineral soils. No finds or features of potential archaeological significance were observed in the course of field inspection.

The Coole Site, Mayne Townland Unit 2 **(Attachment 8, Plates 5-11)**
Unit 2 is an extensive 'L'-shaped area bounded on the north by the R395, on the west by ground adjoining the Inny River, on the east by an area of unexploited bog and forestry at the foot of gently rising farmland rising towards the village of Coole and on the south by a large drainage ditch (division between units 2 & 3). The drains run north – south (Attachment 8, Plate 4).

The peat was generally homogenous though surface undulations result in depths varying between 2m and 3m apparent in the drains.

The only archaeological feature observed was a wooden trackway (bog road/togher) and its location is shown in Attachment 1, Figure 4.8.1. This trackway has been known since at least 2005 when the site was visited by officers from the Department of Environment, Heritage & Local Government (now the Department of Arts, Heritage & Gaeltacht). The trackway was partially excavated in 2006 by Jane Whitaker (ADS Ltd) on behalf of the Department (Licence No. 06E0928).

The trackway is now apparent over a length of *c.* 450m (Attachment 8, Figure 5 and Plates 5-11), i.e. recorded in 35 drains. On the eastern side of the bog the timbers occur at a depth of 0.40m-0.50m below the current surface (Attachment 8, Plate 6) but further to the west the timbers run closer to the surface (Attachment 8, Plates 8-9) and in places, especially towards the west are now scattered along the surface of the bog (Attachment 8, Plate 11) currently in production. The timbers appear to be large planks resting on brushwood but in at least one instance a plank appears to be resting on a round-wood rail (Attachment 8, Plate 10). The trackway appears to be 4.5m to 6m in width (Attachment 8, Plates 5-7) and where apparent the trackway surface is made of planks, some with mortices (Attachment 8, Plates 8 & 9). This concurs with the evidence recorded in the excavation in 2006.

When recorded in 2006 the length of the trackway was 657m '*but was seen to extend beyond both recorded limits*' (Attachment 8, Whitaker in *Excavations 2006*). It is likely that the trackway extended from a crossing point on the Inny River linking the higher ground to the east and west. A radiocarbon (C14) date of 1200-820bc was obtained from the excavated structure (*ibid)*, and therefore it is likely that the construction and operation of the trackway is dated to the Late Bronze Age and its use continuing into the Iron Age or perhaps even the early Medieval period.

No other finds or features of potential archaeological significance were observed in the course of field inspection.

The Coole Site, Ballinaloe Townland, Unit 3 **(Attachment 8, Plates 12-13)**
Unit 3 is an Irregular rectangular area with east-west drains. Bounded on the south by a local road L1826 leading from Coole to Multyfarnham, on the west by a main drain separating the bog under review from other adjoining commercially exploited bogs, on the north by main drain (dividing units 2 & 3) and a meander of the Inny River, and on the east by an area of forest leading to gently sloping agricultural land. The bog has a general saucer shaped profile probably relating to the underlying geological pattern. The peat is very soft and homogenous and in places depth of up to 4m are apparent, however many of the drains were deeply filled with water leading to some collapse of the side (Attachment 8, Plate 13). No finds or features of potential archaeological significance were observed in the course of field inspection.

The Clonsura Site, Clonsura Townland, Unit 1 **(Attachment 8, Plates 14-15)**
A roughly rectangular area with northeast-southwest drains. Bounded on three sides by forestry and on the northwest side by a large open drain separating unit 1 from unit 2. The Inny River lies *c.* 300m to the west. The peat is very homogenous and significant surface undulations were apparent. No significant variations in the consistency of the peat were observed and only occasional natural round wood branches and twigs were recorded. No finds or features of potential archaeological significance were observed in the course of field inspection.

The Clonsura Site, Clonsura Townland, Unit 2. **(Attachment 8, Plates 16-18).**
A rectangular area with north-south drains. Bounded on the southern side by the Clonsura Stream/S1 separating unit 2 from unit 1, on the western side by an area of unexploited bog standing to 0.50m higher than the harvested bog (Attachment 8, Plate 16). Lough Bane (Attachment 8, Figure 2B) with its associated crannog (RMP WM001-028) lies *c.* 190m to the east. The northern side adjoins an area of cutaway bog (Attachment 8, Plate 17) and an area of forestry to the northwest, the western side contains unexploited bog and forestry close to the Inny River which lies *c.* 250m to the west; the Inny River represents the boundary between Counties Westmeath and Longford in this area. The peat is generally soft and homogenous with very little internal structure apparent. Many of the drains contained significant amounts of water at c.1m-1.5m below the surface (Attachment 8, Plate 18).

General History of the Area and its Archaeological Monuments
Peatland areas are a characteristic feature of the Irish midlands, and cover about 17,000 hectares (9%) of County Westmeath. Most of the bogs are raised bog (such as those at the Coole and Clonsura sites) and fen, many of which are cutaway or are currently under exploitation as cutover bog. Midland bogs represent a significant archaeological resource as they are capable of preserving a spectrum of Ireland's cultural heritage over many millennia. Preservation can often be comprehensive and spectacular due to the anaerobic conditions (oxygen free) prevailing in the peat.

Westmeath is generally flat terrain with occasional glacial ridges (eskers) and hillocks such as the hillock where the village of Coole is located (115m-117m summits). Peat bogs occupy much of the low-lying ground (basin peats) such as the area flanking the Inny River and others in the River Shannon catchment basin. The slow flowing meandering rivers were significant transport and communication arteries in ancient times. The rivers, especially those flanked by broad areas of bogland such as those at Coole and Clonsura, were also significant barriers to overland transport and as such were frequently boundaries between provinces, counties, territories (baronies) and townsland; the northern reaches of the Inny River near Clonsura defines the boundaries between Co. Westmeath and Longford and Counties Meath and Cavan also meet at Lough Sheelin *c*. 5km to the north of Clonsura Bog.

The bogs in this area of Westmeath are either un-reclaimed, having a covering of scrub and rushes (i.e. living bogs) or are exploited (i.e. cutaway for traditional open cast peat-cutting or drained and

cutover for peat harvesting as in the case of the bogs under review), others are reclaimed for forestry or agricultural use.

The bogs present a unique environment for archaeologists. Bogs could not be used in the same way as agricultural lands (on mineral soils) and therefore a specific range of uses tends to be represented within the peatlands. The recovery of human remains from bogs (bog bodies/ 'bog persons') is well documented (one of the most recently reported sites was a body found at a Bord na Mona site near Kinnegad, Co. Meath (Appendix F, *Irish Times 10/December/*2012) and in some instances appears to represent the deliberate deposition of bodies on significant points such as territorial boundaries. For example a body found in a bog at Cul na Mona, between Abbeyliex and Portlaoise, Co. Laoise was said by Dr. Ned Kelly, keeper at the National Museum of Ireland to be a ritual deposition on a territorial boundary (Appendix F, quoted in the *Irish Times* 12/August/2011). While many prehistoric examples are now documented, bog bodies tend to date primarily to the late medieval or modern times. Most of the burials appear to have been accidental (possibly as a result of bog slides or falling into bog holes. In many cases these bodies are found complete with preserved clothing, footwear and personal items. The more macabre cases of deliberate burial possibly after strangulation and mutilation have of late been more highly publicised (Appendix F, *Irish Times,* 8th/September/2011 and exhibition at the National Museum of Ireland entitled *Kingship and Sacrifice)*.

Other than these the uses of bogs can be defined either by pre-bog occupation, use of the bog as a resource for defence and storage or overcoming the obstacles to transport created by the bog. Pre-bogland occupation (Mesolithic), lake settlements (*crannogs*, Bronze Age to Medieval), transport routes across bogs (*toghers* or bog roads) which may date from the Bronze Age up to post medieval times. Artefacts of all periods may be found trapped within the bogs and are frequently spectacular by virtue of their preservation. The more common 'stray or casual' finds include the remarkable wooden drinking vessels (*mether*), shoes/clothing and weapons and of course 'bog butter' and these may occur anywhere throughout bogland but are presumably most likely to be close to areas of occupation. A Viking sword, for example, was recently discovered along with other artefacts in a bog near the River Shannon in Co. Offaly (Appendix F, *Metro/Herald* 17th/December/2012).

Mesolithic (7000BC) shoreline-settlements are known to occur on the margins of former lakes which were subsequently covered by peat, examples are known from Lough Boora, Co. Offaly (Attachment 8, Ryan 1980, 1981, 1984). Generally, these settlements are located on the upper surface of the mineral soils underlying the bogs which commenced growing since *c.* 7000BC. The Mesolithic camp sites tend to contain flint artefacts, axe heads as well as burnt mammal fish and bird bones. The large raised bogs such as those at Coole and Clonsura may not contain such evidence as these probably had begun to form following the end of the last glaciations some 10,000 years ago. In any case cut-over peat harvesting tends not to impact on the underlying soil levels.

By Neolithic times (*c.* 5000BC), the raised bogs of the midlands had grown considerably and appear to have been unattractive to human occupation.

By the Bronze Age, possible pressure on the population appear to have resulted in the construction of crannogs or lake settlements (Attachment 8, Hencken 1936) but most of the crannogs appear to have been constructed in lakes and marshes as defended homesteads within the Early Medieval period; as such they are mostly contemporary with ringforts. The subsequent draining of lakes, marshes, fens and peat land has resulted in crannogs appearing today as a simple mound in a lake or bog. The crannog at Lough Bane (RMP WM01-006-011), now located on the margins of the lake was once completely surrounded by water. Within bogs, evidence for crannogs is generally recognisable by the large concentrations of timbers, brushwood, wickerwork, straw and even bracken with possible

occurrence of stone and other material used by the occupiers to build a raised platform enclosure and dwellings above the water level.

The raised bogs were major obstacles to transport since Neolithic times (5,000BC) and ever since then trackways known as toghers have been constructed to facilitate transport, including both pedestrian and wheeled traffic. A variety of construction techniques have been employed in the construction of these toghers including oak planks resting on long runners (rails) or bunches of brushwood, layers of gravel were sometimes used especially in Co. Offaly. As the bogs continued to grow many of the toghers were regularly built and replaced and therefore several levels may be represented in a bog.

A summary of the history of investigation at the sites is included in the following sections.

Fieldwork and Preservation by Record - 2005-2006
A plank togher, WM002-038/MYE001a–as, was first identified in Mayne Bog in 2005 and brought to the attention of the National Monument Service (NMS). The bog was in industrial peat harvesting production at the time by Westland Horticulture Ltd. At the request of the NMS the site was investigated, fully surveyed and a single cutting excavated in September 2006 by Jane Whitaker then of ADS Ltd., with the full co-operation and assistance of Westland Horticulture Ltd. A radiocarbon sample from the superstructure returned a calibrated date of 1200–820 BC, dating it to the later Bronze Age.

During the course of the 2006 excavation an additional togher, WM002-039/ MYE002, was identified, located slightly to the north of the plank togher WM002-038 and running roughly parallel to it. This site was also fully surveyed and each sighting recorded. It was recorded at the same level as the excavated section of the togher and was composed mainly of longitudinally placed brushwoods. It varied in width from 1.3m to 2.9m and had an overall recorded length of 383m.

Environmental Impact Assessment - 2013
The plank togher WM002-038/MYE001a–as was further recorded in 2013 during a survey carried out as part of a cultural heritage assessment as part of an EIS. It was recorded that the plank togher was then evident over a length of 450m (35 drains) and that its western surviving elements were located on the bog surface.

IAC Site Inspection - 2014
A site inspection was carried out in December 2014 by Tim Coughlan and Jane Whitaker of IAC Ltd at the request of Westland Horticulture Ltd. The purpose of the inspection was to assess the current status of two toghers originally identified and recorded in 2005 and 2006. This revealed that the sites were partially exposed on the field surface.

Preservation by Record - 2015
In 2015 further cuttings were excavated on both toghers by Jane Whitaker of IAC Ltd. under licence (15E0056 and 15E0057). The subsequent post-excavation analysis confirmed that both sites date to the Late Bronze Age with dendrochronology dates from the plank togher indicating at date of 882 BC ±9. Radiocarbon dates from the brushwood sites indicate broadly contemporary activity [1016–854 BC (2σ) and 901–808 (2σ)]. Analysis of the insect samples from the sites has given indications that the lighter structure may be directly associated with the larger plank structure possibly facilitating stockpiling of timbers but more likely an adjacent walking/access surface/platform.

Probe Survey of High Bog - 2015
A probe survey was carried out in 2017 by Tim Coughlan of IAC Ltd in the area of high bog to the east of the industrial bog. The survey confirmed that the plank track continued for approximately 200m to

the east into the high bog. Probing at the west of the bog suggested that there may have been a possible platform close to the western bog edge, but also confirmed that the plank togher continued west of this point. It was suggested that the possible platform which was adjacent then end of a field drain may have been associated with disturbed togher elements from drainage works.

The 200m length of the site that continues into the high bog in the east, which is not under industrial peat production, provides an opportunity for preservation in situ of this section of the togher, which would not be achieved in the industrial bog.

List of Archaeological Sites in the Vicinity

There are no known Recorded Monuments within the existing peat harvesting sites but there are a number in the wider environs. The sites shown on Attachment 8, Figures 2A & 2B are Recorded Monuments (Attachment 8, Appendix 1).

The Coole Site (Coole/Mayne/Ballinealoe Townlands)

Reference Number	**WM006-011**
Monument Type	Ringfort
Townland	Shrubbywood
County	Westmeath
NGR	638769, 770130
Distance to site boundary	1km. Lies to the W of the Inny River.

Reference Number	**WM003-053**
Monument Type	Windmill
Townland	Mayne
County	Westmeath
NGR	641047, 772728
Distance to site boundary	1km

Reference Number	**WM003-086**
Monument Type	Earthwork
Townland	Ballinealoe
County	Westmeath
NGR	640500, 770949
Distance to site boundary	500m

Reference Number	**WM003-081**
Monument Type	Ringfort
Townland	Mayne
County	Westmeath
NGR	639493, 770288

Distance to site boundary	1.2km

Reference Number	**WM003-082**
Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640995, 771166
Distance to site boundary	1.1km

Reference Number	**WM003-087**
Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640965, 770720
Distance to site boundary	800m

Reference Number	**WM003-088**
Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640988, 770521
Distance to site boundary	1km

Reference Number	**WM007-001**
Monument Type	Earthwork
Townland	Lispopple
County	Westmeath
NGR	640955, 770870
Distance to site boundary	1km

The Clonsura Site

Reference Number	**WM006-011**
Monument Type	Crannog
Townland	Clonsura
County	Westmeath
NGR	641542, 777502
Distance to site boundary	190m

Historic Landscape

The togher located at the Coole site has been dated to 1200-800bc by radiocarbon dating. The construction of the togher and possibly its use is likely to have predated the Early Medieval ringfort settlements near Coole. Nevertheless, the togher connected the higher ground at Coole to a crossing point on the Inny River and further on to ridges at the west between the villages of Lismacaffry and Street.

The location of ringforts (see below and Attachment 8, Figures 3 & 4) in close proximity to the townland boundary between Mayne and Ballinaloe may be significant as the boundary traverses the bog in the vicinity of the line of the togher (Attachment 8, Figure 3).

Details of the excavation undertaken in 2006 are provided in Attachment 8, Appendix 2. The togher is clearly of the oak plank type with mortices, rails or runners were apparent beneath the planks in some of the drains (Attachment 8, Plate 10). The proportions of the trackway at 3.5m to 4m in width (and once extending for more than 600m) and its construction of oak planks laid edge to edge (Attachment 8, Appendix 2) is comparable in proportions to a wooden bog road excavated at Corlea, Co. Longford, where the roadway was interpreted as a transport route for wheeled vehicles and possibly part of a wider network of communication (Attachment 8, Raftery 1991, 110).

There appears to be only one significant level of trackway on the Coole site, i.e. there is no obvious evidence of raising or rebuilding. The possibility of the increased likelihood of the occurrence of artefacts, lost, discarded and dumped in the vicinity of an accessible route such as a trackway (togher) has to be a consideration; wooden block-wheels are an obvious possibility.

Summary of 2018 Assessment

Fiedl surveys were carried out by IAC between September 10-13, 2018. The location of the two previously recorded toghers (WM02-0038 and WM02-0039) has been well documented and but detailed GPS survey data was available to confirm its location across the bog. The first stage of the field survey was carried out by walking of the bog and visually inspecting the full length of every field drain. Once the initial survey of each bog drain was completed, identified sites or potential sites were investigated in closer detail to establish their significance, extent and relationship to other identified sites and the wider landscape. Occurrences of bog ore would be recorded and marked on accompanying survey maps.

Zones of archaeological activity were identified and individual site numbers assigned to positively identified individual sites. In order to facilitate this work, existing exposures were carefully cleaned providing for the efficient retrieval of maximum information with minimal disturbance to the archaeological resource.

Where a new site (other than the two previously recorded toghers) was identified in the field surface or drain edge loose peat overlying the full width and a minimum 1m length of the structure was cleaned. For features identified in the drain section face, the features and an area of peat around it, of approximately a shovel width, were cleaned back allowing the sectioned material to be clearly legible in the peat face.

Each archaeological site was recorded and described to include the following: site number, written description, its classification (as per current classifications of Peatland sites), composition, width and depth, noting whether bark is present, the extent and relationship to any sites in the near vicinity, as well as the depth below field surface.

This descriptive record also included photography, sketch plans and sections as well as relevant palaeoenvironmental information and the recording of wood technologies. Any sampling carried out was also noted in this recording phase.

Previously Recorded Road Class 1 Toghers

In the immediate vicinity of the two previously recorded toghers (10m either side to the north and south) the assessment was carried out along the full length of the toghers, in every drain face and field surface. This more detailed survey was aimed at achieving a full assessment of the current status of both sites.

In tandem with the detail assessment survey, a metal-detecting survey was carried out along the length of both previously recorded monuments within a buffer of *c.*15m from the recorded centreline. This was completed in 2m trancepts along the length and width of the toghers and within the designated buffer zone.

Further assessment of the possible platform identified during the 2017 probing survey in the west of the bog was undertaken. This involved the removing some portions of the overlying peat material by hand to temporarily expose some of the underlying structure. The aim of this work was to gain an understanding of the extent, nature and function of the possible platform. Further detailed but localised probing was also undertaken.

Assessment Results

The survey results are presented below on the basis of archaeological findings rather than works sequence as documented in the methodology above.

Class 1 Plank Togher WM002-038 – Site 1 (Fig 2-5, Plates 1-13)

A detailed table of the survey results, recorded field by field from east to west is included in Appendix 1.

The site was not evident on the field surface within Field 1 and was recorded in the drain faces where it is under 0.80m of peat in the east and 0.40m of peat in the west of the field. Field 1 represents the only fully intact section of the togher in the east industrial peat bog. A previous probe survey in 2017 (Coughlan 2017) confirmed that the site continued to the east into the high bog for a further 200m where it has not been impacted by industrial peat production.

In Field 2 the site is evident on the field surface adjacent the field drains. This becomes more pronounced on Fields 3-6 with the plank elements of the togher not surviving adjacent the drain edge in these locations.

In Fields 7-9 the site is identified only in the centre of the field. It was difficult to assess the site closely in these locations as a ridge of loose material was placed centrally along most fields following drainage works. However, while only sections are intact the elements in the centre of the field are in moderate condition.

Between Fields 10-15 there are only occasional elements, possibly disturbed, identifiable in the very centre of the field. From Field 16-19 there are more clearly defined elements with survival and condition similar to that in Fields 7-9, however the elements often appear broken, presumably from the weight of plant/machinery traffic above given the thin peat cover.

There was no evidence of the site in Field 20 and 25, with partial remains in the centre of the field only in Fields 21, 22, 24 and 29. More intact remains were recirded in Fields 23, 26, 27 and 28 where more clearly defined elements remain *in situ*, but only centrally within each of these fields with poor peat cover. There was little evidence of the site between Fields 30-43. Occasional possible vertical pegs/posts were identified along the general alignment but none of the main substructure or superstructure was identifiable, even as disturbed elements.

To the west of Field 43 (the location of Cutting 1 2015 – Whitaker 2016) the site was identified as far as the main western headland drain bounding the bog. The 2015 excavation identified that the surviving elements at this location had slumped into a hollow and it is possible that elements in the adjacent Field 44 to the west may also be subject to hummock-hollow displacement. No elements are evident in the drain between Fields 43 and 44 however a couple of metres to the west some plank elements were identified on the field surface. These appeared to slope sharply downwards potentially associated with another hollow. The site was identified in the drain between Field 44 and 45, and wood was evident at the base of the headland drain to the west. This area was subject to probing to confirm width and extent of the togher. It confirmed that there is potentially 30m of the plank togher surviving in this location.

The metal detection survey across the width of the bog along the alignment of the site within the agreed buffer did not produce any positive results.

<u>Possible Platform</u>

A possible platform (peatland structure) was identified at the location of the plank togher in Field 45 during the 2017 probe survey (Coughlan, 2017). As outlined above it is now clear that this is not the site of a platform but a variation in the depth of the planks. The togher in this general vicinity is within a hummock and hollow area of the bog. Peat cover changes significantly in depth over very short distances in this area as can be seen in the results from the 2015 Cutting 1 (Whitaker, 2016), where the planks slumped into a hollow in one corner of the cutting, with no evidence of any surviving material metres to the east. The possible platform was identified as being only 10cm below the bog surface whereas the togher was evident in the opposing drain face at a depth of 0.70m, and it was thought in 2017 they may represent separate sites.

A section of the togher was exposed in plan at the eastern edge of Field 45. This confirmed the presence of two transvers planks in keeping with the general morphology of the site as identified previously. Within a box cutting along the northern extent of the site in this location the remains were more haphazard but were also increasing with depth to the immediate west. Detailed probing confirmed the continuation and extent of the elements of the plank togher. Any apparent variation in width and/or orientation can be attributed to the hummock-hollow nature of the underlying bog which is causing some localised variations based on topography.

<u>Class 1 Brushwood Togher WM002-039 – Site 2 (Figs 2&4, Plates 14-15)</u>

A detailed table of the survey results, recorded field by field from east to west is included in Appendix 1.

Unlike the plank togher which has clearly identifiable large oak plank elements, the brushwood site is less well defined however the survey recorded sightings and locations that it was felt represented surviving sections of this site. The loose material on the bog surface also impaired identification of the site which would be best seen in section at the drain face but in most cases, it was no longer evident at these locations.

The site was not evident on the field surface within Field 1 and was recorded only in the drain faces where it is under 0.86m of peat in the east and 0.40m of peat in the west of the field. Field 1 represents the only fully intact section of the togher within the industrial peat bog.

In Field 2 the site is evident on the field surface adjacent the western field drain and is at the field surface adjacent the eastern drain. As with the plank togher sightings are only identified on the field surface away from the drain edge on Fields 3-6.

In Fields 7, 9, 14, 15 and 16 it was felt that sufficient evidence existed to confirm that the site survived in the centre of the fields only. It is likely to be fragmentary in these locations. There was some possible evidence of the site in Fields 13, 17, 23 and 26. There was no evidence of the site in Fields 10, 11, 12, 18, 19, 20, 21, 22, 24 and 25 and this often was in keeping with the sightings of the plank togher. There was no evidence of the brushwood site to the west of Field 26, although in original surveys it had not previously extended to the western half of the bog.

The metal detection survey across the width of the bog along the alignment of the site within the agreed buffer did not produce any positive results.

Site 3 Stake Row (New site) (Fig 2&6, Plates 16-18)

This site was identified on the field surface at the southern end of Fields 17 and 18 and consisted of a NNE-SSW orientated stake row. It consisted of 2 parallel rows of stakes, with possible evidence of a third at the southernmost sighting in Field 18. There was no evidence of any associated timbers or structural elements associated with the stakes. It extended for approximately 50m across two fields. It may have continued further but it was not obvious in the area to the north, however it was difficult to identify and follow given the small diameter of the stakes and the overlying loose peat on the bog surface. It is likely that it did originally continue further but does not survive or was not clearly evident as there was upcast material from drain clearance in the centre of the fields

Many of the stakes that were examined appeared to have been squared, however this could relate to the fact that it was the lower worked ends that survived and were visible. The stakes appeared to be largely constructed from brushwood with the occasional roundwood element, ranging in size from 0.027m x 0.03m to 0.04m x 0.042m. An example of a roundwood stake was 0.10m in diameter. The distance between the stakes generally ranged from 0.8m to 0.29m. Most of the stakes were angled NNE-SSW, similar to their general alignment which may be of significance.

Stake Row sites can generally relate to boundary markers, or define terrain, or mark a routeway and could date from the early medieval period. Samples were taken for subsequent dating be required.

Site 4 Structure Peatland - Platform (New site) (Fig 2&6, Plates 21-24)

A probable platform was identified at the southern end of Fields 18 and 19. It had been truncated by the field drain, which as it was close to the end of the field was wider and deeper than standard. The southern end of this drain was very deep and filled with water and could not be accessed. The structure was visible in both drain faces.

The platform appeared to be multi layered and multiple species were evident within it. Oak, ash and birch were identified on site. There were flat axe marks present which indicate that the site may possibly be Iron Age or Early Medieval in date. There was also evidence of some worked roots present – in fact it was initially thought to be a complex root horizon. There was some worked brushwood just below the bog surface at the northern end in Field 19. Up to 4 layers of tightly packed roundwoods were exposed on the western drain face (Field 19) with no clearly defined orientation. The upper

brushwood elements were more sparsely placed. Just south of the drain there is evidence of this site on the bog surface.

The sighting in the western drain face is 0.3m thick. Elements consist of heavy brushwoods and roundwoods with up to 0.42m of peat cover above this part of the site. The elements appear gnarly and dried up possibly due to exposure at the drain face and following a particularly dry summer spell in advance of the survey. It was often difficult to differentiate between root and dried elements. 0.1-0.2m above the main elements of the site there was a mix of worked brushwood and roots. The size range of some of the elements range from: - brushwood below the surface 0.03-0.05; Roots 0.025 in diameter; Roundwoods 0.07-0.13m.

The site is 0.7m thick on the eastern drain face close to the wider and deeper section of the drain and as such was difficult to examine closely. Some of the elements ay represent disturbance from the drain but much is clearly *in situ.*

The upper peat is poorly humified with calluna, sphagnum peat moss, purple brown in colour. The peat throughout the site is moderately humified with calluna and sphagnum peat moss, Dark brown in colour. The peat below is blackish brown, moderately humified with occasional sedges and grasses and calluna.

The site extends to the main southern drain which runs E-W along the south of the bog, with elements evidence close to the base of the drain. It has a total potential length N-S of approximately 26m. Its exact width is unclear as it did not appear to extend far beyond the field drain in either direction and as such the drain may have removed a substantial portion of the structure. Localised probing also appeared to confirm a continuation of the site, but the proximity of the field drain and the main southern drain may be associated with disturbed elements.

Due to the location of the site it is difficult to clearly identify its full extent and or function. Given the relative proximity of the stake row (Site 3) to the east/northeast, it is possible that both are associated or contemporary. Samples were taken should subsequent dating be required.

4.8.4 Actual and Potential Impacts of the Activity

This section assesses the potential impact of the peat harvesting activity on the archaeological resource of the Coole and Clonsura sites.

The Archaeological Resource of the Site

Throughout most of the Coole and Clonsura sites, there was no evidence of finds or features of archaeological significance. The bog road/trackway or togher crossing the Coole Bog is a notable exception and this structure is clearly of archaeological significance. The togher was first reported to the Department of Environment, Heritage & Local Government (now Dept. Arts, Heritage & Gaeltacht) in 2005 and a small part was excavated in 2006 (Attachment 8, Appendix 2). The trackway was not entered into the Record of Monuments and Places and therefore is not a Recorded Monument with associated statutory protection (Attachment 8, Appendix 1). The trackway was impacted initially when the bog was drained in the 1980s and is subject to on-going activity. Today much of its former length has disappeared.

The long-term survival of an organic feature, such as the wooden trackway within a drained bog, is vulnerable to the altered drier environmental conditions; the anaerobic conditions that resulted in the survival of the trackway no longer pertain. Consequently, the only available option is to archaeologically record the salient features of the find. Archaeological monitoring and recording of

the remaining elements of the trackway within the area subject to impact by peat harvesting has been carried out in 2018.

4.8.5 Existing and Proposed Mitigation Measures and/or Factors

Mitigation Procedures for Archaeology
Archaeological monitoring and recording of the remaining elements of the trackway within the area subject to impact by peat harvesting has been carried out in 2018.

4.8.6 Conclusions/Residual Impacts

With the exception of a wooden trackway (togher) in the Coole site, no other finds or features of archaeological significance came to light in the course of research and field work. Substantial amounts of the trackway remain *in situ* although the trackway is not a Recorded Monument (hence harvesting works have continued) and was subject to limited archaeological excavation in 2006 (Attachment 8, Appendix 2).

Following consultation between Westland Horticulture and the National Monuments Service where it was agreed that a detailed assessment survey would be appropriate to record the status of both sites.

The archaeological assessment and survey were carried out over the course of 4 days from 10 September 2018. The survey involved the walking and visual inspection of linear drains within the industrial peat production bog. Both of the previously identified toghers were subject of further detailed inspection and recording along their entire length. The work included a detailed metal detection survey at 2m trancepts along the length and breadth of the sites within a 15m buffer of the centreline. The metal detection survey produced no positive results.

The survey confirmed that the plank togher (WM002-038) is intact in the extreme east (Field 1 only: 14m) and extreme west (Field 44 and to the west: 30m) of the industrial bog. In general, the togher has been impacted in every other location in the centre of the bog to differing degrees. There are some moderately intact sections although partly disturbed in the east (approximately 70m in total – Field 2-9). These are exposed on the field surface adjacent the drain face but are relatively intact within the centre of the field, albeit with reduced peat cover. There are some further surviving elements in the eastern half of the bog but these are generally restricted to localised areas in the centre of fields (3-5m in length). With the exception of the surviving 30m in the west of the bog, there is no other evidence of the site in the western half of the bog between Fields 29 and 44.

A possible platform recorded during an earlier probe survey has been confirmed as not being a platform or separate structure but forming part of the main plank togher. The site in this location has been subject to the hummock and hollow of the underlying bog and as such it survives at varying levels. A detail probe survey in the west of the bog has confirmed in tandem with limited exposure of some elements that the togher continues to the main headland drain at the west of the site.

The brushwood togher WM002-039 was previously identified in the eastern half of the bog only, and there was no expectation that any remains would be identified in the west, and none were. The survey identified the brushwood togher had a broadly similarly status as the plank togher in the east of the site (Fields 1-9) but beyond this evidence was sporadic at best. There was little evidence west of Field 16 and no evidence was identified west of Field 26. There may be some further survival of this site in the east of the bog, with intact elements in the centre of fields as recroded with the plank togher, but this site is difficult to identify on the field surface and intensive investigation would damage what little remains.

Two additional sites were identified during the survey. Both were located in the south of the bog. Site 3 consisted of a stake row alignment orientated NNE-SSW and extending for approximately 50m. This site may continue beyond the recorded sightings. Nothing was evident in the immediate area surrounding the sighting but due to varying peat levels from production the site may survive in the "higher" eastern fields to the northeast, but it has not been identified during the survey.

Site 4 consisted of a Structure Peatland, possibly a platform. Site 4 was heavily disturbed by a drain and as such it was difficult to interpret the nature and extent of the identified remains. It was constructed of multiple species, with evidence of tool marks over an area 26m in length. It consisted of roundwood, brushwood and root elements and was often multiple layers deep. It was not identified in drains to the east or west but continued to the main headland drain at the south of the bog.

While both newly identified sites were not immediately adjacent to each other, a direct association cannot be ruled out given their relative proximity. The survey has confirmed that there are intact sections of the plank togher at the site.

4.8.7 Interactions with Other Environmental Attributes

Cultural heritage interacts with the following environmental aspects:

- Noise and Vibration: Not applicable. The equipment use during harvesting is agricultural and therefore would not cause vibrations which could affect any listed monuments. Typically, notwithstanding this, there are no monuments of significance in the immediate vicinity that could be impacted on.

4.8.8 Monitoring

Monitoring to be carried out as described above.

4.8.9 Reinstatement

Not applicable. As set out in Section 4.8.4 the togher has been compromised but this was mainly due to the drainage which occurred in the 1980s.

4.8.10 Difficulties in Compiling Specific Information

No difficulties were encountered in compiling this section of the EIAR

4.9 Landscape and Visual

4.9.1 Introduction

This chapter deals with landscape and visual impact assessment (LVIA) examining potential effects of the activity on the landscape setting as well as on visual receptors in the landscape such as residents, visitors, people pursuing recreational activities etc.

The assessment indicates the level of anticipated impact and outlines measures by which impacts can be mitigated.

4.9.1.1 Competent Expertise

This chapter has been prepared by Brady Shipman Martin. Celebrating 50 years, Brady Shipman Martin is one of Ireland's largest and most reputable planning, landscape and environment specialists, with four partners, a diverse team of professionals, and offices in Dublin, Cork and Limerick. We have successfully completed thousands of projects in Ireland and internationally, and both public and private sector clients have experienced the benefit of our practical, considered and innovative approach. This fluid team ethos was Hugh Brady, Philip Shipman and Arthur Martin's professional legacy, and it lies at the heart of the practice that still bears their names.

4.9.2 Study Assessment and Methodology

General

Landscape has two separate but closely related aspects. The first is visual impact*, i.e.* the extent to which a new structure in the landscape can be seen. The second is landscape character impact*, i.e.* effects on the fabric or structure of the landscape.

The assessment methodology has regard to the guidance publications set out in Chapter 1 of this EIAR and includes:

- “Guidelines on the information to be contained in Environmental Impact Assessment Reports” (draft, May 2017).
- "Advice notes on current practice in the preparation of Environmental Impact Statements" (draft, September 2015);
- “Guidelines for Planning Authorities and An Bord Pleanala Carrying out Environmental Impact Assessment” Department of the Environment, Community and Local Government (2018).

The findings and recommendations of other chapters of this EIAR have also been considered in the preparation of this assessment. Particular liaison and consultation have taken place with the relevant EIAR consultants in terms of the description and design of the proposed development and with aspects such as Flora and Fauna and Hydrology.

A site visit was conducted in July as part of this assessment.

Significance Assessment Criteria

The significance criteria as set out in the EPA Guidelines have been used for the purpose of this assessment (see Table 1.2).

4.9.3 Existing Environment

The existing peat harvesting development is carried out on two separate sites at Clonsura and Coole within County Westmeath. The sites are located immediately east of the Inny River and close to the Westmeath/Longford county boundary. Long-term peat harvesting and extraction by other bodies is a major feature of the landscape, not only on these two sites, but within the wider landscape generally. Coniferous plantations associated with peat workings are also a common feature.

Coole Site

The Coole site, which is approximately 6 km west of Castlepollard, is divided into primary Northern and Southern sections by the R395 (Coole to Edgeworthstown) regional road. A smaller local road, the L1826 also bounds the southern boundary of the site.

The main habitat present within the site comprises cutover bog with exposed peat divided by vegetated drainage channels the dominant visual characteristic. Refer to Plate 4.9.4. A buffer zone, where peat is not extracted, occurs to the west of the two main peat harvesting areas and separates the works from the Inny River. Refer to Plate 4.9.5. Two small remnant areas of raised bog, with intact surface vegetation occur in the northeast and southeast of the site. Extensive peatlands are also worked by other bodies to the west of the Inny River and to the south of the site. Refer to Plate 4.9.6.

While not especially visible from nearby, the Coole site is visible from higher ground to the northeast of the site. This includes from some residential properties circa 1km from the site that are located on the edge of Coole village proper at Coole Upper. The site lies within the middle and background context of such views and while noticeable, is an established part of the wider background landscape mosaic. Refer to Plate 4.9.1. Properties located closer to the site are screened by a combination of lower topography and vegetation. In this manner a number of properties at Coole Lower (adjacent to the Inny View public house) although closer do not have any significant views of the site.

Approximately 1km of public road extending east from Float Bridge (R395 - over the Inny River) runs through to the site and has open views south over the site. Refer to Plates 4.9.2, 4.9.3 and 4.9.4. At the time of the site visit this was characterised by stockpiles of milled peat located mostly on the southern side of the road (but with some also on northern area). Refer to Plates 4.9.2 and 4.9.3. While these are visually significant for road users they did not impact any residential properties and are part of the established peatland harvesting activity of the area.

Clonsura Site

The site at Clonsura is located approximately 8km northwest of Castlepollard, Co. Westmeath. As with the Coole site, the main habitat present comprises cutover bog together with a series of drainage channels traversing the site. A buffer zone of high bog, where peat is not being extracted, occurs to the west of the main peat extraction areas and separates the existing peat harvesting sites from the Inny River. Conifer plantation occurs to the east and north.

The Clonsura peatland is located up a narrow laneway (L57671) and is substantially screened by vegetation. It is not overlooked by higher ground or by public roads. As at Coole, there are stockpiles of milled peat but they are not visible from adjacent roads, residential properties or public amenities. Refer to Plates 4.9.7, 4.9.8 and 4.9.9.

County Westmeath Landscape Character Assessment

A Landscape Character Assessment of the county was carried out as part of the 2008- 2014 County Development Plan and provides an understanding of the value and sensitivity of the county's landscapes and its future management needs (See Section 6 of the County Development Plan, 2014 – 2020 page 108). This character assessment classifies the county into 11-character areas (see Figure

6.1 of the Plan, page 109) and the two sites are located towards the northern end of the Landscape Character Area described as the Inny River Lowlands. The presence of extensive areas of cutaway bog under industrial peat production and conifer plantation is recognised as a characteristic feature of the lowland. Policy P-LLM7 discusses the future of cutaway peatland, stating:

> ***P-LLM7*** *To explore with the relevant agencies the future potential of cut away peatlands, including opportunities for habitat creation or amenity and recreation areas such as community woodlands or parklands.*

The Plan indicates that there are no High Amenity Areas (section 6.22 of the Plan, page 114/ Volume 2 Book of Maps Map 12) or Tree Preservation Orders (Appendix 12) on or immediately adjoining the sites.

Appendix 7 of the Plan lists 'Views to be Preserved or Improved'. While the sites do not fall prominently under any such views, the Coole site forms part of the background landscape mosaic of views south from View 49 (See Figure 4.9.1). View 49 is described as "*Panoramic view of countryside from top of hill on Regional Road R-395 at Coole"* (Refer to Plate 4.9.1.).

Summary
The two sites form part of the long-standing, peat workings, which is commonplace in the wider surrounds. The use and activity is established and an acknowledged aspect of the landscape context. While the Clonsura site is strongly screened, neither site is especially visible even from the higher ground at Coole.

The existing harvesting activities on the site are considered to be of generally low landscape and visual significance and of low landscape and visual sensitivity, with the greatest sensitivity limited to the interface with the corridor of the Inny River.

4.9.4 Actual and Potential Impacts of the Activity

The existing sites and their continued development are considered to have a slight to moderate negative impact on the landscape and visual characteristics of the area. This arises in that the activity is *altering the character of the environment in a manner that is consistent with existing and emerging trends*.

The peat harvesting is well-established, both on the subject lands and within the wider landscape context. In addition, the sites are well-screened from surrounding residential properties, with the main views limited to longer-range views from higher ground at Coole and from the R395, which passes through the northern portion of the Coole site. In neither instance, can the view be considered to be unusual, out-of-place or significant or particularly adverse in a visual context.

Likewise the peat harvesting is not considered to have any significant effects on the protected view at Coole which is expansive in nature and takes in a wide range of landuses, including the Coole site as well as other worked peatlands.

Nevertheless, the visually homogenous nature of the exposed peatland (and coniferous plantations in wider area) is in notable contrast to the more diverse mosaic of the semi-natural background landscape. This semi-natural landscape is visually most interesting along the corridor of the Inny River. For this reason, the existing landscape buffer along the river must and will be maintained.

4.9.5 Existing and Proposed Mitigation Measure and/or Factors

Other than in maintaining and protecting the corridor of the Inny River; as well as other small areas of ecologically interesting and diverse landscape habitat (Refer to Chapter 4.2 of this document) specific proposals for the mitigation of landscape and visual impact arising from the existing activity are not required.

The principal opportunity for beneficial landscape and visual improvement lies in the final rehabilitation of the sites. Therefore, following final decommissioning, a comprehensive site rehabilitation plan will be implemented. This plan will include specific measures aimed at enhancing the biodiversity, landscape and visual characteristics of the site.

From a landscape perspective the objective should be to provide as varied a natural landscape as is practical. However, the suitability and type of habitat that will be established will depend on a number of factors including the hydrology of the site coupled with and the physical characteristics of the substrate (depth, topography and chemistry) that dominate the site when peat harvesting ceases.

The rehabilitation plan will be developed in consultation with the landowner and the potential for public amenity along the banks of the Inny will be explored.

4.9.6 Conclusions/Residual Impacts

Continued peat harvesting is unlikely to give rise to any significant landscape or visual impacts and the effects were slight to moderate permanent negative. Appropriate final rehabilitation of the sites has potential for significant local landscape improvement.

4.9.7 Interaction with Other Environmental Attributes

There are clear interactions between ecology and landscape improvement which will be detailed in the rehabilitation/closure plan for the sites.

4.9.8 Monitoring

Not applicable.

4.9.9 Reinstatement

Remnant bog will be maintained as part of future rehabilitation plans.

4.9.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.10 Traffic

4.10.1 Introduction

This section describes the road network and identifies the existing traffic levels on roads in the vicinity of the peat harvesting sites at Coole and Clonsura. The existing impact of peat harvesting activities on the surrounding roads in terms of capacity and safety is described and the abatement measures that may be employed to reduce/ eliminate the impact are identified where necessary.

4.10.1.1 Competent Expertise

This chapter has been prepared by Siobhan Maher whose qualifications include M.Tech. Environmental Management, B.Sc. Analytical Science and a Dip. Acoustics and Noise Control Engineering. Siobhan is a Member of the Institute of Acoustics (MIOA) and has over 20 years of experience carrying out environmental impact assessments.

4.10.2 Study Assessment & Methodology

The approach to this transportation statement included consultation with Westmeath County Council and takes due regard of the National Roads Authority (NRA) Guidance including the following:

- The NRA Traffic and Transport Assessment Guidelines, published in September 2007, which outlines criteria to determine when and if a full Traffic Impact Assessment is required.
- NRA TD 41-42 - Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads (incorporating TD 41 and TD 42).
- RT180 Geometric Design Guidelines, NRA, May 1977 was also referred to where necessary.
- The Road Safety Authority's website www.rsa.ie for statistics on accidents in the study area.

An initial site inspection was conducted and aerial photography reviewed in order to identify the access points from the peat harvesting sites to the surrounding road and transportation network. The access points at both sites consist of main entrances and access for trucks to secondary stockpile locations.

A traffic survey was conducted by Abacus Transportation Surveys at selected points on 4th July 2013 from 07:00 to 19.00, in order to obtain data of existing traffic levels on the surrounding roads. This also included traffic to/from both Coole and Clonsura sites as harvesting was on-going at the time of the survey.

Additional survey data was obtained on January 28, 2020.

4.10.3 Existing Environment

Surrounding Road Network

The Coole site is located approximately 1.5 km west from the village of Coole and is linked to the village by the R395 regional road, which connects the village and also Castlepollard further east to Edgeworthstown to the west in County Longford. The N4 and the N55 intersect at Edgewortstown providing the main links to the east and west and to the north and south respectively.

The R396 is also located close to the Coole site and also links the site to Granard, Co. Longford and the N55.

The southern boundary of the Coole site at Ballinealoe and Shrubbywood is bounded by the L1826, which links Coole Village with Multyfarnham to the south. Multyfarnham eventually links via an unnamed country road to the N4 further south.

The Coole site is accessed off a main entrance on the R395 and a number of other minor points also on the R395 and on the L1826. The Clonsura site is accessed from a county road the L57671off the R394 which runs from Castlepollard to the village of Finnea. This route then eventually links to the N55 north of Granard and connect the site to Cavan and the north. Figure 2.3 and 2.4 depict the locations of the site accesses.

Plates 4.10.1 – 4.10.7 illustrates the site accesses at Coole and Clonsura.

Traffic Survey Results

Attachment 9 contains the traffic counts completed by Abacus Transportation Surveys. The locations where traffic counts were undertaken at the junctions listed below in Table 4.10.1 are also shown on Map 1 in in Attachment 9. Map 2 in Attachment 9 summarises the turning movements. The results of the traffic survey are summarised in the table below. Data gathered from the traffic survey was used to determine the average day-time traffic flow, expressed in Passenger Car Units (PCUs).

Table 4.10.1 Traffic Survey Results

Location	Description	Site Traffic (pcu)	Total Traffic (excluding site traffic) (pcu) (2013-2020 range)	% Site Traffic
1	R394 at access to Clonsura site from R394.	38*	698 – 1190	1.26-2.14
2	R396	NA	947 - 1349	NA
3	R395 at main access to Coole site	15	917-1324	1.13-1.64
4	Multyfarnham Road at access to Coole site	4	375	1.06

NA = not applicable. The use of the R396 is not significant during the harvesting period. Furthermore, the % of the traffic derived from the Coole site could not be identified as the R396/R395 junction as it serves multiple sources.
**Includes local traffic as well on the L5767, assume 15 pcu for site traffic as per Coole*

The 2013 survey occurred during the harvesting period, and therefore the site traffic arose mainly from staff arriving to and from work. Machinery including tractors, a bulldozer, harvesters and quads are brought onto the sites at the start of harvesting and remain for the duration and therefore are not constantly on the local roads. Loading of peat does not occur during the harvesting period and therefore did not contribute to the traffic counts recorded. No harvesting was taking place during the 2020 survey.

Overall, the counts for the regional roads are low and are considered to be lower than the design capacity of the roads. The counts were done during the summer period and therefore school traffic would not be present. Nevertheless, the counts are still considered low and it would appear that the routes are mainly used by local traffic.

Given the low counts, the speed of vehicles is likely to be quite high at 70 - 80kph except for farm vehicles observed travelling at lower speeds.

4.10.4 Actual and Potential Impacts of the Activity

There are no plans to intensify operations on either of the sites, therefore the impact of existing activities has been assessed below.

As can be seen from Table 4.10.1 site traffic arising from peat harvesting operations which occurs generally from April through to September is insignificant.

The other time of significant activity is generally during the months of January through to June when stockpiled peat is loaded onto articulated trucks and transported off site for processing.

On average, approximately 8 -14 trucks (approximately 13 – 18 tonne unladen weight) travel to and from either of the sites on a daily basis during this period and between the operational hours 08.00 – 20.00 hrs. Loading is only done at one site at a time. Accordingly, for each site, up to 64[73] pcus per day enter or exit onto the adjoining road network during loading operations.

Westland use contracted hauliers from various locations and therefore trucks arrive from different directions to the Coole site from the M4/N4 via Edgeworthstown, Castlepollard or Multyfarnham. Once loaded, they depart via the R396 toward Granard, and onto the N55 national primary route.

For the Clonsura site, trucks coming from the eastern direction arrive from the M4 via Castlepollard then onto the Finnea Road (R394). Trucks arrive from the west via Edgeworthstown and Granard, onto the Finnea Road. All the trucks when loaded travel northbound on the Finnea Road (R394), emerging on the N55 national primary route at Dundevan.

Table 4.10.2 Truck and Staff Traffic as a Percentage of Existing Non-site Traffic

Location	Description	Site Traffic (pcu)	Total Traffic (excluding site traffic) (pcu)	% Site Traffic
1	R394 at access to Clonsura site from R394.	79*	698	11.31
2	R396	32	1349	2.37
3	R395 at main access to Coole site	79	917	8.66
4	Multyfarnham Road at access to Coole site	68	375	18.1

**Excludes local traffic on the L57671and estimates site traffic other than trucks as 15 pcus*

[1] 1 Truck = 2.3 pcus

The results of the traffic survey showed the traffic count in general to be relatively low. It is noted that the traffic counts on the respective roads are likely to be below the design capacities of the roads in accordance with *Section 4 of Chapter C in RT 180 Geometric Design Guidelines."* The regional roads and the Multyfarnham road in vicinity of the southern boundary of the Coole site, are likely to have design capacities in the range of 850 to 1200 pcus and 650 to 925 pcus respectively. Therefore, the site traffic during the loading period is likely to be in the region of 7 - 9% and 7 -10% of the design capacity of the regional roads and the Multyfarnham Road respectively.

[73] 1 truck = 2.3pcus

It is therefore not considered that traffic associated with either the Coole or Clonsura site exceed any thresholds including sub-thresholds set out by the NRA to warrant a full Traffic and Transportation Assessment (TTA).

Safety Considerations

The existing junctions are well established for over 20 years. In terms of safety records, the Road Safety Authority's website[74] was consulted for statistics on accidents close to the existing site junctions. The following table sets out details of accident rates which are extremely low over a 6-year period.

Table 4.10.3 Accident Record at or Close to Junctions 2010 - 2016

Location	Year	Classification	Time	Speed (kph)
R395 East of Coole	2016	Minor car with pedestrian collision.	1600 - 1900	50
R395 West of site entrance	2015	Minor car collision. Unknown cause.	1900 - 2300	80
R395 West of site entrance	2010	Minor car with car collision. Unknown cause.	1000 - 1600	80
R394 south of site entrance	2012	Minor car with car collision. Unknown cause.	1000 - 1600	80
R394 north of site entrance	2011	Minor HGV collision. Unknown cause.	1600 - 1900	80
R394 north of site entrance	2011	Minor car with car collision. Unknown cause.	0700 – 1000	80
R394 south of site entrance	2010	Minor car with car collision. Unknown cause.	0700 – 1000	80

Accordingly, the existing activity is not considered to be causing a road safety hazard.

4.10.5 Existing and Proposed Mitigation Measures and/or Factors

The volume of traffic generated due to the peat harvesting activities at the Coole and Clonsura site, as stated previously, does not provide cause for concern.

The hedges on right-hand side of the main site entrance at Coole, as shown in Attachment 2, Plates 4.10.1 and 4.10.2, facing the road are regularly trimmed back to maintain existing visibility. The nature of the activity and maintenance procedures by Westland as part of the EMS does not give rise to mud/dirt issues on the roads.

4.10.6 Conclusions/Residual Impacts

It is concluded based on the above assessment that the traffic arising from the Coole and Clonsura sites, do not have a significant effect on existing traffic flows or on the surrounding road network.

4.10.7 Interaction with Other Environmental Attributes

Interactions of the impact of traffic on the ambient noise and air environment and the inter-relationship with human beings is described in Section 4.5 – Noise and Vibration.

[74] Road Safety Authority (RSA) www.RSA.ie

4.10.8 Monitoring

Not applicable.

4.10.9 Reinstatement

Not applicable.

4.5.10 Difficulties Encountered in Compiling this Information

No difficulties were encountered in compiling this section of the EIAR.

4.11 Interactions

4.11.1 Introduction

As set out in Article 3(1e) of Directive 2014/52/EU an EIAR is required to assess the interactions between topics/factors assessed within the EIAR i.e. population and human health, biodiversity, land, soil, water air and climate, material assets, cultural heritage and landscape where relevant.

This chapter describes and assesses the interaction between the different potential impacts of the proposed development. The identified technical interactions are provided below.

Noise, Human Health and Biodiversity

Noise has the potential to impact upon the residential amenity and disturb the habits of natural species surrounding an activity.

The noise assessment discussed above in Chapter 4.5 concluded that the concluded that the activities carried out by Westland do not have significant effects, in terms of noise and vibration, on existing noise sensitive receptors in the areas of Coole and Clonsura. The activity is typical of the soundscape of the area i.e. agricultural, 'with the exception of the use of articulated trucks on a seasonal basis. However, this is not considered likely to give rise to noise nuisance or significant impact.

Noise resulting from the activity will not result in significant adverse impacts on biodiversity. Wesltand's site operations involve the milling of peat during the period April to September and are largely weather dependent. Taking into consideration the results of bird surveys undertaken at the site, and the consented area over which peat harvesting operations have taken place over the past number of years, there is no evidence to suggest that bird species of conservation concern utilise the habitats of the sites at Coole and Clonsura.

The number of birds utilising the existing peat harvesting sites are low, especially during the months that most works are being undertaken (summer season). Disturbance arising as a result of operation works is therefore not considered likely to impact on the avifauna interest of the site. As the peat harvesting activities have been ongoing for some time, the avifauna populations may have become habituated to the level of disturbance associated with the works and therefore no additional disturbance impact is foreseen.

Overall, it is expected that the continued harvesting activities at Coole and Clonsura are unlikely to cause any additional disturbance to bird and mammal populations resident in the area.

Air Quality, Human Health and Biodiversity

A significant decrease in air quality and the emission of harmful contaminants can pose a risk to the health of human beings and animals over periods of time. A decrease in air quality such as the production of harmful emissions or strong odours can also reduce the outdoor amenity.

The activity does not give rise to significant impacts on local air quality or produce emissions that would have the potential to impact on local air quality. Overall, the impact of the operation on ambient air quality and nearby residential receptors is expected to continue to be insignificant.

Operations at the site are managed and controlled to limit dust emissions and ongoing activities will not impact on the health of the local population or biodiversity within the surrounding area.

Landscape and Visual and Biodiversity

The landscape and visual assessment completed as part of Chapter 4.9 assessed the impact of the activity on local views. The assessment determined that the two harvesting sites form part of the long-standing, peat workings, which is commonplace in the wider surrounds. The use and activity is established and an acknowledged aspect of the landscape context. While the Clonsura site is strongly screened, neither site is especially visible even from the higher ground at Coole.

The assessment concluded that continued peat harvesting is unlikely to give rise to any significant landscape or visual impacts. Appropriate final rehabilitation of the sites has potential for significant local landscape improvement, with potentially positive impacts on biodiversity, through creation of new habitat.

Water Quality and Biodiversity

Development projects have the potential to result in significant effects on local hydrology such as rivers and streams if they are constructed without consideration for the protection of such natural features. Contamination, pollution, erosion or development within hydrological features can have a knock-on negative impact on the species and habitats within and surrounding rivers and streams.

The harvesting activity does not result in any significant effects on local hydrological features or on the biodiversity which avail of the available natural water resources.

It is considered that the activity has negligible impact on water quality and control measures in place are appropriate for the nature of activities being undertaken. It is noted that the activity is seasonal, taking place over a number of months only, and weather dependant, with an overall requirement for dry weather to facilitate moisture reduction in the harvested peat.

The EIAR has concluded that the proposed development will not result in any adverse impacts on local hydrological features and as a result will not adversely impact on the biodiversity which avail of the natural water resources.