Westland Horticulture Ltd.

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

Volume I

Environmental Impact Statement of Westland Peat Harvesting Operations

July 2013

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

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Control Sheet

Document Title:	Environmental Impact Statement of Westland Peat Harvesting Operations	**Revision**	01
Document No:	1182_06	**Issue Date:**	31/07/2013
Prepared By:	Siobhán Maher	**Approved By**	

Westland Horticulture Ltd.

Environmental Impact Statement (EIS) of Westland Peat Harvesting Operations at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole and Finnea, County Westmeath.

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NON-TECHNICAL SUMMARY

INTRODUCTION

This Environmental Impact Statement (EIS) has been prepared by OES Consulting on behalf of Westland Horticulture Ltd. (WHL) for peat harvesting operations currently undertaken on lands at Lower Coole, Mayne, Ballinealoe and Clonsura near the villages of Coole and Finnea, County Westmeath.

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

WHL applied to the Environmental Protection Agency (EPA) for an IIPPC Licence for both sites (IPPC Licence Ref No. P0914-01) in March 2010. As part of that application, the EPA[1] asked WHL to prepare this Environmental Impact Statement (EIS) for the activity.

A screening exercise carried out by the EPA in January 2013 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. It is considered that the EPA's basis of determination is flawed and in error, as WHL's peat extraction activity does not as a matter of fact involve any new or extended area of development. Notwithstanding this, as the EPA is entitled and indeed obliged to carry out EIA in circumstances where no planning permission/EIA is required, which is the position in this case, ,WHL commissioned this EIS to facilitate the IPPC licencing process and having regard to Section 83(2A) of the EPA Acts 1992 – 2012.

This EIS has been prepared in accordance with the EPA Advice Notes and Guidelines for the preparation of EISs. 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 is similar to agricultural activities and the process 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 processing at WHL's facility in Dungannon, Co. Tyrone.

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

WHL 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 IPPC Licence on issue.

WHL 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.

[1] EPA has new powers to request an EIS under European Union (Environmental Impact Assessment) (Integrated Pollution Prevention and Control) Regulations, 2012.

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

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

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 alternative processes. Sedimentation basins used for treatment of surface water run-off are considered best practice. Preferred options for rehabilitation will be developed in the future.

Although not directly relevant to the existing activity on site, it is noted that WHL 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 is currently targeting products to be 70% peat free in 2013 and is a key player in changing consumer behaviour regarding the use of peat and peat free products.

ASSESSMENT OF IMPACTS

HUMAN BEINGS – SOCIO ECONOMIC

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 especially from the existing peat harvesting activities carried out at the Coole[3] and Clonsura sites.

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 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 such as agriculture and peat extraction.

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

[3] Refers to lands at Mayne, Ballinealoe and Coole but the overall landbank is referred to as the Coole site.

under the Soils, Geology and Hydrology section of this NTS.

WHL currently employs three permanent and six seasonal workers in total at both sites combined. In addition, the company uses hauliers based in the west and east to transport peat to Dungannon, Co. Tyrone. Overall the economic impact in terms of provision employment is considered to be both a direct and indirect imperceptible to slight positive impact.

TERRESTRIAL ECOLOGY

Wetland Surveys Ireland (WSI) completed the assessment of impact on terrestrial flora and fauna. 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 waterbird sites in the wider landscape surrounding the existing peat harvesting sites including Lough Derravaragh SPA, 1.2 km to South.

Following the habitat survey of the site, 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 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 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 EIS).

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 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 activities are unlikely to cause any additional disturbance to bird and mammal populations resident in the area.

Once peat harvesting activities cease on the sites, a rehabilitation plan will be fully implemented. Key aims are detailed earlier in this NTS.

The potential impacts assessed (direct, indirect and cumulative) on terrestrial ecology are considered to be imperceptible to minor in significance.

AQUATIC ECOLOGY

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. 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 EIS as the Mayne Stream and the Clonsura Stream/S1.

The main report 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 WHL's 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 Derravaragh) 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 EIS) merit a Q-rating of Q3-4 indicating slightly polluted conditions. If WHL's 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. Likewise 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.

Migitation 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. WHL has no objection to implementing this measure although it is acknowledged that the BATNEEC emission limit value for other licensed peat harvesting/extraction operations is 35mg/l. WHL also propose to implement a one-off comprehensive monitoring programme to assess any seasonal changes to their discharges.
Wind breaks of trees will also be planted along the Inny River as a further dust minimisation precautionary measure.

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

SOILS, GEOLOGY AND HYDROLOGY
The assessment of impact on soils, geology and hydrogeology was prepared by Hydro-Environmental Services (HES) with input from OES Consulting.

A desk study of both sites and their surrounding areas was completed in advance of undertaking the walkover survey and site investigation. This involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area.

Peat depth profiling, drainage mapping and hydrological baseline monitoring/sampling were undertaken in June 2013. Water hydrochemistry was assessed to determine the source of water to specific surface water features of interest including Lough Bane.

The sites 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 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 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 walkover and drainage outfalls from the bog, the site can be divided into approximately 9 no. sub-catchments. Two of the sub-catchments drain directly into the Mayne Stream. WHL will review the existing arrangements and rectify this situation by draining to existing basins or construction of new basins.

Notwithstanding the above, it is not considered that the existing operation is impacting on 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 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.

NOISE AND VIBRATION

Noise monitoring was conducted in the vicinity of the Coole and Clonsura sites at the nearest Noise Sensitive Locations (NSLs) or representative locations in June 2013. Harvesting was in operation at the time and activities were found to be inaudible during the monitoring period. 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 WHL 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.

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 2011 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. WHL 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.

CLIMATE

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

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 WHL'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 0.02% 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 WHL'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 WHL 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

A desk-based study and field survey was conducted by Dr. Maurice Hurley to assess the cultural heritage of the sites and surrounding areas.

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.

It is suggested that an appropriate mitigation may be provided by archaeological monitoring and a dendrochronology dating programme which would have the benefit of providing a more precise date for the construction of the trackway.

LANDSCAPE AND VISUAL

Brady Shipman Martin conducted the landscape and visual impact assessment for this EIS.

In summary, the sites 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 impacts 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 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.

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 impact on existing traffic flows or on the surrounding road network.

Chapter One – General

1.0 Introduction

OES Consulting Ltd. has been retained by Westland Horticulture Ltd (WHL) to prepare an EIS for peat harvesting operations, currently undertaken on lands at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole & Finnea, County Westmeath as part of its Integrated Pollution Prevention and Control (IPPC) Licence Application processAttachment 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.

WHL applied to the Environmental Protection Agency (EPA) for an IIPPC Licence for both sites (IPPC Licence Ref No. P0914-01) in March 2010. As part of that application, the EPA[4] asked WHL to prepare this Environmental Impact Statement (EIS) for the activity.

A screening exercise carried out by the EPA in January 2013 determined that the activity fell within a particular class[5] 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. It is considered that the EPA's basis of determination is flawed and in error, as WHL's peat extraction activity does not as a matter of fact involve any new or extended area of development. Notwithstanding this, as the EPA is entitled and indeed obliged to carry out EIA in circumstances where no planning permission/EIA is required, which is the position in this case ,WHL commissioned this EIS to facilitate the IPPC licencing process and having regard to Section 83(2A) of the EPA Acts 1992 – 2012.

1.1 Brief Description of the Activity

The peat lands in County Westmeath comprise of 4 separate holdings near the villages of Coole, and Finnea in County Westmeath. The total land area covered by the operation is approx. 252ha.

Peat is harvested from the lands through typically the drier months of April through to September. The operation is similar to agricultural activities and the process 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 typically during the months of January through to June for processing in Dungannon, Co. Tyrone.

[4] EPA has new powers to request an EIS under European Union (Environmental Impact Assessment) (Integrated Pollution Prevention and Control) Regulations, 2012.
[5] Class 2 of Part 2 of Schedule 5 of the Planning and Development Regulations 2001 – 2012

1.2 Peat Harvesting Chronology and Legislative Context

It is understood that peat harvesting operations have been carried out on the lands at least since the mid 1940s and were harvested for turf supply to Dublin in the late 1950s.

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.

The sites were drained and developed in 1982 with state funded aid.

WHL went into occupation of the sites in the mid 1990s and began producing milled peat for use in the horticultural industry.

A licence to discharge water from the sedimentation basins to the local river was granted to WHL in 2009 (File Ref. ENV/W01/2009) under the Local Government (Water Pollution) Acts 1977 and 1990 and the Local Government (Water Pollution) Regulations, 1978 and 1992.

As noted above, WHL has applied for an IPPC licence (Reg No. P0914-01) in 2010 under Class 1.4.0. - Minerals and Other Materials – the harvesting of peat in the course of business which involves an area exceeding 50 hectares. That application is currently under consideration by the EPA.

This EIS is part of that consent process i.e. the IPPC licensing process. The scope of this EIS deals with the existing and, where relevant, future peat harvesting activities and rehabilitation on the site, and is not meant to be , and should not be taken to be an acceptance of any requirement for planning permission or EIA to be sought or carried out under planning legislation.

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 through out the rest of this EIS. 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 Sites and Surrounding Lands

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 Closura 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[6]. 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 sites.

[6] 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

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 was to ensure that the main potential effects of the activity are identified and that this EIS is focused.

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)
- 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 EIS 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 EIS and the assessments proposed therein.
Westmeath County Council (WCC)	20/6/2013	WCC commented as follows that the 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 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 Derravaragh 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; • 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 EIS and planning issues can be found in the preceding Sections 1.0 and 1.2 of this EIS.***
An Bord Pleánala	27/05/2013	No comments were raised regarding the EIS Scoping Document.
Health Service Executive (Dublin Mid Leinster)	19/06/2013	No comments were raised regarding the 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 EIS. ***Action: Agriculture is considered within Section 4.1 which deals with socio-economic impacts***

Department of Arts, Heritage and the Gaeltacht and National Parks and Wildlife Services (NPWS)	05/06/2013 Previous correspondence received during the preparation of the Natura Impact Statement document 22/12/2010	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: • 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 Derravaragh 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 Derravaragh 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 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 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 EIS which could affect the National Roads Network should be taken into account when preparing the 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 Tasice.*** ***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 Derravaragh SPA and Lough Bane pNHA. • 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 EIS addresses the impact of existing and future activities where relevant on the environment. The EIS 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 Statement

1.5.1 General Guidance

This EIS has been prepared in accordance with requirements of the *European Communities (Environmental Impact Assessment) Regulations*, 1989-2006.

The EIS has been prepared in accordance with the following Environmental Protection Agency (EPA) documents and relevant best practice guidelines:

- "Advice notes on current practice in the preparation of Environmental Impact Statements" (2003); and
- "Guidelines on the information to be contained in Environmental Impact Statements" (2002).
- "Guidelines for Planning Authorities and An Bord Pleánala Carrying out Environmental Impact Assessment" Department of the Environment, Community and Local Government (2013).

1.5.2 Structure of the Environmental Impact Statement

The structure of this EIS adopts a sequence as follows:

- A non-technical summary;
- A description of the activity;
- Alternatives considered;
- A description of the baseline receiving environment for a number of environmental topics;
- The impacts of the activity and mitigation of those impacts.

In the description of the impacts of the activity the following attributes of the receiving environment and their interactions are described:

- Human Beings - Socio - Economic;
- Terrestrial Ecology;
- Aquatic Ecology;
- Soils, Geology and Hydrology;
- Noise and Vibration;
- Air Quality;
- Climate;
- Cultural Heritage;
- Landscape and Visual;
- Material Assets – Traffic and Roads.

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 EIS 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 EIS in collaboration with members of the following project team:

- Brady Shipman Martin, Landscape & Visual Specialists;
- Dr. Maurice Hurley Archaeological Services, Cork – Archaeological Assessment;
- Wetland Surveys Ireland Ltd. – Terrestrial Ecological Assessment and Bird Survey;
- Conservation Services Ireland Ltd – 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
Bord	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

EIS	Environmental Impact Statement
EMS	Environmental Management Plan
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
IPPC	Integrated Pollution Prevention 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
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
WHL	Westland Horticulture Limited
WSI	Wetland Surveys Ireland
yr	year

1.6 Guide to the Document

This document comprises an Environmental Impact Statement (EIS) in respect of the existing and future peat harvesting activities carried out by WHL at two sites 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 sufficient detail in order to facilitate identification of environmental impacts of the peat harvesting activities.

Chapter Three - Alternatives Considered
It is a statutory requirement that a detailed evaluation of 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. It also takes into account the interactions between the various 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

It is understood that peat harvesting operations on site originally commenced in the late 1950s. The site was then drained and developed in 1982 with state funded aid. WHL took over occupation of the site in the mid 1990s with the aim of producing milled peat for use in the horticultural industry.

The peat 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.

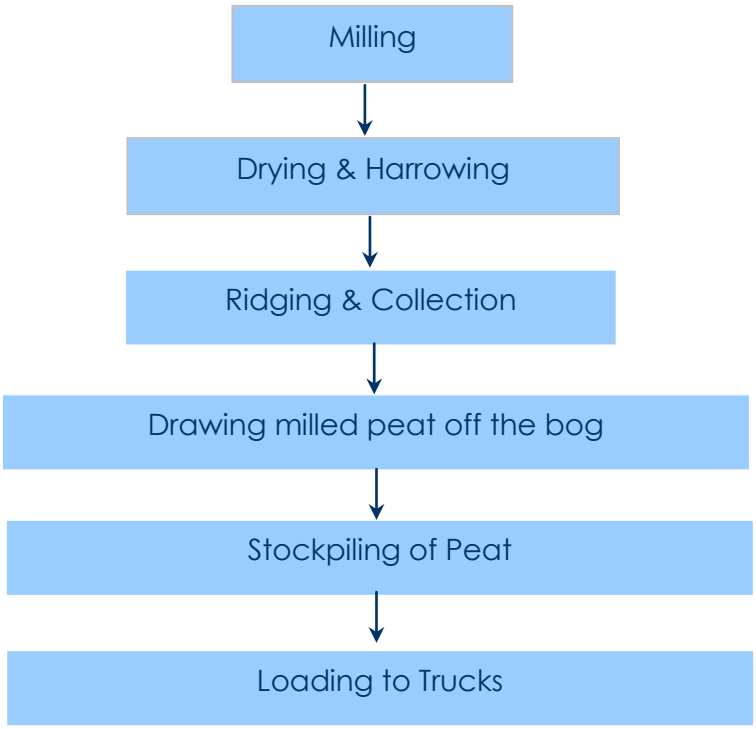
The volume of peat harvested varies and is dependent on weather conditions. WHL are Members of the Growing Media Initiative and have developed alternative peat free material for their products which also influences the amount of peat harvested now and more so into the future.

2.2 Site Operations

WHL's site operations involve milling of peat, typically within the months of April to September. The operation is largely 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 overleaf.

The operations of milling, harrowing, ridging and harvesting are repeated for each crop and are collectively described as a cycle.

Flow Diagram of Operations



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 over a period of a few days.

2.2.2 Drying and Harrowing

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

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.

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, 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 are approx. 6 – 7m in height.

2.2.5 Transportation

The stockpiled peat is transported off site to Dungannon Co. Tyrone 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 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.

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), provided by hauliers from the midlands, the West and Dublin, are used to transport peat from the sites to Dungannon Co. Tyrone. 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 ditched. This 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.

2.6 Drainage and Pollution Control Arrangements

WHL maintains surface water drainage ditches every 12 meters (approximately) to provide adequate conditions for peat harvesting. Surface 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.

WHL 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 IPPC 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 WHL have been designed with due regard to the 'Draft BATNEEC Guidance Note for the Extraction of Peat' and to Agency accepted standards on IPPC 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 WHL 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 WHL 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

WHL 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 IPPC 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

WHL 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

Although not directly relevant to the existing activity on site, it is noted that WHL 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 is currently targeting products to be 70% peat free in 2013. Irish spagnum peats have a high absorptive capacity and are lightweight and consistent and it is these properties that WHL hope to replicate in alternatives. In this regard, the company has successfully developed a patented technology used to process sitka spruce to produce a lightweight fibre like alternative. The trees are sourced only from forests with FSC certification and WHL is actively involved in carbon sequestration to offset CO_2 emissions from the harvesting of peat.

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 EPA[7] and at EC[8] level provide direction in interpreting the requirements for the evaluation of alternatives. The EU EIA Guidelines on Scoping refer to three components in the consideration of alternatives and these include alternative location, design and processes. The Guidelines also state that alternatives are essentially different ways in which the developer or in this case the operator of an existing activity can feasibly meet the project objectives. Generally the EU Guidelines seem to envisage that alternatives are identified and reviewed at the outset of the project while mitigation measures can also play a role in the process in terms of alternatives considered.

The EPA 2002 Guidelines on EIA state that "*the consideration of alternative routes, sites, alignments, layouts, processes, designs or strategies, is the single most effective means of avoiding environmental impacts.*" However they also note that it is important from the outset to acknowledge the existence of difficulties and limitations when considering alternatives. The EPA goes on to discuss these difficulties and limitations at some length and summarized overleaf:

[7] Guidelines on the Information to be Contained in Environmental Impact Statements, Environmental Protection Agency, 2002
[8] Guidance on EIA Scoping, European Commission, 2001

- 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.

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. Alternative uses of the land are not considered a realistic alternative for discussion in this EIS on the basis that WHL 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 EIS.

3.2 Alternative Processes

The activity can be described as similar to agricultural in nature and therefore there are no realistic alternatives to the equipment and methods used. WHL 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.

3.3 Alternative Rehabilitation Strategies

WHL 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.

3.4 The 'Do Nothing' Alternative

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

Chapter Four – Impacts

4.0 Introduction

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

- Human Beings - Socio - Economic;
- Terrestrial Ecology;
- Aquatic Ecology;
- Soils, Geology and Hydrology;
- Noise and Vibration;
- Air Quality;
- Climate;
- Cultural Heritage;
- Landscape and Visual;
- Material Assets – Traffic and Roads.

4.1 Human Beings – Socio Economics

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 impinge upon 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 EIS. Accordingly, this section of the EIS focuses on the 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);
- 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);
- Local Area Plan Coole Village, Westmeath County Council, 2008;
- Draft Finnea Appraisal and Management Plan, Westmeath County Council, 2011-2017;
- Westmeath County Development Plan (CDP), 2008-2014;
- Westmeath Draft County Development Plan, 2014-2020;
- Regional Planning Guidelines, Midland and Regional Authority, 2010-2022;

- National Development Plan 2007-2013; and,
- National Spatial Strategy 2002 – 2020.

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

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 2011 shows that Ireland's population grew by 340,000 persons to 4.58 million since 2006. A combination of high birth rates and immigration during that time meant that the strongest increase occurred during 2006-2008. This trend is reflected in County Westmeath with increases in population from 2006 to 2011of 8.5%, from 79,403 to 86,164. The most dramatic increase in that period occurred in Kinnegad DED with an increase of 421%.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[9].

Population statistics in 2006 for Coole and Finnea were reported to be 277 and 316 respectively. The 2011 Census for the Coole, recorded a slight decrease to 253 and details are shown in Table 4.1.1 below of the trends from 1991 to 2011.

Table 4.1.1 Demographic Trends in Coole Electoral Division[10]

Coole ED	**1991**	**1996**	**2002**	**2006**	**2011**
Population No.	229	235	209	277	253
Actual Change Since Previous Census	-	6	-26	68	-24
Population Change Since Previous Census	-	2.6%	-11.1%	32.5%	-8.7%

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.

[9] IBEC (2012) *Irish Consumer Monitor*, Irish Business and Employers Confederation, June 2012
[10] Westmeath Draft County Development Plan, 2014-2020

Table 4.1.2 Population Age Profile for Castlepollard[11]

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[9]. 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[12].

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 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

[11] Census Report 2011, www.cso.ie
[12] Teagasc website www.teagasc.ie

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%[13]. 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

	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.

Tourism, Recreation and Amenity

According to Fáilte Ireland[14], the Business Sentiment Index shows that sentiment in the industry continues to increase significantly and demonstrates a vast improvement since the low point in 2008 / 2009. At present tourism is a really 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 Derravaragh. There are also a number of BandBs 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.

[13] Live register figures June 2006 - June 2013, www.cso.ie
[14] Fáilte Ireland (2013) *Tourism barometer*, Fáilte Ireland, April 2013.

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 Derravaragh. 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.[15] A boat is not necessary with the exception of Lough Kinale, Lough Iron and Lough Derravaragh. 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 Derravaragh 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 Draft County Development Plan (2014-2020) and the Westmeath County Development Plan (2008-2014) have several policies and objectives relating to peatland and socio economic themes. These are listed overleaf in Table 4.1.5.

[15] www.fishinginireland.info

Table 4.1.5 Policies outlined in the Westmeath Draft County Development Plan (2014-2020) and the Westmeath County Development Plan (2008-2014) relating to peat harvesting and socio economic themes.

Policy/ Objective Number	Westmeath Draft County Development Plan 2014-2020	Westmeath County Development Plan 2008-2014	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
O-EH19	-	✓	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. There is potential for habitat creation such as woodlands, grasslands, and wetlands. There is also potential for **amenity value with development of parklands and economic uses** such as agricultural grasslands, forestry and wind energy.
P-EH32	-	✓	Within the next 20–30 years large areas of peatland will be exhausted and provide tracts of land that have **potential for agriculture, habitat and amenity**. The Council, in consultation with relevant agencies, will explore future potential of cut away peatlands that may offer opportunities for habitat creation or amenity and recreation areas such as community woodlands or parklands.

4.1.4 Actual and Potential Impacts of the Activity

Local Economy and Employment
There is no disruption to local businesses by way of traffic and noise during the peat harvesting and site operations given the distance the sites are from the villages of Coole and Finnea. Traffic is dealt with in Section 4.10.

WHL currently employs three permanent and six seasonal workers in total at both sites combined. In addition, the company uses hauliers based in the west and east to transport peat to Dungannon, Co. Tyrone. 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.

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 set back 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 WHL 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.

Westmeath County Council Policies
WHL will take account, where relevant, of the policies outlined in the Westmeath County Development Plan (2008-2014) and Draft 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 IPPC 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 listed within the appropriate sections of this EIS.

There are no measures proposed specifically for socio-economic impacts.

4.1.6 Conclusions/Residual Impacts

Conclusions and residual impacts are the same as listed above under Section 4.1.4.

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 EIS.

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 EIS.

4.2 Terrestrial Ecology

4.2.1 Introduction

This chapter discusses the existing terrestrial ecology 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. Wetland Surveys Ireland (WSI) completed the terrestrial ecology 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

4.2.2 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 EIS 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 in February 2013. These comments were taken account of in the preparation of this chapter of the EIS.

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)[16]. Methods used during the habitat survey followed best practice guidance for habitat survey and mapping as outlined in Smith et al. (2011)[17].

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

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

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

[17] 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.

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 Derravaragh	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 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 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 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)[18], NRA (2009)[19], Gittings (1998)[20] and EPA (2002)[21]. 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.

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 Derravaragh 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.

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

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

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

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

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[16]. 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[16] 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)[22]; the Flora Protection Order 1999, Annex II of the EU Habitats Directive, NPWS rare plant database and the Irish Red Data Book[23].

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. 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[24] and on Annex I of the EU Birds Directive with reference to the winter bird atlas of Britain and Ireland[25]. 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

[22] 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.

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

[24] 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

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

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 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[24] and on Annex I of the EU Birds Directive and their potential to breed on-site was undertaken with reference to published atlas records[26, 27]. 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) and on two occasions during the breeding season (June).

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.

<u>Counts at potential water bird sites in surroundings</u>

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

Analysis of I-WeBS data for the 5 year mean peak during the 2003/04 to 2007/08 period conducted at this site previously recorded 47 Whooper Swan, 931 Pochard, 207 Tufted Duck and 1277 Coot. All four species are known to have undergone declines over the past ten years within the SPA. The current survey

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

[27] 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.

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 waterbird 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 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 Derravaragh SPA occurs approximately 1.2km south of the existing peat harvesting sites. The movement of migratory waterfowl and other waterbirds from Lough Derravaragh 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 (2013)[28] 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:

- 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.

[28] National Biodiversity Data Centre www.NBDC.ie

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 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 impacted 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 – Aquatic Ecology.

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. WHL 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 to date, 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 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 200 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 Derravaragh 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 IPPC licence is granted and a closure plan is submitted in accordance with the IPPC 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 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 do not have a significant impact in the context of the

scope of this assessment, 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 impacts to watercourses are dealt with in more detail in Chapters 4.3 and 4.4.

Mitigation by Reduction

As a means of reducing impacts 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 Derravaragh, 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, Soils, Geology and Hydrology while impacts and mitigation for Aquatic Ecology 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 EIS.

4.3 Aquatic Ecology

4.3.1 Introduction

This section discusses the existing environment in terms of Aquatic Ecology in the vicinity of the sites, the actual and potential impacts 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 WHL 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) Act, 1977, its Amendments (and associated regulations)
- European Communities Environmental Objectives (Surface Waters) Regulations 2009
- The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962
- Fisheries (Amendment) Act 1999
- 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 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

4.3.2 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 streams29.
- 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).

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

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

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 Derravaragh 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 Derravaragh. The Inny was subject to an arterial drainage scheme in the 1960s 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[30]; 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 Derravaragh 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 Derravaragh.

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.

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'.

[30] 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

EPA monitoring indicates that there has been a steady improvement in the water quality of Lough Derravaragh 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. 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 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 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 Summaried 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 25 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.[31] [32] Data on the

[31] 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.

National Biodiversity Data Centre website[33] show that crayfish have been recorded in the River Glore throughout the period 1977 to 2008 (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 were 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.

[32] 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).
[33] National Biodiversity Data Centre www.NBDC.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 Derravaragh	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

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
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
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 impacts of the peat harvesting works in the absence of existing mitigation measures or factors on aquatic ecology could be:

- 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[34] and may be less amenable to removal by conventional Sedimentation basins unless properly sized to allow for peat particles.

Impacts 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 crayfish35.
- Increased levels of sediment can displace fish out of prime habitat into less suitable areas36.

- 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 infections37.

- 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

[34] Forest Service (2008) Forestry and Freshwater Pearl Mussel Requirements Site Assessment and Mitigation Measures. Department of Agriculture, Fisheries and Food
[35] Peay, S. (2000) Guidance on works affecting white-clawed crayfish. Report prepared for English Nature and the Environment Agency.
[36] 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.
[37] Solbe, J. (1988) Water quality for Salmon and Trout. Atlantic Salmon Trust.

will have an extremely destructive impact on the river and in particular its biology[38].

In the absence of adequate mitigation measures, contamination of water courses with suspended solids is one of the most significant potential impacts 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[39]. 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[40] 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)[38] 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 IPPC licensing process.

A study done in 2008 of an actively worked peatland[38] found the concentration of Ammonium in peatland surface water runoff 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

[38] Shannon International River Basin District Project (2008) Peatlands Report. Shannon International River Basin District.
http://www.shannonrbd.com/pdf/peatlandsreportjul08.pdf

[39] McGarrigle M. and Kilmartin, L. (1992). UV-Sensitive Phosphate in Irish Peaty Waters. A Study of Potential Effects on Freshwater Ecosystems. Environmental Research Unit.

[40] 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.

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

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 WHL 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 EIS.

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 EIS. The main mitigation measures currently applied to minimise/avoid suspended solids input to water courses are described in Section 4.4.5 although additional proposals recommended by Conservation Services Ltd and which WHL have no objection to implementing if required by the EPA are described below.

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. However it is acknowledged that the EPA BATNEEC Emission Limit Value is 35mg/l and this has been applied to other peat harvesting sites.

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).

Wind breaks of trees will be planted along sensitive stretches of the Inny River and should be of sufficient width, height and density to prevent significant quantities of peat dust reaching the rivers[41].

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 Soils, Geology and Hydrology.

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

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, WHL 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 EIS.

4.4 Soils, Geology and Hydrology

4.4.1 Introduction

This chapter discusses the impact of the peat harvesting activity on 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:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001);

- S.I. No. 94 of 1997 European Communities (Natural Habitats) Regulations, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);

- S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;

- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009 and SI No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC). Since 2000 water management in the EU has been directed by the Water Framework Directive (WDF). The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least 'good' status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of 'good' status for these depends also on the achievement of 'good' status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have either been completed or are ongoing. In 2015 it

will fully replace a number of existing water related directives, which are successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) will form part of the achievement of implementation of the objectives of the WFD;

- S.I. No. 41 of 1999 Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);

- S.I. No. 249 of 1989 Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);

- S.I. No. 439 of 2000 Quality of Water intended for Human Consumption Regulations and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);

- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations; and,

- S.I No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010.

4.4.2 Study Assessment and Methodology

Relevant Guidance
This chapter of the EIS 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).

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 EIS 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 – 2011);
- Assimilative capacity assessment undertaken by OES Consulting in February 2011, details of which have already been submitted to the EPA; 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 EIS 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[42]

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.

The statutory criteria[43,44] 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.

[42] Adapted from the Scottish Environmental Protection Agency www.sepa.org.uk
[43] EPA (2002). Guidelines on the information to be contained in Environmental Impact Statements.
[44] 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 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[45]. A high groundwater table may also impede drainage. After glaciation, 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[45]. 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 /

[45] 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

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) = AAR – 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 EIS) 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 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.

<u>Clonsura Site Drainage</u>

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 acts 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.

WHL are aware of the need to install additional sedimentation basins at Clonsura and this matter has already been identified as part of the IPPC 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 WHL has already proposed sedimentation basin infrastructure for sub-catchments S5-S13 to be constructed (or improved in the case of S5) to bring these drainage areas up to minimum standard.

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[46] 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

[46] Maps are dated between 1829 and 1842.

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)

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. Alternatively if this is not possible, additional sedimentation basins will be constructed.

Flood Risk Assessment

Within the Republic of Ireland, OPW's indicative river and coastal flood map[47] 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

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

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

The electrical conductivity of the surface waters in the sedimentations 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 (2007 – 2010) is available for the Inny River at Camagh Bridge (Station: 0600) and the Bridge near Shrubbywood (Station: 0700). The 2010 to 2012 water quality data is currently being complied and was not available at the time of writing this EIS. 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 (2007 – 2010)

Parameter	Units	Camagh Bridge (0600)	Bridge near Shrubbywood (0700)
BOD (95%ile)	mg/L O_2	2.4	3
Ammonia N (95%ile)	mg/L	0.082	0.1125
Ortho-phosphate P (95%ile)	mg/L	0.019	0.026

Table 4.4.10 Chemical Conditions Supporting Biological Elements*

BOD	High status ≤ 2.2 (95%ile)
	Good status ≤ 2.6 (95%ile)
Ammonia-N	High status ≤ 0.09 (95%ile)
	Good status ≤0.14 (95%ile)
Ortho-phosphate	High status ≤0.045 (95%ile)
	Good status ≤0.075 (95%ile)

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

At the Camagh Bridge the BOD was below the "Good" status threshold while at the Bridge near Shrubbywood the BOD exceeded the requirements for both the "High" and "Good" status threshold limits.

Ammonia as N was below the "High" status threshold at Camagh Bridge and was below the Good status at the Bridge near Shrubbywood.

Ortho-phosphate was below the "High" status threshold at both Camagh Bridge and the Bridge near Shrubbywood.

Sampling of the Inny River and the River Glore was also undertaken as part of the EIS. 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 WHL

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 II. 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 (78/659/EEC) 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 Council 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.

Recent 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 EIS. Results are shown in Table 4.4.14 below and laboratory certificates are contained in Attachment 6, Appendix III. 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

				Sample ID					
Parameter	EC DIRECTIVES			Coole				Clonsura	
	75/440/EEC	78/659/EEC		SB1	SB3	SB4	SB6	SB3	SB1
	Waters Intended for Abstraction	Salmonid	Cyprinid						
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.

Assimilative Capacity Available

An assimilative capacity assessment for the Inny River was undertaken by OES Consulting Ltd in March 2011. The 95%ile flow of the Inny River upstream of the Clonsura and Coole sites was taken to be 0.78m^3/s and 0.93m^3/s respectively. The assessment was also undertaken under 50%ile flow conditions as discharge from the sites only occurs after rainfall events and therefore the assessment at 95%ile flow conditions would be considered very conservative. The 50%ile flow of the Inny River upstream of the Clonsura and Coole sites was taken to be 5.4m^3/s and 6.42m^3/s respectively.

A summary of the available assimilative capacity is shown in Table 4.4.15.

The assimilative capacity of the Inny River at 95%ile flow conditions downstream of the Clonsura site shows that available assimilative capacity exceeded the loading

rate for all parameters with the exception of BOD where the assimilative capacity was exceeded by 1.29kg/day.
The assimilative capacity of the Inny River at 95%ile flow conditions downstream of the Coole site shows that available assimilative capacity exceeded the loading rate for all parameters with the exception of BOD and ammonia. The BOD and ammonia assimilative capacity was exceeded by 4.42kg/day and 0.3kg/day respectively.

The assimilative capacity of the Inny River at 50%ile flow conditions exceeded the loading rates as assessed for all parameters downstream of both the Clonsura and Coole sites. Tables below show that there is significant available capacity at 50%ile flow conditions.

Table 4.4.15 Summary of the Assimilative Capacity Assessment

Upstream of Sedimentation Basins at Clonsura Harvesting Site	**Available @ 50%ile (Kg/Day)**	**Available @ 95%ile (Kg/Day)**	**Required (Kg/Day)**
BOD	74.6	11.3	8.5
Orthophosphate	20.5	3.1	0.28
Ammonia	19	2.8	1.71
Suspended Solids	4556.3	690	19.95
Downstream of Sedimentation Basins 1,2 & 5 @ Clonsura	**Available @ 50%ile (Kg/Day)**	**Available @ 95%ile (Kg/Day)**	**Required (Kg/Day)**
BOD	81.27	4.41	5.7
Orthophosphate	24.44	3.28	0.19
Ammonia	21.12	1.59	1.14
Suspended Solids	5460.80	771.56	13.3
Upstream of Sedimentation Basins at Coole Harvesting Site	**Available @ 50%ile (Kg/Day)**	**Available @ 95%ile (Kg/Day)**	**Required (Kg/Day)**
BOD	94.18	13.80	5.70
Orthophosphate	26.05	3.81	0.19
Ammonia	22.50	3.29	1.14
Suspended Solids	5746.63	842.25	13.30
Downstream of Sedimentation Basins 1&2 @ Coole	**Available @ 50%ile (Kg/Day)**	**Available @ 95%ile (Kg/Day)**	**Required (Kg/Day)**
BOD	101.09	9.78	14.2
Orthophosphate	29.35	4.09	0.47
Ammonia	24.37	2.55	2.85
Suspended Solids	6502.51	931.44	33.26

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 decreases 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[48]. 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[48].

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[49]. 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;
- 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.

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

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

Groundwater Body Status

Local Groundwater Body and Surface water Body status reports are available for download[50].

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[51]. 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 'Poor Status' with an overall risk[52] result of 1a (At Risk).

A section on the west of the Clonsura site, and the entire Coole site exists within the Inny Surface Water Body (IE_SH_26_1371). This surface water body is assigned an overall 'Poor Status' with an overall risk result of 1a (At Risk). 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 Bodies

Water Body	Macro-invertebrate Status	Overall Ecological Status	Overall Status	Overall Risk Result	Overall Objective
Glore River	Poor	Poor	Poor	1a	Restore_2021
Inny River	Poor	Poor	Poor	1a	Restore_2021

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[48].

[50] Water Matters www.WFDIreland.ie
[51] Water Framework Directive (2010) Shannon River Basin Management Plan (2009-2015)
[52] 'At Risk' means that a water body will not achieve good ecological or good chemical status/potential by at least 2015. The risk to the waterbody is placed in four categories: 1a at risk, 1b probably at risk, 2a probably not at risk, 2b not at risk

4.4.4 Actual and Potential Impacts of the Activity

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.* ammonia N & phosphorus).

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 Freshwater Fish Directive (78/659/EEC) value of 25mg/l. Both sites were also below the EPA BATNEEC emission limit value of 35mg/L for suspended solids. The available water quality monitoring data therefore indicates that the in-situ sedimentation basins are effective in removing suspended solids from the surface water discharges from the sites.

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. Therefore, 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. The assessment was undertaken for 50%ile and 95%ile flow conditions in the Inny River. It should be noted that the assessment at 95%ile flow conditions is extremely conservative as a significant preceding rainfall event would be required to have runoff discharging from the sites and therefore flow conditions in the Inny River and River Glore are likely to be significantly higher than the 95%ile flow when actual discharge from the sites are occurring.

At 95%ile flow conditions the BOD input (14.2kg/day) downstream of both the Clonsura and Coole sites exceeds the available assimilative capacity (9.78kg/day) by 4.42kg/day which accounts for an exceedance of 45%. However, at 50%ile flow conditions the BOD input only accounts for 14% of the available assimilative capacity of 101.09kg/day.

At 95%ile flow conditions the ortho-phosphate input (0.47kg/day) only accounts for 11.5% of the available assimilative capacity (4.09kg/day).

At 95%ile flow conditions the Ammonia N input (2.85kg/day) downstream of both the Clonsura and Coole sites exceeds the available assimilative capacity (2.55kg/day) by 0.3kg/day which accounts for an exceedance of only 11.7%. However, at 50%ile flow conditions the ammonia N input only accounts for 11.7% of the available assimilative capacity of 24.37kg/day.

At 95%ile flow conditions the suspended solid input (33.26kg/day) only accounts for 3.5% of the available assimilative capacity (931.44kg/day).

Even though there are assimilative capacity exceedences for the 95%ile flow conditions (*i.e.* ammonia & BOD) this assessment is likely to be overly conservative as there will be no significant discharge from the sedimentation basins during dry conditions. In addition, the concentration of ammonia, BOD & orthophosphate in the discharge is likely to become diluted during periods of heavy rainfall when significant volumes of runoff are being discharged from the site.

It is noted that the assimilative capacity assessment took account of the discharges from the existing sedimentation basins at both sites and one proposed additional sedimentation basin for Clonsura. The assessment was on the basis that all of the run-off from the sites including the proposed area discharges via the basins. It is noted from recent site visits that run-off from parts of the sites do not currently discharge to the surface water via sedimentation basins. In this regard, runoff from approximately 45.3ha (*i.e.* sub-catchments S5 to S13) of the Clonsura site discharges into the Inny River without being passed through sedimentation basins. At the Coole site approximately 44.5ha of the site (*i.e.* sub-catchments S8 and S9) discharge into the Mayne Stream prior to the Inny River without being passed through a sedimentation basin first.

This will be mitigated by WHL as described below however, notwithstanding this, the assimilative capacity 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 EIS 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 vivcinity 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 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 and drainage ditches and in effect this gives WHL 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 WHLs 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, WHLs 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:

- Ecology: 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 - Aquatic Ecology and Chapter 4.2– Terrestrial Ecology.

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 EIS.

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.

4.5.2 Study Assessment & Methodology

Noise Monitoring

An initial site inspection was conducted and aerial photography reviewed in 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)*" published by the EPA in April 2012 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.

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.

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.
Noise measurements were carried 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[53]. The weather conditions noted at Mullingar, the closest weather station to the site, are outlined in Table 4.5.1 overleaf.

[53] Met Eireann website www.met.ie

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.
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.

Truck Access
Articulated trucks are used from January through to June to transport peat from the sites to the processing facility at Dungannon in Co. Tyrone.

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 Catlepollard 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 WHL 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 EIS 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 WHL:

- 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 CE54 marked.
- Road surfaces to, from the Clonsura site are maintained by WHL 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 WHL 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.

Overall it is considered that the activity can comply with the following limit likely to be set in the IPPC license as specified for areas of low background noise in 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.

[54] CE has no meaning as an abbreviation but it is thought that it is an acronym for Communaute Europeenne.

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 EIS.

4.6 Air Quality

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.

4.6.2 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 during harvesting operations.

The existing environment is described taking account of literature sources such as the EPA publication 'Air Quality in Ireland 2011 (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

In 2011, monitoring was 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.
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 2011 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/m³	1 - 3	NA (daily limit:125 µg/m³)	NA (daily limit exceedences: 0)
NO_2	µg/m³	3 - 9	40	0
NO_x	µg/m³	3 - 14	40	0
CO	mg/ m³	0.2	10	0
Ozone	µg/m³	40 - 74	120 (No more than 25 days)	0
AOT 40	µg/m³	704-4931 (period 2006-2011)	18,000 (averaged over 5 years)	0
PM_{10}	µg/m³	9 - 14	40 (daily limit:50 µg/m³)	0 (daily value exceedences: Castlebar (5) & Longford (11))
$PM_{2.5}$	µg/m³	6 - 9	20	0
PAH benzo(a)pyrine	ng/m³	0.14	1	0

Other PAHs	µg/m^3	0.01 – 0.17	NA	NA
Benzene	µg/m^3	0.4	5	0
Lead	ng/m^3	2.3	500	0
Arsenic	ng/m^3	1.2	6	0
Cadmium	ng/m^3	0.2	5	0
Nickel	ng/m^3	0.7	20	0
Mercury	ng/m^3	1.49	NA	NA
Metal deposition (Lead)	µg/m^2/day	0.7	NA	NA
Metal deposition (Arsenic)	µg/m^2/day	0.2 – 0.7	NA	NA
Metal deposition (Cadmium)	µg/m^2/day	0.1	NA	NA
Metal deposition (Nickel)	µg/m^2/day	3.7 – 6.7	NA	NA

NA = not applicable

As noted in the results shown above, sourced from the Air Quality Report 2011, 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.

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

Harvesting and Stockpiling
During the site visit of the 26th June, 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. WHL 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.

Traffic Related Emissions to Air
The activity gives rise to peak levels of 8 – 14 truck movements per day during the January to June season when peat is transported off site. Up to 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, the impact of the operation on ambient air quality and nearby residential receptors is expected to continue to be insignificant.

4.6.7 Interaction with Other Environmental Attributes

The other environmental factors with which ambient air impacts 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 EIS.

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.

4.7.2 Study Assessment and Methodology

Various national and international documents on climate change were reviewed in order to compile this section.

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.

International and EU Climate Change Policy

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 2020 known as the "20-20-20" targets which set three key objectives for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.
- The targets were set by EU leaders in March 2007, when they committed Europe to become a highly energy-efficient, low carbon economy, and were enacted through the climate and energy package in 2009.

The EU is also offering to increase its emissions reduction to 30% by 2020 if other major economies in the developed and developing worlds commit to undertake their fair share of a global emissions reduction effort.

Situation in Ireland

Under the Kyoto Protocol, Ireland was required to limit total national greenhouse gas emissions to 314.2 Mtonnes of CO_2eq over the five year period 2008 – 2012 which is equivalent to 62.8 Mtonnes of CO_2eq per annum. The Kyoto Protocol limit was calculated as 13% above Ireland's 1990 baseline value which was established and fixed at 55.61 Mtonnes of CO_2eq following an in-depth review of Ireland's 2006

greenhouse gas inventory submission to the United Nations Framework Convention on Climate Change (UNFCCC).

According to the EPA's report and news release**Error! Bookmark not defined.** entitled '*Ireland's Greenhouse Gas Emissions Projections 2012-2030*', which was published on 25th April 2013, Ireland is on track to meet its commitment under the Kyoto Protocol. This is in marked contrast to the projection in Ireland's 2007 National Climate Change Strategy which forecast a total distance to target of 18 Mtonnes of CO_2eq.

The report goes on to state the following:

"Whilst the reduction in the distance to target for the Kyoto Protocol period is a positive outcome in terms of compliance, its occurrence is, primarily, a direct result of the current economic recession and economic outlook for the future. In order to meet future targets, Ireland cannot rely on a recession and needs to develop as a low carbon economy going forward.

There continues to be a significant risk that Ireland will not meet its 2020 EU targets even under the most ambitious emission reduction scenario. There is projected to be a cumulative distance to target of 7 – 24 Mtonnes for the period 2013-2020 with Ireland breaching its annual limits in 2015-2016. Strong projected growth in emissions from transport and agriculture are the key contributors to this trend."

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[55]. 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[56]. 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

[55] 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.

[56] Gorham, E. (1991) Northern peatlands: Role in the carbon cycle and probable responses to climate warming. *Ecological Applications*

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[57].

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 WHL'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[58] and store an estimated 1.2 billion tonnes of carbon based on the whole Island of Ireland[59,60]. 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 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[59]. 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)[61].

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 is 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[62].

[57] Lappalainen, E. (1996) Global Peat Resources. International Peat Society. Jyskä, Finland
[58] Hammond, R. F. (1979) Peatlands of Ireland, Soil Survey Bulletin
[59] Tomlinson, R.W. (2005) Soil carbon stocks and changes in the Republic of Ireland. Journal of Environmental Management 76:77–93;
[60] 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
[61] Irish Peatland Conservation Council (IPCC) website www.IPCC.ie
[62] 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

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)[63]

	CO_2-C	**CH_4-C**	**N_2O-N**
Location	**Tonnes ha^{-1} yr^{-1}**	**Tonnes ha^{-1} yr^{-1}**	**Tonnes ha^{-1} yr^{-1}**
Finland[64]	2.40	0.002	0.0002
Sweden[65]	0.55–2.73	0.003–0.034[a]	-
Canada[66]	3.98[b]	-	-
Canada[67]	0.88-3.97[b]	-	-
Canada[68]	3.02	0.014	-
Sweden[69]	2.73[c]	0-0.02	0-0.016
Finland[69]	3.16	0.004	0
Ireland[70]	1.9-3.5	-0.001	-
Finland[71]	1.89-11.18	0.054	
IPCC[72]	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).

[63] 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.

[64] 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.

[65] 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.

[66] Waddington J. M. & Warner K. D. 2001. Atmospheric CO2 sequestration in restored mined peatlands. *Ecoscience* 8(3): 359–68.

[67] 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.

[68] 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

[69] 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.

[70]Wilson D., Alm J., Riutta T., Laine J., Byrne K. A., Farrell E. P. & Tuittila E.-S. 2007a. A high resolution green 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.

[71] 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.

[72] 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.

Westmeath County Council Policies

The Westmeath Draft County Development Plan (2014-2020) and the Westmeath County Development Plan (2008-2014) have several policies and objectives relating to peatland and climate. These are listed overleaf in Table 4.7.4.

Table 4.7.4 Policies outlined in the Westmeath Draft County Development Plan (2014-2020) and the Westmeath County Development Plan (2008-2014) relating directly and indirectly climate.

Policy/ Objective Number	Westmeath Draft County Development Plan 2014-2020	Westmeath County Development Plan 2008-2014	Policy
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**.
P-IF16		✓	It is the policy of the Planning Authority to promote renewable forms of energy where it is consistent with the proper planning and sustainable development of an area.
P-IF17		✓	It is the policy of the Council to favour the use of renewable energy as a contribution to the energy demand of all new buildings.
P-IF18		✓	It is the policy of the Council to encourage the development of small-scale wind energy development and single turbines in urban and rural areas, including residential areas, and industrial parks, provided they do not negatively impact upon the environmental quality or residential amenity of the area.

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 WHLs activities however using the figures for Ireland shown in Table 4.7.2 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[62] is just 0.04-0.07% of this. In comparison, the green house gas emissions from Irish agriculture account for 34% of the national emissions.[73]

Overall the impact of WHL'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 WHL 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 (2008-2014) and Draft 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. WHL 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 IPPC Licences in general.

4.7.5 Existing and Proposed Mitigation Measures and/or Factors

WHL are members of the Growing Media Initiative[74] and are members of the Sustainable Growing Media Task Force.[75] 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 60% and is targeting 70% by end of 2013. The UK Government has targets for reduction of peat in horticultural products by 2020.

[73] Website of the Department of Agriculture, Food and the Marine http://www.agriculture.gov.ie/ruralenvironment/climatechangebioenergybiodiversity/agricultureclimatechange/
[74] The Growing Media Initiative http://www.growingmedia.co.uk/page.php?pageid=424
[75] The Sustainable Growing Media Task Force http://www.defra.gov.uk/peat-taskforce/

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 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, WHL 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 on-going 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 EIS.

4.7.8 Monitoring

See Section 4.7.5 on carbon auditing.

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.

4.8.2 Study Assessment and Methodology

The following study assessment methodology was undertaken by Dr. Maurice Hurley:

- 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. 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. 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 places 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.

The trackway is not a Recorded Monument and hence peat harvesting activities have continued in this area leading to on-going disturbance of the remains.

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 mounds 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.

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.

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. While a limited archaeological excavation has already been done (Attachment 8, Appendix 2), the archaeological monitoring and recording of the remaining elements of the trackway within the area subject to impact by peat harvesting is proposed (see Section 4.8.5, below).

4.8.5 Existing and Proposed Mitigation Measures and/or Factors

Mitigation Procedures for Archaeology
The existing peat harvesting activities of the bog at the Coole site, undoubtedly presents further opportunities for archaeological research in particular obtaining a range of dendrochronological dates from the oak timbers of the trackway. A dendrochronology dating programme may have the benefit of providing a more precise date for the construction of the trackway as the date range obtained from the radiocarbon dating is very broad (Attachment 8, Appendix 2, '1200-800bc'). Such a programme of sampling and dating undertaken in conjunction with archaeological monitoring of the existing peat harvesting activities in the vicinity is offered as acceptable mitigation if required.

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). Mitigation by archaeological monitoring of the existing peat harvesting activities in that area undertaken in conjunction with a programme of dendrochronology dating of timbers is suggested and will be undertaken if required. The monitoring archaeologist will also be alert to the possibility of stray finds occurring on or nearby the trackway.

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 EIS

4.9 Landscape and Visual

4.9.1 Introduction

This chapter of the EIS assesses the impact of the proposed project on the landscape and visual environment, including its associated landscape and visual planning context, its features, significance and sensitivity.

Brady Shipman Martin was commissioned by OES Consulting Ltd. to prepare this assessment.

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 EIS.

The findings and recommendations of other chapters of this EIS have also been considered in the preparation of this assessment. Particular liaison and consultation has taken place with the relevant EIS 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 draft landscape character assessment has been carried out for County Westmeath (See Section 2.5.5 of the County Development Plan, 2008 – 2014 page 90). This character assessment classifies the county into 11 character areas (see Figure 5 of the Plan, page 91) 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-EH32 discusses the future of cutaway peatland, stating:

> ***P-EH32*** *Within the next 20–30 years large areas of peatland will be exhausted and provide tracts of land that have potential for agriculture, habitat and amenity. The Council, in consultation with relevant agencies, will explore future potential of cut away peatlands that may offer 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 2.5.6 of the Plan, page 100) or Tree Preservation Orders on or adjoining the sites – See Figure 4.9.1.

Schedule 8.1.2 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 Road No. 18 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 adverse impact 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. 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 EIS.

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.

4.10.2 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.

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)	% Site Traffic
1	R394 at access to Clonsura site from R394.	38*	698	2.14
2	R396	NA	1349	NA
3	R395 at main access to Coole site	15	917	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 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.

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 from April through to September is insignificant.

The other time of significant activity is during the months of January through to June when stockpiled peat is loaded onto articulated trucks and transported north to Co. Tyrone for processing.

On average, 8 -14 trucks (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[76] pcus per day enter or exit onto the adjoining road network during loading operations.

WHL use contracted hauliers from the east, west and south 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 to Abbeylara and Granard and eventually travel via the N55 to Cavan.

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 and then onto the N55 towards Cavan.

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

[76] 1 truck = 2.3pcus

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.

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[77] 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 2005 - 2011

Location	Year	Classification	Time	Speed (kph)
R395 to west of site entrance	2007	Minor car collision. Unknown cause.	16.00 – 19.00	80
R394 north of junction with L57671	2005	Minor car with pedestrian collision.	07.00 -10.00	100
L1826	-	None	-	-

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 WHL 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, does not have a significant impact on existing traffic flows or on the surrounding road network.

[77] Road Safety Authority (RSA) www.RSA.ie

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.

4.10.8 Monitoring

Not applicable.

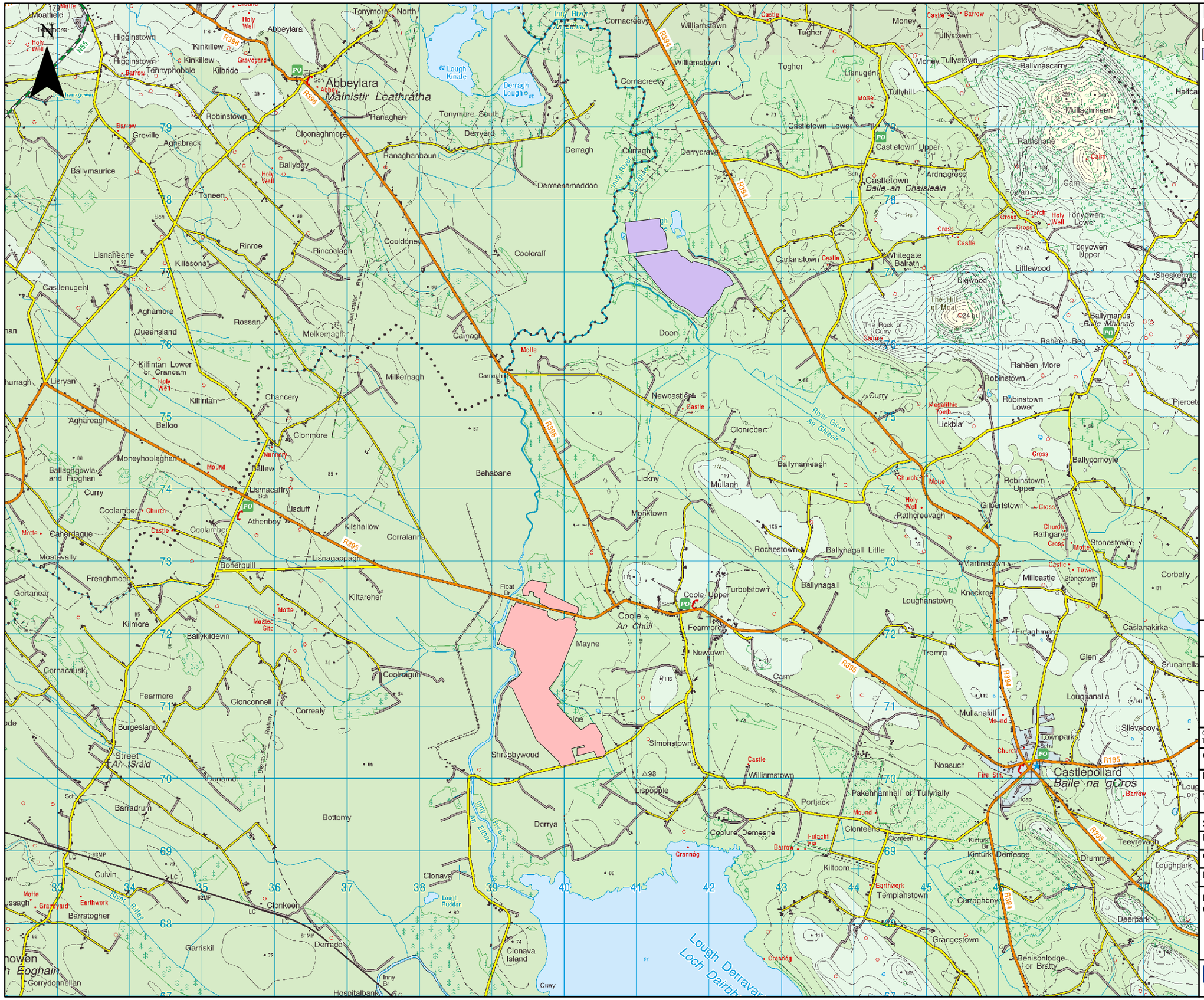
4.10.9 Reinstatement

Not applicable.

4.5.10 Difficulties Encountered in Compiling this Information

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

Attachment 1 - Figures



Legend

- Coole Harvesting Area
- Clonsura Harvesting Area

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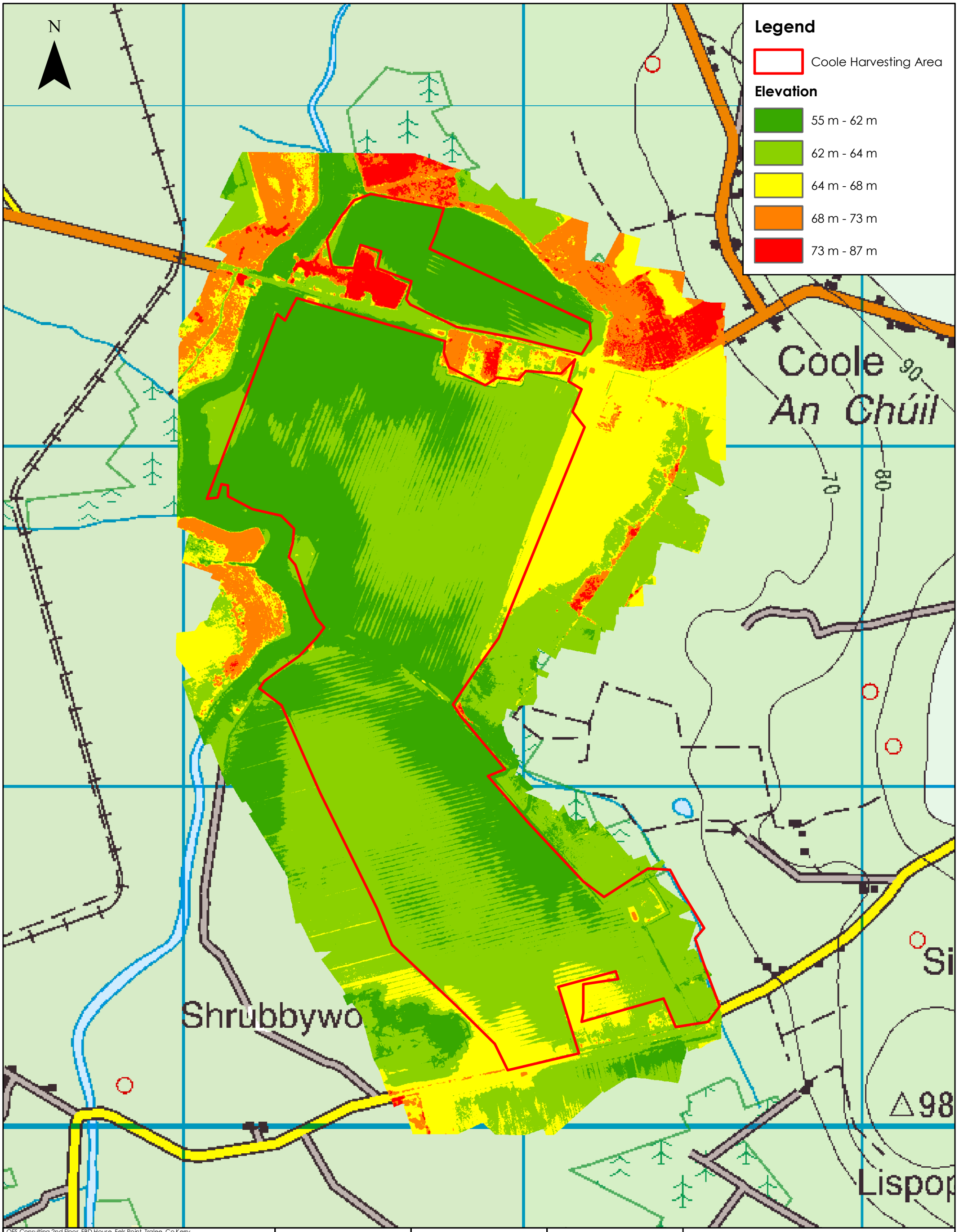
Client:	Westland Horticulture Ltd.	
Project:	Environmental Impact Statement	
Title:	Site Location Map	
Scale:		
Ref:	Figure 1.1	
OES Ref:	F_11820601_00	
Revision:	00	
Document Control:	Date:	22/07/2013
	Drawn By:	JK
	Checked By:	SM
	Approved By:	SM



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Client:	Westland Horticulture Ltd.
Project:	Environmental Impact Statement
Title:	Topographical Survey - Coole
Scale:	1:10,000 @ A3 Paper Size
Ref:	Figure 1.2
OES Ref:	F_11820602_00
Revision:	00

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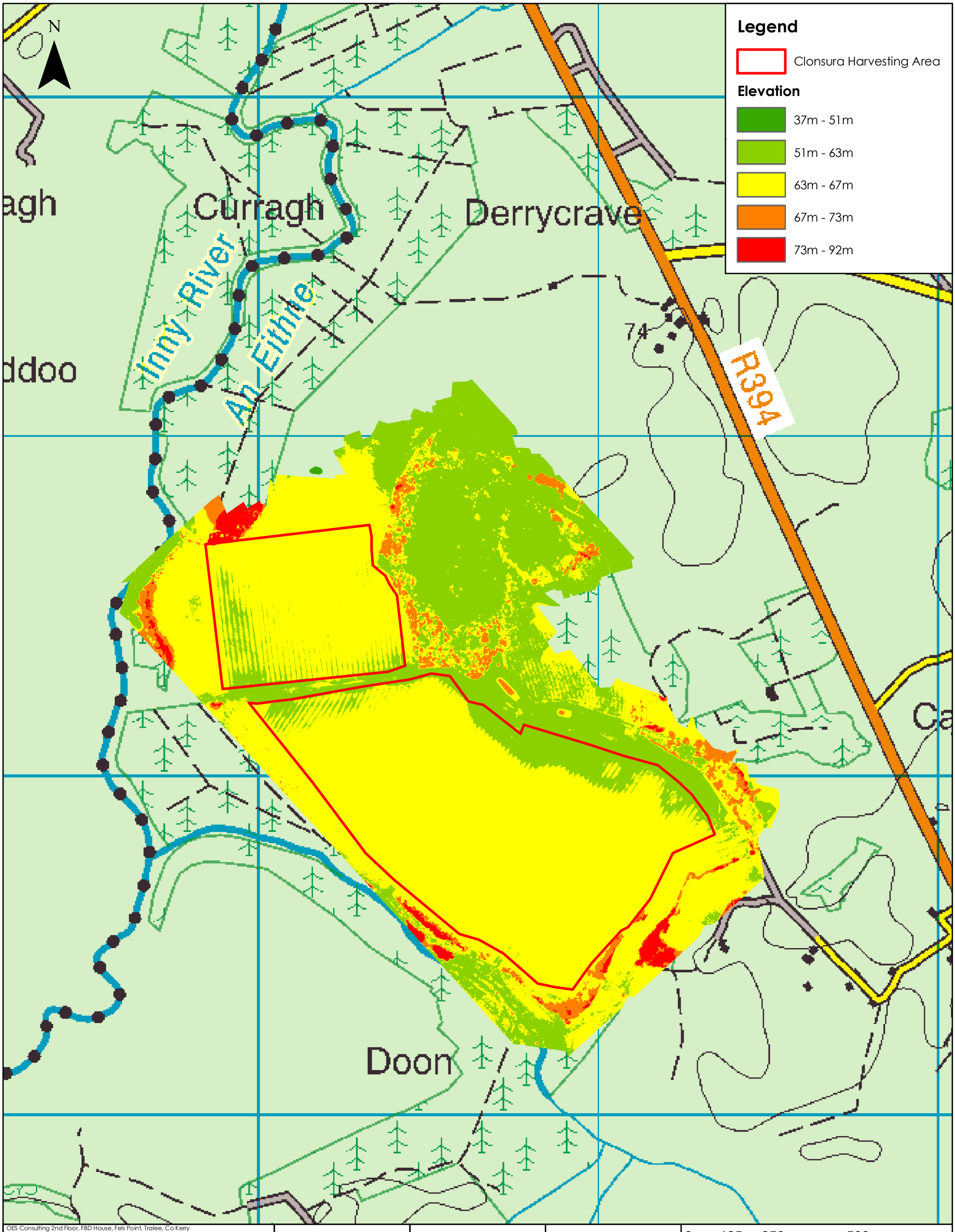

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Client:	Westland Horticulture Ltd.
Project:	Environmental Impact Statement
Title:	Topographical Survey - Clonsura
Scale:	1:10,000 @ A3 Paper Size
Ref:	Figure 1.3
OES Ref:	F_11820603_00
Revision:	00

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Stock Piles - Coole
Scale:	
Ref:	Figure 2.1
OES Ref:	F_11820604_00
Revision:	00

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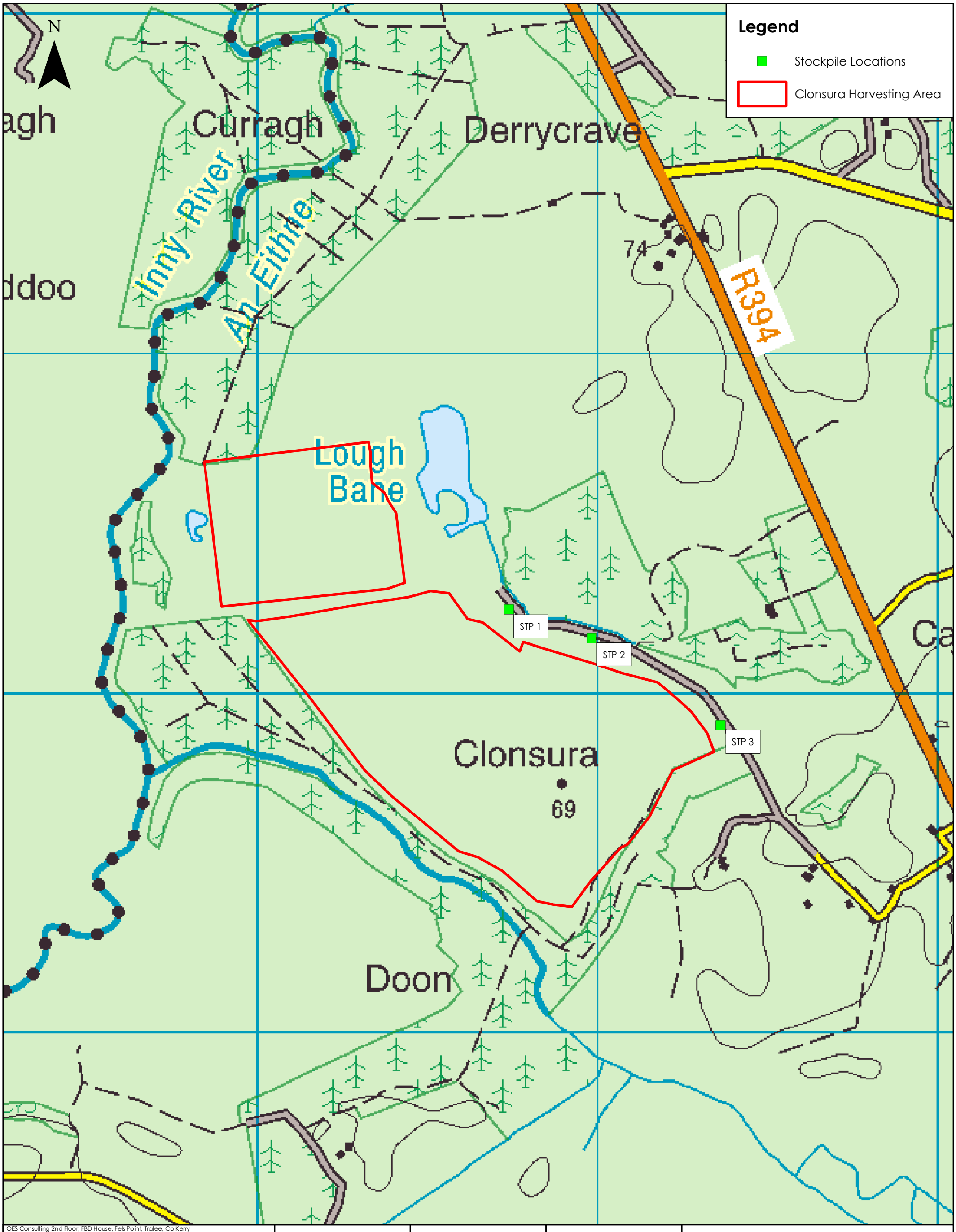

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Stock Piles - Clonsura
Scale:	
Ref:	Figure 2.2
OES Ref:	F_11820605_00
Revision:	00

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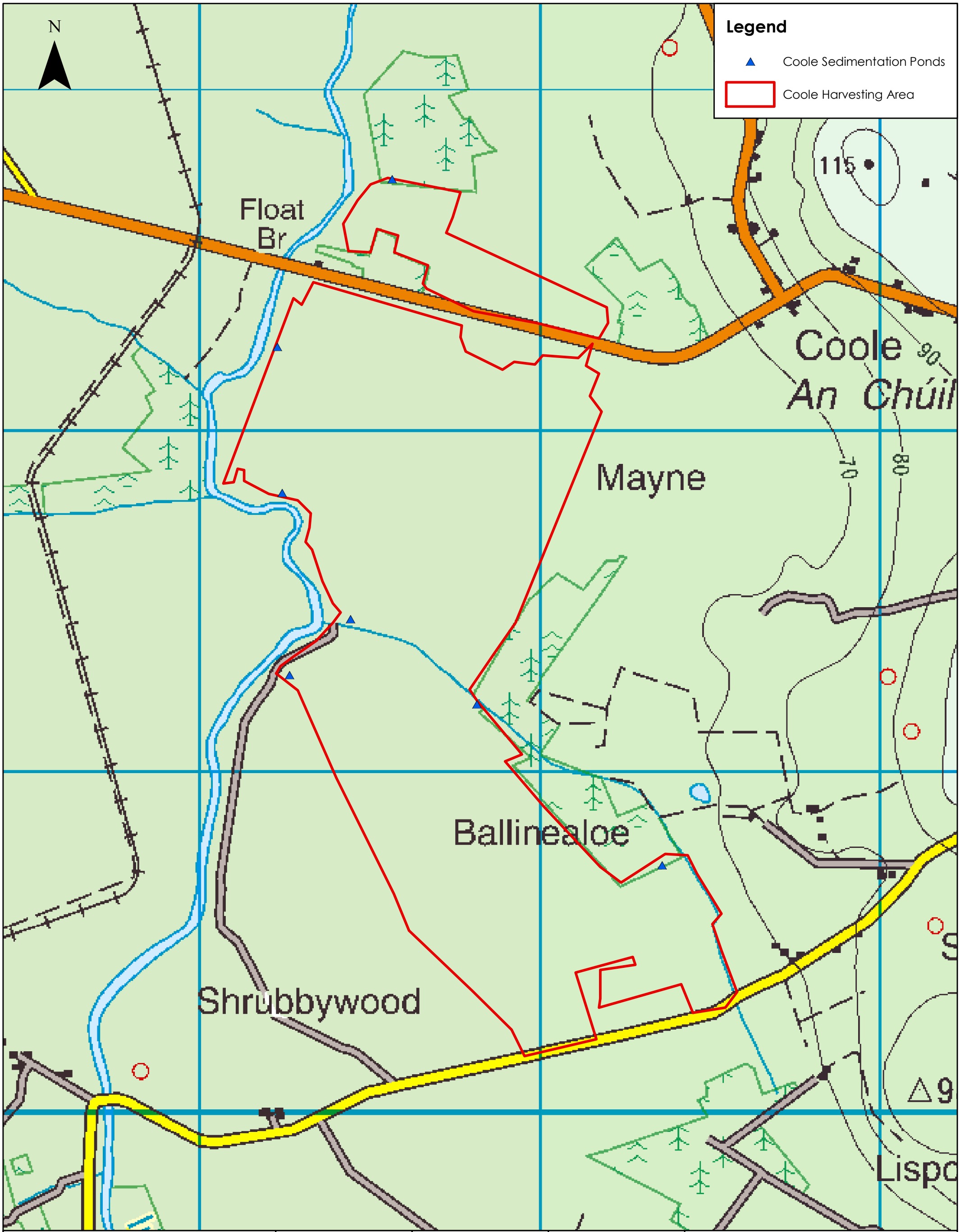

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Sedimentation Basins - Coole
Scale:	
Ref:	Figure 2.3
OES Ref:	F_11820606_00
Revision:	00

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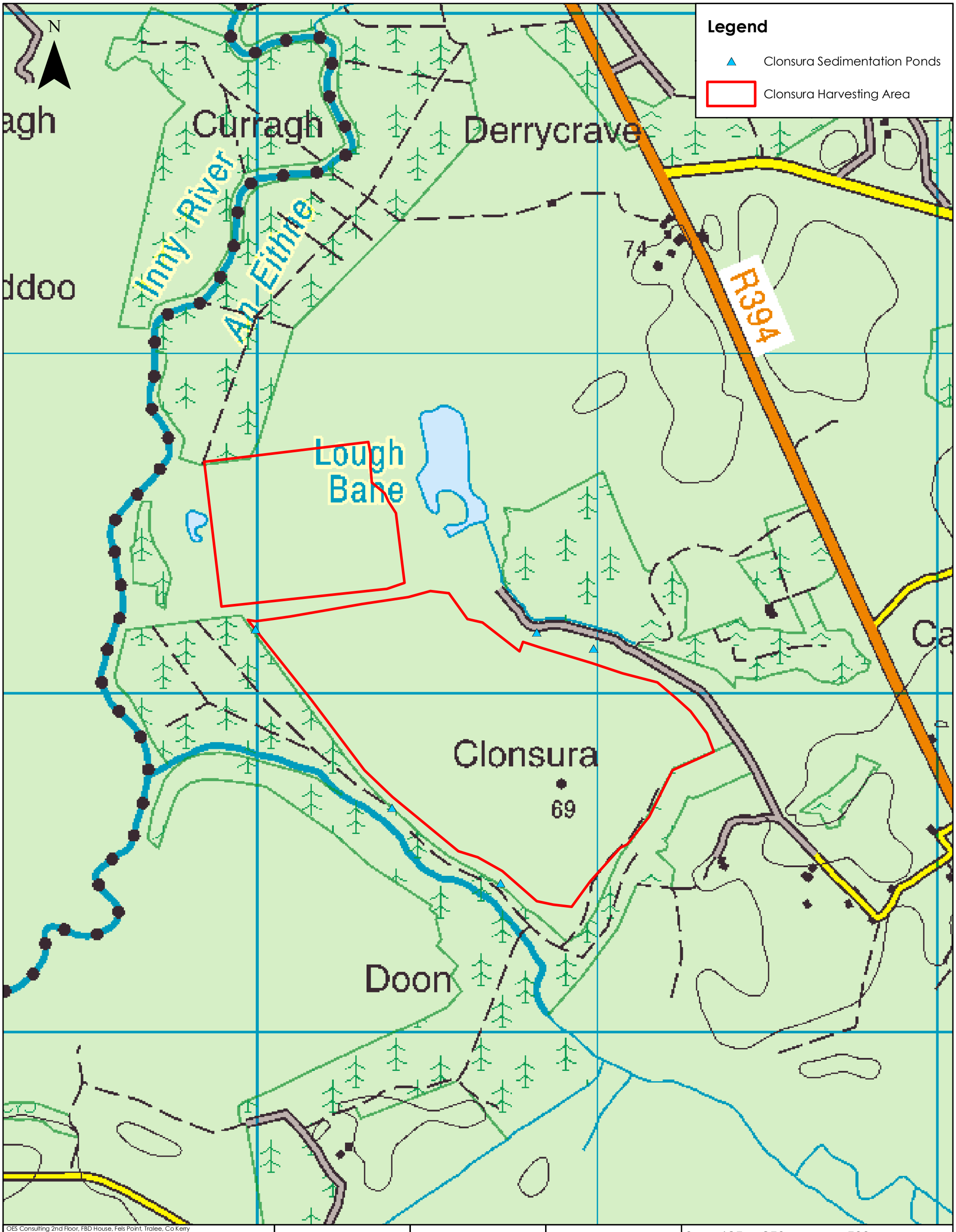

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Sedimentation Basins - Clonsura
Scale:	
Ref:	Figure 2.4
OES Ref:	F_11820607_00
Revision:	00

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Local Roads and Access Arrangements - Coole
Scale:	
Ref:	Figure 2.5
OES Ref:	F_11820608_00
Revision:	00

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Document Control:	Date:	26/07/2013
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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Local Roads and Access Arrangements-Clonsura
Scale:	
Ref:	Figure 2.6
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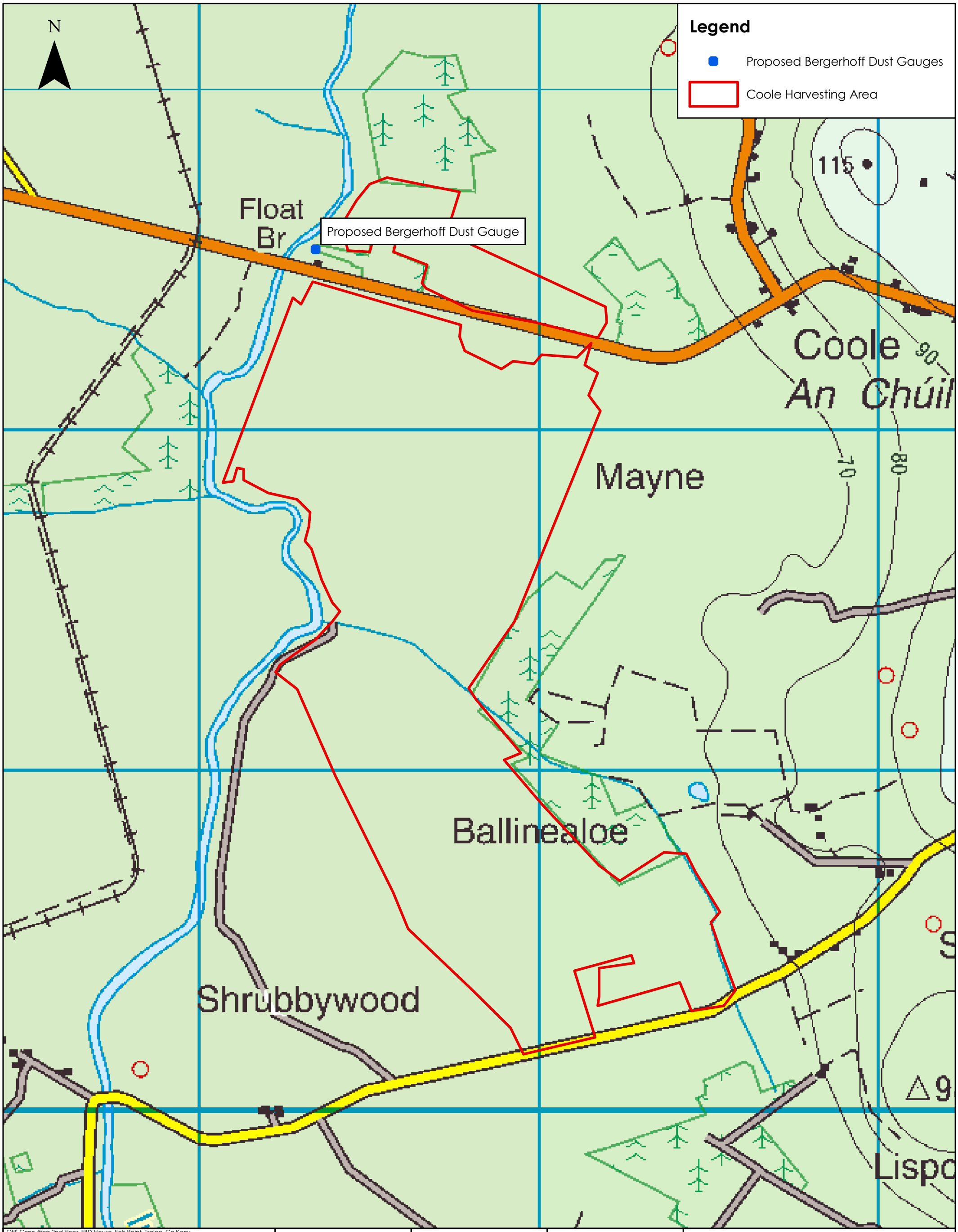

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Proposed Bergerhoff Dust Gauges - Coole
Scale:	
Ref:	Figure 2.7
OES Ref:	F_11820610_00
Revision:	00

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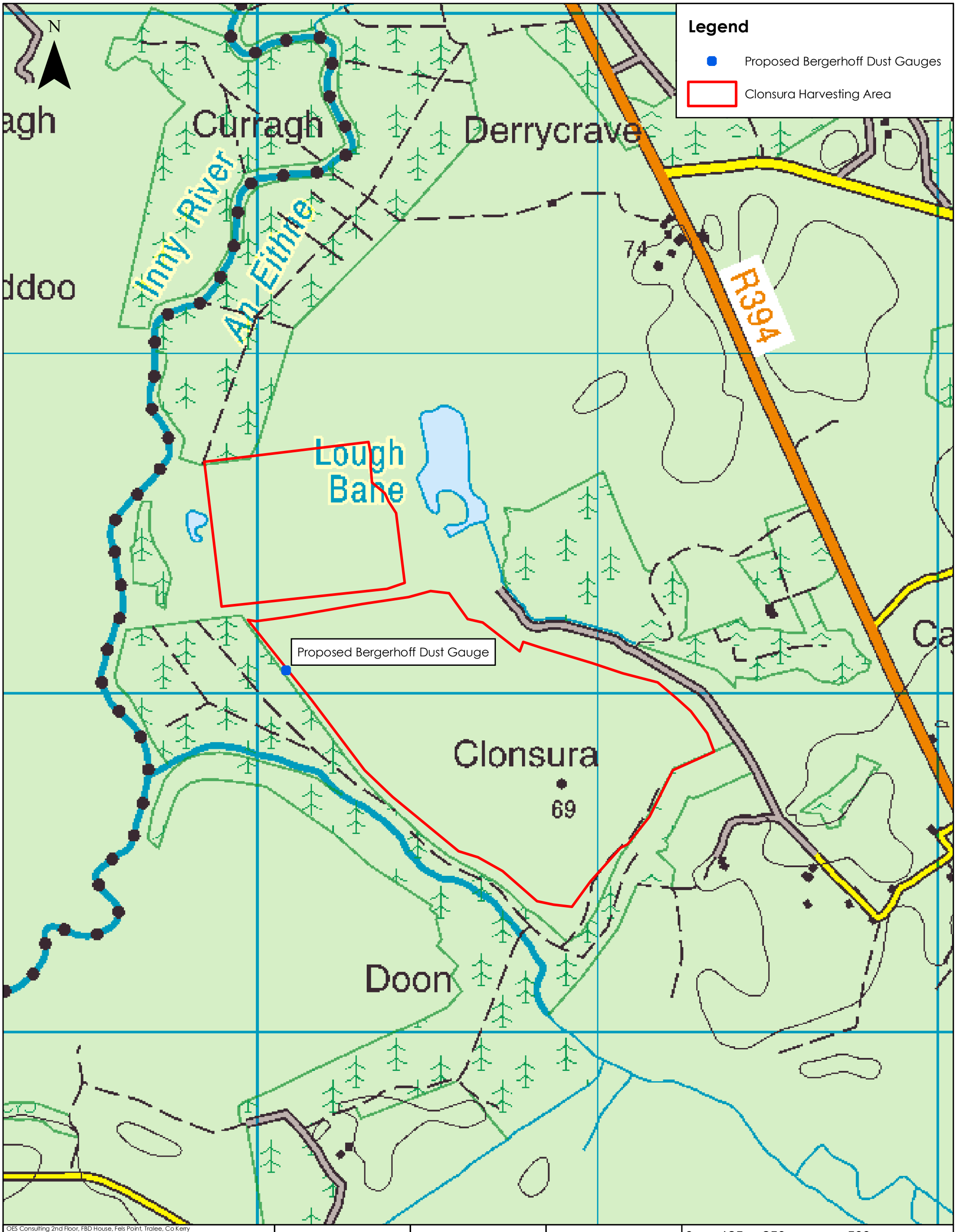

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Location of Proposed Bergerhoff Dust Gauges - Clonsura
Scale:	
Ref:	Figure 2.8
OES Ref:	F_11820611_00
Revision:	00

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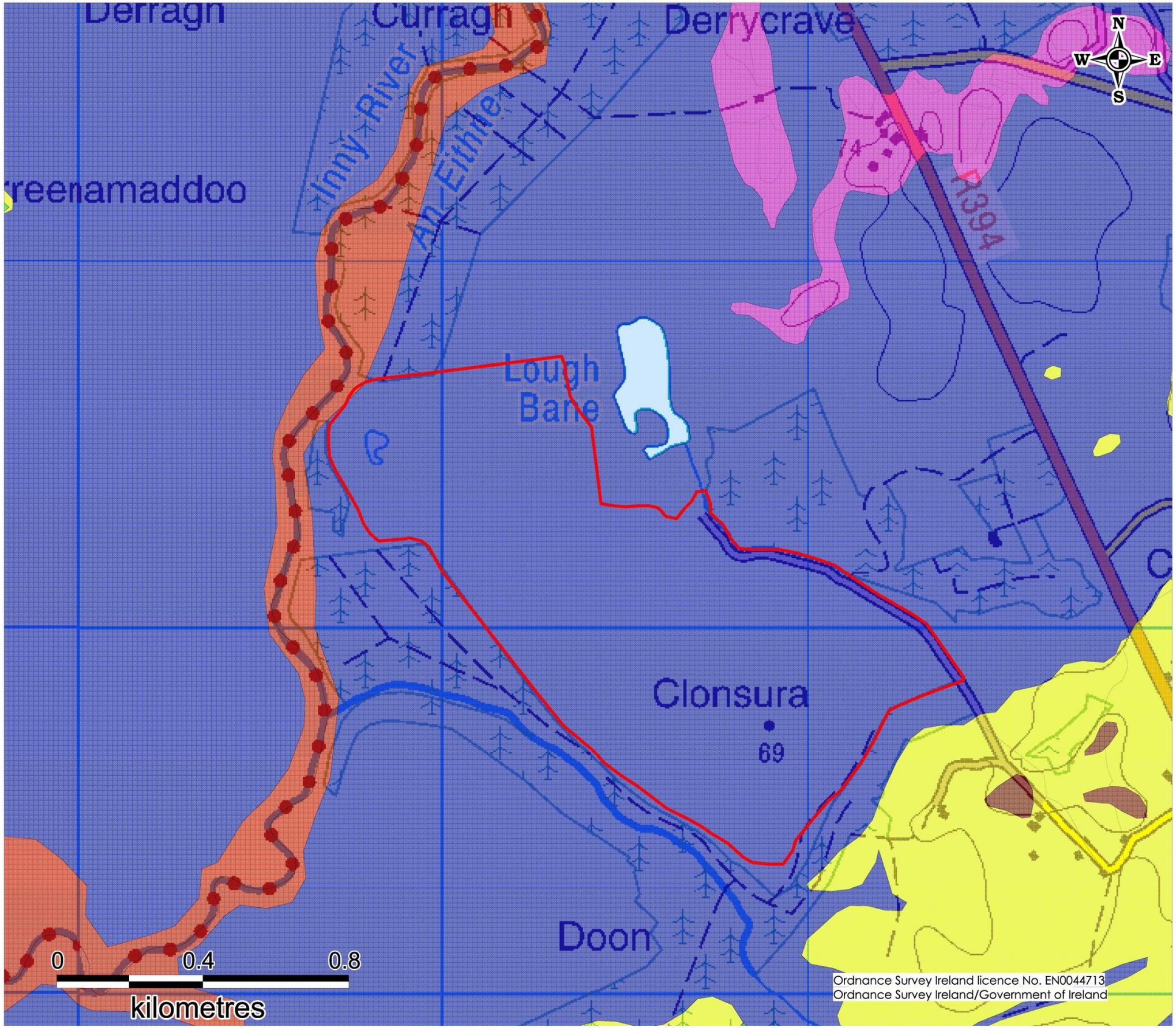

Legend

- Study Areas within the site
- Cutaway Peat
- Sandstone/Shale Gravels
- Limestone Gravels
- Alluvium
- Lake Sediments

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Clonsura Subsoils

Scale		
Ref.	Figure 4.4.1	
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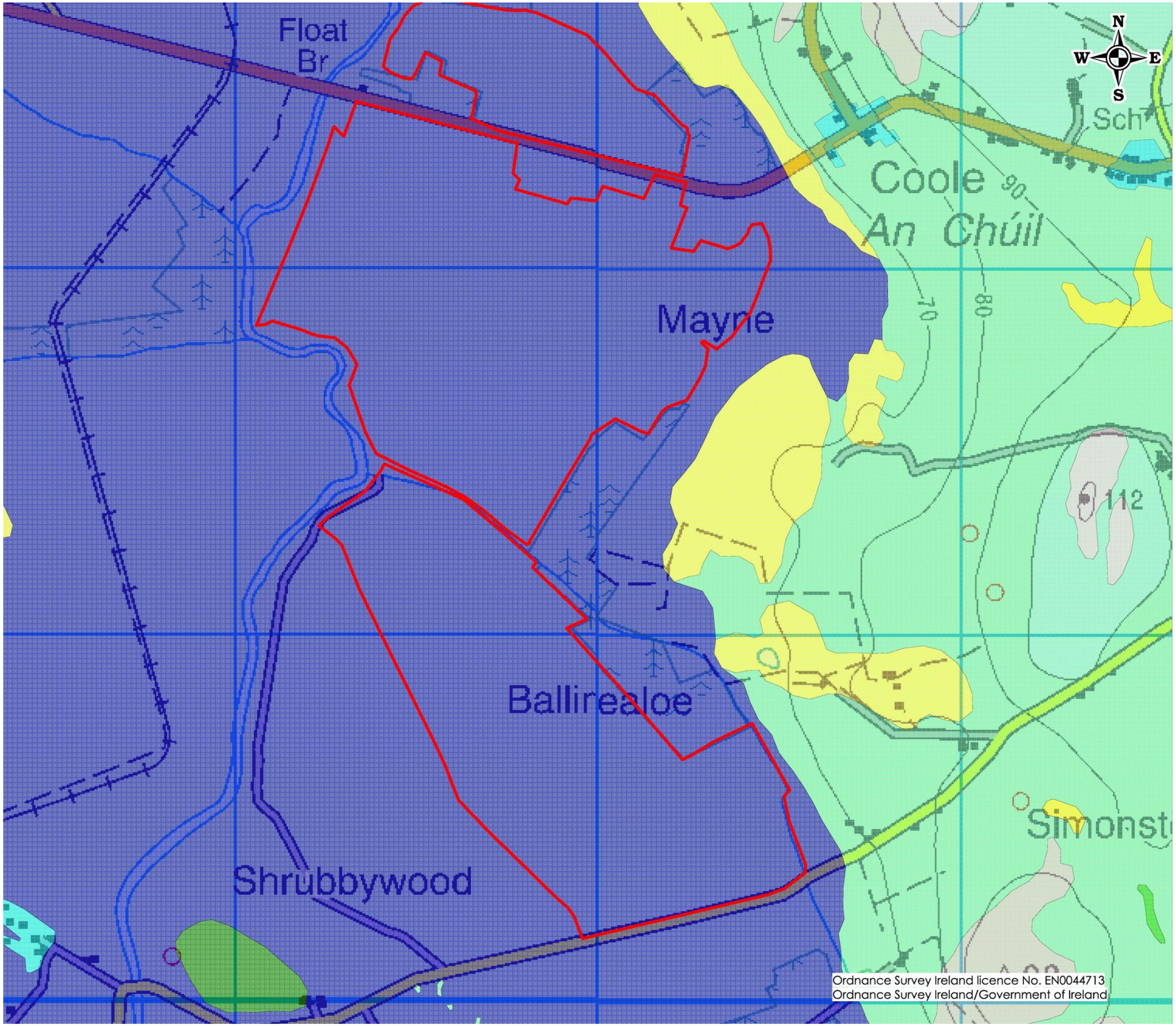

Legend

- Study Areas within the site
- Cutaway Peat
- Limestone Tills
- Limestone Gravels
- Chert Till
- Rock at Surface

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Coole Subsoils

Scale		
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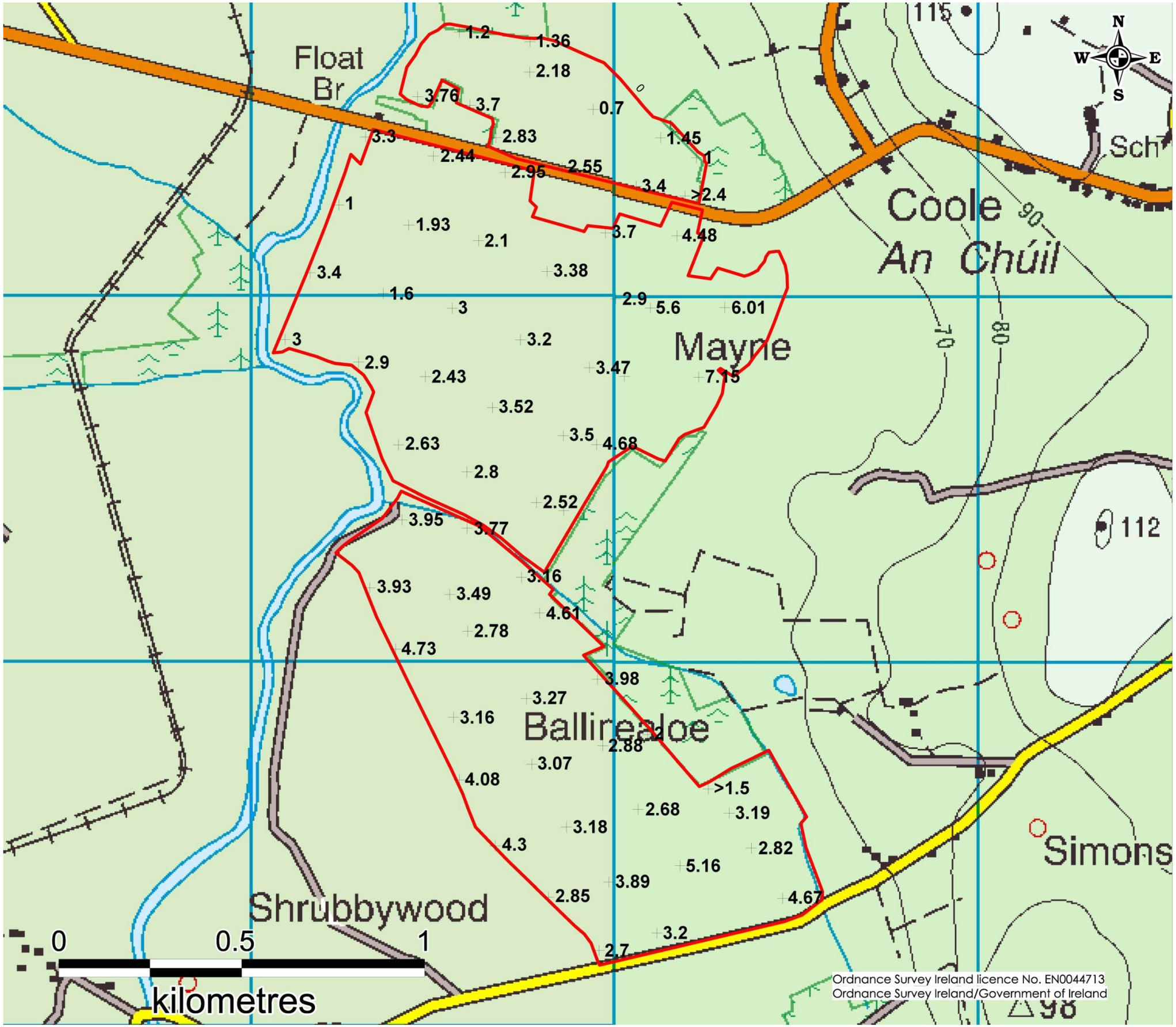

Legend

Study Areas within the site

Peat Depth (Metres)

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Coole Peat Depth Map

Scale	
Ref.	Figure 4.4.3
OES Ref.	F_11820614_00
Revision	00
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Legend

Study Areas within the site

Peat Depth (Metres)

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Clonsura Peat Depth Map

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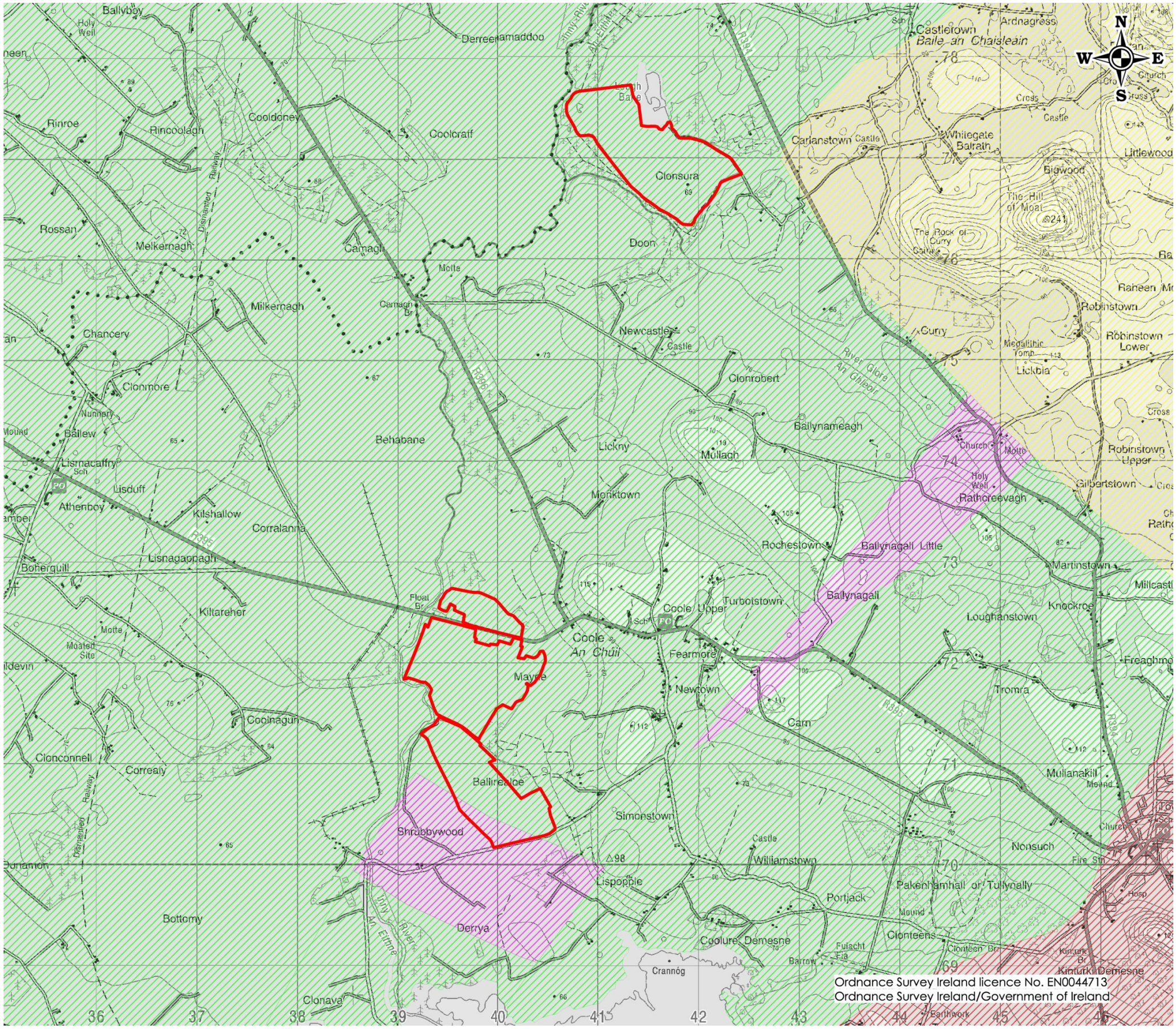

Legend

- Study Areas within the site
- Lucan Formation
- Mudbank Formation
- Visean Limestones
- Derravaragh Cherts

westland

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Regional Bedrock Geology Map

Scale		
Ref.	Figure 4.4.5	
OES Ref.	F_11820616_00	
Revision	00	
Document Control	By:	JK
	Chkd By	SM
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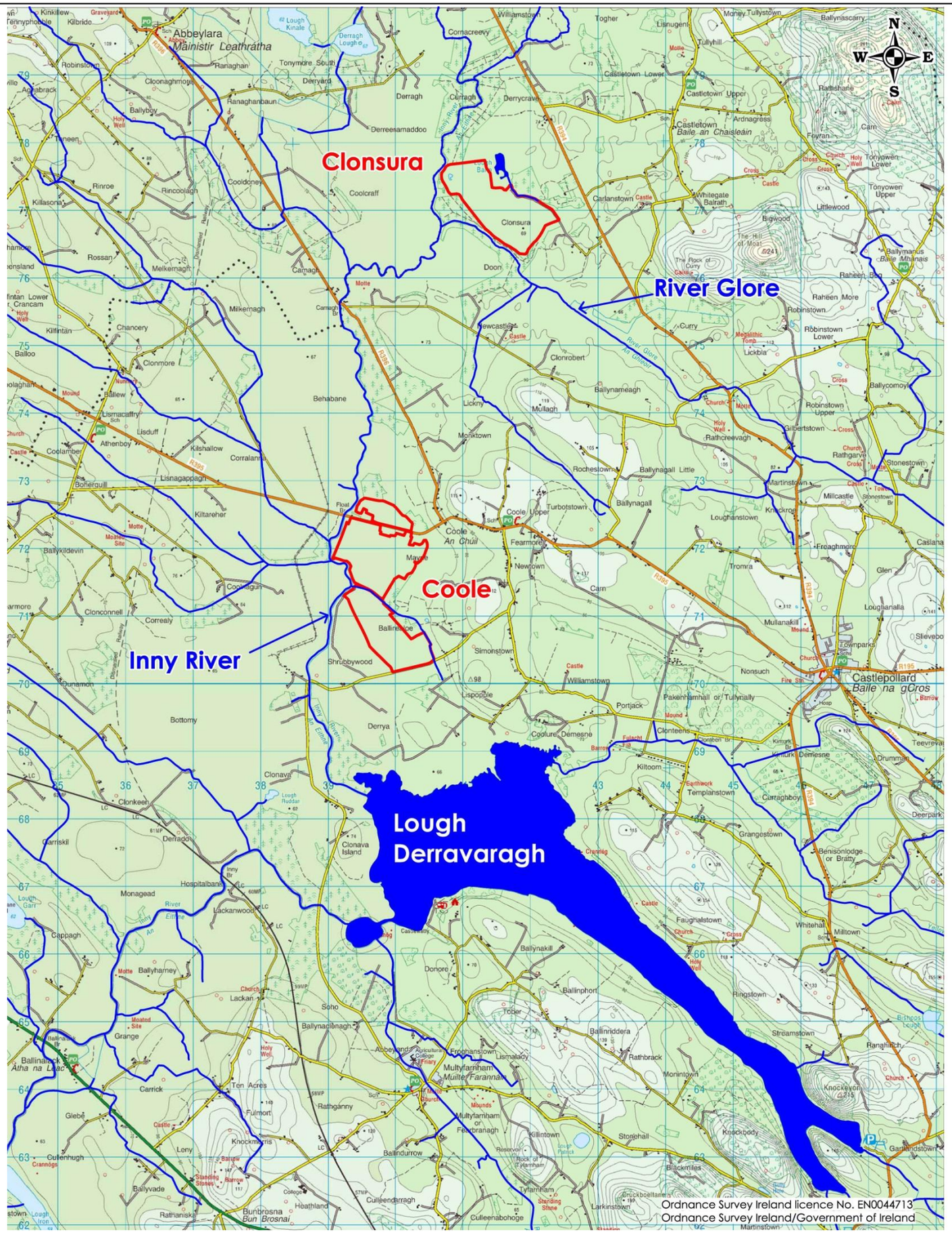

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Regional Hydrology Map

Scale	
Ref.	Figure 4.4.6
OES Ref.	F_11820617_00
Revision	00
Document Control	By: JK
	Chkd By SM
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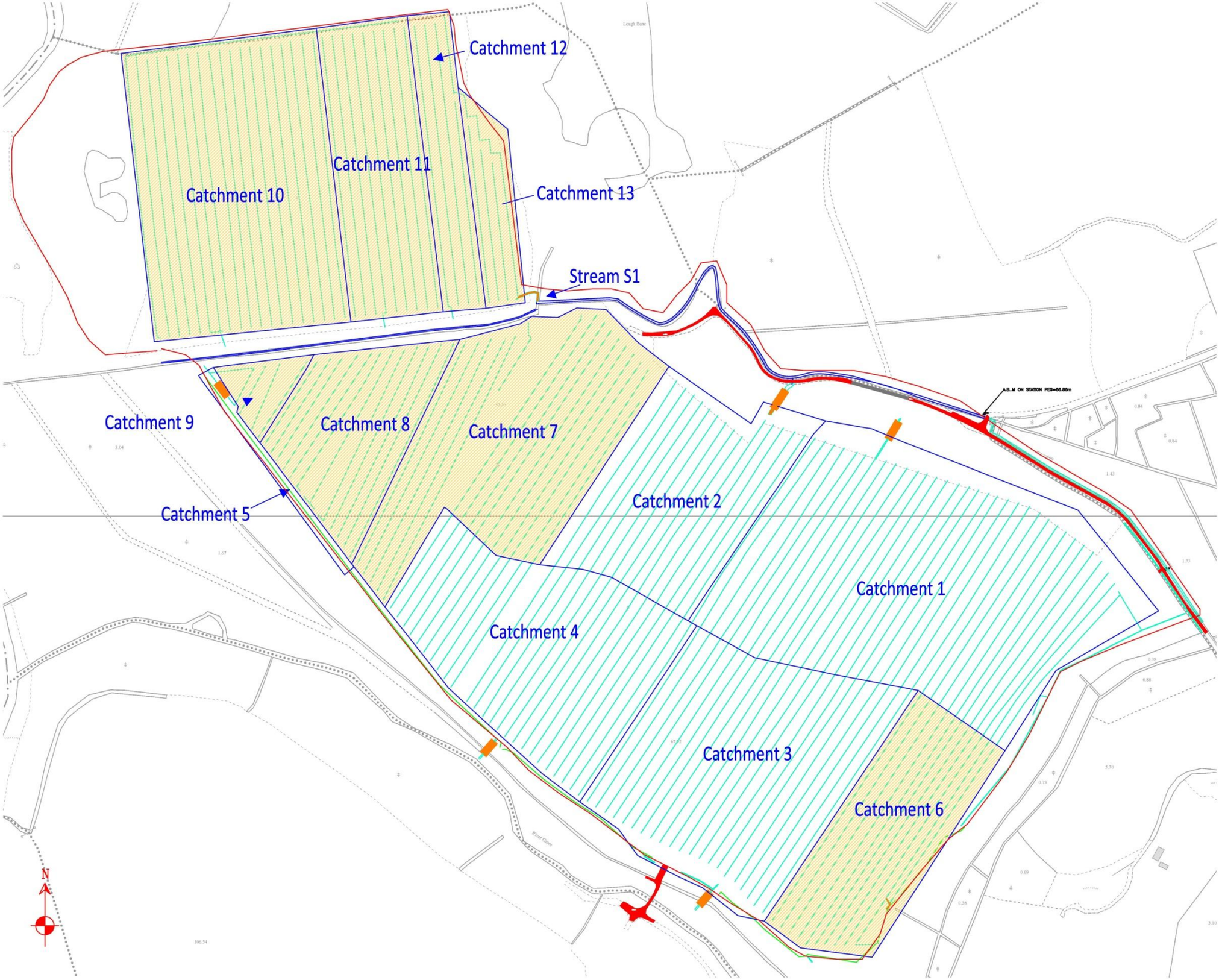

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Clonsura Drainage Mapping
Scale	
Ref.	Figure 4.4.7
OES Ref.	F_11820618_00
Revision	00
Document Control	By: JK
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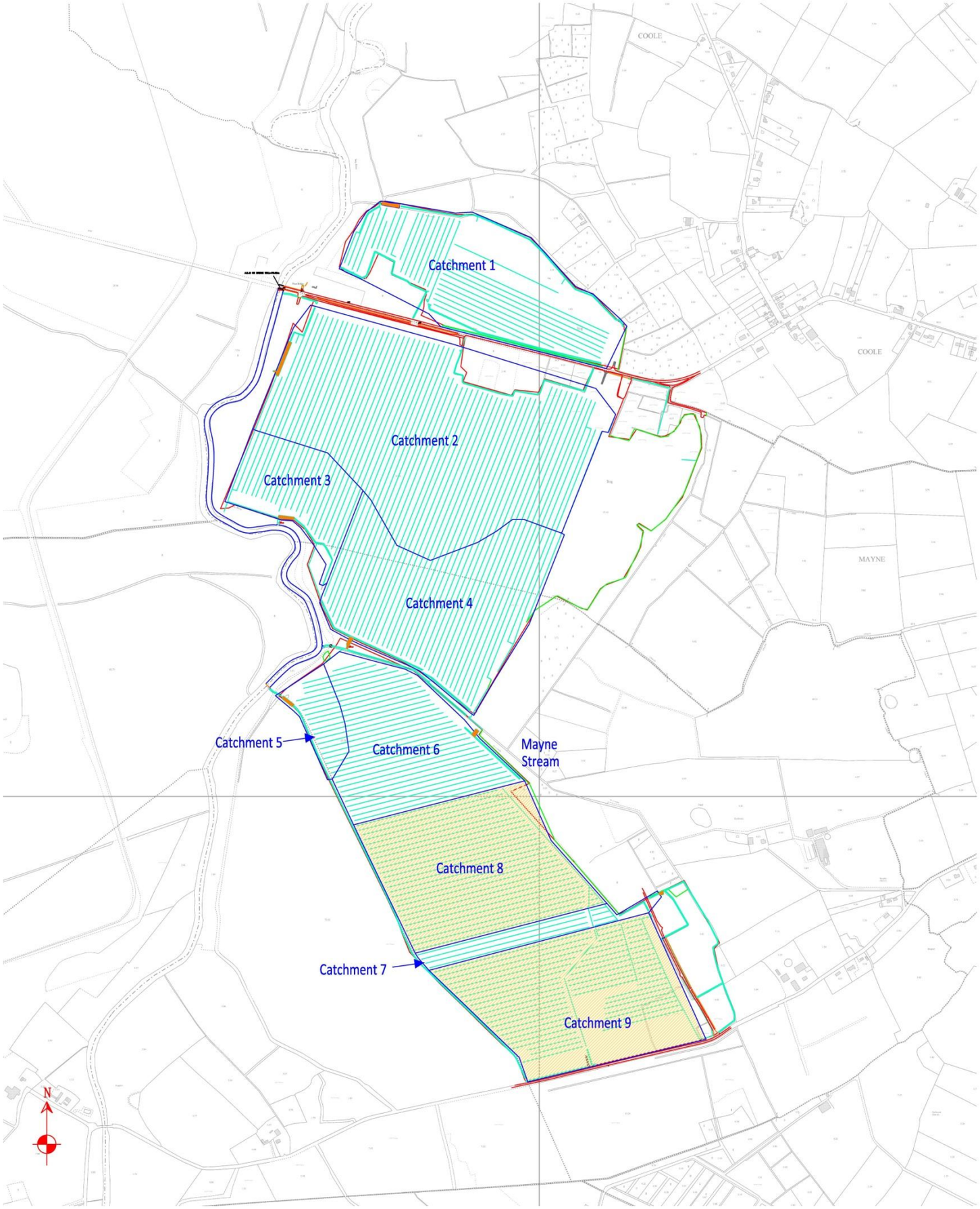
	App. By SM



westland garden health

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Title: Coole Drainage Mapping

Scale		
Ref.	Figure 4.4.8	
OES Ref.	F_11820619_00	
Revision	00	
Document Control	By:	JK
	Chkd By	SM
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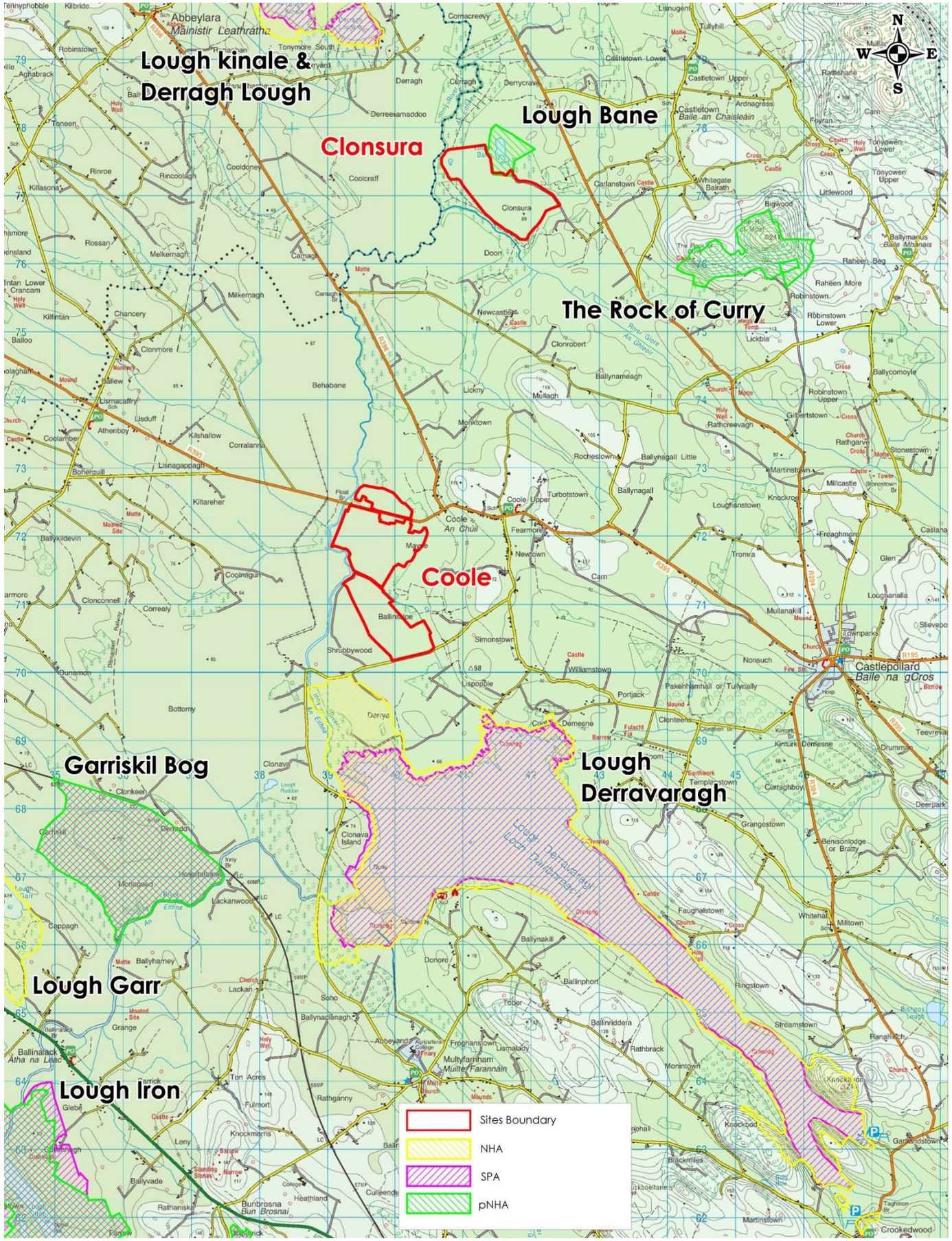

Legend

- Study Areas within the site
- NHA
- SPA
- pNHA

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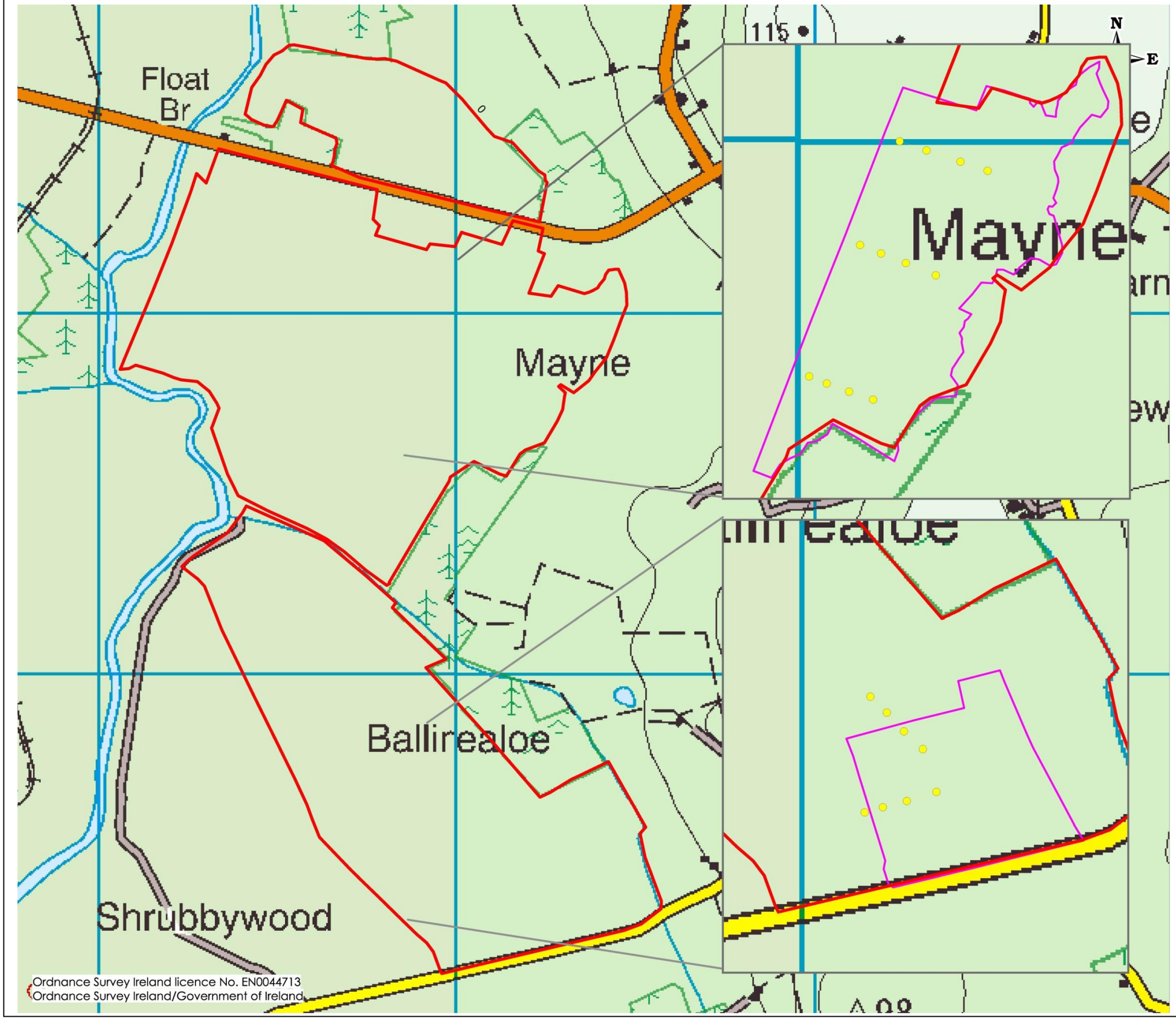
Project: EIS of Westland Peat Harvesting Operations

Title: Designated Site Map

Scale	
Ref.	Figure 4.4.9
OES Ref.	F_11820620_00
Revision	00
Document Control	By: JK
	Chkd By SM
	App. By SM



Legend

- Study Areas within the site
- Remnant Raised Bog
- Piezometer Transect

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Proposed Hydrological Monitoring - Coole

Scale		
Ref.	Figure 4.4.10	
OES Ref.	F_11820621_00	
Revision	00	
Document Control	By:	JK
	Chkd By	SM
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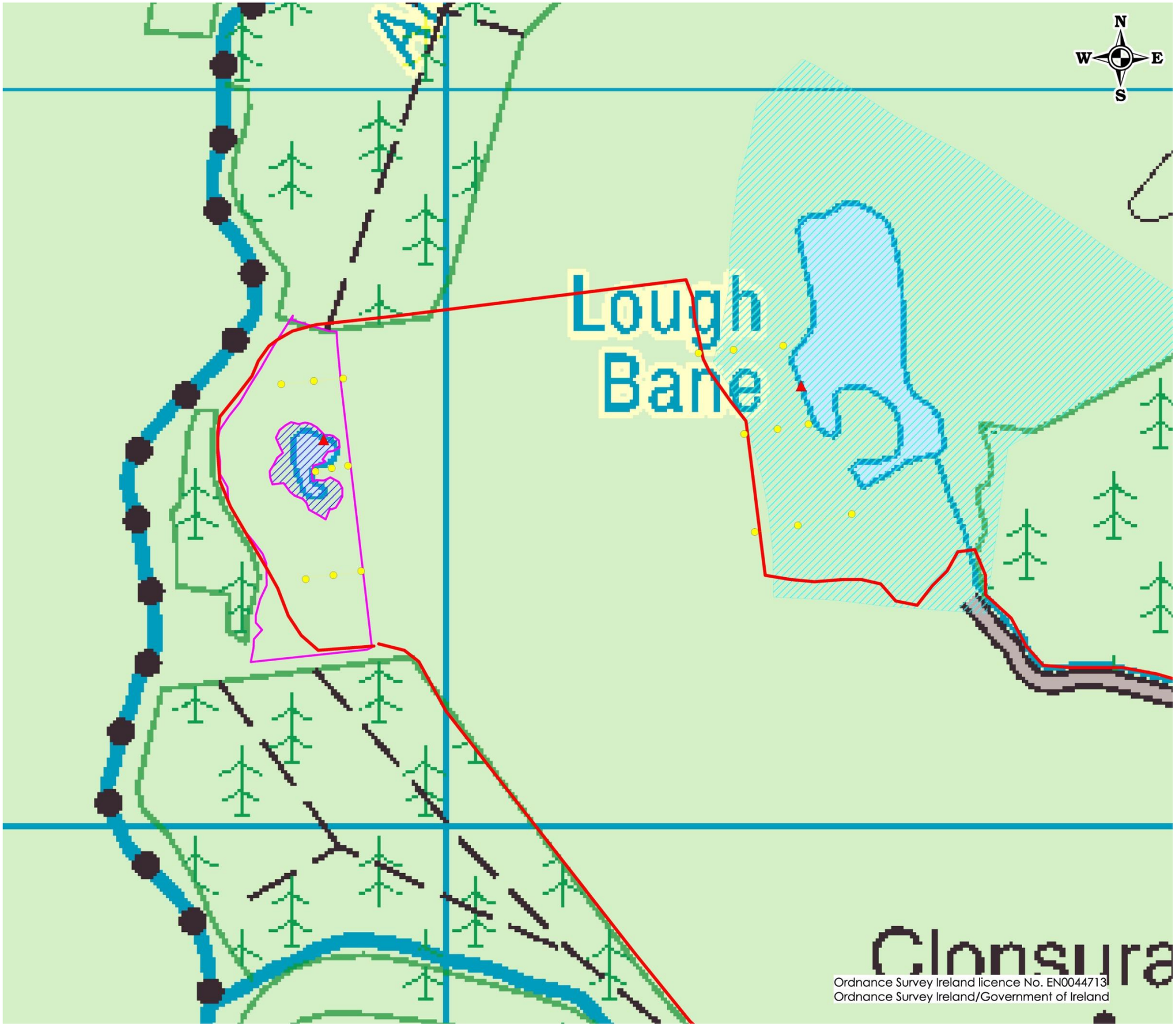

Legend

- Study Areas within the site
- Remnant Raised Bog
- Lough Bane pNHA
- Dystrophic Lake
- Piezometer Transect
- Staff Gauge

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Title: Proposed Hydrological Monitoring - Clonsura

Scale		
Ref.	Figure 4.4.11	
OES Ref.	F_11820622_00	
Revision	00	
Document Control	By:	JK
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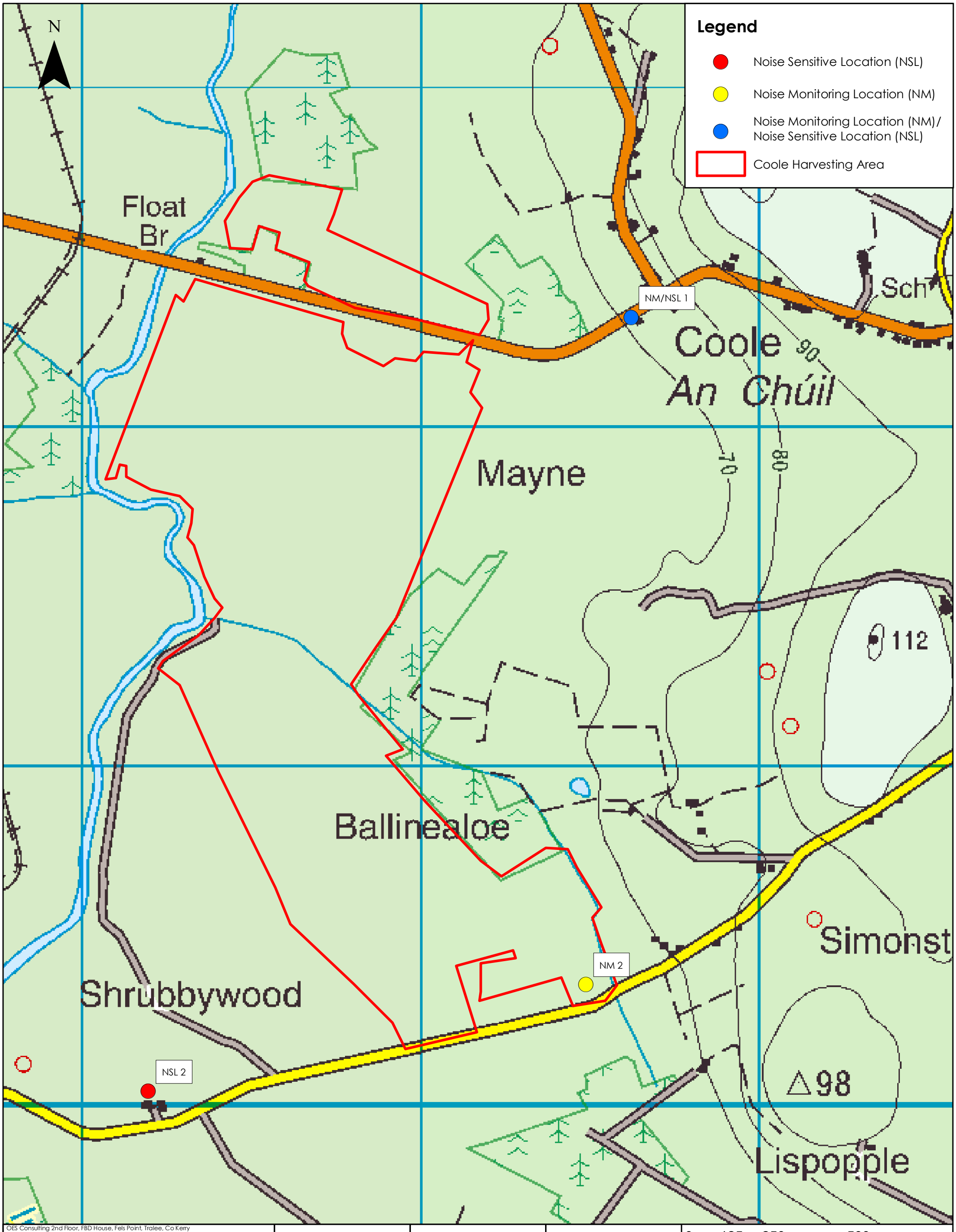

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Noise Monitoring Locations and NSLs - Coole
Scale:	
Ref:	Figure 4.5.1
OES Ref:	F_11820623_00
Revision:	00

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Document Control:	Date:	26/07/2013
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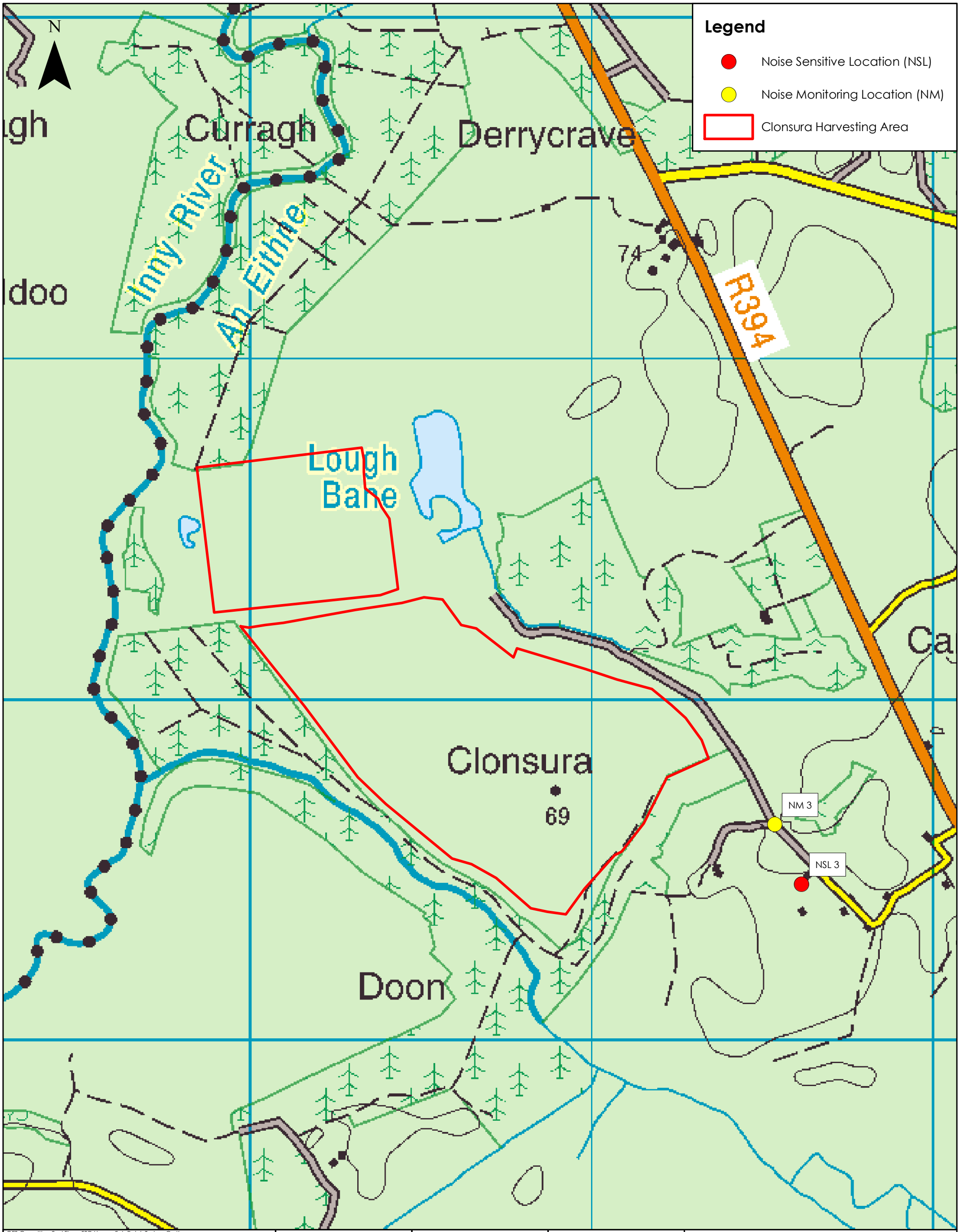

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Client:	Westland Horticulture Ltd.
Project:	EIS of Westland Peat Harvesting Operations
Title:	Noise Monitoring Locations and NSLs - Clonsura
Scale:	
Ref:	Figure 4.5.2
OES Ref:	F_11820624_00
Revision:	00

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Project:	Environmental Impact Statement
Title:	Location of Togher
Scale:	
Ref:	Figure 4.8.1
OES Ref:	F_11820625_00
Revision:	00

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County Development Plan 2008-2014
Countywide Designations

- High Amenity Areas
- Natural Heritage Areas
- Special Protection Areas
- Special Area of Conservation
- Zones of Archeological Potential
- Special Heritage Area
- Views to be Preserved or Improved
- National Monument in State Care
- Tree Preservation Orders
- Town/Village
- National Primary Route
- National Secondary Route
- Regional Route
- River
- County Boundary
- Railway
- Gas Pipeline
- Mullingar — Identified Towns and Priority Settlements

N

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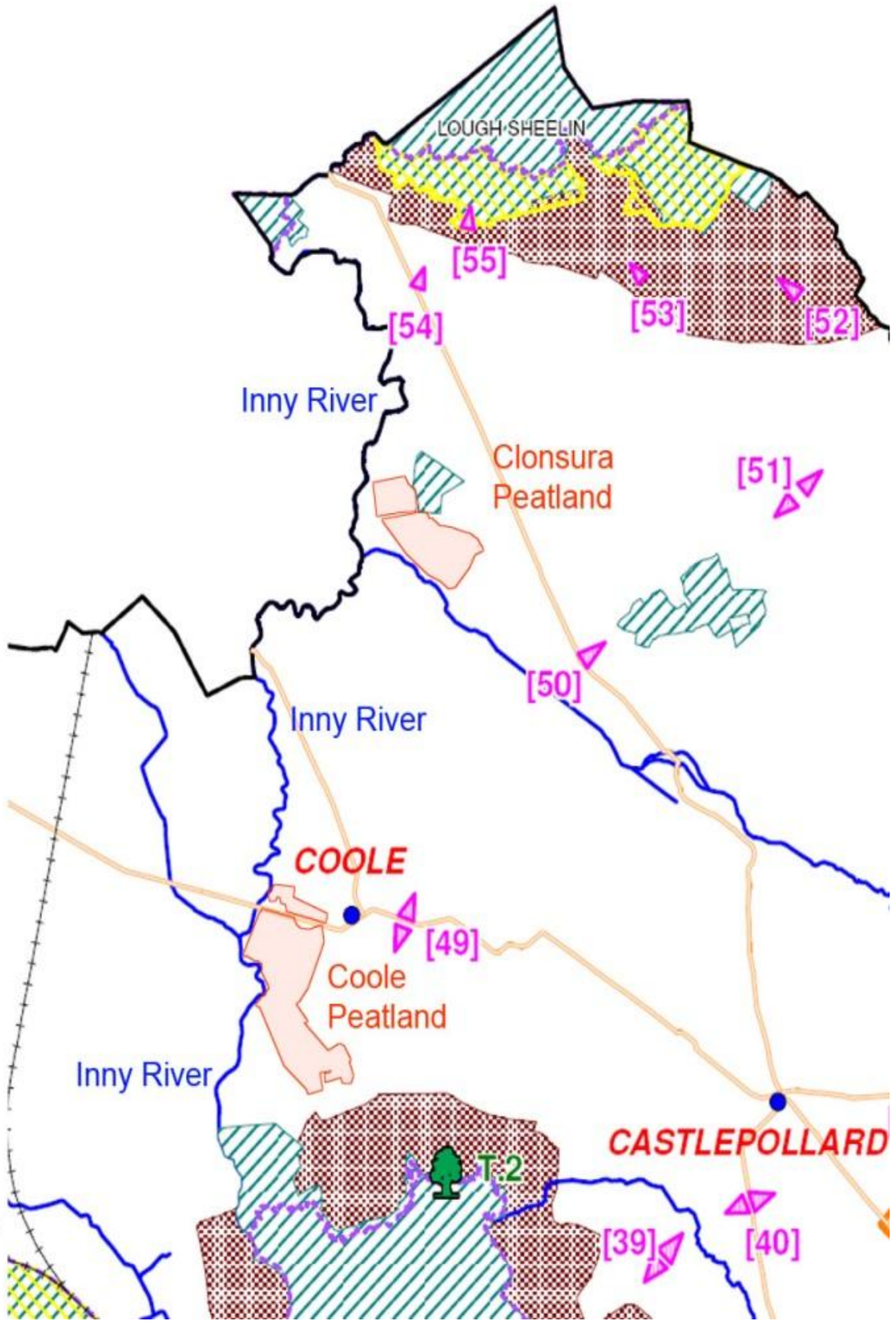

Map Ref Section: 8.3.4

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Client: Westland Horticulture Ltd.

Project: EIS of Westland Peat Harvesting Operations

Title: Extract from Westmeath County Development Plan: Countywide Designations (Ref 8.3.4)

Scale	
Ref.	Figure 4.9.1
OES Ref.	F_11820626_00
Revision	00
Document Control	By: JK
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Attachment 2 - Plates

Plate 1.1 Aerial Photograph of Coole and Surrounding Area

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Project
Environmental Impact Statement of Peat Harvesting Operations

Title
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Plate 1.2 Aerial Photograph of Clonsura and Surrounding Area

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Plate 2.1 Milling/Harrowing

Plate 2.2 Ridging

Plate 2.3 Collection

Plate 2.4 Stockpiling

Legend

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Plate 2.5 Access road through Clonsura site

Plate 2.6 Access area at Coole

Plate 2.7 Access area at Clonsura

Plate 2.8 Sedimentation basin at Clonsura

Legend

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Plate 2.9 Sedimentation basin at Clonsura

Plate 2.10 Weir located at sedimentation basin at Coole

Legend

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Plate 4.6.1 Localised dust generation during harrowing

Plate 4.9.1 View over Coole Peatland from higher ground at Coole

Plate 4.9.2 View west of peat stockpiles along R395 at Coole Peatland

Plate 4.9.3 View east over Coole Peatland from alongside R395

Legend

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Plate 4.9.4 View south over Coole Peatland from R395

Plate 4.9.5 View south from R395 (Float Bridge) along Inny River Corridor

Plate 4.9.6 View of other peat operators Workings located west of Inny River

Plate 4.9.7 View of Clonsura Peatland

Legend

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Revision	CCC	
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Plate 4.9.8 View of Clonsura Peatland

Plate 4.9.9 View of peat stockpiling at Clonsura Peatland

Legend

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Plate 4.10.1 Main entrance road into Coole site, looking east

Plate 4.10.2 Main entrance road into Coole site, looking west

Plate 4.10.3 Entrance road into Clonsura site

Plate 4.10.4 Access Point 1

Legend

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Plate 4.10.5 Access Point 2

Plate 4.10.6 Access Point 4

Plate 4.10.7 Access Point 5

Legend

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