

11.3 Description of Existing Environment

11.3.1 Habitats Vegetation and Flora

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The site comprises four agricultural fields: one large field unit on entering from the public roadway, with a slope downwards with a northerly aspect to the remaining three. Access to all is through this first and largest field unit. The long axis of the site area as a whole is perpendicular to the public roadway.

All fields are in grassland which has not been intensively grazed in recent times. A distinction between improved agricultural grassland and wet grassland can be made. Hedgerows and/or tree-lines form the field boundaries, though most of these have not been managed and are not stock-proof. Shallow drainage ditches accompany some of the field boundaries but not all contained water at the time of the survey.

The area of the site does not include any natural or semi natural habitats such as woodland, true marsh, or surface water bodies. The habitat components of main ecological interest are the hedgerow/tree-line field boundaries.

The vegetation types and habitats recorded are described below. An ecological resource map is shown (Figure 11.3) and is referred to throughout this ecological report.

1) Grassland

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With poultry and mushroom production being the dominant farming activities in the region and only low intensity grazing for beef production, grassland is the dominant vegetation type in terms of land cover. The extent of the grassland habitat type and the divisions within it were defined and are indicated on the ecological resource map. Note: the transition from improved agricultural grassland to wet grassland occurs along a gradient and therefore there is an overlap rather than a discrete interface between boundaries. The midline of these overlaps was taken to be the actual boundary between grassland types.

Quadrat surveys of terrestrial flora were conducted in accordance with standard ecological random sampling procedures in order to quantitatively and qualitatively assess the floral communities of both subdivisions in this habitat type. A scaled grid of 1m² squares was superimposed over the map of the site and each square was numbered. The squares to be sampled were identified by using random number tables. These were clearly marked on the map and located in the field by measuring from obvious landmarks.

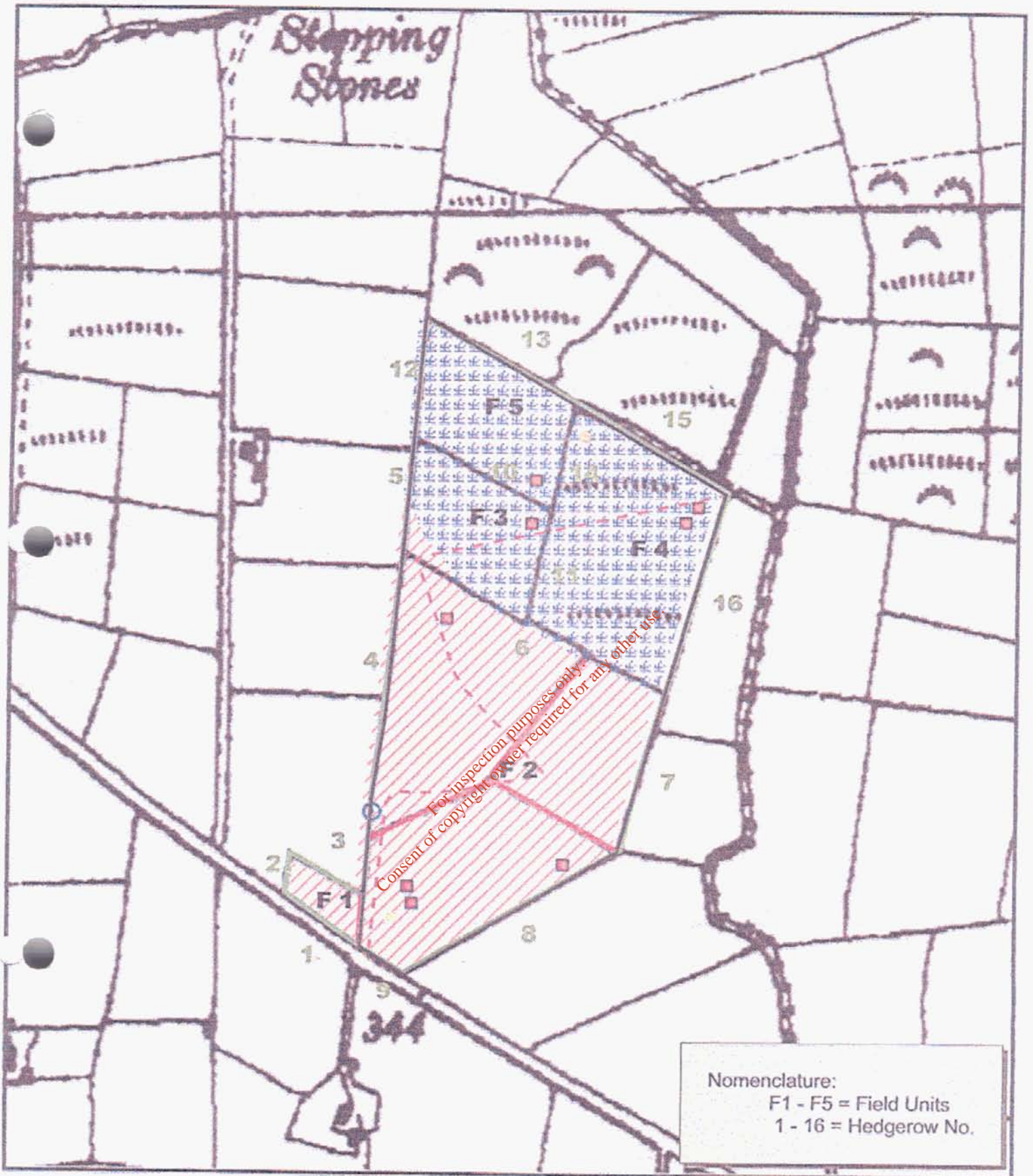


Figure 11.3: Ecological Resource Map

- Boundary of Biomass CHP Plant
- Animal burrow
- Additional historical field boundaries
- Existing field boundaries
- Quadrat locations
- Highest point
- Lowest point
- Route for pollard walk survey of butterfly species
- Improved agricultural grassland
- Wet grassland



Project: CHP Biomass Plant
Client: Renewtech Ltd.
Date: December 2001
Prepared by: KO'D
Approved by: CH/SH/DW

0 0.05 0.1 0.15 Kilometers



South Western Environmental Services

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The relative abundances of all species recorded were expressed using the Braun Blanquet Cover Abundance Scale, as shown in appendix 11.1 of this report.

The following assessments were made of the floral communities occurring in the two subdivisions of the grassland habitat type.

i) Improved agricultural grassland

Improved agricultural grassland is the dominant habitat type at the site, occurring in the largest field with a gradation to wet grassland in other fields. It occurs on the higher more freely draining ground within the site and the surrounding area. This habitat type occupies fields F1 and F2 with a gradation to wet grassland in F3. Its extent within the site boundary is indicated in the ecological resource map. Soil was high in organic content, compact, dark in colour. It was ascertained that four quadrats were sufficient to identify all species present by plotting the accumulative number of species recorded against quadrat number. The locations of all quadrats are indicated on the ecological resource map.

The dominant floral species were the grass species including Purple Moorgrass (*Molinia Caerulea*), Yorkshire Fog (*Holcus lanatus*), Marsh Foxtail (*Alopecurus geniculatus*), Couch Grass (*Agropyron repens*), Smooth Meadow Grass (*Poa pratensis*). A diversity of species occur with a clumped distribution, with most clusters dominated by Broad Leafed Dock (*Rumex obtusifolius*) and Creeping Buttercup (*Ranunculus repens*). A detailed species list with associated abundances is included in appendix 11.2 of this EIS. No unusual or protected species were recorded. The general character of the flora in this habitat type is that of rough pasture.

ii) Wet grassland

Wet grassland occurs to the northern end of the site at the areas of lowest elevation (Field units F3, F4 and F5). It comprises poorly drained farmland that has not been recently improved. These are sections of the site where free drainage does not occur and waterlogged soils support plant species tolerant of such conditions. Its extent within the site boundary is indicated in the ecological resource map. The soil was high in organic content, compact, very dark in colour and waterlogged. It was ascertained that, again in this case, four quadrats were sufficient to identify all species present.

The floral assemblage occurring in this habitat type is dominated by Rushes (*Juncus effusus*, *J. acutiflorus*) with percentage covers of up to 85% in quadrat areas surveyed. In areas where *Juncus* growth is less dense, grass species such as Yorkshire Fog (*Holcus lanatus*),

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Smooth Meadow Grass (*Poa pratensis*) and Sweet Vernal Grass (*Anthoxanthum odoratum*) provide the greatest ground cover. Common perennial herb species, many of which were flowering at the time of the survey, include Red Clover (*Trifolium repens*), Meadow Buttercup (*Ranunculus acris*), Creeping Buttercup (*Ranunculus repens*), Common Mouse Ear (*Cerastium fontanum*), Marsh Willow Herb (*Epilobium palustre*), Bog Stitchwort (*Stellaria alsine*) and Cuckoo Flower (*Cardamine pratensis*). A detailed species list with associated abundances is included in Appendix 11.3 of this EIS. No unusual or protected species were recorded.

ii) Field Boundaries

Hedgerows and tree-lines of varying quality form the perimeter and internal field unit boundaries at the site. Six separate field boundary units are identified and are shown on the ecological resource map accompanying this document.

All hedgerows were surveyed in accordance with in-house standard operating procedures "Hedgerow Flora Surveying" derived from UK hedgerow Regulations 1997. Hedgerows were numbered as shown in Figure 11.5 below. A brief description of each of the 16 field boundary units is given in Appendix 11.5. A detailed account of woody and herb layer species occurring in each individual field boundary in Appendix 11.5 and 11.6 respectively.

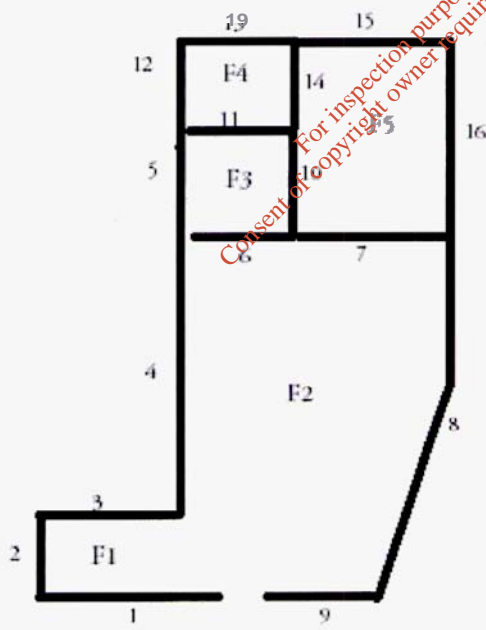


Figure 11.4 Field Boundaries surveyed and described

Hedgerows along the public roadside have undergone management by means of annual cutting back. Other field boundaries have not been maintained and are, in general, not stock proof without the use of barbed wire fencing. Many exhibit poor structural development with poor development of the understory vegetation in particular. Hedgerows are dominated by Hawthorn (*Crataegus monogyna*) and Bramble (*Rubus fruticosus*) whilst Grey Willow (*Salix cinerea*), Beech (*Phagus sylvatica*), Holly (*Ilex aquifolium*), Common Alder (*Alnus glutinosa*) and Hawthorn (*Crataegus monogyna*) dominate those classified as tree-lines. Tree-lines are, in general, tall and without great cross-sectional width.

The hedgerows and field boundaries at the site are considered to be of limited ecological value due to their poor structural development. They do, however, contain a diversity of species. Numerous woody species hold the potential to become valuable to local wildlife if they were to be subjected to management and maintenance. This will be considered in the mitigation section.

iii) Lichen Survey

Lichens are very sensitive to air pollution and examination of their coverage and/or biodiversity can be used as an indicator of air quality in an area. A baseline lichen survey in the vicinity of the site was, therefore, undertaken, in order to ascertain existing ecological conditions. This survey was completed in accordance with in-house operating procedures. The site itself and its immediate surrounding area were found to be devoid of any suitable lichen growth substrates. The closest fixed structure with lichen growth was at the crossing point of the third class road 1 km to the south-east of the site and the River Mountain Water. Here, a limestone bridge provided a suitable substrate for the establishment of encrusting lichens. However, none of the particularly sensitive and therefore useful *Parmelia* genus were found to occur.

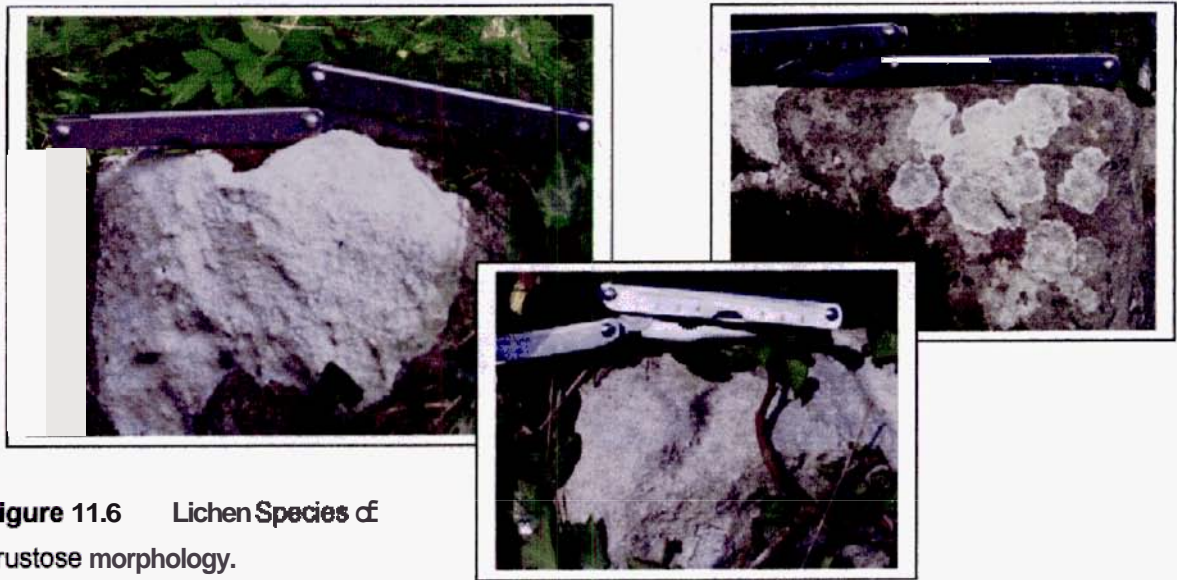


Figure 11.6 Lichen Species of crustose morphology.

Species found were crustose in form (Figure 11.5) and belong to a genus not useful as ambient air quality indicators, or for the establishment of permanent quadrats. Should the development's ambient air monitoring regime require biological air quality indicators, the usefulness of these species could be investigated further.

Likelihood of Rare plant species occurring at the site

No rare, threatened or protected plant species, as listed in the Irish Red Data Book (Curtis and Mc Gough, 1988) were recorded at the site during the survey. No rare plant species had been previously brought to the attention of The Conservation Ranger for the area. Based on an appraisal of the habitat types recorded as occurring at the site is considered unlikely that any rare or exceptional species would occur within the site.

11.4. Fauna

11.4.1 Mammals, amphibians and reptiles

A survey to ascertain whether mammal, bat and reptile species were present at the site was carried out in accordance with in-house standard operating procedures for mammal surveying.

Hedgerows and embankments are the ecological elements with the greatest potential to accommodate mammal species were searched for burrows, faeces or indicators of activity. A single Rabbit (*Oryctolagus cuniculus*), burrow was located in hedgerow 4, along the western boundary of F2. No activity was evident at the time of the survey. This burrow was recorded as being abandoned. The probable reason for the marked absence of subterranean dwelling mammals was the poor drainage in the area. Burrows would be vulnerable to inundation by a

rising water table during periods of increased precipitation. Habitats at In drier, more freely draining sections of the site could potentially house other common mammal species such as Foxes (*Vulpes vulpes*), Badgers (*Meles meles*) and Brown Rats, (*Rattus norvegicus*). A particular search was made of field-boundary embankments for badger setts and none were found.

Whilst bats species may hunt along hedgerows occasionally, there are no potential bat roosts i.e. old mature trees, porous buildings or caws, at the site. There was no bat activity observed at the site at the time of the ecological survey.

The wetter sections to the north of the site are suitable for the occurrence of the Common Frog (*Rana temporaria*) but none were observed or recorded at the time of the survey. The habitats at the site were considered not to be suitable for the occurrence of the Common Lizard (*Lacerta vivipara*)

The National Parks and Wildlife Service Conservation Ranger for the area stated that the Red Deer (*Cervus elaphus*), the largest of the three deer species currently found wild in Ireland, and the only species native to this country, occurs in small numbers to the north of the site. These deer originate from the area around Aghnacloy, approximately 7Km from the site.

11.4.2 Birds

Due to the nature of the site terrain, (i.e. small in area with a low habitat diversity) standard transect methods traversing the site along its long axis would not have yielded results representative of the bird community occurring at the site. Progress along a plotted route would have been interrupted due to the presence of hedges and barbed wire fences traversing the site.

As an alternative, a sampling method of direct observation over a one-hour period was employed in order to compile a quantitative bird species list for the site. Additional species observed over the course of all other ecological survey procedures were recorded also for the compilation of a complete species list for birds at the time of the survey. This list is included in Appendix 11.7 of this document

Examination of the areas surrounding the site revealed that a rookery is located to the north east of the site boundary. Species typical of agricultural areas with hedgerow field boundaries were recorded. A complete species list is included in the appendices.

A species of particular interest observed in the locality but not in the immediate area of the site was the Buzzard (*Buteo Buteo*). One pair was sighted daily approximately 0.75Km to the

north east of the site. According to the National Parks and Wildlife Service Conservation Ranger for the area, the Buzzard has been multiplying successfully in the region over the past 10 years and is extending its range in a southerly direction from Northern Ireland.

Mallard Duck (*Anas platyrhynchos*) and Water Hen, Dipper (*Cinclus cinclus*), Kingfisher (*Alcedo atthis*) and Grey Wagtail (*Motacilla cinerea*) are common on the River Mountain Water, with most bridges confirmed as Dipper nesting sites. Dippers are a species indicative of good water quality.

Slieve Beagh, 15km to the West of Emyvale, and its surrounding elevated lands straddling the border with Northern Ireland, is an important habitat for such bird species as Red Grouse (*Lagopus lagopus ssp scoticus*), Sky Lark (*Aluda arvensis*), Golden Plover (*Pluvialis apricaria*) Greenland White-Fronted Geese (*Anser albifrons flavirostris*) and approximately one pair of Hen Harriers (*Circus cyaneus*)

Some concern has been expressed in relation to declining numbers of Grouse on Bragan Hill, 5km west of the site. It has been suggested that this decline in numbers is due to the lack of management of their habitat and deterioration in the quality of heather.

BirdWatch Ireland does not have a representative responsible for the Monaghan area but were able to advise on local experts in bird watching. These individuals were contacted and their shared knowledge included in this report.

11.4.3 Butterflies

A Pollard Walk Survey of butterfly species was carried out in accordance with In-house standard operating procedures. The route is shown on the ecological resource map in Figure 11.2. It was ensured that climatic conditions were suitable for the emergence and activity of butterflies as outlined in standard procedure guidelines. Three species of butterfly were recorded (Appendix 11.8). One species, the Orange Tip (*Anthocharis cardamines*) is a species particular to wet grassland habitats as its larvae feed mainly on the Cuckoo Flower, an abundant flower at the site and in the locality. The Large White (*Pieris brassicae*) and Small Tortoise Shell (*Aglais urticae*) are common species common to most wayside habitats and gardens.

11.5 Survey Limitations

Seasonality and the variability in flora and fauna that occurs as seasons change always impose a certain degree of limitation on any ecological assessment that is not of 12 months duration to span all seasons. Ecological surveys for assessing the predicted impact of this development spanned the seasons of summer and autumn so that the presence of plank and animals with a narrow temporal range would be recorded. Amphibians, for example, require a water body or wet conditions for the completion of their lifecycle. Seasonally water filled drainage ditches could potentially provide breeding sites for some amphibian species. They could also potentially support a seasonal plant community, although the short period for which they contain water would inhibit the advanced succession of any aquatic plant community. The survey began in early summer and some spring species were recorded, for example the Orange Tip butterfly. The site was revisited again in September and no additional species of ecological importance were recorded.

The local library was consulted in a search for any publications pertaining to occasional or visiting species to the area or to draw attention to any ecological aspects of particular interest not made apparent by discrete surveying periods. Little additional information was obtained in this manner. Rather, the most reliable sources were found to be individuals from the area either working in the field of conservation or avidly interested in local wildlife.

Flora

It is predicted that the proposed development will impact on terrestrial fauna through the removal of vegetation for the construction of building units and areas of hard-standing. The impacts are significant on a local scale, however. Impacts on a regional or national scale are not considered significant as the site is limited in both habitat and species diversity and does not contain any ecological entities of particular special ecological interest.

The development will require the removal of four lengths of hedgerow/tree-line within the site boundary and the partial removal of a fifth for entrance widening.

Fauna

Potentially, the disturbance of greatest significance to faunal species would be the removal of field boundary lengths to accommodate the development. Hedgerows and embankments are the ecological elements with the greatest potential to accommodate mammal species. The occurrences of mammalian species were not recorded at the site. No burrows, faeces or indicators of activity were found to be present. There will therefore be no significant impact on mammal populations in the area. The site itself does not act as a wildlife corridor and no

disruption of this nature is anticipated either during the constructional phase or the operational phase due to the contained nature of the site area.

In consultation with landscape architects and horticultural experts, the developer intends to improve the overall condition of hedgerows surrounding the site through the introduction of a management regime where there previously was none. The result will be hedgerow units of greater ecological value. It is therefore predicted that the development will have a positive impact on bird populations on a local scale by establishing new and higher quality habitats.

The proposed development will not have any significantly negative effect on butterfly species diversity or population sizes in the area.

11. Mitigation Measures and Recommendations

Whilst no rare or protected plant or animal species were recorded as occurring or having occurred at the site, it is acknowledged that ecological value lies in that which is typical in addition to that which is rare. In order to minimize the impact of the proposed development on ecological assets typical and special to the locality and region, a stringent policy of care will be employed and enforced by site managers at the constructional phase and the operational phase to ensure that quality control targets are met and exceeded with respect to all activities.

As stated in the field boundaries section of this ecological report, numerous woody species in the hedgerows and field boundaries hold the potential to become valuable to local wildlife. In their current state of poor structural development they are of limited ecological value. Strategic management and maintenance of the tree lines in particular would enhance and increase the faunal diversity accommodated by the trees. Where relevant, it is proposed that the most valuable specimens of indigenous and locally important tree species be selected along the tree lines. Weaker specimens between these selected specimens will be eliminated in order to allow the maturation of a number of ecologically valuable individual trees rather than the poor development of a great number. This will play a role in enhancing the ecological richness of the area in addition to providing a visual screen for the development. The shrub and herb layers of these field boundaries will be maintained in a manner that will encourage the nesting of birds and other small animals. This contrasts with their current gappy state and poor habitat value.

There is also an opportunity for the planting of new hedgerows for division and screening of various sections of the installation. Indigenous species from local genetic stock would be introduced respecting the genetic integrity of local plant specimens.

The noise impact on wild& will be minimised through noise abatement measures to ensure compliance with Irish and European legislation as detailed in Chapter 5 of the EIS.

1.8 Conclusion

The introduction of the proposed development to the receiving environment described is not predicted to have a significant impact on ecology on a regional or national scale.

Whilst the site of the proposed development was not found to contain floral or faunal species regarded as being rare, in decline or requiring conservation programmes, the developer acknowledges the fact that ecological value lies in that which is typical in addition to that which is rare. The development will result in the removal of some field boundaries which are currently of limited ecological value. It is believed that the introduction of a regime of maintenance and management to existing hedgerows will enhance ecological richness. The opportunity for planting new hedgerows for division and screening of various sections of the installation will be availed of whenever possible and serve to provide additional habitats to the area.

Indigenous species from local genetic stock would be introduced respecting the genetic integrity of local plant specimens.

In order to minimize the impact of the proposed development on ecological assets typical and special to the locality and region, a stringent policy of care will be employed and enforced by site managers at the construction phase and the operational phase to ensure that quality control targets are met and not exceeded with respect to all activities.

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12.0 Archaeology

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An archaeological assessment was commissioned by South Western Environmental Services and an assessment was undertaken in June 2001 in order to identify any archaeological constraints associated with the proposed development. Cultural heritage, with respect to man made features on the landscape including archaeological, architectural and historic features were examined. Both a desktop assessment and a detailed field assessment were carried out. A full copy of the report is available as Appendix 12.

This report outlines the archaeological importance of the land selected for the proposed development. The aim is to assess the impact of the development on the receiving archaeological environment and the implications of any impact.

12.1 Methodology

The archaeological assessment was based on a desktop study, which examined the archaeological environment within approximately 2km of the proposed development site and a field inspection of the proposed site itself. The desktop study comprised of a cartographic study, review of the sites and monuments record and the record of monuments and places. A field survey was conducted in June 2001.

12.1.1 Cultural Heritage in the Existing Environment

The proposed development is located in the north-westerly section of the townland of Killycarran in the parish of Ennigal Truagh. The proposed site itself is used for rough grazing.

12.1.2 Desktop Survey

The desktop study included a detailed search of the following archaeological and historical records (see Figure 12.1):

Sites and Monuments Record (SMR)- This record compiled by the Archaeological Survey of Ireland comprises a list of all known archaeological sites and monuments in the county and their location. The SMR for County Monaghan was published in 1996.

Record of Monuments and Places (RMP)- This record is compiled as a replacement for the SMR by Duchas. It lists all known archaeological monuments and sites in the county. It is an offence to interfere with any of the sites or monuments listed in the record without first giving

2 months notice in writing to the National Monuments Service, Dúchas, at the Department of Arts, Heritage, Gaeltacht and the Islands.

Archaeological Inventory of County Monaghan.

1. Topographical Files of Monaghan County Museum No finds were recorded from the area.
2. Cartographic Sources - The first and second editions of the OS 6 inch maps, sheets 3/6 were consulted.
3. Documentary sources- all available literary references were consulted in Monaghan library.

12.1.3 Field Survey

The field survey was carried out on Friday 15th June 2001. Weather conditions on the day were damp and misty.

The site of the proposed development was surveyed and a visual inspection carried out to ascertain if any features of archaeological significance were visible. The ground in general was very wet due to torrential rain the previous evening. For survey purposes the site was divided into five fields F1, F2, F3, F4, and F5, using the same naming scheme as depicted in Figure 11.2 Chapter 11. The field pattern has only changed slightly since the 1907 edition of the 6-inch map. F1 and F2 are gently sloping and fairly well drained (Plate 1). F3 and F4 are level and very poorly drained. F5 is a level field and was waterlogged on the day (Plate 2). F4 and F5 contain dense growths of marshy plants. Man made drains have been constructed around the borders of F2, F3 and F4. Small ridges at the northern boundary of F3 along with the associated vegetation change have arisen from material thrown up during drain clearance. The entire site is used for grazing.

Nothing of an archaeological nature was noted during the inspection. However, it is acknowledged that this does not mean that sub-surface features do not exist. Because of the potential for much of the landscape to contain previously unidentified subsurface archaeological features, conditions and requirements in relation to archaeological monitoring are required.

12.2 Potential Impacts of the Development

Based on this study there is no evidence of clearly defined archaeological remains or artifacts on the site of the proposed development or in the immediate vicinity. While the proposed development will not directly affect any known archaeological sites, it is possible it will affect any previously unrecorded archaeological sites, which might still exist undetected below the ground surface during groundworks.

12.3 Construction Impacts and Mitigation Measures

Although the archaeological study carried out indicates that there are no items of significance on the site, nevertheless, where extensive earthmoving is involved archaeological features are often discovered. The remains of a leveled ring fort or fulacht fiadh may show quite clearly in the subsoil once the topsoil has been removed. Likewise any other archaeological soils, features or deposits may be exposed during topsoil removal.

Earthworks will be associated with site clearing activities during the construction period. It is therefore considered necessary that:

- an archaeologist should monitor all topsoil removal on the site
- in the event of discovering any archaeological features, their investigation and recording by an archaeologist should be facilitated and funded by the developer and the discovery reported to Duchas, 51 St. Stephen's Green, Dublin 2. Duchas the Heritage Service and the National Monuments and Historic properties and Planning Authority can advise on what procedures should be adopted for the preservation of such features.
- Artifacts discovered should be reported to the Duty Officer of the National Museum of Ireland, Kildare Street, Dublin 2.

These mitigation measures outlined above will prevent negative impacts on any archaeological finds on the site during construction.

12.4 Operational Impacts and Mitigation

No archaeological impacts will be associated with plant operation and therefore no mitigation is considered necessary.

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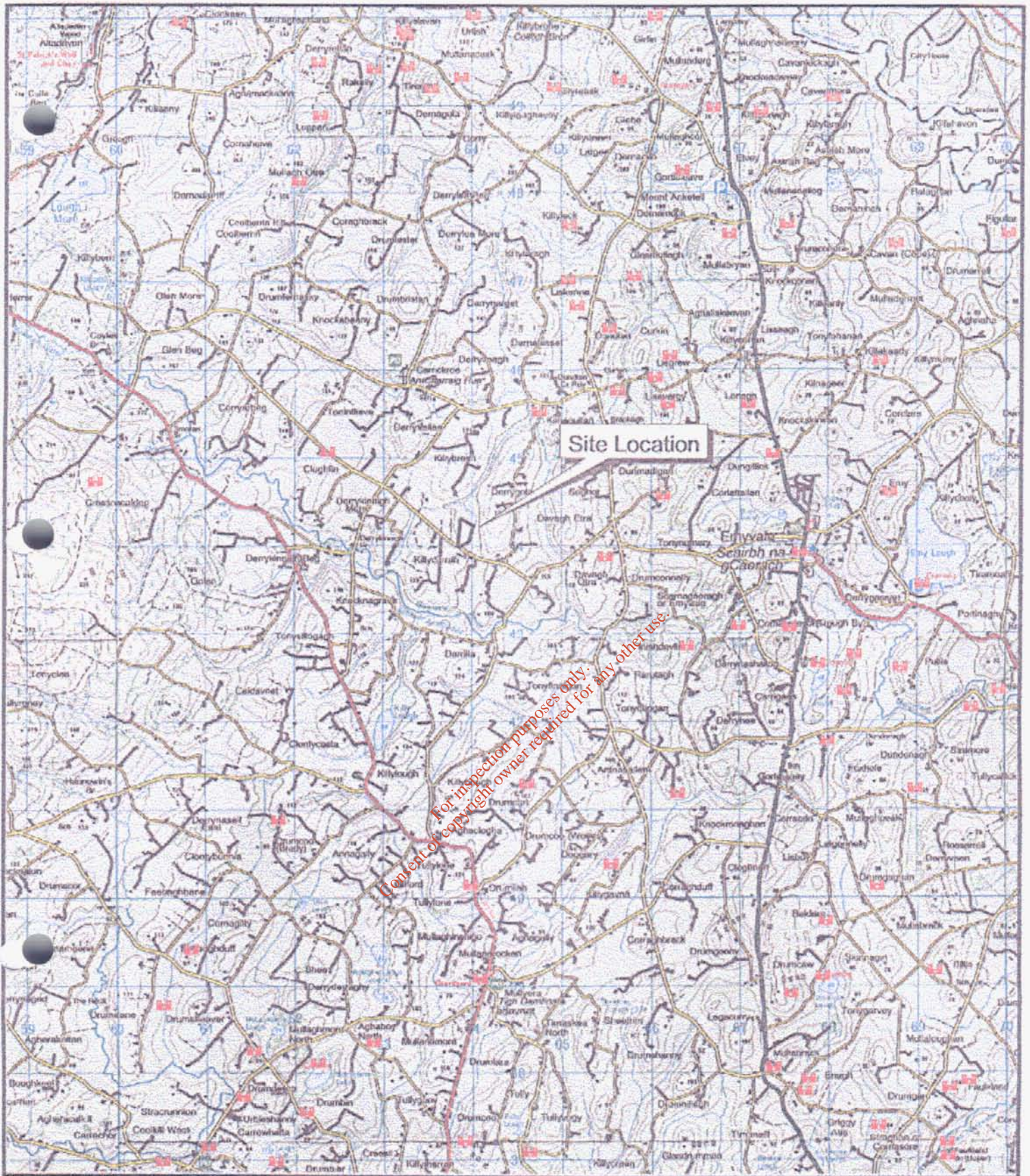





Figure 12.1: National Monuments and Sites & Monuments

-  Boundary of Biomass CHP Plant
-  Sites & Monuments
-  National Monuments



Project: CHP Biomass Plant
Client: Renewtech Ltd.
Date: December 2001
Prepared by: KO'D
Approved by: SH/DW

0 1 2 3 4 Kilometers




South Western Environmental Services

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13.0 Material assets

13.1 Introduction

This section assesses the potential impacts of the development on the material assets of the development area including assets of human origin (infrastructure and Utilities) and assets of natural origin and identifies measures to mitigate against any significant impacts. Many of the area covered in this section have already been discussed in other sections of the EIS.

13.2 Existing Environment

The transportation network in the area is scheduled for improvement as outlined in Section 7.0. The National Roads Authority (NRA) programme includes a plan to by-pass Emyvale located on the N 2. The proposed route is located west of Emyvale passing within 3km of the site. There are no existing sewerage lines or water supply at the site. Two telecommunication masts are located approximately 1km west of the site and there is a 38kV electrical substation 0.5km west of the site.

13.3 Construction Impacts and Mitigation

The construction phase of the development will not have a significant impact on the material assets of the area. Mitigation against increased construction traffic includes a traffic management plan. Water will be supplied from the developers well for use as a potable supply during construction. Generators will be used on site to supply the necessary power requirements for construction equipment. All domestic effluent generated on site will be discharged to temporary sewage containment facilities prior to transport and treatment off-site.

13.4 Operational Impacts and Mitigation

The material assets of the area including infrastructure will be utilised by the development in a sustainable manner.

The development will have a significant impact on traffic levels and upgrade of the road to regional route status will be required to accommodate this. Water supply will be from a groundwater development well on the site as outlined in Section 8.0 and will not impact on local water supplies. With the exception of groundwater resources, there are no existing underground utilities located on site.

13.5 Conclusion

With the exception of traffic the development should not impact on material assets the upgrade of public infrastructure will mitigate against this.

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14.0 Interactions

14.1 Introduction

In accordance with the conditions of SI 349 1989 the interactions of all the elements outlined in the previous sections are identified and discussed. The most common interactions are between the following and the human environment:

- Noise
- Landscape
- Construction and Operational Traffic
- Atmospheric Emissions

The interactions between the differing environmental factors has been discussed in the preceding sections.

Elements of the development which may be considered to have a negative impact on the environment are traffic, noise, visual impact and air quality. Potential impacts on air quality are the primary concern of residents and the public in relation to this development. In general the effect may be positive (decreased emissions) at a regional and national level, but it may be negative (increased emissions) at the site where the development is located. This issue is especially critical in urban areas, where air quality may be lower than the national average and the tolerance for additional emissions may be small. In this instance the location is rural and the tolerance would be regarded as large.

In all cases where negative impacts have been identified mitigation measures will be put in place as outlined in preceding sections of this EIS.

The development is considered to have a positive impact in terms of employment generation, sustainable development and providing a source of renewable energy in line with EU and Government policy.

Sustainable agriculture and rural development (SARD) are policy priorities in the EU. There are clear signals that the agri-food industries current trajectory is fast approaching its environmental, economic and socio-political limits.

Sustainable agriculture builds on current agricultural achievements, adopting a sophisticated approach that can maintain high yields and farm profits without undermining the resources on which agriculture depends.

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Ireland cannot continue to accept Way's productive, but highly polluting agriculture as the best that this country can do. Recently the EU Commission decided to bring the Irish and UK Governments before the European Court of Justice for failing to implement the Commissions action programmes to reduce pollution from agricultural fertilisers and waste. Ireland is the only Member State not to have yet designated any nitrate vulnerable zones, despite evidence that a significant number of Irish inland and coastal waters are increasingly eutrophic, due largely to agricultural pollution. In recent decades water pollution by nitrates has worsened by the introduction of intensive farming methods. In the immediate future the border counties will see significant restrictions to farming practices to reduce their environmental impacts.

Landspreading and landfilling of wastes will be significantly reduced, this could have a very significant effect on the viability of existing agricultural enterprises in the Monaghan region particularly agri-industries (e.g mushroom and poultry) that currently largely dispose of their organic waste by landspreading. Restrictions will include requirements to limit applications of fertilizers and organic manure and to observe closed periods for fertilizer and some applications of livestock manure, as well as rules on record keeping, waste handling and storage facilities, in addition designation of Nitrate Vulnerable Zones under EC Nitrate Directive 91/676 will require farmers within the Zones to comply with mandatory measures to control nitrate pollution from agriculture.

There are few examples in the EU of management programmes that have an integrated view of SARD which recognise the multiple roles of farming, and which appreciate that agriculture can also assist the development of certain social, environmental and regional goals such as; developing new renewable energy fuels, reducing environmental burdens of power generation, reducing greenhouse gases, improving agri-waste management and protecting water resources.

The Economic and Social Council of the United Nations Secretariat report *Sustainable agriculture and rural development: Trends in National implementation, E/CN.17/2000/5*, based on information supplied by Governments including that of Ireland, reported that the main priorities and challenges in relation to SARD facing Western Europe are:

- Sustainable farming,
- Rural development,
- Pollution of water resources, and
- Stabilization of nitrate levels,

In addition the report stated that one of the main activities and programmes in Western Europe in undertaking SARD is developing renewable energy.

The positive aspects of this biomass development for agriculture, rural development, protection of water resources, renewable energy development, climate change, socio-economics, environmental and political cross border development are significant.

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The European Commission (EC), Directorate General XII, see biomass as an important renewable energy source and hopes it will provide up to 9 % of the total energy consumption in the EU by 2010, according to its recently published overview of EC-Funded studies in the field of biomass conversion technologies.

This project is a part EU funded Research and Demonstration project for new clean technologies and new renewable energy fuel sources and must be seen as a significant positive development in sustainable and environmentally friendly power generation.

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Glossary of Terms

Ambient air quality	The condition of the air in the surrounding environment.
Anaerobic Digestion	A biochemical process by which organic matter is decomposed by bacteria in the absence of oxygen, producing methane and other by-products.
Atmospheric Dispersion	The process by which gaseous pollutants discharged into the dispersion atmosphere are diluted. These processes include diffusion, which involves the spreading out of the pollutants from the point of discharge and transport by wind.
Background level	The average amount of a substance present in the environment. Originally referring to naturally occurring phenomena.
Background Noise Level	The A-weighted ambient sound pressure level in the absence of sound under investigation exceeded for 90% of the measurement period. Normally equated to the average minimum A-weighted sound pressure level.
Bioenergy	Useful, renewable energy produced from organic matter. The conversion of the complex carbohydrates in organic matter to energy. Organic matter may either be used directly as a fuel or processed into liquids and gases.
Biofuel	Renewable fuel originating from biomass
Biomass	Non-fossilised organic matter
Carriageway	The portion of the road used by vehicles (exclusive of shoulders and auxiliary lanes)
Chips	Woody material cut into short, thin wafers. Chips are used as a raw material for pulping and fibreboard or as biomass fuel.
Cogeneration	The sequential production of electricity and useful thermal energy from a common fuel source. Reject heat from industrial processes can be used to power an electric generator (bottoming cycle). Conversely, surplus heat from an electric generating plant can be used for industrial processes, or space and water heating purposes (topping cycle).
Combined Heat and Power (CHP)	An older term for what is now generally called cogeneration.
Combustion	Burning. The transformation of biomass fuel into heat, chemicals, and gases through chemical combination of hydrogen and carbon in the fuel with oxygen in the air.
Combustion air	The air fed to a fire to provide oxygen for combustion of fuel. It may be preheated before injection into a furnace.
Combustion efficiency	actual heat produced by combustion
Combustion gases	The gases released from a combustion process.
Condenser	A heat-transfer device that reduces a fluid from a vapour phase to a liquid phase. Exhaust steam from the steam turbine is condensed to water for reuse.

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Condensing turbine	A turbine used for electrical power generation from a minimum amount of steam
Cumulative effects	Effects in the environment resulting from actions that are individually minor but that add up to a greater total effect as they take place over a period of time.
Decibel	A scale unit used in the comparison of powers and levels of sound energy. The number of decibels is 10 times the logarithm to the bases of 10 of the ratio of the powers (Unit dB)
Decommissioning	The final dosing down and putting into a state of safety of a development project or process when it has come to the end of its useful life
Diversity	The distribution and abundance of different plants and animals within an area.
Effluent	Liquid wastes
Emission	The amount of pollutant discharged per unit time or the amount of pollutant per unit volume of gas or liquid emitted
Environmental Management System	Part of the overall management system which includes structures, practices, procedures and resource for the systematic implementation of an organisations own environmental policy.
Fabric Filters	Semi-permeable material in the form of bags or sleeves which trap particles and which are mounted in an airtight housing (baghouse) which is divided into a number of sections. Fabric filters are also used as a second stage in acid gas control systems
Fog	cloud forming very close to or at ground level.
Fossil Fuel	Solid, liquid or gaseous fuels formed in the ground after millions of years by chemical and physical changes in plant and animal residues under high temperature and pressure. Oil, natural gas, and coal are fossil fuels.
Fly Ash	Small ash particles carried in suspension in combustion products.
Fuel handling system	A system for unloading wood fuel from vans or trucks, transporting the fuel to a storage pile or bin, and conveying the fuel from storage to the boiler or other energy conversion equipment.
Furnace	An enclosed chamber or container used to burn biomass in a controlled manner to produce heat for space or process heating.
Gasification	Low temperature reduction where carbon is converted from carbonaceous solid into fuel gas potential energy. The process requires thermal support which is usually gained from the partial combustion of the fuel in air or oxygen
Greenhouse gases:	Gases that trap the heat of the sun in the Earth's atmosphere, producing the greenhouse effect. The two major greenhouse gases are water vapor and carbon dioxide. Other greenhouse gases include methane, ozone, chlorofluorocarbons, and nitrous oxide
Grid connection	Joining a plant that generates electric power to a utility system so that electricity can flow in either direction between the utility

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Gross heating value	<p>system and the plant. (GHV) The maximum potential energy in the fuel as received. It reflects the displacement of fiber by water present in the fuel. Expressed as:</p> $GHV = HHV (1 - MC / 100)$
Higher heating value Humidity" *see relative humidity Kilowatt (kW)	<p>(HHV) The maximum potential energy in dry fuel. The amount of moisture in the air</p> <p>A measure of electrical power equal to 1,000 Watts. 1 kW = 3.413 Btu/hr = 1.341 horsepower</p>
L _{A90}	<p>The A-weighted sound level exceeded for 90% of the sample period and referred to as the 'average minimum or background noise level' (Unit: dBA)</p>
Lower heating value	<p>(LHV) The potential energy in a fuel if the water vapor from combustion of hydrogen is not condensed.</p>
Maximum Residue Levels	<p>MRL's are the maximum concentration of a pesticide residue expressed in mg/kg permitted in or on food commodities and animal feeds. MRCs are based on a supervised residue trial data which reflect Good Agricultural Practice. MRCs established for particular food commodities are such that potential consumer exposure to residues are judged to be toxicologically acceptable.</p>
Mitigation	<p>Steps taken to avoid or minimize negative environmental impacts. Mitigation can include: avoiding the impact by not taking a certain action; minimizing impacts by limiting the degree or magnitude of the action; rectifying the impact by repairing or restoring the affected environment; reducing the impact by protective steps required with the action; and compensating for the impact by replacing or providing substitute resources.</p>
Moisture content, wet basis	<p>Moisture content expressed as a percentage of the weight of wood as received.</p> $\frac{\text{weight of wet sample} - \text{weight of dry sample}}{\text{weight of wet sample}} \times 100$
Moisture Content	<p>(MC) The weight of the water contained in wood, usually expressed as a percentage of weight, either oven-dry or as received.</p>
Moisture content, dry basis	<p>Moisture content expressed as a percentage of the weight of oven-dry wood.</p> $\frac{\text{weight of wet sample} - \text{weight of dry sample}}{\text{weight of dry sample}} \times 100$
Net heating value:	<p>(NHV) The potential energy available in the fuel as received, taking into account the energy loss in evaporating and superheating the water in the sample. Expressed as</p> $NVH = (HHV \times (1 - MC / 100)) - (LH(2)O \times MC / 100)$

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Particulate emissions	Fine liquid or solid particles discharged with exhaust gases. Usually measured as grains per cubic foot or pounds per million Btu input
PM10	Usually airborne particulate matter less than 10µm microns (or one millionth of a meter) in diameter, a measure of dust concentration
Prevailing Wind	The wind direction most frequently observed during a given period.
Pyrolysis	The thermal decomposition of biomass at high temperatures (greater than 400° F, or 200° C) in the absence of air. The end product of pyrolysis is a mixture of solids (char), liquids (oxygenated oils), and gases (methane, carbon monoxide, and carbon dioxide) with proportions determined by operating temperature, pressure, oxygen content, and other conditions.
NOx	Oxides of nitrogen including nitric oxide (NO) and nitrogen dioxide
98-percentile Value	The value of a ranked distribution above (or below) which 98 percent of values in the distribution lie, depending on application
Relative humidity	the ratio of water vapour in the air at a given temperature to the maximum amount that could exist at that temperature.
Renewable Energy	Energy of which the consumption does not reduce natural resources because it is based on elements that replenish themselves naturally such as biomass, geothermal, solar or wind power
Renewable energy resource	An energy resource replenished continuously or that is replaced after use through natural means. Sustainable energy. Renewable energy resources include bioenergy, solar energy, wind energy, geothermal power, and hydropower.
Second Pass Harvesting Sensitive species:	See Threatened, endangered, and sensitive species
Shortwood Harvesting	Forestry harvesting system whereby the top of the tree below 7cm in diameter and removed branches and needles constitutes forest residues.
Spreader stoker furnace	A furnace in which fuel is automatically or mechanically spread. Part of the fuel is burned in suspension. Large pieces fall on a grate.
Sustainable Development	Defined by the Brundtland Commission (1987) as "development that meets the needs of the present without comprising the ability of the future generations to meet their own needs"
Geographic Information System (GIS)	A set of integrated techniques for storing, retrieving, transforming and displaying spatially referenced thematic data in map form
Greenhouse Effect	Enhanced warming of the atmosphere due to the reduction in outgoing solar radiation resulting from increased concentrations of gases. In particular, CO ₂

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Moving Grate	A grate on which the waste is burned. Primary air is introduced through the grate and passes through the mass of waste material. The moving grate agitates the waste and promotes thorough distribution of air
Fluidised Bed Combustor	A bed of sand or similar inert material which is agitated or fluidised by an upward flow of air through a porous plate below it. Combustion occurs within the bed
Rotary Kiln	Waste is fed into a slightly inclined, rotating, refractory-lined drum which acts as a grate surface. The rotating action of the drum mixes it with air supplied through the walls
Energy Recovery	The removal of heat from the exhaust gases so as to provide heat and/or electricity for use in the plant elsewhere.
Precipitation	is condensation of atmospheric water vapour deposited on the earth's surface
Wet Scrubbers	Remove acid gases (eg HCL, HF and SO2) by washing the flue gases in a reaction tower. Designed to provide a high gas-liquid contact. In the first stage the gases are cooled by water sprays, removing HCL, HF, some particulates and some heavy metals. In the second stage calcium hydroxide or another suitable alkali is used to remove SO2 and any remaining HCL
Wind	the horizontal movement of air relative to the earth's surface and is caused by variations in temperature and pressure
Wind Direction	describes the direction from which the wind is blowing
Volatile Organics	Organic Substances that evaporate at ambient temperature

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Acronyms and Abbreviations

AER	Alternative Energy Requirements
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BOD	Biochemical Oxygen Demand
CHP	Combined Heat and Power
CO	carbon Monoxide
CO ₂	Carbon Dioxide
Cu	Copper
Cr	Chromium
dB(A)	Environmental Noise level assessed in terms of A-weighted decibels
EC	European Communities
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELV	Emission Limit Values
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
GIS	Geographic Information System
GSI	Geological Survey of Ireland
Hg	Mercury
HGV	Heavy Goods Vehicle
IFA	Irish Farmers Institute
IPC	Integrated Pollution Control
IWC	Irish Wild bird Conservancy
Km	Kilometre (1000 metres)
KV	Kilovolt (1000 volts)
L ₁₀	The noise level which is exceeded for 10% of the measurement period
Leq	The steady state noise which over a given period has the same acoustic energy as the actual noise
LOS	Level Of Service
m	Meter(s)
mg/l	Milligrams per litre
MPV	Mechanically Propelled Vehicle
m/s	Meters per second
N	Nitrogen
NA	Not Applicable
NGO's	Non Government Organisations
NHA	Natural Heritage Areas
NO	Nitrogen Oxide
NO ₂	Nitrogen Dioxide
NO ₃	Nitrate
NO _x	Nitrogen Oxides
PAH's	Polyaromatic Hydrocarbons
PCB's	Polychlorinated biphenyls
PCU	Passenger car Units
P	Phosphorous
Pb	Lead
PM ₁₀	Particulate matter measuring less than 10 microns in diameter
SAC	Special Areas of Conservation
SO ₂	Sulphur Dioxide
SO ₄	Sulphate

SOx
SPA
VOC
Zn

Sulphur Oxides
Special Area of Conservation
Volatile Organic Compounds
Zinc

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