

**ECOLOGICAL IMPACT ASSESSMENT  
OF PROPOSED WASTE DISPOSAL SITE AT  
TALLAGH, BELMULLET, CO. MAYO**

**Compiled by**

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**June 2005**

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## 1 INTRODUCTION

An application has been made to Mayo County Council on behalf of Lennon Quarries Ltd. for a waste permit for lands at Tallagh, Belmullet, Co. Mayo. The application outlines the proposed disposal of recovered material from development sites within the local area on a 25.5ha site. The activity will be staggered over a period of ten years. Given the location of the proposed development site and the potential impacts on the adjacent Broadhaven Bay complex, a number of issues of concern were raised by the Development and Applications Section (DAS) of the National Parks and Wildlife Service (NPWS). Dr. C.A. Farrell was commissioned to undertake an appropriate assessment of the development for Lennon Quarries Ltd. The aim of this assessment is to evaluate the site and proposed activity, and address the issues of concern.

## 2. SCOPE

The scope of the study was developed through consultation with (a) the developer, (b) regional NPWS staff (Denis Strong, Deputy Regional Manager) and (c) consideration of the issues of concern raised through the DAS, NPWS (letter dated 22/10/2004, Ref.: E2004/120).

The main issues of concern highlighted were (a) potential loss of blanket bog habitat, (b) impact of run-off on the adjacent Broadhaven Bay complex and (c) cumulative impacts.

This study considers the proposed waste disposal development in the context of (a) the existing ecology at and around the site and (b) the potential impacts of the development on these features. Areas of scientific and/or conservation interest, as well as the presence of protected plant and animal species within the vicinity of the proposed development site are investigated. On the basis of consideration of the interactions of these factors, the predicted impact of the development is assessed.

Recommendations are made as to the mitigation of potential impacts and appropriate monitoring of the activity. The cumulative impact of the development in light of existing land-use in the area is also considered.

## 3 METHODOLOGY

The site of the proposed development was visited in June 2005 to provide data on habitats and fauna. The fieldwork consisted of a walkover survey of the site. The main habitats were identified and the species composition listed. Fauna noted at the site (actual sightings and observed tracks) were also recorded. The main surface drainage network was surveyed and assessed.

The habitats are classified according to Fossitt (2000). The habitats are described in the text and habitat codes (after Fossitt 2000) are presented in parentheses. A habitat map is also presented (Fig. 1). This was compiled using field survey and aerial photographs. Nomenclature for vascular plants follows Webb *et al.* (1996). Nomenclature for bryophytes follows Smith (1978).

National Parks and Wildlife (NPWS) were consulted for relevant ecological information relating to the site and surrounding areas.

The proposed development site is evaluated for its ecological significance based on the outcome of desk and field studies and consultation with statutory bodies to date. The temporary and permanent impacts of the development are evaluated using the *Guidelines for Ecological Evaluation and Impact Assessment* (Regini 2000). An outline of the decision framework is provided in Table 2 (within the text) and Tables 3 and 4 (see **Appendix**).



## 4 RECEIVING ENVIRONMENT

### 4.1 General site description

The development site is located in north-west Mayo, on the Belmullet peninsula (Erris region) in the townland of Tallagh approximately 3km due north of Belmullet town. Access to the site is from a trackway that leads from the regional road that links Belmullet with Ballyglass. The aspect of the proposed development site is northerly, and as such the activity will not be visible from the main access road. A gravel trackway is the main access to the site and is currently utilised by heavy machinery accessing the site for turf production and transport.

The development site is 25.5ha and triangular in shape. The site is intensively utilised for turf production (sausage machine and hand-cut) and grazing (predominantly sheep). The site is also utilised as a firing range for the local gun club. The site is dominated by cutover bog habitat. The land-use history has resulted in a mosaic of habitats ranging from bare peat, operating turf banks, access trackways, drainage channels with patches of acid grassland and heavily grazed cutover bog in revegetated areas that are not currently utilised for turf production. The peat depth is on average 0.5m but with deeper pockets on flat areas where turf production is ongoing (1m average). A fence surrounds the site but otherwise the area is exposed with no shelter, and the aspect is northerly. The general fall from the site is in a north easterly direction, with the highest point at 105m to the south and the lowest along the main drainage channel at 87m. The local landscape is undulating with patches of low-lying bog and drier rush-dominated slopes.

There is low-intensity rural settlement in the area and the land-use is largely turf production and agricultural. There is a small industrial base just east of the proposed development site and this comprises a number of tunnels and associated facilities for commercial mushroom production. There is extensive turf production in the general area particularly to the west of Moyrahan Bay. This activity is conducted right up to the edge of the bay.

There are a number of drainage channels on site, draining in a north easterly direction into an artificial interceptor drain that flows into the main natural drainage channel, that meanders to the north of the site (see Fig.1). The flow in both the interceptor drain and the natural stream channel is slow. The interceptor drain enters the main stream just east of the proposed development site, and the stream flows into Moyrahan Bay. Moyrahan Bay is part of the greater Broadhaven Bay complex. The slope of the site and the intensive drainage network results in the site being well drained. This is amenable to the current turf production activity.

### 4.2 Designated areas and rare species records

There are no records for rare plants or animals within the development area and no rare or restricted distribution plants or animals were recorded during the survey of the site<sup>1</sup>.

Areas of conservation interest located within 10km of the development site are outlined in Table 1. In total 11 designated areas occur within 10km or at the 10km boundary from the development site. These areas are representative examples of a number of habitats listed in Annex I of the Habitats Directive (92/43/EEC), notably aquatic (freshwater lakes and rivers and coastal dunes, machair, estuarine and marine habitats).

There are records of Annex II species listed in the Habitats Directive for designated areas within 10km of the site. These include otter (*Lutra lutra*), salmon (*Salmo salar*), white-clawed crayfish (*Austropotamobius pallipes*) and brook lamprey (*Lampetra planeri*) in freshwater systems. The surrounding designated areas are of particular conservation owing to their ornithological importance for breeding and wintering birds.

<sup>1</sup> It should be noted that all flora and fauna are protected in Ireland under the Wildlife and Amendment Acts (1976 and 2000).



Table 1. Designated conservation areas within 10Km of the development site

	Name	Site Code	Designation	Approximate distance from development site
1	Broadhaven Bay complex	000472	pNHA	0.5 km
2	Mullet/Blacksod Bay complex	000470	pSAC	1 km
3	Erris Head	001501	pSAC	1 km
4	Carrowmore lake complex	000476	pSAC	8 km
5	Glenamoy Bog complex	000500	pSAC	9 km
6	Stags of Broadhaven	000546	pNHA	9 km
7	Inishkea Islands	000507	pSAC	9 km
8	Pollatomish Bog	001548	pNHA	9.5 km
9	Tullaghan Bay and Tullaghanashammer Bog	001567	pNHA	10 km
10	Owenduff/Nephin complex	000534	pSAC	10 km
11	Slieve Fyagh Bog	000542	pSAC	10 km

#### 4.2.1 The ecological significance of adjacent designated areas

The north west Mayo coastline, and in particular the Erris peninsula and its associated coastal habitats is recognised as being of significant ecological value. This is based on the incidence of a number of habitats listed as priority habitats under the EU Habitats Directive such as machair and extensive sand dune systems, and the utilisation of these areas by noteworthy species. In particular, these coastal areas are rich in bird species. The coastal areas have therefore warranted a number of designations as outlined above.

Broadhaven Bay and the Mullet/Blacksod Bay areas are of particular conservation value. The designations within these areas include cSAC, pNHA, SPA, IBA and Ramsar sites. SPAs (Special Protection Areas) are areas designated for their ecological significance based on the presence of bird species and, as such are statutory designations under the EU Birds Directive. IBAs are Important Bird Areas, outlined by *BirdWatch Ireland* to indicate areas that are significant for their bird species complement. They are not statutory designations, but in general, most of IBA areas are included in SPAs. *Ramsar* refers to an international convention in relation to wetland sites, which was ratified by Ireland in 1985. The *Ramsar Convention* has its roots in the protection of wetland wildfowl and for many sites it is species-associated. While the convention has no statutory basis it is generally operated through EU or national legislation. In the case of the Blacksod Bay and Broadhaven Bay *Ramsar* site, the EU Birds Directive and EU Habitats Directive through the Wildlife and Amendment Acts (1976 and 2000) covers the statutory status of the site.

The proposed development site is not included within a conservation-designated area, but the site is included within the catchment of the Broadhaven Bay complex, draining into Moyrahan Bay. Salt marsh occurs along the sheltered inlet within the Tallagh townland and comprises fringe marshes on peat that are typical of the Atlantic salt meadow type. Activity within the proposed development site must take the proximal location of these significant ecological sites into consideration at design and operation phase.

## 4.3 Habitats

### 4.3.1 Introduction

The habitats recorded from the development site are outlined below. The habitats included are those from the actual development site and those that are located within immediate proximity of the development site, with a brief description provided of those in the surrounding area. The extent of these habitats can be viewed from the habitats map (Fig. 1). An overview is also provided in Fig.2, which is a photograph of the site showing the main habitat type.

Table 2. Summary of the habitat types recorded at and adjacent to the development site (after Fossitt 2000).

Habitat type	Habitat name and code
Cutover bog	PB4
Acid grassland	GS3
Wet grassland	GS4
Poor fen	PF2
Tall herb swamps	FS2
Lowland rivers	FW2
Drainage ditches	FW4

### 4.3.2 Habitat descriptions

#### Cutover Bog, PB4

The greater part of the proposed development site is assigned to the cutover bog habitat class. The original bog type was Atlantic blanket bog. However, the land-use history, which involved intensive turf production, both historically and at present has resulted in the degradation of this habitat type. The current condition comprises a mosaic of poor fen, wet grassland, acid grassland with remnant features of the original vegetation in patches (Fig. 2 & 3). In the areas that are currently utilised for turf production, the habitat is bare peat for spreading and drying turf, turf banks and bare peat faces, with associated trackways to transport the turf from the site.

These habitats form a continuous mosaic across the greater part of the site. Bare peat areas grade into acid grassland. This vegetation is characterised by sweet vernal grass, *Anthoxanthum odoratum*, mat grass *Nardus stricta*, with depauperate ling, *Calluna vulgaris* and *Rhytidiadelphus squarrosus* in the bryophyte layer. This can grade into wet grassland, dominated by soft rush, *Juncus effusus* and in wetter parts, poor fen, with *Sphagnum* species and *Polytrichum commune* in the bryophyte layer. In some instances black bog rush *Schoenus nigricans* and deer sedge *Trichophorum caespitosum* with purple moor grass *Molinia caerulea* occur. The occurrence of these typical Atlantic blanket bog species however is discontinuous and patchy.

#### Acid grassland, GS3

This habitat largely occurs along drainage channels and trackways. The vegetation is characterised by low-growing grasses such as sweet vernal grass, *Anthoxanthum odoratum*, mat grass *Nardus stricta*, with depauperate ling, *Calluna vulgaris* and *Rhytidiadelphus squarrosus* in the bryophyte layer. Other species occurring are heath bedstraw *Galium saxatile* and tormentil *Potentilla erecta*. The vegetation is intensively grazed (Fig. 3).

#### Wet grassland, GS4

This habitat comprises wet grassland dominated by soft rush, *Juncus effusus*. Soft rush is generally indicative of poorly drained agricultural soils. The main feature of the vegetation is the soft rush tussocks that range from 0.5m to 1.0m in height. Grasses recorded include Yorkshire fog (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*) and creeping bent (*Agrostis stolonifera*). The grass species are generally low-growing and dominate the inter-tussock spaces. Herbs recorded



include: creeping buttercup (*Ranunculus repens*), sorrel (*Rumex acetosa*), daisy (*Bellis perennis*), marsh thistle (*Cirsium palustre*), with occasional stands of iris (*Iris pseudacorus*). A number of bryophytes are present, including *Rhytidiadelphus squarrosus* and *Eurhynchium praelongum*. These are species commonly found in wet grassland habitat. This habitat is patchy in occurrence and grades into patches of poor fen.



Fig.2. This photograph, taken to the west of the development site facing northwards, illustrates the general character of site. The site is dominated by cutover bog with a range of habitats – bare peat, wet grassland, and acid grassland. This habitat complex is a common feature of northeast Mayo.



Fig.3. This photograph, taken to the south of the development site facing northwards, again illustrates the general character of site. The bare peat areas are clearly seen in the background with acid grassland habitat to the foreground.

#### *Poor fen, PF1 and drainage ditches, FW4*

The occurrence of poor fen vegetation is low and patchy throughout the site. The character species are soft rush, *Juncus effusus* and *Polytrichum commune*, with patches of *Sphagnum* throughout. This



combination is typical of the deep drainage channels throughout the site. The drainage channels are typically 2m to 3m deep and cut to the underlying acidic mineral soil. In instances where shallow water is present, other species were recorded such as pennywort *Hydrocotyle vulgaris* and floating reed grass *Glyceria fluitans*. In areas where the water is stagnant and relatively deep the vegetation is dominated by tall-herb swamp (see next).

#### *Tall-herb swamps, FS2 and lowland rivers, FW2*

The main stream draining the site is meandering and water is slow moving. The stream varied in width but was typically greater than 2m wide and relatively deep at more than 1m. The main feature of the vegetation is the tall herb: iris, *Iris pseudacorus* with pondweed, *Potamogeton polygonifolius* and starwort *Callitriche stagnalis* and cuckoo-flower, *Cardamine pratensis*.

## 4.4 Fauna

### *Mammals*

There were no direct sightings of mammals during visits to the development site. There were a number of sheep grazing the site, which reflects the current land-use of the site. Mammals likely to be traversing the site are foxes (*Vulpes vulpes*) and hares (*Lepus timidus hibernicus*). Other species such as badger (*Meles meles*) may also utilise the site. There is no evidence of badger setts or fox dens. Other species that may be active in the area are pygmy shrew (*Sorex minutus*), wood mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). All of the aforementioned mammals may use the site for hunting and/or foraging (Hayden & Harrington 2000). There are no potential bat roosts on the site.

### *Birds*

A number of bird species were recorded on the site. These included: stonechat (*Saxicola torquata*), robin (*Erithacus rubecula*), skylark, (*Alauda arvensis*), wren (*Troglodytes troglodytes*) and over flying rook (*Corvus frugilegus*) and magpie (*Pica pica*). Other species may utilise the site such as snipe (*Gallinago gallinago*), and meadow pipit (*Anthus pratensis*). A kestrel (*Falco tinnunculus*) was observed hunting over the area.

**N.B.** The general area is significant for over wintering and breeding birds, as noted already. The proposed development site however, is intensively utilised for turf production and there is a lack of suitable habitat for either feeding or breeding grounds.

### *Other vertebrates*

There are no records of vertebrates for the site, however, other vertebrates likely to utilise the area are frogs (*Rana temporaria*) in the drainage channels. Frogs are common in wet grassland areas and the drains provide breeding and feeding areas. It is unlikely that there is extensive use of the area by frogs as the drains may dry-out in spring and summer leading to lack of feeding and subsequent juvenile mortality. Frog breeding activity is more likely in deeper drains and channels.

### *Invertebrates*

No invertebrates were recorded at the site but it is likely that the site is host to common butterflies. A range of small beetles, spiders and ants would also be found amongst the wet grassland vegetation, hedgerows and drainage channels. Invertebrate larvae may utilise the drains for over wintering and feeding.

#### 4.5 Surface drainage

As outlined already, the proposed development site is characterised by a slope in the north easterly direction. There are two main drains flowing in this general direction. Both have been artificially deepened. These north easterly flowing drains enter either the main natural stream to the north or a canalised drain that follows an old trackway, both flowing in a west to east direction. The flow in this artificial interceptor drain is slow and the water is stagnant in parts. This drain flows into the natural stream just east of the development site (see Fig. 4).

*N.B.* This drain will be a key feature in the drainage scheme of the proposed development. The high retention and slow-moving water make it appropriate for settlement of sediments. Settlement ponds will be installed midway and at the endpoint of the drainage channel. All waters draining the activity area will flow through this drain and enter the natural stream at the existing outfall to the east of the development site (see later).



Fig.4 This photograph, taken to the north east of the development site facing eastwards, shows the main artificial interceptor drain that runs to the south of the natural stream. Water movement is slow.

#### 4.6 Habitats and land use in the surrounding area

The habitats adjacent to those within the development site are largely comprised of similar types. There is a high level of turf production in the area and this continues to the shores of Moyrahan Bay. The dominant habitat is therefore cutover bog PB4, with associated turf banks, bare peat, acid grassland, dry heath and poor fen. Other habitats present are scrub, WS1 and built artificial habitats BL3. A derelict Roman Catholic Church to the south of the site may serve as a local bat roost site. There is a small-scale industrial activity to the east of the site. The Broadhaven Bay complex is directly adjacent to the proposed development site just east of the most easterly point of the site.

#### 4.7 Habitats map

The habitats map illustrates the extent of the habitats as outlined above. The dominant habitat is cutover bog with associated habitat. The main artificial drain is fringed by acid grassland, while the natural course of the main draining stream meanders to the north of the site (Fig.1).



#### 4.8 Evaluation of the ecological value of the site and surrounding area

An attempt is made here to provide an evaluation of the habitats within the proposed development site, and also in the context of the habitats recorded directly adjacent to the development site. The evaluation follows the Regini (2000) guidelines for ecological evaluation. This evaluation considers the presence/absence of noteworthy species and a judgement of the viability of the habitat present. The levels of ecological value are listed in Table 2.

Table 2. Levels of Ecological Value

Ecological Value	
A	International value
B	National value
C	Regional Value
D	High local value
E	Moderate local value
F	Low local value
G	Negligible

The proposed development site is considered to have **Negligible value, G**. This category includes 'low grade and widespread habitats' (Regini 2000). This assignment is justified for the following reasons:

- There are no records or sightings of rare plants or animals within the proposed development site and/or the surrounding area.
- The proposed development site and/or the surrounding area do not include any areas designated, or that will be potentially designated, for their ecological value.
- The site is currently utilised for turf production and there is also a high level of sheep grazing ongoing.
- The greater part of the site comprises cutover bog habitat that is widespread throughout the area and not considered of conservation value, either at a national, regional or local context.
- The cutover bog area is intensively drained and unlikely to revert to peat-forming habitat without significant restoration measures. The hydrology has been altered significantly and the area is likely to remain a degraded peatland habitat with potential for expansion of acid grassland communities.

Nonetheless, the site drains into the Broadhaven Bay complex, an area that is covered under 5 conservation designations for its ecological significance. While the proposed development site is considered to be of negligible value, its proximal location to this sensitive complex is noted. The site is considered in this context in relation to potential impacts.



## 5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

### 5.1 General features

The proposed development is for the establishment of a waste disposal area on an area of cutover bog at Tallagh, Belmullet, Co. Mayo. The site covers 25.5ha, of which 22ha will be utilised for the activity. A buffer zone will remain un-developed between the interceptor drain and the stream north of the site (3.5ha). The development will involve the upgrade of the existing main access route and trackways throughout the site. The drainage pattern will also be upgraded to provide for adequate run-off and treatment of waters leaving the site. Settlement lagoons will be installed to ensure that any water leaving the site will be treated before entering the local watercourses.

### 5.2 Disposal of recovered material

The developer proposes to dispose of recovered material from development sites within the local area. The nature of the recovered material will be peat/clay/silt/sands/gravel/cobbles/boulders. The maximum volume of material disposed at the site will be 162,000 m<sup>3</sup>. The activity will be on a staggered basis over a period of 10 years. Recovery will involve the loading of the material using 360 degree 25 tonne to 35 tonne excavators into A25 or A40 or HGVs to be transported into the designated areas where they will be tipped and controlled by a D6 dozer to ensure compaction and confinement of the material. The recovered material will be deposited on site to a depth of 1m maximum over the current surface. Disposal will commence at the west of the site, and gradually move in an eastward direction as the area is covered.

### 5.3 Surface water drainage

The activity will be restricted to the area outlined in Fig. 5, to the south of the artificial interceptor drain (22ha of total 25.5ha area). This will be the main drainage channel from the site, and settlement lagoons<sup>2</sup> will be established along this drain for treatment of surface run-off. A number of superficial drains will also be excavated, the location depending on contours. A sketch of the proposed drainage pattern is outlined in Fig. 5. The drainage plan will be adapted as areas are covered (relating to new levels, material type and settling of material). A 2m buffer zone along these drains will remain undisturbed.

The settlement lagoons will be maintained for the life-time of the activity and beyond if considered necessary by the licensing authority. The recommended locations of the settlement lagoons and drainage pattern are shown on Fig. 5. Water will enter the main drainage channel of the natural stream east of the development site at the existing outfall point. Therefore, all water draining the site will be treated before leaving the site. Water sampling will be conducted at regular intervals to ensure sediment loads are within prescribed limits.

### 5.4 Traffic

The material will be disposed at irregular intervals and the traffic that will be generated is considered to be low intensity and at irregular intervals. Vehicles leaving the site will be cleaned to reduce the requirement for road cleansing.

### 5.5 Stabilisation of disposed material

As the proposal involves staggered disposal of recovered material over a period of 10 years, it is anticipated that the recovered material will colonise naturally with local species over that period and therefore stabilise in a sustainable manner. This will be a gradual process, but it is likely that the material will be colonised within the first growing season by soft rush, *Juncus effusus*, with a slower colonisation of other species typical of disturbed habitats and grassland communities.

<sup>2</sup> The size of the silt ponds will be related to the catchment area and based on a standard formula.

## 6 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

The levels of magnitude of impact are assessed according to the Regini (2000) guidelines (see Appendix). Impacts are considered as (a) temporary (0-25 years) and (b) permanent (from 25 years) following from the initiation of development (Regini 2000).

### 6.1 Temporary impacts during proposed activity

There will be a number of temporary impacts on the site during the upgrading of the required transport and drainage infrastructure and the actual disposal of the recovered material.

#### *Designated conservation areas*

There are a number of designated conservation areas within 10km of the proposed development site and these are listed in Table 1. The most proximal area of potential impact is Moyrahan Bay, which is part of the Broadhaven Bay complex. There will be no temporary impacts on any designated conservation areas, given that the developer intends to introduce the recovered material over a period of 10 years at a low-intensity of activity, and an appropriate surface water treatment management plan is implemented.

There will be no impact from development of the site on any species listed as rare or scarce. There will be no effect on species listed under Annex II and IV of the Habitats Directive.

#### *Habitats*

There will be a high magnitude temporary impact on the habitats within the development site. The development involves the introduction of recovered material to a maximum depth of 1m over 90% of the site area. The material will be compacted and shaped using heavy machinery. This will result in complete loss of the existing habitat. Drainage channels will be re-directed and maintained to allow for treatment of the drainage waters in settlement lagoons.

As the activity may continue at the site for up to 10 years, the impacts will remain of high magnitude over discrete areas within the site as the area is covered gradually over this period. A completely new habitat will be created in place of the cutover bog habitat. There will be no temporary impacts on habitats in the surrounding area, given that the activity will be restricted to the development site.

#### *Fauna*

There will be **high magnitude** impact on the fauna present in the development area. This will be largely due to the loss of habitat from the site.

### 6.2 Permanent impacts of the development

Under the Regini (2000) guidelines, the permanent impacts are considered in the period after 25 years of onset of the development.

#### *Designated conservation areas*

There will be **no permanent impacts** on any designated areas within 10km of the proposed development site.

#### *Habitats and fauna*

There will be no negative permanent impacts on habitats and fauna from the development. As stated previously, the development will result in a replacement artificial habitat that may with time form part of the greater SAC-NHA network either as a wildlife sanctuary/reserve. The potential permanent impact is therefore considered to be of **very low magnitude**.



## 7 DO-NOTHING SCENARIO

If the proposed development does not proceed, the site will continue to be utilised for turf production and sheep grazing. The site will remain as a cutover bog habitat. There is potential for this habitat to increase in ecological value over time and cutover bogs can be diverse systems. However, there is no *timeframe for cessation of activity* and the site will continue to be degraded through current land-use. There would be no changes in the ecological value of the site and/or the surrounding area and no impacts on current populations of species.

## 8 MITIGATION MEASURES

In any planning application mitigation measures should be included as appropriate to avoid or reduce any *negative impacts on flora, fauna, habitats and aquatic systems*.

Proposed mitigation measures outlined in the planning application are (a) the provision of settlement lagoons for treatment of water before leaving the site (see Fig. 5) and (b) a planned programme of disposal to minimise the footprint of activity at any time during the 10 year period of use. It is also recommended that disposal commence in the most westerly parts of the site with gradual movement over the 10 year period in an eastward direction. It is not anticipated that there will be a high sediment load from the *disturbed cutover bog habitats*. However, *drainage channels* will be re-directed and maintained to allow for treatment of the water in settlement lagoons before leaving the site.

These proposed measures will respectively, mitigate against elevated silt entering drainage waters and affecting the adjacent designated area, while reducing the impact footprint at all times of activity within the area.

Operating hours could also be restricted to *between 8am to 6pm* to reduce the impact of disturbance on faunal activity.

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## 9 PREDICTED IMPACT OF THE PROPOSED DEVELOPMENT

### 9.1 Direct and indirect impacts

The impact of the development will be a product of (a) traffic onto the site, (b) the loss of habitat, (c) the development of artificial habitat in its place, and (d) the mitigation measures incorporated into the design and operating phases.

Based on the field and desk studies presented here, it is predicted that the impact of the development on the proposed development site will be of **minor or negligible ecological significance** (Regini 2000, see *Table 4 in Appendix*). This evaluation is based on consideration of:

- The negligible ecological value of the proposed development site.
- The widespread occurrence of similar habitat type within the local area and directly adjacent to the development site.
- The implementation of the outlined mitigation measures.
- The installation of settlement ponds for treatment of water leaving the thereby mitigating against potential impacts on the Broadhaven Bay complex.
- The restriction of activity to the minimal footprint area for the duration of the activity.
- The relatively staggered and slow covering of the area over a 10 year period (low-intensity operation), thereby reducing the level of disturbance to discrete parts of the site at any time over the 10 year period.

The main negative impacts as outlined previously will be the loss of cutover bog habitat, which is common in the local area, and disturbance of faunal activity through loss of habitat and disturbance. These are viewed as temporary and direct impacts, restricted to the duration of activity on the site. As outlined they will be high magnitude impacts on the actual development area, but considering the **negligible ecological value** of this habitat, the overall predicted impact is of **minor or negligible significance**.

Treatment of water will mitigate against any potential impacts on the adjacent designated areas thereby reducing the overall predicted impact. In the permanent impact view, natural colonisation of the site will allow the area to blend with the surrounding landscape. This in turn will lead to indirect effect through provision of an alternative semi-natural habitat and potential enhancement of local biodiversity of habitats and species.

There are no negative indirect effects foreseen from the development on the flora and fauna within the local, regional and national context. The worst-case scenario prescribed would be no treatment of water leaving the site. Even at this, the impact would be considered to be of low magnitude due to the low intensity of the activity. The inclusion of the mitigation measures minimises the effects to direct effects on the development site only.

### 9.2 Cumulative impacts

The development should be considered in the context of land-uses in adjacent areas. In particular the low-intensity industrial activity to the east of the proposed development site. The commercial mushroom production unit is restricted to a small footprint and is enclosed. The site was probably cleared of habitats and may have been used for sand/gravel quarrying prior to its current use. There has been no loss of ecologically significant habitat from the area. Disturbance through noise and traffic has not impacted negatively and there is no run-off from the site (consultation with NPWS). The main impact is visual, relating to the number of tunnels present on site.

Given that the proposed development will also be of low-intensity and screened from the existing main roadway, the cumulative impacts of both developments are therefore considered to be of low impact magnitude. This is given the absence of activity other than the current levels described and the implementation of the outlined mitigation measures.

## 10 MONITORING

Regular sampling of treated waters should be carried out to ensure that sediment levels remain within prescribed limits and that settlement lagoons are operating effectively. This will be subject to requirements set by the planning authority and/or recommendations from the North Western Regional Fisheries Board (NWRFB).

The drainage of the site should also be checked at regular intervals to ensure that it is operating effectively for the duration of the activity. This will involve maintenance of drains and also altering the drainage system if necessary. This should be included in an annual report (see next).

It is recommended that the developer submit an annual report detailing the amount of material disposed of at the site and the area covered. This will allow the local authority to track the rate of disposal over the 10-year period and ensure that the activity remains at the intended low-intensity.

Vegetation establishment on the introduced recovered material should be monitored. This can be addressed by including photographic records in the proposed annual report.

## 11 REINSTATEMENT AND RESIDUAL IMPACTS

### 11.1 Re-instatement

There is no re-instatement necessary. The area will re-colonise naturally and self-sustaining habitats will establish on the recovered material.

### 11.2 Residual Impacts

There are no negative residual impacts foreseen at this stage of the development.

## 12 REFERENCES

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