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Retention and development of sandpit
at Ballinrooaun, Screen Co wexford

Further information & clarification

Ecology

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Wexford County Council
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Planning Section

Report prepared for Sean Kelly

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1. INTRODUCTION

The purpose of this report is to examine the possible impacts of the developing sand quarry on the proposed Natural Heritage Area of Screen Hills (Code No 0708) and on the adjoining candidate SAC of the same name. The portion included in the SAC is currently being restored to a plan (October 2008) submitted to the NPWS.

The report takes the form of an appropriate assessment under the terms of the EU Habitats Directive because of its potential effects on a Natura 2000 site. It answers Item 1a & b in the request for further information and deals with other matters raised in the request for clarification (17/4/09), and by the NPWS in the DAU letter of 16/4/09 and later meeting (27/4/09).

2. BASIS FOR DESIGNATION

The site synopsis (see end) describes the site as containing important examples of two habitats listed on Annex I of the EU Habitats Directive, i.e. oligotrophic lakes and dry heath formations. Both are unusual examples because of site specific reasons related to the glacial deposit. The soil material is acid sand which was deposited by wind in the tundra conditions at the edge of an ice sheet. It was also scattered with remnant blocks of ice which later melted to give the undulating kame and kettle topography. Other examples of oligotrophic lakes are generally on rock in the western half of the country while dry heath more commonly has a peaty content and is covered by heather (NPWS 2008).

The designated site also supports a number (6) of rare plants which are included in the Red Data Book list (updated by NPWS since Curtis and McGough 1988). Four of them are currently protected by the Flora Protection Order 1999 – *Filago minima*, *Lotus subbiflorus*, *Gnaphalium sylvaticum* and *Scleranthus annuus*.

3. CONSERVATION OBJECTIVES

Conservation plans are being prepared for candidate SAC's and the draft plan for this site has the following objectives

1. To maintain the Annex I habitats, for which the Screen Hills cSAC has been selected, at favourable conservation status: (lowland) oligotrophic lakes and dry heath.
2. To maintain the extent, species richness and biodiversity of the entire site
3. To establish effective liaison and co-operation with landowners, legal users and relevant authorities

Favourable conservation status is achieved when the habitats or species in question are maintaining themselves or increasing in extent or numbers and when the habitat is large enough to support a viable population.

4. EFFECTS OF DEVELOPMENT

4.1 Screen Hills cSAC

The development is not in the cSAC itself so that any effects would have to be transmitted through the groundwater or be windblown or otherwise transported from the site.

4.1.1 Watertable

The groundwater report (BMA Associates) shows that the base of the pit is far (28m) above the winter watertable so that operations in the present and future will not alter groundwater levels. Adjacent lakes are ponded features supported on a perched watertable and thus not in contact with groundwater – they are fed by run-off from the slopes around. In addition the contour levels of the groundwater indicate a flow to the north-east, away from the cSAC. There are no waterbodies dependant on ground water in this direction (see Groundwater Report April 2009).

The development at Ballinrooaur cannot affect the few larger lakes (e.g. Doo Lough) that are groundwater controlled as it will not change the height or direction of flow of the groundwater.

Changes in landform caused by future extraction will if anything increase the drying out of adjacent land and assist in the development of additional dry heath habitat in the surroundings.

4.1.2 Pollutants

Materials that could potentially leave the site include oil and other chemicals which would be leached to the watertable from the quarry floor and also the sand that could be blown onto adjacent fields, including the SAC.

Contaminants from machinery can be fully prevented by appropriate mitigation measures on the quarry floor (see elsewhere). Some superficial loss of sand is likely in the vicinity of the quarry faces but it will be deposited close at hand (10-20m) as at present. Wherever it goes it will lighten the existing soils and improve the habitat for most of the specialised plants for which the site is designated. This is noticeable close to the (Roadstone) quarry in Kilmuckridge where additional dry heath habitat occurs in unworked areas.

During site restoration there will be no import of outside materials which might have a different composition to those there at present.

4.2 Screen Hills pNHA

The NHA area includes the cSAC but also extends to the north and west as a band of 300-700m width. The development is planned within this zone and there would be an extension of 200m into it by the pit. Although this could be assumed to be habitat loss the ground at present is in agricultural grassland without any significant diversity of species.

4.2.1 Vegetation

The cover is based on common grasses, ryegrass *Lolium perenne* and crested dogstail *Cynosurus cristatus* and white clover *Trifolium repens* with a little cocksfoot *Dactylis glomerata* and red fescue *Festuca rubra* in places. It is fertilised regularly and has nutrient-demanding species such as chickweed *Stellaria media* and sticky mouse-ear *Cerastium glomeratum* mixed through. In a few places, in slight openings, there are common broad-leaved plants characteristic of the rest of the area, for example

<i>Geranium molle</i>	soft cranesbill
<i>Bellis perennis</i>	daisy
<i>Hypochoeris radicata</i>	catsear
<i>Erodium cicutarium</i>	common storksbill
<i>Rumex acetosa</i>	sorrel
<i>R. acetosella</i>	sheep's sorrel
<i>Sherardia arvensis</i>	field madder

Subsequent to topsoil removal some *Scleranthus annuus* was reported in August 2008 and a little *Ornithopus perpusillus* in October 2008 growing on the 'scraped' ground above the pit.

4.2.2 Fauna

There is no vertebrate fauna present in the field in question except for the rabbit which has burrows in the surrounding hedgerows. Hares, fox and badger are likely to occur at times but there was no actual evidence of them on site. In addition the stoat and pygmy shrew would be expected because of the habitat.

The bird life is based in the hedges with pheasant, blackbird, dunnoek, wren and linnet the only species seen during site visits in winter (a few woodpigeon were also feeding in the fields). In summer whitethroat, stonechat, song thrush and robin are additional breeding species locally. Although there are skylark and yellowhammer in the general area the actual habitat within the site does not suit them for nesting.

The lack of diversity in the vegetation means that the butterfly and other insect life is very limited on site. There are no suitable banks for ground-nesting bees though the hedges do have suitable sites for bumble bee nests.

4.2.3 Soils

Details of local soils were collected by sampling in April 2009 in order to more fully assess the likely impacts of the development.

4.2.3.1 Methodology

Standard agricultural soil samples were taken with a funnel corer to a depth of 100mm and analysed at the Teagasc soil laboratory in Johnstown Castle. This method was chosen so as to be relatively quick, easily repeatable and suitable for shallow rooting annual plants – the more interesting members of the local flora. Samples were taken from five sites (see Photo 1), two in an extensively grazed field east of the site which has had virtually no artificial fertiliser added to it recently (M. Kelly, pers.comm.), two from the topsoil removed from the current sandpit which would be used for restoration and one from the field where it is planned to extend the quarry. The existing flora in a 3 x 3m area on these sites was recorded at the same time as sampling.

The field to the east is thought to represent an appropriate form of management for the Screen Hills cSAC and is one of few fields in the immediate area that is not intensively farmed. A former quarry occurs ESE of the area under discussion

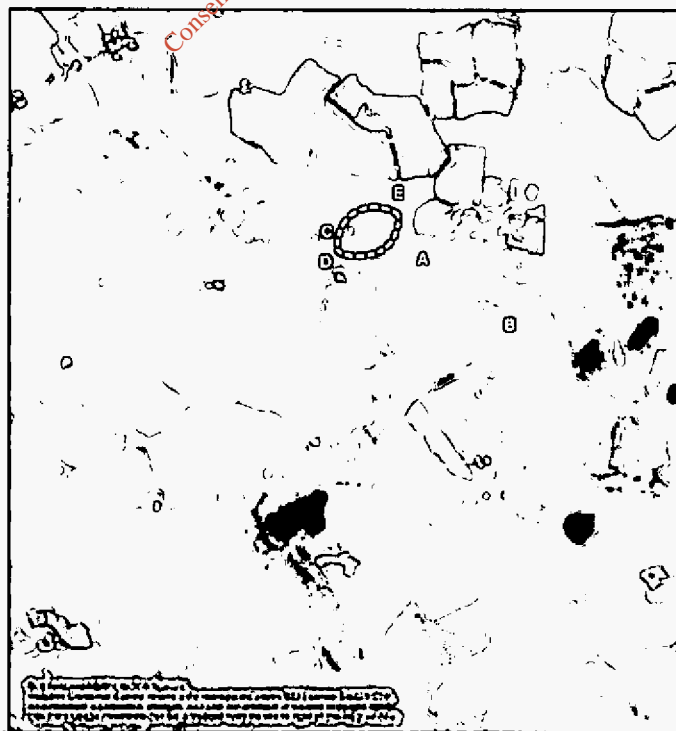


Photo 1. Aerial photo showing rough outline of pit and sampling locations around it

4.2.3.2 Vegetation at soil sampling locations

A Adjoining grassland

A high, nutrient-rich point in the adjacent pasture used as a cattle lie with a good grass cover but also a few niches for annual plants. The species in rough order of abundance are *Lolium perenne*, *Cynosurus cristatus* and *Poa pratensis*; also *P. annua*, *Geranium molle*, *Veronica arvensis*, *Bellis perennis*, *Veronica chamaedrys*, *Ranunculus bulbosus*, *Senecio jacobaea*, *Hypochoeris radicata*, *Cerastium glomeratum* and *Viola tricolor*.

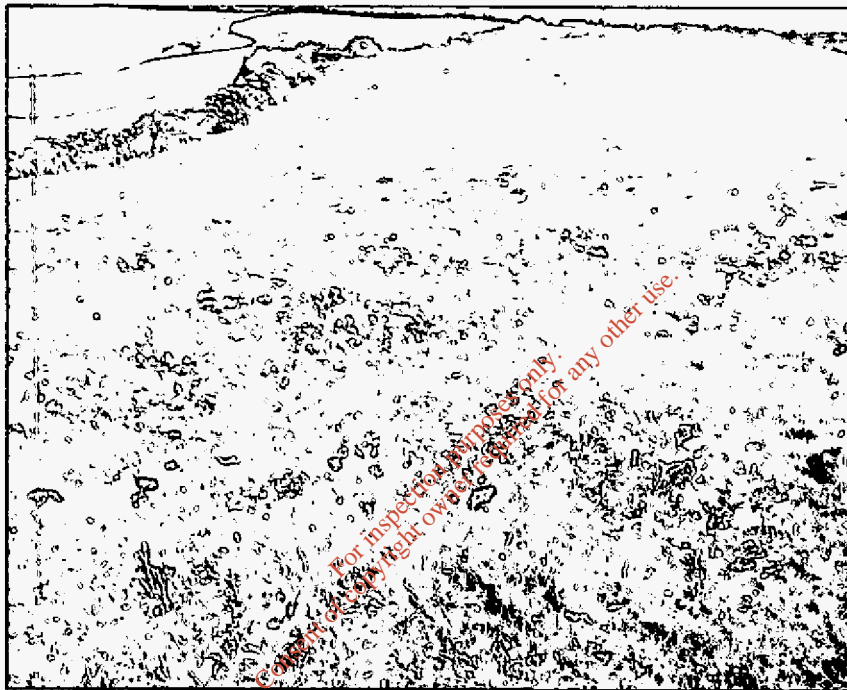


Photo 2. High point of field looking east (A)

B Adjoining grassland

A heathy slope close to a valley or former quarry, covered by gorse. The vegetation consists of *Luzula campestris*, *Anthoxanthum odoratum*, *Festuca rubra*, *Trifolium repens*, *Lotus corniculatus*, *Agrostis capillaris*, *Viola riviniana*, *Veronica officinalis*, *Rumex acetosella*, *Hypochoeris radicata*, *Veronica chamaedrys*, *Ornithopus perpusillus*, *Pteridium aquilinum*, *Brachythecium albicans* and *Rhytidiadelphus squarrosus*. The frequency of a *Bovista* species in the surroundings, probably *B. nigrescens*, was notable.



Photo 3. Dry slope with former quarry to left (B)

C Overburden (topsoil) pile to west

The uneven top surface is partly covered by tall plants in summer with gaps still showing some sandy soil. The dominant plants are *Elytrigia repens*, *Rumex acetosella*, *Veronica persica*, *Vicia sativa*, *Poa trivialis*, *Cerastium glomeratum*, *Taraxacum officinale*, *Erodium cicutarium* and *Carduus nutans*. *Ornithopus perpusillus* present on unstable slopes.

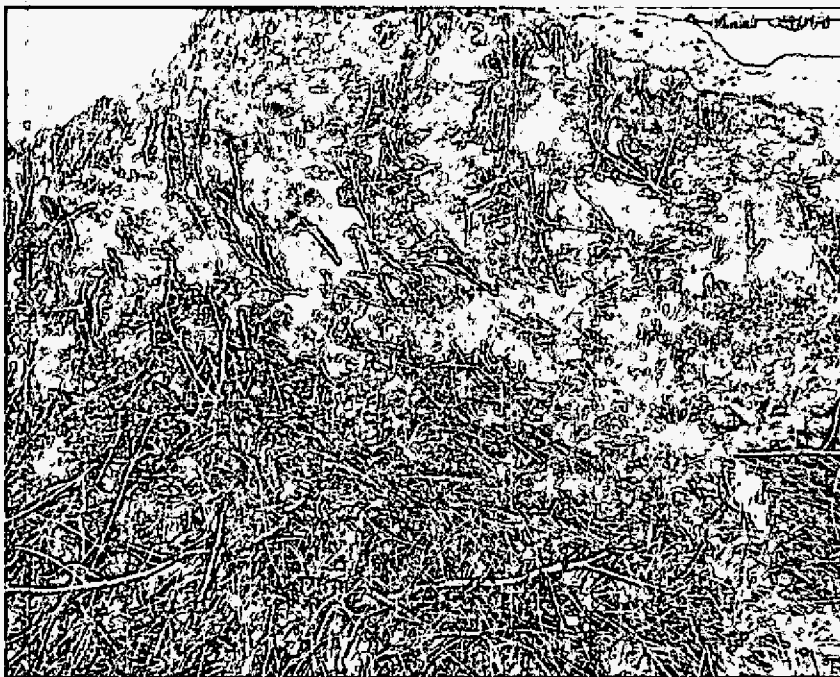


Photo 4. Top of overburden piles: note bluish *Carduus nutans* (C/D)

D Overburden (topsoil) pile to south

Slightly older and more completely vegetated pile again dominated by *Elytrigia repens* with *Trifolium repens*. Additional species are *Geranium molle*, *Carduus nutans*, *Taraxacum officinale*, *Poa annua*, *Cerastium fontanum*, *Cardamine hirsuta*, *Senecio vulgaris* and *Rumex acetosella*.

E Field north of pit

This is an intensive pasture for cattle fertilised with pig slurry and CAN. The grasses consist of *Lolium perenne*, *Bromopsis hordeaceus* with a little *Dactylis glomerata* and *Festuca rubra*. Other species within 1.5m are *Bellis perennis*, *Geranium molle*, *Taraxacum officinale*, *Veronica persica*, *V. arvensis*, *Cerastium glomeratum*, *Luzula campestris* and *Hypochoeris radicata*.

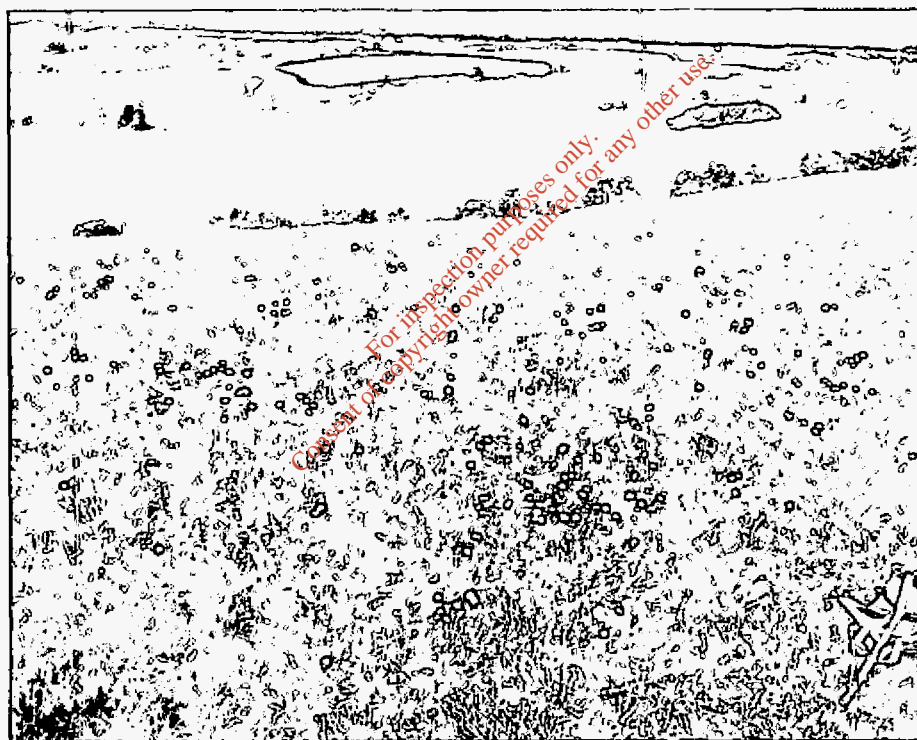


Photo 5. Grazed field with *Bellis perennis* prominent (E)

4.2.3.3 Species requirements

Some guidance as to the pH and nutrient requirements of the more interesting species is given in Hill *et al* (2004) which is based on Ellenberg's work on indicator values. Two attributes are shown in Table 1 - the soil acidity (1 extreme acidity – 9 calcareous or other high pH soil) and soil fertility (1 extremely infertile – 9 extremely rich). Four additional species that have not been seen on the site are included, as they represent the distinctive element of the Screen Hill flora

Table 1. Acidity and nutrient requirements of local plants

Species	Soil acidity	Nutrient richness
* <i>Filago minima</i>	4	2
<i>Rumex acetosella</i>	4	3
<i>Ornithopus perpusillus</i>	4	3
* <i>Gnaphalium sylvaticum</i>	4	3
<i>Veronica officinalis</i>	4	4
<i>Scleranthus annuus</i>	4	4
<i>Luzula campestris</i>	5	2
* <i>Trifolium striatum</i>	5	2
<i>Hypochaeris radicata</i>	5	3
<i>Viola tricolor</i>	6	4
<i>Veronica arvensis</i>	6	5
* <i>Lotus subbiflorus</i>	6	5
<i>Geranium molle</i>	6	5
<i>Cerastium glomeratum</i>	6	5
<i>Elytrigia repens</i>	7	7
<i>Carduus nutans</i>	8	5

* other rare plants in area, not seen near this site

4.2.3.4 Soil results

The local area has a distinct soil type, the Screen Series (Gardiner *et al* 1964) with a coarse sandy texture and is subject to considerable leaching, resulting in base depletion. The profile (Photo 6) consists of dark greyish-brown upper horizon (25cm in photo) overlying a yellowish-red layer (10cm) where the iron and leached constituents accumulate. This merges with the yellowish-brown parent material beneath. All horizons are recorded as being of coarse sand with a percentage content of 93-97%. Available nutrients and base saturation are very low and the pH values then recorded varied between 5 and 5.3 in the upper horizons. The natural vegetation is recorded as including *Pteridium aquilinum* and *Rumex acetosa*, with *Calluna vulgaris*, *Ulex europaeus* and *Erica cinerea* on the summits of the hills.

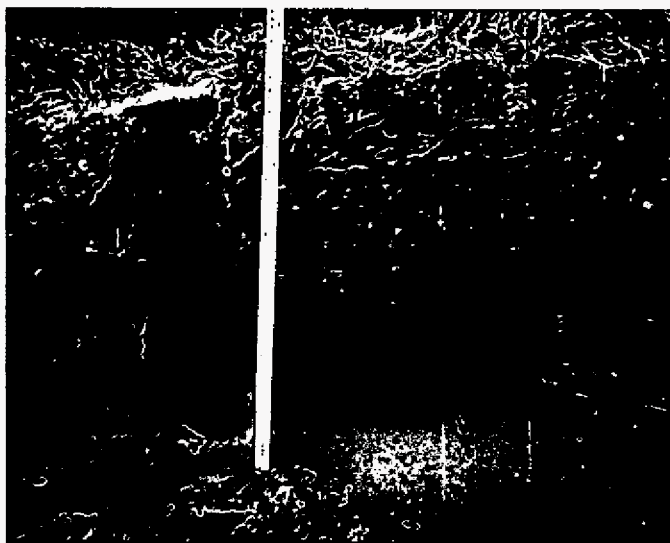


Photo 6. Soil profile in scraped ground above pit (Site E). Scale 70cm long in total.

Table 2. Results from soil laboratory (April 2009)

Sample	pH	P-available	K	Mg
A	6.88	35.7	88.4	314.4
B	6.42	1.4	40.9	157.3
C	7.19	3.5	122.6	188.6
D	7.12	3.4	106.0	163.0
E	6.60	3.3	45.0	220.0

The current analyses (above) show the most natural field soil (B) has the lowest pH (6.4) and lowest levels of nutrients. This site carries a vegetation suitable for many of the rarer species of the area, e.g. *Ornithopus perpusillus*, *Scleranthus annuus* and *Gnaphalium sylvaticum* which correspond in their soil requirements to *Veronica officinalis* and *Rumex acetosella* (Hill *et al* 2004). A cattle lie (A) in the same field grossly inflates the available phosphorus and magnesium level but still allows some annual plants into the stand such as *Veronica arvensis*, *Viola tricolor* and *Geranium molle*.

The grazed and fertilised field north of the pit (E) has relatively low available phosphorus and potassium despite fertilisation, but still shares with B the *Luzula campestris* of nutrient-poor soils.

The topsoil piled around the existing pit (C & D) has similar levels of P as the managed grassland but an increase of potassium because of the mixing of layers. Both will be subject to leaching in the future but their levels already allow the growth of *Ornithopus perpusillus* and *Rumex acetosella*. These soil characteristics would also suit *Scleranthus annuus* and *Lotus subbiflorus*. The presence of *Carduus nutans* is of interest as it generally requires a more basic soil. It also occurs around the margins of tillage fields nearby and is probably connected with open soils of moderate nutrient status. It would be expected to die out in the topsoil when nutrients are removed by leaching, as would *Elytrigia repens*, a species that has appeared in abundance on the restored slope. The topsoil shows very similar levels of magnesium to the unmanaged site (B) showing that this nutrient is more stable in the soil than either K or P.

4.2.3.5 Ecological impacts

The restoration proposed is simply to cover the slopes with mixed topsoil and gravel as in the SAC restoration and wait 1-2 years for a vegetation cover to develop from the included seeds, and through wind and other natural dispersal. Experience with the current restoration shows that soil compaction is not a problem with these light soils and that a slope below 30° is relatively stable. A small amount of rainwash of fine material has occurred there but no gullyng. Slopes in the restoration plan are set at 26.5° which will allow access for grazing cattle. Slopes at the nearby Blackwater Quarry which is unrestored are above 30° and the sides have scattered gorse bushes and moving sand. There is no possibility for grazing animals except for rabbits.

Natural colonisation involves mosses and annual plants at the outset and these are succeeded by grasses and legumes in the low nutrient conditions. Around the pit at

present there is birdsfoot trefoil *Lotus corniculatus* (see table below) and hairy birdsfoot *Ornithopus perpusillus* with much corn spurrey *Spergula arvensis* and storksbill *Erodium cicutarium*. Where more fertile topsoil is involved, as in the restoration proposals, the growth is taller with a variety of agricultural weeds and also some characteristic plants of the area like musk thistle *Carduus nutans*, the musk storksbill *Erodium moschatum* and wild pansy *Viola tricolor*. Rarer plant species, the cudweeds *Filago minima* and *Gnaphalium sylvaticum*, knawel *Scleranthus annuus* and hairy birdsfoot trefoil *Lotus subbiflorus* occur in the region from Kilmuckridge to Curracloe and may appear in future. The risk of impoverishment of the local flora is very low as the stored topsoil will retain the normal seedbank since it is open and aerated.

Table 3. Status and likely impacts on plants mentioned above

Species	Irish status	Short term impact during site works	Long term impact
<i>Bellis perennis</i>	Abundant	Decrease	None
<i>Carduus nutans</i>	Rare, mainly Wexford	Increase during restoration	None
<i>Erodium cicutarium</i>	Frequent, coastal	Increase on edges	Increase
<i>Erodium moschatum</i>	Occasional	Increase during restoration	None
† <i>Filago minima</i>	Rare, Wexford, Kerry, Tyrone	Not present	Potential sites
<i>Geranium molle</i>	Common	Increase during restoration	Increase
† <i>Gnaphalium sylvaticum</i>	Rare but countrywide	Not present	None
† <i>Scleranthus annuus</i>	Rare, declining	Increase on edges	Potential sites
<i>Hypochoeris radicata</i>	Abundant	Negative	None
<i>Lotus corniculatus</i>	Abundant	Increase after restoration	Increase
† <i>Lotus subbiflorus</i>	Rare, southern	Not present	Potential sites
<i>Ornithopus perpusillus</i>	Occasional, eastern coastal	Increase on edges	Increase
<i>Spergula arvensis</i>	Common, arable weed	Increase on edges	None
<i>Rumex acetosella</i>	Common, acid soil	Increase on edges	None
<i>Rumex acetosa</i>	Common, grassland	Loss of habitat	None
<i>Sherardia arvensis</i>	Common, disturbed ground	Increase on edges	Increase
<i>Viola tricolor</i>	Countrywide, esp. east	Increase during restoration	None

†protected species

5. DISCUSSION

5.1 Soil conditions

The soil results show that the topsoil removed from the current operation is very similar in P and K to the field soil to the north – as would be expected. They also suggest that nutrient content may not be that significant for the rare plants and that it is more the disturbance and the creation of open soil that allows them to grow. In this way already *Ornithopus perpusillus* and *Carduus nutans* (two species with differing nutrient requirements, see Table 1) grow on the topsoil, provided there is an open vegetation cover. Leaching is acknowledged to be quick in the soils and is likely to occur rapidly when they are opened up and spread on a restored surface. Most of the P and N will be in the form of organic matter which will be oxidised with the good drainage and open texture of the sand. Non-calcareous soils have been found to lose phosphate more rapidly than calcareous soils and those close to neutral more rapidly than strongly acidic ones (Tunney *et al* 2007).

Another factor that will tend to reduce nutrient levels in the spread topsoil is that it will be thinner than the existing layer today. The new profile of the quarry will have a greater surface area than that of the preceding field.

The restoration that has been done with stored topsoil in January has resulted in a SW-sloping surface on which *Elytrigia repens* and *Spergula arvensis* are the commonest species after three months. Other seedlings that have appeared are *Rumex acetosella*, *Taraxacum officinale*, *Trifolium repens*, *Polygonum aviculare*, *Erodium cicutarium*, *Hypochaeris radicata* and *Senecio jacobaea*.

5.2 Management

Light grazing will be done when appropriate to prevent the spread of gorse. This will maintain slightly unstable slopes where animal treading will bring fresh sand to the surface, suitable for the specialised flora. The heathland habitat depends on some form of disturbance (burning or grazing) and the methods proposed would be a way of adding biodiversity to an area currently dominated by agricultural grassland.

Animals would not be wintered in the worked out area as they would add too much nutrient to the adjacent heath habitat.

The only planting proposed is to reconnect the hedges at the southern and northern ends of the site to improve the connectivity of the habitat for fauna. Oak, hawthorn and holly are the species to be used as they are native to the area.

On going monitoring of the SAC restoration will be used to augment or alter any management found necessary in the current development.

5. CONCLUSIONS

The proposals will not have any detrimental influence on the conservation objectives for the SAC. There will be no loss of or negative impacts on the oligotrophic lakes or dry heath there.

The overall effect of the quarrying activity will be to produce new areas of disturbed soils in a landscape to which cattle will have temporary access. The steeper slopes will retain an open vegetation cover and with subsequent leaching will develop as dry heath habitat. This will result in a better outcome for the ecology of the pNHA than the intensification of agricultural activity that is prevalent in most other fields in the area. The biodiversity of native plants is likely to be increased.

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SITE SYNOPSIS

SITE NAME: SCREEN HILLS

SITE CODE: 000708

The Screen Hills are located in the south-east of Ireland just north of the Wexford Slob. The site is characterised by the glacial landscape known as "kettle and kame". This term refers to kettlehole lakes in hollows between hills.

The site contains two habitats listed on Annex I of the EU Habitats Directive: oligotrophic lakes and dry heath formations. The many lake basins mark the positions of former ice blocks in an acidic, sandy moraine. The lakes in the site are of two types: those which are more low-lying and in contact with groundwater are influenced by what is occurring over a wide area. Other lakes are suspended at a height above the regional water-table and are influenced by the area immediately surrounding them. These lakes can usually be considered oligotrophic although nutrient input from the adjacent land may change this. The lakes vary in size, most being pond-sized, and have widely different plant and animal communities. These include bog formation in all stages, from open sandy shores with only a narrow band of emergent vegetation, to wide rafts of floating fen type vegetation, to small *Sphagnum* bogs with Royal Fern (*Osmunda regalis*), to consolidated Heather/ Willow/ Birch (*Calluna/Salix/Betula*). Many plant species which are rare in south-east Ireland are currently found in these lakes. They include Fen Sedge (*Cladium mariscus*), White Water-lily (*Nymphaea alba*), Shoreweed (*Littorella uniflora*) and Lesser Bladderwort (*Utricularia minor*). Species of good quality boggy habitats are widespread, such as Lesser Tussock-sedge (*Carex diandra*), Marsh Cinquefoil (*Potentilla palustris*), Marsh St. John's-wort (*Hypericum elodes*), Lesser Water-plantain (*Baldellia ranunculoides*) and Water Dock (*Rumex hydrolapathum*). Lake edges in grazed fields have species typical of exposed mud such as Water-purslane (*Lythrum portula*), Nodding Bur-marigold (*Bidens cernua*), Trifid Bur-marigold (*B. tripartita*) and Lesser Marshwort (*Apium inundatum*). Six-stamened Waterwort (*Elatine hexandra*) has been recorded but not recently re-found.

Dry heath at the site is extensive and species-rich. The heath vegetation at the site differs from most heaths elsewhere in the virtual absence of Heather, and in the presence of a diverse range of annual species. Substantial populations of the following Red Data Book species have been found at this very important and complex site and in other localities on and adjoining the moraine: Slender Cudweed (*Logfia minima*), Heath Cudweed (*Omalotheca sylvatica*), Hairy Bird's-foot-trefoil (*Lotus subbiflorus*) and Bird's-foot (*Ornithopus perpusillus*). Musk Thistle (*Carduus nutans*), another Red Data Book species, is also present in large numbers. It may have been introduced with cattle feed, but is thoroughly established. Other typical plant species of the heath at this site include Common Bent (*Agrostis capillaris*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Sorrel (*Rumex acetosella*), Tormentil (*Potentilla erecta*), Violets (*Viola* spp.), Common Cudweed (*Filago vulgaris*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Bracken (*Pteridium aquilinum*) Gorse (*Ulex europaeus*) and the

uncommon Knotted Clover (*Trifolium striatum*), Lesser Trefoil (*T. dubium*) and Annual Knawel (*Scleranthus annuus*).

The site is under threat because of reclamation for intensive agriculture. Some fields have been re-seeded with Perennial Rye-grass (*Lolium perenne*), while others have been brought into crop production. This process of agricultural improvement eventually leads to the loss of rare plant habitat and also increases the risk of pollution to the lakes.

The Screen Hills contain important examples of two habitats listed on Annex I of the EU Habitats Directive. The presence of several Red Data Book plant species adds further importance to this site.

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