

BTO Research Report No. 82

ECOLOGICAL ASSESSMENT  
OF THE IMPACT OF ROAD  
CONSTRUCTION ON  
MERLIN (*Falco columbarius*)  
and  
HEN HARRIER (*Circus cyaneus*)  
IN PERTSHIRE

prepared by

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## CONTENTS.

- 1.0 Summary.
- 2.0 Aim.
- 3.0 Description.
  - 3.1 Background.
  - 3.2 Description of study area.
  - 3.3 Description of proposed operations.
  - 3.4 Species profiles.
    - 3.41 Merlin
    - 3.42 Site-specific data for Merlin.
    - 3.43 Hen Harrier.
    - 3.44 Site-specific data for Hen Harrier.
  - 3.5 Other ornithological interest.
  - 3.6 Legal constraints.
- 4.0 Assessment of impacts.
  - 4.1 Habitat loss.
  - 4.2 Disturbance.
    - 4.21 Human disturbance.
    - 4.22 Noise pollution.
- 5.0 Conclusions.
- 6.0 Recommendations.
- Appendix 1. List of Scottish birds given special protection under Annex 1 of EC Directive 79/409/EEC and its amendment 85/411/EEC.
- Appendix 2. References.
- Map 1. Map of study area showing the routes of the haul road.

## 1.0. SUMMARY.

**Aim.** To prepare an ecological assessment of the impact of road construction on breeding Merlin ( *Falco columbarius* ) and Hen Harrier ( *Circus cyaneus* ) in Perthshire and to recommend one of two routes which will have the least detrimental effect on the breeding and hunting behaviour .

### **Background.**

MI Great Britain Ltd, 12 Dunkeld Road, Aberfeldy intend to mine and haul Barite 12 kilometres across the Aberfeldy Hills.

### **Ornithological data.**

3-4 pairs each of Hen Harrier and Merlin breed in these hills. Golden Eagle, Peregrine Falcon, and Short-eared Owls also have home ranges which include the eastern part of the hills.

All five species are included in Annex 1 of EC Directive 79/409/EEC and its amendment 85/411/EEC on Conservation of Wild Birds.

### **Impacts.**

Impacts fall in three categories:

#### A. Human Disturbance.

- i. Increased human activity during construction and use of the haul road.
- ii. Increased public access after construction is completed.

#### B. Noise pollution.

- i. Especially during construction.
- ii. Continuously when the haul road is in use.

#### C. Habitat loss.

- i. A small loss of habitat is expected to the construction of the road. ( Probably less than 1-2 hectares.)

### **Recommendations.**

Impacts will be minimised if :

- the northerly option ,to build the road round the back of Meall a Charra is finally adopted.
- the construction phase in the areas nearest the nest-site are kept to a minimum during the period April-August.

There is little known about the impacts of road construction and noise on breeding birds of prey. A long-term study should be implemented.

## 2.0. AIM.

To prepare an ecological assessment of the impact of road construction on breeding Merlin ( Falco columbarius ) and Hen Harrier ( Circus cyaneus ) in Perthshire and to recommend one of two routes which will have the least detrimental effect on the breeding and hunting behaviour of these birds.

## 3.0. Description.

### 3.1. Background.

MI Great Britain Ltd., an amalgamation of Dresser and Haliburtons' two mud sales companies, Magcobar and Imco, have been mining Barite , at Foss, in the Aberfeldy Hills since 1984. Both opencast and underground mining takes place.

Barite is a naturally occurring form of Barium Sulphate and when crushed is used as an additive to drilling fluids in the oil industry and to make dense concrete for radiation shielding in X-ray rooms, whole body scanners and nuclear power stations. It has a variety of applications in the glass/ceramic and paint industries.

The company are currently considering exploiting a deposit below Ben Eagagach , at NN 867 573 , approximately 7 kilometres east of the Foss mine , which could make the U.K. self-sufficient in this important mineral.

This will be an underground operation.

### 3.2. Description of the study area. ( See Map 1.)

The Aberfeldy range of hills lie immediately to the east of two important landscape designations. To the north they form part of a panoramic feature , adjoining a National Scenic Area ( NSA ), as seen by many tourists from the famous Queens View at the eastern end of Loch Tummel .The lower slopes beside Loch Tummel are covered in natural Birch ( Betula pendula ) woodland , with scattered Oak ( Quercus sp. ), Rowan ( Sorbus aucuparia ) and a sparse shrub layer of Juniper ( Juniperus communis ) in several places.

The land to the south which drops more gently towards Strath Tay meets an extensive area which has been designated an Environmentally Sensitive Area ( ESA ).The NSA and ESA overlap and include the famous Ben Lawers botanical sites.

Recent extensive Forestry Commission plantings , to the south , have resulted in the huge loss of habitat. This ground is wet with numerous lochans.

The ridge is exposed and bedrock outcrops frequently to create a series of small tops and a landscape which is both rugged and varied. These tops are higher than 609 metres ( 2000 feet ) in many cases.

The open moorland of the higher levels is dominated by Ling ( Calluna vulgaris ) with some Blaeberry ( Vaccinium myrtillus ). This vegetation is managed as part of an extensive Grouse moor and shows no signs of recent degradation by sheep grazing. Some natural regeneration of native trees is evident.

### 3.3. Description of proposed operations. ( See Map 1.)

The site of the underground mining of the mineral is approximately NN 867 573 ,from which point a haul road will be constructed , across the moor , east-north-east to the shoulder of Meall a Charra.At this point there are two options of route,one to the south and one to the north.These options meet east of Meall a Charra, dropping between Creag Bhealaidh and Creag a Choire finally entering the Forestry Commission plantations with two possible access routes to the A9 Trunk road.

### 3.4. Species profiles.

#### 3.41. Merlin. ( Falco columbarius )

The Merlin ( Falco columbarius )is a small falcon breeding on heather-dominated open moorland with higher occupancy on kept estates where the moor is managed for Red Grouse. The total number breeding in Britain, is 550-600 pairs and this represents the entire EEC population. They can breed in their first year but usually not until their second.The oldest known individual is 10 years 7 months. Territories vary in size with the nest-to-nest distance falling within the range 0.6-5.3 kilometres.They feed mostly on small birds,particularly Meadow Pipits ( Anthus pratensis ),in addition to several daytime-flying moths and their caterpillars which feed on Ericaceous plants.Preys are caught on the

wing , often involving conspicuous aerial pursuits.  
Their numbers have been slowly declining since the beginning of this century and there are a variety of reasons,including,human predation,organo-chlorine pesticide poisoning with associated eggshell thinning and habitat losses due to afforestation and improved grazing for sheep .  
This decline is in contrast to other birds of prey which have,generally,been increasing.  
Outside the breeding season Merlin are found on the coast of Britain.

### 3.42. Site-specific data.

In 1989 25 pairs bred in Tayside with 3-4 pairs in the Aberfeldy Hills.

These birds have been studied for 6 consecutive years.

Only one pair will be affected by the proposed access route and they have held a territory south of Meall a' Charra in each of these years ,rearing young successfully on four occasions.

The prey spectrum is similar to that in other areas.In 1990,12 species of bird were identified from prey remains at a favoured plucking post.48.9 % were Meadow Pipits

( Anthus pratensis ). Northern Eggar

( Lasiocampa callunae )and Emperor Moths ( Saturnia pavonia ) made up 13.3 % and 4.4 % respectively.

Siskin ( Carduelis spinus ) , Chaffinch

( Fringilla coelebs ) and Goldcrest ( Regulus regulus ) were taken in the adjoining coniferous plantations early in the

season , before the migratory Meadow Pipits

( Anthus pratensis ) had returned .

The main feeding areas were to the north and east of the nest-site and the prey remains suggest that there are preferred hunting areas at different times of the breeding season.

The conifer plantations are important in April with emphasis on the moor later in the season.

The pair is on-site from early April to mid-August.

This pair ,or other individuals have used the same nest-site for six seasons showing that it is a favoured location .

### 3.43. Hen Harrier. ( Circus cyaneus )

The Hen Harrier ( Circus cyaneus ) is an open moorland bird in Britain where the population is around 450 pairs.( The main stronghold is in Orkney.) This represents about 24% of the EEC total.The population has been increasing steadily from the mid-1940s and has now reached a plateau , with definite decline south of the Borders.

This increase is partly due to the availability of secure nesting areas in young forestry plantations and the large vole numbers present in the early stages of tree establishment.

Polygamy is common in Orkney where one male may have up to 7 females with territories within his own larger one.The territory can be 250 hectares in size.They nest on the ground and feed the young on Voles,young Rabbits,Hares and birds ,especially Pipits.



These prey are caught on the ground and not in the air.

#### 3.44. Site-specific data.

3-4 pairs are present in the Aberfeldy Hills from April - August.

Little information is available ,despite 6 years of study. They have reared young successfully only once during this period and no prey samples have been recorded.

Despite their lack of success they show a similar site-fidelity to Merlin ( Falco columbarius ).

There are two pairs in the immediate vicinity of the proposed haul road and both have attempted to breed along the southern ridge below Meall a'Charra.

Only one pair , south of Meall a Charra ,may be affected.

#### 3.5 Other Ornithological Interest.

In summer,on the moor ,Meadow Pipits ( Anthus pratensis ) are very numerous' and there are smaller numbers of Cuckoo ( Cuculus canorus ),Skylark ( Alauda arvensis ),Ring Ouzel ( Turdus torquatus ) and Twite ( Acanthis flavirostris ) breeding . Carrion Crows ( Corvus corone ) , Ravens ( Corvus corax ) and Red Grouse ( Lagopus lagopus )are present throughout the year. The study area is within the home territory of Golden Eagle ( Aquila chrysaetos ), Peregrine

Falcon ( Falco peregrinus ) , Buzzard ( Buteo buteo )  
and Short-eared Owl ( Asio flammeus ).

The lower Birch woods have small populations of Black Grouse  
( Lyrurus tetrix ) , Tree Pipit ( Anthus trivialis )  
and Redstart ( Phoenicurus phoenicurus ).

Crossbills ( Loxia curvirostra ) are seen in the coniferous  
plantations. Their race has not been established but it is  
unlikely that they are Scottish Crossbills  
( Loxia scotica ) . Continental birds regularly invade and some  
do remain to breed.

Typical moorland breeding waders are notably absent.

### 3.6 Legal constraints.

EC Directive 79/409/EEC and its amendment 85/411/EEC , on the  
Conservation of Wild Birds provides special protection for rare  
and endangered species and their habitats.

Under Article 3 Member States must take measures to  
" preserve , maintain, or re<sup>-e</sup>establish a sufficient diversity and  
area of habitats for all species referred to in Article 1".

( Article 1 is the list of species afforded special protection  
and this list is named Annex 1.)

Article 4 states that " the species mentioned in Annex 1 shall  
be the subject of special conservation measures concerning  
their habitat in order to ensure their survival and  
reproduction in their area of distribution."

Appendix 1 of this report lists those Scottish species which are included in Annex 1. Hen Harrier ( Circus cyaneus ), Golden Eagle ( Aquila chrysaetos ), Peregrine Falcon ( Falco peregrinus ), Merlin ( Falco columbarius ) and Short-eared Owls ( Asio flammeus ) are species which could be affected by the proposed engineering works. These birds are given further protection under Schedule 1 of the Wildlife and Countryside Act 1981.

#### 4.0. Assessment of Impacts.

##### 4.1. Habitat Loss.

Both species could be adversely affected by loss of habitat causing a reduction in the breeding areas for their prey species. The area lost is unlikely to exceed 1-2 Hectares. This should have little effect on the numbers of prey available to either species.

Merlin and Hen Harrier show a high degree of site fidelity and any loss of nesting site would be crucial, affecting, not only particular pairs but indirectly the other breeding pairs by increased competition for a site. The road does not damage or put any of the nest-sites at physical risk. ( see Table 1 )

Table 1. Relative proximity of both options to the nearest nest-site.

	Distance ( metres ) to the nearest nest-site	
	Merlin	Hen Harrier
South option	400	700
North option	700	1200

#### 4.2. Disturbance.

Disturbance will be a crucial factor in determining the future of both species.

There will be two main types of disturbance during and after construction of the haul road.

##### 4.21. Human disturbance.

Human activities during the surveying, setting out and construction of the road will result in :-

- an increase in the number of people in the nesting area
- an increase in the background levels of human noise.  
( Road construction is a vocal activity !)

It is impossible due to lack of information to guess what the effect of this may be.

The Merlin site ,which will be most affected,is situated 50 metres below the road, in height, as well as 400/700 metres away and some sound will be dampened .

The nest-site is south of both options and the prevailing winds are westerly , further reducing impact.

Merlins ( Falco columbarius ) are more sensitive when the young are bigger and leave the nest calling when a walker approaches at 200 metres distant but there is no set rule.

Earlier in the season ,during incubation , if access is concealed , a bird can remain on the nest until the last 40 metres .

Studies in the Peak District suggest that when hill-walkers approach on the opposite side of a gulley to the nest the birds tend to sit tight.

The northerly option would remove this pressure except to the east where the two options merge again.

This ridge is not easily visited and most walkers are discouraged by the long heather and difficult terrain and the fairly long distance from the nearest roads; as the crow flies , approximately 3 kilometres from the southside Loch Tummel road and 5 kilometres from the Strath Tay road.

The ridge is therefore not visited frequently by walkers.

Either option of haul route will provide walkers with a firm route and one can assume that numbers of walkers and perhaps birdwatchers in the area will increase as a direct result .

The Peak District study reported that footpath access was not a major factor in abandonment or desertion .

However it is a new and unpredictable pressure on these birds .

There is little or no data on public access pressure on

moorland birds except that relating to Red Grouse ( Lagopus

lagopus ) which found that their population was not affected. It is safe to suggest that birds of prey are less tolerant. The only desertion on record, attributable to engineering works , is a case of a pair of Merlin ( Falco columbarius ) breeding in central Perthshire . The work was being carried out by the Hydro-electric Board , 50 metres from the nest , during the laying period.

#### 4.22. Noise pollution.

The main sources of noise will be :-

- different types of excavator , bulldozer , and lorries during construction . Levels will be variable.
- an intermittent , but regular , background level of noise resulting from lorries using the road after commencement of the extraction.

The haul lorries will be passing frequently, perhaps every 6 minutes and how this will affect the birds is uncertain.

However Hen Harrier ( Circus cyaneus ) and Merlin ( Falco columbarius ) do nest close to Class A Forestry Commission roads , estate access roads and minor public highways. In many parts of Scotland this is the case and breeding is successful. The RSPB have a nest site near Struie which is only 200 metres from the road and in addition the pair is watched from a public hide a similar distance away in a public car park. They seem to be unaffected by either intrusion and have nested successfully for the past three seasons. A factor in the success may be continuous wardening.

It seems that both species will stand some background noise. Vulnerability will be greatest during construction when a variety of different and variable sounds will be heard .

It is possible that they will quickly adapt to the regularity of the trucks during mining.

## 5.0 Conclusions.

Merlin ( Falco columbarius ), Hen Harrier ( Circus cyaneus ) and their habitats are protected by law and any impacts should be studied closely especially in the case of Merlin ( Falco columbarius ) as their populations have been declining in the long-term.

The construction of either options of haul road will degrade their habitat by minor habitat loss and increased disturbance. This may result in abandonment of sites increasing pressure on the species , particularly Merlin ( Falco columbarius ).

A decreasing population tends to have a decreasing rate of breeding success and the whole is undesirable.

It is unlikely that due to the distances involved the Hen Harriers ( Circus cyaneus ) will be affected to any great extent by either option.

The Merlin ( Falco columbarius ) is much more vulnerable due to its proximity to the proposed southerly route.

The aim of this assessment is to recommend the option which is most suitable. There is no doubt that the northerly option, round the back of Meall a Charra, will have least impact on breeding birds of prey, and consequently this is the recommended option.

This decision is made in the light of a lack of data regarding disturbance and the impact of noise on breeding birds of prey. It is therefore impossible to say exactly what the likely impact of the southerly option would be.

The other Annex 1 birds of prey should not be affected adversely, nor is there any significant interest in the parts of the plantations through which the road passes at lower levels. When other issues, like botanical and landscape interest, are taken into account, there may be an equally strong case for not choosing the northerly option. In the event of this scenario, a series of recommendations are made to safeguard the birds, should the final choice be the southerly route.

## 6.0 Recommendations.

1. The preferred route, on ornithological grounds, is the northerly option.
2. The knowledge of the impacts of this type of project could be greatly increased if the company were willing to provide annual funding for a low-key study at Aberfeldy.



3. Construction activities in the immediate vicinity of the nests should be kept to a minimum during the early part of the period April-August when the birds are present.

4. Merlin (Falco columbarius) are often killed by striking overhead wires and these should be excluded, if their use is intended.

In the event of a compromised situation, the following recommendations are made.

1. The section of haul road between NN 897577 and NN 898575 should be constructed outwith the breeding season, i.e. September - March.

2. A more detailed study should be implemented to monitor the birds' responses. In the event of abandonment, it will be important to find out the consequent effects on breeding Merlin (Falco columbarius) and Hen Harrier (Circus cyaneus) and on the whole population of both species on these hills.

#### Acknowledgments.

I am indebted to Wendy Mattingly for allowing me to use her hard-earned data.

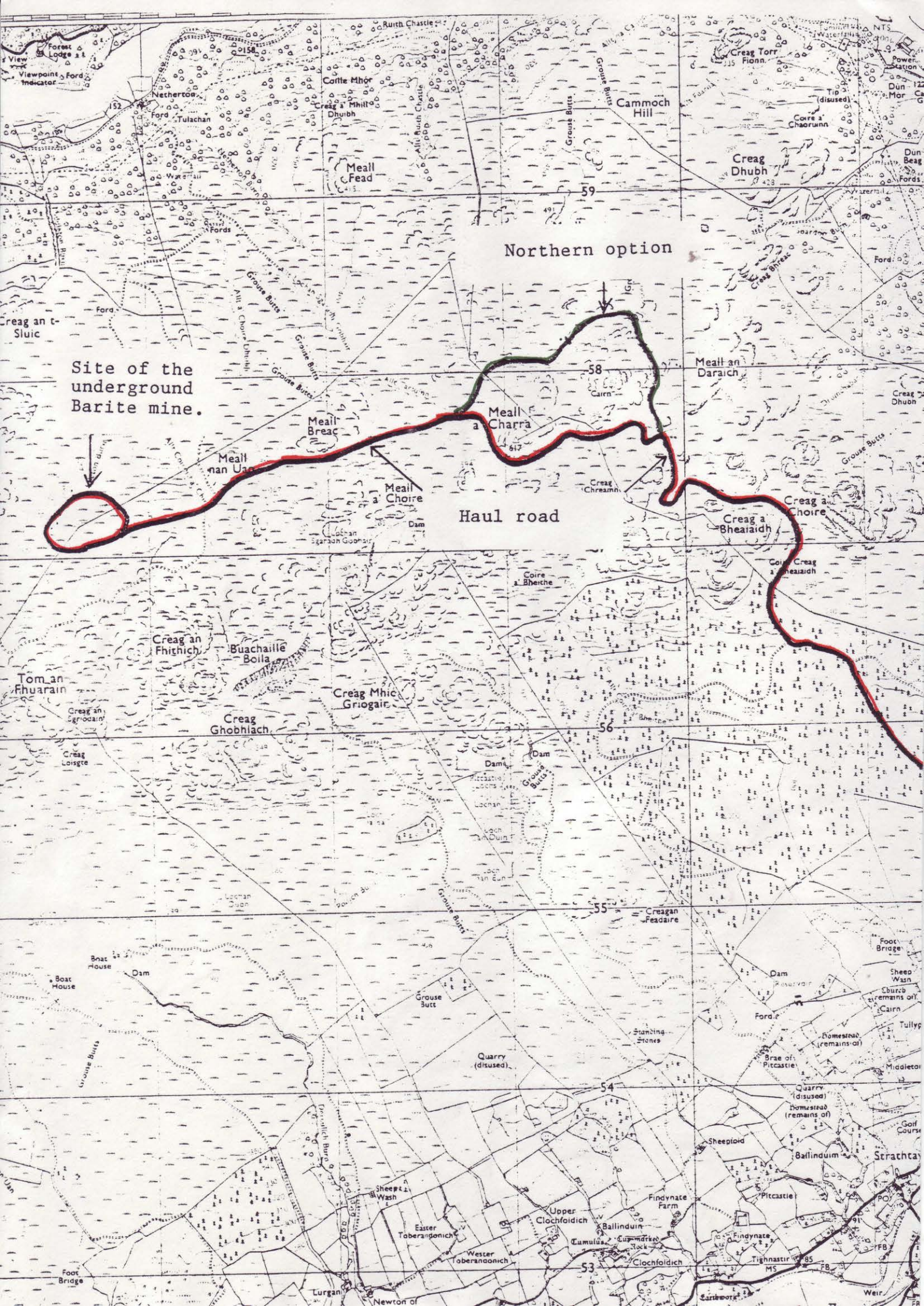
Thanks also to Brian Etheridge, Verena Keller, Alan Pollack, Graham Rebecca and Ken Shaw for their assistance and helpful discussions.

Black-throated Diver ( Gavia arctica )  
Red-throated Diver ( Gavia stellata )  
Great Northern Diver ( Gavia immer )  
Slavonian Grebe ( Podiceps auritus )  
Storm Petrel ( Hydrobates pelagicus )  
Leach's Storm Petrel ( Oceanodroma leucorhoa )  
Whooper Swan ( Cygnus cygnus )  
White-fronted Goose ( Greenland sub-species )  
( Anser albifrons flavirostris )  
Barnacle Goose ( Branta leucopsis )  
White-tailed Eagle ( Haliaeetus albicilla )  
Hen Harrier ( Circus cyaneus )  
Golden Eagle ( Aquila chrysaetos )  
Osprey ( Pandion haliaetus )  
Peregrine Falcon ( Falco peregrinus )  
Merlin ( Falco columbarius )  
Capercaillie ( Tetrao urogallus )  
Corncrake ( Crex crex )  
Spotted Crake ( Prozana porzana )  
Dotterel ( Charadrius morinellus )  
Golden Plover ( Pluvialis apricaria )  
Ruff ( Philomachus pugnax )  
Wood Sandpiper ( Tringa glareola )  
Red-necked Phalarope ( Phalaropus lobatus )  
Sandwich Tern ( Sterna scandvicensis )  
Roseate Tern ( Sterna dougallii )  
Common Tern ( Sterna hirundo )  
Arctic Tern ( Sterna paradisea )  
Little Tern ( Sterna albifrons )  
Snowy Owl ( Nyctea scandiaca )  
Short-eared Owl ( Asio flammeus )  
Nightjar ( Caprimulgus europaeus )  
Kingfisher ( Alcedo atthis )  
Wren ( Fair Isle sub-species ) ( Troglodytes troglodytes  
fridariensis )  
Red-backed Shrike ( Lanius collurio )  
Scottish Crossbill ( Loxia scotica )  
Chough ( Pyrrhocorax pyrrhocorax )

## APPENDIX 2 : References.

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Site of the  
underground  
Barite mine.

Northern option

Haul road





Alternative access routes  
to the A9

MAP 1



