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**Nightjar survey  
Haxby Plantation & Ugglebarnby Moor**

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**INCA**



Industry Nature Conservation Association

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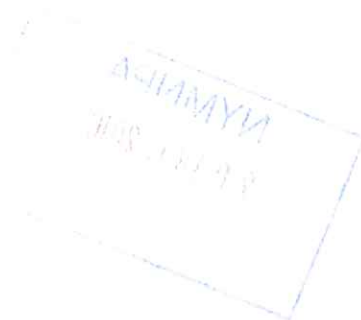




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## Introduction

This document has been prepared on behalf of Sirius Minerals plc (Sirius Minerals) and details the results of Nightjar survey Haxby Plantation & Ugglebarnby Moor for at Doves' Nest Farm. This survey is required to discharge condition 54 of the North York Moors National Park Authority (NYMNPA) planning permission NYM/2014/0676/MEIA and has been prepared in accordance with current good practice and in line with all relevant environmental legislation.

## Condition Compliance

### Condition NYMNPA 54: Nightjar Surveys at Haxby Plantation and Ugglebarnby Moor

Condition	Compliance with Condition NYMNPA-54
Breeding birds surveys of Haxby Plantation, the wooded heath to its east, and Ugglebarnby Moor to identify the extent of their use as breeding habitat by nightjar must be undertaken and completed prior to the Commencement of Development at the Doves Nest Farm site. Before the results of these surveys are known, noise emitted within the breeding season 15 May to 30 September inclusive must be controlled to levels that would not disturb nightjar breeding at Haxby Plantation, or the wooded heath to its east or Ugglebarnby Moor.	Nightjar survey document outlines survey methodology and survey findings
Should the surveys indicate the presence of nightjar breeding on Ugglebarnby Moor or Haxby Plantation, mitigation measures must be agreed with the MPA and be implemented before noise at levels likely to disturb nightjar during the breeding season 15 May to 30 September inclusive is emitted from development at the Doves Nest Farm site. The survey methodology shall be agreed with the MPA in advance of the surveys being undertaken.	The modelled noise levels are below 50dBA (c. 42dB for the nocturnal times and 45dBA for the daytime), therefore no specific mitigation measures are required.

## Site description

The survey areas are shown outlined in red in Figure 1 below. These comprise the whole of Ugglebarnby Moor, which is the larger area highlighted to the west; two small areas within Haxby Plantation and the wooded heath to the east of Haxby Plantation. The survey area on Ugglebarnby Moor is around 80ha in extent and the combined area of the survey areas identified in Haxby Plantation and the wooded heath to its east is around 10ha.





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Figure 1. Survey areas

Photographs of the survey areas are shown in Appendix 1.

Ugglebarnby Moor is now becoming colonised with Scot's pine *Pinus sylvestris* and Silver birch *Betula pendula*. A typical view is shown in Photograph 1 (Appendix 1). At the southern end the moor is somewhat damp and the ground vegetation largely comprises dense tussocks of Purple Moor-grass *Molinia caerulea* and Cross-leaved Heath *Erica tetralix*. Towards the north and north-west it is a little drier, less wooded and comprises mainly of Heather *Calluna vulgaris* and Gorse *Ulex europaeus*. There has been some minor management of the heath in places towards the northern end, resulting in some variety in the structure of the vegetation. A view across part of the northern end of the moor can be seen in Photograph 2.

Haxby Plantation is largely comprised of mature conifers. The survey areas, which appear quite open in Figure 1, which is from a 2008 aerial photograph, are now densely vegetated with birch trees of over 2m in height. The wooded heath to the east of Haxby Plantation is still fairly open heath at the southern end, resembling the southern end of Ugglebarnby Moor in its vegetation, i.e. Purple Moor-grass and Cross-leaved Heath with scattered young pines. The northern end is more densely vegetated with young trees, mainly birch. It is also damper than the southern end with rushes, *Juncus sp*, being notable in the ground flora. A typical view of the southern end of this wooded heath can be seen in Photograph 3.

## Methodology

The surveys followed the methodology of Conway et al (2007) with respect to time of day and season and suitable weather conditions. Details of the timing of the surveys and weather conditions are given in Table 1 below.

Table 1. Times of surveys and weather conditions

Date	Start	Finish	Sunset	Rain	Beaufort	Temperature (°C)
16/06/16	21:45	22:45	21:39	Fog	2	15
07/07/16	21:35	22:40	21:35	Dry	2	14

The methodology that had been agreed with NE and the planning authority, again in line with Conway et al (2007), stated that transects would be walked across each of the survey areas so that surveyors passed within 200m of all areas of suitable nightjar habitat. Subsequent reconnaissance of Ugglebarnby Moor identified that it would not be safe to walk across the moor in the dark due to the lack of tracks and nature of the vegetation and topography. Consequently this element of the survey was modified. On the first survey a surveyor was stationed towards the north of Ugglebarnby Moor, at the location marked as 1 on Figure 2, while a static, automated bat detector was set to record towards the south of the moor at the location marked as 2 on Figure 2. This change in methodology was considered acceptable as far as demonstrating whether nightjar were using that part of the moor as automated acoustic recorders have been demonstrated to be significantly more effective than human surveyors in detecting nightjar, Zwart et al (2014). However due to a technical problem with the acoustic detector, it was considered that a more reliable method for the southern end of the moor, that also took account of safety considerations, was to have a surveyor undertake a transect in a vehicle. Consequently on the second survey one surveyor drove along the two roads that dissect the southern end of the moor, stopping at various points on each road for 10 minutes at each stop to survey for nightjar, while a second surveyor operated towards the northern end of Ugglebarnby Moor, somewhat further north than on the first survey, walking a short transect where it was safe to do so.

In Haxby Plantation and the adjacent wooded heath, the surveyor walked a transect that went through or immediately adjacent to each of the survey areas.

The positions and transect routes of the surveyors for both surveys are shown in Figure 2.



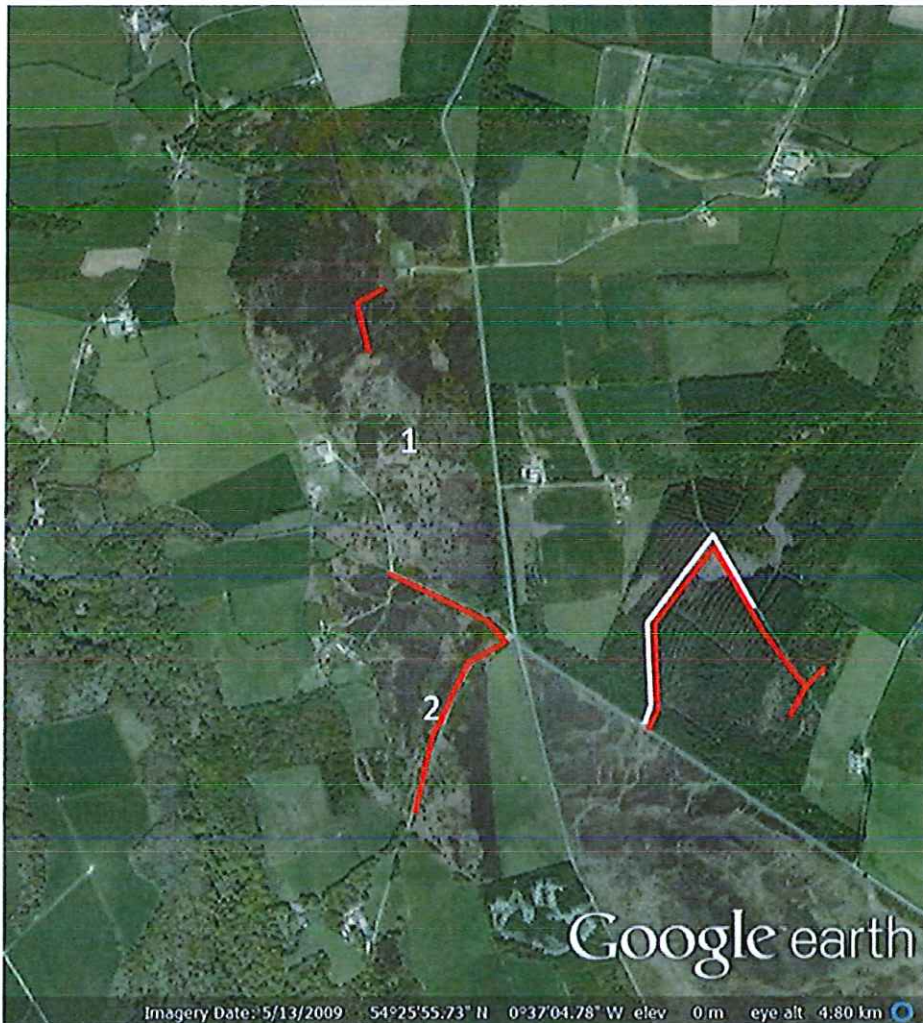


Figure 2. Survey routes and locations. The transect route on 16<sup>th</sup> June is shown in white and the transect routes on 7<sup>th</sup> July are shown in red.

### Survey constraints

Weather conditions were considered to be suitable on each survey night. Although there was fog during the first survey the temperature was high and the wind was light. It was noted that there was a considerable amount of bird calls, including Song Thrush, *Turdus philomelas* and Woodcock, *Scolopax rusticola* during the survey and that these carried well in excess of 200m.

The survey on Ugglebarnby Moor was restricted due to the nature of the terrain, much of which could not be safely negotiated in low light levels. Furthermore, technical problems with the static bat detector meant that evidence for presence/absence of breeding nightjar at the southern end of Ugglebarnby Moor could not be relied on for the first survey. However given the successful results of the second survey there would be no material gain in a third survey of the southern part of Ugglebarnby Moor.

On the second survey all potentially suitable areas of Ugglebarnby Moor, except for a small area at the far north east, were surveyed to within 300m. Although this is further than the 200m used in Conway et al (2007), which was originally proposed for this survey, experience indicates that nightjar calls can be heard in excess of 300m in suitable weather conditions so it is considered that this

would not have affected the results of the survey to any material extent. This is born out by the results of the second survey.

Within Haxby Plantation, several trees had fallen across one point of the planned survey transect route which has been identified during the initial site survey. Consequently this change curtailed the completion of this survey transect in its entirety on the first survey, as shown in Figure 2. Nevertheless from the furthest point east that the transect reached on the first survey, part of the wooded heath was within 200m of the surveyor and all of the suitable nightjar habitat on that heath was within 300m, so any nightjar present there were likely to have been heard in any case. On the second survey there were no constraints and all areas of suitable habitat on the wooded heath were approached to within 100m.

#### Survey personnel

Surveys were carried out by Ian Bond CEnv MCIEEM, Dr Robert Woods and Ken Smith. All surveyors are employed by INCA and have previous experience in surveying for nightjars. Additional personnel were employed to accompany surveyors where required due to reasons of health and safety.

#### **Results**

##### Survey 1: 16<sup>th</sup> June 2016

##### Haxby Plantation

Nightjar was heard calling within the larger of the former clearings for much of the survey period, commencing 16 minutes after sunset. A single bird was seen in flight. The locations where the bird was encountered are shown in Figure 3 with details given in Table 2. The locations of both the calls and the flight were all close together, with no more than 50m between any two encounters. On no occasion during the survey were two males heard calling simultaneously in Haxby Plantation. Conway (2007) established a threshold of 350m to differentiate between male nightjar territories at times when males are not heard calling simultaneously, therefore this should be considered as a single calling male.

Although it was not possible to physically access the wooded heath to the east of Haxby Plantation on the first survey, no nightjars were heard calling from that location.







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**Figure 3. Locations of nightjar encounters in Haxby Plantation 16 June 2016**

**Table 2. Details of nightjar encounters in Haxby Plantation on 16 June 2016**

Time	Location	Activity recorded
21.55-22.02	1	Continuous nightjar churring calls
22:03	1	Nightjar seen to fly over the spruce plantation in the direction indicated by the arrow
22:14 – 22:16	2	Continuous nightjar churring calls
22:37 – 22:40	3	Intermittent nightjar churring calls

Ugglebarnby Moor

There were no encounters with nightjar on Ugglebarnby Moor during the first survey.

Survey 2: 7<sup>th</sup> July 2016

Haxby Plantation

There were no encounters with nightjar in Haxby Plantation and the wooded heath to its east during the second survey.

Ugglebarnby Moor

Nightjar was encountered at several locations on Ugglebarnby Moor during the second survey. The locations where nightjar were encountered are shown in Figure 4 with details given in Table 3. At least four individual nightjars were encountered. At the southern end of Ugglebarnby Moor the

churring calls of two males were heard simultaneously at a distance of around 200m apart, indicating that they represent two separate breeding territories. Towards the northern end of the moor a single male was heard churring briefly and two nightjars were glimpsed briefly as they flew together in a courtship display.

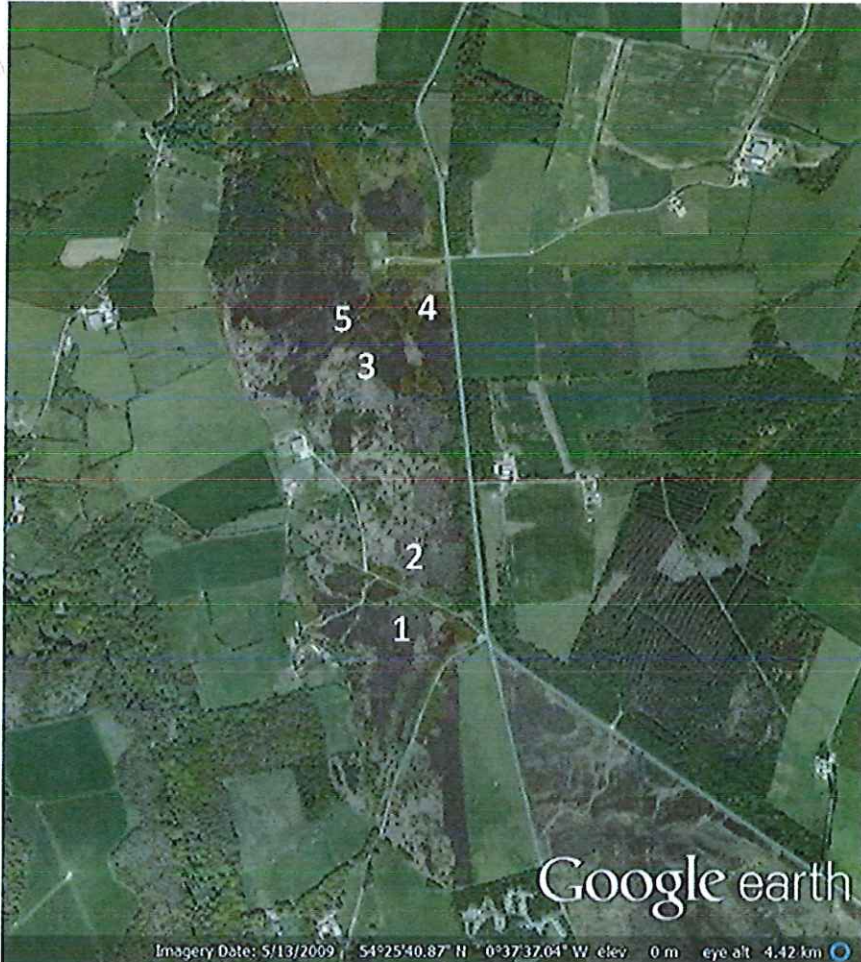


Figure 4. Locations of nightjar encounters on Ugglebarnby Moor on 7 July 2016

Table 3. Details of nightjar encounters in Haxby Plantation on 7 July 2016

Time	Location	Activity recorded
22:25 – 22:30	1	Nightjar churring heard and a single bird was seen in flight.
22:25 – 22:30	2	Nightjar churring was heard simultaneously with the bird at point 1
22:30	3	A single bird was seen in flight flying in the direction of point 4
22:33	4	Churring heard briefly, less than one minute
22:35	5	Two nightjars seen in flight with one closely pursuing the other.

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Assessment

A single male nightjar was heard calling for a sustained period in Haxby Plantation on the first survey on 16<sup>th</sup> June however no nightjar were found on the second survey on 7<sup>th</sup> July. The presence of nightjar in Haxby Plantation was unexpected as the former clearings are now densely vegetated with birch saplings in excess of 2m in height and in any case only extend for a little over one hectare, which is very much towards the lower end of the size range of nightjar breeding territories. A

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possible explanation for this is that the encounter on 16<sup>th</sup> June was with a male prospecting for a mate early in the season but which was ultimately unsuccessful in what is sub-optimal habitat. There was no sign of nightjar in the wooded heath to the east of Haxby Plantation on either survey. This area would appear to contain at least 2-3ha of suitable nightjar habitat but is perhaps somewhat sub-optimal as it is surrounded on two sides by closely grazed pasture.

On Ugglebarnby Moor there appears to be at least two nightjar territories at the southern end, with the locations of the simultaneously churring males indicating that the boundary is approximately the road running north west, known as Lousy Hill Lane. The more northerly of these two calling males was approximately 600m south of the nightjar that was heard calling towards the northern end of Ugglebarnby Moor. Conway (2007) established a threshold of 350m to differentiate between male nightjar territories at times when males are not heard calling simultaneously. This should therefore be considered as a third nightjar territory on Ugglebarnby Moor.

While the surveys have established with a high level of certainty that there are three nightjar breeding territories on Ugglebarnby Moor, it is possible that the moor supports further pairs. Nevertheless it is unlikely that the carrying capacity of the moor is much beyond the three pairs that were encountered. Cadbury (1981) found an average density of nightjars of one pair per 21.3ha. The extent of Ugglebarnby Moor south of Lousy Hill Lane is only around 18ha this area so would typically just support the one nightjar territory that was found there.

There is roughly 30ha of potentially suitable habitat between Lousy Hill Lane and the nightjar calling at location 4, which again would be of the order that would typically support two nightjar territories.

There is nothing to indicate whether or not the bird calling at location 4 was at the northern boundary of its territory but if it were then there is approximately a further 20ha of suitable habitat north of location 4 which could potentially support a further nightjar territory. Nevertheless even if there were a further nightjar breeding territory at the northern limit of the moor it would be further away from the development than those locations where nightjar has been shown to be present. Therefore the degree of uncertainty as to the presence/absence of breeding nightjar at the northern end of Ugglebarnby Moor is immaterial as far as the fulfilment of the condition is concerned.

Nightjar territories do of course vary somewhat in size, for example Berry (1979) found that territories ranged from 5.9-25.2ha per pair. However in patches of habitat <1km<sup>2</sup>, the total area of Ugglebarnby Moor is 0.8km<sup>2</sup>, territory locations are further from the edge than would be expected if distributed randomly (Bright et al, 2007). Therefore given the edge effects of the road and the agricultural areas which surround Ugglebarnby Moor on all sides, the number of nightjar territories is likely to be lower than might be the case if Ugglebarnby Moor was part of a larger habitat patch. Taking that into consideration it is considered likely that the three territories that were positively identified represent the total number of nightjar breeding territories on Ugglebarnby Moor. Nevertheless, regardless of the total number of individual territories, the extent of use of Ugglebarnby Moor by breeding nightjar has been determined as a result of these surveys.

## Conclusion

Nightjar surveys have been carried out in each of the areas stipulated in planning condition NYMNPA-54 of the permission for the York Potash mine. The surveys followed the standard methodology for nightjar surveys with the exception that the standard, transect methodology was adapted on Ugglebarnby Moor to take account of safety concerns with the terrain. Nevertheless it is considered that the revised methodology was satisfactory for the purpose of the survey, i.e. to identify the extent of its use as breeding habitat by nightjar.

It has been established with a high level of certainty that there are at least three nightjar breeding territories on Ugglebarnby Moor. It is considered likely that this represents the extent of the current use of Ugglebarnby Moor by breeding nightjar.

A single nightjar was present in Haxby Plantation but this was only present during the survey in the early part of the year. It is considered that the absence of nightjar during the later survey indicates that the earlier record was of a single male unsuccessfully prospecting for a mate.

Nightjar was not recorded on the wooded heath to the east of Haxby Plantation on either of the surveys.

In respect of noise disturbance to nightjar, the majority of all of the available literature relates to the species' vulnerability to nest predation caused by (or associated with) human and/or dog presence within breeding territories. It is unlikely that there will be no increase in such recreational use of the nightjar breeding territories on Ugglebarnby Moor during the construction or operation of the mine. However, there remains the potential for construction noise to impact upon the species. However results of study published by Argus Ecology succinctly described the issue as:

*"In the case of nightjar, a reduction in the detectability of males churring by paired or prospective females could affect breeding success. An analysis of recordings of churring males indicates a peak sound pressure level in the 1-2kHz frequency bands (Hayes McKenzie Partnership, 2010). They would therefore be most sensitive to increased noise in this frequency range. Road traffic noise typically shows a peak sound pressure at 1kHz frequency, due particularly to tyre noise (Sandberg, 2003) and could therefore have a proportionately greater masking effect on nightjar churring than on the vocalisation of other species in the 2-6kHz frequency range.*

*There are no UK guidelines for assessment of the masking effect of road traffic noise on birds. In USA a standard of 60dB(A) has commonly been applied, although Dooling & Popper (2007) propose that a level of 55dB(A) would be precautionary. In Germany, a standard of 52dB(A) has been applied to define a zone of significant impact on corncrake within a Special Protection Area (ECONAT, 2008); corncrake are regarded as particularly sensitive to traffic noise masking effects, and are another species with predominantly nocturnal calls. Corncrake calls have more variable and wider frequency spectra than nightjar, but they do include calls with maximal amplitude in the 1-2kHz frequency range (Osiejuk & Olech, 2004; Ręk, 2013). It is therefore likely that nightjar would experience comparable masking effects, so a 50dB(A) level would be precautionary."*

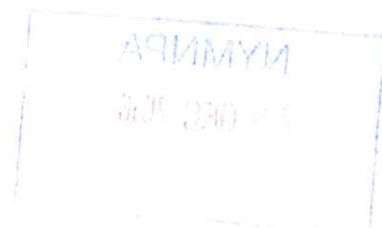
Therefore a 50dBA noise limit at the centre of the nightjar territories on Ugglebarnby Moor will be adhered to throughout the construction phase. The modelled noise levels are consistently below 50dBA (c. 42dB during nocturnal times and 45dBA during the daytime), therefore no further mitigation measures are considered as being required. Should the modelled noise levels alter and become above 50dBA, restrictions on the activities will be required during the nightjar breeding season (which is typically between 1 May and 31 August), and only during nocturnal times, i.e. between 2100 and 0600hrs.

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Appendix 1: Photographs



Photograph 1. Typical view of UGGLEBARNBY MOOR



Photograph 2. The more open area at the north-west of UGGLEBARNBY MOOR

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Photograph 3. The southern end of the wooded heath east of Haxby Plantation

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