Proposed reopening of Collyweston Slate Mine

Planning Application

Mine Working and Method Statement

Report prepared for

Claude N Smith Ltd.
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1. **Introduction**

1.1 It is proposed to reopen the underground Collyweston Slate mine on the property of Claude N Smith Ltd. on Slaters Drift Industrial Estate, Collyweston near Stamford. Collyweston slate has been mined for use as a roofing material in the village of Collyweston Northamptonshire since the 1600s. The slates are produced by excavation of limestone which is then left to weather outside over a number of winters. Only a thin bed of rock can produce the Collyweston Slates and so the location of mines is dependent on the occurrence of the stratum.

1.2 The Slaters Drift industrial estate was created about 200 years ago, when approximately 10 plots of land were let or sold to entrepreneurs specifically for the extraction of Collyweston Slate. Workings were initially opencast but many sites also have shafts, which are evidence of underground mines. Works on the application site continued until the 1960s and remain in stable condition, suitable for reopening. Recommencing underground mining would represent a continuation of traditional industry on the site, producing a unique material of regional significance by methods requiring skills that are a local heritage.

2. **Existing mine**

2.1 The Claude N Smith Ltd. mine extends to a depth of 8m below ground level. The host site covers an area of 2.5 acres. The planned mining area is 0.5 acres, all of which will be underground except for the small areas of the access shaft and adit entrance.

2.2 The site is generally level, comprising light industrial units and workshops. There is current small-scale industrial activity at the site. The existing shaft is located on site and the proposed access adit will also be located within the site.

2.3 No water courses or standing water are present on the site or within close proximity to the workings.

2.4 The old mine was previously worked in a strip cut and fill operation, working in an easterly direction. The old working face is orientated approximately north – south. The workings progressed eastwards from a quarry face, following the 1m thick Collyweston Slate stratum. The underlying bed of sand was excavated as part of the extraction process. This sand was piled up in the excavated area as the works progressed. Discards of small waste stone were used to form retaining walls which both held back the sand and provided support for the roof of the workings. These supports remain in good condition at the present time.

2.5 There are very few joints in the overlying mine roof. It is evident the backfilling of the mine was planned to provide support in areas with joints (natural fractures) in
the roof. The joints are widely spaced and locating the supports under these minimised potential weakness in the roof span. The separation between supporting walls is typically 3m, with some areas up to 5m.

3. **Proposed mine design**

3.1 Due to the favourable stability conditions observed in the old mine, it has been decided that the layout of the new mine should follow a similar working layout. This will be verified as necessary using standard geotechnical techniques and supplemented where necessary to conform to modern support regulations, (The Mines (Control of Ground Movement) Regulations 1999). It is not feasible to use a room and pillar arrangement for the extraction of the stone by leaving material in place. Pillars will be formed from concrete blocks or steel struts which will be spaced appropriately (typically at 4m centres) to support and distribute the roof loading. These struts will be constructed as the works progress at an even spacing.

3.2 The spacing and strength characteristics of the pillars will be determined by the ground conditions. The mineral stratum is buried under 8m of overburden. The overlying material is weathered limestone, gradually increasing with strength, and with the degree of weathering reducing with depth. The lower beds of the overburden are able to support the roof spans (up to 5m) in the existing tunnels.

3.3 A dense sand deposit (1 – 1.5m thick) underlies the slate beds. The sand is subsequently underlain by mudstone (Lower Lias). The sand will be excavated to provide sufficient working headroom. This material will be utilised as building sand, subject to suitability.

3.4 The load from the roof struts will be carried by reinforced concrete pad foundations located on the mudstone stratum. The exact size of the foundations will be determined following investigation into the shear strength of the mudstone. Based on preliminary observations of the mudstone as a very stiff clay, the foundation dimensions may be 2 x 2 m, with a typical thickness of 0.5m.

3.5 The loading on the struts has been determined conservatively using typical bulk density and strength values for the limestone overburden. A 4 m spacing would provide an adequate factor of safety for the mine roof support.

4. **Access**

4.1 The new mine will be accessed via a newly constructed adit, which will be excavated through previously backfilled workings from the original quarry face. An ramp will lead down to the adit entrance, located approximately 6 metres below existing ground level.
4.2 The adit dimensions will 3m wide by 2.5m high. The size has been determined to suit small, electrically powered machinery to both excavate the stone and remove the blocks. The width is sufficient for people to walk around the equipment, avoiding blockages. The adit will have a supported and protected portal, the design of which will reflect the long term stability needed for this part of the mine.

4.3 To comply with HSE Regulations (Safety of Exit Regulations, 1988) the mine requires two means of access and egress to the underground workings. The existing mine shaft will act as the emergency egress from the mine. The existing ladder and cover structure will remain.

5. Phased working

5.1 The mine will be worked in a number of phases to allow safe and efficient extraction of the slates and systematic placement of long-term supports. The phasing has also been designed to mitigate possible impacts on bats (see below).

5.2 The first stage of working will involve construction of the main access adit from the entrance portal. This will be a 3m wide by 2.5m high passageway with high strength concrete blocks used to form roof-supporting struts at 4m spacings along the length of the adit. The struts are required as the area has been previously quarried, and so the walls of the adit are not in-situ rock. The use of natural stone pillars is not feasible because the adit is a long-term structure which will be constant use.

5.3 The adit will extend to the currently accessible previous mine workings. This will allow the existing shaft to provide an emergency exit point, ensuring there are two point un-associated points of access / egress constantly throughout mining operations.

5.4 Safe havens will be constructed and will be well sign posted.

5.5 Phase 1 of the mining (Drawing No. P30206-PLN-006) will be confined to the southern sector of the remaining slate beds. The slate and underlying sand will be extracted to form rooms 4m wide, extending to the site boundary. Struts will be installed to support the roof when the slate is removed from the adjacent area. The struts will be formed from steel H-beams or concrete blocks, resting on concrete foundations. The struts will be permanent installations.

5.6 The sand will be excavated by electric face shovel and will be stockpiled on site. It will be tested in order to determine suitable uses. The most likely will be general mortar sand associated with the installation of the Collyweston slate roofs.

5.7 The Collyweston slate occurs in a bed, approximately 1m thick. After the sand is removed in an area, the slate will be induced to break off naturally into blocks
(called "log") by use of a pneumatic chisel. The log will be transported out to a storage area for processing.

5.8 The floor of the adit and mine will be mudstone. This will be covered with a dressing of discarded rock fragments or clean hardcore to form a stable road surface.

5.9 Recent observations show that there is a small amount of groundwater in the sand bed. This will be diverted into drainage ditches on the edge of the adit and around the workings. These will be graded to allow the water to flow in its natural path. A sump will allow excess water to be pumped into a storage tank on site.

5.10 The processing of the log requires wetting in winter and this will utilise water from the storage tank.

5.11 When slate mining is completed in the southern sector, the rooms and struts will be sealed with a stone wall (see bat mitigation, below) and mining will commence in the northern part of the site.

5.12 Mining will follow the same process, with slate and sand being extracted in 4m wide rooms, which are then supported by struts.

6. Mitigation of potential impact on bats

6.1 The main reason for phasing the working in the southern and northern sectors is to allow mitigation of any potential impacts on the local bats.

6.2 A Bat Mitigation Scheme has been prepared to avoid any impact on the local bat population; this is possible through a phased extraction plan, development of bat refuges and with the use of bat-proof walls and gates. The mitigation methods will be put in-place before any extraction of the Collyweston Slates commence. No further survey work is recommended, as the surveys undertaken were proportionate to the development and allow the usage of the site by bats to be described adequately. The basic phasing of the works to prevent bat impact is shown on drawings P30206-PLN-006 to 009.

6.3 While working on Phase 1, bats will be physically prevented from entering this sector. A solid, opaque, soundproof barrier will be constructed in the existing underground passage, just south of the entrance shaft. This will not allow access by bats. However, the barrier will be fitted with a door which can be opened to provide emergency access.

6.4 Immediately after the barrier is put in place (spring / summertime), the southern areas will be searched for bats by an experienced ecologist. Any that are found will be relocated into the northern sector, which will provide a refuge. Bats will also be excluded from the southern working area by the incorporation of one-way doors in the barrier. This will allow any bats that are not found during the relocation
procedure to leave the southern sector of their own accord while preventing them from re-entering. The bats can then continue to use the existing shaft and northern mine throughout Phase 1, whilst stone extraction is carried out to the south.

6.5 Upon completion of stone extraction in the southern area a dry stone wall will be constructed to form a designated bat refuge area. Sand infill and other measures will prevent bats from passing through the wall. A range of suitable roosting crevices will be provided in the form of stacked discards, waste rock, shot-holes or cracks in the bedrock.

6.6 At the start of the Phase 2 of the works (Drawing No. P30206-PLN-008) a solid, opaque, soundproof barrier will be constructed just north of the existing entrance shaft. This will be installed during the spring / summer months. The southern barrier will be opened to allow access for the bats to the southern refuge.

6.7 Immediately after this barrier is put in place a registered ecologist will search the northern sector for bats. Any that are found will be relocated to the southern bat refuge. Bats will be excluded from the northern passage by the use of one-way doors which will allow them to leave this area while preventing them from re-entering. The bats will then have access to the southern refuge area via the existing shaft and the mining operations can continue in the northern sector.

6.8 When all Collyweston Slate is extracted from the northern sector the long-term stability will be assessed to ensure suitable pillars are in place. Crevices will be added to enable long-term bat roosting. The barriers will then be removed and the access adit will be fitted with a bat-proof door. The existing entrance shaft will be left open to provide access to the whole mine for bats.