



Extension to Messingham Quarry
and New Haul Road

Brigg Road, Messingham

Environmental Statement

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1 Introduction

1.1 Preamble

This Environmental Statement (ES) accompanies:

- a second application for planning permission for consent to extend Messingham Quarry by carrying out silica sand extraction and related development at Greetwell Hall Farm to the north of Brigg Road (B1400); and
- a new application for planning permission to construct a haul road link between a crossing point over Brigg Road and the existing mineral processing plant to the west.

Both applications have been submitted by Sibelco UK Ltd. (Sibelco) to North Lincolnshire Council (NLC) and relate to sites which are c.2.6km east of Messingham village, c.1.3km west of Greetwell, c.4.0km west of Scawby and c.3.0km south west of M180 junction 4.

The second quarry extension application follows an application (number MIN/2016/1823) which was validated on 3rd November 2016, refused by North Lincolnshire Council (NLC) on 2nd October 2017 and which is now the subject of an appeal.

As before, the second quarry extension application relates to a 24.2 hectare parcel of land which is mainly in agricultural use. The site also includes some woodland and a pond. The proposed sand extraction will take place from 17.9 hectares - with the remaining area being used for the temporary storage of soils and excavated sand.

Sand from the proposed quarry extension will be transported by dump trucks via a crossing point over Brigg Road and an internal haul road to the existing processing plant site to the west. Once processed, the vast majority of sand sales will be transported by HGVs to customers via Junction 4 of the M180 – as at present.

Following an initial period in which the extension site will be worked at a lower rate in conjunction with the existing quarry (in order to maintain product consistency to satisfy customer requirements), sand extraction will take place within the proposed extension at the rate of up to 280,000 tonnes per annum. At these rates the 850,000 tonnes reserve in the proposed extension will be worked out in 3 to 3.5 years - with a further year to complete the restoration of the final sand extraction phase.

The annual level of processed sand sales are expected to be maintained at the level of 250,000 tonnes per annum – meaning that there would be no increase in the numbers of HGVs transporting processed sand on the local highway network to the east of the application site, relative to the existing levels of such traffic.

The haul road application meanwhile relates to a c. 0.79km long and 20 metre wide corridor of land which extends between the proposed crossing point over Brigg Road and the existing haul road which links the current area of extraction at Messingham Quarry to the stockpiling area to the south of the existing processing plant site - where the sand is stockpiled before being transferred via a field conveyor (which runs under Brigg Road) to the processing plant.

1.2 Environmental Impact Assessment

Applications for planning permission are required to be accompanied by an ES prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 where either the proposed development:

- falls in one of the categories specified in Schedule 1 of the 2011 Regulations; or

- is 'likely to have significant effects on the environment'.

Schedule 2 of the 2017 Regulations contains exclusion thresholds (below which Environmental Impact Assessment (EIA) does not normally need to be considered) and indicative criteria and thresholds to help planning authorities determine whether significant effects are likely – also having regard to the location of the proposed development.

Although the original quarry extension application (number MIN/2016/1823) did not exceed the relevant Schedule 1 threshold (25 ha), Sibelco decided to submit an ES to accompany that application on a voluntary basis and did not therefore make a request for NLC to adopt an EIA screening opinion in accordance with Regulation 5(1) of the 2011 EIA Regulations.

The company has similarly decided to submit this ES in relation to its second quarry extension and haul road applications on a voluntary basis.

1.3 Purpose

The purpose of this ES is to ensure that:

- relevant environmental issues are appropriately assessed;
- potential environmental effects are identified having regard to, inter alia, the mitigation measures embedded in the scheme design;
- the proposed embedded and any further mitigation measures will be effective and that they will ensure any residual impacts are reduced to an acceptable degree; and
- interested parties are given the opportunity to address any relevant issues.

The Non-Technical Summary of the ES provides a summary in non-technical language and is included separately.

1.4 Scoping

The ES which accompanied the original quarry extension application (number MIN/2016/1823) was prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. After considering the possible need for assessment of all the topics listed in Schedule 4 of the 2011 EIA Regulations and the EIA scoping opinion adopted by NLC on 16th November 2015, it was decided to focus the detailed assessments on the following topics:

- alternatives;
- soils;
- transport;
- landscape and visual;
- noise;
- air quality;
- ecology;
- flood risk and hydrology;
- hydrogeology; and
- cultural heritage.

This ES meanwhile is required to be prepared in accordance with the new EIA Regulations made on 18th April 2017 (the Town and Country Planning (Environmental Impact Assessment) Regulations 2017).

Following consideration of the need for assessment of the topics listed in Regulations 4 and 18 and in Schedule 4 of the 2017 EIA Regulations (see Appendix K) Sibelco has concluded that the assessments included in the

original ES remain suitable - the only exceptions being the assessments previously made in respect of potential transport and ecological effects.

Accordingly, this ES has been updated to include all of the previous assessments and:

- a revised and updated transport assessment;
- a revised and updated ecological impact assessment in relation to the proposed quarry extension area; and
- a preliminary ecological assessment carried out in relation to the proposed haul road.

In addition, this ES includes a 'statement of competence' at Appendix L, as is now required under Regulation 18(5) of the 2017 EIA Regulations.

1.5 Structure

The content of the ES is structured as follows:

Chapter 1 Environmental Statement

Chapter 2 Site and Surroundings

Chapter 3 Proposed Development

Chapter 4 Alternatives

Chapter 5 Soils

Chapter 6 Transport

Chapter 7 Landscape and Visual

Chapter 8 Noise

Chapter 9 Air Quality

Chapter 10 Ecology

Chapter 11 Hydrology

Chapter 12 Hydrogeology

Chapter 13 Cultural Heritage

Chapter 14 Other issues

Chapter 18 Conclusions

Figures

Appendices A to M (EIA scoping opinion, technical reports, EIA compliance checklist and statement of compliance).

1.6 Approach

The environmental impacts of the proposed development have been considered by reference to baseline conditions at the time of undertaking the original EIA (2015/16) and (in respect of potential ecology and transport effects) at the time of preparing this ES (2018).

Where appropriate, the severity or magnitude of environmental impacts are categorised in this ES as “Major / High / Substantial / Severe”, “Moderate/Medium”, “Minor/Low/Slight” or “Negligible”, dependent upon criteria set out in the individual topic chapters. Also where appropriate, the significance of the potential effect of an environmental effect has been assessed on the basis of the magnitude of the impact and the sensitivity, importance or value of a resource, receptor or group of receptors.

In various instances account is taken of whether effects are considered to be positive or negative, permanent or temporary, direct or indirect, the duration and frequency of the effect and whether any combined or cumulative effects are likely.

Where impacts have been identified which may give rise to significant adverse effects, notwithstanding the mitigation embedded in the scheme design, further mitigation measures are described and assessed as a means of avoiding, reducing or compensating for any such adverse effects on the environment. The likely effectiveness of the embedded and any further mitigation is assessed and the significance of any residual effects is described.

1.7 Figures

The proposed development is shown on figure numbers MQ01 to MQ13 Rev A included in this ES. In the event of any discrepancies with the various drawings and figures included in the technical reports appended to the ES, the MQ series of figures are to take precedence.

1.8 Statement of Competence

A statement of competence is included at Appendix L.

1.9 Documents for Purchase and Inspection

Paper copies of the planning application and the accompanying ES are available to purchase from the company (Nicola Cole, Sibelco, Brookside Hall, Sandbach, Cheshire CW11 4TF; e-mail nicola.cole@sibelco.com) at a cost of £25.00 and £75.00 respectively.

Electronic copies of both on CD (in Adobe Acrobat format) are available from the same address at a cost of £10.00 each.

The application and ES documents are also available for inspection:

- at the offices of North Lincolnshire Council (Civic Centre, Ashby Road, Scunthorpe DN16 1AB) and on the Council's website; and
- by appointment (please contact Nicola Cole, details above), at the Sibelco site office on Brigg Road between 09:00 and 16:30 hours Monday to Friday during the statutory determination period.

2 The Site and its Surroundings

2.1 Quarry Extension

The proposed extension to Messingham Quarry is at Greetwell Hall Farm, to the north of Brigg Road (B1400) and c.3.0km east of Messingham village, c.1.4km west of Greetwell, c.4.0km west of Scawby and c.3.0km south west of M180 junction 4.

The application relates to a 24.2 hectare parcel of land within which the proposed sand extraction area is 17.9 hectares.

The application site presently comprises three fields and an area of the woodland in Manton Warren. The central (and larger) field includes smaller areas within which there is a pond and associated woodland, an area newly planted with trees for game cover. Further details of the existing trees and hedgerows are provided in the arboricultural survey report included at Appendix B of the Quarry Extension Planning Statement. Two other ponds are located approximately 40 metres outside the northeast corner of the site. There are other lakes and ponds in the general vicinity - but these are all in excess of 200 metres from the perimeter of the proposed extraction area.

The boundary between the western and central fields is marked by a hedge. The boundary between the central and eastern fields is marked by a large drain and hedgerow. Only part of the eastern field is included in the application area. The site of the former buildings at Greetwell Hall Farm (now demolished) and the land to the east of the farm leading up to one of the lakes in Manton Warren are excluded.

A large drain runs from north to south through the centre of the site (between the central and western fields). The secondary ditch along the northern boundary of the site flows from east to west and then crosses the site from north to south between the western and central fields. The main ditch and secondary ditch exit the site through culverts. In general, the condition of the drainage ditches can be described as overgrown with vegetation in many areas. Typically the drainage ditches have a minimum of 1.5 metres freeboard from the water level to the ground level at the edges of the ditch.

The majority of the site is generally level with slight undulations and lies at an altitude of approximately 22 metres AOD, the topography falls gently from north to south. To the east the land rises progressively towards Manton Warren - which is set on a limestone plateau above the proposed extension area and surrounding land.

The existing average groundwater level beneath the site is approximately 1 metre below the present ground level. Existing ground surface levels vary between 19.5 metres AOD in the south western corner of the site to approximately 25.5 metres AOD in the north eastern corner. The groundwater level lies at approximately 0 - 0.5 metres below the existing ground level in the centre of the site and at about 2.5 metres below ground level in the southwest corner. Recent groundwater level monitoring indicates groundwater levels at the south western corner of the site of 17.41 metres AOD and 25.34 metres AOD at the north eastern corner, indicating a groundwater flow direction from northeast to southwest. The groundwater level within the site and the majority of the surrounding area is partially controlled by the system of agricultural drains and drainage ditches, as well as the current quarrying operations to the south of Brigg Road.

The southern boundary of the application site fronts on to Brigg Road, and is interspersed with trees. The western boundary adjoins Broom and Black Hoe Plantations. The northern boundary is marked in part by a hedge interspersed with trees, a drainage ditch (with further agricultural land beyond) and by the remainder of the woodland and lakes which form part of Manton Warren. The eastern boundary is not defined by existing features on the ground and abuts the site of the former buildings at Greetwell Hall Farm and further agricultural land.

2.2 Haul Road

The proposed haul road meanwhile will occupy a c. 0.79km long and 20 metre wide corridor of land which extends between the proposed crossing point over Brigg Road and the existing haul road which links the current area of extraction at Messingham Quarry to the stockpiling area to the south of the existing processing plant site where the sand is stockpiled before being transferred via a field conveyor (which runs under Brigg Road) to the processing plant.

The route crosses the area of current working at Messingham Quarry and will be progressively restored to agricultural use in accordance with the relevant planning permission (MIN/2009/0356). Except for the northernmost section linking to the proposed crossing point over Brigg Road the proposed haul road will remain unsurfaced. The sections of hedgerow and recent planting to be removed and the two ditch crossing points are described in the preliminary ecological appraisal report included as Appendix M.

2.3 Surroundings

The application site is in a sparsely populated rural area characterised by arable farm production, areas of woodland, several ponds / lakes, the settlements of Messingham, Manton and Greetwell, various farm buildings and a number of individual houses or small groups of houses along Brigg Road. Bell View Farm to the north of Brigg Road (together with fields to the south) includes a livery business.

The area is further characterised by an agricultural field pattern interspersed by drainage ditches controlling the water level to allow the established patterns of farming. The local groundwater table is between 1 to 2 metres below ground level over much of the area and is held at these levels by the drainage system – which comprises underground field drains and open ditches. Typical ditches are 2 to 2.5 metres deep.

There is one current licensed groundwater abstraction in the vicinity of the site area, which is licensed for general agriculture spray irrigation. This abstraction point is located close to a small pond approximately 325 metres south of the south western corner of the site.

Historical plans indicate that a landfill site was present to the south west of the site and south of Brigg Road. It is known that this landfill ceased receiving waste on 27th September 1977. There are no known records of any leachate migration associated with this former facility.

The site is located within the River Trent catchment. The nearest watercourse is the Bottesford Beck - which is located approximately 3 km to the north west.

The land in which the applicant currently has an interest (shown edged blue on figure number MQ02 Rev A) comprises the areas of existing quarrying, permitted reserves and the processing plant area together with past working areas, much of which has been progressively restored to a variety of uses including nature conservation, agriculture and water features since 1987.

2.4 Mineral Resource

The site is underlain by the Devensian Age Sutton Sand Formation which is in turn underlain by the Charmouth Mudstone Formation that generally comprises dark grey laminated shales and dark, pale and bluish grey mudstones.

The sand resource present has been investigated by drilling and the samples obtained have been analysed. The mineral assessment report included at Appendix A of the Planning Statement provides information as to:

- the mineral to be extracted;
- the total quantity (in tonnes) to be extracted;
- details of the site investigation work undertaken e.g. borehole / trial pit locations and logs and the sampling techniques employed;

- the results of tests undertaken including physical and chemical analysis, to indicate quality of the deposit and the British Standards with which the material complies or will comply after processing.

The mineral resource assessment report confirms that the amount of sand to be extracted and processed will be 850,000 raw tonnes and that allowing for approximately 10% waste (very fine sand, silts and clays) which is removed during processing the amount of sand product to be sold is likely to be in the region of 765,000 tonnes as high quality silica sand to industrial end uses, including coloured glass containers (bottles and jars); specialist tinted float (flat) glass; tiles, sanitary ware; specialist flooring; sports and horticultural applications; water filtration; electrical distribution and specialist coatings. A small proportion, produced as a consequential by-product of making the other grades, is likely to be sold as concreting and mortar sand to users in the construction sector.

2.5 Designations

2.5.1 Soils

The majority of the site is mapped as Grade 3 quality land on the Provisional Agricultural Land Classification maps issued by the Ministry of Agriculture, Fisheries and Food (MAFF, 1974) with a small area in the north east mapped as land primarily in non-agricultural use. However, these provisional maps were produced prior to the issuing of revised guidelines for the grading of agricultural land in 1988 and before the subdivision of Grade 3 land, they were not intended for site specific grading and should only be treated as indicative of the agricultural land quality of large areas.

A survey carried out in accordance with the revised guidelines and criteria for grading the quality of agricultural land issued by the Ministry of Agriculture, Fisheries and Food (MAFF, 1988) has confirmed that the majority of the agricultural land (15.9ha) is sub-grade 3b and that the various areas of higher grade 3a land together amount to 3.7 hectares.

2.5.2 Landscape

The scheme area does not fall within an area either designated nationally or locally for its landscape value and there are no such designations within 2km of the site boundary.

2.5.3 Ecology

There are no international nature conservation designations within 10km of the site boundary and no local statutory nature conservation designations within 2km.

The two national statutory designations within 2km are Manton and Twigmoor SSSI (340 metres to the north east) and Messingham Sand Quarry SSSI (720 metres to the south west).

The north eastern part of the site falls within Greetwell North Local Wildlife Site (LWS). There are 10 other non-statutory nature conservation (ecology) designations within 1km of the site boundary. These are named and described in detail in Table 4.2 of the ecological impact assessment report included at Appendix G of this ES.

2.5.4 Air Quality

The nearest Air Quality Management Areas are those declared in the Scunthorpe area approximately 4km to the north of the site. These have been declared since the daily PM₁₀ levels are above the national standard - primarily due to industrial emissions from local steel works.

2.5.5 Water

The site is shown to be in Flood Zone 1 on the Environment Agency's Flood Map i.e. in an area considered as having a less than 0.1% (1 in 1000) annual probability of flooding from rivers or sea.

2.5.6 Cultural Heritage

There are no cultural heritage designations i.e. scheduled monuments, listed buildings, historic parks and gardens, registered battlefields or conservation areas, within the site.

The nearest listed building (Twigmoor Hall – Grade II) lies about 1.6km to the north of the site. The nearest scheduled monument is just under 3km to the southeast at Staniwells Farm.

2.5.7 Other

The site is not subject of any public rights of way.

3 Proposed Development

3.1 Introduction

In summary, the proposed scheme for EIA assessment purposes can be described as one for an extension to an existing quarry, together with the construction of a crossing point over Brigg Road and a new haul road link to the existing processing plant site, associated works and planting and progressive restoration of i) the quarry extension to a landscaped lake and land suitable for nature conservation and agriculture and ii) the haul road.

3.2 Quarry Extension Establishment

The initial site establishment works will be as shown in figure number MQ04 Rev A and will include:

- diversion of the existing overhead power line;
- the construction of a new access from Brigg Road and the connecting section of internal surfaced haul road;
- soil stripping and storage of soils and the formation and grass seeding of soil screen mounds along the frontage with Brigg Road;
- installation of wheel cleaner;
- the erection of fences and gates; and
- perimeter hedgerow gap planting.

The duration of the initial site establishment works is likely to be 3 to 6 months - and subject to the requisite consents, could take place in the second half of 2018. The soil screens will be seeded with grass at the first suitable opportunity following formation.

3.3 Quarry Extension Method of Working

The soil stripping, soil screen mound construction and sand extraction will take place using the methods currently employed in the current quarry operation to the south. Working will begin in the eastern section of the site and will progress from north to south before entering the western section where working will progress from east to west (as shown on figure numbers MQ05 to MQ07 (Rev A) and MQ08).

Before soil stripping and sand extraction takes place in the central and western section of the extension site, the drain which runs from north to south through the centre will be diverted around the western site boundary.

Before and during sand extraction the level of groundwater will be temporarily drawn down by pumping to the base of the sand deposit to enable the quarry to be worked in a dry condition. Sand extraction will take place on a campaign basis (described below), pumping will only take place immediately before and during these campaign periods. When pumping is in operation the groundwater will be pumped from the excavation to the ditch which crosses the site from north to south (or to its culvert in the south of the site which crosses beneath Brigg Road). At the completion of sand extraction and restoration the pumps will be removed and pumping will permanently cease, the groundwater will be allowed to return to its original levels.

Soils will be stripped in accordance with a phased scheme using a 360° backactor and transported by dumper truck for direct placement on worked / levelled areas where practicable or for storage in the temporary soil storage and screening mounds shown in figure numbers MQ04 to MQ07 (Rev A) and MQ08.

Typically soil screening mounds will be 2 to 2.5 metre high with an outer slope of no steeper than 1:2.5, where space is limited, and 1:4 on corners and ends of bunds. The soil screening mounds will be seeded with a low maintenance grass seed mix.

After the soils are stripped, the sand will also be extracted using a 360° backactor and will be transported by dumper truck to the temporary sand stockpiles up to 4 metres in height within the proposed quarry extension area.

No blasting will be required. An initial incline will be excavated to allow plant access to the quarry floor. The depth of excavation will vary between 2 to 8 metres below adjoining ground levels.

Soil stripping and sand extraction will take place on a “campaign basis” i.e. during separate periods typically twice per annum. The duration of each soil stripping and sand extraction campaign is likely to be between 10 and 12 weeks. The transportation of sand to the processing plant stockpiling area will similarly take place on a “campaign basis” between 2.5 and 3 times per annum – with each lasting approximately 7 weeks.

Soil stripping and sand extraction will only take place in part of each phase at any one time in order to minimise the area of land taken out of agricultural or restored use.

Sand recovered from the temporary stockpiles and/or loaded direct from the excavation face will be transported in dumper trucks via Brigg Road via an internal haul road to the south of Brigg Road to the other stockpiling area to the south of the existing processing plant site before being transferred by the existing field conveyor which runs under Brigg Road and to the processing plant. Some sand will be stockpiled in the quarry extension area prior to transfer by dumper trucks via a new crossing point over Brigg Road and new / existing haul roads.

At the site processing plant, the sand will be washed, screened, dried and bagged in order to produce a range of products to meet customer specifications. Very fine sand, generally clays and silts, will be removed from the sand during the washing process and pumped to an on-site lagoon for settling out with clean water for re-use in the processing plant. Some of the tailings will be removed from the lagoons, allowed to dry and returned to the quarry excavation. This will be a relatively small volume and will be returned to the quarry excavation as back loads. A closed loop water processing system will be used – as at present.

The annual level of extraction from the quarry extension area will be around 280,000 tonnes leading to annual processed sand sale is expected to be up to 250,000 tonnes. This tonnage will be less than the amount excavated from the quarry due to the losses incurred during the processing needed to ensure that the sand meets the relevant specifications. These losses include very fine sand, clays and silts that do not meet customer specification. In total the losses equate to approximately 10% of the in situ reserve.

3.4 Crossing Point and Haul Road

The design and construction of the proposed crossing point is as shown on Figure MQ13 Rev A.

Existing operations utilise a haul road to transport the mineral from the extraction area to the stockpiling area. In order to minimise the impact on the public highway, it is proposed to extend the existing haul road into the proposed extraction area north of Brigg Road.

In order to access the proposed extraction area, a temporary vehicle crossing of Brigg Road is required. The crossing will be in the form of a priority crossroads as detailed on Figure MQ13 Rev A. The crossing will provide a 10 metre wide access which is designed to accommodate an A40 dumper truck with appropriate ‘Stop Line’ road markings. Turning movements to / from Brigg Road will not be permitted. This will be enforced by the provision of ‘no right / left turn’ signs on each approach road to the crossing.

The haul road will cross the area within the existing Messingham Quarry from where sand is currently being extracted and where the land is being progressively restored to agriculture. The route of the haul road will be confined to land which has either already been stripped of soils and/or worked for sand.

3.5 Hours of Operation

The proposed development will operate during daylight hours between the same hours of operation as apply to the existing quarry, namely 0700 to 1800 hours Monday to Friday and 0700 to 1300 hours on Saturdays. There will continue to be no working on Sundays or Public Holidays.

No fixed artificial lighting will need to be provided with any operations which take place during the hours of darkness in winter utilising lights on mobile plant only.

Transportation of sand to the plant site will be restricted to a 10 hour period during the above hours and to weekdays (excluding Bank Holidays) only. After allowing for break times, use of the crossing is likely to take place for 8.5 hours during each working day during campaign periods.

3.6 Duration

Based on the reserves in the proposed extension area and the existing quarry (850,000 tonnes and 440,000 tonnes (as at 1st January 2018) respectively), the proposals for joint working in 2019 and the anticipated annual rate for excavation the expected life of the extension and the remaining existing quarry (excluding final restoration works) is as shown in Table 1 below.

TABLE 1: Proposed Extension and Existing Quarry - Duration

	Amount of sand excavated (000s tonnes)					Totals
	2018	2019	2020	2021	2022	
Proposed extension site north of Brigg Road	0	120	280	280	170	850
Existing quarry south of Brigg Road	280	160	0	0	0	440
Total	280	280	280	280	170	1,290

3.7 Traffic Generation and Routeing

The processed sand will be transported by HGVs to customers via Junction 4 of the M180 junction– as at present. Despatch of processed product from the processing plant to individual customers occurs all year round. This will not increase as a result of the proposed quarry extension but will be maintained at current levels of approximately 250,000 tonnes per annum meaning that the numbers of HGVs transporting sand to customers at an average of 74 movements per day , with only outbound movements (average 37 per day) routing via the outskirts of Scawby. The purpose of the extension is to prolong the life of the quarry and safeguard the associated jobs and investment in plant and equipment

There will be no change to the routing of HGV's which arrive from the M180 Junction 4 via the A18 Mortal Ash Hill, the B1398 Kirton Road and Brigg Road to collect the product. They then despatch with the processed product from the processing plant via Brigg Road, Messingham Lane, the B1207 Vicarage Lane / Scawby Road and the A18, to the M180.

Sibelco has prepared a HGV routing agreement and HGV routing plan which are provided within Appendix C of this Environmental Statement, which also includes a letter from one of Sibelco's main third party hauliers (Brigg Haulage) showing their commitment to using the designated HGV routes.

During each “campaign” transportation of sand from the quarry extension is expected to generate 28 dumper truck movements per hour on average (and an average of 246 per weekday - excluding Bank Holidays) at the Brigg Road crossing point and along the sections of new and existing haul road linking the crossing point to the processing plant stockpiling area (where one movement is either an incoming or outgoing leg of a return journey).

3.8 Restoration

The restoration of the proposed extension area will be to land suitable for agriculture and nature conservation and a landscaped lake as shown on figure number MQ09 Rev C.

The proposed extension area will be restored on a progressive basis using replaced soils to the profiles no steeper than 1 in 4 as shown on drawing numbers MQ04 to MQ07 (Rev A) and MQ09 Rev C.

The need to maintain dewatering for the duration of the sand extraction programme in the quarry extension area means that the lake will not be allowed to fill until the final stages of the site restoration.

No waste or other material derived from the proposed quarry extension area will be brought to the site for restoration purposes.

Some slopes into the water will be formed at a shallow gradient to provide ideal feeding conditions for wading birds and wildfowl. The water level of the lake is expected to be approximately 18.3 metres AOD with a varying water depth across the lake. The final water level of 18.3 metres AOD will be controlled by the invert of the outlet of the lake.

The drain to be diverted during the extraction phase of the development will be re-routed through the lake as part of the final restoration works.

The haul road will be restored to agriculture in accordance with the terms of the existing quarry planning permission (MIN/2009/0356) and will be completed within 12 months of the date when they are no longer required.

3.9 Aftercare and after-uses

The present farming operation will be progressively reduced as land is taken for sand extraction. Agricultural activity will be able to be continued during and after the development in the western section of the site. The area around the margins of the lake and to the north meanwhile will be restored to nature conservation use.

Both areas will be managed for 5 years following restoration in accordance with an after-care scheme to be submitted for approval by North Lincolnshire Council pursuant to a condition attached to the planning permission.

The haul road meanwhile will be managed in accordance with the after-care scheme which applies under the existing quarry planning permission (MIN/2009/0356).

3.10 Embedded Mitigation

3.10.1 Traffic and Highways

The proposed scheme incorporates measures that specifically minimise the impact of transport movements as follows:

- the transportation of the won mineral between the stockpiling area and the processing plant is via a conveyor under the B1400 Brigg Road. This removes the need for frequent vehicle movements across Brigg Road between the stockpile area and the processing plant.

Traffic Management

- to minimise the impact upon the public highway it is proposed to link the proposed extraction area north of Brigg Road with the existing southern haul road to the south of Brigg Road thus removing the need for additional HGV movements along Brigg Road;
- the proposed vehicle crossing point on Brigg Road will be temporary over a period of approximately 3 to 3.5 years and is purely to provide access between the proposed extraction area and the haul road, with turning prohibited onto or from Brigg Road; and
- 30 / 40 tonne capacity dumper trucks will be utilised thus limiting the crossing of Brigg Road around 14 weeks in the year in two campaigns of around 7 weeks each.

The proposed scheme incorporates measures that specifically minimise the impact of dumper trucks as follows

Dumper Truck Mitigation

- the use of a mobile sweeper will be continued;
- a wheel cleaning facility will be provided on the haul road at the northern and southern approaches to Brigg Road to prevent the deposit of material on the local highway;
- advance warning signage will be erected on the B1400 Brigg Road on the approach to the vehicle crossing point warning of slow moving vehicles crossing ahead. The type and size of signage to be provided and its location on the B1400 will be discussed and agreed with the local highway authority prior to its implementation;
- before and after road condition surveys will be undertaken at the crossing point (together with yearly intermediate surveys) to identify and rectify any issues directly attributable to the use of Brigg Road by the dumper trucks; and
- at the proposed vehicle crossing point a banksman will be permanently sited during campaigns to control the dumper truck crossings and give priority to the users of Brigg Road at all times.

To mitigate the potential for impacts from HGVs on the local road network the following measures are proposed as presented within the Routing Agreement in Appendix C of this ES:

- limit HGV generation to a maximum of 37 in / 37 out per day (measured as an average over a year);
- limit HGV generation to Monday to Friday and Saturday mornings only (excluding Public holidays and Bank holidays); and
- all third party HGV hauliers to comply with the HGV routing agreement (see Annex H).

These are outlined in more detail in the Traffic Management Plan (TMP) presented within Appendix C of this ES.

3.10.2 Landscape and Visual

The scheme has been designed to minimise adverse effects on landscape character and views by:

- retaining and safeguarding of boundary trees and hedgerows;
- retaining the pond adjacent to the northern boundary and the associated surrounding woodland;
- ensuring that the route of the ditch diversions lies outside the Root Protections Zones of the boundary trees and hedges to be retained;
- progressively constructing soil screens around the perimeter of the sand extraction to help screen views and limiting the typical height of such mounds to 2.5 metres and seeding with grass;
- planting a new hedgerow alongside Brigg Road and retaining the self-set shrubs and trees in the roadside ditch;
- undertaking the soils stripping, extraction and restoration progressively in phases – so that the area disturbed at any time is kept to a minimum;
- limiting the height of temporary sand stockpiles to 4 metres; and

- avoiding the need for artificial lighting.

3.10.3 Noise

Best practice noise control measures are implemented as standard on all well managed mineral extraction sites, with noise limits defined in Government technical guidance for minerals developments. Such measures are designed to reduce potential emission of noise at source.

Various measures have been incorporated in the design of the scheme to help reduce noise emissions from the site. These are described in section 2.4 of the noise assessment included at Appendix E of this ES and are listed below:

- all plant will be maintained appropriately to ensure noise emissions are minimised;
- quiet plant options will be used wherever possible;
- vehicle routing on site will be arranged to minimise the requirement for reversing;
- all site mobile plant will be fitted with broadband reversing alarms to reduce noise levels off-site;
- localised screening and/or acoustic enclosures will be used where necessary;
- equipment will be regularly serviced to minimise noise emissions;
- the quietest plant will be utilised where possible for the task required; and
- operating hours for the Site will be restricted to between 07.00 and 18.00 hours on weekdays and between 07.00 and 13.00 on Saturdays. There will be no working on Sundays or Bank Holidays.

3.10.4 Dust

Best practice dust control measures are implemented as standard on all well managed mineral extraction sites. Such measures would be designed to reduce potential emission of particulate matter at source.

The practical measures to be employed in this case comprise:

- use of a mobile water bowser and spay to dampen working and loading area and routes trafficked by mobile plant during periods of dry and/or windy weather;
- hard surfacing of the first section of haul road from the entrance off Brigg Road and provision of rumble strips – to minimise the “trackout” of dust on to the public highway;
- screening of selected operational areas with soil mounds to shield activities which have the potential to create dust from the wind and to shield dust sensitive receptors from potential dust sources;
- undertaking the soils stripping, extraction and restoration progressively in phases – so that the area disturbed at any time is kept to a minimum;
- minimise drop heights from all loading or handling equipment;
- grass seeding perimeter soil screen mounds at the earliest opportunity; and
- ensure HGVs leaving the processing plant site are sheeted to prevent escape of materials during transport.

In addition, Sibelco will employ the following complimentary management measures:

- display the head or regional office contact information at the site entrance;
- record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book; and
- carry out regular site inspections to ensure that the mitigation measures are being employed effectively.

3.10.5 Cultural Heritage

The archaeology will be preserved by record through archaeological excavation, recording, analysis and publication appropriate to significance of the archaeological resource. Accordingly the following, post-consent mitigation strategy will be adopted:

- geophysical survey of all areas not covered by the evaluation in 2014-15;
- further trenching of anomalies identified by geophysical survey and of areas not accessible to trenching, due to game cover, tree growth in north-east corner and the power line; and
- subject to the above, archaeological excavation of the topographical mound near Trench 7 and other archaeological features found in the post-consent evaluation.

3.10.6 Ecology

The embedded mitigation included in the proposed scheme to minimise adverse ecological effects can be summarised as follows:

- implementation of a stand-off between the limit of extraction and the northern site boundary, within which habitats would be retained and relevant protected species (e.g. reptiles) maintained. This standoff would be a minimum 10 metres wide, but larger in many cases e.g. 25 metres along the southern boundary. This takes account of requirements for protected species mitigation and the maintenance of appropriate tree root protection zones;
- application site entrance off Brigg Road coincides with a large existing gap in the northern boundary hedgerow and therefore does not require hedgerow removal save for a short section to enable construction of the southern arm of the crossing point.;
- the application site would not be lit and no processing plant would be installed;
- topsoil is to be stockpiled on species-poor neutral grassland and away from retained boundary habitats where there would be a risk of interaction with relevant protected species (reptiles);
- de-watering would only be undertaken 1st March to 31st October, minimising the potential hydrological effect on adjacent habitats both during mineral working and post-working; hydrological studies have confirmed that there are no pathways for a hydrological effect on retained ponds and surrounding designations; and
- commitment to restore 11.3 ha (67%) of the habitat area lost to a nature conservation end use. Additional peripheral land within the application boundary, but outwith the working area, would also be incorporated into the area allocated for nature conservation.

In addition to the above precautionary mitigation measures will be adopted to avoid any residual risk to reptiles associated with the haul road including:

- arisings from vegetation clearance will not be stored in a manner that might risk them being used as a place of refuge by reptiles;
- where practical, any vegetation disturbance and removal required will be undertaken from mid-April to coincide with the period when reptiles are likely to be active and able to disperse away from works areas;
- vegetation will be appraised by an ecologist for its potential for reptiles and removed under ecological supervision in a manner appropriate to the management of this risk e.g. incremental strimming of grassland prior to removal;
- any potential refuges for reptiles (rubble piles, logs, mammal burrows etc.) will be dismantled under ecological supervision;
- any reptiles found will be moved by the ecologist to a nearby place of safety. The ecologist will attend site prepared for the potential for these species to occur, and will have a suitable means to transport any reptiles found (e.g. bucket with sealable lid); and
- a record will be kept on the numbers and locations of reptiles found during the restoration works.

3.10.7 Soils

Soil stripping, handling, storage and placement will take place in accordance with the Good Practice Guide for Handling Soils published by the former MAFF in 2000.

The restoration scheme will include the return of a single 5.6ha area to Grade 3a agricultural land quality by providing a soil depth of at least 120cm – to compensate for the working of the various parts which jointly make up 3.7ha of Grade 3a land currently.

Soil stripping, handling, storage and placement within the proposed haul road meanwhile will take place in accordance with the arrangement approved under the existing quarry planning permission (MIN/2009/0356).

3.10.8 Groundwater

The dewatering will be controlled to ensure that there will be no noticeable adverse impacts within the site or beyond its boundaries, including on the water abstraction point to the south. The provision of a new lake would provide a new receptor for groundwater, which would assist in maintaining the groundwater flow direction towards the west.

3.10.9 Land Stability

To mitigate the potential risk of slope failure during the quarry operations:

- an unworked margin up to 25 metres wide will be left alongside Brigg Road;
- the gradient of the temporary face to be excavated at the boundary of the workings will be no steeper than 1 in 1;
- no excavation will take place within 25 metres of the Messingham Drain before it is diverted or the water bodies to the north and north east; and
- no excavation will take place within 10 metres of the existing and proposed ditches along the northern and western boundaries.

To mitigate the potential risk of slope failure post restoration, the final slopes will be no steeper than 1 in 4 and suitable soil replacement and seeding/planting will be carried out to prevent wave erosion at the lake margins.

4 Alternatives

4.1 Introduction

Schedule 4, Part II 4 of the 2017 Regulations requires an ES to include “*A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effect*”.

The alternatives considered by the applicant in this case have been those relating to:

- location;
- the method of working;
- extraction phasing sequence;
- the means of access to the processing plant; and
- the restoration scheme.

The consideration given to each of these aspects which contribute to the overall development design is outlined below.

4.2 Location

The extent of the sand deposit means that there is no potential to extend Messingham Quarry to the west or east. Land to the south has already been worked and restored.

It follows that the only scope to extend the quarry is to the north and therefore no alternative location was considered. As there is no other location in proximity to enable an extension of Messingham Quarry a comparison of environmental effects in terms of site selection was not carried out. However, from the early stages of the design the aspects below have provided opportunities for alternatives within the design.

4.3 Method of Working

In general terms the depth of the sand deposit in the western part of the proposed extension site is comparable to that currently being worked to the south of Brigg Road and therefore could be worked dry (without dewatering) in the same way. The deposit in the eastern part is however deeper – meaning that a significant proportion lies below the water table.

There are two main ways in which the sand could be worked – either by working it dry (following de-watering (to depress the water table) or by working it wet using a long reach excavator (without de-watering).

After taking expert advice which established that dewatering would not give rise to any significant adverse effects, Sibelco selected the first option mainly because the second would result in a high rate of sand losses and thereby affect the viability of the project adversely.

4.4 Phasing Sequence

The proposed phasing of development takes account of the local geology, the relationship of the local groundwater table to the surface and the overall site layout. The site has been divided into three phases, each of about one year duration.

The proposed phasing and direction of working is a reflection of the fact that the sand deposit is deeper in the east – meaning that the necessary dewatering can take place there more efficiently and thereby enable restoration to rough grassland and native wet woodland matrix at the earliest opportunity.

The phasing is also designed to ensure that sand is extracted to the periphery of the site as soon as possible in each phase so restoration works can be undertaken at the earliest opportunity. This includes agricultural restoration and lake shore restoration works.

The majority of the agricultural restoration works are proposed for the western part of the site where the base of sand extraction will lie above the final lake level.

4.5 Access to the Processing Plant

In general terms, the two options considered for the transportation of the sand to the processing plant were to:

1. establish a plant crossing point over Brigg Road and then transport the sand using dumper trucks via the current haul road system and an extension to the current haul road to the stockyard to the south of Brigg Road and from there transfer the sand to the processing plant by the underground conveyor system as at present; or
2. transport the sand by conventional fixed body tipper lorries via Brigg Road to the stockyard to the south of Brigg Road and from there transfer the sand to the processing plant by the underground conveyor system as at present.

As part of the first application (MIN/2016/1823) option 2 was chosen as the preferred option. Following a review of the access and its design the applicant for the purposes of this application has selected option 1, the crossing point. A review of potential for environmental effects associated with option 1 was carried out to inform any updates that were required to appropriately assess the environmental impacts. In summary the technical assessments carried and which are summarised in this ES confirm that the resulting environmental effects for option 1 are not significant, as was the case for option 2.

4.6 Restoration

Three restoration options were considered for the proposed quarry extension area. The first involved the importation of inert waste materials to enable the void created by sand extraction to be backfilled and restored to agriculture. The second involved restoration mainly to a shallow lake by part infilling the void with soils stripped from the excavation area and the third involved the creation of a smaller lake together with land to be returned to best and most versatile (BMV) agricultural quality.

The first option would add significantly to the number and duration of HGV movements and could result in a greater degree of disturbance generally. The second would run counter to national and local planning policy which is to restore BMV land to its previous quantity and quality where practicable. The third option avoided the problems associated with the first two. For these reasons the third option was chosen.

4.7 Conclusions

Following the company's assessment of the options for the method of working and phasing to be employed, the means of accessing the processing plant and the manner of restoration, the choice of the scheme now being proposed was made primarily with the aims of:

- minimising potential adverse environmental effects;
- complying with national and local planning policy; and
- achieving a scheme which is economically viable.

5 Soils

5.1 Introduction

This Chapter provides a summary of the assessment of effects on soils within the proposed quarry extension area as detailed in the report included at Appendix B.

5.2 Methodology

A survey of the site was undertaken on 14th January 2015. Soil profiles were examined using a hand auger and/or spade to a depth of 120cm, where possible. The fieldwork was conducted at a detailed density of one auger boring per hectare on a 100 metre grid. Soil pits were dug in representative soil types to assess subsoil structure and allow the preparation of a statement of soil physical characteristics.

The quality of the agricultural land within the site was assessed using the revised guidelines and criteria for grading the quality of agricultural land issued by the Ministry of Agriculture, Fisheries and Food (MAFF, 1988).

A qualitative assessment was then undertaken of the predicted impact on soils as a result of the proposed development. The likelihood of significant effects, taking into account the mitigation proposed was considered and the effects were categorised in accordance with standard methodology and using professional judgement.

5.3 Baseline Conditions

This survey showed the site to comprise a single soil type comprising a non-calcareous, stoneless, loamy medium sand textured topsoil, which overlies a medium sand subsoil. The medium sand textured subsoil has a weakly developed medium sub-angular blocky structure which becomes apedal single grained with depth. Profiles of this soil type are well drained and assessed as Wetness Class I.

The limiting factor for the quality of the agricultural land within the survey area is droughtiness. The available moisture for crop growth within the coarse textured soils in the site is limited, which together with the climatic characteristics at the site will restrict the potential of the land to supply the total moisture requirements for crop growth.

Subgrade 3a quality land is restricted to small areas of land across the site in which the topsoil is relatively thick in extent. The soil profiles cannot provide sufficient moisture during the growing season under the climatic conditions at the site for unrestricted plant growth. However, as the topsoil within a soil profile provides a higher level of moisture availability than similarly textured subsoil, such profiles have only a moderate droughtiness limitation to the land quality limiting the land to Subgrade 3a quality.

The majority of the land within the survey area has a significant droughtiness limitation which restricts the land to Subgrade 3b. The thinner topsoil horizon and the coarse texture of the subsoil result in low moisture retention properties for the majority of the soil profiles sampled and together with the climatic factors at the site combine to be sub-optimal for the supply of moisture to growing crops.

5.4 Assessment of Effects

The assessment of potential effects has paid regard to the proposed incorporation of best working practice embedded into the scheme design and the restoration proposals.

Restoration proposals for the proposed site are for approximately a quarter of the site to be a lake and a further quarter to be returned to productive agriculture. The remaining areas of the site will be restored to a mix of wetland, rough grassland and woodland. The soil profiles within the areas restored to agriculture will have the physical characteristics of best and most versatile land and comprise the loamy medium sand topsoil from within the present agricultural land.

Working of the proposed site would result in an initial loss of approximately 19.6 ha of agricultural land of which only 3.7 ha is of BMV quality. As 5.6 ha of agricultural land will be restored a total of 14 ha will be lost. However, all of the restored land will be of BMV quality.

5.5 Mitigation

No further mitigation is considered to be necessary in addition to that embedded in the scheme design.

5.6 Statement of Significance and Summary

A soil survey and ALC was undertaken in January 2015 and found one soil type to be present across the area. Land quality was predominantly Subgrade 3b with four small areas of Subgrade 3a quality land. The limiting factor for the ALC grade was droughtiness.

Land assessed Grades 1, 2 and 3a are considered to be Best and Most Versatile (BMV) in terms of their agricultural quality and there are policies both national and local that require consideration of the loss of such quality land. Where there is loss, either restoration has to endeavour to restore land back to BMV or provide overriding reasons for the loss; such a reason for consideration is biodiversity gain.

There is little scope to restore all the land to agricultural usage as fill material for the whole site is unavailable and infilling is not proposed. As much agricultural land will be restored as possible using the topsoil resources available within the site and all the restored agricultural land will be of BMV quality. It is thus considered that there will be a loss of agricultural land but only that land which was of Subgrade 3b quality and a gain in the amount of BMV quality land following restoration.

The BMV quality land restored will also be in a single block of land that will be easier to manage as BMV land compared to the existing situation where the BMV land is in four separate small blocks dispersed within lower quality land.

The soil resource would be stripped, stored and re-laid according to best practice and would be used to restore profiles sufficient to achieve BMV quality land. Additionally topsoil stripped from wooded areas will be used to restore non-agricultural habitats.

Therefore there will be no loss of topsoil resources from the development.

6 Transport

6.1 Introduction

This Chapter provides a summary of the assessment transport effects as detailed in the report included at Appendix C.

6.2 Methodology

The Transport Statement (TS) has been prepared in accordance with current best practice as set out in paragraph 007 (reference ID: 42-007-20140306) and paragraph 015 (reference ID: 42-015-20140306) of the PPG first published by the Department of Communities and Local Government (DCLG) in March 2014. The scope of the TS has been informed by a scoping meeting held with North Lincolnshire Council on the 3rd May 2017 which discussed the development proposals and the transport characteristics, local transport issues and the scope of assessment in particular.

The TS assesses aspects of the potential environmental effects of the proposed traffic generation has been carried out with regard to national and local transport planning policy.

Due to the very low numbers of people to be located at the site (and in line with the guidance provided at paragraph 009 (reference ID: 42-009-20140306) of the PPG), measures to promote sustainable travel are not regarded as a key issue – meaning that a Travel Plan is not necessary in this case.

6.3 Baseline Conditions

6.3.1 Highway Network

The B1400 Brigg Road is a single carriageway road and is subject to the national speed limit of 60mph along the 1.7km stretch of road between the proposed quarry extension area and the existing access to the quarry stockpile area. The road has straight horizontal alignment with level gradient. It is a rural road and there are no existing footways present on either side. The carriageway width varies between 6.3m and 6.8m and there is no street lighting present. There are very few frontage buildings or side accesses along the length.

6.3.2 Traffic Flows

To assess the traffic impact of the proposed extension area, a 7-day ATC was undertaken on the B1400 Brigg Road in the vicinity of the proposed site access between Thursday 19th March and Wednesday 25th March 2015. The 5 day average combined two way flow and recorded 1,921 movements of which 11.3% were HGVs.

The average weekday hourly profile on Brigg Road shows a typical profile with traffic flows highest during the AM and PM peak hours. A total two-way flow of 177 vehicles was recorded in the AM Peak (08:00 – 09:00) and 188 vehicles were recorded on the same basis in the PM Peak (17:00 – 18:00). These numbers compare to an average two-way flow of 124 vehicles per hour during the off peak hours between 10:00 and 17:00.

6.3.3 Personal Injury Accidents

Personal Injury Accident (PIA) data has been acquired from Crashmap Department of Transport (DoT) online database to obtain data for accidents in proximity to the proposed crossing on Brigg Road This data identified the timing and number of accidents over the 5 year period of 01/01/2013 to 30/09/2017.

Analysis of the data above shows that no accidents have occurred where the proposed vehicle crossing is to be located over the five year study period.

6.4 Assessment of Effects

6.4.1 Transport

The assessment considers the transportation impacts of the crossing point and any impacts on capacity or safety of the local highway network.

The development will not result in any material increase in movements on the highway network as these movements will only be crossing the network. However, as part of the assessment the TS consider existing traffic flows in the vicinity of the crossing point.

The proposed development will result in up to 28 dumper truck crossings per hour or 246 dumper truck crossing per day. The level of flow along Brigg Road is very low and the number and frequency of gaps in flow mean that there will be ample opportunity for the dumper trucks to cross Brigg Road.

Processed mineral will continue to be transported from the processing plant to customers at a rate of 250,000 tonnes per annum as is the current situation (despatch of the processed product from the processing plant will be via Brigg Road, Messingham Lane, the B1207 Vicarage Lane / Scawby Road and the A18 with HGV's arriving to the site via the A18 Mortal Ash Hill, the B1398 Kirton Road and Brigg Road). Based on 253 operating days per year and 27 tonne payload HGVs, this equates to an average of 37 HGV departures per day or 74 HGV movements. As such HGV volumes associated with the transport of processed material will not increase above existing levels as a result of the development.

Based on the above there will be no material increase in traffic on the B1400 Brigg Road.

6.4.2 Environmental

The effects on the B1400 Brigg Road from the temporary crossing point is of negligible significance as the B1400 will not experience and increase in total flows.

6.5 Mitigation

The proposed development incorporates embedded mitigation which minimises the effect of transport movements, in particular:

- the annual amount of processed sand sales (and therefore the number of HGV movements generated along Messingham Lane and through the outskirts of Scawby will be maintained at current levels – thereby removing any potential concerns about increased HGV traffic from Messingham Quarry along these sections of the local highway network;
- the sand will continue to be transported from the main stockpiling area to the processing plant by underground conveyor. This removes the need for frequent vehicle movements across Brigg Road between the main stockpiling area and the processing plant;
- a wheel cleaning facility (rumble strips/cattle grid) will be provided at the entrance to the proposed site extraction area to prevent the deposit of material on the local highway;
- the proposed crossing point will link the proposed extraction area north of Brigg Road with the existing southern haul road to the south of Brigg Road thus removing the need for additional HGV movements along Brigg Road;
- the proposed vehicle crossing point on Brigg Road will be temporary over a period of approximately 3 to 3.5 years during the operating hours of Monday – Friday and Saturday mornings only between 07:00 to 17:00 and is purely to provide access for dumper trucks between the proposed extraction area and the haul road, with turning prohibited onto or from Brigg Road;
- advance warning signage will be erected on the B1400 Brigg Road on the approach to the vehicle crossing point warning of slow moving vehicles crossing ahead. The type and size of signage to be provided and its location on the B1400 will be discussed and agreed with the local highway authority prior to its implementation;

- at the proposed vehicle crossing point a banksman will be permanently site during campaigns to control crossings and give priority to users of Brigg Road at all times;
- before and after road condition surveys will be undertaken at the crossing point (together with yearly intermediate surveys) to identify and rectify any issues directly attributable to the use of Brigg Road by the dumper trucks.
- a TMP has been prepared to formalise all of the required mitigation measures; and
- Sibelco has prepared a routing agreement and HGV routing plan which outlines the routes incoming and outgoing HGV's will take to and from the Site.

6.6 Statement of Significance and Summary

The environmental effects of development traffic have been assessed having regard to the embedded mitigation and all residual effects are considered to be insignificant.

In conclusion the proposed development would not lead to a material adverse effect in terms of road capacity or road safety.

7 Landscape and Visual

7.1 Introduction

This Chapter provides a summary of the assessment of landscape and visual effects as detailed in the report included at Appendix D.

7.2 Methodology

The Landscape and Visual Impact Assessment (LVIA) has been carried out in general accordance with:

- Guidelines for Landscape and Visual Impact Assessment 3rd Edition (The Landscape Institute, 2013) (GLVIA);
- An Approach to Landscape Character (Natural England, 2014); and
- Photography and Photomontage in Landscape and Visual Impact Assessment (Advice Note 01/11) (Landscape Institute, 2011).

The purpose of the LVIA is to define the existing or “baseline” landscape character and visual context of the site and the wider study area (established from both published data and site visits) and then identify the likely significant effects of the proposed development (including the embedded mitigation) on landscape character and visual amenity and identify any further mitigation which is necessary to reduce residual effects to an acceptable degree.

Various viewpoints were identified for assessment following consultation with North Lincolnshire Council officers to represent a variety of views from vantage points in the locality.

7.3 Baseline Conditions

The surrounding landscape exhibits a working agricultural character interspersed with sand quarries and restored quarry sites, which now form areas of a less intensively farmed and more biodiverse character, especially in areas where previous quarries have been restored such as Messingham Sand Quarry and at Manton Warren and Twigmoor Woods.

7.3.1 Designations

There are no international, national or local landscape designations within the site or the LVIA study area.

7.3.2 Landscape Character

The scheme area lies within National Character Area (NCA) 45: Northern Lincolnshire Edge with Coversands. This NCA is associated with *‘post-glacial wind-blown sands which have given rise to mosaics of heathland, acid grassland and oak/birch woodland, supporting rare plant and animal communities akin to the Brecklands’*.

As the published descriptions character of NCA 45 is at a regional scale and unlikely to be directly relevant to this specific development, the key characteristics have not been reproduced in the LVIA report. However, as the landscape context of the study area exhibits some of these key characteristics, they have been taken as an appropriate description.

At the local level, the North Lincolnshire Landscape Character Assessment & Guidelines 1999 shows that the Site lies wholly within the Lincolnshire Edge Landscape Character Area (LCA). Its key characteristics are summarised as:

- large-scale escarpment landscape, mainly arable, with two locally distinctive north-south scarp slopes;
- complex landscape includes arable farmland, scarp slopes, urbanisation and dereliction in the Scunthorpe area, and the coversands area of heath, blown sand habitats and conifer woods;
- farmland characterised by open, rectilinear fields and few boundaries. Where enclosure is still present, a mixture of discontinuous hedgerows, shelterbelts and trees; and
- the historically significant Roman road, Ermine Street follows a north-south route, to the east of the area.

Each character area defined within the North Lincolnshire Landscape Character Assessment & Guidelines (1999) has been subdivided into Local Landscape Types (LCTs). The description of Lincolnshire Edge LCA recommends future landscape strategies based upon their condition (at the time of the LCA surveys: c.1999), these are the conservation of landscape character (and features which contribute to that character) and the enhancement of landscape character (where character and features that contribute to that character have suffered decline or damage).

The current landscape is typical of the descriptions within the LCA and is considered (in overall terms) to be of fair condition and medium quality due to the matrix of successful restoration of previous quarry sites and a lack of major development to detract from the rural setting.

A site-specific landscape assessment has been undertaken in order to identify the key characteristics of the landscape and also make an assessment of factors such as the landscape quality / value and sensitivity to absorb change or development. The site-specific assessment deals both with the Site and land confined to the study area.

The site-specific assessment adds detail to the less specific assessments undertaken at a broader scale, including those from Natural England and the landscape character assessments undertaken by local councils.

7.3.3 Visual

The LVIA study area was defined, in part, by the Zone of Theoretical Visibility (ZTV) of the scheme. The ZTV has been established by initial analysis of topographic maps, 3D digital modelling and terrain analysis and is based on the maximum theoretical visibility of the scheme derived from points at ground level height located along the Site boundary, which represents theoretical visibility from within the surrounding landscape.

The field survey indicated that the availability of views from the other surrounding residential areas is highly constrained by intervening vegetation immediately surrounding the site. Views of the site may be possible to receptors using the public rights of way (PRoWs) to the south, although from here views would be obtained within the immediate context of the existing quarry site. Mature wooded land to the northern, eastern and western boundary of the Site act as a visual barrier, preventing accessible views to the Site from elsewhere within the study area. The views from Brigg Road are partially filtered by a number of semi mature trees, shrubs and gappy hedgerow.

Photo viewpoints were recorded from 9 locations within the wider study area.

7.3.4 Summary

The assessment of the baseline context of the Site and study area identified the following key points:

- the site/study area does not incorporate areas of landscape value and quality at a national scale (National Park/AONB);
- the landscape of the study area has been included within character assessments published by North Lincolnshire Council. These documents have informed the site-specific landscape assessment included within this assessment;
- the site is an area of rough grassland and is bound by mature vegetation in the north, west and east and juvenile vegetation in the south;
- the site lies approximately 30 metres north of an existing quarry;

- the site is not well defined within the wider landscape due to the effect of topography and intervening vegetation; and
- direct views of the site are therefore predominantly obtained from highway locations in the immediate south and from highway locations on the rising landform to the south east of Manton.

7.4 Assessment of Effects

The assessment of the potential landscape and visual effects takes account of the embedded mitigation included in the scheme design – which includes:

- the formation of temporary screening bunds to be seeded with an annual based species of rich wildflower and grass seed mix to help screen views from locations to the south of the quarry;
- advanced planting and ‘gapping up’ of new native hedgerows and hedgerow trees along the site’s boundary with Brigg Road to minimise the visual impact of the screening bunds and incorporate them into the wider landscape;
- the construction of the temporary screening bunds along the Site’s boundary with Brigg Road has been designed to minimise the required height whilst maintaining their effectiveness for visual screening. The screening bunds will be seeded with an appropriate species rich grass seed;
- the retention of existing hedgerows and hedgerow trees along the site’s boundary with Brigg Road; and
- using stripped soils in direct restoration where possible.
- advanced planting and ‘gapping up’ of new native hedgerows and hedgerow trees along the site’s boundary with Brigg Road to increase the coverage of this characteristic landscape feature;
- the creation of woodland (wet and drier) to the north of the Site to compensate for the loss of existing wet woodland and scrub habitat and provide integration of the scheme into the adjacent landscape; and
- the use of native species of local provenance (where possible) to provide species suitable for local landscape character.

7.4.1 Landscape Character

The proposed scheme is located wholly within the Lincolnshire Edge LCA. The scheme is considered to be consistent with the existing character of the LCA and as such, it has been assessed that the LCA has a Very Low to Low sensitivity to the scheme during all phases.

The magnitudes of the effects are predicted to be Very Low due to the small geographical area affected for only a short duration.

This will result in a negligible significance of effect at all stages.

7.4.2 Visual

The assessment made of visual effects at the 9 selected viewpoints is summarised in table 7.1 below.

Table 7.1: Assessment of Visual Effects

Viewpoint	Assessment
1. PRow 207	<p><u>Earthworks</u>: A very low magnitude of change in a medium value view for receptors of medium sensitivity would result in an adverse visual effect of negligible significance.</p> <p><u>During operation</u>: A very low magnitude of change in a medium value view for receptors of medium sensitivity would result in an adverse visual effect of negligible significance.</p> <p><u>Restoration at year 15</u>: A very low magnitude of change in a medium value view for receptors of very low sensitivity would result in a beneficial visual effect of negligible significance.</p>

Viewpoint	Assessment
2. Brigg Road (SW corner of the Site)	<p><u>Earthworks:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>During operation:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a low value view for receptors of very low sensitivity would result in a beneficial visual effect of negligible significance.</p>
3. (a & B) Brigg Road (southern midpoint of the Site looking east and west)	<p><u>Earthworks:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>During operation:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a low value view for receptors of very low sensitivity would result in a beneficial visual effect of negligible significance.</p>
4. PRow 201 (to the SE corner)	<p><u>Earthworks:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of negligible significance.</p> <p><u>During operation:</u> A low magnitude of change in a low value view for receptors of low sensitivity would result in an adverse visual effect of negligible significance.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a low value view for receptors of very low sensitivity would result in a neutral visual effect.</p>
6. PRow 241 (northern section)	<p><u>Earthworks:</u> A low magnitude of change in a medium value view for receptors of medium sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>During operation:</u> A low magnitude of change in a medium value view for receptors of medium sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a medium value view for receptors of very low sensitivity would result in a beneficial visual effect of negligible significance.</p>
7. PRow 241 (mid-section)	<p><u>Earthworks:</u> A low magnitude of change in a low value view for receptors of medium sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>During operation:</u> A low magnitude of change in a low value view for receptors of medium sensitivity would result in an adverse visual effect of minor significance.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a low value view for receptors of very low sensitivity would result in a beneficial visual effect of negligible significance.</p>
8. PRow 241 (southern section)	<p><u>Earthworks:</u> A very low magnitude of change in a medium value view for receptors of medium sensitivity would result in an adverse visual effect of negligible significance.</p> <p><u>During operation:</u> A very low magnitude of change in a medium value view for receptors of medium sensitivity would result in a negligible effect on visual amenity.</p> <p><u>Restoration at Year 15:</u> A very low magnitude of change in a medium value view for receptors of very low sensitivity would result in a beneficial effect on visual amenity.</p>
9. South East Manton	<p><u>Earthworks:</u> A very low magnitude of change in a low value view for receptors of low sensitivity would result in a negligible effect on visual amenity.</p> <p><u>During operation:</u> A very low magnitude of change in a low value view for receptors of low sensitivity would result in a negligible effect on visual amenity.</p> <p><u>Restoration at year 15:</u> A very low magnitude of change in a low value view for receptors of very low sensitivity would result in a beneficial effect on visual amenity.</p>

7.5 Statement of Significance and Summary

At a site level the scheme would result in the loss of existing landscape elements which can be summarised as: an area of agricultural grassland, plantation woodland in the north east and hedgerows and mature trees along field boundaries. Overall, the site is considered to have a low to very low sensitivity to the scheme. The loss of existing landscape features are proposed to be mitigated by the implementation of the Restoration Masterplan (Figure MQ09 Rev C), which has been designed to strengthen and extend characteristic landscape elements present in the wider landscape.

No significant effects on the landscape character within the study area have been identified at any stage of the Scheme.

It has been assessed that overall the scheme will result in very localised, short duration adverse visual effects (minor / negligible) during the 'Earthworks' and 'Operation' periods. The greatest of these would be from the section of public highway (Brigg Road) located immediately adjacent to the Site and a section of PRow 210 located to the south east of the site.

Following the implementation of the proposed restoration masterplan, it has been assessed that there would be a negligible beneficial significance effects on visual amenity.

In conclusion there is no over-riding landscape or visual reason, identified by the LVIA, to suggest that the scheme would cause other than a very localised effect to landscape or visual amenity during the relatively short term operational period.

8 Noise

8.1 Introduction

This Chapter provides a summary of the assessment of noise effects as detailed in the report included at Appendix E.

8.2 Methodology

The noise limits have been identified utilising the methodology prescribed in the PPG guidance relating to noise emissions from mineral extraction.

8.3 Baseline Conditions

Background noise monitoring was undertaken outside Low Greetwell Farm, Belle Vue Farm and adjacent to the security fence surrounding the derelict buildings at Greetwell Hall Farm. The results of the monitoring are summarised in Table 8.1 below.

Table 8.1: Baseline Monitoring Results

Monitoring Location	Average Background Level (LA ₉₀ 1hour)
Low Greetwell Farm	49
Belle Vue Farm	50
Greetwell Hall Farm	50

At all sites noise levels were dominated by traffic using Brigg Road. At the Belle Vue Farm location dump trucks using a haul road immediately south of Brigg Road were audible as were occasional reverse warning alarms. Sand was being extracted from the area opposite the western end of the proposed extraction area and was just about audible at the Greetwell Hall Farm monitoring location during times when there was no traffic noise.

Access to Twigmoor Grange was obstructed by plant undertaking drainage works when the site visit was made to undertake noise monitoring. Consequently background noise readings at Twigmoor Grange were assumed to be 45LA₉₀, some 5dBA lower than measured levels at Greetwell Hall Farm to account for the greater distance from Brigg Road.

8.4 Assessment of Effects

At all identified receptors, the background sound level exceeded 45 dB(A), hence in accordance with the PPG (which advises that noise limits be set at LA90 + 10 dB, subject to a maximum of 55 dB LAeq,1h), the daytime operational noise limits at the selected receptor locations have been determined to be 55 dB(A).

The PPG also advises that 70 dB LAeq,1h be applied to temporary operations such as soil stripping – where such operations are not anticipated to continue for more than eight weeks in any one location.

The noise levels at 3 out of the 4 selected receptor locations during the sand extraction operation are predicted to be between 52 and 55 LAeq, 1h (dB) - all below the daytime noise limit set in accordance with the PPG.

The exception is at the potential residential receptor at Greetwell Hall Farm, where the predicted noise level from activity on the site is 64 LAeq 1 hour – 9dBA above the daytime noise limit set in accordance with the PPG.

The predicted noise levels at this location are based upon the very worst possible set of circumstances for the generation of noise from the site. In reality these would be very unlikely to occur. Once plant is operating below ground level the acoustic attenuation would rapidly increase with increasing depth (at 2 metres the additional attenuation would be 10dBA reducing the potential noise level at the yet to be built property to 54 LAeq(60 min), i.e. 1dBA below the PPG level).

In addition, 2.5 metre high soil screening mounds along both joint boundaries with the former Greetwell Hall Farm plot will be constructed, if it becomes clear that the house will be built and occupied during the life of the site. The acoustic attenuation provided by such a barrier when work is being undertaken in Phase 1, at the closest approach and at existing ground level, would be 10dBA. Such barriers would allow work to take place within this Phase without exceeding the PPG guideline level at the proposed property.

In addition to the noise produced by activities within the extraction site and the ongoing transportation of processed sand from the plant site to the customer which forms part of the baseline conditions described above, there will be a noise impact from dumper trucks using the crossing point and Haul Road during the periods when extracted sand is transferred from the Site to the processing plant stockpile area.

It is considered that the noise impact from the dumper truck movements transporting material to the stockpiles via the proposed crossing point and haul road will not result in noise levels greater than those already experienced by the existing quarry Mitigation

No further mitigation is considered necessary in addition to that already embedded in the scheme design.

8.5 Statement of Significance and Summary

Worst case scenario noise levels from activities on the site have been calculated at the closest noise sensitive residential receptors. These were then compared with the limits obtained by application of the PPG guidance. For all existing residential receptor locations there would be no significant effect as the predicted noise levels are at or below the limit value.

There is an extant planning permission for a single residential property on the Site previously occupied by Greetwell Hall Farm. Should it become apparent that this residential property is to be built and occupied during the lifetime of the site, 2.5 metre high soil mounds will be constructed along both joint boundaries with that site. The effect of the provision of such an acoustic barrier would be to reduce noise levels at the property to below that recommended in the PPG guidance.

There will be no increase in HGV movements along t Brigg Road as a result of the proposed crossing point and haul road between the proposed quarry extension and the processing plant site. Therefore there would be no significant effects from the transportation of materials for the occupants of properties located on Brigg Road between the proposed site and the existing stockpile area via the haul road.

9 Air Quality

9.1 Introduction

This Chapter provides a summary of the assessment of air quality effects detailed in the report included at Appendix F.

9.2 Methodology

The air quality assessment considers the potential impacts of air quality and dust on sensitive receptors from all activities associated with the proposed development. Impacts have been considered from Heavy Goods Vehicle (HGV) tailpipe emissions and fugitive dust emissions from mobile plant utilised to extract, deposit, and load sand, soils and other materials within the site.

The methodology has regard to the guidance produced by Environmental Protection UK (EPUK), the IAQM on Land-Use Planning and Development Control: Planning for Air Quality, BS6069:1994 and the National Planning Policy Framework (NPPF) Technical Guidance and has been agreed with the Environmental Protection Department at North Lincolnshire Council.

9.3 Baseline Conditions

The site is essentially flat, agricultural land that is level with Brigg Road. To the east the land is wooded and rises up to Greetwell whilst to the west it is predominantly open agricultural land with small pockets of woodland.

Other than the two small and relatively distant settlements of Messingham and Greetwell there are only a few isolated properties in the area, the closest to the extraction area being Greetwell Hall some 450 metres to the east, Clevedale some 300 metres to the south west and Twigmoor Grange in excess of 400 metres to the north west.

'Clevedale' lies approximately 30 metres from the section of Brigg Road that is proposed to be used for transporting extracted sand to the processing area at Messingham Quarry. There are two other properties adjacent to this road but at a greater distance than 500 metres from the site entrance (Low Greetwell Farm and Belle Vue Farm).

Planning permission has been granted for the construction of a new detached dwelling (Greetwell Hall Farm development) on the site formerly occupied by Greetwell Hall Farm approximately 90 metres to the east of the proposed site boundary. Work has not commenced on this development but potentially it could be completed and occupied during the proposed development at the site.

The M180 motorway runs parallel to the Site in excess of 1500 metres to the north.

Messingham Sand Quarry Nature Reserve SSSI is located approximately 1500 metres to the southwest of the Site. Messingham Sand Quarry Nature Reserve SSSI has been created from the restoration of former sand extraction. Manton and Twigmoor SSSI is located, in parts, approximately 400 meters to the North and also 500 metres to the south east of the site. Consideration of these SSSIs as ecologically sensitive receptors to dust emissions has been included in this assessment. In addition, the local designation at Greetwell North Local Wildlife Site (LWS) has been given consideration. This is the wooded area to the east of the site.

North Lincolnshire Council carries out monitoring of particulates in the Scunthorpe area close to the steelworks sites although there are no monitors located in the vicinity of the Site. There are also no Air Quality Management Areas declared in the locality.

Sibelco has carried out directional dust deposit monitoring in the area. This included monitoring locations close to the site. The average deposition rate for the monitoring period was typical for a rural location.

9.4 Assessment of Effects

As there are less than 10 sensitive residential receptors within 350 metres of the proposed extraction site, the IAQM guidance and professional judgement indicates that the sensitivity of the area to dust soiling at residential properties from earthworks is low.

Considering health impacts, the background annual mean PM10 concentrations are low and the distances to potential dust emissions all human receptors are assessed as having a low sensitivity to health impacts.

There are no ecological sensitive receptors with statutory designations within 50 metres of dust emission sources. The SSSI sites are in excess of 400 metres of the site. Greetwell North LWS as a locally designated site is classed as a low sensitivity receptor according to the guidance and the sensitivity of the area to ecological effects is also classed as 'low'.

The sensitivity of the area to dust soiling, health and ecological impacts has therefore been assessed as being 'low'.

Should a residential property be developed and occupied at Greetwell Hall Farm whilst sand extraction activities were taking place, the additional mitigation measures included in the mitigation embedded in the scheme design will be implemented. These are assessed as likely to be effective in controlling dust and air quality impacts on this property (and the health of its occupants) to an acceptable degree during the limited period of operations in the nearby part of the site.

9.5 Mitigation

No further mitigation is considered necessary in addition to that already embedded in the scheme design and as described in the Air Quality report.

9.6 Statement of Significance and Summary

The assessment of potential air quality (including dust effects) due to the proposed sand extraction at the site concludes that:

- the overall risk to sensitive receptors from dust soiling is low;
- there is a committed development site to the east however the inbuilt mitigation included as part of this proposal would effectively control any adverse dust impacts in this location;
- the risk of adverse health effects due to the particulate emissions from proposed operations and dust impacts on ecological receptors is low; and
- good practice mitigation measures will ensure that dust impacts are kept to a minimum at all locations and therefore the dust and air quality impacts can be considered as not significant.

10 Ecology

10.1 Introduction

This Chapter provides a summary of the ecological impact assessment (EcIA) for the Quarry extension area included at Appendix G and the findings of the Haul Road Preliminary Ecological Appraisal (PEA) included at Appendix M.

The objective of the EcIA is to identify, and where possible quantify, the likely significant effects of the implementation and restoration of the proposed quarry extension on ecology and nature conservation. With reference to the Chartered Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment (CIEEM, 2016), the aims of the EcIA were to:

- identify relevant ecological features (nature conservation designations, ecosystems, habitats, species assemblages and/ or individual species) which may be impacted by the proposed quarry extension. Impacts may be either beneficial or adverse;
- provide an objective and transparent assessment of the likely ecological impacts and resultant likely significant effects of the proposed quarry extension as described in the planning statement and the ES and having regard to the mitigation and compensation embedded in the scheme design;
- facilitate objective and transparent determination of the consequences of the proposed quarry extension in terms of national and local policies relevant to nature conservation and biodiversity; and
- set out the steps which will be taken to adhere to relevant legal requirements relating to nature conservation designations and legally protected or controlled species.

Consideration has been given to the Lincolnshire Biodiversity Action Plan (LBAP) (Lincolnshire Biodiversity Partnership, 2011) and the North Lincolnshire Edge with Coversands National Character Area (NCA) profile (Natural England, 2014), relevant legislation and planning policies, the mitigation embedded in the scheme design and the proposed ecological compensation.

The Preliminary Ecological Appraisal (PEA) identifies whether there are known or potential ecological features (nature conservation designations, and protected and notable habitats and species) that may constrain or influence the design and construction of the proposed haul road.

10.2 Methodology

The study area for the ECIA was defined with reference to the potential Zone of Influence (Zoi) over which the proposed quarry extension may have potential to result in significant effects on relevant ecological receptors (nature conservation designations, habitats and species). The Zoi for most receptors is confined to the footprint of the proposed quarry extension and immediately surrounding land where indirect effects might arise e.g. from disturbance or alteration to local hydrological regimes.

A desk study and field surveys were undertaken to gather data on relevant ecological features in the Zoi including statutory and non-statutory nature conservation designations and protected and/or notable habitats, species assemblages and species. Information was also collected on the presence/absence of non-native controlled weed species.

Based on the findings of the desk study and field surveys for the quarry extension are the following more detailed habitat and protected species surveys were confirmed as necessary:

- woodland National Vegetation Classification (NVC);

- breeding birds;
- wintering birds;
- bats;
- badger (*Meles meles*);
- riparian mammals: water vole (*Arvicola amphibius*) and otter (*Lutra lutra*);
- reptiles;
- great crested newt (*Triturus cristatus*);
- terrestrial invertebrates (selected habitats only); and
- aquatic invertebrates (selected habitats only).

PEA can either be used to (a) define the baseline site context to inform requirements for further more detailed survey and more detailed assessment, or (b) in situations where there can be confidence that adverse ecological effects are unlikely, it can be used as appropriate evidence to demonstrate this to third party stakeholders and to evidence why no further survey work or assessment is necessary to allow the planning application to be determined.

In the case of the proposed haul road, this PEA report serves the latter purpose and provides all of the ecological information necessary to allow determination of the planning application.

Based on the findings of the desk study and field surveys for the haul road no further detailed habitat and protected species surveys were confirmed as necessary. It was possible to fully appraise the habitats present for their protected species risks and there was no reasonable likelihood of the habitats present being of high nature conservation value for their flora (the main reason for undertaking surveys latter in the year) given that the area has only recently been quarried

10.3 Baseline Conditions

There are no international or local statutory nature conservation designations in the study area. There are however two national statutory nature conservation designations:

- Manton and Twigmoor SSSI (350 metres to the north east); and
- Messingham Sand Quarry SSSI (720 metres to the south west).

There are also 10 non-statutory nature conservation (ecology) designations in the study area:

- Greetwell North Local Wildlife Site (LWS) (part within the application site);
- Broom Plantation LWS (less than 10 metres to the west);
- Black Hoe Plantation (less than 10 metres to the north west);
- Greetwell South LWS (810 metres to the south east);
- Greetwell Road, West Verge LWS (1.2km to the south east);
- Greetwell Road, West Verge LWS (1.2km to the south east);
- Messingham Northwest LWS (1.2km to the south west);
- Messingham Grassland LWS (1.2km to the south west);
- Holme Lane Verge LWS (1.5km to the north west); and
- Staniwells Plantation Site of Nature Conservation Interest (SNCI) (1.5km to the south east).

The PEA did not identify any international or local statutory nature conservation designations in the study area.

There are three national statutory nature conservations (ecology) designations within 2km of the haul road.

- Manton and Twigmoor SSSI (850 metres to the north of the haul road);
- Messingham Sand Quarry SSSI (610 metres to the west of the haul road); and
- Manton Stone Quarry SSSI (1.8km south-east of the haul road).

There are also six non-statutory nature conservation (ecology designations in the study area;

- Broom Plantation Local Wildlife Site LWS (240 metres north-west of the proposed haul road);
- Black Hoe Plantation LWS (260 metres north-west of the haul road);
- Greetwell North LWS (400 metres north-east of the haul road);
- Messingham Sand Pit East Extension LGS (270 metres south-east of the haul road);
- Greetwell South LWS (400 metres north-east of the haul road); and
- Twigmoor Warren LGS (820 metres north-east of the haul road).

10.3.1 Habitats

All of the habitats recorded were of local ecology and nature conservation value only and were not therefore considered further because they are species-poor examples of habitats that are common in the wider landscape. Within the haul road area the dominant habitat is bare ground. None of the semi-natural habitats associated with the proposed haul road are considered to be ecologically notable. The hedgerow at the northern end of the haul road is species poor and is not covered by the Hedgerow Regulations. Equally the wet drains and mixed woodland plantation are not considered notable ecological habitats.

10.3.2 Flora

Small, localised populations of common cudweed, sand spurrey and field mouse-ear were identified. These are considered to be of county ecology and nature conservation value in view of their unfavourable status and local distribution in the county. National value is not considered appropriate given these species are still widespread, albeit declining nationally, and because the populations within the application site are relatively small. These species can be expected to be present more widely in the local area in association with comparable habitats in the various nature conservation designations. County value is also justified given these species contribute to an acid grassland assemblage of county ecology and nature conservation value.

All other flora species associated with the application site are of local ecology and nature conservation value, although some contribute to an acid grassland community of county ecology and nature conservation value.

Within the haul road area no notable species. There is a small stretch of c.80 metres of semi-improved neutral grassland dominated by limited species of grass and is overall herb poor.

10.3.3 Birds

The application site has been assessed as being of local ecology and nature conservation value for wintering birds. This is because of the very low levels of activity recorded, and which relates to a limited suite of predominantly common and widespread bird species.

With the exception of quail, the breeding bird assemblage is also assessed to be of local ecology and nature conservation value. The limited number of bird species recorded, and the small population sizes are the reason for the assigned value. While there are a limited number of Red and Amber List bird species of conservation concern present, the numbers of territories are very small and typical of comparable habitats that are widespread in the local landscape.

The quail activity meanwhile may be linked to the cover crops sown to benefit game birds. On this basis, the application site may not be attractive to this species and therefore the application site may be best considered as

a transitory and opportunistic location rather than as suitable for the long-term needs of the breeding population of the species. The occasional use of the application site by one pair is unlikely to be critical for maintenance of the county population. Given lack of confidence in the maintenance of suitable habitat for this species over the medium term (greater than 5 years), it is considered that local value is most appropriate.

The habitats associated with proposed haul road are of relatively low value for birds and comparable habitat is extensive in the local area. Little Ringed Plover, a Schedule 1 bird species benefiting from additional legal protections has the potential to occur in areas of bare ground which often occurs on land being quarried or recently abandoned after quarrying and would require specific consideration. Overall the habitats associated with proposed haul road are of relatively low value for birds and comparable habitat is extensive in the local area.

10.3.4 Bats

The recorded bat population does not meet any criteria for national or higher ecology and nature conservation value. In the absence of any bat roosts in the potential Zol of the proposed quarry extension, there are no criteria for the selection of sites of county value for bats. The value of the foraging/commuting habitat associated with the application site for bats has been assessed based on the numbers present and their relative nature conservation value. There is no potential for bats to be adversely affected as a result of the proposed haul road as the land take from semi natural habitats would be too small to substantively affect availability or access to suitable foraging habitats. Overall, the application site is considered to be of district value to foraging and commuting bats.

10.3.5 Badger

No desk study records of badger were returned for the study area of the Quarry extension or the haul road. No setts or other evidence of badger was found within the application site or from accessible adjacent land within 50 metres of the application site. On this basis, this species was not considered further.

10.3.6 Riparian Mammals

No records of otter were returned for the study area. There are several records of water vole from Messingham Sand Quarry SSSI. No evidence of water vole or otter was found within the application site or from connected watercourses within 50 metres of the application site. Riparian mammals are not therefore relevant and no further consideration was given to them.

10.3.7 Reptiles

Given the extent of the common lizard population and the interconnectivity of the habitats that it is using, it was considered appropriate to assess the status of this species as a single metapopulation. The survey area does not meet criteria for the identification of sites of national importance for reptiles. As such, the survey area must be of less than national value for reptiles.

Based on the presence of a viable and breeding 'good' population of common lizard, a species that remains widespread in Lincolnshire, it is considered that the population associated with the application site is of district ecology and nature conservation value.

The majority of the habitats associated with the proposed haul road are sub-optimal for reptiles, being bare ground associated with a track and land that was recently worked for sand. The only potentially suitable habitat associated with the proposed haul road is the area of semi-improved grassland at the northern end, and only 80 metres of the proposed haul road crosses through this grassland.

10.3.8 Great Crested Newt

Great crested newts were only recorded from two closely associated off-site ponds, and are considered to relate to a single metapopulation of the species. It is considered unlikely that this species will occur within the application site, based on the relative distance of the breeding ponds from the application boundary. Common toad use a pond within the application boundary (this pond will be retained), but this represents only one of a large number of waterbodies suitable for this species in the local area.

Great crested newts and common toad are widespread and considered relatively abundant in Lincolnshire. In this light, the populations of these species are not considered to merit county or higher ecology and nature

conservation value. It is considered that district value is most appropriate for great crested newt. Recent pond creation has the potential to improve the status of this species in the local area over the short to medium term (within 10 years). The common toad population is considered to be of local value only, this species is able to exploit a greater range of freshwaters than great crested newt, and consequently is less habitat limited and more widespread as a consequence.

Suitable terrestrial habitats in association with the proposed haul road are very limited. Most of the land required for the proposed haul road is bare ground (encompassing 600 metres of the 790 metre long route), and therefore is not suitable for this species.

10.3.9 Terrestrial Invertebrates

Although the assemblage is of below national value, consideration needs to be given to the individual weighting that should be placed on the three Red Data Book species recorded, i.e. the rove beetle *Alaobia hybrida*, the snail-killing fly *Dichetophora finlandica*, and the comb-footed spider *Achaearanea riparia*.

The invertebrate assemblage recorded within the application site reflects the habitats present within this wider landscape as encompassed within the boundaries of the LWS and SSSI, with just over half having some reliance and c. 14% are stenotopic on these habitats. Therefore the assemblages and rare species recorded within the application site are also likely to be present in the wider LWS and the SSSI. This reduces the relative importance of the application site to the availability of suitable habitat for the relevant invertebrates.

On balance, it would seem reasonable to conclude that the woodland and acid grassland communities within the application site are collectively of County value for their invertebrate assemblage.

10.3.10 Aquatic Macroinvertebrates

Two of the waterbodies support notable aquatic invertebrate assemblages that include three uncommon and/or Nationally Scarce species of diving beetle. These species of diving beetle are of local distribution but there are other occurrences in North Lincolnshire, suggesting that suitable habitat conditions occur more widely and that the site is not of specific importance for these species.

However, as with the terrestrial invertebrates, this has a bearing on but does not negate the relative value of the populations of notable species, the wider assemblage and the significance and nature conservation value of their supporting habitats associated with the site. While suitable habitats occur more widely it can be assumed that they are only of local occurrence given the relative rarity of the most notable species present (the three diving beetles). Balancing these various considerations, the aquatic invertebrate assemblages of the two waterbodies are considered to be of county ecology and nature conservation value.

The remaining waterbodies are of relatively low importance for aquatic invertebrates and considered to be of no more than local ecology and nature conservation value.

10.4 Assessment of Effects

Taking account of the proposals for habitat compensation and enhancement, and notwithstanding the unmitigated short term effect, the medium to long term effect of the proposed quarry extension on the conservation status of Greetwell North LWS is assessed as not significant as comparable habitats can be reinstated and there is potential for nature conservation gain.

Losses of habitats of district or greater ecological value will be offset by potential beneficial effects from gains in habitat area or extent, e.g. the substantial improvement in hedgerow habitat quality.

The potential adverse effect on bird species and a bird assemblage of local value is assessed as not significant.

The potential adverse effect on the conservation status of bat population comprised of species of district value is assessed as not significant.

Given mitigation is feasible, the potential effect of the proposed quarry extension on a common lizard population of district value is assessed as not significant. Over the medium to long term the proposed restoration scheme has potential to have a beneficial effect on the local conservation status of common lizard.

The potential adverse effect on the conservation status of great crested newt population comprised of species of district value is assessed as not significant.

The drainage regime associated with the waterbody which support aquatic invertebrate assemblages of county value would be temporarily altered during operation of the proposed quarry extension, as a new outfall will be constructed to enable baseline conditions to be broadly maintained during periods of high precipitation. Given this, it is unlikely that the change in drainage would alter the hydrology of the waterbody such that it was no longer suitable for the notable aquatic invertebrate species recorded. It follows that there is no likelihood of an adverse effect on the hydrological regime supporting the aquatic invertebrate interest.

The proposed haul road has a very limited potential to impact protected and notable ecological features, as it coincides with recently quarried land and requires a small working footprint. Therefore it can be concluded that there are no significant effects associated with the proposed haul road.

10.5 Mitigation and Compensation

10.5.1 Quarry Extension

On the basis of the mitigation embedded in the scheme design and as shown in the restoration masterplan (Figure MQ09 Rev C) in particular, and the following habitat compensation proposals:

- creation of a minimum of 0.7 ha of wet woodland in association with low lying land adjacent to the new lake;
- creation of a minimum of 0.2 ha of drier woodland on the proposed island within the new lake, with additional new trees in the proposed new and gapped-up hedgerows;
- creation of a minimum of 2.7 ha of acid grassland on free draining, sandy substrates associated with the restored quarry faces; and
- planting and gapping-up to create 0.65 km of species-rich hedgerow with standards along Brigg Road, and to provide a north/ south habitat linkage across the application site.

No further mitigation is considered to be necessary for the quarry extension area.

10.5.2 Haul Road

On the basis of the mitigation embedded in the scheme design as noted in section 3.9 for the protection of reptiles no further mitigation is considered to be necessary for the haul road area.

10.6 Statement of Significance and Summary

No medium to long term significant ecological effects are predicted as a result of the operation and restoration of the proposed quarry extension. This is based on consideration of the relevant baseline ecological features, proposed methods of working, the relatively small scale and limited duration (3 to 4 years) of the proposed quarry activities, and the options available to mitigate and compensate potential adverse effects.

The assessment demonstrates that the proposed quarry extension would be implemented in a manner that complies with relevant legislation and planning policy. Mechanisms are identified to explain how compliance can be achieved, including opportunity for the involvement of relevant stakeholders in finalising specifications for ecological mitigation, compensation (habitat creation and restoration) and enhancement.

Potential net gains for biodiversity can be secured as a direct consequence of the proposed quarry extension. These include measures that would secure an increase in area of key habitats (wet woodland and acid grassland), with likely benefits for a range of protected and notable fauna and flora. Some of the identified potential net gains are only likely to be deliverable through mineral working, as this affords opportunity to re-profile soils and topography in a manner supportive of the proposed habitat creation.

Equally no significant ecological effects are predicted as a result of the operation and restoration of the proposed haul road. This is based on consideration of the relevant baseline ecological features, proposed methods of working and the mitigation options incorporated.

11 Flood Risk and Hydrology

11.1 Introduction

This Chapter provides a summary of the assessment made of potential flood risk and related hydrological effects as detailed in the report included at Appendix H.

11.2 Methodology

This Flood Risk Assessment (FRA) has been prepared in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated Technical Guidance (TG) document.

A climate change allowance (CCA) of +20% has been applied to the peak flows, representing the “upper end” of the potential change anticipated for the period 2015 to 2039 in the Humber river basin district.

11.3 Baseline Conditions

The site is located within the River Trent catchment and the nearest watercourse is the Bottesford Beck which is located approximately 3km NW of the site. The site is also approximately 20km from the River Trent estuary and is significantly above sea level (15 m AOD).

The proposed quarry extension is in Flood Zone 1 on the Environment Agency Flood Map i.e. in an area considered as having a less than 0.1% (1 in 1000) annual probability of flooding from rivers or sea.

The Environment Agency map for Risk of Flooding from Surface Water shows that some limited sections of the site are at medium or low risk.

The quarry area is drained by rural ditches and it is not intersected by urban sewers.

The site is not shown to be at risk of flooding from reservoirs on the Environment Agency Flooding from Reservoirs Flood Map. There are no canals within the vicinity of the site. Therefore the probability of flooding from artificial sources can be considered to be low.

11.4 Assessment of Effects

Pluvial and groundwater flooding are the main sources of flood risk to the site. The pluvial flood risk will be eliminated as a result of the large stored volume provided by the excavated quarry area itself and associated dewatering activities. The mitigation measures detailed in the hydrogeological report will ensure that the groundwater flood risk to the site is safely managed.

The present system for discharge of surface water from the site to the drainage ditches through surface runoff and underground field drains will not be altered by the proposed quarrying operations, as the surface water will still be collected and conveyed to the ditches together with the dewatering operations - with the only difference being the proposed ditch diversion.

The proposed development could increase the downstream runoff due to the dewatering activities (adding pump discharges to the existing surface runoff). For this reason dewatering operations will be temporarily suspended during extreme rainfall events even though the easternmost culvert under Brigg Road and the associated channel have sufficient conveyance for extreme events up to 0.1 Annual Exceedance Probability (AEP).

The site is not located in the fluvial floodplain; therefore the proposed development will not be depriving flood storage space from the floodplain. No additional impermeable area is proposed and no temporary impervious structures will be installed outside the excavated area (the sand stockpiling is considered to maintain the infiltration rate into the ground unchanged). Accordingly, no measures are needed to protect other sites from flooding.

A small portion of the site (in Phase 3 of the quarrying operations) has been identified to be at risk of fluvial flooding after the diversion of the main ditch to allow quarrying activities during extreme fluvial events. Any spills will be managed through the normal dewatering operations of the quarry.

11.5 Mitigation

No further mitigation measures are proposed in addition to those embedded in the scheme design, as the flood risk at the site is low and there is no increase in flood risk elsewhere.

11.6 Statement of Significance and Summary

Pluvial and groundwater flooding are the main sources of flood risk to the site.

Hydraulic modelling has shown that the ditch diversion will not increase flood risk elsewhere.

A small portion of the site (in Phase 3 of the quarrying operations) has also been identified to be at risk of fluvial flooding after the diversion of the main ditch to allow quarrying activities during extreme fluvial events. Any spills will be managed through the normal dewatering operations of the quarry.

Dewatering activities will mitigate the pluvial and groundwater flood risk and the associated discharge can be easily conveyed by the existing ditch.

The proposed development does not increase the impermeable area of the site.

Dewatering operations will be suspended during extreme rainfall events in order to avoid any increase of downstream flood risk.

In the long term, extreme flood flows will be attenuated by the proposed new lake, which will provide extra storage capacity to slow down the water currently conveyed downstream by the main ditch.

12 Hydrogeology

12.1 Introduction

This Chapter provides a summary of the potential hydrogeological impacts of the proposed development on the surrounding area as detailed in the report included at Appendix I.

12.2 Baseline Conditions

At present, there is a main ditch running from north to south through the centre of the site, as well as a secondary ditch along the northern boundary of the site that flows from east to west and then crosses the site from north to south in the western half of the site. The main ditch and secondary ditch exit the site through culverts under Brigg Road.

The existing average groundwater level beneath the site is approximately 1 metre below the present ground level. Existing ground surface levels vary between 19.5 metres AOD in the south western corner of the site to approximately 25.5 metres AOD in the north eastern corner. The groundwater level lies at approximately 0-0.5 metres below the existing ground level in the centre of the site and at about 2.5 metres below ground level in the southwest corner.

The groundwater flow direction is from northeast to south west and the annual seasonal variations in groundwater levels range between 1.53m to 0.56m. The groundwater level within the Site and the majority of the surrounding area is partially controlled by the system of agricultural drains and drainage ditches, as well as the current quarrying operations to the south of Brigg Road.

There is only one body of standing water within the site boundary which is located adjacent to the northern boundary in the western section of the site. This pond is to be retained outside the limit of extraction. Two ponds are located approximately 40 metres outside the northeast corner of the site boundary. There are other lakes and ponds within the vicinity of the site, but these are all in excess of 200 metres from the perimeter of the proposed extraction area.

In general, the condition of the drainage ditches can be described as overgrown with vegetation in many areas. Typically the drainage ditches have a minimum of 1.5 metres freeboard from the water level to the ground level at the edges of the ditch.

There is one current licensed groundwater abstraction in the vicinity of the site area which is used for general agriculture spray irrigation. This abstraction point is located close to a small pond approximately 325 metres south of the southwestern corner of the site boundary.

Historical plans indicate that a landfill site was present approximately 250 metres to the southwest of the site, south of Brigg Road. It is known that the landfill ceased receiving waste on 27th September 1977. There are no known records of any leakage of leachate from this waste site. There are no other active or closed registered waste disposal facilities within a 500 metre radius of the site boundary.

12.3 Assessment of Effects

The main impacts on the water environment from the proposed development are the lowering of the groundwater level to below the base of the sand excavation and the generation of a new lake in the eastern side of the site.

The new lake will have the overall effect of lowering the groundwater table over the rest of the site. The water level in the new lake will be controlled by an outlet and maintained at a maximum level of 18.3 metres AOD.

Water from the site area will ultimately be directed into the Manton Drain, immediately to the south of the site. This pattern of drainage is essentially the same as current drainage arrangements.

The existing network of drainage ditches has the overall effect of maintaining the groundwater level at an artificially lower level.

For the proposed extraction area, the potential impact of dewatering has been assessed. The radii of influence is predicted to be less than 67.5 metres, meaning that groundwater or surface water bodies further away are highly unlikely to be affected by dewatering.

The groundwater table would initially be lowered by pumping within Phase 1. Subsequently groundwater would be allowed to drain naturally into a sump as the sand excavation progresses. The edge of dewatering (i.e. the toe of the excavated sand face) would be approximately 20 to 25 metres from the site boundary, allowing for a 10 metre stand-off to the perimeter drainage ditches around the site. Potentially, the influence of drawdown could, excluding the effect of the current field drainage, extend up to 67.5 metres beyond the site boundary. However, the presence of the perimeter drainage ditches would largely prevent the impact of the dewatering extending outside the site, beyond these ditches.

The amount of dewatering needed would be expected to fall as the excavation moves westwards due to a lower groundwater level in the western part of the site, as well as a shallower elevation of the quarry floor. As no dewatering is proposed for the western most section of the site there will be no impact on either the Broom Plantation or Black Hoe Plantation Local Wildlife Site.

The estimated area of drawdown associated with the periodic dewatering operations extends beyond the site boundary in two small areas on the northern and north eastern part of the site. Within these areas the amount of drawdown is likely to be no greater than 1 metre and is therefore similar to the current annual seasonal variations in the groundwater table in this area (approximately 0.85m). Therefore the impact of the dewatering on those areas of the Greetwell North LWS outside the site boundary would be minimal. On completion of the quarrying works and restoration of the site, it is anticipated that the groundwater levels within these two small areas of wet woodland would return to their pre-extraction levels.

The proposed limited dewatering of the quarry excavation would not impact the Manton and Twigmoor SSSI which is located to the north of the site. The maximum expected drawdown extends for less than 15 metres beyond the northern site boundary, however the southern boundary of the Manton & Twigmoor SSSI is more than 350 metres north of the proposed northern site boundary.

The proposed dewatering should have no significant impact on the licensed groundwater abstraction point to the south of the site, as the abstraction point is significantly outside the calculated radius of influence.

The old historic landfill site to the southwest of the site has the potential to leak leachate. However, the groundwater flow direction is from east to west, so any leachate would be taken away from the site area, towards the west. In addition, the landfill ceased receiving wastes in 1977 and it is likely that any leachate generation would have significantly reduced, with time. The closest part of the old landfill is more than 350 metres from the extraction area in the southwest corner of Phase 3. At this distance, the proposed lowering of the groundwater table during the extraction of Phase 3 would have no impact on any leachate within the landfill, as it is outside the cone of depression.

12.4 Mitigation

Having regard to the mitigation embedded in the scheme design, including that dewatering operations will only be carried out for short periods of time between March and November, no further mitigation measures are considered necessary.

12.5 Statement of Significance and Summary

The main impact on the water environment is the lowering of the water table within the site. The drawdown calculations indicate that any adverse impacts on the water environment within the site would be small and largely limited to the eastern end.

There would be a limited impact on two small areas of the North Greetwell LWS, just beyond the site boundary, but these impacts would be minimal as the dewatering will only take place for part of each year. In addition, any variations in groundwater level during dewatering would be similar to natural seasonal groundwater fluctuations.

There would no impact on water bodies more than 15 metres from the site boundary as they would be beyond the anticipated drawdown area.

There would be no impact from the development on the water abstraction point to the south of the site.

The provision of a new lake would provide a new receptor for groundwater, which would assist in maintaining the groundwater flow direction towards the south west.

13 Cultural Heritage

13.1 Introduction

This Chapter provides a summary of the potential cultural heritage impacts of the proposed development on the surrounding area as detailed in the report included at Appendix J.

13.2 Methodology

The cultural heritage assessment follows the recommendations set out by the Chartered Institute for Archaeologists in Standards and Guidance for Archaeological Desk-Based Assessments (2014) and the Brief for desk-based assessment of heritage assets in North Lincolnshire prepared by North Lincolnshire Historic Environment Service.

A geophysical survey of approximately 40% of the site was undertaken by Archaeophysica in December 2014 and a site walkover carried out by Oxford Archaeology in February 2015. In August 2015, trial-trenching was undertaken by Archaeological Services West Yorkshire.

13.3 Baseline Conditions

There are no designated sites of archaeological interest within the site. A Grade II listed building Twigmoor Hall (National Heritage List entry 1083018) lies about 1.6km to the north of the site. It comprises a late eighteenth to early nineteenth century house with earlier origins. The nearest scheduled monument (National Heritage List entry 1005221) is just under 3km to the southeast at Staniwells Farm.

No world heritage sites, historic parks and gardens or battlefields lie within 2km of the site.

The site is situated on sand which produces a soil that tends to be acidic in nature. This acidity is likely to have had an impact on the survival of bone, metalwork and low-fired prehistoric and Saxon pottery. Other pottery, i.e. of the Roman and Medieval periods may still be in reasonable condition but survival (of all artefact materials) can be very variable depending on the localised burial environment. Sub-surface survival of flint, however, is likely to be good. Pollen and other environmental evidence is also likely to be affected.

Agricultural activity, in particular ploughing and drainage, has had an impact on sub-surface horizons. The interface between the plough soil and sandy subsoil has been subjected to plough damage due to the lack of resistance caused by the soft nature of the subsoil. Ploughing will also have had a denuding effect upon any earthworks, although there is evidence of at least one mound that may be related to iron-working.

The number of prehistoric flint finds recorded within 1.5km of the site might suggest further examples will occur within the extension. The scatters are themselves however derived, as far as can be told, from unstratified contexts and they can therefore only be treated as indicative of background activity rather than specific site activity. No funerary or occupation sites of this period have been identified within the broader study area. Because of the resilience of flint to decay, a more significant discovery was the recovery of Neolithic and Beaker pottery sherds in the study area.

The evidence for Iron Age activity in the form of enclosures suggests a settled agricultural occupation within the landscape but none of those so far evaluated has produced evidence of any buildings or structures.

The potential for the site to contain remains of the Prehistoric period is considered to be medium.

The four crop mark enclosure sites assigned to either the Iron Age or Roman periods demonstrates there is activity of this period within the broader study area. This activity is presumably agricultural in nature with activity not generating a great deal of material culture. The apparent lack of surface finds in the study area is a little surprising given that other phases of quarrying have been preceded by both field walking and trial trenching. The group of recorded Roman finds is unfortunately not the most secure provenance and the two largest Roman groups lie some distance from the site. The potential of the site for this period is considered to be medium.

The fragility of Anglo-Saxon pottery to weather and other agencies of degradation suggests the find spots within the study area may reflect occupation. One of the sites is also recorded as having evidence of a potential structure. Finds of this period tend to be quite localised around either settlement or cemetery areas. The potential of the site for containing Anglo-Saxon remains, based on current evidence, is considered to be medium.

The paucity of definitive medieval features within the study area and the knowledge that the site lies beyond the open fields of Manton would suggest there is at best only low potential for remains of this period within the site.

The map evidence indicates that the present landscape within the study area has undergone only relatively minor changes since enclosure in the nineteenth century. The changes that are observed consist of boundary changes caused by the gradual amalgamation or sub division of fields. It is unlikely therefore, that any unrecorded archaeological features of later post-medieval date lie within the site, with the exception of drainage systems. The potential of the area for this period is considered to be low.

The discovery of a slag-block, situated near a topographical mound, and the occurrence of pre-medieval iron working in the close vicinity, clearly indicates that there is a strong possibility of further industrial remains in the site of prehistoric and later date. This will require geophysical survey to assess further the extent, but on current information it is considered that there is a high potential for industrial remains to be present within the site.

13.4 Assessment of Effects

There is no evidence of archaeology of such importance as to require preservation in situ.

The assessment of potential effects has paid regard to the mitigation embedded in the scheme design, in particular the archaeological mitigation strategy included in the cultural heritage assessment as Annex B.

Indirect impacts - which do not physically affect a cultural heritage feature or landscape, but which alter the context or setting – were also assessed. The distances between the site and the nearest scheduled monument (just under 3km at Staniwells Farm) and the Grade II listed building at Twigmoor Hall (about 1.6km to the north) and the absence of visual connection in both cases means that their settings will be unaffected.

13.5 Mitigation

No further mitigation is considered necessary in addition to that already embedded in the scheme design and as proposed in the archaeological mitigation strategy included in the cultural heritage assessment as Annex B.

13.6 Statement of Significance and Summary

The assessment has identified an area of archaeological interest – an iron slag-block within an undated ditch, situated near a topographical mound. This could be of Iron Age or Saxon date. The site of this feature will require further investigation prior to sand extraction.

There is clear evidence from the evaluation that the site has been ploughed, with extensive under-drainage, and that all archaeological remains have been truncated or denuded to some extent.

The distances between the site and the nearest scheduled monument (just under 3km at Staniwells Farm) and the Grade II listed building at Twigmoor Hall (about 1.6km to the north) and the absence of visual connection in both cases means that their settings will be unaffected.

No world heritage sites, historic parks and gardens or battlefields lie within 2km of the proposed development area.

Having regard to the baseline conditions, the nature of the proposed development and the proposed measures that would be effective in mitigating the impacts of the scheme, there would be no significant residual effects upon known features of cultural heritage.

14 Other Potential Effects

14.1 Introduction

The topics referred to in the EIA scoping opinion adopted by North Lincolnshire Council on 16th November 2015 (copy included at Appendix A) which have not been assessed in the preceding sections of this ES are:

- vibration; and
- lighting.

These matters are assessed in this section together with:

- land stability;
- socio – economic effects; and
- cumulative and combined effects.

These matters are considered to ones requiring “only very brief treatment” in accordance with paragraph 035 (reference ID: 4-035-20140306) of the PPG (see section 1.4 above).

14.2 Vibration

No blasting will be required to extract the mineral.

Mobile plant associated with operation of the site will not give rise to high levels of ground borne vibration. Typically the levels of ground borne vibration from a bulldozer for example are imperceptible to humans at a distance of approximately 20 metres. As the closest residential properties are further than this distance, the resulting levels of ground borne vibration will be imperceptible to occupants, and the impact of the vibration will be negligible.

Vibration generated by dumper trucks travelling between the proposed quarry extension and the processing plant via the haul road will be negligible. Typically, ground borne vibration levels for heavy mobile plant on a poor road surface would give rise to an imperceptible level of vibration at a distance of more than 10 metres from the haul road. The houses along the section of Brigg Road affected are set back from the internal haul road by more than this distance and any new dwelling built on the former site of Greetwell Hall Farm will similarly be located more than this distance from the nearest internal haul roads.

Hence no adverse effects due to vibration are predicted.

14.3 Lighting

As the proposed sand extraction and related operations will be undertaken mainly during daylight hours with no requirement for fixed artificial lighting, no adverse effects due to lighting are predicted.

14.4 Land Stability

In terms of potential instability during sand extraction, the following risks have been assessed:

- failure of sand slopes excavated too steeply at the limits of the excavation causing loss of ground beyond the site boundary and affecting third party land (e.g. public highway); and

- internal erosion (piping) failures induced by inflow of groundwater at concentrated locations leading to slope failure and potential loss of ground beyond the limits of excavation and beyond the site boundary.

The second of these potential risks is most likely where the excavation takes place close to water bodies (i.e. the ponds to north and north east) or the drainage ditches which bisect the site or run just inside the site boundaries.

A specialist soil and rock slope stability package (Rocscience SLIDE V5) was used for the calculations. The analysis indicates that the embedded mitigation measures proposed will be effective in ensuring the stability of the adjoining land.

In terms of the potential instability post restoration, the following risks have been assessed:

- slope failures of restored slopes leading to irregular profile at the limits of the water body and water breaking through from adjacent water courses or ponds; and
- wave erosion causing cutting back of slopes and potentially creating unstable near-vertical, slopes at the limits of the water body.

As before, the analysis using Rocscience SLIDE V5 indicates that the embedded mitigation measures proposed will be effective in ensuring that the restored slopes are stable.

The assessment similarly concludes that the proposed soiling and seeding/planting of the lake margins will be effective in preventing wave erosion.

14.5 Socio-economic

The proposed development will:

- be a source of supply of silica sand to key end users in the local and wider area;
- give rise to continued investment to maintain plant and equipment and site infrastructure and set-up works;
- enable the company to continue supporting the local economy by purchasing local goods and services to the value of around £2,000,000 per annum;
- enable the company to continue supporting the local economy by paying salaries of around £300,000 per annum and business rates to North Lincolnshire Council of around £85,000 per annum;
- maintain jobs for 9 company employees based in North Lincolnshire, plus 2 local contractors and 10 local contract hauliers employed for the extraction of sand; and
- provide employment for 8 additional people during sand transfer campaigns from the quarry to the plant site stockpiling area by internal haul road

and will therefore give rise to significant socio-economic benefits.

The assessments made of potential environmental and traffic effects elsewhere in this ES have not identified any factors which might be described as significant socio-economic disbenefits.

The proposed development is therefore assessed as one which is likely to give rise to significant socio-economic benefits over its limited duration.

14.6 Cumulative and Combined Effects

Where appropriate cumulative and/or combined effects have been assessed in the individual EIA reports included as appendices to this ES.

14.6.1 Cumulative Effects

Cumulative effects are those which could arise from both the proposed development any other relevant future development (which does not therefore form part of the baseline conditions) which is reasonably foreseeable and likely to proceed.

Regard has been given to the proposed new haul road on land to the south of the quarry extension that would service the proposed quarry extension. The ecological assessment of the proposed haul road has confirmed that it would not produce any significant cumulative effects.

No other relevant future development is known of in this case or has been drawn to Sibelco's attention through the EIA scoping process or the pre-application discussions which have taken place. Accordingly no potential cumulative effects have been identified.

14.6.2 Combined Effects

Combined effects are those which may arise from interactions between various aspects of impact. Assessment of such effects is accomplished by assessing how a particular type of effect (for example, an increase in noise) may become a source of impact that results in an effect to a different category of receptor.

Interactions between more than one type of impact experienced at a particular receptor (e.g. a receptor of noise and air quality impacts) are managed in the context of residual effects following mitigation. In the case of interactions between traffic, noise and air quality, potential impacts could be experienced simultaneously or intermittently. There is no direct connection between the effects, other than that both could cause annoyance, whether experienced separately or together. Mitigation of combined impacts is best achieved through management of construction or operation to prevent the individual impacts themselves and prevent such interactions occurring.

In this case, as the residual effects are considered to be low in all main respects, no significant combined effects have been identified.

Figures

MQ01	Location Plan
MQ02 Rev A	Application & Ownership Boundaries
MQ03	Existing Situation
MQ04 Rev A	Site Establishment Works
MQ05 Rev A	Phase 1
MQ06 Rev A	Phase 2
MQ07 Rev A	Phase 3
MQ08	Interim Restoration
MQ09 Rev C	Restoration Masterplan
MQ10	Mineral Extraction Sections
MQ11	Restoration Sections
MQ12	Restoration Sections Insets
MQ13 Rev A	Access and Related Details

Appendix A. EIA Scoping Opinion

Appendix B. Soils Assessment

Appendix C. Transport Assessment

Appendix D. Landscape and Visual Assessment

Appendix E. Noise Assessment

Appendix F. Air Quality Assessment

Appendix G. Ecological Assessment

Appendix H. Flood Risk and Hydrological Assessment

Appendix I. Hydrogeological Assessment

Appendix J. Cultural Heritage Assessment

Appendix K. EIA Compliance Checklist

Appendix L. Competence Statement

Appendix M. Haul Road Preliminary Ecological Appraisal (PEA

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