SILICA SAND

MIN 40 - land east of Grandcourt Farm, East Winch

Site Characteristics

- The 32.77 hectare site is within the parish of East Winch
- The estimated silica sand resource at the site is 3 million tonnes
- The proposer of the site has given a potential start date of 2019 and estimated the extraction rate to be 750,000 tonnes per annum. Based on this information the full mineral resource at the site could be extracted within four years which would be within the plan period.
- The site is proposed by Sibelco UK as an extension to an existing site.
- The site is currently in agricultural use and the Agricultural Land Classification scheme classifies the land as being Grade 4.
- The site is approximately 1.8km from the Leziate processing plant. The mineral would be transported by an internal haul route to the processing plant.

A reduced extraction area has been proposed of 22.11 hectares. This proposal includes standoff areas between the extraction and the properties along the A47 and Gayton Road.

M40.1 Amenity: There is a residential property within the site, the next nearest residential property is 23m from the site boundary. There are 88 sensitive receptors within 250m of the site boundary and 25 of these are within 100m of the site boundary. The settlement of East Winch is 23m away. However, part of the site nearest to East Winch is not proposed to be extracted. Therefore, the nearest residential property is 84m from the extraction area and there are 54 sensitive receptors within 250m of the proposed extraction area (three of these are within 100m of the extraction area). Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100 metres of a source, if uncontrolled. A planning application for mineral extraction at this site would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

M40.2 Highway access: It is proposed to access the site via the established internal haul route through the existing adjacent extraction area. Mineral would be taken from the site to the processing plant at Leziate using the internal haul route. The majority of processed mineral leaves the processing plant through the onsite railhead. The road transport of mineral would leave the processing plant via the existing access onto Station Road. The site is not within an AQMA. The proposed highway access is considered to be suitable by the Highway Authority.

M40.3 Historic environment: The historic landscape character of the site is Twentieth Century agriculture with boundary loss. The site is within a wider historic landscape character of Twentieth century agriculture with enclosure and boundary loss, agriculture with 18th to 19th century piecemeal enclosure and a common. The wider historic landscape character also includes mineral extraction, informal parkland and 18th to 20th century woodland plantation.

M40.4 The nearest Listed Building is the Grade II* Church of All Saints, which is 50m away on the opposite side of the A47. The Grade II Hall Farmhouse (formally Church Farmhouse) is 250m away. There are 10 Listed Buildings within 2km of the site. The nearest Scheduled Monument is the ‘Moated site of Crancourt Manor’ which is 790m away. There are 2 Scheduled Monuments within 2km of the site. There are no Conservation Areas or Registered Historic Parks and Gardens within 2km of the site. A planning application for mineral extraction at this site would need to include a Heritage Statement to identify heritage assets and their settings, assess the potential for impacts and identify appropriate mitigation measures if required.

M40.5 Archaeology: The site is located within an area of interest, and there are Historic Environment records of isolated multi period finds and features including a WW2 searchlight battery and a former roadway, within the site boundary. The site is in a wider landscape with a significant number of finds and features from multiple periods, including an adjacent site, with an Iron Age
settlement which has produced regionally significant finds assemblages. Significant archaeological investigations have been carried out as part of the extraction of the adjacent active site. Therefore, there is the potential that unknown archaeology exists on the site and an assessment of the significance of archaeological remains will be required at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this site. The archaeology assessment may initially be desk-based but may need to be followed up with field surveys and trial-trenching.

M40.6 Landscape: The site is not located within the AONB, a Core River Valley or any other designated landscape feature. The site comprises open arable gently undulating landscape. The site is within the landscape character area described as ‘Gayton and East Winch Farmland with Woodland and Wetland’ in the King’s Lynn and West Norfolk Landscape Character Assessment. The eastern boundary of the site is adjacent to part of the village of East Winch, and the A47 (a strategic trunk road) runs along the southern boundary of the site. An active permitted silica sand extraction site is adjacent to the western boundary, and an internal haul route travels north to the processing plant site at Station Road, Leziate.

M40.7 There are filtered views over the site from the A47 and from the Public Right of Way along the western boundary. There are more open views of the site from the PRoW (East Winch FP2) which crosses the site and from the properties on the eastern edge of East Winch. There are also two isolated properties to the south-west corner of the site, adjacent to the A47 which would have views of the site. Based on the existing adjacent mineral working, it is considered that views of the site from the A47 could be sufficiently screened by bunding. The extraction area of the site will need to be set back from the properties in East Winch village and from properties in the south-west corner. A suitable screening scheme will also be required to mitigate the views of the site from these properties.

M40.8 There is a Public Right of Way along the western boundary of the site (East Winch BR1). There is also a PRoW running across the site (East Winch FP2). The PROW would need to be diverted during mineral extraction operations and reinstated as part of the restoration of the site.

M40.9 Ecology: East Walton and Adcock’s Common SSSI, which is part of the Norfolk Valley Fens SAC, is 3.79km from the site boundary. The site is outside the 3km Impact Risk Zone for the SSSI and therefore there would be no adverse effects on the SSSI or Norfolk Valley Fens SAC from the proposed mineral extraction.

M40.10 East Winch Common SSSI is 0.74km from the site boundary. The SSSI citation states that it is an area of predominantly wet acid heathland on shallow peat. Many wet hollows are present containing diverse fen and mire communities. One rare plant species occurs and also several uncommon species. The site is surrounded by young woodland. The potential exists for impacts from mineral extraction at MIN 40, if uncontrolled. An assessment of potential hydrogeological impacts from dewatering, together with appropriate mitigation would be required as part of any planning application.

M40.11 River Nar SSSI is 2.89km from the site boundary. The SSSI citation states that the River Nar combines the characteristics of a southern chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system of its type. Whilst the site is within the Impact Risk Zone for the SSSI, the site is not within the hydrological catchment for the River Nar and due to the distance, there would be no adverse impacts to the SSSI.

M40.12 The nearest County Wildlife Site is CWS 410 ‘East Winch Common’ which is 740m away and is an area of broad-leaved woodland with a number of ponds across the site. The potential exists for impacts from mineral extraction at MIN 40, if uncontrolled. An assessment of potential hydrogeological impacts from dewatering, together with appropriate mitigation, would be required as part of any planning application.

M40.13 There are no ancient woodland sites within 3km of the site.

M40.14 Geodiversity: The site consists of Leziate member – sand and Carstone Formation – sandstone. Potential impacts to geodiversity would need to be assessed and appropriate mitigation
identified as part of any future application. It would be useful to retain some open faces for scientific study during operational stages, and ideally after restoration, and have a ‘watching brief’ during the extraction phase in case features of potential geodiversity interest are uncovered.

**M40.15 Flood Risk:** The site is in Flood Zone 1 (lowest risk) of flooding from rivers. The site has a low probability of flooding from surface water, with one small location of surface water pooling in a 1 in 1000-year rainfall event. Silica sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The site is not in an Internal Drainage Board area.

**M40.16 Hydrogeology:** The site is located over a principal aquifer (bedrock) and partially over a Secondary (undifferentiated) aquifer (superficial deposits). However, there are no groundwater Source Protection Zones within the proposed site.

**M40.17 Water Framework Directive:** The site is approximately 675 metres from the Mintlyn Stream/ Middleton Stop Drain, which is the nearest Water Framework Directive waterbody. The groundwater level in this area is several metres below ground level and therefore overland flows are not expected from the site towards Mintlyn Stream. MIN 40 and the existing processing plant to the north, which the sand would be transported to via an internal haul route, are located on either side of the Mintlyn Stream. The sand to be processed would be transported along an existing internal haul route which currently serves the existing extraction area adjacent to site MIN 40. The potential exists for silt ingress to the Mintlyn Stream from material transported by HGV on the haul route, unless conditions are required. Due to the continued use of the existing haul route, it is not considered that physical impacts on the Mintlyn Stream would occur, provided that the conditions regarding dust in relation to the haul route are replicated in any future planning permission for MIN 40. Due to the distance of the site from the Mintlyn Stream it is not expected that there would be a pathway for silt ingress into Mintlyn Stream from any future silica sand extraction within site MIN 40.

**M40.18 Utilities infrastructure:** There are no Anglian Water sewerage assets within the site. There are two water mains on the boundaries of the proposed extraction area. Anglian Water would require the standard protected easement widths for the water main and for any requests for alteration or removal to be conducted in accordance with the Water Industry Act 1991. There is no electricity transmission infrastructure within the site. There are no high-pressure gas pipelines within the site.

**M40.19 Safeguarding aerodromes:** The site is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. Therefore, a Bird Hazard Assessment would be required at the planning application stage.

**M40.20 Restoration:** The site is proposed to be restored to a lake area with grassland, woodland and scrub, and an agricultural field with hedgerow reinforcement.

**M14.21 Conclusion:** The site is considered suitable to allocate for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and Specific Site Allocation Policy MIN 40.
Specific Site Allocation Policy MIN 40 (land east of Grandcourt Farm, East Winch):
The site is allocated as a specific site for silica sand extraction. Development will be subject to compliance with the Minerals and Waste Local Plan policies and all the following requirements:

- Submission of a Landscape and Visual Impact Assessment which will identify any potential impacts to the wider landscape and suggest appropriate mitigation measures, particularly regarding views from the properties along Gayton Road, the PROW and surrounding roads, and protecting of the setting of listed buildings, including All Saints’ Church, East Winch;
- Submission of noise, dust and air quality assessments and a programme of mitigation measures to deal appropriately with any amenity impacts;
- Submission of a Bird Hazard Assessment report to identify the risk of bird hazard to the safe operation of aerodromes and aircraft, identify proposed mitigation of any identified risk, and include a Bird Hazard Management Plan if necessary;
- Submission of an Arboricultural Impact Assessment to identify the impact of the development on existing trees and identify appropriate mitigation measures if required;
- Provision of opportunities during working for any geodiversity assets to be studied;
- Submission of a scheme of phased working and progressive restoration including the direction of working (to assist in the mitigation of amenity impacts) and landscaping;
- Submission of a restoration scheme incorporating arable agricultural with wide field margins and blocks of woodland which provides biodiversity gains and does not result in permanent dewatering of a perched water table in the carstone aquifer if one is identified in a hydrogeological risk assessment;
- Submission of a suitable scheme for the temporary diversion and reinstatement of the PRoW;
- A sufficient stand-off distance around the water mains on the site boundary or diversion of the water mains at the developers costs and to the satisfaction of Anglian Water;
- Submission of a Heritage Statement to identify heritage assets and their settings, assess the potential for impacts and identify appropriate mitigation measures if required;
- An appropriate archaeological assessment must be prepared in consultation with Norfolk County Council; this may initially be desk-based but may need to be followed up with field surveys and trial-trenching. The archaeological assessment will be used by Norfolk County Council/Historic Environment Service to agree appropriate mitigation measures;
- Submission of a Hydrogeological Risk Assessment to identify any potential impacts on groundwater during both the extraction and restoration of the site, including the potential for a perched water table to occur in the carstone aquifer, and propose appropriate mitigation to address any of these impacts; and
- The use of conveyor and/or internal haul routes to the current processing plant site.
SIL01 - land at Mintlyn South, Bawsey

Site Characteristics

- The 21 hectare site is within the parish of Bawsey.
- The estimated silica sand resource at the site is 1,200,000 tonnes.
- The site is part of a former mineral working which was partially extracted.
- The site is located in an area which has a history of mineral working and is adjacent to restored and permitted workings.
- The Agricultural Land Classification scheme classifies the land as being in 'Non-Agricultural' use.
- The site is approximately 700 metres from the Leziate processing plant and the proposer of the site has indicated that it is intended that mineral will be transferred by conveyor to the processing plant.

S1.1 Amenity: The nearest residential property is approximately 280 metres from the site boundary. Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100 metres of a source, if uncontrolled. A planning application for mineral extraction at this site would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

S1.2 Historic Environment: The historic landscape character of the site is mineral extraction. The site is within a wider historic landscape character of 20th century agriculture with enclosure and boundary loss, 18th and 19th century agriculture with piecemeal enclosure, mineral extraction, leisure/recreation, informal parkland, water reservoir, and 18th to 20th century plantation woodland.

S1.3 The site is set within a landscape which has evidence of former settlements. The nearest Listed Building is ‘the font against south façade of Whitehouse Farmhouse’ (Grade II) which is 302m away. The Ruins of Church of St Michael (Grade II*) Listed Building is just under 650 metres to the west of site SIL01. The majority of the site is screened from the ruins of the Church of St Michael by established woodland. Any future planning application would need to consider whether additional screening would be required for the southern part of the site to ensure that the setting of the church is not affected. There are 13 Listed Buildings within 2km of the site. The site is 1.24km from the nearest Scheduled Monument, which is the ‘Moated site in Crow’s Wood’. There are three Scheduled Monuments within 2km of the site. There are no Conservation Areas or Registered Historic Parks and Gardens within 2km of the site. Any future planning application for site SIL01 would need to include a Heritage Statement assessing the setting of heritage assets, addressing the potential for impacts and suggesting potential mitigation measures such as bunding and screen planting.

S1.4 Archaeology: SIL01 contains a series of cropmarks related to undated ditches and banks, together with a possible Bronze Age barrow. A detailed assessment of the significance of archaeological remains will be required by field evaluation at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this site.

S1.5 Landscape: The site is set within a landscape which has been modified over time by the extraction of mineral, particularly silica sand and carstone. Extraction in the 19th and 20th century has resulted in a number of lakes and previously worked areas and the restored workings are important for biodiversity and recreation in the area.

S1.6 The site is on a flat-topped ridge between the valleys of the Gaywood River and the Mintlyn Stream (Middleton Stop Drain). The Gaywood River valley is just to the north of the site and the valley of the Middleton Stop Drain is to the south. The southern boundary of the site starts to gently fall away to the Middleton Stop Drain.

S1.7 The site is within a landscape characterised as ‘Farmland with woodland and wetland’. This creates a landscape with different scales of enclosure created by the interaction between woodland
blocks, agricultural fields and wetlands. Viewpoints of the site are generally limited by hedgerows and woodland over large parts of the area. It is considered that bunding and screen planting could provide successful mitigation if well designed. Any future planning application for site SIL01 will need to ensure that any proposed extraction is appropriately screened through the use of a Landscape and Visual Impact Assessment and appropriate mitigation.

S1.8 There are no Public Rights of Way within the site. There is a PROW (Bawsey RB8) close to the northern boundary of the site and PROW Bawsey RB9 is to the east of the site.

S1.9 **Ecology:** SIL01 is located 2.8km from Roydon Common SSSI (which forms part of Roydon Common and Dersingham Bog SAC and is also designated as Roydon Common Ramsar. SIL01 is 2.6km from Leziate, Sugar and Derby Fens SSSI. However, the majority of SIL01 is outside the hydrological catchment for both of these SSSIs and is down gradient of these sites. In addition, Bawsey Lakes are located between SIL01 and these SSSIs. Therefore, no adverse impacts are expected on these SSSIs and no likely significant effects are expected on the qualifying features of the SAC or Ramsar site.

S1.10 There is a County Wildlife Site partly within site SIL01 (CWS 416 ‘70 & 100 Plantations’), therefore part of CWS 416 would be directly affected by mineral extraction. There is also a CWS adjacent to this site (CWS 418 ‘Haverlesse Manor Plantation’) on an area which has been subject to previous mineral working. Due to the proximity of these County Wildlife Sites to site SIL01, there is the potential for adverse impacts to be caused by mineral extraction which will need to be assessed as part of a planning application and mitigation measures proposed.

S1.11 The nearest ancient woodland site is Reffley Wood, which is a Plantation on Ancient Woodland Site (PAWS); it is 2.14km from the site boundary. Due to the distance from the ancient woodland there would be no impacts from dust deposition. There are no likely hydrological impacts on Reffley Wood because land within SIL01 does not drain towards the ancient woodland. Therefore, no adverse impacts to the ancient woodland site are expected from the proposed mineral extraction.

S1.12 **Geodiversity:** There is the potential for this site to contain examples of geodiversity priority features. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future planning application. There would be a preference for restoration to provide opportunities for further geological research of suitable exposures.

S1.13 **Flood Risk:** The site is in Flood Zone 1 (lowest risk) for flooding from rivers. 4% of SIL01 is at low risk of flooding from surface water and less than 1% is at medium risk of flooding from surface water. Silica sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The site is not in an Internal Drainage Board area.

S1.14 **Hydrogeology:** Site SIL01 is within the hydrological catchments of the Gaywood River and Middleton Stop Drain. The proposed site is located over a principal aquifer and partially over a secondary B aquifer; but it mainly overlays an unproductive secondary aquifer. There are no Groundwater Source Protection Zones within the proposed site. If extraction below the watertable and/or dewatering is proposed a hydrogeological risk assessment will be necessary to identify potential risks and appropriate mitigation.

S1.15 **Water Framework Directive:** Site SIL01 is approximately 910 metres from the Mintlyn Stream which is a Water Framework Directive waterbody. The groundwater level in this area is several metres below ground level and therefore, overland flows are not expected from the site towards the stream. SIL01 and the existing processing plant at Leziate, which the silica sand would be transported to by conveyor, are both located north of Mintlyn Stream so the silica sand would not be transported across the Mintlyn Stream. Therefore, it is not expected that there would be a pathway for silt ingress into the Mintlyn Stream from future silica sand extraction within site SIL01.

S1.16 **Utilities Infrastructure:** There are no Anglian Water sewerage assets or water assets within the site. There is no electricity transmission infrastructure within the site. There are no high-pressure gas pipelines within the site.
S1.17 Safeguarding Aerodromes: The site is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. Therefore, a Bird Hazard Assessment would be required at the planning application stage.

S1.18 Conclusion: Site SIL01 is considered suitable to allocate for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and Specific Site Allocation Policy SIL01.

Specific Site Allocation Policy SIL01 (land at Mintlyn South, Bawsey):
The site is allocated as a specific site for silica sand extraction. Development will be subject to compliance with the Minerals and Waste Local Plan policies and all the following requirements:

- Submission of noise, dust and air quality assessments and a programme of mitigation measures (e.g. standoff areas, screening and/or bunding) to deal appropriately with any amenity impacts;
- Submission of a Landscape and Visual Impact assessment to identify potential landscape impacts. The LVIA will include Scheduled Monuments, Listed Buildings, archaeological assets and non-designated assets as affected and their settings, together with suitable mitigation measures to address the impacts and conserve the significance of those assets;
- Submission of a Heritage Statement to identify heritage assets and their settings, assess the potential for impacts and identify appropriate mitigation if required. As a result of the historically complex and significant environment in which the mineral resource is present, applicants should consider the potential for early engagement with Historic England, the Norfolk Historic Environment Service and Conservation Officers in the preparation of the Heritage Statement;
- An appropriate archaeological assessment must be prepared; this may initially be desk-based but may need to be followed up with field surveys and trial-trenching. The archaeological assessment will be used by Norfolk County Council/Historic Environment Service to agree appropriate mitigation measures;
- Submission of a Hydrogeological Risk Assessment, based on proportionate evidence,
  - to identify potential impacts to groundwater quality, quantity and levels;
  - to propose appropriate mitigation to protect any abstraction points, ecosystems and surface water features that are reliant on groundwater, in particular SSSIs, SACs and SPAs.
  The assessment will need to consider the precautionary principle as it relates to European designations. The assessment should include a programme of mitigation measures to address identified potential impacts;
- Submission of a Biodiversity Survey and Report including assessment of the potential for impacts on environmental designations, together with suitable mitigation measures;
- Submission of an assessment to consider the potential for impacts on the Mintlyn Stream and Gaywood River, including from silt ingress and modification, and appropriate mitigation to prevent unacceptable adverse impacts.
- Submission of a Transport Assessment or Statement which considers the potential for transport impacts and identifies appropriate mitigation measures, including highway improvements where appropriate, to address these impacts. There will be a preference for a transport route which minimises amenity impacts through the use of off-highway haul routes from the B1145 to the processing plant;
- Submission of a comprehensive working and restoration plan, in particular considering the opportunities, on restoration, for ecological enhancement, the improvement of public access and geological exposures for future study; and
- Submission of a Bird Hazard Assessment report to identify the risk of bird hazard to the safe operation of aerodromes and aircraft, identify proposed mitigation of any identified risk, and include a Bird Hazard Management Plan if necessary.
Area of Search: AOS E Land to the north of Shouldham

Area of Search Characteristics

- The area of search covers 815 hectares within the parishes of Wormegay, Shouldham, Marham and Shouldham Thorpe.
- The area of search is adjacent to areas of previous and current mineral workings and close to a sand and gravel allocation.
- The area of search is an area of agricultural use with commercial plantation and other woodland.
- The Agricultural Land Classification splits the area between non-agricultural use, Grade 3 and Grade 4 agricultural land.
- The nearest residential property is approximately 250 metres from the AOS boundary. The settlements of Shouldham and Wormegay are 250 metres from the boundary of the AoS. A planning application for mineral extraction within AOS E would need to include mitigation measures to deal appropriately with any amenity impacts.
- The area of search is approximately 15 kilometres from the Leziate processing plant and it is considered likely that any extraction site would transfer mineral to the processing plant by road, although it would be preferable for transport options to be used which avoided use of the public highway (such as a pipeline, conveyor of off-highway haul route).

E.1 Highway access: The area of search is located on the A134 which is a principal route and designated HGV route in the route hierarchy. Access via West Briggs Lodge is unsuitable. Preferred access would be via the A134. Existing access roads to the A134 should be used subject improvement and junction improvements. The Highway Authority considers that the area of search is suitable subject to network improvements.

E.2 The route from the area of search to the Leziate processing plant would be expected to be north along A134 and A10 and A149, before turning east onto the B1145. From the B1145 the preferred access to the Leziate processing plant would be an off-road route turning right off the B1145 before Bawsey and utilising the existing track and/or conveyor route through the existing mineral workings at Mintlyn to access Station Road and the processing plant south of Brow of the Hill. A right turn lane at the junction with the B1145 would probably be required to provide a suitable junction. Utilising an off-road haul route would avoid lorries accessing the processing plant via Brow of the Hill, Fair Green or Middleton and therefore mitigate amenity impacts.

E.3 Historic environment: AOS E is within a historic environment which contains numerous high value heritage assets from multiple time periods starting in early prehistory. There are four Scheduled Monuments located less than 400 metres from the area of search. They are the Remains of Pentney Priory at Abbey Farm (267 metres), the Motte and Bailey Castle in Wormegay village (250 metres), Shouldham Priory (250 metres), and Village Cross 330 metres south of Cross Hill Farm (250 metres). In addition there are five Listed Buildings located less than 300 metres from the area of search. They are the Church of St Michael (Grade II*), the Church of St Botolph (Grade I), Castle Meadow (Grade II), Castle Road Bridge (Grade II) and Village Cross (Grade II).

E.4 Norfolk County Council’s Historic Environment Service have carried out a Historic Environment Impact Assessment on AOS E. It concluded that mineral extraction within the parts of AOS E located on the agricultural land north of Shouldham Warren would have a relatively severe impact on the setting of the heritage assets at Wormegay, whilst mineral extraction within the eastern part of AOS E would have a relatively severe impact on the setting of Pentney Priory. The assessment also concluded that the provision of mitigation measures such as bunds and planting to screen the extraction area would in themselves significantly and adversely alter the landscape and setting of Pentney Priory and the heritage assets at Wormegay. Therefore, the assessment recommended that the northern parts of the AOS nearest to Wormegay and to Pentney Priory should not be allocated (as shown with purple crosses on the map). Any future planning application within the AoS would need to include a Heritage Statement assessing the setting of heritage assets, addressing the potential for impacts and suggesting potential mitigation measures such as bunding.
E.5 AOS E is adjacent to a large area of fen edge, parts of which were studied as part of the Fenland Survey. The Fenland Survey recorded evidence of prehistoric and later land use and occupation across the fen close to the AoS, including a probable Iron Age settlement and some significant palaeo-environmental remains. The northern edge of the AoS contains the southern fringe of the early medieval settlement at Wormegay, a Bronze Age barrow, the site of a former windmill, several finds of metalworking remains and several isolated instances of human skeletal remains. As stated earlier, the northern part of AOS E, nearest to Wormegay is no longer considered suitable to allocate, which would remove the majority of these locations from the AoS. The place-name Shouldham Warren suggests that earthworks along the north edge could be remnants of a medieval warren, although no definitive research has been carried out; and there is the potential for the area to contain further earthworks. Shouldham Warren was used as a military training area in the Second World War, and there are surviving earthworks relating to this period.

E.6 Given the constrained nature of this AoS with regards to the historic environment, any proposal for extraction here should pay particular attention to the setting of the designated heritage assets. The Norfolk Historic Environment Service recommend that proposals for extraction avoid areas of palaeoenvironmental potential, the former barrow and the areas of former settlement. The Norfolk Historic Environment Service would not support proposals that result in the destruction of historic earthworks. Therefore, a detailed assessment of the significance of archaeological remains will be required by both desk-based assessment and field evaluation at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this area of search. In addition, the relevant assessments in support of any planning application will need to have regard to the historic landscape character of the wider area, with specific regard to the medieval landscape, to an extent agreed with Norfolk County Council/Historic Environment Service.

E.7 Landscape: The AoS falls under two different landscape character areas, with the north-east classified as ‘fen, open inland marshes’ and the south-west as a landscape of ‘Settled Farmland with Plantations’ in the King’s Lynn and West Norfolk Landscape Character Assessment. This is a transitional landscape between the Fens to the west and the Brecks to the east. Generally, the AoS slopes gently away to the west but at a rate where many parts of the area would be perceived as flat. In the AoS viewpoints are limited by field boundaries and woodland over large parts of the area, however in some northern and eastern parts drainage dykes form a more significant landscape component as boundary features.

E.8 There are a number of viewpoints in the AoS from roads and Public Rights of Way. The AoS is crossed by the following PRoWS: Shouldham BR1, Shouldham FP3, Shouldham FP4, Shouldham FP5, Shouldham FP17, Shouldham RB2 and Wormegay FP1. Within the AoS Shouldham Warren is a significant woodland plantation managed by the Forestry Commission as a commercial forestry operation and the landowner allows the Forestry Commission to permit access throughout Shouldham Warren. The Warren is crossed by a number of PRoWs and has some picnic areas within it. Depending on the location of a site within the AoS, PRoWs may need to be diverted during mineral extraction operations and reinstated as part of the restoration of the site. Any future planning application within the area of search will need to ensure that any proposed extraction is appropriately screened through the use of a Landscape and Visual Impact Assessment and appropriate mitigation.

E.9 Ecology: The AoS is more than 5km from any SPA, SAC or Ramsar site. Therefore, there would be no likely significant effects on these sites.

E.10 AOS E is located just less than 2.5km from Setchey SSSI. Whilst the southern part of the AoS is within the hydrological catchment (Polver Drain) of Setchey SSSI, due to the land being artificially drained to multiple outlets, the AoS does not drain towards Setchey SSSI. The land in the AoS that is within the catchment of Mow Fen IDB Drains does not drain to Setchey SSSI. Therefore there are no likely adverse impacts on Setchey SSSI from mineral extraction within AOS E.

E.11 AOS E is located 250 metres from the River Nar SSSI. However, due to the land within AOS E being artificially drained to multiple outlets (within the catchments of the Polver Drain and Mow Fen
IDB Drains), none of the land in the AoS drains to the River Nar. Therefore there are no likely adverse impacts on the River Nar SSSI from mineral extraction within AOS E.

E.12 There is one County Wildlife Site within the area of search, CWS 425 ‘Mow Fen’ which comprises of an area of mature birch woodland containing small patches of fen and grassland along the drains. CWS 424 ‘Westbrigg’s Wood’ (which comprises of two area of largely oak and birch dominated woodland), and CWS 373 ‘Adjacent Adams Plantation’ (which consists of an area of reasonably species-rich neutral grassland) are adjacent to the AoS boundary. AOS E is a large area of search; therefore the effect on any of these County Wildlife Sites from mineral extraction would depend on the location of mineral extraction within the area of search. The potential for adverse impacts to be caused to County Wildlife Sites by mineral extraction will need to be assessed as part of a planning application and mitigation measures proposed if necessary.

E.13 AOS E is 1.34km from Bowl Wood Ancient Woodland and is within the hydrological catchment (Polver Drain) for Bowl Wood. Therefore, there is the potential for hydrological impacts on the ancient woodland if mineral extraction operations cause changes in the water table. If extraction below the watertable and/or dewatering is proposed a Hydrogeological Risk Assessment will be necessary to identify potential risks and appropriate mitigation.

E.14 Geodiversity: The AoS has overburden made up of Tidal, Till, Peat and Head deposits partially overlying the Lower Cretaceous Leziate Beds (part of the Sandringham Sands). The Head deposits are geodiversity priority features due to their method of formation. The Leziate Beds are sands, interbedded with sandstones and mudstones. The AoS contains geodiversity priority features in the form of paleo-environmental deposits, and Setchey SSSI, north of the site, is designated for its geological features related to successive periods of marine inundation and retreat. There is the potential for a mineral extraction site within this area to contain other examples of geodiversity priority features. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future planning application. There would be a preference for restoration to provide opportunities for further geological research of suitable exposures.

E.15 Flood Risk: 52% of the area of search is in Flood Zones 2 and 3 (medium and high risk) for flooding from rivers. Silica sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. Silica sand extraction would be a temporary non-residential use, which exposes relatively few people to risk as only a small number of employees are required. Residual risk can be addressed through the use of a site evacuation plan. 7% of AOS E is at low risk of flooding from surface water and 2% is at medium or high risk of flooding from surface water. The AoS is within the ‘East of Ouse, Polver and Nar’ Internal Drainage Board Area.

E.16 Hydrogeology: AOS E is within the hydrological catchments for the Mill Fen IDB Drains, Mow Fen IDB Drains and Polver Drain. The AoS is located over a principal aquifer and partially over secondary B and secondary undifferentiated aquifers; however there are no Groundwater Source Protection Zones within the area of search. If extraction below the watertable and/or dewatering is proposed a Hydrogeological Risk Assessment will be necessary to identify potential risks and appropriate mitigation.

E.17 Water Framework Directive: The northern part of the AoS (within the catchment of Mill Fen IDB Drains) drains to the River Nar. The River Nar is a Water Framework Directive waterbody which runs to the north of the AoS. A future planning application within the AoS will need to assess the potential for impacts on the River Nar, including from silt ingress and modification, and propose appropriate mitigation to prevent unacceptable adverse impacts.

E.18 Utilities Infrastructure: There are public water mains within the boundary of AOS E. Anglian Water would require the standard protected easement widths for the water mains and for any requests for alteration or removal to be conducted in accordance with the Water Industry Act 1991. There are no Anglian Water sewerage assets within the AOS. There is no electricity transmission infrastructure within the AOS. There are no high-pressure gas pipelines within the AOS.
E.19 Safeguarding Aerodromes: The AOS is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. The Ministry of Defence (Defence Infrastructure Organisation) have stated that “The MOD have safeguarding concerns to the wet working and restoration of this site due to its potential to attract and support hazardous waterfowl closer within critical airspace. Therefore, further information would be required before a definitive response can be made.” As an area of search, no further information is currently available regarding how a site within the AOS could be worked and restored; this would be dependent on both the size and location of an extraction site and would therefore be a matter to be determined at the planning application stage. A Bird Hazard Assessment would be required at the planning application stage.

E.20 Conclusion: AOS E is considered suitable to allocate as an Area of Search for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and the Areas of Search Policy.
Area of Search: AOS F Land to the north of Stow Bardolph

Area of Search Characteristics

- The AoS consists of two parcels of land covering approximately 31 and 30 hectares respectively within the parishes of Runcton Holme and Stow Bardolph.
- The AoS is a mixture of forestry and agricultural uses with the agricultural land in grades 3 and 4.
- The area of search is approximately 17 kilometres from the Leziate processing plant and it is considered likely that any extraction site would transfer mineral to the processing plant by road.

F.1 Amenity: The nearest residential property is approximately 250 metres from the AOS boundary. There are 16 sensitive receptors located 250m from the AoS boundary. The settlements of Stow Bardolph and South Runcton are 250 metres from the AOS boundary. Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100m of a source, if uncontrolled. A planning application for mineral extraction within AoS F would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

F.2 Highway access: The area of search is located on the A10, which is a principal route and designated HGV route in NCC route hierarchy. The Highway Authority considers that access to parts of AoS F from the Runcton Road is suitable, subject to improvements to the junction onto the A10. The route from AoS F to the Leziate processing plant would be expected to be north along the A10 and A149, before turning east onto the B1145. From the B1145 the preferred access to the Leziate processing plant would be an off-road route turning right off the B1145 before Bawsey and utilising the existing track and/or conveyor route through the existing mineral workings at Mintlyn to access Station Road and the processing plant south of Brow of the Hill. A right turn lane at the junction with the B1145 would probably be required to provide a suitable junction. Utilising an off-road haul route would avoid lorries accessing the processing plant via Brow of the Hill, Fair Green or Middleton and therefore mitigate amenity impacts.

F.3 Historic environment: The historic landscape character of AOS F is 20th century agriculture with boundary loss, 18th-20th century woodland plantation and enclosed wetland meadow. The area of search is within a wider historic landscape character of 20th century agriculture with boundary loss, agriculture with 18th-19th century with piecemeal enclosure and estate fields, informal parkland and enclosed wetland meadow. The wider historic landscape character also includes 18th-20th century plantation woodland, ancient woodland, water reservoir, and allotments.

F.4 The historic environment in which the AoS is located has features and land use patterns which are related to the formation of parkland and estates related to high status buildings in particular the wider setting of Stow Hall (now demolished) and Wallington Hall, a Listed Building (Grade I). Both parts of AoS F are separated from Wallington Hall by areas of woodland. The northern part of AoS F is separated from the setting of Stow Hall by woodland and the southern part of AoS F is separated from the grounds of Stow Hall by the A10. The AoS is 245m from the nearest Listed Building, which is the North Lodge to Stow Hall (Grade II). There are 20 Listed Buildings within 2km of the area of search. There are two Conservation Areas within 2km of AoS F; Wimbotsham is 0.65km away and Shouldham Thorpe is 1.63km away. Stradsett Hall, a Registered Historic Park and Garden is 1.95km from AoS F. There are no Scheduled Monuments within 2km of the AoS. Any future planning application within the AoS would need to include a Heritage Statement assessing the setting of heritage assets, addressing the potential for impacts and suggesting potential mitigation measures such as bunding and screen planting.

F.5 Archaeology: Area AoS F is largely unstudied in terms of archaeology. Therefore, a detailed assessment of the significance of archaeological remains will be required at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this area of search. The archaeological assessment will need to include a desk-based assessment and field evaluation.
F.6 Landscape: The AoS is not located within the AONB, a Core River Valley or any other designated landscape feature. The AoS is within the landscape character area described as ‘Stow Bardolph Settled Farmland with Plantations’ in the King’s Lynn and West Norfolk Landscape Character Assessment. This is a transitional landscape between the Fens to the west and the Brecks to the east. Generally, the AoS slopes gently away to the west but at a rate where many parts of the area would be perceived as flat. Any future planning application within the area of search will need to ensure that any proposed extraction is appropriately screened through the use of a Landscape and Visual Impact Assessment and appropriate mitigation.

F.7 There are no Public Rights of Way within or adjacent to the AoS.

F.8 Ecology: The AoS is more than 5km from any SPA, SAC or Ramsar site. Therefore, there would be no likely significant effects on these sites. There are no SSSIs within 4km of the AoS boundary and the AoS is not within the Impact Risk Zone for any SSSIs.

F.9 There is a County Wildlife Site adjacent to the area of search (CWS 365 ‘Broad Meadow Plantation’) which consists of extensive areas of broad-leaved and coniferous plantation with semi-natural woodland scattered indistinctly throughout. CWS 361 ‘north-east of Wallington Hall’ is 280 metres from the AoS and consists of a series of four mesotrophic lakes which could be adversely affected if mineral extraction operations cause changes in the water table. If mineral extraction in the AoS were to go below the watertable and/or dewatering is proposed a hydrogeological risk assessment will be necessary to identify potential risks and appropriate mitigation.

F.10 There are three ancient woodlands (Chiswick’s Wood and two unnamed ancient woodlands) located between 500m to 1km from AOS F. AOS F is within the hydrological catchment (War Bank Drain) for these ancient woodlands, however, the land within the AoS drains away from the ancient woodland sites and therefore adverse hydrological impacts are not likely. Due to the distance of the AoS from the ancient woodland sites other adverse impacts are also unlikely.

F.11 Geodiversity: The AoS has overburden made up of Till deposits partially overlying the Lower Cretaceous Leziate Beds (part of the Sandringham Sands). These are sands, interbedded with sandstones and mudstones. There is the potential for a mineral extraction site within this area to contain other examples of geodiversity priority features under more recent deposits. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future planning application. There would be a preference for restoration to provide opportunities for further geological research of suitable exposures.

F.12 Flood risk: The area of search is in Flood Zone 1 (lowest risk) for flooding from rivers. 4% of AOS F is at low risk of flooding from surface water and less than 1% is at medium or high risk of flooding from surface water. There is a surface water flow path east-west across the southern land parcel of AOS F in a 1 in 1000-year rainfall event. Sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The AoS is not within an Internal Drainage Board Area.

F.13 Hydrogeology: AOS F is within the hydrological catchments for the Mill Fen IDB Drains, Mow Fen IDB Drains and Polver Drain. The AoS is located over a principal aquifer and partially over a secondary undifferentiated aquifer; however there are no Groundwater Source Protection Zones within the area of search. If extraction below the watertable and/or dewatering is proposed a hydrogeological risk assessment will be necessary to identify potential risks and appropriate mitigation.

F.14 Water Framework Directive: The Relief Channel is a Water Framework Directive waterbody; it is approximately 1.7km to the west of the Area of Search. The groundwater level within mineral workings in this area is several metres below ground level and therefore, overland flows are not expected from the site towards the channel. Mineral extracted from AOS F is likely to be transported by road to the existing processing plant at Leziate, which would have to cross the Polver Drain (which feeds into the Relief Channel) on the A10 at Setchey. The Area of Search policy requires that appropriate mitigation is put in place to ensure that no unacceptable impacts to the drain or the river occur, including from silt ingress and fugitive dust emissions. A dust
assessment would also be required at the planning application stage. Therefore, it is not expected that there would be a pathway for silt ingress into the Relief Channel from any future silica sand extraction within Area of Search F.

**F.15 Utilities Infrastructure:** There is a public water main within the boundary of AOS F. Anglian Water would require the standard protected easement widths for the water main and for any requests for alteration or removal to be conducted in accordance with the Water Industry Act 1991. There are no Anglian Water sewerage assets within the AOS. There is no electricity transmission infrastructure within the AOS. There are no high-pressure gas pipelines within the AOS.

**F.16 Safeguarding Aerodromes:** The AOS is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the 'bird strike' risk to aircraft. Therefore, a Bird Hazard Assessment would be required at the planning application stage.

**F.17 Conclusion:** AOS F is considered suitable to allocate as an Area of Search for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and the Areas of Search Policy.
**Area of Search: AOS I Land to the east of South Runcton**

**Area of Search Characteristics**

- The area of search covers just over 47 hectares within the parishes of Runcton Holme, Shouldham Thorpe, and Tottenhill.
- The area of search is in an agricultural landscape between the A10 and A134.
- The area of search is a mixture of small blocks of woodland and agricultural uses and the area is classified as Grade 3 agricultural land.
- The area of search is approximately 16 kilometres from the Leziate processing plant and it is considered likely that any extraction site would transfer mineral to the processing plant by road.

**I.1 Amenity:** The nearest residential property is approximately 250 metres from the AOS boundary and there are seven sensitive receptors located 250m from the AoS boundary. Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100m of a source, if uncontrolled. A planning application for mineral extraction within AoS I would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

**I.2 Highway access:** Access to the area of search is suitable subject to improvements to the junction onto the A10 from Runcton Road, and if a route using the A134 was proposed this may also require junction improvements. If Watlington Road was proposed, junction improvements may be necessary to allow access to the A10 or A134. The Highway Authority considers that the area of search is suitable to subject to network improvements.

**I.3** The route from AOS I to the Leziate processing plant would be expected to be north along the A10 and A149, before turning east onto the B1145. From the B1145 the preferred access to the Leziate processing plant would be an off-road route turning right off the B1145 before Bawsey and utilising the existing track and/or conveyor route through the existing mineral workings at Mintlyn to access Station Road and the processing plant south of Brow of the Hill. A right turn lane at the junction with the B1145 would probably be required to provide a suitable junction. Utilising an off-road haul route would avoid lorries accessing the processing plant via Brow of the Hill, Fair Green or Middleton and therefore mitigate amenity impacts.

**I.4 Historic environment:** The historic landscape character of AOS I is 20th century agriculture with boundary loss, agriculture with 18th-19th century piecemeal enclosure, and 18th-20th century plantation woodland. The area of search is within a wider historic landscape character of 20th century agriculture, 18th-19th century agriculture with enclosure, enclosed wetland meadow, disused mineral extraction and 18th-20th century plantation woodland.

**I.5** The nearest Listed Building is 726m away and is the Grade II* Church of St Andrew. There are 14 Listed Buildings within 2km of the AoS boundary; five of these are within Shouldham Thorpe Conservation Area which is 1.27km from the boundary of the AoS. Historic England have no immediate concerns regarding this area of search if the site proposed is well contained, although the setting of the Church of St Andrew (Grade II*) and Church of St Mary the Virgin (Grade II*) and a number of Grade II Listed Buildings and should be taken into consideration at an early stage. There are no Registered Historic Parks and Gardens or Scheduled Monuments within 2km of the AoS boundary. Any future planning application within the AoS would need to include a Heritage Statement assessing the setting of heritage assets, addressing the potential for impacts and proposing mitigation measures such as bunding and screen planting.

**I.6 Archaeology:** Area AOS I is almost entirely unstudied in terms of archaeology. Therefore, a detailed assessment of the significance of archaeological remains will be required at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this area of search. The archaeological assessment will need to include a desk-based assessment and field evaluation.
I.7 Landscape: The AoS is not located within the AONB, a Core River Valley or any other designated landscape feature. The AoS is characterised as a landscape of ‘Settled Farmland with Plantations’ in the King’s Lynn and West Norfolk Landscape Character Assessment. This is a transitional landscape between the Fens to the west and the Brecks to the east. Generally, the AoS slopes gently away to the west but at a rate where many parts of the area would be perceived as flat. Viewpoints are limited by field boundaries and woodland over large parts of the landscape area. However, hedgerows are intermittent in the area surrounding the AoS opening up views across open fields often to tree lined horizons. There are a number of viewpoints in the AoS from roads and Public Rights of Way, and any future planning application in the area of search will need to ensure that any proposed extraction is appropriately screened through the use of a Landscape and Visual Impact Assessment and appropriate mitigation.

I.8 Ecology: The AoS is more than 9km from any SPA, SAC or Ramsar site. Therefore, there would be no likely significant effects on these sites. There are no SSSIs within 3km of the AoS boundary and the AoS is not within the Impact Risk Zone for any SSSIs.

I.9 The nearest County Wildlife Site to the AoS is over 600m away (CWS 366 ‘St Andrews Churchyard’) which consists of mown neutral grassland with small stands of scrub and trees. Due to the distance of the CWS from the area of search, no adverse impacts are expected from mineral extraction within the AoS.

I.10 There are two ancient woodland sites located less than 1.5km to the south of AOS I (Chiswick’s wood PAWS and an unnamed PAWS). Land within AOS I does not drain towards the ancient woodland sites, therefore no hydrological impacts are expected and due to the distance of the ancient woodland sites from the area of search, no other adverse impacts are expected from mineral extraction within the AoS.

I.11 Geodiversity: The AoS has overburden made up of Till deposits partially overlying the Lower Cretaceous Leziate Beds (part of the Sandringham Sands). These are sands, interbedded with sandstone and mudstones. There is the potential for a mineral extraction site within this area to contain examples of geodiversity priority features. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future planning application. There would be a preference for restoration to provide opportunities for further geological research of suitable exposures.

I.12 Flood Risk: AOS I is in Flood Zone 1 (lowest risk) for flooding from rivers. 8% of AOS I is at low risk of flooding from surface water, 4% is at medium risk and 3% is at high risk of flooding from surface water. There is a surface water flow path across the south-western part of the AOS. Sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The AoS is not within an Internal Drainage Board Area.

I.13 Hydrogeology: AOS I is within the hydrological catchments for the Polver Drain. The AoS is located over a principal aquifer and partially over secondary A and B aquifers. However, there are no Groundwater Source Protection Zones within the area of search. If extraction below the watertable and/or dewatering is proposed a hydrogeological risk assessment will be necessary to identify potential risks and appropriate mitigation.

I.14 Water Framework Directive: The Polver Drain is a Water Framework Directive waterbody; it is approximately 1.7km to the northeast of the Area of Search and is separated from it by the A134. The groundwater level within mineral workings in this area is several metres below ground level and therefore, overland flows are not expected from the site towards the drain. Mineral extracted from AOS I is likely to be transported by road to the existing processing plant at Leziate, which would have to cross the Polver Drain on the A10 at Setchey. The Area of Search policy requires that appropriate mitigation is put in place to ensure that no unacceptable impacts to the drain or the river occur, including from silt ingress and fugitive dust emissions. A dust assessment would also be required at the planning application stage. Therefore, it is not expected that there would be a pathway for silt ingress into the Polver Drain from any future silica sand extraction within Area of Search I.
I.15 Utilities Infrastructure: There are no Anglian Water sewerage assets or water assets within the site boundary. There is no electricity transmission infrastructure within the site. There are no high-pressure gas pipelines within the site.

I.16 Safeguarding Aerodromes: The AOS is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. Therefore, a Bird Hazard Assessment would be required at the planning application stage.

I.17 Conclusion: AOS I is considered suitable to allocate as an Area of Search for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and the Areas of Search Policy.
Area of Search: AOS J Land to the east of Tottenhill

Area of Search Characteristics

- The area of search covers just less than 23 hectares within the parishes of Tottenhill and Wormegay.
- The area of search is in an agricultural landscape between the A10 and A134.
- The area of search is a mixture of small blocks of woodland and agricultural uses and the area is classified as Grade 4 agricultural land.
- The area of search is approximately 15 kilometres from the Leziate processing plant and it is considered likely that any extraction site would transfer mineral to the processing plant by road.

J.1 Amenity: The nearest residential property is approximately 250 metres from the AOS boundary and the settlement of Tottenhill is less than 300 metres from the boundary of the AOS. Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100m of a source, if uncontrolled. A planning application for mineral extraction within AoS J would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

J.2 Highway access: Access from AOS J could be via the southern track onto the A134, which is a principal route in the NCC route hierarchy, subject to junction improvements. A dedicated access could also be created to the A134, or the A10 to the west with junction improvements to the existing network. The area of search is acceptable to the Highway Authority subject to highway improvements.

J.3 The route from AOS J to the Leziate processing plant would be expected to be north along the A10 and A149, before turning east onto the B1145. From the B1145 the preferred access to the Leziate processing plant would be an off-road route turning right off the B1145 before Bawsey and utilising the existing track and/or conveyor route through the existing mineral workings at Mintlyn to access Station Road and the processing plant south of Brow of the Hill. A right turn lane at the junction with the B1145 would probably be required to provide a suitable junction. Utilising an off-road haul route would avoid lorries accessing the processing plant via Brow of the Hill, Fair Green or Middleton and therefore mitigate amenity impacts.

J.4 Historic Environment: The historic landscape character of AOS J is 20th century agriculture with boundary loss, agriculture with 18th-19th century piecemeal enclosure and enclosed wetland meadow. The area of search is within a wider historic landscape character of 20th century agriculture with boundary loss and enclosure, agriculture with 18th-19th century enclosure, common, enclosed wetland meadow, disused mineral extraction, industry, water reservoir and 18th-20th century plantation woodland.

J.5 The nearest Listed Building is the Church of St Botolph at West Briggs (Grade I), which is 325m from the area of search boundary; there are five Listed Buildings within 2km of the AoS boundary. There are three Scheduled Monuments within 2km of the AoS boundary; the AoS is approximately 1.2km from the motte and bailey castle in Wormegay village, 1.6km from the site of Wormegay Priory and 1.74km from the village Cross at Wormegay. Tottenhill Row Conservation Area is 1.7km from the AoS boundary. There are no registered Historic Parks and Gardens within 2km of the AoS boundary. Any future planning application within the AoS would need to include a Heritage Statement assessing the setting of heritage assets, addressing the potential for impacts and proposing mitigation measures such as bunding and screen planting.

J.6 Archaeology: AOS J contains a number of cropmark sites, including a series of late prehistoric to Romano-British enclosures, and medieval banks (including a parish boundary bank). The cropmarks are accompanied by finds of Bronze Age, medieval and post medieval date. Therefore, a detailed assessment of the significance of archaeological remains will be required at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this AoS. The archaeological assessment will need to include a desk-based assessment and field evaluation.
J.7 Landscape: The AoS is not located within the AONB, a Core River Valley or any other designated landscape feature. The AoS is characterised as a landscape of ‘Settled Farmland with Plantations’ in the King’s Lynn and West Norfolk Landscape Character Assessment. This is a transitional landscape between the Fens to the west and the Brecks to the east. Generally, the AoS slopes gently away to the west but at a rate where many parts of the area would be perceived as flat. However, it is considered that there are areas within the AoS where bunding and screen planting could provide successful mitigation if well designed. Viewpoints are limited by field boundaries and woodland over large parts of the landscape area. However, hedgerows are intermittent in the area surrounding the AoS opening up views across open fields often to tree lined horizons. There are a number of viewpoints in the AoS from roads and Public Rights of Way, and any future planning application in the area of search will need to ensure that any proposed extraction is appropriately screened through the use of a Landscape and Visual Impact Assessment and appropriate mitigation.

J.8 Ecology: The AoS is more than 9km from any SPA, SAC or Ramsar site. Therefore, there would be no likely significant effects on these sites.

J.9 The AoS boundary is 2.35km from the River Nar SSSI and is within the Impact Risk Zone for this SSSI. The SSSI citation states that the River combines the characteristics of a southern chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system of its type. However, due to the land being artificially drained to multiple outlets, this area of search does not drain to the River Nar and therefore no adverse impacts are expected.

J.10 The AoS boundary is 2.04km from Setchey SSSI and is within the Impact Risk Zone for this SSSI. The SSSI citation details the geological importance of the site for scientific study. However, due to the land being artificially drained to multiple outlets, this area of search does not drain towards Setchey SSSI and therefore no adverse impacts are expected.

J.11 There are two County Wildlife Sites within 300 metres of the area of search: CWS 385 ‘Tottenhill Village Green’ (250 metres) which is an area of moderately species-rich grassland containing three small ponds, and CWS 424 ‘Westbrigg’s Wood’ (271 metres) which comprises of two areas of largely oak and birch dominated woodland. If mineral extraction in the AoS were to go below the water table or involve dewatering, then there could be impacts on the ponds in CWS 385. In that instance, a hydrogeological risk assessment would be necessary to identify potential risks and appropriate mitigation.

J.12 Geodiversity: The AoS has overburden made up of Head and Till deposits partially overlying the Lower Cretaceous Leziate Beds (Sandringham Sands). The Head deposits are priority geodiversity features due to their method of formation. The Leziate Beds are sands, interbedded with sandstones and mudstones. There is the potential for a mineral extraction site within this AoS to contain examples of geodiversity priority features. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future planning application. There would be a preference for restoration to provide opportunities for further geological research of suitable exposures.

J.13 Flood Risk: AOS J is in Flood Zone 1 (lowest risk) for flooding from rivers. 9% of AOS J is at low risk of flooding from surface water, 4% is at medium risk and 1% is at high risk of flooding from surface water. There is an area of surface water pooling in a 1 in 30-year rainfall event, which increase in size in a 1 in 100-year rainfall event and a 1 in 1000-year rainfall event. There is also a surface water flow path through the AOS in a 1 in 1000-year rainfall event. Sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The AoS is not within an Internal Drainage Board Area.

J.14 Hydrogeology: AOS J is within the hydrological catchments for the Polver Drain. The AoS is located over a principal aquifer and partially over secondary A and B aquifers. However, there are no Groundwater Source Protection Zones within the area of search. If extraction below the
A hydrogeological risk assessment will be necessary to identify potential risks and appropriate mitigation.

**J.15 Water Framework Directive:** The Polver Drain is a Water Framework Directive waterbody; it is approximately 1km to the northeast of the Area of Search and is separated from it by the A134. The groundwater level within mineral workings in this area is several metres below ground level and therefore, overland flows are not expected from the site towards the drain. Mineral extracted from AOS J is likely to be transported by road to the existing processing plant at Leziate, which would have to cross the Polver Drain on the A10 at Setchey. The Area of Search policy requires that appropriate mitigation is put in place to ensure that no unacceptable impacts to the drain or the river occur, including from silt ingress and fugitive dust emissions. A dust assessment would also be required at the planning application stage. Therefore, it is not expected that there would be a pathway for silt ingress into the Polver Drain from any future silica sand extraction within Area of Search J.

**J.16 Utilities Infrastructure:** There are no Anglian Water sewerage assets or water assets within the site boundary. There is no electricity transmission infrastructure within the site. There are no high-pressure gas pipelines within the site.

**J.17 Safeguarding Aerodromes:** The AOS is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. The Ministry of Defence (Defence Infrastructure Organisation) have stated that “The MOD have safeguarding concerns to the wet working and restoration of this site due to its potential to attract and support hazardous waterfowl closer within critical airspace. Therefore, further information would be required before a definitive response can be made.” As an area of search, no further information is currently available regarding how a site within the AOS could be worked and restored; this would be dependent on both the size and location of an extraction site and would therefore be a matter to be determined at the planning application stage. A Bird Hazard Assessment would be required at the planning application stage.

**J.18 Conclusion:** AOS J is considered suitable to allocate as a Area of Search for silica sand extraction. Development will be subject to compliance with the relevant Minerals and Waste Local Plan Policies and the Areas of Search Policy.
The following policy applies to all of the allocated areas of search for silica sand extraction.

**Policy MP13: Areas of Search for silica sand extraction**

AOS E, AOS F, AOS I and AOS J are allocated as areas of search for silica sand extraction. It is considered that a planning application for silica sand extraction could be submitted for part/s of the areas of search. Development will be subject to compliance with the Minerals and Waste Local Plan policies and all the following requirements:

- To address the shortfall in silica sand supply to meet the requirements of the existing processing plant (as set out in the NPPF);
- Submission of a noise assessment, an air quality/dust assessment and a programme of mitigation measures (e.g. standoff areas, screening and/or bunding, operational practices) to deal appropriately with any potential impacts;
- Submission of a Landscape and Visual Impact Assessment to identify potential landscape impacts, together with suitable mitigation measures to address the impacts and manage change in ways that will best sustain heritage values. The LVIA will include Core River Valleys, Scheduled Monuments, non-designated heritage assets of archaeological interest, Listed Buildings and Conservation Areas and their settings where appropriate;
- Submission of a Heritage Statement to identify heritage assets and their settings, assess the potential for impacts and identify appropriate mitigation to sustain heritage values if required. As a result of the historically complex and significant environment in which the mineral resource is present, applicants should consider the potential for early engagement with Historic England, the Norfolk Historic Environment Service and Conservation Officers in the preparation of the Heritage Statement;
- An appropriate archaeological assessment must be prepared in consultation with Norfolk County Council; this may initially be desk-based but may need to be followed up with field surveys and trial-trenching. The archaeological assessment will be used by Norfolk County Council/Historic Environment Service to agree appropriate mitigation measures;
- Submission of a Hydrogeological Risk Assessment; based on proportionate evidence, to identify potential impacts to groundwater quality, quantity and levels; and to propose appropriate mitigation to protect any abstraction points, ecosystems and surface water features that are reliant on groundwater, in particular SSSIs, SACs and SPAs. The assessment will need to consider the precautionary principle as it relates to European designations. The assessment should include a programme of mitigation measures to address identified potential impacts;
- Submission of a Biodiversity Survey and Report, including a protected species assessment. If protected species are found on the proposed extraction site, then appropriate mitigation will be required;
- Submission of an assessment of the potential for impacts on Water Framework Directive waterbodies, including from silt ingress and modification, and appropriate mitigation to prevent unacceptable adverse impacts;
- A sufficient stand-off distance around any water main that crosses the site or diversion of the water main at the developers costs and to the satisfaction of Anglian Water;
- Submission of an Arboricultural Impact Assessment to identify the impact of the development on existing trees and identify appropriate mitigation measures if required;
- Submission of a suitable scheme for the temporary diversion and reinstatement of any Public Rights of Way located within the site;
- Submission of a detailed agricultural land survey to identify subgrades, if the application area contains Grade 3 agricultural land. Land identified as being within the Best and Most Versatile classification (grades 1, 2, 3a) will require a working scheme which incorporates a soil management and handling strategy which is compliant with Policy MW6;
• Submission of a Transport Assessment or Statement which considers the potential for transport impacts and identifies appropriate mitigation measures, including highway improvements where appropriate, to address these impacts;

• There is a preference for the existing processing plant to be accessed via conveyor, pipeline or off-public highway routes. However, if silica sand is proposed to be transported to the processing plant using the public highway then there will be a preference for a transport route which minimises amenity impacts through the use of off-highway haul routes from the B1145 to the processing plant. A right-turn lane at the junction with the B1145 would probably be required to provide a suitable junction;

• Submission of a comprehensive phased working and restoration scheme, incorporating opportunities on restoration for ecological enhancement, the improvement of public access and geological exposures for future study;

• Submission of a Bird Hazard Assessment report to identify the risk of bird hazard to the safe operation of aerodromes and aircraft, identify proposed mitigation of any identified risk, and include a Bird Hazard Management Plan if necessary; and

• Within the allocated areas of search, the development of mineral extraction sites should follow a sequential approach to flood risk.
SIL 02 - land at Shouldham and Marham (silica sand)

Site Characteristics

- The site is considered to be a potential ‘Preferred Area’ rather than a specific site allocation, from which smaller specific sites could come forward.
- The 390.36 hectare site is within the parishes of Marham and Shouldham
- The estimated silica sand resource in the site is 16,000,000 tonnes
- The proposer of the site has given a potential start date of 2027 and estimated the extraction rate to be 800,000 to 900,000 tonnes per annum. Based on this information the full mineral resource at the site could be extracted within 20 years. Therefore, 9,000,000 tonnes could be extracted within the plan period.
- The site is proposed by Sibelco UK Ltd
- The site is currently in agricultural use and the Agricultural Land Classification scheme classifies the land as being grade 3, with a very small area being grade 4.
- The site is approximately 6km from the processing plant at Leziate and the proposer has suggested that mineral may be transported by pipeline.

A reduced development area has been proposed of 215.31 hectares, within which extraction is proposed to take place. The reduction is to allow buffers and screening within the site.

S2.1 Amenity: The nearest residential property is 81m from the site boundary. There are 10 sensitive receptors within 250m of the site boundary. The settlement of Marham is 430m away. However, the land nearest to Marham is not proposed to be extracted and there is a suggested buffer area around the rest of the site boundary. Therefore, the nearest residential property is 280m from the extraction area and there are no sensitive receptors within 250m of the proposed extraction area. Even without mitigation, adverse dust impacts from sand extraction sites are uncommon beyond 250m from the nearest dust generating activities. The greatest impacts will be within 100 metres of a source, if uncontrolled. A planning application for mineral extraction at this site would need to include noise and dust assessments and mitigation measures to deal appropriately with any amenity impacts.

S2.2 Highway access: The proposer of the site has suggested that mineral could be transported to the processing plant at Leziate by pipeline, although the proposed route of the pipeline has not been provided. Therefore, proposed highway access to the site has not been provided. If mineral was transported by HGV to the processing plant at Leziate then the crossing of the River Nar would have to be appropriately engineered to mitigate potential silt ingress into the watercourse. It is unlikely that existing highways between the site and the processing plant could be suitably improved, and the construction of an off-highway haul route would probably be necessary, although it is uncertain whether appropriate mitigation measures could be put in place to address potential landscape impacts close to the River Nar and the Scheduled Monument at Pentney Priory. The site is not within an AQMA.

S2.3 Historic environment: The historic landscape character of the site is Twentieth Century agriculture with boundary loss and enclosure, and drained Parliamentary fen enclosure. The site is within a wider historic landscape character of Twentieth century agriculture with enclosure and boundary loss with a relict element, agriculture with 18th to 19th century piecemeal enclosure, drained parliamentary fen enclosure, unimproved freshwater fen, and a historic earthwork. The wider historic landscape character also includes a military airfield (RAF Marham), mineral extraction, leisure/recreation, and 18th to 20th century woodland plantation.

S2.4 The nearest Listed Building is the Grade I Remains of Augustinian Priory which is 310m away. There are 22 Listed Buildings within 2km of the area boundary. Eight of these are within the Shouldham Conservation Area which is 1.14km away. The nearest Scheduled Monument is the Remains of Pentney Priory at Abbey Farm which is 30m away. There are 6 Scheduled Monuments within 2km of the site boundary. There are no Registered Historic Parks and Gardens within 2km of
the site boundary. Norfolk County Council’s Historic Environment Service have carried out a Historic Environment Impact Assessment on proposed site SIL 02. It concluded that mineral extraction within the eastern part of SIL 02 would have a relatively severe impact on the setting of Pentney Priory and that the provision of mitigation measures such as bunds and planting to screen the extraction area would in themselves significantly and adversely alter the landscape and setting of Pentney Priory. Therefore, the assessment recommended that the eastern part of the site should not be allocated (as shown with purple crosses on the map). A planning application for mineral extraction within site SIL 02 would need to include a Heritage Statement to identify heritage assets and their settings, assess the potential for impacts and identify appropriate mitigation measures if required.

S2.5 Archaeology: The site is located within an area of interest, and there are significant Historic Environment records of prehistoric to Late Neolithic finds; with isolated finds from later periods, within the site boundary, and a possible Iron Age settlement. The site is in a wider landscape with a significant number of finds and features from the multiple periods. Therefore, there is the potential that unknown archaeology exists on the site and an assessment of the significance of archaeological remains will be required at the planning application stage, in order to protect and mitigate the impact of mineral extraction in this site. The archaeology assessment may initially be desk-based but may need to be followed up with field surveys and trial-trenching.

S2.6 Landscape: The site is not located within the AONB. The northern part of the site is within a Core River Valley designation, although the proposed extraction area is outside it. Any permanent change within the Core River Valley would need to demonstrate an enhancement to the landscape. The site is an area of flat grazing marsh along the southern bank of the River Nar. The site is within the landscape character area described as ‘The Fens – Open Inland Marshes – Saddlebow and Wormegay’ in the King’s Lynn and West Norfolk Landscape Character Assessment.

S2.7 The northern boundary of the site borders the River Nar. The western boundary of the site borders the wooded area of Shouldham Warren. The northwestern boundary is adjacent to a drain and on the opposite bank is an area of woodland plantation. At the southeastern end of the site is the village of Marham a short distance from the boundary; south of the village is RAF Marham.

S2.8 Due to the open nature of the landscape, there would be views of the site from some properties in Marham, however due to the buffer areas and the potential they offer for bunding, it should be possible for an appropriate screening scheme to be developed. There are isolated properties along the southern boundary, which would also have views of the site if screening is not put in place. If bunding is proposed this will need to take into account flood risk so as to not impede the flow of water in a flood event. On the opposite side of the River Nar is the Scheduled Monument (Pentney Priory Gatehouse); due to the open nature of the landscape mineral extraction within the eastern part of the site (as shown with purple crosses on the map) would have a relatively severe impact on the setting of Pentney Priory, even with mitigation measures. Therefore, the eastern part of the site is not considered suitable to allocate. Views of the western part of the site could be appropriately screened from view by bunding and screen planting. Care will need to be taken in the design of any screen bunding, to ensure that it is not intrusive in its own right.

S2.9 There is a Public Right of Way adjacent to the northern boundary of the site (Marham FP8 and Wormegay RB7). There is also a PRoW running through the site (north to south) (Marham FP9).

S2.10 Ecology: Breckland Forest SSSI, which is part of the Breckland SPA, is 4.74km from the site boundary. The SSSI citation states that the clear fell areas and young plantations within Breckland Forest SSSI provide suitable breeding habitat for woodlark and nightjar which occur in internationally important numbers. The forest also supports an important assemblage of protected plant species, internationally rare and nationally scarce plant species. The forest also supports an exceptionally rich invertebrate fauna. Whist the site is within the Impact Risk Zone for the SSSI, due to the distance of the proposed site from the SSSI no impacts on the SSSI are expected.

S2.11 East Walton and Adcock’s Common SSSI, which is part of the Norfolk Valley Fens SAC is 4.28km from the site boundary. The SSSI citation states that the commons are notable for a
complex set of basin-shaped depressions separated by chalky ridges which were formed under periglacial conditions. Active springs are also a feature. This varied topography has resulted in a mosaic of habitats ranging from fen or occasionally open water in the depressions to chalk grassland or scrub on the intervening ridges. The topography is of considerable geomorphological interest. The site is also of great botanical interest containing some of the finest unimproved grassland remaining in Norfolk. The two commons have a very rich invertebrate fauna and the wide range of habitats is attractive to many breeding birds. Whilst the site is within the Impact Risk Zone for the SSSI, due to the distance, provided that no dewatering is proposed as part of the working scheme, no impacts are expected on this SSSI.

S2.12 River Nar SSSI is adjacent to the site boundary. The SSSI citation states that the River combines the characteristics of a southern chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system of its type. The potential exists for impacts from mineral extraction within SIL 02, if uncontrolled. An assessment of potential impacts, including from dust deposition and hydrogeology, together with appropriate mitigation would be required as part of any planning application.

S2.13 The nearest County Wildlife Sites are: CWS 528 ‘North of Marham’ is 230m from the site boundary and is a mixed CWS with scrub, fen and grassland. CWS 488 ‘Osierbed Plantation’ is 230m from the site boundary and is a semi-natural woodland with coppice. CWS 545 ‘The Carr’ is 180m from the site boundary and is a thin strip of woodland dominated by ash. The potential exists for impacts from mineral extraction within SIL 02, if uncontrolled. An assessment of potential impacts, including from dust deposition and hydrogeology, together with appropriate mitigation would be required as part of any planning application.

S2.14 CWS 530 ‘Marham Fen’ is 80m from the site boundary. Marham Fen CWS consists of lowland basic grassland, mixed fen, scrub and coppice woodland lying over chalky ground which contains depressions called ‘pingos’ created by glacial activity during the last ice-age. The potential exists for impacts from mineral extraction within SIL 02, if uncontrolled. An assessment of potential impacts, including from dust deposition and hydrogeology, together with appropriate mitigation would be required as part of any planning application.

S2.15 The nearest ancient woodland site is Bowl Wood, which is a Plantation on Ancient Woodland Site (PAWS) and Ancient Semi-Natural Woodland (ASNW); it is 1.26km from the site boundary. Due to this distance, provided that no dewatering is proposed as part of the working scheme, no impacts on this ancient woodland site are expected.

S2.16 Geodiversity: The site consists of Peat, river terrace deposits-sand and gravel, which are geodiversity priority features, overlying Leziate member-sand, and Carstone Formation-sandstone. Potential impacts to geodiversity would need to be assessed and appropriate mitigation identified as part of any future application. It would be useful to retain some open faces for scientific study during operational stages, and ideally after restoration, and have a ‘watching brief’ during the extraction phase in case features of potential geodiversity interest are uncovered.

S2.17 Flood Risk: The majority (52%) of the area is within Flood Zone 3 (high risk) and 42% of the area is within Flood Zone 2 (medium risk) for flooding from rivers, within the borough council’s SFRA. The area has a low risk of surface water flooding with a few locations of surface water pooling, mainly in the south of the site, in a 1 in 30-year rainfall event. There are additional locations of surface water pooling in a 1 in 100-year rainfall event. The number of locations of surface water pooling increase significantly in a 1 in 1000-year rainfall event and there are a number of surface water flow paths in the southern part of the proposed area. Silica sand extraction is considered to be a ‘water compatible’ land use which is suitable in all flood zones. The site is within the East of Ouse, Polver and Nar IDB area.

S2.18 Hydrogeology: The site is located over a principal aquifer (bedrock) and partially over a Secondary A aquifer (superficial deposits). The eastern part of the site is within groundwater Source Protection Zone 1, however, this has been excluded from the proposed extraction area. The rest of the site is not within a groundwater SPZ. A planning application for mineral extraction at
this site would need to include a Hydrogeological Risk Assessment to identify any potential impacts to groundwater and appropriate mitigation measures. The Environment Agency have stated that the site would need to be worked wet without any dewatering. The proposer of the site has indicated that potentially extraction could be via wet suction dredging; this may mean that dewatering is unnecessary.

**S2.19 Water Framework Directive:** The Nar to the confluence with the Blackborough Drain is adjacent to part of the norther boundary of the site and is a Water Framework Directive waterbody. The site proposers have submitted a smaller extraction area which provides a standoff area between the proposed extraction and the River Nar. Therefore, no potential exists that the working of silica sand within the proposed extraction area within SIL 02 could lead to the realignment of the Nar.

**S2.20** The Fourteen Foot Drain is a Water Framework Directive waterbody and it bisects the proposed extraction area. The drain flows eastwards eventually flowing into the Polver Drain (3.5km away) which in turn flows into the Relief Channel. Any future planning application for mineral extraction at the site would be required to carry out an assessment of the potential for impacts on Water Framework Directive waterbodies, including from silt ingress and modification, and appropriate mitigation to prevent unacceptable adverse impacts.

**S2.21** The groundwater level within mineral workings in this area is several metres below ground level. As screening bunds form part of mineral extraction sites, if any flow did occur these bunds would form a barrier that would to prevent any flow moving down slope until infiltration took place. The proposed standoff area between the extraction area and the embankment would also provide an opportunity for any flows to infiltrate.

**S2.22** The River Nar is embanked at this point and only if the embankment was in some way breached, would a flow reach the river, and such a risk is considered to be negligible. The River Nar is in part fed by base flow; however as it is proposed to work the extraction area wet, this is unlikely to affect base flow rates into the river.

**S2.23** SIL02 and the existing processing plant at Leziate, which the silica sand would be transported to, are both located several kilometres apart. It is proposed to transport the mineral by pipeline. It is not known at this stage whether the pipeline would pass over the River Nar by bridge or whether a sub-surface pipeline would be used. Methods such as trenchless crossing could be utilised if a subsurface crossing was preferred which would not disturb the river base. If a pipeline bridge was preferred seamless pipeline could be utilised for the crossing which should ensure the potential for leakage and therefore silt ingress is negligible.

**S2.24** Any future planning application would be required to carry out a dust assessment in accordance with the National Planning Policy Framework. Therefore, it is not expected that there would be a pathway for silt ingress into the River Nar from any future silica sand extraction within SIL 02.

**S2.25 Utilities infrastructure:** There is a water main along the site boundary and a water main within the site. There is an Anglian Water sewerage pumping station adjacent to the site boundary. Anglian Water would require the standard protected easement widths for the water main and for any requests for alteration or removal to be conducted in accordance with the Water Industry Act 1991. There are no electricity transmission lines within the site. There are no high-pressure gas pipelines within the site.

**S2.26 Safeguarding aerodromes:** The site is within the zone for RAF Marham where the Defence Infrastructure Organisation must be consulted on developments with the potential to increase the number of birds and the ‘bird strike’ risk to aircraft. The Ministry of Defence (Defence Infrastructure Organisation) have stated that “The proposed site is a considerable area which is proposed to be restored with large areas of open water. A development of this nature in such proximity to the aerodrome is of great concern to aircraft safety. Even if the site were to be reduced in scale this would be of serious concern to the MOD. Therefore, we would object to this site based on current plans."
S2.27 Restoration: No restoration scheme has been proposed by the mineral operator at this stage. However, based on the depth of the mineral and the water table in the area, along with the restoration of other silica sand extraction sites in Norfolk, it is expected that the majority of the site would be restored to open water. As stated earlier, restoration of the site to large areas of open water has the potential to increase birdstrike risk and therefore is of great concern to the MOD DIO due to the proximity of the proposed site to the operational airbase at RAF Marham.

S2.28 Conclusion: The site is considered to be unsuitable for allocation because:

- Due to the size of the extraction site proposed within 5km of RAF Marham and the likelihood of the site being restored to open water, there is a high risk of unacceptable adverse impacts on aviation safety and the Ministry of Defence (Defence Infrastructure Organisation) has objected to the proposal.