MINERAL RESOURCE ASSESSMENT

LAND EAST OF STATION ROAD, ELSENHAM

Bloor Homes Limited and Gillian Smith, John Robert Carmichael Smith, Robert Giles Russell Smith and Andrew James Smith

BLOOR HOMES

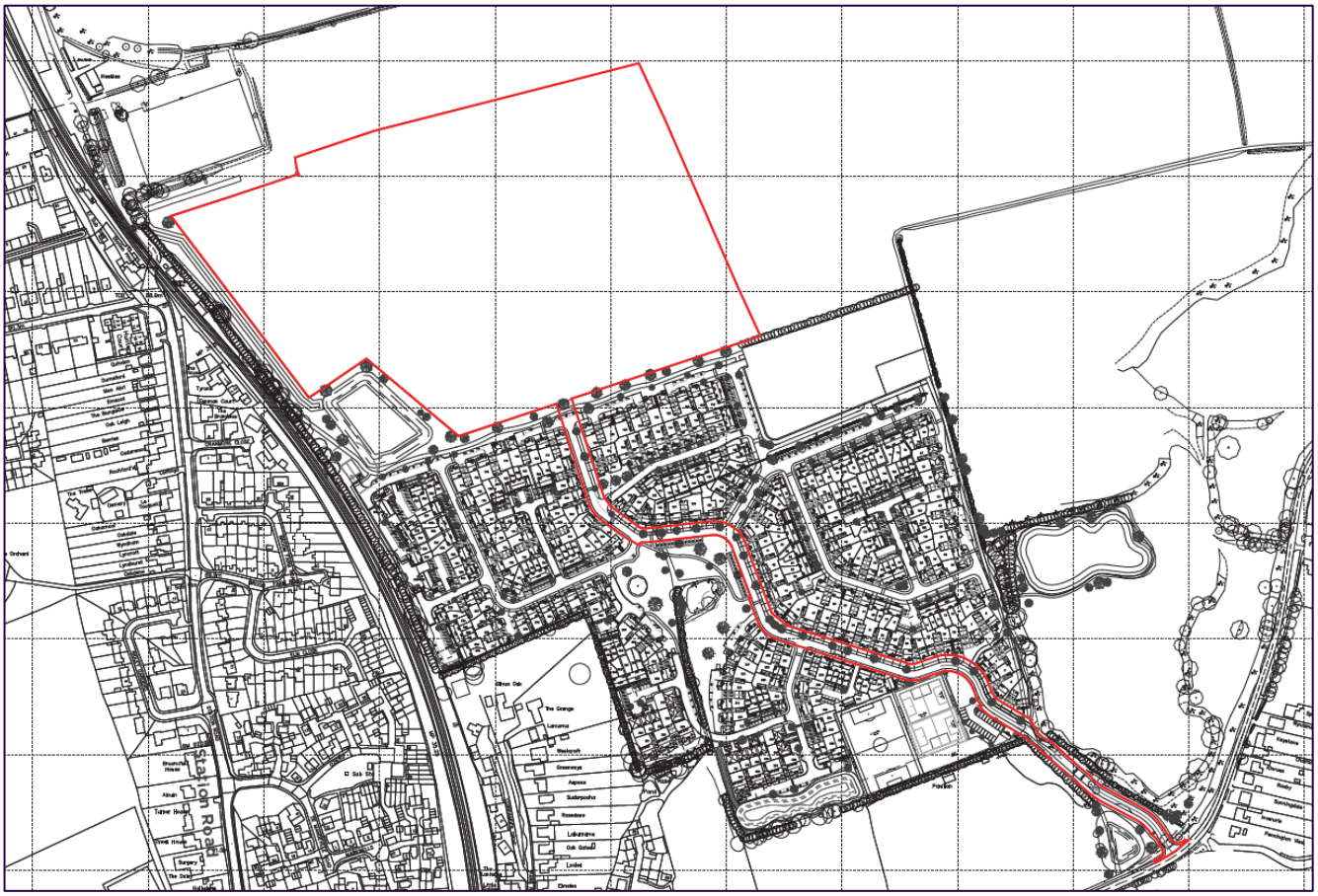
Carter Jonas

Carter Jonas

Mineral Resource Assessment

For Land East of Station Road, Elsenham

On behalf of: Bloor Homes Limited and Gillian Smith, John Robert Carmichael Smith, Robert Giles Russell Smith and Andrew James Smith



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1.0 INTRODUCTION

Background

1.1 This report has been prepared in accordance with the instruction from Bloor Homes Limited and Gillian Smith, John Robert Carmichael Smith, Robert Giles Russell Smith and Andrew James Smith (the 'Client'), to prepare a Minerals Resource Assessment (MRA) in support of an outline planning application for residential development on Land East of Station Road, Elsenham, Essex (the 'Site').

1.2 The MRA meets the requirements of Policy S8 of the adopted Minerals Local Plan to undertake an MRA for development sites exceeding 5 hectares within Sand and Gravel Mineral Safeguarding Areas (MSA).

Scope of Report

1.3 This MRA has been prepared in accordance with the 'Mineral Safeguarding Practice Guidance' (April 2019) produced by the Mineral Products Association and the Planning Officers' Society. The guidance sets out that developers should provide sufficient information to enable the mineral planning authority (MPA) and local planning authority (LPA) to consider the potential effect of non-exempt development in Mineral Safeguarding Areas/Mineral Consultation Areas (MSAs/MCAs) on mineral safeguarding, and the viability of prior extraction of mineral ahead, or in conjunction with, the non-mineral development. This information should be in the form of an MRA and Annex 1 to the guidance sets out matters to be addressed.

1.4 The Essex Minerals Local Plan provides no additional guidance in respect of the format of an MRA.

1.5 This report is a desk-based assessment and includes:

- a review of minerals supply and safeguarding planning policies in Essex;
- an appraisal of key planning and environmental designations on the Site and adjoining land, including constraints which may affect the prior extraction of mineral resources;
- a review of any nearby planning applications for non-mineral development which were accompanied by a Mineral Resource Assessment;
- the mineral potential associated with the proposed Site (e.g., an initial view on the quantity and quality based on available published geological data and results of any site investigation already undertaken) and consideration of mineral resources in the vicinity of the MSA; and
- need for the safeguarded mineral resources (based on the existing landbank) albeit that of itself this should not preclude the need to consider the scope for some prior extraction.

1.6 A series of intrusive investigations have been undertaken within and in proximity to the Site in recent years to inform this application and separate planning applications on land to the south of the Site. Due regard has been given to this data as well as information published by the British Geological Survey. Further details are provided in Section 5 of this MRA.

1.7 The report has been prepared by Tamsyn Luggar and Alexander Heath and peer reviewed by Karen Hearnshaw:

Karen Hearnshaw is a Chartered Town Planner, Partner at Carter Jonas and the Minerals and Waste Planning lead. Karen has over 20 years' experience working in local government, as a consultant and

in the minerals industry. Karen has provided evidence at Local Plan Examination and acted as an Expert Witness at Public Inquiries to address matters of mineral safeguarding.

Tamsyn Luggar is an Associate in Carter Jonas' Minerals and Waste Management Team. Tamsyn is a Chartered Mineral Surveyor with experience in producing MRA's.

Alexander Heath is a Surveyor in Carter Jonas' Minerals and Waste Management Team. Alex is a Chartered Mineral Surveyor with experience in producing MRA's.

2.0 THE SITE

Location

2.1 The Site is located on the north-eastern edge of Elsenham.

2.2 To the west of the Site is the railway line, with Elsenham Station and station car park located to the northwest of the Site. There are commercial buildings located to the north of the station car park. To the north and east of the Site are agricultural fields.

Figure 1: Site Location

Source: Figure 04, Design and Access Statement

Site Description

2.3 The Site is in agricultural use as arable land.

2.4 The proposed residential development would be located on part of the existing field, but does not extend to the western, northern or eastern field boundaries. The Site is 11.12 hectares in size, including the access road and the proposed built development area is broadly rectangular in shape extending to approximately 9.8 hectares. The Site is relatively flat, although the eastern part of the Site is at a slightly higher level than the western part of the Site.

2.5 There is a public right of way adjacent to the northern field boundary. The land to the south of the Site is a construction site as Bloor Homes are currently building out the 350 dwellings approved here[1].

The Proposed Development

2.6 The proposed development comprises the development of up to 200 residential dwellings along with landscaping, public open space and associated infrastructure works.

Figure 2: Illustrative Layout

Source: Planning Application Drawing Number J004523_007

[1] Outline Permission UTT/17/3573/OP and APP/C1570/W/19/3243744 and Reserved Matters UTT/21/3269/DFO

3.0 PLANNING POLICY – MINERAL SAFEGUARDING

National Policy and Guidance

3.1 The National Planning Policy Framework (NPPF) sets out the requirements for the safeguarding of both mineral resources and infrastructure.

3.2 Paragraph 210 requires that planning policies should:

c) safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked).

3.3 Paragraph 212 makes it clear that:

Local planning authorities should not normally permit other development proposals in Mineral Safeguarding Areas if it might constrain potential future use for mineral working.

3.4 Further guidance on safeguarding is set out in Planning Practice Guidance (PPG), which includes the purposes of safeguarding, the steps that should be taken by MPAs to define appropriate MSAs and the responsibilities for safeguarding.

Local Policy and Guidance

3.5 The Site is located within the administrative boundary of Uttlesford District Council (UDC). Essex County Council (ECC) is the Mineral and Waste Planning Authority.

3.6 For the purposes of this MRA, the Development Plan documents comprise:

- Essex Minerals Local Plan (Adopted July 2014)
- Uttlesford Local Plan 2005 (policies were saved in December 2007)

Adopted Minerals Local Plan

3.7 The Essex Minerals Local Plan (MLP) was adopted in July 2014 and covers the period to 2040

3.8 ECC have commenced a review of the adopted local plan, with;

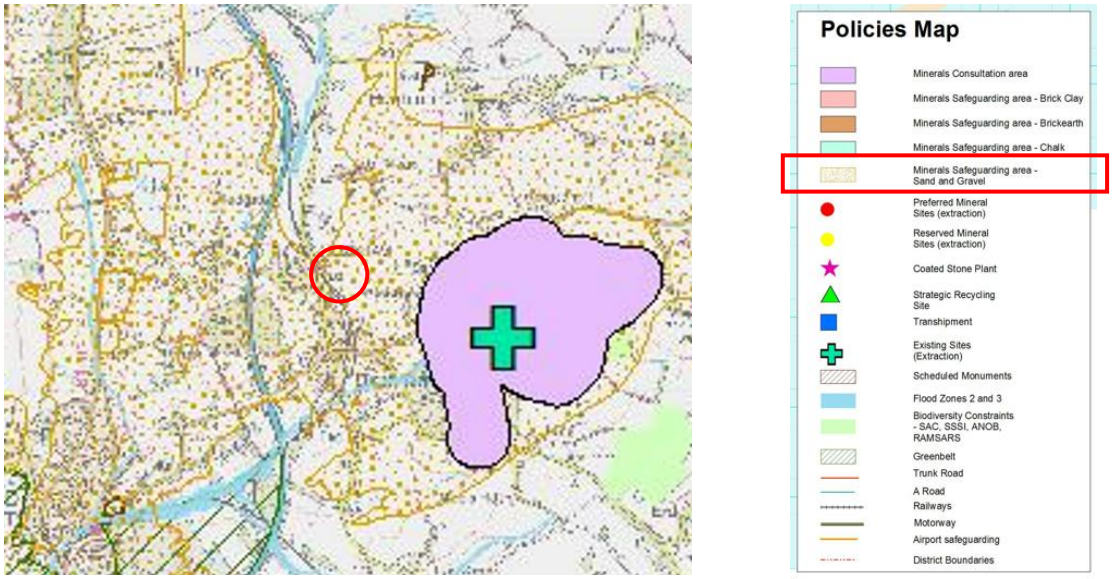
- A consultation (under Regulation 18 of the Town and Country Planning (Local Planning) (England) Regulations 2012 (as amended)) in March to April 2021.
- An informal engagement on Policy S6 of the Minerals Local Plan in February to March 2022.
- A “Call for Sites” exercise for new future sand and gravel extraction sites in February to March 2022.

3.9 It is proposed that further consultation will take place in early 2023.

3.10 Until the review is complete, the current Essex Minerals Local Plan (2014) will be the main document used to determine any mineral planning applications.

3.11 The Site is identified within the MLP as a Minerals Safeguarding Area for Sand and Gravel, as illustrated in the extract below:

Figure 3: Extract from the Essex Minerals Local Plan



Source: Essex Minerals Local Plan 2014 – Policy Map

3.12 Policy S8 of the MLP provides guidance on the safeguarding of mineral resources and mineral reserves.

By applying Mineral Safeguarding Areas (MSAs) and/ or Mineral Consultation Areas (MCAs), the Mineral Planning Authority will safeguard mineral resources of national and local importance from surface development that would sterilise a significant economic resource or prejudice the effective working of a permitted mineral reserve, Preferred or Reserve Site allocation within the Minerals Local Plan. The Minerals Planning Authority shall be consulted, and its views taken into account, on proposed developments within MSAs and MCAs except for the excluded development identified in Appendix 5.

Mineral Safeguarding Areas

Mineral Safeguarding Areas are designated for mineral deposits of sand and gravel…, as defined on the Policies Map.

The Mineral Planning Authority shall be consulted on:

a) all planning applications for development on a site located within an MSA that is 5ha or more for sand and gravel, …..; and

b) any land-use policy, proposal or allocation relating to land within an MSA being considered by the Local Planning Authority for possible development as part of preparing a Local Plan (with regard to the above thresholds).

Non-mineral proposals that exceed these thresholds shall be supported by a minerals resource assessment to establish the existence or otherwise of a mineral resource of economic importance. If, in the opinion of the Local Planning Authority, surface development should be permitted, consideration shall be given to the prior extraction of existing minerals…….

3.13 At paragraph 3.106 of the MLP, proposals for mineral extraction on "non-preferred sites" may occur in relation to:

Prior extraction to prevent mineral sterilisation – this may be required on occasions where significant development takes place (on a site of over 5 hectares for sand and gravel) and where a workable mineral resource could otherwise be permanently lost through sterilisation.

3.14 As set out in Section 6 below, whilst the Site extends to 9.84 hectares, once appropriate buffer zones have been applied, the area of potentially workable reserves is reduced to 4.54 hectares, which is below the 5 hectare threshold set out in paragraph 3.106, and confirmed in the letter from Essex County Council to Uttlesford District Council, dated 7 August 2019, in respect of the outline application for the land immediately to the south of the site (see Appendix A.3):

"Having reviewed the Mineral Resource Assessment (MRA) Addendum 2019, the MPA accepts the overarching conclusion that the prior extraction of the mineral underlying the application site is not practicable. This conclusion is accepted on the basis that underlying deposits equate to 5ha which is the minimum threshold at which safeguarding provisions apply, and that the material within the deposit is of marginal quality as demonstrated through laboratory testing."

4.0 SAND AND GRAVEL SUPPLY AND NEED

4.1 Paragraph 213 of the NPPF requires MPAs to ensure a steady and adequate supply of minerals. Safeguarding minerals will assist with enabling future supply, by requiring due consideration to be given to the potential for unnecessary sterilisation of resources within MSAs.

4.2 The NPPF requires MPAs to maintain a landbank of at least seven years for sand and gravel.

Landbank for Sand and Gravel

4.3 The latest Local Aggregates Assessment (LAA) for Essex was published in 2021[2] and details the recent (as at 31 December 2020) and predicted situation in Essex with respect to all aspects of aggregate supply. The LAA provides details of the landbank for sand and gravel across the County.

4.4 As at end 2020, the total permitted reserve of sand and gravel was 33.59 million tonnes. Based on the current apportioned provision rate of 4.45 million tonnes per annum[3], the landbank for sand and gravel supplies within Essex is 7.55 years (mid-2027). However, if the 10-year average sales figure is applied, then the landbank extends to 10.30 years (early 2030).

4.5 In addition to the permitted sites referred to, the MLP has identified "Preferred Sites" which together with the permitted sites have the potential to provide an additional 40.67 million tonnes of sand and gravel. The Site is not one of the Preferred Sites for future extraction.

Recent Mineral Planning Applications and Permissions

4.6 Since the LAA was published, a number of planning permissions have been granted, which has increased the permitted reserve by 6.69 million tonnes, which is the equivalent of an addition 1.5 years (to c.2029) of production based on the annual apportioned provision, as summarised below:

Table 1: Planning Permissions since December 2020

Permission Reference	Address	Mineral Yield	Decision date
ESS/12/20/BTE	Bradwell Quarry	6.50Mt	22 June 2022
ESS/77/20/CHL	Salt's Green	0.19Mt	1 March 2022

Source: Essex County Council online planning records

4.7 ECC and the neighbouring planning authority of Thurrock Council (which is included within the MLP and LAA) have a number of mineral planning applications awaiting determination, which have the potential to add an additional 3.878 million tonnes of sand and gravel to the Landbank.

[2] Greater Essex Local Aggregate Assessment 2021 (Covering the calendar year of 2020)

[3] The ten-year average sales (2011 to 2020) figure (3.26Mt) and the three-year sales (2018 to 2020) average (3.23Mt) are below the apportioned tonnage of 4.45 million tonnes per annum (Mtpa) provision made in the adopted Development Plan.

Table 2: Planning Applications since December 2020

Application Reference	Address	Mineral Yield	Notes
19/01709/FUL*	Orsett Quarry & Walton Hall Farm	1.500Mt	To be determined
ESS/29/20/TEN	Martells Quarry	1.310Mt	Resolved to grant subject to conditions and legal agreement.
ESS/101/21/TEN	Lufkins Farm, Great Bentley Road, Frating, CO7 7HN	1.068Mt	Construction of an agricultural reservoir. The site has been previously permitted, but that consent had lapsed. To be determined

* Thurrock Council

Source: Essex County Council and Thurrock Council online planning records

Future Supply

4.8 The Site has not been identified in the MLP as a "preferred site" or as a "reserve site". Policy S6 – Provision for sand and gravel extraction states:

Mineral extraction outside Preferred or Reserve Sites will be resisted by the Mineral Planning Authority unless the applicant can demonstrate:

a. An overriding justification and/ or overriding benefit for the proposed extraction, and,

b. The scale of the extraction is no more than the minimum essential for the purpose of the proposal, and,

c. The proposal is environmentally suitable, sustainable, and consistent with the relevant policies set out in the Development Plan.

4.9 Whilst the MLP makes reference to proposals for mineral extraction on "non-preferred sites" (see para 3.13. above) where this will prevent the sterilisation of minerals, the supporting text confirms that this is subject to a minimum site area of 5 hectares for sand and gravel. This site area threshold is considered further in Section 6.

5.0 MINERAL ASSESSMENT

Geology

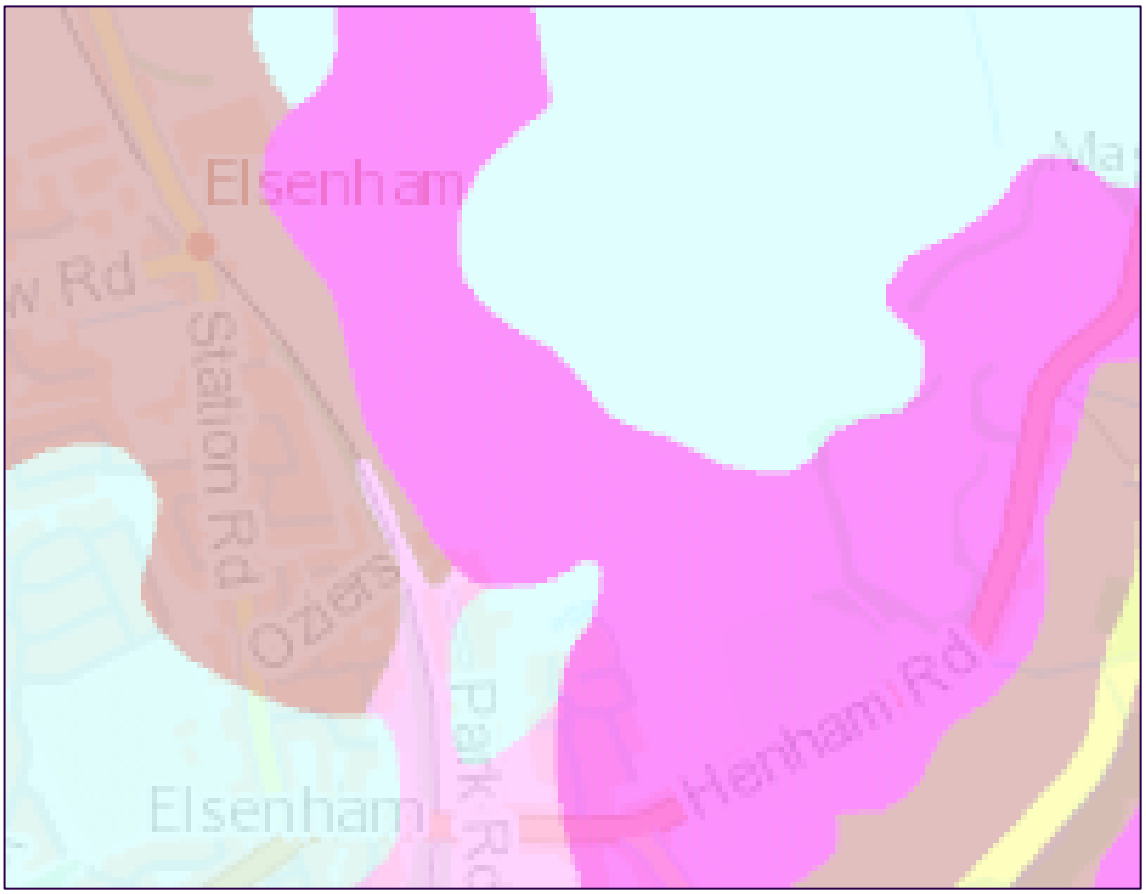
Regional Geology

5.1 Our review of publicly availably geological data provides an overview of the geology in the vicinity of the Site. Geologically, a distinction is made between 'superficial deposits' and 'solid geology'. Superficial deposits such as sand and gravel are found at, or close to, the surface. The solid bedrock beneath the superficial deposits is called the 'solid' or 'bedrock' geology.

Superficial deposits

5.2 British Geological Survey (BGS) Onshore GeoIndex indicates that at the 1:50,000 scale the superficial geology varies across the site and comprises three types of superficial geology, which is illustrated in Figure 4 below.

Figure 4: BGS Superficial Geology



Source: BGS

5.3 The eastern half of the site comprises “Lowestoft Formation - Diamicton” illustrated in light blue, which forms an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content. The carbonate content of the till matrix is about 30%, and tills within the underlying Happisburgh Formation have less than 20%.

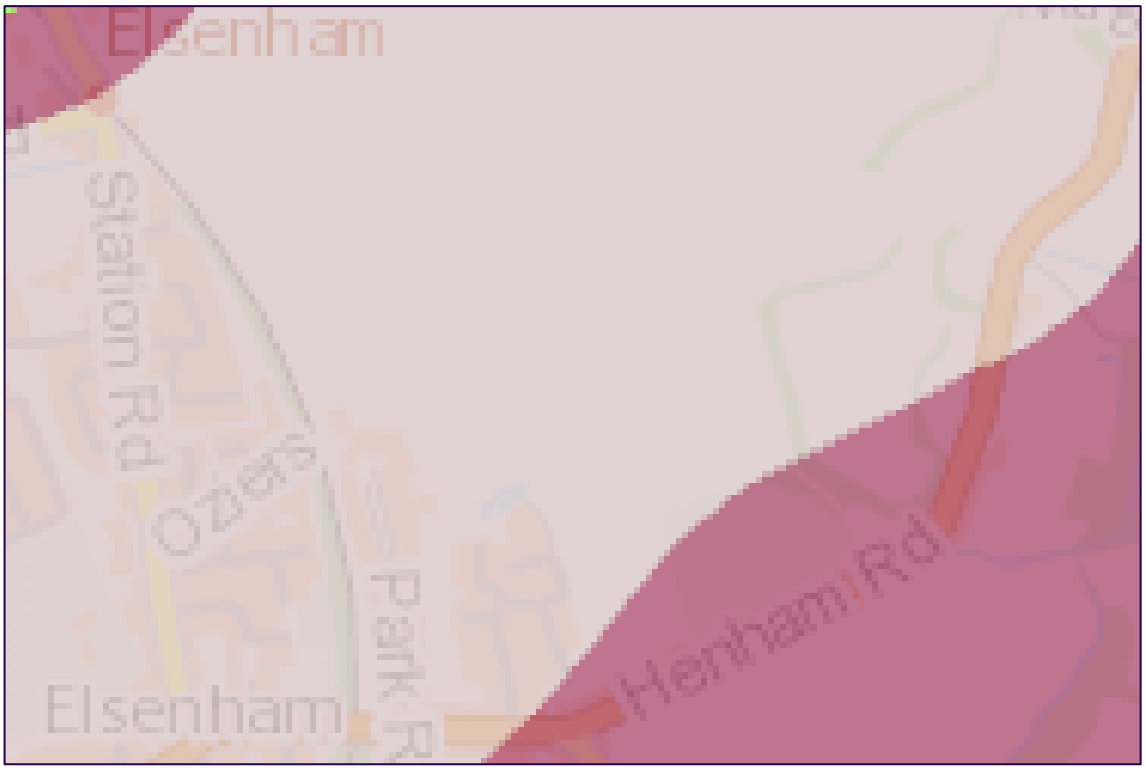
5.4 The centre of the site comprises the Kesgrave Catchment Subgroup illustrated in magenta. Sand and Gravel superficial deposits defined by the BGS as “*bodies of cross-bedded and massive, moderately sorted sand and gravel*”. The Kesgrave Catchment Subgroup is typically characterised by interbedded quartz and quartzite rich sand and sandy gravels deposited in a fluvial environment up to 3 million years ago.

5.5 The western extent of the site identified in brown, comprises Head deposits of clay, silt, sand and gravel. BGS define the Head deposits as poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes.

Solid Geology

5.6 BGS Onshore GeoIndex shows that at the 1:50,000 scale the bedrock geology at the Site comprises the “London Clay Formation”, as illustrated in Figure 5 below.

Figure 5: BGS Bedrock Geology



Source: BGS

5.7 The BGS describe this as mainly comprising bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of

sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

Localised Mineral Resource Data

Historical BGS Borehole Records

5.8 The BGS Onshore GeoIndex records confirm that borehole reference TL52NW93 is located just beyond the northern border of the Site. The 10-metre deep borehole BGS record is summarised in the table below:

Table 3: Summary Borehole Data

BGS Borehole Reference	Ground Level (mAOD)	Geological classification	Thickness (m)	Description
TL52NW93	98.3	Topsoil	0.6	
		Kesgrave Sand and Gravel	4.0	Sand with some discrete clay seams throughout. GRAVEL a Trace of fine angular with well-rounded flint, with some quartz and a trace of quartzite and sandstone. SAND medium with some fine and a trace of coarse subangular to subrounded quartz, and some mica pale yellowish brown.
		Red Crag	4.4	Pebbly Sand. GRAVEL course and fine, well rounded with angular flint, with some quartz, ironstone and quartzite, and a trace of sandstone. SAND medium with fine and course subangular to subrounded quartz and some mica and ironstone, orange brown
		London Clay	+1.0	Clay, silty, fine sand, dark grey

Source: BGS

5.9 The borehole confirms the superficial and bedrock geology for the locality.

WSP Trial Pit Assessment 2012

5.10 In 2012, a Trial Pit Assessment was undertaken by WSP Environmental comprising a series of intrusive ground investigations on an area of land, including the Site. The ground investigations were undertaken to determine the infiltration characteristics of the soils beneath the site to inform the drainage strategy.

5.11 The ground investigations comprised two phases of works; the first phase comprising fifty trial pit locations (TP1 to TP50) dug to locate areas of granular deposits and to delineate areas of shallow groundwater present across the site. The second phase comprised a further sixteen trial pit locations (TP201 to TP216) excavated in areas highlighted during the first phase as having good infiltration potential.

5.12 The ground investigations encountered the following geological units beneath the investigation area:

- Head Deposits – these deposits were encountered at depths ranging from 0.2 to 0.4 metres below ground level (BGL). The deposits mainly comprised of brown to orange slightly gravelly

sandy clay, with consistencies varying from soft to firm and gravels ranging from fine to coarse chalk and flint.

- Glacial Till – encountered from 0.1 to 1.5 metres BGL, comprising light brown/brown to grey slightly gravelly slightly sandy clay of varying consistency soft to stiff with fine to coarse chalk and flints.
- Kesgrave Sands and Gravels – encountered from 0.2 to 3.0m BGL and typically comprises a brown / grey to orange clayey sand and brown / yellow-orange sand.

Due to the shallow nature of this scheme of preliminary investigations, the London Clay, Lambeth Beds and White Chalk were not encountered. The ground conditions encountered were generally consistent with the BGS mapped geology.

5.13 Of the trial pits dug by WSP, seven were situated within the boundary of the Site. The seven trial pits are summarised in Table 4 below:

Table 4: Trial Pit Logs

Trial Pit Reference	Head Deposit Depth (m)	Weathered Glacial Till Depth (m)	Glacial Till Depth (m)	Kesgrave Sand & Gravel Depth (m)	Total Trial Pit Depth (m)
TP31	0	0	1.5	1.4	2.9
TP32	0	1	0	2.3	3.3
TP33	0.9	0	0	1.3	2.2
TP34	0.3	0	2.4	0.6	3.3
TP35	0	0	0.2	3.1	3.3
TP211	1.65	0	0	0	1.65
TP212	0	0.4	0	1.3	1.7
Average	0.41	0.2	0.59	1.24	2.62

Source: WSP Infiltration Testing Report

5.14 Of the sixty-six trial pits dug shallow groundwater was encountered in thirteen trial pits, varying between 1.7 and 3.3 metres BGL. Two of the trial pits where groundwater was encountered are located within the Site, TP33 and TP211, with groundwater encountered at 2.5 and 2.0 metres BGL respectively.

5.15 From the first phase trial pit investigations, twenty-five samples were scheduled for particle distribution size analysis to confirm the granular content within the soils. The following trial pits within the Site were subject to grading analysis, summarised below in Table 5:

Table 5: Grading Analysis

Borehole Reference	Cobbles (%)	Gravel (%)	Sand (%)	Silt and Clay (%)	
TP31 (2.2m - 2.7m)	0	17	70	13	
TP32 (1.4m – 1.9m)	0	37	51	12	
TP34 (3.0m – 3.5m)	0	3	80	17	
TP35 (2.0m – 2.5m)	0	3	93	4	
Average	0	15	73.5	11.5	

Source: WSP Infiltration Testing Report

5.16 The grading analysis indicates that the formations beneath the Site have a high sand content, with a lower gravel and fines content. This is of relevance as the MSA relates to sand and gravel and not sand in isolation, with the analysis indicating the resource is closer to a sand categorisation. However, the limited depth of the trial pits is acknowledged and the average gravel content may increase with depth.

East of Elsenham - 2017 and 2019 Mineral Resource Assessment

5.17 In December 2017, an MRA was undertaken by Wardrop Minerals Management Limited, in respect of planning application reference UTT/17/3573/OP for a proposed residential development site immediately to the south of the Site.

5.18 The 2017 MRA made reference to the same published geological data as that set out in the preceding sections of this report. It also made reference to the results of the trial pit programme conducted by WSP in 2012.

5.19 The submitted 2017 MRA concluded that the Particle Size Distributions of the trial pit sand samples within that Property confirmed most gradings were too fine throughout the size range and several showed a significantly high proportion of very fine particle sizes smaller than around half a millimetre. Furthermore, if a notional excavation were to be contemplated then standoffs to residential areas in the south and to the railway line on the western boundary would constrain a dig to an area of 3 hectares at maximum with a sand content of not much more than 100,000 tonnes. The resultant excavation would have steep sides and the base of the excavation would suffer from impaired drainage due to being close to the water table in very fine poorly draining sand.

5.20 In this case the MRA concluded that not only is the area of marginally suitable sand significantly less than 5 hectares but the combined quality and quantity factors are such that the resource could not fairly be described as a mineral resource of economic value. Very small volumes of relatively low value mineral such as building materials are only economic to work when they lie immediately adjacent to an established quarry site with its associated infrastructure, processing plant, sales organisation and customer base.

5.21 In the MRA author's opinion, even if the sand in this site was of high quality, it would not be economically viable to contemplate extracting it and selling into the open market. The overburden

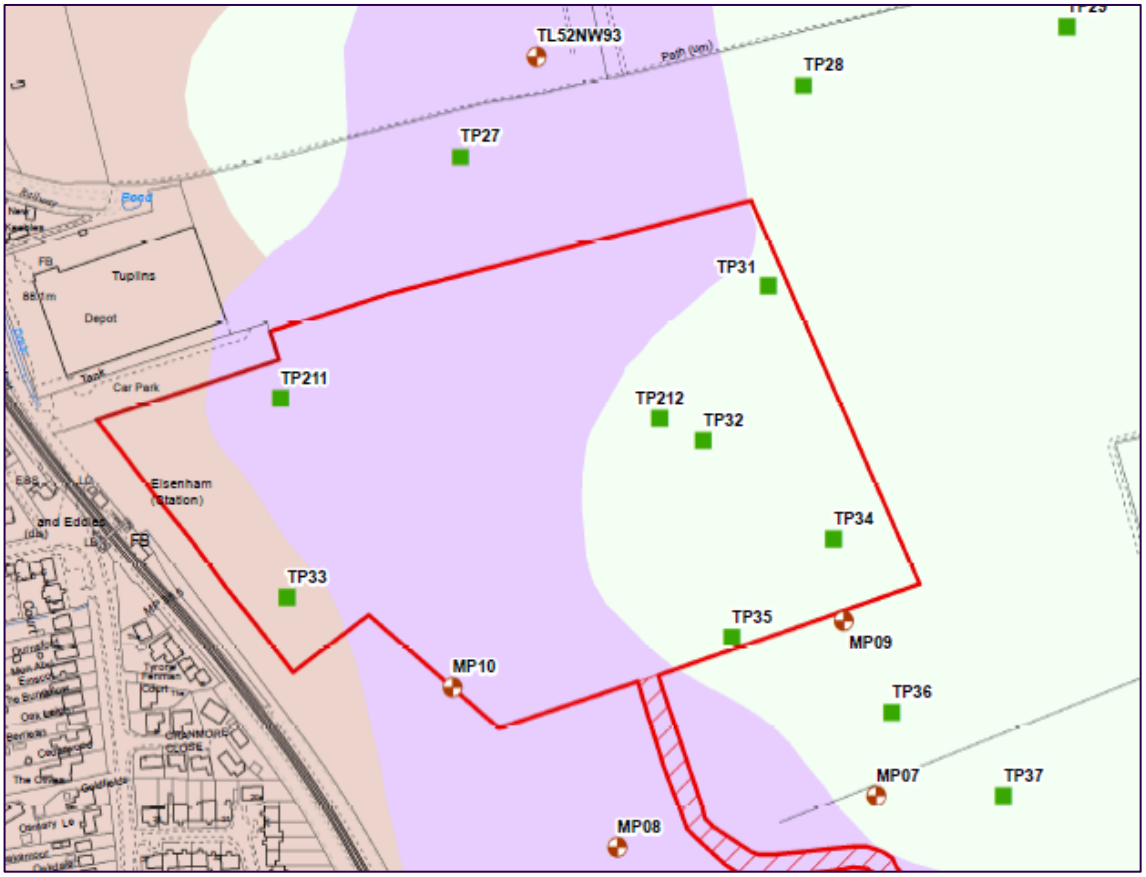
stripping and replacement costs would be disproportionately high; site infrastructure such as an access road, processing plant, weighbridge/small office, safety fencing and planning and environmental costs could only be defrayed over around 100,000 tonnes and could only be justified on a reserve of many times this amount.

5.22 Upon submission of the 2017 MRA, the MPA were reluctant to accept the conclusion of the 2017 MRA without a full intrusive borehole investigation being carried out. Their advice was that borehole spacing should be in the order of 150 metres.

5.23 An addendum to this MRA was prepared in May 2019 by the same author. The Addendum reflected the results of a fully intrusive borehole investigation undertaken in February 2019 that comprised 10 boreholes drilled across the proposed development site.

5.24 Figure 6 below illustrates that borehole numbers MP9 and MP10 lie immediately adjacent to the southern boundary the Site. The figure also illustrates the location of the 2012 WSP trial pits (TP) in the context of the Site.

Figure 6: Geological investigation within boundary of Site



Source: Addendum MRA (May 2019), WSP 2012 trial pit data and BGS Onshore Geoindex

5.25 The 2019 MRA Addendum concluded that a laboratory testing programme shows that there is a patch around boreholes MP4, MP7, MP8 and MP9 of sand that mostly falls in the BS1200 grading specification for general purpose building sand. It is however marginal in quality in that the material falls at the finer side of the grading envelope. The patch was 5 hectares in size and includes the top

4.0 metres or so of MP4, the middle part of MP7, the top 5 metres or so of MP8 and the full depth of the deposit at MP9.

5.26 The 2019 MRA Addendum concluded that within "Sand Patch" area, shown outlined in red below on Figure 7, had a mean overburden thickness (including the non-compliant 4 metres in MP7) of 1.74 metres, with an interpreted complaint sand thickness of 4.5 metres.

Figure 7: "Sand Patch" identified in the East of Elsenham MRA

Source: Addendum MRA (May 2019) Appendix iii

5.27 The 2019 MRA Addendum added that the amount of this sand patch that may be recoverable in economic terms is substantially driven by the effects of an excavation in the middle of a potential housing development site. An excavation of the full patch would remove substantial lengths of 2 hedges and the trees in the western central part of the site. An excavation even with very gentle side slopes right in the middle of the potential housing site might render the landform unsuitable for building and prejudice the economics of the proposal.

5.28 Most building sites now receive their sand in a silo rather than work from a pile of processed sand such that the likelihood of processing and using sand on site is low.

5.29 In this case not only does the area of marginally suitable sand only just amount to 5 hectares at the surface, significantly less at the exposed sand level at the base of an overburden slope, but the combined quality and quantity factors are such that the resource could not fairly be described as a mineral resource of economic value.

5.30 As referenced in Section 3, in a letter dated 7th August 2019, the MPA *"..accepted the overarching conclusion that the prior extraction of mineral underlying the application site is not practicable. This conclusion is accepted on the basis that the underlying deposits equate to 5ha which is the minimal threshold at which safeguarding provisions apply, and that the material within the deposit is of marginal quality as demonstrated through laboratory testing."*

Site Specific Mineral Investigation

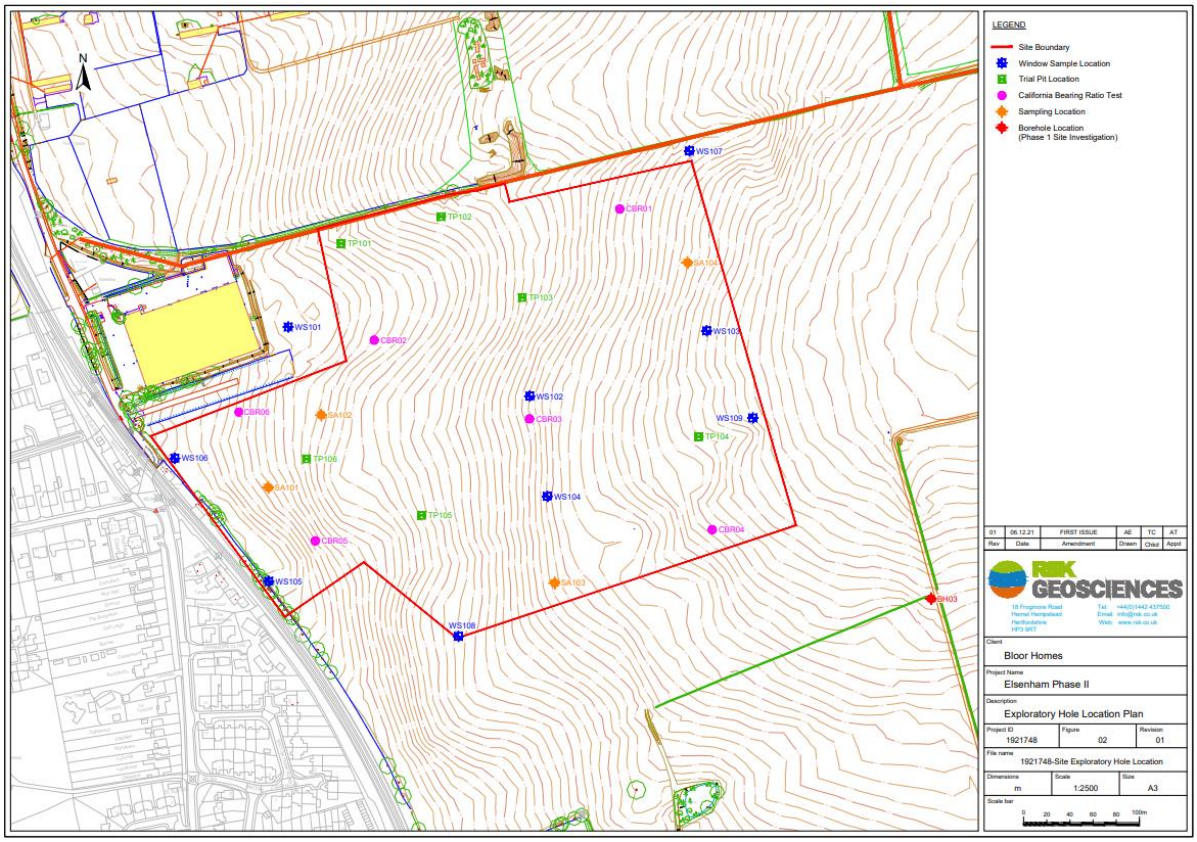
5.31 Carter Jonas has been provided with a copy of a Geo-environmental and Geotechnical Site Investigation Report produced by RSK Geosciences dated December 2021 in respect of the Site.

5.32 The objective of the report was to identify any land contamination and/or geotechnical constraints to the proposed development; and to identify the need for any additional investigation or remediation works to demonstrate that the site is suitable for its proposed use.

5.33 The scope of works included intrusive investigation comprising nine window sample borehole with gas installations, ten trial pits, in situ testing (including soakaway tests and plate load tests), soil sampling for geo-environmental and geotechnical purposes.

5.34 The location of the intrusive investigations undertaken by RSK in 2021 is illustrated in Figure 8 below:

Figure 8: RSK Exploratory Hole Location Plan 2021[4]



[4] Please note that the Site Boundary illustrated in red related to the site boundary for geotechnical site investigation and does not reflect the Site Boundary for the outline planning application.

Source: Figure 3 RSK report December 2021

5.35 Section 8.1 of the RSK report set out the descriptions of the ground conditions encountered from their intrusive investigation as follows:

"The exploratory holes encountered made ground locally along the northern and western boundaries of the site. Topsoil mantled the majority of the site, with the Head Deposits and Lowestoft Formation sub cropping beneath the western and eastern flanks of the site. The Kesgrave Catchment Sub Group sub cropped directly beneath the Head Deposits, topsoil and Lowestoft Formation in the western, central and eastern areas, respectively. The findings of the investigation broadly confirm the stratigraphic success described within the CSM, however the Lowestoft Formation is further east than originally anticipated.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in Table 17 with the strata discussed in subsequent subsections"

Figure 9: General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Made ground	WS101, WS105 & WS107	Ground level	0.61 to 1.20
Topsoil	All except WS101, WS105 and WS107	Ground level	0.30 to 0.40
Subsoil	All except WS101, WS105, WS106 WS107, SA02, SA03	0.3 to 0.4	0.2-0.85
Lowestoft Formation	WS103, WS107, WS109, SA104, TP104, SA03	0.3 to 1.15	0.85 to 4.50+
Head Deposits	SA01, WS101, WS106, TP01	0.3 to 0.85	0.55 to 4.7+
Kesgrave Catchment Subgroup	TP105, WS101, WS102, WS104, TP102, TP103, TP105, TP106, WS105, SA02, SA03,	0.35 to 2.3	1.85 to 3.8+
+ = Base of stratum not proven			

Source: Table 17 RSK report December 2021

5.36 Made ground was recorded locally at three exploratory points, two of which (WS101 and WS107) were located just outside of the boundary of the site to the northwest and northeast. Made ground was also encountered along the western boundary of the site at WS105.

5.37 Topsoil was encountered across the remainder of site and comprised a dark brown gravelly organic silt or sand with roots, which was underlain by a subsoil consisting of brown gravelly silty clay or sand.

5.38 The Lowestoft Formation was encountered beneath the eastern boundary of the site and comprised a stiff sandy gravelly clay with fine to cobble sized fragments of flint and chalk. The base of this stratum was beyond the limit of investigation, 5 metres BGL.

5.39 Head deposits were encountered beneath the topsoil / made ground beneath the western boundary and northwest corner of the site and comprised a firm to stiff brown sandy slightly gravelly to gravelly clay with flint.

5.40 The central and southern areas were directly underlain by granular deposits of the Kesgrave Catchment Subgroup comprising a medium dense to very dense brown / yellow brown silty to slightly silty sand with varying proportions of flint gravel. A high proportion of flint gravel was recorded initially at SA102 and TP106 which are possibly indicative of naturally reworked material from the Lowestoft Formation. The base of the stratum was not proven during this investigation. However, the top of the Lambeth Group was encountered between 7 and 15.8 metres BGL during the previous investigation of the Phase I development area, directly to the south.

5.41 The RSK investigation appears to confirm the previous localised investigation findings, which in summary comprise:

- Topsoil of 0.3 to 0.4 metres across the Site;
- The western section of the Site comprises Head Deposits of clay between 0.55 and 4.7 metres depth. Borehole MP10 (2019 MRA) showed a thin (1.2 metres) of grey sandy clay and flinty gravels with brown sand and gravel above 5.8 metres of brown silty sandy clay before intersecting the London Clay at 7.8 metres depth at the south-western corner of the Site.
- The eastern section of the Site comprises Lowestoft Formation – glacial till comprising chalk and sandy, gravelly clays. This sits at variable thicknesses of between 0.85 and +4.5 metres above the Kesgrave sand and gravel.
- The Kesgrave sand and gravels are located in the central section of the Site and below the Lowestoft Formation of the east at varying depths of between 1.85 and +3.8 metres. MP09 (2019 MRA was drilled to 14 metres and showed 1.9 metres of brown and weathered chalk, below which was approximately 11.3 metres of variable coloured and variable sorted horizons of sand and gravel. Particle Size Distribution samples from MP09 were determined for BS 1200 general purpose building sands. The report stated at paragraph 7.4.9 that all samples from MP09 met specification except for at 8m depth where the sample was too silty

5.42 It is difficult to extrapolate an average mineral depth across the Site due to the fact that the majority of test locations did not extend deep enough to find the base of the geological formation. Furthermore, the variable overburden thickness and quality of the upper sands / Lowestoft Formation is questionable, with samples taken from WSP 2012 trial pit investigation at locations TP32 and TP34 failing to meet specification.

High Level - Unconstrained Resource Estimate

5.43 The 2019 MRA assumed an average compliant sand thickness of 4.5 metres, which is considered to be reasonable having regard to the effect of the overlying Lowestoft Formation across the eastern section of the Site and have therefore assumed the same BS standard compliant average sand thickness of 4.5 metres across the Site.

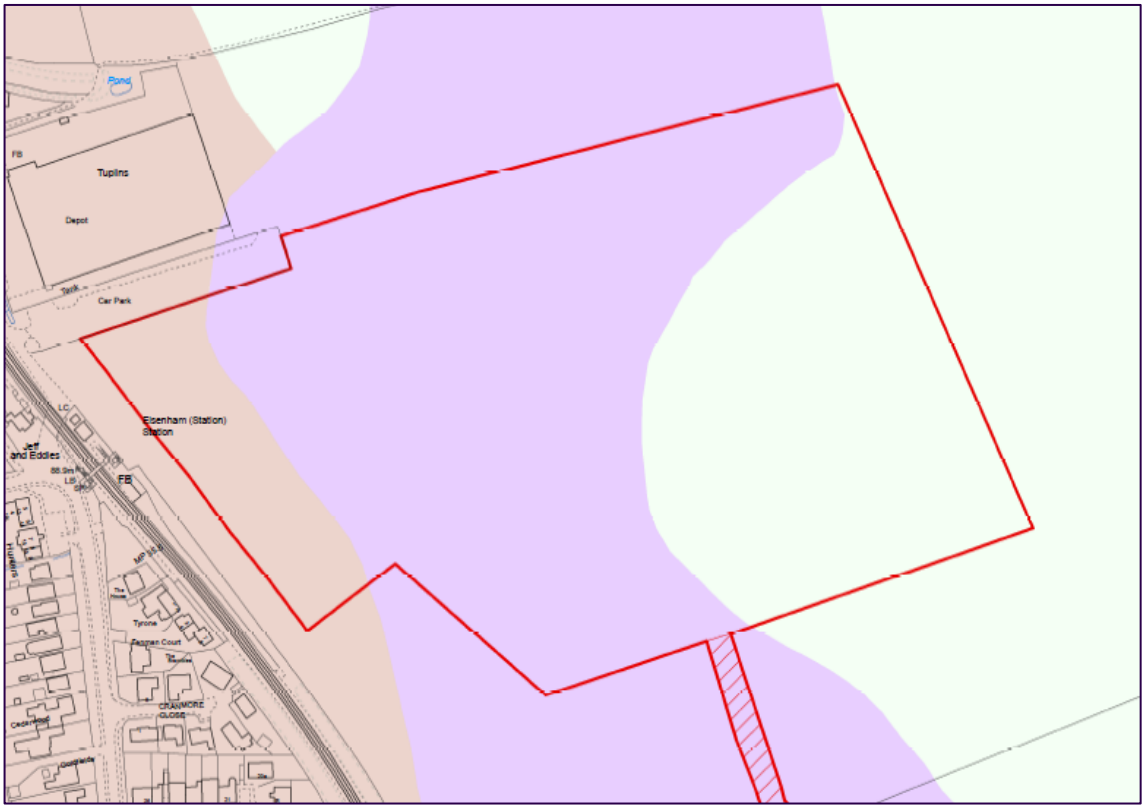
5.44 The estimated resource area is based on the BGS extent of the Kesgrave sand and gravel (magenta in Figure 10), which has been confirmed through the various investigations as well as the deposits which sit beneath the Lowestoft Formation (light green in Figure 10). However, the western extent of

the site which comprises the Head Deposits (brown in Figure 10) has been excluded based on testing of borehole MP10 and WSP 2012 trial pits at the western extent, which did not meet specification. The estimated resource area (excluding Head Deposits) extends to approximately 8.9 hectares.

5.45 Adopting the average assumed compliant mineral depth of 4.5 metres across the estimated resource area of 8.9 hectares and assuming vertical sides to the extraction area provides for a maximum estimated mineral resource gross volume of 400,500 cubic metres. Based on the proven thickness in Table 17 of the RSK report, it is estimated that the average overburden thickness including non-compliant Lowestoft Formation would be in the order to 2.7 metres, equating to approximately 240,300 cubic metres. This provides for an estimated gross ratio of approximately 1.67:1 (mineral:overburden).

5.46 The gross mineral resource volume reflects vertical sides which would not be achievable within the proposed housing development site, therefore an adjustment would need to be made to reflect appropriate batter slope gradient. The 2019 MRA adopted batter slopes of 1:6 gradient, which is considered reasonable and has been adopted for consistency.

Figure 10: Gross Resource Area – excludes Head deposits on western side of Site



6.0 SITE CONSTRAINTS

6.1 A review has been undertaken of potential constraints to mineral extraction at the Site. This comprises a review of physical constraints in the form of built development and adjoining property boundaries, services (underground and overground), environmental designations and site-specific constraints identified during the initial assessment work. These constraints could reduce the potential area of the Site available for prior extraction of the mineral resource.

Site Infrastructure/utilities

6.2 Carter Jonas has not been made aware of any utilities crossing the Site either underground or overground.

Planning and Environmental Designations

6.3 There are no site-specific policies or designations in the adopted Uttlesford Local Plan 2005 that affect the Site. The Site and its immediate surroundings are not in a sensitive area e.g. designated for nature conservation, landscape or heritage reasons.

6.4 The Site is not located in a conservation area. There are listed buildings in the vicinity of the site, with the Waiting Room at Elsenham Station (Grade II Listed) located to the west of site, and the various buildings at Elsenham Place and Pennington Hall off Henham Road (all Grade II Listed) located to south of site. The approved residential development is located between the site and the listed buildings to the south.

6.5 The Mineral Local Plan (MLP) policies map indicates that the Site is located within an airport safeguarding zone around Stansted Airport. The MLP contains a chapter on potential hazard to aircraft from bird strike, which acknowledges *"Mineral workings restored by landfill materials or, particularly, to water uses or wetland habitat, may attract large numbers of birds. These may be a safety hazard to aircraft at sites close to airports and aerodromes because of bird strike. Applicants and the Mineral Planning Authority shall consult airport operators and military base authorities for their views before finalising restoration and after-use proposals. This is covered separately by Policy DM1 (Development Management Criteria) and by Policy S10: Protecting and Enhancing the Environment and Local Amenity."*

6.6 The site falls within Flood Zone 1 on the Environment Agency Flood Maps for Planning, which means it has a low probability of flood risk.

6.7 The RSK report states that the superficial deposits of the Lowestoft Formation and Kesgrave Catchment Group comprise Secondary undifferentiated aquifer and Secondary A aquifers respectively. There are no groundwater abstractions within a 1km radius of the Site, and the Site does not lie within a currently designated groundwater Source Protection Zone (SPZ).

Proximity of Other Development

6.8 As detailed in Section 2 of this MRA, the Site is bounded to the west by the railway line with the settlement of Elsenham beyond. The land immediately to the south of the Site is currently a construction site, where 350 dwellings are being built. To the north and east, the neighbouring land comprises agricultural fields.

6.9 Appropriate “buffer zones” would be required to protect the amenity of the residential buildings bordering the Site to the south and west, together with the railway line that runs in close proximity to the western boundary, as well as providing lateral and super adjacent support to neighbouring properties.

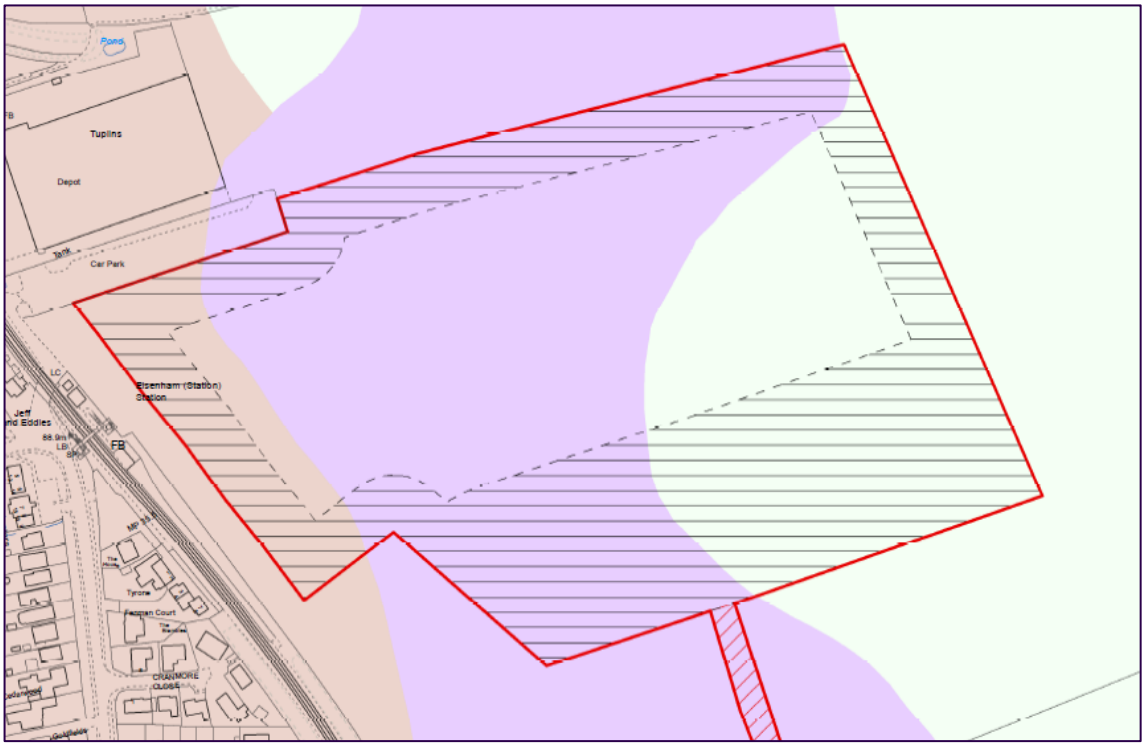
Buffer Zones

6.10 Paragraph 5.20 of the MLP provides guidance on the appropriate standoff, “buffer zone”, that should be provided from a residential property.

Local amenity can be protected by minimising work in sensitive areas and creating ‘buffers’ between residential areas and mineral workings. A minimum of a 100m ‘buffer zone’ from the extraction face to the wall of a residential property would normally be required to minimise the impact of working on local amenity.

6.11 For the purposes of this MRA, a buffer zone of 100 metres has been applied from the front elevation of neighbouring residential properties (as set out in paragraph 5.20 of the MLP), with a 30-metre buffer along the remaining boundaries. On this basis, the potential maximum workable area is circa 4.54 hectares. The indicative mineral extraction area is shown in Figure11, below.

Figure 11: Maximum extent of potential mineral extraction



6.12 The high-level Resource Assessment in Section 5 has been adjusted using the parameters below to quantify the extent of the potential recoverable sand and gravel and consider the economic viability of the resource:

- A site area reflecting the 100 metre buffer to the front elevation of neighbouring residential properties (both constructed and those permitted by way of permission reference UTT/17/3573/OP) and a 30 metre buffer along the remaining boundaries.

6.13 The adjusted estimated resource area (excluding Head Deposits) reflecting the above buffer is in the order of 4.31 hectares.

6.14 Applying the estimated average mineral depth to this reduced estimated resource area and assuming vertical side slopes would provide for a reduced resource volume of 193,950 cubic metres. The estimated overburden volume including non-compliant Lowestoft Formation would be in the order of approximately 116,370 cubic metres.

6.15 The estimated area containing recoverable underlying mineral resource equate to less than 5 hectares, which is the minimum threshold at which safeguarding provisions apply.

Batter Slopes

6.16 As discussed in the preceding section, the adjusted mineral resource volume reflects vertical sides which would not be achievable within the proposed housing development site, therefore an adjustment would need to be made to reflect appropriate batter slope gradient. Application of the 2019 MRA adopted batter slopes of 1:6 gradient, would result in a further reduction to the estimated resource volume of 93,774 cubic metres. The estimated overburden volume would be in the order of 99,444 cubic metres providing for a mineral to overburden ratio of 0.94 to 1.

Groundwater

6.17 Having established the potential estimated mineral resource available based on a range of potential buffer zones from lateral Site constraints, regard has also been had to Groundwater, a key constraint that could affect the recovery and viability of any mineral from the Site as well as the potential restoration of any resultant voidspace to create the development platform for the allocated non-mineral development.

6.18 The 2012 WSP trial pit assessment confirmed that of the sixty-six trial pits dug shallow groundwater was encountered in thirteen trial pits, varying between 1.7 and 3.3 metres BGL.

6.19 Two of the trial pits where groundwater was encountered are located within the Site, TP33 and TP211, with groundwater encountered at 2.5 and 2.0 metres BGL respectively.

6.20 The RSK report states:

"No groundwater was recorded within any of the exploratory points during the ground investigation. During three subsequent monitoring visits groundwater was recorded at between 0.55 m and 1.22 m BGL in WS101. The source of the water is unclear, but is unlikely to represent a continuous body of water otherwise flooding would have been observed further west and down-gradient of the boreholes. It is considered more likely that the observations represent either perched water and / or lateral

movement of water during periods of rainfall into the void created by the well. Additional investigation would need to be carried out fully characterise the groundwater regime in this area.

Groundwater was also recorded between 9.75 m and 9.8 m BGL at BH3 which was installed during the previous investigation to the southeast of the site. It is considered that the water levels in this borehole do reflect the groundwater table in the Kesgrave Catchment Subgroup.

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations. On-going monitoring would be required to establish both the full range of conditions and any trends in groundwater levels."

6.21 RSK concluded that localised incoherent pockets of water were encountered within the superficial soils and groundwater was recorded at circa 9 metres depth in the Kesgrave Catchment Subgroup in BH3 located near the southwest boundary of the site.

6.22 The high pockets of water encountered has implications on the ability to extract the mineral prior to the proposed development, which are made even more acute when the relatively small site area is taken into account. The recommendation in the RSK report that dewatering may be required to facilitate foundation excavation for shallow excavations to enable the development to proceed without being impacted by groundwater ingress would have implication on any prior mineral extraction at the Site, which would require extraction to an estimated depth of +8 metres below existing ground levels.

6.23 It would seem that any mineral extraction in parts of the Site would quickly encounter groundwater requiring the "de-watering" of the Site to enable extraction. De-watering would also be required during restoration to original ground levels if the voidspace created by mineral extraction were to be restored through the importation of inert waste.

6.24 This raises some key issues in the consideration of the potential for prior extraction at the Site and the potential adverse impacts on the future re-use of the land, not limited to:

- Given the reduction in site area available for potential mineral extraction due to adoption of buffer zones, it would be very difficult to engineer any form of waterbody to transfer the pumped groundwater into, which in itself would be a potential constraint due to airport safeguarding and potential bird strike.
- There are no local water courses within the Site that the groundwater could be discharged into. Any discharge off site to a watercourse would require a pipeline, which in turn would require negotiation of rights with third party landowners. Furthermore, any discharge would require a discharge consent and other relevant licences from the Environment Agency.
- The impact of de-watering the Site to enable extraction (and restoration) could affect the stability of the side walls, so the buffer zones may need to be extended to ensure the integrity of adjoining property.
- The Site currently comprises a relatively level site which would not require any pre-development extraction / surcharging to achieve appropriate development platforms for residential development. If prior extraction were to be undertaken the site would require restoration via the importation of inert waste. During restoration, any infilled inert waste would more likely be less permeable than the in-situ geology, the inert waste material being deposited would need to be of similar specification to the indigenous mineral to ensure that the groundwater regime is not affected and is safe for the allocated non-mineral development to be constructed. This would require a stringent waste acceptance criteria that could result in a difficulty in attracting appropriate material in sufficient volumes and in a timely manner. Given

the issues with groundwater the approval of an environmental permit to enable inert landfilling at the Site is not guaranteed.

- Furthermore, Carter Jonas has held discussions with specialist consultants that manage permit applications and determination periods are currently in excess of 1 year, well beyond the current statutory determination period of 4 months. It currently takes up to 4 months for an application to be allocated to an Environment Agency officer. When post closure monitoring of stability of the infilled area is taken into account, it would result in significant delays that would impact on the viability and deliverability of the scheme.

Conclusion on Estimated Resource

6.25 Applying an estimated bulk density of 1.6 tonnes per cubic metre, the estimated resource of 93,774 cubic metres equates to approximately 150,000 tonnes.

6.26 However, the resource is considered to be quite silty, with the 2012 WSP trial pit analysis indicating a silt content of 11.5% to a limited depth. Processing losses of 15% have been assumed, which would result in a reduced estimated resource volume of 127,500 tonnes.

6.27 The estimated recoverable mineral resource, 127,500 tonnes, would increase the published landbank (33.59 million tonnes) by less than 0.38%, and contribute between 2.8% (apportionment tonnage) and 3.9% (average 10-year sales) of the current annual requirement for sand and gravel in Essex. This equates to between ten and fourteen days of Essex's required supply of aggregate at the current LAA apportionment tonnage and average 10-year sales rates respectively.

6.28 Furthermore, the small site area and shape of the Site is considered to have the following constraining effects on mineral extraction and viability:

- The potential extraction area would require extraction to an estimated average depth of approximately 8.0 metres BGL. It would be difficult to achieve a safe working area to accommodate appropriately graded haul roads into the extraction area and circulation areas to accommodate mobile plant and machinery.
- It is considered unlikely that the Site could accommodate a "stand-alone" processing plant to undertake on-site mineral processing as this would require site reception infrastructure such as a weighbridge, site office and possibly wheelwash facilities.
- To the east of the Site is a rail line and to the south is a housing site which is under construction. This would make access difficult for the purposes of exporting aggregates and importing waste. Sourcing of waste may also be an issue as there is a Viridor landfill nearby which is proposed to be restored with imported material.

7.0 VIABILITY OF POTENTIAL MINERAL RESOURCE

7.1 This section considers the viability of prior extraction and opportunistic extraction.

Prior Extraction

7.2 The estimated area containing recoverable underlying mineral resource equate to less than 5 hectares, which is the minimum threshold at which safeguarding provisions apply.

7.3 The stand-off areas required from residential property boundaries and other adjoining land uses coupled with the application of appropriate batter slopes reduce the potential resource area significantly, providing for a estimated recoverable mineral resource of approximately 127,500 tonnes.

7.4 Potential to export off site to a local mineral operator for further treatment is considered unlikely. The closest mineral operators to the Site are Highwood Quarry (SRC) and Crumps Farm (Edviron) located approximately 7.3 kilometres and 7.4 kilometres to the southeast of the Site.

7.5 Therefore, if the small volume of mineral at the Site were to be extracted and exported off site, the only realistic prospect of an “off site” receptor to process the mineral would be one of these operators. Any mineral won from the Site would have to be sold “as raised” to a third party operator, which attracts a far lower selling price per tonne than processed sand and gravel. The income received may possibly “break even” with the incidental cost of extraction but when the cost of haulage to a third-party processing plant is accounted for, the mineral would be loss making and uneconomic to extract on an as raised basis.

7.6 The extent of the potential mineral resource is also impacted by the presence of high / perched groundwater. This would require “de-watering” of the mineral resource to enable any prior extraction, which poses a range of constraints, not only to the extraction process itself but on the restoration of the Site to accommodate the future re-use of the land for the proposed residential development.

7.7 Given the fact that the recoverable volume of the constrained resource would more than likely be reduced further due to groundwater constraints, such a small volume of mineral is considered uneconomical to recover through prior extraction in advance of the proposed non-mineral development. Prior extraction would not be a sustainable approach to the future proposed re-use of the Site for residential development.

7.8 The Stansted Airport Safeguarding allocation could also constrain any potential mineral extraction in the event that it would result in the creation of a water body which could pose a risk of bird strike.

Opportunistic Extraction

7.9 The depth of topsoil and overburden may be shallow enough in sections of the Site (the central area or possibly the southern area) for it to be considered appropriate to extract underlying sand and gravel during the preparatory works required for the proposed development such as the foundations and footings or landscaping works associated with the development. However, the depth of any extraction would be limited by the potential impact of groundwater ingress.

7.10 If this is appropriate then this material could be recovered for re-use in the development, albeit that for usage in an aggregate, it would need to be of the right specification or capable of being processed to achieve this and the volumes available are likely to be minimal. This could encourage a reduction of excavation waste removed from site as well as inbound materials for construction uses. The potential

volume of mineral available from incidental extraction in the form of footings, trenches, landscaping, etc. cannot at this stage be quantified.

8.0 SUMMARY AND CONCLUSION

8.1 An outline planning application for residential development has been prepared for land east of Station Road, Elsenham

8.2 The application area is located within the Mineral Safeguarding Area for a Sand and Gravel as designated by Essex County Council.

8.3 The purpose of the Mineral Safeguarding Area is to define land within which planning applications for non-minerals development submitted to the district/borough councils may not be determined until the county council has been given the opportunity to comment on whether the proposal would unacceptably sterilise mineral resources.

8.4 This report has been prepared in accordance with the guidance issued by the MPA and the Planning Officers' Society, together with the guidance outlined by ECC in their MLP.

8.5 This report demonstrates that the potential Sand and Gravel Resource within the Site has been rendered uneconomic by the characteristics of the Site including its size, shape and the constraining effect of residential dwellings in close proximity.

8.6 When appropriate stand-off areas required from residential property boundaries and other adjoining land uses are applied to the Site, the estimated area containing recoverable underlying mineral resource equate to less than 5 hectares, which is the minimum threshold at which safeguarding provisions apply.

8.7 Additional constraining factors are access, groundwater, the questionable quality of the resource and the potential for bird strike due to potential areas of standing water within an airport safeguarding zone.

8.8 The contribution that the potential mineral resource at the Site (even if it was capable of being extracted) would make to the annual provision rate in Essex equates to between 10 and 14 days supply, which is not considered proportionate to the adverse effect and risk that prior extraction could have on the future re-use of the Site and the timeframe for its delivery.

8.9 Potential to export off Site to a local established mineral operator for processing and therefore for use of the extracted material as an aggregate is considered unlikely.

8.10 Opportunistic extraction may be possible to a shallow depth during the preparatory works required for the proposed development such as the foundations and footings or landscaping works associated with the development. The most likely potential would be to re-use the materials associated with the superficial deposits on-site for general fill and selected end uses such as Capping material. The logistics for undertaking the construction works to enable the beneficial re-use during the phased residential development of the Site could be set out in a Minerals Recovery Strategy to be agreed with Essex County Council as Mineral Planning Authority and secured by planning condition.

APPENDICES

A East of Elsenham Mineral Resource Assessment

A.1 Mineral Resource Assessment (December 2017)

A.2 Mineral Resource Assessment Addendum (May 2019)

A.3 Essex Mineral and Waste Planning response (7 August 2019)

EAST OF ELSENHAM
OUTLINE PLANNING
APPLICATION
DECEMBER 2017

THE FAIRFIELD PARTNERSHIP

I

MINERAL RESOURCES ASSESSMENT

EAST OF ELSENHAM
OUTLINE PLANNING
APPLICATION
DECEMBER 2017

THE FAIRFIELD PARTNERSHIP

PREPARED BY
WARDROP
MINERALS
MANAGEMENT
LIMITED

MINERAL RESOURCES ASSESSMENT

MINERAL RESOURCES ASSESSMENT, LAND EAST OF ELSENHAM, ESSEX, ON BEHALF OF FAIRFIELD (ELSENHAM) LTD

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MINERAL RESOURCES OF LAND AT HENHAM ROAD, EAST OF ELSENHAM, ESSEX.
HOUSING PROPOSAL BY DAVID LOCK ASSOCIATES

1. Introduction

1.1. David Lock Associates are promoting residential development on land east of Elsenham on behalf of Fairfield (Elsenham) Ltd. Essex County Council as mineral planning authority have a duty to avoid unnecessary sterilisation of mineral bearing land that might be caused by other forms of development and require evidence as to the mineral potential of the Henham Road, Elsenham, land.

1.2. Policy S8 of the Essex Minerals Local Plan establishes the background against which to determine a 'mineral resource of economic importance' on land within Mineral Safeguarding Areas or Mineral Consultation Areas.

1.3. This report deals only with this potential development site, and 'mineral' in this case embraces only construction materials such as building sand or concreting sand and gravel.

1.4. The proposed development site is only part of a larger landholding in the same control and this appraisal benefits from information derived over a substantial part of that landholding. Also in the same land control and lying immediately adjacent to the east of the proposal site is an old quarry that has been worked for sand in the past and provides useful subjective evidence as to the mineral potential.

1.5. This report presents the results of a review of published geological information together with interpretation of detailed site specific investigations and ground investigation trial pits conducted by consultants for the developer.

1.6. The author and now Principal of an independent company was for over 30 years the head of the national geology and mineral exploration teams in Redland Aggregates and subsequently Lafarge.

2. Executive Summary

2.1. A number of trial pits, laboratory tests and infiltration pits together with published geological information provide a robust evidence base with which to support the opinion expressed in this report.

2.2. The superficial geology includes 3 sequences of material including 2 non-mineral materials and the sand body, with a variable distribution that shows significant changes over relatively small distances in the order of 100 to 200 metres. Underlying bedrock is London Clay.

2.3. The only possible mineral identified by the trial pit investigations was in the northwestern part of the proposal site. The northeast corner of the site shows thick overburden of Boulder Clay, whilst the southern roughly half of the site shows 3 metres or more thickness of sand but it is of notably poor quality.

2.4. The former sand working to the east of the proposal site is shallow and has an irregular northwestern edge rather than a defined boundary. This is indicative of an excavation process that 'chased' the workable sand until it ran out or deteriorated in quality and the progress of the excavation simply stopped.

2.5. Taken together the physical investigation data, the laboratory analyses and the evidence of former sand industry preferences makes it quite clear that this proposed housing site does not contain any workable building or concreting sand.

3. Sources of Information.

3.1. Geological maps are published at 1:50,000 scale and the geological information is also available online from the British Geological Survey (BGS).

3.2. The former Industrial Minerals Assessment Unit (IMAU) of the BGS conducted a study of aggregate potential in numerous areas of the UK. A report was published entitled 'IMAU report 104: The Sand and Gravel resources of the country around Stansted Mountfichet, Essex. Description of 1:25,000 resource sheet TL 52'. This study includes 2 boreholes that are within or very close to the site under consideration.

3.3. Open source borehole logs are available on the BGS website apart from some that are kept confidential for commercial reasons. In this case the only relevant open source borehole logs are those from the IMAU report.

3.4. The prime source of definitive information is the extensive pattern of trial pits that were conducted and supervised by consultants for Fairfield (Elsenham) Ltd. Trial pits were excavated for ground investigation purposes and some were subsequently replicated for conducting water infiltration tests as part of the drainage design for the site. The relevant trial pit location plans, pit logs, infiltration tests and Particle Size Distribution tests are contained in the planning application document at Appendix 15.2 Infiltration Testing Report.

3.5. The trial pits taken especial note of in this report include those within the proposed housing site itself but also a number from outside that boundary. It is important to try and identify trends in the deposits and the boundary of thick overburden areas outside of the specific site, together with the nature of material underlying the old sand workings to the east of the site.

3.6. Circumstantial evidence is derived from observations of the shape and style of the old sand workings adjacent to the land and also the identified concentration in recent decades of the former Elsenham Sand company, later Brett Aggregates, on land to the southeast of Henham Road.

4. Geological setting

4.1. Geology of the area around Elsenham is shown on the Great Dunmow sheet 222 geological map published by the British Geological Survey at a scale of 1:50,000. The 'solid and drift' version shows the younger glacial materials of Boulder Clay, Glacial Head, and the Kesgrave sands and gravels overlying the bedrock of predominantly London Clay. The area lies on the northwestern extremity of the London Basin where the clay dips down to the south forming the basin with London at its heart.

4.2. In places the London Clay is topped by, and therefore the Kesgrave deposits are underlain by, a thin layer of gravelly material known as the Red Crag. The major geological unit of the Chalk lies under the London Clay and outcrops not far to the north.

4.3. Sands and sands with gravels exist quite widely in parts of the Counties of Essex and Suffolk and are almost all derived from the Kesgrave Subgroup or its equivalent. The Boulder Clay and Glacial Head between them form an overburden to any sands and gravels and typically the sands and gravels tend to be exposed and therefore visible for mapping in the river valleys or other areas where erosion has removed the Boulder Clay.

4.4. The published maps show that the superficial Boulder Clay is very extensive in this area with a thin ribbon of exposed Kesgrave associated with rivers between Newport in the North and Harlow in the south. Glacial Head is generally the reworked product of erosion processes on the Boulder Clay and locally is mapped in ribbon outcrops broadly along the line of the railway bounding the landholding to the west and along the river lying to the southeast of Henham Road and aligned roughly parallel to it. A plan Figure 3 in the WSP Flood Risk Assessment and Drainage Strategy, itself derived from BGS mapping, shows the distribution of the three members of the glacial succession.

4.5. The trial pits in the area of the potential application site confirm the mapping interpretation to a high degree.

4.6. Local mineral history is of working only sand, that is granular material finer than a 4 millimetre particle size. Elsewhere the Kesgrave is a source of high quality sand and gravel used for concrete production and a wide range of construction industry uses, but around Elsenham the main product has been building sand.

4.7. Groundwater was found in the trial pits closest to Henham Road.

5. Investigations

5.1. A WSP trial pit programme in 2012 was carried out over the larger landholding comprising 50 trial pits in total on the application site and the landholding to the north with 3 pits located in the old sand working. At some locations the pits were replicated for water infiltration tests in a series of 16 infiltration pits. Most of the trail pits penetrated a significant proportion of the thickness of the glacial deposits.

5.2. A composite plan extracted from a previous WSP Flood Risk is included in the planning application documents as an Appendix 15.2 Infltration Testing Report. This shows the locations of all the trail pits and includes the descriptive logs of those pits used in this assessment. It can be seen that there is a greater concentration of pits in the southern half of the land.

5.3. Two IMAU boreholes are within or very close to the site as shown on the Site Investigation plan. Borehole TL52NW93 is close to the centre of the larger landholding while TL52NW94 lies just off the southern edge of the land at the junction of Henham Road with Hall Road. These boreholes are significantly deeper than the trial pits but they confirm both the glacial and the solid geological setting described above.

5.4. In the part of the landholding lying to the south of Elsenham station the density of trial pits is only a little less than is conventionally used for a full detailed mineral investigation and they provide a high degree of confidence in the results obtained.

5.5. Samples of sand were taken from 25 of the trial pits and tested for Particle Size Distribution (PSD), the key formal specification for a building sand.

5.6. The boundaries and some exposed old sand faces were inspected on foot in the former sand working to the east.

6. Results

6.1. In general terms the detailed trial pit investigation results are consistent with the surface distribution of deposits as mapped by the British Geological Survey while the IMAU boreholes confirm the geology at greater depth.

6.2. Building sand must meet a grading or PSD specification but there are a number of other requirements that are just as important if not more so. Building sand as a generic term includes sand used in mortar for brick or block laying and for base coat plastering. Unusually for a quarried product the acceptability of sand in the market is very much governed by its acceptability to the direct users on building sites. In addition to the technical matter of the Particle Size Distribution a good building sand must also meet the following relatively subjective requirements:

- Cleanliness. The sand must not contain clay or other deleterious substances and should not leave an iron stain when handled or when in place.
- The best building sands are produced from a dry excavation and are processed only by “dry screening” through a piano wire screen.
- The sand must retain an optimum content of water when mixed as a mortar such that the mortar has “fat” on the bricklayer’s trowel. The mortar has to spread smoothly onto a brick and remain stuck to it when being put in place in a wall.
- Consistent colour. A sand product must be of consistent colour such that differences in mortar colour are not evident on a house wall. Achieving this is partly dependant on the sand layer colours in the ground but also a sand excavation needs to allow the material to be blended as it is dug such that natural variations in colour are evened out in the digging and processing.
- The economics of the market are such that most sand workings only have a thin overburden lying above the saleable mineral.

6.3. It is not unusual for a quarry to be able to produce a sand that can meet the specification grading but still not be a good or acceptable building sand in the building trade.

6.4. The pertinent trial pits to the potential housing site are numbers TP36 to TP40 inclusive within the body of the site and TP32 to TP34 situated to the north of the site boundary. Other pits further afield clearly identify the extent of the Glacial Head overburden. Pits 24, 28, 30, 34, 37, 43 and 45 proved between 2.6 and 3.5 metres of glacial Head overburden and in so doing confirm the local geological mapping of the Head shown on the plan referred in paragraph 4.4. The other pits show overburden varying in thickness from 0.4 to 1.50 metres underlain by sand in excess of 3.10 metres in thickness.

6.5. The majority of the trial pit logs describe the sand as being slightly clayey sand or clayey silty sand and describe the grain size as being fine or fine to medium. A good building sand would usually more often be described as medium grain.

6.6. Particle Size Distributions were carried out on sand samples from trial pits 32, 34 to 36, 38 to 40, 42 and 44. The required grading was only met in pits 35, 36 and 38 and even then the sand is towards the finer (smaller particle size) end of the specification envelope. These pits lie in the northern third or so of the application site. Pits in the south, numbers 39, 40, 41, 49 (across the road), and those in the old sand working all display material that is much too fine to meet the grading. Most of these gradings are too fine throughout the size range and several show a significantly high proportion of very fine particle sizes smaller than around half a millimetre.

6.7. If a notional excavation were to be contemplated then standoffs to residential areas in the south and to the railway line on the western boundary would constrain a dig to an area of 3 hectares at maximum with a sand content of not much more than 100,000 Tonnes. The resultant excavation would have steep sides and the base of the excavation would suffer from impaired drainage due to being close to the water table in very fine poorly draining sand.

6.8. The former sand working to the east of the proposal site is shallow and has an irregular northwestern edge rather than a defined boundary such as field or planning consent boundary. This is indicative of an excavation process that ‘chased’ the workable sand until it ran out or deteriorated in quality and the progress of the excavation simply stopped. Trial pits in the floor identify very fine sand and it is a fair assumption that the sand deposit gets finer with depth.

6.9. In recent decades the local sand producer in the shape of the Elsenham Sand Company, later Brett Aggregates, has preferred to operate outside of the village and most recently to the east. This is an area mapped as Boulder Clay but clearly this offers a relatively thin overburden above a suitable graded and clean sand deposit.

6.10. Policy S8 of the Essex Minerals Local Plan sets out some guidance for judging the significance of mineral resources that might lie in Mineral Safeguarding Area or Mineral Consultation Areas. In this case not only is the area of marginally suitable sand significantly less than 5 hectares but the combined quality and quantity factors are such that the resource could not fairly be described as a mineral resource of economic value.

6.11. Very small volumes of relatively low value mineral such as building materials are only economic to work when they lie immediately adjacent to an established quarry site with its associated infrastructure, processing plant, sales organisation and customer base. In my opinion, even if the sand in this site was of high quality, it would not be economically viable to contemplate extracting it and selling into the open market. The overburden stripping and replacement costs would be disproportionately high; site infrastructure such as an access road, processing plant, weighbridge/small office, safety fencing and planning and environmental costs could only be defrayed over around 100,000 Tonnes and could only be justified on a reserve of many times this amount.

7. Conclusions

7.1. A thorough trail pit investigation and laboratory testing programme shows that there is no useful mineral resource contained in the prospective housing area. Almost two thirds of the site is accounted for by either thick overburden or by sand that is not suitable for use. The remaining area with only marginally suitable sand would yield a very small volume of mineral if excavated and in the process would reduce the area and substrate quality of developable land.

7.2. In my opinion the potential sand resource on this site is unlikely to be of marketable quality and could not anyway be worked economically in real terms.

7.3. A surface landuse including built development would therefore not sterilise any construction material mineral.

D R Wardrop. B.Sc (Hons), C. Geol., C. Eng., MIMMM, FGS.
Principal

November 2017

EAST OF ELSENHAM
OUTLINE PLANNING
APPLICATION UPDATE
MAY 2019

THE FAIRFIELD PARTNERSHIP

F

MINERAL RESOURCE ASSESSMENT ADDENDUM

EAST OF ELSENHAM
OUTLINE PLANNING
APPLICATION UPDATE
MAY 2019

THE FAIRFIELD PARTNERSHIP

PREPARED BY
David Lock Associates

F

MINERAL RESOURCE ASSESSMENT ADDENDUM

MINERAL RESOURCES ASSESSMENT, LAND EAST OF ELSENHAM, ESSEX, ON BEHALF OF FAIRFIELD (ELSENHAM) LTD

April 2019

MINERAL RESOURCES ASSESSMENT, LAND EAST OF ELSENHAM, ESSEX, ON BEHALF OF FAIRFIELD (ELSENHAM) LTD

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Appendix i Borehole plan
Appendix ii Table of Gradings
Appendix iii Area of Sand meeting Specification
Appendix iv Borehole logs
Appendix v Laboratory Gradings

1. Introduction

1.1. David Lock Associates are promoting residential development on land east of Elsenham on behalf of Fairfield (Elsenham) Ltd. Essex County Council as mineral planning authority have a duty to avoid unnecessary sterilisation of mineral bearing land that might be caused by other forms of development and require evidence as to the mineral potential of the Henham Road, Elsenham, land.

1.2. Policy S8 of the Essex Minerals Local Plan establishes the background against which to determine a 'mineral resource of economic importance' on land within Mineral Safeguarding Areas or Mineral Consultation Areas.

1.3. The author previously wrote a mineral resources report based on the site investigations and concluded that there was no economic resource because the upper parts of the sand sequence appeared to be somewhat fine and silty compared to the specification for building sand, and site constraints were such that a sand excavation would prejudice the developable landform.

1.4. At a meeting with Essex County Council in January 2018 the mineral planners were reluctant to accept this conclusion without a full intrusive borehole investigation being carried out. Their advice was that borehole spacings should be in the order of 150 metres.

1.5. This report presents the results of a drilling investigation designed in accordance with the County Council's advice and conducted between 04 and 13 February 2019.

2. Executive Summary

2.1. An intrusive mineral investigation by drilling has been carried out on the site at Henham Road after consultations with Essex County Council. The Council's industry compliant criteria were used in the design of the investigation alongside a reasonable approach to proportionality and cost effectiveness.

2.2. Ten boreholes were drilled and sampled where sand was encountered and 31 samples were submitted to a UKAS accredited laboratory for Particle Size Distribution (grading) analysis.

2.3. The majority of the samples fail the British Standard 1200 grading for General Purpose Building sand and those samples that do comply do so only marginally being always towards the fine grained side of the grading envelope. Four of the boreholes identify a dual lobed patch of sand where the material does fall within the fine end of the specification.

2.4. Using a manual model and applying 2 different side slope gradient criteria results in a maximum estimated resource of 160,000 Tonnes in-situ using relatively steep side slopes reduced to effectively zero resource using more realistic side slopes.

2.5. There is no practical means of removing sand from site for processing at an existing sand producing quarry whilst any prospect of limited processing on site runs counter to the industry standard of dry silo delivery for building sand on development sites.

2.6. The excavation of a closed bowl in the middle of a potential development site may well prejudice the economics and functioning of the overall proposal.

2.7. The conclusion is that in real terms there is not considered to be a mineral resource of economic value on this site.

3. Geological setting

3.1. Geology of the area around Elsenham is shown on the Great Dunmow sheet 222 geological map published by the British Geological Survey at a scale of 1:50,000. The 'solid and drift' version shows the younger glacial materials of Boulder Clay, Glacial Head, and the Kesgrave sands and gravels overlying the bedrock of predominantly London Clay. The area lies on the northwestern extremity of the London Basin where the clay dips down to the south forming the basin with London at its heart.

3.2. In places the London Clay is topped by, and therefore the Kesgrave deposits are underlain by, a thin layer of gravelly material known as the Red Crag. The major geological unit of the Chalk lies under the London Clay and outcrops not far to the north.

3.3. The published maps show that the superficial Boulder Clay is very extensive in this area with a thin ribbon of exposed Kesgrave associated with rivers between Newport in the North and Harlow in the south. Glacial Head is generally the reworked product of erosion processes on the Boulder Clay and locally is mapped in ribbon outcrops broadly along the line of the railway bounding the landholding to the west and along the river lying to the southeast of Henham Road and aligned roughly parallel to it. A plan Figure 3 in the WSP Flood Risk Assessment and Drainage Strategy, itself derived from BGS mapping, shows the distribution of the three members of the glacial succession.

3.4. The original trial pits and the recent mineral proving boreholes in the area of the potential application site confirm the shallow geological mapping interpretation to a high degree.

3.5. Local mineral history is of working only sand, that is granular material finer than a 4 millimetre particle size and primarily for the building sand market. In recent decades the local sand producer in the shape of the Elsenham Sand Company, later Brett Aggregates, has preferred to operate outside of the village and most recently to the east. This mineral operation ceased some years ago and the site is now in restoration including landfill.

4. Prior Investigations

4.1. A WSP trial pit programme in 2012 was carried out over the larger landholding comprising 50 trial pits in total on the application site and the landholding to the north with 3 pits located in the old sand working. At some locations the pits were replicated for water infiltration tests in a series of 16 infiltration pits. Most of the trail pits were in the order of 3 to 4 metres deep.

4.2. A composite plan extracted from a previous WSP Flood Risk Assessment and Drainage Strategy of September 2017 is included in the previously submitted planning application supporting documents as an Appendix 15.2 Infiltration Testing Report. This shows the locations of all the trail pits and includes the descriptive logs of those pits used in this assessment. It can be seen that there is a greater concentration of pits in the southern half of the land.

4.3. Two British Geological Survey Industrial Minerals Assessment Unit boreholes are within or very close to the site as shown on the Site Investigation plan. Borehole TL52NW93 is close to the centre of the larger landholding while TL52NW94 lies just off the southern edge of the land at the junction of Henham Road with Hall Road. These boreholes are significantly deeper than the trial pits but they confirm both the glacial and the solid geological setting described above.

4.4. Samples of sand were taken from 25 of the trial pits and tested for Particle Size Distribution (PSD), the key formal specification for a building sand.

4.5. Groundwater was found in the trial pits closest to Henham Road.

5. Drilling Investigation

5.1. Following a meeting and consultations with Essex County Council a borehole pattern was designed to industry standards that are consistent with ECC advice for a spacing of approximately 150 metres between boreholes. With one exception the spacings on the drilled pattern ranged from 110 to 150 metres. The author prefers to use an offset grid rather than a rectangular grid since this gives a smaller diagonal distance between boreholes and also carries a higher chance of detecting irregular underground features.

5.2. All boreholes were drilled by a cable percussion rig drilling 150mm diameter holes and all were advanced to the bedrock of London Clay unless progress was defeated. The 10 holes are designated MP1 through MP10 and the locations are shown on the plan at **Appendix i.**

5.3. Site works took place in very wet weather between the 4th and 13th February 2019.

5.4. Bulk samples were taken in sand, where encountered, every 2 metres throughout the deposit thickness with each sample including approximately 0.5 metres of borehole. Other visual samples were taken for logging purposes. All boreholes were backfilled with their own arisings.

5.5. Thirty one samples have been submitted to a UKAS accredited materials laboratory for determination of Particle Size Distribution, colloquially known as grading, whilst a further 10 samples have been retained for additional visual inspection if required.

6. Borehole Results

6.1. In general terms the detailed trial pit and mineral proving borehole investigation results are consistent with the surface distribution of deposits as mapped by the British Geological Survey but the mineral proving boreholes reported in this report do lead to a modified interpretation of the site geology at depth.

6.2. The published geological mapping and the previous trial pit investigation identified a clay cap in the NE corner of the site and this was confirmed as being in excess of 10 metres thickness by borehole MP6. Borehole MP9 is towards the western edge of the clay cap and encountered 2.7 metres of clay over sand while MP7 0.5 metres of clay cap over sand. Earlier trial pits 34 to 37 inclusive identify the extent of the clay cap fairly well and it was not cost effective to replicate boreholes in additional positions.

6.3. Original borehole driller's logs are at **Appendix iv.**

6.4. The remaining boreholes showed thin soil of only a few centimetres thickness passing rapidly down into the sand deposit which becomes gritty or gravelly in the Red Crag immediately on top of the London Clay. Sand ranges in thickness from 4.6 to an exceptional 13.3 metres.

6.5. Borehole MP3 alone identified an interleave clay at a depth of 4.5 metres with a thickness of 1.4 metres. Over 5.1 metres of sand was proved below this clay. This borehole is on the southern section of the eastern boundary of the site close to the edge of the former sand working and the clay might explain the limited depth of the excavation and in part explains the interpretation put forward in the earlier WMML report.

6.6. Generally the upper 2 to 4 metres of sand on visual inspection tends to be slightly silty and finer in grade and light buff in colour with the central part of the deposit a pale or medium orange colour. The base of the deposit in most boreholes proved the Red Crag as a sharper coarser sand with some rounded gravel constituents.

6.7. Boreholes MP1 and MP2 on the southern boundary displayed a finer and lighter coloured sand throughout, beneath a thin topsoil, than was typical in the major part of the site. London Clay was identified at 9.0 and 8.2 metres respectively.

6.8. Borehole MP4 beneath topsoil proved mainly a yellow sand until encountering London Clay at 8.7 metres below ground.

6.9. Borehole MP5 showed a slightly thicker overburden with 0.4 metres of sandy clay on top of sand and gravelly sand down to 7.6 metres.

6.10. MP6 is interpreted as being in the centre of the clay cap in the northeast corner of the site and proved clay with small chalk fragments down to 10.5 metres.

6.11. MP7 towards the edge of the clay cap showed a brown sandy clay overburden for 1.3 metres with the top part of the sand deposit being light grey and brown. The body of the sand is gravelly in places and extends to London Clay at only 11.2 metres.

6.12. MP8 showed the thin topsoil passing into sand of a light brown colour before finding London Clay at 8.3 metres.

6.13. MP9 was also on the edge of the clay cap and proved chalky clay and sandy clay to 2.7 metres below ground underlain by variable colour sands down to more than 15.0 metres which was the maximum drilling capability. London Clay was not found.

6.14. MP10 showed a grey sandy clay overburden on top of brown sand to 5.8 metres below ground where the London Clay was found.

6.15. The London Clay was identified in all boreholes except MP3, 6 and 9 where the clay thicknesses defeated the capacity of the drilling rig. In general the surface of the clay seems to undulate between just under 80 metres AOD to 88.2 metres. In this relatively small site it is not possible to identify any particular features on the surface of the clay but the two boreholes MP5 and MP8 on the central western boundary show the lowest topographic levels of 79.7 and 79.9 metres respectively.

7. Laboratory Results/Sand Quality

7.1. Building sand must meet a grading or PSD specification but there are a number of other requirements that are just as important if not more so. Building sand as a generic term includes sand used in mortar for brick or block laying and for base coat plastering. Unusually for a quarried product the acceptability of sand in the market is very much governed by its acceptability to the direct users on building sites. In addition to the technical matter of the Particle Size Distribution a good building sand must also meet the following relatively subjective requirements:

- Cleanliness. The sand must not contain clay or other deleterious substances and should not leave an iron stain when handled or when in place.
- The best building sands are produced from a dry excavation and are processed only by “dry screening” through a piano wire screen. Typically this will remove material coarser than 6.3mm but cannot process out any other fraction.
- The sand must retain an optimum content of water when mixed as a mortar such that the mortar has “fat” on the bricklayer’s trowel. The mortar has to spread smoothly onto a brick and remain stuck to it when being put in place in a wall.
- Consistent colour. A sand product must be of consistent colour such that differences in mortar colour are not evident on a house wall. Achieving this is partly dependant on the sand layer colours in the ground but also a sand excavation needs to allow the material to be blended as it is dug such that natural variations in colour are evened out in the digging and processing.
- The economics of the market are such that most sand workings only have a thin overburden lying above the saleable mineral.

7.2. It is not unusual for a quarry to be able to produce a sand that can meet the specification grading but still not be an acceptable building sand in the building trade.

7.3. Gradings were determined to BS EN 933-1:2012 and these need to be compared to BS 1200 general purpose building sands. Laboratory results are presented in **Appendix v.** Where a sample contains a fraction coarser than 6.3mm the grading is recalculated to show the sand fraction passing this sieve as 100% in order to replicate the effect of screening out this coarser material in a quarry sand screen. A summary table shows numbers with red cells where samples are out of specification together with a reference copy of the BS1200 table in **Appendix ii.**

7.4. The grading numbers are related to sample depth below ground but also must be read in the context of how a building sand quarry is typically excavated. Blending is always achieved both laterally and vertically in a sand working in order to even out variations in

grade and colour. Therefore when gradings are in specification in a borehole the Mean is calculated of some or all gradings and itself compared against specification. All of the samples fell within the grading envelopes in the sieve sizes from 6.3 down to 0.6mm (or 600µm) although most were very close to the upper limit of the envelope. The sand is always comparatively fine and most samples notably so below the 500µm sieve.

7.4.1. MP1 The sample at 2.0 metres is in specification but those at 4.0 and 6.0 metres are significantly too fine from the 250µm sieve downwards. The borehole mean is also out of specification.

7.4.2. MP2 All samples in this borehole are significantly too fine for the specification.

7.4.3. MP3 All samples in this borehole are too fine for specification.

7.4.4. MP4 The sample at 2.0 metres is in specification but those at 6.0 and 10.0 are too fine from the 250µm sieve.

7.4.5. MP5 The upper 3 samples from 2.0, 4.0 and 6.0 metres are all significantly too fine for specification, as is the borehole mean.

7.4.6. MP6 No sand samples were available since this borehole is all clay.

7.4.7. MP7 The sample at 2.0 metres is too fine from the 250µm sieve ad the 8.0 metre sample is too fine on the 125µm sieve. The mean is also too fine at the 125µm sieve.

7.4.8. MP8 Samples at 2.0 and 4.0 metres are in specification. Samples at 6.0 and 8.0 fail the grading in the middle of the envelope between the 1mm and 500µm sieves. The borehole mean falls within specification.

7.4.9. MP9 All samples in MP9 fall within the specification envelope except for 8.0 metres where the sample is too silty. The borehole mean falls within the envelope.

7.4.10. MP10 Both samples fail the specification as does the borehole mean.

7.5. Generally the better quality building sands will have a grading tending towards the middle of the envelope. At Elsenham even where material is in specification the sand is close to the fine side of the grading envelope. For instance on the 1.18mm sieve the permitted range is 70-100% passing, most of the MP borehole samples are around 90 to 100% passing the 1.0 mm sieve and therefore will be slightly higher at 1.18mm.

7.6. At the 600µm sieve the envelope is 40-100% and in the samples even of compliant sand many of the numbers are around 70 to 90% passing where a good quality sand will be close to 70% in every sample.

7.7. These grading characteristics are consistent with the samples tested from the upper parts of the deposit by the previous trial pit exercise.

7.8. Boreholes MP4, MP7, MP8 and MP9 cluster together in the centre of the site and delineate a two-lobed patch of sand that is mostly in specification although marginal as stated above. An illustration of this area is presented at **Appendix iii** on a GoogleEarth image. This patch would potentially include the top 4.0 metres or so of MP4, the middle part of MP7, the top 5 metres or so of MP8 and the full depth of the deposit at MP9. The practicality of excavating a sand working to meet these criteria is very doubtful.

8. Excavation Constraints

8.1. Any excavation of sand would need to have very gentle side slopes in order not to render the land unsuitable for built development. The precise criteria to apply lie beyond the remit of this report but guidance for scenario assessments can be taken from a building site currently operative on the north side of Stansted Mountfichet. The site has a natural slope, in one direction only, ranging in gradient from approximately 1 in 6 (Vertical to Horizontal) to 1 in 9.

8.2. Starting with the sand patch surface area of approximately 5 hectares the mean overburden thickness including the non-compliant top 4 metres at MP7 is around 1.74 metres equating to a gross volume of 87,000 cubic M. An interpreted compliant sand thickness of 4.5 metres gives a gross volume of 225,000 cubic M.

8.3. Applying a 1:6 batter reduces these volumes to an estimated 77,000 cubic M of overburden and 106,500 cubic metres of sand in-situ, or a resource of around 170,000 Tonnes in situ. Production losses would reduce this to around 160,000 Tonnes. These estimates equate to a yield of roughly 1.38 cubic metres of sand per 1.0 cubic metres of overburden removed.

8.4. Most commercial sand operations in the author's experience need to operate at a yield many times this, typically 10 cubic metres of sand to 1 cubic metre of overburden or better.

8.5. Applying a 1:10 batter would remove entirely the southeastern lobe of the sand patch as a mineral yielding excavation. The larger northwestern lobe would be approximately 3.7 Ha in extent or 37,000 square metres with a perimeter of around 790 linear metres. A simple manual model shows that sand yield would effectively be reduced to zero.

8.6. An alternative manual model of a west to east trench across this lobe gives a sand yield of less than 40,000 Tonnes.

8.7. Neither of the above manual models allow for a mineral excavation access ramp or the creation of suitable landform for housing infrastructure, access roads or drainage requirements.

8.8. Very small volumes of relatively low value mineral such as building materials are only economic to work when they lie immediately adjacent to an established quarry site with its associated infrastructure, processing plant, sales organisation and customer base. In the author's opinion, even if the sand in this site was of high quality, it would not be economically viable to contemplate extracting it and selling into the open market. In addition there are constraints on using the sand on site. Most building sand is supplied to projects in dry silos from specialist manufacturers.

8.9. There is now no local quarry operator to which as-raised sand could be taken for processing. The Elsenham sand pit operated in latter years by Brett Aggregates is now in restoration by landfill.

9. Conclusions

9.1. A borehole drilling investigation and laboratory testing programme shows that there is a patch around boreholes MP4, 7, 8 and 9 of sand that mostly falls in the BS1200 grading specification for general purpose building sand. It is however marginal in quality in that the material falls at the finer side of the grading envelope. The patch includes the top 4.0 metres or so of MP4, the middle part of MP7, the top 5 metres or so of MP8 and the full depth of the deposit at MP9.

9.2. The sand patch is in the order of 5 Ha in extent with a perimeter of about 1,100 metres.

9.3. How much of this sand, if any, is recoverable in economic terms is substantially driven by the effects of an excavation in the middle of a potential housing development site. An excavation of the full patch would remove substantial lengths of 2 hedges and the trees in the western central part of the site.

9.4. An excavation even with very gentle side slopes right in the middle of the potential housing site might render the landform unsuitable for building and prejudice the economics of the proposal.

9.5. Most building sites now receive their sand in a silo rather than work from a pile of processed sand such that the likelihood of processing and using sand on site is low.

9.6. Policy S8 of the Essex Minerals Local Plan sets out some guidance for judging the significance of mineral resources that might lie in Mineral Safeguarding Area or Mineral Consultation Areas. In this case not only does the area of marginally suitable sand only just amount to 5 hectares at the surface, significantly less at the exposed sand level at the base of an overburden slope, but the combined quality and quantity factors are such that the resource could not fairly be described as a mineral resource of economic value.

D R Wardrop. B.Sc (Hons), C. Geol., C. Eng., MIMMM, FGS.
Principal

April 2019

Essex County Council
Minerals & Waste Planning
County Hall
Chelmsford
Essex CM1 1QH

Essex County Council

Uttlesford District Council
Development Management
London Road
Saffron Walden
CB11 4ER

Your ref: UTT/17/3573/OP

Date: 07 August 2019

Dear Sir / Madam,

Application Description: Outline application with all matters reserved except for access for: up to 350 dwellings, 1 no. primary school including early years and childcare setting for up to 56 places, open spaces and landscaping including junior football pitch and changing rooms, access from B1051 Henham Road with associated street lighting and street furniture, pedestrian, cycle and vehicle routes. pedestrian and cycles link to Elsenham Station and potential link to Hailes Wood, vehicular and cycles parking. provision and/or upgrade/diversion of services including water, sewerage, telecommunications. electricity, gas and services media and apparatus, on-plot renewable energy measures including photovoltaics, solar heating and ground source heat pumps, drainage works, sustainable drainage systems and ground and surface water attenuation features, associated ground works, boundary treatments and construction hoardings.

Location: Land to the North West of Henham Road, Elsenham

Thank you for your letter received via email on 15 July 2019 notifying Essex County Council acting as the Mineral Planning Authority (MPA) of the submission of additional evidence in support of the above application.

Having reviewed the Mineral Resource Assessment (MRA) Addendum 2019, the MPA accepts the overarching conclusion that the prior extraction of mineral underlying the application site is not practicable. This conclusion is accepted on the basis that underlying deposits equate to 5ha which is the minimal threshold at which safeguarding provisions apply, and that the material within the deposit is of marginal quality as demonstrated through laboratory testing.

The MPA would however also note the following, although this does not affect its overall conclusion:

- It is suggested in the MRA Addendum that commercial sand and gravel operations need to operate at a yield of 10m^3 of sand to 1m^3 of overburden. This ratio is not

accepted. British Geological Survey criteria as endorsed by the Minerals Products Association state that deposits with a ratio of 3:1 can be economic, and there are numerous sites across Essex operating at ratios significantly less favourable than 10:1.

- It is unclear whether mineral yield calculations are based on batters being created from the edge of the resource or further away such that sufficient depths are realised upon reaching the outer edge of the mineral. There is the potential that the MPA would have asked for clarification had the mineral deposit been of greater extent and/or quality.
- It is unclear why different sieve sizes have been used in the laboratory testing and subsequent reporting in Appendix ii to that presented in the BGS Guidance also presented in Appendix ii.
- The impact of removing existing hedgerows and trees would be a planning judgement weighed against the benefit of the prior extraction of mineral. No commentary is provided with regard to whether the existing hedge and/or trees are protected, whilst the NPPF notes that "When determining planning applications, great weight should be given to the benefits of mineral extraction" (Para 205).

To clarify, whilst the MPA does not agree with all the conclusions made within the MRA Addendum, it considers that sufficient appropriate information has been submitted to justify the overarching conclusion that the prior extraction of mineral is not practicable. On that basis, the MPA removes its holding objection and has no further comment to make on the above application.

I trust that this is of assistance but should you have any queries regarding the content of this letter please do not hesitate to contact me.

Yours sincerely,

[redacted]

Philip Dash
Senior Minerals and Waste Planner

Telephone: 03330 136822
Email: [redacted]

B Compliance with Minerals Safeguarding Practice Guidance (April 2019)

The following table outlines how this report addresses the requirement for an MRA set out in Annex 1 of the Minerals Safeguarding Practice Guidance (April 2019)

Site Location, Boundaries and Area • Red line area in relation to MSA/MCA • Description of development including layout & phasing • Timescale for development	See Section 2
Mineral Resource • Type of mineral • Existing mineral exploration data (e.g. previous boreholes in • area) • Results of further intrusive investigation if undertaken • Extent of mineral – depth & variability • Overburden – depth & variability, overburden : mineral ratio • Mineral quality – including silt %/content • Estimated tonnage of resource potentially affected • Estimated economic/market value of resource affected	See Section 5
Potential constraints on mineral extraction at location • Site location, proximate receptors, infrastructure/utilities, • accessibility • Landscape, biodiversity & heritage designations	See Section 6
Potential opportunities for mineral extraction at location • Proximity to existing mineral sites or processing plant • Previous consideration of site or adjacent land in preparation of Minerals Local Plan • Context of site and mineral within wider resource area • Proximity to viable transport links for mineral haulage • Potential benefits through mineral restoration e.g. land reclamation, landscape enhancement	See Section 6
Conclusions • Amount of mineral at risk of sterilisation • Current and future economic or heritage importance of • mineral • Viability of extraction from Site, taking account of existing • reserves and potential resources elsewhere • Importance of the proposed non-minerals development	See Section 6 and 8
Prior Extraction	
Commercial & market considerations • Interested operators/local market demand • Processing needs • Proximity to processor or market • Potential for on-site use of some or all of the mineral • Accessibility	See Section 7
Practicability & acceptability • Effect on viability of non-minerals development including • through delays and changes to landform and character • Site location, setting & proximity to receptors • Accessibility/transport • Hydrology/hydrogeology/drainage • Effect on designations or interests	See Section 7

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