

**A USERS GUIDE TO THE
ARCHAEOLOGICAL SURVEY OF MINERAL EXTRACTION SITES
AROUND THE THAMES ESTUARY**

**Phase 2 (Project Dissemination)
of an
Aggregates Levy Sustainability Fund
Project)**

Issue 2 : Summary Guide

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**A USERS GUIDE TO THE
ARCHAEOLOGICAL SURVEY OF MINERAL EXTRACTION SITES AROUND THE
THAMES ESTUARY;**

**AGGREGATES LEVY SUSTAINABILITY FUND
PHASE 2: PROJECT DISSEMINATION**

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AGGREGATES LEVY SUSTAINABILITY FUND PHASE 2: PROJECT DISSEMINATION

1.0 PROJECT SUMMARY

The *Archaeological Survey of Mineral Extraction Sites Around the Thames Estuary* was a joint venture between Essex and Kent County Councils, funded by the Aggregates Levy Sustainability Fund (administered by English Heritage). The project concentrated on an area around Grays and Thurrock (Essex) and Dartford and Gravesend (Kent). This area has been established as one of the most significant in terms of Pleistocene deposits and early homind activity. This survey collated a large amount of data about these topics to help informed decision making in this important area. The main results of the survey are a series of GIS layers with detailed attribute data. These are supported by an assessment report which provides method statements, background information and specialist reports (ECC and KCC 2004).

The archaeology of south Essex and north Kent has been strongly influenced by the River Thames and its Pleistocene precursors. The 'Thames terraces' deposited by the river as its route shifted through the millennia, contain some of the most significant deposits of Palaeolithic material in the country as well as later archaeological remains. They are also, however, an important source of aggregate and chalk. Mineral extraction has therefore taken place from the 19th century to the present day.

Key sites for the understanding of the depositional environment of the terraces, which include important information on changing environments and climates, and Palaeolithic remains survive either within or along the peripheries of the former extraction sites.

The development of the extraction industry in the area has left a significant mark on the landscape. The former extraction sites encompass a large area of Thurrock, Dartford and Gravesham. Although much of the 19th and 20th century infrastructure within the sites, such as industrial plant, has been removed the quarries remain a significant landscape feature.

The remaining geological and archaeological resource in this area is coming under increasing pressure as it lies within the Thames Gateway, an area proposed for massive re-development. In order to respond to this up-to-date and usable information on these sites was required.

The survey studied a number of extant and former extraction sites within the study area, identified on an 'artificial ground' map layer provided by the British Geological Survey. The resulting list was further refined by identifying those sites excavated though eligible aggregates and by map regression. Specialist studies were then carried out, with the results incorporated into GIS layers.

This survey concentrated on three key areas of specialist study:

- Pleistocene Geology
- Palaeolithic Archaeology
- Industrial Archaeology

This guide presents

- summaries of the respective specialist studies (prepared from information in the main report)
- information on the GIS layers prepared as part of the project
- Instructions on using the layers in ArcView/ArcGIS
- Examples of the uses of the data

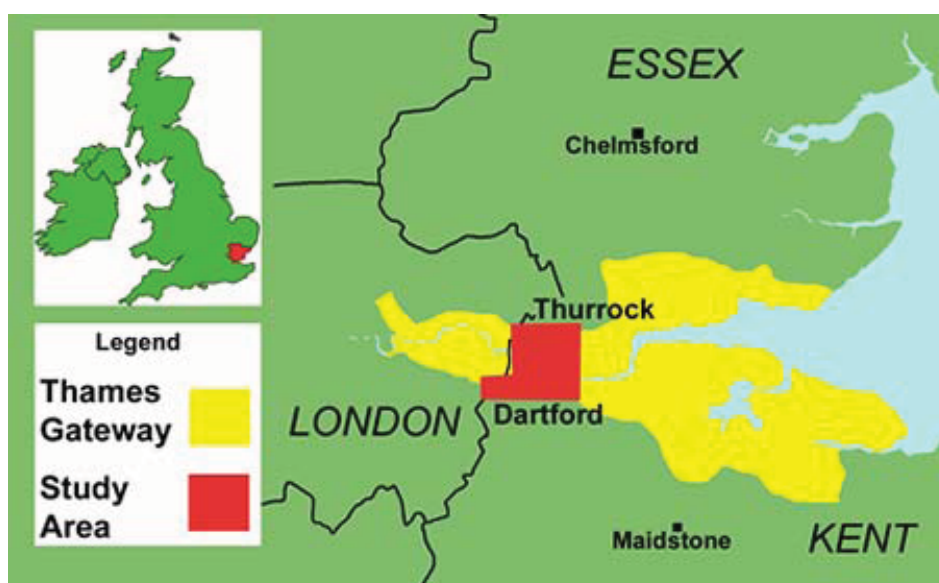


Fig 1 The Thames Gateway and the project study area

2.0 THE PROJECT TEAM

The project was carried out by Essex and Kent County Councils, specialists, the British Geological Survey and English Heritage.

The following people were involved in the project:

Peter Allen (Independent consultant) – Pleistocene geology assessment

David Bridgland (Independent consultant) - Pleistocene geology assessment

Stuart Cakebread (KCC) – SMR officer

Paul Cuming (KCC) – SMR officer

Ruarigh Dale (ECC FAU) – project management

Lis Dyson (KCC) – project co-ordination steering committee

Adam Garwood (ECC) – industrial archaeology assessment

Paul Gilman (ECC) – project co-ordination steering committee

Ellen Heppell (ECC FAU) – archaeological assessment

Barry Hillman-Crouch (ECC) – web site and display boards

Stephen Mathers (BGS) – geological data and digitising of mineral extraction sites

Teresa O'Connor (ECC) – archaeological assistant

Francis Wenban-Smith (University of Southampton) – Palaeolithic assessment

3.0 SPECIALIST SUMMARIES

3.1 Geology

The geology component of the project addressed two main aims, the first of which was to summarise and enhance the knowledge of the Middle Pleistocene and later geology of the survey area through the use of desk studies and site visits to selected areas. The second was to provide information on the location and threats to any surviving sediments.

The investigation of the Middle Pleistocene is heavily dependent on the information exposed within former quarries, many of which are now under threat from increasing development. Although some sites are protected by having SSSI status, many former quarries with Middle Pleistocene geology and archaeology are not, and are consequently in danger of being infilled, landscaped or redeveloped.

The Thames has flowed through London only since the Anglian glaciation blocked its former valley, north of the U.K. capital, and diverted it into the pre-existing Medway-Darent drainage basin. From that event onwards the Thames has formed a staircase of depositional terraces, which are an exemplary record of climatic events since the end of the Anglian. Four terraces can be recognised, with the lowest of these disappearing beneath the modern floodplain downstream from London.

River terraces are a common phenomena all over the world, but particularly at temperate latitudes. They are composed of alluvial sediments form pairs of relatively flat platforms on either side of the valley slope . They are interpreted as fragments of former valley bottoms, or floodplains that have been left above river level by fluvial down-cutting. Where the down-cutting has been progressive, which is usual, the terraces (and the sediments forming them) will increase in age with height above the river.

Bridgland has developed an empirical model that explains the formation of the Lower Thames terraces in response to climatic triggering, set against progressive background uplift. The evidence for this model comes from observations of the sedimentary sequence present within each terrace, which presents a cold-warm-cold sandwich of deposits. The temperate-climate sediments are often fossiliferous and can contain evidence of human activity (typically artefacts). This is shown on Fig 2.

Further Reading:

Bridgeland, D, Allen, P and Haggart, BA (eds)
1995

The Quaternary of the Lower Reaches of the Thames

Quaternary Research Association

Bridgeland, D. R. 1994

The Quaternary of the Thames

Geol. Conservation Review Series 7

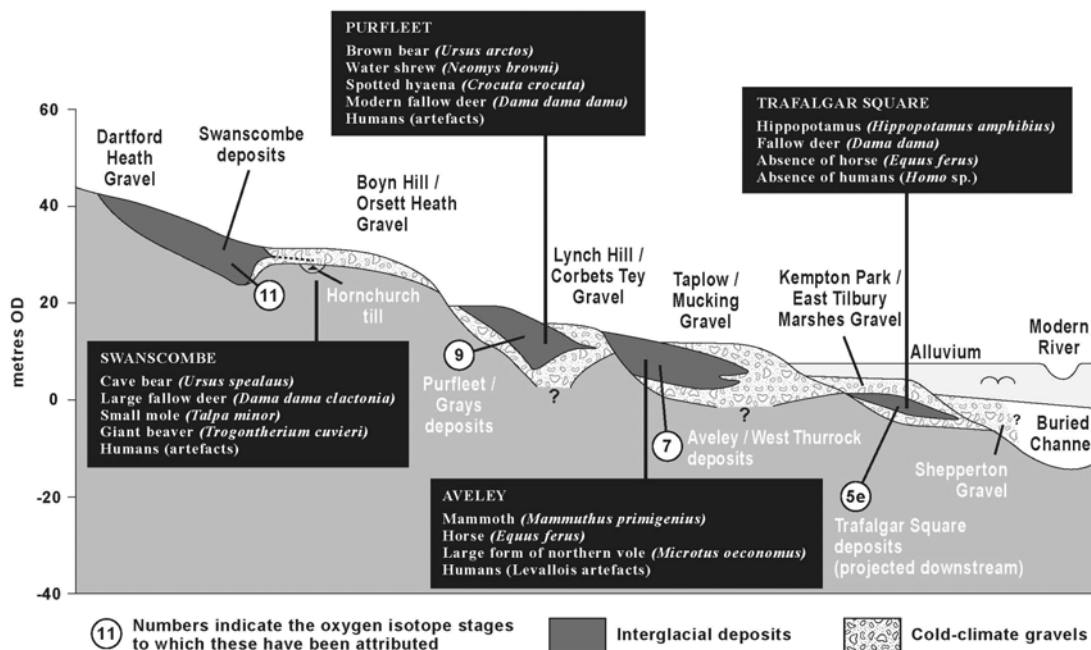


Fig 2: Geology: The Lower Thames Terraces, a transverse section with vertebrate and archaeological evidence

The first phase of the geological study comprised a desk-based assessment of the eligible extraction sites, identifying those sites located on the Black Park, Boyn Hill, Lynch Hill and Taplow Gravels. Site visits were then carried out to establish where such sediments are exposed or may survive, to consider the potential and significance of the sites. The data from the desk-based and field studies was incorporated into the GIS as attribute data appended to a polygon for each site. A scoring system was introduced in order to allow a comparison of the significance and potential of those sites.

The data from the geological study can be used to identify those areas where remains of potentially nationally important sediments may survive allowing threats to the resource to be better assessed.

The geological studies were carried out by Dr Peter Allen.

A detailed methodology and report are available in
 ECC and KCC 2004 *Archaeological Survey of Mineral Extraction Sites in the Greater Thames Estuary ALSF 1. Assessment Report*

3.2 Palaeolithic

The Palaeolithic covers the time span from the initial colonisation of Britain in the Middle Pleistocene, c. 500,000 years ago, to the end of the Late Pleistocene, corresponding with the end of the last ice age c. 10,000 years ago. Early hominids were periodically present in Britain, which was at the northern margin of the inhabited world. The archaeological evidence mostly comprises flint tools, and the waste flakes left from their manufacture. Other forms of evidence include faunal dietary remains, wooden artefacts and hominid skeletal remains. The Palaeolithic has been divided into three broad, chronologically successive stages — Lower, Middle and Upper — based primarily on changing types of stone tool. Britain was only occasionally inhabited during the Upper Palaeolithic and no evidence of the period was identified in any of the survey sites.

The Thames Estuary is a key region for Palaeolithic archaeology in Britain. It remained to the south of the ice-sheets that periodically covered most of Britain during the Pleistocene. Therefore deposits contemporary with Palaeolithic occupation are better preserved than in most other parts of the country. The Pleistocene deposits in northwest Kent and south Essex are of particular significance, and finds from a few sites have made a disproportionately high contribution to current knowledge of the Lower Palaeolithic in Britain. Furthermore, the only hominid skull known from this period in Britain comes from Barnfield Pit, Swanscombe in Kent.

The known Palaeolithic evidence has typically been recovered during the course of aggregate extraction. In a number of cases this was extensive and only vestiges of the deposits containing faunal and artefactual evidence survive. It also, however, provided the opportunity to identify and recover artefacts and created the exposures of sediments essential to developing our understanding of the period.

The Palaeolithic study began by synthesising the existing recorded evidence which could be related to the eligible extraction sites. This primarily utilised data from the respective county HERs, the English Rivers Surveys, published material and information from other ALSF projects (particularly the Stopes Project). As well as providing information on presence/absence this study also considered the research potential for the artefact collections. This assessment was followed by field visits to those extraction sites which were considered to be significant and /or were under a specific threat. The information from these studies was appended to polygon data for use in GIS.

Although the data collated through this study is limited to those sites with known Palaeolithic significance it provides an enhancement of the HER data. It can however be used in conjunction with the information from the geological studies to consider the potential of areas where no Palaeolithic material has been recovered to date though comparison of the depositional

environment (eg fluvial) and the stratigraphic/lithological units from which material has previously been recovered.

Palaeolithic studies were carried out by Dr Francis Wenban-Smith

A detailed methodology and report are available in

ECC and KCC 2004 *Archaeological Survey of Mineral Extraction Sites in the Greater Thames Estuary ALSF 1. Assessment Report*

Further Reading:

Wymer, J.J. 1999. *The Lower Palaeolithic Occupation of Britain*. London: Wessex Archaeology & English Heritage

Wymer, J.J. 1997 *The English Rivers Palaeolithic Project – Region 7 (Thames)* Wessex Archaeology and English Heritage



Fig 3 Ovate handaxe from excavations in the Ebbsfleet Valley (Southfleet Road) in advance of Channel Tunnel Rail Link (courtesy of Francis Wenban-Smith)

3.3 Post-Palaeolithic Archaeology

A desk based assessment (DBA) of the archaeology was carried out as an integral part of the survey of mineral extraction sites around the Thames Estuary. The DBA looked at data provided by relevant Sites and Monuments Record (SMR) and Historic Environment Record (HER) officers, readily available archaeological material (*i.e.* published/development control reports), aerial photographs and general archaeological studies of the area. The potential of the sites was then assessed in very broad terms. In terms of archaeological potential the level of disturbance within the extraction areas themselves was likely to have either severely damaged or destroyed any archaeological remains. The assessment of potential therefore related to the immediate vicinity of the extraction area.

The Thames Estuary area is important for all periods of archaeology. A recent outline of the nature of this resource can be found in *An Archaeological Research Framework for the Greater Thames Estuary* (Williams and Brown eds, 1999).

The counties of Kent and Essex possess a variety of archaeological remains which are distinctive or even unique. The alluvial/estuarine marsh deposits of the Thames estuary and its tributaries often overlie well preserved prehistoric land surfaces, and also contain important evidence of human occupation and environmental and coastal change since the end of the last glaciation. Kent contains the only group of Neolithic megalithic long barrows in eastern England, and recent work has revealed the presence of other types of Neolithic monument, such as causewayed enclosures. Moreover, there are considerable stretches of multi-period cropmark landscapes spread throughout the Essex part of the project area.

Neolithic and Bronze Age landscapes in this area have provided some of the best evidence in eastern England for understanding the transformation from a hunter-gatherer to a fully agricultural economy. Two scheduled sites within the extensively quarried Ebbsfleet Valley contain evidence of both Mesolithic and Neolithic occupation. At the latter end of this period the evidence includes a series of defended 'Springfield-type' circular enclosures, notably at Mucking.

For the Iron Age and Roman periods, extensive field systems and settlements include some highly distinctive sites, such as triple-ditched rectangular enclosures of Late Iron Age date. A very extensive Late Iron Age settlement and salt working area, and later Roman cemetery was partly excavated on the Isle of Grain ahead of gravel extraction. From the Roman period onwards the Thames Gateway area has developed close relationships with the major city established at London.

The establishment of Saxon settlement is dramatically represented not only by the extensive settlement and two cemeteries at Mucking, but also by a range of evidence from other extraction sites.

Whilst the Thames Gateway area has highly distinctive and important medieval and post-medieval archaeological remains, most of the evidence relating to these periods is not derived from quarry sites.

A map regression exercise was also carried out. This looked at readily available historic Ordnance Survey mapping, modern mapping and vertical aerial photographs

A detailed methodology and report are available in
ECC and KCC 2004 *Archaeological Survey of Mineral Extraction Sites in the Greater Thames Estuary ALSF 1. Assessment Report*

Further Reading:

Bedwin, O. (ed) 1996

The Archaeology of Essex; The Proceedings of the Writtle Conference Essex County Council

Williams, J and Brown, N (eds) 1999

An Archaeological Research Framework for the Greater Thames Estuary
Essex CC, Kent CC and English Heritage

3.4 Industrial Archaeology

The 20th century witnessed massive development along the Thames based upon cement manufacture, power generation and oil refining. This industrial use however goes back to the 18th century. Quarry sites supplying gravel, sand and chalk to industry, particularly cement and whiting works, were once widespread in the estuary. These generally cut back into the valley sides.

All the large 19th century concentrations of cement works have been systematically demolished and redeveloped, to the extent that only one site (Aspdins Northfleet works) retains 19th century structural remains of any technological significance. In general the degree of survival of industrial buildings and plant is poor. Most of the surviving structures are ancillary ones, dating to the turn of the 20th century or later.

The actual quarries dominate the landscape in some of the study area. Many have been extensively re-developed, perhaps the most famous being the Lakeside and Bluewater shopping centres, both of which are located in quarries. Apart from the actual excavated faces of the quarries, the features most commonly encountered are former tramway cuttings and associated road bridges, access routes or the tunnels used to inter-connect quarries below roads or railways.

Other features of interest include 'glory bumps' on Dartford Heath. These are a series of linear banks of the lower quality gravel, excavated to get to the better quality material.

The influence of the industry also extended beyond the quarries to the surrounding landscape. The Whitbreads were a brewing family who diversified in the late 18th century; establishing quarries at Tank Hill and The Dipping in Purfleet. They provided workers houses, a chapel of ease, masters house and a school house. These are still extant, although some are in poor condition.

Assessment of the significance and potential of the industrial sites has also been considered as part of this project. This has included standing structures, earthworks, and potential below ground remains.

The statistics from the survey show a remarkably similar pattern of survival; fifty percent have no or very low archaeological significance for industrial archaeology because they have been so extensively redeveloped; thirty percent have low to medium significance because they retain some industrial features or have a higher potential for below ground survival; and twenty-percent have

medium significance because they retain structures or combinations of features associated with the sites industrial use.

Few significant industrial remains survive in the more built-up industrialised areas. The degree of survival in the rural quarries is equally poor, possibly as a consequence of recreational re-use.

A detailed methodology and report are available in
Archaeological Survey of Mineral Extraction Sites in the Greater Thames Estuary
ALSF 1. Assessment Report 2004 ECC and KCC

Further Reading:

Booker J *Essex and the Industrial Revolution*

Eve, D 1999 *The Cement Industry in Kent*



Fig 4 Earthworks, locally known as 'glory bumps' on Dartford Heath

4.0 THE DATA

4.1 Introduction

The archaeological survey of mineral extraction sites around the Thames Estuary was conceived as a largely GIS based project, with a series of digital map layers forming a key output of the project. These layers were used to address the aims and objectives of this project, but will be placed in the respective counties' HER/SMR. They will therefore be able to be used for other projects and considered in light of other datasets as they become available. This guide is meant for use as an aid to exploring, understanding and analysing the GIS data in a way that is relevant to the end user.

GIS layers relating to the general geology of the area were provided by the British Geological Survey. Their data on 'artificial ground' formed the basis of the other layers. Geology, Palaeolithic and industrial archaeology specialists compiled their data, which was then passed on to the appropriate HER/SMR officer (T.O'Connor / P.Cuming) to digitise or append to the polygon data.

The GIS layers compiled as part of this project contain a wide range of information relating to the specialist studies summarised above. In order to utilise the data you will first need to identify the appropriate GIS layer. These layers contain information which is both factual and interpretive; that is details of the known resource which has been used to consider questions such as significance and potential. Some of the GIS layers also contain suggestions for further work or mitigation measures.

Artificial ground is defined by the BGS as man-made ground, this category refers to both deposits (eg. a road bank) and voids (eg. a quarry).

The BGS uses the following categories of artificial ground

Made Ground

Ground deposited by man eg. road bank, spoil heap, sea wall

Worked Ground

Area excavated by man eg. quarry, pit, road cutting

Infilled Ground

Worked ground which has then been wholly or partially infilled

Landscaped Ground

Areas of landscaped ground where it is not possible to distinguish between deposited and excavated areas

Disturbed Ground

Areas of surface or near surface excavations with ill defined limits

More details can be found on the BGS website www.bgs.ac.uk

4.2 Data Formats

The digital GIS layers have been produced as Esri Shapefiles. These were largely created in ArcGIS 8, but will work in earlier versions of ArcView, although there is greater functionality in

ArcGIS 8. This means that the data collated as part of this survey will be available to a greater number of end users.

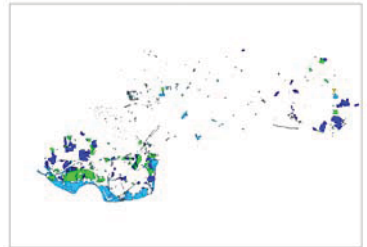
The **Summary Data Catalogue** lists the available map layers with a short summary to help you select the layers you need.

Each data set has attribute data attached; tabular data about each individual polygon. Each layer has an information sheet which explains the field names and what type of information is found in them. It is these fields which can be used when sorting using attributes.


5.0 DATA CATALOGUE SUMMARY

This section lists the GIS layers created as part of this project and provides a short summary of the information that they contain. These include information on the best symbology to be used when displaying the layer.

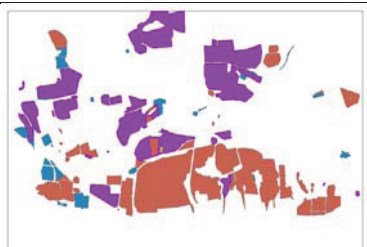
Layers relating to Kent are prefixed by KN and Essex by EX.

EX_eligible_quarries	
Polygon data of mineral extraction sites that were chosen to be included in the project on the eligibility criteria defined by the ASLF and project team.	


Recommended symbology: Single symbol OR Unique Value: Category	Scale: 1: 10 000
---	-------------------------

EX_geol_potential	
Polygon data depicting the possible location and/or survival of Pleistocene sediments that have potentially important archaeological and/or environmental remains. These deposits are then scored according to their potential significance. MAX SCORE=24	

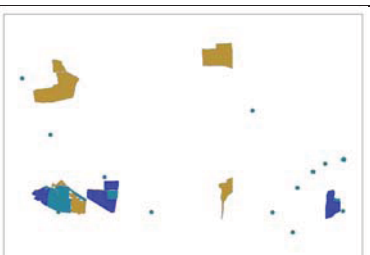
Recommended symbology: Unique Value OR Graduated colour: GEOL_SCORE	Scale: 1: 10 000
--	-------------------------

EX_historical_mapping	
Polygon data of selected quarry sites with information relating to the history of the site acquired through a historical map regression exercise.	

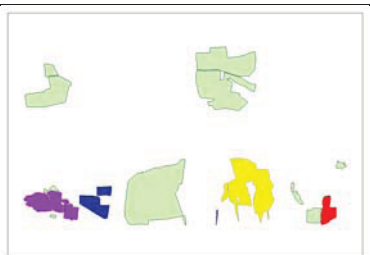
Recommended symbology: Single Symbol OR Unique Value: BGS type	Scale: 1: 10 000
---	-------------------------

EX_Industrial_arch	
Polygon data relating to the industrial archaeological history of selected sites, with recording of industrial survival above ground and an assessment of the significance of the sites visited.	

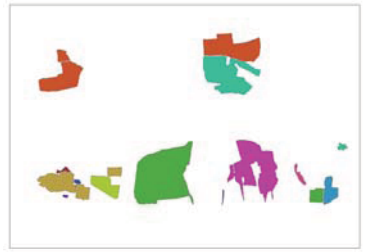
Recommended symbology: Single Symbol OR Unique Value: Significance; Arch_pot; Status	Scale: 1:1 to 1: 3000
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EX_Pal_arch	
Polygon data relating to quarry sites where Palaeolithic archaeology has been found and information gathered from the Essex Historic Environment Record and from other sources relating to these sites.	


Recommended symbology: Single Symbol OR Unique Value: Poly_descrip.	Scale: 1: 10 000
--	-------------------------

EX_Pal_Artefact_history	
Polygon data relating to quarry sites where Palaeolithic archaeology has been found and the potential for analysis of the material found	


Recommended symbology: Unique Value OR Graduated colour: Total score	Scale: 1: 10 000
--	-------------------------

EX_Pal_potential	
Polygon data depicting the quarries where Palaeolithic finds have been recorded with information on the significance of the finds and possible survival of the sediments in which they were found.	


Recommended symbology: Unique Value OR Graduated colour: TOTAL	Scale: 1:10 000
--	------------------------

EX_Pal_Sed_potential	
Polygon data relating to quarry sites with sediments that have yielded Palaeolithic artefacts, the potential of the sediments and possible location of surviving sediments.	

Recommended symbology: Unique Value OR Graduated colour: Total	Scale: 1: 10 000
--	-------------------------

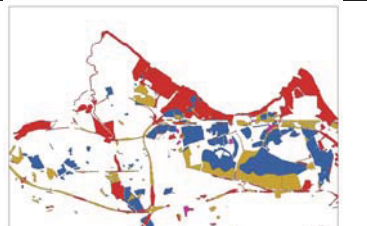
EX_Quarries	
Polygon data for mineral extraction quarry sites as recorded by the British Geological Survey for Essex	

Recommended symbology: Single symbol OR Unique Value: Category	Scale: 1: 10 000
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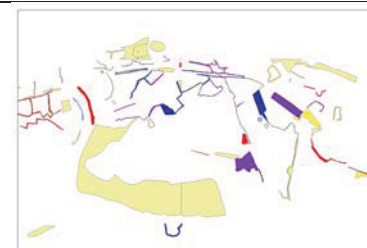
EX_site_arch	
Polygon data of the selected quarries with information on known archaeological and historical sites and finds within the quarried area as recorded by the Essex Historic Environment Record	

Recommended symbology: Single Symbol OR Unique Value: BGS type	Scale: 1: 10 000
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KENT SHAPEFILES

KN_eligible_quarries	
Polygon data of mineral extraction sites that were chosen to be included in the project on the eligibility criteria defined by the ASLF and project team.	

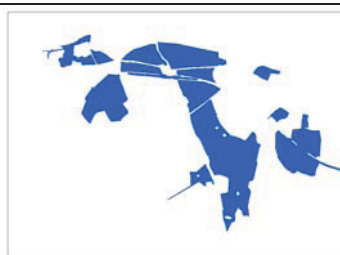
Recommended symbology: Single symbol OR Unique Value: Category	Scale: 1: 10 000
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KN_geol_potential	
Polygon data depicting the possible location and/or survival of Pleistocene sediments that have potentially important archaeological and/or environmental remains. . These deposits are then scored according to their potential significance. MAX SCORE=24	

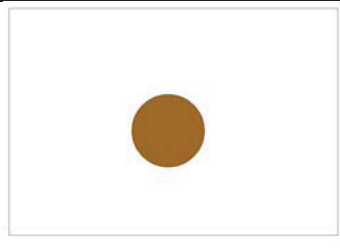
Recommended symbology: Unique Value OR Graduated Colour: GEOL_SCORE	Scale: 1: 10 000
--	-------------------------

KN_historical_mapping	
Polygon data of selected quarry sites with information relating to the history of the site acquired through a historical map regression exercise.	

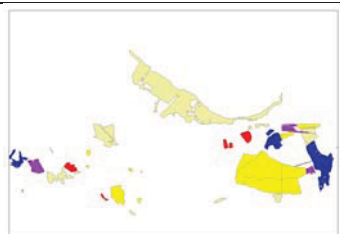
Recommended symbology: Single symbol OR Unique Value: BGS_TYPE	Scale: 1: 10 000
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KN_Industrial_arch	
Polygon data relating to the industrial archaeological history of selected sites, with recording of industrial survival and a rating of the potential significance of the sites visited.	


Recommended symbology: Single Symbol	Scale: unknown
--	-----------------------

KN_Pal_arch	
Point data relating to quarry sites where Palaeolithic archaeology has been found and information gathered from the Kent Sites and Monuments Record and from other sources relating to these sites.	


Recommended symbology: Point	Scale: unknown
--	-----------------------

KN_Pal_Artefact_history	
Polygon data relating to quarry sites where Palaeolithic archaeology has been found and the potential for analysis of the material found	


Recommended symbology: Unique Value OR Graduated Colour: TOTAL_ALL	Scale: 1: 10 000
---	-------------------------

KN_Pal_potential	
Polygon data depicting the quarries where Palaeolithic finds have been recorded with information on the significance of the finds and possible survival of the sediments in which they were found.	


Recommended symbology: Unique Value OR Graduated Colour: TOTAL	Scale: 1: 10 000
---	-------------------------

KN_Pal_Sed_potential	
Polygon data relating to quarry sites with sediments that have yielded Palaeolithic artefacts, the significance of the remains and the possible survival of the sediments that yielded the remains.	


Recommended symbology: Unique Value OR Graduated Colour: TOTAL_ALL	Scale: 1: 10 000
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KN_Sens_seds_location	
The specific location of potentially significant sediments identified from their geology and the potential to yield Palaeolithic archaeology and/or environmental remains.	

Recommended symbology: Single symbol OR Unique Value:Sed_locale	Scale: 1: 10 000
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KN_Quarries	
Polygon data for mineral extraction quarry sites as recorded by the British Geological Survey for Kent	

Recommended symbology: Single symbol OR Unique Value: Category	Scale: 1: 10 000
---	-------------------------

KN_site_arch	
Polygon data of the selected quarries with information on known archaeological and historical sites and finds within the quarried area as recorded by the Kent Sites and Monument Record.	

Recommended symbology: Single symbol OR Unique Value: BGS_TYPE	Scale: 1: 10 000
---	-------------------------

EX eligible quarries

Description: Quarries selected due to their ASLF eligibility from the BGS Artificial Ground Layers shapefile (EX_Quarries)

Area Covered: Thames Gateway areas of Essex

Polygon Data:

a) Individual polygons (from the BGS Artificial Ground Layer-EX_Quarries) with ASLF eligibility criteria applied.

Attributes:

Field	Comment	Source Data
SHAPE:	The shape files of data are polygons.	EX_Quarries.shp shapefile (supplied by BGS)
BGS_lexico	A two-part code, LEX & ROCK, used to label each polygon of DigGMapGB data and for creating legends	EX_Quarries.shp shapefile (supplied by BGS)
LEX	Lexicon Code. First part of the LEX_ROCK label. Up to 5 characters (mostly letters). An abbreviation of the named rock unit as listed in the BGS Lexicon: e.g. 'WGR'	EX_Quarries.shp shapefile (supplied by BGS)
ROCK	A code, up to 5 letters, for the type of rock, and forming the second part of the Lex_Rock label. It is an abbreviation of the lithology as listed in a BGS database or dictionary called Dic_Rock_Type: e.g. 'OPEN' for worked ground.	EX_Quarries.shp shapefile (supplied by BGS)
Category	Description of the Lexicon code above giving the name of the unit: e.g. Worked Ground is the name of the unit coded as WGR	EX_Quarries.shp shapefile (supplied by BGS)
Form	The form of the deposit, if applicable	EX_Quarries.shp shapefile (supplied by BGS)
Material	The material forming the deposit, where known	EX_Quarries.shp shapefile (supplied by BGS)
Mineral_Ex	The mineral extracted from workings & former workings, where known	EX_Quarries.shp shapefile (supplied by BGS)
Note	Additional information	EX_Quarries.shp shapefile (supplied by BGS)
Sheet	The 1:10,000 map sheet on which the polygon lies, allowing cross reference to the metadata spreadsheet	EX_Quarries.shp shapefile (supplied by BGS)
Hectares	Area covered in hectares	mwessexdists.2002 shapefile (ECC)
Status	Current status ie.active, disused	mwessexdists.2002 shapefile (ECC)
Material_1	The material forming the deposit, where known	mwessexdists.2002 shapefile (ECC)

<i>Site_name</i>	Usual name by which the site is referred to (where known)	mwessexdists.2002 shapefile (ECC)
<i>Operator</i>	Company owning/quarrying the site	mwessexdists.2002 shapefile (ECC)
<i>Recno</i>	Unique ASLF id number	

EX geol potential

Description: Collation of material and fieldwork to identify the possible location of surviving significant Pleistocene sediments.

Area Covered: 3D modelling area as defined in PD etc

Polygon Data: Individual polygons (from the BGS Artificial Ground Layer) with 10m buffer applied if sediments identified in an extant face or periphery. No buffer applied if sediments located on floor.

Polygons to be viewed by choosing the **Quantities** option –**graduated colours** option on the symbology tab (Properties) and selecting **Total_score** in the drop down **Value** field (ArcView 8); or Choosing **Graduated colour** in the drop down menu for **Legend type** and selecting **Total_score** in the drop down menu in the **Classification field** (ArcView 3)

Attributes:

Field	Comment	Source Data
<i>Area</i>	Area ID = EX (Essex)	
<i>ALSF_no</i>	Unique numerical project id (per polygon)	EX_eligible_quarries.shp
<i>Includes</i>	Polygon which is part of the same site	As above
<i>Sed_locale</i>	Location of Pleistocene sediments	P.Allen site visit and recording sheet
<i>BufferDist</i>		
<i>Dig_scale</i>	Scale at which the polygons were digitised	BGS Artificial Ground Layer
<i>Curr_stat</i>	Current status of quarry ie. Open, worked, infilled, landscaped	BGS Artificial Ground Layer P.Allen site visit
<i>Access</i>	Accessibility of the surviving sediments of interest	P.Allen site visit and recording sheet
<i>Acc_score</i>	0 - No deposit 1 - Poor: covered by roads or housing; no faces or very inaccessible faces 2 - Moderate; faces with limited potential for cleaning; restricted or difficult top access 3 - Good; direct unrestricted access to face and from above	P.Allen site visit and recording sheet
<i>Strat_1_T</i>	Sediments in order of stratigraphy (top/earliest to oldest Pleistocene sediments)	BGS 1:50000 (1996) maps Other sources (see recording sheets or report)
<i>Strat_2</i>	As above	
<i>Strat_3</i>	As above	
<i>Solid_geol</i>	Solid geology	
<i>Varies_BGS</i>	Whether the on-site recorded sediments	P.Allen site visit and recording

	vary from the BGS recorded data	sheet
<i>Quant_sed</i>	Quantity of Pleistocene sediments present	P.Allen site visit and recording sheet
<i>Qty_score</i>	0 - None/unknown 1 - Small amount 2. - Moderate amount 3 - Abundant sediments	P.Allen site visit and recording sheet
<i>Phys_pot</i>	Potential of sediments (biological environmental information)	P.Allen site visit and recording sheet
<i>PP_score</i>	0 - None 1 - Limited potential for sedimentological information (stone counts, heavy minerals) 2 - Medium potential (some measurable features, e.g. x-beds) 3 - High potential (many measurable features, e.g. x-beds, clast fabrics, deformation structures)	P.Allen site visit and recording sheet
<i>Bioenv_pot</i>	Potential of sediments (biological environmental information)	P.Allen site visit and recording sheet
<i>BP_score</i>	0 - None 1 - Limited potential for bio-environmental information (microfossils e.g. pollen) 2 - Medium potential (e.g. possibility of microvertebrates 3- High potential (e.g. macrovertebrates, molluscs, beetles, plant macros)	P.Allen site visit and recording sheet
<i>Geol_score</i>	Total score ($Acc_score + qty_score + (PP_score * 3) + (bp_score * 3)$)	P.Allen site visit and recording sheet
<i>Sed_Bio_Ar</i>	Sedimentological or biological material archived 0 - None/not known 1 - Yes	P.Allen site visit and recording sheet Pers Comm (D.Shreve-Royal Holloway University)
<i>Geol_info</i>	Quality of geological information 0 - None 1 - Regional information only 2 - Basic site descript. available 3- Detailed descript. available	P.Allen site visit and recording sheet Other sources (see report)
<i>Notes</i>	Any notes/comments (specifically if information varies from BGS)	P.Allen site visit and recording sheet
<i>Date_visit</i>	Date site was visited	P.Allen site visit and recording sheet
<i>Visit_by</i>	Who visited the site	P.Allen site visit and recording sheet

EX historical mapping

Description: **Map regression data relating to each ALSF eligible sites in Essex**

Area Covered: **3D modelling area as defined in PD etc**

Polygon Data: Individual polygons (from the BGS Artificial Ground Layer) with queries applied to

a) Establish eligible geology (see EX_eligible_quarries ESRI shape file provided by ECC)

Attributes:

Field	Comment	Source Data
<i>Area</i>	Area ID = EX (Essex)	
Recno	Unique numerical project id (per polygon)	EX_eligible_quarries
<i>Same_as</i>	Polygon which is part of the same site	As above
<i>Name</i>	Usual name by which the site is referred to (where known)	Pers Comms SMR Other sources
<i>Sheet</i>	1:10,000 Quarter Sheet	
<i>Map_sheet</i>	1:2500 Sheet	
<i>BGS_Type</i>	Artificial ground category	EX_eligible_quarries
BGS_notes		
<i>1st Ed (Zst_Ed)</i>	Excavated area shown on First ed? Yes/No	1st Edition Ordnance Survey (digital 25")
<i>Notes_1</i>	Brief description of what is shown on the edition	As above
<i>2nd ED (Znd_ed)</i>	Excavated area shown on 2 nd Ed? Yes/No	2 nd Ed Ordnance Survey (digital 25")
<i>Notes_2</i>	Brief description of what is shown on the edition	As above
<i>3rd Ed (Zrd_ed)</i>	Excavated area shown on 3 rd Ed? Yes/No	3 rd Ed Ordnance Survey (digital 25")
<i>Notes_3</i>	Brief description of what is shown on the edition	As above
<i>4th Ed (Zth_ed)</i>	Excavated area shown on 4 th Ed? Yes/No	4 th Ed Ordnance Survey (digital 25")
<i>Notes_4</i>	Brief description of what is shown on the edition	As above
1960s (N16)	Excavated area shown on 1960s OS? Yes/No	1960s Ordnance Survey 6" (CKS)
<i>Notes_5</i>	Brief description of what is shown on the edition	As above

<i>1980s (Z960S)</i>	Excavated area shown on 1980s OS? Yes/No	1980s 1:25000 (CKS)
<i>Notes_6</i>	Brief description of what is shown on the edition	As above
<i>Modern</i>	Brief description of what is shown on modern map	1:10000 OS mapping (digital)
<i>AP_Vertc</i>	Brief description of what is shown on vertical Aps (AD 2000)	Digital AP (provided by ECC)
<i>Ind?</i>	Any features of potential interest for industrial archaeology noted during map regression. Yes/No	
<i>Type</i>	Type of excavation identified by map regression	
<i>Alt_type</i>	Alternative type	
<i>Notes_gen</i>	General comments	

EX Industrial arch

Description: Collation of industrial archaeological data relating to specific ALSF eligible sites in Essex, recording of industrial survival and potential significance of sites visited.

Area Covered: 3D modelling area as defined in PD etc

Polygon Data:

- a) Individual polygons (from the BGS Artificial Ground Layer)
- b) OS landline data

To display the polygons correctly they need to be displayed according to their **Poly_type** and arranged in the following order:

Surviving structures
Surviving features
Existing SMR
Former quarry type.

Attributes:

Field	Comment	Source Data
Area	Area ID = EX (Essex)	
ALSF_no	Unique numerical project id (per polygon)	EX_Eligible_quarries.shp
Same_as_1	Polygon which is part of the same site	As above EX_historical_mapping (ECC FAU)
EHCR_no	Unique identifying number assigned by the Essex Heritage and	EHCR (HIR)

	Conservation Record (formerly SMR)	
Poly_type	Basic classification of EHCR data for visual display purposes	
Site_Name	Usual name by which the site is referred to (where known)	Map sheet EHCR Documentary Other sources (DBA)
Site_desc	Description of site comprising historic background and use, extent and description of present day survival, if any.	Pers Comms EHCR Other sources (DBA)
Remains	Yes/no as to whether remains survive on site	Survey data Map sheets Historic OS eds (1st-4th)
Current_Us	Description of the sites current use i.e. Cement works, Nature reserve	Map sheets Survey data
Component	Broad description of site or category surviving features belong i.e. Cutting, Building	Map sheets Survey data
Date_	Original date attributed to site or building	Map sheets Historic OS eds (1st-4th) Documentary DBA EHCR
Form	More specific description of surviving component i.e. tunnel, revetment, derelict building	Survey data Map sheets Documentary
At_risk	Whether the sites/remains are actively in-use or lie redundant and more 'at risk' .	Survey data
Arch_pot	Assessment of site potential	Survey data EHCR
Significan	Statement of the sites significance, on comparable, local and regional levels	Survey data Author (EHCR) MPP site Assessment steps 2-4
Recommendations	Recommendations on future proposals, mitigation, research objectives	Survey data Author (EHCR) MPP site Assessment steps 2-4
Status	Whether the sites has any form of statutory protection and if so what designation	DCMS Other sources MPP site Assessment step 2-4
Management	Proposal for future management of sites.	Author (EHCR)
1st_ed_in	YES/NO If site was active or not active at time of compilation of the 1st edition	1st ed Os map sheet

2nd_ed_in	YES/NO If site was active or not active at time of compilation of the 2nd edition	2nd ed Os map sheet
3rd_ed_in	YES/NO If site was active or not active at time of compilation of the 3rd edition	3rd ed Os map sheet
4th_ed_in	YES/NO If site was active or not active at time of compilation of the 3rd edition	4th ed Os map sheet
Map_sheet	1:10,000 Quarter sheet	Ordnance Survey
Site_visit	Date of survey visit	
Dig_by	Digitised by	
Date_date	Date polygon digitised	
Dig_scale	Scale at which polygon digitised	

EX Pal arch

Description: Collation of information from the Essex Heritage and Conservation Record database (SMR) and a desk based assessment of past and present Palaeolithic sites relating to ALSF eligible sites in Essex

Area Covered: 3D modelling area as defined in PD etc

Polygon Data:

- a) Individual polygons (from the BGS Artificial Ground Layer)
- b) EHCR ThurrockSMR shapefile (ECC HIR)

Polygons to be viewed by choosing the **Categories** option -**unique value** option on the symbology tab (Properties) and selecting **Poly_desc** in the drop down **Value field** (ArcView 8);

or

Choosing **unique value** in the drop down menu for **Legend type** and selecting **Poly_desc** in the drop down menu in the **Values field** (ArcView 3)

Attributes:

Field	Comment	Source Data
EHCR_No	Essex Heritage & Conservation Record unique id (formerly SMR number)	EHCR (Essex County Council Heritage Information & Records)
ASLF_No	Unique numerical project id (per polygon)	EX_eligible_quarries.shp
Same_as	Polygon which is part of the same site	

Poly_descr	Description of polygon in terms of source ie.exiting EHCR site	
Dig_by	Digitised by	
Dig_date	Digitised date	
Dig_scale	Digitised scale	EX_eligible_quarries.shp
AdminArea	Administrative area	EHCR
Name	Usual name by which the site is referred to (where known)	EHCR
Recordtype	EHCR record type	EHCR
Summary	Brief description	EHCR
Easting	Projected coordinate system:Easting	British_National_Grid
Northing	Projected coordinate system:Northing	British_National_Grid
NGR	National Grid Reference	British_National_Grid

EX Pal Artefact history

Description: Potential for analysis of existing collections of Palaeolithic material relating to ALSF eligible sites in Essex.

Area Covered: 3D modelling area as defined in PD etc

Polygon Data: a) Individual polygons (from the BGS Artificial Ground Layer

Polygons to be viewed by choosing the **Quantities** option –**graduated colours** option on the symbology tab (Properties) and selecting **Total_score** in the drop down **Value** field (ArcView 8); or Choosing **Graduated colour** in the drop down menu for **Legend type** and selecting **Total_score** in the drop down menu in the **Classification field** (ArcView 3)

Attributes:

Field	Comment	Source Data
County	EX (Essex)	
ASLF no	Unique numerical project id (per polygon	EX_eligible_quarries.shp
Same as	Polygon which is part of the same site	
EHCR no	Essex Heritage & Conservation Record unique id (formerly SMR number)	EHCR
Artefact_a	1.1 Abundance of artefacts	FWS DBA and recording sheet
Score 1	0 None 1 Single f-spot 2 Several 3 Abundant	

Artefact_d	1.2 Diversity of artefact types Sum of number of different types present	FWS DBA and recording sheet
Dep_hist	1.3 Artefact depositional history	FWS DBA and recording sheet
Score 2	0 Unknown 1 Significant fluvial transport 2 Minor fluvial/colluvial/solifluction transport 3 Undisturbed	
Sed_rec_sc	0 No archive 1 Sediments or biological material archived	P.Allen DBA and site visit
C_M_fauna	1.5 Cut-marked fauna	FWS DBA and recording sheet
Score 3	0 Absent 3 Present	
Hom_remain	1.6 Hominid remains	FWS DBA and recording sheet
Score 4	0 Absent 3 Present	
Biol_evid	1.7 Biological evidence	FWS DBA and recording sheet
Score 5	0 Absent 3 Present	
Biol_evid_d	1.8 Diversity of biological evidence Sum of number of different types present	FWS DBA and recording sheet
History	1.9 History of investigation	FWS DBA and recording sheet
Score 6	0 Collection 2 Controlled collection 4 Controlled excavation	
Geol_info_s	1.10 Quality of geological information (GD1) 0 None 1 Regional literature or maps only 2 Basic site description available 3 Detailed site description available	P.Allen DBA and site visit
Score 7	0 None 1 Single/Several artefacts 2 Abundant artefacts	
Total score	Sum of #1.1–1.10 multiplied by #1.11	

EX Pal Sed potential

Description: Potential significance of surviving sediments and Palaeolithic archaeology relating to ALSF eligible sites in Essex.

Area Covered: 3D modelling area as defined in PD etc

Polygon Data: a) Individual polygons (from the BGS Artificial Ground Layer)
b) Geol_potential shapefile

Polygons to be viewed by choosing the **Quantities** option –**graduated colours** option on the symbology tab (Properties) and selecting **Total_score** in the drop down **Value** field (ArcView 8); or Choosing **Graduated colour** in the drop down menu for **Legend type** and selecting **Total_score** in the drop down menu in the **Classification field** (ArcView 3)

Attributes

Field	Comment	Source
County	EX (Essex)	
ASLF_No	Unique numerical project id (per polygon	EX_eligible_quarries.shp
Same_as	Polygon which is part of the same site	
Includes	Polygons which may be within or on outskirts of another polygon but not necessarily are part of the same quarry	
Sed_surviv	2.1 Sediment survival (within site or at margins) (GV2)	P.Allen DBA and site visit
Score 1	0 None 1 Some present	
Sed_signif	2.2 Sedimentological significance/potential (GV3) 0 No potential 1 Limited 2 Medium 3. High	P.Allen DBA and site visit
Arte_abun	2.3 Abundance of artefacts	FWS DBA and recording sheet
Score_3	0 None 1 Single f-spot 2 Several 3 Abundant	
Dep_Hist	2.4 Artefact depositional history	FWS DBA and recording sheet
Score_4	0 Unknown 1 Significant fluvial transport 2 Minor fluvial/colluvial/solifluction transport 3 Undisturbed	
C_M_Fauna	2.5 Cut-marked fauna	FWS DBA and recording sheet
Score_5	0 Absent 3 Present	

Hom_remain	2.6 Hominid remains	FWS DBA and recording sheet
Score_6	0 Absent 3 Present	
Bioenv_evi	Bioenvironmental evidence 0 - No potential 1 Limited 2 Medium 3 High	P.Allen DBA and site visit
Total	Sum of #2.2–2.7 multiplied by #2.1	

EX Pal potential

Description: Heritage potential of surviving sediments and Palaeolithic archaeology relating to ALSF eligible sites in Essex.

Area Covered: 3D modelling area as defined in PD etc

Polygon Data: a) Individual polygons (from the BGS Artificial Ground Layer)

Polygons to be viewed by choosing the **Quantities** option –**graduated colours** option on the symbology tab (Properties) and selecting **Total_score** in the drop down **Value** field (ArcView 8);
or

Choosing **Graduated colour** in the drop down menu for **Legend type** and selecting **Total_score** in the drop down menu in the **Classification field** (ArcView 3)

Attributes

Field	Comment	Source
County	Area ID = EX(Essex)	
ASLF_NO	Unique numerical project id (per polygon)	EX_eligible_quarries.shp
SAME_AS	Polygon which is part of the same site	
Sed_surv	3.1 Quantity of surviving Pleistocene sediments (GV1) 0 - None 1 Small amount 2 Moderate amount 3 Abundant sediments	P.Allen DBA and site visit
Access	3.2 Accessibility of surviving sediments (GV6) 0 No deposit 1 Poor; covered/no faces/faces inaccessible 2 Moderate; limited cleaning possible, restricted access	P.Allen DBA and site visit

	3 -Good; reasonable or unrestricted access	
Artefact_A	3.3 Abundance of artefacts	FWS DBA and recording sheet
Score_2	0 None 1 Single f-spot 2 Several 3 Abundant	
Artefact_D	3.4 Diversity of artefact types Sum of number of different types present	FWS DBA and recording sheet
Lg_mam_rem	3.5 Large mammalian biological evidence	FWS DBA and recording sheet
Score_3	0 None 1 Some 2 Abundant	
Coll_holdi	3.6 Collection holdings	FWS DBA and recording sheet
Score_4	0 None 1 Single artefact 2 Several artefacts 3 Abundant artefacts	
Total	Total Sum of #3.1–3.6	

EX site arch

Description: Collation of archaeological data relating to each ALSF eligible sites in Essex

Area Covered: 3D modelling area as defined in PD etc

Polygon Data: Individual polygons (from the BGS Artificial Ground Layer) with queries applied to

- a) Establish eligible geology (see EX_eligible_quarries ESRI shape file provided by ECC HIR)
- b) Map regression (see EX_historical_mapping Esri shape file created by ECC FAU)

Attributes:

Field	Comment	Buffer used (where applicable)	Source Data
Area	Area ID = EX(Essex)		
Rec_no	Unique numerical project id (per polygon)		EX_eligible_quarries
Same_as	Polygon which is part of the same site		As above EX_historical_mapping (ECC FAU)
Site_Name	Usual name by which the site is referred to (where known)		Pers Comms SMR Other sources
Map_sheet	1:10,000 Quarter sheet		
BGS_Type	Artificial ground category		EX_eligible_quarries (ibid)

Ind_			
<i>Type</i>	Historic Type, ie pit, quarry		EX_historical_mapping (ECC FAU)
Alt_type			
<i>Notes_gen</i>			
<i>PR_SMR</i>	Prehistoric SMR refs	200m	Essex SMR data provided Dec 2003
<i>PR_Note</i>	Prehistoric- general notes incl any Aop		General comments
<i>Rm_SMR</i>	Roman SMR refs	200m	Essex SMR data provided Dec 2003
<i>RM_Note</i>	Roman-Gen notes incl any AoP		General comments
<i>Sax_SMR</i>	Sax SMR refs	200m	Essex SMR data provided Dec 2003
<i>Sax_Note</i>	Saxon- gen notes incl AoP		General comments
<i>Med_SMR</i>	Medieval- SMR refs	200m	Essex SMR data provided Dec 2003
<i>Med_Notes</i>	Med- gen notes and AoP		General comments
<i>PM_Mod_SMR</i>	Post Medieval and Modern SMR refs	200m	Essex SMR data provided Dec 2003
<i>PM_Mod_Note</i>	Post Med and Modern gen notes incl AoP		General comments
<i>UD_SMR</i>	Undated SMR refs	200m	Essex SMR data provided Dec 2003
<i>UD_Notes</i>	Undated gen notes		General comments
<i>Other</i>	Other sources	200m	'Grey' literature
<i>SAM</i>	SAM refs within or in immediate vicinity	100m	SAM (shp) provided by ECC Dec 2003
<i>Update SMR</i>	?SMR updates required		
<i>Potential</i>	Archaeological potential: Yes -within an already identified ara of archaeological potential, close to a SAM, proximity to areas of potential (eg. The Mar Dyke) Possible -Reasonable number of HER references in the vicinity suggesting at least the possibility that there may be archaeological material in the immediate vicinity of the area Low -No HER references within 200m	200m	
<i>Comments</i>	Specific comments relating to the potential		
<i>Notes</i>	Any other general comments		

NB: *The 'other' information is summarised from a bespoke shapefile prepared by ECC FAU from information contained in grey literature. As this shapefile contains copyright material it will not be circulated.*