APPENDICES

Appendix 1 – Sites selected for geodiversity auditing

The sites selected for field auditing for the 2009 version of this document are listed in Table A1 below. Site numbers prefixed with a GLA number are either SSSIs (orange rows), recommended and potential RIGS (green rows) (see paragraph 7.6), or potential LIGS (blue rows) – a total of 59 sites. The remaining 62 sites that were shortlisted are shown with a PS (Potential Site) prefix. Future visits are recommended for those sites highlighted in yellow to determine whether they should be protected.

Table A1

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
GLA 1	Abbey Wood	Bexley	480 786	No	8	SSSI
GLA 2	Avenue House	Barnet	252 903	No	3	LIGS
GLA 3	Beckenham Place Park	Lewisham	385 703	No	5	RIGS
GLA 4	Chelsfield Gravel	Bromley	476 642	No	5	RIGS
GLA 5	Chingford Hatch	Waltham Forest	384 927	No	4	LIGS
GLA 6	Croham Hurst	Croydon	338 630	No	6	RIGS
GLA 7	Crystal Palace Dinosaurs	Bromley	345 705	No	8	RIGS
GLA 8	Dog Rocks	Greenwich	443 779	No	5	RIGS
GLA 12	Finsbury Gravel	Islington	315 828	No	3	LIGS
GLA 14	Gilbert's Pit	Greenwich	418 786	Yes	8	SSSI
GLA 15	Hainault Forest Country Park	Redbridge	475 926	No	4	LIGS
GLA 17	Happy Valley	Croydon	309 568	No	6	RIGS
GLA 18	Harrow Weald	Harrow	147 929	No	6	SSSI
GLA 19	Hornchurch Cutting	Havering	547 874	No	6	SSSI
GLA 20	Horsenden Hill	Ealing	162 844	No	5	RIGS
GLA 22	Keston Common	Bromley	417 638	No	5	RIGS
GLA 24	Old Gravel Pit	Lewisham	385 763	Yes	2	LIGS
GLA 25	Putney Heath	Wandsworth	235 735	No	3	LIGS
GLA 26	Rose and Crown Pit	Croydon	338 594	No	7	RIGS
GLA 29	The Gravel Pits	Hillingdon	084 913	Yes	4	RIGS
GLA 30	Cray Valley Golf Course Sand Pit	Bromley	489 692	Yes	7	RIGS
GLA 31	North End Pit	Bexley	515 771	No	6	RIGS
GLA 32	High Elms Dene Hole	Bromley	439 627	No	7	RIGS
GLA 33	Elmstead Pit	Bromley	4232 7066	No	6	SSSI
GLA 34	Harefield Pit	Hillingdon	049 898	No	8	SSSI
GLA 35	Wansunt Pit	Bexley	515 738	Yes	9	SSSI
GLA 36	Pinner Chalk Mines	Harrow	116 905	Yes	9	RIGS
GLA 37	Marks Warren Farm, Romford	Barking & Dagenham	4875 8970	Yes	6	Recommended RIGS

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
GLA 38	Chalky Dell	Bexley	4814 7846		6	
GLA 39	Erith submerged forest and saltings	Bexley	5285 7801	No	6	Thames foreshore. Holocene Alluvium eg paleobotany
GLA 40	Chislehurst Caves Bromley	Bromley	TQ 431 696 1.74 (c.8 UNDGND)	Yes	6	Chalk Group, Late Cretaceous/basal Thanet Sand Formation Accessible mines with good exposure of junction showing Bullhead Beds
GLA 41	Klinger Pit, Foots Cray Bromley	Bromley	TQ 478 703 0.69	Yes	6	Good exposure of Paleocene Thanet Sand Formation in disused quarry privately owned – protection from development urgently sought
GLA 42	Kenwood House Quarry Hampstead Heath Camden	Camden	TQ 2685 8745 0.07	Yes	6	Eocene Bagshot Formation, omitted from 2009 edition. Potential for conserving old quarry face near Kenwood House (details of small exposures on Sandy Heath included)
GLA 43	Springfield Park Hackney	Hackney	TQ 345873 13.58	partially	6	Only London Geological Nature Reserve, designated for spring lines associated with junctions of Pleistocene Langley Silt (brickearth) on top of Hackney Gravel overlying Eocene London Clay Formation. Villas on site built from the brickearth.
GLA 44	Highgate Woods & Queens Wood Haringey	Haringey	TQ 280 885 TQ 285 885 Total 51.16	?partially	6	Newly established Claygate Member of London Clay Formation in Highgate Woods overlying London Clay that is deeply incised by 'glacial gorges' in Queens Wood. Highgate Woods was called Gravel Pit Wood on old maps although gravels are not shown on current BGS maps. The Anglian ice sheet was very close and the road between the 2 woods is the interfluve between the Lea & Brent tributaries. The Romans exploited the Claygate Beds for making pottery.
GLA 45	Bedfords Park, Havering Ridge Havering	Havering	TQ 517 930 (Ent) TQ 519 922 (VC) 86.82	No	6	Eocene London Clay, Claygate Member and Bagshot Sand overlain by Pre-Anglian Stanmore Gravel and Anglian Lowestoft Till. Recommended for variety of rock types although exposure not always good. Visitor Centre has terminal with interactive geology and there is potential for a Geotrail to accompany existing trail. The 'Whin Sill' boulder from Black Park Gravel at Mark's Warren Quarry will be moved here.
GLA 46	Rainham Submerged Forest Havering	Havering	TQ 5160 795 2.29	No	5	Best example of Neolithic submerged forest on north bank of the Thames
GLA 47	Southall Farm/ Spring Farm Quarry Complex Havering	Havering	TQ 535 818 33.54	Yes	6	Pleistocene Taplow Gravel still exposed. Need to obtain RIGS status for future conservation.
GLA 48	Thames Foreshore, Isleworth Hounslow	Hounslow	TQ 168 760 0.56	No	6	Natural exposure of London Clay Formation with septarian nodules at low tide. It is the best exposure of several in the area and the only place, apart from temporary exposures and worn patches, where septarian noldules and London Clay can be seen.

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
GLA 49	Fairlop Quarry Complex (Hainault Quarry) Redbridge	Redbridge	TQ 462 896 173.9	Yes	6	Pleistocene Boyne Hill Gravel still exposed. Need to obtain RIGS status for future conservation.
GLA 50	Knighton Wood Redbridge	Redbridge	TQ 413 935 14.92	probably	6	Probably best example of Pleistocene Woodford Gravel. Additional feature of Pulhamite Rock Work. Easy access
GLA 51	Parish'sPit, Erith Bexley	Bexley	a) TQ 510 0 7815 b) TQ 5095 7800 0.98	Yes	3-4	Former quarry primarily for Thanet Sand Formation but originally displaying Lambeth Group & Harwich Formation as well, both now obscured by vegetation. 2 faces of Thanet Sand still visible.
GLA 52	Bromley Palace Park: Pulhamite & St. Blaise's Well	Bromley	TQ 408 691 0.35	No	4	Waterfall structures at the inflow and an outflow of a lake in the grounds of the former Bishop's Palace now the Bromley Civic Centre. Formed of artificial rockwork, Pulhamite and constructed in 1865. The inflow structure is adjacent to a modern fountain in a circular basin on the site of St Blaise's Well, a chalybeate spring which was used for its curative properties in the 18th century.
GLA 53	Charmwood Farm Bromley	Bromley	TQ 4616 6244 1.64	Yes	4	Chalk Group, Late Cretaceous. Small mine on private farmland with entrance covered by grille
GLA 54	Sundridge Park Manor Pulhamite grotto. Bromley	Bromley	TQ 4184 7063 0.09	No	3-4	Artificial rockwork 'grotto' worth listing by English Heritage and worth conserving even though on private land
GLA 55	Trent Park Enfield	Enfield	TQ 281 969 183.83	No	3-4	Recommended LIGS for variety of rock types (London Clay Formation, Claygate Member, Dollis Hill Gravel and Lowestoft Till), spring lines and deeply incised glacial valleys.
GLA 56	Bleak Hill Sandpit Greenwich	Greenwich	TQ 4606 7776 0.23	Yes	4	Only remaining faces of 3 former pits which in 19th century worked for sand and In 20th century worked for sand and chalk. The quarry extended upwards through the Lambeth Group to the Blackheath Pebble Beds but these are now obscured by vegetation and only sand is visible.
GLA 57	Wickham Valley Brickworks Complex	Greenwich	TQ 4604 7743 12.75	Yes	4	The complex is all that remains of three adjacent pits, the rest of the area has been built over. The tall cliff forming the southern edge of the former South Metropolitan Quarry can still be seen through the trees with Woolwich Cemetery is at the top still be seen. The Wickham Valley Brickworks sites were primarily quarrying the Thanet Sand but also exploited the Brickearth in the Valley. Chalk was extracted from underground mines which are now pumped full of fly-ash slurry and sealed off.
GLA 58	Coldfall Wood Haringey	Haringey	TQ 276 903 13.43	No	3-4	Pleistocene Lowestoft Till overlying Dollis Hill Gravel and Eocene London Clay formation cut by 'glacial gorges'. Site of discovery of glaciation this far south,

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
GLA 59	Pole Hill Waltham Forest	Waltham Forest	TQ 3835 9485 7.02	partially	4	Isolated London Clay Formation hillock capped by Claygate Member formally utilised for brick making. Meridian passes top marked by an obelisk. Public access
PS 1	Stanwell Upper Mill	Hillingdon	0405 7573	Yes	0	Landscaped ground
PS 2	Fairlop	Redbridge	4572 9072	Yes	0	Landscaped ground and Lake
PS 3	Ingrebourne Valley	Havering	5247 8312	Yes	0	Restored and landscaped, water feature
PS 4	Broadwater Farm	Hillingdon	044 895	Yes	0	Water filled
PS 5	Harmondsworth Lane	Hillingdon	0685 7755	Yes	0	Landfill Site
PS 6	Holloway Lane	Hillingdon	0670 7815	Yes	0	Landfill Site
PS 7	Feltham	Hounslow	0932 7232	Yes	0	Restored and landscaped; playing fields
PS 8	Chipstead Valley	Croydon	2898 5938	No	0	Developed – housing and gardens
PS 9	Springwell Lane Chalk Pit	Hillingdon	0441 9300	No	?	Did not obtain access, but worth investigating
PS 10	Harrow Hill	Harrow	1526 8667	No	?	Developed – housing and gardens
PS 11	Hangar Hill	Ealing	1818 8198	No	0	Old reservoir, now playing fields, nothing seen
PS 12	Wall Garden Farm	Hillingdon	0754 7808	Yes	0	Landfill Site
PS 13	Robbs Nurseries	Hillingdon	0439 7540	Yes	?	Gravel Pit for T5 development
PS 14	Heathside Sand and Gravel Pi	Bexley	5134 7385	Yes	0	Housing Estate
PS 15	Wickham Lane Brick Works	Greenwich	4615 7748	Yes	0	Developed – housing and gardens
PS 16	Upper College Farm Gravel Pit	Bexley	4905 7305	Yes	0	Restored and landscaped
PS 17	Gun Club	Bexley	510 740	Yes	0	Restored and landscaped
PS 18	Cranford Lane	Hillingdon	095 779	Yes	?	Active Sand and Gravel Pit; access not gained
PS 19	Harefield Halt	Hillingdon	0543 8707	Yes	0	Restored: water features
PS 20	Sipson Lane	Hillingdon	0819 7832	Yes	0	Landfill Site
PS 21	Bourne Wood Thanet Sand Quarry	Bromley	5023 6828	Yes	?	Active Sand Pit; access not gained
PS 22	Bedfont	Hounslow	0828 7219	Yes	0	Restored and landscaped; recreation ground
PS 23	Poyle	Hillingdon	0398 7619	Yes	0	Developed – M25
PS 24	Spout Lane	Hillingdon	0468 7519	Yes	0	Developed – reservoir?
PS 25	Lake at Peckham Rye Park	Southwark	3497 7499	No	?	Not visited; worth investigation
PS 26	Pinner Hill	Harrow	1075 9168	No	0	Housing and Golf course
PS 27	The Mount, Belmont	Harrow	1629 9107	No	0	Golf Course
PS 28	Broads Dock	Hillingdon	0775 7954	No	?	Water-filled Brickearth extraction site; access not gained
PS 29	Heathrow Airport	Hillingdon	0711 7574	No	?	Landscape feature – all of Heathrow Airport is built on Taplow Gravel Formation Terrace
PS 30	Tripcock Ness	Greenwich	4527 8098	No	?	Not visited; worth investigation

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
PS 33	New Cross Gate Cutting Nature Reserve	Lewisham	3635 7641	No	?	Not visited; site of major landslip
PS 32	St Andrew's Ch, Kingsbury	Brent	2064 8686	No	?	Not visited; worth investigating. Lynch Hill Gravel exposed?
PS 33	Mud flats near Gores Brook	Barking & Dagenham	4758 8209	No	?	Not visited; worth investigation. Active processes - mudflats
PS 34	Chelsea Creek	H&F	2577 7751	No	?	Railway line; no access
PS 35	Glebelands Local Nature Reserve	Barnet	2686 9102	No	?	Not visited; worth investigation
PS 36	Finchley cemeteries	Barnet		No	?	Jurassic fossils
PS 37	Biggin Hill Valley	Bromley		No	?	
PS 38	Cudham Valley	Bromley		No	?	
PS 39	Downe Valley	Bromley		No	?	
PS 40	Spring Park	Bromley	381 649	No	?	Water processes
PS 41	St Martin's Hill	Bromley		No	?	
PS 42	Top of North Downs	Bromley		No	?	View across Greensand Ridge
PS 43	Sandy Heath (Hampstead Heath)	Camden	270 865	No	?	Bagshot Formation: exposures and ponds caused by iron panning. Viewpoint. Geomorphology – spring lines, vegetation, slope
PS 44	Riddlesdown	Croydon		No	?	Dry Valley
PS 45	Whalebone Lane	Havering	487 893	No	?	Periglacial patterned ground
PS 46	Summerhouse Lane chalk pit	Hillingdon	044 918	Yes	?	Large chalk quarry. New housing but face and features still evident
PS 47	City of London Cemetery, Wanstead	Newham	423 863	No	?	Geology of building stones
PS 48	Wanstead Flats	Redbridge	405 865	No	?	Lynch Hill / Corbets Tey terrace surface
PS 49	Rotherhythe pingo	Southwark		No	?	Anglian ice-age pingo
PS 50	Leyton Flats (Snaresbrook Park)	Waltham Forest	393 889	No	?	Boyn Hill / Orsett Heath terrace surface
PS 51	Lesnes Abbey	Bexley	384 950	partially	3	Worth mentioning in Gazetteer for past flooding in Thames and building stones from Caen in Normandy
PS 52	Building Stones at UCL	Camden		No	2	Geology of building stones Included in Building London and ? worth mentioning in Gazetteer
PS 53	Radnor Crescent	Greenwich	4604 7743	Yes	4	Recommended as LIGS above as part of Wickham Lane Brickworks Complex
PS 54	Blackheath Pits	Greenwich		Yes	?	Harwich Formation, Blackheath Pebbles. Possible duplication with GLA 24. Need to assess which is the better.

Site No.	Site Name	Borough	NGR (all TQ)	Aggreg Site	GD Value	Comments
PS 55	Shooters Hill	Greenwich			3	Worth mentioning in Gazetteer as highest point in SE London with London Clay Formation capped by Claygate Member and capped by Stanmore Gravel. Section in Green Chain Geotrail.
PS 56	Kenley Station Chalk Pit	Croydon		Yes	?	Owned by Optical Services Ltd.
PS 57	Bronze Plaque to Ilford Mammoth, Mammal Ilford Methodist Church Hall	Redbridge	4371 8609	Commemorates find in former quarry	3	Worth gazetteer mention for importance of find in former gravel quarry. Unfortunately plaque has recently been stolen. (Already described by GeoEssex)
PS 58	Park Farm Boulder	Havering	4909 9375	No	?	Possibly the only sarsen stone in London, and may be worth Gazetteer mention; already described by GeoEssex but needs visiting by LGP
PS 59	Thames Barrier	Greenwich	?	No	3	Geological conditions for siting worthy of note in Gazetteer. Start point of Green Chain Geotrail. Story of flooding in Thames
PS 60	Richmond Park	Richmond	Large area	No	?	Black Park gravels already mentioned in GLA 25 Putney Heath but potential for Geotrail. Specific features need investigation
PS 61	Trafalgar Square	Westminster		No	3	Worth gazetteer mention for importance of finds of Pleistocene mammals (particularly hippo) in building excavations. Potential for geological interpretation within the Square.
PS 62	Bow Creek Meanders	Newham		No	3	Natural feature best viewed from the air. Worth gazetteer mention (already described by GeoEssex)

Appendix 2 - Site selection criteria

Site Type: Feature Selection criteria for features are given below:

CODE	DESCRIPTION	TRANSLATION
N_SECTION	NATURAL SECTION	Natural outcrop of one or more geological features forming a linear exposure (river section, cliff face, shoreline etc)
N_ EXPOSURE	NATURAL EXPOSURE	Natural outcrop of geological feature
N_ LANDFORM	NATURAL LANDFORM	Constructional or erosion geomorphological feature (valley, crevasse, dune, all Q features etc)
N_VIEW	NATURAL VIEW	Collection of geological features forming a landscape overview interpretation
A_ MINWORKS	ARTIFICIAL MINE WORKINGS	Feature produced by minerals/coal workings (adit, spoil, hush etc)
A_ QRYWORKS	ARTFICIAL QUARRY WORKS	feature produced by stone/aggregate workings (quarry, pit, waste dumps etc)
A_SECTION	ARTIFICIAL SECTION	section exposure created artificially by work to construct a road/track/path etc
A_EXCAV	ARTIFICIAL EXCAVATION	Artificially created exposure (excavation - not related to any of the above)
N_SAMPLE	Natural geological sample not in situ	Natural geological sample not in situ
A_SAMPLE	Manmade Artefact	Manmade Artefact

Site Type: Current use

Selection criteria for current use are given below:

CODE	DESCRIPTION	TRANSLATION
IN_USE	IN CURRENT USE	Feature still used for primary purpose (working quarry etc)as defiend by the FEATURE term
DISUSED	DISUSED	Feature no longer used for primary purpose and has no other current use
OPEN_CNTRY	OPEN COUNTRY	Feature on publicly accessible natural countryside with no unique use (mountains national park land etc)
PVTE_CNTRY	PRIVATE COUNTRY	Feature is on privately owned, natural countryside with limited/no public access (Estate land etc)
AGRIC_LAND	AGRICULTURAL LAND	Feature is used/forms part of land used for agricultural purposes (farm fields and grazing areas etc)
DOMESTIC	DOMESTIC LAND	Feature falls within the limits of private lands associated with dwellings (gardens, stately home grounds etc)
URBAN	URBAN	Feature is on publicly accessible lands (but not recreational lands) within the urban limits (allotments, road verges etc)
RECREATION	RECREATIONAL LAND	Feature is on land specifically designed or modified for recreational uses (parks, picnic areas etc)
MILITARY	MILITARY LAND	Feature is on MOD land or land used for military perposes
INDUSTRIAL	INDUSTRIAL LAND	Feature is on land used for industrial purposes (including waste land forming part of/owned by an industrial complex)
DISPOSAL	DISPOSAL USE	Feature is used or is on land used for waste disposal (quarries now used for land-fill etc)

Site Area

Entered where known. Generally large sites are usually more important than small sites as relationships between rock units are more likely to be demonstrated. They are also more able to withstand visitors, by diluting their pressure within a wider space.

Stratigraphy and Rock Types

The time units (chronostratigraphy), rock units (lithostratigraphy) and rock type (lithology) of the exposures present are given. Ideally, representative sections of the main formations present in the GLA area should be represented in the selected RIGS and LIGS sites.

Access and Safety

Access is an important consideration, particularly in areas of large urban populations where opportunities to experience the natural world are limited. Safety of access, Safety of exposure, Current condition, Current conflicting activities, Restricting conditions and Nature of exposure criteria are descriptive and for general guidance only. Field Leaders and teachers should prepare a separate risk assessment where required.

Cultural, Heritage and Economic

These criteria are taken from the UKRIGS system and include important associations with the cultural, historical and economic aspects of geodiversity. The rating scale used is 0 to 10, with 10 reflecting important associations providing excellent opportunities for raising public awareness. The criteria used are:

1. Historic, archaeological & literary associations
2. Aesthetic landscape
3. History of Earth Sciences
4. Economic geology

It is recognised that scoring systems are difficult to apply in practice (Scottt, 2007) and the values listed should be used as a general guide only.

GeoScience Rank

Geoscientific criteria are the key intrinsic attributes of a site or feature and the main reasons to justify conserving a site, even if it has restricted or no current access. A single site is unlikely to score highly on every criterion. Rarity and quality scores are combined into a single score in Appendix 5 site assessments. Ranking criteria are given below.

RARITY	**Rating**	
The abundance or significance of the feature of the site in the global context. Is the rarity such that the feature is one of only a few in the world, in the UK or in the regional area or is it one of many examples and only of reference or educational significance (because it is on the doorstep)?	10	World
	8	UK
	6	Regional
	4	Local (LGAP)
	2	Educational / Reference
	0	Not Present / Relevant

QUALITY	**Rating**	
The extent to which a feature is typical or demonstrates 'text-book' features. World class specimen or poor example?	10	World
	8	UK
	6	Regional
	4	Local (LGAP)
	2	Educational / Reference
	0	Not Present / Relevant

LITERATURE / COLLECTIONS	Rating	
The detail of written literature or material collections relating to the feature.	10	Detailed Studies
	8	Interpretations
	6	Descriptions
	4	Collected Material
	2	Referenced
	0	No Data

Potential use

The following attributes are available for selection:

- Research
- Higher/further education
- school education
- on-site interpretation
- on-site geotrail
- incorporated
- multidisciplinary

Fragility

The following attributes are available for selection:

- Geohazard (e.g. landslip risk)
- weathering/erosion
- natural overgrowth
- sample/fossil collecting
- dumping
- likelihood of development.

Current Site Value

Ranking criteria for these attributes are given below:

EDUCATIONAL VALUE	Rating	
The value of the site feature for educational fieldwork (including school, degree and adult education courses). Including 'relief sites' that may relieve pressure on other popular sites. Is it visited by UK-wide groups or local schools only?	10	UK Educational
	8	Regional
	6	Local area schools
	4	Local (walking distance) groups
	2	Little value
	0	No value

COMMUNITY VALUE	Rating	
The value of the site to local people as a local amenity including historical or cultural associations outside the geological significance. 'Local is defined as within walking or 10 min drive distance. Is the feature of the site used daily as common ground or rarely visited by the local community?	10	Detailed Studies
	8	Interpretations
	6	Descriptions
	4	Collected Material
	2	Referenced
	0	No Data

Geodiversity Value

Key sites in the Geodiversity network may represent unique or outstanding features or exceptional preservation and should be designated as a RIGS and protected for their specific scientific value. Such sites may have been considered for designation as SSSIs, but not fully met the requirements. Most sites of high specific scientific value will also have high assessed ratings for education and science and for cultural, heritage and economic aspects, but there may be exceptions. High-rating examples would include sites of the only exposure of a key horizon or feature, e.g. an unconformity, a basal conglomerate, a marine band, an ash band, a dyke, a highly fossiliferous bed, waterfall or other feature listed under Geoscientific Merit. Lower ratings are given to sites with locally more common or less well preserved features.

Geodiversity Value can be considered as an assessment of the importance of the site to the local network. Geodiversity Value may appear to be a rather subjective assessment. It should take into consideration an overview of other sites in the vicinity. Suggested scoring guides are:

- 0 – no specific scientific interest
- 5 – some specific scientific interest, the average for similar sites in the vicinity
- 10 – key site, showing unique or outstanding features, the best site in the vicinity

APPENDIX 3 - FIELD AUDIT RECORDING SHEET

LOCAL GEODIVERSITY ACTION PLAN (LGAP)
ASSESSMENT OF GEOLOGICAL SITES

LGAP

SCORER | DATE | OBSERVED?

SITE NAME | BNG

FEATURE
CURRENT USE
CURRENT DESIGNATION
DESIGNATED FOR

ACCESS

OWNERSHIP DETAILS

GEOLOGICAL DESCRIPTION

PHOTO

REFERENCES

CURRENT SITE VALUE
EDUCATIONAL
COMMUNITY

FRAGILITY
- ☐ GEOHAZARD
- ☐ WEATHERING / EROSION
- ☐ NATURAL OVERGROWING
- ☐ COLLECTING
- ☐ DUMPING
- ☐ DEVELOPMENT

NOTES

GEOLOGICALSCIENTIFIC MERIT

	RARITY	QUALITY	LITERATURE / COLLECTIONS	1st
LITHO-STRATIGRAPHY				
SEDIMENTOLOGY				
IGNEOUS / MINERALOGY / METAMORPHIC GEOLOGY				
STRUCTURAL GEOLOGY				
PALAEONTOLOGY				
GEOMORPHOLOGY				

NOTES

OTHER SCIENTIFIC FIELDS TO WHICH THIS SITE IS OF KNOWN IMPORTANCE
- ☐ BIOLOGY
- ☐ ARCHEOLOGY
- ☐ ECOLOGY
- ☐ OTHER _____

POTENTIAL USE
- ☐ RESEARCH
- ☐ HE / FE
- ☐ SCHOOL EDUCATION
- ☐ ONSITE INTERPRETATION
- ☐ ONSITE GEOTRAIL
- ☐ INCORPORATED
- ☐ MULTI-DISCIPLINARY

NOTES

FURTHER INFORMATION

LOCAL GEODIVERSITY ACTION PLAN (LGAP)

ASSESSMENT OF GEOLOGICAL SITES - RANKING CRITERIA

RARITY	The abundance or significance of the feature of the site in the global context. *Is the rarity such that the feature is on of only a few in the world, in the UK or in the regional area or is it one of many examples and only of reference or educational significance (because it is on the doorstep)?*	10 WORLD 8 UK 6 REGIONAL 4 LOCAL (LGAP) 2 EDUCATIONAL/ REFERENCE 0 NOT PRESENT/ RELEVANT
QUALITY	The extent to which a feature is typical or demonstrates 'text-book' features. *World class specimen or cruddy example?*	10 WORLD 8 UK 6 REGIONAL 4 LOCAL (LGAP) 2 EDUCATIONAL/ REFERENCE 0 NOT PRESENT/ RELEVANT
LITERATURE & DATA	The detail of written literature or material collections relating to the feature.	10 DETAILED STUDIES 8 INTERPRETATIONS 6 DESCRIPTIONS 4 COLLECTED MATERIAL 2 REFERENCE 0 NO DATA
EDUCATIONAL VALUE	The value of the site feature for educational fieldwork (including school, degree and adult education courses). Including 'relief sites' that may relieve pressure on other popular sites. *Is it visited by UK-wide groups or local schools only?*	10 UK EDUCATIONAL 8 REGIONAL 6 LGAP AREA SCHOOLS / HE 4 LOCAL (WALKING DIST.) GROUPS 2 LITTLE VALUE 0 NO VALUE
COMMUNITY VALUE	The value of the site to local people as a local amenity including historical or cultural associations outside the geological significance. Local is defined as within a 10 min drive or walking distance . *Is the feature of the site used daily as common ground or rarely visited by the local community.*	10 DAILY LOCAL USE 8 WEEKLY USE 6 MONTHLY USE 4 YEARLY USE 2 INFREQUENT USE 0 NO LOCAL USE

Access and safety	***Comments/ details***	
1 road access and parking		
2 safety of access		
3 safety of exposure		
4 Permission to visit		
5 Current condition		
6 current conflicting activities		
7 restricting conditions		
8 nature of exposure		
9 multiple exposure/ prospect for trail		
notes		
Culture, Heritage & Economic	**Comments**	**Assessed rating (circle one)**
1 historic, archaeological & literary associations		0 1 2 3 4 5 6 7 8 9 10
2 aesthetic		0 1 2 3 4 5 6 7 8 9 10
3 history of Earth Sciences		0 1 2 3 4 5 6 7 8 9 10
4 economic geology		0 1 2 3 4 5 6 7 8 9 10
notes		0 1 2 3 4 5 6 7 8 9 10
Geodiversity value	**Brief details**	**Assessed rating (circle one)**
Brief note on key specific interest (fuller details recorded separately)		0 1 2 3 4 5 6 7 8 9 10
Ratings: 1-2 very poor; 3-4 poor; 5-6 acceptable/useful; 7-8 quite good; 9-10 very good/ excellent; NA not applicable; DK don't know.		

Appendix 4 – GIS datasets used in geodiversity audit

Dataset	Format	Supplier
Earth science		
1:10k, 1:50k and 1:250k Digital Geology (DiGMapGB)	ESRI shape	BGS
BritPits database of Mines and Quarries	ESRI Shape	BGS
Geological Conservation Review sites (GCR)	Web table	JNCC
Earth Science Sites of Special Scientific Interest (SSSI)	ESRI Shape	Natural England
Regionally Important Geological and Geomorphological Sites (RIGS)	MS Word	South London RIGS Group
Geology Interest Parcels	ESRI Shape	GLA
Topography and landscape		
NEXTMap Britain DSM from radar altimetry, Hill Shade	Raster images	Intermap/BGS
1:250k, 1:50k, 1:25k, 1:10k topography, National Grid, Admin Meridian	Raster and vector	Ordnance Survey
Landscape Character Assessment	ESRI Shape	Natural England
Parks and Gardens	ESRI Shape	Natural England
Habitats, ecology and biodiversity		
World Heritage Sites	ESRI Shape	Natural England
Ramsar sites	ESRI Shape	Natural England
Special Protection Areas (SPAs)	ESRI Shape	Natural England
Special Areas of Conservation (SACs)	ESRI Shape	Natural England
Biological Sites of Special Scientific Interest (SSSI)	ESRI Shape	Natural England
Areas of Outstanding Natural Beauty (AONB)	ESRI Shape	Natural England
National Nature Reserves (NNR)	ESRI Shape	Natural England
Local Nature Reserves (LNR)	ESRI Shape	Natural England
Ancient and semi-natural woodland inventory	ESRI Shape	Natural England
Community Forests	ESRI Shape	Natural England
Woodland Trust Sites	ESRI Shape	Natural England
RSPB Reserves and Ornithological areas	ESRI Shape	Natural England
Doorstep Green and Millennium Green areas	ESRI Shape	Natural England
Archaeology		
Scheduled Ancient Monuments	ESRI Shape	English Heritage

Appendix 5 – Site assessment sheets

Sheets headed in orange are SSSIs, green denotes recommended RIGs and blue potential LIGS.

GLA 1 Abbey Wood	
Grid Reference: TQ 480 786	Site Type: Natural exposure
Site Area (hectares): 6.89	Current use: Recreational land
Site ownership: London Borough of Bexley	Borough: London Borough of Bexley
Field surveyor: Joanna Brayson	Date: 21st December 2007
Current geological designations: SSSI	Other scientific:

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Stratigraphy and Rock Types	
Time Unit: Eocene	Rock Unit: Lesnes Shell Bed (Blackheath Beds), Harwich Formation Thames Group
Rock Type: Sand and Gravel	Details: Glauconitic sandy clays and very fine grained glauconitic sands with a mainly marine fauna.
Time Unit: Paleocene	Rock Unit: Lambeth Group
Rock Type: Sand, silt and clay	Details: This clay seams overlain by grey clays and sands with Brackish fauna and interleaved red and variegated clays and sands.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: Glauconitic coated nodular flint at base, overlain by pale yellow-brown, fine-grained sand that can be clayey and glauconitic. Rare calcareous or siliceous sandstones.

Site Description

Abbey Wood contains some of the most fossiliferous deposits in the Greater London area providing remains of a diverse mammal assemblage of early Tertiary age. The deposits are also important for studies in the evolution of bird faunas.

The site covers deposits of early Eocene age (Lesnes Shell Bed within the Blackheath (Beds) Formation). Excavations of these Beds have yielded an important mammalian fauna of 46 species described by Jerry Hooker (2010), some of which have been described and the rest are under study. Additional species are still being added during most excavations. This is comparable to sites in the Paris Basin, and contains elements resembling those of the Wasatchian faunas of North America. Upnor Formation (latest Paleocene) and Thanet Sand Formation are present but the Woolwich Formation (early Eocene) is cut out by the unconformity at the base of the Blackheath beds which represents incised valley fill.

This site also yields remains of one of only two birds described from the Paleocene of Great Britain. A lower mandible has been reconstructed as the holotype of *Marinavis longirostris*, which is the only bird of this type known from this period. It appears to have been a large Procellariiform sea bird and would seem to indicate a coastal fauna. The site has great potential in that it might help solve the problem of Procellariiform - Pelecaniform ancestry.

Assessment of Site Value

Geodiversity topic: Palaeontology, sedimentology lithostratigraphy, evolution and palaeobiogeography.

Access and Safety

Aspect	**Description**
Safety of access	Paths run through the park and woods from the roadside. Fossil collecting site is situated a short distance from a path in the woods and surface collecintg is permitted. Fairly level and obstruction free.
Safety of exposure	Fossil collecting area consists of a flat fenced off area with an open entrance way. Safety procedures must be followed when excavating.
Permission to visit	The fossil beds can be visited at any time but excavation can only be carried out with prior permission. Important vertebrate material should be taken t a museum. Contact Bexley Parks and Open Spaces department on 020 8303 7777 or at parks&openspaces@bexley.gov.uk
Current condition	As a SSSI, the site is very well maintained by the park rangers.
Current conflicting activities	None.
Restricting conditions	Excavation and collecting of fossils only by prior permission. Feature only visible with excavation.
Nature of exposure	Flat fenced off area within woods within which Palaeontology of the Lesnes Shell Bed can be excavated from the sediment.

Culture, Heritage & Economic

Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	The park in which the SSSI is situated also contains the remains of Lesnes Abbey which was established in 1178. Much research has been carried out on the site.	10
Aesthetic landscape	The park provides an important green space within the local area.	8
History of Earth Sciences	Evolution of mammal and rare bird faunas; Procellariiform – Pelecaniform ancestry.	8
Economic geology	Within the park there was an old chalk quarry which is of local economic importance	4

GeoScientific Merit

Geomorphology	None within the SSSI.	0
Sedimentology	Sedimentary processes leading to preservation of fauna.	6
Palaeontology	Diverse mammalian assemblage; rare bird fauna.	7

Igneous/mineral/Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Junctions between three stratigraphic units lie within the area.	6
Potential use	Research, Higher/further education, School education, On-site interpretation.	
Fragility	Finite resource; natural overgrowing.	
Current Site Value		
Community	Area is used daily by the local community.	10
Education	This site is available for group use by a wide range of users.	8
Geodiversity value		
SSSI: Excellently maintained site with much research potential and educational value.		8

GLA 1 Abbey Wood

Fenced off Fossil Bed area within Abbey Wood site

Fenced of Fossil Bed area used by groups for excavation

GLA 2 Avenue House, Finchley

Grid Reference: TQ 25213 90296	Site Type: Natural Exposure
Site Area (hectares): 3.17	Current use: Recreational Land
Site ownership: Avenue House Estate Trust	Borough: London Borough of Barnet
Field surveyor: Joanna Brayson	Date: 13th May 2009
Current geological designations:	Other scientific:

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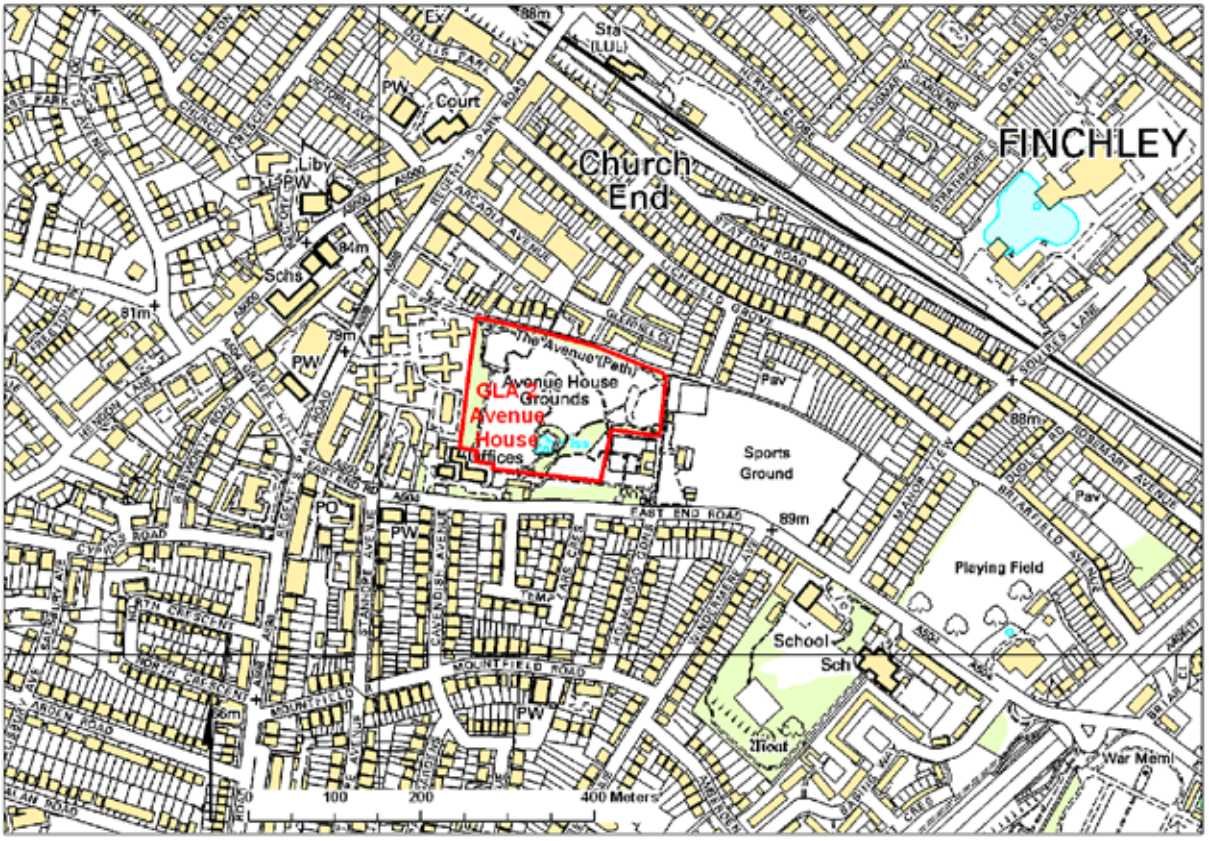

Stratigraphy and Rock Types

Time Unit: Quaternary	Rock Unit: Lowestoft Formation, Albion Glacigenic Group
Rock Type: Till	Details: Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content.

Site Description

Park area with pebbly clay exposures (Till) beneath trees and in temporary exposures. One of the most southerly exposures of till deposited by the largest of the Pleistocene glaciations, the Anglian, c.450,000 years.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy, sedimentology.

Access and Safety

Aspect	Description
Safety of access	Public park area, footpaths and open areas.
Safety of exposure	Some exposures adjacent to steps, care should be taken.
Permission to visit	Site has open access, contact Avenue House Estate Trust for information on access for groups. www.avenuehouse.org.uk
Current condition	Landscaped ground, exposures are small and mainly in wooded areas.

Current conflicting activities	Landscaping activities.	
Restricting conditions	Disturbance of grounds for further investigation would need permission.	
Nature of exposure	Patches of till in open areas between trees.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	The site is the grounds of a Victorian Mansion which has a rich history.	6
Aesthetic landscape	The park is very well maintained and well used by the community with wedding and other ceremonies being held in the house and grounds.	7
History of Earth Sciences	Relationship of various till units in Essex, East Anglia and the East Midlands.	8
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	None.	0
Sedimentary	Till composition.	5
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Correlation of till with other locations.	6
Potential use	On-site interpretation; research.	
Fragility	Natural overgrowing; landscaping.	
Geodiversity value		
Potential LIGS: Small exposures in area with good potential for information for local community.		3
GLA 2 Avenue House		

Till exposure in grounds of Avenue House Estate

GLA 3 Beckenham Place Park

Grid Reference: TQ 38534 70267	Site Type: Natural exposure
Site Area (hectares): 0.51	Current use: Recreational land
Site ownership: London Borough of Lewisham	Borough: London Borough of Lewisham
Field surveyor: Joanna Brayson	Date: January 2009
Current geological designations:	Other scientific:

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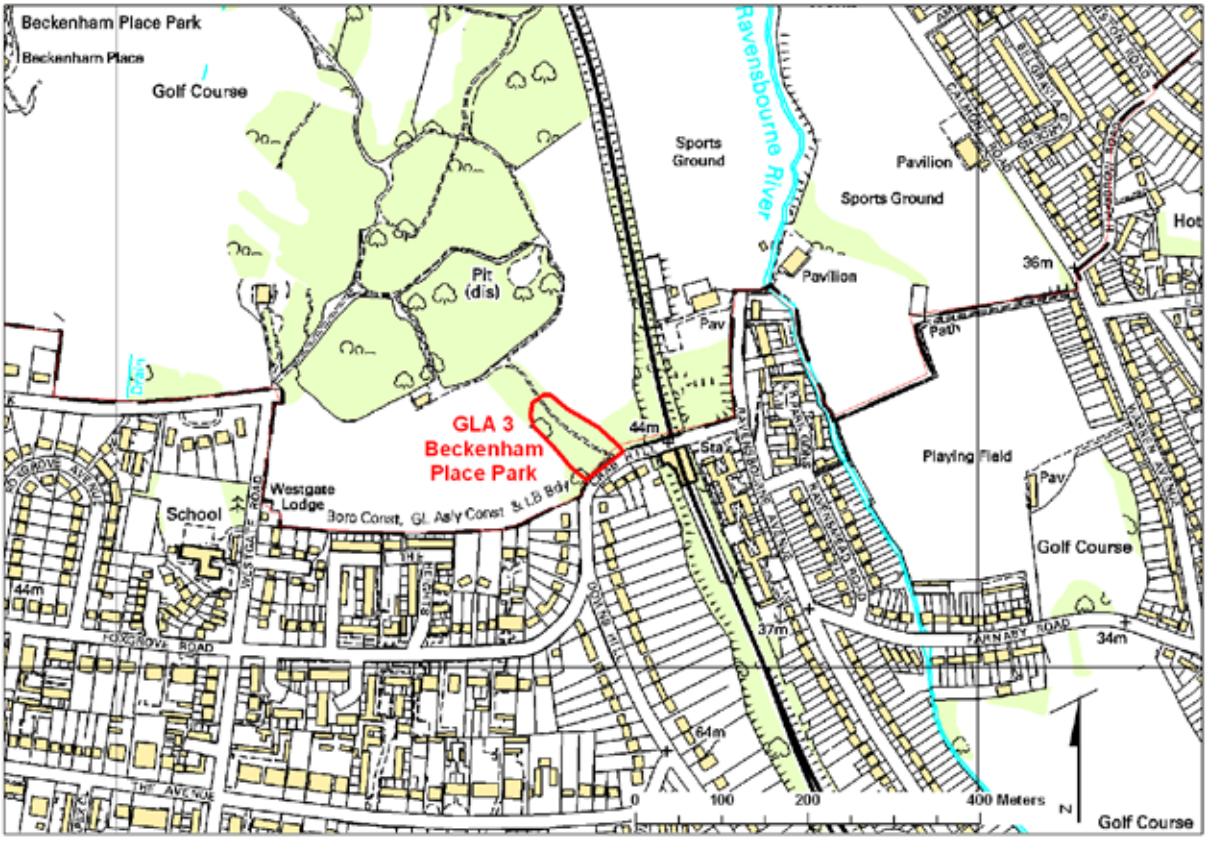

Stratigraphy and Rock Types	
Time Unit: Paleocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay and silt	Details: Fine, sandy, silty clay/ clayey silt. Glauconitic at base.
Time Unit: Paleocene - Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.

Site Description

Exposure of Harwich Formation (rounded flint pebbles with calcareous cement) near the entrance to the park.

Assessment of Site Value

Geodiversity topic: Sedimentology; lithostratigraphy.

Access and Safety

Aspect	Description
Safety of access	Exposures are either side of a Green Chain Walk within a public park.
Safety of exposure	Surrounding area is muddy, care should be taken near the exposures.
Permission to visit	Public space, contact Lewisham Borough for details.

Current condition	Good – leaf cover in autumn means exposures slightly covered, possibly also by vegetation in summer.	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Cemented blocks of rounded flint pebbles with calcerous cement near the entrance to the park.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	The park contains a Grade II listed Mansion which houses a golf club house.	4
Aesthetic landscape	Provides interesting entrance to park.	4
History of Earth Sciences	Cementation of conglomerate – environmental inferences.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Slope beside the path exposes small outcrops	4
Sedimentology	Depositional environment.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Correlation between outcrop and other outcrops of Harwich Formation.	6
Potential use	Research; higher further education; school education; on-site interpretation.	
Fragility	Natural overgrowing; weathering/erosion.	
Geodiversity value		
Recommended RIGS: Good exposure with easy access and good local facilities.		5
GLA 3 Beckenham Place Park		

Harwich Formation boulders and outcrop

GLA 4 Chelsfield Gravel

Grid Reference: TQ 476 642	Site Type: Natural exposure
Site Area (hectares): 9.55	Current use: Recreational land/ agricultural land
Site ownership: Court Lodge Farm	Borough: London Borough of Bromley
Field surveyor: Joanna Brayson	Date: 21st February 2008
Current geological designations:	Other scientific:

Site Map

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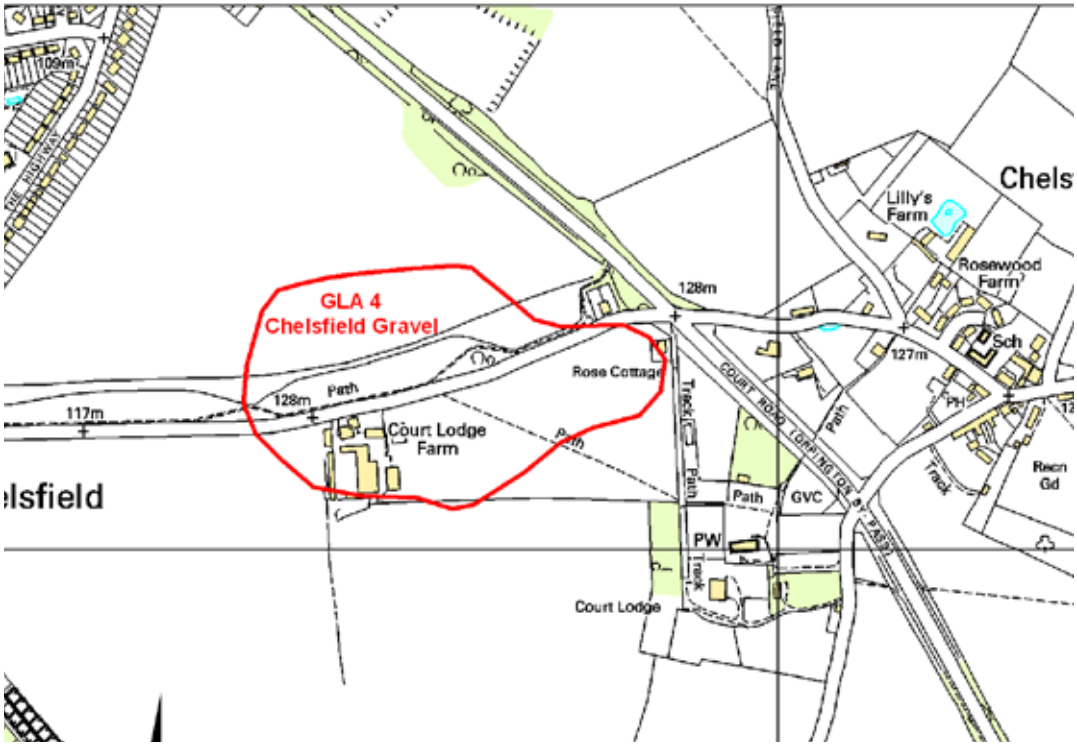

Stratigraphy and Rock Types

Time Unit: Pliocene - Pleistocene	Rock Unit: Chelsfield Gravel Formation, Residual Deposits Group
Rock Type: Sand and gravel	Details: Well rounded flint pebble gravels, sandy gravels, pebbly sands and sands. Lithologies similar to those in Harwich Formation (formerly Blackheath Beds) from which it is thought to have been mainly derived.

Site Description

This is the type locality for the Chelsfield Gravel which has been reworked from the Harwich Formation. The deposit is interpreted as a head, partly let down with the underlying Thanet Sand into dissolution hollows in the Chalk below.

This outcrop covers an area of grassy footpaths frequented by dog walkers who use the nearby station car park. It also extends into farmland on either side which is where the gravel can be seen in ploughed fields. A viewpoint of the local area is situated at the edge of the open area. The Chelsfield Gravel can be viewed from here and geological information could be added to the existing sign.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology.

Access and Safety

Aspect	Description
Safety of access	Footpaths leading to site from car park. Part of exposure across main road, caution should be taken crossing road.
Safety of exposure	Exposure in ploughed fields on/adjacent to public footpaths. Be aware of farm machinery.
Permission to visit	Access to some of the site is open, contact farm for access to remainder of site.

Current condition	Mostly grassed over or part of ploughed fields. Disturbed where ploughed.	
Current conflicting activities	Farming.	
Restricting conditions	Site partially on working farmland.	
Nature of exposure	Gravel seen in ploughed fields.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	This is a newly defined unit as described in The Geology of London (Ellison 2004)	2
Aesthetic landscape	Located within public footpath area – well used by public.	6
History of Earth Sciences	Evidence of the erosion and re-working of the Harwich Formation.	4
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Distribution of deposit along with the Thanet Sand in hollows of the underlying Chalk.	6
Sedimentology	Reworking of Harwich Formation – surface processes.	6
Palaeontology	None.	0
Igneous/mineral/Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship between bedrock and superficial deposits.	6
Potential use	Research; Higher Education; School Education; On-site Interpretation	
Fragility	Natural overgrowing; weathering/erosion.	
Current Site Value		
Community	Valuable open space for the local community.	10
Education		3
Geodiversity value		
Recommended RIGS: Only exposure of this local deposit with good access.		5
GLA 4 Chelsfield Gravel		

View of feature forming edge of Chelsfield Gravel outcrop

GLA 5 Chingford Hatch

Grid Reference: TQ 38271 92594	Site Type: Natural Landform
Site Area (hectares): 17.87	Current use: Recreational Land
Site ownership: London Borough of Waltham Forest	Borough: London Borough of Waltham Forest
Field surveyor: Joanna Brayson	Date: 7th December 2010
Current geological designations:	Other scientific:

Site Map

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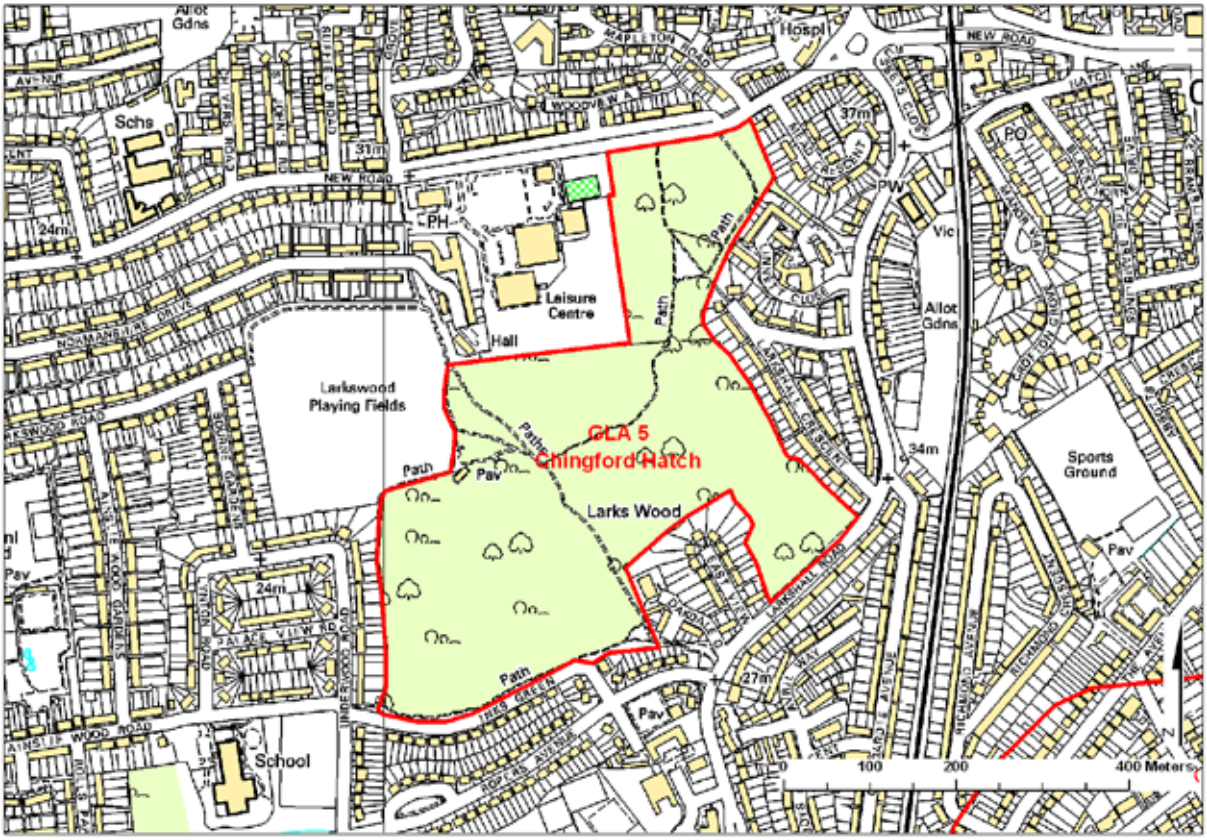

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Woodford Gravel Formation
Rock Type: Sand and gravel	Details: Sand and gravel, locally with lenses of silt, clay or peat and organic material.
Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt. Glauconitic at base.

Site Description

A London Clay hillock in woodland (Larks Wood) near Chingford Hatch with a capping of Woodford Gravel. The Woodford Gravel has been interpreted as the river terrace deposits of south-bank tributaries of the ancestral Thames. The gravel consists of angular flint (83%), rounded flint (14%), quartz (1%) and Lower Greensand Chert (1%) and is 3–4 m thick.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology.

Access and Safety

Aspect	Description
Safety of access	Footpaths through woodland.
Safety of exposure	Exposure in woodland – observe general safety in woodlands.

Permission to visit	Open access.	
Current condition	Ok – exposures small and scattered.	
Current conflicting activities	None.	
Restricting conditions	Trees and Leaf cover in autumn.	
Nature of exposure	Small exposures in woodland.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Mentioned in London Borough of Waltham Forest information.	2
Aesthetic landscape	Footpaths through woods used by local community.	4
History of Earth Sciences	Distribution of gravels used to determine location and behaviour of ancestral Thames.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Distribution of exposures of Woodford Gravel used to determine location relative to ancestral Thames.	6
Sedimentology	Research into composition of the gravels could give more information on the provenance of the gravels and therefore the river that deposited them.	6
Palaeontology	None.	0
Igneous/mineral/Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship of river terrace deposits.	6
Potential use	Research; further education; on-site interpretation.	
Fragility	Dumping; natural overgrowing; weathering/erosion.	
Current Site Value		
Community	Valuable green space.	8
Education		2
Geodiversity value		
Potential LIGS: Small exposures with reasonable access for local community.		4
GLA 5 Chingford Hatch		

Chingford Hatch

GLA 6 Croham Hurst

Grid Reference: TQ 338 630	Site Type: Natural exposure
Site Area (hectares): 34.57	Current use: Recreational land
Site ownership: London Borough of Croydon	Borough: London Borough of Croydon
Field surveyor: Joanna Brayson	Date: April 2010
Current geological designations:	Other scientific: SSSI (Bio)

Site Map

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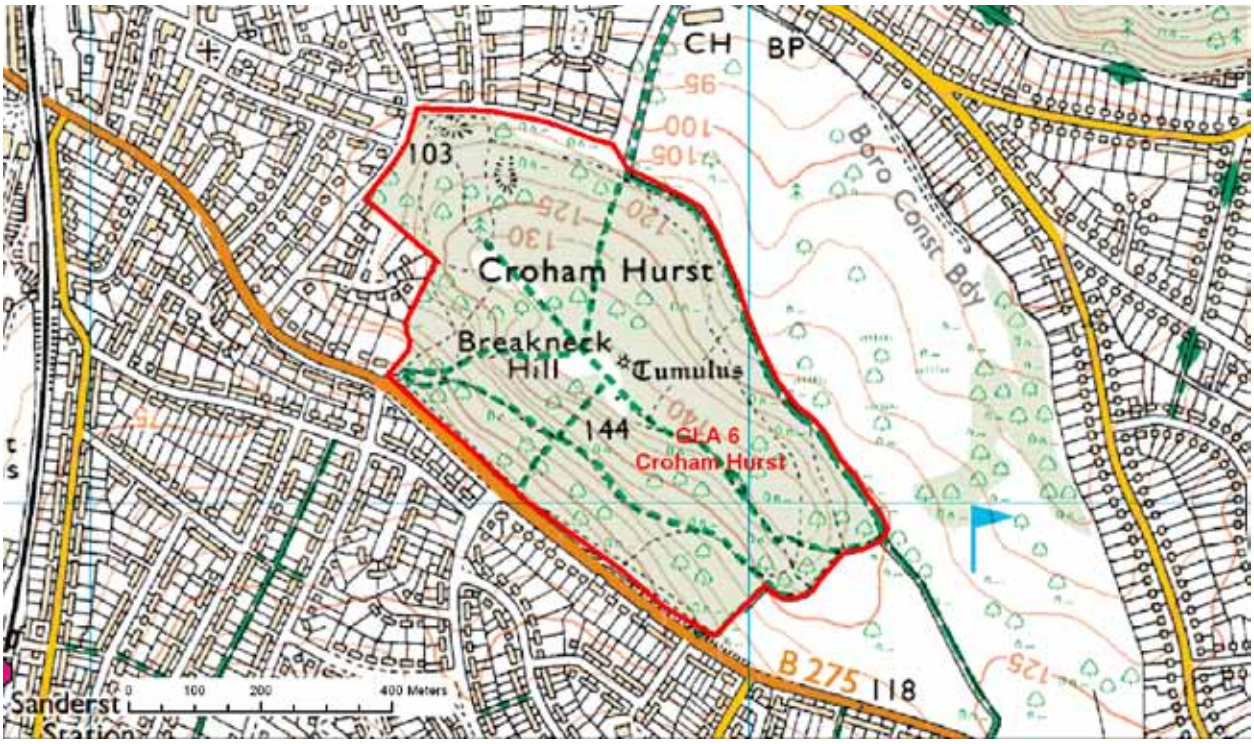

Stratigraphy and Rock Types

Time Unit: ~~Paleocene/~~Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.
Time Unit: Paleocene	Rock Unit: Lambeth Group
Rock Type: Sand and gravel	Details: Glauconitic sands overlain by grey clays and sands with Brackish fauna and interleaved red and variegated clays and sands.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: Glauconite-coated, nodular flint at base, overlain by pale yellow-brown, fine-grained sand that can be clayey and glauconitic. Rare calcareous or siliceous sandstones.
Time Unit: Cretaceous	Rock Unit: Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated, Chalk Group
Rock Type: Chalk	Details: Chalk

Site Description

Small exposures of calcite cemented rounded flint pebbles belonging to the Harwich Formation can be found at the top of this steep inlier. Evidence of chalk and Thanet Formation can also be found in landslips, animal holes, eroded surfaces and in fallen tree roots. The disused Chalk and Thanet Sand quarries are rather overgrown. Although the Lambeth Group should also be visible, it has been very elusive and it is possible that the Blackheath Beds are within a channel that has cut it out, at least for much of the hill. There is an information board erected by Croydon Natural History and Scientific Society showing the location of the disused quarries and outcrops. A leaflet is also published with the same map but with the addition of a section.

Assessment of Site Value		
Geodiversity topic: Sedimentology; lithostratigraphy, geomorphology.		
Access and Safety		
Aspect	**Description**	
Safety of access	Footpaths through woods. Slippery in autumn with leaf cover.	
Safety of exposure	As above.	
Permission to visit	Open access, check with local borough for organised visits.	
Current condition	Patchy exposures, hard to find in autumn due to leaf cover.	
Current conflicting activities	None.	
Restricting conditions	Small exposures in woods.	
Nature of exposure	Small exposures on floor of woodland.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Evidence of a Mesolithic settlement and occupation up until Bronze age burials.	6
Aesthetic landscape	Valuable green space.	6
History of Earth Sciences	Boundaries between 4 different formations are located at this site, excavation could provide information on these formations and their boundaries.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Shape of hill due to the properties of different formations.	6
Sedimentology	Depositional environment of 4 different formations.	6
Palaeontology	Possible in the chalk if excavated.	6
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationships between 4 formations.	8
Potential use	Research; higher education; on-site interpretation.	
Fragility	Natural overgrowing; weathering/erosion.	
Current Site Value		
Community	Valuable green space.	10
Education		4
Geodiversity value		
Recommended RIGS: Small exposures of a range of lithologies in woodland with adequate access.		6
GLA 6 Croham Hurst		

Exposure within woodland

GLA 7 Crystal Palace Geological Illustrations

Grid Reference: TQ 34553 70539	Site Type: Man-made artefact
Site Area (hectares): 5.37	Current use: Recreational land
Site ownership: London Borough of Bromley	Borough: London Borough of Bromley
Field surveyor: Joanna Brayson	Date: November 2011
Current geological designations:	Other scientific: Listed building Grade I

Site Map

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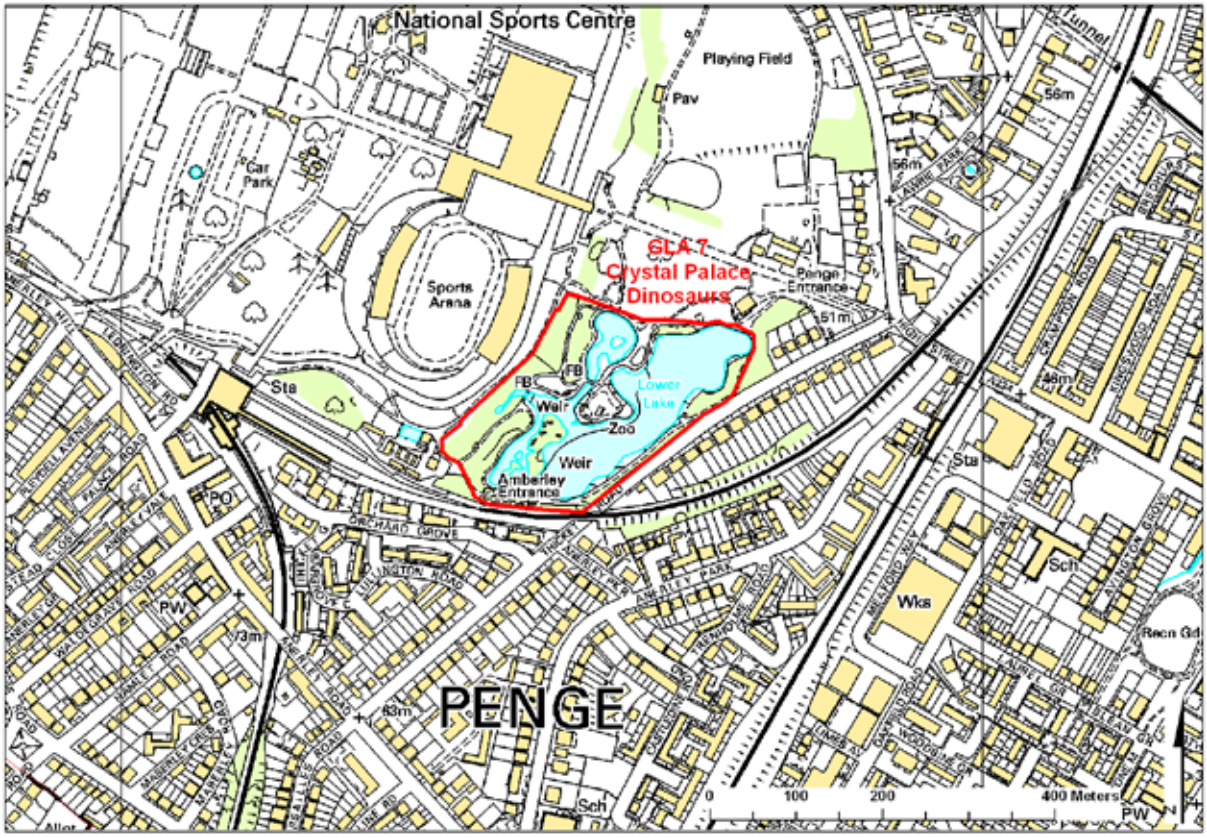

Stratigraphy and Rock Types

Time Unit: N/A	Rock Unit: N/A
Rock Type: N/A	Details: N/A

Site Description

The Crystal Park Dinosaurs are located at the southern edge of Crystal Palace park. They were designed and sculpted by Benjamin Waterhouse Hawkins between 1852 and 1854 under advice from Sir Richard Owen. The collection includes 15 complete species of dinosaurs and mammals, although more had been planned until funding was cut. The models are now known to be largely inaccurate due to a lack of information at the time of design.

Several periods of neglect and movement lead to the models becoming damaged. A full restoration project was completed in 2002 and the site now has excellent footpaths and explanatory signs. The new signs give information about the models and how modern interpretations of the creatures differ to the models and are available as an iphone app and on the internet. The animals are set on strata of appropriate age.

There are also two man-made exposures illustrating geological resources.

Assessment of Site Value

Geodiversity topic: Palaeontology, geology

Access and Safety

Aspect	Description

Safety of access	Very good – pathways suitable for wheelchairs. Fencing around lakes.	
Safety of exposure	Models are viewed from pathways.	
Permission to visit	Public park, access during park opening hours.	
Current condition	Recently restored (2002) – excellent.	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Extinct dinosaur and mammal models with descriptions and additional information within a public park.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Historic models.	8
Aesthetic landscape	Situated in a well used public park, well maintained.	8
History of Earth Sciences	History of palaeontology, highlights the increase in information since the models were made but also the interest in Geology at the time.	8
Economic geology	Man-made illustrative sections explaining economic geology.	8
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Man-made illustrative models explaining sedimentation in relation to economic geology.	8
Palaeontology	Dinosaur models.	8
Igneous/mineral/ Metamorphic Geology	Some aspects of illustrative sections illustrate metamorphism.	6
Structural Geology	Faults are illustrated in the man-made sections.	6
Lithostratigraphy	Illustrated in the man-made sections.	6
Potential use	School education; on-site interpretation (already present).	
Fragility	Needs continuous care and maintenance.	
Current Site Value		
Community	Valuable open space used everyday.	10
Education	Excellent introduction to geology and palaeontology.	8
Geodiversity value		
Recommended RIGS: Excellent educational site accessible and interesting to all age groups.		8
GLA 7 Crystal Palace Dinosaurs		

Anoplotherium models

GLA 8 Dog Rocks

Grid Reference: TQ 44301 77916	Site Type: Natural Exposure
Site Area (hectares): 0.02	Current use: Recreational land
Site ownership: London Borough of Greenwich	Borough: London Borough of Greenwich
Field surveyor: Joanna Brayson	Date: Summer 2011
Current geological designations:	Other scientific:

Site Map

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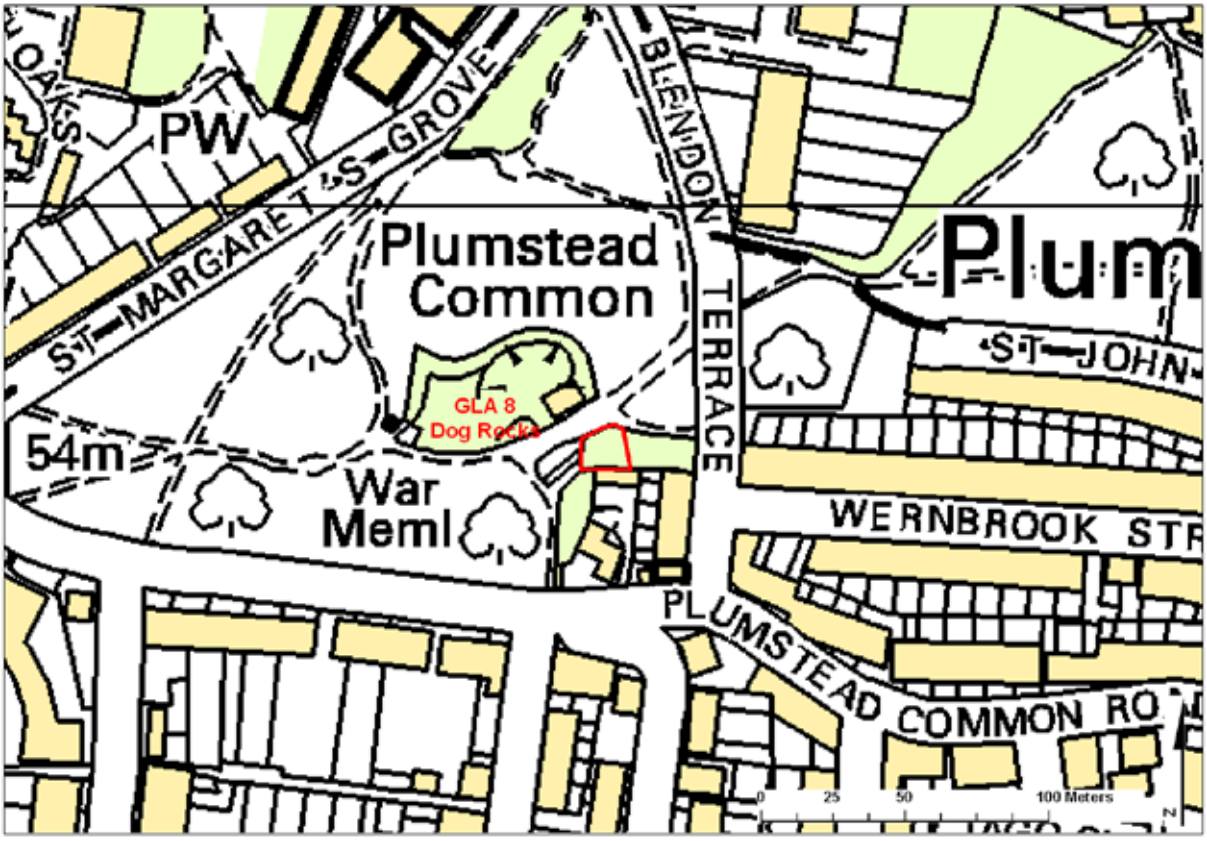

Stratigraphy and Rock Types

Time Unit: Paleocene/Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.

Site Description

Large boulders of Harwich Formation in a public park in the shrubbery opposite the entrance to the Adventure Playgorund. The boulders consist of rounded flint pebbles with a calcareous cement and are named Dog Rocks for their similarity in silhouette. The steep bank crossing the common here is one side of a former quarry and the blocks were probably put on one side by the quarry men.

Assessment of Site Value

Geodiversity topic: Sedimentology.

Access and Safety

Aspect	Description
Safety of access	In public park, adjacent to footpath.
Safety of exposure	Boulders stable.
Permission to visit	Open access.

Current condition	Exposure has suffered from graffiti.	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Boulders in public park.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	None.	0
Aesthetic landscape	Valuable open space.	6
History of Earth Sciences	Environment of deposition and history – cementation.	4
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Deposition and cementation of the Harwich Formation.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Position of exposure within Harwich Formation.	6
Potential use	School education; on-site interpretation.	
Fragility	Weathering/erosion; vandalism.	
Current Site Value		
Community	Area used by local community everyday.	10
Education		4
Geodiversity value		
Recommended RIGS: Good exposure in an urban area; suffers from vandalism.		5

GLA 8 Dog Rocks

Dog Rocks (Harwich Formation)

GLA 10 Dulwich Mill Pond

Grid Reference: TQ 333 731	Site Type: Natural landform
Site Area (hectares): 0.45	Current use: Private land
Site ownership: Dulwich Estates	Borough: London Borough of Southwark
Field surveyor: Joanna Brayson	Date: 18th January 2008
Current geological designations:	Other scientific: Borough Grade II (Bio)

Site Map

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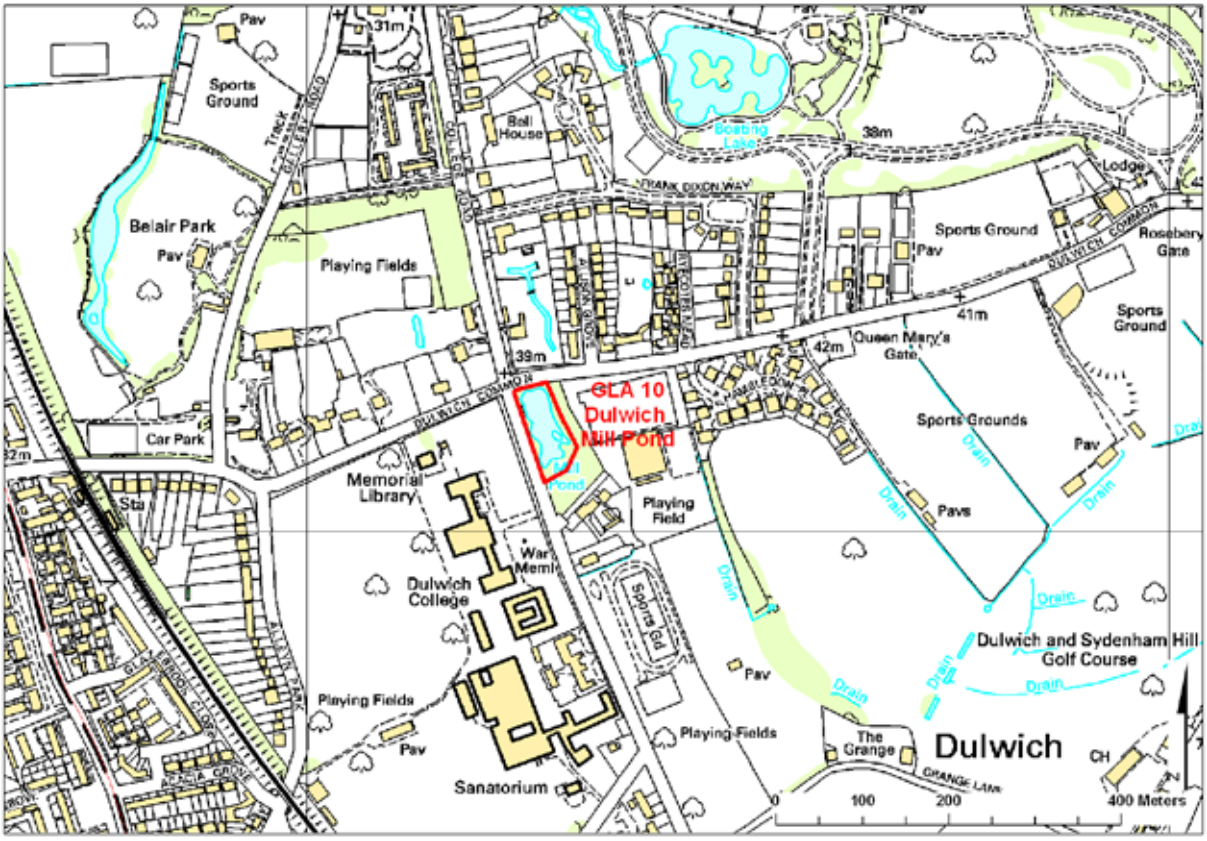

Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group.
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/clayey silt. Glauconitic at base.

Site Description

A mill pond adjacent to Dulwich College. This pond is one of the few remaining traces of the River Effra stream system in Southwark.

Assessment of Site Value

Geodiversity topic: Geomorphology

Access and Safety

Aspect	Description
Safety of access	At roadside.
Safety of exposure	Pond itself is fenced off.
Permission to visit	Unable to access pond itself but clearly visible from roadside.
Current condition	Good.
Current conflicting activities	None.

Restricting conditions	None.	
Nature of exposure	Pond.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Oldest mill pond in area.	4
Aesthetic landscape	Pleasant water feature in relatively built up area.	6
History of Earth Sciences	Evidence of previous stream system.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Remnant of old stream system – gives information of areas drainage patterns.	8
Sedimentology	None.	0
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	None.	0
Potential use	On-site interpretation; school education.	
Fragility	Protected as Borough Grade 2 site.	
Current Site Value		
Community	Site is fenced off but can be seen from pavement.	2
Education		2
Geodiversity value		
Potential LIGS: Only remnant of stream system with poor access (seen from roadside).		4
GLA 10 Dulwich Mill Pond		

Dulwich Mill Pond

GLA 12 Finsbury Gravel, Sadler's Wells

Grid Reference: TQ 31470 82811	Site Type: Natural exposure
Site Area (hectares): 0.23	Current use: Recreational land
Site ownership: London Borough of Islington	Borough: London Borough of Islington
Field surveyor: Joanna Brayson	Date:Summer 2009
Current geological designations:	Other scientific:

Site Map

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Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Finsbury Gravel Member, Maidenhead Formation, Thames Catchments Subgroup
Rock Type: Sand and gravel	Details: Sand and gravel, locally with lenses of silt, clay or peat.

Site Description

Small park area with gravel in borders. The Finsbury Gravel may be related to a phase of deposition of the Lynch Hill Gravel close to the confluence of the rivers lea and Thames. Site of Islington Spa, famous for chalybeate water from the gravels.

Assessment of Site Value

Geodiversity topic: Sedimentology; Lithostratigraphy, water source.

Access and Safety

Aspect	Description
Safety of access	In public park – footpaths.
Safety of exposure	Exposure adjacent to and level with paths.
Permission to visit	Open space – contact Islington Borough Greenspace division on 020 75274953.
Current condition	Landscaped, possibly disturbed.

Current conflicting activities	Landscaping.	
Restricting conditions	None.	
Nature of exposure	Exposures in borders of park.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Site of Islington Spa. Highlights importance of the gravels as a source of water for early development.	0
Aesthetic landscape	Park of valuable open space.	6
History of Earth Sciences	Evolution of local river systems. Influence of geology on development.	6
Economic geology	Water and associated tea gardens and spa	0
GeoScientific Merit		
Geomorphology	Position of gravels – reconstruct river systems. Thames terrace (100')	6
Sedimentology	Environment of deposition, provenance.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship between different terrace gravels.	6
Potential use	Research; school education; on-site interpretation.	
Fragility	Natural over-growing.	
Current Site Value		
Community	Local community pass through site everyday.	10
Education		4
Geodiversity value		
Potential LIGS: Very small exposures in small park in urban area. Important Islington water story		3
GLA 12 Finsbury Gravel		

Exposure of gravel in borders

GLA 14 Gilbert's Pit

Grid Reference: TQ 418 786	Site Type: Former quarry works
Site Area (hectares): 5.35	Current use: Private (within recreational land)
Site ownership: London Borough of Greenwich	Borough: London Borough of Greenwich
Field surveyor: Joanna Brayson	Date: 3rd January 2008
Current geological designations: SSSI	Other scientific:

GLA 14

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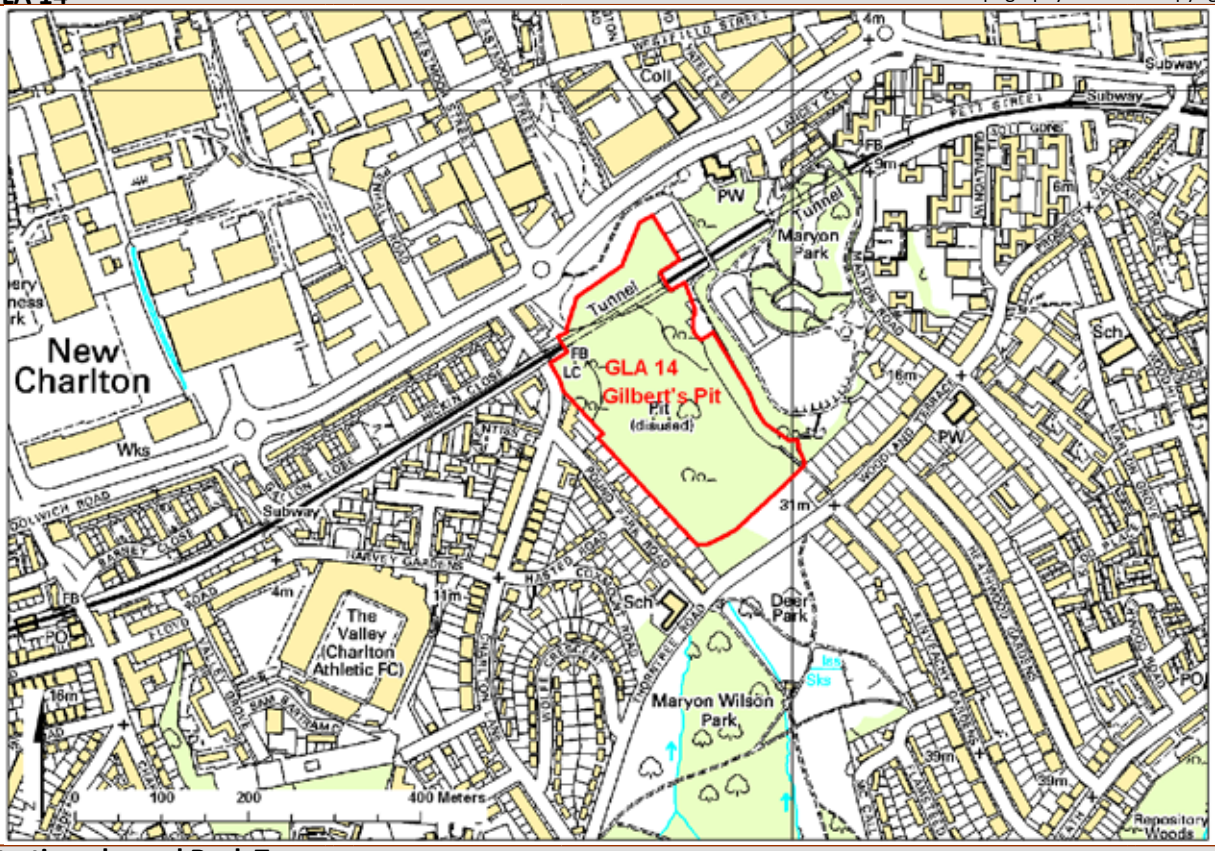

Stratigraphy and Rock Types

Time Unit: Paleocene/Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.
Time Unit: Paleocene	Rock Unit: Woolwich and Reading Formations, Lambeth Group
Rock Type: Sand and gravel	Details: Glauconitic sands overlain by grey clays and sands with Brackish fauna and interleaved red and variegated clays and sands.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: Glauconite-coated, nodular flint at base, overlain by pale yellow-brown, fine-grained sand that can be clayey and glauconitic. Rare calcareous or siliceous sandstones. Not now visible without digging.

Site Description

Gilbert's Pit provides one of the most complete sections through Palaeogene beds in the Greater London area. It forms a key Tertiary site for stratigraphic studies and is particularly important for a palaeographic reconstruction of the Woolwich and Reading Formations.

The site covers a disused pit cut into a sequence of Palaeogene sediments dating from approximately 55 millions years ago. Faces are present on the eastern and southern sides and rise to over 20 metres above the pit floor. A narrow causeway separates the eastern and southern exposures from an abutting face of a second pit at Maryon Park.

The faces formerly provided a sequence from the Chalk, through the overlying Thanet Sand Formation and Woolwich Formation. Now only the Lambeth Group and capping of Blackheath Beds are visible. Some of the beds are highly fossiliferous, yielding mollusc, rare fish, plant and reptile remains. The Woolwich Formation in particular is noted for an abundant but very low-diversity brackish water molluscan fauna. These beds also contain a number of named subdivisions which include the Woolwich Shell Bed and Striped Loams (leaf-bed of Lewisham).

The site has attracted scientific study for over 120 years and a substantial amount of literature has been published on the various geological features present. The fossil fauna has been described in particular detail.

Assessment of Site Value

Geodiversity topic: Palaeontology; sedimentology; lithostratigraphy.

Access and Safety

Aspect	Description
Safety of access	Access to actual site is restricted but site can be viewed from footpaths adjacent to fenced off area.
Safety of exposure	Exposure unstable and steep.
Permission to visit	Entry to fenced off area via Greenwich Greenspace Ranger. Gate at North end of site.
Current condition	Vegetation and slumping obscure the faces of the pit.
Current conflicting activities	Lack of maintenance.
Restricting conditions	Controlled access.
Nature of exposure	Old pit faces, fenced off, with information board.

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	Many	8
Aesthetic landscape	Highest point of site provides excellent view over much of Greater London. Also part of the Green-chain network of footpaths.	7
History of Earth Sciences	Environment of deposition.	6
Economic geology	Sand from the pit was used for glass making and for the Woolwich Arsenal.	5

GeoScientific Merit

Geomorphology	None.	0
Sedimentology	Various formations – sedimentary environments.	8
Palaeontology	Highly fossiliferous beds.	8
Igneous/mineral/ Metamorphic Geology		0
Structural Geology		0
Lithostratigraphy	Succession of formations at one site.	8
Potential use	Research; higher further education; school education; on-site interpretation; on-site geotrail.	
Fragility	Natural overgrowing; geohazard; weathering/erosion.	

Current Site Value

Community	Site passed by on a daily basis.	10
Education	Particularly important for engineers to learn about the nature of the Lambeth Group.	8

Geodiversity value

SSSI: Excellent exposure of several lithologies with economic history. Information signs already present. Great potential for research and site improvement allowing further uses.	8

GLA 14 Gilbert's Pit

Slumped material viewed from top of site (left). Information sign in front of slumped material (right)

GLA 15 Hainault Forest Country Park

Grid Reference: TQ 47507 92940	Site Type: Natural exposure
Site Area (hectares): 119.45	Current use: Recreational land
Site ownership: London Borough of Redbridge	Borough: London Borough of Redbridge
Field surveyor: Joanna Brayson	Date: 3rd May 2011
Current geological designations:	Other scientific:

Site Map

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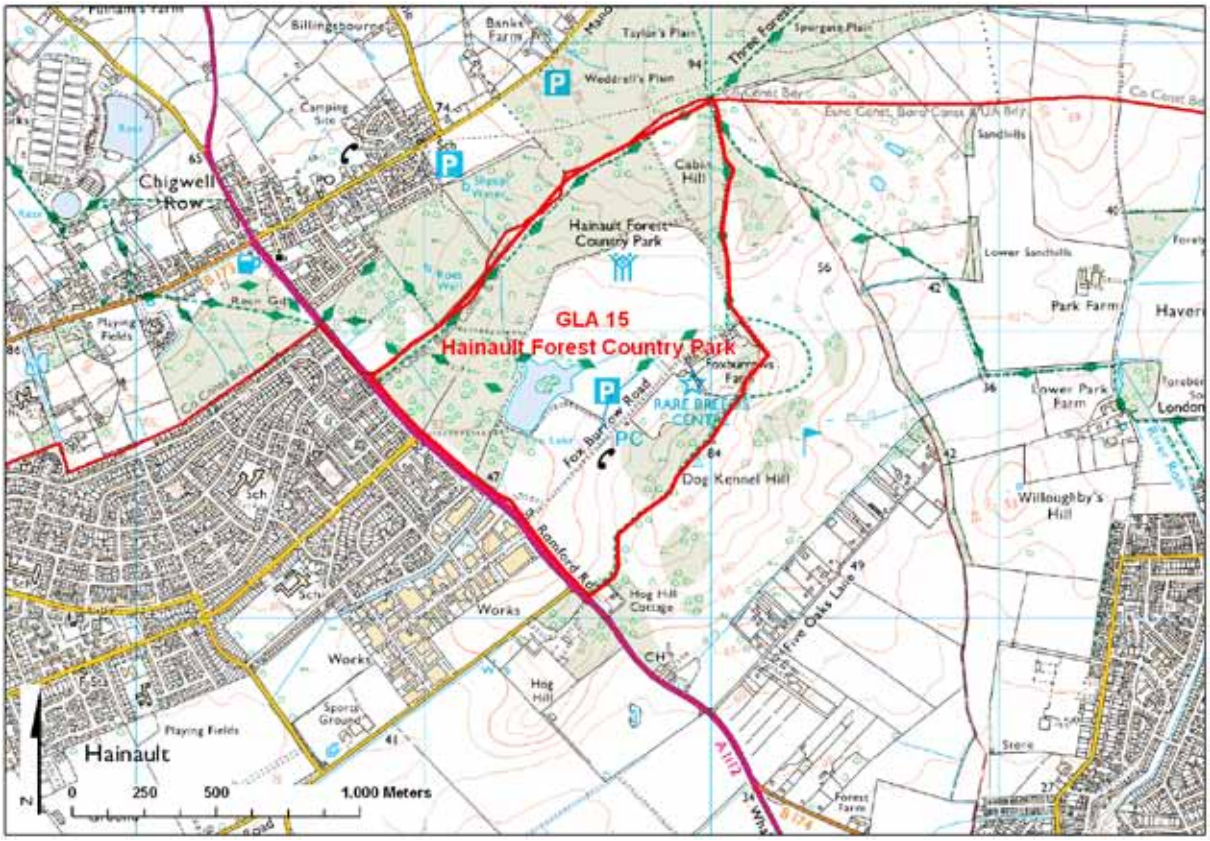

Stratigraphy and Rock Types

Time Unit: Quaternary	Rock Unit: Head
Rock Type: Clay, silt, sand and gravel	Details: Polymict deposit comprising poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep.
Time Unit: Quaternary	Rock Unit: Lowestoft Formation, Albion Glacigenic Group
Rock Type: Till	Details: Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content.
Time Unit: Eocene	Rock Unit: Bagshot formation, Claygate Member, London Clay Formation, Bagshot sand
Rock Type: Sand, silt and clay	Details: Interbedded fine-grained sand, silt and clay.
Time Unit: Eocene	Rock Unit: London Clay Formation
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/clayey silt. Glauconitic at base.

Site Description

Large public park showing the geomorphology of Claygate Member capped London Clay. Cabin Hill offes a large variety of rock types. At the base, in the valley between Cabin Hill and Dog Kennel Hill, the lake lies at the lowest point, about 50m OD, in London Clay, surrounded by 'head' which extends up the small streams that run into the lake. On th elower part of the hill the London Clay is overlain by 'Glacial Gravel' which in turn is overlain by till deposited during the Anglian Glaciation. Towarsds the top of the hill, the top of the London Clay Formation remains briefly unburied by the gravel and till but this is the sandier facies known as the Claygate Beds. Above this the variable sands and gravels of the Bagshot Formation cap the hill with 2 very small patches of Pre-Anglain Stanmore Gravel lying at the summit (both in Essex).

Assessment of Site Value

Geodiversity topic: Geomorphology; Lithostratigraphy.

Access and Safety

Aspect	**Description**
Safety of access	Large open space with footpaths, some suitable for wheelchairs.
Safety of exposure	No specific exposure.
Permission to visit	Open access, check with park rangers before group visits.
Current condition	Well maintained as open space.
Current conflicting activities	None.
Restricting conditions	None.
Nature of exposure	No specific exposure – geomorphology.

Culture, Heritage & Economic

Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	None.	0
Aesthetic landscape	Valuable open space.	8
History of Earth Sciences	Weathering and erosion of London Clay Formation/Claygate member to current landscape.	4
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Landscape in relation to underlying geology.	6
Sedimentology	Underlying geology.	4
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship between the London Clay and the Claygate Member.	6
Potential use	Higher further education; school education; on-site interpretation; on-site geotrail.	
Fragility	Weathering/erosion; natural overgrowing.	
Current Site Value		
Community	Site well used by local people for dog walking, jogging, family outings etc.	10
Education		4
Geodiversity value		
Potential LIGS: Good feature in country park very well used by local community.		4
GLA 15 Hainault Forest Country Park		

View of hills topped with Claygate Member, London Clay Formation

GLA 17 Happy Valley

Grid Reference: TQ 30447 57673	Site Type: Natural Landform
Site Area (hectares): 142.21	Current use: Recreational land
Site ownership: London Borough of Croydon	Borough: London Borough of Croydon
Field surveyor: Joanna Brayson	Date: 18th January 2008
Current geological designations:	Other scientific: SSSI (Bio)

Site Map

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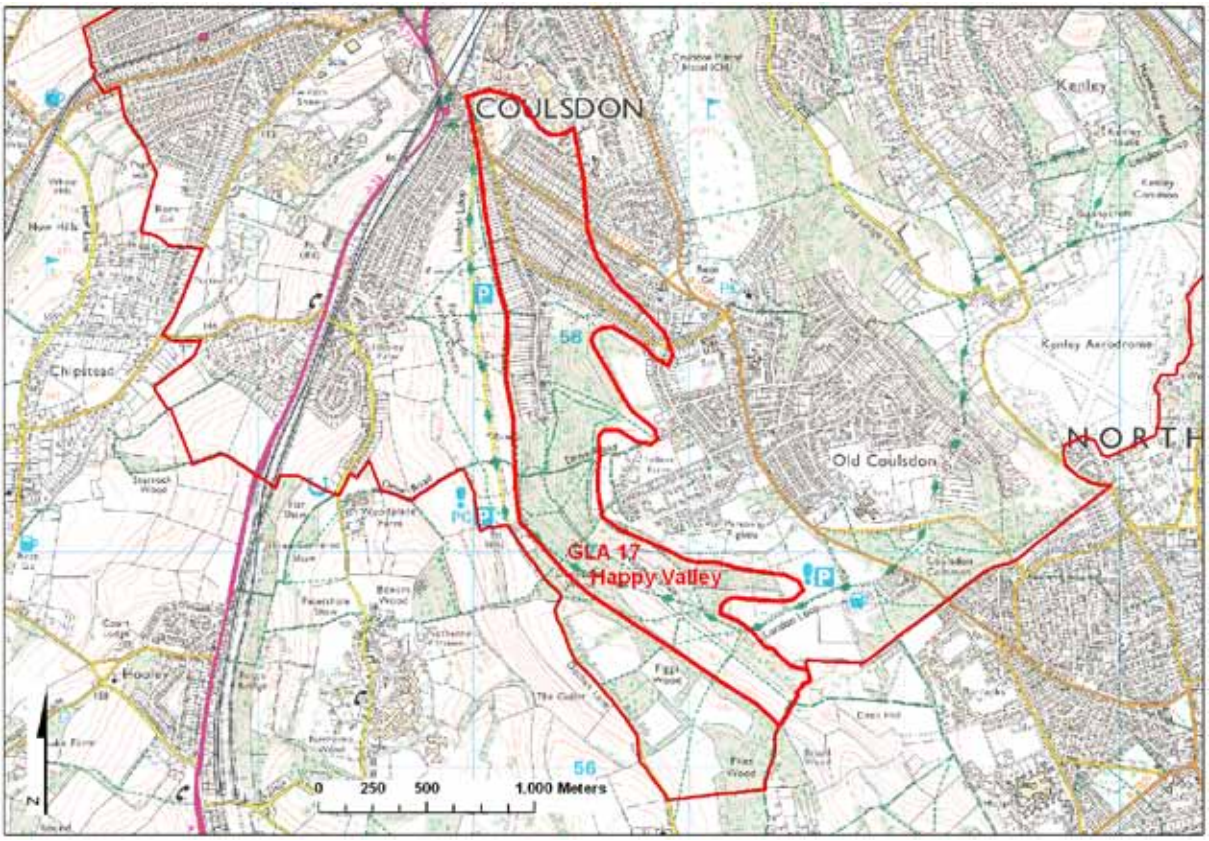

Stratigraphy and Rock Types

Time Unit: Cretaceous	Rock Unit: Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated, Chalk Group
Rock Type: Chalk	Details: Chalk

Site Description

Dry valley in the Chalk. Much of the valley is open access land with footpaths and woodland. Excellent views from the higher parts.

Assessment of Site Value

Geodiversity topic: Geomorphology.

Access and Safety

Aspect	Description
Safety of access	Footpaths cover area, some steep and slippy.
Safety of exposure	N/a.
Permission to visit	Open access.
Current condition	Well maintained as Happy Valley Park.

Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Landform.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Nearby Saxon settlement.	4
Aesthetic landscape	Valuable open space with great views and topography.	8
History of Earth Sciences	Position of water courses.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Excellent example of a dry valley.	6
Sedimentology	None.	0
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	None.	0
Potential use	Research; school education; on-site interpretation.	
Fragility	Well maintained.	
Current Site Value		
Community	Well used by the local community for exercise/dog-walking etc.	10
Education		6
Geodiversity value		
Recommended RIGS: Excellent feature with good access and well used by local community.		6
GLA 17 Happy Valley		

View of trees in bottom valley from valley side

GLA 18 Harrow Weald

Grid Reference: TQ 147 929	Site Type: Natural exposure
Site Area (hectares): 3.52	Current use: Private country
Site ownership:	Borough: London Borough of Harrow
Field surveyor: Joanna Brayson	Date: 22nd February 2008
Current geological designations: SSSI	Other scientific:

Site Map

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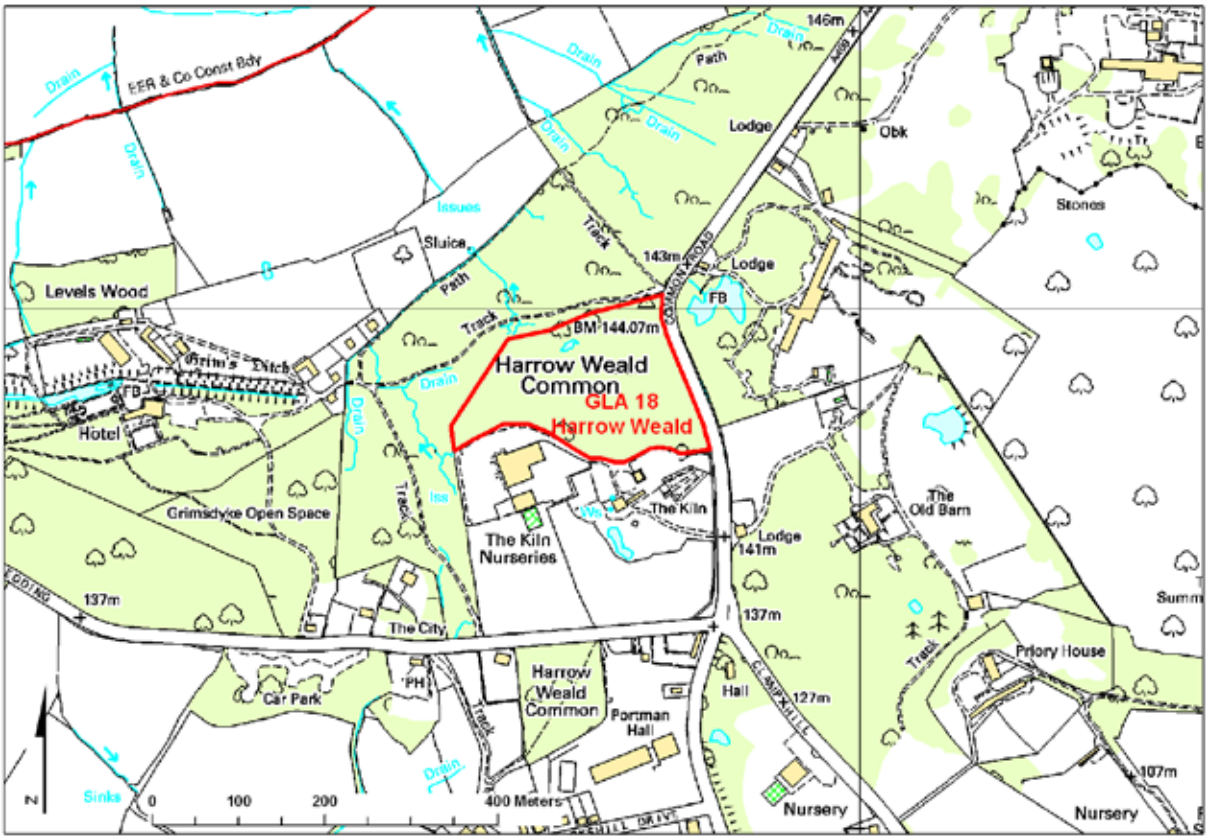

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Stanmore Gravel Formation, Dunwich Group
Rock Type: Sand and gravel	Details: Gravel and sand, clayey near base. Gravel mostly composed of flints, up to 150mm in diameter, with a little quartz, quartzite and Lower Greensand chert in the fine fractions. Matrix of orange-brown, pale grey, red mottled clay and sandy clay, with pockets of coarse sand. Locally with layers of silt, clay or peat. Interpreted as offshore or beach gravels (Ellison et al 2004), or possibly fluvial (Bridgland 1994).
Time Unit: Eocene	Rock Unit: Claygate Member, London Clay Formation
Rock Type: Sand, silt and clay	Details: Interbedded fine-grained sand, silt and clay.

Site Description

Harrow Weald is a small but important geological site which exhibits the most complete exposure of the Stanmore Gravel Formation overlying the Claygate Member of the London Clay. The Stanmore Gravel Formation is of uncertain origin and this has been the subject of much controversy over the past century. Recent research has cast doubt on their marine origin which was inferred by most early workers. The Harrow Weald section is important as a key site on which to base further studies of these deposits.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology.

Access and Safety		
Aspect	**Description**	
Safety of access	Site accessed from garden centre access road, be aware of vehicles.	
Safety of exposure	Wooded area, take care – rough under foot.	
Permission to visit		
Current condition	Neglected.	
Current conflicting activities	None.	
Restricting conditions	Access.	
Nature of exposure	Exposure in wooded area.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Much research has been done here over the last century.	6
Aesthetic landscape	Not accessible to public but is adjacent to open access area.	4
History of Earth Sciences	Marine origin versus fluvial.	6
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Depositional environment (marine/fluvial).	7
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology		0
Lithostratigraphy	Relationship between superficial deposits and bedrock.	6
Potential use	Research; higher further education.	
Fragility		
Current Site Value		
Community	Not accessible.	0
Education		0
Geodiversity value		
SSSI: Exposures of units valuable for research but with poor access.		6
GLA 18 Harrow Weald		

Woodland setting

GLA 19 Hornchurch Cutting

Grid Reference: TQ 547 874	Site Type: Artificial section
Site Area (hectares): 1.57	Current use: On railway line
Site ownership: Network Rail	Borough: London Borough of Havering
Field surveyor: Joanna Brayson	Date: 3rd January 2008
Current geological designations: SSSI; GCR	Other scientific:

Site Map

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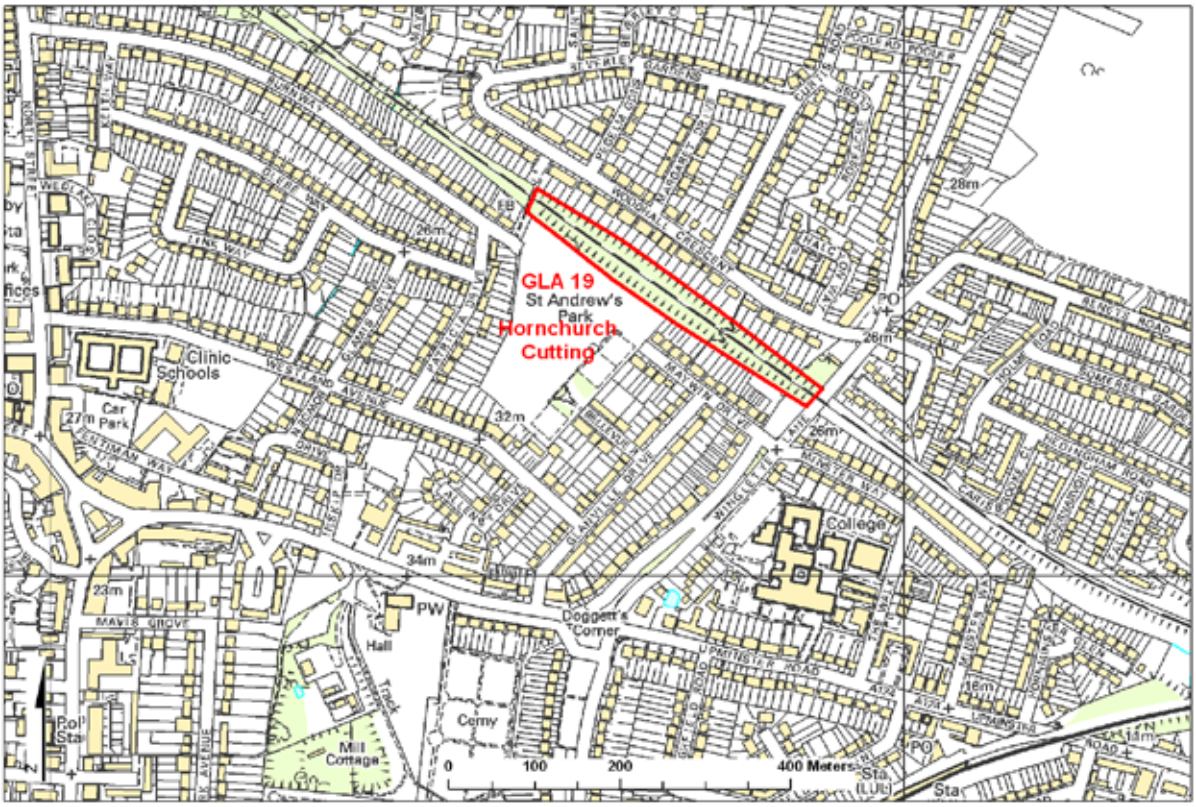

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Black Park Gravel Formation
Rock Type: Sand and Gravel	Details: Sand and gravel, with possible lenses of silt, clay or peat. Matrix supported gravel with thin tabular cross-bedded sand channels. Gravel assemblage is characterised by abundant flint (75-89%), sparse rounded flint (3-9%), sparse vein quartz (4-10%) and sparse quartzite (1-6%).
Time Unit: Eocene	Rock Unit: Orsett Heath Gravel Maidenhead formation
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/clayey silt. Glauconitic at base.

Site Description

Hornchurch Cutting provides unique sections through a series of deposits which are of great stratigraphical importance for studies of the Pleistocene. In particular the site is of considerable significance for correlating the formation of the Thames terrace sequence with the glacial stratigraphy of Southern Britain.

The sections revealed by the cutting show a channel cut into the London Clay and infilled with a glacial till – the Hornchurch Till – laid down at the southern extremity of the Anglian ice sheet. This till is overlain by the Black Park Gravel (the first post-diversionary terrace of the Thames). Hornchurch is the only area where glacial deposits are known to come into contact with the Lower Thames Terrace gravels. This relationship, first demonstrated when the railway cutting was excavated in the last century, indicates that the highest terrace in the Hornchurch area is more recent than the most extensive glaciation of Eastern England. However, further research is urgently required to clarify this picture. The Hornchurch Cutting is thus clearly a site of prime stratigraphic and also historical importance.

Assessment of Site Value		
Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology.		
Access and Safety		
Aspect	**Description**	
Safety of access	Access to site itself would require full railway safety procedures.	
Safety of exposure	Access to site itself would require full railway safety procedures.	
Permission to visit	Contact railway owner.	
Current condition	Overgrown but maintained as part of railway network.	
Current conflicting activities	Railway.	
Restricting conditions	On railway.	
Nature of exposure	Railway cutting.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Cutting excavated last century – gave insights into processes.	8
Aesthetic landscape	None.	0
History of Earth Sciences	Cutting allowed timings of glaciations/river evolution to be suggested at an early time in investigations.	5
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Relationship between tills and terrace gravels.	8
Sedimentology	Depositional environment and provenance of sediments.	7
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Allows correlation of terrace gravels and till.	8
Potential use	Research.	
Fragility	Overgrowing.	
Current Site Value		
Community	None.	0
Education	Not suitable for educational visits.	0
Geodiversity value		
SSSI: Exposure of rarely seen boundary between tills and terrace gravels. Excellent site for research but very difficult access.		6
GLA 19 Hornchurch Cutting		

View from footbridge

GLA 20 Horsenden Hill

Grid Reference: TQ 16562 84381	Site Type: Natural exposure
Site Area (hectares): 43.15	Current use: Recreational land
Site ownership: London Borough of Ealing	Borough: London Borough of Ealing
Field surveyor: Joanna Brayson	Date: 5th December 2007
Current geological designations:	Other scientific:

Site Map

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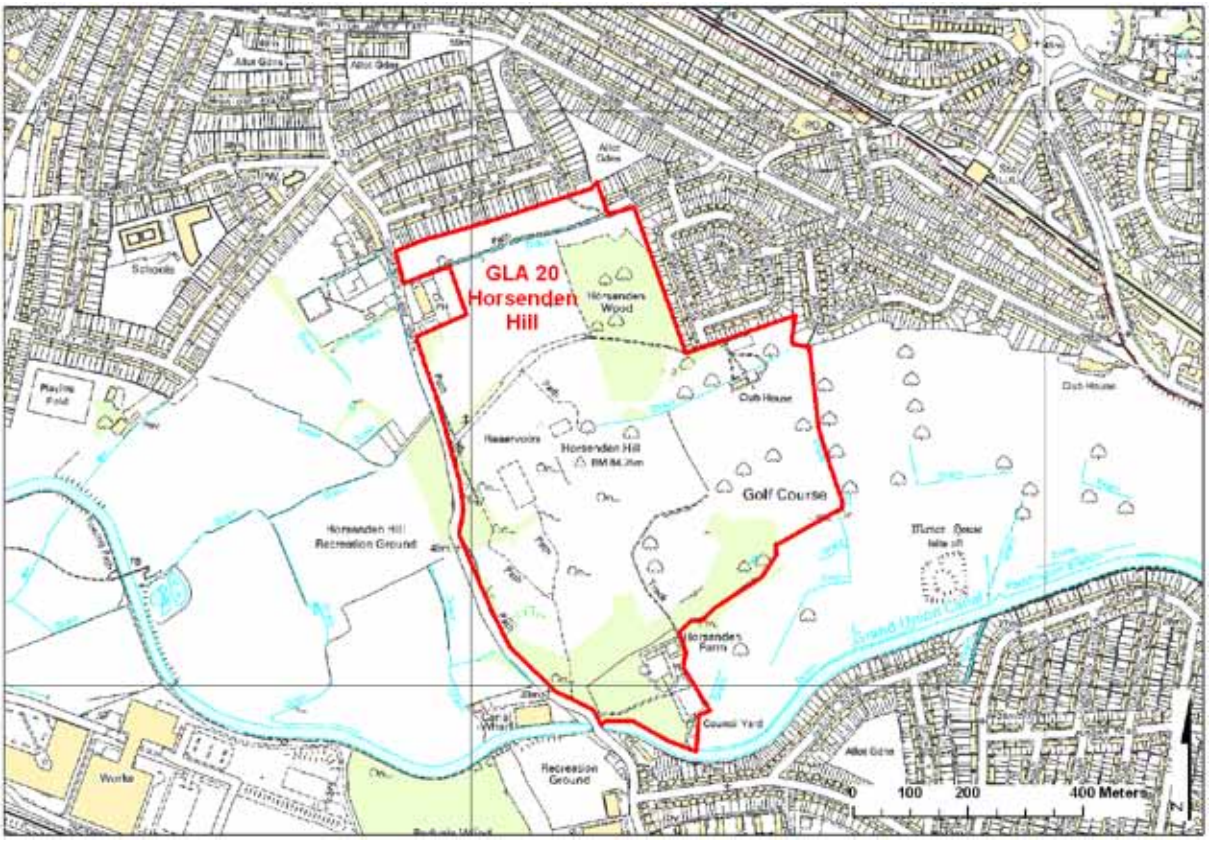

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Dollis Hill Gravel Formation
Rock Type: Sand and gravel	Details: Gravel, sandy and clayey in part, with some laminated silty beds. Sand and gravel, locally with lenses of silt, clay or peat and organic material.
Time Unit: Eocene	Rock Unit: Claygate Member, London Clay Formation
Rock Type: Sand, silt and clay	Details: Interbedded fine-grained sand, silt and clay.
Time Unit: Eocene	Rock Unit: London Clay Formation
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/clayey silt. Glauconitic at base.

Site Description

This site is a hill in the London Clay capped by the Claygate Member and Dollis Hill Gravel Formation. The Dollis Hill Gravel is a river terrace deposit from the pre-diversionary Thames. It forms hill-caps that decline in elevation northwards, indicating deposition in south-bank tributaries of the ancestral Thames. The gravel is composed of angular flint (58%), rounded flint (32%), quartz/quartzite (1.8%) and Lower Greensand chert (7%).

Horsenden Hill is the highest point in North West London with excellent views of the surrounding area. There are information boards explaining the view, this would be an ideal position to explain the geological landscape.

Assessment of Site Value

Geodiversity topic: Geomorphology; lithostratigraphy; sedimentology.

Access and Safety		
Aspect	**Description**	
Safety of access	Footpaths from car park up hill, through woods and some fields with livestock – care should be taken.	
Safety of exposure	Mostly adjacent to footpaths, some slippery due to clay nature of London Clay.	
Permission to visit	Open access, contact the ranger's office for group visits.	
Current condition	Outcrops are small, mostly grassland or woods.	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Small exposures in fields and in woodland.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Site of an ancient hillfort.	8
Aesthetic landscape	Excellent views of surrounding area from this highest point in north-west London (site of a trig point).	8
History of Earth Sciences	Composition of gravel – provenance of material.	4
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	Formation of hill.	4
Sedimentology	Sedimentary environments and provenance.	4
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship between bedrock and terrace gravels.	4
Potential use	Research; on-site interpretation; on-site geotrail.	
Fragility	Natural overgrowing.	
Current Site Value		
Community	Used daily by local community.	10
Education		6
Geodiversity value		
Recommended RIGS: Small exposures of units accompanied by good geomorphological features and good access.		5
GLA 20 Horsenden Hill		

View of local area with information board

GLA 22 Keston Common

Grid Reference: TQ 41746 63953	Site Type: Natural exposure
Site Area (hectares): 11.82	Current use: Recreational land
Site ownership: London Borough of Bromley	Borough: London Borough of Bromley
Field surveyor: Joanna Brayson	Date: 25th March 2011
Current geological designations:	Other scientific: SSSI (Bio)

Site Map

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Stratigraphy and Rock Types

Time Unit: Paleocene/Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.

Site Description

Small exposures of Harwich Formation within woodland.

Assessment of Site Value

Geodiversity topic: Sedimentology; lithostratigraphy

Access and Safety

Aspect	Description
Road access & parking	Car park off main road.
Safety of access	Footpaths, some uneven, take care.
Safety of exposure	Autumn leaf cover leaves ground slippery in parts.
Permission to visit	Open access.
Current condition	Small exposures, leaf cover makes them hard to find.

Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Small exposures in woodland.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	None.	0
Aesthetic landscape	Valuable green space used by local community.	6
History of Earth Sciences	None.	0
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Environment of deposition.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Correlation of Harwich Formation.	5
Potential use	Research; on-site interpretation; higher further education.	
Fragility	Natural overgrowing; dumping.	
Current Site Value		
Community	Used daily by dog walkers etc	10
Education		6
Geodiversity value		
Recommended RIGS: Small exposures with adequate access. Good research potential.		5
GLA 22 Keston Common		

Harwich Formation exposure

GLA 24 Old Gravel Pit, Blackheath

Grid Reference: TQ 38522 76309	Site Type: Former quarry works
Site Area (hectares): 0.84	Current use: Recreational land
Site ownership: London Borough of Lewisham	Borough: London Borough of Lewisham
Field surveyor: Joanna Brayson	Date: 25th March 2011
Current geological designations:	Other scientific:

Site Map

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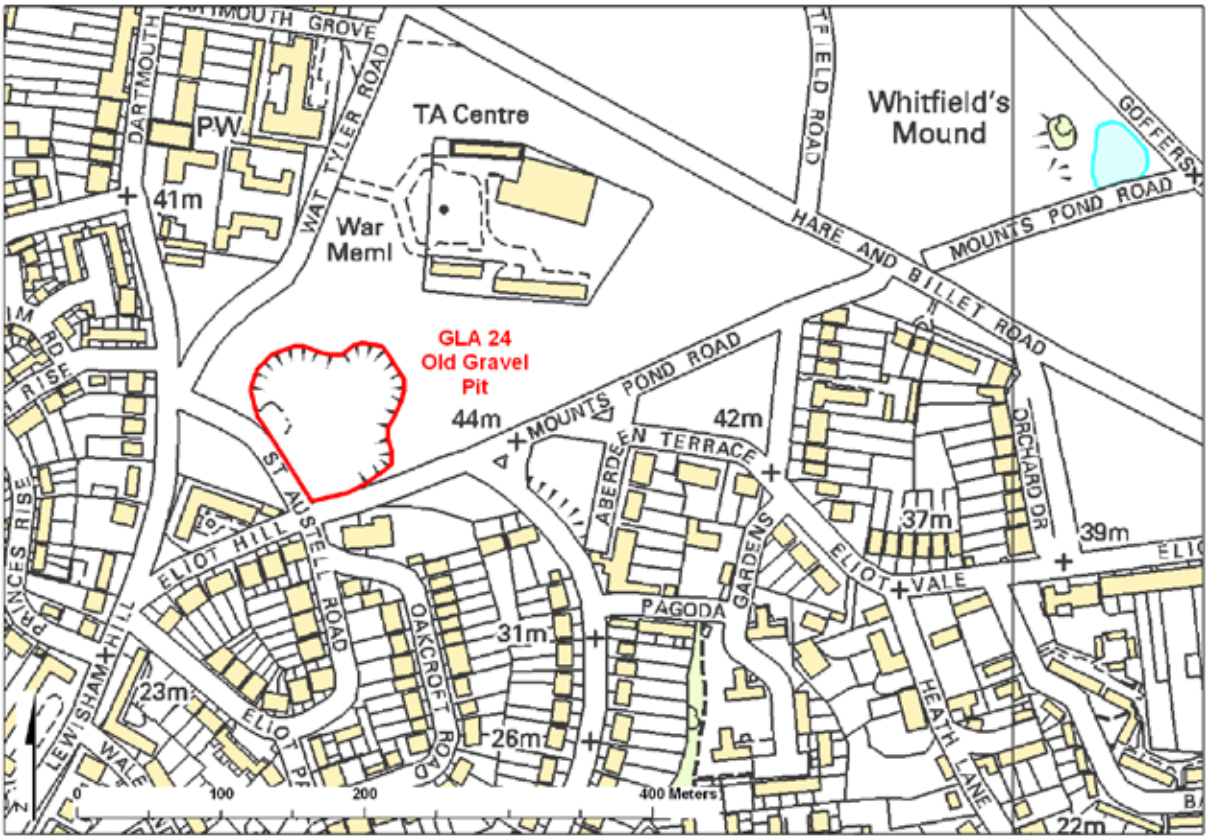

Stratigraphy and Rock Types

Time Unit: Paleocene/Eocene	Rock Unit: Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Rounded black pebbles, glauconitic sandy clays and very fine-grained glauconitic sands; marine fauna, locally brackish.
Time Unit: Paleocene	Rock Unit: Lambeth Group
Rock Type: Sand and gravel	Details: Glauconitic sands overlain by grey clays and sands with Brackish fauna and interleaved red and variegated clays and sands.

Site Description

Old gravel pit at the edge of open space in Blackheath.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; economic geology.

Access and Safety

Aspect	Description
Safety of access	Adjacent to small road, grassy area with no significant dangers.
Safety of exposure	Pit sides are short and grassed over, little risk of falling.
Permission to visit	Open access.

Current condition	Grassed over but shape visible.	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Old grassed over pit.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Shown on 1896 OS Historic map as Old Gravel Pit.	8
Aesthetic landscape	Part of large open space.	6
History of Earth Sciences		0
Economic geology	Gravel extraction.	6
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	If excavation could be carried out, environment of deposition.	4
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Correlation with other units.	4
Potential use	On-site interpretation; research.	
Fragility	Natural overgrowing.	
Current Site Value		
Community	Valuable open space	8
Education		4
Geodiversity value		
Potential LIGS: Good example for economic history in local area.		2
GLA 24 Old Gravel Pit		

Old Gravel Pit behind trees

GLA 25 Putney Heath

Grid Reference: TQ 23254 73177	Site Type: Natural exposure
Site Area (hectares): 35.30	Current use: Recreational land
Site ownership: London Borough of Wandsworth	Borough: London Borough of Wandsworth
Field surveyor: Joanna Brayson	Date: 8th May 2011
Current geological designations:	Other scientific:

Site Map

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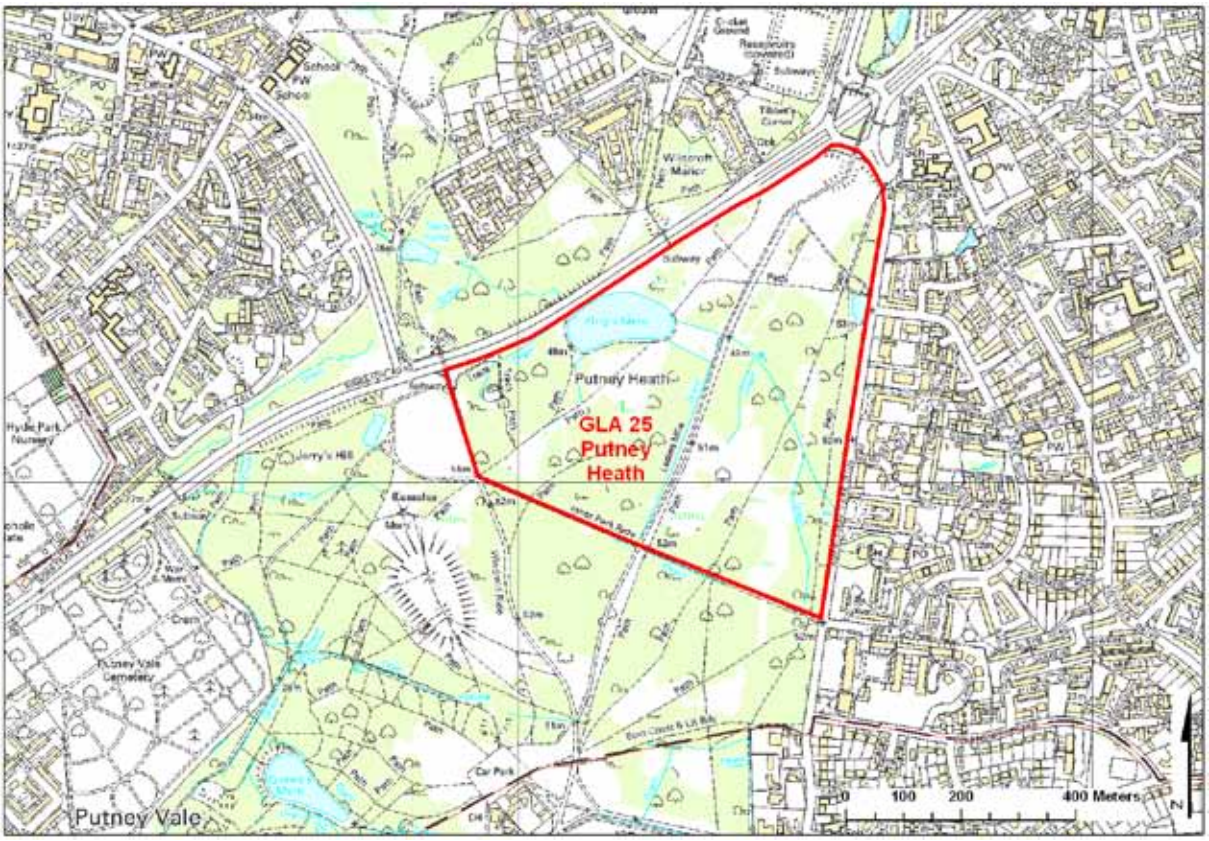

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Black Park Gravel Formation
Rock Type: Sand and Gravel	Details: Sand and gravel, with possible lenses of silt, clay or peat. [Generic description]. Horizontally straffed, matrix supported gravel with thin tabular cross-bedded sand channels. Gravel assemblage is characterised by abundant flint (75-89%), sparse rounded flint (3-9%), sparse vein quartz (4-10%) and sparse quartzite (1-6%).
Time Unit: Eocene	Rock Unit: London Clay Formation
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/clayey silt. Glauconitic at base.

Site Description

Small exposures of Black Park Gravel (Thames river terrace) on the heath. Putney Heath is included as a potential LIGS site for its small exposures of Black Park Gravel. The best exposure can be seen round the edges of King's Mere Lake. The area cited is a plateau on the top of the wider parkland area which becomes Wimbledon Common to the south. The plateau also extends into the adjacent Richmond Park to the east. The Black Park Gravel is the oldest of the Thames terraces, deposited immediately after the retreat of the Anglian Ice Sheet about 400,000 years ago. On Putney Heath they overlie London Clay formation but further souththey overlie the sandier Claygate member at the top of the London Clay and in the southwest, the overlying Bagshot Formation.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy' sedimentology.

Access and Safety		
Aspect	**Description**	
Safety of access	Footpaths, some rough.	
Safety of exposure	Felt unsafe alone, fine in groups.	
Permission to visit	Open access.	
Current condition	Overgrown, some landscaping (paths etc).	
Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Patchy exposures under bushes, in tracks.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations		
Aesthetic landscape	Part of large open space in urban area.	8
History of Earth Sciences		
Economic geology	None.	0
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Composition and depositional environment of gravels.	6
Palaeontology	None	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Relationship of terrace gravels and bedrock.	6
Potential use	On-site interpretation; research.	
Fragility	Natural overgrowing.	
Current Site Value		
Community	Valuable open space used daily.	10
Education		4
Geodiversity value		
Potential LIGS: Small exposures in large open area with good access.		3
GLA 25 Putney Heath		
No photographs taken		

GLA 26 Riddlesdown Quarry (formerly Rose and Crown Pit)

Grid Reference: TQ 33751 59418	Site Type: Former quarry works
Site Area (hectares): 3.66	Current use: Disused
Site ownership: City of London Corporation	Borough: London Borough of Croydon
Field surveyor: Joanna Brayson	Date: 7th November 2010
Current geological designations:	Other scientific:

Site Map

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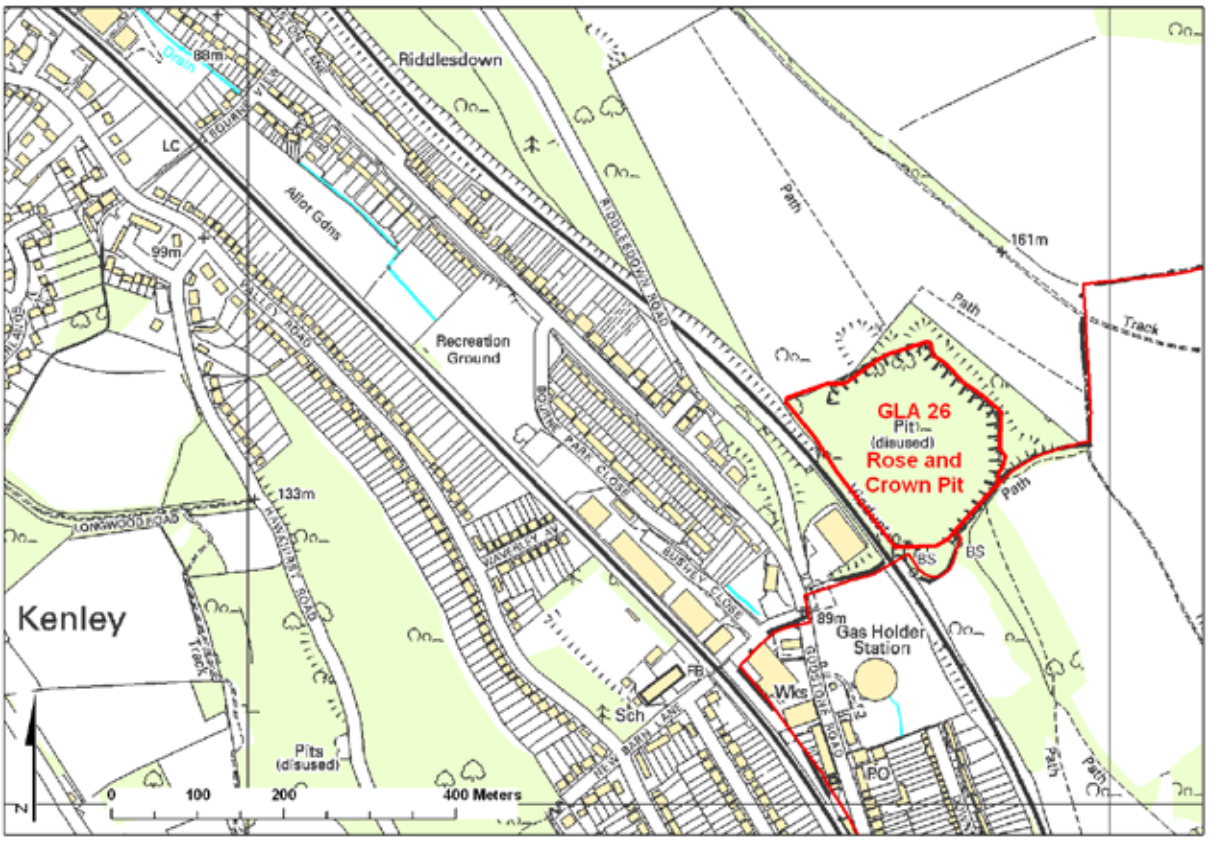

Stratigraphy and Rock Types

Time Unit: Cretaceous	Rock Unit: New Pit Chalk Formation; Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated, Chalk Group
Rock Type: Chalk	Details: Chalk

Site Description

Large abandoned chalk quarry (also called Riddlesdown Quarry) in area called Riddlesdown. The finest chalk exposure in London and well-maintained b ythe City of London Corporation who have created steps adjacent to the face for detailed viewing. Feaures include nearly 50m of chalk lithology from the Glynde marls (New Pit Chalk Formation) to the Seaford Chalk Formation, different styles of fracturing within the chalk, conspicuous large flint bands forming marker beds across the face of the quarry, marl and dissolution pipes filled with clay-with-flints.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology.

Access and Safety

Aspect	Description
Safety of access	Access is restricted – fence surrounds site. Close to railway line, care should be taken. Quarry visible from footpaths surrounding site – these are steep and slippery in places.

Safety of exposure	Quarry contains steep faces and slumped material.	
Permission to visit	Access via ranger/council (Tandridge district council 01883 722000).	
Current condition	Partially overgrown but faces clear.	
Current conflicting activities	None.	
Restricting conditions	Fenced off, safety concerns.	
Nature of exposure	Disused quarry.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Roman road built across downs. Saxon burial sites close by.	8
Aesthetic landscape	Extremely well used surrounding area – chalk downlands.	8
History of Earth Sciences		
Economic geology	Chalk quarry.	8
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Chalk succession – environment of deposition.	8
Palaeontology	Chalk Stratigraphy determined in part by macro and micro palaeontology.	8
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Chalk succession.	8
Potential use	Research; higher further education; school education; on-site interpretation; on-site geotrail.	
Fragility	Natural overgrowing; geohazard.	
Current Site Value		
Community	Valuable open space, used daily	10
Education	Good site for fieldwork, with appropriate safety.	8
Geodiversity value		
Recommended RIGS: Excellent outcrop with great potential for research and education. Difficult access.		7

GLA 26 Riddlesdown Quarry (Formerly called Rose and Crown Pit)

View of north east quarry face

GLA 29 The Gravel Pits, Northwood

Grid Reference: TQ 08390 91349	Site Type: Former quarry works
Site Area (hectares): 5.47	Current use: Recreational land
Site ownership: London Borough of Hillingdon	Borough: London Borough of Hillingdon
Field surveyor: Joanna Brayson	Date: 14th September 2010
Current geological designations:	Other scientific:

Site Map

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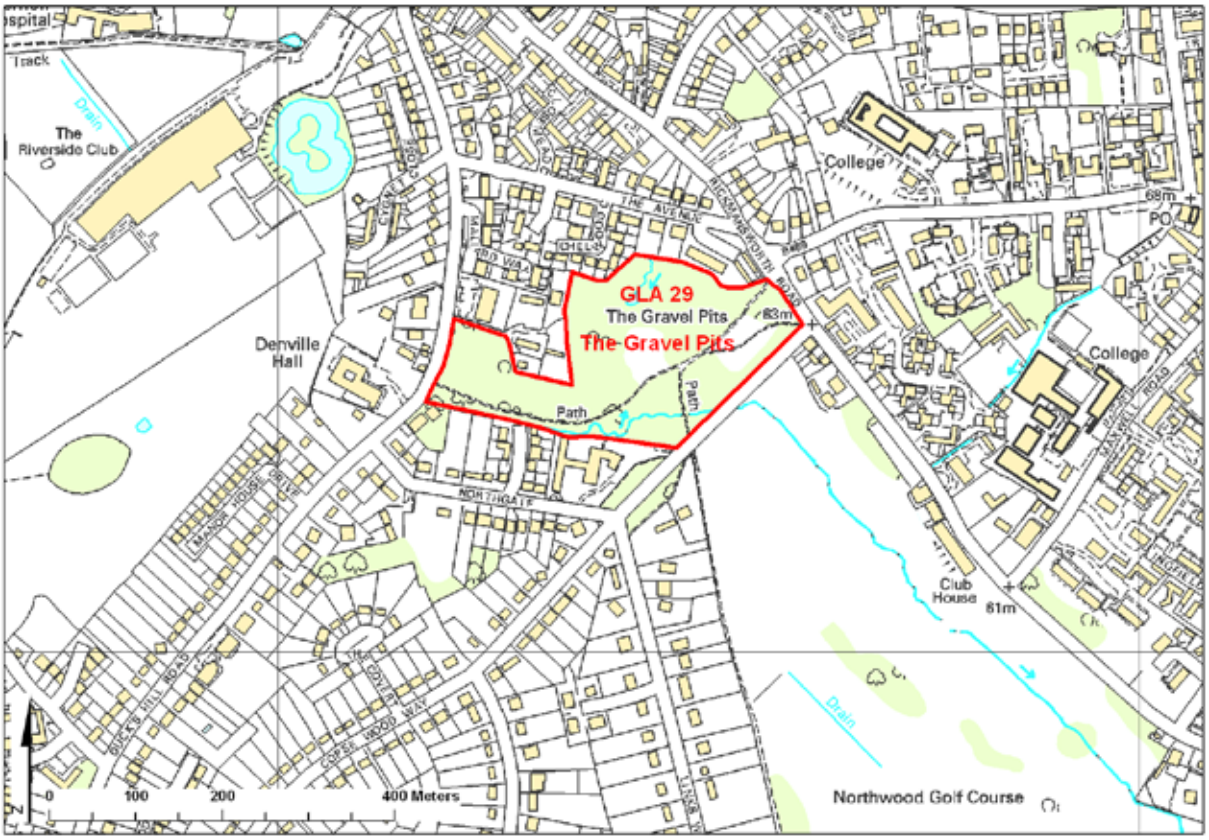

Stratigraphy and Rock Types

Time Unit: Paleocene	Rock Unit: Lambeth Group
Rock Type: Sand and gravel	Details: Glauconitic sands overlain by grey clays and sands with Brackish fauna and interleaved red and variegated clays and sands.

Site Description

An area of woodland covering old gravel pits in the Lambeth Group. The gravel from these pits was used for several hundred years for road mending in the area. The gravel was described as 'worked out' in 1898 and the area was saved as a public amenity in commemoration of Queen Victoria's diamond jubilee the previous year.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; economic geology.

Access and Safety

Aspect	Description
Safety of access	Footpaths.
Safety of exposure	In woodland, felt uneasy alone.
Permission to visit	Open access.
Current condition	Overgrown.

Current conflicting activities	None.	
Restricting conditions	None.	
Nature of exposure	Old gravel pits in woods.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Historic pits (information from Ruislip, Northwood and Eastcote Local History Society).	8
Aesthetic landscape	Valuable green space for the local community.	8
History of Earth Sciences		
Economic geology	Gravel pits used for road mending.	8
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Composition of gravels.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Correlation with other units.	6
Potential use	Research; school education; on-site interpretation.	
Fragility	Natural overgrowing.	
Current Site Value		
Community	Used daily by local community.	10
Education	Good site for local schools – history and geology.	4
Geodiversity value		
Recommended RIGS: Well used local site with information.		4
GLA 29 The Gravel Pits		

Information board at The Gravel Pits

GLA 30 Cray Valley Golf Course Sand Pit

Grid Reference: TQ 48927 69199	Site Type: Former quarry works
Site Area (hectares): 0.57	Current use: Golf Course
Site ownership: Cray Valley Golf Club	Borough: London Borough of Bromley
Field surveyor: South London RIGS Group	Date: Summer 2008
Current geological designations:	Other scientific:

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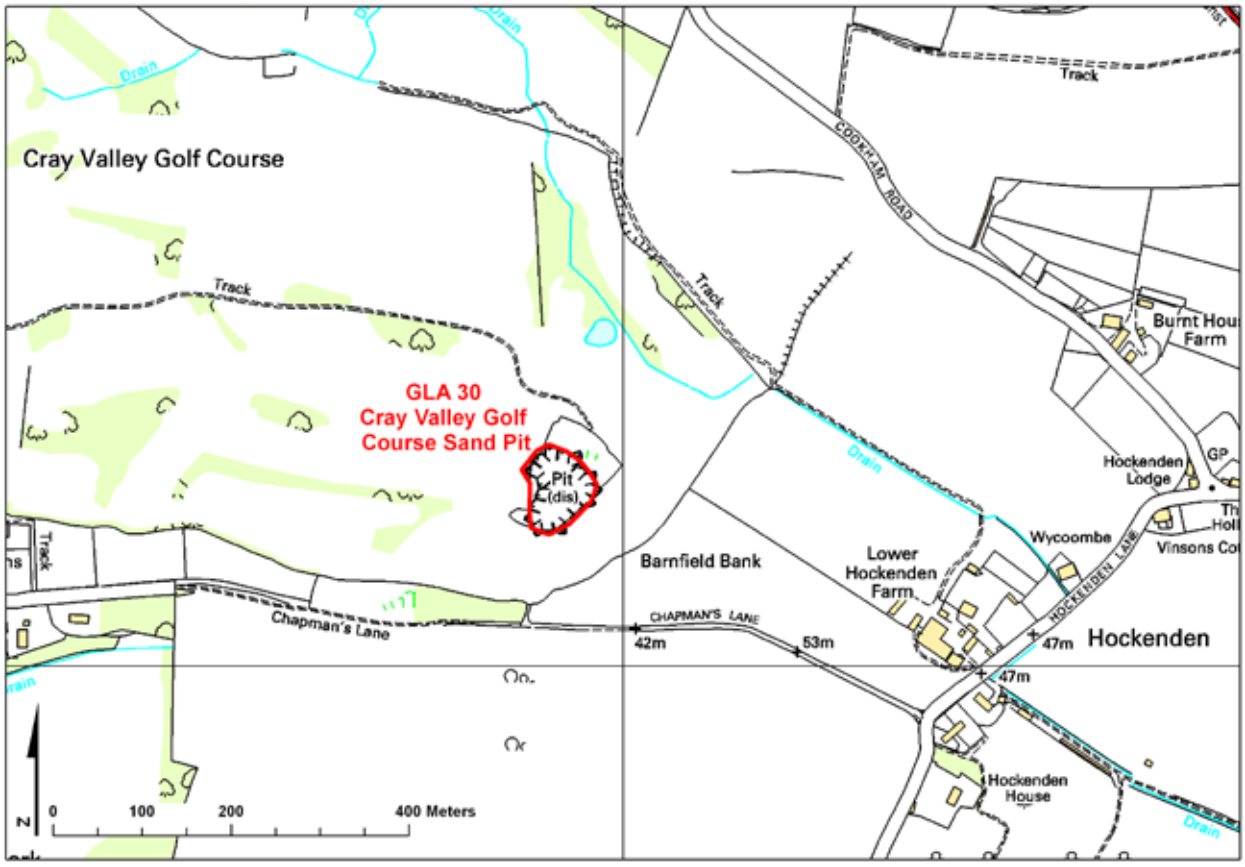

Stratigraphy and Rock Types

Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: fine-grained, iron- stained (from the decay of glauconite)

Site Description

Clean large vertical exposures of Thanet Sand Formation in disused sand pit. They have been left after previous mineral extraction stopped (for the construction of A20). The exposures are situated towards the eastern end of Cray Valley Golf Course. Approximately 64 sand martin holes are present in the north-west facing cliff – the only known breeding colony of sand martins within the Borough of Bromley, and one of the largest in London.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy and sedimentology.

Access and Safety

Aspect	Description
Safety of access	Site is on the edge of a golf course. Access normally by golf buggy hired from the club.
Safety of exposure	The quarry is not on the course and is not exposed to golf ball hazard.

Permission to visit	Access is by permission of the owners. Cray valley golf course Secretary. Telephone 016898 39677. Management at the course are helpful and permit controlled access.	
Current condition	The exposed face is clear with little evidence of overgrowth	
Current conflicting activities	Possibility of reuse as a sand quarry or change in golf course layout	
Restricting conditions	Private Golf Course	
Nature of exposure	Semi vertical face of disused sand pit Cliffs in disused sand pit	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	None known but site is near a Victorian rubbish dump with period relics such as glass bottles.	1
Aesthetic landscape	Sand martin nesting colony.	5
History of Earth Sciences	No associations known, but site is a very rare clear exposure of Thanet Sand. No other site of this importance is known to exist in the South London area.	5
Economic geology	Sand from this pit was used in the construction of the A20 motorway.	3
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	The sand was deposited in a coastal environment. The yellowish sand shows some evidence of weathering. No clay or silt deposits exist in the exposure. Evidence of podsoil formation is confined to the top 100mm of the formation. No detailed analysis of the sand is currently available. Sand is well sorted.	4
Palaeontology	No macrofossils are evident in the formation.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Thanet Sand Formation.	5
Potential use	Research, school and higher education as well as its interest as a sand martin colony.	
Fragility	Natural overgrowth, potential as sand source and exposed to changes in the course layout	
Current Site Value		
Community	Available to the community under careful control.	4
Education		5
Geodiversity value		
Recommended RIGS: The best Thanet sand exposure in the area.		**7**
GLA 30 Cray Valley Golf Course Sand Pit		

Quarry Face with Sand Martin burrows, Cray Valley Golf Course Sand Pit

GLA 31 North End Pit

Grid Reference: TQ 515 771	Site Type: Not known
Site Area (hectares): 0.43	Current use: Housing Estate
Site ownership: LB Bexley	Borough: London Borough of Bexley
Field surveyor: South London RIGS Group	Date: 10th March 2011
Current geological designations:	Other scientific:

Site Map

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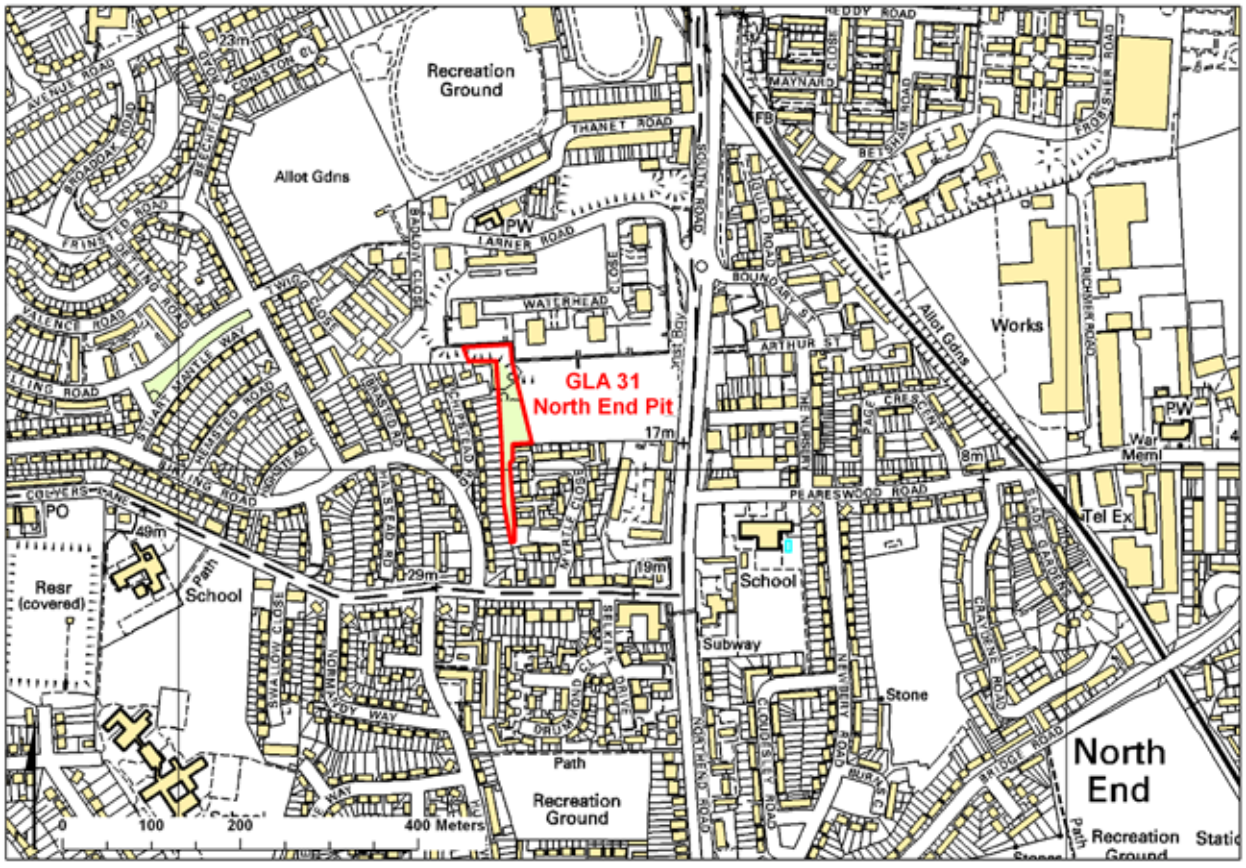

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Crayford Silt Formation
Rock Type: Brickearth (silt)	Details: Fine-grained 'rock-flour' suitable for brick-making as it contains Chalk.

Site Description

A rare site of brickearth. The present housing estate was built on the site of brickworks. Vertical exposures of brickearth. Site has east access but is fenced off, overgrown and has some dumped rubbish. It needs clearing and an information board

Assessment of Site Value

Geodiversity topic: Palaeontology, sedimentology and lithostratigraphy.

Access and Safety

Aspect	Description
Safety of access	Site is fenced in currently without any access gate. Site can be viewed from outside fence.
Safety of exposure	Exposure is steep and slightly unstable.
Permission to visit	Site is in a new housing estate and is owned by the London Borough of Bexley.

Current condition	Considerable overgrowth has occurred with some obscuring by dumped rubbish. It needs clearing and an information panel.	
Current conflicting activities	Rubbish dumping.	
Restricting conditions	Difficult access.	
Nature of exposure	Site is the last relic of a large brickworks that covered the area now devoted to housing. It is located on a steeply sloping bank and is fenced off.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Brickearth has been used for brick making since Roman times. Few exposures now exist. The site was part of a large brickworks, now demolished.	8
Aesthetic landscape	A potential interesting feature of a drab estate.	4
History of Earth Sciences	The last major exposure of Crayford Silt Formation.	5
Economic geology	Former brickworks and pit.	4
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	The deposit is banked up against a steep bedrock slope and consistsof fine sand and silt. Probably of windblown origin.	4
Palaeontology	Crayford brickearth has long been famous for mammalian and molluscan remains as well as Palaeolithic implements.	4
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Rare site for brickearth.	6
Potential use	Education and research.	
Fragility	Natural overgrowth, rubbish dumping and no recognition of its value e.g. a climate change indicator.	
Current Site Value		
Community	Site passed by on a daily basis.	7
Education	High value.	5
Geodiversity value		
Recommended RIGS: An interesting and rare exposure.		**6**

GLA 31 North End Pit

North End Pit

GLA 32 High Elms Dene Hole

Grid Reference: TQ 43956 62823	Site Type: Small underground Chalk mine, possible ancient
Site Area (hectares): 0.02	Current use:
Site ownership: LB Bromley	Borough: London Borough of Bexley
Field surveyor: South London RIGS Group	Date: 18th January 2008
Current geological designations:	Other scientific:

Site Map

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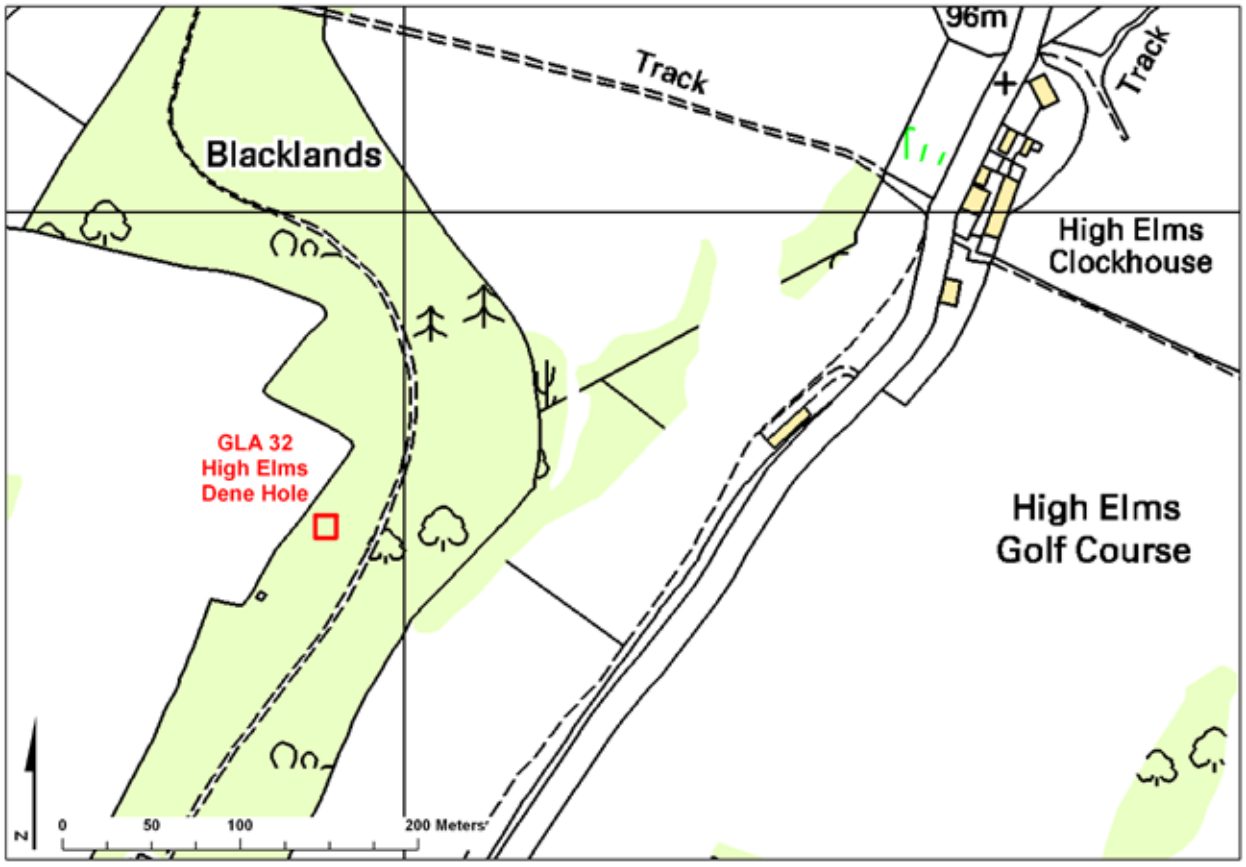

Stratigraphy and Rock Types

Time Unit: Cretaceous	Rock Unit: Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated, Chalk Group
Rock Type: Chalk	Details: Chalk extends to surface

Site Description

This is a well preserved and protected underground Chalk pit. It is located in the High Elms Country Park. Very few, if any, of the over 200 chalk pits in the area are preserved. The pit is used for bat hibernation in winter.

Assessment of Site Value

Geodiversity topic: Palaeontology, sedimentology and lithostratigraphy.

Access and Safety

Aspect	Description
Safety of access	Level ground from nearby footpath.
Safety of exposure	The mine is securely protected by a steel grille.
Permission to visit	The site has open access. Permission to enter the mine must be obtained from the Head Ranger who would consult with other interested parties.

Current condition	Well preserved.	
Current conflicting activities	The mine is an important bat roost.	
Restricting conditions	Access to the mine workings is controlled by LBB.	
Nature of exposure	Disused trefoil type of shallow chalk mine.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Rare survivor of over 200 chalk mines in the area. Mining by this method to get chalk for marling land began in Roman times	6
Aesthetic landscape	Point of interest on popular walk route	5
History of Earth Sciences	Historic mining system	5
Economic geology	Former chalk mine	4
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Environment of deposition.	2
Palaeontology	None	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated, Chalk Group.	2
Potential use	Onsite interpretation.	
Fragility	Natural overgrowth.	
Current Site Value		
Community	Site passed by on daily basis.	8
Education	High value.	8
Geodiversity value		
Recommended RIGS: Rare survivor of an agricultural system in use for centuries.		7

GLA 32 High Elms Dene Hole

High Elms Dene Hole

GLA 33 Elmstead Pit

Grid Reference: TQ 42327066	Site Type: Former quarry works
Site Area (hectares): 0.05	Current use: Private garden
Site ownership: Private resident	Borough: London Borough of Bromley
Field surveyor: None, from Natural England website	Date: 4 November 2002
Current geological designations: SSSI	Other scientific:

Site Map

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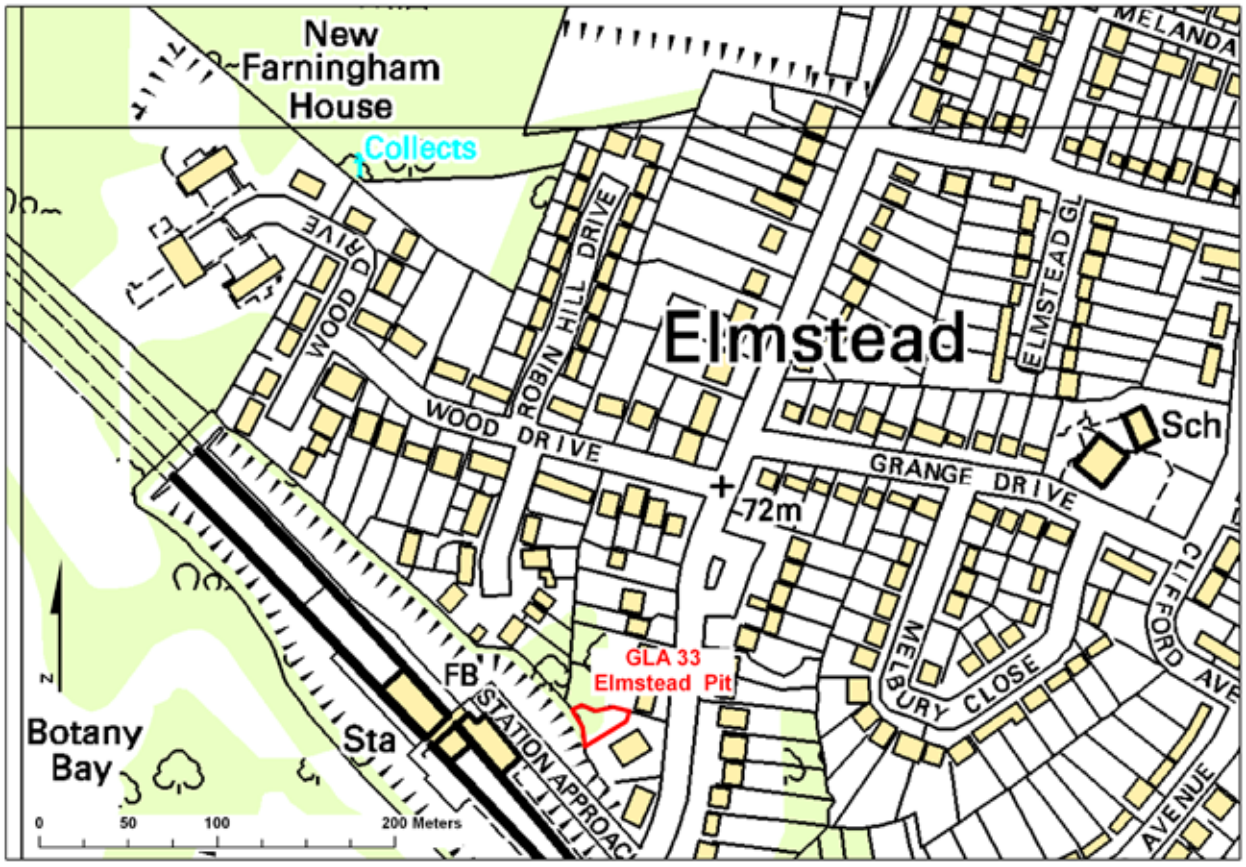

Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: Blackheath Beds, Harwich Formation, (Thames group)
Rock Type: Sand and gravel	Details: as specified below

Site Description

Elmstead Pit provides a nationally important exposure of the Oldhaven (Blackheath) Beds through a section containing an unusually rich fossil fauna. A wide range of geological features are present providing information on the changing disposition of land and sea in the Greater London area during Eocene times.

The site covers a 6 m high pit face cut into a series of Blackheath Beds consisting of fine quartz sands and an abundance of flint pebbles. These beds accumulated as sub-tidal bars in an estuarine environment during Eocene times approximately 50 million years ago. They are particularly noted for very large-scale 'cross-bedding' with angles of dip of up to 25 degrees.

The sediments are bound by a heavy calcite cement which has preserved an unusually abundant and diverse fossil fauna. Pits at Elmstead have yielded a substantial part of the known molluscan fauna from the Blackheath Beds and a number of sharks teeth and fish scales have also been recovered. The site is now the only exposure in this locality of these highly fossiliferous beds.

Assessment of Site Value

Geodiversity topic: Palaeontology, sedimentology and lithostratigraphy.

Access and Safety		
Aspect	**Description**	
Safety of access	Access to site over level ground.	
Safety of exposure	Site has consolidated vertical face and level area at bottom of face.	
Permission to visit	Permission needed from house owner, normally requested through Natural England.	
Current condition	Some encroaching ivy and shrubs that may in the long-term cause obstruction. In the long-term there may also be issues of instability of the rock face.	
Current conflicting activities	Site in a private garden.	
Restricting conditions	None.	
Nature of exposure	Vertical pit face.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	The area had a number of chalk and sand pits, all of which are now filled in for housing. This and Chislehurst caves are the only examples left	8
Aesthetic landscape	Private garden	2
History of Earth Sciences	The area has strong association with Whitaker. Described and sketched in his 1889 edition of The Geology of London	8
Economic geology	Former building stone pit, probably worked in Victorian times	5
GeoScientific Merit		
Geomorphology	None.	0
Sedimentology	Large scale cross bedding. Imbricated flint pebbles occur in bands.	6
Palaeontology	Abundant fossil molluscs, plus shark's teeth.	6
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Blackheath Formation.	8
Potential use	Research and education.	
Fragility	Natural overgrowth and weathering of face.	
Current Site Value		
Community	None, Access is difficult.	2
Education	High value.	5
Geodiversity value		
SSSI: Importance for its history and potential for research.		6
GLA 33 Elmstead Pit		

Elmstead Pit face detail – sand with flint pebbles

GLA 34 Harefield Pit	
Grid Reference: TQ 049 898	Site Type: Land filled former quarry works
Site Area (hectares): 1.61	Current use: Fallow field, formerly dairy herd grazed
Site ownership: Ms Moyra East	Borough: London Borough of Hillingdon
Field surveyor: Information from Natural England	Date: 15 October 2002
Current geological designations: SSSI	Other scientific:

Site Map

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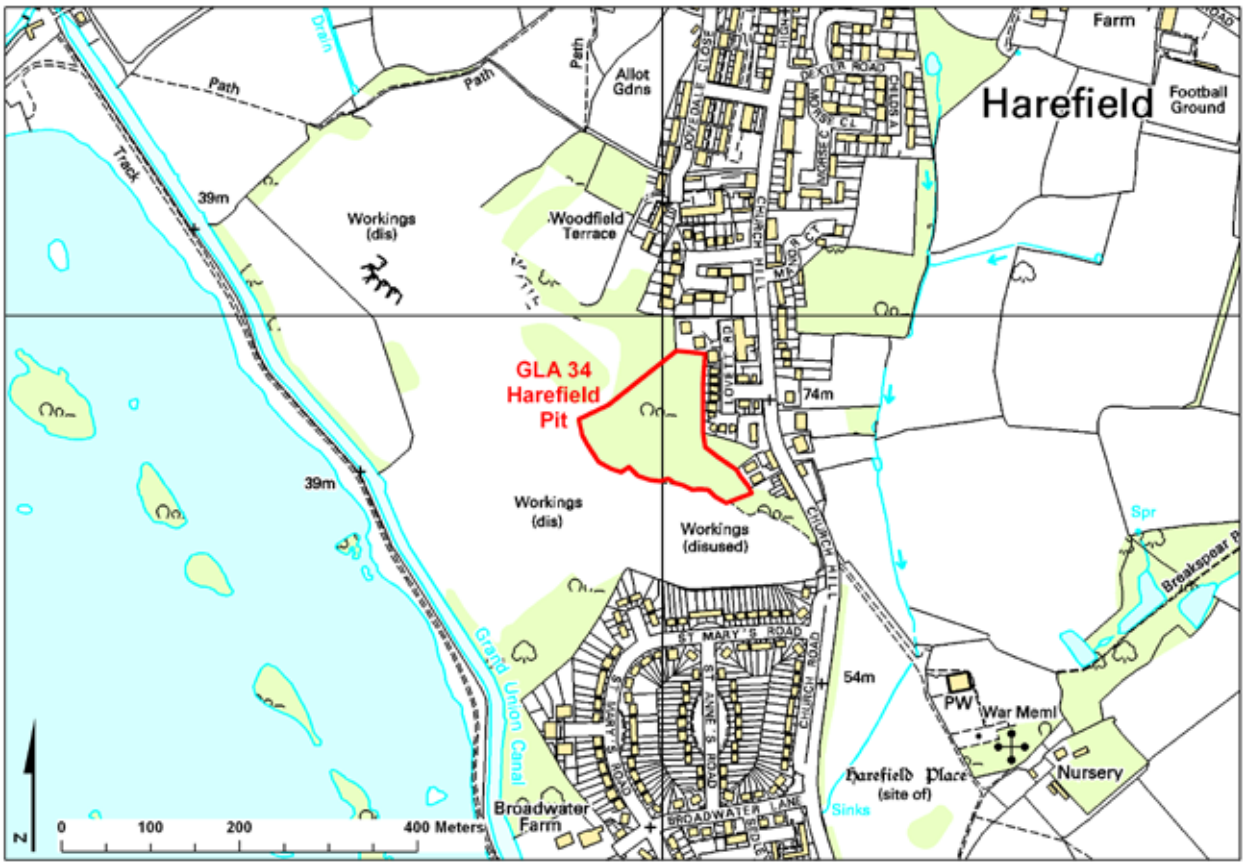


Stratigraphy and Rock Types	
Time Unit: Eocene	Rock Unit: Harwich Formation, London Clay Formation (Thames Group)
Rock Type: Chalk sands and clays	Details: Seaford Chalk with large flints near top, fossiliferous marine alternating sands and clays
Time Unit: Paleocene-Eocene	Rock Unit: Lambeth Group (Upnor and Reading Formations)
Rock Type: sands and clays	Details: variable sands showing cross-stratification in places; nodular glauconite-covered flints at base.
Time Unit: Cretaceous	Rock Unit: Chalk Group
Rock Type: Chalk	Details: Seaford Chalk with large flints near the top

Site Description

A key section in the London Basin for a sequence through the Upper Chalk, Upnor and Reading Formation, Harwich and London Clay Formation. It is also the only known site for calcareous floral remains in the Reading Formation. The site covers part of a disused chalk quarry which has been infilled leaving only the upper faces exposed. These display a superb Palaeogene section including the contact between the Upper Chalk and Upnor Formation, which has here been intensively bored by crustaceans. The faces also show a full section through the Reading Formation, up into mottled fluviatile clays of the Upper Reading Formation. These are overlain by sandy clays with a diverse marine fauna, comprising the Harefield Member of the Harwich Formation for which this is the stratotype locality. Harefield Pit is additionally of particular interest as the only known source of Charophytes in the Reading Formation. These are important palaeo-environmental indicators, and have potential for correlation with other coeval localities in Europe. The overlying London Clay Formation Basement Bed has also yielded plant material.
Managed by Harrow & Hillingdon Geological Society by agreement with former long-standing owners, as resources permit.

Assessment of Site Value

Geodiversity topic: Palaeontology, sedimentology and lithostratigraphy.

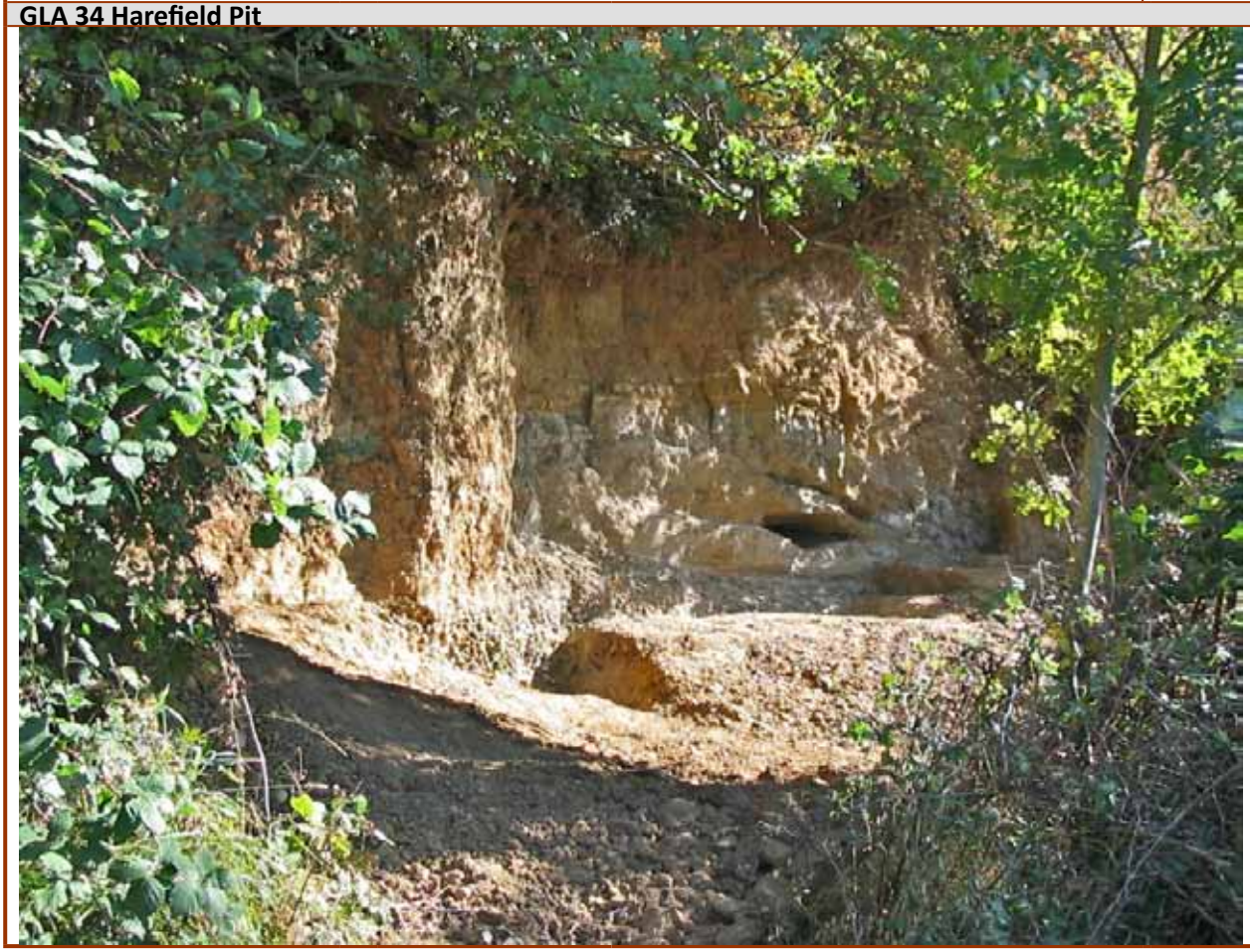
Access and Safety

Aspect	**Description**
Safety of access	Difficult access from road and to the top section of the exposure.
Safety of exposure	Collapse has occurred in one section.
Permission to visit	Permission to visit required
Current condition	Scrub grown up on part of site and brambles making access to geological sections difficult. Clearance works necessary, in particular, clearance and on-going management of vegetation
Current conflicting activities	Not known.
Restricting conditions	Site is overgrown and difficult to use
Nature of exposure	Infilled chalk quarry. Top of chalk quarry protected during landfill.

Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	One of the major Colne valley chalk quarries developed beside the Grand Union Canal to serve the 19th century building expansion of London.	
Aesthetic landscape	Good view across the Colne valley to proto-Thames terraces.	
History of Earth Sciences	Site is well documented, earliest reference 1864, throughout working life as a quarry and subsequently. A critical source of both palaeontological and stratigraphical information	7
Economic geology	Former chalk quarry local interest	4
GeoScientific Merit		
Geomorphology	None.	
Sedimentology	Important locality for understanding the sedimentology of the Reading Formation and its relationship with the overlying Oldhaven and London Clay Formations. Also exposed is the unconformable relationship with the underlying Cretaceous Chalk	8
Palaeontology	Only known locality to have yielded fossil charophytes (stoneworts) from the Reading Formation. – important environmental indicator and for comparison with similar aged sites across Europe. Interesting burrows of Upnor Formation into the top of the Chalk, originally described as *Terebella harefieldensis (now Glypichnus harefieldensis)*.	9
Igneous/mineral/ Metamorphic Geology	None.	

Structural Geology	None.	
Lithostratigraphy	Has been and remains a critical site in understanding Upner and Reading Formation lithostratigraphy. Former type section of the Tilehurst Member of the Oldhaven Formation	8
Potential use	Research, higher education and potential for wider interpretation (subject to access arrangements)	
Fragility	Threatened by vegetation and build up of scree	
Current Site Value		
Community	Access by permission only	2
Education	Restricted access but potentially an important field locality for university students. Keen local group interest	6
Geodiversity value		
SSSI: Of high scientific value for Tertiary palaeobotany and Tertiary stratigraphy		8

GLA 34 Harefield Pit



GLA 35 Wansunt Pit

Grid Reference: TQ 515738	Site Type: Not known
Site Area (hectares): 1.44	Current use: Not known
Site ownership: Not known	Borough: London Borough of Bexley
Field surveyor: Information from Natural England	Date: 16 October 2001
Current geological designations: SSSI	Other scientific:

Site Map

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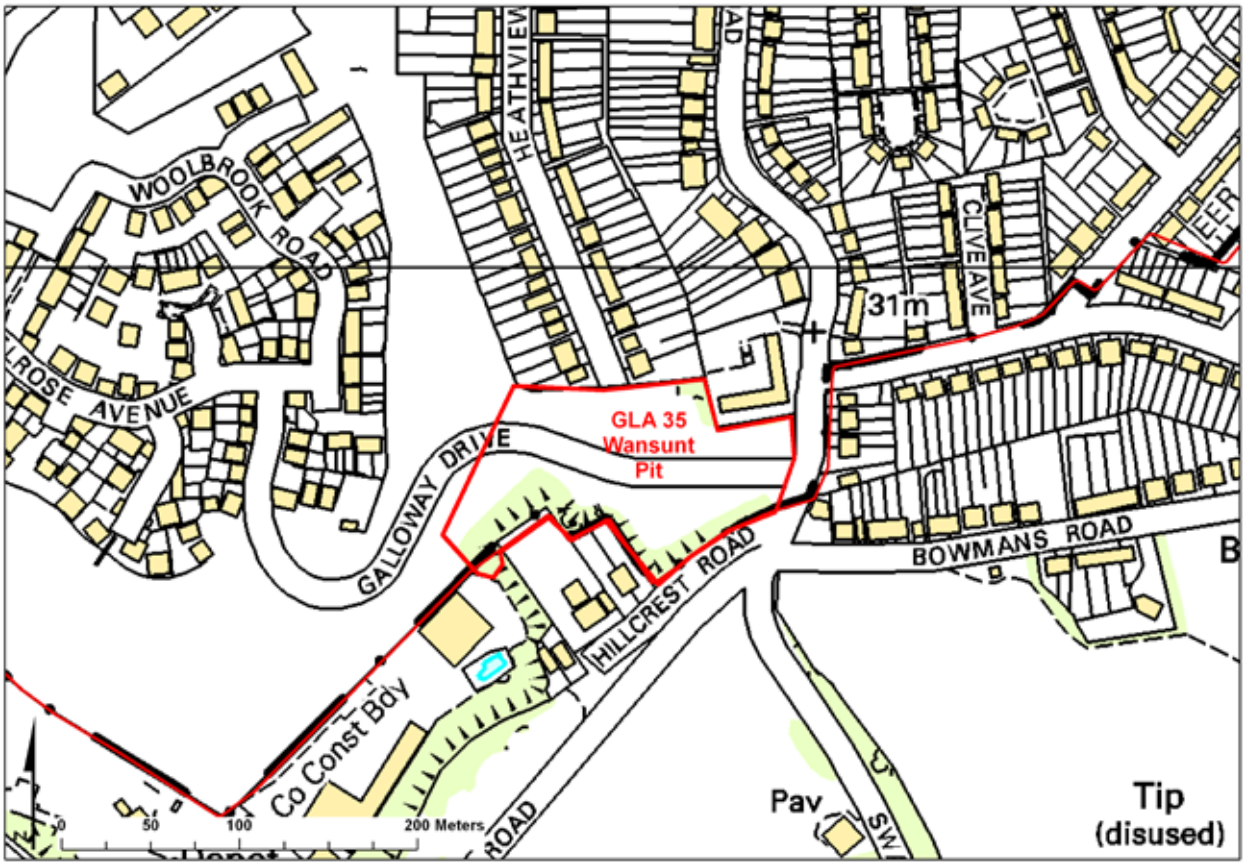

Stratigraphy and Rock Types

Time Unit:	Rock Unit: Dartford Heath Gravel
Rock Type:	Details:

Site Description

This site provides exposures in the Dartford Heath Gravel, a deposit which has been the subject of considerable controversy since the turn of the century. It has been variously attributed to the Boyn Hill Terrace, part of the Swanscombe sequence or to an older, higher terrace. The presence or absence of archaeological material in the gravel itself is questionable, but a working floor of Acheulian age has been discovered in loam overlying the gravel in Wansunt Pit. The question of whether or not the Dartford Heath gravel is equivalent to any part of the Swanscombe sequence, and what its relationship is to the Thames Terraces, is one of the more burning issues in the Thames Pleistocene studies, and therefore the exposures here are of considerable importance.

London Wildlife trust responsible for site management.

Assessment of Site Value

Geodiversity topic: Sedimentology and lithostratigraphy.

Access and Safety

Aspect	Description
Safety of access	Not known

Safety of exposure	Not known	
Permission to visit	Permission to visit required	
Current condition	Part filled former gravel pit. Part developed for local industrial units with access roads. Enclosed by housing and mainly over grown. Recent development of land within the pit has resulted in land raising up to the base of the SSSI and construction of a new access road into the development site. Several exposures have been created on the northern face of the SSSI as part of the planning conditions. None currently visible.	
Current conflicting activities	Not known	
Restricting conditions	Vegetation and flytipping	
Nature of exposure	Overgrown in southern part of the site. Managed exposures in northern part of the site	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Source of palaeolithic artefacts	7
Aesthetic landscape	Not known.	
History of Earth Sciences	Significant history of research and a critical (and controversial) site in the interpretation of the Thames Gravel sequence	7
Economic geology	Former gravel pit – local interest	4
GeoScientific Merit		
Geomorphology	Not rated.	
Sedimentology	Not rated.	
Palaeontology	Mammalian remains	7
Igneous/mineral/ Metamorphic Geology	None.	
Structural Geology	None.	
Lithostratigraphy	Critical site for the interpretation of the Thames Gravel sequence and for correlation across Europe (esp. development of the Rhine River system). Presence of Palaeolithic artefacts adds significant value.	8
Potential use	High research interest, potential local and regional educational value	
Fragility	Vegetation management necessary, critical sections in northern part of site	
Current Site Value		
Community	Access permission required for much of the site	2
Education	Important educational locality especially university level and research, possible regional and local interest particularly in northern managed part of site	10
Geodiversity value		
SSSI: High scientific value for its Thames Terrace sequence, critical site for interpreting Thames Terraces and for comparison across Europe		9
GLA 35 Wansunt Pit		
Site not visited		

GLA 36 Pinner Chalk Mines

Grid Reference: TQ 11538 90483	Site Type: Former mine workings
Site Area (Hectares): 90	Current use: Under recreational land
Site ownership: London Borough of Harrow	Borough: London Borough of Harrow
Field surveyor: Harrow & Hillingdon Geol. Soc.	Date: 24th November 2011
Current geological designations: RIGS	Other scientific:

Site Map

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Stratigraphy and Rock Types

Time Units: Upper Cretaceous/ Paleocene	Rock Units: Chalk Group/Upnor and Reading Formations (Lambeth Group)
Rock Types: Chalk with flints/ puddingstone	Details: Seaford Chalk, Hertfordshire Puddingstone

Site Description

Pinner Chalk Mines extend over a large area, with mixed extraction methods recorded from the 14th century. Access to most is no longer possible, and this survey is of the 1830-70 mine. When accessible, it is one of the few locations still existing in London where the chalk can be examined without being masked by vegetation. It is also important for the extremely rare *in situ* Hertfordshire Pudding Stone that can be seen in the shaft to the mine and in small roof falls. Its presence allowed the quarry men to utilise the Cahlk almost to the top as it provided a hard ceiling.

Assessment of Site Value

Geodiversity topic: Sedimentology; Palaeotology; Lithostratigraphy;.

Access and Safety

Aspect	Description
Safety of access	Public footpath steep/slippery in places. Mine shaft enclosed in security fence with locked cover.

Safety of exposure	Accessible galleries with pillar and stall in good condition (only 2 roof falls in last 160 years, one caused by contractors during construction of latest shaft access cover).	
Permission to visit	By request to Council Licensee (ken.kirkman@btinternet.com, or via Harrow & Hillingdon Geological Society).	
Current condition	Good	
Current conflicting activities	None	
Restricting conditions	Availability of Caving Group that provides means of access by 35m caving ladder with safety harness, and HHGS geological support.	
Nature of exposure	Old mine workings.	
Culture, Heritage & Economic		
Aspect	**Description**	**Rating**
Historic, archaeological & literary associations	Well documented with summary and references in Pinner Local History Society's publication Pinner Chalk Mines' ISBN 0 9507955 6 9 and Harrow & Hillingdon Geological Society's 'A guide to Pinner Chalk Mine' ISBN 0 9520325 0 3.	10
Aesthetic landscape	Potential for Interpretation Board, subject to survey of surface safety and vandalism history.	3
History of Earth Sciences		
Economic geology	Local economic importance	8
GeoScientific Merit		
Geomorphology		
Sedimentology	Chalk with flint and overlying puddingstone	8
Palaeontology	Chalk with flint	7
Igneous/mineral/ Metamorphic Geology		
Structural Geology		
Lithostratigraphy	Chalk and puddingstone succession	8
Potential use	Continued research; Higher and further education; School education.	
Fragility	Roof potentially, as in most mines, due to external influences. Surface overgrown and subject to vandalism.	
Current Site Value		
Community	Under recreational space access.	6
Education	Long-standing and continuing research, education and public interest. Training 'ground' for Fire Service and Met. Police.	9
Geodiversity value		
Recommended RIGS: Rare regional example of 'deep' chalk mining with well-documented history and wide educational value. It is important scientifically for its exceedingly rare *in situ* exposure of Hertfordshire Pudding stone.		9
GLA 36 Pinner Chalk Mines		

GLA 37 Mark's Warren Quarry Complex

Grid Reference: TQ 488 895	Site Type: aggregate quarry site
Site Area (hectares): 31.06	Current use: potential land fill
Site ownership: Brett Lafarge	Borough: London Borough of Barking & Dagenham
Field surveyor: Diana Clements/ Peter Collins/Bill George	Date: July 2011 v
Current geological designations:	Other scientific:

Site Map

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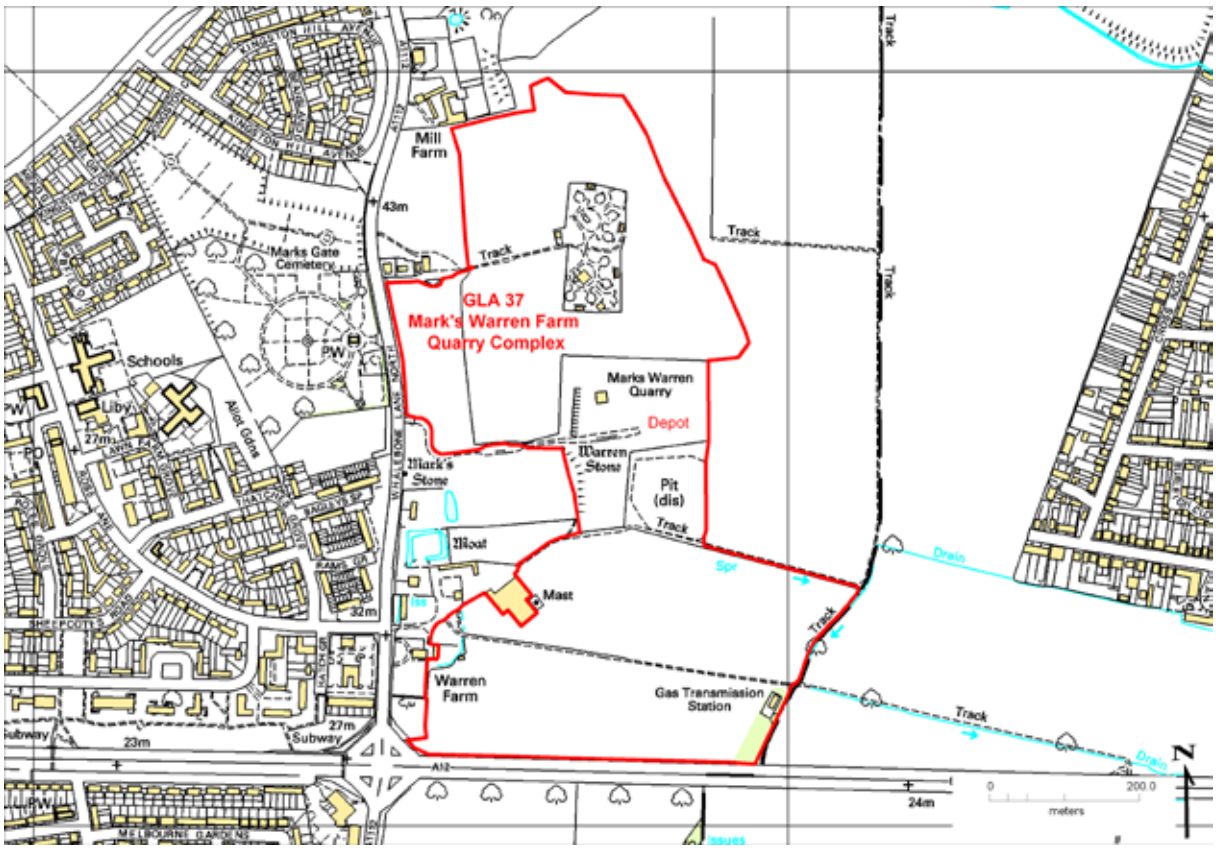

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Black Park Gravel Member, Maidenhead Formation
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly flint),

Site Description

The quarry was on its last days of extraction of Thames Terrace Black Park Gravel (OIS12-11) in July 2011 and landfill had already commenced on the west side of the quarry. A glacial erratic boulder was found within the gravels. It is reported to be dolerite, originating from the Carboniferous Whin Sill in Northumbria, and, if confirmed, will be the furthest south boulders of this nature have travelled. Original transportation was by ice within the Anglian ice sheet with subsequent emplacement within the earliest of the Thames Gravels as the ice melted. It is planned to move this boulder to Bedfords Park Visitor Centre for display purposes. Other former quarries from the Mark's Warren complex are being used for processing or have been landfilled and re-established as agricultural land. As this is the only area in east London still quarrying Black Park Gravel, future planning permissions for the Mark's Warren Complex are recommended to designate a permanently exposed face for geoconservation purposes. It is therefore proposed that any future planning applications adjacent to this site be designated for RIGS status.

Assessment of Site Value		
Geodiversity topic: Lithostratigraphy; sedimentology, glaciotectonics		
Access and Safety		
Aspect	**Description**	
Safety of access	The quarry can only be visited when accompanied by a representative of the quarry owner. It is locked when not operating.	
Safety of exposure	Danger from landfill vehicles	
Permission to visit	Brett Lafarge Ltd. Fairlop Quarry, Hainault Road, Little Heath, Romford, Essex, RM6 5SS Tel no: 02085 992 Limited.Reg No 316788,Brett House, Bysing Wood Road Faversham, Kent ME13 7UD. Registered office: 150 Aldersgate Street, London EC1A4AB. The site is off Whalebone Lane and en route to a processing area in a former quarry	
Current condition	The site has recently finished operations and is being actively landfilled	
Current conflicting activities	Landfill and land reclamation	
Restricting conditions	Imminent disappearance of this site; potential for adjacent quarry once operational.	
Nature of exposure	quarry for Black Park Gravel.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	The area has been quarried from c.1898-1921 but literature has not been researched. The glacial erratic boulder is an important find, scientifically.	4
Aesthetic landscape	Private land	0
History of Earth Sciences	Other gravel pits in East London have been important for Archaelogical remains but none have been reported from the Mark's Warren complex as far as can be ascertained	2
Economic geology	Gravel extraction has been an important industry in east London	8
GeoScientific Merit		
Geomorphology	Flat terrace at 35-40m above OD	2
Sedimentology	Potential detailed description of the gravels possible. Further research into far-travelled clasts recommended	6
Palaeontology	None known	0
Igneous/mineral/ Metamorphic Geology	Inclusion of igneous boulder within predominantly flint gravel	6
Structural Geology	None.	0
Lithostratigraphy	The boulder provides added interest to the study of the Black Park Gravel	6
Potential use	Research; (off-site education on Thames Terraces and Anglian ice sheet)	
Fragility	landfill	
Current Site Value		
Community	.	2
Education		8

Geodiversity value	
Potential RIGS: It is important to maintain an accessible face once extraction has ceased and for Barking & Dagenham to consider designating a face within the complex a RIGS for the Black Park Gravel as there are no other exposures in east London, and in particular because of the importance of the discovery of the glacial erratic boulder within the gravel	6

GLA 37 Mark's Warren Quarry Complex

Image GLA 37. Photo credit: Diana Clements 2011

GLA 38 Chalky Dell

Grid Reference: TQ 48147846	Site Type: Former Chalk Pit with Thanet Sand at top
Site Area (hectares): 0.54	Current use: within recreational land of Lesnes Abbey Woods
Site ownership: L.B. of Bexley	Borough: London Borough of Bexley
Field surveyor: Diana Clements	Date: October 2010
Current geological designations: none here but close to Abbey Wood SSSI	Other scientific:

Site Map

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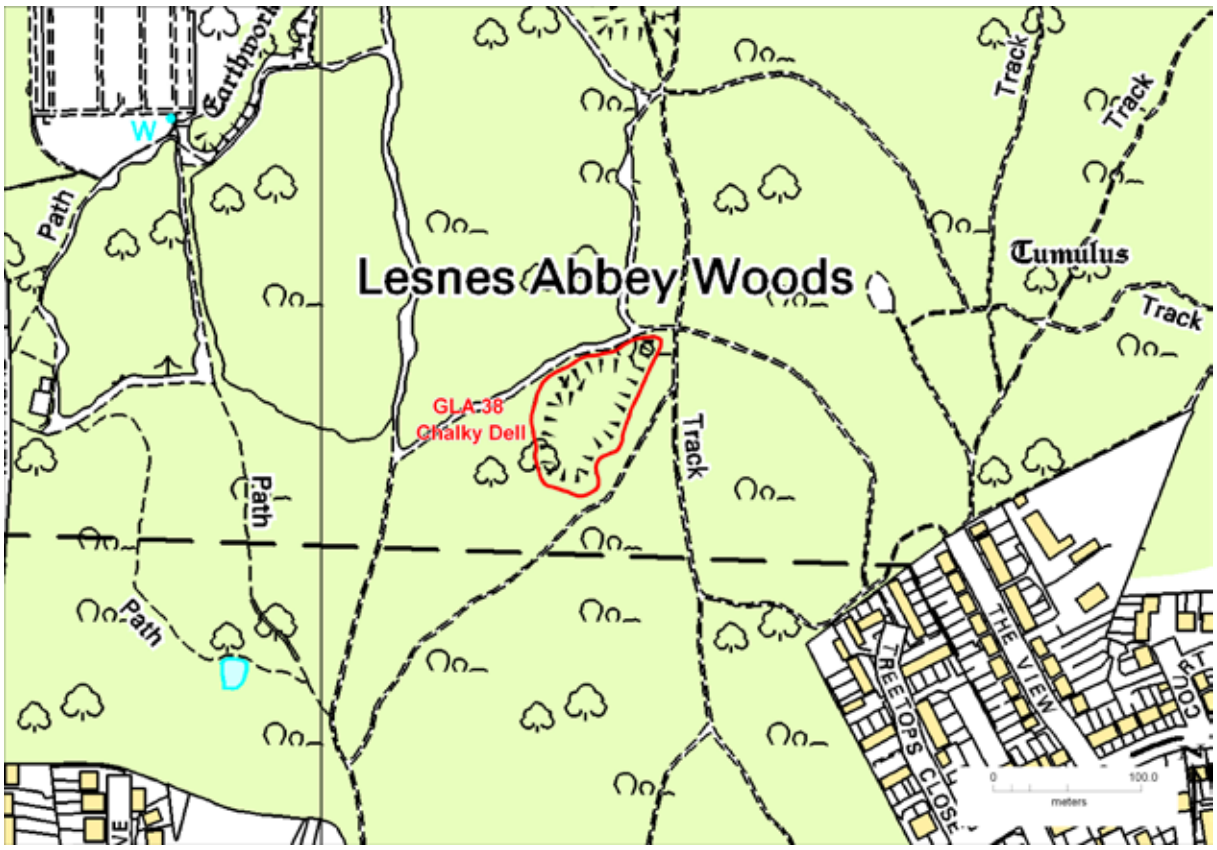

Stratigraphy and Rock Types

Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Clay, silt, sand	Details: Pale yellow-brown fine-grained sand that can be clayey and glauconitic. Bullhead Bed of nodular green glauconite-covered flints at base.
Time Unit: Cretaceous	Rock Unit: Probably Seaford Chalk Formation, White Chalk Subgroup
Rock Type: Chalk	Details (Seaford Chalk): Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

Site Description

Small,partially-overgrown Chalk pit that formerly exposed the junction with the Thanet Sand Formation above including the unweathered glauconite-coverd flints of the Bullhead Beds at the base. The quarry is included as Stop 10 on the Green Chain Walk Geotrail but at present only small exposures of Chalk are visible close to the floor of the pit, the rest is covered in scree. There is potential for re-excavating steps up the scree slope still just visible, and re-exposing the Bullhead Bed. More research required to confirm that the top of the Chalk is within the Seaford Chalk Formation (the norm for the London region).

Assessment of Site Value		
Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology; palaeontology.		
Access and Safety		
Aspect	**Description**	
Safety of access	Fenced off area within Lesnes Abbey Woods.	
Safety of exposure	It is not safe to climb the scree slope or access the top of the quarry	
Permission to visit	Open access to quarry floor	
Current condition	Thanet Sand scree covers the vegetation-bare area of the quarry. Elsewhere vegetation obscures the faces.	
Current conflicting activities		
Restricting conditions	Present non-visibility of face	
Nature of exposure	The quarry was cleared of rubbish in 1992 and has potential as a Regionally Important Geological Site if conserved.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Described by Marriott, 1925 with a photograph of the Bullhead Bed junction	6
Aesthetic landscape	Distinct quarry on Green Chain Walk Geotrail	4
History of Earth Sciences		0
Economic geology	Chalk used for agricultural purposes	4
GeoScientific Merit		
Geomorphology	Research potential in establishing the thickness of the overlying Thanet Sand Formation at this point. At the SSSI the Blackheath Beds channel down through the Lambeth Group and the sub-surface geology can provide useful evidence to the palaeostructures	4
Sedimentology	Details not known but the site offers an opportunity to examine the Chalk, Bullhead Bed and Thanet Sand.	5
Palaeontology	None known about	
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	Local sub-surface structure needs resolving	4
Lithostratigraphy	Junction between Thanet Sand Formation (Bullhead Bed) and Chalk is main lithology of interest. Only Chalk exposure in Bexley.	6
Potential use	Research; education;	
Fragility	natural overgrowing; weathering/erosion;	
Current Site Value		
Community	On Green Chain Walk Geotrail	7
Education	Potential for display in future exhibition at Lesnes Abbey and interpretation board within quarry	8
Geodiversity value		
Potential RIGS: worth conserving for an introduction to the geology of the area and specifically for the Bullhead Beds. Good public access		6

GLA 38 Chalky Dell

Image GLA 38. Photo credit Diana Clements

GLA 39 Erith Submerged Forest

Grid Reference: TQ 526 776	Site Type: Natural foreshore exposure of submerged forest
Site Area (hectares):6.28	Current use: Natural marsh land and foreshore
Site ownership: Port of London Authority	Borough: London Borough of Bexley
Field surveyor: Laurie Baker, Diana Clements	Date: 2010
Current geological designations:	Other scientific:

Site Map

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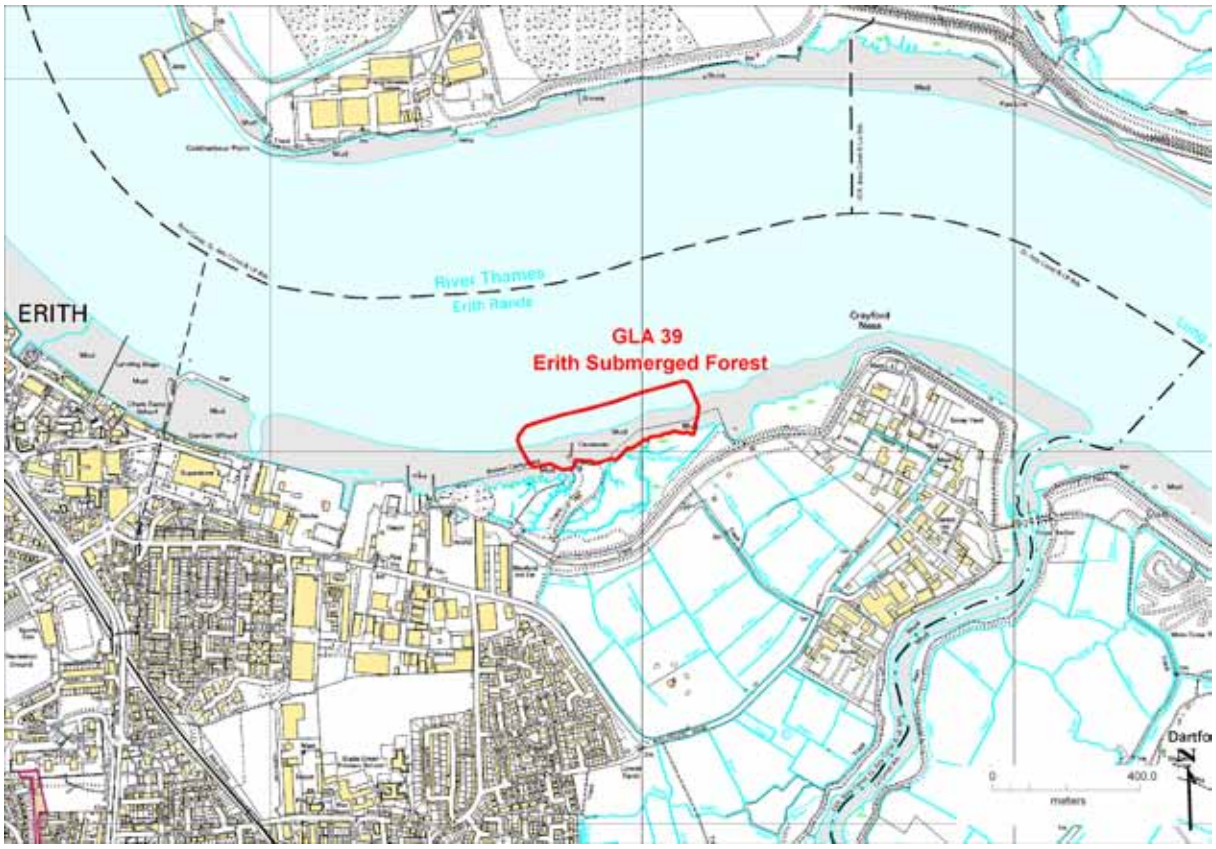

Stratigraphy and Rock Types

Time Unit: Holocene	Rock Unit: Alluvium & peat
Rock Type: Alluvium	Details: peat horizons at varying horizons

Site Description

This is the best place on the Thames Estuary within Greater London for viewing the Neolithic/Bronze Age submerged forest. At low tides whole tree trunks are revealed amongst the root balls and occasional nuts and seeds can also be found. Peat beds are also found on the banks above mean high tide level. At least 5 different ages of peat and trees have been dated ranging from approximately 3,000 years ago until over 5,000 years ago. 15 different tree and shrub species have been recognised of which the majority are alder. Other species include birch, willow, poplar, yew, maple, ash, oak, holly and elm. Shrubs include dogwood, alder buckthorn and buckthorn. The site represents a change from a drier environment when the yew and other 'dry' species were growing, to the wetter environment, produced by rising sea levels, leading to the dominance of alder.

Assessment of Site Value

Geodiversity topic: Holocene processes in the Thames

Access and Safety		
Aspect	**Description**	
Safety of access	Access to the Thames foreshore is via a path (signed to Erith Yacht Club, TQ 527 779) leading from Manor Road, off the A2016 Bronze Age Way, Erith. After about 150 m a right turn onto the Thames Cycle Route along the top of a barrier as far as a concrete structure with a steel covering and then down to the foreshore (TQ 532 781) The submerged forest can only be seen at low tide. Access to the foreshore itself is potentially dangerous and slippery and should only be attempted on a falling tide and never alone.	
Safety of exposure	Storms could potentially damage the exposure as could any development along this stretch of the Thames	
Permission to visit	Open access. A further exposure just to the west requires permission from the Erith Yacht Club.	
Current condition	The foreshore is muddy, slippery and dangerous and should not be attempted alone.	
Current conflicting activities	None known	
Restricting conditions	Tide, weather, mud	
Nature of exposure	Natural foreshore exposure of Neolithic submerged forest	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Details can be found in Seel, 2000 and Sidell & Haughey, 2007. Described in GA Guide 68, 2010.	8
Aesthetic landscape	Public viewing from cycle route	7
History of Earth Sciences	Described in early editions of the Proceedings of the Geologists' Association	4
Economic geology	None	0
GeoScientific Merit		
Geomorphology	Record of changing sea levels in the Thames Estuary and an example of existing saltmarsh. A Key Stage 3 Resource Guide to Erith Saltings is at http://www.bexley.gov.uk/CHttpHandler.ashx?id=1143&p=0)	6
Sedimentology	At least 5 peat horizons have been dated between 3,000 and 5,000 years old	6
Palaeontology	At least 15 different species of plant	6
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Holocene alluvium and associated peat horizons	6
Potential use	Research; further education; on-site interpretation.	
Fragility	Storms; human engineering of Thames estuary	
Current Site Value		
Community	Valuable, as can be seen from cycle route	8
Education	Excellent evidence for teaching about past environments of the Thames Estuary and about global warming and sea-level rise	9
Geodiversity value		

Potential RIGS: The best exposure of the Neolithic submerged forest with reasonable access for local community.	6

GLA 39 Erith submerged forest

Image GLA 39. Photo credit Jane Sidell

GLA 40 Chislehurst Caves

Grid Reference: TQ 431696	Site Type: Man made chalk caves
Site Area (hectares): 1.74 (c.8 underground)	Current use: privately owned tourist feature
Site ownership: Private owner	Borough: London Borough of Bromley
Field surveyor:	Date: 22nd November 2011
Current geological designations:	Other scientific:

Site Map

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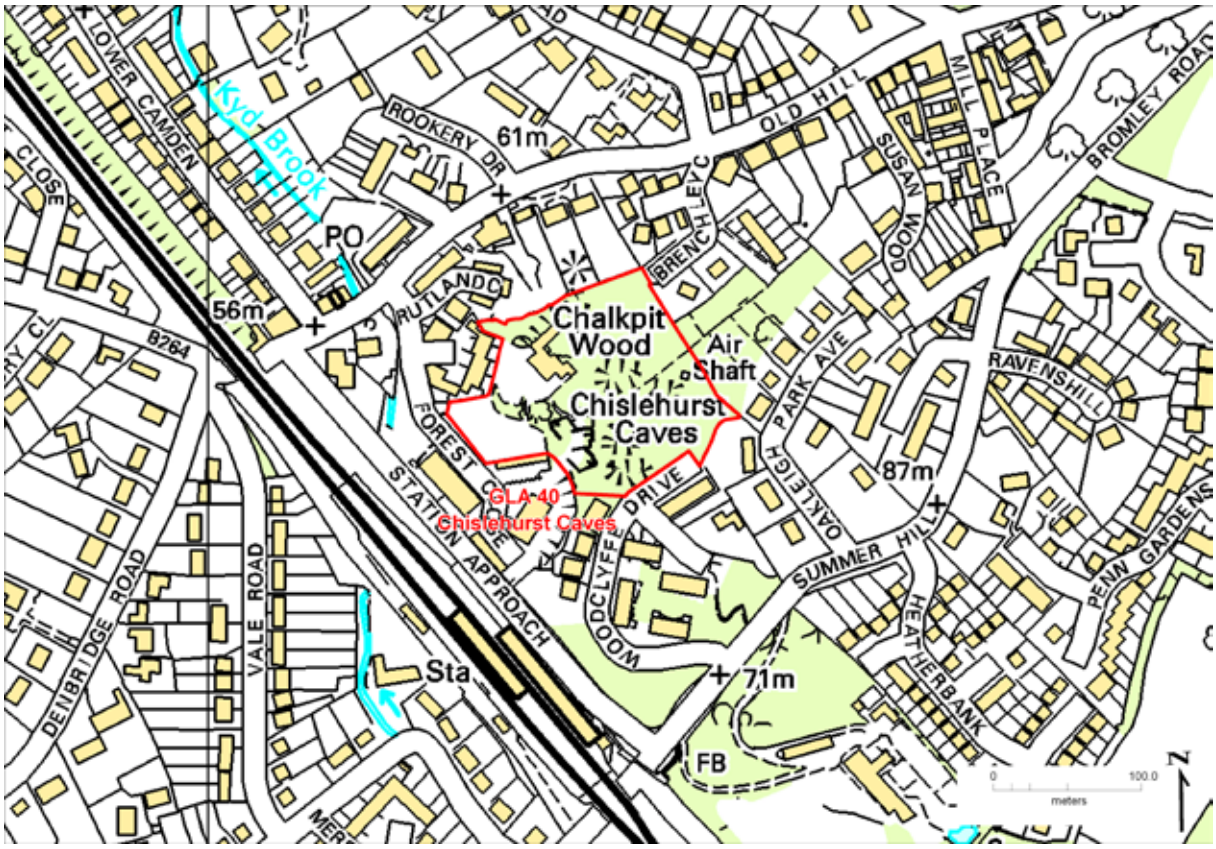

Stratigraphy and Rock Types

Time Unit: Palaeogene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: Sand with some clay. At the base of the formation there is a layer of rounded green coloured flint known as The Bullhead Bed
Time Unit: Cretaceous	Rock Unit: Seaford Chalk Formation, White Chalk Subgroup, possibly running up to base of Newhaven Chalk Formation at the top
Rock Type: Chalk	Details (Seaford Chalk): Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

Site Description

A man made subterranean chalk mine dating from mediaeval times but mostly exploited during the 1800's. Mining chalk from a drift mine entrance at the bottom of a valley using a pillar and stall technique has been carried out for over 100 years. The site is famous for its use as an air-raid shelter in World war two. The site is privately owned and has regular guided tours.
Geologically the main point of interest is the well exposed junction between the eroded top of the Upper Chalk and the Thanet Sand. It is one of the rare good exposures of the Bullhead Bed. With a full exposure of the top of the chalk there is a potential for more research on the detailed age at the top of the section,

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology.

Access and Safety	
Aspect	**Description**
Safety of access	Good
Safety of exposure	Well maintained by Owner.
Permission to visit	Regular paid tours available
Current condition	Good
Current conflicting activities	None.
Restricting conditions	Opening hours; route of guided tours does not pass the exposure of the Bullhead Bed and Thanet Sand
Nature of exposure	Good underground exposures

Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Well known historical site. Featured in GA Guide 68, 2010.	8
Aesthetic landscape	Popular visit feature	6
History of Earth Sciences	Useful educational location	6
Economic geology	Of great past importance.	8
GeoScientific Merit		
Geomorphology	Chalk close to the surface along the valley floor	2
Sedimentology	High quality rare exposure of Bullhead Bed	6
Palaeontology	External mould of *Parapuzosia* ammonite visible in roof of Middle Section. Macro and Microfossil potential.	4
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology		2
Lithostratigraphy	Relationship of formations	6
Potential use	Research; further education; on-site interpretation.	
Fragility	Well protected.	

Current Site Value		
Community	Excellent tourist attraction	8
Education	Valuable	5

Geodiversity value	
Potential RIGS. High geodiversity value because of junction with overlying Thanet Sand and the only publically accessible mine in Greater London. Potential for more detailed research on the Chalk stratigraphy.	6

GLA 40 Chislehurst Caves

Image GLA 40. Photo credit Vernon Marks

GLA 41 Klinger Pit, Foots Cray

Grid Reference: TQ 478 703	Site Type: Disused Thanet Sand pit
Site Area (hectares): 0.69	Current use: none (boarded-up business)
Site ownership: unknown	Borough: London Borough of Bromley
Field surveyor: Diana Clements/Vernon Marks/ Steve Tracey/Laurie Baker	Date: 30/1/12; (more thoroughly in 2008)
Current geological designations:	Other scientific:

Site Map

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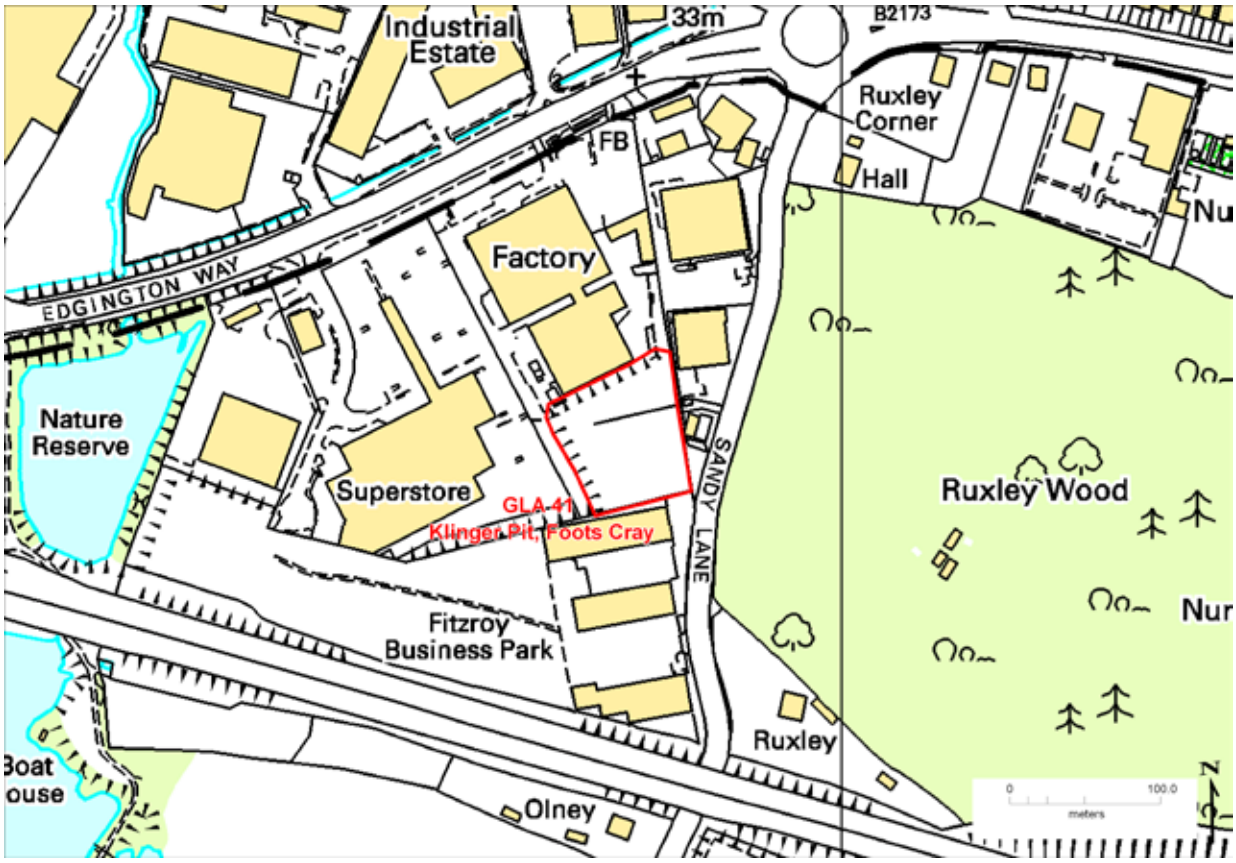

Stratigraphy and Rock Types

Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Sand	Details: well-bedded fine yellow sand

Site Description

Abandoned pit in the Thanet Sand Formation showing c.3-10 m of nearly vertical face on the S & E sides of the site. There is some slumping near the base. In January 2012 the floor of the quarry had been cleared of dumped material and birch trees but the birch were still growing on the slumped slopes and were taller than the quarry faces. The low residual face (c.2 m tall) screening the quarry from the back of the factory had also been removed in January 2012. The lithology is predominantly fine yellow sand. This remains the best exposure of Thanet Sand in the London area and deserves to be conserved as a RIGS

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology;

Access and Safety

Aspect	Description
Safety of access	Access is currently denied. Official entry is through the locked gates of the Klinger factory on the A223, Edgington Way, through the factory itself and into the yard beyond. The site has been secured and there is no access from the adjacent Tesco car park although it can be viewed through the fence. The floor of the quarry has been recently cleared; purpose unknown at present (01/12).
Safety of exposure	Minimal danger of falling sand.
Permission to visit	Unknown owner; LB Bromley are trying to ascertain
Current condition	The site seems to be in the process of development. Self-seeded birch trees colonising the scree slopes are now taller than the cliff faces (over 10 m).
Current conflicting activities	Future development. There is an urgency to designate this as a RIGS and to try to discuss future access with any potential developer, particularly in light of recent activity.
Restricting conditions	At present, access; in future, possible development
Nature of exposure	c.3-10 m of nearly vertical face remain on the S & E sides of the site. Entirely Thanet Sand Formation

Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	unknown.	2
Aesthetic landscape	Quarry faces in 2 dimensions	2
History of Earth Sciences	None known	0
Economic geology	Sand quarrying	6
GeoScientific Merit		
Geomorphology	None	0
Sedimentology	Marine sand deposited in a coastal environment. The pale colour implies little evidence of glauconite and relatively recent quarrying. Sand is well sorted but no detailed analysis of the sand is currently available	6
Palaeontology	None seen	0
Igneous/mineral/ Metamorphic Geology	None	0
Structural Geology	At southern edge of the London Basin Syncline	2
Lithostratigraphy	Thanet Sand Formation	6
Potential use	Research; education; on-site interpretation adjacent to Tesco	
Fragility	Development; natural overgrowth; dumping; weathering/erosion.	
Current Site Value		
Community	If conserved, could be more accessible than the proposed LIGS on the Cray Valley Golf Course (GLA30)	8
Education	Good potential	8
Geodiversity value		
Potential RIGS: The best Thanet Sand exposure in the area if it were accessible to the public		6

GLA 41 Klinger Pit, Foots Cray

Image GLA 41 (21/01/12) from Tesco car park. Photo credit Laurie Baker

GLA 42 Kenwood House quarry, Hampstead Heath

Grid Reference: TQ 2685 8745	Site Type: Small quarry for Bagshot Sand (within larger area of Bagshot Sand on Hampstead Heath)
Site Area (hectares): 0.07	Current use: Fenced area behind Recreational Land
Site ownership: English Heritage	Borough: L B Camden
Field surveyors: Diana Clements	Date: LGAP launch Oct 2010
Current geological designations:	Other scientific:

Site Map

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Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: Bagshot Formation
Rock Type: iron-rich sand	Details: predominantly fine sand showing stratification and locally iron rich.
Time Unit: Eocene	Rock Unit: London Clay Formation and Claygate member, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt, clay.

Site Description

Former quarry of Bagshot Formation exploited in the building of Kenwood House. This site close to Kenwood House would make an ideal location for cutting a face into the slope to create a conserved face and adding some interpretation. Unfortunately the most promising section of the slope that was stripped bare in the 1987 storm has been re-planted during 2010. (A second quarry can be seen within the gardeners' compound at TQ 2670 8735). In the meantime the small exposures on Sandy Heath around the natural ponds, purportedly floored by iron pan, provide an opportunity of minor observation of the Bagshot Sand. In 2011 an interpretation board was placed on Sandy Heath by LGP with a picture of the area being actively quarried in 1867. A spring line occurs at the base of the Bagshot Sand at the junction with the underlying Claygate Member at the top of the London Clay Formation. A lower spring line occurs at the base of the Claygate Member. These springs give rise to the Fleet, Westbourne and Tyburn Rivers flowing into the Thames and the Mutton Hall Brook flowing in the River Brent.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.

Access and Safety

Aspect	Description
Safety of access	The area suggested for conservation is currently fenced off and inaccessible on a steep slope. Sandy Heath has footpaths through woodlands with areas of open grassland and can be seen well adjacent to the largest pond
Safety of exposure	Vegetation prevents slipping on the proposed site but large storms can bring down trees providing better exposure. Exposures on Sandy Heath are aided by 'people erosion'.
Permission to visit	The proposed conservation site(shown as 'Old Quarry' on the map requires permission from English Heritage at Kenwood House. Sandy Heath has open access.
Current condition	The proposed site has had trees planted in 2010 so permission to clear might now be more difficult. Scree at base of slope could also be more problematical so any exposure created higher up the slope would require step access.
Current conflicting activities	Wildlife and aesthetic planting
Restricting conditions	Fenced off area, vegetation
Nature of exposure	1913 photograph shows a vertical quarry face.

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	Quarries within Kenwood are described in Rudler, 1913; extraction of sand on Sandy Heath by Sir Thomas Marion Wilson for construction of St. Pancras railway is described in many books on the heath and painted by Constable in 1867. There are a number of photographic records. More recently GA Guide 68, 2010 describes a guided walk around the Heath.	8
Aesthetic landscape	Footpaths through woods and heath used by local community; good views over London	9
History of Earth Sciences	Descriptions of field trips in Proceedings of the Geologists' Association but not much mention of Bagshot Sand eg1873, 1877, 1989, 1993; Also Lobley, 1889, Rudler, 1913	4
Economic geology	Extraction of sand (poor quality)	8

GeoScientific Merit

Geomorphology	Highest hill in inner London (134 m) with fine views to the south; One of several isolated hills remaining; part of the 'Northern Heights'	6
Sedimentology	A conserved section would potentially be the best exposure of Bagshot Sand in Greater London (only otherwise found at Harrow-on-the-Hill and Havering Ridge). Although photographs exist showing bedding and cross stratification (Rudler, 1913), no written description has been found from Hampstead Heath. An iron-pan is described within the Bagshot Sands, underlying the ponds on Sandy Heath.	6
Palaeontology	None recorded from Bagshot Sands	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology		
Lithostratigraphy	Hampstead Heath is an excellent location for identifying the different lithologies from clues in the landscape – spring lines, vegetation, small exposures. The Bagshot Sands lie above the Claygate Member of the London Clay Formation with the London Clay below	6
Potential use	Research; education; on-site interpretation.	
Fragility	Natural overgrowing	
Current Site Value		
Community	Valuable woodland and green space.	8
Education	Visitors centre in Highgate Wood has further potential for geological education	4
Geodiversity value		
Potential RIGS: Bagshot Sand was not hitherto represented in *London's foundations*: this is the best location and warrants a permanent accessible exposure. The Heath in general is an excellent educational tool to demonstrate geomorphology, particularly the spring lines; access for local community.		6
GLA 42 Kenwood House quarry, Hampstead Heath		

Image GLA 42.1 Kenwood House Quarry

Image GLA 42.2 Sandy Heath exposures of Bagshot Sand
Photo credits: Geoff Swann 42.1, Diana Clements 42.2

GLA 43 Springfield Park, Hackney

Grid Reference Main Park entrance TQ 345 873	Site Type: Public park on east facing slope down to the River Lea
Site Area (hectares): 13.58	Current use: Recreational Land with Information Centre & café
Site ownership: London Borough of Hackney	Borough: London Borough of Hackney
Field surveyors: Diana Clements	Date: June 2009
Current geological designations:only London Geological Nature Reserve	Other scientific:

Site Map

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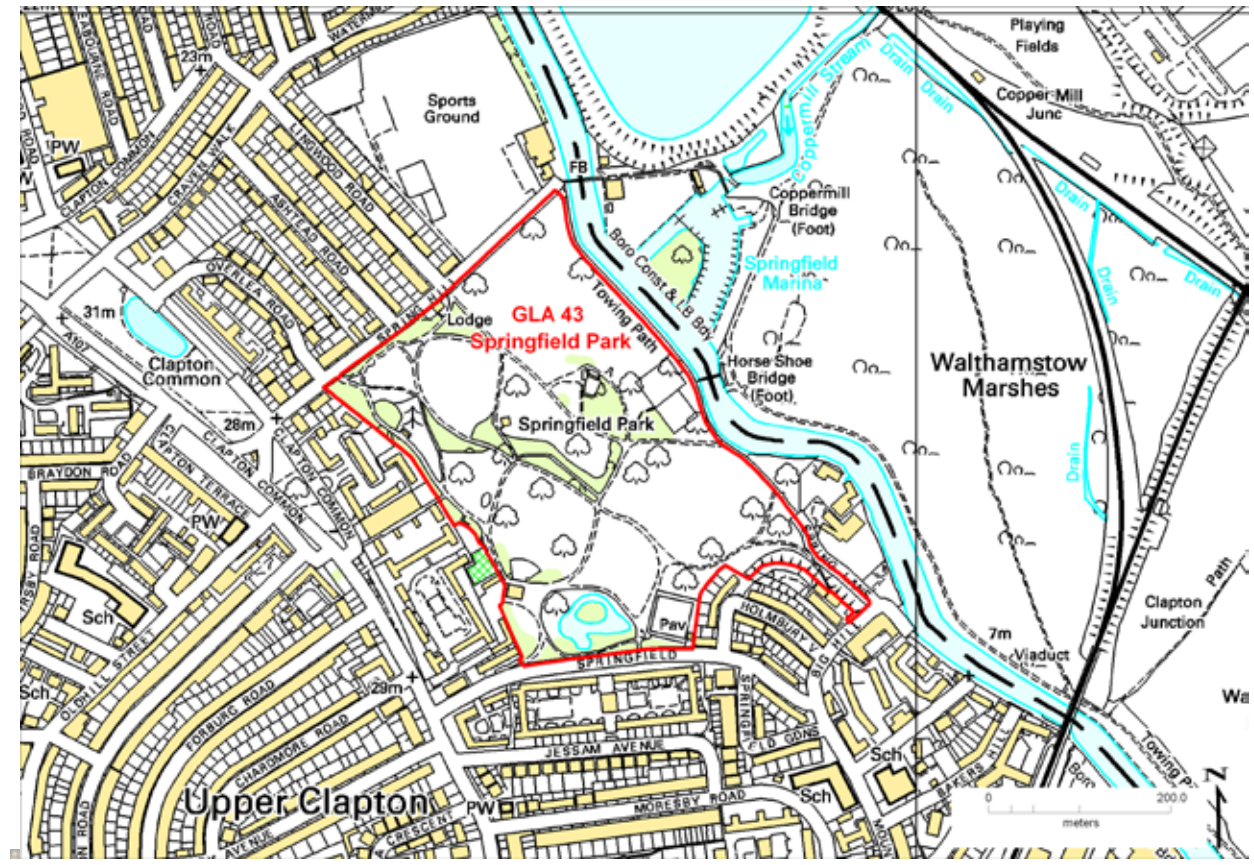

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock unit: Langley Silt Member, Maidenhead Formation
Rock Type: brickearth	Details: fine clay containing chalk; pebble stringers & laminations
Time Unit: Pleistocene	Rock unit: Hackney Gravel Member, Maidenhead Formation
Rock Type:	Details: predominantly flint gravel within range base 6-15m, top16-18m above floodplain of River Lea
Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, clayey silt, clay.

Site Description

Springfield Park was designated London's only Geological Nature Reserve in 1997. It is on the west bank of the River Lea and slopes down to the tow path. The name Springfield is the key to the reason for its designation with the spring line along the junction of the Hackney Gravels and underlying London Clay emerging along the slope. A small pit within the park supplied sufficient brickearth for the building of the 3 villas originally there (now only one remains). There are fine views from the top of the park over the wide Lea Valley to the Epping Forest Ridge on the far side. Interpretation boards for the geology are placed at several sites and a leaflet *Wild about Springfield Local Nature Reserve* which includes a section on the geology is available from the Information Centre. The London Geodiverstiy Partnership needs to ensure that geological interpretations are retained in the park. Information on the melting Anglian ice sheet which created the valley could be added.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.

Access and Safety

Aspect	Description
Safety of access	On street car parking is adjacent to the park and there is also access from the towpath of the Lea. Springfield Park is open daily from 7.30 to dusk.
Safety of exposure	There are well-marked footpaths throughout the park but actual exposures are mostly not seen. Instead the geology is inferred by the topography and numerous springs that bubble up in the grassy slopes. In prolonged dry weather plants indicate the position of the springs.
Permission to visit	Open access.
Current condition	The park is well maintained with rough grass areas allowing access to the position of several of the springs. There is an excellent view over the Lea Valley. Conservation of boards and leaflets need to be regularly assessed.
Current conflicting activities	none
Restricting conditions	Vegetation, limited exposures
Nature of exposure	Natural slope allowing geomorphological interpretation

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	Created as a geological nature reserve in 1997 backed by information and interpretation boards initiated by Eric Robinson. Brick pit on old maps	7
Aesthetic landscape	Footpaths through woods and meadows and around ponds used by local community; good views over London	9
History of Earth Sciences	unknown	2
Economic geology	Brick pit for use on site. Over-burnt bricks used in walls around trees within parks.	4
GeoScientific Merit		
Geomorphology	Steep eastward-sloping bank of the River Lea with spring lines denoting changes in morphology	6
Sedimentology	None visible	4
Palaeontology	None recorded	
Igneous/mineral/ Metamorphic Geology	none	0

Structural Geology		
Lithostratigraphy	Only location demonstrating Langley Silt & Hackney Gravel. Geological nature reserve has interpreted the different lithologies from clues in the landscape – spring lines, vegetation, small exposures	6
Potential use	education; interpretation panels & leaflet exists	
Fragility	Draining of springs for other amenity users	
Current Site Value		
Community	Valuable green space.	9
Education	plenty of potential for geological education	9
Geodiversity value		
Potential RIGS: As this is already a geological nature reserve it deserves protection as such by becoming a designated RIGS. Only location with Langley Silt and Hackney Gravel. Spring line prominent.		6
GLA 43 Springfield Park, Hackney		

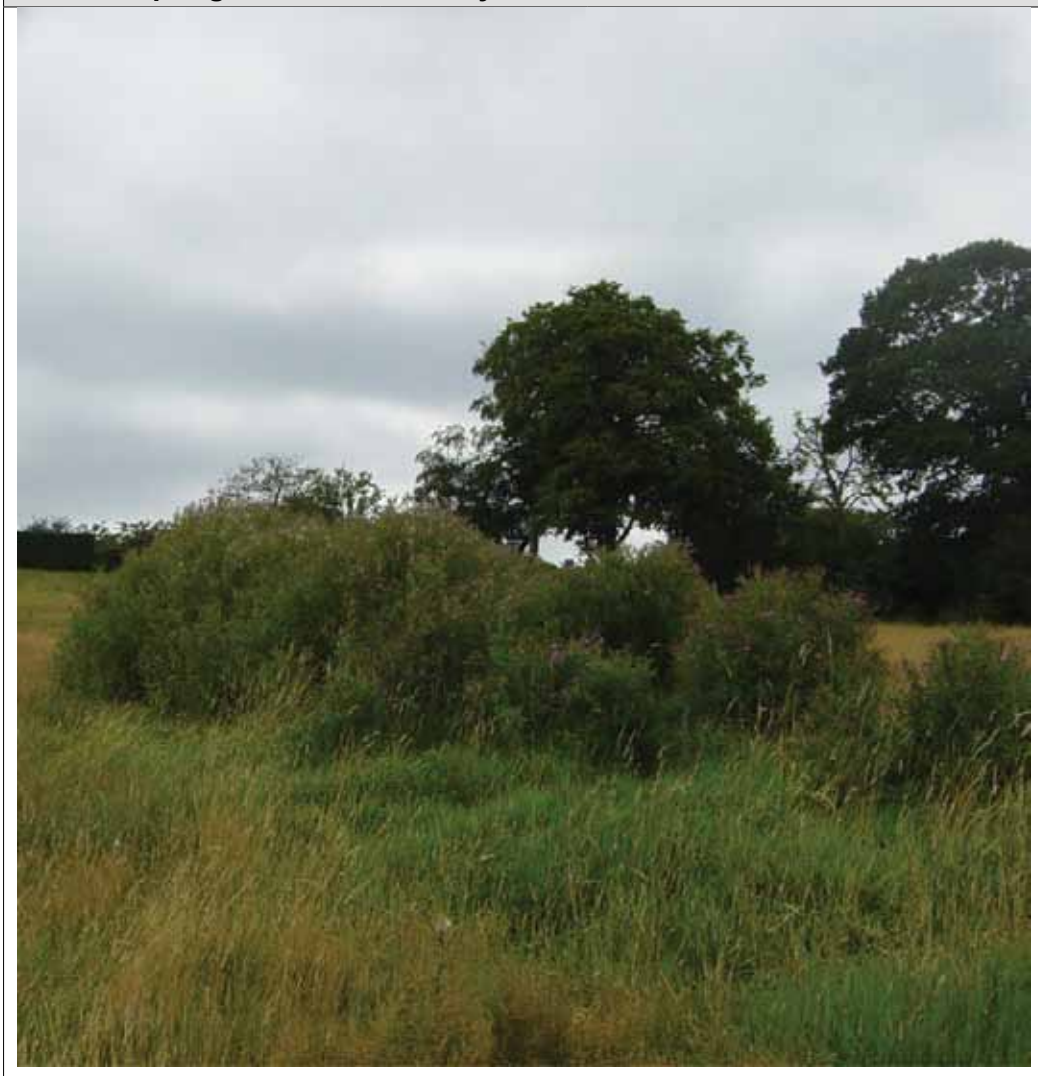

Image GLA 43. Photo credit Diana Clements

GLA 44 Highgate Wood and Queen's Wood

Grid Reference: Highgate Wood TQ 280 885 Queen's Wood TQ 285 885	Site Type: Natural Landform
Site Area (hectares): QW 21 ha HW 28ha (total 51.16)	Current use: Recreational Land
Site ownership: Highgate Wood is Corporation of London and Queen's Wood is LB Haringey	Borough: London Borough of Haringey
Field surveyors: Peter Collins, Diana Clements and Mike Hacker	Date: 25th May 2011
Current geological designations:	Other scientific:

Site Map

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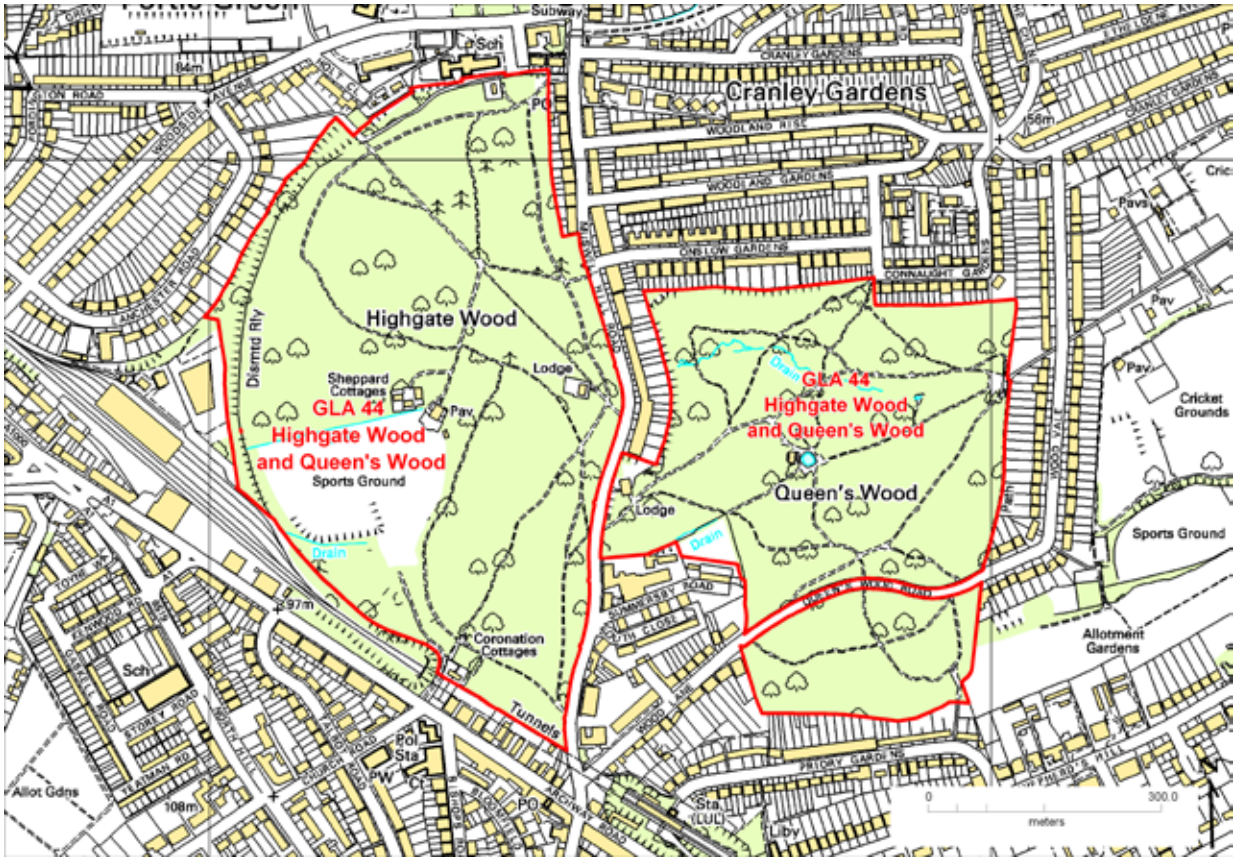

Stratigraphy and Rock Types

Time Unit: Pleistocene/ Holocene	Rock Unit: Head, solifluction and glacigenic deposits
Rock Type: Sand and gravel	Details: Polymict comprising poorly sorted silt, sand and gravel, with some pebbles, probably glacigenic deposits formed by fluvio-glacial processes
Time Unit: Eocene	Rock Unit: London Clay Formation and Claygate member, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt, clay.

Site Description

Two wooded areas with London Clay underlying the hillocks of the Claygate member on higher land (Highgate Wood). Archaeological linked excavation in Highgate Wood found Claygate Member deposits extending beyond the limit shown in BGS maps. There are deeply cut ravines in Queen's Wood that may be related to the Anglian and later glaciations. There is a key north-south interfluve dividing the watershed to the Brent in the west and the Lea in the east. The is an important site located between the glacial till to the north and the Bagshot Formation and Stanmore Gravel Formation on the higher land of Highgate and Hampstead Heath to the south. There is potential for research into composition of the gravels found on and near the surface which could give more information on the provenance of the gravels and therefore possible glacigenic processes that deposited them. There is also potential for research into the fluvial or glacial processes causing the formation of the deeply-cut gorges in Queen's Wood.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.

Access and Safety

Aspect	Description
Safety of access	Footpaths through woodlands with areas of open grassland. Two woods divided by main road. Some step slopes
Safety of exposure	Observe general safety in woodlands.
Permission to visit	Open access.
Current condition	OK. Highgate Wood well looked after by City of London Corporation. Includes Visitor Centre
Current conflicting activities	None.
Restricting conditions	Trees and leaf cover in autumn.
Nature of exposure	Exposures in woodland.

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	Mesolithic/Neolithic flint surface finds Romano-British pottery kilns utilising Claygate member, quarrying of sands and gravels (formerly named Gravel Pit Wood).	9
Aesthetic landscape	Footpaths through woods used by local community.	9
History of Earth Sciences	.	2
Economic geology	Extraction of clay, sand and gravels	7

GeoScientific Merit

Geomorphology	Gorges within Queen's wood.	6
Sedimentology	Detailed analysis of the clay in Highgate Woods indicates that it belongs to the Claygate Member of the London Clay Formation	4
Palaeontology	None observed but the Highgate railway tunnel runs beneath the SW corner where Whitaker (1889) found fossils of the 'Highagate Fauna' in Division E2 of King (1981) which underlies the Claygate Member of the London Clay.	(6)
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology		

Lithostratigraphy	Revision of surface London Clay as mapped by BGS to Claygate Member (pers. comm. with Don Aldiss BGS)	6
Potential use	Research; further education; on-site interpretation.	
Fragility	Natural overgrowing; weathering/erosion.	
Current Site Value		
Community	Valuable woodland and green space.	8
Education	Visitors centre in Highgate Wood has further potential for geological education	4
Geodiversity value		
Potential RIGS: Well maintained woodlands with much research potential on Claygate Member, gravel exposures and deeply-cut gorges; excellent access for local community.		6

GLA 44 Highgate Wood and Queen's Wood

Image GLA 44. Photo Credit Diana Clements

GLA 45 Bedfords Park, Havering Ridge

Grid Reference Park entrance TQ 517 930 Visitor Centre TQ 519 922	Site Type: south-facing aspect of natural ridge
Site Area (hectares): 86.82 acres	Current use: Recreational Land with Visitor Centre
Site ownership: London Borough of Havering	Borough: London Borough of Havering
Field surveyors: Diana Clements/Peter Collins	Date: June 2011
Current geological designations: Geology featured in Visitor Centre	Other scientific: Local Nature Reserve status, Green Flag stutus

Site Map

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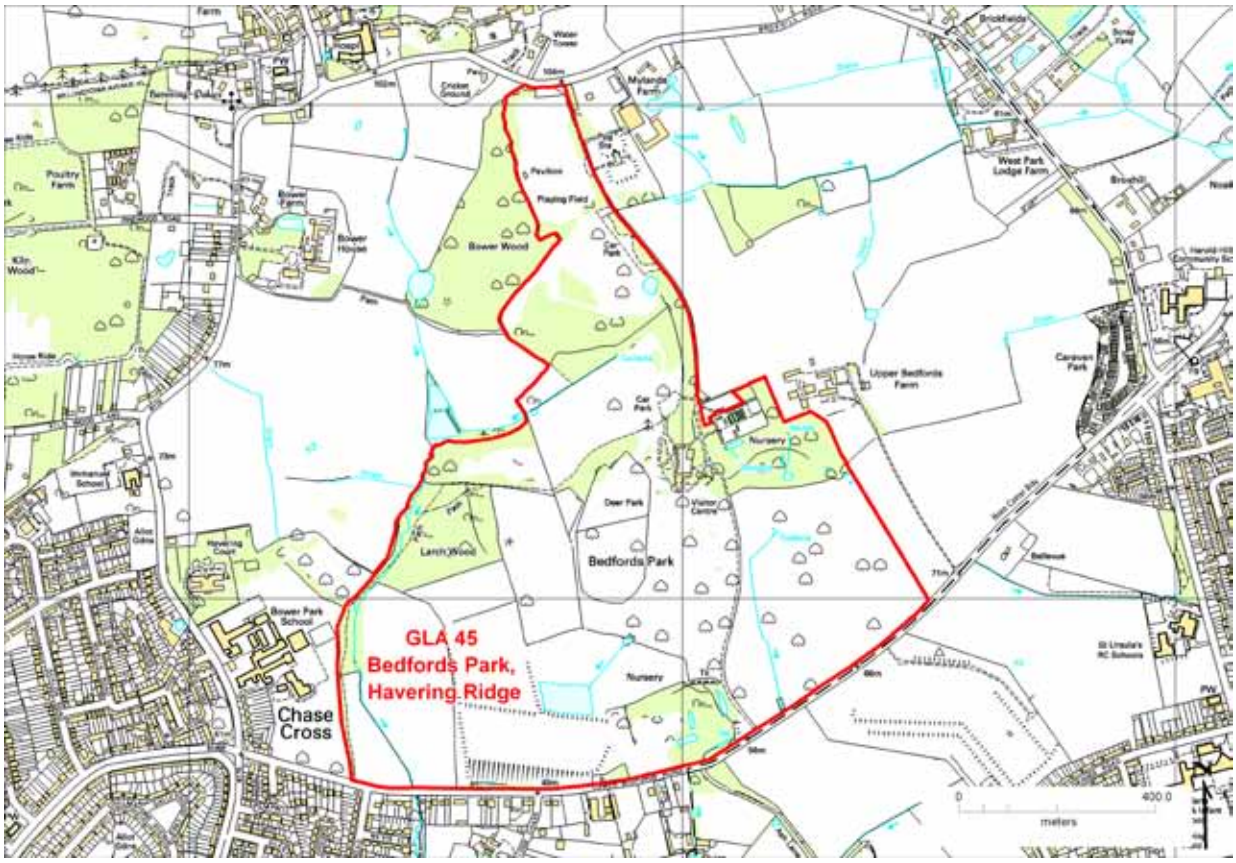

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock unit: Lowestoft Formation, Albion Glacigenic Group
Rock Type:	Details: Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content
Time Unit: Quaternary	Rock unit: Stanmore Gravel Formation, Crag Group
Rock Type:	Details: Gravel & sand, clayey near base. Contains quartzite & Lower Greensand chert (see GLA 18 for full details of clast analysis).
Time Unit: Eocene	Rock Unit: Bagshot Sand Formation
Rock Type: iron-rich sand ?pebble stringers	Details: predominantly fine sand showing stratification and locally iron rich. Pebble stringers reported but none seen
Time Unit: Eocene	Rock Unit: London Clay Formation and Claygate member, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt, clay.

Site Description

Havering Ridge displays 5 different lithologies and so is an excellent location for studying the geology of London and Bedfords Park is the best place to study the geomorphology. Essex Wildlife Trust runs a Visitor Centre where an interactive computer terminal describes the various units and they also publish a Trail Guide. With some small detours this could provide the basis for a parallel Geotrail. It is planned that the glacial erratic boulder (probably from the Whin Sill) recently discovered in the quarry extracting Black Park Gravels at Mark's Warren Farm (GLA 37) will be put on display at the Visitor Centre to add to the geological interest. The Visitor Centre is situated at over 90 m and affords spectacular views over Canary Wharf to Shooters Hill on the south side of the Thames and beyond. The entrance is at the top of Havering Ridge at 90 m where there are more extensive outcrops of Stanmore Gravels extending through Havering-atte-Bower to Havering Park. There is potential for identifying the different lithologies from clues in the landscape – spring lines, vegetation, small exposures. Exposures are otherwise a bit difficult to find unless excavations are made.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.

Access and Safety

Aspect	**Description**
Safety of access	There is a car park and public access to Bedfords Park during opening times (8 am to sunset). Visitor Centre open 9-5 Tuesday to Sunday.
Safety of exposure	There are well-marked footpaths throughout the park but actual exposures are limited to temporary exposures. The Trail of c. 2 ½ miles follows some steepish hills which can be slippery.
Permission to visit	Open access.
Current condition	The park is well maintained with a range of habitats including a small overgrown quarry at the top of the hill and ponds in London Clay at the bottom. There is an excellent view over London to Shooters Hill from the Visitor Centre
Current conflicting activities	none
Restricting conditions	Vegetation, limited exposures
Nature of exposure	Natural hill showing range of rock units.

Culture, Heritage & Economic

Aspect	**Description**	Rating
Historic, archaeological & literary associations	Deer park acts as a reminder that this was a royal hunting ground from 11th to 16th centuries. The Visitor Centre sells copies of the Trail Guide and other local information	3
Aesthetic landscape	Footpaths through woods and meadows and around ponds used by local community; good views over London	9
History of Earth Sciences	unknown	4
Economic geology	Small quarry above car park used for sand or gravel (?Stanmore or Bagshot)	4
GeoScientific Merit		
Geomorphology	Part of the Havering Ridge with sloping landscape to the south and ponds within the London Clay at the bottom of the Hill.	6
Sedimentology	Observations were not made except for the London Clay at the lowest point in the park where a pond is situated. The clay exposed around the perimeter is thick and sticky and is ironstained.	4
Palaeontology	None recorded	

Igneous/mineral/ Metamorphic Geology	The outside area of the Visitor Centre will display the 'Whin Sill' boulder from the Black Park Gravel at Mark's Warren Quarry down the hill. If correctly identified, this will be the furthest south such boulders have travelled	8
Structural Geology		
Lithostratigraphy	Important as the area contains 5 distinct rock units	6
Potential use	education; Geotrail to parallel Trail Guide.	
Fragility	Natural overgrowing	
Current Site Value		
Community	Valuable woodland and green space.	9
Education	Visitors centre provides plenty of potential for geological education	9
Geodiversity value		
Potential RIGS: This is the best location for such a variety of rock types. The installation of the glacial eratic ('Whin Sill') boulder will give it added attraction		6

GLA 45 Bedfords Park, Havering Ridge

Image GLA 45 exposure of London Clay around lake
Photo credit Diana Clements

GLA 46 Rainham submerged forest

Grid Reference: TQ 516 795	Site Type: Natural foreshore exposure of submerged forest
Site Area (hectares): 2.29	Current use: Foreshore exposure adjacent to London Loop Thames footpath
Site ownership: Port of London Authority	Borough: London Borough of Havering
Field surveyor: Diana Clements, Peter Collins, Bill George	Date: July 2011
Current geological designations:	Other scientific:

Site Map

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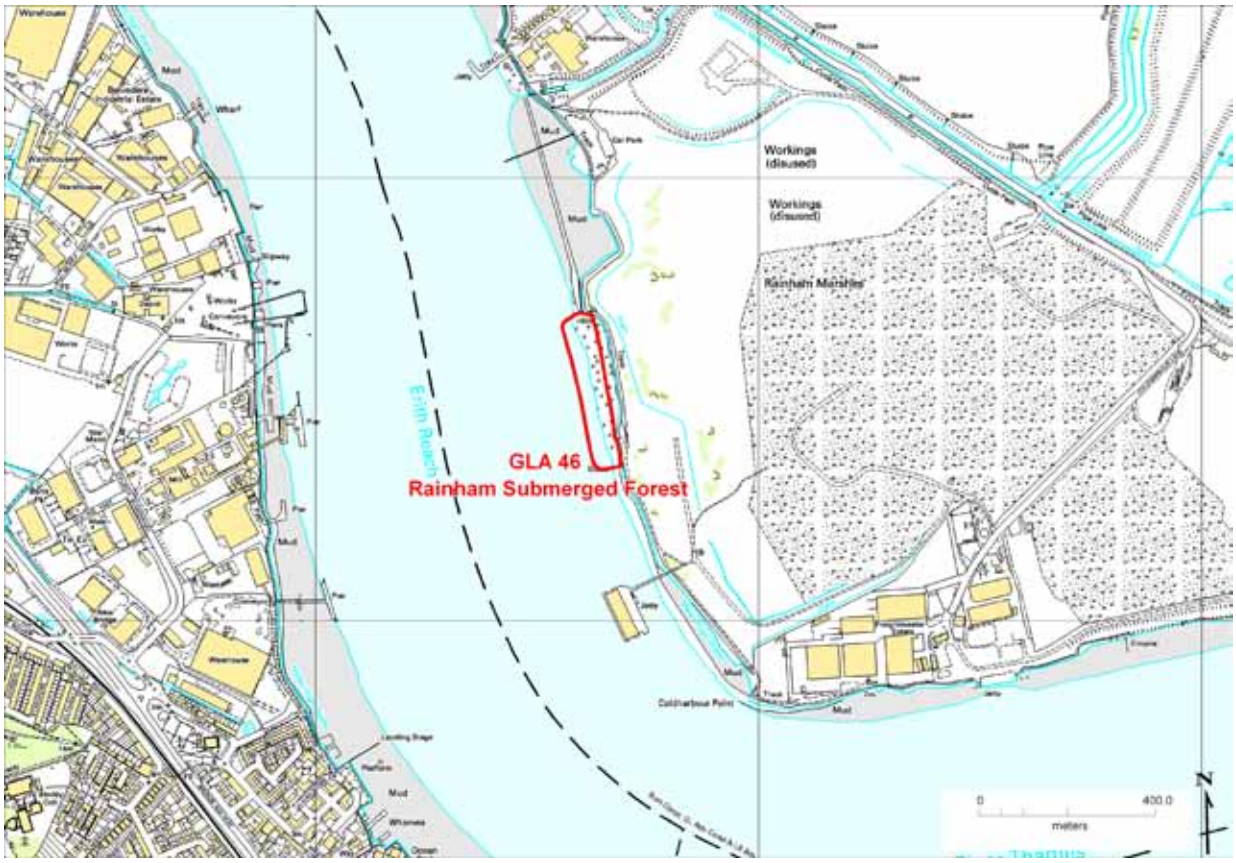

Stratigraphy and Rock Types

Time Unit: Holocene	Rock Unit: Alluvium & peat
Rock Type: Alluvium	Details: peat horizons at varying horizons

Site Description

This is the best place on the north bank of the Thames Estuary for viewing the Neolithic peat exposures and submerged forest. At low tides whole tree trunks are revealed amongst the root balls. Within the RSPB site, during drainage maintenance logs from the forest bed are found, possibly older than those occurring on the foreshore – one is on permanent display on the northern side of the RSPB site – unfortunately the RSPB charge to enter the site.

Assessment of Site Value

Geodiversity topic: Holocene processes in the Thames.

Access and Safety

Aspect	Description	
Safety of access	Can be viewed from the adjacent Thames Walk footpath, part of the London Loop but access to the foreshore down the steep bank is slippery and awkward and should only be attempted on a falling tide. For safety it is inadvisable to access the foreshore alone.	
Safety of exposure	The site is only visible at low tide and in future may not be visible at all if it is covered in sediment. Storms could potentially damage the exposure as could any development along this stretch of the Thames	
Permission to visit	Open access to the path and not required for the foreshore	
Current condition	Good except for access to the foreshore	
Current conflicting activities	None observed	
Restricting conditions	High tide and bad weather	
Nature of exposure	Natural foreshore exposure of Neolithic submerged forest	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Submerged forest on the north bank of the Thames is referred to in Bates & Barham, 1995; Sidell et al., 2001; Meddens & Beasley, 1990.	7
Aesthetic landscape	Visible at low tide from London Loop foot and cycle route.	7
History of Earth Sciences	Dereham, 1712	4
Economic geology	None	0
GeoScientific Merit		
Geomorphology	Record of changing sea levels in the Thames Estuary	6
Sedimentology	Intercalated peats, organic muds and alluvial and estuarine clays	4
Palaeontology	Probably several species of trees and shrubs as at Erith	4
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Holocene alluvium and associated peat horizons	4
Potential use	This site warrents further research; potential for further education and on-site interpretation (possible London Loop Geotrail)	
Fragility	Storms; human engineering of Thames estuary; SL rise	
Current Site Value		
Community	Valuable, as can be seen from cycle route.	8
Education	Excellent evidence for teaching about global warming and sea-level rise	6
Geodiversity value		
Potential RIGS: Best example of Neolithic submerged forest on north bank of the Thames		5
GLA 46 Rainham Submerged Forest		

Image GLA 46. Photo credit Diana Clements July 2011

GLA 47 South Hall Farm/Spring Farm Quarry complex

Grid Reference: TQ 535 818	Site Type: aggregate quarry site
Site Area (hectares): 33.54	Current use: processing/potential land fill
Site ownership: Brett Lafarge	Borough: London Borough of Havering
Field surveyor: Diana Clements/ Peter Collins/Bill George	Date: July 2011
Current geological designations:	Other scientific:

Site Map

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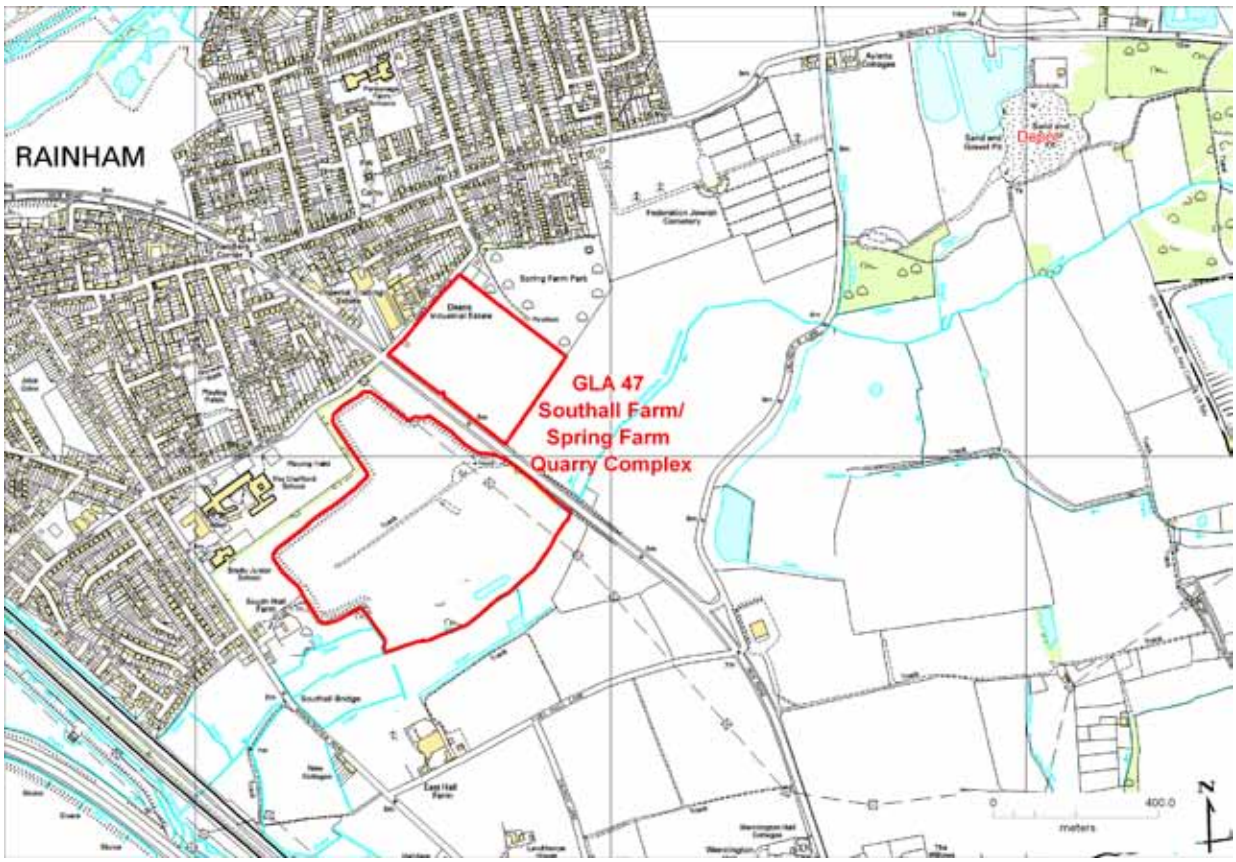

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Taplow Gravel Member, Maidenhead Formation
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly flint),

Site Description

The South Hall Farm quarry had already almost finished extraction of Thames Terrace Taplow Gravel in June 2011 (OIS 6-8) and was primarily being used for storage; gravel was entering the site by conveyor, presumably from Spring Farm opposite which was still operational. Processing was taking place adjacent to the offices in nearby Launders Lane. A large number of other former quarries in the area have been landfilled and returned to agricultural use. As this is the only area in east London still quarrying Taplow Gravel,future planning permission for the South Hall Farm/Spring Farm Complex is recommended to designate a permanently exposed face for geoconservation purposes. It is therefore proposed that any future planning applications adjacent to this complex be designated for RIGS status.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology.		
Access and Safety		
Aspect	**Description**	
Safety of access	The quarries can only be visited when accompanied by a representative of the quarry owner. It is locked when not operating.	
Safety of exposure	Danger from machinery	
Permission to visit	Brett Lafarge Ltd. Fairlop Quarry, Hainault Road, Little Heath, Romford, Essex, RM6 5SS Tel no: 02085 978992 Brett Aggregates is the trading name of Brett Aggregates Limited Reg No 316788, Brett House, Bysing Wood Road Faversham, Kent ME13 7UD.Registered office: 150 Aldersgate Street, London, EC1A4AB. It is unclear whether the office and processing area in Launders Lane are still operational as all queries are now transferred to Sharon Pickering.	
Current condition	The Southall Farm site has recently finished operations but benches of gravel can still be inspected	
Current conflicting activities	Landfill and land reclamation	
Restricting conditions	Imminent disappearance of this site; potential for adjacent Spring Farm quarry (not visited)	
Nature of exposure	Man-made quarry for Taplow Gravel.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	The area has been quarried from at least between 1898 and 1921 but literature has not been researched.	2
Aesthetic landscape	Private land	0
History of Earth Sciences	Other gravel pits in East London have been important for Archaelogical remains but none have been reported from this complex as far as we can ascertain	2
Economic geology	Gravel extraction has been an important industry in east London but is rapidly disappearing	8
GeoScientific Merit		
Geomorphology	Flat river terrace cut by tributary stream close to the Thames	2
Sedimentology	Potential detailed description of the gravels possible.	6
Palaeontology	None known	0
Igneous/mineral/ Metamorphic Geology		0
Structural Geology	None	0
Lithostratigraphy	Opportunities for future research	6
Potential use	Research; (off-site education on Thames Terraces)	
Fragility	landfill	
Current Site Value		
Community	.	2

Education		6
Geodiversity value		
Potential RIGS: It is important to maintain an accessible face once extraction has ceased and for Havering to consider designating a face within the complex a RIGS for the Taplow Gravel as there are no other exposures in east London.		6
GLA 47 South Hall Farm/Spring Farm Quarry complex		

Image GLA 47. Photo credit Diana Clements 2011

GLA 48 Thames Foreshore, Isleworth

Grid Reference TQ 168 760	Site Type: Thames Foreshore (low tide necessary)
Site Area (hectares): 0.56	Current use: public access at low tide used by local people to feed ducks & view Thames
Site ownership: Port of London Authority	Borough: London Borough of Hounslow
Field surveyors: Diana Clements	Date: June 2010
Current geological designations:	Other scientific:

Site Map

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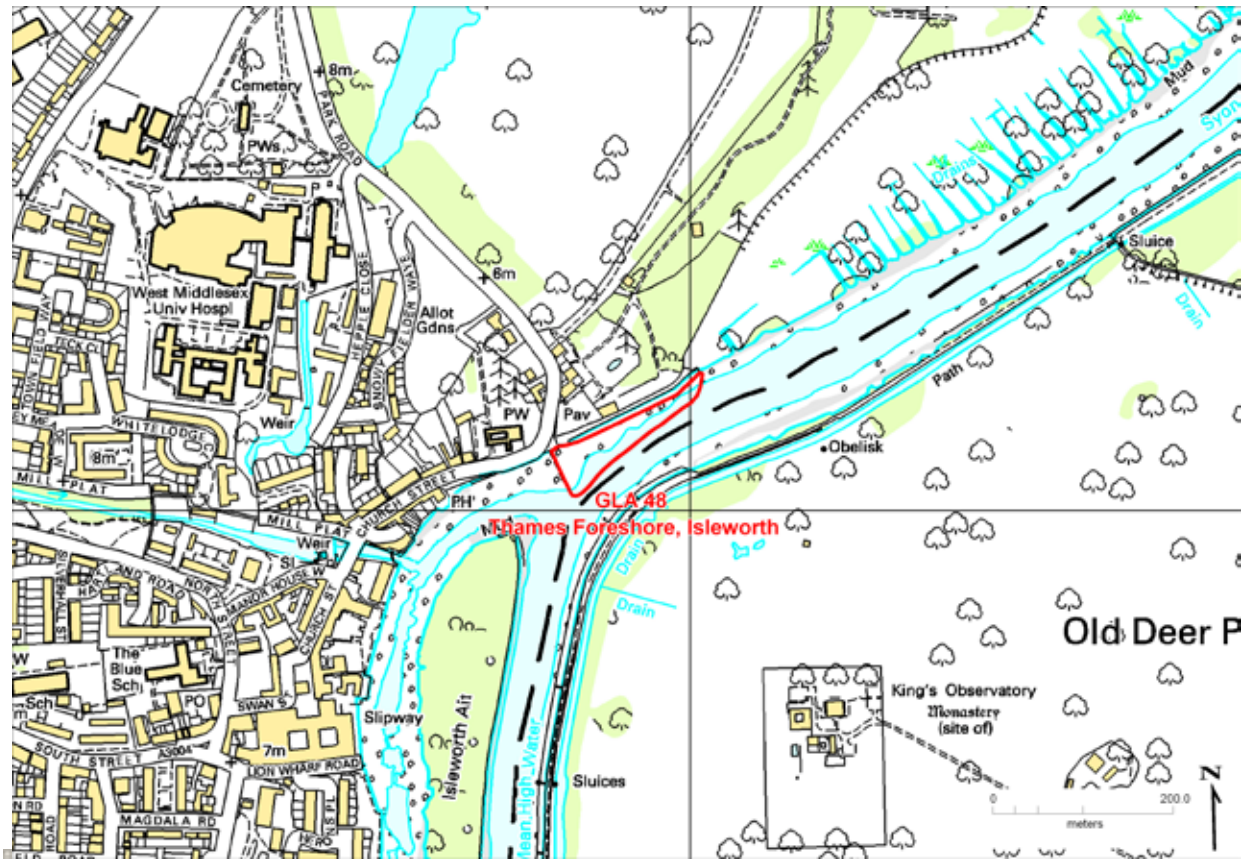

Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, clayey silt, clay; includes septarian nodules

Site Description

There are a number of sites in the upper tidal reaches of the Thames where the river gravels have been eroded away to expose small patches of London Clay at low tide. For the most part a spring tide is required to see them. They are easily distinguished from the alluvium by the presence of in situ and broken septarian nodules. The best exposure is at Isleworth where access is easy and pale pink fossil *Ditrupa* point the way to other molluscs which are mostly preserved as black pyrite (golden if fresh) (Division C2-D1 of King, 1981). Other exposures can be seen under Hammersmith Bridge (N. side) and upstream from Kew Railway Bridge (S. Side). They provide a rare opportunity of seeing in situ London Clay with septaria other than in temporary sites.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; palaeontology

Access and Safety		
Aspect	**Description**	
Safety of access	On street car parking is adjacent to the steps down to the foreshore	
Safety of exposure	The exposure can be very slippery in places and the rock fragments on the foreshore are difficult to walk over. A low tide is essential.	
Permission to visit	Open access.	
Current condition	The exposure at Isleworth is on the outside of a bend and is best seen by turning downstream from the steps towards Syon House. The area is approximately 80 m long and c. 4.5 m wide.	
Current conflicting activities	none	
Restricting conditions	Silt covering; high tides	
Nature of exposure	Natural foreshore exposure	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Described by Rundle, 1970 & GA Guide 68, 2010	5
Aesthetic landscape	Opposite Kew & frequented by locals. Adjacent to good pub	7
History of Earth Sciences	unknown	
Economic geology		0
GeoScientific Merit		
Geomorphology	Outside of bend in Thames causing Thames gravels to be eroded	2
Sedimentology	Recognised by septarian nodules within the London clay which is mostly weathered orange	6
Palaeontology	Mostly microfossils recorded by Rundle, 1970 but the tube-worm *Ditrupa* is easily picked out. Occasional small gastropods & bivalves mostly pyritised and weathered dark. Rare fresh golden examples can be found.	4
Igneous/mineral/ Metamorphic Geology	none	0
Structural Geology		
Lithostratigraphy	Rare exposures of in situ London Clay & septaria	6
Potential use	Education; research	
Fragility	Covering by silt or rising water levels	
Current Site Value		
Community	Accessible foreshore	6
Education	View of local bedrock	6
Geodiversity value		
Potential RIGS: Rare example of permanent exposure of in situ London Clay with septarian nodules and fossils, albeit only exposed at low spring tides.		6

GLA 48 Thames foreshore, Isleworth

Image GLA 48. Photo Credit Diana Clements

GLA 49 Fairlop Quarry Complex (Hainault Quarry)

Grid Reference: TQ 462 896	Site Type: aggregate quarry site
Site Area (hectares): 173.9	Current use: potential land fill
Site ownership: Brett Lafarge	Borough: London Borough of Redbridge
Field surveyor: Diana Clements/Peter Collins	Date: July 2011
Current geological designations:	Other scientific:

Site Map

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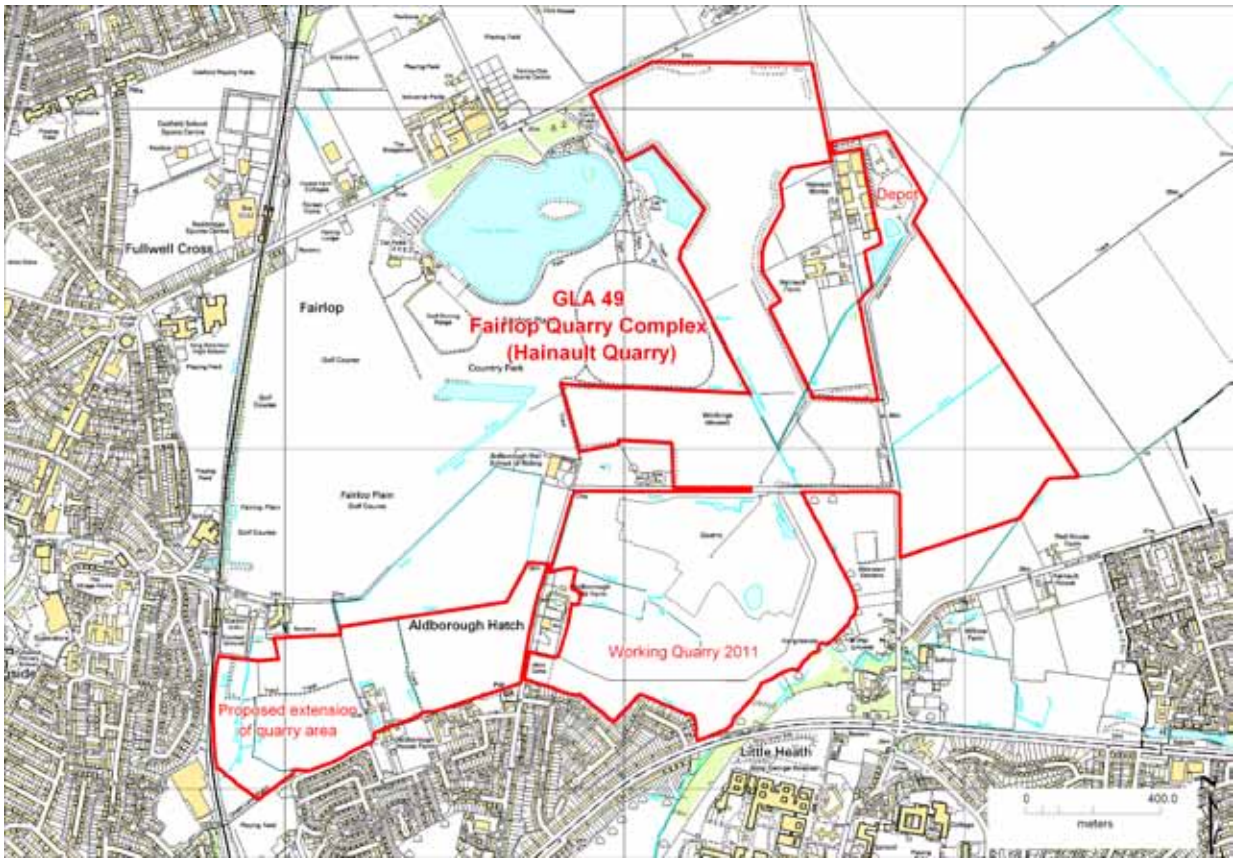

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Boyn Hill Gravel Member, Maidenhead Formation
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly flint)

Site Description

The working quarry had recently finished extraction of Thames Terrace Boyn Hill Gravel (OIS 11) in July 2011 but it is part of a complex that includes the Hainault Road depot/processing plant and plans were in process for opening up a new quarry in the adjacent plot to July 2011 workings (scheduled for August 2012). Previous excavations in the area include the landscaped water feature that is now used for public recreation as Fairlop Waters. Other former quarries have been landfilled and re-established as agricultural land. As this is the only area in east London still quarrying Boyn Hill Gravel, future planning permissions for the Fairlop Complex are recommended to designate a permanently exposed face for geoconservation purposes. It is therefore proposed that the designated 2012 site be designated for RIGS status.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology.

Access and Safety		
Aspect	**Description**	
Safety of access	The quarry can only be visited when accompanied by a representative of the quarry owner. It is locked when not operating.	
Safety of exposure	Standing water now fills part of the 2011 working quarry; in future workings danger of working machinery needs to be considered	
Permission to visit	Brett Lafarge Ltd. Fairlop Quarry, Hainault Road, Little Heath, Romford, Essex, RM6 5SS Tel no: 02085 978992 Brett Aggregates is the trading name of Brett Aggregates Limited Reg No 316788, Brett House, Bysing Wood Road Faversham, Kent ME13 7UD.Registered office: 150 Aldersgate Street, London, EC1A4AB. It is unclear whether the office and processing area in Launders Lane are still operational as all queries are now transferred to Sharon Pickering.	
Current condition	The site has recently finished operations and is becoming vegetated	
Current conflicting activities	Landfill and land reclamation	
Restricting conditions	Access and imminent disappearance of this site; potential for adjacent quarry once operational	
Nature of exposure	Quarry for Boyn Hill Gravel.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	The area has been quarried from at least 1938 (BGS GDI old OS maps) but other literature not yet researched	2
Aesthetic landscape	Private land	0
History of Earth Sciences	Other gravel pits in East London have been important for Archaelogical remains but none have been reported from the Fairlop Complex as far as can be ascertained.	2
Economic geology	Gravel extraction has been an important industry in east London	8
GeoScientific Merit		
Geomorphology	Flat terrace feature at 25m above OD	2
Sedimentology	Potential detailed description of the gravels possible	6
Palaeontology	None known	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Potential better exposure when Area E becomes operational	6
Potential use	Research; (off-site education on Thames Terraces)	
Fragility	landfill	
Current Site Value		
Community	.	2
Education		4

Geodiversity value	
Potential RIGS: It is important to maintain an accessible face once extraction has ceased and for Redbridge to consider designating a face within the complex a RIGS for the Boyn Hill Gravel as there are no other exposures in east London	6

GLA 49 Fairlop Quarry Complex (Hainault Quarry)

Image GLA 49. Photo Diana Clements July 2011

GLA 50 Knighton Wood

Grid Reference: TQ 413 935	Site Type: Exposures of Woodford Gravel in public park
Site Area (hectares): 14.92	Current use: Open access public space
Site ownership: Part of Epping Forest which is managed by the Corporation of London.	Borough: London Borough of Redbridge but the adjoining Lord's Bushes lies within Essex. They are considered one public space.
Field surveyor: Diana Clements, Peter Collins	Date: 3rd May 2011
Current geological designations:	Other scientific: SSSI biodiversity

Site Map

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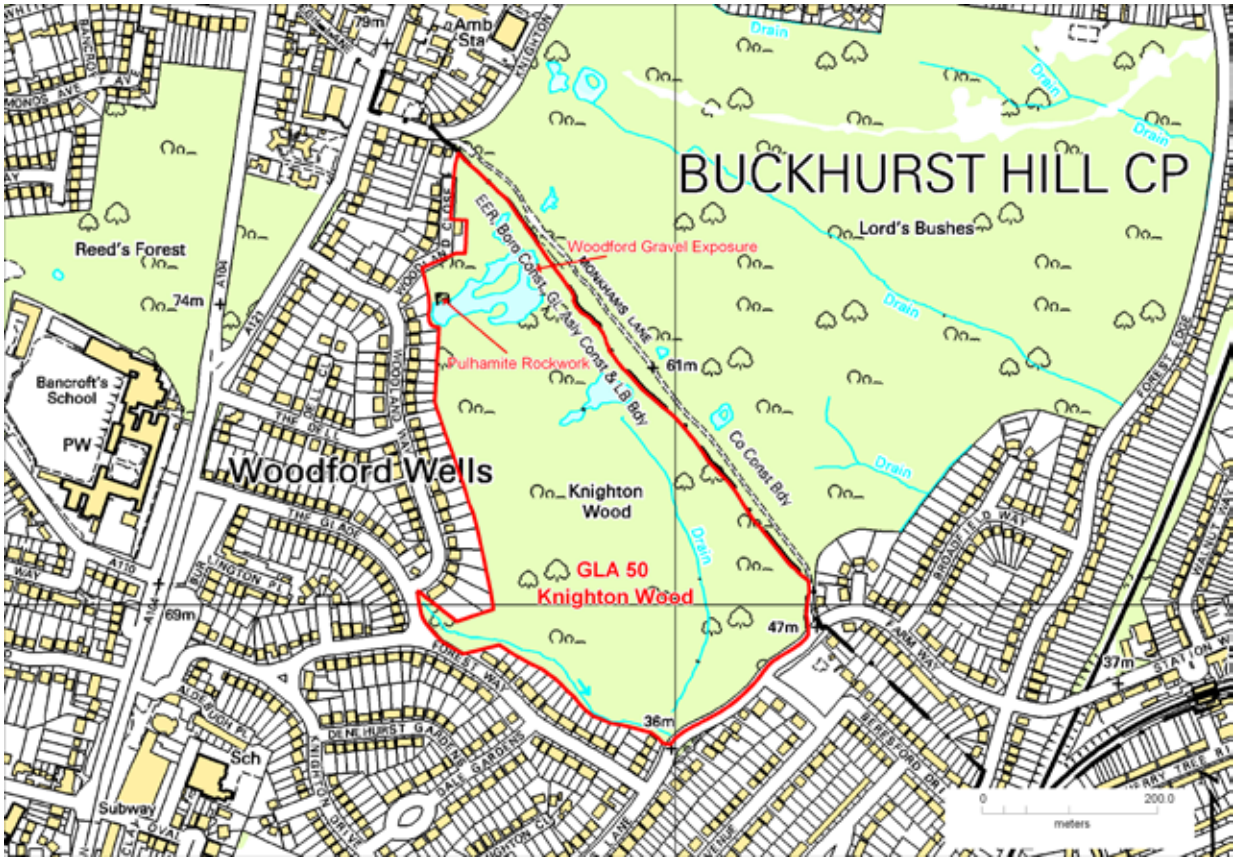

Stratigraphy and Rock Types

Time Unit: Pleistocene	Rock Unit: Woodford Gravel Member, Sudbury Formation
Rock Type: Sand and gravel	Details: Sand and gravel, locally with lenses of silt, clay or peat and organic material.
Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt.

Site Description

Pleistocene/pre-Anglian Woodford Gravel overlies Eocene London Clay Formation with the junction between the two covered by 'Head' (run off from the gravels).
The Woodford Gravel is well-exposed around the edge of Knighton Lake, particularly on the east side, close to the path. Junction with London Clay not seen.
A good example of Pulhamite (manufactured rock face) can be seen at the western end of the Lake.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology.		
Access and Safety		
Aspect	**Description**	
Safety of access	Via Knighton Lane car park in Monkham's Lane, off Knighton Lane (close to Buckhurst Lane underground station). A well-maintained path runs directly to Knighton Lake	
Safety of exposure	Exposure in public woodland at the edge of a lake – observe general safety in woodlands and slope towards water	
Permission to visit	Open access.	
Current condition	Good. Pulhamite needs some maintenance and vegetation clearing	
Current conflicting activities	None.	
Restricting conditions	High water levels may restrict viewing. People erosion will probably protect from overgrowth and good management by CoL from dumping, but the need for geoconservation should be communicated to CoL	
Nature of exposure	The Woodford Gravel is well-exposed around the edge of Knighton Lake, particularly on the east side, close to the path.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Pulhamite Rock face (none known for Woodford Gravel)	4
Aesthetic landscape	Pleasant open space with easy public access. 'Maintain Rock Exposure' is mentioned in the CoL Management Plan for 2004-10. This may refer to the Pulhamite at the other end of the lake.	8
History of Earth Sciences	No specific reference to Knighton Wood known.	2
Economic geology	Evidence of quarrying in 1883 (CoL Management Plan 2004-10). Several pits are located in the adjacent Lord's Bushes	5
GeoScientific Merit		
Geomorphology	Distribution of exposures of Woodford Gravel used to determine location relative to the pre-diversionary Thames and its tributaries flowing over the current London Basin from the Weald. Rests on top of London Clay hillocks 50 – 80 m OD (Ellison et al. 2004 cite adjacent Lords Bushes in Essex, as example)	6
Sedimentology	Research into composition of the gravels could give more information on the provenance of the gravels and therefore the river that deposited them. Woodford Gravel covers a restricted area and includes clasts from the Weald.	6
Palaeontology	None.	0
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	One of several exposures of Woodford Gravel in the area and probably the best within Greater London (type section from borehole data)	6
Potential use	Research; further education; on-site interpretation.	
Fragility	Dumping; natural overgrowing; weathering/erosion.	
Current Site Value		

Community	Site passed on a daily basis	10
Education		6
Geodiversity value		
Potential RIGS: Woodford Gravel is described from borehole data and is of limited extent. This would appear to be the best exposure in the area although there are others not far away at Lord's Bushes (Essex) and within Epping Forest.		6
GLA 50 Knighton Woods		

Image 50 Exposure of Woodford Gravel on the east perimeter of Knighton Lake.
Photo credit Diana Clements

GLA 51 Parish's Pit, Erith

Grid Reference: a) TQ 5100 7815 b) TQ 5095 7800	Site Type: Former aggregate site
Site Area (hectares): Total 0.98 a) = 0.6, b) = 0.3) Original pit c. 40	Current use: Steep inaccessible cliffs.
Site ownership: Mainly private estates securely guarded by high fences	Borough: London Borough of Bexley
Field surveyor: Paul Rainey	Date: 26th November 2011
Current geological designations:	Other scientific:

Site Map

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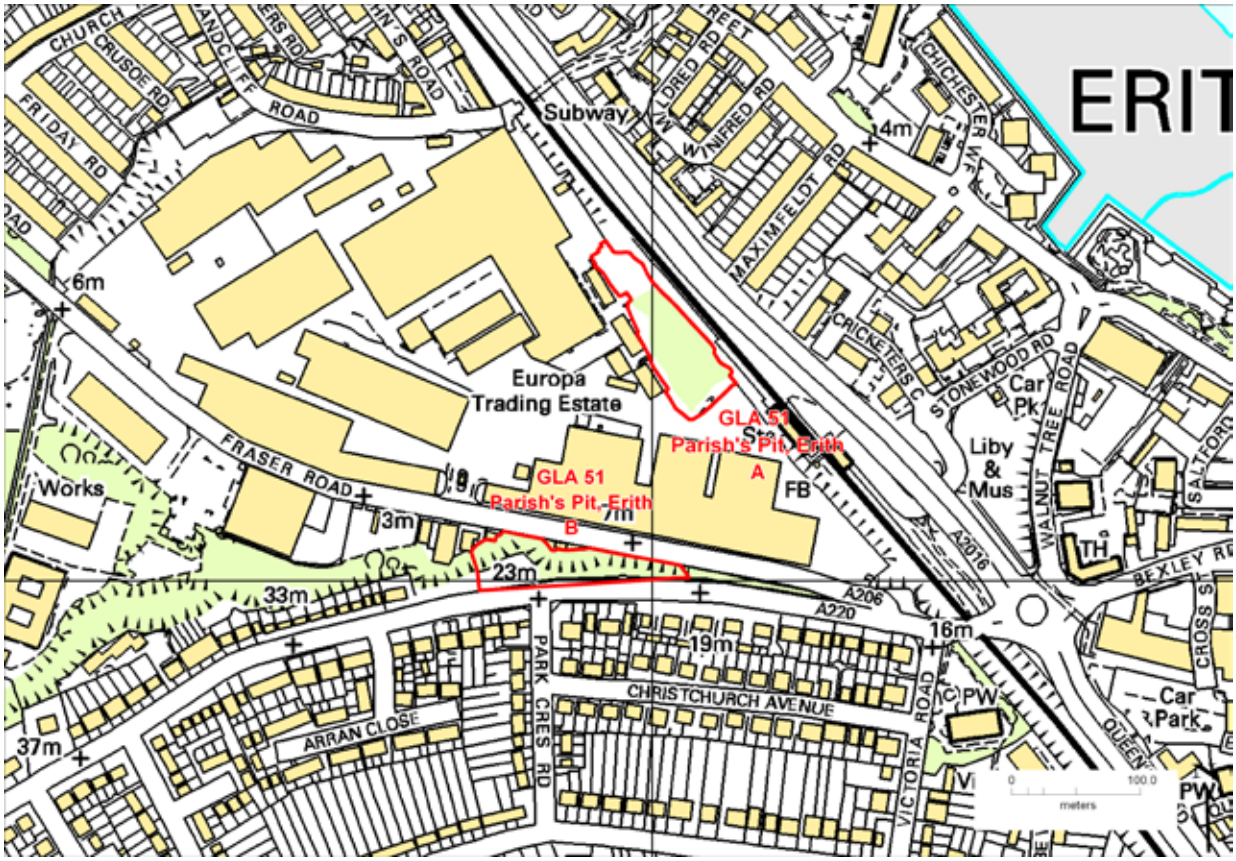

Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: Blackheath Member, Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly round, black), marine fauna. Calcitic conglomerate found at certain horizons.
Time Unit: Paleocene	Rock Unit: Upnor and Woolwich Formations, Lambeth Group
Rock Type: Clay, silt, sand	Details: Glauconitic sands overlain by interleaved grey clays and sands with brackish fauna.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Clay, silt, sand	Details: Pale yellow-brown fine-grained sand that can be clayey and glauconitic.

Site Description

This is a large, half a square kilometer, former pit that mainly worked Thanet Sand between 1805 and about 1970. Strata are horizontal. The natural site was a north east facing slope rising from the top of the Chalk at Thames river level some 30m to the Harwich Formation plateau. The base of the pit was at about the top of the Chalk. The Thanet Sand can stand in near vertical cliffs, some still visible. Other strata do not stand so steeply and are mainly hidden by impenetrable vegetation, scree and fences. About half the pit floor has been backfilled, the other half has been built over as industrial estates, formerly the Vickers works.
One still spectacular rectangular "Lost World" type of "island" (Site a) is surrounded on three sides by high vertical Thanet Sand cliffs and on its fourth side by a railway cutting This is shown on a painting and a photograph of the 1870s when the former quarry floor was a cricket ground. Another high Thanet cliff (Site b) is marked by "Danger Falling Rocks" signs as Fraser Road climbs across it. Elsewhere the geology is completely hidden.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; palaeontology.

Access and Safety

Aspect	Description
Safety of access	Within industrial estate
Safety of exposure	The faces are within private estates securely guarded by high fences but they do slip occasionally
Permission to visit	Probably individual unit owners within the industrial estate
Current condition	The southern faces of the site are heavily overgrown but vertical cliffs of Thanet Sand are still visible from the public highway in 2 areas (a), (b) on map). In area (a) the lower parts of the cliffs are heavily overgrown. In area (b) lower parts of the cliffs are covered by brickwork and concrete. The upper parts of the cliffs form prominent landmarks.
Current conflicting activities	Industrial estate activities
Restricting conditions	Access
Nature of exposure	Only remaining sections of former large quarry

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	Site of great interest to local history and industrial archaeology.	5
Aesthetic landscape	Best viewed in winter	4
History of Earth Sciences		2
Economic geology	No longer operational	6

GeoScientific Merit

Geomorphology	North east facing slope rising c. 30m from chalk at the base to the Harwich Formation plateau. The base of the pit was at about the top of the Chalk and all that is visible now are remnant Thanet Sand near-vertical cliffs at the perimeters of the old quarry. Other strata do not stand so steeply.	0
Sedimentology	Thanet Sand Formation still visible, mostly stained orange, but in one area quite pale. Glauconite observed in small slipped area at site (b). Strata above are obscured.	4
Palaeontology	None known about	
Igneous/mineral/ Metamorphic Geology	None.	0

Structural Geology	None.	0
Lithostratigraphy	Paleocene Thanet Sand Formation, Paleocene/Eocene Lambeth Group, Eocene Harwich Formation all formerly visible at this site	3
Potential use	Research; education;	
Fragility	Natural overgrowing; weathering/erosion; future development	
Current Site Value		
Community	Limited access as industrial site, but visible from roadsides and railway station platforms	2
Education	Site of great interest to local history and industrial archaeology	5
Geodiversity value		
Potential LIGS: worth protecting the remaining faces from developers as currently only exposure of Thanet Sand Formation in Bexley (NB Chalky Dell also, if conserved)		3-4

GLA 51 Parish's Pit Erith

Image GLA 51A (landscape)
Photo credit Diana Clements 2012

GLA 51B (portrait)

GLA 52 Bromley Palace Park, Pulhamite and St. Blaise's Well

Grid Reference: TQ 408 691	Site Type: Man made artefacts on lake inflow and outflows
Site Area (hectares): 0.35	Current use: Recreational Land
Site ownership: London Borough of Bromley	Borough: London Borough of Bromley
Field surveyor: Paul Rainey	Date: 30th November 2011
Current geological designations:	Other scientific: Listed Buildings,Grade II

Site Map

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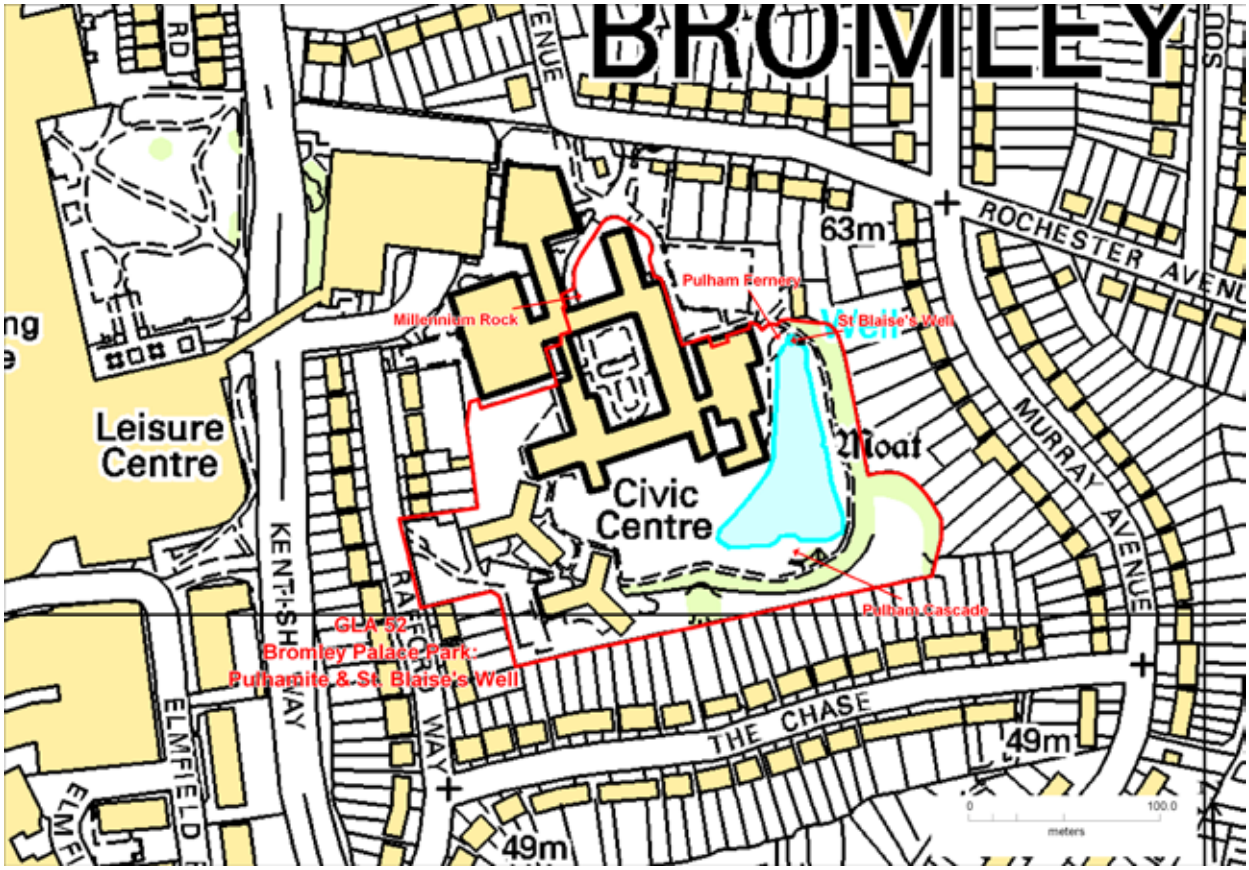

Stratigraphy and Rock Types

Time Unit: N/A	Rock Unit: N/A
Rock Type: N/A	Details: Artificial but incorporating blocks of Hythe Beds (Cretaceous, Lower Greensand Group)

Site Description

The sites are waterfall structures at the inflow (Pulham Cascade) and an outflow (Pulham Fernary)of a lake (part of a former mediaeval moat) in the grounds of the former Bishop's Palace now the Bromley Civic Centre. They are formed of Pulhamite and were constructed in 1865. The inflow structure is adjacent to a modern fountain in a circular basin on the site of St Blaise's Well, a chalybeate spring which was used for its curative properties in the 18th century. A large plaque tells the story of St Blaise's Well. To the north of the Palace is the Millennium Rock, a boulder of Lewisian Gneiss presented to Bromley by the Highland Council.

Assessment of Site Value		
Geodiversity topic: Geology, hydrogeology		
Access and Safety		
Aspect	**Description**	
Safety of access	Within public park	
Safety of exposure	The site is well cared for by the London Borough of Bromley	
Permission to visit	Open access.	
Current condition	The Pulhamite rockeries are damaged by tree roots and are somewhat overgrown. English Heritage have surveyed the structures and Bromley Council is seeking funds for restoration (see www.bromleytownparks.org.uk)	
Current conflicting activities	None	
Restricting conditions		
Nature of exposure	Artificial rockeries over small streams. A modern fountain in a brick basin.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	At the site of a chalybeate spring, formerly of local economic significance. Examples of Victorian landscape architecture. Listed by English Heritage in *Durability Guaranteed* (Ref. to Pulham, c.1877, Festing, 1984)	5
Aesthetic landscape	Attractive lakeside features.	5
History of Earth Sciences	N/A	0
Economic geology	Former chalybeate spring exploited by local doctor	4
GeoScientific Merit		
Geomorphology	None	0
Sedimentology	Manmade features incorporating blocks from the Weald	3-4
Palaeontology	None	0
Igneous/mineral/ Metamorphic Geology	Lewisian Gneiss (Millennium Stone)	2
Structural Geology	None	0
Lithostratigraphy	Site of chalybeate spring	4
Potential use	Aesthetics, education	
Fragility	natural overgrowing	

Current Site Value		
Community	Valuable green space.	8
Education	Explaining springs	8
Geodiversity value		
Potential LIGS: the site is interesting historically and aesthetically and is in a public place that has a story to tell about Pulhamite (see www.pulham.org.uk) and the chalybeate spring		4
GLA 52 Bromley Palace Park, Pulhamite and St. Blaise's Well		

Image GLA 52.1 Pulhamite (landscape).

Image GLA 52.2 St. Blaise's (portrait).

Photo credits: Laurie Baker

GLA 53 Charmwood Farm

Grid Reference: TQ 4616 6244	Site Type: Subterranean chalk pits
Site Area (hectares): 1.64	Current use: Woodland on private farm land
Site ownership: Part of Charmwood farm. GK Denniss Farms	Borough: London Borough of Bromley
Field surveyor: Vernon Marks, Paul Rainey	Date: 20TH Feb 2011
Current geological designations:	Other scientific:

Site Map

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Stratigraphy and Rock Types

Time Unit: Cretaceous	Rock Unit: probably Seaford Chalk Formation, White Chalk Subgroup
Rock Type: Chalk	Details (Seaford Chalk): Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

Site Description

In a small wood midway between Little Molloms Wood and Charmwood Farm, there are a series of associated depressions and a half-filled open cast chalk quarry. The entrance arch is 1.5m by 1.5m. A steep descent follows into a chamber 4.5m high. A short (9m) blind tunnel leads off on the right and there are two connections, about 3m long, on the left to a parallel tunnel which once had its own entrance. The two parallel tunnels are each about 25m long. In 1992 the Kent Underground Research Group dug a deep exploratory trench but only found loose chalk rubble, probably part of a roof collapse. The site is gated by a metal grille. As most of the surface exposures of chalk in the London area are in Seaford Chalk, this is the likely horizon here although this has not been confirmed.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; palaeontology

Access and Safety		
Aspect	**Description**	
Safety of access	Woodland on private farm land. Entrance to mine covered by a grille	
Safety of exposure	The mine is securely protected by a steel grille but access inside could be dangerous	
Permission to visit	GK Denniss Farms tel 01892 770931 Access controlled by Alan Dimbleby 07917763352 at farm cottage	
Current condition	Entrance to mine has been cleared of vegetation	
Current conflicting activities	It is managed as a bat hibernation site.	
Restricting conditions	Access and possible overgrowth. Grilles prevent access to mine.	
Nature of exposure	Chalk mine and small open cast chalk quarry. Adits have been driven into the hillside.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Underground site description and history closely based on: Pearman, 1973 and LeGear,1992 – 1993.	8
Aesthetic landscape		2
History of Earth Sciences	Research required (Bromley ref. Library)	4
Economic geology	Former chalk mine	9
GeoScientific Merit		
Geomorphology	None	4
Sedimentology	Environment of deposition	3
Palaeontology	possibly	1
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	Regional structure of Chalk	3
Lithostratigraphy	Seaford Formation, White Chalk Subgroup	6
Potential use	Research; further education; website interpretation.	
Fragility	natural overgrowing around entrance; falling chalk within mine; dumping	
Current Site Value		
Community	Limited value because of private access	4
Education	Possible asset if access & information made accessible	6
Geodiversity value		
Potential LIGS: Fresh chalk provides material for research and there is potential for local education		4
GLA 53 Charmwood Farm		

Image GLA 53. Photo credit Vernon Marks

GLA 54 Sundridge Park Manor Pulhamite grotto

Grid Reference: TQ 4184 7063	Site Type: Man-made artefact
Site Area (hectares): 0.09	Current use: Grounds of Conference Centre
Site ownership: Sundridge Park Manor	Borough: London Borough of Bromley
Field surveyor: Diana Clements/Vernon Marks	Date: September 2010
Current geological designations:	Other scientific: Listed in English Heritage's *Durability Guaranteed*

Site Map

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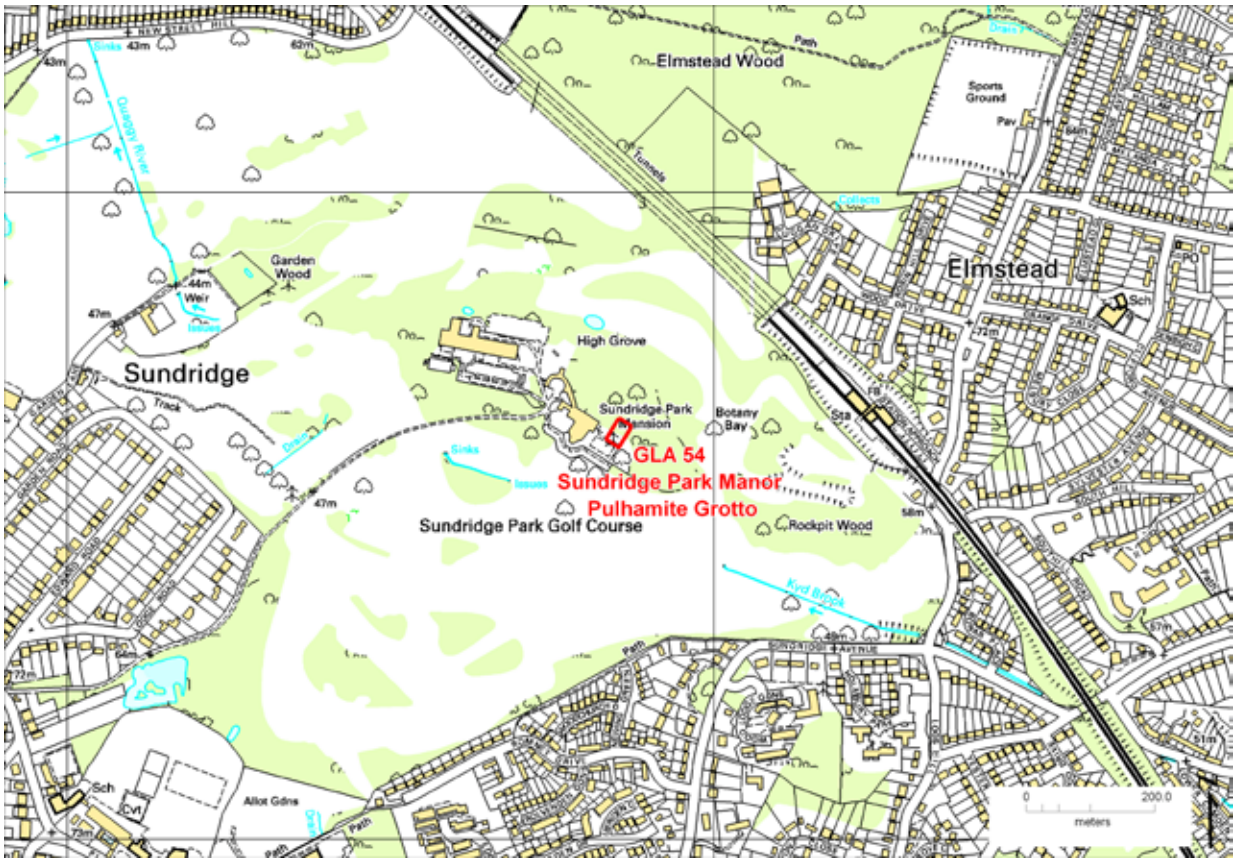

Stratigraphy and Rock Types

Time Unit: N/A	Rock Unit: N/A
Rock Type: N/A	Details: Artificial but incorporating blocks, probably of Tunbridge Wells sandstone (Early Cretaceous, Wealden, Hastings Beds) and making use of the immediately local Blackheath Beds (Harwich Formation, Eocene)

Site Description

The Pulhamite Grotto at Sundridge Park Manor was completed in 1874 and remains in good repair. It is a good, walk-in example of the artificial rockwork of the Pulham family incorporating blocks of sandstone amongst the artificial blocks to give it a more authentic look. Where the surface of the artificial blocks has eroded blocks of the local cemented Blackheath Beds can be seen but these are better displayed in an arch to the west of the manor house but still within the grounds. A temporary exposure between the two revealed in situ Blackheath Beds. There were former quarries for the Blackheath Beds within Sundridge Park and at Elmstead Lane and it would appear that this local material was used for creating the grotto.

Assessment of Site Value

Geodiversity topic: Geology		
Access and Safety		
Aspect	**Description**	
Safety of access	Within private estate used as a conference centre. Accessible on Open House days.	
Safety of exposure	Appears stable	
Permission to visit	From Sundridge Park Manor: www.sundridgeparkmanor.com	
Current condition	The artificial rock work seems to be stable but is in danger of being overgrown, particularly by ivy which would damage the surface. Regular maintenance has been carried out by South London RIGS but requires permission from Sundridge Park Manor which is not always forthcoming. Some of the surface render is damaged but reveals blocks of local Blackheath Beds which is an asset.	
Current conflicting activities		
Restricting conditions	Access	
Nature of exposure	An artificial grotto set at the bottom of the slope above the flat lawns of the Manor gardens. A path winds up between the rockwork which is set within woodland	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	Completed in 1874 and one of a number of examples of rockwork fashionable with the Victorians. Listed by English Heritage in *Durability Guaranteed* (Ref. to Pulham, c.1877). Featured in GA Guide 68, 2010	5
Aesthetic landscape	Very attractive 'surprise' inviting viewers to walk up the path	9
History of Earth Sciences	N/A	
Economic geology	N/A	
GeoScientific Merit		
Geomorphology	None	0
Sedimentology	Man-made rockwork using local materials	3-4
Palaeontology	Oyster fossils and other molluscs visible in the blocks of the cemented Blackheath Beds visible in places	2
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Ex-situ blocks of Blackheath Beds and probably Tunbridge Wells Sandstone incorporated within the structure	3
Potential use	Aesthetics; education;	
Fragility	natural overgrowing; weathering/erosion	
Current Site Value		

Community	Limited access but enjoyed by visitors to the Conference Centre. Currently open to the public on Open House day	4
Education	In context of explaining Pulhamite; examples of local 'rock'	4
Geodiversity value		
Potential LIGS: worth conserving as an excellent example of the Pulhamite rockwork		3-4
GLA 54 Sundridge Park Manor Pulhamite		

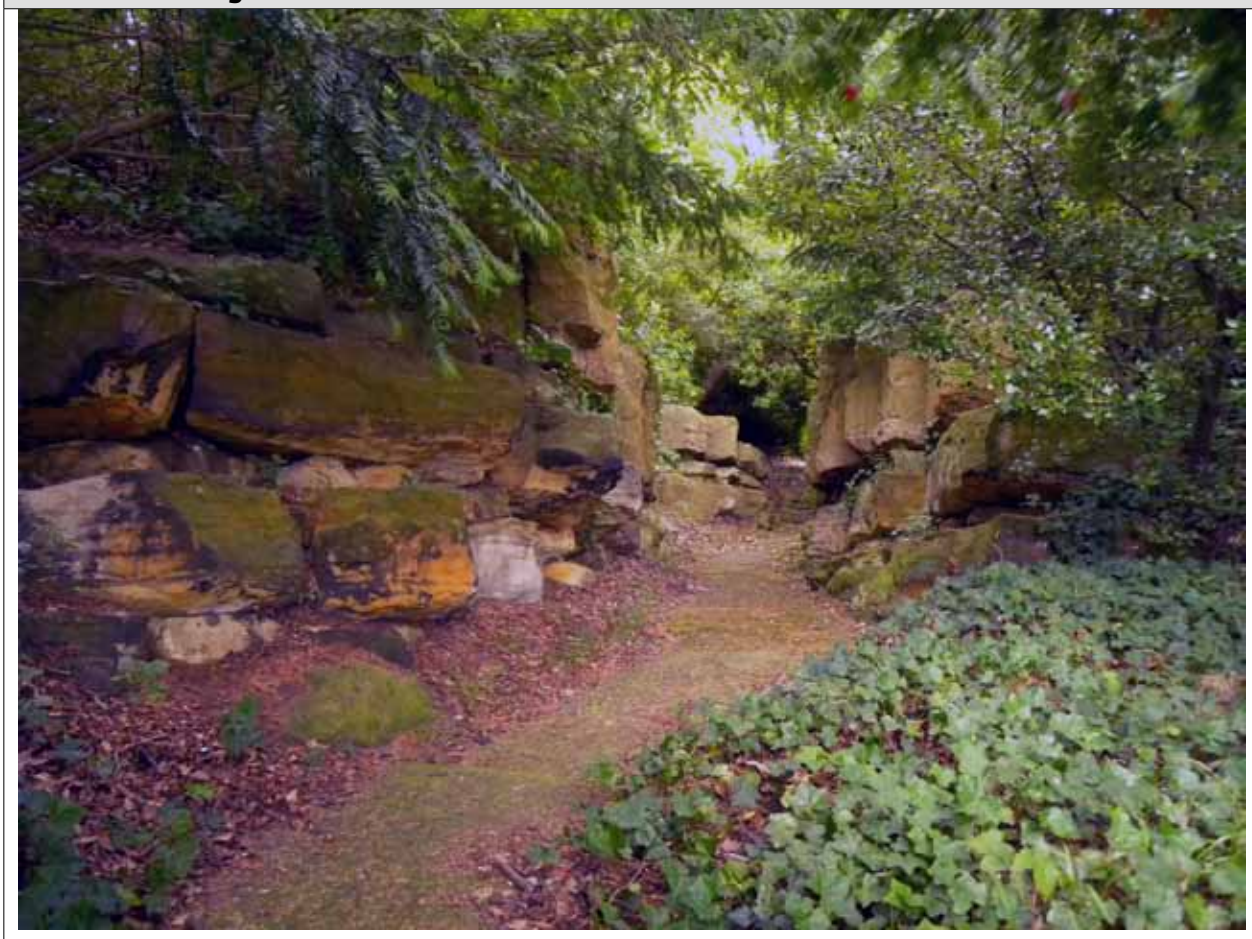

Image GLA 54. Photo credit Steve Tracey

GLA 55 Trent Park

Grid Reference Park entrance TQ 281 969	Site Type: large public park
Site Area (hectares): 183.83	Current use: Recreational Land with Visitor Centre within London's Green Belt
Site ownership: London Borough of Enfield	Borough: London Borough of Enfield
Field surveyors: Diana Clements	Date: Summer 2009
Current geological designations:	Other scientific:

Site Map

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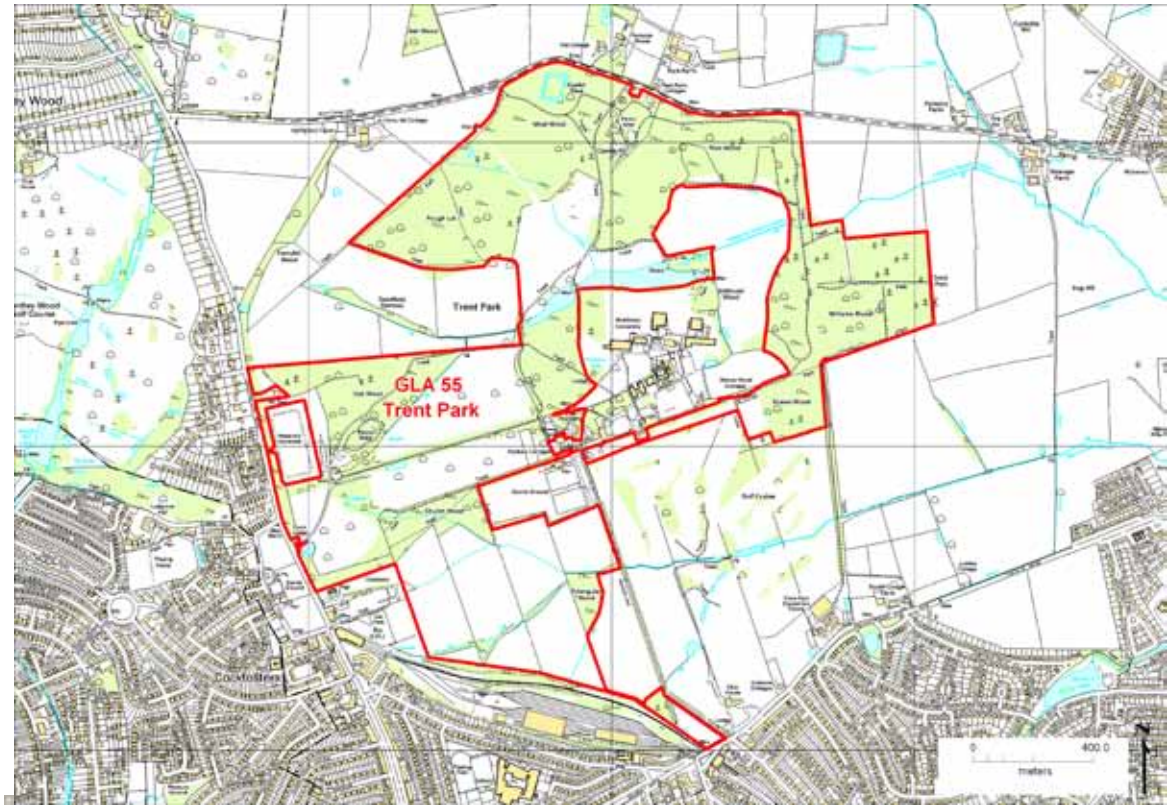

Stratigraphy and Rock Types

Time Unit: Quaternary	Rock unit: Lowestoft Formation, Albion Glacigenic Group
Rock Type:	Details: Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content
Time Unit: Quaternary	Rock unit: Dollis Hill Gravel Member Sudbury Formation, Kesgrave Catchment Subgroup
Rock Type:	Details: Gravel, sandy and clayey in part, with some laminated silty beds. Sand and gravel, locally with lenses of silt, clay or peat and organic material
Time Unit: Eocene	Rock Unit: London Clay Formation and Claygate member, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt, clay.

Site Description

Trent Park displays 4 different lithologies and so is an excellent location for studying geomorphology. Spring lines pick up the junctions between the lithologies and the small streams emanating from them have, in places, cut deep ravines. This must have happened as the ice sheet retreated at the end of the Anglian glaciations, and permofrost in subsequent stadials, when the ground would have been frozen. Evidence of till can be seen on the ploughed fields at the top of the hill, just outside the enclosed park. The London Loop runs through the park.		
Assessment of Site Value		
Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.		
Access and Safety		
Aspect	**Description**	
Safety of access	There is a car park and public access to Trent Park during opening times (8.30 am to dusk). There are toilets, a cafe and a small Visitor Centre.	
Safety of exposure	There are well-marked footpaths throughout the park but actual exposures are limited to temporary exposures and erosion around the fish ponds.	
Permission to visit	Open access.	
Current condition	The park is well maintained with a range of habitats including a series of fish ponds through which the leaging Beech Gutter flows. Fishermen erosion have helped expose patches of London Clay.	
Current conflicting activities	none	
Restricting conditions	Vegetation, limited exposures	
Nature of exposure	Natural hill showing range of rock units.	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	The Enfield Council website details the history of the Park which came into public ownership in 1951 to safeguard the Green Belt. It was originally a royal hunting forest before passing into private hands.	3
Aesthetic landscape	Footpaths through woods and meadows and around ponds used by local community. Car park, toilets, café and Visitor Centre within the Park. Sports facilities on the periphery.	8
History of Earth Sciences	Geotrail described in GA Guide 68, 2010	4
Economic geology	None apparent	0
GeoScientific Merit		
Geomorphology	Ridges and valleys provide potential for identifying the different lithologies from clues in the landscape – spring lines, vegetation, small exposures	4
Sedimentology	Exposures of London Clay around the Fish Ponds but other lithologies are a bit difficult to find unless excavations are made. Lumps of chalk found in ploughed fields to the north of the public enclosure indicate Lowestoft Till.	3
Palaeontology	None recorded	
Igneous/mineral/ Metamorphic Geology	none	
Structural Geology		

Lithostratigraphy	Important as the area contains 4 distinct rock units	4
Potential use	education; use can be made of the existing Geotrail	
Fragility	Natural overgrowing	
Current Site Value		
Community	Valuable woodland and green space.	8
Education	Geotrail in GA Guide 68, 2010. Possible additional information could be displayed in the small Visitors centre. The park is on the London Loop.	6
Geodiversity value		
Recommended LIGS: This is a good location for demonstrating the geomorphology of a variety of rock types. The deep gullies emphasise the importance of successive ice ages in creating the landscape seen today.		4
GLA 55 Trent Park		

Image 55.1 exposure around London Clay lake (portrait, LH side). Image 55.2 deep gully (portrait, RH side). Photo credits Diana Clements

GLA 56 Bleak Hill Sandpits

Grid Reference: TQ 4606 7776	Site Type: Former aggregate site
Site Area (hectares): 0.23	Current use: Recreational Land
Site ownership:	Borough: London Borough of Greenwich
Field surveyor: Vernon Marks, Paul Rainey, Laurie Baker	Date: 19th November 2010
Current geological designations:	Other scientific:

Site Map

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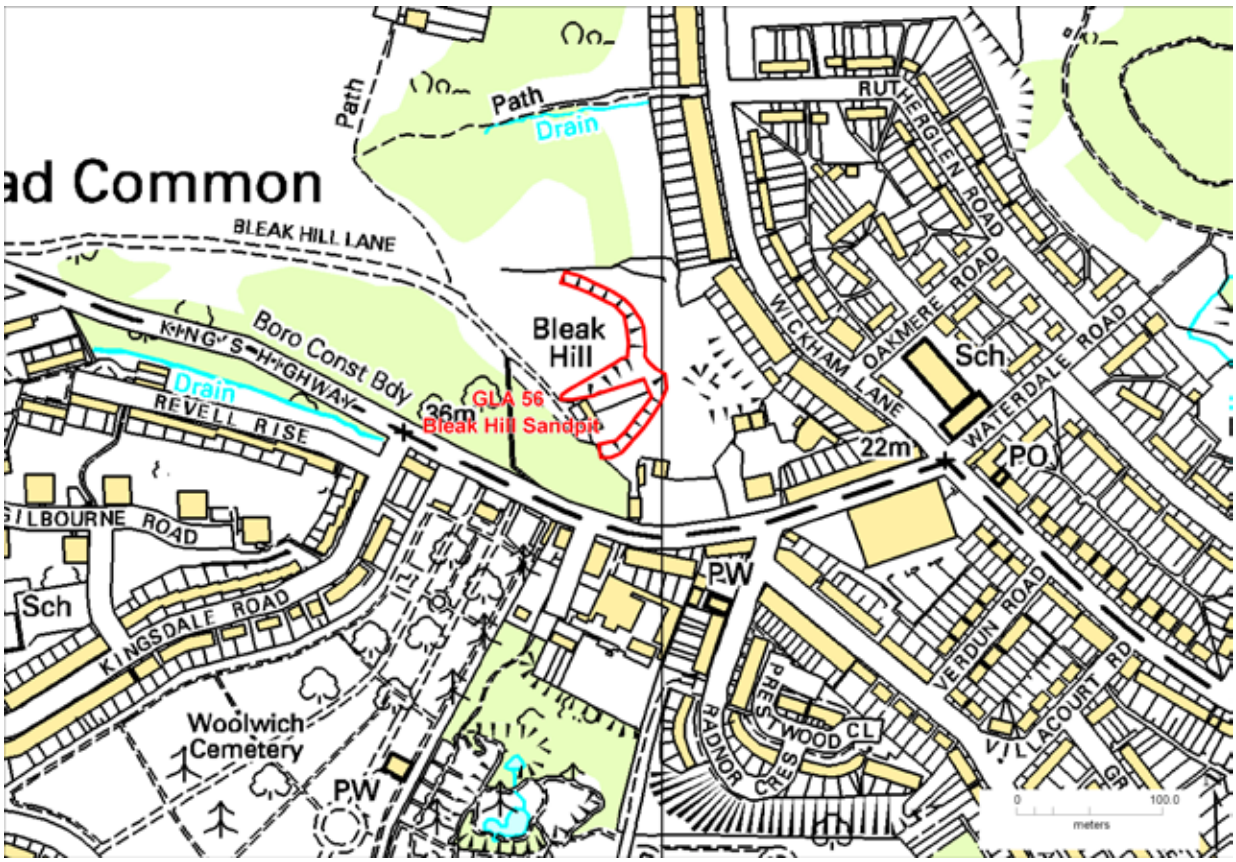

Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: Blackheath Member, Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly round, black), marine fauna. Calcitic conglomerate found at certain horizons.
Time Unit: Paleocene	Rock Unit: Upnor and Woolwich Formations, Lambeth Group
Rock Type: Clay, silt, sand	Details: Glauconitic sands overlain by interleaved grey clays and sands with brackish fauna.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation
Rock Type: Clay, silt, sand	Details: Pale yellow-brown fine-grained sand that can be clayey and glauconitic.
Time Unit : Cretaceous	Rock Unit: Seaford Chalk, White Chalk Subgroup
Rock Type: Chalk	Details Chalk with flints (unseen)

Site Description

The site is the remains of three pits.1) Hope Cottage pit (TQ 4600 7768) (visited 1887, 1906) only in the strata above the Chalk, the floor is now a car park; 2) Jenner's (Hoar's) pit (TQ 4606 7766) (visited 1894, 1906, 1908) only in Thanet Sand and Chalk), floor is now a car park. Today it is a very steep, inaccessible face with mainly obscured geology; 3) Tuff and Hoar's pit (TQ 4598 7776) (visited 1908, 1919, 1929). A photo (Priest, 1919) shows 25m high face to upper pit with Blackheath, Lambeth and Thanet strata and, lowering its floor, a 3m deep lower pit in Chalk. This area is now heavily overgrown and is accessed with difficulty by several minor footpaths from the Green Chain Walk to the north. There is still clear evidence of quarrying activities in the steep central valley. Several lumps of calcitic conglomerate were found (presumably from the Blackheath Beds). One appeared to be natural but a several cylindrical pieces were manmade possibly as test pieces?
The geology is believed to be similar to Gilbert's Pit but few clear exposures were found.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; palaeontology.

Access and Safety

Aspect	Description
Safety of access	A matter of scrambling on steep slopes for Tuff and Hoar's pit. Other pit faces inaccessible near property boundaries
Safety of exposure	The faces are heavily overgrown.
Permission to visit	Open access.
Current condition	The faces are heavily overgrown.
Current conflicting activities	Development
Restricting conditions	Vegetation and leaf cover in autumn.
Nature of exposure	Disused pits in woodland and behind car parks.

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	There is scope for a geological/industrial archaeology walk through this area and neighbouring former brick pits and chalk mines to the south and chalk pits to the east.	6
Aesthetic landscape	Mainly forming high wooded background "island" to otherwise built up area.	4
History of Earth Sciences	Geologist Association excursions to the quarries are described in the Proceedings (PGA): Goodchild, 1887; Leach & Polkinghorne,1906; Priest,1919; Baker & Priest,1919; Leach, 1929. Hope Cottage Pit (King's Highway Garage) is also described in GA Guide No. 68, 2010.	4
Economic geology	In 19th century worked for sand. In 20th century worked for sand and chalk.	4

GeoScientific Merit

Geomorphology	Steep valley beneath Harwich Formation plateau.	4
Sedimentology	Thanet Sand Formation, Upnor Formation, Woolwich Formation (and probably) Blackheath Beds (Harwich Formation) were all originally quarried at this site and illustrate the variability in the succession from marine to estuarine and back to marine with alternating sands, clays and shell bed, with the rounded Blackheath Pebbles at the top. Now it is only orangey sand that is visible, probably from the Thanet &/or Upnor Formations but without access it is difficult to confirm. The Chalk is buried beneath the car park.	4

Palaeontology	None observed but probably to be found in Woolwich Formation and possibly in Harwich Formation.	4
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Succession of lithology at one site (better seen at GLA 14, Gilbert's Pit, SSSI). Historically pits were of much interest for displaying the variability within the Lambeth Group and researching the divisions between the Formations.	4
Potential use	Research; further education; on-site interpretation.	
Fragility	natural overgrowing; weathering/slumping	
Current Site Value		
Community	Near paths on Green Chain Walk	6
Education		6
Geodiversity value		
Potential LIGS: Disused quarry included because of the possibility of informing walkers on the Green Chain Walk.		4

GLA 56 Bleakhill Sandpits

Image GLA 56. Photo credit Diana Clements 2012

GLA 57 Wickham Valley Brickworks Complex

Grid Reference: Exposure best seen at TQ 4604 7743	Site Type: Former aggregate sites
Site Area (hectares): 0.5	Current use: Steep inaccessible cliff in front of and behind residential area
Site ownership: 12.75	Borough: London Borough of Greenwich
Field surveyor: Vernon Marks, Paul Rainey, Laurie Baker	Date: 19th November 2010
Current geological designations:	Other scientific:

Site Map

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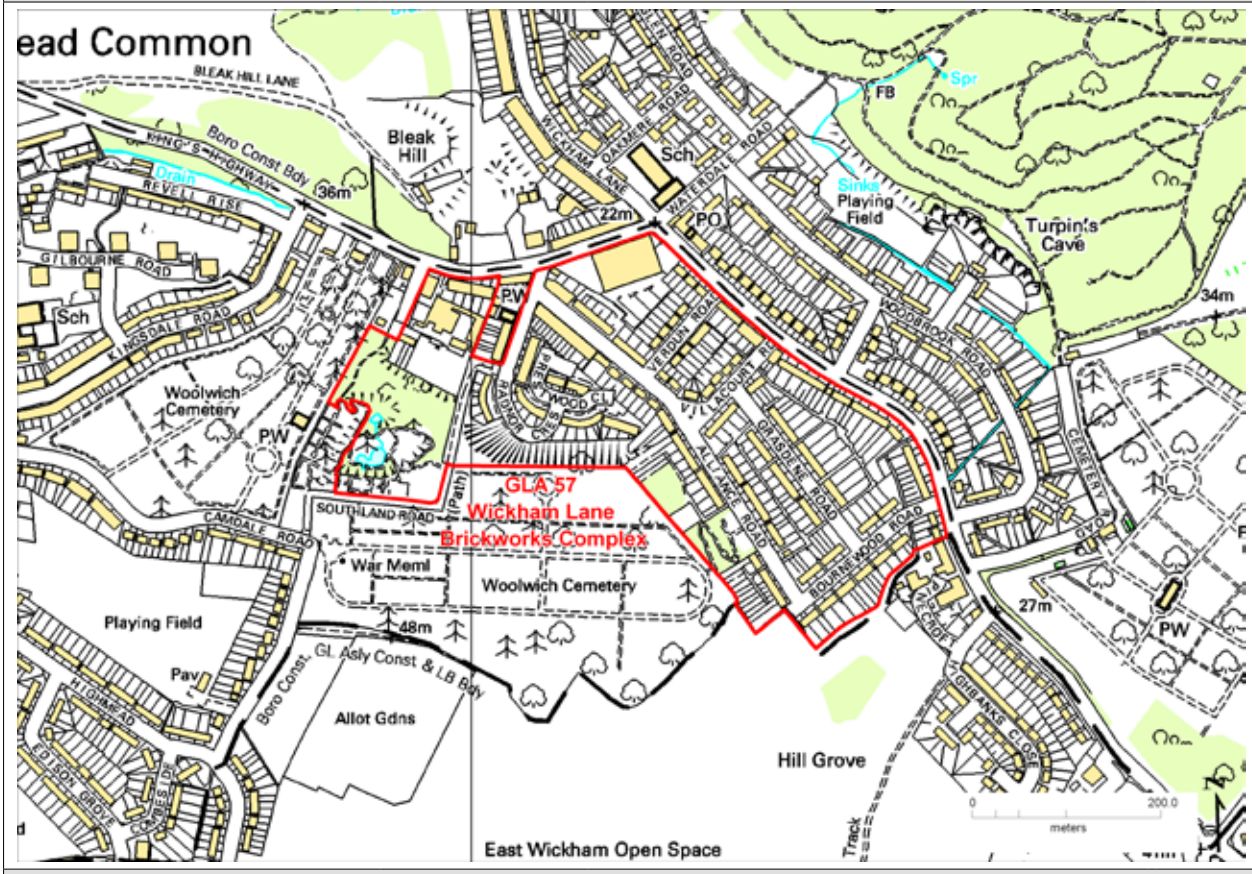

Stratigraphy and Rock Types

Time Unit: Quaternary	'Undifferentiated Thames Gravels'
Rock Type:	Includes 'Brickearth'
Time Unit: Eocene	Rock Unit: Blackheath Member, Harwich Formation, Thames Group
Rock Type: Sand and gravel	Details: Sand and pebbles (mostly round, black), with a fragile brackish marine fauna locally. Calcitic conglomerate found at certain horizons.
Time Unit: Paleocene-Eocene	Rock Unit: Upnor and Woolwich Formations, Lambeth Group
Rock Type: Clay, silt, sand	Details: Glauconitic sands overlain by a unit of blue-grey sand, not observed elsewhere, followed by interbedded grey clays and sands with a well-preserved brackish mollusc fauna.
Time Unit: Paleocene	Rock Unit: Thanet Sand Formation

Rock Type: Clay, silt, sand	Details: Pale yellow-brown fine-grained sand
Time Unit : Cretaceous	Rock Unit: White Chalk Subgroup
Rock Type: Chalk	Details: Chalk with flints (unseen)

Site Description

The complex is the remains of three adjacent pits.1) Cemetery Brickyard (1861-1908, now Rockcliff Gardens), 2) South Metropolitan Brickyard (1880-1912, reworked for sand in 1940s and 50s) (now Radnor Crescent and Prestwood Close) and 3) Gregory's Pit, also known as Wickham Lane Brick Pit (c. 1840-1930) (now between Alliance Road and Wickham Lane. The area has been entirely built over but behind the garages in Radnor Crescent the tall cliff forming the southern edge of the South Metropolitan Quarry can still be seen through the trees (best viewed in winter). The geology of this cliff is similar to Gilbert's Pit SSSI (GLA 14) except for an unusual unit of blue-grey sand at the top of the Upnor Formation. Woolwich Cemetery is at the top of the cliff but allows no access. A recently installed fence surrounding the base of the c.100m long exposure, perhaps to discourage dumping, allows no access from the bottom either but with binoculars small patches of exposure in mid- and upper- cliff can still be seen. All three Brick Works were mixing clay and sand from Upnor, Woolwich and Thanet Formatons from their open pits with chalk from their own underground mines but also exploited local 'Brickearth'.
In the 1950s the underground mines were filled with fly-ash slurry and sealed off. Rockcliffe Gardens are of interest as an attempt to develop a major area of subsidence into the mine in 1937.

Assessment of Site Value

Geodiversity topic: Lithostratigraphy; sedimentology; palaeontology.

Access and Safety

Aspect	Description
Safety of access	Access no longer possible; scree at the base, still vertical at the top
Safety of exposure	The remaining cliff is fenced off and overgrown; the rest of the complex is built over.
Permission to visit	Private land with no access
Current condition	Overgrown.
Current conflicting activities	Access and vegetation.
Restricting conditions	Vegetation
Nature of exposure	Residual cliff in former quarry complex

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	There is scope for a geological/industrial archaeology walk through this area and neighbouring former brick pits and chalk mines to the north and chalk pits to the east.	6
Aesthetic landscape	A fairly striking cliff visible to local residents	4
History of Earth Sciences	Whitaker, 1889 describes the pits. Geologist Association excursions to the quarries are described in the Proceedings (PGA): Leach & Polkinghorne,1906; Baker & Priest,1919; Leach, 1929, Pitcher, 1948, Epps, 1956. Leach, 1910 and Pearman, 1973 describe the mines. South Metropolitan Brickyard (Radnor Crescent) is also described in GA Guide No. 68, 2010.	4
Economic geology	Brickmaking in 19th century and up to 1930. Underground chalk mining until 1920. One pit reworked for sand in 1950s.	4

GeoScientific Merit

Geomorphology	Steep valley beneath Harwich Formation plateau which has been quarried leaving a residual cliff	4

Sedimentology	Upnor Formation, Woolwich Formation and Blackheath Beds (Harwich Formation) are all still visible on the cliff-face, albeit sporadically and illustrate the variability in the succession from marine to estuarine and back to marine with alternating sands, clays and shell bed, with the rounded Blackheath Pebbles at the top. The prominent white band, visible from the base is the shell bed within the Woolwich Formation.	4
Palaeontology	Brackish fauna in the Woolwich Formations, probably also in Blackheath Beds.	4
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology	None.	0
Lithostratigraphy	Succession of lithology at one site (more accessible at GLA 14, Gilbert's Pit, SSSI). Historically pits were of much interest for nature of unconformities.	4
Potential use	Research; further education; on-site interpretation.	
Fragility	natural overgrowing; weathering/slumping.	
Current Site Value		
Community	Green background.	6
Education		6
Geodiversity value		
Potential LIGS: Disused quarries included because of their historical significance in the area and the possibility of informing walkers on the Green Chain Walk.		4
GLA 57 Wickham Valley Brickworks Complex		

Image GLA 57 from Radnor Crescent. Photo credit Diana Clements

GLA 58 Coldfall Wood

Grid Reference Park entrance TQ 277 901	Site Type: small public park
Site Area (hectares): 13.43	Current use: woodland paths with published Nature Trail
Site ownership: London Borough of Haringey	Borough: London Borough of Haringey
Field surveyors: Diana Clements	Date: Summer 2009
Current geological designations:	Other scientific:

Site Map

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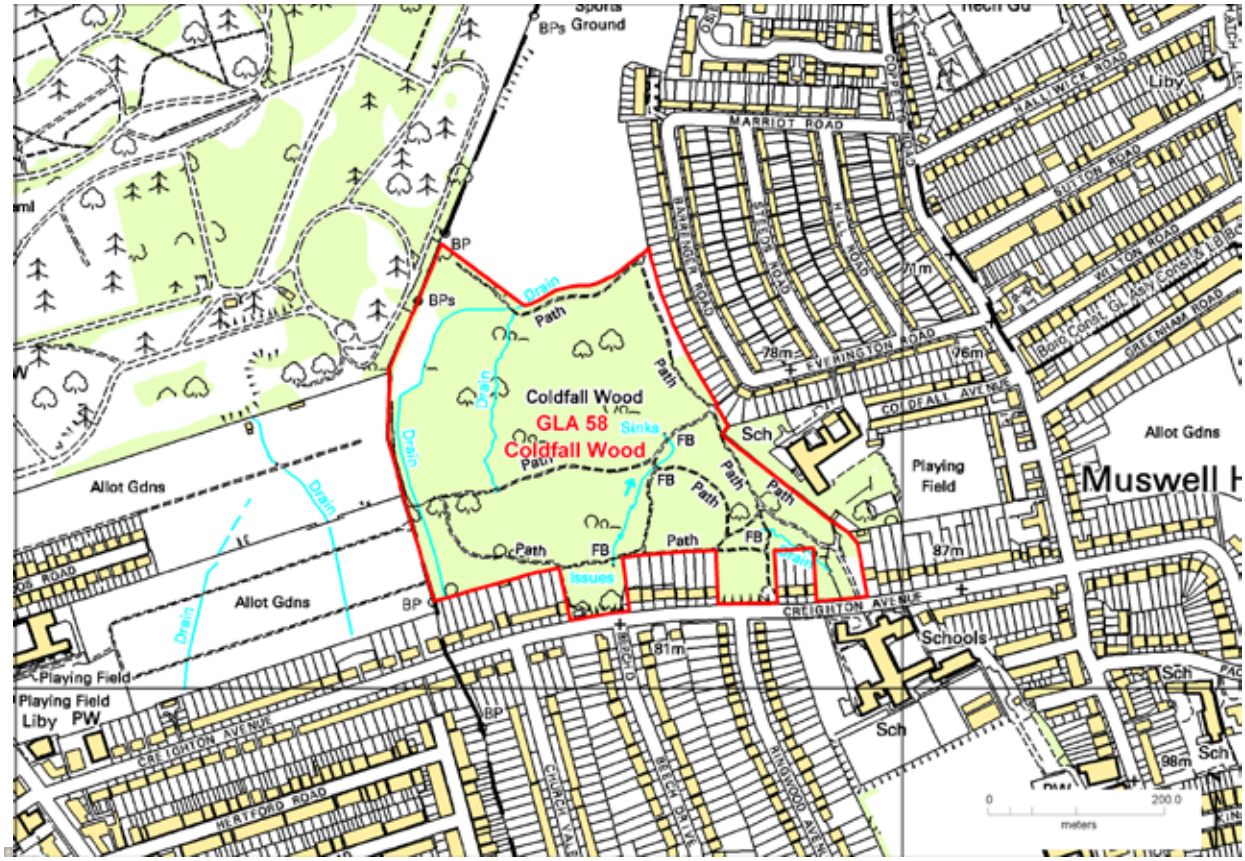

Stratigraphy and Rock Types

Time Unit: Quaternary	Rock unit: Lowestoft Formation, Albion Glacigenic Group
Rock Type:	Details: Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content
Time Unit: Quaternary	Rock unit: Dollis Hill Gravel Member, Sudbury Formation, Kesgrave Catchment Subgroup
Rock Type:	Details: Gravel, sandy and clayey in part, with some laminated silty beds. Sand and gravel, locally with lenses of silt, clay or peat and organic material
Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt, clay.

Site Description

Coldfall Wood is a small area of ancient woodland still surviving in an area that is mostly built over. It slopes down to the north cutting a gully. The 3 rock types of glacial till, underlying pre-Anglian Dollis Hill Gravel and Eocene London Clay within the area are not easy to see but there is potential for geological interpretation, particularly in relation to the deep gullies cut as successive ice ages melted. The area was originally part of the Finchley depression that allowed the Anglian ice sheet to come close to London and it is the site of the discoveries which first led to the recognition that glaciation had once reached the south of England. Evidence of till can be seen more easily in the adjacent St. Pancras & Islington Cemetery. Haringey publish a nature trail aimed at Primary school children. There is potential for identifying the different lithologies from clues in the landscape – spring lines, vegetation and small exposures, although they are not so obvious as elsewhere.

Assessment of Site Value

Geodiversity topic: lithostatigraphy, sedimentology; geomorphology.

Access and Safety

Aspect	Description
Safety of access	Access is from 2 entrances in Creighton Avenue and via the adjacent Muswell Hill Playing Fields
Safety of exposure	There are rough footpaths through the wood but actual exposures are difficult to see under the vegetation.
Permission to visit	Open access.
Current condition	The park is maintained by the Friends of Coldfall Wood. There is a tendency for flooding at the base of the wood.
Current conflicting activities	none
Restricting conditions	Vegetation, limiting exposure
Nature of exposure	Woodland with a stream running through and a gully at the bottom of the hill.

Culture, Heritage & Economic

Aspect	Description	Rating
Historic, archaeological & literary associations	The Friends of Coldfall Wood has a website detailing the history of the wood and highlighting what biodiversity can be found there	6
Aesthetic landscape	Footpaths through the wood used by local community and as a teaching asset for Primary School Children. There is an interpretation board for the biodiversity at the entrance.	8
History of Earth Sciences	Site of the discoveries which first led to the recognition that glaciation had once reached the south of England.	8
Economic geology	None	0

GeoScientific Merit

Geomorphology	The till-topped ridges were formerly the ‘Finchley depression’ through which the glacier forged its path. The gullies provide evidence of the ice ages.	3
Sedimentology	Exposures are poor but Lowestoft Till and London Clay are easily distinguishable on newly-dug graves in the adjacent cemetery. Chalk fragments in clay provide a common and easy indicator of till.	3
Palaeontology	Jurassic fossils have been found in both the Finchley cemeteries, transported by the Anglian glacier	4
Igneous/mineral/ Metamorphic Geology	Igneous rock fragments have been found in both cemeteries carried by the glacier and deposited as erratics	4
Structural Geology		2

Lithostratigraphy	Lowestoft Till, Dollis Hill Gravel, London Clay located mainly by spring lines and vegetation as exposure is poor.	3
Potential use	education; there is a potential to add information to the existing educational materials available for the wood	
Fragility	Well maintained by the Friends but the lithology is not normally exposed	
Current Site Value		
Community	Valuable woodland in an urban setting	7
Education	Nature trail and interpretation boards for biodiversity already exist and it should be possible to add in information about the Anglian glaciation	6
Geodiversity value		
Recommended LIGS: This is a good teaching location for explaining the extent of the Anglian glaciations particularly as it is the site of the discoveries which first led to the recognition that glaciation had once reached the south of England. Actual evidence is best seen in the newly-dug graves in the adjacent cemetery. The deep gullies emphasise the importance of successive ice ages in creating the landscape seen today.		4
GLA 58 Coldfall Wood		

Image GLA 59. Photo credit Diana Clements

GLA 59 Pole Hill

Grid Reference: TQ 3835 9485	Site Type: Natural hillock within Epping Forest
Site Area (hectares): 7.02	Current use: Recreational Land
Site ownership: City of London Corporation	Borough: London Borough of Waltham Forest
Field surveyor: Diana Clements, Peter Collins	Date: 29th June 2011
Current geological designations:	Other scientific:

Site Map

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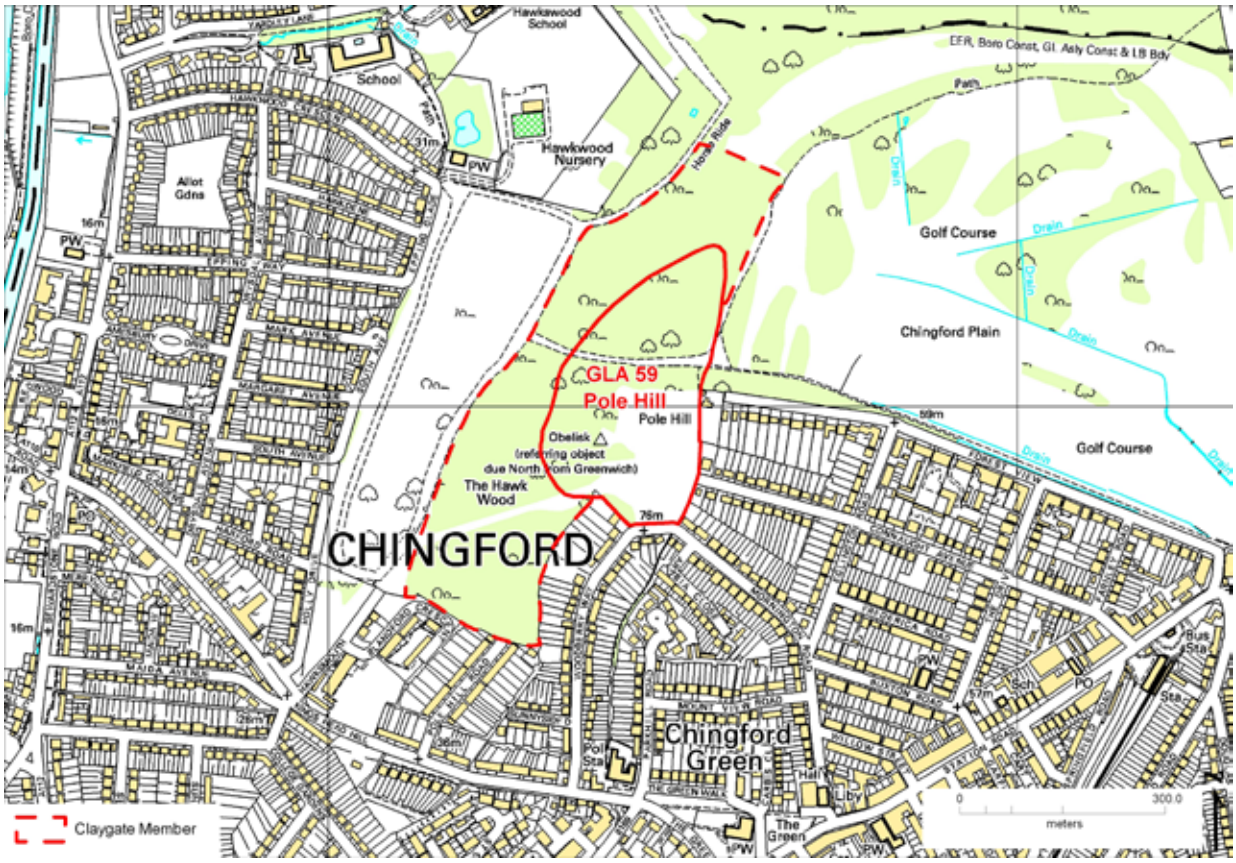


Stratigraphy and Rock Types

Time Unit: Eocene	Rock Unit: Claygate Member, London Clay Formation, Thames Group
Rock Type: Sand silt and clay	Details: Interbedded sand silt and clay
Time Unit: Eocene	Rock Unit: London Clay Formation, Thames Group
Rock Type: Clay, silt, sand	Details: Fine, sandy, silty clay/ clayey silt.

Site Description

The site is a natural hillock of London Clay Formation capped by Claygate Member. There was formerly (mid 19th C until 1930) a large brick pit situated on the south side of the site; the Claygate Member was much favoured by brick makers. It is now a westerly lobe of Epping Forest and is publically accessible. Although not the highest point of Epping Forest, at 91m it affords fine views over the Lea Valley and the City of London with the Surry Hills beyond. It lies on the Greenwich Meridian that is marked by an obelisk (erected in1824). Claygate Member exposed at the top due to erosion by walkers and run off.

Assessment of Site Value

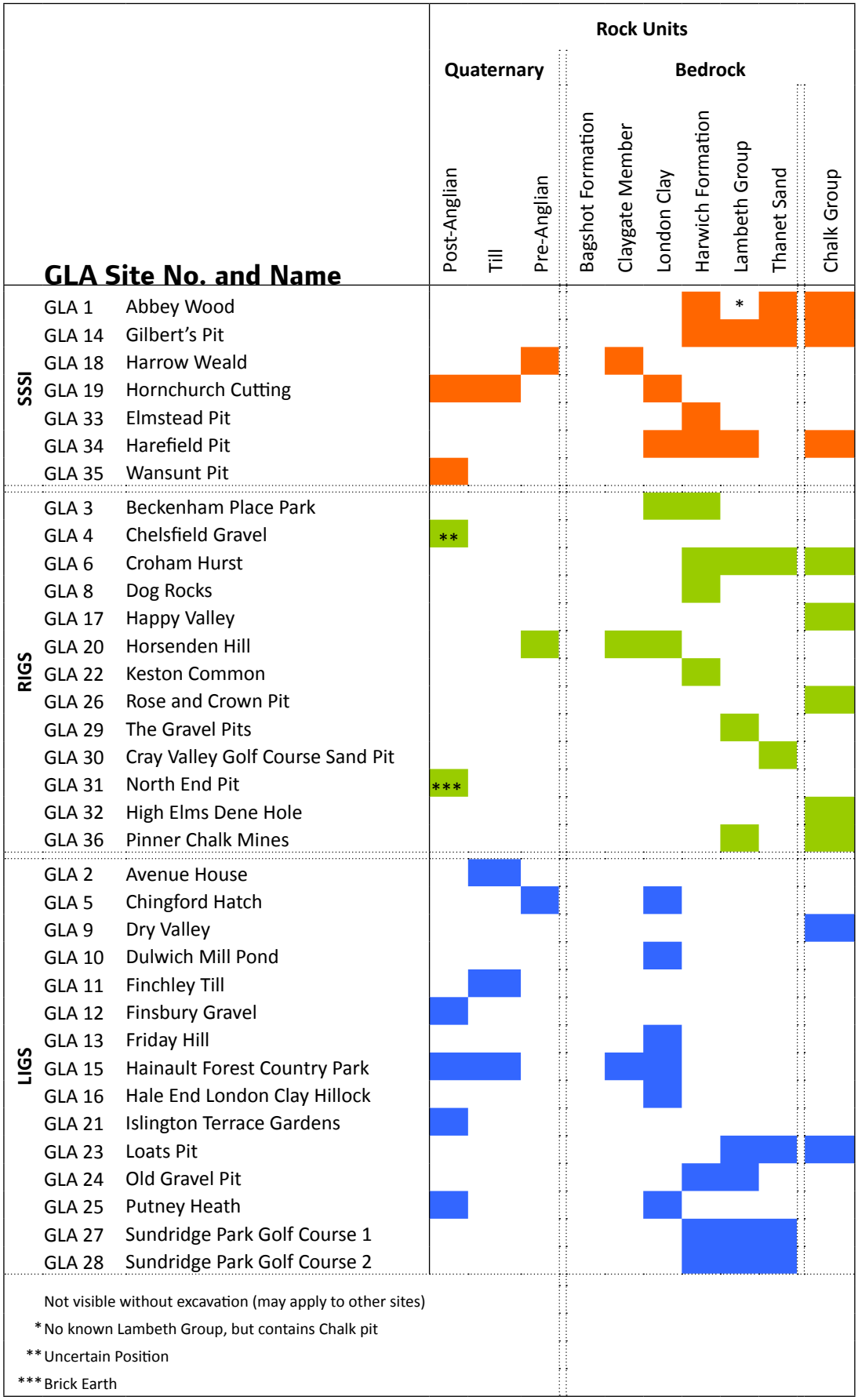
Geodiversity topic: Lithostratigraphy; sedimentology; geomorphology		
Access and Safety		
Aspect	**Description**	
Safety of access	accessed by several footpaths and is close to the London Loop.	
Safety of exposure	The site is well cared for by the City of London Corporation	
Permission to visit	Open access.	
Current condition	The top of the site is open but the views towards Greenwich along the meridian are obscured by trees growing in the area that was probably a brickfield in former times	
Current conflicting activities	None	
Restricting conditions	Most of the hillock is covered by vegetation (grass or trees)	
Nature of exposure	The viewing area is denuded of grass allowing a glimpse of the underlying Claygate Beds. This can be slippery when wet. In the woods just to the northwest small dips indicate minor digging of the Claygate beds	
Culture, Heritage & Economic		
Aspect	**Description**	Rating
Historic, archaeological & literary associations	More research required into old maps for exact position of brick pit. Meridian passes through top of the hill and an obelisk has been erected in 1824. Included in Epping Forest Guides eg Hoy, 2010	8
Aesthetic landscape	Footpaths through woods and in open ground used by local community.	9
History of Earth Sciences	PGA visit 1948. Potentially more information on the brickpits locally and the surface processes that have left the Epping Forest Ridge between the valleys of the Lea and Roding	3
Economic geology	Brick pit worked from mid 19th C to 1930 (probably Claygate Member)	6
GeoScientific Merit		
Geomorphology	Westward lobe of the Epping Forest Ridge with fine views over the Lea Valley	4
Sedimentology	No details seen but silty nature of surface Claygate Member of the London Clay Formation is evident	2
Palaeontology	None recorded	
Igneous/mineral/ Metamorphic Geology	None.	0
Structural Geology		0
Lithostratigraphy	London Clay Formation capped by Claygate Member at the top of the hill	4
Potential use	education; on-site interpretation on the geological structure of the hillock and possibly the rest of Epping Forest to NE. Anglian ice sheet probably stopped just to the north at the lower-lying Yardly Hill where Lowestoft Till can be found. There is already a plaque about the Meridian; there is scope for information about the brick pits	
Fragility	natural overgrowing	

Current Site Value		
Community	Valuable green space.	8
Education		8
Geodiversity value		
Potential LIGS: Small exposures of Claygate Member with good access for local community and a story of brickmaking. This site is considered to be a better 'London Clay hillock' than the former GLA 13, Friday Hill which it replaces as a potential LIGS		4

GLA 59 Pole Hill

Image GLA 59 View from Pole Hill 2011. Photo credit Peter Collins

Appendix 6 – Summary of geological strata of sites



Glossary

Ammonite	Extinct group of marine animals of the subclass Ammonoidea in the class Cephalopoda, phylum Mollusca. They are excellent index fossils, and it is often possible to link the rock layer in which they are found to specific geological time periods. They originated in the late **Silurian**, were extremely abundant during the **Mesozoic** and became extinct at the end of the **Cretaceous**.
Anglo-Brabant Massif	Part of the **Caledonian** fold belt which extends from East Anglia to central Belgium.
Allochthonous	Pertaining to materials, particularly rock masses, that formed somewhere other than their present location, and were transported by fault movements, large-scale gravity sliding, or similar processes. Autochthonous material, in contrast, formed in its present location. Landslides can result in large masses of allochthonous rock, which typically can be distinguished from autochthonous rocks on the basis of their difference in composition. Faults and folds can also separate allochthons from autochthons.
Alluvial	Environments, actions and products of rivers or streams.
Anticline	An arch-shaped fold in rock in which the rock layers are upwardly convex. The oldest rock layers form the core of the fold, and outward from the core progressively younger rocks occur.
Avalonia	Avalonia was an ancient microcontinent or **terrane** whose history formed much of the older rocks of Western Europe, Atlantic Canada, and parts of the coastal United States. The name is derived from the Avalon Peninsula in Newfoundland.
Axial zone	The area on either side of a fold axis
Basin inversion	Is the process whereby a sedimentary basin is uplifted and partially extruded. This uplifting is a result of crustal shortening and fault reactivation.
Bedding	A feature of sedimentary rocks, in which planar or near-planar surfaces known as bedding planes indicate successive depositional surfaces formed as the sediments were laid down.
Bedrock	A term used to describe unweathered rock below soil or superficial deposits. Can also be exposed at the surface.
Belemnite	Belemnites (or belemnoids) are an extinct group of marine cephalopod, very similar in many ways to the modern squid and closely related to the modern cuttlefish. Belemnites were numerous during the **Jurassic** and **Cretaceous** periods, and their fossils are abundant in **Mesozoic** marine rocks, often accompanying their cousins the **ammonites**. The belemnites became extinct at the end of the **Cretaceous** period.
Bioturbation	The disruption of depositional sedimentary structures by organisms e.g. activities such as burrowing.
Bivalve	Class of molluscs with paired oval or elongated shell valves joined by a hinge.
Bouguer Gravity Anomaly	The remaining value of gravitational attraction after accounting for the theoretical gravitational attraction at the point of measurement, latitude, elevation, the Bouguer correction and the free-air correction. The difference between the actual value and the predicted value is the gravity anomaly, which results from differences in density between the actual Earth and reference model anywhere below the measurement station.
Brachiopods	A phylum of solitary marine shelled invertebrates.
Bryozoa	Tiny colonial animals superficially similar to coral. They date back to the Ordovician, 480 million years ago, to present day. Mainly living in a marine environment, they cover rocky surfaces like moss.
Calcite	Calcium Carbonate [$CaCO_3$] a widely distributed mineral and a common constituent of sedimentary rocks, limestone in particular. Also occurs as stalactites and stalagmites and is often the primary constituent of marine shells.
Calcrete	**Conglomerate** consisting of surficial sand and gravel cemented into a hard mass by calcium carbonate precipitated from solution and redeposited through the agency of infiltrating waters, or deposited by the escape of carbon dioxide from vadose water.
Caledonides	The mountain belt formed during the **Caledonian Orogeny**

Caledonian	Refers to a major mountain-building (**orogeny**) event related to the closure of the Iapetus Ocean and the convergence of the Laurentia, Baltica and Avalonia crustal blocks during the **Ordovician**, **Silurian** and early **Devonian**. It affected eastern North America, Scotland, Ireland, Scotland, Scandinavia and Greenland.
Carboniferous	A geological period [359–299 Ma] of the Palaeozoic Era preceded by the **Devonian** and followed by the **Permian**.
Chronostratigraphy	The branch of **stratigraphy** linked to the concept of time. Chronostratigraphical units are defined as bodies of rock that formed during a specific interval of geologic time. Chronostratigraphical units are thus special rock bodies that are conceptual, as well as being material.
Conglomerate	A sedimentary rock, a significant proportion of which is composed of rounded pebbles and boulders, greater than 2 mm in diameter, set in a finer-grained groundmass.
Cenozoic	[Cainozoic] A geological era covering 65.5 Ma [65.5 – present day]. It is preceded by the **Mesozoic**, the **Cretaceous** – Tertiary (K-T) extinction event marks this boundary.
Clast	Particle of broken down rock, eroded and deposited in a new setting.
Craton	An old and stable part of the continental crust that has survived the merging and splitting of continents and supercontinents for at least 500 million years. Some are over 2 billion years old. Cratons are generally found in the interiors of continents and are characteristically composed of ancient crystalline basement crust of lightweight felsic igneous rock such as granite. From the Greek kratos; "strength"
Cretaceous	A geological period [145–65.5 Ma] of the **Mesozoic** Era preceded by the **Jurassic** and followed by the **Neogene**.
Crinoid	A sea dwelling creature (class Crinodea) which has survived since **Ordovician** times. They are known as sea-lilies and have three sections, the stem, the calyx and feather-like arms by which they collect food. There abundance in the **Palaeozoic** era has meant that their remains have formed large thicknesses of limestone due to their calcareous skeletons.
Cross-bedding	Cross-stratification formed by the migration of dunes and sand waves on a sediment surface.
Cryoturbation	A collective term to describe the churning, modification and all other disturbances of soil resulting from frost action. The repeated freezing and thawing of the soil eventual leads to patterned ground.
Devensian	The last glacial stage in Britain, lasting from around 70 000 BP (Before Present) to about 10,000 BP.
Devonian	A geological period [416–359 Ma] of the Palaeozoic Era preceded by the **Silurian** and followed by the **Carboniferous**.
Dinoflagellate	The dinoflagella are a large group of flagellate organisms. Most are marine plankton, but they are also common in fresh water habitats. Their populations are distributed depending on temperature, salinity, or depth. Dinoflagellate cysts are commonly preserved in the fossil record and are useful for stratigraphic correlation and palaeoenvironmental analysis.
Earth heritage	The geological and landscape heritage of an area. Used mostly in the context of geoconservation
Earth science	Science related to planet Earth. Also known as geoscience. Includes disciplines such as economic geology, geochemistry, geomagnetism, geomorphology, geophysics, glaciology, hydrogeology, mineralogy, palaeontology, petroleum geology, petrology, stratigraphy, structural geology, engineering geology, sedimentology, seismology.
Echinoid	Sea urchins (class Echinoidea) found in oceans all over the world. Their shell or "test", is globular in shape and covered with spines. The size of an adult test is typically from 3 to 10 cm. The earliest known echinoids are found in the rock of the Late part of the Ordovician period, and they have survived to the present day.
Eocene	A geological epoch [55.8 – 33.9 Ma] belonging to the **Palaeogene** period. It is preceded by the **Paleocene** and succeeded by the Oligocene.
Eustatic	World-wide changes in sea-level caused either by tectonic movement or growth or melting of glacial ice-sheets (glacioeustatic).

Fault	A fracture in the Earth's crust across which the rocks have been displaced relative to each other.
Ferricrete	A conglomerate consisting of surficial sand and gravel which has been cemented into a hard mass by iron oxide.
Fluvial	Referring to a river environment.
Fold	A bend in planar structures such as rock strata or bedding planes.
Fold axis	A line which lies parallel to the hinge line and marks the intersection of the axial plane with the hinge zone
Foraminifera	The Foraminifera, or forams for short, are a large group of amoeboid organisms. They typically produce a shell, or test, which can have either one or multiple chambers. About 275 000 species are recognized, both living and fossil. They are usually less than 1 mm in size and are commonly preserved in the fossil record. Useful for stratigraphic correlation and palaeoenvironmental analysis.
Formation	The fundamental unit used in lithostratigraphy. Specific features distinguish one formation from another. Formations may be subdivided into members and several formation may constitute a group.
Glaciofluvial	Refers to sediments deposited by flowing glacial **meltwater.**
Glaciolacustrine	Refers to deposits and landforms derived from materials brought by glacial meltwaters into lake environments.
Glauconite	A greenish mineral belonging to the mica group.
Hercynian	A period of mountain building in Europe throughout the late **Palaeozoic**, synonymous with the **Variscan Orogeny.** The northern Alps are said to be Hercynian.
Holocene	The youngest epoch of the **Quaternary** Sub-Era. Covers the last 11 800 years. Part of the **Cenozoic** Era.. The concept of the Holocene ending at the end of the 18th Century is gaining ground, with the following Epoch termed the Anthropocene.
Inlier	Area where older rocks are surrounded completely by younger rocks, produced by, faulting or folding followed by erosion.
Involution	Irregular folds in sedimentary strata caused by **cryoturbation.**
Jurassic	A geological period [200–145 Ma] of the **Mesozoic** Era preceded by the **Triassic** and followed by the **Cretaceous**.
Lacustrine	Refers to a lake environment.
Laurentia	An ancient supercontinent comprising the Canadian shield, North America, Greenland and parts of North-West Europe.
Lithology	The character of a rock expressed in terms of its mineral composition, structure, grain size and arrangement of its constituents.
Lithostratigraphy	The branch of **stratigraphy** concerned with the description of rock units in terms of their lithological features and spatial relationships
London Platform	A block of **Palaeozoic** rock, part of the **Anglo-Brabant Massif**, which underlies most of the south-east of England.
Ma	Abbreviation for mega-annum (million years)
Marl	Calcareous (lime-rich) mudstone, or clay-rich chalk.
Mass-movement	The down slope movement of earth material due to the force of gravity.
Meltwater	Water produced by melting of snow or ice.
Mesozoic	The geological era between the **Palaeozoic** and the **Cenozoic**. It covers the time span between 251–65 Ma.
Milankovitch Cycles	The collective effect of changes in the Earth's circumnavigation of the Sun upon its climate. The cycles are eccentricity (100,000 years), axial tilt (41,000 years), and precession (23,000 years). Together, variations in these three cycles create alterations in the seasonality of solar radiation reaching the Earth's surface. These times of increased or decreased solar radiation directly influence the Earth's climate system.
Miocene	A geological epoch [23 – 5.3Ma] preceded by the Oligocene and followed by the **Pliocene**. Part of the **Neogene** Period
Nannoplankton	Plankton of minute size, especially plankton composed of organisms measuring from 2 to 20 micrometers.

Neogene	A geological period [23 Ma–present day] of the **Cenozoic** Era, preceded by the **Palaeogene**.
Ordovician	A geological period [488–444Ma] of the **Palaeozoic** Era preceded by the **Cambrian** and followed by the **Silurian**.
Orogeny	A period of mountain building by tectonic activity.
Ostracod	Small aquatic crustacean dating back to **Cambrian** times, [class : Ostracoda]. They vary in size from 0.2mm to 30mm and have a bivalve-like protective shell. They are very important in correlating palaeoenvironments due to their worldwide occurrence.
Outlier	Area where younger rocks are surrounded completely by older rocks, produced by erosion, faulting, folding or any combination of these.
Palaeogene	The lowest period belonging to the **Cenozoic** Era [65.5–23Ma].
Paleocene	The lowest epoch of the **Palaeogene** period, [65.5–55.8Ma]
Palaeozoic	The lowest era of the Phanerozoic Eon. It is preceded by the **Proterozoic** and is followed by the **Mesozoic**, [542–251Ma].
Palynomorph	Microscopic organic particles found in sedimentary rocks. They include pollen and spores and are important for indicating past climatic conditions.
Pelecyod	Benthic dwelling mollusc belonging to the class Bivalvia.
Pericline	A fold where the strata dips away from the centre to form a dome or where the strata dips towards the centre to create a basin.
Periglacial	Conditions, processes and landforms associated with cold, nonglacial environments.
Permian	A geological period [299–251 Ma] of the **Palaeozoic** Era preceded by the **Carboniferous** and followed by the **Triassic**.
Pingo	A **periglacial** landform, a conical hill of earth covering ice found in the Arctic, subarctic and Antarctica. The name is derived from the Inuit word meaning small hill.
Pleistocene	A geological epoch [1.8Ma–11.5 Ka] preceded by the **Pliocene** and followed by the **Holocene**. Part of the **Cenozoic** Era and **Quaternary** Sub-Era.
Pliocene	A geological epoch [5.3 – 1.8Ma] preceded by the **Miocene** and followed by the **Pleistocene**. Part of the **Cenozoic** Era.
Proterozoic	The Late eon [2500–542Ma] of the Precambrian followed by the Achaean.
Quaternary	A geological sub-era [1.8Ma to present day] of the **Cenozoic** Era, following the **Neogene**
Radiolarian	Planktonic organisms that occur throughout the water column. They have been in existence since **Cambrian** times. Due to the preservation of their silicon skeletons they are important as palaeoenvironment indicators.
Sedimentary rock	A rock formed in one of three main ways: by the deposition of the weathered remains of other rocks (clastic sedimentary rock); by the deposition of the results of biogenic activity; and by precipitation from solution. Four basic processes are involved in the formation of a clastic sedimentary rock: weathering (erosion), transportation, deposition and compaction.
Silcrete	A conglomerate consisting of surficial sand and gravel which has been cemented into a hard mass by silica.
Silurian	A geological period [444–416 Ma] of the **Palaeozoic** Era preceded by the **Ordovician** system and followed by the **Devonian**.
Smectite	A family of clay minerals that includes montmorillonite and bentonite
Solifluction	Solifluction is a slow downslope flow of water-saturated fragmental material or soil. It is promoted by the existence of permafrost which traps snow and ice melt within the surface layer making it more fluid.
Strata	Rocks that form layers or beds.
Stratigraphy	The definition and description of the stratified rocks of the Earth's crust.
Syncline	A basin- or trough-shaped fold in rock in which rock layers are downwardly concave. The youngest rock layers form the core of the fold and outward from the core progressively older rocks occur.

Terrane	A fault-bounded body of rock of regional extent, characterized by a geological history different from that of contiguous terranes. A terrane is generally considered to be a discrete **allochthonous** fragment of oceanic or continental material added to a **craton** at an active margin by accretion.
Terrigenous	Derived from the erosion of rocks on land.
Thrust	The movement of one crustal surface over another.
Triassic	A geological period [251–200 Ma] preceded by the **Permian** and followed by the **Jurassic**.
Unconformable	A term generally applied to younger strata that do not conform in position or that do not have the same dip and strike as those of the immediately underlying rocks. Also applies to the contact between unconformable rocks.
Unconformity	A surface of contact between two groups of **unconformable** strata. Represents a break in the geological record where a combination of erosion and lack of deposition was taking place.
Variscan	A period of continental collision and mountain building in Europe throughout the late **Palaeozoic**. The Variscan **Orogeny** occurred when the continent of Gondwana collided with Laurasian continent creating the supercontinent of Pangaea. The Appalachian mountain range is an outcome of the Variscan **Orogeny**.

References and resources

Most of the references listed here can be consulted at the BGS Library, Keyworth. The BGS Library may be able to provide copies of other material, subject to copyright legislation. Links to the BGS Library catalogue and other details are provided on the BGS website: www.geolib.bgs.ac.uk.

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Archive and Material collections

Documentary Sources

Many years of geological observation, recording and research in Britain have created an enormous archive of information, published and unpublished, and collections of geological materials. Although some of these collections and archives may now reside at locations remote from the source area, they are, nonetheless, vital parts of that area's geodiversity. In particular, such collections may include information on, or specimens from, locations or features which are no longer accessible and for which they now offer the only means of study and research.

The most significant geological archives relevant to Greater London are considered below.

The British Geological Survey

As the national geological survey, BGS has an incomparable archive of information and materials collections relating to the district, dating back to the earliest years of geological mapping and research in the 19th century and continuing to the present day. Information sources held by BGS include original field maps (field slips), published maps, memoirs, reports, open-file maps and reports, borehole records, mine plans, fossils, rock samples, thin sections, hydrogeological, geochemical, geophysical and geotechnical data and photographs.

Further information on BGS publications, data sources and information available from the British Geological Survey can be accessed at www.bgs.ac.uk.

Soil Survey

Specialised information on soil character, properties and classification may be obtained from the publications of the Soil Survey of England and Wales, now the Soil Survey and Land Research Centre. www.silsoe.cranfield.ac.uk/nsri.

Other Documentary Sources

Information on geological Sites of Special Scientific Interest (SSSIs) within Greater London is held by Natural England www.naturalengland.org.uk. Information on other geologically significant sites is held by South London and North West London RIGS Groups www.ukrigs.org.uk.

Materials Collections

Many specimens of rocks and fossils collected within Greater London are held in the collections of Britain's national museums and university departments; important material is also held by BGS. These specimens, and their accompanying locality and other data, comprise an extremely important aspect of the Greater London's geodiversity.

Natural History Museum

The Museum's palaeontology collection of around 9 million specimens from all over the globe is one of the world's great palaeontological collections. Specimens have come from scientists who were at the fore of the developing science of geology, including Charles Darwin, William Smith, the Sowerbys, Buckman, Murchison, Samuel Beckles, James Bowerbank, Thomas Davidson, and Gideon Mantell. The mineralogy collection at the museum includes the Building and Decorative Stones Collection, set up by a nationwide survey of all building stones after the fire at the Palace of Westminster in 1834. Special collections within the main collection include the Nicholson Collection of marble and decorative stones and the London

Natural History Society Collection of marbles. There is also a unique collection of roadstones and macadams, which contains samples of rock from quarries used to dress road surfaces.

British Geological Survey

The BGS Collections hold rock and fossil specimens taken from surface exposures and boreholes within Greater London. Thin sections of rocks from the district are registered in the BGS sliced rock collection.

Croydon Natural History and Scientific Society Museum

This museum houses a large collection of rocks, fossils and minerals, made by Society members. It includes the W H Bennett Collection, bequeathed in 1975, and a collection of industrial objects linked to mining and quarrying in Reigate and Godstone areas.

Essex Field Club

Collection of rocks and fossils, including a large number from the east London boroughs. The collection is currently in temporary storage in central Essex.

National and Local Societies

National Geological Societies:

Geological Society of London
The Geological Society, Burlington House, Piccadilly, London. W1J 0BG
Web: www.geolsoc.org.uk

Geologists' Association
The Geologists' Association, Burlington House, Piccadilly, London. W1J 0DU
Web: www.geologists.org.uk/Email: geol.assoc@btinternet.com

Local Societies:

Amateur Geological Society
Julia Daniels, 25 Village Road, Finchley, London N3 1TL

Brent Geological Society
John Stevens, 8 Winchester Road, Kenton, Middlesex. HA3 9PE
Web: www.brentgeology.co.uk Email: ruthweinberg@ntl.world.com

Croydon Natural History and Scientific Society
96a Brighton Road, South Croydon, Croydon. CR2 6AD
Web: www.greig51.freeserve.co.uk/cnhss/index.htm

East Herts Geology Club
Web: www.ehgc.org.uk

Essex Rock and Mineral Society
Web: www.erms.org

Farnham Geological Society
Shirley Stephens, 27 Dinorben Close, Fleet, Hampshire. GU52 7SL
Web: www.farnhamgeosoc.org.uk/Email: secretary@farnhamgeosoc.org.uk

Harrow & Hillingdon Geological Society
Web: www.hhgs.org.uk

Ravensbourne Geological Society
Mr Maurice Green, 49 Station Road, West Wickham, Kent. BR4 0PY

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Chinese

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Hindi

यदि आप इस दस्तावेज की प्रति अपनी
भाषा में चाहते हैं, तो कृपया निम्नलिखित
नंबर पर फोन करें अथवा नीचे दिये गये
पते पर संपर्क करें

Vietnamese

Nếu bạn muốn có văn bản tài liệu
này bằng ngôn ngữ của mình, hãy
liên hệ theo số điện thoại hoặc địa
chỉ dưới đây.

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি
(কপি) চান, তা হলে নীচের ফোন্ নম্বরে
বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں
چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر
پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish

Bu belgenin kendi dilinizde
hazırlanmış bir nüshasını
edinmek için, lütfen aşağıdaki
telefon numarasını arayınız
veya adrese başvurunuz.

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى
الاتصال برقم الهاتف أو مراسلة العنوان
أدناه

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ
ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ
ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં
જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર
ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

MAYOR OF LONDON