

25 March 2016  
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For the attention of Ian Butcher, Interim Planning Policy Team Leader

**DRAFT**

Dear Sirs,

**ADVICE ON MINERALS**  
**LAND AT WILLOW FARM, BILLET ROAD, RM6 5SX**

Further to our recent discussions and correspondence regarding the above, we now provide our advice as set out below.

**SCOPE OF ADVICE**

You have instructed us to provide a report on the potential economic mineral present at Willow Farm, Billet Road, RM6 5SX. As agreed this is our Stage 1 Report comprising a 'desk based' review of published geological and other relevant information to ascertain the potential extent & nature of economic mineral at the property. It includes a review against existing and proposed planning policy.

For this report we have reviewed and relied upon the following publically available information:

1. Plan ALOS04 - Area of Open Land at Billet Road and Surrounding Area showing outlined red the extent of the land to be considered as part of this review.
2. Information available from the British Geological Survey (BGS) online resource including the Geology of Britain Viewer and related Borehole Scans. All such information is used courtesy of BGS © NERC 2016.
3. Information available from the LB Redbridge online planning resource including the Minerals Local Plan (MLP) (adopted 2012) and the Redbridge 2028 Core Strategy Review – Preferred Options Report dated January 2013.
4. Published current and historic Ordnance Survey (OS) maps.
5. Information available from the Environment Agency (EA) online resource and from their historic landfill records.

**LOCATION**

The property is located on the eastern extent of the LB Redbridge at the boundary with LB Barking & Dagenham. It is bounded to the north by Billet Road and to the south by the A12, Eastern Avenue. The land immediately to the north is mainly agricultural land, while to the west it is playing fields, some residential property and thereafter Fairlop Quarry. The land to the south and east is predominantly residential.

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## DESCRIPTION

The property extends to approximately 19.77 hectares (48.90 acres) as shown outlined red on the Site Plan attached as **Appendix 1**.

The land is broadly level with a slight fall from the north (at around 25m AOD) to the south (at around 23m AOD).

It is used predominantly as rough grazing land and paddocks. The only buildings located within the designated site boundaries are at Willow Farm in the westernmost area although Hainault House, fronting Billet Road, is effectively situated within the site 'envelope'. There are residential properties along the east boundary and also adjacent to Willow Farm in the north west. Otherwise the boundaries are formed by Billet Road and the A12 plus Little Heath School and playing fields.

## HISTORIC LAND USE

The OS six-inch map dated 1898 shows the land in agricultural use. There are some buildings at the present Willow Farmhouse and there is a building already shown as Hainault House.

The updated OS six-inch map of 1938 again shows all the land in what appears to be agricultural use. Outwith the subject site there is a school marked where the current Little Heath School is located and the housing on the corner of Billet Road and Hainault Road has appeared.

The 1:25,000 OS map dated 1959 has some new buildings to the west of the current playing fields but otherwise the subject land appears unchanged. The housing development to the east of the site has started to emerge.

The OS mapping from 1968 to 1987 shows no significant change to the subject land when compared with the current mapping.

Based on these documents the subject land appears to have been in the current land uses for a considerable period of time. In particular, there is no evidence *from these sources* of any past mineral workings or landfill activity.

## PLANNING

The Redbridge LDF and MLP documentation confirms the site as within the Green Belt (Policy E1) and within a Green Corridor (Policy E2).

The London Plan Policy apportions LB Redbridge a target of 100,000 tonnes per annum of aggregate production, with all of this currently coming from the Tarmac Brett JV operation at Fairlop Quarry. MLP policy is to identify and safeguard sites with the potential for sustainable aggregate extraction and to ensure at least 7 years supply (700,000 tonnes) of mineral with planning permission.

The site does not have Safeguarded Mineral status although the area to the north of Billet Road at Red House Farm along with other areas around Fairlop do have this status. It has however been designated as a Mineral Search Area – areas where the presence of significant mineral reserves is indicated by the BGS mapping but where deposits have not actually been confirmed through bore hole test drilling.

Under Policy M4 of the MLP, planning applications for development on Minerals Safeguarded land will be refused if it contains commercially viable mineral resources or there is an overriding community need for the proposed development that outweighs the need for the mineral.

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The Redbridge 2028 Core Strategy Review of January 2013 proposed no significant change to the minerals policy as contained in the MLP.

## POTENTIAL MINERAL RESOURCE

### Geology

The BGS data confirms that the surface geology throughout the site is the Boyn Hill Gravel Member. This is a Pleistocene river terrace deposit of sand & gravel with possible lenses of silt, clay or peat. It is found at thicknesses of 1m to 9m but on average is around 5m thick. This is the same geology recorded at the nearby Fairlop Quarry.

The bedrock geology is noted as the London Clay Formation – a sedimentary bedrock of clay, silt and some layers of sandy clay. It can be found up to 150m thick in this part of the London Basin.

Only the sand and gravel has potential as an economic mineral.

### Boreholes

While the surface geology provides a general indication of the minerals present, the detailed position can only be fully established by undertaking ground investigations. For sand & gravel this normally comprises boreholes and/or trial pits.

We understand no ground investigations have been carried out as part of any specific exercise to identify the likely economic sand & gravel deposit at the property, as part of the planning process or otherwise. In these circumstances we have reviewed the historic borehole data held within the BGS website as a means to estimate the potential reserves.

There are five historic boreholes on the subject land, all in the south east corner as shown on the Site Plan at **Appendix 1**. Ideally there would be a series of boreholes at regular intervals throughout the site as the geology can vary significantly over such a large site. In the absence of any further on site boreholes, we have looked at two boreholes to the south west (at the junction of the A12 and Hainault Road) and three boreholes to the east in the residential area around Nash Road. These are also shown on the Site Plan.

We have summarised the borehole data on the Borehole Data Schedule contained at **Appendix 2**. From this you will note:

The boreholes located on the subject land (11, 12, 17, 18 & 19) show a sand and gravel layer of between zero and 1m thick with overburden of between 2.0m and 2.7m thick. The respective averages are 0.44m and 2.32m.

The boreholes to the south west (1 & 2) show a sand and gravel layer of between 1.6m and 2.3m thick with overburden of between 1.2m and 1.3m thick. The respective averages are 1.95m and 1.25m.

The boreholes to the south west (32,33 & 34) show a sand and gravel layer of between zero and 1m thick with overburden of between 2.0m and 2.7 m thick. The respective averages are 0.33m and 2.27m

The overall average figures are sand & gravel 0.91m thick and overburden 1.95m thick.

*We would reiterate that these figures should be taken as a very general indication only as there are insufficient boreholes to establish the extent of the mineral (and overburden) with any degree of certainty.*

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## Resource Estimate

Adopting the information from the boreholes shown on the Site Plan, we have calculated the potential sand & gravel resource set out on the Tonnage Calculation Schedule contained at **Appendix 3**.

To arrive at a net area suitable for mineral extraction, we have allowed for a 'buffer zone' of 40m from the boundary of residential property and 5m from the boundary for all other land uses. We have assumed Willow Farmhouse will remain occupied. There is no set buffer zone distance guidance within the LB Redbridge Minerals Local Plan (MLP) – the distance from operational quarry workings is to be subject to an Environmental Impact Assessment. In our experience from other locations, these buffer zones can vary from nil where there is no sensitive boundary to 100m for some residential boundaries. We have adopted 40m and 5m as reasonable estimates but these could be subject to amendment. The approximate net area is shown outlined green on the Site Plan.

We have then applied a range of sand & gravel thicknesses from the borehole data to this net area to give a series of possible mineral volumes. These have then been converted to tonnes by a suitable estimated density factor, giving gross tonnage. From this we have deducted 10% to reflect 'working losses' - generally the tonnage lost from washing silts and other non-saleable material from the sand & gravel. Working losses for S&G can range from nominal amounts to over 15% but generally are found in the 5% to 10% range.

Depending on the assumed sand & gravel thickness, we have calculated a range of resource from around 70,000t to just over 400,000t. In our opinion the best estimate from these figures is that taken from the boreholes on the subject land at approximately 92,000t, followed by the overall average at 190,000t.

This compares with the estimated reserve figure of 600,000t contained at paragraph 5.1.5 of the MLP albeit this includes the area of approximately 10 hectares to the north of Billet Road, around Red House Farm and may in fact be based on this 10 hectare area alone.

The potential tonnage estimated by us is however unlikely to be capable of commercial extraction due to two further issues:

Firstly the presence of significant overburden material. In general, sand & gravel is uneconomic to quarry if the overburden to mineral ratio is at or above 1:1. In other words if there is 1m of overburden there has to be at least 1m of mineral underneath to make it economically viable. In fact most operators like to work to a better ratio but due to the proximity of the site to a strong market, a 1:1 ratio could be acceptable. The borehole data suggests that if repeated across the entire site, the overburden would on average be around double the thickness of the mineral and accordingly uneconomic to work, regardless of the actual tonnage.

Secondly, due to the costs associated with planning and environmental matters along with other site establishment costs, operators require a minimum total tonnage over which to spread these costs. In most cases the minimum figure for a new site (not an extension to an existing operation) is around 1 million tonnes. Again allowing for the strength of the London market, this can probably be reduced to some extent however in our opinion, this site is unlikely to be economic to work as a discrete 'standalone' unit. It would have to form part of a larger planning application, perhaps involving the mineral to the north of Billet Road.

We have made no allowance for the possible loss of workable mineral that may have resulted from the historic landfill site (and likely prior mineral working) indicated on the Environment Agency (EA) web resource plan - identified as the area **outlined & hatched blue** on our Site Plan. We have received a verbal response to our written enquiry in respect of this matter and have been advised by the EA that the site appears to have been an unlicensed tip that received waste between 1970 and 1973. The EA has no documents associated with this site and therefore cannot provide any additional information including for example whether the tipping was illegal or undertaken via a waste exemption.

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We understand that during the process for developing the Minerals Local Plan, Redbridge Council's Planning Service held several meetings with the local operator Brett Lafarge (now Tarmac Brett) and discussed the prospect of other sites in the Fairlop quarry area being further exploited for commercially viable deposits of sand and gravel. The operator stated that Extension Areas of Aldborough Hatch/Aldborough Farm and the Hainault Farm area are the only areas with proven tonnage. The operator also felt that there was limited scope for further minerals excavation at all in the Borough, as much of the minerals deposits in Redbridge had already been excavated and the operator was now reaching the limit of the Borough's resources.

Commentary in the MLP (Schedule 1 page 17) notes that the 'operator' (Brett Lafarge) indicated that Willow Farm may have been worked and then landfilled by PT Reid Ltd between 1965 and 1975 although "the data is not entirely reliable and the area could contain viable deposits". In addition, the map 'Figure 1 – All former minerals extraction areas in Redbridge' (MLP page 7) shows a large part of the subject land having being worked in the past.

While no specific planning applications relating to works undertaken in the past can be identified, we are advised that a report entitled 'Site Restoration for recreation following gravel extraction and refuse disposal: Design Report (1975)', probably submitted with a planning application for minerals development at Fairlop, indicates that Willow Farm at Billet Road is a site which had experienced mineral extraction and needed to be restored.

Given all of the above it seems highly likely that a significant part of the property has been subject to previous mineral extraction and therefore our mineral resource estimate noted above is almost certainly overstated.

*As advised previously, our estimates should be viewed as indicative only as there is insufficient detailed information to provide more accurate figures.*

## **SUMMARY & CONCLUSIONS**

The site extends to approximately 19.77 hectares (48.90 acres) and the historic & current land use is predominantly rough grazing and paddocks. It is located in the Green Belt.

The land has been designated as a Mineral Search Area in the MLP – defined as areas where the presence of significant mineral reserves is indicated by the BGS mapping but where deposits have not actually been confirmed through bore hole test drilling. It has been identified as having the potential to be included in the LB Redbridge 7 year mineral land bank but is not currently Mineral Safeguarded land which would afford protection from development unless there was an overriding community need for the proposed development that outweighed the need for the mineral.

The surface geology throughout the site is the Boyn Hill Gravel Member comprising sand & gravel with possible lenses of silt, clay or peat. This is the same geology recorded at the nearby Fairlop Quarry. The sand & gravel is underlain by London Clay. Only the sand and gravel has potential as an economic mineral.

There are five historic boreholes on the subject land. Ideally there would be a series of boreholes at regular intervals throughout the site as the geology can vary significantly over such a large site. In the absence of any further on site boreholes, we have looked at two boreholes to the south west and three to the east. This produces a range of data in respect of thickness of mineral and overburden with an average of 0.91m thick for sand & gravel and 1.95m thick for overburden.

Based on the information we have reviewed, and after applying allowances for estimated buffer zones and working losses, we consider there could be in the region of around 100,000 to 200,000 tonnes of potentially exploitable sand & gravel at Willow Farm.

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There is some evidence to suggest that a significant part of the property has been subject to historic mineral working and accordingly our estimated resource figures are probably overstated. More significantly however, the thickness of the overburden compared to the mineral thickness plus the small size of the overall deposit is likely to render any commercial extraction uneconomic.

The data on which our opinions are based is limited and accordingly our estimate of economic reserve could change significantly, either up or down, depending on the results of ground investigation or other relevant information not currently made available to us.

We trust this is suitable for your purposes. We would be pleased to provide any clarification or further input as required.

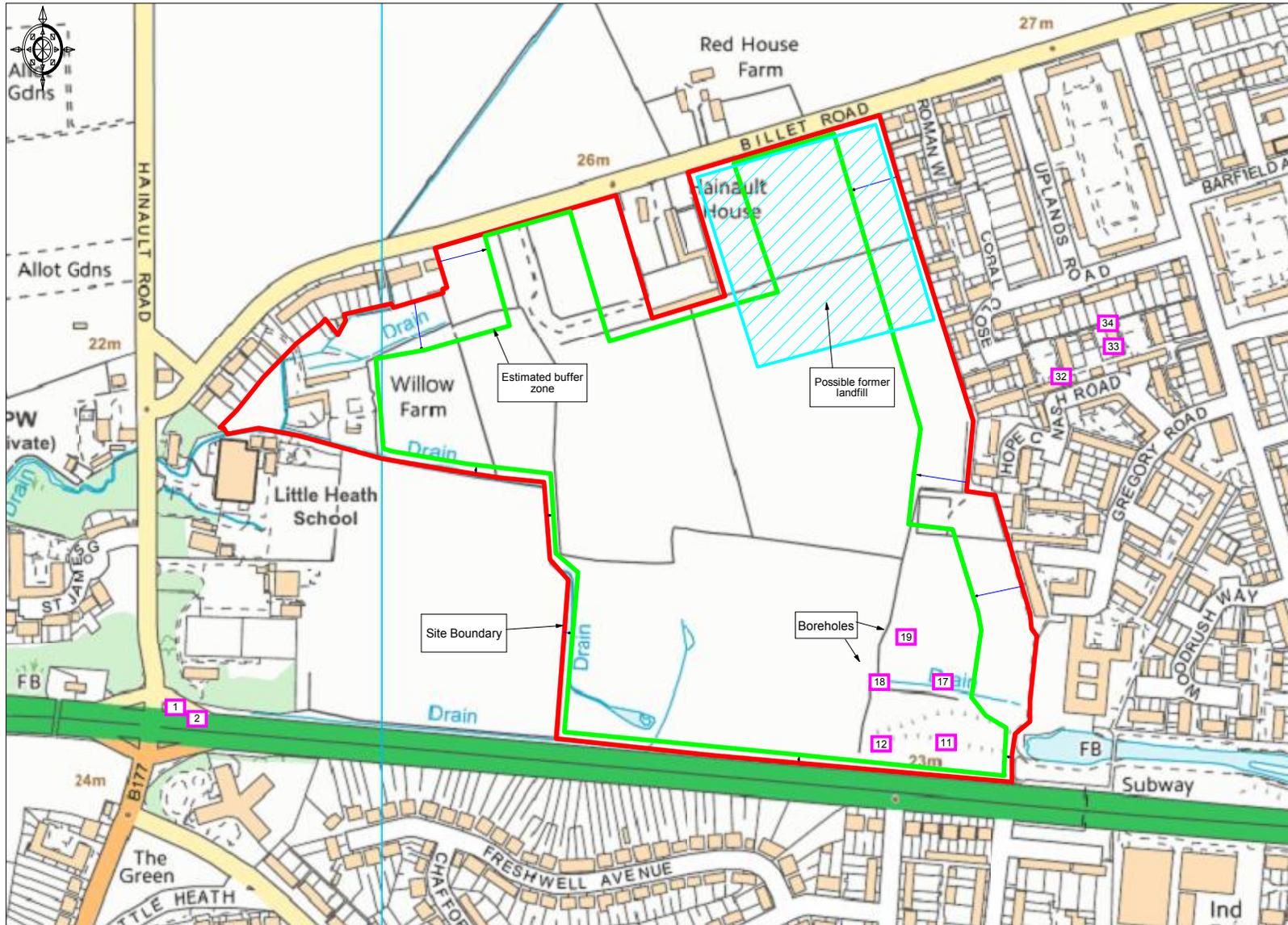
Yours faithfully  
For and on behalf of Savills (UK) Ltd

**ALAN HAMILTON BSC MRICS MIQ**  
Director  
Mineral & Waste Management

Enc: Appendices 1 to 3

## Appendix 1

# LB Redbridge - Willow Farm Site



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File: CHMI361971 Plan: WillowSite1 Drwn by: AEH Date: 22 Feb 2016



## Appendix 2

**LB Redbridge - Willow Farm Site - Borehole Data Schedule**

	<b>Borehole</b>					
<b>Material Thickness (m)</b>	<b>11</b>	<b>12</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>Average</b>
Topsoil	0.3	0.3	0.3	0.5	0.3	0.34
Overburden	2.0	2.1	2.7	2.2	2.6	2.32
Sand & gravel	0.0	0.0	1.0	0.9	0.3	0.44
Clay	1.0+	1.0+	1.0+	1.0+	1.0+	1.0+

	<b>Borehole</b>					
<b>Material Thickness (m)</b>	<b>1</b>	<b>2</b>				<b>Average</b>
Topsoil	0.0	0.2				0.10
Overburden	1.2	1.3				1.25
Sand & gravel	1.6	2.3				1.95
Clay	2.7+	2.7+				2.7+

	<b>Borehole</b>					
<b>Material Thickness (m)</b>	<b>32</b>	<b>33</b>	<b>34</b>			<b>Average</b>
Topsoil	0.3	0.3	0.3			0.30
Overburden	2.0	2.1	2.7			2.27
Sand & gravel	0.0	0.0	1.0			0.33
Clay	1.0+	1.0+	1.0+			1.0+

	<b>Overall Average</b>					
Overburden						1.95
Sand & gravel						0.91

Notes:

1. Information is taken from borehole scans made available via the BGS online Geology of Britain Viewer - © NERC 2016. The approximate borehole locations are as shown on the Savills Site Plan.
2. Some strata layers have been amalgamated and the thickness figures rounded where appropriate.
3. The data produced should be treated as a general estimate only and is not a substitute for more detailed ground investigations.
4. "Overburden" comprises a range of descriptions including silty clay, clayey gravel, gravel & clay but overall is assumed not capable of yielding saleable sand & gravel aggregate.
5. "Sand & gravel" comprises a range of descriptions including dense gravel with sand, dense sand & gravel and gravel with clayey sand but overall is assumed to be capable of yielding saleable sand & gravel aggregate
6. The boreholes only extended to between 3m and 4m and therefore it is assumed there is only clay below the "sand & gravel" layer.

## Appendix 3

## LB Redbridge - Willow Farm Site - Tonnage Calculation Schedule

### **A. From Boreholes 32, 33 & 34**

Net Area (less buffer)	145,100	m2
S&G Thickness	<u>0.33</u>	
Volume	47,883	m3
Conversion to t	<u>1.6</u>	
Tonnage	76,613	t
Working loss (silts etc)	<u>10%</u>	
Net Tonnage	<u>68,952</u>	t

### **B. From Boreholes 11,12,17,18 & 19**

Net Area (less buffer)	145,100	m2
S&G Thickness	<u>0.44</u>	
Volume	63,844	m3
Conversion to t	<u>1.6</u>	
Tonnage	102,150	t
Working loss (silts etc)	<u>10%</u>	
Net Tonnage	<u>91,935</u>	t

### **C. From Average of all Boreholes**

Net Area (less buffer)	145,100	m2
S&G Thickness	<u>0.91</u>	
Volume	132,041	m3
Conversion to t	<u>1.6</u>	
Tonnage	211,266	t
Working loss (silts etc)	<u>10%</u>	
Net Tonnage	<u>190,139</u>	t

### **D. From Boreholes 1 & 2**

Net Area (less buffer)	145,100	m2
S&G Thickness	<u>1.95</u>	
Volume	282,945	m3
Conversion to t	<u>1.6</u>	
Tonnage	452,712	t
Working loss (silts etc)	<u>10%</u>	
Net Tonnage	<u>407,441</u>	t

#### Notes:

1. Information is taken from borehole scans made available via the BGS online Geology of Britain Viewer - © NERC 2016. The approximate borehole locations are as shown on the Savills Site Plan.
2. Some strata layers have been amalgamated and the thickness figures rounded where appropriate.
3. The data produced and calculations from this data should be treated as a general estimate only and is not a substitute for more detailed ground and other investigations.
4. "Overburden" comprises a range of descriptions including silty clay, clayey gravel, gravel & clay but overall is assumed not capable of yielding saleable sand & gravel aggregate.
5. "Sand & gravel" comprises a range of descriptions including dense gravel with sand, dense sand & gravel and gravel with clayey sand but overall is assumed to be capable of yielding saleable sand & gravel aggregate
6. The boreholes only extended to between 3m and 4m and therefore it is assumed there is only clay below the "sand & gravel" layer.
7. These figures are subject to review to reflect updated information subsequently received.
8. No deduction has been made for the possible landfill area in the north east sector.