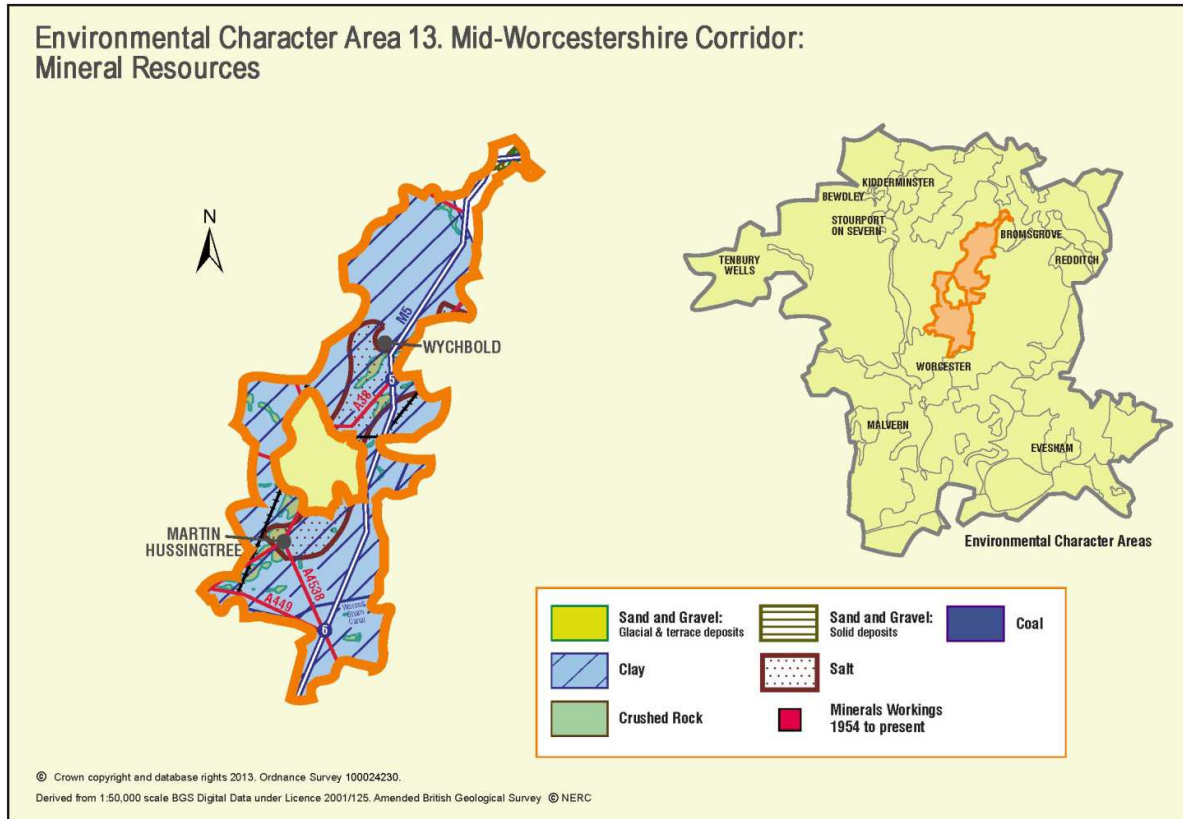


Appendix 13: Analysis of aggregate resources in ECA 13: Mid Worcestershire Corridor



ECA Summary for the Fourth Stage consultation on MLP (Winter 2018):

Sand and gravel

There are 15 resource areas identified for sand and gravel in Mid-Worcestershire Corridor ECA:

- Key: 1
- Significant: 2
- Not significant: 8
- Compromised: 4

Crushed rock

There are no resource areas identified in Mid-Worcestershire Corridor for crushed rock.

Non-aggregates

BGS data indicates that there are deposits of clay and salt in this ECA.

Overview of resource assessment for ECA 13

Sand and gravel resource areas:

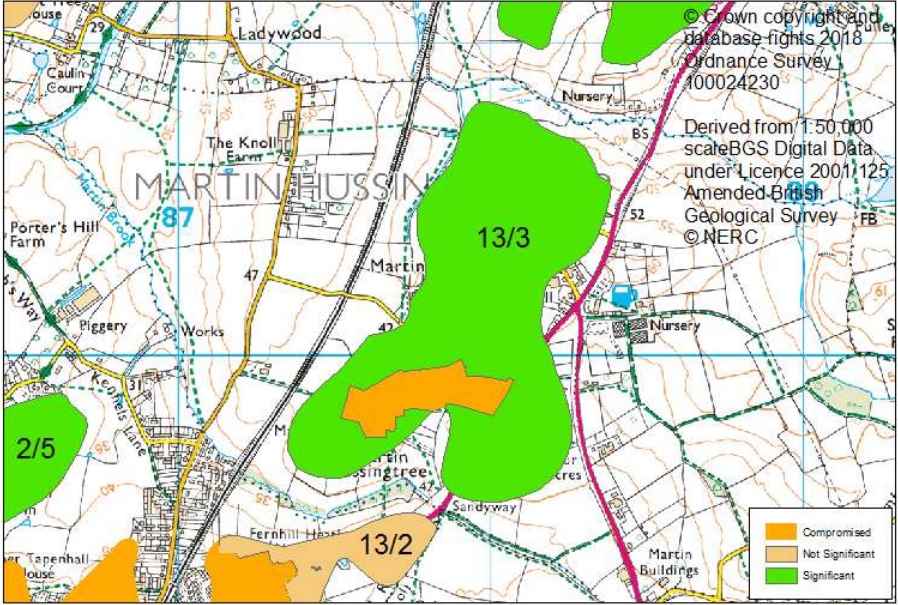
Resource number*	Second Stage Consultation		Third Stage Consultation		Fourth Stage Consultation		
	Original estimated resource tonnage (2 tonnes/m ³)	Significance	Revised estimate of resource tonnage (1.65 tonnes/m ³)	Significance	New resource number (where resource has been split)	Revised estimate of resource tonnage (1.65 tonnes/m ³)	Result
13/1	100,000	Not significant	82,500	Not significant	Not reassessed		
13/2	300,000	Not significant	247,500	Not significant			
13/2a	510,000	Compromised	420,750	Compromised			
13/3	2,040,000	Key	1,683,000	Significant	13/3	1,509,750	Significant
					13/3b		Compromised
13/4	1,470,000	Significant	1,212,750	Significant	13/4	618,750	Significant
					13/4b		Compromised
13/5	0	Not significant	0	Not significant	Not reassessed		
13/6	0	Not significant	0	Not significant			
13/7	0	Not significant	0	Not significant			
13/8	3,950,000	Key	2,346,300	Key	13/8	2,257,200	Key
					13/8b		Compromised
13/9	0	Not significant	0	Not significant	Not reassessed		
13/10	451,000	Not significant	372,075	Not significant			
13/11	Not assessed	Not assessed	57,750	Not significant			

Overview	
Resource number:	13/1
Resource name:	South of Fernhill Heath
Resource area:	10ha
Resource depth:	Estimated 1m
Location	
OS sheet reference:	SO 85 NE
National grid ref:	386168, 258683
Resource description:	
Resource description:	5 th terrace (Bushley Green) sand and gravel. Sandy and clayey gravels. The deposits are believed to be thin. Hand augering on the high ground of Fernhill Heath proved a veneer of gravel generally less than 1m thick. (Estimated resource depth 1m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area intersected by a road, with some ribbon development across the centre of the area and a school in the west.
Crude estimate of resource:	Area: 10 ha x average depth: 1m ÷ 2 Estimated resource volume: 50,000 m ³ Estimated resource tonnage (at 2 t/m³): 100,000 tonnes
Conclusion:	Not significant: Small deposit with less than 300,000m ³ . Not for consideration in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 10 ha x average depth: 1m ÷ 2 Estimated resource volume: 50,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 82,500 tonnes
Conclusion:	Not significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

Overview	
Resource number:	13/2
Resource name:	Fernhill Heath East
Resource area:	10ha
Resource depth:	Estimated 3m
Location	
OS sheet reference:	SO 85 NE
National grid ref:	387505, 259347
Resource description:	
Resource description:	4 th terrace (Kidderminster Station) sand and gravel. The deposit varies in grade from gravel to sand and its thickness is believed to range from 1-5m. (Estimated resource depth based on median depth of 3m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area intersected by a road. There is little other built development in this resource area. This deposit extends under the village of Fernhill Heath. This section of the deposit is assessed separately as resource area 13/2a.
Crude estimate of resource:	Area: 10 ha x average depth: 3m ÷ 2 Estimated resource volume: 150,000 m ³ Estimated resource tonnage (at 2 t/m³): 300,000 tonnes
Conclusion:	Not significant: Small deposit with less than 300,000m ³ . Not for consideration in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 10 ha x average depth: 3m ÷ 2 Estimated resource volume: 150,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 247,500 tonnes
Conclusion:	Not significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	

Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation

Overview	
Resource number:	13/2a
Resource name:	Fernhill Heath East (a)
Resource area:	17ha
Resource depth:	Estimated 3m
Location	
OS sheet reference:	SO 85 NE
National grid ref:	387505, 259347
Resource description:	
Resource description:	4 th terrace (Kidderminster Station) sand and gravel. The deposit varies in grade from gravel to sand and its thickness is believed to range from 1-5m. (Estimated resource depth based on median depth of 3m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area almost entirely overlain by the village of Fernhill Heath. The deposit extends to the east of the village, this section of the deposit is assessed separately as resource area 13/2.
Crude estimate of resource:	Area: 17 ha x average depth: 3m ÷ 2 Estimated resource volume: 255,000 m ³ Estimated resource tonnage (at 2 t/m³): 510,000 tonnes
Conclusion:	Compromised by development with less than 10ha of the deposit remaining.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 17 ha x average depth: 3m ÷ 2 Estimated resource volume: 255,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 420,750 tonnes
Conclusion:	Compromised by development.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

Overview	
Resource number:	13/3
Resource name:	Martin Hussingtree
Resource area:	68 ha
Resource depth:	Estimated 3m
Location	
OS sheet reference:	SO 85 NE, SO 86 SE
National grid ref:	387941, 260115
	
Resource description:	
Resource description:	4 th terrace (Kidderminster Station) sand and gravel. The deposit varies in grade from gravel to sand and its thickness is believed to range from 1-5m. (Estimated resource depth based on median depth of 3m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A medium-sized resource area with dispersed built development across the south and the east of the area.
Crude estimate of resource:	Area: 68 ha x average depth: 3m ÷ 2 Estimated resource volume: 1,020,000m ³ Estimated resource tonnage (at 2 t/m³): 2,040,000 tonnes
Conclusion:	Significant – key resource. Use to define areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 68 ha x average depth: 3m ÷ 2 Estimated resource volume: 1,020,000m ³ Estimated resource tonnage (at 1.65 t/m³): 1,683,000 tonnes
Conclusion:	Change to conclusion: Significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	
This resource area has been split into areas 13/3 and 13/3b.	

Resource area 13/3		Resource area 13/3b	
Resource area:	61 ha	Commentary:	Screened out due to the following appendix A criterion: <ul style="list-style-type: none"> - Conservation Area - Listed Buildings
Resource depth:	Estimated 3m		
Revised estimate of resource:	Area: 61 ha x average depth: 3m ÷ 2 Estimated resource volume: 915,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 1,509,750 tonnes		
Conclusion:	Significant resource	Conclusion:	Compromised

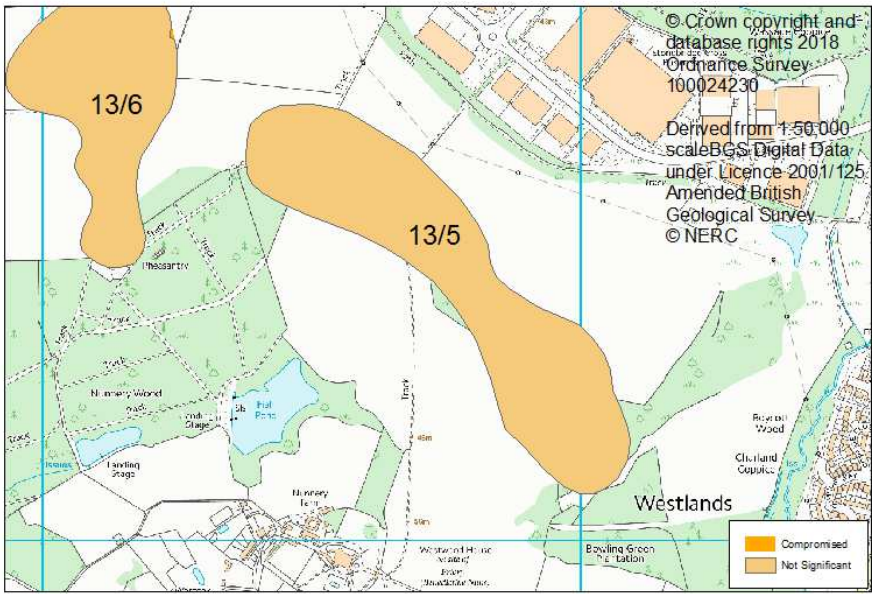
Overview	
Resource number:	13/4
Resource name:	Copcut
Resource area:	49 ha
Resource depth:	Estimated 3m
Location	
OS sheet reference:	SO 86 SE
National grid ref:	388522, 261363
Resource description:	
Resource description:	4 th terrace (Kidderminster Station) sand and gravel. The deposit varies in grade from gravel to sand and its thickness is believed to range from 1-5m. A temporary planning permission for working the terrace was granted in 1960 (likely to have been a borrow-pit for road construction) and one of the conditions stated that no working should take place more than 12ft below existing ground level. No information is available to explain if this was detailed information on the thickness of the deposit or an estimate. (Estimated resource depth based on median depth of 3m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area intersected by roads and some ribbon development across the centre of the area.
Crude estimate of resource:	Area: 49 ha x average depth: 3m ÷ 2 Estimated resource volume: 735,000m ³ Estimated resource tonnage (at 2 t/m³): 1,470,000 tonnes
Conclusion:	Significant. Consider in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 49 ha x average depth: 3m ÷ 2 Estimated resource volume: 735,000m ³ Estimated resource tonnage (at 1.65 t/m³): 1,212,750 tonnes
Conclusion:	Significant.

Assessment of resource for the Fourth Stage consultation on MLP (August 2018)

This resource area has been split into areas 13/4 and 13/4b.

Resource area 13/4		Resource area 13/4b	
Resource area:	25 ha	Commentary:	Screened out due to the following appendix A criterion: <ul style="list-style-type: none"> - Allocated site in South Worcestershire Development Plan - Listed Buildings - Settlement boundary
Resource depth:	Estimated 3m		
Revised estimate of resource:	Area: 25 ha x average depth: 3m ÷ 2 Estimated resource volume: 375,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 618,750 tonnes		
Conclusion:	Significant resource	Conclusion:	Compromised

Overview	
Resource number:	13/5
Resource name:	Westlands
Resource area:	16ha
Resource depth:	Not known
Location	
OS sheet reference:	SO 86 SE
National grid ref:	387759, 264482



Resource description:

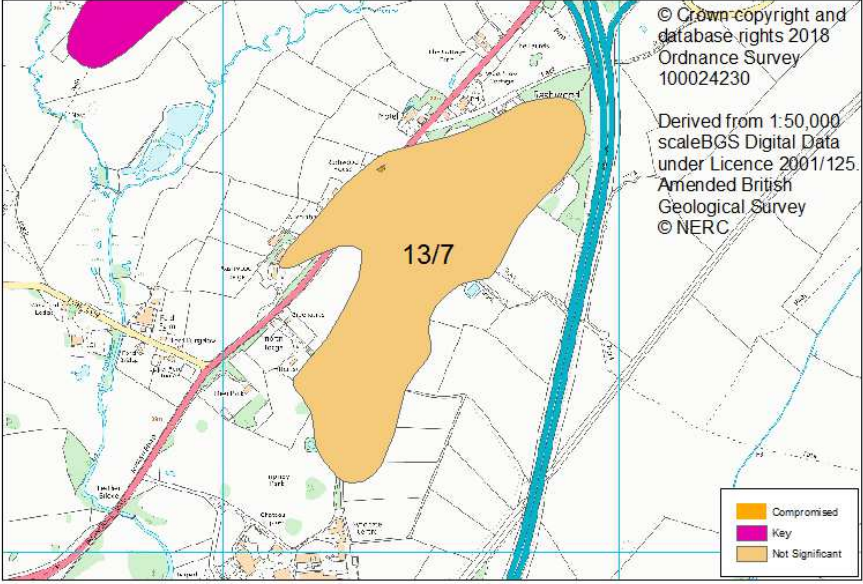
Resource description: 4th terrace (Kidderminster Station) sand and gravel. No details of thicknesses are available in the BGS memoirs.

Assessment of resource for the second consultation on MLP (Autumn 2013)

Commentary:	A small resource area with little built development.
Crude estimate of resource:	Depth not known.

Conclusion:	Not significant: Small deposit with no information to estimate the resource in this area. Not for consideration in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	No change to the assessment.
Conclusion:	Not significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

Overview		
Resource number:	13/6	
Resource name:	North of Westwood Park	
Resource area:	10 ha	
Resource depth:	Not known	
Location		
OS sheet reference:	SO 86 SE	
National grid ref:	387114, 264833	
Resource description:		
Resource description:	4 th terrace (Kidderminster Station) sand and gravel. No details of thicknesses are available in the BGS memoirs.	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	A small resource area with little built development.	
Crude estimate of resource:	Depth not known	
Conclusion:	Not significant: Small deposit with no information to estimate the resource in this area. Not for consideration in defining areas of search.	
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)		
Revised estimate of resource:	No change to the assessment.	
Conclusion:	Not significant.	
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)		
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation		

Overview		
Resource number:	13/7	
Resource name:	Rashwood	
Resource area:	32ha	
Resource depth:	Not known	
Location		
OS sheet reference:	SO 96 NW, SO 96 SW	
National grid ref:	391494, 264736	
Resource description:		
Resource description:	5 th terrace (Bushley Green) sand and gravel. No details of thicknesses are available in the BGS memoirs.	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	A small deposit with dispersed development across the resource area.	
Crude estimate of resource:	Depth not known.	
Conclusion:	Not significant: Small deposit with no information to estimate the resource in this area. Not for consideration in defining areas of search.	
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)		
Revised estimate of resource:	No change to the assessment.	
Conclusion:	Not significant.	
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)		
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation		

Overview	
Resource number:	13/8
Resource name:	Wychbold
Resource area:	79ha
Resource depth:	Estimated 5m
Revised depth:	Estimated 3.6m
Location	
OS sheet reference:	SO 96 NW
National grid ref:	391922, 266448
Resource description:	
Resource description:	3 rd terrace (Holt Heath) sand and gravel. The former pit at Upton Warren to the east of this resource area was worked to a depth of approximately 5m. (Estimated resource depth 5m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A medium resource area with dispersed development. The area overlain by the M5 is not considered as part of this resource area.
Crude estimate of resource:	Area: 79 ha x average depth: 5m ÷ 2 Estimated resource volume: 1,975,000 m ³ Estimated resource tonnage (at 2 t/m³): 3,950,000 tonnes
Conclusion:	Significant – key resource. Use to define areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised resource description	A site in the north eastern extremity of this resource area has been proposed by the landowners S Hudson and T Dunkley. The majority of the submitted site is within this resource area, the remainder has been assessed as resource area 13/11. The landowners provided a geological report "Land at Upton Warren Preliminary Mineral Resource Evaluation" (dated October 1998) which showed the results of site investigation carried out in August 1998 comprising a

total of 14 excavated trial pits. Sand and gravel was intersected in all the trial pits with the mineral deposit comprising a dense silty and slightly clayey sand and gravel. Proven deposit thicknesses ranged between 0.75m in trial pit 02 and greater than 3.8m in trial pit 04 (both in this resource area). The report concludes that across the whole (5.3ha) area, the recoverable mineral tonnage was estimated at 142,000 tonnes.

The former pit at Upton Warren to the east of this resource area was worked to a depth of approximately 5m.

(Estimated resource depth based on mean average of: a) former pit at Upton Warren: 5m, b) trial pit range (0.75m and 3.8m): $2.28m = 3.6m$)

Revised estimate of resource: Area: 79 ha x average depth: $3.6m \div 2$
 Estimated resource volume: $1,422,000m^3$
Estimated resource tonnage (at 1.65 t/m³): 2,346,300 tonnes

Conclusion: Significant – key resource.

Assessment of resource for the Fourth Stage consultation on MLP (August 2018)

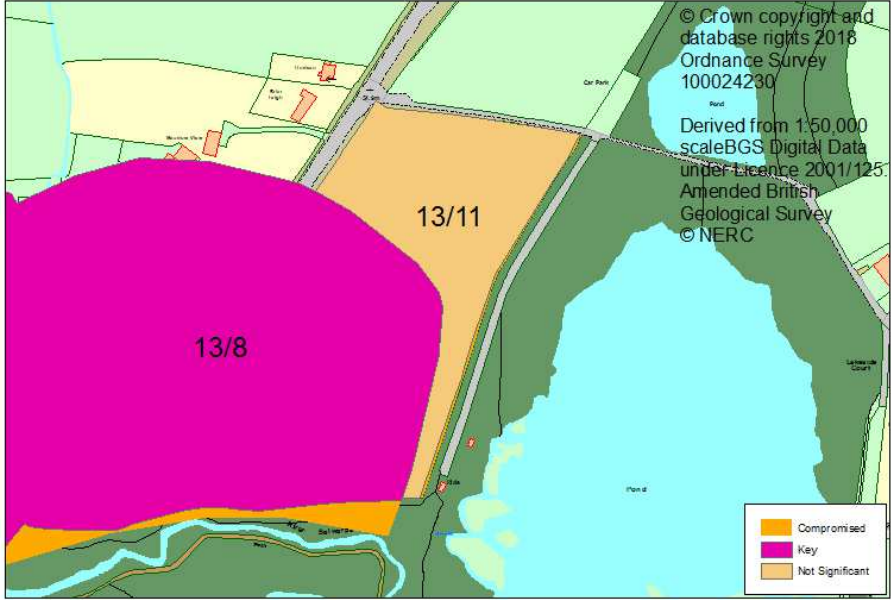
This resource area has been split into areas 13/8 and 13/8b.

Resource area 13/8		Resource area 13/8b	
Resource area:	76 ha	Commentary:	Screened out due to the following appendix A criterion: - Conservation Area - Listed Buildings - Settlement boundary
Resource depth:	Estimated 3.6m		
Revised estimate of resource:	Area: 76 ha x average depth: $3.6m \div 2$ Estimated resource volume: $1,368,000 m^3$ Estimated resource tonnage (at 1.65 t/m³): 2,257,200 tonnes		
Conclusion:	Key resource	Conclusion:	Compromised

Overview		
Resource number:	13/9	
Resource name:	Park Gate	
Resource area:	19ha	
Resource depth:	Not known	
Location		
OS sheet reference:	SO 97 SW	
National grid ref:	393739, 270926	
Resource description:		
Resource description:	Glaciofluvial sand and gravel. No details of thicknesses are available in the BGS memoirs.	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	A small resource area intersected by roads and small scale ribbon development.	
Crude estimate of resource:	Depth not known.	
Conclusion:	Not significant: Small deposit with no information to estimate the resource in this area. Not for consideration in defining areas of search.	
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)		
Revised estimate of resource:	No change to the assessment.	
Conclusion:	Not significant.	
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)		
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation		

Overview	
Resource number:	13/10
Resource name:	Barnsley Hall
Resource area:	11ha
Resource depth:	Estimated 4.1m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	395935, 272757
Resource description:	
Resource description:	3 rd terrace (Holt Heath) and alluvial fan deposit sand and gravel. A borehole to the east of the deposit near the M42 showed 3.2m of sand and gravel and 0.9m of sandy clay (total = 4.1m). It is not clear whether this is in the 3 rd terrace or the alluvial fan deposit. (Estimated resource depth 4.1m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area, overlain by some built development. The deposit extends under the M42 motorway, this is not included as part of the resource area.
Crude estimate of resource:	Area: 11ha x average depth: 4.1m ÷ 2 Estimated resource volume: 225,500 m ³ Estimated resource tonnage (at 2 t/m³): 451,000 tonnes
Conclusion:	Not significant: Small deposit with less than 300,000m ³ . Not for consideration in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 11ha x average depth: 4.1m ÷ 2 Estimated resource volume: 225,500 m ³ Estimated resource tonnage (at 1.65 t/m³): 372,075 tonnes
Conclusion:	Not significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	

Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation

Overview	
Resource number:	13/11
Resource name:	Upton Warren
Resource area:	2 ha
Resource depth:	3.5 m
Location	
OS sheet reference:	SO 96 NW
National grid ref:	393643, 267645
	
Resource description:	
Resource description:	<p>A site (approximately 5.3ha) has been proposed by the landowners S Hudson and T Dunkley. The majority of the submitted site is within resource area 13/8, the remainder (approximately 2ha) has been assessed as resource area 13/11.</p> <p>This resource area is not shown to have any superficial deposits on BGS digital maps.</p> <p>The landowners provided a geological report "Land at Upton Warren Preliminary Mineral Resource Evaluation" (dated October 1998) which showed the results of site investigation carried out in August 1998 comprising a total of 14 excavated trial pits. Sand and gravel was intersected in all the trial pits with the mineral deposit comprising a dense silty and slightly clayey sand and gravel. Proven deposit thicknesses ranged between 0.75m in trial pit 02 (in this resource area) and greater than 3.8m in trial pit 04 (in resource area 13/8). The report concludes that across the whole (5.3ha) area, the recoverable mineral tonnage was estimated at 142,000 tonnes.</p> <p>The former pit at Upton Warren to the east of this resource area was worked to a depth of approximately 5m.</p>
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	This resource area was not assessed for the second consultation on the MLP. It was proposed as a resource

	in response to that consultation by the landowners S Hudson and T Dunkley.
Crude estimate of resource:	Not assessed for the second consultation on the MLP.
Conclusion:	Not assessed for the second consultation on the MLP.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Commentary:	A resource area of less than 10 ha (assessed because it has been proposed for consideration as a specific site with accompanying geological data). No built development in the resource area.
Revised estimate of resource:	<p>There are three options to estimate the resource tonnage in this resource area:</p> <ol style="list-style-type: none"> 1. Standard method: (Estimated resource depth based on mean average of: a) former pit at Upton Warren: 5m, b) trial pit range (0.75m and 3.8m): $2.28m = 3.6m$ Based on resource area and the above estimated average depth, the estimate of resource in this resource area would be: Area: $2ha \times \text{average depth: } 3.6m \div 2$ Estimated resource volume: $36,000 m^3$ Estimated resource tonnage (at $1.65 t/m^3$) would be: 59,400 tonnes 2. Proportion of total site estimate: The submitted geological report concluded that across the whole (5.3ha) site, the recoverable mineral tonnage was estimated at 142,000 tonnes. Based on this resource area being 2ha (or 38%) of the total 5.3ha site, the estimated resource tonnage would be: 53,585 tonnes. 3. Trial pit data: Based on the location of the Trial Pits shown in the submitted geological report, it is assumed that Trial Pits TP01, TP03, TP12, TP13 and TP14 fall within this resource area. The Trial Pit Logs for these pits reveal an average depth of 3.5m+. Based on the resource area and this average depth, the estimate of resource in this resource area would be: Area: $2ha \times \text{average depth: } 3.5m \div 2$ Estimated resource volume: $35,000 m^3$ Estimated resource tonnage (at $1.65 t/m^3$) would be: 57,750 tonnes <p>The trial pit logs in option 3 are considered to be the best available data about this resource area. Therefore: Estimated resource tonnage: 57,750 tonnes</p>
Conclusion:	Not significant.
Assessment of resource for the Fourth Stage consultation on MLP (August 2018)	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	