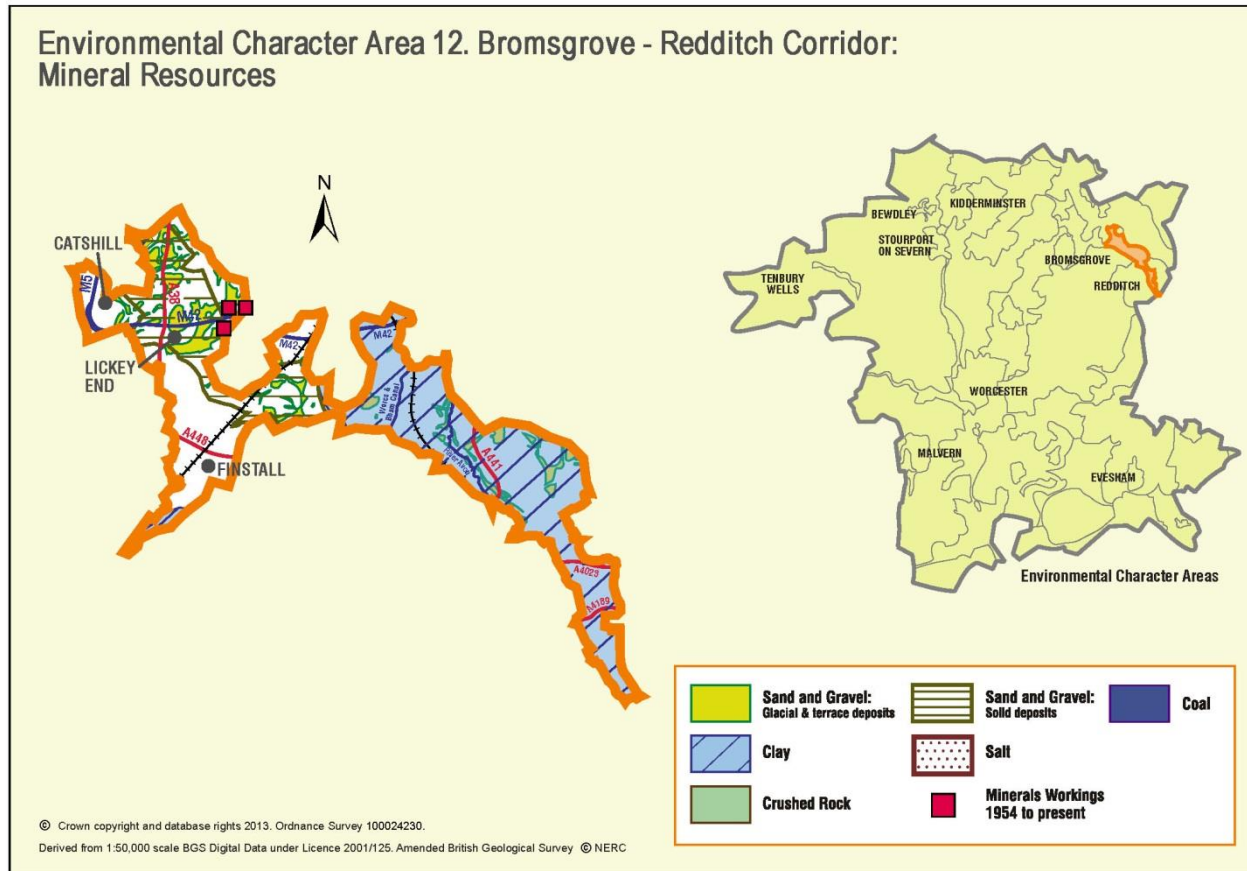


Appendix 12: Analysis of aggregate resources in ECA 12: Bromsgrove – Redditch Corridor



ECA Summary for the Third Stage consultation on MLP (Spring 2015):

Sand and gravel

There are 10 resource areas identified for sand and gravel in Bromsgrove-Redditch corridor ECA:

- Key: 1
- Significant: 2
- Not significant: 1
- Compromised: 6

There are additional resource areas for solid sand and gravel which cross into this ECA, but are assessed as part of ECA 3.

Crushed rock

There are no resource areas identified in Bromsgrove-Redditch corridor ECA for crushed rock.

Non-aggregates

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

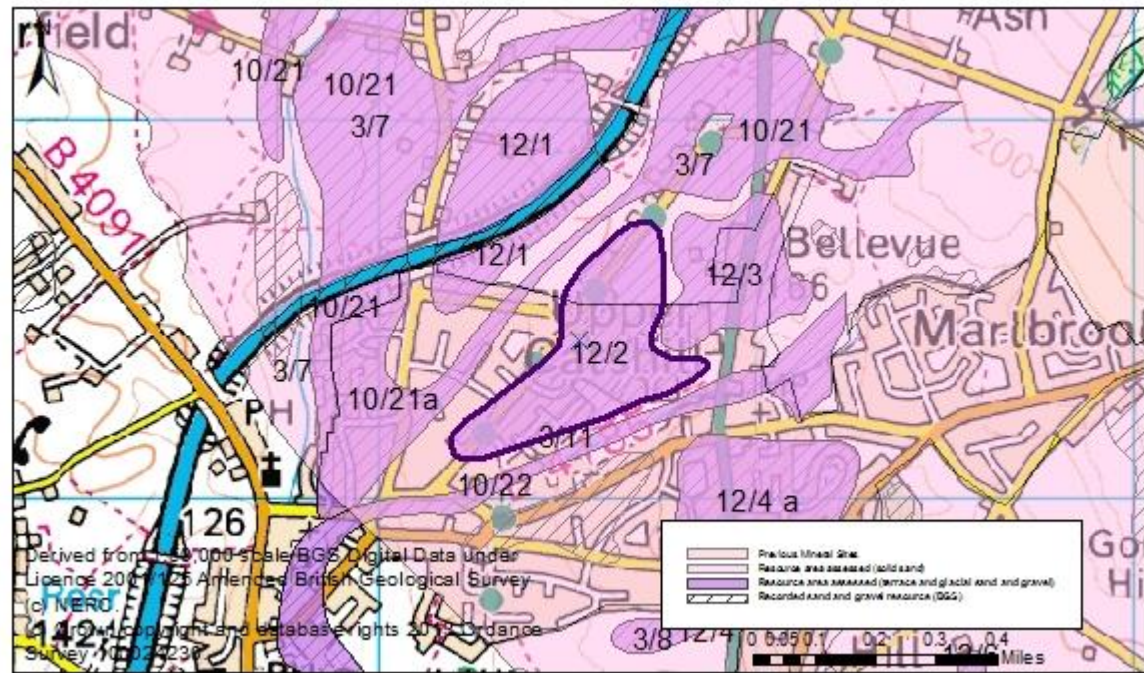
Overview of resource assessment for ECA 12

Sand and gravel resource areas:

Resource number*	Second Stage Consultation		Third Stage Consultation	
	Original estimated resource tonnage (2 tonnes/m ³)	Significance	Revised estimate of resource tonnage (1.65 tonnes/m ³)	Significance
12/1	780,000	Significant	643,500	Significant
12/2	884,000	Compromised	729,300	Compromised
12/3	520,000	Compromised	429,000	Compromised
12/4	884,000	Compromised	729,300	Compromised
12/5	182,000	Compromised	150,150	Compromised
12/5a	364,000	Compromised	300,300	Compromised
12/6	1,314,000	Significant	1,084,050	Significant
12/6a	252,000	Compromised	207,900	Compromised
12/7	Depth not known	Not significant	Depth not known	Not significant
12/8	435,690,000	Key	359,444,250	Key

	Chadwich Farm Pit: 1.9m d) borehole adjacent to M5 south east of Chadwich Lane/Money Lane: 8.2m, and e) average of exposures at Tramontana's Pit: 11.6m = 5.15m rounded to 5.2m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area with little built development throughout but extending under the settlement of Upper Catshill to the south. The deposit extends under the M5 motorway, this section is not included as part of the resource area.
Crude estimate of resource:	Area: 15 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 390,000 m ³ Estimated resource tonnage (at 2 t/m³): 780,000 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: 15 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 390,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 643,500 tonnes
Conclusion:	Significant.

Overview	
Resource number:	12/2
Resource name:	Woodrow Lane
Resource area:	17 ha
Resource depth:	Estimated 5.2m
Location	
OS sheet reference:	SO 97 NE
National grid ref:	396530, 274325



Resource description:

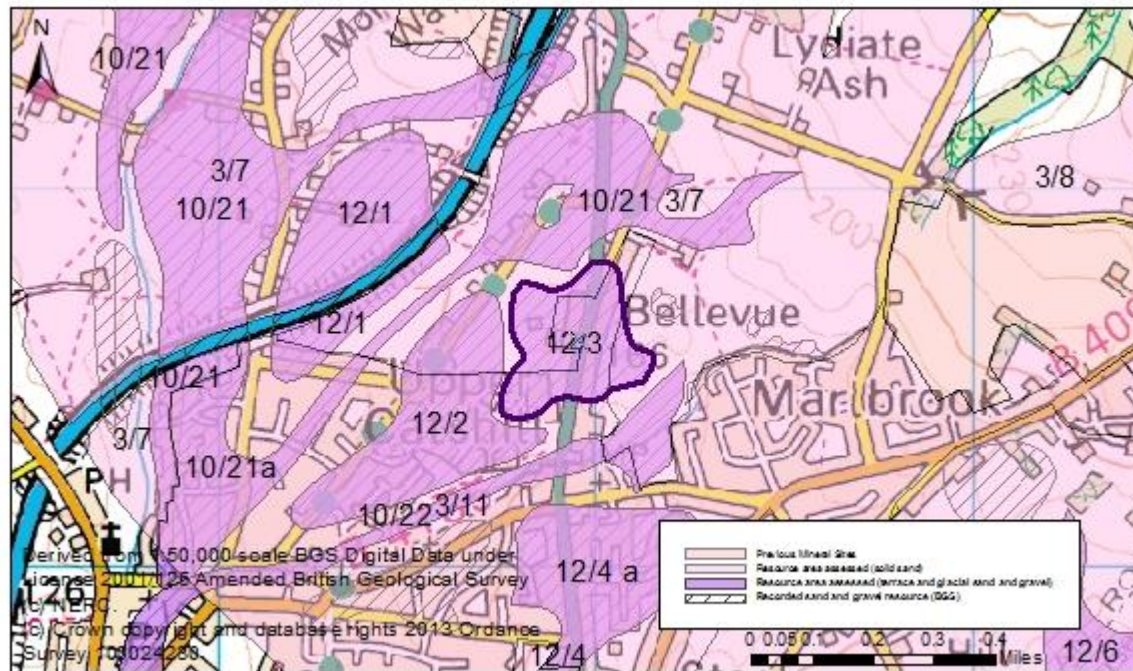
Resource description: Resource area 12/2 is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource areas 3/7 and 3/10). This is a complex area of geology but with some limited information available:

- To the north of Junction 4 of the M5 motorway, between Chadwich Grange Farm and Manor Farm, 3 boreholes have recorded:
 - 3.6m of sand and gravel on sandstone overlain by 0.7m of sandy clay;
 - 1.4m of clayey, silty sand on 7.6m of sandstone and
 - 1.3m of clayey, pebbly sand on 5.7m of sandstone.
- 2 boreholes at Lydiat Ash recorded 2.1m and 1.8m of sand and gravel on sandstone.
- An exposure at the southern end of the Chadwich Farm Pit shows 1.9m of sand and gravel on sandstone.
- A borehole adjacent to the M5 south east of the Chadwich Lane / Money Lane junction proves 8.2m of sand and gravel on sandstone overlain by 1.4m of boulder clay.
- An exposure at Tramontana's Pit (in the Chadwich Lane, Money Lane, Sandy Lane area) on the south side of the County Council tip showed a 15m base of well bedded sand and gravel. The pit now infilled by Austin / BL formerly exposed 7.6m of gravel on 4m of coarse sand and fine gravel with the base not seen (total 11.6m).

Estimated resource depth based on mean average of: a) boreholes to the north of Junction 4: (average of 3.6m, 1.4m and 1.3m = 2.1m), b) boreholes at Lydiat Ash: (average of 1.8m to 2.1m = 1.95m), c) exposure at

	Chadwich Farm Pit: 1.9m d) borehole adjacent to M5 south east of Chadwich Lane/Money Lane: 8.2m, and e) average of exposures at Tramontana's Pit: 11.6m = 5.15m rounded to 5.2m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area which extends under the settlement of Upper Catshill. Only approximately 3 hectares remains uncompromised by development.
Crude estimate of resource:	Area: 17 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 442,000 m ³ Estimated resource tonnage (at 2 t/m³): 884,000 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: 5.2 m ÷ 2 Estimated resource volume: 442,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 729,300 tonnes
Conclusion:	Compromised by development.

Overview	
Resource number:	12/3
Resource name:	Halesowen Road
Resource area:	10ha
Resource depth:	Estimated 5.2m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	396933, 274591



Resource description:

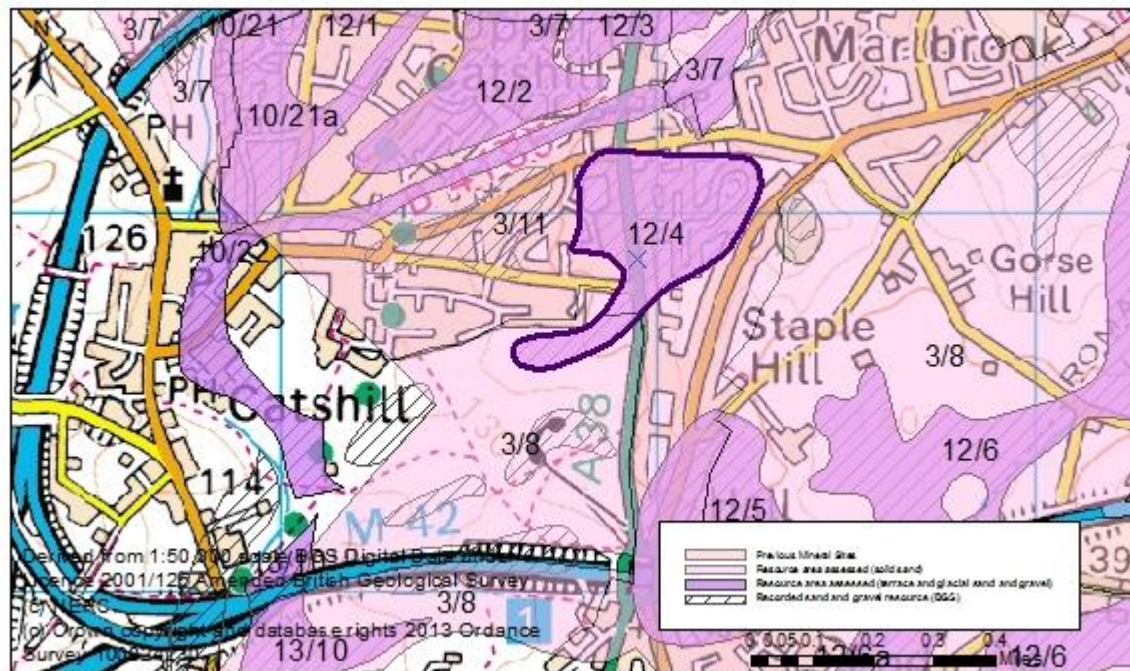
Resource description: Resource area 12/3 is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource areas 3/7 and 3/10). This is a complex area of geology but with some limited information available:

- To the north of Junction 4 of the M5 motorway, between Chadwich Grange Farm and Manor Farm, 3 boreholes have recorded:
 - 3.6m of sand and gravel on sandstone overlain by 0.7m of sandy clay;
 - 1.4m of clayey, silty sand on 7.6m of sandstone and
 - 1.3m of clayey, pebbly sand on 5.7m of sandstone.
- 2 boreholes at Lydiate Ash recorded 2.1m and 1.8m of sand and gravel on sandstone.
- An exposure at the southern end of the Chadwich Farm Pit shows 1.9m of sand and gravel on sandstone.
- A borehole adjacent to the M5 south east of the Chadwich Lane / Money Lane junction proves 8.2m of sand and gravel on sandstone overlain by 1.4m of boulder clay.
- An exposure at Tramontana's Pit (in the Chadwich Lane, Money Lane, Sandy Lane area) on the south side of the County Council tip showed a 15m base of well bedded sand and gravel. The pit now infilled by Austin / BL formerly exposed 7.6m of gravel on 4m of coarse sand and fine gravel with the base not seen (total 11.6m).

Estimated resource depth based on mean average of: a) boreholes to the north of Junction 4: (average of 3.6m, 1.4m and 1.3m = 2.1m), b) boreholes at Lydiate Ash: (average of 1.8m to 2.1m = 1.95m, c) exposure at

	Chadwich Farm Pit: 1.9m d) borehole adjacent to M5 south east of Chadwich Lane/Money Lane: 8.2m, and e) average of exposures at Tramontana's Pit: 11.6m = 5.15m rounded to 5.2m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area intersected by roads and largely overlain by built development.
Crude estimate of resource:	Area: 10 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 260,000 m ³ Estimated resource tonnage (at 2 t/m³): 520,000 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: 10 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 260,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 429,000 tonnes
Conclusion:	Compromised by development.

Overview	
Resource number:	12/4
Resource name:	Birmingham Road
Resource area:	17ha
Resource depth:	Estimated 5.2m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	396768, 273656



Resource description:

Resource description: Resource area 12/4 is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource areas 3/8 and 3/10). This is a complex area of geology but with some limited information available:

- To the north of Junction 4 of the M5 motorway, between Chadwich Grange Farm and Manor Farm, 3 boreholes have recorded:
 - 3.6m of sand and gravel on sandstone overlain by 0.7m of sandy clay;
 - 1.4m of clayey, silty sand on 7.6m of sandstone and
 - 1.3m of clayey, pebbly sand on 5.7m of sandstone.
- 2 boreholes at Lydiate Ash recorded 2.1m and 1.8m of sand and gravel on sandstone.
- An exposure at the southern end of the Chadwich Farm Pit shows 1.9m of sand and gravel on sandstone.
- A borehole adjacent to the M5 south east of the Chadwich Lane / Money Lane junction proves 8.2m of sand and gravel on sandstone overlain by 1.4m of boulder clay.
- An exposure at Tramontana's Pit (in the Chadwich Lane, Money Lane, Sandy Lane area) on the south side of the County Council tip showed a 15m base of well bedded sand and gravel. The pit now infilled by Austin / BL formerly exposed 7.6m of gravel on 4m of coarse sand and fine gravel with the base not seen (total 11.6m).

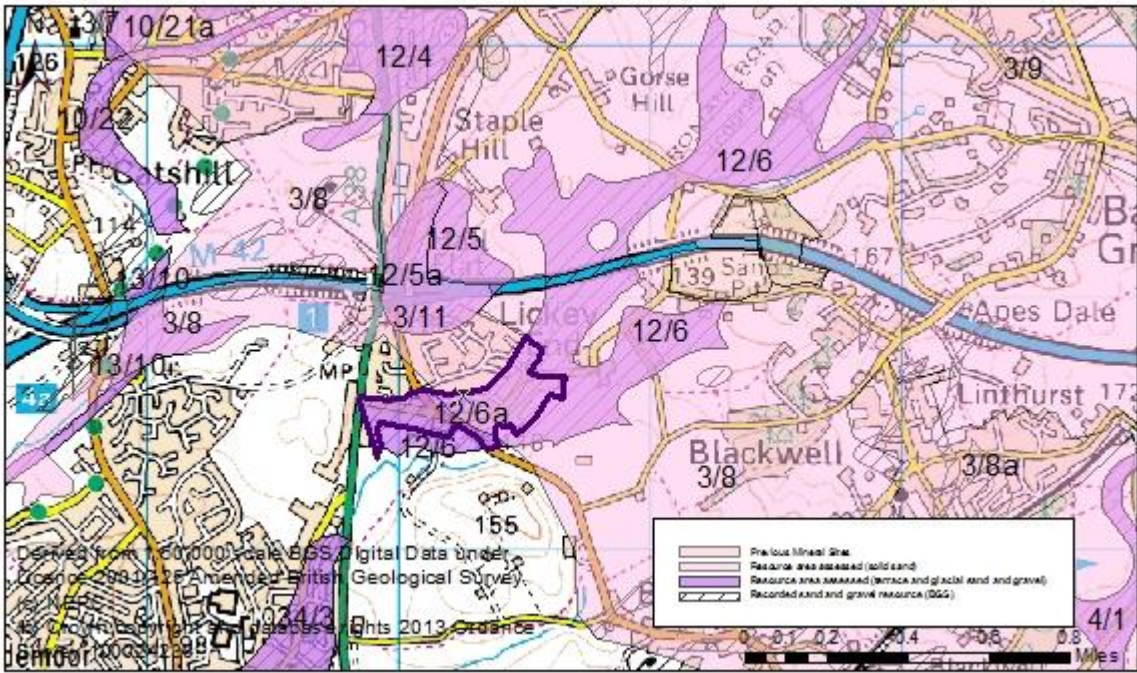
Estimated resource depth based on mean average of: a) boreholes to the north of Junction 4: (average of 3.6m, 1.4m and 1.3m = 2.1m), b) boreholes at Lydiate Ash: (average of 1.8m to 2.1m = 1.95m), c) exposure at

	Chadwich Farm Pit: 1.9m d) borehole adjacent to M5 south east of Chadwich Lane/Money Lane: 8.2m, and e) average of exposures at Tramontana's Pit: 11.6m = 5.15m rounded to 5.2m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area that is largely overlain by the settlement of Upper Catshill.
Crude estimate of resource:	Area: 17 ha x average depth: 5.2 m ÷ 2 Estimated resource volume: 442,000 m ³ Estimated resource tonnage (at 2 t/m³): 884,000 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: 5.2 m ÷ 2 Estimated resource volume: 442,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 729,300 tonnes
Conclusion:	Compromised by development.

Overview	
Resource number:	12/5
Resource name:	Staple Hill
Resource area:	7ha remaining
Resource depth:	Estimated 2.6m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	397241, 273210
Resource description:	
Resource description:	Resource area 12/5 is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource area 3/8 and 3/10). A borehole in this deposit found 3.1m of sand and gravel over 3m of clay and 9m of sandstone. A second borehole found 3.8m of sandy clay over 2m of sand and gravel.
	Estimated resource depth based on a) 1 st borehole: 3.1m and b) 2 nd borehole: 2m = 2.6m
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area with little built development. The deposit extends to the south and west under Junction 1 of the M42, this area is not included as part of the resource area. The deposit also extends under the urban areas of Lickey End and Staple Hill, this is considered as resource area 12/5a.
Crude estimate of resource:	Area: 7 ha x average depth: 2.6 m ÷ 2 Estimated resource volume: 91,000 m ³ Estimated resource tonnage (at 2 t/m³): 182,000 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: 7 ha x average depth: 2.6 m ÷ 2 Estimated resource volume: 91,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 150,150 tonnes
Conclusion:	Compromised by development.

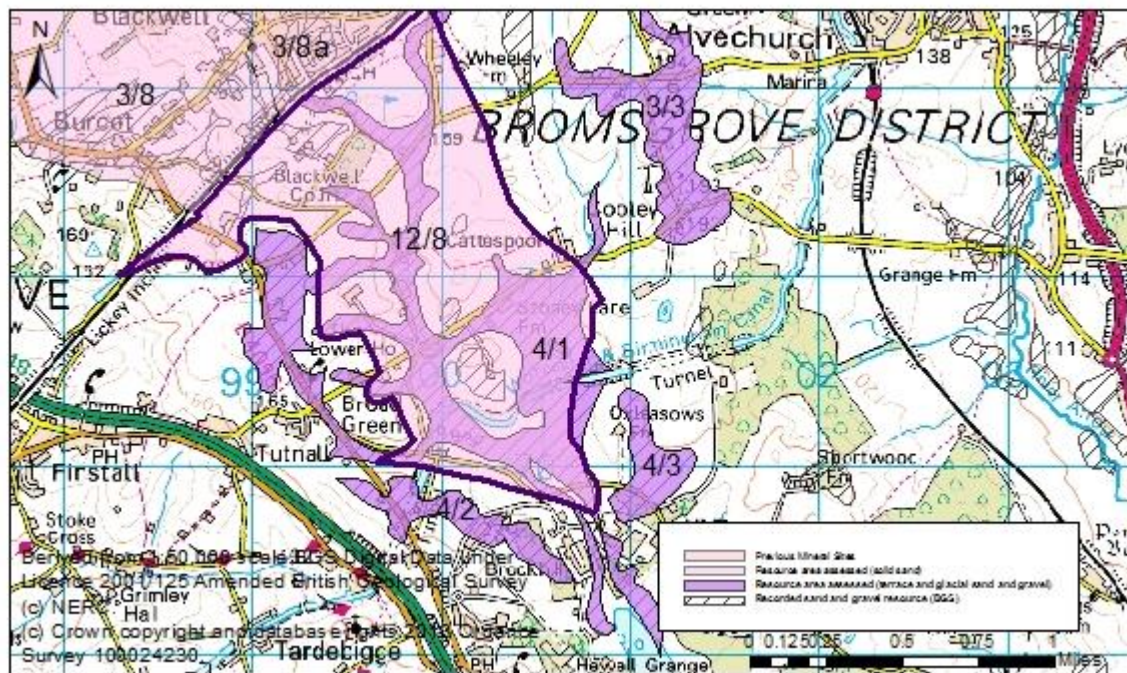
Overview	
Resource number:	12/5a
Resource name:	Staple Hill a)
Resource area:	14ha
Resource depth:	Estimated 2.6m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	397241, 273210
Resource description:	
Resource description:	Resource area 12/5a is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource area 3/8 and 3/10). A borehole in this deposit found 3.1m of sand and gravel over 3m of clay and 9m of sandstone. A second borehole found 3.8m of sandy clay over 2m of sand and gravel. Estimated resource depth based on a) 1 st borehole: 3.1m and b) 2 nd borehole: 2m = 2.6m
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area overlain by the urban areas of Lickey End and Staple Hill. The deposit extends to the north-east this is considered as resource area 12/5a.
Crude estimate of resource:	Area: 14 ha x average depth: 2.6 m ÷ 2 Estimated resource volume: 182,000 m ³ Estimated resource tonnage (at 2 t/m³): 364,000 tonnes
Conclusion:	Compromised by development.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 14 ha x average depth: 2.6 m ÷ 2 Estimated resource volume: 182,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 300,300 tonnes
Conclusion:	Compromised by development.

Overview		
Resource number:	12/6	
Resource name:	Lickey End to Gorse Hill	
Resource area:	73ha	
Resource depth:	Estimated 1.8m	
Location		
OS sheet reference:	SO 97 SE	
National grid ref:	397987, 273223	
Resource description:		
Resource description:	<p>Resource area 12/6 is Alluvial fan sand and gravel, however this is partially underlain by solid sand deposits (assessed as resource area 3/8 and 3/10). A borehole north of Shepley Quarry reported 1.1m of sandy clay, 0.6m of sand and gravel, 1.2m of sand, 2.6m of clay and silt and 10.9m of sandstone. (Total 1.8m of sand and gravel).</p> <p>Estimated resource depth based on borehole North of Shepley Quarry: 1.8m</p>	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	<p>A medium-sized resource area with some built development. The deposit extends under the M42 motorway, this is not included as part of the resource area. The deposit also extends under the urban area of Lickey End, this section is assessed as resource area 12/6a.</p>	
Crude estimate of resource:	<p>Area: 73 ha x average depth: 1.8 m ÷ 2 Estimated resource volume: 657,000 m³ Estimated resource tonnage (at 2 t/m³): 1,314,000 tonnes</p>	
Conclusion:	<p>Significant. Consider in defining areas of search.</p>	
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)		
Revised estimate of resource:	<p>Area: 73 ha x average depth: 1.8 m ÷ 2 Estimated resource volume: 657,000 m³ Estimated resource tonnage (at 1.65 t/m³): 1,084,050 tonnes</p>	
Conclusion:	<p>Significant.</p>	

Overview	
Resource number:	12/6a
Resource name:	Lickey End a)
Resource area:	14ha
Resource depth:	Estimated 1.8m
Location	
OS sheet reference:	SO 97 SE
National grid ref:	397987, 273223
	
Resource description:	
Resource description:	Resource area 12/6a is Alluvial fan sand and gravel, however this is underlain by solid sand deposits (assessed as resource area 3/10). A borehole north of Shepley Quarry reported 1.1m of sandy clay, 0.6m of sand and gravel, 1.2m of sand, 2.6m of clay and silt and 10.9m of sandstone. (Total 1.8m of sand and gravel). (Estimated resource depth based on borehole North of Shepley Quarry: 1.8m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A small resource area overlain by the urban area of Lickey End. The deposit extends to the south and east, this is assessed as resource area 12/6.
Crude estimate of resource:	Area: 14 ha x average depth: 1.8 m ÷ 2 Estimated resource volume: 126,000 m ³ Estimated resource tonnage (at 2 t/m³): 252,000 tonnes
Conclusion:	Compromised by development.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
Revised estimate of resource:	Area: 14 ha x average depth: 1.8 m ÷ 2 Estimated resource volume: 126,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 207,900 tonnes
Conclusion:	Compromised by development.

Overview		
Resource number:	12/7	
Resource name:	East of Bordesley Park Farm	
Resource area:	26ha	
Resource depth:	Not known	
Location		
OS sheet reference:	SO 07 SE, SO 06 NE	
National grid ref:	405177, 270266	
Resource description:		
Resource description:	Glaciofluvial and alluvial fan sand and gravel. No information on thicknesses available.	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	A small narrow 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.	

Overview	
Resource number:	12/8
Resource name:	Blackwell Court to Brockhill
Resource area:	282ha
Resource depth:	Estimated 154.5m
Location	
OS sheet reference:	SO 97 NE, SO 97 SE, SP 07 SW, SP 06 NW
National grid ref:	399890, 271073



Resource description:

Resource description: Resource area 12/8 is Wildmoor Sandstone Formation solid sand. This is overlain by resource area 4/1 which is alluvial fan sand and gravel.

The Wildmoor Formation is generally described as red-brown and orange, fine to medium grained, feldspathic sandstone with sparse, thin mudstone beds. Generally the formation is characterised by a remarkably uniform, very weakly cemented, fine grained, silty, micaceous sandstone and an absence of pebbles, in contrast to the Kidderminster Formation, although sparse pebbly stringers are recorded. The fine grain-size and soft, poorly cemented, nature of the sandstone in some areas made it ideal for exploitation as moulding sand for use in the foundry industry.

The Wildmoor Sandstone Formation ranges in thickness, a borehole near Hagley (at grid reference 389940 281690) proved 175m of red hard and soft sandstone some of this could be attributed to the underlying Kidderminster Formation since the lower boundary is indistinct. The memoir for Redditch reports that the strata in this district is thickest at Webheath (134m), approx. 3km south of this resource area. East of the main outcrop the formation is cut out rapidly by the overstepping Bromsgrove Sandstone. There is no additional information about the depth of the deposit in this resource area.

(Estimated resource depth based on a mean average of: a) borehole near Hagley: 175m, b) Webheath: 134m = 154.5m)

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

Commentary:	A large resource area with some built development.
Crude estimate of resource:	Area: 282 ha x average depth: 154.5 m ÷ 2 Estimated resource volume: 217,845,000 m ³ Estimated resource tonnage (at 2 t/m³): 435,690,000
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: 282 ha x average depth: 154.5 m ÷ 2 Estimated resource volume: 217,845,000 m ³ Estimated resource tonnage (at 1.65 t/m³): 359,444,250 tonnes
Conclusion:	Significant – key resource.