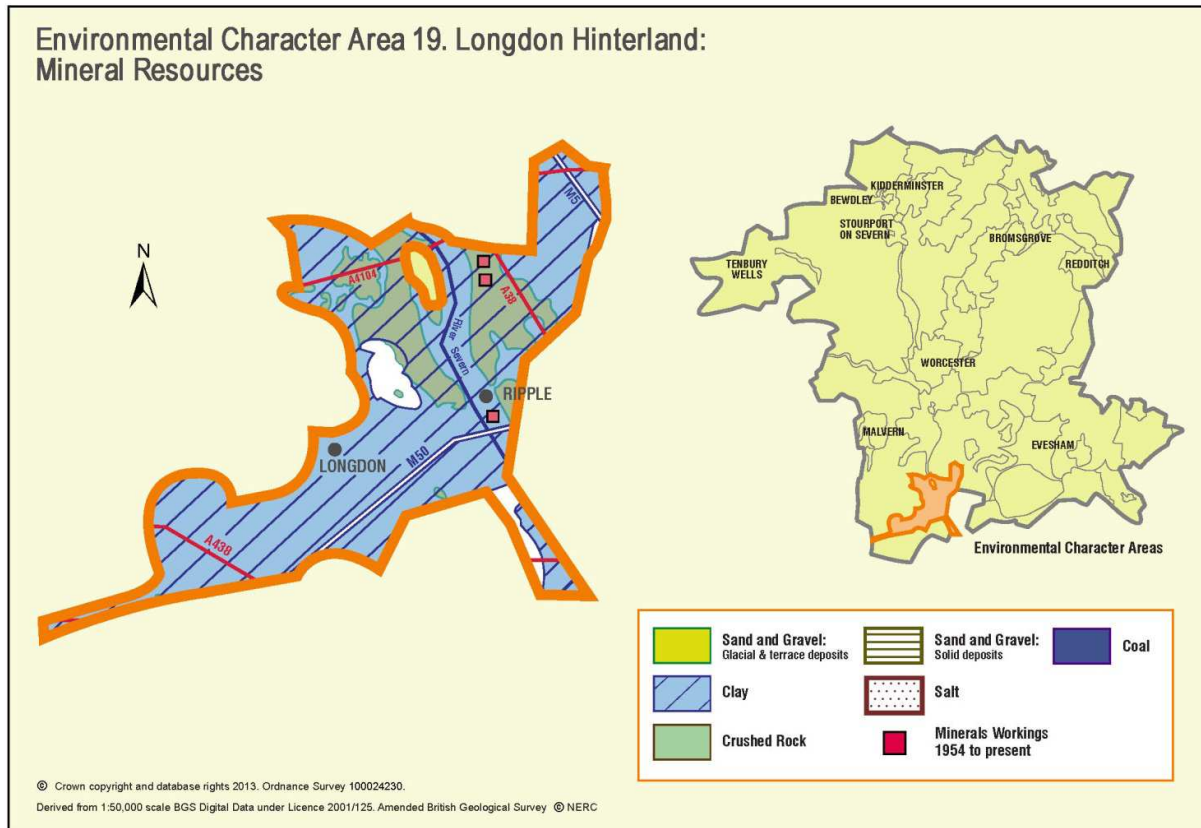


## Appendix 19: Analysis of aggregate resources in ECA 19: Longdon Hinterland



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

#### Sand and gravel

There are 16 resource areas identified for sand and gravel in Longdon Hinterland ECA:

- Key: 2
- Significant: 2
- Not significant: 5
- Compromised: 7

#### Crushed rock

There are no resource areas identified in Longdon Hinterland ECA for crushed rock.

#### Non-aggregates

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

## Overview of resource assessment for ECA 19

### Sand and gravel resource areas:

Resource number*	Second Stage Consultation		Third Stage Consultation		Fourth Stage Consultation		
	Original estimated resource tonnage (2 tonnes/m <sup>3</sup> )	Significance	Revised estimate of resource tonnage (1.65 tonnes/m <sup>3</sup> )	Significance	New resource number (where resource has been split)	Revised estimate of resource tonnage (1.65 tonnes/m <sup>3</sup> )	Result
19/1	8,988,000	Key	7,415,100	Key	19/1	7,103,250	Key
					19/1b		Compromised
19/2	4,014,000	Key	3,311,550	Key	19/2	3,237,300	Key
					19/2b		Compromised
19/2 a	810,000	Compromised	668,250	Compromised	Not reassessed		
19/3	285,000	Not significant	235,125	Not significant			
19/4	165,000	Not significant	136,125	Not significant			
19/5	195,000	Not significant	160,875	Not significant			
19/6	676,000	Significant	557,700	Not significant			
19/6 a	156,000	Compromised	128,700	Compromised			
19/7	780,000	Significant	643,500	Significant			
					19/7b	Compromised	
19/8	2,214,000	Key	1,826,550	Significant	19/8	1,782,000	Significant
					19/8b		Compromised
19/9	420,000	Not significant	346,500	Not significant	Not reassessed		
19/9 a	798,000	Compromised	658,350	Compromised			

<b>Overview</b>	
<b>Resource number:</b>	19/1
<b>Resource name:</b>	Naunton
<b>Resource area:</b>	214 ha
<b>Resource depth:</b>	Estimated 4.2m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 84 SE, SO 83 NE
<b>National grid ref:</b>	387026, 239279
<b>Resource description:</b>	
<b>Resource description:</b>	<p>Some 2<sup>nd</sup> terrace (Worcester) but predominantly 3<sup>rd</sup> terrace (Holt Heath) sand and gravel.</p> <p>Along the river cliff south from Ryall Hill, between 3.5m and 6.7m of deposits are exposed: at the thickest point (6.7m) this is revealed as 4.5m of red sand overlying 2.2m of cross-bedded gravel. Wills (1938) gives a section from the same area which shows 3.05m of sand overlying 3.5m of gravel (total 6.55m).</p> <p>Resistivity soundings in the adjacent fields showed similar thickness with variations from 4.1m to 6m. Part of the 3<sup>rd</sup> terrace has previously been worked out at the Ryall and Saxon's Lode sites. The Ryall application (1989) showed 10 boreholes revealing that the thickness of sand and gravel varied between 1.5m and 3m, with a mean recoverable depth of sand and gravel of 2.3m. The Saxon's Lode application (1997) reported three boreholes within the application area varying between 1.3m and 2m of reddish-brown to dark reddish brown, sub-rounded to rounded, silty, slightly clayey, fine to coarse sand with moderately sorted fine to medium gravel, averaging 1.7m sand and gravel across the site, beneath 1m-1.6m of overburden.</p> <p>(Estimated resource depth based on mean average of: a) Ryall Hill exposures (3.5m to 6.7m = median average 5.1m), b) Wills (6.55m), c) resistivity soundings (4.1m to 6m = median average 5.1m) + d) Ryall application recoverable depth (2.3m), e) Saxon's Lode application (1.7m), mean average = 4.2m)</p>
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A large resource area which is intersected by the A38, with small-scale dispersed development across the resource area. The deposit extends under Ryall village, this section is considered as a separate resource area

	(19/9a), and has previously been worked at Ryall and Saxon's Lode, the worked areas are not included in the resource area. The deposit continues to the north of Ryall village and this is considered as a separate resource area (19/9) as it is separated by over 500m.		
<b>Crude estimate of resource:</b>	Area: 214 ha x average depth: 4.2 m / 2 Estimated resource volume: 4,494,000 m <sup>3</sup> . <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 8,988,000</b>		
<b>Conclusion:</b>	Significant – key resource. Use to define areas of search.		
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>			
<b>Additional information</b>	A 15ha site within resource area 19/1, between Ryall House Farm quarry and the A38, was proposed by landowner the Diocese of Worcester. No detailed geological information was provided but the Diocese's agent estimates that the 15ha site would contain 420,000-700,000 tonnes of terrace deposit.		
<b>Revised estimate of resource:</b>	Area: 214 ha x average depth: 4.2 m / 2 Estimated resource volume: 4,494,000 m <sup>3</sup> . <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 7,415,100 tonnes</b>		
<b>Conclusion:</b>	Significant – key resource.		
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>			
This resource area has been split into areas 19/1 and 19/1b.			
<b>Resource area 19/1</b>		<b>Resource area 19/1b</b>	
<b>Resource area:</b>	205 ha	<b>Commentary:</b>	Screened out due to the following appendix A criterion: - Conservation Area - Listed Buildings - Settlement boundary - Scheduled Ancient Monument
<b>Resource depth:</b>	Estimated 4.2m		
<b>Revised estimate of resource:</b>	Area: 205 ha x average depth: 4.2m ÷ 2 Estimated resource volume: 4,305,000 m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 7,103,250 tonnes</b>		
<b>Conclusion:</b>	Key resource	<b>Conclusion:</b>	Compromised

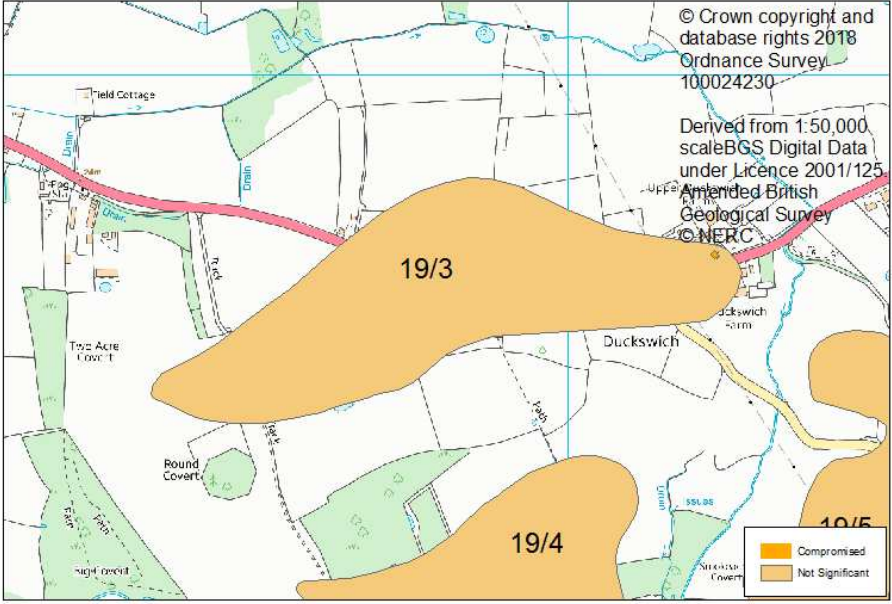
<b>Overview</b>	
<b>Resource number:</b>	19/2
<b>Resource name:</b>	Newbridge Green
<b>Resource area:</b>	223 ha
<b>Resource depth:</b>	Estimated 1.8m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NW
<b>National grid ref:</b>	384892, 239290
<b>Resource description:</b>	
<b>Resource description:</b>	<p>2<sup>nd</sup> terrace (Worcester) and 3<sup>rd</sup> terrace (Holt Heath) sand and gravel.</p> <p>A small pit 500m north of Newbridge Green (3<sup>rd</sup> terrace) adjacent to the River Severn formerly showed 1m of clean gravel consisting of bunter pebbles in a sandy matrix. A little to the south, more extensive overgrown diggings have reached depths of about 3m, which probably represents the maximum thickness of the deposit in this area. The 2<sup>nd</sup> terrace deposit is similar in composition to the 3<sup>rd</sup> terrace. Two disused pits to the west of Upton exposed 1.5m of gravel.</p> <p>(Estimated resource depth based on mean average: a) pit at Newbridge Green (1m), b) overgrown diggings (3m) c) two disused pits to the west of Upton (1.5m and 1.5m) = 1.8m)</p>
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A large resource with small-scale dispersed development across the resource area. The deposit extends under Upton upon Severn, this section is considered as a separate resource area (19/2a).
<b>Crude estimate of resource:</b>	<p>Area: 223ha x average depth: 1.8m / 2</p> <p>Estimated resource volume: 1,951,250m<sup>3</sup>.</p> <p><b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 4,014,000 tonnes</b></p>
<b>Conclusion:</b>	<p>Significant – key resource.</p> <p>Use to define areas of search.</p>
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	<p>Area: 223ha x average depth: 1.8m / 2</p> <p>Estimated resource volume: 1,951,250m<sup>3</sup>.</p>

<b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 3,311,550 tonnes</b>			
<b>Conclusion:</b>		Significant – key resource.	
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>			
This resource area has been split into areas 19/2 and 19/2b.			
<b>Resource area 19/2</b>		<b>Resource area 19/2b</b>	
<b>Resource area:</b>	218 ha	<b>Commentary:</b>	Screened out due to the following appendix A criterion: <ul style="list-style-type: none"> <li>- Conservation Area</li> <li>- Listed Buildings</li> <li>- Settlement boundary</li> <li>- Site of Special Scientific Interest</li> </ul>
<b>Resource depth:</b>	Estimated 1.8m		
<b>Revised estimate of resource:</b>	Area: 218 ha x average depth: 1.8m ÷ 2 Estimated resource volume: 1,962,000m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 3,237,300 tonnes</b>		
<b>Conclusion:</b>	Key resource	<b>Conclusion:</b>	Compromised

<b>Overview</b>	
<b>Resource number:</b>	19/2a
<b>Resource name:</b>	Newbridge Green a)
<b>Resource area:</b>	45 ha
<b>Resource depth:</b>	Estimated 1.8m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NW
<b>National grid ref:</b>	385373, 240173
<b>Resource description:</b>	
<b>Resource description:</b>	<p>2<sup>nd</sup> terrace (Worcester) and 3<sup>rd</sup> terrace (Holt Heath) sand and gravel. A small pit 500m north of Newbridge Green (3<sup>rd</sup> terrace) adjacent to the River Severn formerly showed 1m of clean gravel consisting of bunter pebbles in a sandy matrix. A little to the south, more extensive overgrown diggings have reached depths of about 3m, which probably represents the maximum thickness of the deposit in this area. The 2<sup>nd</sup> terrace deposit is similar in composition to the 3<sup>rd</sup> terrace. Two disused pits to the west of Upton exposed 1.5m of gravel.</p> <p>(Estimated resource depth based on mean average: a) pit at Newbridge Green (1m), b) overgrown diggings (3m) c) two disused pits to the west of Upton (1.5m and 1.5m) = 1.8m)</p>
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A small resource area compromised by the settlement of Upton upon Severn. The deposit extends beyond the settlement and this is considered as a separate resource area (19/2).
<b>Crude estimate of resource:</b>	<p>Area: 45ha x average depth: 1.8m / 2</p> <p>Estimated resource volume: 405,000 m<sup>3</sup>.</p> <p><b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 810,000 tonnes</b></p>
<b>Conclusion:</b>	Compromised by development.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	<p>Area: 45ha x average depth: 1.8m / 2</p> <p>Estimated resource volume: 405,000 m<sup>3</sup>.</p> <p><b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 668,250 tonnes</b></p>
<b>Conclusion:</b>	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	
<b>Resource number:</b>	19/3
<b>Resource name:</b>	Upper Duckswich Farm
<b>Resource area:</b>	19ha
<b>Resource depth:</b>	Estimated 1.5m
Location	
<b>OS sheet reference:</b>	SO 83 NW
<b>National grid ref:</b>	382798, 239290
	
Resource description:	
<b>Resource description:</b>	2 <sup>nd</sup> terrace (Worcester) sand and gravel. The gravel is estimated generally to be less than 2m thick and locally less than 1m thick and is composed of angular and sub-angular sheared diorites and granites set in a matrix of clayey sand to silty clay. The deposits appear to be thin and of low quality. (Estimated resource depth based on mean average: 2m and 1m = 1.5m)
Assessment of resource for the second consultation on MLP (Autumn 2013)	
<b>Commentary:</b>	A small deposit with small-scale dispersed development across the resource area.
<b>Crude estimate of resource:</b>	Area: 19ha x average depth: 1.5m / 2 Estimated resource volume: 142,500m <sup>3</sup> . <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 285,000 tonnes</b>
<b>Conclusion:</b>	Not significant: Small deposit with less than 300,000m <sup>3</sup> . Not for consideration in defining areas of search.
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)	
<b>Revised estimate of resource:</b>	Area: 19ha x average depth: 1.5m / 2 Estimated resource volume: 142,500m <sup>3</sup> . <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 235,125 tonnes</b>



<b>Conclusion:</b> Not significant.
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<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>
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Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation
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<b>Overview</b>		
<b>Resource number:</b>	19/4	
<b>Resource name:</b>	The Stanks	
<b>Resource area:</b>	11ha	
<b>Resource depth:</b>	Estimated 1.5m	
<b>Location</b>		
<b>OS sheet reference:</b>	SO 83 NW	
<b>National grid ref:</b>	382798, 239637	
<b>Resource description:</b>		
<b>Resource description:</b>	<p>2<sup>nd</sup> terrace (Worcester) sand and gravel. The gravel is estimated generally to be less than 2m thick and locally less than 1m thick and is composed of angular and sub-angular sheared diorites and granites set in a matrix of clayey sand to silty clay. The deposits appear to be thin and of low quality.  (Estimated resource depth based on mean average: 2m and 1m = 1.5m)</p>	
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>		
<b>Commentary:</b>	A small deposit with no built development in the resource area.	
<b>Crude estimate of resource:</b>	Area: 11ha x average depth: 1.5m / 2 Estimated resource volume: 82,500m <sup>3</sup> <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 165,000 tonnes</b>	
<b>Conclusion:</b>	Not significant: Small deposit with less than 300,000m <sup>3</sup> . Not for consideration in defining areas of search.	
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>		
<b>Revised estimate of resource:</b>	Area: 11ha x average depth: 1.5m / 2 Estimated resource volume: 82,500m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 136,125 tonnes</b>	
<b>Conclusion:</b>	Not significant.	
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>		
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation		

<b>Overview</b>	
<b>Resource number:</b>	19/5
<b>Resource name:</b>	Smokeacre Covert
<b>Resource area:</b>	13ha
<b>Resource depth:</b>	Estimated 1.5m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NW
<b>National grid ref:</b>	383464, 239207
<b>Resource description:</b>	
<b>Resource description:</b>	2 <sup>nd</sup> terrace (Worcester) sand and gravel. The gravel is estimated generally to be less than 2m thick and locally less than 1m thick and is composed of angular and sub-angular sheared diorites and granites set in a matrix of clayey sand to silty clay. The deposits appear to be thin and of low quality. (Estimated resource depth based on mean average: 2m and 1m = 1.5m)
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A small deposit intersected by a road but with no other built development in the resource area.
<b>Crude estimate of resource:</b>	Area: 13ha x average depth: 1.5m / 2 Estimated resource volume: 97,500m <sup>3</sup> . <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 195,000 tonnes</b>
<b>Conclusion:</b>	Not significant: Small deposit with less than 300,000m <sup>3</sup> . Not for consideration in defining areas of search.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	Area: 13ha x average depth: 1.5m / 2 Estimated resource volume: 97,500m <sup>3</sup> . <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 160,875 tonnes</b>
<b>Conclusion:</b>	Not significant.
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

<b>Overview</b>	
<b>Resource number:</b>	19/6
<b>Resource name:</b>	Tunnel Hill
<b>Resource area:</b>	52ha
<b>Resource depth:</b>	Estimated 1.3m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NW, SO 84 SW
<b>National grid ref:</b>	384167, 239852
<b>Resource description:</b>	
<b>Resource description:</b>	4 <sup>th</sup> terrace (Kidderminster Station) sand and gravel. In a road cutting about 1km south of Upton upon Severn, 1m of gravel rests on red-brown mercia mudstone. The gravel consists mainly of bunter pebbles and subordinate patinated sub-angular flints. Away from the road section, the surface of the gravel rises which, assuming a level base, gives an estimated maximum thickness of approximately 2-3m. (Estimated resource depth based on mean average: 1m and (2m to 3m = median 1.5m) = 1.3m)
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A medium-sized resource area with dispersed development across the resource area. The deposit extends under Tunnel Hill village, this section is assessed separately as resource area 19/6a.
<b>Crude estimate of resource:</b>	Area: 52ha x average depth: 1.3m / 2 Estimated resource: 338,000m <sup>3</sup> . <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 676,000</b>
<b>Conclusion:</b>	Significant. Consider in defining areas of search.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	Area: 52ha x average depth: 1.3m / 2 Estimated resource: 338,000m <sup>3</sup> . <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 557,700 tonnes</b>
<b>Conclusion:</b>	Change to conclusion: Not significant.
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>	

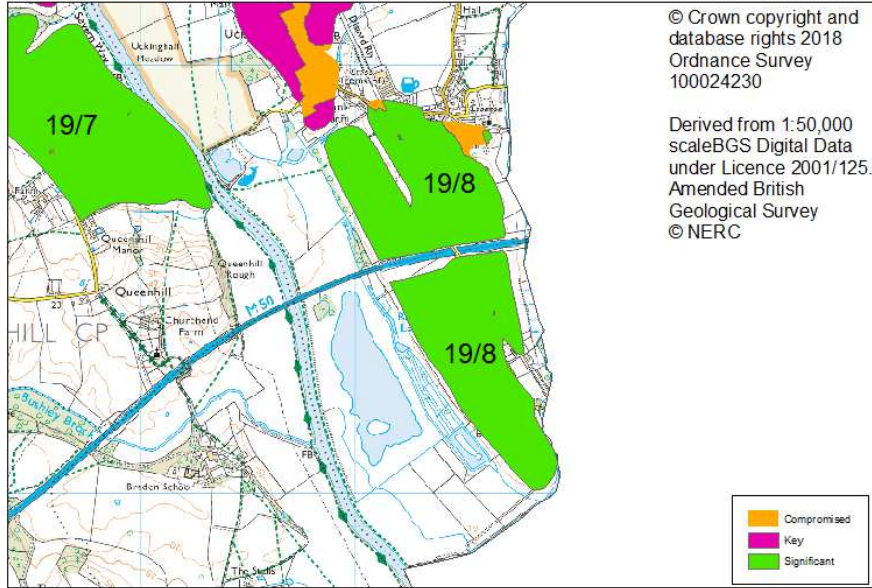
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation

<b>Overview</b>	
<b>Resource number:</b>	19/6 a
<b>Resource name:</b>	Tunnel Hill a)
<b>Resource area:</b>	12 ha
<b>Resource depth:</b>	Estimated 1.3m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NW, SO 84 SW
<b>National grid ref:</b>	384112, 240086
<b>Resource description:</b>	
<b>Resource description:</b>	4 <sup>th</sup> terrace (Kidderminster Station) sand and gravel. In a road cutting about 1km south of Upton upon Severn, 1m of gravel rests on red-brown mercia mudstone. The gravel consists mainly of bunter pebbles and subordinate patinated sub-angular flints. Away from the road section, the surface of the gravel rises which, assuming a level base, gives an estimated maximum thickness of approximately 2-3m. (Estimated resource depth based on mean average: 1m and (2m to 3m = median 1.5m) = 1.3m)
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A small resource area which is largely compromised by the village of Tunnel Hill. The deposit continues beyond the village and this is assessed separately as resource area 19/6.
<b>Crude estimate of resource:</b>	Area: 12ha x average depth: 1.3m / 2 Estimated resource: 78,000m <sup>3</sup> . <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 156,000</b>
<b>Conclusion:</b>	Compromised by development.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	Area: 12ha x average depth: 1.3m / 2 Estimated resource: 78,000m <sup>3</sup> . <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 128,700 tonnes</b>
<b>Conclusion:</b>	Compromised by development.
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

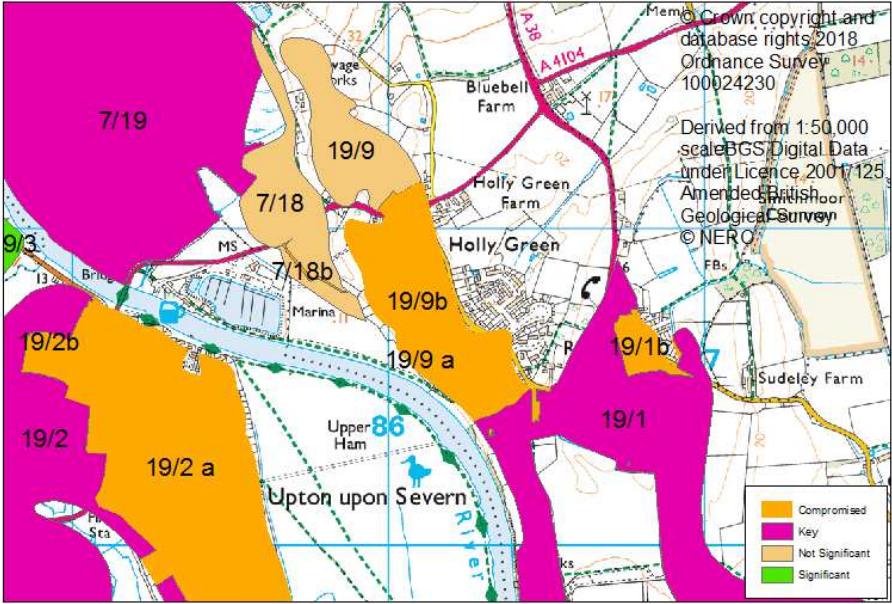
Overview	
Resource number:	19/7
Resource name:	North of Queenshill
Resource area:	65ha
Resource depth:	Estimated 1.2m
Location	
OS sheet reference:	SO 83 NW
National grid ref:	385668, 237767
Resource description:	
Resource description:	<p>3<sup>rd</sup> terrace (Holt Heath) sand and gravel. The deposits consist mainly of sandy gravel and gravelly sand, the pebbles being mainly rounded quartzites with subordinate flints. BGS memoirs record that they have been dug in one small pit to a depth of about 3m.</p> <p>An application submitted by Cemex for working in this resource area (2011) showed that the depth of sand and gravel varied between 1.2m and 3.7m across the application's proposed working phases, but also indicated that there were some parts of this resource area where there was no sand and gravel. The overburden varied between 0.5m and 2.6m. 25 boreholes across the deposit showed an average depth of sand and gravel of 1.15m.</p> <p>(Estimated resource depth based on Cemex application average depth: 1.15m (1.2m rounded to 1 decimal place))</p>
Assessment of resource for the second consultation on MLP (Autumn 2013)	
Commentary:	A medium-sized deposit with small-scale dispersed development across the resource area.
Crude estimate of resource:	<p>Area: 65ha x average depth: 1.2 m / 2</p> <p>Estimated resource volume: 390,000 m<sup>3</sup></p> <p><b>Estimated resource area (at 2 t/m<sup>3</sup>): 780,000 tonnes</b></p>
Conclusion:	<p>Significant.</p> <p>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: 65ha x average depth: 1.2 m / 2</p> <p>Estimated resource volume: 390,000 m<sup>3</sup></p>

<b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 643,500 tonnes</b>			
<b>Conclusion:</b>		Significant.	
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>			
This resource area has been split into areas 19/7 and 19/7b.			
<b>Resource area 19/7</b>		<b>Resource area 19/7b</b>	
<b>Resource area:</b>	65 ha	<b>Commentary:</b>	Screened out due to the following appendix A criterion: - Listed Buildings
<b>Resource depth:</b>	Estimated 1.2m		
<b>Revised estimate of resource:</b>	Area: 65 ha x average depth: 1.2m ÷ 2 Estimated resource volume: 390,000 m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 643,500 tonnes</b>		
<b>Conclusion:</b>	Significant resource	<b>Conclusion:</b>	Compromised



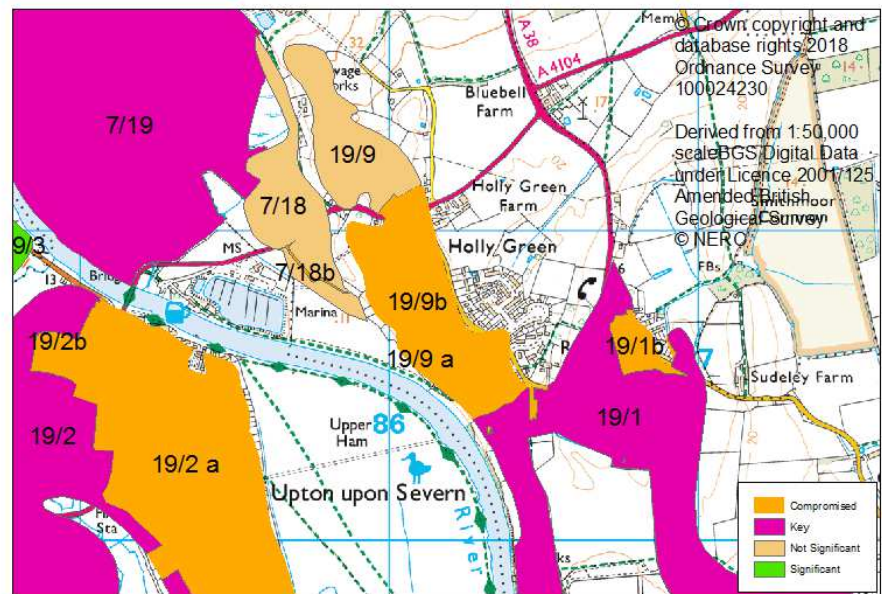
<b>Overview</b>	
<b>Resource number:</b>	19/8
<b>Resource name:</b>	South of Ripple
<b>Resource area:</b>	82ha
<b>Resource depth:</b>	Estimated 2.7m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 83 NE
<b>National grid ref:</b>	387431, 237063
	
<b>Resource description:</b>	
<b>Resource description:</b>	<p>2<sup>nd</sup> terrace (Worcester) and 3<sup>rd</sup> terrace (Holt Heath) sand and gravel (approximately two thirds 2<sup>nd</sup> terrace and one third 3<sup>rd</sup> terrace). These deposits consist mainly of gravelly sand and sandy gravel, although sand occurs at one locality on the River Avon. Boreholes indicate that in many places the deposits of the two lowest terraces continue beneath the alluvial silts and clays of the rivers. Any assessment of these sub-alluvial gravels would require a programme of closely spaced boreholes. 7 boreholes south west of Ripple along the length of the M50 at the River Severn bridge show the depth of the sand and gravel to be very variable, at one point 4.7m of sand and gravel lie beneath 2.9m of alluvium, whilst at another 0.6m of sand and gravel is overlain by 10.6m of alluvial overburden. (Estimated resource depth based on mean average 0.6m and 4.7m = 2.7m)</p>
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	
<b>Commentary:</b>	A medium-sized resource area with small-scale development on the periphery of the resource area and intersected by a road which runs close to the boundary between the terraces. The resource area is crossed by the M50 motorway, this is not included in the resource area.
<b>Crude estimate of resource:</b>	<p>Area: 82ha x average depth: 2.7m / 2          Estimated resource volume: 1,107,000m<sup>3</sup>  <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 2,214,000 tonnes</b></p>
<b>Conclusion:</b>	<p>Significant – key resource.          Use to define areas of search.</p>
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Additional information</b>	An 86ha site, approximately 32ha of which is within resource area 19/8, was proposed by landowner and

	mineral operator Moreton C Cullimore (Gravels) Ltd. The company estimates that the whole 86ha site would contain approximately 2 million tonnes of sand and gravel although the majority of this lies east of the River Severn on the western boundary of Bow Farm. No detailed geological information was provided to estimate how much of this is within resource area 19/8.		
<b>Revised estimate of resource:</b>	Area: 82ha x average depth: 2.7m / 2 Estimated resource volume: 1,107,000m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 1,826,550 tonnes</b>		
<b>Conclusion:</b>	Change to conclusion: Significant.		
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>			
This resource area has been split into areas 19/8 and 19/8b.			
<b>Resource area 19/8</b>		<b>Resource area 19/8b</b>	
<b>Resource area:</b>	80 ha	<b>Commentary:</b>	Screened out due to the following appendix A criterion: - Allocated site in South Worcestershire Development Plan - Conservation Area - Listed Buildings - Settlement boundary
<b>Resource depth:</b>	Estimated 2.7m		
<b>Revised estimate of resource:</b>	Area: 80 ha x average depth: 2.7m ÷ 2 Estimated resource volume: 1,080,000 m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 1,782,000 tonnes</b>		
<b>Conclusion:</b>	Significant resource	<b>Conclusion:</b>	Compromised

<b>Overview</b>	
<b>Resource number:</b>	19/9
<b>Resource name:</b>	North of Ryall
<b>Resource area:</b>	10ha
<b>Resource depth:</b>	Estimated 4.2m
<b>Location</b>	
<b>OS sheet reference:</b>	SO 84 SE
<b>National grid ref:</b>	385866, 241293
	
<b>Resource description:</b>	
<p><b>Resource description:</b> A 3<sup>rd</sup> terrace (Holt Heath) sand and gravel deposit.</p> <p>Along the river cliff south from Ryall Hill, between 3.5m and 6.7m of deposits are exposed: at the thickest point (6.7m) this is revealed as 4.5m of red sand overlying 2.2m of cross-bedded gravel. Wills (1938) gives a section from the same area which shows 3.05m of sand overlying 3.5m of gravel (total 6.55m). Resistivity soundings in the adjacent fields showed similar thickness with variations from 4.1m to 6m.</p> <p>Part of the 3<sup>rd</sup> terrace has previously been worked out at the Ryall and Saxon's Lode sites. A planning application at Ryall House Farm, south of this resource area (1989) showed 10 boreholes revealing that the thickness of sand and gravel varied between 1.5m and 3m, with a mean recoverable depth of sand and gravel of 2.3m. An application for mineral working at the Saxon's Lode site (1997), to the south of this resource area, reported three boreholes within the application area varying between 1.3m and 2m of reddish-brown to dark reddish brown, sub rounded to rounded, silty, slightly clayey, fine to coarse sand with moderately sorted fine to medium gravel, averaging 1.7m sand and gravel across the site, beneath 1m-1.6m of overburden.</p> <p>(Estimated resource depth based on mean average of: a) Ryall Hill exposures (3.5m to 6.7m = median average 5.1m), b) Wills (6.55m), c) resistivity soundings (4.1m to 6m = median average 5.1m) + d) Ryall application recoverable depth (2.3m), e) Saxon's Lode application (1.7m), mean average = 4.2m)</p>	
<b>Assessment of resource for the second consultation on MLP (Autumn 2013)</b>	

<b>Commentary:</b>	A small deposit with small-scale development on the periphery of the resource area. The deposit continues to the south under Ryall village, this section is considered as a separate resource area (19/9a) and the deposit also continues beyond Ryall village, this section is considered as a separate resource area (19/1) as it is separated by over 500m.
<b>Crude estimate of resource:</b>	Area: 10 ha x average depth: 4.2 m ÷ 2 Estimated resource volume: 210,000 m <sup>3</sup> <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 420,000</b>
<b>Conclusion:</b>	Not significant: Small deposit with less than 300,000m <sup>3</sup> . Not for consideration in defining areas of search.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	Area: 10 ha x average depth: 4.2 m ÷ 2 Estimated resource volume: 210,000 m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 346,500 tonnes</b>
<b>Conclusion:</b>	Not significant.
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	

Overview	
Resource number:	19/9a
Resource name:	North of Ryall
Resource area:	19ha
Resource depth:	Estimated 4.2m
Location	
OS sheet reference:	SO 84 SE
National grid ref:	385866, 241293



**Resource description:**

**Resource description:** A 3<sup>rd</sup> terrace (Holt Heath) sand and gravel deposit.

Along the river cliff south from Ryall Hill, between 3.5m and 6.7m of deposits are exposed: at the thickest point (6.7m) this is revealed as 4.5m of red sand overlying 2.2m of cross-bedded gravel. Wills (1938) gives a section from the same area which shows 3.05m of sand overlying 3.5m of gravel (total 6.55m). Resistivity soundings in the adjacent fields showed similar thickness with variations from 4.1m to 6m.

Part of the 3<sup>rd</sup> terrace has previously been worked out at the Ryall and Saxon's Lode sites. A planning application at Ryall House Farm, south of this resource area (1989) showed 10 boreholes revealing that the thickness of sand and gravel varied between 1.5m and 3m, with a mean recoverable depth of sand and gravel of 2.3m. An application for mineral working at the Saxon's Lode site (1997), to the south of this resource area, reported three boreholes within the application area varying between 1.3m and 2m of reddish-brown to dark reddish brown, sub rounded to rounded, silty, slightly clayey, fine to coarse sand with moderately sorted fine to medium gravel, averaging 1.7m sand and gravel across the site, beneath 1m-1.6m of overburden.

(Estimated resource depth based on mean average of: a) Ryall Hill exposures (3.5m to 6.7m = median average 5.1m), b) Wills (6.55m), c) resistivity soundings (4.1m to 6m = median average 5.1m) + d) Ryall application recoverable depth (2.3m), e) Saxon's Lode application (1.7m), mean average = 4.2m)

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

**Commentary:** A small resource area, compromised by the village of Ryall. The deposit continues to the south of Ryall village

	(considered as resource area 19/1), and to the north of Ryall (resource area 19/9).
<b>Crude estimate of resource:</b>	Area: 19 ha x average depth: 4.2 m ÷ 2 Estimated resource volume: 399,000 m <sup>3</sup> <b>Estimated resource tonnage (at 2 t/m<sup>3</sup>): 798,000</b>
<b>Conclusion:</b>	Compromised by development.
<b>Assessment of resource for the Third Stage consultation on MLP (Spring 2015)</b>	
<b>Revised estimate of resource:</b>	Area: 19 ha x average depth: 4.2 m ÷ 2 Estimated resource volume: 399,000 m <sup>3</sup> <b>Estimated resource tonnage (at 1.65 t/m<sup>3</sup>): 658,350 tonnes</b>
<b>Conclusion:</b>	Compromised by development.
<b>Assessment of resource for the Fourth Stage consultation on MLP (August 2018)</b>	
Not reassessed due to resource not being classified as Key or Significant in the Third Stage Consultation	