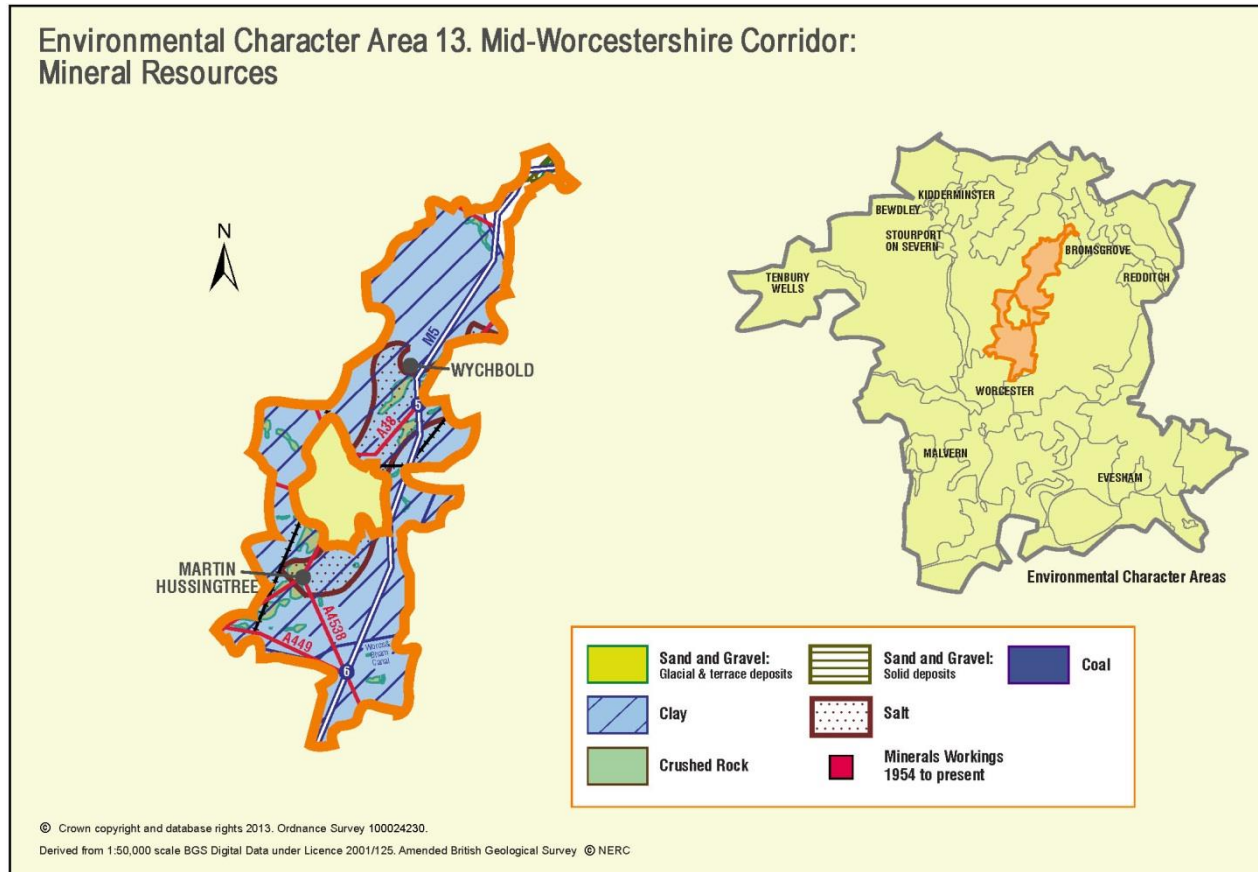


Appendix 13: Analysis of aggregate resources in ECA 13: Mid Worcestershire Corridor



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

Sand and gravel

There are 12 resource areas identified for sand and gravel in Mid-Worcestershire Corridor ECA:

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

Crushed rock

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

Non-aggregates

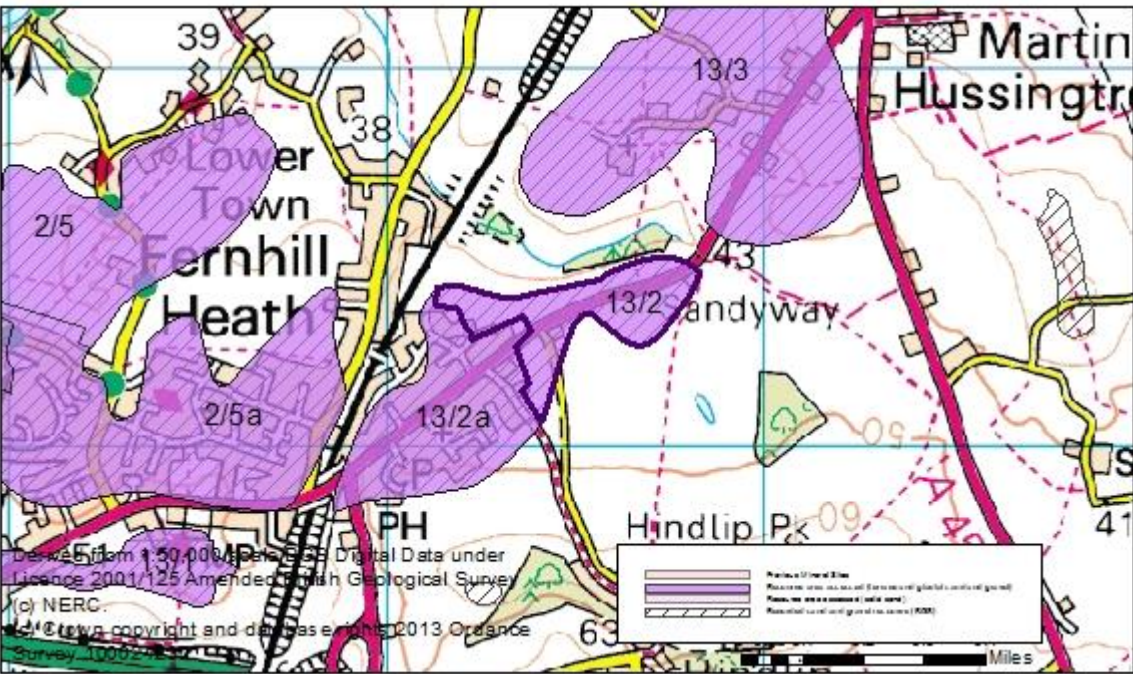
BGS data indicates that there are deposits of clay and salt in this ECA.

Overview of resource assessment for ECA 13

Sand and gravel resource areas:

Resource number*	Second Stage Consultation		Third Stage Consultation	
	Original estimated resource tonnage (2 tonnes/m ³)	Significance	Revised estimate of resource tonnage (1.65 tonnes/m ³)	Significance
13/1	100,000	Not significant	82,500	Not significant
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
13/4	1,470,000	Significant	1,212,750	Significant
13/5	0	Not significant	0	Not significant
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
13/9	0	Not significant	0	Not significant
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.	

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.


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.	

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.

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.

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:	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.	

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.

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.	

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): $2.28\text{m} = 3.6\text{m}$)

Revised estimate of resource:

Area: 79 ha x average depth: $3.6\text{m} \div 2$

Estimated resource volume: $1,422,000\text{m}^3$

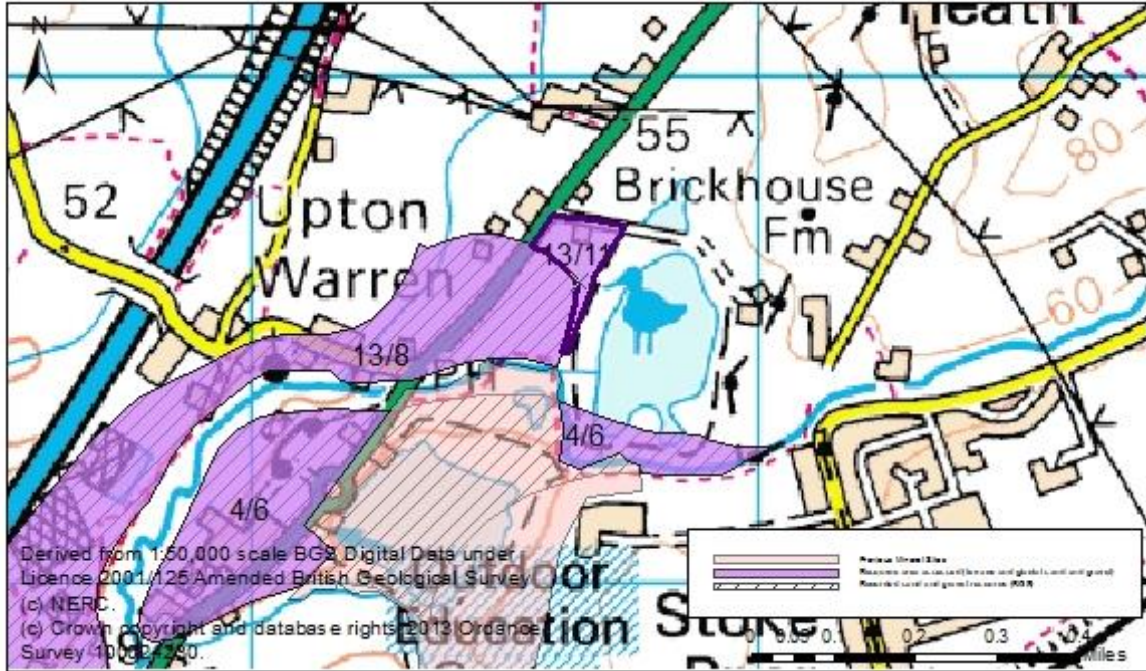
Estimated resource tonnage (at 1.65 t/m^3): 2,346,300 tonnes

Conclusion:

Significant – key resource.

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.	

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:	<p>3rd 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 3rd terrace or the alluvial fan deposit. (Estimated resource depth 4.1m)</p>	
Assessment of resource for the second consultation on MLP (Autumn 2013)		
Commentary:	<p>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.</p>	
Crude estimate of resource:	<p>Area: 11ha x average depth: 4.1m ÷ 2 Estimated resource volume: 225,500 m³ Estimated resource tonnage (at 2 t/m³): 451,000 tonnes</p>	
Conclusion:	<p>Not significant: Small deposit with less than 300,000m³. Not for consideration in defining areas of search.</p>	
Assessment of resource for the Third Stage consultation on MLP (Spring 2015)		
Revised estimate of resource:	<p>Area: 11ha x average depth: 4.1m ÷ 2 Estimated resource volume: 225,500 m³ Estimated resource tonnage (at 1.65 t/m³): 372,075 tonnes</p>	
Conclusion:	<p>Not significant.</p>	

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"> <p>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): $2.28\text{m} = 3.6\text{m}$ Based on resource area and the above estimated average depth, the estimate of resource in this resource area would be: Area: $2\text{ha} \times \text{average depth: } 3.6\text{m} \div 2$ Estimated resource volume: $36,000\text{ m}^3$ Estimated resource tonnage (at 1.65 t/m^3) would be: 59,400 tonnes</p> <p>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.</p> <p>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: $2\text{ha} \times \text{average depth: } 3.5\text{m} \div 2$ Estimated resource volume: $35,000\text{ m}^3$ Estimated resource tonnage (at 1.65 t/m^3) would be: 57,750 tonnes</p> <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.