

**Sub-Regional Apportionment of  
Aggregates Provision in the West  
Midlands Region 2005 – 2020  
Consultation paper  
17-02-2010**

**Prepared for West Midlands  
Regional Assembly  
by  
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# CONTENTS

<b>1. Introduction .....</b>	<b>1</b>
<b>2. Revised Factors, data and options .....</b>	<b>3</b>
Revised factors and Datasets Used.....	3
Factor 1: Demand .....	3
Factor 1a: Future housing.....	3
Factor 1b: Current (Existing population).....	4
<i>Modifications to demand factor for sand and gravel.....</i>	<i>4</i>
<i>Modifications to demand factor for crushed rock.....</i>	<i>7</i>
Factor 2: Past Sales .....	8
Factor 3: Unsterilised Resource .....	10
<i>Modifications to the data for the resource factor.....</i>	<i>11</i>
<i>Further considerations for factor 3 as highlighted by consultation.....</i>	<i>14</i>
Factor 4: Constraints .....	15
Development of Options .....	17
Revised Options for Appraisal .....	18
<b>3. Findings.....</b>	<b>29</b>
Sand and Gravel (five year sales data) .....	29
Sand and Gravel (ten year sales data).....	32
Crushed Rock.....	34

## TABLES

Table 2.1: Future housing and demolitions (2006-2026) by sub-region .....	4
Table 2.2: Existing population 2008 .....	4
Table 2.3: Redistribution of future housing and demolitions for sand and gravel .....	6
Table 2.4: Redistribution of existing population for sand and gravel .....	6
Table 2.5: Redistribution of future housing and demolitions for crushed rock.....	7
Table 2.6: Redistribution of existing population for crushed rock.....	8
Table 2.7: Past sales for sand and gravel.....	9
Table 2.8: Average past sales for sand and gravel.....	9
Table 2.9: Current apportionment figures for crushed rock to be used as a proxy for past sales .....	10
Table 2.10: Mean working thickness (m) of deposits by sub-region .....	12
Table 2.11: Area (ha) and volume (mt) of unsterilised sand and gravel outside of international designations by sub-region .....	13
Table 2.12: Area (ha) and volume (mt) of unsterilised crushed rock outside of international designations and Malvern Hills Conservators landholdings by sub-region.....	14
Table 2.13: Areas (ha) and volume (mt) of unsterilised sand and gravel outside of constraints .....	16
Table 2.14: Areas (ha) and volume (mt) of unsterilised crushed rock outside of constraints .....	17
Table 2.15: Weighting for Option F.....	19
Table 2.16: Weighting for Refined Option F.....	19
Table 2.17: Weighting for Refined Option F with Factor 1a:1b ratios applied.....	20
Table 3.1: Summary of sand and gravel sub-regional apportionment options with five year sales data (percentages) .....	29
Table 3.2: Summary of sand and gravel sub-regional apportionment options with five year sales data (million tonnes) .....	30
Table 3.3: Refined option F for sand and gravel with five year sales data broken down by time period phase.....	30
Table 3.4: Refined option F for sand and gravel with five year sales data broken down by phase and expressed as a volume (mt).....	31
Table 3.5: Summary of sand and gravel sub-regional apportionment options with ten year sales data (percentages) .....	32
Table 3.6: Summary of sand and gravel sub-regional apportionment options with ten year sales data (million tonnes) .....	32
Table 3.7: Refined option F for sand and gravel with ten year sales data broken down by phase (expressed as a percentage) .....	33
Table 3.8: Refined option F for sand and gravel with ten year sales data broken down by phase and expressed as a volume (mt).....	33
Table 3.9: Summary of crushed rock sub-regional apportionment options F and Refined F (percentages).....	35

Table 3.10: Summary of crushed rock sub-regional apportionment options F and Refined F (million tonnes) ..... 35

Table 3.11: Refined option F for crushed rock broken down by phase (expressed as a percentage) ..... 36

Table 3.12: Refined option F for crushed rock broken down by phase and expressed as a volume (mt) ..... 36

## FIGURES

(Figures 1-9 are presented at the end of Section 2)

Figure 1: Unsterilised sand and gravel resource outside of International Designations (Factor 3)

Figure 2: Unsterilised hard rock resource outside of International Designations and Malvern Hills Conservators landholdings (Factor 3)

Figure 3: International designations and Malvern Hills Conservators landholdings (Factor 3)

Figure 4: Major Urban Areas and Settlements of Significant Development with a 38km buffer

Figure 5: Data collection exercise

Figure 6: National designations (Factor 4)

Figure 7: Unsterilised sand and gravel resource outside of constraints Factor 4)

Figure 8: Unsterilised rock resource outside of constraints Factor 4)

Figure 9: Illustrative comparison of revised sand and gravel sub-regional apportionment options (with five year sales data) ..... 31

Figure 10: Illustrative comparison of revised sand and gravel sub-regional apportionment options (with ten year sales data) ..... 34

Figure 11: Illustrative comparison of crushed rock sub-regional apportionment options 37



# I. INTRODUCTION

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I.1. The West Midlands Regional Assembly (WMRA) commissioned Land Use Consultants (LUC) in November 2009 to prepare alternative options for the apportionment of primary aggregates in the West Midlands for the period 2005-2020. LUC prepared a draft report<sup>1</sup> setting out the proposed methodology, factors and datasets to be used to generate five draft options for the apportionment (LUC Options A to E). WMRA circulated LUC's draft report for a technical consultation with WMRAWP representatives (held 18 December 2009 to 22 January 2010 and WMRAWP meeting held on 9 February 2010).

I.2. The key issues raised in the responses to the technical consultation that relate to the LUC methodology and options were:

## Data

- Data used for the Resource factor is too coarse
- Which period of Past Sales data should be used (3, 5 or 10 years)
- Local environmental designations should be included in Constraints factor
- Resource factor needs to reflect proximity to markets (viable transport distances)
- Resource factor should exclude MPAs with evidence of inadequate supplies

## Weighting/Options

- Not enough weight given to the Past Sales factor
- LUC Options A-E not considered to be deliverable / sustainable
- RAWP options were generally favoured over LUC options, except responses from two authorities

## Other

- Timescale for the development of the LUC options was considered to be too short
- LUC method was considered to be 'not tested'

I.3. As a result of the technical consultation on the LUC draft report with WMRAWP representatives, modifications to the factors and datasets to be used in the sub-regional apportionment methodology have been made, and two additional options

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<sup>1</sup> Sub-regional Apportionment of Aggregates Provision in the West Midlands Region 2005-2020. Prepared for West Midlands Regional Assembly by Land Use Consultants, December 2009.

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have been generated, to try and address the issues raised. This report describes the modifications and two additional options in detail.

## 2. REVISED FACTORS, DATA AND OPTIONS

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### REVISED FACTORS AND DATASETS USED

- 2.1. For each factor used within the LUC methodology for developing sub-regional apportionment options, this section describes the source of data, how the data has been processed, and any limitations to the data. Any modifications to the data used in the LUC draft report are described. The factors used are:
- Factor 1: Demand (with a ratio of 6:4 for 1a and 1b)
    - Factor 1a: Future (Housing provision)
    - Factor 1b: Current (Existing population)
  - Factor 2: Past Sales
  - Factor 3: Unsterilised resource outside of international designations (now including the Malvern Hills Conservators landholdings)
  - Factor 4: Constraints

### FACTOR 1: DEMAND

- 2.2. Representatives of the Mineral Products Association advised that approximately 60% of demand for aggregates for construction is for development associated with meeting future housing/infrastructure targets/needs for the Region whilst the remaining 40% of demand is for existing redevelopment/refurbishment.
- 2.3. It was therefore agreed that Factor 1 would be made up of two factors – future and existing demand and these two factors (1a and 1b respectively) would be combined using a ratio of 6:4 to reflect this information.

#### Factor 1a: Future housing

- 2.4. The data used to quantify this factor are the Regional Housing Trajectory Indicative Average Annual Rates for 5 year periods presented in the Addendum to the Panel Report of the WM RSS Phase Two Revision for the period 2006-2021 with demolitions from West Midlands Regional Spatial Strategy Phase Two Revision – Draft Preferred Option December 2007 (Table 2) added. Data for this factor were supplied by WMRA and are shown in **Table 2.1**.
- 2.5. Data were presented by groups of Local Authorities and have been aggregated into the six sub-regions.

**Table 2.1: Future housing and demolitions (2006-2026) by sub-region**

Sub-region	Housing proposals 2006-2021	Demolitions 2006-2021	Total 2006-2021 (housing plus demolitions)	% of total
Herefordshire	12,050	375	12,425	3.90
Shropshire	37,100	420	37,520	11.77
Staffordshire	51,400	4,215	55,615	17.45
Warwickshire	29,075	1,515	30,590	9.60
West Midlands County	109,975	44,505	154,480	48.47
Worcestershire	27,075	1,005	28,080	8.81
<b>West Midlands</b>	<b>266,675</b>	<b>52,035</b>	<b>318,710</b>	<b>100.00</b>

Source: West Midlands RSS Phase 2 Revision Draft December 2007 and Addendum to the Panel Report of WM RSS Phase 2 Revision.

### **Factor 1b: Current (Existing population)**

- 2.6. The data used to quantify the existing population were sourced from the Office for National Statistics. The most current data available are the 2008 mid-year estimates at district level. The data were presented by district or unitary authority, and so were assimilated into the six sub-regions for the purposes of the apportionment. The data for existing population are shown in **Table 2.2** below.

**Table 2.2: Existing population 2008**

Sub-region	2008 population	% of total
Herefordshire	179,300	3.31
Shropshire	454,900	8.41
Staffordshire	1,069,000	19.76
Warwickshire	530,700	9.81
West Midlands County	2,619,600	48.41
Worcestershire	557,600	10.30
<b>West Midlands Region</b>	<b>5,411,100</b>	<b>100.00</b>

Source: Office for National Statistics 2008 mid-year population estimates

### **Modifications to demand factor for sand and gravel**

- 2.7. A reality check on sand and gravel resources in West Midlands County highlighted that the vast majority of this resource is coming from Solihull and Walsall only. In order to better reflect this in the apportionment method, the calculation for the resource factor was reduced to these two Authorities only (to be discussed in more detail under Factor 3). The demand factor also needed to be adjusted to reflect this.

- 2.8. It was agreed with the Steering Group that the resource factor for West Midlands County should only include the amount of resource which is found in Solihull and Walsall, and therefore the amount of demand should be reduced similarly for that sub-region. However, this demand generated by West Midlands County still needs to be accounted for, and it was decided to redistribute the remaining demand evenly between the other sub-regions. This was straightforward for the existing population dataset as these figures are provided at Local Authority level and could be disaggregated easily. It was less straightforward for future housing and demolitions which are not provided at Local Authority level, but rather in groups of Local Authorities.
- 2.9. Future housing data for West Midlands County are presented in the Addendum to the Panel Report of the WM RSS Phase Two Revision for the period 2006-2021 disaggregated into:
- Birmingham and Solihull;
  - Coventry; and
  - Black Country.
- 2.10. In order to isolate housing figures for Solihull and Walsall and the rest of West Midlands County, some assumptions have had to be made. Table I in the Panel Report has indicative annual average figures split between Birmingham and Solihull showing a split between the two at 85% for Birmingham and 15% for Solihull. This percentage split has been used to divide the 2006-2021 future housing figures shown for the combined Birmingham and Solihull figure.
- 2.11. No figures are available which show the breakdown of future housing between the four authorities in Black Country. It was decided that in the absence of detailed data, an even split would be a fair division between the authorities. This reflects the existing population distribution in the Black Country which, at 2001, showed that Walsall had 23.5% of the total Black Country population<sup>2</sup>.
- 2.12. The data used for demolitions was available at Local Authority level and lent itself easily to being disaggregated. The redistributed housing and demolitions figures are illustrated in **Table 2.3**.

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<sup>2</sup> Office for National Statistics, 2001 census.

**Table 2.3: Redistribution of future housing and demolitions for sand and gravel**

Sub-region	Housing proposals 2006-2021	Demolitions 2006-2021	Total 2006-2021 (housing plus demolitions)	Redistributed total 2006-2021 (housing plus demolitions)	% of total
Herefordshire	12,050	375	12,425	38,203	11.99%
Shropshire	37,100	420	37,520	63,298	19.86%
Staffordshire	51,400	4,215	55,615	81,393	25.54%
Warwickshire	29,075	1,515	30,590	56,368	17.69%
West Midlands County	109,975	44,505	154,480	25,591	8.03%
<i>Solihull and Walsall</i>	<i>17349</i>	<i>8242</i>	<i>25,591</i>	<i>25,591</i>	<i>8.03%</i>
<i>Rest of West Midlands County</i>	<i>92626</i>	<i>36263</i>	<i>128,889</i>	<i>0</i>	<i>0.00%</i>
Worcestershire	27,075	1,005	28,080	53,858	16.90%
<b>West Midlands</b>	<b>266,675</b>	<b>52,035</b>	<b>318,710</b>	<b>318,710</b>	<b>100.00%</b>

- 2.13. The redistributed existing population figures are shown in **Table 2.4**. This table shows how the population for the 'Rest of West Midlands County' has been divided by five and added to the remaining sub-regions.

**Table 2.4: Redistribution of existing population for sand and gravel**

Sub-Region	2008 population	Redistributed 2008 population	% of total
Herefordshire	179,300	611,040	11.29%
Shropshire	454,900	886,640	16.39%
Staffordshire	1,069,000	1,500,740	27.73%
Warwickshire	530,700	962,440	17.79%
West Midlands County	2,619,600	460,900	8.52%
<i>Walsall and Solihull</i>	<i>460,900</i>	<i>460,900</i>	<i>8.52%</i>
<i>Rest of West Midlands County</i>	<i>2,158,700</i>	<i>0</i>	<i>0.00%</i>

Sub-Region	2008 population	Redistributed 2008 population	% of total
Worcestershire	557,600	989,340	18.28%
<b>West Midlands Region</b>	<b>5,411,100</b>	<b>5,411,100</b>	<b>100.00</b>

### ***Modifications to demand factor for crushed rock***

- 2.14. For crushed rock, it is known that the reserves in West Midlands County have been exhausted<sup>3</sup>. It was therefore necessary to account for this in the apportionment method by reducing the resource data to zero in West Midlands County. This is described in more detail under Factor 3. Consequently, we need to account for the demand generated in this sub-region despite the lack of crushed rock resource available. It was decided with the Steering Group that the West Midlands County demand should be redistributed to other sub-regions.
- 2.15. In a similar way to the current apportionment for crushed rock, the demand factor for West Midlands County has been redistributed evenly between Shropshire and Warwickshire. These two sub-regions are the only two that have a similar type of rock to West Midlands County<sup>4</sup>.
- 2.16. The future housing and demolitions figures for West Midlands County were redistributed evenly between Shropshire and Warwickshire to match the redistribution of the resource. This is illustrated in **Table 2.5**.

**Table 2.5: Redistribution of future housing and demolitions for crushed rock**

Sub-region	Housing proposals 2006-2021	Demolitions 2006-2021	Total 2006-2021 (housing plus demolitions)	Redistributed total 2006-2021 (housing plus demolitions)	% of total
Herefordshire	12,050	375	12,425	12,425	3.90%
Shropshire	37,100	420	37,520	114,760	36.01%
Staffordshire	51,400	4,215	55,615	55,615	17.45%
Warwickshire	29,075	1,515	30,590	107,830	33.83%

<sup>3</sup> West Midlands Regional Aggregate Working Party Annual Report 2007

<sup>4</sup> West Midland regional Aggregate Working Party Annual Report 2007.

Sub-region	Housing proposals 2006-2021	Demolitions 2006-2021	Total 2006-2021 (housing plus demolitions)	Redistributed total 2006-2021 (housing plus demolitions)	% of total
West Midlands County	109,975	44,505	154,480	0	0.00%
Worcestershire	27,075	1,005	28,080	28,080	8.81%
<b>West Midlands</b>	<b>266,675</b>	<b>52,035</b>	<b>318,710</b>	<b>318,710</b>	<b>100.00%</b>

- 2.17. **Table 2.6** shows the redistribution of the existing population figures by splitting the West Midlands County population evenly between Shropshire and Warwickshire.

**Table 2.6: Redistribution of existing population for crushed rock**

Sub-Region	2008 population	Redistributed 2008 population	% of total
Herefordshire	179,300	179,300	3.31%
Shropshire	454,900	1,764,700	32.61%
Staffordshire	1,069,000	1,069,000	19.76%
Warwickshire	530,700	1,840,500	34.01%
West Midlands County	2,619,600	0	0.00%
Worcestershire	557,600	557,600	10.30%
<b>West Midlands Region</b>	<b>5,411,100</b>	<b>5,411,100</b>	<b>100.00%</b>

## FACTOR 2: PAST SALES

- 2.18. The source of data for past sales was the WMRAWP Annual Report 2007. The technical consultation showed that there was a preference for the use of five year or ten year past sales data (as opposed to three years used in the LUC draft report). Data for crushed rock sales over a five or ten year period is not available for confidentiality reasons. It was therefore agreed that for crushed rock, the existing apportionment would be used as a proxy for past sales as this apportionment was based on past sales. **Table 2.7** shows the data for sand and gravel over the full ten year period from 1998-2007.

**Table 2.7: Past sales for sand and gravel**

Sub-Region	Sales 1998 (mt)	Sales 1999 (mt)	Sales 2000 (mt)	Sales 2001 (mt)	Sales 2002 (mt)	Sales 2003 (mt)	Sales 2004 (mt)	Sales 2005 (mt)	Sales 2006 (mt)	Sales 2007 (mt)
Herefordshire	0.304	0.297	0.289	0.261	0.236	0.254	0.25	0.24	0.19	0.19
Shropshire	0.839	0.808	0.742	0.857	0.841	0.822	0.84	0.83	0.77	0.78
Staffordshire	6.491	6.589	6.442	6.411	6.196	6.264	6.1	5.8	6.8	6.44
Warwickshire	1.179	1.017	1.043	1.031	0.854	0.827	0.84	0.9	0.98	1.19
West Midlands County	0.445	0.474	0.481	0.536	0.512	0.499	0.52	0.58	0.55	0.61
Worcestershire	0.968	0.887	0.839	0.836	0.833	0.89	0.85	0.75	0.7	0.81
<b>West Midlands</b>	<b>10.23</b>	<b>10.07</b>	<b>9.836</b>	<b>9.932</b>	<b>9.472</b>	<b>9.556</b>	<b>9.4</b>	<b>9.1</b>	<b>9.99</b>	<b>10.02</b>

Source: WMRAWP Annual Reports

- 2.19. **Table 2.8** shows the five and ten year averages of past sales used in the apportionment methodology. It still needs to be decided whether the five or ten year period is preferred.

**Table 2.8: Average past sales for sand and gravel**

Sub-Region	Total sales 2003-2007 (mt)	Total sales 1998-2007 (mt)	5 year average (mt)	% of total (5 years)	10 year average (mt)	% of total (10 years)
Herefordshire	1.124	2.511	0.225	2.34%	0.251	2.57%
Shropshire	4.042	8.129	0.808	8.41%	0.813	8.33%
Staffordshire	31.404	63.533	6.281	65.34%	6.353	65.09%
Warwickshire	4.737	9.861	0.947	9.86%	0.986	10.10%
West Midlands County	2.759	5.207	0.552	5.74%	0.521	5.33%
Worcestershire	4.000	8.363	0.800	8.32%	0.836	8.57%
<b>West Midlands</b>	<b>48.066</b>	<b>97.604</b>	<b>9.613</b>	<b>100.00%</b>	<b>9.760</b>	<b>100.00%</b>

Source: WMRAWP Annual Reports

- 2.20. **Table 2.9** shows the current apportionment for crushed rock which is the data used as a proxy for past sales in the absence of a full ten year set of data.

**Table 2.9: Current apportionment figures for crushed rock to be used as a proxy for past sales**

<b>Sub-regions</b>	<b>Current apportionment 2005-2016 (million tonnes per annum)</b>	<b>Percentage of regional total (%) 2005-2016</b>
Herefordshire	0.424	7.30%
Shropshire	2.949	50.75%
Staffordshire	1.395	24.01%
Warwickshire	0.88	15.14%
West Midlands County	0	0%
Worcestershire	0.163	2.81%
<b>West Midlands Region</b>	<b>5.812</b>	<b>100%</b>

Source: West Midlands Regional Spatial Strategy Phase Two Revision – Draft. Preferred Option December 2007

### **FACTOR 3: UNSTERILISED RESOURCE**

- 2.21. Data for this factor were the GIS layers for mineral resources as defined by the BGS into deposit types. The data is subject to the some limitations discussed below.
- 2.22. The British Geological Survey (BGS) data shows the distribution of minerals in the region in GIS. The best available data at the regional scale is the DiGMapGB-100 Mineral Resource dataset at 1:50 000. There is some evidence that there are gaps in the BGS data (e.g. incomplete coverage of the Shropshire 'fault line' and SW Herefordshire). Some MPAs have done further work with the BGS to map their resource more accurately, but there is not complete coverage for the Region.
- 2.23. The BGS data layers did not take account of resource that has been sterilised by urban development and associated infrastructure. They also did not take account of worked-out sites. It was therefore necessary to process the BGS data further to more accurately estimate the distribution of the resource within each sub-region.
- 2.24. In a recent BGS study<sup>5</sup> undertaken for the former South East Regional Assembly (now South East England Partnership Board) a methodology for determining the extent of the sterilised resource was developed. This methodology has been drawn upon for this study. Factors that sterilise the resource are:

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<sup>5</sup> South East England Regional Assembly: South East Plan – Review of Mineral Supply and Demand. Economic Minerals Programme Commissioned Report CR/06/147. British Geological Society 2006.

- The road network – based on the Primary Road Network with a 5m buffer of the line features in GIS to approximate the footprint on the ground;
  - Railways – based on railway data supplied by WMRA with a 5m buffer of the line features in GIS to approximate the footprint on the ground;
  - Urban areas – based on the 2001 Census Urban Areas dataset; and
  - Worked-out sites – see next paragraph.
- 2.25. No comprehensive GIS layer of worked-out sites was available for the Region. Each of the MPAs was asked to provide this data for their MPA in GIS format and these were collated by Staffordshire County Council and passed on to Land Use Consultants to use in GIS.
- 2.26. Data for historic/worked-out sites were only available for some of the MPAs. The list below summarises the data collection exercise:
- Shropshire: Historical sites available as GIS layer and have been removed from the resource layer;
  - Staffordshire: Historical sites available as GIS layer and have been removed from the resource layer;
  - Worcestershire: No GIS data on historical sites available;
  - Herefordshire: No GIS data on historical sites available;
  - Warwickshire: Data on some worked-out sites provided as GIS layer. No data available for historic sites;
  - Walsall: Historical sites available as GIS layer and have been removed from the resource layer; and
  - Solihull: Historical sites available as GIS layer and have been removed from the resource layer.

***Modifications to the data for the resource factor***

- 2.27. There is no ‘off the shelf’ BGS dataset that gives further information on thickness and quality of the mineral resource. Previous iterations of this methodology relied solely on the surface area of the resource on the ground as mapped by the BGS. Consultation responses from the WMRAWP highlighted that this was an inadequate measure of the resource in the region given that there are such large variations in deposit thickness across the region.
- 2.28. In response to the requests via consultation that a finer grain of detail was needed in order to have confidence in using the BGS minerals data as a factor in this method, three minerals planning officers (one a geologist) from the region analysed the

deposit types in the region and using local knowledge, approximated a mean working thickness for each deposit type in each sub-region. The results of their analyses are presented in **Table 2.10**. For hard rock, the minerals planning officers recommended excluding any deposits of Building Stone and Silica Sand.

**Table 2.10: Mean working thickness (m) of deposits by sub-region**

Sub-Region	Sand and gravel		Hard rock		
	Superficial (thickness m)	Bedrock (thickness m)	Igneous (thickness m)	Limestone (thickness m)	Sandstone (thickness m)
Herefordshire	6	24	60	25	-
Shropshire	6	24	60	50	60
Staffordshire	6	24	-	100	-
Warwickshire	6	24	60	16	60
West Midlands County	6	24	60	25	60
Worcestershire	6	24	60	27	-

2.29. Using GIS, and taking each deposit type in turn, these thicknesses were applied to the areas of each deposit in order to convert the area (ha) to a volume (mt). In order to do this, an average bulk density for sand and gravel and hard rock also needed to be used in the calculation. Based on the BGS study in the South East<sup>6</sup>, these bulk density figures were approximated at:

- 1675kg/m<sup>3</sup> for sand and gravel – this is an average of the figures for soft sand (1600kg/m<sup>3</sup>) and sharp sand (1750kg/m<sup>3</sup>); and
- 2600kg/m<sup>3</sup> for hard rock.

2.30. Furthermore, it was decided following the technical consultation that all international nature conservation and heritage designations would be removed from the calculations for ‘unsterilised resource’ to reflect the level of protection that international designations are afforded by the Planning system. The area of these designations was removed from the area of resource prior to converting the area to a tonnage. These designations included:

- Special Areas of Conservation;
- Special Protection Areas;
- Ramsar sites; and

<sup>6</sup> South East England Regional Assembly: South East Plan – Review of Mineral Supply and Demand. Economic Minerals Programme Commissioned Report CR/06/147. British Geological Society 2006.

- World Heritage Sites.
- 2.31. In addition, at the RAWP meeting of 9<sup>th</sup> February 2010, a representation was made by Worcestershire to remove the Malvern Hills Conservators Landholdings from any hard rock resource calculations, as the restriction placed on quarries in the Malvern Hills is considered to be as stringent as an international designation. These landholdings are found on the border of Worcestershire and Herefordshire and are protected by the The Malvern Hills Act 1924 and the 1953 decision of the Minister of Housing and Local Government which defined the physical and time limits of the existing quarries still in existence and secured their permanent closure.
- 2.32. The removal of the hard rock resource that falls within the area covered by this Act is yet to be agreed by the RAWP, but for the purposes of this consultation note, these areas have been excluded from the hard rock calculations.
- 2.33. For sand and gravel, as discussed under Factor 1, in order to better reflect reality, resource calculations for West Midlands County were based on the resource found in Solihull and Walsall only.
- 2.34. **Tables 2.11 and 2.12** show the breakdown of unsterilised resource area by sub-region for sand and gravel and crushed rock and **Figures 1 and 2** show the mapped resource. **Figure 3** shows the international designations and the Malvern Hills Conservators landholdings.

**Table 2.11: Area (ha) and volume (mt) of unsterilised sand and gravel outside of international designations by sub-region**

Sub-region	Area of unsterilised sand and gravel (ha)	Volume of unsterilised sand and gravel (mt)	% of total
Herefordshire	24,036.99	2,415.72	7.48%
Shropshire	79,855.64	10,783.65	33.38%
Staffordshire	52,817.96	11,326.64	35.06%
Warwickshire	36,797.88	3,698.19	11.45%
West Midlands County (Solihull and Walsall only)	5,491.80	862.40	2.67%
Worcestershire	25,036.34	3,222.57	9.97%
<b>West Midlands</b>	<b>224,036.60</b>	<b>32,309.16</b>	<b>100.00%</b>

Source: BGS and MPAs (for worked-out/historic sites)

**Table 2.12: Area (ha) and volume (mt) of unsterilised crushed rock outside of international designations and Malvern Hills Conservators landholdings by sub-region**

Sub-region	Area of unsterilised crushed rock (ha)	Volume of unsterilised crushed rock (mt)	% of total volume	% of total volume (when West Mids County is excluded)
Herefordshire	4,596.33	3,132.77	6.11%	6.12%
Shropshire	21,011.25	31,397.80	61.27%	61.33%
Staffordshire	5,798.34	15,075.60	29.42%	29.45%
Warwickshire	1,919.17	1,163.78	2.27%	2.27%
<i>West Midlands County*</i>	<i>65.12</i>	<i>48.94</i>	<i>0.10%</i>	<i>0.00%</i>
Worcestershire	508.98	427.58	0.83%	0.84%
<b>Total</b>	<b>33,899.19</b>	<b>51,246.48</b>	<b>100.00%</b>	<b>100.00%</b>

Source: BGS and MPAs (for worked-out/historic sites)

\* Although the BGS data shows 65.12ha of unsterilised crushed rock in West Midlands County, the reserves are known to be exhausted and this will be set to zero for the apportionment. See para 2.35

- 2.35. Despite the BGS data showing that there is some crushed rock resource in West Midlands County, the reserves have been exhausted and the last quarry in the area has ceased production<sup>7</sup>. For this reason, the area used in the apportionment methodology for crushed rock will be set to zero so that West Midlands County receives no apportionment for crushed rock.

***Further considerations for factor 3 as highlighted by consultation***

- 2.36. Two other issues raised during the technical consultation were considered when refining the resource data: viable transport and location of existing mineral sites.

**Viable transportation and proximity to markets**

- 2.37. Proximity of minerals to markets was raised as an issue during consultation. It was felt that the LUC methodology needed to better reflect the potential barriers with regards to transporting minerals around the Region. An economist for the Minerals Products Association was consulted and suggested that a distance of 38km could be used to reflect the distance within which it is economically viable to transport minerals by road.
- 2.38. A buffer of 38km was applied to the Major Urban Areas (MUAs) and Settlements of Significant Development beyond MUAs (defined in the West Midlands Regional Spatial Strategy) to approximate the viable transport distance, as these settlements are likely to generate most of the demand for aggregates. These buffers covered almost the entire Region and it was decided therefore that introducing this further constraint to the resource data would not have a significant effect on the resulting

<sup>7</sup> West Midlands Regional Aggregate Working Party Annual Report 2007.

apportionment options. The 38km buffers are illustrated in **Figure 4** overlaid onto the sand and gravel resource data. . At the 9<sup>th</sup> February RAWP meeting, it was acknowledged that the inclusion of past sales data (factor 2) already presents a proxy for viable transport distances, as the pattern of past sales reflects the historic proximity of resource to market.

#### **Existing minerals allocations, preferred minerals areas and existing sites**

- 2.39. A further suggestion was to restrict the area of resource to the areas within each MPA sub-region which are/have:
- Existing extraction permissions;
  - Allocated sites in development plans; and
  - Preferred areas or potential sites preferred by developers in emerging Minerals development plan documents.
- 2.40. It was not possible to obtain all of these sites for the Region in the timescale, and from the data that was obtained, it was decided that this would limit the resource data to too large an extent. The data that was provided in GIS format is presented in **Figure 5**.

### **FACTOR 4: CONSTRAINTS**

- 2.41. Data for this factor were the area (ha) of unsterilised resource outside of international and national designations, converted to a volume using the mean working thickness and bulk density figures discussed under Factor 3. All of these data are available as GIS layers from Natural England and English Heritage, and are shown in **Figure 6**.
- 2.42. The four international designations considered for this factor are listed below:
- Special Areas of Conservation;
  - Special Protection Areas;
  - Ramsar sites; and
  - World Heritage Sites.
- 2.43. In addition to the international designations, as discussed under Factor 3, the Malvern Hills Conservators Landholdings were also excluded.
- 2.44. The eight national designations considered for this factor are listed below:
- Sites of Special Scientific Interest;
  - Areas of Outstanding Natural Beauty;

- National Nature Reserves;
- National Parks;
- Scheduled Ancient Monuments;
- Registered Parks and Gardens;
- Registered Battlefields; and
- Listed Buildings.

2.45. All of the layers are available as polygons (i.e. they have an area or footprint) except for the Listed Building data, which are available as both points (i.e. with no associated footprint/area) and polygons. In order to exclude the area covered by Listed Buildings where data were only available as a centre point, a notional 10m buffer was applied to each point in order to give each Listed Building a footprint. These constraint layers were aggregated in GIS and removed from the resource calculations.

2.46. **Tables 2.13 and 2.14** show the areas of resource outside of international and national designations that were used in this calculation. **Figures 7 and 8** show the spatial relationship between each of the deposit types and these designations.

**Table 2.13: Areas (ha) and volume (mt) of unsterilised sand and gravel outside of constraints**

Sub-region	Area of unsterilised sand and gravel outside of international and national designations (ha)	Volume of unsterilised sand and gravel outside of international and national designations (mt)	% of total
Herefordshire	22,116.26	2,222.68	7.64%
Shropshire	74,202.16	10,176.63	34.97%
Staffordshire	47,397.64	9,312.55	32.00%
Warwickshire	34,742.94	3,491.67	12.00%
West Midlands County (Solihull and Walsall only)	5,408.48	850.98	2.92%
Worcestershire	23,437.05	3,047.46	10.47%
<b>West Midlands</b>	<b>207,304.53</b>	<b>29,101.97</b>	<b>100.00%</b>

**Table 2.14: Areas (ha) and volume (mt) of unsterilised crushed rock outside of constraints**

Sub-region	Area of unsterilised crushed rock outside of international and national designations (ha)	Volume of unsterilised crushed rock outside of international and national designations (mt)	% of total volume	% of total volume (when West Midlands County is excluded)
Herefordshire	3,032.33	2,042.49	10.32%	10.34%
Shropshire	8,725.95	12,909.77	65.20%	65.34%
Staffordshire	1,537.39	3,997.16	20.19%	20.23%
Warwickshire	738.22	626.14	3.16%	3.17%
<i>West Midlands County*</i>	<i>52.18</i>	<i>40.51</i>	<i>0.00</i>	<i>0.00</i>
Worcestershire	197.46	183.11	0.92%	0.93%
<b>West Midlands</b>	<b>14,283.52</b>	<b>19,799.19</b>	<b>100.00%</b>	<b>100.00%</b>

Source: BGS, MPAs, Natural England and English Heritage

\* Although the BGS data shows 52.18ha of unsterilised crushed rock outside of designations in West Midlands County, the reserves are known to be exhausted and this will be set to zero for the apportionment. See para 2.35

## DEVELOPMENT OF OPTIONS

2.47. An initial set of 'extreme' options was consulted on between December 2009 and January 2010. Each of these options was 'led' by a particular factor, by applying the highest weighting to that factor:

- **Option A: Supply-led** weighted 70% on the supply (i.e. the location of the unsterilised resource), and 10% for each of the other factors (with a 6:4 ratio for future : current demand);
- **Option B: Growth-led** weighted 70% on demand (with a 6:4 ratio for future: current demand), and 10% for each of the other factors;
- **Option C: Environment-led** weighted 70% on constraints (i.e. the area of sterilised resource outside of environmental, landscape and heritage constraints), and 10% for each of the other factors (with a 6:4 ratio for future : current demand);
- **Option D: Equal weighting** weighted 25% for all the factors (with a 6:4 ratio for future : current demand); plus an additional option:

- **Option E: Demand and resource** weighted 40% on demand (with a 6:4 ratio for future: current demand), 40% on supply (the location of the unsterilised resource) and 10% each for past sales and constraints.
- 2.48. The technical consultation showed that none of these options presented a preferred option, and due to the 'extreme' weighting, few represented viable options in practical terms. These options did however serve a purpose which was to demonstrate the principle of weighting used in the LUC methodology, and the effect that each factor has on the resulting sub-regional apportionment.
- 2.49. Feedback from the technical consultation showed a strong opinion to test the LUC method on a sales-led option. Using this feedback, two new, sales-led options were developed for the WMRAWP meeting on 9<sup>th</sup> February. These revised options are the subject of this current consultation paper, and are described below.

## REVISED OPTIONS FOR APPRAISAL

- 2.50. Following technical consultation, it was decided to only proceed with the two sales-led options. These two new options are:
- **Option F: Past sales-led** weighted 70% on past sales, and 10% for each of the other factors (with a 6:4 ratio for future : current demand); and
  - **Refined Option F: Past sales led but with phasing** weighted 100% on past sales in the early years of the apportionment period (2011-2012), 90% weighting to past sales 2013-2015 decreasing to 70% in 2016-2020, so still the highest weighting to past sales, and distributing equal weighting to the remaining factors.
- 2.51. Note that for sand and gravel, both options have been developed using past sales data for a five year and a ten year period. The results of this consultation should demonstrate a preference for one of these two time periods and will inform the options that go forward.
- 2.52. **Table 2.15** illustrates the weightings to be used for Option F and the final percentages to be used once the ratios have been applied for Factor I.

**Table 2.15: Weighting for Option F**

Factor		Option F: Past sales-led (weighting per factor)	Option F: Past sales-led (weighting per factor once Factor 1a:1b ratios have been applied)
<b>1: Demand</b>	a: future housing/infrastructure	10%	6%
	1b: current refurbishment and redevelopment)		4%
<b>2: Past sales</b>		<b>70%</b>	<b>70%</b>
<b>3: The resource</b>		10%	10%
<b>4: Constraints</b>		10%	10%

2.53. **Table 2.16** shows the weightings to be applied at each phase for refined option F. **Table 2.17** shows the weightings to be applied during each of the time periods for refined option F once the ratios for factor 1 have been applied.

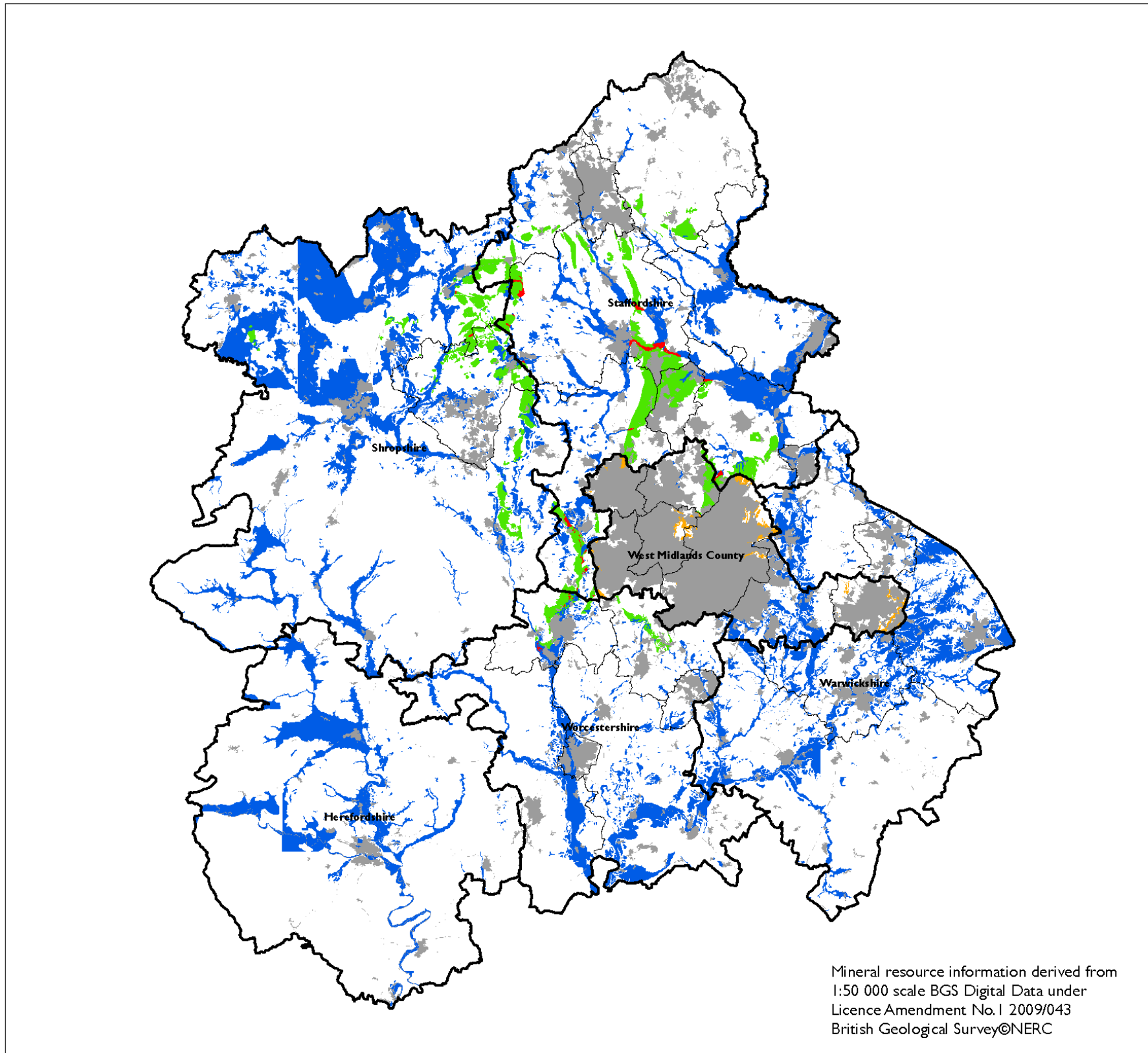
**Table 2.16: Weighting for Refined Option F**

Factor	2005-2010	2011-2012	2013-2015	2016-2020
<b>1: Demand</b> (split 60/40 between 1a: future housing/infrastructure and 1b: current refurbishment and redevelopment)	Current apportionment	0%	3.3%	10%
<b>2: Past sales</b>		<b>100%</b>	<b>90%</b>	<b>70%</b>
<b>3: The resource</b>		0%	3.3%	10%
<b>4: Constraints</b>		0%	3.3%	10%

**Table 2.17: Weighting for Refined Option F with Factor Ia:Ib ratios applied**

<b>Factor</b>	<b>2005-2010</b>	<b>2011-2012</b>	<b>2013-2015</b>	<b>2016-2020</b>
<b>I: Demand</b> (split 60/40 between Ia: future housing/infrastructure and Ib: current refurbishment and redevelopment)	<b>Current apportionment</b>	0%	2%	6%
1.3%			4%	
<b>2: Past sales</b>		<b>100%</b>	<b>90%</b>	<b>70%</b>
<b>3: The resource</b>		0%	3.3%	10%
<b>4: Constraints</b>		0%	3.3%	10%

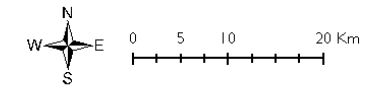
- 2.54. Data for Factors 1 to 4 were entered into the Microsoft Excel based database, and using multi-criteria analysis, the weightings of each factor could be adjusted to reflect the options that were developed.
- 2.55. The results of applying these options to the sub-regional apportionment are discussed and illustrated in the next section.



**West Midlands Sub-Regional Apportionment**  
**Figure 1: Unsterilised sand and gravel resource outside of International Designations (Factor 3)**

**Key**

- Sub-Regions
- Local Authority boundaries
- Sterilising factors including:  
Urban areas  
Transport infrastructure  
Worked-out/historic sand and gravel sites  
International designations
- Deposit**
- Bedrock sand and gravel (24m thickness)
- Superficial sand and gravel (6m thickness)
- Bedrock and superficial sand and gravel (24m+6m thickness)
- Resource excluded from West Midlands County



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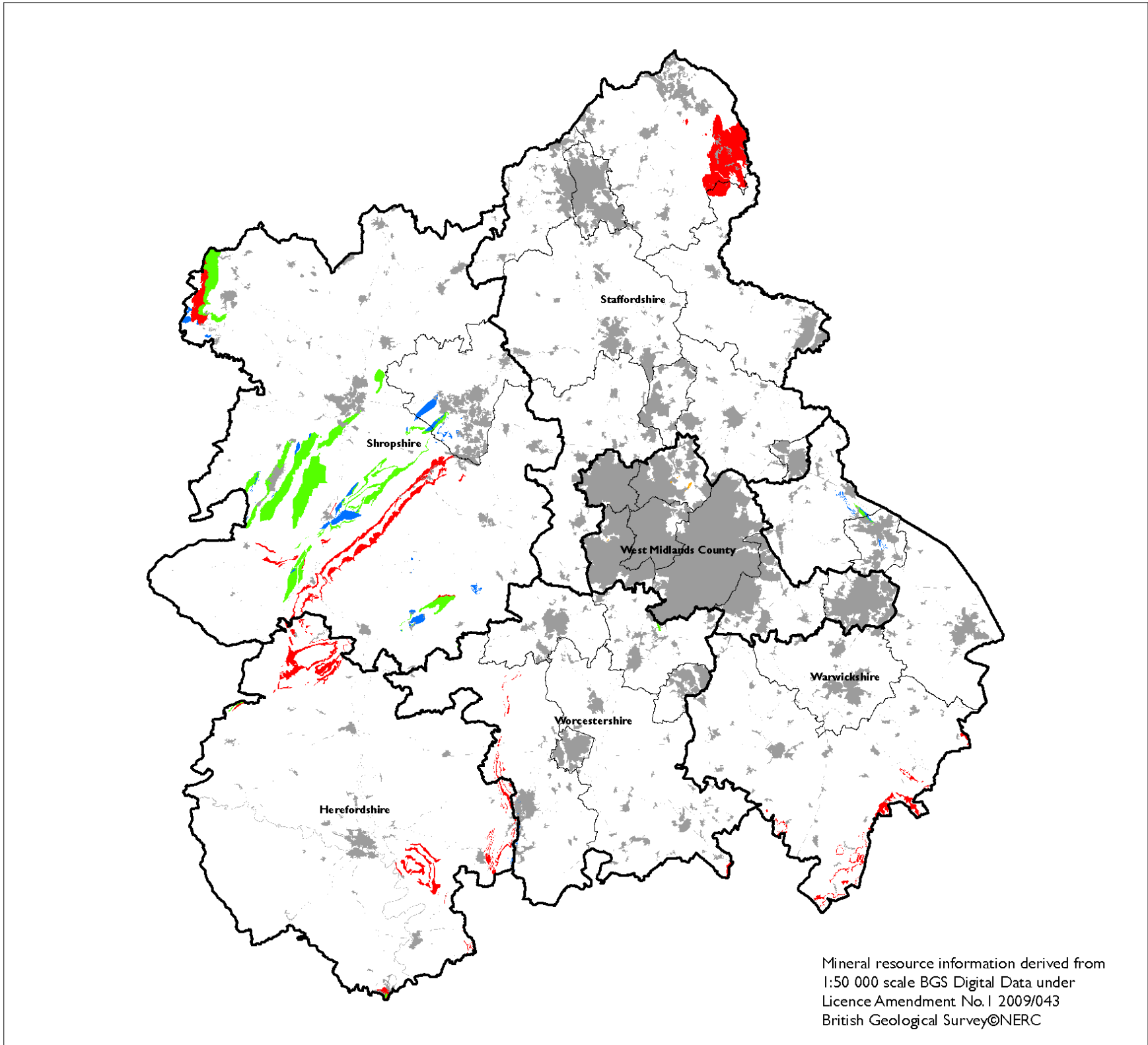
Source: WMRA, BGS, Ordnance Survey, MPAs, Natural England, English Heritage

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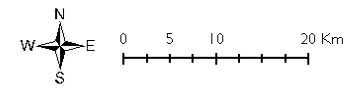
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**West Midlands Sub-Regional Apportionment**  
**Figure 2: Unsterilised hard rock resource outside of International Designations and Malvern Hills Conservators landholdings (Factor 3)**

**Key**

- Sub-Regions
- Local Authority boundaries
- Sterilising factors including:**
  - Urban areas
  - Transport infrastructure
  - Worked-out/historic crushed rock sites
  - International designations
  - Malvern Hills Conservators landholdings
- Deposit**
  - Igneous (60m thickness across all sub-regions)
  - Limestone-including crushed rock (varies from 16m in Warks to 100m thick in Staffs)
  - Sandstone-excluding building stone (60m thickness across all sub-regions)
  - Resource excluded from West Midlands County



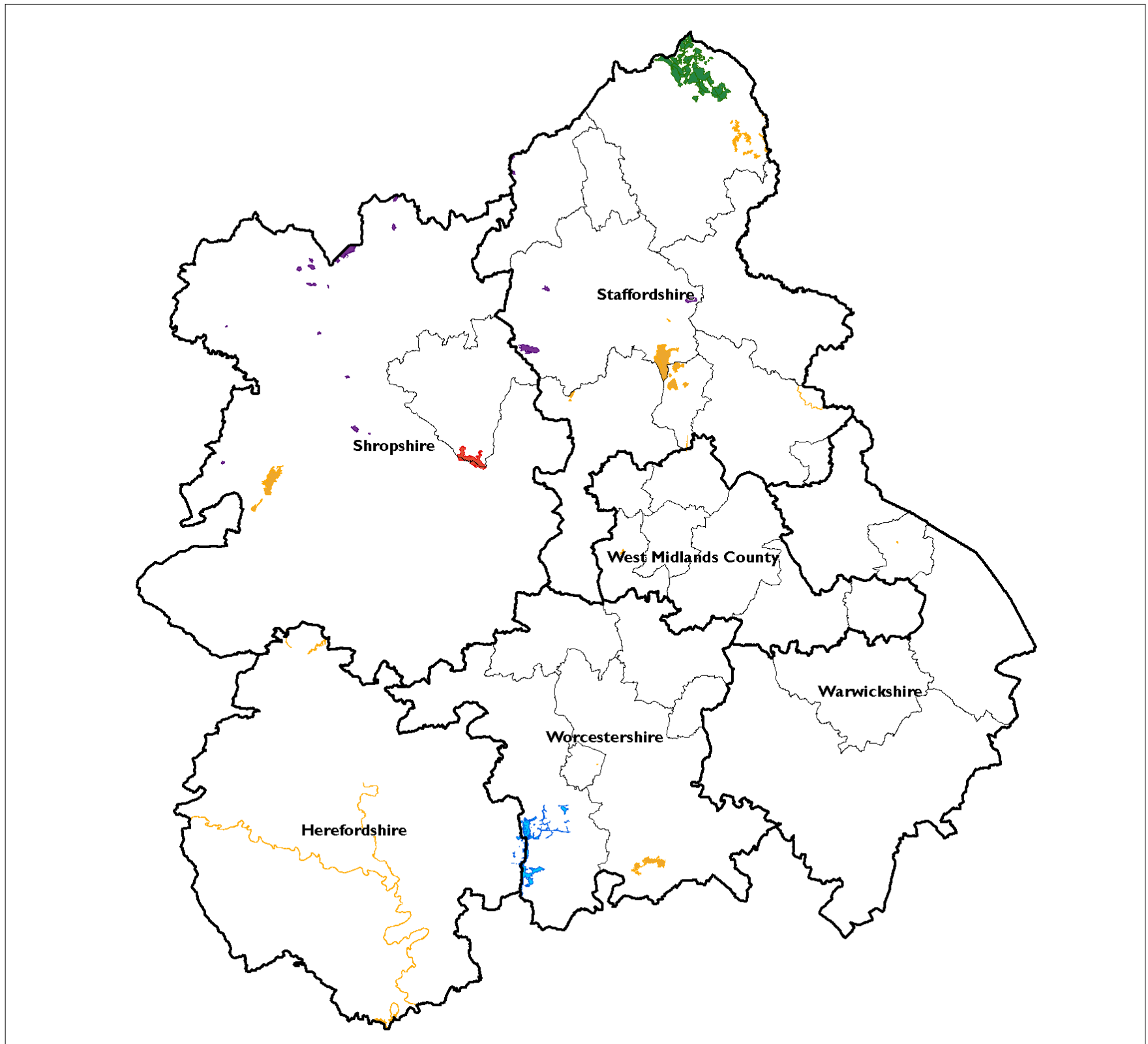
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Source: WMRA, BGS, Ordnance Survey, MPAs, Natural England, English Heritage, Malvern Hills Conservators  
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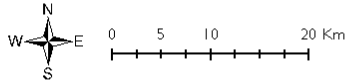


**West Midlands Sub-Regional Apportionment**

**Figure 3: International designations and Malvern Hills Conservators landholdings (Factor 3)**

**Key**

-  Sub Regions
-  Local Authority boundaries
-  Ramsar sites
-  Special Protection Areas
-  Special Areas of Conservation
-  World Heritage Sites
-  Malvern Hills Conservators landholdings (for Crushed Rock only)



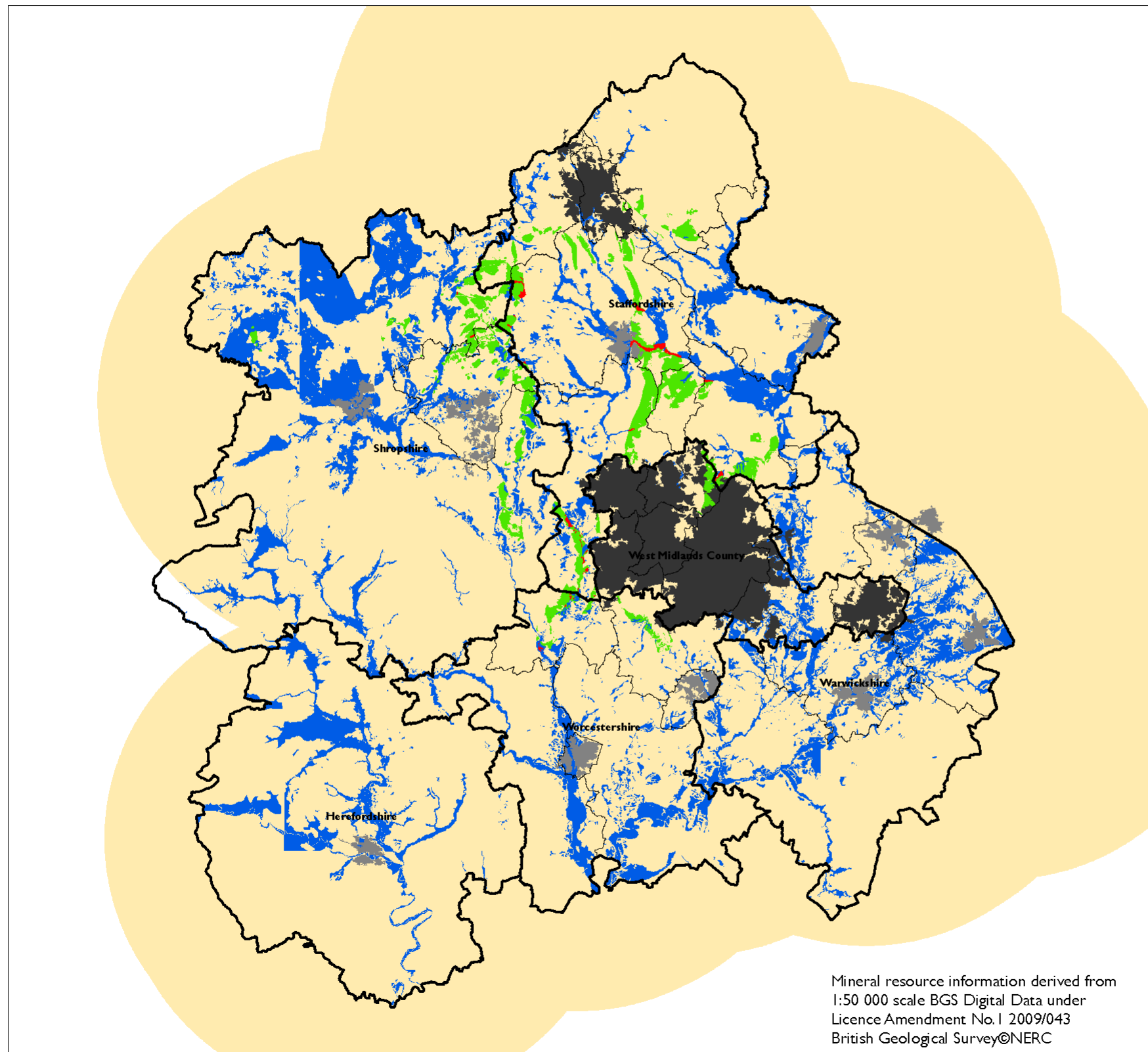
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Source: English Heritage, Natural England, Malvern Hills Conservators

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**West Midlands Sub-Regional Apportionment**  
**Figure 4: Major Urban Areas and Settlements of Significant Development with a 38km buffer**

**Key**

- Sub-Regions
- Local Authority boundaries
- 38km buffer around MUAs and SSDs
- Major Urban Areas
- Settlements of Significant Development

**Deposit**

- Bedrock sand and gravel (24m thickness)
- Superficial sand and gravel (6m thickness)
- Bedrock and superficial sand and gravel (24m+6m thickness)

N  
W E  
S

0 5 10 20 Km

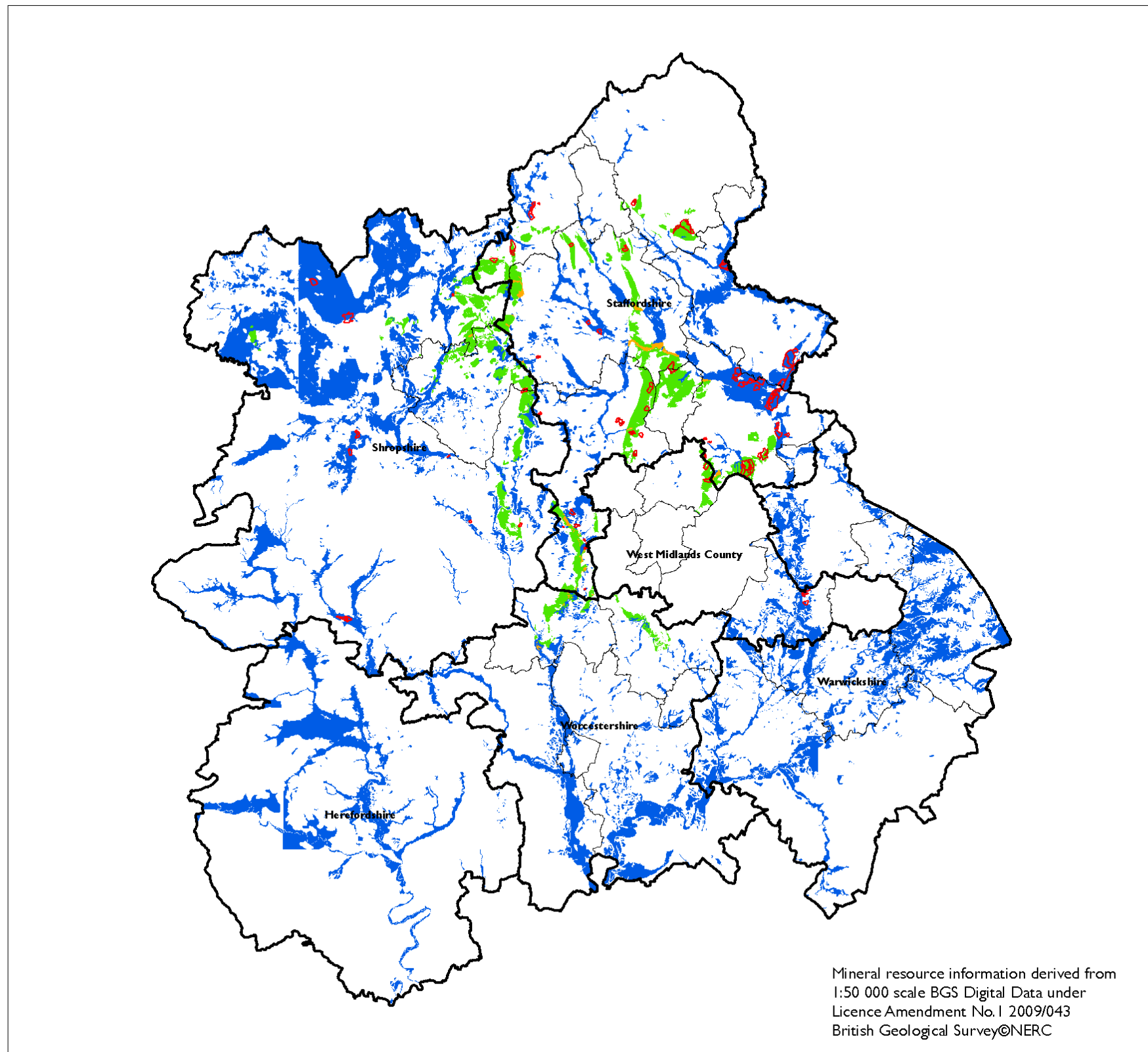
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Source: WMRA, BGS, ONS

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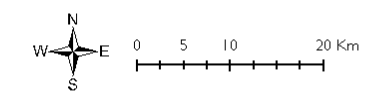
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**West Midlands Sub-Regional Apportionment**  
**Figure 5: Data collection exercise**

- Key**
- Sub-Regions
  - Local Authority boundaries
  - Existing permissions, areas of search, allocations
- Deposit**
- Bedrock sand and gravel (24m thickness)
  - Superficial sand and gravel (6m thickness)
  - Bedrock and superficial sand and gravel (24m+6m thickness)

**Please note:**  
 Data collection is incomplete at time of producing this map. Results are summarised below:  
 Herefordshire: Sites need to be digitised so are not illustrated on this map.  
 Shropshire: No data available on preferred areas/potential sites as study is not complete.  
 Warwickshire: No data received.  
 Worcestershire: Revised BGS data sent, but not yet received.  
 Staffordshire, Solihull and Walsall: Data shown on map.



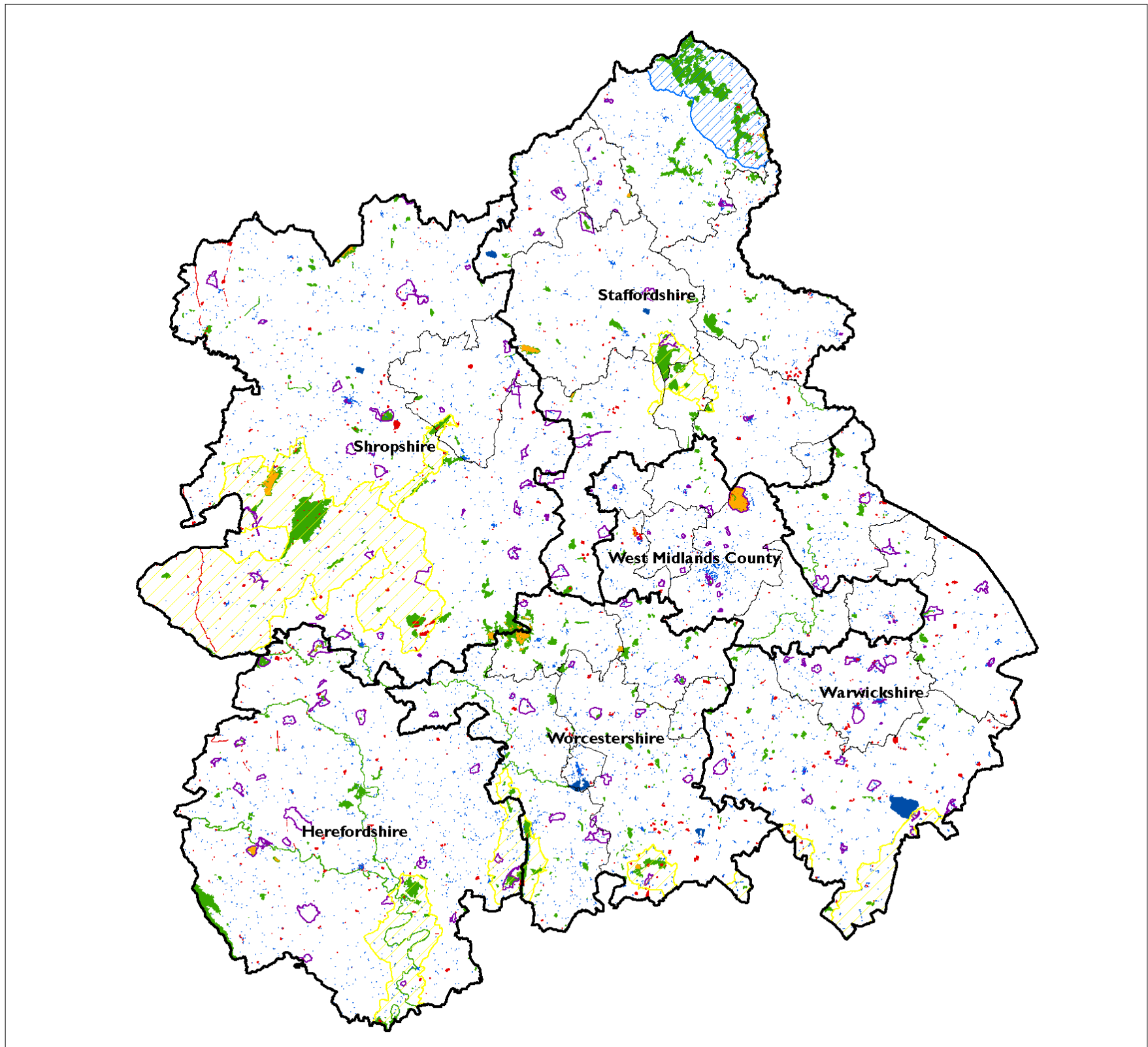
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Source: WMRA, BGS, Ordnance Survey, MPAs

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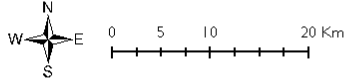


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**West Midlands Sub-Regional Apportionment**  
**Figure 6: National designations (Factor 4)**

- Key**
-  Sub Regions
  -  Local Authority boundaries
  -  Areas of Outstanding Natural Beauty
  -  Historic Parks and Gardens
  -  National Parks
  -  Listed Buildings (converted to a footprint)
  -  Battlefields
  -  National Nature Reserves
  -  Scheduled Monuments
  -  Sites of Special Scientific Interest

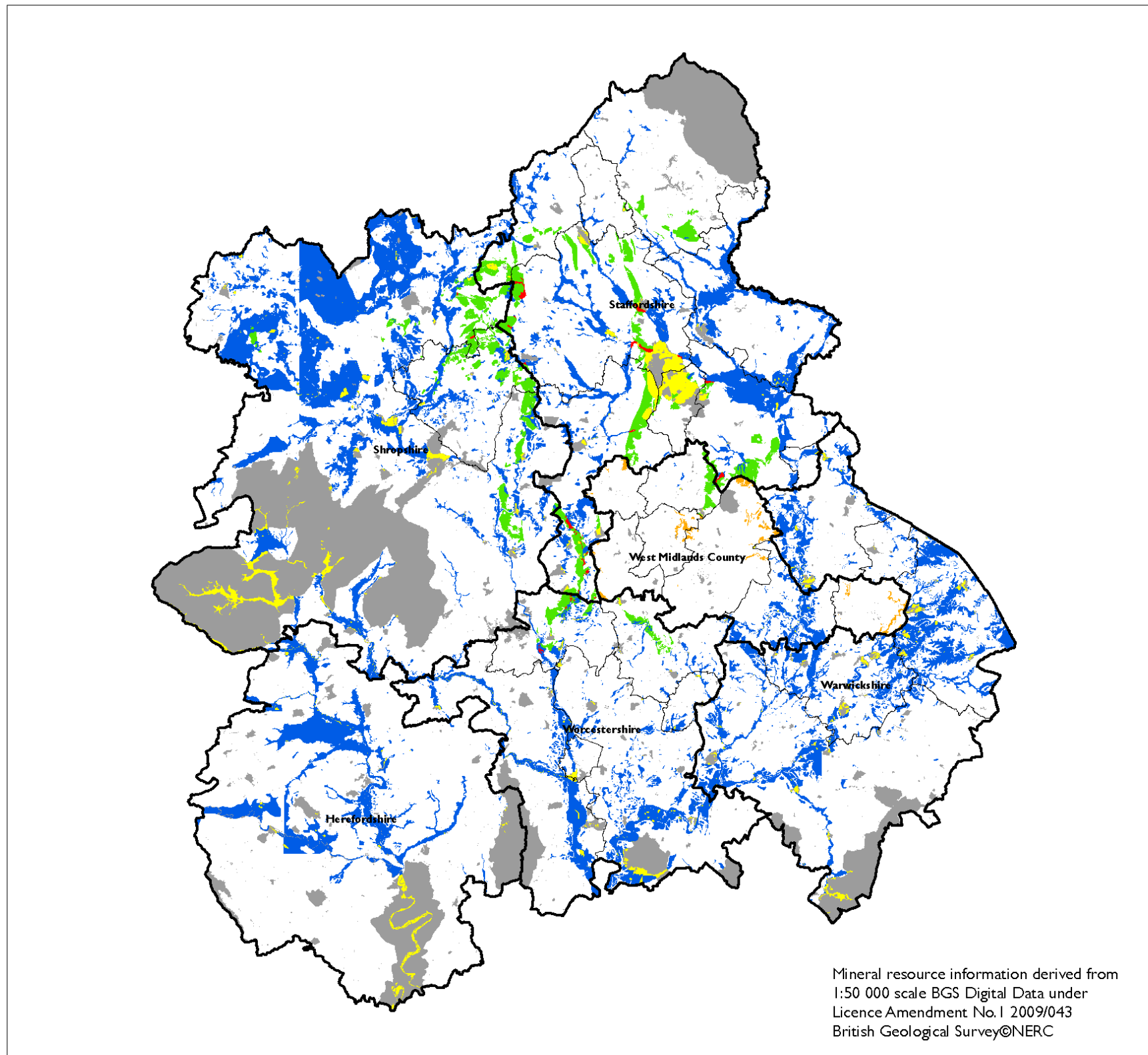


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 Source: English Heritage and Natural England

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








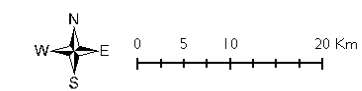
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**West Midlands Sub-Regional Apportionment**  
**Figure 7: Unsterilised sand and gravel resource outside of constraints Factor 4)**

**Key**

-  Sub-Regions
-  Local Authority boundaries
-  International and national designations
- Deposit**
-  Bedrock sand and gravel (24m thickness)
-  Superficial sand and gravel (6m thickness)
-  Bedrock and superficial sand and gravel (24m+6m thickness)
-  Resource excluded from West Midlands County
-  Sand and gravel resource excluded due to national designations



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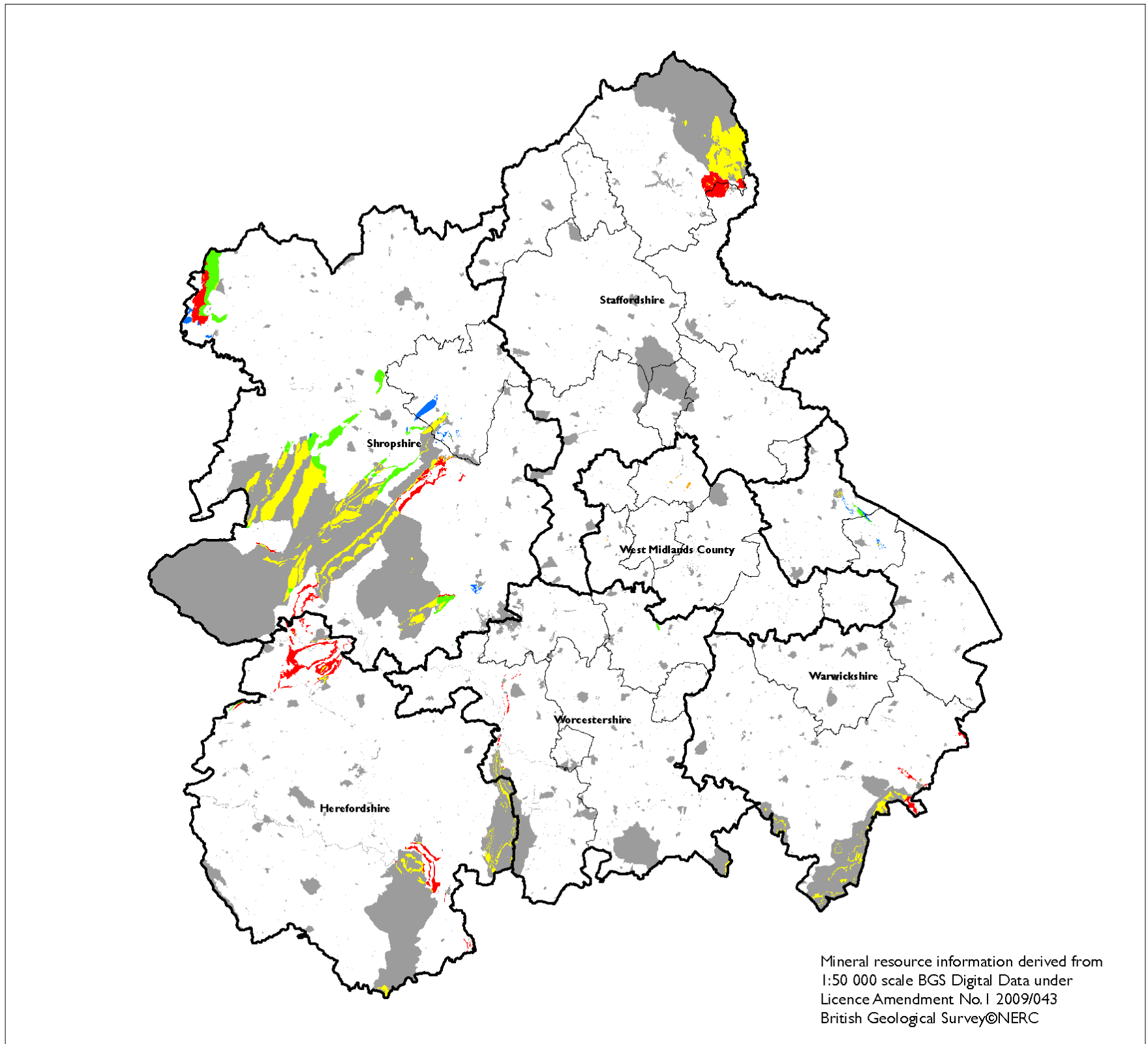
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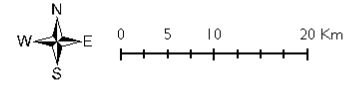
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**West Midlands Sub-Regional Apportionment**  
**Figure 8: Unsterilised rock resource outside of constraints (Factor 4)**

- Key**
- Sub-Regions
  - Local Authority boundaries
  - International and national designations
- Deposit**
- Igneous (60m thickness across all sub-regions)
  - Limestone-including crushed rock (varies from 16m in Warks to 100m thick in Staffs)
  - Sandstone-excluding building stone (60m thickness across all sub-regions)
  - Rock resource excluded due to national designations
  - Resource excluded from West Midlands County



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Source: WMRA, BGS, Ordnance Survey, MPAs, Natural England, English Heritage

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### 3. FINDINGS

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- 3.1. The resulting sub-regional apportionments for the two additional past sales options introduced at the end of **Section 2** of this paper are shown below. For both sand and gravel and crushed rock, a summary graph and tables illustrate the outcomes of applying the apportionment methodology for each of the two new options. In the case of sand and gravel, each option is presented using five year sales data and ten year sales data, as this dataset still needs to be agreed.
- 3.2. The sub-regional apportionment has been expressed as a percentage of the regional total that each sub-region will need to provide for each resource type. Percentages have been used so that if the overall regional supply figures change (e.g. in the future or if a higher rate of recycled aggregate provision was to be agreed for the region), the methodology is flexible enough to accommodate these changes. These percentages have then been translated into volumes (million tonnes) of aggregate to be supplied based on the regional guideline supply figure. The current apportionment is also included in the tables and charts for comparison.

#### SAND AND GRAVEL (FIVE YEAR SALES DATA)

- 3.3. **Table 3.1** shows the results of the revised sub-regional apportionment options F and Refined F for land-won sand and gravel using a five year sales average as the data for factor 2. A comparison has been made between the options and the current apportionment. **Table 3.2** shows the percentages translated into million tonnes (mt) based on achieving an overall Regional total of 165mt.

**Table 3.1: Summary of sand and gravel sub-regional apportionment options with five year sales data (percentages)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales (averaged over 2005-2020)	Current apportionment
Herefordshire	4.33%	3.26%	2.80%
Shropshire	14.56%	10.63%	8.10%
Staffordshire	55.07%	61.39%	65.20%
Warwickshire	11.03%	10.47%	10.30%
West Midlands County	5.39%	5.33%	5.00%
Worcestershire	9.61%	8.92%	8.60%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

**Table 3.2: Summary of sand and gravel sub-regional apportionment options with five year sales data (million tonnes)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales	Current apportionment
Herefordshire	7.14	5.39	4.61
Shropshire	24.03	17.53	13.36
Staffordshire	90.87	101.30	107.59
Warwickshire	18.21	17.28	17.00
West Midlands County	8.89	8.79	8.25
Worcestershire	15.86	14.71	14.19
<b>West Midlands</b>	<b>165.0</b>	<b>165.0</b>	<b>165.0</b>

- 3.4. In order to generate an overall summary figure for each sub-region under Refined option F, the contribution for each of the time periods was calculated. This breakdown is illustrated in **Table 3.3**.

**Table 3.3: Refined option F for sand and gravel with five year sales data broken down by time period phase**

Sub-region	2005-2010	2011-2012	2013-2015	2016-2020
Herefordshire	2.80%	2.35%	3.01%	4.33%
Shropshire	8.10%	8.40%	10.46%	14.56%
Staffordshire	65.20%	65.32%	61.91%	55.07%
Warwickshire	10.30%	9.88%	10.27%	11.03%
West Midlands County	5.00%	5.72%	5.61%	5.39%
Worcestershire	8.60%	8.32%	8.75%	9.61%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

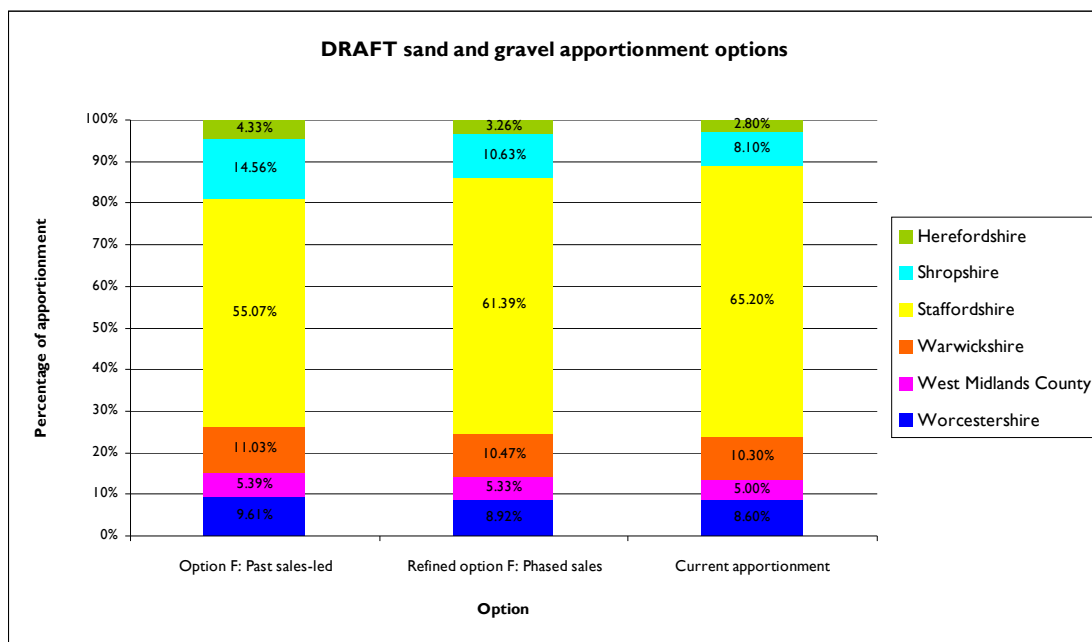
- 3.5. A total contribution in million tonnes for each phase can be calculated based on a total apportionment of 165mt over the full 16 year time period (2005-2020). It is assumed that for years 2005-2010 (6 years in total), regional production has been in line with the current apportionment (i.e. producing 10.13mt per annum across the region) – equating to a total of 60.75mt for 2005-2010. For the remainder of the time period 2011-2020 (10 years in total), 104.25mt still needs to be produced by the region (to meet the new regional supply total of 165mt), giving an average figure for the region of 10.425mt per annum. Based on producing 10.425mt per year for years 2011-2020, **Table 3.4** shows the contributions that will need to be made by each sub-region for each phase of the apportionment period under Refined option F.

**Table 3.4: Refined option F for sand and gravel with five year sales data broken down by phase and expressed as a volume (mt)**

Sub-region	2005-2010	2011-2012	2013-2015	2016-2020	2005-2020	Overall percentage (averaged over 2005-2020)%
Herefordshire	1.70	0.49	0.94	2.26	5.39	3.26%
Shropshire	4.92	1.75	3.27	7.59	17.53	10.63%
Staffordshire	39.61	13.62	19.36	28.71	101.30	61.39%
Warwickshire	6.26	2.06	3.21	5.75	17.28	10.47%
West Midlands County	3.04	1.19	1.75	2.81	8.79	5.33%
Worcestershire	5.23	1.73	2.74	5.01	14.71	8.92%
<b>West Midlands</b>	<b>60.75</b>	<b>20.85</b>	<b>31.28</b>	<b>52.13</b>	<b>165.00</b>	<b>100.00%</b>

3.6. **Figure 9** illustrates these options expressed as a percentage.

**Figure 9: Illustrative comparison of revised sand and gravel sub-regional apportionment options (with five year sales data)**



3.7. Under the current apportionment, Staffordshire is required to provide over 65% of the regional sand and gravel total. Using five year sales data, under options F and refined option F, there is a reduction in Staffordshire’s apportionment. The result of this decrease for Staffordshire is an increase in the apportionment for all other sub-regions under the two new options F and Refined F.

3.8. The increases are less dramatic than those generated under options A to E, and the increase in West Midlands County has been tempered by the exclusion of resource outside of Solihull and Walsall and the consequent redistribution of demand.

## SAND AND GRAVEL (TEN YEAR SALES DATA)

- 3.9. **Table 3.5** shows the results of the revised sub-regional apportionment options for land-won sand and gravel using the ten year sales average for factor 2. A comparison has been made between the two new options and the current apportionment. **Table 3.6** shows the percentages translated into million tonnes (mt) based on achieving an overall Regional total of 165mt.

**Table 3.5: Summary of sand and gravel sub-regional apportionment options with ten year sales data (percentages)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales (averaged over 2005-2020)	Current apportionment
Herefordshire	4.48%	3.38%	2.80%
Shropshire	14.51%	10.59%	8.10%
Staffordshire	54.91%	61.27%	65.20%
Warwickshire	11.19%	10.59%	10.30%
West Midlands County	5.12%	5.13%	5.00%
Worcestershire	9.79%	9.04%	8.60%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

**Table 3.6: Summary of sand and gravel sub-regional apportionment options with ten year sales data (million tonnes)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales	Current apportionment
Herefordshire	7.40	5.57	4.61
Shropshire	23.95	17.47	13.36
Staffordshire	90.60	101.10	107.59
Warwickshire	18.46	17.47	17.00
West Midlands County	8.45	8.46	8.25
Worcestershire	16.15	14.92	14.19
<b>West Midlands</b>	<b>165.0</b>	<b>165.0</b>	<b>165.0</b>

- 3.10. In order to generate a summary figure for refined option F, the contribution for each of the time periods was calculated in the same way as described above. This breakdown is illustrated as percentages in **Table 3.7**. **Table 2.8** shows the contributions in millions tonnes that will need to be made by each sub-region for each phase of the apportionment period.

**Table 3.7: Refined option F for sand and gravel with ten year sales data broken down by phase (expressed as a percentage)**

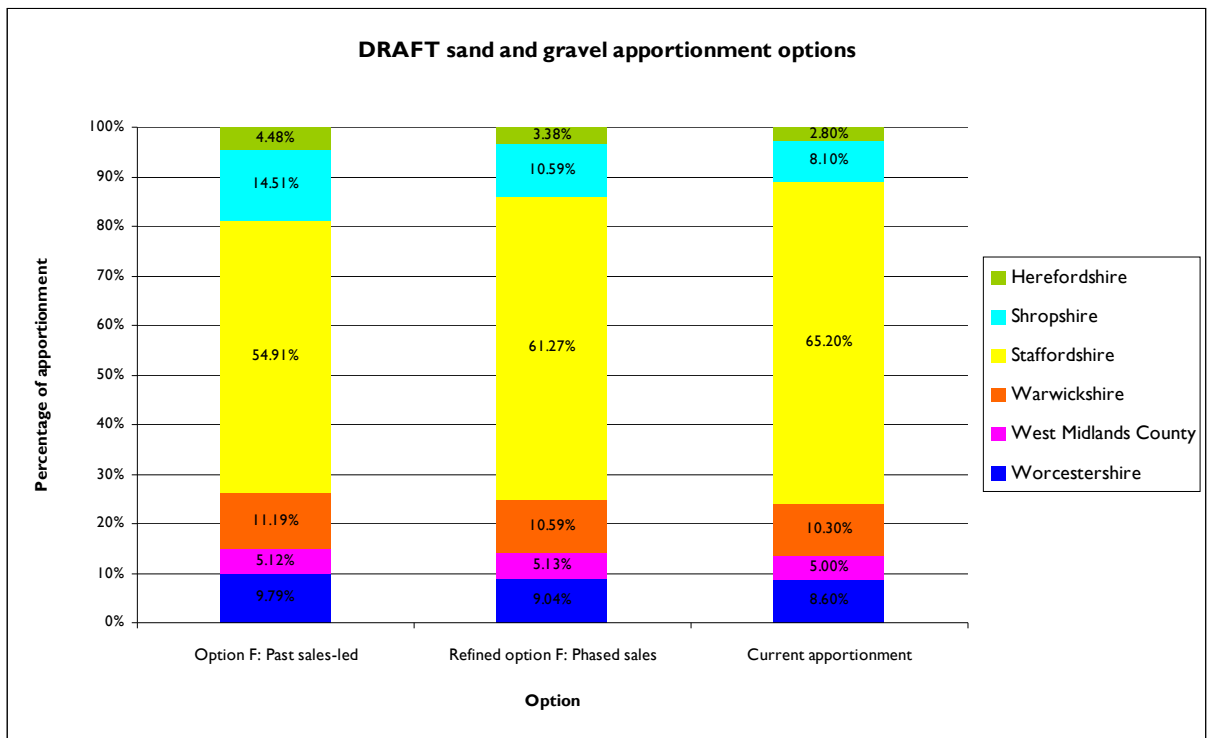
Sub-region	2005-2010	2011-2012	2013-2015	2016-2020
Herefordshire	2.80%	2.57%	3.21%	4.48%
Shropshire	8.10%	8.33%	10.39%	14.51%
Staffordshire	65.20%	65.09%	61.70%	54.91%
Warwickshire	10.30%	10.10%	10.46%	11.19%
West Midlands County	5.00%	5.34%	5.26%	5.12%
Worcestershire	8.60%	8.57%	8.97%	9.79%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

**Table 3.8: Refined option F for sand and gravel with ten year sales data broken down by phase and expressed as a volume (mt)**

Sub-region	2005-2010	2011-2012	2013-2015	2016-2020	2005-2020	Overall percentage (averaged over 2005-2020)%
Herefordshire	1.70	0.54	1.00	2.34	5.57	3.38%
Shropshire	4.92	1.74	3.25	7.56	17.47	10.59%
Staffordshire	39.61	13.57	19.30	28.62	101.10	61.27%
Warwickshire	6.26	2.11	3.27	5.83	17.47	10.59%
West Midlands County	3.04	1.11	1.65	2.67	8.46	5.13%
Worcestershire	5.23	1.79	2.81	5.10	14.92	9.04%
<b>West Midlands</b>	<b>60.75</b>	<b>20.85</b>	<b>31.28</b>	<b>52.13</b>	<b>165.00</b>	<b>100.00%</b>

3.11. **Figure 10** illustrates these options expressed as a percentage.

**Figure 10: Illustrative comparison of revised sand and gravel sub-regional apportionment options (with ten year sales data)**



- 3.12. Under the current apportionment, Staffordshire is required to provide over 65% of the regional sand and gravel total. Using ten year sales data, under options F and Refined option F, there is a reduction in Staffordshire’s apportionment which is slightly greater than when five year sales data is used. This reflects a lower overall percentage contribution of sales by Staffordshire over the longer timescale compared to the five year timescale. The result of this decrease for Staffordshire is an increase in the apportionment for all other sub-regions under all the options.
- 3.13. A comparison between the options using five and ten year data also shows a slightly higher apportionment for Herefordshire and Warwickshire using ten year data reflecting a higher longer term percentage sales contribution by these two sub-regions compared to the five year contribution.
- 3.14. The increases are less dramatic than those generated under options A to E, and the increase in West Midlands County has been tempered by the exclusion of resource outside of Solihull and Walsall and the consequent redistribution of demand.

## CRUSHED ROCK

- 3.15. **Table 3.9** shows the results of the sub-regional apportionment options for crushed rock expressed as a percentage of the Regional total. A comparison has been made between the options and the current apportionment. **Table 3.10** shows the percentages translated into million tonnes (mt) based on achieving an overall Regional total of 82mt. As the current apportionment has been used as a proxy for past sales of crushed rock (as explained in Section 2), these options have only been developed

once for crushed rock, instead of different versions for five and ten year data (as for sand and gravel).

- 3.16. As per paragraph 2.35, no apportionment has been given to West Midlands County on account of the reserves having been exhausted<sup>8</sup> - despite the BGS resource data showing that there is a very small amount of resource in this sub-region.

**Table 3.9: Summary of crushed rock sub-regional apportionment options F and Refined F (percentages)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales (averaged over 2005-2020)	Current apportionment
Herefordshire	7.12%	7.24%	7.30%
Shropshire	51.66%	51.06%	50.75%
Staffordshire	23.61%	23.87%	24.01%
Warwickshire	14.54%	14.93%	15.14%
West Midlands County	0.00%	0.00%	0.00%
Worcestershire	3.08%	2.90%	2.81%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

**Table 3.10: Summary of crushed rock sub-regional apportionment options F and Refined F (million tonnes)**

Sub-region	Option F: Past sales-led	Refined Option F: Phased sales	Current apportionment
Herefordshire	5.84	5.93	5.98
Shropshire	42.36	41.87	41.61
Staffordshire	19.36	19.57	19.69
Warwickshire	11.92	12.25	12.42
West Midlands County	0.00	0.00	0.00
Worcestershire	2.53	2.38	2.30
<b>West Midlands</b>	<b>82.00</b>	<b>82.00</b>	<b>82.00</b>

- 3.17. In order to generate a summary figure for refined option F, the contribution for each of the time periods was calculated. This breakdown is illustrated in **Table 3.11**.

<sup>8</sup> West Midlands Regional Aggregate Working Party Annual Report 2007.

**Table 3.11: Refined option F for crushed rock broken down by phase (expressed as a percentage)**

Sub-region	2005-2010	2011-2012	2013-2015	2016-2020
Herefordshire	7.30%	7.30%	7.24%	7.12%
Shropshire	50.75%	50.75%	51.05%	51.66%
Staffordshire	24.01%	24.01%	23.87%	23.61%
Warwickshire	15.14%	15.14%	14.94%	14.54%
West Midlands County	0.00%	0.00%	0.00%	0.00%
Worcestershire	2.81%	2.81%	2.90%	3.08%
<b>West Midlands</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

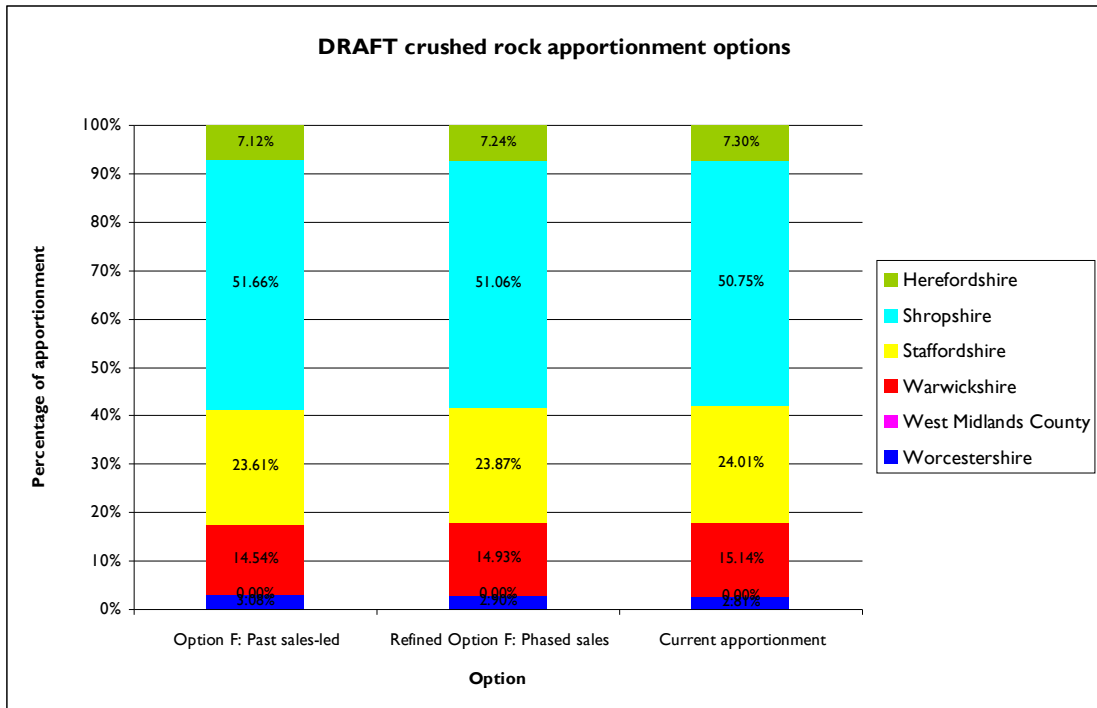
- 3.18. A total contribution in million tonnes for each phase can be calculated based on a total regional production of 82mt over the full 16 year time period. It is assumed that for years 2005 – 2010 (6 years in total), production has been in line with the current apportionment (producing 5.81mt per annum) – equating to a total of 34,87mt over the 6 year period. For the remainder of the time period 2011-2020 (10 years in total), 47.13mt still needs to be produced by the region (to meet the total 82mt regional figure), giving an average contribution of 4.713mt per annum. Based on producing 4.713mt per year for years 2011-2020, **Table 3.12** shows the contributions that will need to be made by each sub-region for each phase of the apportionment period.

**Table 3.12: Refined option F for crushed rock broken down by phase and expressed as a volume (mt)**

Sub-region	2005-2010	2011-2012	2013-2015	2016-2020	2005-2020	Overall percentage (averaged over 2005-2020)%
Herefordshire	2.54	0.69	1.02	1.68	5.93	<b>7.24%</b>
Shropshire	17.69	4.78	7.22	12.17	41.87	<b>51.06%</b>
Staffordshire	8.37	2.26	3.38	5.56	19.57	<b>23.87%</b>
Warwickshire	5.28	1.43	2.11	3.43	12.25	<b>14.93%</b>
West Midlands County	0.00	0.00	0.00	0.00	0.00	<b>0.00%</b>
Worcestershire	0.98	0.26	0.41	0.73	2.38	<b>2.90%</b>
<b>West Midlands</b>	<b>34.87</b>	<b>9.43</b>	<b>14.14</b>	<b>23.57</b>	<b>82.00</b>	<b>100.00%</b>

- 3.19. **Figure 11** illustrates these new options for crushed rock expressed as a percentage.

**Figure 11: Illustrative comparison of crushed rock sub-regional apportionment options**



3.20. Under the current apportionment for crushed rock, Shropshire has the highest apportionment at just over 50%. Under both options F and refined option F, Shropshire continues to have the highest apportionment with a slight increase on the current apportionment. Both options result in an increase for Worcestershire, although this is very small due to the removal of the Malvern Hill resource. Reductions for Herefordshire, Staffordshire and Warwickshire are very small.

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