

Minerals Resource Statement

The West Midlands Rail Freight Interchange Order 201X

Regulation 5 (2) (q)

Four Ashes Limited - June 2019

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Document Ref 14.3

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Table of contents

1	Introduction	4
2	The Proposed Development	4
3	The Site and the Existing Calf Heath Quarry	6
4	Minerals Local Plan for Staffordshire (2015-2030)	7
5	Applicant Ground Investigations	10
6	WMI Proposed Earthwork Scheme	17
7	Surface Water Drainage Strategy.....	20
8	Ground Conditions, Substructure Works and Geotechnical Engineering.....	20
9	Use of on-Site aggregates / minerals	22
10	Implications of Commercial Extraction of Minerals.....	23
11	Sustainable Use of the Minerals Plan Allocation.....	25
12	Conclusion	26

1 Introduction

- 1.1 The purpose of this Minerals Resource Statement (MRS) is to summarise the existence, quantity, quality and value of the underlying mineral resource at the proposed site of the West Midlands Rail Freight Interchange (referred to as “WMI” or the “Proposed Development”). This document in particular considers the sand and gravel minerals allocation (known as Calf Heath) which is located within the Order Limits of the proposed Strategic Rail Freight Interchange (SRFI), and the ways in which the allocated minerals could be best utilised without prejudicing the deliverability of the Nationally Significant Infrastructure Project (see Section 2 of this MRS).
- 1.2 This MRS has been produced in accordance with Policy 3 of the Minerals Local Plan for Staffordshire (2015-2030) (‘the Minerals Plan’) and follows detailed discussions with Staffordshire County Council Officers. The scope of this MRS has been agreed with the Officers.
- 1.3 This Statement should be read in the context of the Development Consent Order (DCO) application documents which were submitted to the Planning Inspectorate on 3 August 2018. The suitability of the proposed site from a planning and environmental perspective is assessed in detail within the Planning Statement [Document 7.1A], Environmental Statement [Document 6.2] and Design and Access Statement [Document 7.5]. Further information regarding the Proposed Development’s response to National and Regional minerals policy can be found at Section 7.2 of the Planning Statement.

2 The Proposed Development

Description of Development

- 2.1 The West Midlands Interchange (WMI) proposal constitutes a Nationally Significant Infrastructure Project (NSIP). As such it is considered under the Planning Act 2008 rather than the Town and Country Planning Act route. Under the 2008 Act, applicants apply for a Development Consent Order (DCO) from the Secretary of State – in this case from the Secretary of State for Transport, with the Planning Inspectorate managing the Examination process on behalf of the Secretary of State.
- 2.2 FAL submitted a DCO application to the Planning Inspectorate on 3 August 2018 which seeks consent for:
 - An intermodal freight terminal with direct connections to the West Coast Main Line, capable of accommodating up to 10 trains per day and trains of up to 775m long, including container storage, Heavy Goods Vehicle (‘HGV’) parking, rail control building and staff facilities;
 - Up to 743,200 square metres (gross internal area) of rail served warehousing and ancillary service buildings;
 - New road infrastructure and works to the existing road infrastructure;
 - Demolition and alterations to existing structures and earthworks to create development plots and landscape zones;
 - Reconfiguring and burying of existing overhead power lines and pylons; and
 - Strategic landscaping and open space, including alterations to public rights of way and the creation of new ecological enhancement areas and publicly accessible open areas.
- 2.3 The main components of the Proposed Development are described in further detail in Section 3.5 of the Planning Statement.

- 2.4 A 'parameters approach' has been applied to the Proposed Development whereby the development is described in terms of clearly defined parameters inside which future design development will be undertaken. This approach has been used across a range of infrastructure projects in order to ensure that the potential impacts of a project are properly controlled whilst allowing flexibility for future detailed design development.
- 2.5 A set of Parameters Plans [Document Series 2.5 – 2.7] identify the parameters with which the Proposed Development is required to comply. The Parameters Plans identify those elements of the scheme which are to be fixed or controlled as part of the DCO (i.e. the location of development plots and the framework of Green Infrastructure) and those elements which are subject to restrictions. The set of Parameters Plans is made up of the Development Zone Parameters Plans [Document Series 2.5], Floor Levels and Building Heights Parameters Plans [Document Series 2.6] and Green Infrastructure Parameters Plans [Document Series 2.7].
- 2.6 The WMI Illustrative Masterplan, provided at Figure 1 below, demonstrates one way in which the Proposed Development could come forward, in accordance with the controls set out in the Parameter Plans.



Figure 1: Illustrative Masterplan Layout

Development Programme

- 2.7 It is anticipated that the construction of the Proposed Development would come forward over approximately 15 years (2020 – 2035). Phased works will be made up of a number of elements to include infrastructure (roads, bridges, drainage, etc.), two phases of the rail freight terminal and individual warehouse buildings, with relevant earthworks, landscaping and utilities works to be undertaken in each phase. The phased works would serve the delivery of the principal warehouse buildings, the delivery and timing of which would respond to market demand.
- 2.8 Further details of the timescales for development, including an indicative phasing strategy, are provided in Section 3.7 of the Planning Statement.

3 The Site and the Existing Calf Heath Quarry

- 3.1 The Proposed Development site (the “Site”) covers an area of approximately 297 hectares, lying within the administrative boundaries of South Staffordshire District Council (SSDC) and Staffordshire County Council (SCC). The Order Limits Plan [Document 2.4] provides the Order Limits for the DCO application.
- 3.2 The Proposed Development is approximately 10km north of Wolverhampton and lies immediately west of Junction 12 of the M6. The site is broadly bounded by the A5 trunk road to the north (from Junction 12 to the Gailey Roundabout); Calf Heath reservoir, the M6, Stable Lane and Woodlands Lane to the east; Station Drive, Vicarage Road and Straight Mile to the south; and the A449 trunk road (Stafford Road), from the Gailey Roundabout to Station Drive to the west. The south-eastern area of the Site is also bisected by Vicarage Road.
- 3.3 The north eastern section of the Site is characterised by a large area of sand and gravel mineral extraction known as Calf Heath Quarry (Application Ref: SS.12/08/681); with a patchwork of agricultural fields with hedgerows and trees to the west and south of this; and an area of mixed woodland known as Calf Heath Wood to the centre of the Site. Principally, the remainder of the Site is in arable farming use.
- 3.4 Calf Heath Quarry covers approximately 38 ha, with almost the entirety of this area currently open-cast. The site levels in the quarry area have been reduced to the base of the glaciofluvial deposits (sandstone formation). This varies in elevation between 102.5m above ordnance datum (AOD) and 106.5m AOD.
- 3.5 Settlement ponds and stockpiles are present within the boundary of the quarry. The plant area is approximately central along the western boundary, with various material stockpiles present around the plant equipment.
- 3.6 The general groundwater levels in the vicinity of the quarry were recorded between 102.3m AOD and 104.4m AOD, meaning that the water table is at, or marginally lower, than the quarry base level. Figure 2 (from February 2016) is indicative of this, with much of the quarry area covered by ponds which appears, from observations, to maintain a permanent water level.



Figure 2: Calf Heath Quarry (February 2016)

- 3.7 It is understood that spoil (consisting of approximately 94,700m³ of topsoil and 656,200m³ of quarry spoil) is currently stockpiled within the limits of the Calf Heath Quarry boundary.
- 3.8 It is anticipated that the existing Quarry will be fully worked prior to a decision being made on the WMI DCO application (anticipated in Spring 2020) and the commencement of any development work associated with WMI.

4 Minerals Local Plan for Staffordshire (2015-2030)

- 4.1 The Minerals Local Plan ('the Minerals Plan') for Staffordshire identifies suitable land and provides the planning policies that will be used to determine planning applications to develop SCC's minerals resources during the period 2015 to 2030. The most relevant policies within the Minerals Plan are repeated below.

Minerals Plan Policy 1

- 4.2 Policy 1.1 (Provision for Sand and Gravel) states that *"provision will be made to maintain at least a 7-year landbank of permitted reserves based on production capacity of 5.0 million tonnes of sand and gravel per annum. This production capacity will be provided initially from existing permitted reserves and by granting planning permissions to extend the [existing allocation at] sand and gravel sites"* including at Calf Heath Quarry.

Minerals Plan Policy 3

- 4.3 The Minerals Plan Policy 3 (Safeguarding Minerals of Local and National Importance and Important Infrastructure) sets out how minerals will be safeguarded against unnecessary sterilisation by non-mineral development (see Annex 2 of the NPPF 2019).

4.4 Policy 3.2 (Safeguarding Mineral Resources) states that *“Within a Mineral Safeguarding Area, non-mineral development [...], should not be permitted until the prospective developer has produced evidence prior to determination of the planning application to demonstrate: a) the existence, the quantity, the quality and the value of the underlying or adjacent mineral resource”*.

4.5 Policy 3.3 (Safeguarding Mineral Resources) states that:

“Within a Mineral Safeguarding Area, where important mineral resources do exist [...], non-mineral development should not be permitted unless it has been demonstrated that:

a) the non-mineral development is temporary and does not permanently sterilise the mineral; or,

b) the material planning benefits of the non-mineral development would outweigh the material planning benefits of the underlying or adjacent mineral; or,

c) it is not practicable or environmentally acceptable in the foreseeable future to extract the mineral.”

Minerals Plan Calf Heath Allocation

4.6 The Mineral Safeguarding Area covers the majority of Staffordshire, including a large portion of the WMI Site. Please refer to Appendix 1 for a plan of the Minerals Safeguarding Area in the vicinity of the WMI Site. In addition, a portion of the north / eastern section of the WMI Site is allocated for minerals working in the Minerals Plan (see Figure 3).

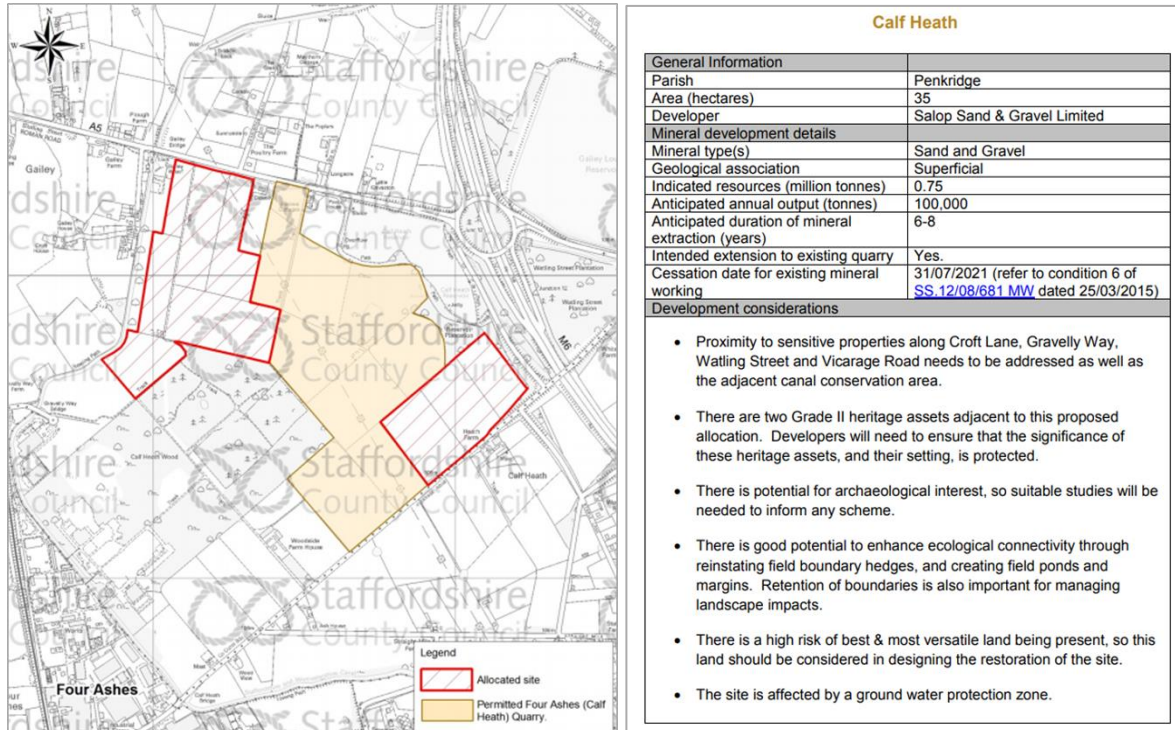


Figure 3: Minerals Plan for Staffordshire (2015-2030) Allocation and accompanying details

- 4.7 The shaded area on the plan illustrates the location and extent of the Calf Heath Quarry. As noted in Section 3, it is anticipated that this area will be fully worked prior to a decision being made on the WMI DCO application (anticipated in Spring 2020).
- 4.8 The area outlined in red with diagonal hatching illustrates the location of the extended sand and gravel allocation. The Minerals Plan states that SCC consider there to be 0.75 million tonnes of sand and gravel within the extended allocation areas. In volume terms, this one of the smallest mineral allocation in the Minerals Plan and represents 15% of a single year of SCC's sand and gravel production capacity.

Scope of this Statement and Minerals Plan Policy 3

- 4.9 The Proposed Development's compliance with the MLP is principally set out in Section 7.2 of the Applicant's Planning Statement [Document 7.1A]. This includes a full assessment of the Proposed Development against Policy 3 (Safeguarding Minerals of Local and National Importance and Important Infrastructure), and in particular Policy 3.3(b). This concludes that the material benefits of the Proposed Development far outweigh the material planning benefits of the mineral infrastructure on Site and underlying mineral, even if the mineral exists to the maximum extent estimated by the Minerals Local Plan. It is therefore considered that the Proposed Development complies with national and regional policy regarding mineral resources.
- 4.10 However, following further discussions with SCC Officers, this Statement has been produced to provide further detail and respond to Policy 3.2 (a) of the Minerals Plan. This document is provided to demonstrate the existence; the quantity; the quality; and the value of the remaining mineral resource. This document also considers the potential for the allocated minerals to be best utilised without prejudicing the deliverability of the Nationally Significant Infrastructure Project.

4.11 As noted above, the Calf Heath Quarry has consent for sand and gravel extraction and is anticipated to be fully worked ahead of a DCO decision or the commencement of WMI's construction work. On this basis, this Statement does not consider the potential safeguarding or sterilisation of the minerals in this portion of the Minerals Safeguarding Area. This Statement relates specifically to the remaining minerals resource within the recently allocated and unworked portions of the extended allocation areas (as shown outlined in red with diagonal hatching in Figure 3 above) and, at a higher level, the rest of the Minerals Safeguarding Area (which covers a larger portion of the WMI Site).

5 Applicant Ground Investigations

Introduction

- 5.1 To inform the WMI Environmental Statement (ES) and to outline engineering proposals for the Proposed Development (including the Earthworks Scheme), the Applicant commissioned ground investigations at the Site. This comprised desk-based assessments, followed by intrusive fieldwork across the Site.
- 5.2 To assess the Minerals Plan allocation in accordance with Minerals Plan Policy 3.2(a), two boreholes dug at the Site have been assessed. It is considered these provide a representative sample of the two areas of the allocation (hereby referenced as the "western allocation" and the "eastern allocation"). The two rotary cored boreholes (to 10m) are referred to as:
- BH207 for the western allocation; and
 - BH216 for the eastern allocation.
- 5.3 The locations of the two boreholes is provided in Figure 4 below. Each of these boreholes had samples collected which were screened for grade size, allowing appropriate assessment of the mineral. While BH216 is outside of the allocated area, it is considered to be representative of the allocation area. Of the boreholes across the Site, eight were specifically screened for particle size, with BH216 being the closest screened borehole to the western allocation. The unscreened records within the eastern allocation generally describe the materials uncovered, suggesting that the samples are representative.

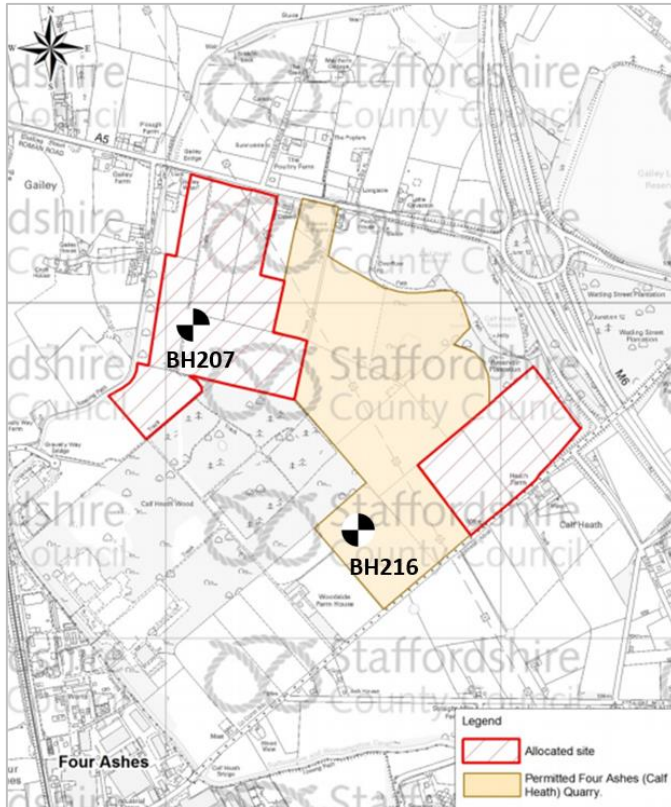


Figure 4: Borehole locations

5.4 Further work at the Site included:

- 13 no. rotary cored boreholes (BH101 – BH113) to 20 m;
- 24 no. rotary cored boreholes (BH201 – BH224) to 10 m;
- 24 no. windowless sampling boreholes (BH301 – BH324) to 4 m;
- 24 no. machine excavated trial pits (TP401 – TP424) to 4 m;
- 7 no. BRE 365 Soakage Tests (SP1 – SP7), machine excavated; and
- 24 no. Cone Penetration Tests (CPTC01 – CPTC24) to 15 m (or refusal).

5.5 The samples were collected from the further work to help estimate mineral aggregate assessment for the rest of the Site and the Mineral Safeguarding Area.

Grading of Mineral / Aggregates

5.6 BS EN 12620 (Aggregates for Concrete)¹ has been used by the Applicant to grade minerals from boreholes at the Site. This specifies the properties of aggregates and filler aggregates obtained by processing natural, manufacturing or recycled materials and mixtures of these aggregates for use in concrete.

¹ BS EN 12620 also complies with European Standards

5.7 BS EN 12620:2002+A1 requirements using the following groups of properties:

- a) geometrical properties, including grading, shape and fines content;
- b) mechanical and physical properties, including resistance to fragmentation;
- c) weathering properties, including freeze-thaw resistance; and
- d) chemical properties, including sulphate and chloride content.

Sand

5.8 Sand is a 'fine' aggregate with particle size greater than 150 microns, which is then further graded as fine, medium or coarse. The grade of the sand dictates its most appropriate use:

- Coarse – generally used as concrete aggregate;
- Medium – may be used in masonry mortar, or for plastering works;
- Fine – not typically used as a construction product but is instead typically used in landscaping applications.

Gravel

5.9 Gravel is a coarser aggregate than sand, typically with particle sizes between 2mm and 63mm, which is then graded as fine, medium or coarse. The grade of the gravel dictates its most appropriate use:

- Coarse – is not typically used in the construction of buildings and infrastructure, but is instead typically used in landscaping applications (note: larger grades may be crushed down and graded to fall within finer gradings);
- Medium – generally used as concrete aggregate;
- Fine – generally used as concrete aggregate.

Quality, Grading and Type of Mineral

Western Allocation

5.10 The results of the rotary cored borehole (to 10m) from BH207 are provided at Figure 5 and Table 1.

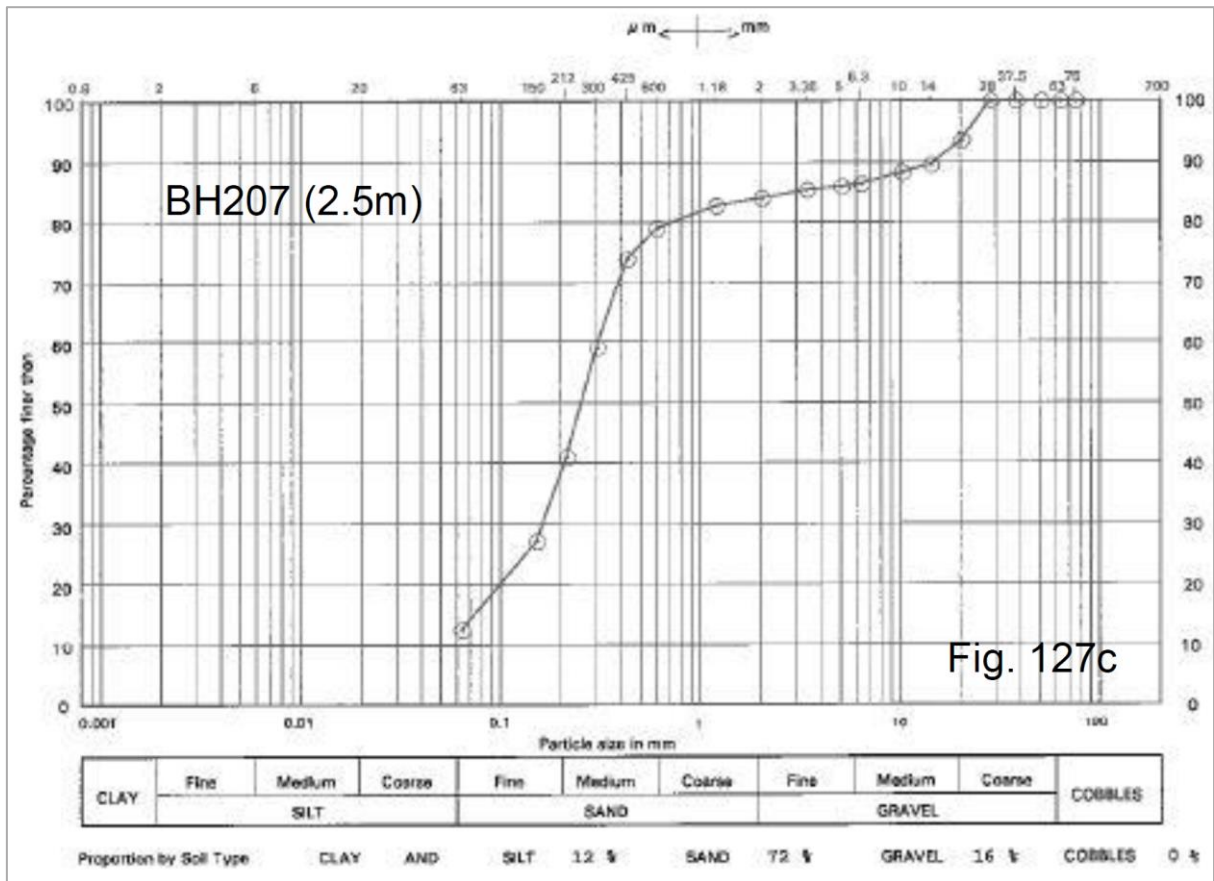


Figure 5: BH207 Particle Size Distribution – Western Allocation Extension

Particle Size Distribution	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel	Unusable Fine Sand and Silt Size Material
BH207	38%	7%	9%	6%	40%

Table 1: BH207 Particle Size Distribution – Western Allocation Extension

Eastern Allocation

5.11 The results of the rotary cored borehole (to 10m) from BH216 are provided at Figure 6 and Table 2.

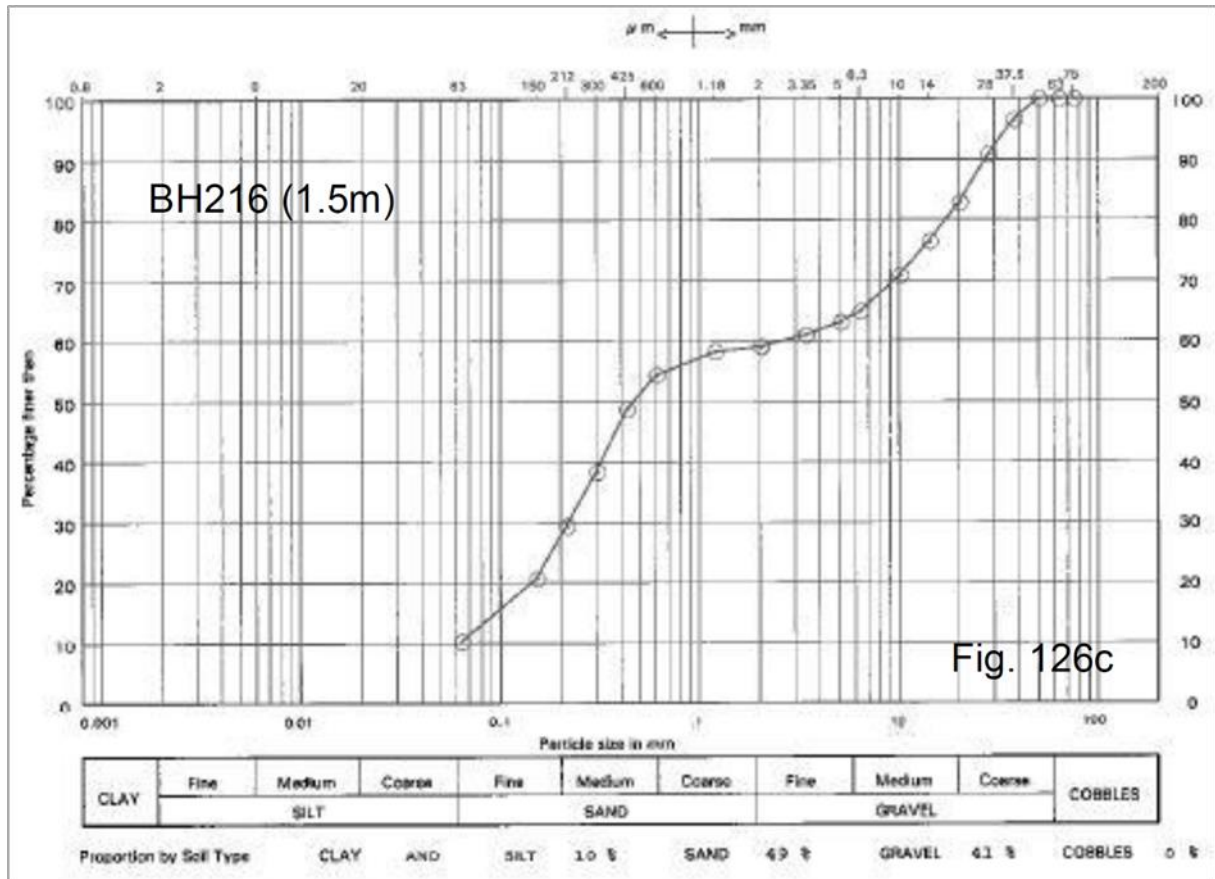


Figure 6: BH216 Particle Size Distribution – Eastern Allocation Extension

Particle Size Distribution	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel	Unusable Fine Sand and Silt Size Material
BH216	25%	5%	23%	17%	30%

Table 2: BH216 Particle Size Distribution – Western Allocation Extension

Allocation Extent and Quantity

Depth of resource in allocation areas

5.12 BH207 and BH216 are considered the most appropriate to assess the allocation as these have samples screened for grade sizes, however, the other boreholes across the allocation areas are useful to assess the depth of the resource available.

5.13 Within the western allocation extension area 16 no. borehole and window samples were undertaken and the records indicate glaciofluvial deposit thickness between 1.4m and 4.65m. Based on the available information, it is considered that the average depth of aggregate in the western extension area is 2.4m.

5.14 Within the eastern allocation extension area 7 no. borehole and window samples were undertaken and the records indicate glaciofluvial deposit thickness between 0.8m and 4.45m. It is considered that the average depth of aggregate in the eastern extension area is 3.1m.

Extent of resource in allocation areas

5.15 Table 3 provides a calculation of available minerals / aggregates in the extended allocation, based on the work undertaken above.

5.16 Particle size distribution available from the British Standards BS EN 12620 has been used in the assessment of available 'useable' aggregates; materials graded between 'medium' sand and 'coarse' gravel have been considered as appropriate mineral resource. 'Fine' sand and silt size material (less than 150 microns) is not a suitable construction material (and is considered a quarry spoil).

5.17 The total available tonnage is based on a density of 1.62t/m³, which is representative of dry gravel with sand.

Allocation Area	Plan Area (m ²)	Average glaciofluvial depth (m)	Material Volume (m ³)	Percentage passing		Graded Volume (m ³)	Dry Density (tonne/m ³)	Available Aggregate (t)
Western Extension (BH207)	249,100	2.4	597,840	Medium sand	38%	227,179	1.62	368,030
				Coarse sand	7%	41,849	1.62	67,795
				Fine-med gravel	9%	53,806	1.62	87,165
				Coarse gravel	6%	35,870	1.62	58,110
				Total Useable	60%	358,704		581,100
Eastern Extension (BH216)	115,095	3.1	356,795	Medium sand	25%	89,199	1.62	144,502
				Coarse sand	5%	17,840	1.62	28,900
				Fine-med gravel	23%	82,063	1.62	132,942
				Coarse gravel	17%	60,655	1.62	98,261
				Total Useable	70%	249,756		404,605

Table 3: Particle Size Distribution – Sand and Gravel

5.18 Ground Investigations indicate approximately 0.985m tonnes of 'useable'² (sand and gravel) available in the unworked areas of the allocated areas, if the full extent of the allocation were to be extracted.

² As defined by the British Standards

Of this 'useable' aggregate, 48% (0.473m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 52% (0.512m tonnes) suitable for masonry mortar and plastering.

- 5.19 The total of 0.985m tonnes of resource is greater than the 0.75m tonnes estimated in the Minerals Plan, however, the allocation remains one of the smallest in the Minerals Plan.

Extent of resource in the rest of the Mineral Safeguarding Area

- 5.20 The same methodology established above has been used to estimate the amount of mineral aggregate for the rest of the Site and the Mineral Safeguarding Area.
- 5.21 The site covers a vast area with variable material properties and depth. To provide a suitable degree of accuracy for the estimation of the varying grades of sand and gravel, the assessment separates the site into zones. Borehole and trial pit records have been used to establish the average strata depth in each of the zones and sample records have been identified which are representative of the material in each of the zones.
- 5.22 Appendix 2 shows the location of the zones and boreholes which have provided the representative samples. Also, a table provides the calculation of available minerals / aggregates in the extended allocation, based on the work undertaken above.
- 5.23 The review of the exploratory hole logs has revealed that there are areas where made ground is present and in other areas topsoil was disclosed to depth (as shown on the Assessment Zoning Key Plan at Appendix 2). In addition, as Officers are aware, Zone 4 is the subject of ongoing remediation works and it would not be feasible to extract this mineral in the foreseeable future. Finally, Zone 5 is not within the Mineral Safeguarding Area and, therefore, these zones have been excluded from the assessment.
- 5.24 The further ground investigations have confirmed the existence of sand and gravel in the rest of the Mineral Safeguarding Area. The further ground investigations indicate approximately 2.73m tonnes of 'useable' (sand and gravel) available in the rest of the Site. Of this useable aggregate, 54% (1.47m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 46% (1.26m tonnes) suitable for masonry mortar and plastering.

Summary

- 5.25 The Applicant's Ground Investigations demonstrate the existence, quantity and quality of the underlying mineral resource.
- 5.26 The work undertaken has confirmed the existence of the underlying mineral, estimating 0.985 tonnes of 'useable' sand and gravel in the area allocated by the Minerals Plan. Of this useable aggregate, 48% (0.473m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 52% (0.512m tonnes) suitable for masonry mortar and plastering. In addition, there is estimated to be approximately 2.73m tonnes of 'useable' (sand and gravel) available in the rest of the Site. Of this useable aggregate, 54% (1.47m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 46% (1.26m tonnes) suitable for masonry mortar and plastering.
- 5.27 It has been determined that the available aggregate is of good quality when appropriately graded.
- 5.28 In the context of the Minerals Plan, the value of the mineral to Staffordshire should be determined against the availability of the resource as considered in the Minerals Plan. If the resource is considered to be of the higher extent estimated by the Applicant, the allocated area still only represents 2.7% of

the sand and gravel allocated in the Plan period to 2030. The total resource across the allocated areas and the usable Minerals Safeguarding Area would be approximately 3.715m.

- 5.29 As noted in Section 3, the Applicant considers that the policy test provided by Policy 3.3 of the Minerals Plan has been met, however, the Applicant is committed to using any disturbed minerals at the Site as sustainably as possible.
- 5.30 The following sections explain how the proposed Earthworks Scheme will seek to utilise any available minerals on the Site, and how the Applicant has secured the sustainable use of minerals, as far as consistent with the Proposed Development.

6 WMI Proposed Earthwork Scheme

- 6.1 As set out in Chapter 5 (Demolition and Construction) of the ES [Document 6.2], the Proposed Development includes an extensive earthworks scheme, the development of which will continue post-DCO approval for the detailed design. For the purposes of the ES, a cut and fill model and volumes balance have been generated based on the topographical survey for the Site; information obtained from the quarry operator; and using the illustrative masterplan. The model has been developed to target a 1:1 cut/fill balance so as to reduce import/export of material from Site. The cut/fill model takes into account the perimeter bunding and surface water drainage network, as well as the need to create level development plots.
- 6.2 The maximum cut and fill depths measured from existing ground level have been measured as 5m cut and 7.5m fill based on current cut/fill drawings (below). However, these extremes relate to relatively discrete areas such as balancing ponds and berms/earth bunds, and in the vicinity of the watercourse at the north-west of the Site, rather than being representative of wider areas of the Site. In general, where levels are not constrained by rail or road infrastructure, the plateau levels for each of the potential plots can be designed to provide a cut/fill balance to minimise hauling and stockpiling during construction.
- 6.3 Construction of the perimeter landscaping bunds could, where practicable, take place early on in the construction programme, or within each construction phase, so as to provide mitigation for visual and noise effects during construction.
- 6.4 The majority of the existing Site, excepting the quarry workings and railway cutting, is relatively flat and will require minimal cut/fill to achieve the Proposed Development platforms.
- 6.5 The main area of cut/fill are described as follows:
- Area of cut associated with the rail terminal in the west of the Site, owing to the level of the existing railway cutting at approximately 2-3m below ground level;
 - Areas of cut to approximately 4-5m below ground level associated with balancing ponds and swales for the surface water drainage system, located towards the centre of the Site close to Gravelly Way;
 - 1-3m cut associated with the development plateaux for the proposed buildings situated adjacent to Calf Heath Wood;
 - Up to 7.5m fill above existing ground level associated with the earth bunds along the northern and western Site boundaries; and

- 1-3m fill associated with the former Calf Heath quarry.
- 6.6 As Calf Heath Quarry is still active the volume of cut/fill in this area will change but it is anticipated that any cut/fill model developed in future iterations will be based on the same principles as described above.
- 6.7 Within the quarry areas where variable made ground was recorded, and where significant new volumes of clay and silt quarry waste are anticipated, there are volumes of silt and clay materials with geotechnical properties considered to be of low suitability for conventional foundations. Specialised treatments of these materials may be necessary, such as dewatering, excavation and re-compaction, and stabilisation with lime/cement additives.
- 6.8 In addition to establishing a 1:1 cut and fill balance across the site, the earthworks scheme has been designed to:
- Provide a gravity drainage network for the land north of Vicarage Road;
 - Provide development platforms at the lowest possible height to minimise visual impact;
 - Provide stable development platforms with the capability of supporting ground bearing foundations and floor slabs for a typical warehousing use;
 - Provide development platforms with foundation depths that are not in the vicinity of the groundwater table;
 - Provide practicable interfaces between building and yard levels and the elevations of road, rail and drainage infrastructure, without the need for special engineering measures;
 - Provide sufficient material for bunding to provide visual and acoustic mitigation; and
 - Provide flexibility in the development platform levels to suit alternative site arrangements and phasing.

Use of the Minerals Plan Allocation (and the existing Calf Heath Quarry)

- 6.9 The Earthworks Scheme seeks to make sustainable use of the quarry spoil and topsoil recovered in the construction of the bunding and landscaping works.
- 6.10 Figure 7 illustrates the cut and fill 'isopachyte'³ plan output from the 3D earthworks modelling for the Proposed Development. The plan illustrates how the existing quarry is proposed to be filled using material from extended allocation areas and using that gained from the partial removal of the Calf Heath Wood plantation.
- 6.11 The risk of land instability at the existing Calf Heath Quarry (post extraction) would be addressed through the planned removal of the quarry bi-product and topsoil, and the up-filling of between 1m and 3m (depending on platform levels) with suitable fill won from unworked areas of the WMI Site. It is estimated that the great majority of this material would be from the extended allocation areas, with around 0.65m tonnes (approx. 43% of the extended allocation) anticipated to be utilised in this way.

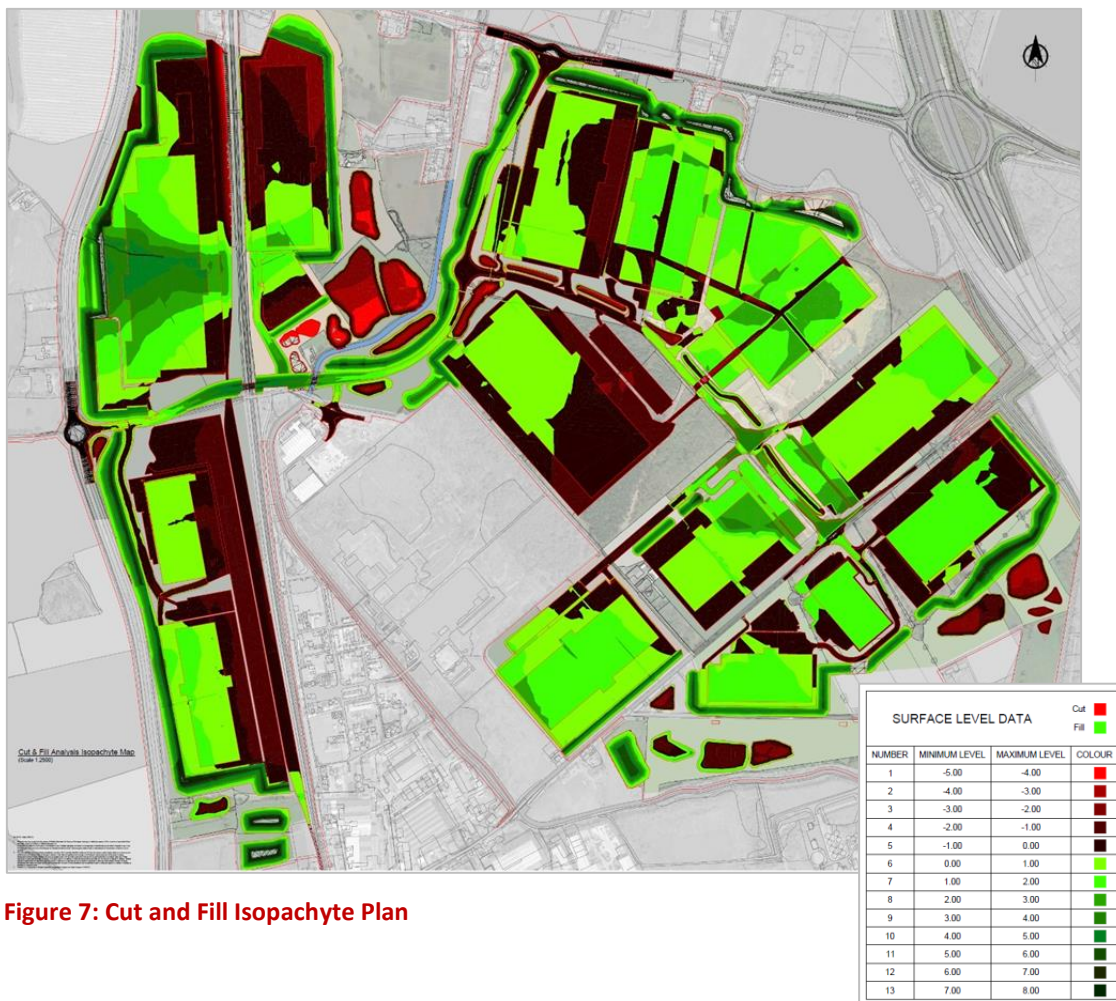


Figure 7: Cut and Fill Isopachyte Plan

³ An isopach map illustrates thickness variations within a tabular unit, layer or stratum. Isopachs are contour lines of equal thickness over an area.

7 Surface Water Drainage Strategy

- 7.1 The Surface Water Drainage Strategy has been designed to capture rain that falls onto the Site and convey this to the outfall points in the local land drainage network, or nearby watercourses. The Strategy provides measures to restrict the rate of flow into the receiving waters and proposes to store the resultant build-up of storm water in open attenuation basins.
- 7.2 The network of open basins is designed to provide natural treatment for surface water, using sustainable drainage (SuDS) principles in accordance with National Policy Statement for National Networks (the “NPS”) (paragraphs 5.100 - 5.115), to manage the quality of water in receiving watercourses.
- 7.3 As the Site is underlain by a Principal Aquifer and lies within a groundwater Source Protection Zone (SPZ), the channels and basins are proposed to be lined to prevent potential contamination due to infiltration and interaction with the groundwater table. The Water Framework Directive Assessment (Document 6.2, ES Technical Appendix 16.2) provides assessment of the potential risks to receiving waters, including groundwater, and concludes that the Strategy is appropriate in respect of the Water Framework Directive.
- 7.4 The network has been designed to be above the existing groundwater table, as far as possible, to prevent buoyancy and failure of the open channels. The drainage network levels have also been set at a level which would avoid the need to excavate into the sandstone formation.
- 7.5 The minimum development platform levels and the Surface Water Drainage Strategy are intrinsically linked – with the drainage strategy for land to the north of Vicarage Road (i.e. the entirety of the allocated area) designed to achieve gravity outfall from all areas using lined, open channels.
- 7.6 The fall required from the upstream end of the network at Development Zone A5a (see Development Zone Parameter Plan), to the point at which the network drains below the canal, west of Zone A4b, is 3.5m.
- 7.7 The base of existing mineral extraction at Calf Heath Quarry at the downstream end of the network is approximately 100.5m AOD which dictates the upstream level of 104.0m AOD and a relative finished floor levels for the Zone A5 buildings between 107.0m AOD and 109m AOD.
- 7.8 Much of the land to the north of Vicarage Road is at the upstream of this network, therefore any reduction in the development platform levels in this area would compromise the ability to drain the site in accordance with the established principles.
- 7.9 Significant work has been undertaken by the Applicant to reach agreements on the proposed Site Wide Surface Water Drainage Strategy (Document 6.2, ES Technical Appendix 16.3) with the relevant statutory bodies. Staffordshire County Council (SCC) have confirmed that the scheme as designed satisfies local and national policy in respect of flood risk, and follows best practice guidelines for sustainable drainage systems (see Section 15 of the SCC SoCG). The EA have also agreed the approach in respect of flood risk, water quality, groundwater and the Source Protection Zone (SPZ) is appropriate within the SoCG with the Environment Agency.

8 Ground Conditions, Substructure Works and Geotechnical Engineering

- 8.1 As set out in Chapter 5 of the ES, Ground investigations were carried out to ascertain geotechnical and geo-environmental conditions at the Site by Waldeck and Ramboll respectively (see Chapter 11 of the

ES for more information on Ground Conditions). These investigations indicate that the use of traditional mass concrete (pad and strip) foundations is a viable option over the majority of the virgin ground on the Site, where Till, Glaciofluvial Deposits and Sandstone formations were found. Excavations within these areas are anticipated to be diggable and side slopes stable above the groundwater table. Where significant depths of fill are required, the engineered earth placement solution will be designed to provide suitable bearing capacity and settlement characteristics for traditional pads.

- 8.2 Floor slabs within the proposed structures are anticipated to be to be ground bearing, with the geotechnical information identifying the magnitude of settlement likely to occur to be low and within tolerance limits for the proposed structure.
- 8.3 Foundations for the majority of buildings are anticipated therefore to be of reinforced concrete construction. This would be poured in situ, and the concrete mixed at an on-site batching plant to minimise HGV movements during concrete pours. Ground bearing slabs are typically completed after the steel frame building structures are completed. In this scenario, the ground would be reinforced/stabilised to permit plant movement prior to completion of the floor slabs.
- 8.4 Based on the geotechnical information described in more detail in Chapter 11 Ground Conditions and in the Waldeck Geotechnical Report (ES Technical Appendix 11.6); and the foundation solutions outlined above, piling is not expected to be required for the majority of the Proposed Development, including the warehouse units and the majority of the rail and rail terminal works, although it may be used for proposed bridges at the Site.
- 8.5 The development platform levels for the Proposed Development have been designed to allow foundations and floor slabs to bear onto the glaciofluvial deposits and till above the sandstone formation, rather than onto it for a number of reasons:
 - The sandstone formation represents the base of mineral extraction, which is approximately at the existing groundwater table level. Construction of foundations and slabs at groundwater level is avoided to mitigate potential instability due to the effect of changes in water table on the bearing strata;
 - The development platforms cover large footprints and are required to be level. The Sandstone is a dense stone material with a variable base which would likely require drilling, chiselling or blasting to cut in bases and to be re-profiled, which is avoided; and
 - Risk of instability due to differential settlements would be avoided, otherwise where buildings are constructed partly onto the sandstone formation and partly on fill material land stability issues arise.
- 8.6 The earthworks scheme retains a significant portion of the sand and gravel in situ, acting as a stable bearing material for the overlying development. As such, piling is not anticipated to be required for typical warehousing at the Site, however, if the Minerals Safeguarding Area were to be fully worked, this would introduce the need for piling across the majority of the site, as the good bearing material (which holds the existing mineral) is removed. Any disturbed mineral and subsequent quarry spoil (and other materials not suitable for bulk earthworks) would be sustainably used within the Order Limits. It is proposed that spoil materials are stabilised and placed in bunding around the Site as part of the Green Infrastructure scheme.

8.7 As noted earlier in this Statement, the risk of land instability at the existing Calf Heath Quarry (post extraction) would be addressed through the planned removal of the quarry bi-product and topsoil, and the up-filling of between 1m and 3m (depending on platform levels) with suitable fill won from unworked areas of the Site. The great majority of this material would be from the extended allocation areas, with around 0.65m tonnes (approx. 43% of the extended allocation) anticipated to be utilised in this way.

9 Use of on-Site aggregates / minerals

9.1 As requested by SCC, the Applicant has sought to estimate the Proposed Development's need for concrete.

9.2 It is estimated that the concrete demand for the Proposed Development would be in the order of 350,000m³ and 450,000m³, in varying grades. This is, of course, a high-level estimate, based upon the Illustrative Masterplan and is subject to change depending on the ultimate layouts that come forward and the final selection of construction materials.

9.3 Assuming 2.22 tonnes of 'all-in' aggregate per 1m³ of concrete, coarse aggregate demand for the development would be in the range 0.777m to 1m tonnes.

9.4 Approximately 0.65m tonnes (approx. 43% of the extended allocation) is anticipated to be excavated and replaced within the Development to form stable bearing platforms, this is based on the median finished levels within the parameters coming forward and in line with the Indicative Phasing Plan (ES Figure 4.5).

9.5 Working within the parameters, it is feasible that large areas of the Site could be developed at a lower level than the median derived from the earthworks model, providing an overall net surplus of material which could be processed to provide aggregate for construction.

9.6 It is intended that any appropriate aggregates that are disturbed in the creation of the development platforms / infrastructure will be used to contribute towards to overall aggregate requirement for the Site, to reduce the reliance on importation.

9.7 Development Zones A4 and A5 cover the existing quarry and newly allocated areas. In the event that these are developed at the lowest parameter level, a potential surplus of approximately 0.67m m³ of material would be available from the allocation areas.

9.8 It is estimated that the partially worked allocation (if practicable and viable) could therefore provide between 40 and 51% of the aggregate demand for the development and 0.32m tonnes of building grade sand. This would reduce the impact on the environment and the local transport network by approximately 11,400 HGV movements throughout construction. These potential savings are not considered in the ES, which provides a reasonable worst case.

9.9 The Applicant has recognised that it would be appropriate that there is more control over the use of any disturbed minerals on the Site, to ensure that minerals are used as sustainably as possible. In response to this, the amended draft DCO (dDCO) provides an addition to Requirement 14 (Earthworks), repeated in full below:

“Earthworks 14.

No phase of the authorised development (with the exception of the highway works to the existing highways (the A5, the A449, Vicarage Road, Station Road and Station Drive) which are governed by Parts 2 and 3 of Schedule 13 (protective provisions) and excluding archaeological investigation, geotechnical or ground contamination investigation and ecological mitigation works) is to commence until details of—

(a) the earthworks strategy relating to that phase of development including the management and protection of soils;

(b) an earthworks specification for each phase of the development;

(c) cutting slopes and embankment design that would accord with the approved earthworks specification;

(d) the extent of any material to be temporarily stored within the site;

(e) the use of the sand and gravel disturbed during the construction of the phase in connection with the authorised development; and

(f) any surplus material to be removed from the site for disposal or material to be imported to the site,

have been submitted to and approved in writing by the local planning authority. All earthworks must be carried out in accordance with the details as approved.”

(emphasis added)

10 Implications of Commercial Extraction of Minerals

10.1 As noted earlier, it is anticipated that the existing, consented Calf Heath Quarry area will be fully worked at the time of a decision on the DCO application, and this has been considered in the Earthworks Scheme.

10.2 The Proposed Development does not propose the commercial extraction of the remaining Minerals Safeguarding Area. The commercial extraction of the extended Minerals Safeguarding Area would compromise the earthworks scheme and drainage strategy, affecting the deliverability of the Proposed Development. If this were to happen, the implications of the commercial extraction of aggregates from the Site is summarised under sub-headings below.

Quarry Spoil

10.3 Table 5 below provides an estimate of the quarry spoil that would be generated through the extraction of the minerals in the Minerals Plan allocation. This is based on a material dry density of 1.46t/m³, which is representative of Silty Loam.

10.4 The samples indicate that 40% (0.349m tonnes) of the material extracted from the western area and 30% (0.156m tonnes) of the materials extracted from the eastern area would be graded from fine sand down to silt and clay sized particles (a total of approximately 0.505m tonnes (398,100m³)).

10.5 During the extraction process, this material would normally be ‘washed’ from the coarser ‘useable’ materials and drained to settlement lagoons before being dried and stockpiled. It is then possible to blend this material with topsoil and use it to reinstate land for low-grade agricultural use, however, it is not of value for construction and would be considered spoil.

Allocation Area	Plan Area (m ²)	Average glaciofluvial depth (m)	Material Volume (m ³)	Percentage passing (silt and fine sand)	Spoil Volume (m ³)	Dry Density (tonne/m ³)	Spoil Produced (t)	Notes
Western Extension	249100	2.4	597840	40%	239136	1.46	349139	BH207 representative particle size distribution sample
Eastern Extension	115095	3.1	356795	30%	107038	1.46	156276	BH216 representative particle size distribution sample

Table 5: Particle Size Distribution – Quarry Spoil

Environmental Considerations

- 10.6 As noted above, it is anticipated that full working of the Minerals Plan allocation would generate a further 0.505 million tonnes of quarry spoil which would need to be exported (or potentially mounded within the limits of the development).
- 10.7 The working of the remaining allocated area would require the removal and stockpiling of 334,000m³ of topsoil followed by excavation and processing of approximately 955,000m³ of glaciofluvial deposits. From this, approximately 0.985m tonnes of aggregate could be exported from the Site. This would equate to approximately 33,000 lorry loads.
- 10.8 Following the working of the remaining allocated area, work would need to be undertaken to restore the land, including works on land stability, gravity drainage and plot flexibility requirements. This would have to be done by restoring the quarry areas to the previous levels, would require the import and controlled placement of approximately 1.1million m³ of graded fill material, requiring a similar scale of importation to the 33,000 lorry loads taken off site.

Earthworks Scheme

- 10.9 The availability of suitable material to be placed as engineering fill is crucial to the earthworks and geotechnical engineering design of the Proposed Development. This would be compromised by the commercial extraction of minerals in the remaining allocated area. The cut and fill balance established in the existing earthworks strategy requires the glaciofluvial deposits and till material from the extended allocations to provide level, stable development platforms.
- 10.10 Furthermore, the proposed earthworks scheme utilises material from across the entire site to fill the existing quarry and establish the cut and fill balance. If more material was taken from other areas on the site, new feasibility and environmental issues would likely be created, as construction would be forced into the groundwater table and sandstone bedrock. Particularly sensitive to the west of the WCML where the groundwater is contaminated.

Land Instability

- 10.11 Working of the extended allocations would reduce overall site levels and place foundations and slabs with the zone of influence of the existing groundwater, creating risk of instability.

10.12 Reduction of the overall site levels would require buildings to be constructed over variable ground conditions, creating risk of land instability.

Drainage and Minimum Floor Levels

10.13 Any changes to the drainage networks would require new agreements to be sought with the LLFA and SCC, in addition to requiring a new assessment to be undertaken of the potential implications of such works. Furthermore, the scheme would need to be reconsidered in respect of groundwater flow and quality which would require new agreements with the EA.

10.14 If the remaining allocated area was to be fully worked, this would require the lowest plateau level to be reduced.

10.15 This would force the open ditch and basin network (see Section 7) entirely into the existing groundwater table. This would risk the integrity of the structures and compromise the Surface Water Drainage Strategy.

10.16 The required increase in depth would also necessitate impracticable, large-scale installation of the drainage network within the sandstone formation.

Future Flexibility

10.17 If the remaining allocated area was to be fully worked, this would remove the plot level flexibility provided by the Parameter Plans, without the significant importation of material to the Site, as founding levels would otherwise be dictated by the base of the allocated area mineral workings.

11 Sustainable Use of the Minerals Plan Allocation

11.1 The Applicant considers the earthworks scheme to make provision for practicable and environmentally acceptable use of the remaining minerals resource – both through the extraction and use of minerals, and through the appropriate retention of mineral to act as a stable bearing material for the overlying development.

11.2 In the likely event that the layout changes from that shown in the Illustrative Masterplan, the geotechnical engineering design of the Proposed Development would change. In this instance, the Applicant is committed to using any disturbed minerals sustainably within the Site, either for forming development platforms or to reduce the need to import aggregates for concrete use at the Site.

11.3 At the detailed design stage, when the initial stages of the Proposed Development are understood, the Applicant will undertake a focussed assessment of the proposed infrastructure and plateau levels, using appropriately detailed ground investigation and laboratory testing information. This will also be used to assess the extent of the minerals to be disturbed, and the potential for their sustainable use within the project.

11.4 The detailed investigations would allow the strata to be modelled accurately so that the material volumes could be effectively calculated, and additional boreholes would allow the groundwater profile to be further understood, informing the design in terms of the detailed drainage routes and potential effects on substructures.

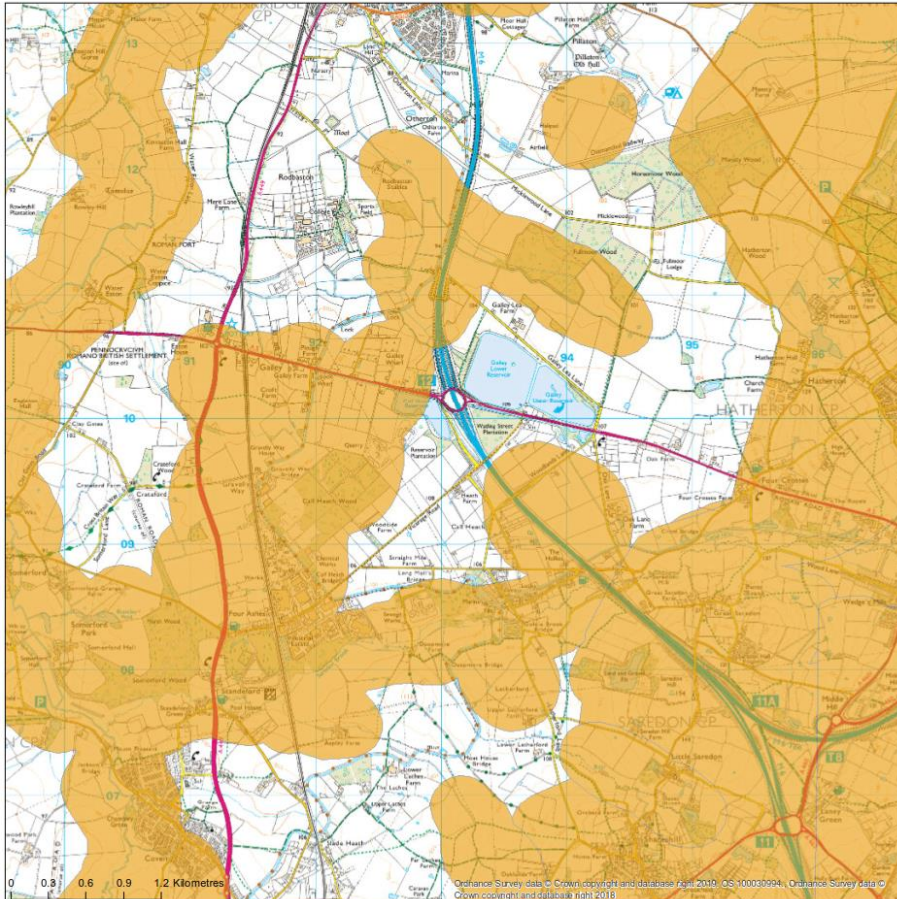
11.5 In designing the schemes for bulk earthworks and geotechnical engineering of the Site at each stage of the development, this will ensure that land stability issues are addressed, while also minimising environmental impact through limiting material movement across the Site in the cut and fill operation.

12 Conclusion

- 12.1 This Mineral Resource Statement (MRS) has confirmed the existence of the underlying mineral at the Calf Heath Allocation in the Minerals Plan, estimating 0.985m tonnes of useable sand and gravel in the allocated area. Of this useable aggregate, 48% (0.473m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 52% (0.512m tonnes) suitable for masonry mortar and plastering. In addition, there is estimated to be approximately 2.73m tonnes of 'useable' (sand and gravel) available in the rest of the Minerals Safeguarding Area. Of this useable aggregate, 54% (1.47m tonnes) is of a suitable grade to be used as concrete aggregate, with the other 46% (1.26m tonnes) suitable for masonry mortar and plastering.
- 12.2 It has been determined that the available aggregate is of good quality when appropriately graded.
- 12.3 If the resource in the allocated area and Minerals Safeguarding Area is considered to be of the higher extent estimated by the Applicant (3.715m tonnes), the allocation still only represents 2.7% of the sand and gravel allocated in the Plan period to 2030 and the rest of the Minerals Safeguarding Area represents another 7.3%.
- 12.4 The Applicant is committed to considering the use of the sand and gravel disturbed during the construction of each phase of the development and these details will be submitted to and approved by the local planning authority prior to the commencement of every phase. However, the Proposed Development does not include the full or commercial extraction of the remaining allocated area or the rest of the Minerals Safeguarding Area. The commercial extraction of the site would not be practicable or environmentally acceptable, while also compromising the proposed Earthworks Scheme, affecting the deliverability of the Proposed Development.
- 12.5 The Applicant considers that it is not practicable or environmentally acceptable in the foreseeable future to extract the extended mineral allocation in its entirety (see Minerals Plan Policy 3.3(c)). The proposed Earthworks Strategy is considered to be the most practicable and environmentally acceptable use of the mineral allocation in the context of the Proposed Development coming forward.
- 12.6 The Proposed Development's compliance with the Minerals Plan is principally set out in Section 7.2 of the Applicant's Planning Statement [Document 7.1A]. This includes a full assessment of the Proposed Development against Policy 3 (Safeguarding Minerals of Local and National Importance and Important Infrastructure), and in particular Policy 3.3(b). This concludes that the material benefits of the Proposed Development far outweigh the material planning benefits of the mineral infrastructure on Site and underlying mineral, even if the mineral exists to the maximum extent estimated by the Minerals Local Plan. The Proposed Development is therefore in compliance with national and regional policy regarding mineral resources.
- 12.7 While the Applicant considers that the Proposed Development accords with Policy 3.3(b), this MRS has also addressed why it is not practicable or environmentally acceptable in the foreseeable future to commercially extract the mineral ahead of the DCO consent being granted (see Minerals Plan Policy 3.3(c)) and explains the flexibility incorporated into the proposals to maximise the use of any disturbed minerals as far as practicable.



APPENDIX 1



Planning Information Web Map

- Staffordshire County Boundary
- Mineral Safeguarding Areas

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APPENDIX 2

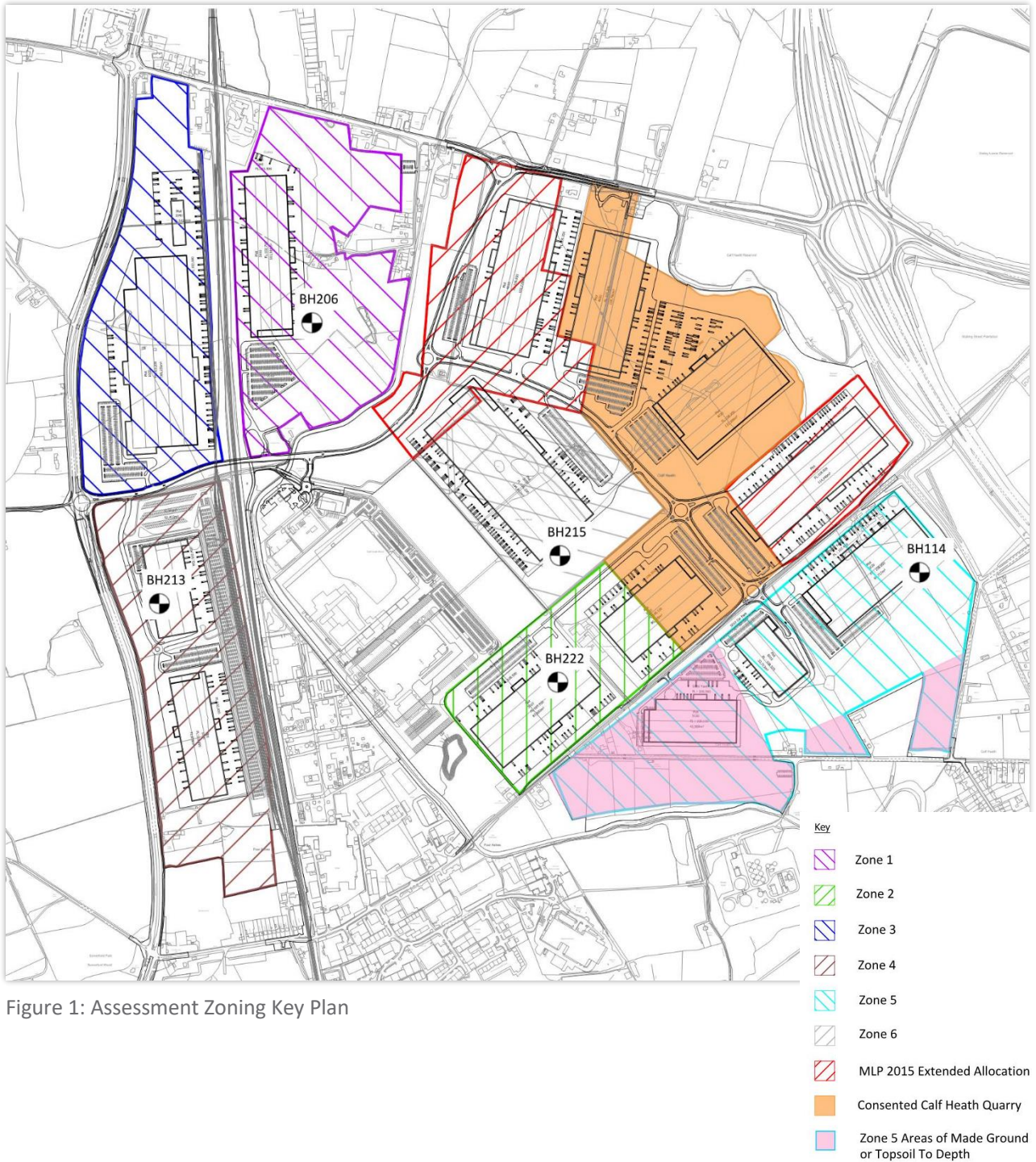


Figure 1: Assessment Zoning Key Plan

Mineral Aggregate Assessment (Outside Allocation)								
Allocation Area	Plan Area (m ²)	Average depth (m)	Material Volume (m ³)	Percentage passing		Graded Volume (m ³)	Dry Density (tonne/m ³)	Available Aggregate (t)
Zone 1 BH206. Sample D2	302140	2.4	725136	Medium sand	28%	203038	1.62	328922
				Coarse sand	14%	101519	1.62	164461
				Fine-med gravel	22%	159530	1.62	258438
				Coarse gravel	0%	0	1.62	0
				Total	64%	464087		751821
Zone 2 BH222. Sample B3	174530	3.1	541043	Medium sand	31%	167723	1.62	271712
				Coarse sand	4%	21642	1.62	35060
				Fine-med gravel	17%	91977	1.62	149003
				Coarse gravel	25%	135261	1.62	219122
				Total	77%	416603		674897
Zone 3 BH206. Sample D2	372880	2	745760	Medium sand	28%	203038	1.62	328922
				Coarse sand	14%	101519	1.62	164461
				Fine-med gravel	22%	159530	1.62	258438
				Coarse gravel	0%	0	1.62	0
				Total	64%	464087		751821
Zone 6 BH 215. Sample D3	199265	2.8	557942	Medium sand	39%	211007	1.62	352508
				Coarse sand	6%	32463	1.62	54232
				Fine-med gravel	8%	43283	1.62	72309
				Coarse gravel	8%	43283	1.62	72309
				Total	61%	330036		551358

Mineral Quantity Calculation