

Addendum to Appendix 3: Analysis of aggregate resources in ECA 3: North Worcestershire Hills

July 2021

Introduction

- 1.1. In the hearing sessions undertaken as part of the examination of the emerging Worcestershire Minerals Local Plan, a change in screening criteria was proposed to no longer screen Source Protection Zone level 2 out of resource areas. In the previous version of the Analysis of Mineral Resources, areas overlapped by SPZ2 were marked as compromised.
- 1.2. To reflect this change, this addendum to *Appendix 3: Analysis of aggregate resources in ECA 3: North Worcestershire Hills* has been produced to update the information held about resource areas, where these have changed by the change in criteria. However, only resource areas impacted by the change in criteria have been updated, this may mean these resources are visible in incorrect form on maps showing neighbouring resources which have not been changed.
- 1.3. The following resource areas in ECA 3: North Worcestershire Hills have been impacted by this change:
 - 3/7
 - 3/8

Update to resource areas

Resource area 3/7

The following map shows the location of resource area 3/7. It is located near Lydiate Ash. This is a large resource area intersected by roads, with some dispersed development.

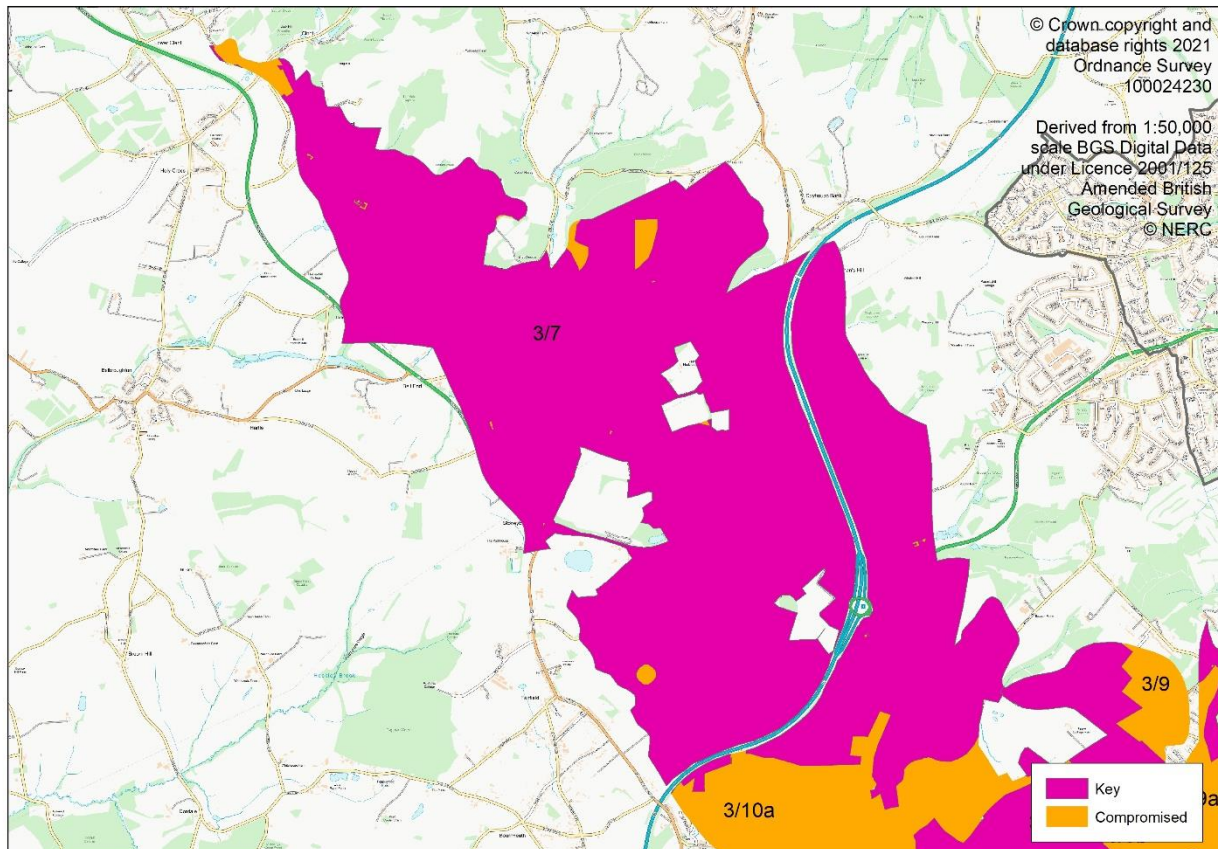


Figure 1. Resource area 3/7.

Resource description

Resource area 3/7 is Wildmoor Sandstone Formation and Kidderminster Formation solid sand.

In this part of the county there are large areas of Wildmoor sandstone formation and Kidderminster formation solid sand of considerable geological complexity. The Kidderminster and Wildmoor sandstones are partially but extensively overlain by terrace and glacial sand and gravel deposits which are recorded as separate resource areas (in this area assessed as resource areas 3/2, 10/21, 12/1, 12/2 and 12/3).

Wildmoor Formation

The western half of this resource area is predominantly Wildmoor Formation. The Wildmoor Formation is generally described as red-brown and orange, fine to medium grained, feldspathic sandstone with sparse, thin mudstone beds. Generally the formation is characterised by a remarkably uniform, very weakly cemented, fine grained, silty,

micaceous sandstone and an absence of pebbles, in contrast to the Kidderminster Formation, although sparse pebbly stringers are recorded. The fine grain-size and soft, poorly cemented, nature of the sandstone in some areas made it ideal for exploitation as moulding sand for use in the foundry industry.

West of the Blackwell Fault the base rock is Wildmoor Formation. The Wildmoor formation ranges in thickness, a borehole near Hagley proved 175m of red hard and soft sandstone some of this could be attributed to the underlying Kidderminster Formation since the lower boundary is indistinct. The memoir for Droitwich Abberley and Kidderminster recorded that the greatest depth of this formation was proved in a borehole at Wildmoor, east of Fairfield, where 398' (121.3m) were passed through without the bottom being touched. East of the main outcrop the formation is cut out rapidly by the overstepping Bromsgrove Sandstone.

Sand pits within the Wildmoor Sandstone deposit have been granted planning permission at:

- Chadwich Lane (currently operational, extended in 2012),
- immediately north of Sandy lane, still operational as Veolia tip (formerly Stanley N Evans)
- south of the lane, Cinetic sand (formerly John Williams Cinetic Sand, currently operated by the Salop sand and gravel company) and
- immediately west of the motorway junction currently operated by MV Kelly (formerly "Pinches").

The memoir records all of these as Foundry sand (silica sand) pits.

There is some information about exposures for some sections of the deposit in this area:

- A borehole adjacent to the M5 South East of Chadwich Lane/Money Lane junction proves sand and gravel on sandstone overlain by boulder clay.
- Material supporting the 1979 application to deepen Chadwich Lane pit reported that the silica sand deposit "varies with the height of the land" and depth is "unknown". Supporting material for the 1998 application to extend the Chadwich Lane Pit indicated a depth of 80' (24.4m), based on the depths of material in and adjoining the existing pit.
- South of Chadwich Lane, material supporting the 1971 application for the pit to the south of Chadwich Lane, formerly known as John Williams Cinetic Sand and currently operated by the Salop Sand and Gravel Company, reported a depth of 80' (24.4m).
- At the site currently operated by MV Kelley (formerly "Pinches"), immediately west of Junction 4 of the M5, the 1990 application proposed to work the site to a depth of 42m.

Kidderminster Formation

The northern and eastern half of this resource area is Kidderminster Formation. The Kidderminster Formation is generally described as well-rounded pebble to cobble size conglomerate and red-brown, medium to coarse sandstone. The lower part of the formation predominantly consists of clast-supported conglomerate composed largely of pebbles and cobbles of red, red brown and grey fine-grained quartzite together with red sandstone, milky

quartz and rare porphyritic igneous rocks and re-worked conglomerate. The formation rests unconformably on Bridgnorth Sandstone. The maximum thickness of the conglomerate dominated facies is probably about 20m but this is gradational into the overlying sandstone dominated facies, which also contains beds and lenses of pebble conglomerate. The thickness of the formation in this district varies although the upper boundary is difficult to recognise because of the lithological similarity of the Kidderminster sandstone to the predominantly non-pebbly Wildmoor Sandstone. The memoir for Redditch records its greatest depth is 155m at Wildmoor (in this resource area) and it thins to 133m at Burcot (resource area 3/8) and 127-129m at Brockhill (resource area 12/8).

There is some information about exposures for some sections of the deposit in this area:

- Walton Pool, Calcot Hill and Sling Common: An outcrop of Kidderminster Formation is exposed on the south western flanks of the Clent Hills. The formation beds directly upon the Clent Breccia and is thought to consist of beds of shingle with lenses of red/brown sand. The only exposure in this area is at Sling Common where pebbly red sandstones were formerly worked. It is possible that the Kidderminster formation outcrops on the high ground, e.g. at Calcot Hill, with the higher beds in the Kidderminster formation exposed on the south western flanks of the outcrop.
- Great Farley Wood, Romsley Hill and Bell Heath: This area is Kidderminster Formation basal conglomerate bounded to the north and south by faults and overlain by boulder clay at Romsley Hill and by 2nd river terrace deposits at Bell Heath. There are no boreholes but details of a well North of Romsley Hill Hospital at Winwood Heath shows the Kidderminster formation to 39.5m, and the memoir (Old 1983) records the Kidderminster Formation in this area as red and brown, pebbly, coarse sandstone up to 160m thick. Madley Ridge is capped by boulder clay, which in turn overlies fluvio glacial sand and gravel which is exposed on the flanks of the boulder clay. The deposit has been worked at the former Madley pit (former County Council tip).
- Boreholes at Money Lane in this area prove up to 60.5m of sandstone dominated part of the Kidderminster Formation with a few mudstone beds and one of conglomerate up to 1m thick. The lack of conglomerates at this working and that at Shepley suggest that the quarried strata are high in the formation.
- Chapman's Hill and Quantry Lane: The outcrop of the Kidderminster formation is overlain by boulder clay adjacent to the M5. Details of the exposure south of Quantry Lane record 2.3m of the Kidderminster formation overlain by 0.1 metres of sandy gravel, but up to 6m of conglomerate has been exposed with the base not seen.
- Lydiate Ash: The Kidderminster formation in this area is primarily a source of building sand but the deposit becomes coarser down the system with quartz and quartzite pebbles increasing. It overlies basal conglomerate. Two boreholes East of Lydiate Ash M5 interchange immediately West of the Chadwich fault recorded:
 - 13.5m of Kidderminster formation and 9.3m of basal conglomerate (total 22.8m) overlying 0.8m of Clent breccias; and
 - 30.5m of Kidderminster formation overlying 0.5m of Clent breccias with the basal conglomerate faulted out.

- Alvechurch Highway: A borehole north of the Alvechurch Highway, east of the Hollywell fault on the edge of the outcrop, recorded 2.3m of boulder clay on 2.2m of conglomerate with Clent breccias to 17.2m.
- Marlbrook: An outcrop of Kidderminster Formation bounded to the west by the Blackwell fault and to the south by the Burcot fault, extensively covered by superficial deposits. The deposit has been worked at Marlbrook. There are no boreholes recorded in the memoir but the exposure at the eastern end of the Marlbrook site showed 9m of Kidderminster Formation and the statement and supporting plans accompanying the RMC application indicated that within that site the deposit reaches a thickness of over 14m in the south thinning to less than 6m in the north (midpoint = 10m).

Estimated depth

Estimated resource depth based on a mean average of: a) borehole at Wildmoor (Wildmoor Formation): 121.3m, b) Chadwich Lane Pit 1998 application: 24.4m, c) Salop Sand and Gravel pit 1971 application: 24.4m, d) MV Kelley site 1990 application: 42m, e) memoir record for the Kidderminster formation at Wildmoor: 155m, f) memoir record for the Kidderminster formation at Burcot: 133m, g) memoir record for the Kidderminster formation at Brockhill (midpoint of 127m to 129m): 128m, h) well north of Romsley Hill Hospital: 39.5m, i) Old 1983 record: 160m, j) boreholes at Money Lane: 60.5m, k) exposures south of Quantry Lane (midpoint of 2.3m to 6m): 4.15m, l) borehole 1 east of Lydiate Ash M5 interchange: 22.8m, m) borehole 2 east of Lydiate Ash M5 interchange: 30.5m, n) borehole north of Alvechurch highway: 2.2m, o) exposure at Marlbrook: 9m, p) RMC application at Marlbrook (midpoint of 6m to 14m): 10m = 60.4m

Previous assessment

This resource area was last assessed as part of the Fourth Stage consultation on MLP (August 2018). At this stage, the resource area was split into areas 3/7 and 3/7b.

Area 3/7b contained parts of the resource screened out and marked as compromised due to the following appendix A criterion:

- Allocations in adopted plans
- Ancient Semi-Natural Woodland
- Conservation Area
- Listed Buildings
- Site of Special Scientific Interest
- Source Protection Zone 1 & 2

Area 3/7 contained the parts of the resource not impacted by the screening criteria. This resource area was 1066ha in area, with an average depth of 60.4m. Therefore, the estimated resource volume was 321,932,000m³, and the estimated tonnage (at 1.65 t/m³) was **531,187,800 tonnes**.

Re-assessment of resource after MLP examination hearing sessions (2021) with SPZ 2 no longer screened out.

Now areas of Source Protection Zone 2 are no longer marked as compromised, resource area 3/7 is now 1091ha in area, with an average depth of 60.4m. Therefore, the estimated resource volume is 329,482,000m³, and the estimated tonnage (at 1.65 t/m³) is **543,645,300 tonnes**.

Resource area 2/22

The following map shows the location of resource area 2/22. It is located to the north and north west of Stourport-on-Severn. This is a large resource area intersected by roads.

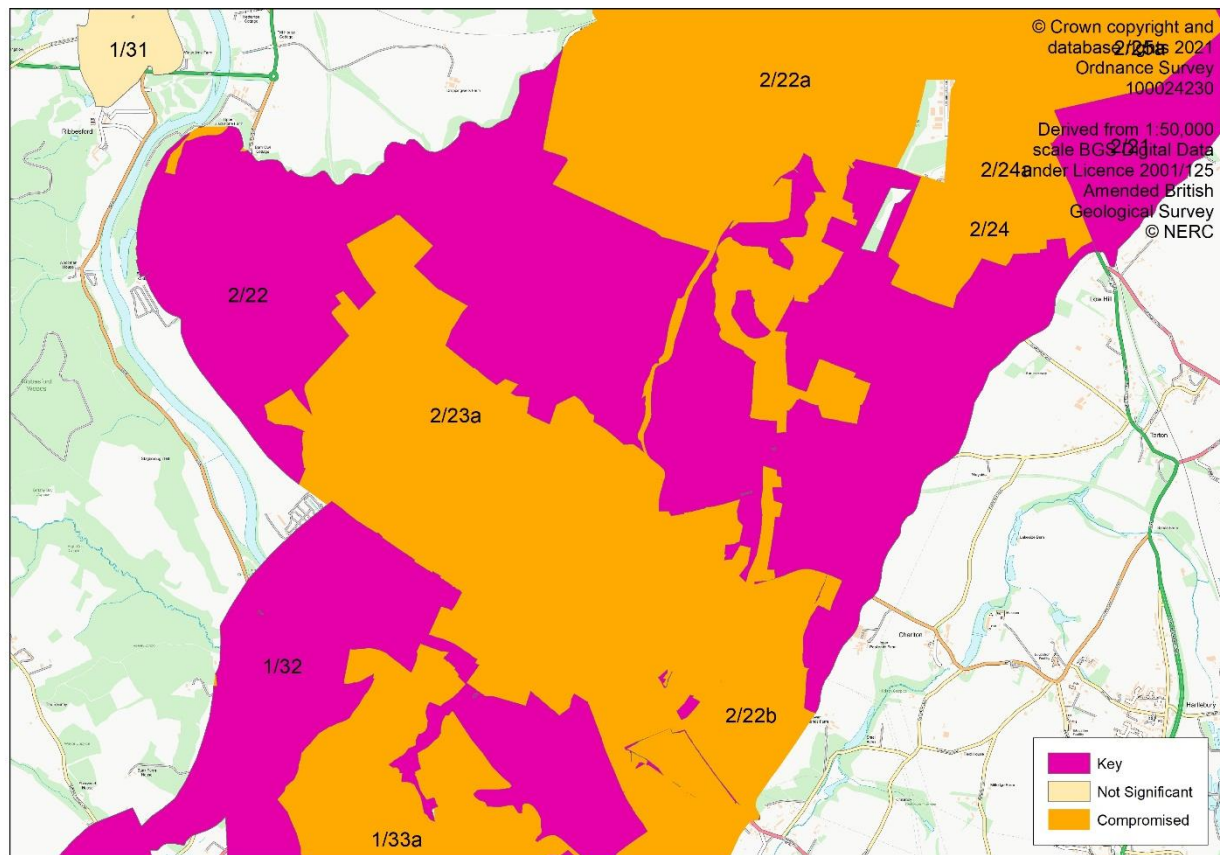


Figure 2. Resource area 2/22.

Resource description

Resource area 2/22 is Wildmoor Sandstone Formation and Kidderminster Formation solid sand.

In this part of the county there are large areas of Wildmoor sandstone formation and Kidderminster formation solid sand of considerable geological complexity. The Kidderminster and Wildmoor sandstones are partially but extensively overlain by terrace and glacial sand and gravel deposits, which are recorded as separate resource areas (this resource area is overlain by resource areas 2/12, 2/13, 2/14 and 25/1, 25/2, 25/2a).

The western part of this resource area (the land north west of Lickhill and north east of Burlish Park and a small area north of Foley Park) is mapped as Kidderminster Formation and the remainder of the resource area is mapped as Wildmoor Sandstone.

Kidderminster Formation

The Kidderminster Formation is generally described as well-rounded pebble to cobble size conglomerate and red-brown, medium to coarse sandstone. The lower part of the formation predominantly consists of clast-supported conglomerate composed largely of pebbles and

cobbles of red, red brown and grey fine-grained quartzite together with red sandstone, milky quartz and rare porphyritic igneous rocks and re-worked conglomerate. The formation rests unconformably on Bridgnorth Sandstone. The maximum thickness of the conglomerate dominated facies is probably about 20m but this is gradational into the overlying sandstone dominated facies, which also contains beds and lenses of pebble conglomerate. The thickness of the formation varies, from 112m-133m in the north of the county near Hagley, to 155m at Wildmoor near Bromsgrove, and 127-129m at Brockhill east of Bromsgrove. However, the upper boundary is difficult to recognise because of the lithological similarity of the Kidderminster sandstone to the predominantly non-pebbly Wildmoor Sandstone.

There is some information about exposures for some sections of the deposit in this area:

- At Burlish Park / Birchen Coppice: the Kidderminster Formation deposit runs north east to south west. An exposure in the railway cutting (Severn Valley Railway line, to the north of the resource area near Birchen Coppice) shows soft red sandstone with subordinate bands of pebbles and local lenses of marl (depth of sandstone not given).
- At Mount Pleasant (north west of Burlish Park): In the railway cutting south of the tunnel more than 50' (15.2m) of the Kidderminster formation deposit is exposed, including pebbly bands and beds of red sandstone with an occasional pebble and a few bands of marl up to 3" (0.08m) thick.
- The construction of a reservoir to the east of Mount Pleasant exposed 10' of coarse pebbly shingle and sand, 15' of soft red sandstone with thin marl bands, 2' of hard coarse sand with pebbles, 6' of red sandstone with few pebbles with some thin marl layers and 3' of coarse breccia with angular blocks of igneous rock (total 36', 11m).

Wildmoor Formation

The memoir describes the Wildmoor Formation as red-brown and orange, fine to medium grained, feldspathic sandstone with sparse, thin mudstone beds. Generally the formation is characterised by an absence of pebbles, in contrast to the Kidderminster Formation, although sparse pebbly stringers are recorded. The fine grain-size and soft, poorly cemented nature of the sandstone made it ideal for exploitation as moulding sand for use in the foundry industry. The memoir states that the Wildmoor Sandstone formation ranges in thickness from 90m-120m. The deposit is exposed in the road cutting 350yd SSE of Hoobrook and at intervals on the western edge of the gravel patch capping Stour Hill and Wilden. There is no more detailed information about depths for the Wildmoor deposit in this area.

Estimated depth

Estimated depth calculated as mean average of: a) depth of Kidderminster formation near Hagley (mid-point of 112m to 133m): 122.5m, b) depth of Kidderminster formation at Wildmoor: 155m, c) depth of Kidderminster formation at Brockhill (mid-point of 127m to 129m): 128m, d) Kidderminster formation at Mount Pleasant railway cutting: 15.2m, e) reservoir east of Mount Pleasant: 11m, f) BGS estimates of Wildmoor Sandstone formation (mid-point 90m to 120m): 105m = 89.5m

Previous assessment

This resource area was last assessed as part of the Fourth Stage consultation on MLP (August 2018). At this stage, the resource area was split into areas 2/22 and 2/22b.

Area 2/21b contained parts of the resource screened out and marked as compromised due to the following appendix A criterion:

- Ancient Semi-Natural Woodland
- Listed Buildings
- Settlement Boundary
- Sites allocated in adopted plans
- Source Protection Zone 1 & 2

Area 2/22 contained the parts of the resource not impacted by the screening criteria. This resource area was 590ha in area, with an average depth of 89.5m. Therefore, the estimated resource volume was 264,025,000m³, and the estimated tonnage (at 1.65 t/m³) was **435,641,250 tonnes**.

Re-assessment of resource after MLP examination hearing sessions (2021) with SPZ 2 no longer screened out.

Now areas of Source Protection Zone 2 are no longer marked as compromised, resource area 2/22 is now 615ha in area, with an average depth of 89.5m. Therefore, the estimated resource volume is 275,212,500m³, and the estimated tonnage (at 1.65 t/m³) is **454,100,625 tonnes**.