Addendum to Appendix 2: Analysis of aggregate resources in ECA 2: Severn Valley North

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 2: Analysis of aggregate resources in ECA 2: Severn Valley North* 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 2: Severn Valley North have been impacted by this change:

- 2/21
- 2/22

Update to resource areas

Resource area 2/21

The following map shows the location of resource area 2/21. It is located to the north east of Kidderminster. This is a large resource area intersected by roads, with some dispersed development.

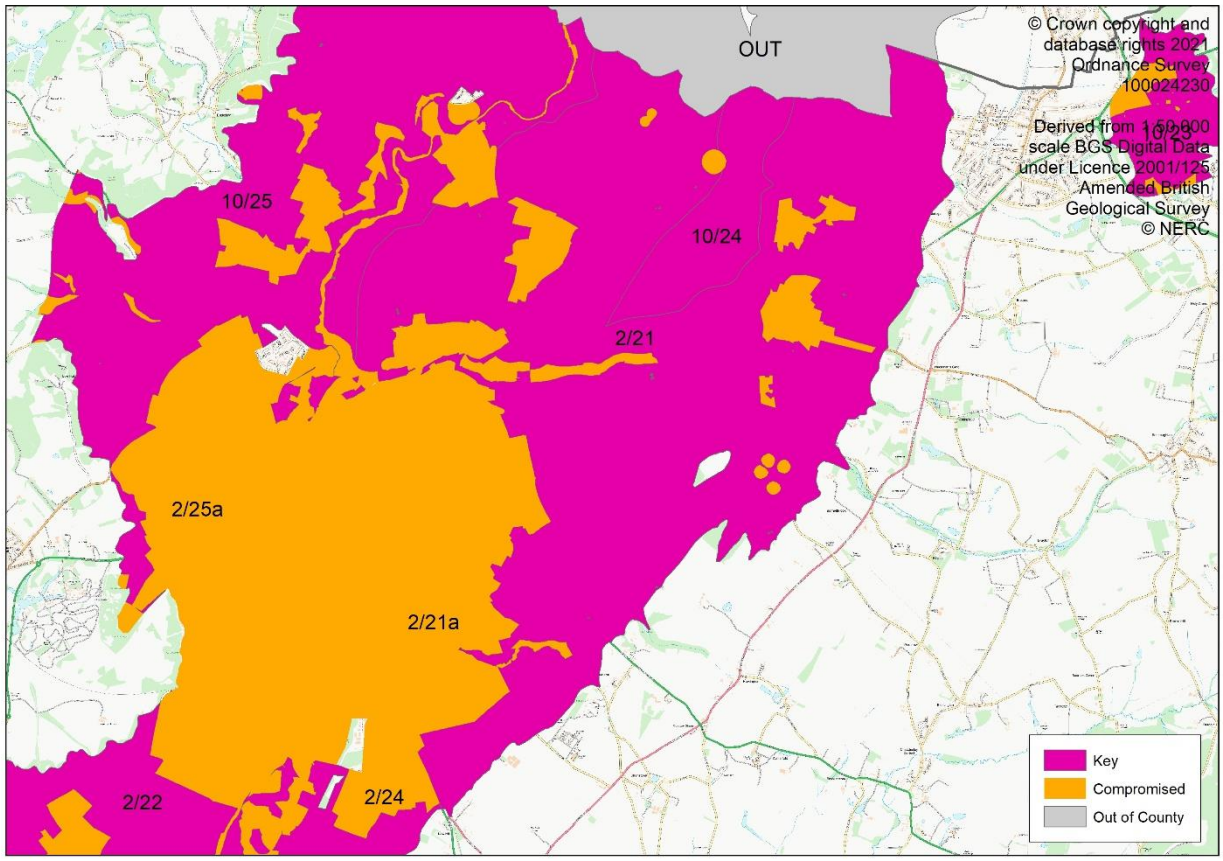

Figure 1. Resource area 2/21.

Resource description

This resource area is predominantly Wildmoor Formation. 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 glacial or terrace sand and gravel deposits (assessed as resource areas 10/6, 10/7, 10/8 10/9, 10/10, 10/12, 10/13, 10/14, 10/15, 10/16, 2/16, 2/17, 2/18 and 2/19, 2/20, 38/1).

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 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 places 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, although there is some more detailed information about some sections of the deposit:

> Near Hagley: a borehole (north of the county boundary at grid reference 389940 281690) 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.
>
> North west of Blakedown: The Stapenhill Fault brings Wildmoor Sandstone into contact with the Kidderminster Formation. No details are recorded, but the presence of the fault and Wildmoor Sandstone contact means that the basement beds are unlikely to occur at the surface. No details of thickness or composition are recorded.
>
> The Churchill Trial Bore (north of the county boundary at grid reference 387070, 280160) found 1.1m of pebbly sand overlying 119m of red, soft, fine-grained, micaceous, cross-bedded sandstone (Wildmoor sandstone) and 122.2m of red-brown, medium-grained, cross-bedded sandstone with scattered pebbles and thin marl beds and beds of pebbly conglomerate in the lower part (Kidderminster formation) (total 242.3m).
>
> A 2nd borehole near to the Wagon and Horses Inn and Ismere Pumping Station (within this resource area at grid reference 387060, 280140) recorded 118.9m of red, soft sandstone cross-bedded with thin marl laminate (Wildmoor sandstone) overlying 18.8m of red-brown, medium- to coarse-grained sandstone with sparse pebbles (tentatively assigned to Kidderminster formation), 114.4m of red-brown, coarse-grained, pebbly sandstone with beds of pebble conglomerate up to 1.5m thick common in the lower part (Kidderminster formation), and 50.3m of red, soft, coarse-grained sandstone (Bridgnorth sandstone) (total 302.4m).
>
> A borehole at Sleepy Pool Mill (on the boundary between this resource area and 10/25 at grid reference 385480 280630) recorded 8m of sandy clay (alluvium) overlying 2m of red, soft sandstone (Wildmoor) and 40m of red sandstone (tentatively assigned to the Kidderminster formation) (total 42m).

Estimated depth calculated as mean average of: a) borehole near Hagley: 175m, b) Churchill Trial Bore: 242.3m, c) borehole near the Wagon and Horses Inn: 302.4m, d) borehole at Sleepy Pool Mill: 42m = 190.4m

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 2/21 and 2/21b.

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
- Conservation Area
- Listed Buildings
- Settlement Boundary
- Sites allocated in adopted plans

- Source Protection Zone 1 & 2

Area 2/21 contained the parts of the resource not impacted by the screening criteria. This resource area was 1883ha in area, with an average depth of 190.4m. Therefore, the estimated resource volume was 1,792,616,000m^3, and the estimated tonnage (at 1.65 t/m^3) was **2,957,816,400 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 2/21 is now 2094ha in area, with an average depth of 190.4m. Therefore, the estimated resource volume is 1,993,488,000m^3, and the estimated tonnage (at 1.65 t/m^3) is **3,289,255,200 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.

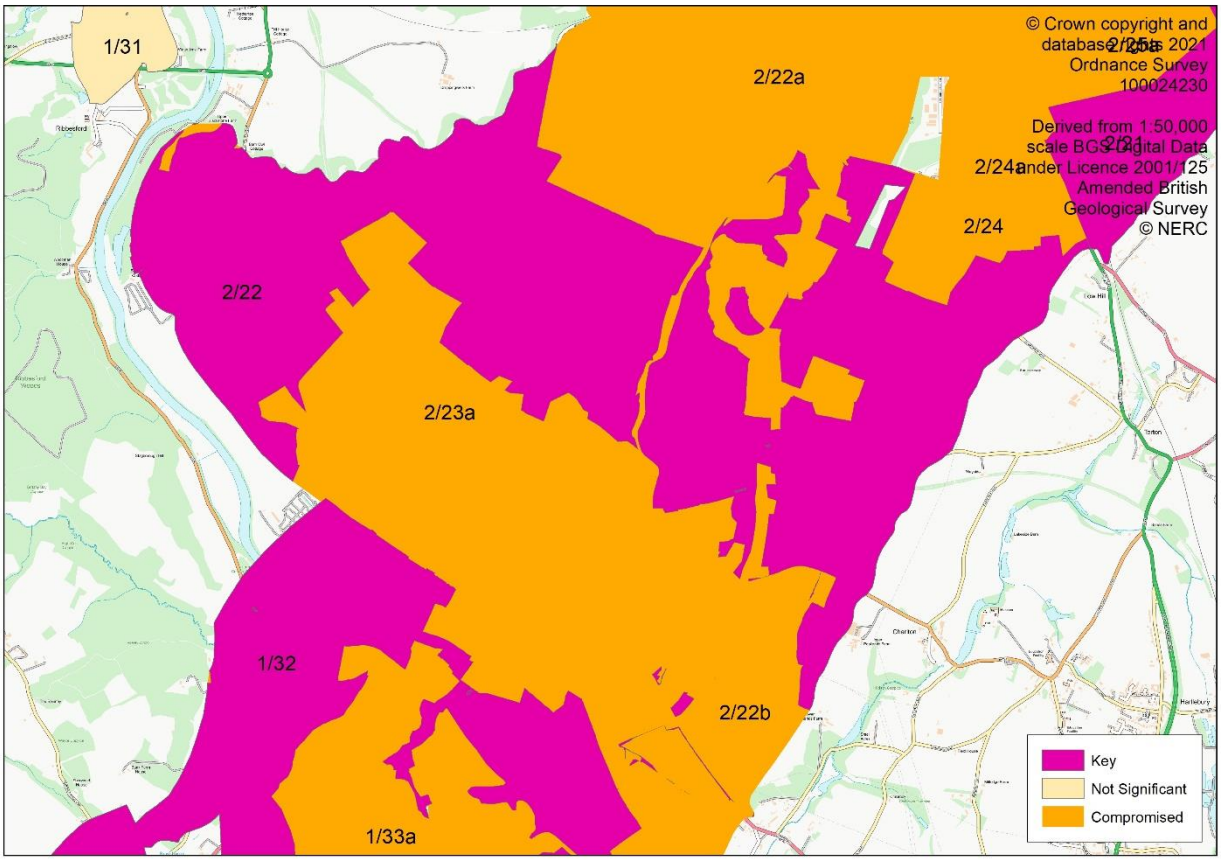

Figure 2. Resource area 2/22.

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 uncomformably 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 264,025,000m^3, and the estimated tonnage (at 1.65 t/m^3) 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 275,212,500m^3, and the estimated tonnage (at 1.65 t/m^3) is **454,100,625 tonnes**.