BRITISH GEOLOGICAL SURVEY

DETR

WEST SUSSEX

A Summary of Mineral Resource Information for Development Plans

Mineral Resources

Scale 1:100 000

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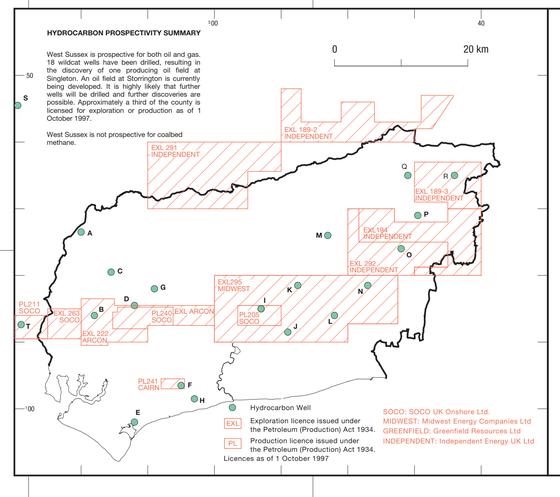
HYDROCARBON PROSPECTIVITY SUMMARY

West Sussex is prospective for both oil and gas. 18 wildcat wells have been drilled, resulting in the discovery of one producing oil field at Singleton. An oil field at Storrington is currently being developed. It is highly likely that further wells will be drilled and further discoveries are possible. Approximately a third of the county is licensed for exploration or production as of 1 October 1997.

West Sussex is not prospective for coalbed methane.



HYDROCARBON WELLS OF WEST SUSSEX

A Rogate 1
Operator: Carless
Drilled: 1985
Total depth: 2146 m
Status: Plugged and abandoned with oil shows in the Kellaways Beds, Great Oolite limestone and Inferior Oolite limestone

B Chilgrove 1
Operator: Carless
Drilled: 1987/1988
Status: Confidential

C Minsted 1
Operator: Carless
Drilled: 1987
Total depth: 1853 m
Status: Plugged and abandoned with oil shows in the Great Oolite limestone

D Singleton 1
Status: Confidential

E Pagham 1
Operator: Ranger Oil (UK) Ltd
Drilled: 1990
Status: Confidential

F Lidsey 1
Operator: Carless
Drilled: 1987
Total depth: 1173 m
Status at completion date: Suspended pending long term test; oil discovery shows in Great Oolite limestone

G Baxter's Copse 1
Operator: Conoco
Drilled: 1983
Total depth: 2366 m
Status: Suspended pending long term test
Oil shows in Great Oolite limestone

H Middleton 1
Operator: Pennzoil
Drilled: 1971
Total depth: 2128 m
Status: Plugged and abandoned as a dry hole

I Storrington 1
Operator: Conoco
Drilled: 1985/86
Total depth: 1822 m
Status: Suspended oil discovery in Great Oolite limestone

J Washington 1
Status: Confidential

K Ashington 1
Operator: conoco
Drilled: 1985/86
Total depth: 1723 m
Status: Plugged and abandoned as a dry hole

L Henfield 1
Operator: D'Arcy Exploration Co Ltd
Drilled: 1936/37
Total depth: 1562 m
Status: Plugged and abandoned as a dry hole

M Southwater 1
Operator: Conoco
Drilled: 1986
Total depth: 2342 m
Status: Plugged and abandoned

N Wineham 1
Operator: Conoco
Drilled: 1987
Status: Confidential

O Bolney 1
Operator: Esso
Drilled: 1963
Total depth: 2440 m
Status: Plugged and abandoned with gas shows in the Hastings Beds, 132-142.5m

P Balcombe 1
Operator: Conoco
Drilled: 1986
Total depth: 1724 m
Status: Plugged and abandoned

Q Worth Forest 2
Operator: N.M.D. Syndicate Ltd
Drilled: 1932
Total depth: 573 m
Status: Plugged and abandoned

R Turners Hill 1
Operator: Conoco
Drilled 1987
Total depth: 1335 m
Status: Plugged and abandoned as a dry hole

S Humbly Grove 1

T Horndean 2

AIMS AND LIMITATIONS

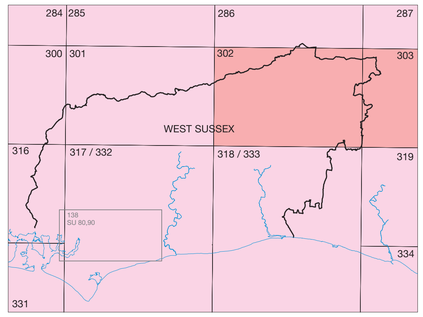
The purpose of the maps and associated reports in this series is to show the broad distribution of those mineral resources which may be of current or potential economic interest and to relate these to selected nationally-recognised planning designations. The maps are intended to assist in the consideration and preparation of development plan policies in respect of mineral extraction and the protection of important mineral resources against sterilisation. They bring together a wide range of information, much of which is scattered and not always available in a convenient form.

The maps have been produced by collation and interpretation of mineral resource data principally held by the British Geological Survey. Information on the extent of mineral planning permissions has been obtained form the relevant Mineral Planning Authority (MPA). Some of these permissions may have lapsed or expired. The status of individual areas can be ascertained from the appropriate MPA. Location information on national planning designations has been obtained from the appropriate statutory body (Countryside Commission, English Nature and English Heritage). For further information the relevant body should be contacted.

The mineral resource data presented are based on the best available information, but are not comprehensive and their quality is variable. The inferred boundaries shown are, therefore, approximate. Mineral resources defined on the map delineate areas within which potentially workable minerals may occur. These areas are not of uniform potential and also take no account of planning constraints that may limit their working. The economic potential of specific sites can only be proved by a detailed evaluation programme. Such an investigation is a essential precursor to submitting a planning application for mineral working. Extensive areas are shown as having no mineral resource potential, but some isolated mineral workings may occur in these areas. The presence of these operations generally reflect very local or specific situations which are referred to in the accompanying report.

The maps are intended for general consideration of mineral issues and not as a source of detailed information on specific sites. The maps should not be used to determine individual planning applications or in taking other decisions on the acquisition or use of a particular piece of land, although they may give useful background information which sets a specific proposal within context.

Availability of BGS geological map sheets



1:50 000 map published

1:63 360 map published

1:25 000 map published (Industrial Mineral Assessment Sand and Gravel Resource map)

Figure A1 West Sussex Resources map (published 1998)

Building stone

Building stone has been produced from a number of horizons within the Lower Cretaceous rocks in the northern half of the county. The working of building stone was much more widespread in the past, present quarrying activities are restricted to a small number of sites producing stone on a very small-scale.

Bognor Common quarry near Petworth works silty sandstones towards the base of the Hythe Formation, mainly for constuction fill but also stone for random walling. The Ardingly Sandstone within the Lower Tunbridge Wells Sand is a traditional source of building stone and is worked near West Hoathly. The Horsham Stone, a thin but persistent sandstone within the Weald Clay, has in the past been worked to the south and west of Horsham as a traditional material for paving and roofing. Small-scale production recently started near Slinfold.

Clay

The Weald Clay of south-eastern England is one of the most important brickmaking raw materials in Britain. It is worked at several sites in West Sussex for the manufacture of facing bricks and tiles. The Weald Clay consists of mudstones and silty mudstones and is up to 400 m to 450 m thick and has a very extensive outcrop within the Low Weald. Laterally persistent beds of sandstone, shelly limestone and clay ironstone occur but are thin. Brick clay is worked at all levels within the Weald Clay and the full extent of the formation is, therefore, shown on the map. However, certain horizons containing calcite, from fossil remains, and also gypsum, have to be avoided during quarrying.

The Wadhurst Clay, which occurs in the extreme east of the county in the High Weald, is up to 70 m thick. It is worked for brick clay at two sites and its full extent is shown on the map. The Gault clay has an extensive east - west outcrop to the north of the South Downs. It is a difficult clay to use in brickmaking and is not shown on the main map. It is worked on a small scale for the production of hand-made bricks at Pitsham, near Midhurst and at Small Dole for sealing landfill sites.

Sand

Bedrock sand resources are confined to the Folkestone Formation, which consists of medium to coarse-grained sands and weakly cemented sandrock. Parts of the sequence can vary both vertically and laterally into fine to medium-grained sands, but variations in particle size are not well known and cannot be defined on the map. Generally the sands become finer towards the east and west of the county and coarsen upwards. The formation is some 40 m to 70 m thick between Midhurst and Washington but thins both to the west and particularly the east. The Folkestone Formation is a regionally-important source of sand and worked at several sites in the county, both by dry and wet working. Dry-screened sand is used for building sand and wet-washed sand for the finer grades of concreting sand, and for concrete roof tile manufacture.

Chalk

Chalk is a relatively soft, fine-grained, white limestone, consisting mostly of the debris of planktonic algae. In West Sussex it forms the prominent natural feature of the South Downs. The Chalk is divided into the Lower, Middle and Upper Chalk and is some 400 m thick in West Sussex. The Upper Chalk is the most extensive, with the Middle and Lower Chalk forming only narrow outcrops where the Chalk Downs have been cut into by rivers and dry valleys. The Lower Chalk is characterised by a relatively high clay content, particularly towards the base, and is shown separately on the map. The overlying Middle and Upper Chalk are of higher purity. Flints are common in the Upper Chalk. Chalk is quarried at four sites in the county for agricultural lime and constructional fill. The Chalk is also a major aquifer and is the most important source of water supply in the county.

Gravel

On the West Sussex coastal plain deposits containing appreciable amounts of gravel (> 4 mm) have been mapped as Head Gravel, Fan Gravel and Storm Beach Deposits. The Older and Younger Raised Beach deposits have been excluded because they consist predominantly of fine sand (< 0.250 mm). The Head Gravel is the most extensive deposit and consists of coarse angular flint gravel set in a clay/silt/sand matrix. It occurs as a wedge-shaped sheet deposit, thinning southwards from about 7 m in the north. Lateral and vertical variation in the ratio of gravel to fines, and within the fines the ratio of clay to silt, make the deposit uneconomic to work in some locations.

In an unprocessed state the Head Gravel can be used as 'hoggin' (a gravel and clay mixture used for fill or for surfacing rough tracks) or for bulk fill. Where the amount of fines is below about 30 per cent, the Head Gravels can be processed to produce coarse aggregate for use in concrete or for re-combination with other material for use in sub-base. Processing entails both washing and crushing. The quality of the final product depends on the nature and ease with which the fines can be removed, both from the gravel as a whole and individual flints.

In the centre of the Head Gravel deposit, and providing a site for Chichester, is an expanse of Fan Gravel. This was primarily derived from the Head Gravel and further denudation of the Chalk dipslope by water action. As a result the Fan Gravel is generally less clayey than the Head Gravel and the deposits have been extensively worked to the south-east of Chichester. Remaining resources are limited.

SAND AND GRAVEL

Superficial deposits

- Gravelly deposit with less than 1 metre of overburden (exposed Head Gravel)
- Gravelly deposit with more than 1 metre of overburden (principally brickearth)

} Head Gravel

- Gravelly deposit with less than 1 metre of overburden
- Gravelly deposit with more than 1 metre of overburden

} Fan Gravel and Storm Beach

Bedrock deposits

- Construction sand resources

} Folkestone Formation

CLAY

- Outcrop area of Weald Clay: principal brick clay resource
- Outcrop area of Wadhurst Clay

CHALK

- Outcrop area of higher purity Chalk (93 - 98 % $CaCO_3$)

} Middle and Upper Chalk

- Outcrop area of lower purity Chalk (< 93% $CaCO_3$)

} Lower Chalk

FULLER'S EARTH

- Tillington ocurrence

MINERAL PLANNING PERMISSIONS (as at 1.1.98)

Source: West Sussex County Council

- Surface planning permission (valid and expired)

MINERAL WORKINGS

- Rock Common — Active site
- *Southwater* — Inactive, worked-out and/or restored site

Mineral commodity

- **Sg** Gravel
- **Cs** Construction sand
- **Ch** Chalk
- **Cl** Common clay and shale
- **Sst** Sandstone
- **Oil** Oil

ENVIRONMENTAL DESIGNATION

- Area of Outstanding Natural Beauty (South Downs, High Weald and Chichester Harbour)
- Site of Special Scientific Interest
- National Natural Reserve
- + Scheduled Monument

ADMINISTRATIVE AREAS

- County
- District

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Figure A2 West Sussex - Unconsolidated sand and gravel

0 5 10 15

Kilometers

West Heath Common

Minsted Sandpit

Pendean Sand Quarry

Heath End Sandpit

Chantry Lane Sandpit

Hampers Lane Sand Pit

Sandgate Park Sandpit

Rock Common Sandpit

Rock Common Sandpit

Hambrook West

Hambrook

Valdoe Wood Gravelpit

Boxgrove Gravelpit

Slindon Bottom Gravel Pit

Eartham Gravel Pits

Drayton Lane North

Drayton Lane South

Scale 1:225,000

PERMITTED SAND & GRAVEL SITES

(West Sussex C.C.)

- ! Active
- ^ Active (Recycling only)
- # Inactive
- " Inactive (Recycling only)
- ! Active sites (BGS BRITPITS database)

SAND & GRAVEL

- GRAVELLY DEPOSIT <1M OF OVERBURDEN
- HEAD GRAVEL: GRAVELLY DEPOSIT>1M OVERBURDEN
- HEAD GRAVEL: HEAD UNDIFFERENTIATED
- RAISED BEACH DEPOSIT
- FAN GRAVEL & RAISED STORM BEACH: GRAVELLY DEPOSIT <1M OVERBURDEN
- FAN GRAVEL & RAISED STORM BEACH: GRAVELLY DEPOSIT >1M OVERBURDEN
- SUB ALLUVIAL : INFERRED RESOURCES
- RIVER TERRACE DEPOSITS
- FOLKESTONE FORMATION
- MPA BOUNDARY
- MPA BOUNDARY WITH 5 KM RADIUS BOUNDARY

These maps were used during the consultation phase of the project. They show geological units from the BGS 'DiGMapGB-50' geological linework and the 1998 published West Sussex Mineral Resources map. This linework was refined to incorporate knowledge from industry and stakeholders in order to produce the MSA and MCA maps.

Permitted Sites data are from the BGS database of active pits called 'BRITPITS' and from data supplied by West Sussex County Council.

The border around the administrative boundary shows minerals up to 5 km beyond the West Sussex border in order to consider the extent of the minerals straddling the MPA boundary.

Figure A3 West Sussex - Brick clay

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0 5 10 15
Kilometers

! Rudgwick Brickworks

! Wealden/Warnham Brickworks

West Hoathly !

Freshfield Lane Brickworks !

Pitsham Brickworks !

! Laybrook Brickworks

Keymer Brick & Tile Works !

Scale 1:225,000

PERMITTED CLAY SITES

! Active (West Sussex C.C.)

! Active (BGS BRITPITS database)

CLAY

- LONDON CLAY FORMATION
- LAMBETH GROUP
- GAULT FORMATION
- WEALD CLAY FORMATION
- WADHURST CLAY FORMATION
- MPA BOUNDARY WITH 5 KM RADIUS BORDER
- MPA BOUNDARY

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Figure A4 West Sussex - Chalk

0 5 10 15

Kilometers

Cocking Lime Works

Duncton Chalkpit

Washington Chalk Pit

Golding Barn Chalkpit

Shoreham Cement Works

Newtimber Chalkpit

Scale 1:225,000

PERMITTED CHALK SITES

! Active
Inactive
(West Sussex C.C.)

! Active
Closed
(BGS BRITPITS database)

CHALK

WHITE CHALK
- 'UPPER CHALK'
  - CULVER CHALK FORMATION
  - NEWHAVEN CHALK FORMATION
  - SEAFORD CHALK FORMATION
  - LEWES NODULAR CHALK FORMATION
  - UPPER CHALK UNDIFFERENTIATED
- 'MIDDLE CHALK'
  - NEW PIT CHALK FORMATION
  - HOLYWELL NODULAR CHALK FORMATION

GREY CHALK
- 'LOWER CHALK'
  - ZIG ZAG CHALK FORMATION
  - WEST MELBURY MARLY CHALK FORMATION
  - GLAUCONITIC MARL MEMBER

MPA BOUNDARY

MPA BOUNDARY WITHIN 5 KM RADIUS BORDER

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0 5 10 15

Kilometers

Figure A5 West Sussex - Consolidated bedrock

! Theale Stone Quarry

Paddockhurst Stone Quarry !

! Philpots Stone Quarry

! Hook Stone Quarry

! Freshfield Lane

! Winters Pit

! Bognor Common Stone Quarry

Scale 1:225,000

PERMITTED CONSOLIDATED BEDROCK SITES

! Active (West Sussex C.C.)

! Active (BRITPITS database)

CONSOLIDATED BEDROCK

- ARDINGLY SANDSTONE
- CUCKFIELD STONE
- HORSHAM STONE
- HYTHE FORMATION
- 'LOWER TUNBRIDGE WELLS SAND'
- UPPER GREENSAND FORMATION
- 'UPPER TUNBRIDGE WELLS SAND'
- MPA BOUNDARY
- MPA BOUNDARY WITH 5 KM RADIUS BORDER

These maps were used during the consultation phase of the project. They show geological units from the BGS 'DiGMapGB-50' geological linework and the 1998 published West Sussex Mineral Resources map. This linework was refined to incorporate knowledge from industry and stakeholders in order to produce the MSA and MCA maps.

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Figure A6 MSA and MCA - Unconsolidated sand and gravel

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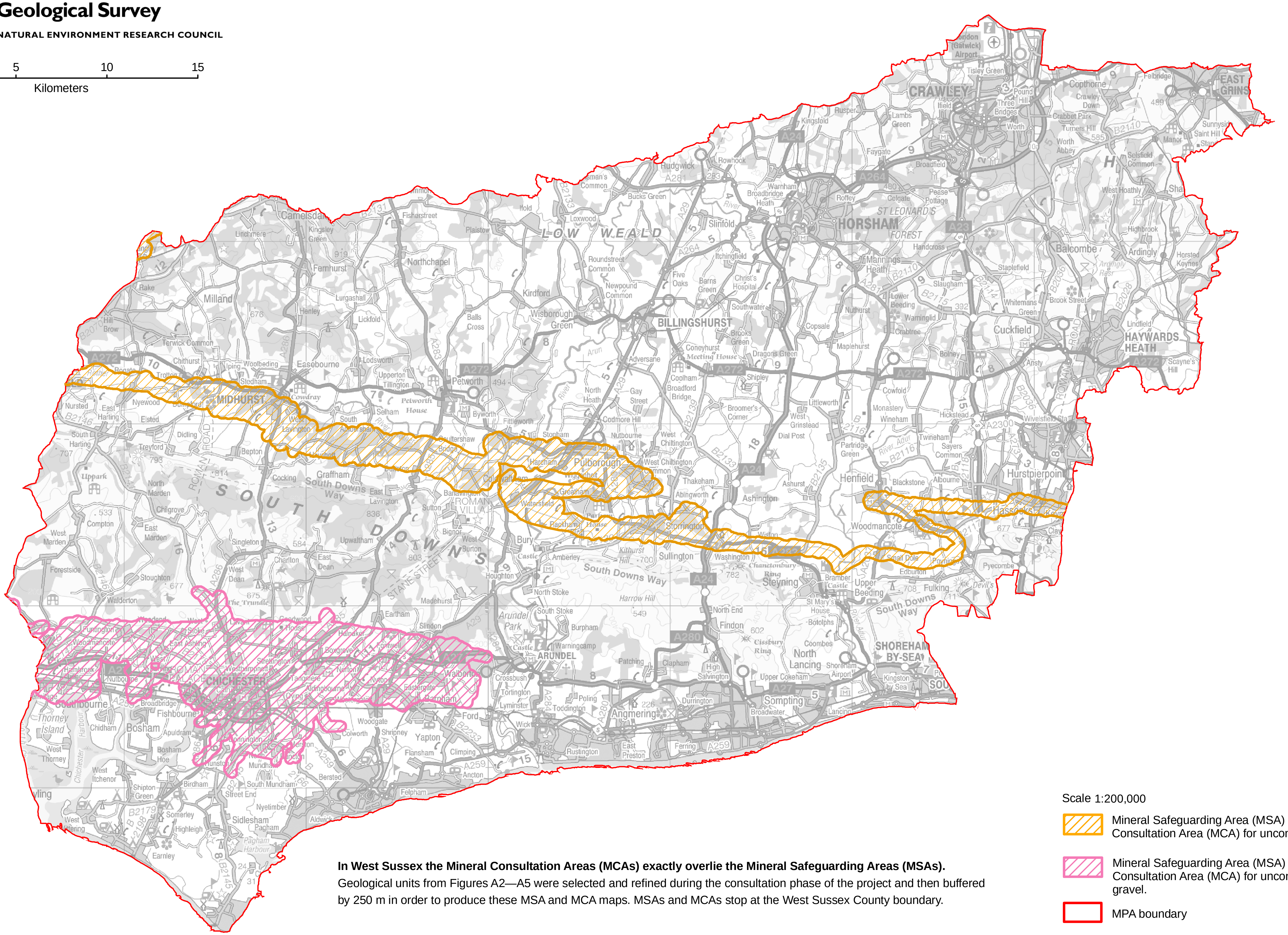
0 5 10 15

Kilometers



Scale 1:200,000

Mineral Safeguarding Area (MSA) and Mineral Consultation Area (MCA) for unconsolidated sand.

Mineral Safeguarding Area (MSA) and Mineral Consultation Area (MCA) for unconsolidated gravel.

MPA boundary

In West Sussex the Mineral Consultation Areas (MCAs) exactly overlie the Mineral Safeguarding Areas (MSAs).
Geological units from Figures A2—A5 were selected and refined during the consultation phase of the project and then buffered by 250 m in order to produce these MSA and MCA maps. MSAs and MCAs stop at the West Sussex County boundary.

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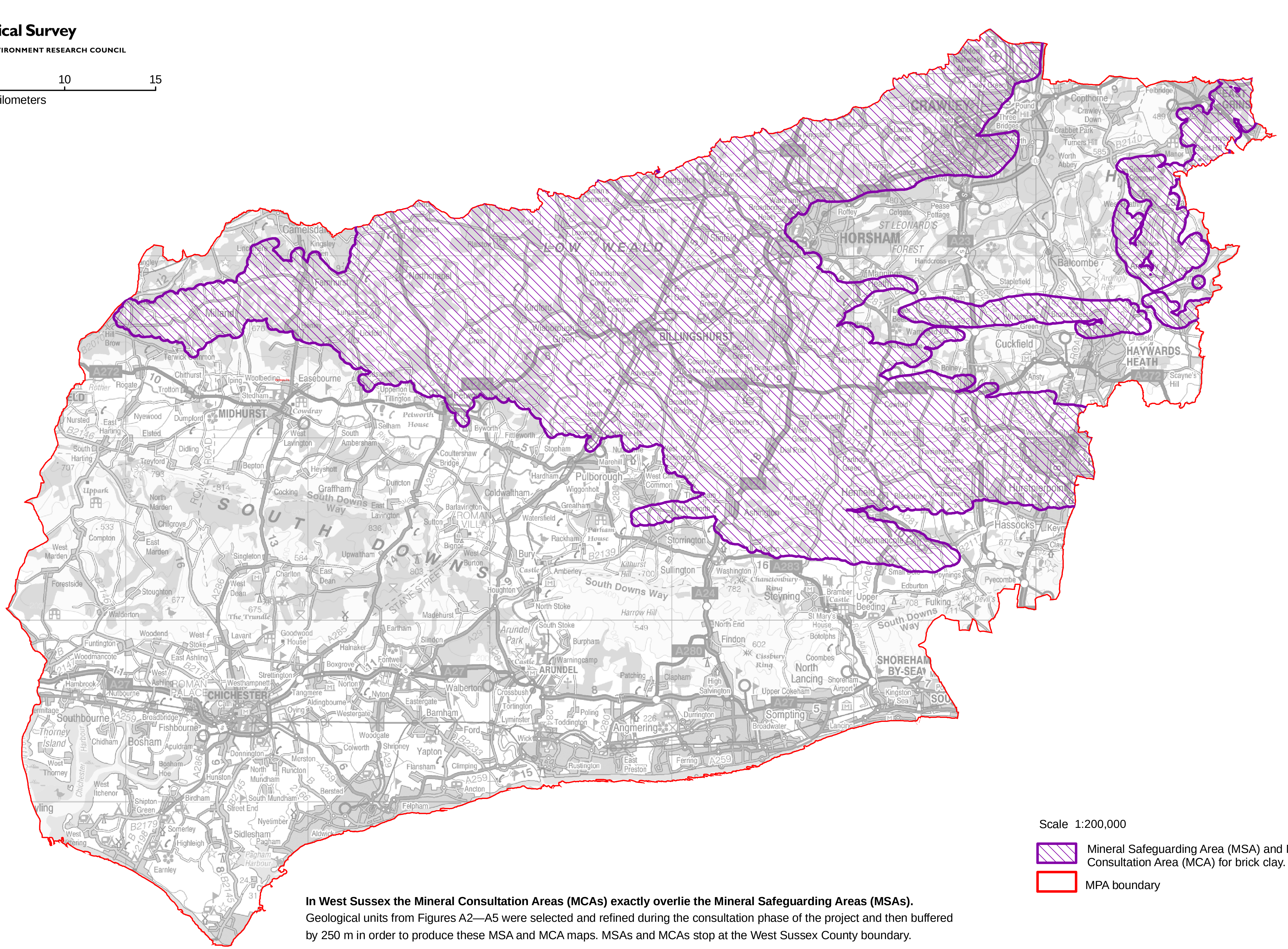
Figure A7 MSA and MCA - Brick clay



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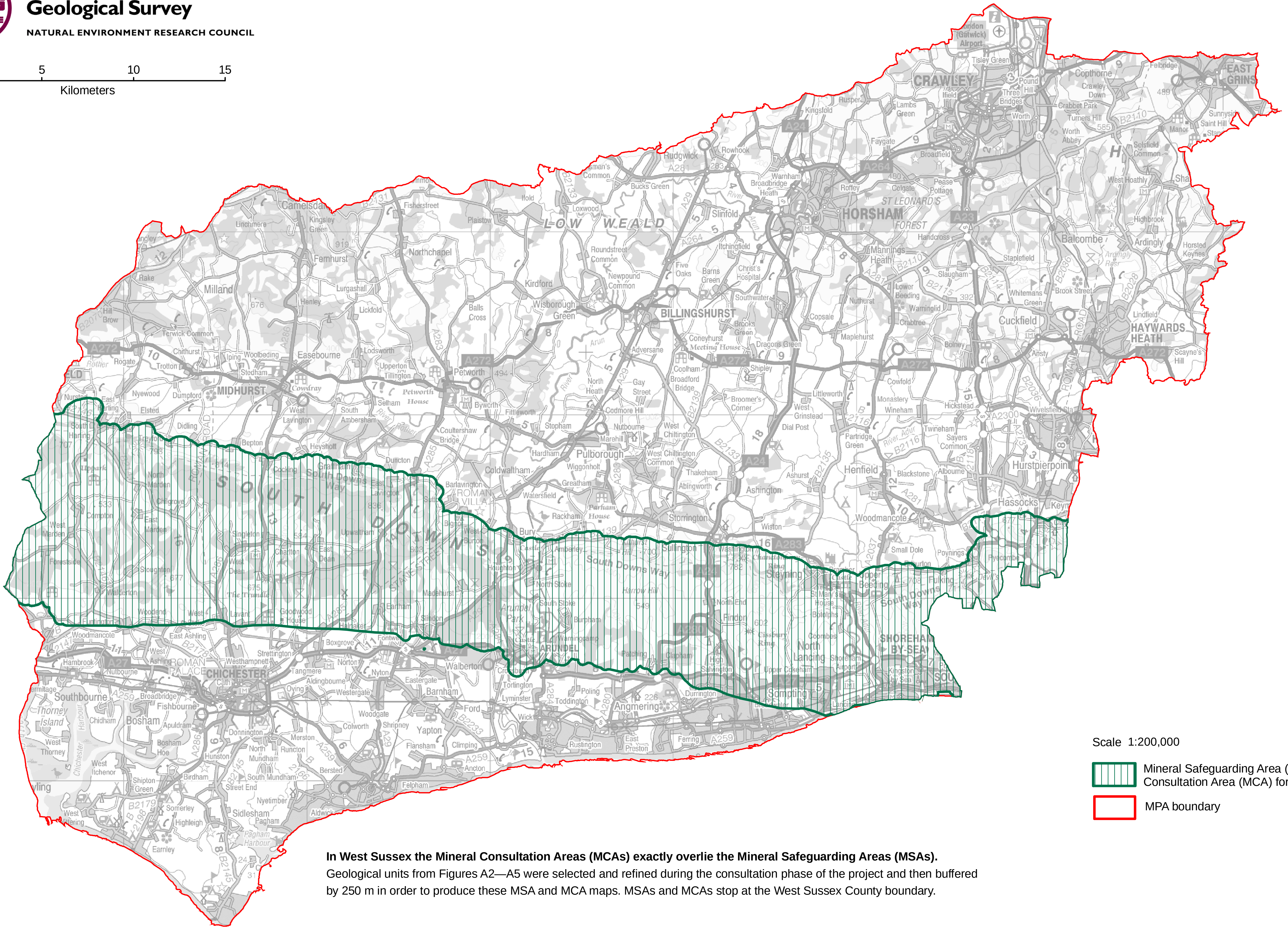
0 5 10 15

Kilometers

Figure A8 MSA and MCA – Chalk



In West Sussex the Mineral Consultation Areas (MCAs) exactly overlie the Mineral Safeguarding Areas (MSAs).**

Geological units from Figures A2—A5 were selected and refined during the consultation phase of the project and then buffered by 250 m in order to produce these MSA and MCA maps. MSAs and MCAs stop at the West Sussex County boundary.

Scale 1:200,000

Mineral Safeguarding Area (MSA) and Mineral Consultation Area (MCA) for chalk

MPA boundary

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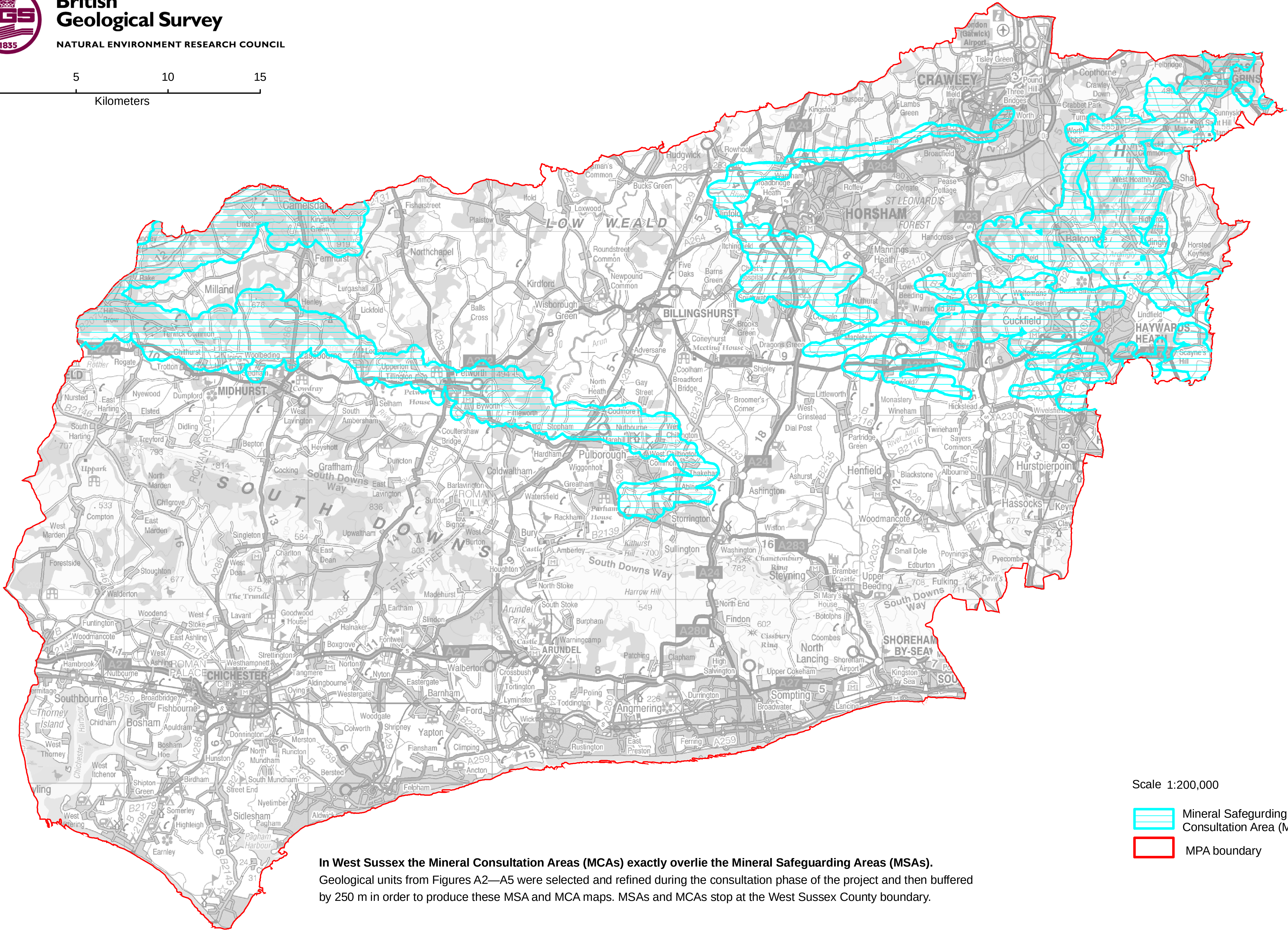
Figure A9 MSA and MCA – Consolidated bedrock

0 5 10 15

Kilometers



Scale 1:200,000

Mineral Safegurding Area (MSA) and Mineral Consultation Area (MCA) for consolidated bedrock

MPA boundary

In West Sussex the Mineral Consultation Areas (MCAs) exactly overlie the Mineral Safeguarding Areas (MSAs).
Geological units from Figures A2—A5 were selected and refined during the consultation phase of the project and then buffered by 250 m in order to produce these MSA and MCA maps. MSAs and MCAs stop at the West Sussex County boundary.

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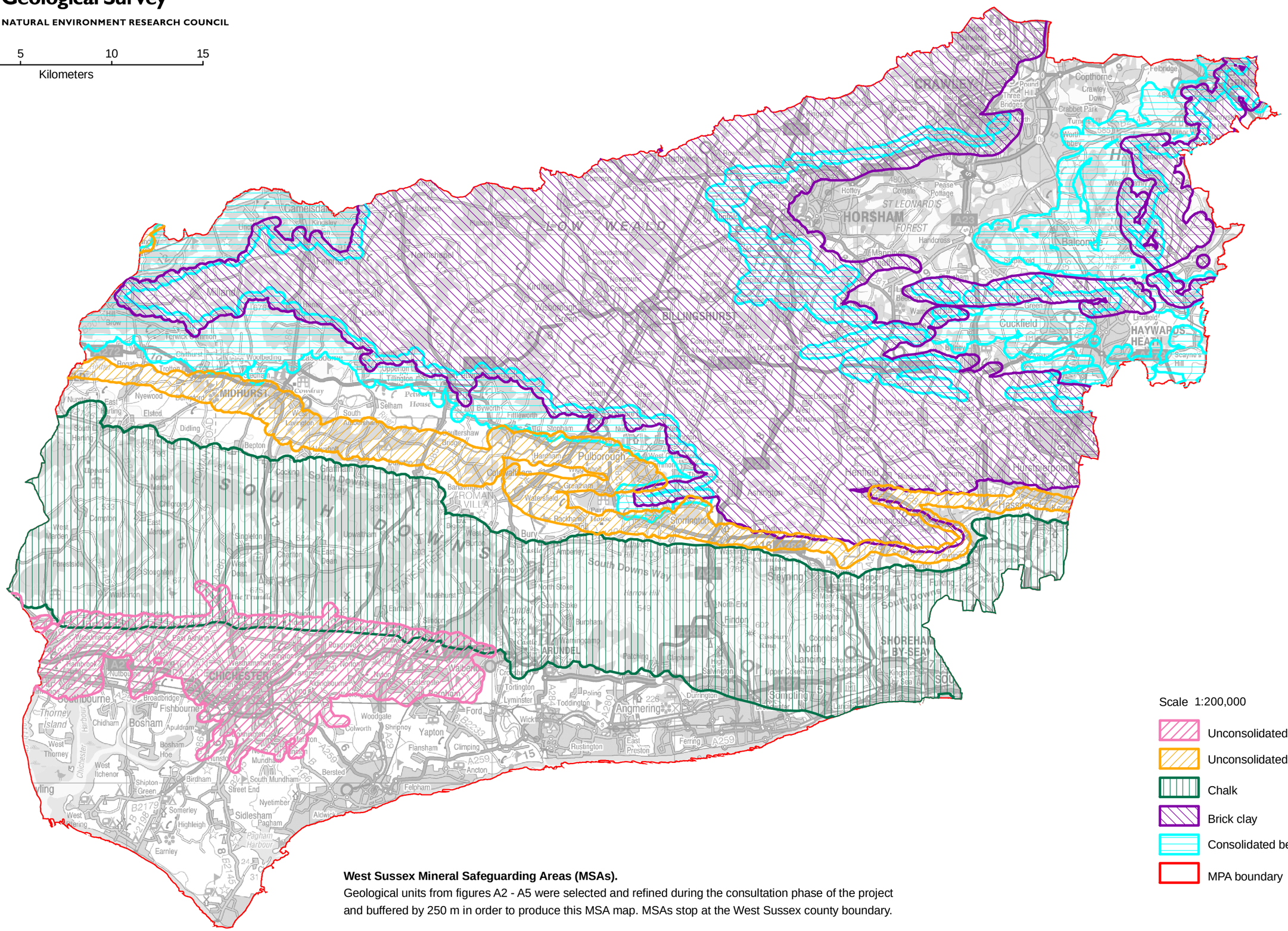
Figure A10 West Sussex Mineral Safeguarding Areas

0 5 10 15
Kilometers



Scale 1:200,000

- ▨ Unconsolidated gravel
- ▨ Unconsolidated sand
- ▥ Chalk
- ▨ Brick clay
- ▤ Consolidated bedrock
- ☐ MPA boundary

West Sussex Mineral Safeguarding Areas (MSAs).
Geological units from figures A2 - A5 were selected and refined during the consultation phase of the project and buffered by 250 m in order to produce this MSA map. MSAs stop at the West Sussex county boundary.

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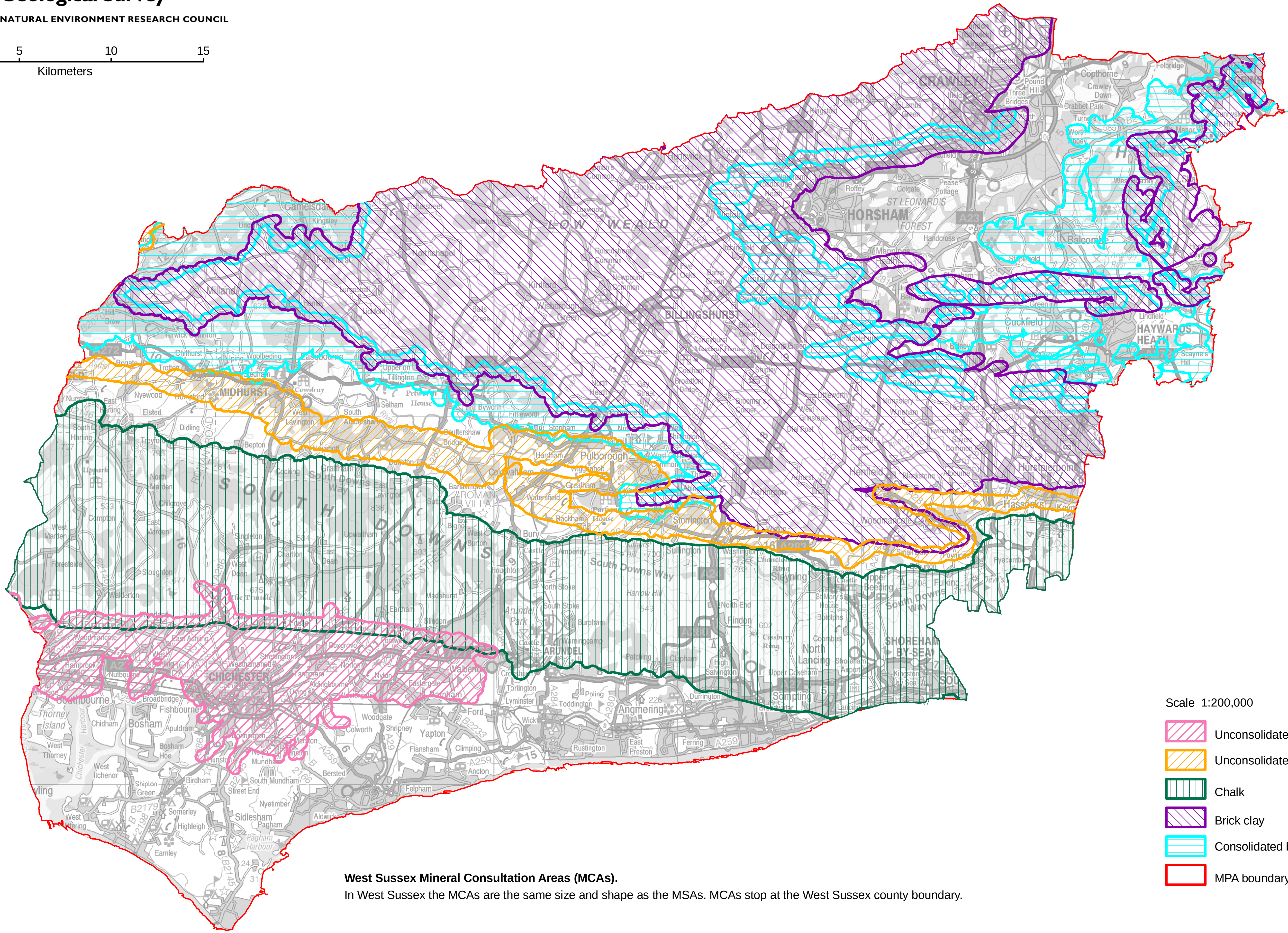
Figure A11 West Sussex Mineral Consultation Areas

0 5 10 15
Kilometers



Scale 1:200,000

- Unconsolidated gravel
- Unconsolidated sand
- Chalk
- Brick clay
- Consolidated bedrock
- MPA boundary

West Sussex Mineral Consultation Areas (MCAs).
In West Sussex the MCAs are the same size and shape as the MSAs. MCAs stop at the West Sussex county boundary.