



Maidstone Local Plan

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Information note prepared by Kent County Council

Minerals Supply and Safeguarding—Relevant Economic Geologies in the Maidstone Borough Area

The National Planning Policy Framework (NPPF) requires the Mineral Planning Authority (MPA) to provide for the long term conservation of minerals and facilitate their use to support sustainable economic development and our quality of life (para. 142). Furthermore, the MPA is required to maintain a ready and sustainable supply of aggregate minerals (para. 145). With regard to hard rock derived aggregates this is to be achieved by seeking to maintain, through the provision of a rolling 10 year landbank, a stock of permitted reserves to support at least the last ten year average of production. For the soft sand and sharp sands and gravels the same applies but for the maintenance of 7 year rolling landbanks. For non-aggregate industrial minerals other specific circumstances apply to secure their steady and adequate supply. With regard to specialist conservation and general construction building stone the NPPF is silent, though these materials are arguably both important for the preservation of our historic fabric thus “our quality of life” and for the needs of general construction of our infrastructure (NPPF para.142) and thus should be both made available and conserved.

The emerging Kent Minerals and Waste Local Plan 2013-30 (the Plan) defines the Mineral Safeguarding Areas in Kent and the Proposal Map, Kent Minerals and Waste Local Plan Maidstone Borough Council-Mineral Safeguarding Areas defines the relevant safeguarded geologies in the Maidstone Borough area. This proposals map as well as the relevant policies of the emerging Plan regarding land-won mineral safeguarding and supply (policies CSM 2, CSM 5 and DM 7) will form part of the Development Plan for the Maidstone Borough area.

Hard Rock-Hythe Formation Kentish Ragstone

Ragstone occurs in a geological formation known in the Hythe Beds of the Lower Greensand, a layer of limestones running from Kent into Surrey which was laid down in the Cretaceous period (this epoch ended some 65 million years ago though the materials were laid down in shallow seas some 100 million years ago). It outcrops in various places, notably at the cliffs of Hythe, Kent (hence its name) and along the Greensand Ridge above the Weald of Kent. In the Maidstone Borough the ragstone occurs as a belt trending in an east west orientation across the borough, which extends from foot of the North Downs Scarp to close to Linton in the Maidstone area and thins out considerably further in the east such that Grafty Green is outside the ragstone belt despite being proximate to the North Downs Scarp.

In succession ragstone occurs in bands between 15 cm and 60 cm thick, alternating with bands of a loose material called hassock (a soft calcareous sandstone deposit). These bands are of similar thickness and the difference in colour between them gives quarry faces a striped appearance. Overall thickness of the unit ranges between 18-100 meters. When the stone is extracted from the quarry, it appears to be of a grey green or blue grey colour but later weathers (oxidation of iron bearing constituent minerals) to an autumnal hue which, together with its hard-wearing properties, traditionally made it an attractive material. This can be seen in local construction of houses, public

works (e.g. Sessions House, Kent County Council and HMP Maidstone and the Archbishop's Palace) and infrastructure in and around the Maidstone area of Kent and further away e.g. the construction of the Tower of London.

Our modern demand is intensive and diverse, with different products being required for use as an aggregate in the ready mix concrete, road building and engineering industries. Larger blocks of ragstone are also used in the construction of sea barriers against coastal erosion. Ragstone remains important for repairing historic buildings. Currently the Hermitage Quarry is the only supplier of building stone in Kent. Blaise Farm is excavated mainly for aggregate, and is not regarded as being a realistic source of building stone. If ragstone cannot be obtained locally, historic buildings such as Rochester Castle, the Archbishop's Palace in Maidstone or the city walls at Canterbury will have to be repaired with stone imported from abroad or elsewhere in the UK, making it difficult to blend in repairs with a traditional Kentish Ragstone appearance.

Current Landbank and Relative Sensitivity of the Kentish Ragstone

The dual NPPF requirements for the provision of the long term safeguarding of minerals and maintenance of a ready and sustainable supply of minerals are reflected in the policies of the Development Plan to prevent the sterilisation of potential ragstone resources. Though the circumstances when non-minerals development may be acceptable at a location within a Minerals Safeguarding area are set out in Policy DM 7. In specific relation to non-mineral development within the ragstone belt the potential exemption from the presumption to safeguard against sterilisation may hinge on a consideration of both the economics of the mineral reserves for the volumetric predominate aggregate market (building stone supply is not subject to the same landbank requirements, but remains important in overall sustainable mineral supply to meet demands) currently in place and the viability and deliverability of the non-minerals development in the form of allocations in the emerging Maidstone local Plan.

There are only two hard rock (Ragstone) operators left in the County thus there is a need to preserve confidentiality regarding the yearly production and thus the 10 year rolling average is an estimate only. This is based on the apportionment that Kent had received in the revised (and now effectively abolished) Regional Spatial Strategy (the South east Plan) Policy M3 of 0.78 million tonnes per annum (mtpa).

It is clear from the table below that Kent has a significant landbank of reserves that can be projected well past the anticipated Kent Minerals and Waste Local Plan's time span of 2013-30. The landbank required to be maintained throughout a plan for crushed rock is 10 years, thus 7.8 million tonnes of permitted reserves should be available in any one year over the Plan period, as a rolling landbank.

Hard Rock (Ragstone) Landbank in Kent 2005-14

Requirements	Computation results to meet NPPF Landbank Requirements
10 Year Sales Average 2005-2014 (A)	0.78 mtpa
Permitted Reserves (B) as end of 2012	Actual figure is confidential though estimated at over 48mt including recent 2013 planning permission for 16.67 mt
Current Landbank (B/A) Duration	61 years (simple landbank)
Rolling Landbank Required by NPPF (based on 0.78 mtpa as the average 10 years production figure)	The requirement of a 7.8 mt landbank of permitted reserves can be maintained to give a 10 year rolling landbank in any one year to 2030 and beyond

The reserves of Kentish Ragstone in Kent are substantial at this time, a simple landbank that is being depleted by an estimated 0.78 mtpa will last for 61 plus years. A maintained, NPPF compliant landbank (that requires at least 10 years of permitted reserves to be available in any one year) would be maintained through the emerging Plan period, with some 34.18 mt of reserves remaining in 2030.

It is apparent that, in the absence of any mineral assessments providing evidence to the contrary, the probability of the non-mineral development allocations in the emerging Maidstone Local Plan causing the sterilisation of significant quantities of potential workable hard rock aggregate or building stone reserves should be considered as low. Particularly when considering the extent of the overall geology in the borough's area. Moreover, the requirements of the NPPF to ensure "a steady and adequate supply of aggregates" will be more than adequately met by the existing permitted reserves until well past the plan period of 2030.

A further consideration is the difficulty of assessing the practicality of any potential prior extraction of an extensive crustal geology to release any identifiable workable aggregate or building stone materials, while not incurring a commensurate adverse impact on the viability and deliverability of non-minerals developments being pursued as non-minerals development by Maidstone Borough Council's emerging local plan. It can be reasonably concluded that to attempt to do so would result in significant difficulty, in viably delivering these sites for non-mineral development in the event of full extraction of potential useable Kentish ragstone materials from these sites.

In conclusion It may be reasonably stated that the probability of the non-mineral development allocations in the emerging Maidstone Local Plan having any significant adverse effect on the objectives of the NPPF to safeguard finite economically important hard rock mineral reserves or

inhibit the provision of sufficient quantities of building stone to meet the needs in general construction and in the conservation of historic buildings and structures is of a low order.

Industrial Sands-Sandgate Formation

The Sandgate Formation is part of the Lower Greensand Group. A geological unit forming part of the underlying structure of southeast England (it is some 100 million years old, being part of the Upper Cretaceous Epoch). South of London in the counties of West Sussex, East Sussex and Kent, which together form the wider Weald, the Lower Greensand can usually be subdivided to what can be referred to as the units formational levels. These formations have varying properties and are composed of the following defined units according to their differing characteristics:

- Atherfield Clay Formation
- Hythe Formation
- Sandgate Formation
- Bargate Formation
- Folkestone Formation

The Sandgate Formation is characterised as a rarely fossiliferous and loosely consolidated mixture of silts, sands and silty clays and some sandstones. The British Geological Survey describes the formation as follows:

“The formation has no single stratotype. Readers should refer to entries for the component members in the western Weald, namely: Bargate Sandstone Member, Rogate Member, Easebourne Member (where present), Selham Ironshot Sands Member, Fittleworth Member, Pulborough Sandrock Member (where present) and Marehill Clay Member (at top). Elsewhere the Formation is undivided. The formation takes its name from Sandgate on the coast near Folkestone, both here,

around the town itself, and in the West Cliff at Folkestone the formation is extensively affected by landslides. The base of the formation was seen in the Goldwell Quarry south of Hothfield in the Maidstone district but this was not designated as a type site.”

The material (where represented as a friable sandstone) is of a reasonably consistent nature such that it is potentially important for industrial applications. It was formerly dug near Marehill (West Sussex where the unit is between 50-100 metres in thickness, in Kent the thickness have not been recorded) for use as moulding sand in iron casting, thus being analogous in use terms to a foundry type silica sand. The County Council has no records of the quarrying of this material in the Maidstone Borough area in recent times; the Goldwell Quarry (worked in the 1940s) was categorised as a ragstone quarry. There may have been some Sandgate Formation sands extracted in association with this activity but this is not recorded.

In addition to the responsibility to safeguard finite economically important minerals the NPPF requires MPAs to plan for a steady and adequate supply of industrial minerals (para.146). With regard to a foundry sand, that may be applicable to the uses the Sandgate Formation Sandstone can be used for, the MPA should provide a stock of permitted reserves to support the level of actual and proposed investment required for new or existing plant and equipment for at least 10 years for individual silica sand sites. The lack of any records of specific extraction of this mineral for industrial purposes renders this requirement difficult to estimate.

It can be reasonably concluded that though there may be some application of the Sandgate Formation Sandstone as an industrial sand source this is unlikely to reoccur in the Maidstone Borough area, if indeed it has ever occurred in the past. The NPPF requirement to make available 10 years of reserves to support this type of industrial mineral industry in the area is not supported by any evidence to derive what quantum of reserve would be required. The circumstances when non-minerals development may be acceptable at a location within a Minerals Safeguarding Area are set out in Policy DM 7; lack of economic value is part of the first exemption criterion to be considered. It

would appear that the material is economically marginal or that any economic status is now historic and unrelated to present day industrial minerals requirements.

Moreover, the degree to which the formation is affected by potentially sterilising non-mineral development, as allocations in the emerging Maidstone Local Plan is limited. Such it can be reasonably concluded than any potential sterilisation of the mineral is unlikely to be material to the emergence of any future quarrying activity that targets this formation specifically to exploit the material as an industrial sand source.

Building Sands - Folkestone Formation

The Folkestone Beds are a component of the the Lower Greensand Group. They are a shallow marine in origin deposit of early Cretaceous age (140 to 100 million years ago). It consists mostly of poorly lithified (cemented) sands which classify onto the loose sand to sandstone transition, having properties neither consistent with the concept of an engineering medium or being of sufficient tensile strength to be considered a rock. In Sussex, Kent and Surrey the formation comprises medium- and coarse-grained, well-sorted cross-bedded sands and weakly cemented sandstones; elsewhere (not in Kent) includes calcareous sandstones. The thickness of the unit has a wide range from as little as 0.5 metres up to 80 metres. In Kent thickness tend towards the higher order of several meters (at about 46 metres near Maidstone and even thicker towards the Surrey border) and have given rise to significant quarrying operations. In the Maidstone Borough area the formation forms a significant component of the North Kent Downs Scarp landscape feature that trends east west as an undulating ridge in the Maidstone and wider Kent countryside.

Occasionally the material is cemented and has a binding clay fraction, though usually occurs as clean loose sands. The quality of the deposit is variable both vertically and horizontally. The loose sand beds are characterised as poorly consolidated, fine, quartzose (low in impurities and high in silica) sands and are capable of providing sands suitable for a wide range of building uses, including mortar

production; silica tile and brick manufacture has also occurred in the past. Parts of the formation yield deposits suited to industrial use as a silica sand, for such uses as a foundry sand. However, the material is generally recognised as economically important as a source of building (mortar) and asphalt (coated stone) sands in its application as an aggregate.

Building Sand (Folkestone Formation) Landbank in Kent 2005-14

The table below demonstrates that there is a relative abundance of permitted reserves for soft sands in the County Council's area, though a significant permitted reserve at Aylesford Sandpit has been (during 2015) re-classified as predominantly a silica sand site. Remaining soft sand reserves at the site are relatively minor, such that most all its remaining permitted reserves (some 3-5 million tonnes depending on the interpretation of the extant planning permission) are below water table silica sands. These materials are industrial sand in their application and thus have been removed from the permitted building sand aggregate landbank in Kent.

Soft Sands Landbank in Kent 2014

Requirements	Computation results to meet NPPF Landbank Requirements
10 Year Sales Average 2005-2014 (A)	0.601 mtpa
Permitted Reserves as end of 2014 (B)	8.04 mt The permitted reserves as of the end of 2014 (assumes the majority of the sand reserves at Nepicar Farm Quarry are industrial in type and are not counted as soft sand)
Current Landbank Duration (B divided by A)	13.4 years (simple landbank)
Maintained Landbank Required by NPPF (0.61 mtpa average based on 10 years of production)	Maintain 4.207 mt of available reserves in any one year (equal to 7 years of average

held at a quantum of reserves equal to 7 years average production)	production)
Current Landbank 8.04 mt, requirement of 4.207mt reserves for a 7 year rolling landbank in any one year	6 years maintained NPPF compliant rolling landbank

In the County Council's, second Kent Local Aggregate Assessment (LAA) produced in 2014, there was highlighted a concern that individual sites may have a degree of interchangeability with markets for silica sand as well as those for aggregate use. In order to clarify the nature of the soft sand reserves the current operators of such sites have all been contacted to determine the degree to which sites can supply both markets from the sands in the overall permitted quarry area. The County Council has concluded that the overall soft sand landbank calculations shown in the table above are representative of the reserve base in Kent as of 2015.

The current landbank of soft sands is sufficient for a 7 year NPPF compliant rolling landbank to be maintained for approximately 6 years. It is clear that further building sand reserves between 2021 and 2030 will be required in order for the emerging Kent Minerals and Waste Local Plan 2013-30 to meet the NPPF maintained landbank requirements for this aggregate mineral across the county area. Where further reserves of industrial sand from the Folkestone Formation to meet the NPPF requirements to support any new industrial sand quarrying activity is likely to occur are difficult to predict. Though it cannot be stated with total certainty, it appears that the deposits in the Maidstone Borough area for both building and silica sands are not generally suitable for modern applications (the one operational site, Lenham Quarry, produced limited non-construction sands alongside the main building sands extraction operations).

It can be reasonably concluded, in the absence of any detailed mineral assessments (that will be required if non-mineral potentially sterilising developments come forward) providing evidence to the contrary, that the probability of the non-mineral development allocations in the emerging Maidstone Local Plan causing the sterilisation of significant quantities of potential workable building sand aggregate or silica sand reserves is low. Particularly when considering the geological extent of the formation in the borough's area and the apparent historical lack of quarry industry interest in this part of the formation. Although, this should be balanced against the fact that significant quarrying has occurred in the past (Aylesford Quarry in Tonbridge and Malling has limited building sand reserves and significant silica sand reserves in the order of 3 million tonnes below the standing water table) close to the borough's boundary.

Sharp Sand and Gravel Aggregates-Sub-Alluvial River Terrace Deposits and River Terrace Deposits

These superficial sands and gravels have been deposited by river action essentially since the end of the last glaciation (the Pleistocene glaciation that ended some 10,000 years ago). This generally means that they are clean (free of clays and silts) and well sorted (meaning a reasonably consistent particle size distribution) and have a sand content that is important in concrete manufacture. They have, therefore, been highly valued by the industry. The deposits quarried at Leybourne were been among the best in the County and are now entirely worked out. Those on the Great Stour gave a lower yield of quality and have also been extensively worked. The deposits within each river valley are highly variable from place to place and isolated deposits with high quality deposits may yet remain though it is generally recognised that this mineral resource in the County is becoming exhausted.

The geological evidence provided by the British Geological Survey indicates that deposits of alluvium and associated river terrace gravels exist in the Medway Valley upstream of Maidstone that fan out to the south east from Yalding to Marden, Headcorn and Staplehurst. How extensive and valuable to the maintenance of a steady and adequate supply of aggregates (NPPF para. 145) is unclear at this time. The NPPF requirement for the emerging Kent Minerals and waste Local Plan 2013-30 is to maintain a 7 year (at least) landbank of this aggregate material over the period of the plan. During the Independent Examination of the Plan (April 2015 to April 2016) it became generally by the Inspector that available resources in the County no longer could sustain this NPPF objective with any certainty given the current landbank and limitation of potential replenishment of the landbank over the period of the plan. The table below illustrates the current (as of 2014) reserve position for this aggregate mineral in the County.

Sharp Sands and Gravels Landbank in Kent 2014

Requirements	Computation results to meet NPPF Landbank Requirements
10 Year Sales Average 2005-14 (A)	0.70 mtpa
Permitted Reserves at end of 2014 (B)	2.64 mt
Current Landbank Duration (B divided by A)	3.77 years
Maintained (rolling) landbank required by the NPPF (0.70 mtpa average based on 10 years of production held at a quantum as reserves equal to 7 years average production)	Maintain 4.9 mt of available reserves in any one year (equal to 7 years of average production)
Current landbank 2.64 mt, 4.9 mtpa required for a rolling 7 year landbank to be maintained in any one year	0 years maintained NPPF compliant current landbank

The permitted reserves together with those anticipated as potential replenishment reserves (a potential 10.11 mt identified in the 2012 Mineral Sites Plan Preferred Option consultation exercise) would enable a 7 year maintained landbank to be in existence at the end of the anticipated Plan period of 2030, provided the lower average of the last three years (0.42 mt) of production as opposed to the last 10 year average production figure (0.70 mt) is applied as a yearly draw down figure. Though an additional 7 years of reserves post 2030 would require another 1.39 mt of reserves that are not identifiable as potentially acceptable through the Preferred Option consultation exercise.

It can be concluded that even if the recent lowered sales experienced by this sector in overall aggregate supply continues the sharp sands and gravel resource in Kent will not meet NPPF requirements post 2030 and further permitted reserves will be required over the Plan period, or increased substitution of land-won materials with recycled and secondary and marine dredged imports will be required to substitute land-won production.

Moreover, it can be reasonably concluded, in the absence of any detailed mineral assessments (that will be required if non-mineral potentially sterilising developments come forward) providing evidence to the contrary, that the probability of the limited number of non-mineral development allocations in the emerging Maidstone Local Plan causing the sterilisation of significant quantities of potential workable sharp sand and gravel aggregate reserves is low. This is compounded by the recorded lack of interest (as evidenced by the 2012 Mineral Sites Plan Preferred Option consultation exercise) by the extractive industry in the remaining sub – alluvial river terrace deposits and the associated river terrace deposits represented in the borough's area.

Building Stone-Paludina Limestone

The uppermost formation within the Wealden Group succession of Kent, the Weald Clay Formation, contains several discontinuous beds of fossiliferous freshwater limestone. These are collectively referred to as the Wealden limestones and are characterised with the presence of numerous fossils of a large freshwater gastropod, 'Paludina' – *Viviparus flaviorum*. These limestones have been given a variety of local names including the 'Large and Small Paludina limestones' and occur in beds up to 30cm thick. In Kent, one of these fossiliferous limestones is widely known as the 'Bethersden Marble' (the term 'marble' being used as the stone is capable of taking a polish), and has been used extensively for decorative work, paving and building stone in Kent. Although this building stone is named after the village of Bethersden, the limestone has been dug from various locations across the county. Some Wealden limestones have also been called 'Winkle Stone' because the small gastropods present are similar in character to the modern 'periwinkle' shell.

Wealden limestones have been used as external paving, kerbstones and channel blocks in the village of Biddenden, but their texture can best be seen in the flooring and internal decorative work in Canterbury Cathedral, and in churches such as St Margaret's in Bethersden. The moulding around the rim of the Norman font of St John the Baptist in Harrietsham provides a good example of finely carved 'Bethersden Marble'.

Other examples of the external use of Wealden Limestone, showing it to be a durable building stone, are provided by the 15th Century church towers at Tenterden and Biddenden, where it has been successfully used for quoins as well as for coursed walling stone. The Norman Herring Bone stonework at Staplehurst church was constructed using slabs of Small Paludina limestone.

Biddenden Church Tower makes external use of Bethersden Marble, in its end-on use as quoins.

The NPPF does not require there to be maintained landbanks of building stone. Though paragraph 142 makes it clear that minerals are essential to support economic growth and our quality of life,

and that a sufficient supply of material should be available to provide the infrastructure, buildings, energy and goods that the country needs. It is emphasised that these materials are finite in nature and their long-term conservation is required. Supplies of specialist local building stone to ensure the specific needs of historic building conservation are important to securing the community's general 'quality of life' in preserving the borough's historic fabric. The occurrence of the Paludina Limestone, that would be suitable for this purpose, is not recorded. Quarrying in the past for this specialist stone was no doubt sporadic and relatively limited in quantity given the specific decorative characteristics of the rock. The geological data provided by the British Geological Survey reflects the recorded outcrop of this unit of the Wealden Group succession not the historically important sources of this specialist building stone.

Moreover, it can be reasonably concluded, in the absence of any detailed mineral assessments (that will be required if non-mineral potentially sterilising developments come forward) providing evidence to the contrary, that the probability of the limited number of non-mineral development allocations in the emerging Maidstone Local Plan causing the sterilisation of this resource (that may be identifiably important to historic buildings conservation) is low.