

The Greensand Country Landscape Partnership


SECRETS OF THE SANDS

SANDSTONE STRUCTURES AUDIT

November 2015

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EXECUTIVE SUMMARY

- S.01 The aim of this report is to promote a better understanding and appreciation of the subtle yet distinctive use of local sandstone in the buildings and structures of the Greensand Country. It also identifies how the survival of minor sandstone structures is threatened, provides a strategy as to how such threats might be mitigated and ways in which funding could aid conservation, and support skills and training.
- S.02 Stretching from the fringes of Leighton Buzzard and Milton Keynes, across Bedfordshire into Cambridgeshire, the Greensand Country lies roughly halfway between Luton and Bedford, embracing 55 civil parishes and six local authorities, albeit with some 81% of its area in Central Bedfordshire. Its scenery stems from a mix of river valley and undulating plateaux, the most prominent feature a steep, north-facing scarp broken only by the valley of the River Ivel. Predominantly rural, the character of the Greensand Country reflects the variety of its soils as well as its underlying geology: a layer of sandstone known as the Woburn Sands Formation.
- S.03 Much of the stone of the Greensand Country is useful only as aggregate (sand), albeit there are layers capable of yielding a building stone of variable quality: harder stone is preferred for buildings with friable (crumbly) stones reserved for boundary walls, etc. Iron-rich compounds lend the stone a distinctive range of rich, rusty ochre-brown colours, for which reason it is often referred to as 'ironstone' though the term is not used in this Report. Difficult to carve and rarely used for mouldings or other complex features, the stone cannot be worked as ashlar: it is always laid as rubble, random or roughly squared. Where fine detail is required, other materials are generally used, most notably limestone. Sandstone can also be seen mixed with cobbles, brick and other walling materials.
- S.04 Historically, the quarrying of building stone in the Greensand Country has been — and still is — secondary to the working of aggregates, and although the sites of a number of *stone* quarries are known, much of the stone used for building is likely to have come from sandpits or shallow workings not always shown on maps. As of 2015, there are only two quarries from which building stone can be obtained.
- S.05 While many of the sandstone churches that are characteristic of the Greensand Country are of ancient foundation, the majority are essentially products of 19th or early 20th century restorations; medieval stonework is rare. Other than a number of bridges, there are few examples of sandstone being used for building prior to the 19th century and even then most buildings are modest houses or cottages, albeit there are four schools, a pumping station and one 'grand' house. Excluding Leighton Buzzard, there are less than 50 occupied sandstone buildings within or close to the Greensand Country. Churches aside (there are 43), the contribution of sandstone buildings to the character and identity of the Greensand Country is small. It is the incidences and clusters of minor sandstone structures that matter.
- S.06 505 minor sandstone structures have been identified within and around the Greensand Country. Of these, just over 90% are freestanding or retaining walls,

including 22 churchyard walls and notable stretches of parkland wall. Otherwise, walls are small scale and mainly associated with residential properties with 24% associated with statutorily listed buildings. The small number of structures which are not walls include bridges, farm buildings, garden structures, a well and an icehouse.

- S.07 Walling in the Greensand Country is traditionally laid in lime or earth (mud) mortar though sometimes open-jointed or 'dry'. The stonework in approximately 17% of walls is squared, often brought to courses or regularly coursed; random rubble walls may also be brought to courses. Some walls are laid as 'polygonal' rubble, or in a diagonal or herringbone pattern. Various types of coping are used, most commonly stones on edge. Some 35% of walls are retaining, and many have openings. Most are low, though there are notable exceptions.
- S.08 Minor sandstone structures can be found in only 34 parishes, of which 18 contain five or more with just 11 having greater than ten. The largest number of structures (109) is in Great Brickhill, though in terms of local authorities 65.6% are in Central Bedfordshire. Over a third are in the county of Buckinghamshire, and some 57% are in conservation areas. The locations of all structures have been mapped, revealing three major concentrations (dense and loose) as well as small but significant groupings. Typology and distribution is key to the contribution of minor sandstone structures to the identity of the Greensand Country, notwithstanding that most are modest in scale and largely self-effacing. Furthermore, they 'belong' in some places but not others and their context is important. Minor sandstone structures reflect and remind us of the underlying geology of the Greensand Country and, if lost, would be notable by their absence.
- S.09 The majority of minor sandstone structures are in reasonable condition with few at risk from total loss, accepting that wavy or — within reason — leaning walls, patchy appearance, mosses and lichens, (sometimes) ivy, natural erosion and slow decay and the 'patina of age' are often part of their character. This is notwithstanding that loss, neglect, salts and inappropriate repairs all have the potential to erode the value of minor sandstone structures to the character of the Greensand Country, leading to and justifying a strategy for mitigation: a Conservation Action Plan.
- S.10 Five themes underpin the Conservation Action Plan:
- Promoting conservation.
 - Grant aid.
 - Possible projects.
 - Skills and training.
 - Implementation.

Each theme is in some way a response to the identified vulnerabilities, presented as a set of practical recommendations that it is hoped will further the appreciation and survival of a cherished, locally distinctive but often overlooked landscape.

01 INTRODUCTION

01.1 CIRCUMSTANCES & BRIEF

- 01.1.1 Following a process of tender and interview, the Christopher Garrand Consultancy was in July 2015 appointed by Bedfordshire Rural Communities Charity — on behalf of the Greensand Country Landscape Partnership — to carry out the Sandstone Structures Audit element of the Secrets of the Sands Programme.
- 01.1.2 The brief for the Audit (issued in April 2015, though evolved over the course of the programme) was to map and assess the condition of the smaller (minor) sandstone structures (walls, gateways, etc.) that are a subtle yet distinctive element of the Greensand landscape, building on a partial survey that was undertaken by volunteers in 2001. Recommended conservation management actions were also required, along with a priced and prioritised action plan.
- 01.1.3 After a project inception meeting, the audit was carried out over the summer and autumn of 2015. The author of this report is Christopher Garand, a conservation architect and principal of the Christopher Garrand Consultancy.

01.2 PURPOSE & CONTEXT

- 01.2.1 The aim of this report is to:

- Promote a better understanding and appreciation of the subtle yet distinctive use of local sandstone in the buildings and structures of the Greensand Country, and to explain how they contribute to local distinctiveness.
- Identify how the survival of minor sandstone structures is threatened, to provide a strategy (action plan) as to how such threats might be best mitigated, and to set out ways in which funds could be targeted to help their conservation, as well as support for associated skills and training.

It is one of a suite of reports that have been commissioned to support a second round submission to the Heritage Lottery Fund (HLF) under their Landscape Partnership programme. The overall aim of the Programme is to inspire and engage people with the Greensand Country, enabling them to play an active and informed role in shaping the future of an exceptional yet in many ways underrated landscape.

- 01.2.2 Ultimately, the purpose of the Report is to inform the Landscape Conservation Action Plan for the Greensand Country, complementing the Landscape Character Assessment prepared in parallel by Alison Farmer Associates, and associated reports dealing with parkland and the characterisation of the historic environment.

01.3 SCOPE & EXTENT

- 01.3.1 Other than as context, the Report (audit) does not deal with churches and chapels, houses or other occupied buildings, including farm buildings that have been converted to residential use. Nor does it cover *parts* of buildings that are made of sandstone, e.g. foundation courses and walls which are now part of occupied buildings. Minor garden features (rockeries, edgings, flowerbed surrounds, etc.) are also excluded. The study covers the whole of the Greensand Country study area plus a one kilometre buffer zone, excluding Leighton Buzzard and urban Linslade.

01.4 METHODOLOGY

- 01.4.1 Excluding reporting, there were two aspects to the audit: desk based study and fieldwork. The former involved the review of relevant previous studies, followed by a review of the 2001 survey in the context of GIS mapping on the basis of data provided by the Partnership via Central Bedfordshire Council. Map study and regression was also a part of this 'desktop' phase.

- 01.4.2 The survey involved:

- A rapid overview of the study area, carried out mainly by car but including some exploration along footpaths, the aim being to test the information arising out of the desk study and to develop a clear picture of how sandstone structures contribute to the character of the Greensand Country. The outcome was an initial analysis of survey results leading to a provisional list of sandstone structures to be targeted as part of a conservation action plan; the locations of all structures were recorded on maps ready for transfer to a GIS database.
- Intensive survey combining fieldwork with a detailed study of GIS mapping (including postcode database, and data on historic buildings, etc. obtained from Historic England and local authority sources), leading to the assembly of a database which was then analysed to produce the basic information underlying this report and its conclusions.

Draft versions of the technical information provide as Appendix C were discussed with Rob Uff, conservation officer at Central Bedfordshire Council.

01.5 STRUCTURE & CONTENT

- 01.5.1 Following this introduction the report is presented in five sections:

- **The Greensand Country** presents a short, descriptive overview of the study area, noting how its geology is manifest in its character.
- **Sandstone & Buildings** provides a brief, non-technical introduction to the geology of the Greensand Country, the properties of the local sandstone, and its extraction and usage.

- **Minor Sandstone Structures** outlines the basic findings of the audit, providing information on the typology of minor sandstone structures and their distribution, and identifying their contribution to local distinctiveness.
- **Vulnerability** discusses those factors that threaten the survival of minor sandstone structures: loss, neglect, salts and inappropriate repair.
- **Conservation Action Plan** outlines a strategy for mitigating vulnerability, presented as five themes: promoting conservation, grant aid, potential (targeted) projects, skills and training and implementation.

The report concludes with a bibliography, incorporating a list of sources (Chapter 07) and series of five appendices (A–E) that are referred to throughout (Appendix B is — with the exception of a cover sheet — provided as a separate document).

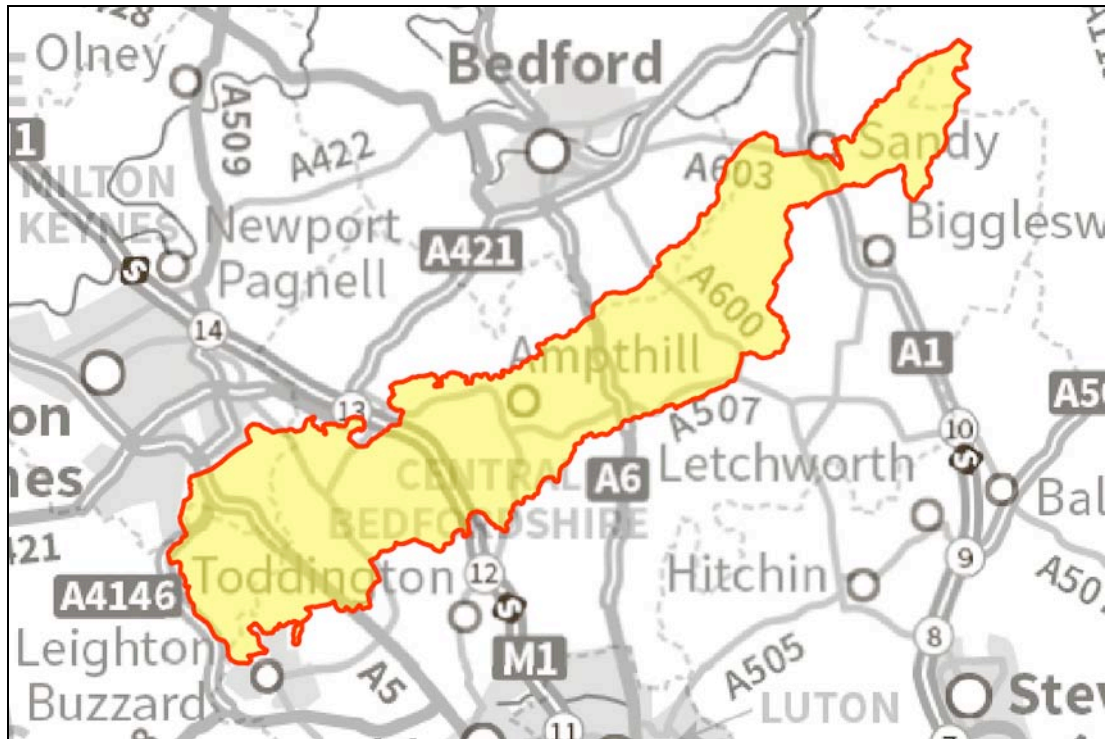
- 01.5.2 Civil parish names are used throughout the report, along with six figure National Grid References (letters SP and TL) to aid identification of buildings or structures in rural or isolated locations. For the purposes of audit and description, individual structures are generally identified on a property-by-property basis, i.e. a wall crossing the frontage of two properties is counted as two structures, even if contiguous albeit no account is taken of gates or other discontinuities. Exceptions are referenced in the notes section of the individual database entries.

01.6 LIMITATIONS & QUALIFICATIONS

- 01.6.1 The audit of sandstone structures was limited by the ground that could be covered in the time available, and hence it is possible that some structures have been missed, though given the numbers involved it is unlikely that further finds would significantly affect the outcome of conclusions; information on additional structures can be added to the database at a later date. In which context it is important to appreciate that no access was gained to any private land including parkland, including in some instances where parkland structures are referred to, in which case secondary information was used.
- 01.6.2 It should be further appreciated that the assessment of the condition of any structure is no more than a snapshot observation, and hence must not be taken as a detailed survey. Likewise the nature and scope of work proposed to any structure, which must on no account be treated as a definitive schedule of works. Repairs, etc. are outlined purely as a basis for estimating ballpark costs, and as information on the likely scale of works involved. Specifications and other information in Appendix C are provided for guidance purpose only and should not be used directly to procure any works; their purpose is to inform the specifications of others, to which end they should be adapted and developed to suit the circumstances of a particular project.
- 01.6.3 All references to legislation and guidance are current at the time of writing, and should always be checked for changes or updates. Similarly the details of suppliers (also) provided in Appendix C.

02 THE GREENSAND COUNTRY

02.1 LOCATION



02.01: MAP SHOWING THE GREENSAND COUNTRY IN CONTEXT

- 02.1.1 Stretching 44 kilometres northeast from the fringes of Leighton Buzzard and Milton Keynes, across Bedfordshire into Cambridgeshire, the 567 square kilometres of the Greensand Country lies roughly halfway between the urban centres of Luton and Bedford. It is served by a number of major roads, notably the Roman Watling Street (A5); the A6 (once the Bedford & St. Albans turnpike); the west–east A507; and the historic Great North Road (A1). The M1 motorway and two railways also cut across the landscape. The Greensand Country embraces — in whole or in part — 55 civil parishes distributed across six local authorities. However, some 81% of its area is administered by Central Bedfordshire Council, with the remainder split mainly between Aylesbury Vale District and Milton Keynes Councils (8% and 6%). Small parcels of land in Huntingdonshire District, South Cambridgeshire District and Bedford Borough Councils make up the rest (5%).

02.2 TOPOGRAPHY

- 02.2.1 The most prominent feature of the Greensand Country is the steep scarp that defines its northern edge, visible across the Bedford Plain though less so from the river valleys and undulating plateaux that typify the area, and imperceptible from the

clay hills and vale to the south. Rising in the west from the valley of the River Ouzel, the highest point of the scarp above OS datum (172 m) is Bow Brickhill Heath, from which point its meandering line gradually drops to where — at its lowest point (25 m) — it is interrupted by the valley of the River Ivel before again climbing and petering out into Cambridgeshire. The valley of the Flit, a short tributary of the Ivel, marks the central part of the southern edge of the Greensand Country, which otherwise merges into the adjacent clay. It is this subtle interplay between scarp, slopes and river valleys that creates the complex mix of expansive and intimate landscapes.

02.3 CHARACTER



02.02: LOOKING ALONG THE SCARP



02.03: UNDULATING RURAL LANDSCAPE



02.04: THE RIVER FLITT



02.05: PARKLAND (HAYNES)

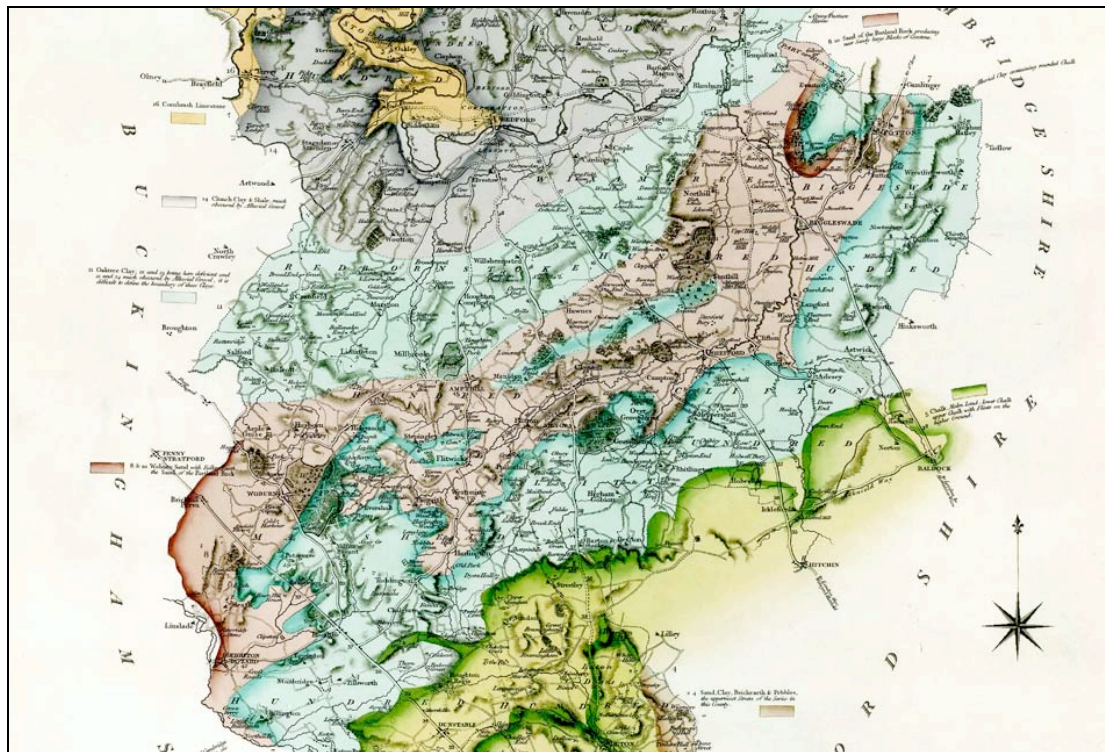
- 02.3.1 A predominantly rural area, the only large settlements within the Greensand Country are Ampthill and Flitwick, and the small town of Potton, albeit Sandy, Biggleswade and Gamlingay are close by. Other than where the scarp drops dramatically to the Bedford Plain, the scenery is quiet and understated, a gentle mix of heath, wooded hills and historic parkland knitted-together by an agricultural landscape settled with hamlets and villages (often with landmark church towers), and sometimes notable for model farms and 'estate' planning. The varying character of the Greensand Country is a reflection of the balance and transition between acidic, sandy soils that are hard to farm and more fertile deposits of heavy clay, as well as — crucially — its underlying sandstone geology.

03 SANDSTONE & BUILDINGS

03.1 GEOLOGY

03.1.1 In geological terms, 'rock' is the mineral that makes up the lithosphere, the solid outer shell of the Earth, including the top layer (crust). There are three types:

- Igneous, formed by the cooling and solidification of magma (fluid, molten rock) rising from below the mantle, e.g. granite and basalt.
- Sedimentary, formed by the 'cementing' (binding together) under pressure of accumulated layers (beds) of particles and eroded fragments of igneous and other older rocks, shells, etc. Limestones (e.g. Portland Stone) and sandstones (e.g. York Stone) are both sedimentary rocks.
- Metamorphic, formed by the alteration of igneous or sedimentary rocks by extreme heat or pressure, e.g. slate and marble.



03.01: WILLIAM SMITH'S GEOLOGICAL MAP OF BEDFORDSHIRE OF 1820 WITH UNDERLYING ROCK TINTED BROWN & OVERLYING CLAY BLUE-GREEN

03.1.2 Underlying the Greensand Country is a layer of sedimentary rock (its 'solid' geology), up to 120 metres thick and laid down some 110 to 125 million years ago during what geologists call the Cretaceous period. Although generally hidden by more recent layers of clay and other soils (the 'drift' geology), it is visible on the surface where exposed by quarrying or other workings. Once the bottom of a narrow seaway, the rock stretches from East Yorkshire and the Wash to the south coast

and the Isle of Wight, with a second formation looping from Kent through Surrey around The Weald into Sussex. Historically known as the Lower Greensand, the band of rock running through Bedfordshire into Buckinghamshire is referred to as the Woburn Sands Formation (Upper Greensand denotes a greenish–grey rock at the foot of the chalk to the south of the Greensand, once thought to be contiguous).

- 03.1.3 The rock is fairly resistant and has therefore — in the 40 million or so years since sea levels dropped — eroded far less than the softer geology of the clay landscapes to north and south, which (in part) explains the elevation of the Greensand Ridge and its steep, north–facing scarp.

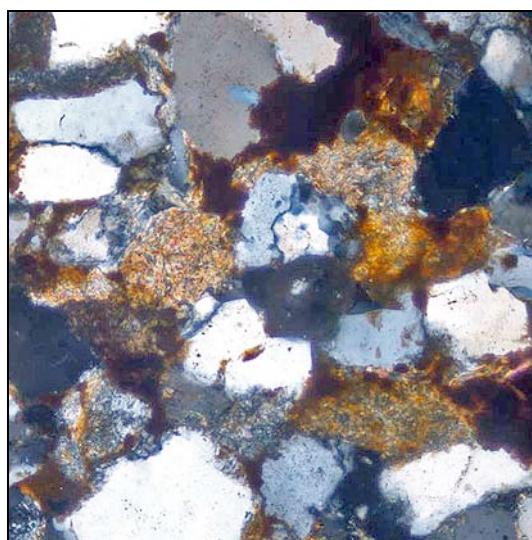
03.2 PROPERTIES

Composition

- 03.2.1 The particles that make up the Woburn Sands Formation are mainly of a hard, chemically–resistant quartz with an average size of 0.07–2.0 mm, and the rock is therefore classed as a sandstone (strictly speaking ‘stone’ is rock which has been detached from the solid, either by way of natural events such as rockfall or human activity, e.g. quarrying). Most of the particles are unconsolidated or only weakly cemented, meaning that much of the rock is largely loose sand, useful as an aggregate but not as a ‘dimensioned’ stone, that is to say stone which can be cut and worked to a specific size or shape for use in building. However, there are horizons (distinct layers or seams) towards the upper levels of the Formation where the particles are tightly bound with more quartz (silica) and iron oxides, and capable of yielding a reasonable building stone, albeit these are discontinuous and irregular; the solid geology of the Greensand — and thereby the quality of available stone — is highly variable. Successful building requires careful selection.



03.02: SECTION THROUGH SANDSTONE SHOWING QUARTZ (SILICA) PARTICLES



03.03: 150 x ‘THIN’ SECTION SHOWING QUARTZ (WHITE/GREY) & IRON (BROWN)

Durability

- 03.2.2 Sandstone that is cemented with a high percentage of quartz (a siliceous stone) is hard and durable while that bound with iron oxide (a ferruginous stone) tends to be friable (crumbly) and more prone to erosion; the stone of the Greensand Country varies between these extremes. Harder stones are preferred for buildings, with more friable stones reserved for boundary walls and other situations where a more rapid rate of erosion is perhaps acceptable.



03.04: HARD, DURABLE STONE



03.05: EROSION OF FRIABLE STONE

- 03.2.3 The durability in use of a sedimentary building stone is also related to the natural height (thickness) of the horizons (beds) of useable rock. In terms of longevity and performance, blocks of sandstone must be laid so their natural bedding planes are horizontal ('on bed' and visible on the faces of the masonry). Stones where the beds are exposed ('face bedded') are more likely to weather and fail, especially if the stone is friable. Copings, string courses and other stones with exposed horizontal surfaces are hence vertically ('edge') bedded. For structural reasons, voussoirs (arch stones) are laid with their beds at right angles to the thrust (line) of the arch. All of which means that the natural height of the rock on bed — which might run and abut at angles (known as cross or current bedding) — will determine the maximum size of a stone and hence the height of any coursing (regular horizontal layers), and thereby character of the masonry. Bed height may also result in stone being laid in unusual ways, such as in Potton and Sutton where elongated stones from very thin beds can be seen placed in diagonal or herringbone patterns.



03.06: HORIZONTAL BEDDING PLANES



03.07: STONES BEDDED ON EDGE

- 03.2.4 While the beds of stones from the Woburn Sands Formation are in the main readily visible, especially when weathered and slightly eroded (which is part of the character of the stone), there are times when they can be hard to see. It is hence important that the beds (not faces) of all stones are marked in the quarry, and that the marking system is retained throughout the whole process of working and laying.

Colour

- 03.2.5 Regardless of the relative proportions of different ‘cements’ (and thus the inherent durability of the rock), it is the presence of iron-rich compounds which in all cases lend the stone of the Greensand Country its distinctive range of rich, rusty ochre-brown colours. For which reason is often referred to as ‘ironstone’, albeit the term is also used for iron-rich stones from elsewhere (including quarries in nearby Northamptonshire) as well as limestones, e.g. the thin Shenley Hill deposits that occur near Leighton Buzzard (geologically, an ironstone is a rock containing a large proportion of compounds that can be smelted to produce iron). For the sake of precision — and in line with recent geological literature (refer 03.3.2) — the term is not used in this Report; which is not to denigrate its more loose usage in a variety of published works including *The Buildings of England* (Pevsner) gazetteers and conservation area appraisals produced by Central Bedfordshire Council.
- 03.2.6 The presence of other minerals may also play a part, a notable example being the iron-potassium silicate called glauconite, evident in the only ‘Greensand’ stone that is truly green, visible in the walls of Husborne Crawley church (until recently thought to be from the Upper Greensand, though recent study suggests a highly localised source of the Woburn Sands Formation to be more likely; refer 03.3.2).



03.08: TYPICAL STONE FROM THE
WOBURN SANDS FORMATION



03.09: SANDSTONE COLOURED WITH
GLAUCONITE (HUSBORNE CRAWLEY)

Working

- 03.2.7 Despite being predominantly fine–medium grained (particle size up to 0.5 mm; stones with finer particles are called mudstones and rarely suited to building) the usable building stone which can be extracted from the Woburn Sands Formation is not a ‘freestone’, a stone that can be readily cut in all directions. This means this it is very difficult to carve and hence is rarely used for mouldings or other complex features. Nor can it be worked as ashlar (masonry laid in precise, regular courses with fine joints). It is always laid as rubble: random (irregular shape and size) or roughly dressed (squared and faced) masonry and generally in thick beds of (traditionally) lime or earth mortar, sometimes in regular courses. Rubble walls are in most cases built of two skins, intermittently tied with ‘bonding’ stones and the ‘core’ between filled with loose rubble, i.e. crushed stone, sand, etc. Some minor structures (mainly freestanding or retaining walls) are solid.



03.10: RANDOM RUBBLE (UNCOURSED)



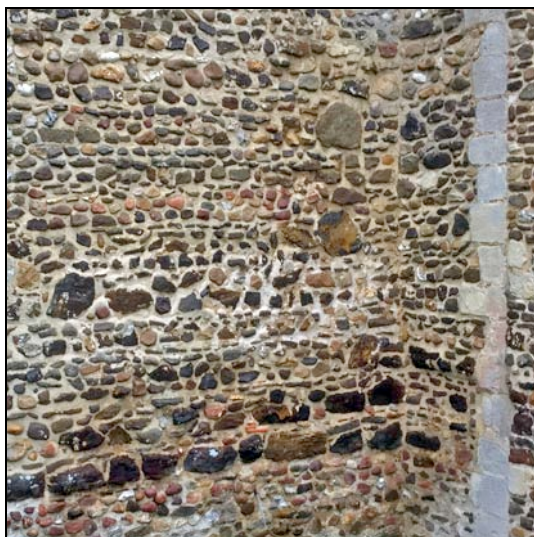
03.11: RANDOM RUBBLE (COURSED)



3.12: SQUARED RUBBLE (UNCOURSED)

- 03.2.8 Where sharp detail is required, the sandstone of the Greensand Country is used in conjunction with other materials, most notably imported fine–grained, easy to carve limestones that are often used for door and window surrounds. A commonly used local stone — popular in the Medieval period — is the soft grey–white Tottenhoe from the nearby Chiltern escarpment, which though superb for carving is of poor durability, especially when in contact with sandstone. In the canal and railway age, stone for dressings came from Lincolnshire, Bath and other places. For ad–hoc, rough walling — which may in some cases have originally been plastered — and repairs, the sandstone rubble can be seen mixed with cobbles (especially towards

the east of the area, near to the Ivel Valley), brick and other materials including 'stitched' tiles, a method of infill repair that was promoted by the Society for the Protection of Ancient Buildings (SPAB) in the late 19th and early 20th centuries, and which is still sometimes used.



03.13: SANDSTONE MIXED WITH COBBLES & LIMESTONE



03.14: LIMESTONE DRESSINGS & TILE STITCHING TO SANDSTONE TOWER

03.3 SOURCES

- 03.3.1 The variable nature of the rock across the Greensand Country and the limited deposits of well cemented, durable beds mean that extraction of building stone has never been on the same scale as areas such as the Cotswolds or even the geologically similar Surrey and Sussex hills (a British Geological Survey map of current and historic sources of building stone published in 2001 does not show any quarrying on the Woburn Sands Formation, whereas numerous sites are shown in and around the Weald). Historically, the quarrying of building stone has been — and still is — secondary to the working of aggregates, especially to the north east of Leighton Buzzard where sand is today extracted on a massive scale.
- 03.3.2 Historic England (formerly English Heritage) and the British Geological Survey (BGS) have for a number of years been researching the use of building stone in England, and have made public their findings. The Strategic Stone Study — as the project is called — currently lists a number of quarries in the Bedfordshire part of the Greensand that are known to have been worked for building stone:
- **Rushmere Sandpit** (SP912278), northwest of Leighton Buzzard in Heath & Reach parish, which provided stone for the nearby Rushmere House.
 - **Chamberlain's Barn** (SP928265), **Stone Lane** (SP929289), **Shenley Hill Sandpits** (SP936274) and **Munday's Hill** (SP937280), to the north and northeast of Leighton Buzzard; also in Heath & Reach.

- **Church End Sandpit** in Husborne Crawley (SP957364), the likely source of the distinctive green stone seen in the adjacent church of St. Mary Magdalene and St. James (refer 03.2.5).
- **Stonepit Hill** (SP970356), south of the Husborne Crawley to Ridgmont road, now within (beyond the wall) of Woburn Abbey Park.
- **Poorshill** (SP997340), northeast of Eversholt and west of the M1.
- **Silsoe** (TL077358), just west of the village, north of West End Road.
- **Back Street, Clophill** (TL082383), on a hill north of the village; known to have been used for the nearby Stone Jug public house and the slightly rustic and somewhat orné West End Cottage about 2.7 km northwest.
- **The Lodge Sandpit** (TL186479) in the grounds of the RSPB headquarters at Sandy Lodge, immediately west of the mansion.

The first edition of the large scale (1:2500) County Series Ordnance Survey (OS) maps published in the 1880s indicates that, other than sandpits in the Leighton Buzzard area, all of the above quarries had by then ceased working or disappeared, save Silsoe (noted in the 1908 Victoria County History as “old”) that was until recently still worked for aggregates. Otherwise, there is now little sign on the ground of these quarries, save the Lodge Sandpit. All have been backfilled or — in the case of those around Leighton Buzzard — obliterated by large-scale sand extraction.



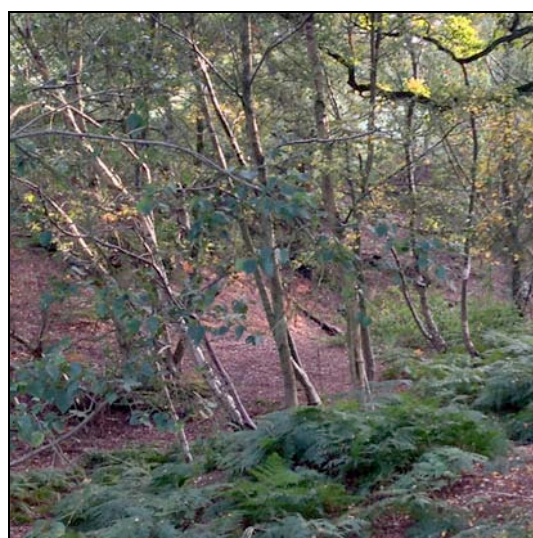
03.15: WORKED FACE OF THE HISTORIC LODGE SANDPIT, SANDY

03.3.3 However, this list of sites is not the whole picture. Notwithstanding that the Strategic Stone Study does not yet extend to cover Buckinghamshire and Cambridgeshire,

even a cursory study of pre-WW2 OS maps reveals many instances of workings, some marked as sand or stone pit and others as quarry, and in one instance — Shenley Hill — both. Considering these in the context of the Strategic Stone Study, it becomes clear that ‘sand’ and ‘stone’ quarrying were to a large extent the same; it is quite likely that sand pits also produced building stone, even if only rough material for freestanding and retaining walls. Fieldwork also reveals instances of old, shallow workings (‘delves’) that are not always shown on maps, for example on the edge of Rammamere Heath (SP921305) to the east of Great Brickhill. These too are likely to have produced small quantities of building stone that was used locally.



03.16: BACKSTREET QUARRY, CLOPHILL AS SHOWN ON 1883 OS MAP



03.17: SHALLOW WORKING ON EDGE OF RAMMAMERE HEATH

03.3.4 At the time of writing, there are only two working quarries from which limited amounts of building stone can be obtained, both worked primarily for aggregates (refer Appendix C for further details):

- Cainhoe quarry on the A507 southeast of Clophill (TL102375), owned and operated (worked) by Thomas Brothers Excavations (Luton) Ltd; and
- The large sandpits east of Heath & Reach (SP927287), operated and worked by L. B. Silica Sand Ltd.

03.4 USAGE

03.4.1 While many of the distinctive sandstone churches of the Greensand Country are of medieval foundation, the majority as they appear today — at least externally — are essentially products of the 19th or early 20th centuries due to extensive restoration (e.g. Millbrook in 1857–8, Little Brickhill in 1864–5 and Husborne Crawley in 1911) or complete rebuilding (e.g. Steppingley in 1858–60 and Maulden in 1858–9). Some are new: Silsoe (1829–31 on the site of a previous chapel), Clophill (1848–9) and Lidlington (1886) as well as the mortuary chapel on the site of Old St. Mary's,

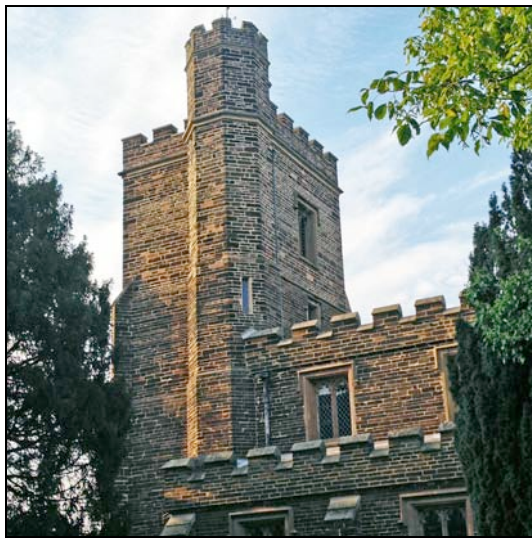
Woburn (1864), the latter now a heritage centre. Surviving medieval stonework is comparatively rare and tends to be internal, though it can still be seen externally, e.g. the towers of Husborne Crawley, Haynes and Everton churches, and the ruins of Segenhoe church (SP981358) and Old St. Mary's at Clophill (TL092389).



03.18: LITTLE BRICKHILL CHURCH



03.19: STEPPINGLY CHURCH (REBUILT)



03.20: NEW CHURCH AT SILSOE



03.21: HAYNES CHURCH (MEDIEVAL)

- 03.4.2 Beyond churches, the only major examples of the use of sandstone for building prior to the 19th century are the rear part of Woburn Lower School (16th century though restored and extended c.1830) and a number of bridges, including a medieval packhorse bridge at Sutton. In the 18th century, major bridges were erected over the Ivel at Biggleswade (demolished) and Girtford (Sandy). Lesser bridges spanned the Flit at Clophill and Beadlow, both lost; it is not known whether a similar bridge in the Chicksands military area survives. There is also an 18th century stone bridge spanning a sunken pathway on the approach to Southill Park, which may have been

designed by Lancelot 'Capability' Brown. North of the Greensand Country, large blocks of sandstone from the Lodge quarry were taken to build Blunham Bridge and the spectacular bridge over the Ouse at Tempsford; parts of Great Barford bridge too. In the early 19th century, local sandstone was also used for the heavy abutments of small iron bridges associated with the Ivel Navigation, e.g. over the lock at Broom.



03.22: MEDIEVAL PACKHORSE BRIDGE OVER STREAM AT SUTTON

- 03.4.3 As with churches and chapels, the use of sandstone for secular buildings dates primarily from 19th century into the Edwardian era, though it is possible that earlier cottages do exist, likely examples being those combined to form the Stone Jug at Clophill (refer 03.3.2) and Arnold's (Hill Farm) Cottages south of Hill Farm on the road to the isolated hamlet of Potsgrove (SP949302). In a minor domestic context, limited usage for chimneys, garden walls and other features continues today.



03.23: COTTAGES, POTSGROVE



03.24: MODERN USAGE OF SANDSTONE

- 03.4.4 Most of the sandstone buildings within or in proximity to the Greensand Country are modest houses or cottages, including lodges to Woburn, Wrest, Southill and Hazells Parks. A small number of sandstone farm buildings have also been converted to residential use. There is one 'grand' house to the south of Potton (Sutton Park House of 1858, now John O'Gaunt Golf Club) and four schools: Postgrove (1897–8), Aspley Guise (1847–50), Steppingley (1877–8) and Potton (1896–8), all now converted to houses. About 2 km southwest of Biggleswade, on the A1 and beyond the Greensand Country (TL210417), is perhaps the most distinctive sandstone building in the area: the rather Glasgow (Mackintosh) style New Spring Water Pumping Station, Engine House and attached Pump Master's House of 1906.



03.25: LODGE TO HAYNES PARK



03.26: SUTTON PARK HOUSE



03.27: SCHOOL AT STEPPINGLEY



03.28: NEW SPRING PUMPING STATION

- 03.4.5 Excluding Leighton Buzzard, there are less than 50 occupied sandstone buildings within or in proximity to the Greensand Country. This is compared to 43 churches and chapels: 33 all or mainly of sandstone; 8 have major sandstone elements such as a tower or chancel; and 2 where sandstone is used to make-up rubble walling. Further afield, there are another 38 ecclesiastical buildings which to some extent use stone from the Woburn Sands Formation, stretching from Roxton in the north to Toddington in the south, and east–west from Cockayne Hatley to Drayton Parslow, 10 km beyond Leighton Buzzard; a map showing all churches is provided as Appendix A.01. It is clear that, churches aside, the contribution of sandstone buildings to the character and identity of the Greensand Country is small. It is the incidences and clusters of minor sandstone structures — primarily walls — that matter, and it is these which form the subject of the remainder of this Report.

04 MINOR SANDSTONE STRUCTURES

04.1 TYPOLOGY

04.1.1 A detailed review of the 2001 survey combined with extensive fieldwork has identified 505 minor sandstone structures within the Greensand Country study area and a roughly 1 km buffer zone, albeit excluding Leighton Buzzard and the urban area of Linslade. Of these, 458 (just over 90%) are freestanding or retaining walls, including 22 churchyard walls (whole or part boundary and sometimes in sections) and in 4 instances — Great Brickhill, Southill, Ickwell and Sandy Lodge — notable stretches of parkland wall. There are also 3 substantial walls alongside the A6 at Clophill: both sides of the Deadman's Hill cutting to the north and bounding Warren Wood to the south (west side of road). Otherwise, walls of all types are small scale and mainly associated with residential properties, with 122 (24.2)% attached to or part of the curtilage of statutorily listed buildings.

04.1.2 Making up the 44 structures which are not walls are:

- **9 x bridges or parts of bridges:** an abutment to the bridge over the Great Union Canal at Old Linslade (SP909261); parapets at each end of the culvert which takes the River Flit under the A6 at Clophill (TL081375 & TL082376); a road bridge over the Flit at Chicksands (TL125392); the abutments of an Ivel Navigation bridge on the edge of the Southill Estate (TL130430) and another just south of Sandy (TL182471); a bridge on the approach to Southill Park (TL145240); Girtford Bridge and the parapet of its side bridge on the A603 just west of the A1 (TL163490); and the packhorse bridge at Sutton (TL220474).
- **10 x farm buildings:** east of Stoke Hammond Church (SP879297); to the rear of 1 Farm Cottage in Little Brickhill (SP908325) and on the west side of Woburn Road (front wall only); part of Corbetts Hill Farm approximately 400 m southeast of Old Linslade church (SP912264); two in woods east of the A5 near Little Brickhill, the remains of Buttermilk Farm (SP921319 & 922319); two at Overend Green Farm east of Heath & Reach (SP930285 & 930287); on the west side of the A5, 2 km east of Heath & Reach (SP948290); and by Mill Farm at Water End, just north of the A505 between Maulden and Clophill (TL073374). All are still in agricultural use or abandoned.
- **5 x historic garden structures:** 4 are in the Swiss Garden at Old Warden and one is a pavilion in the grounds of Hazells Hall.
- **4 x lychgates:** three forming parts of churchyard walls (Husborne Crawley, Haynes and Silsoe) and one freestanding (Old Linslade).
- **3 x churchyard buildings:** Old Linslade (use unknown) and two at Maulden (the Bruce Mausoleum and what might have been a stable).
- **4 x modern village gateways:** Bow Brickhill (SP907347), Wavendon (SP921367); Woburn Sands (SP923356), and Heath & Reach (SP925289).

- **2 x surrounds to village pumps:** Little Brickhill and Haynes Church End.
- **10 x miscellaneous structures:** a bus shelter in Great Brickhill; the war memorial in Little Brickhill; a village lockup (Silsoe); Jacob's Well in Old Warden; an icehouse (Moggerhanger Park); an archway and screen (Southill Park); a seat on the village green at Ickwell; the dovecote of the former Sandeye Place, north of where the Ivel loops around Sandy; the base of the village cross in Everton; and a sandstone sundial in Stockgrove Park.

Sutton bridge is grade II* listed. Girtford Bridge, the Bruce Mausoleum, the Silsoe lockup, Haynes Pump, Jacob's Well, the Moggerhanger icehouse, the archway and screen at Southill, and the Sandeye Place dovecote are all listed grade II.



04.01: PARAPET TO CULVERT UNDER A6



04.02: BARN AT MILL FARM, WATER END



04.03: BRUCE MAUSOLEUM, MAULDEN



04.04: VILLAGE LOCKUP, SILSOE



04.05: JACOB'S WELL, OLD WARDEN



04.06: ICEHOUSE AT MOGGERHANGER

04.1.3 As noted in 03.2.7, the stone of the Woburn Sands Formation does not lend itself to ashlar, and all walling in the Greensand Country is of rubble masonry (squared and random) laid in lime mortar though sometimes earth (mud) mortar, open-jointed or laid 'dry'. The stonework in approximately 17% of walls is squared and either:

- **Uncoursed:** stones of various depths laid in a variety of face arrangements with no attempt to level the beds.
- **Snecked:** a variation of uncoursed walling; small stones are incorporated to avoid long vertical joints that may compromise the integrity of the wall.
- **Brought to courses:** courses of two or more stones brought to level beds and of varying heights.
- **Regularly coursed:** all stones are brought to level beds, with each course comprising a single height of stones.

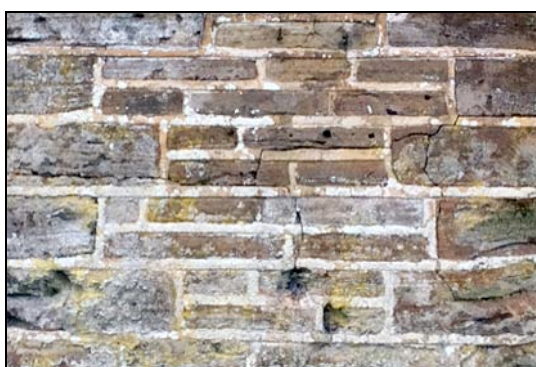
The rough split in usage of squared rubble is: 1% uncoursed; 5% snecked; 22% brought to courses; and 72% regularly coursed, some close to ashlar.



04.07: UNCOURSED



04.08: SNECKED



04.09: BROUGHT TO COURSES



04.10: REGULARLY COURSED

04.07–04.10: TYPES OF SQUARED RUBBLE

04.1.4 Random (un-squared) rubble walls may also be brought to courses. Some are laid as 'polygonal' rubble, a type of masonry where the natural shapes of the stones are fitted to each other with the minimum of dressing. There is also the diagonal and herringbone masonry referred to in 03.2.3, almost certainly a deliberate visual effect

as the thin stones could as easily been laid horizontal. Coursed masonry account for approximately 29% of random rubble walls, with 51% being uncoursed and the remainder laid polygonal (14%), or diagonal or herringbone (6% combined).



04.11: POLYGONAL RUBBLE



04.12: DIAGONAL RUBBLE

- 04.1.5 Various types of coping are used to weather walls including stones on edge (most common), dressed stone copings (rare), brick and beds of mortar. Some 35% of walls are wholly or in part retaining, and many incorporate openings or stone gateposts, the latter sometimes squared and dressed regardless. Most walls are low — less than a metre high — albeit there are notable exceptions, e.g. the walls around the parkland of the former Great Brickhill Manor. As in buildings, sandstone walling is occasionally mixed with other materials, including bricks and cobbles.



04.13: STONE-ON-EDGE COPING



04.14: COURSED BRICK COPING



04.15: GATE + POSTS (SANDY LODGE)



04.16: SANDSTONE USED WITH BRICK

04.2 DISTRIBUTION

04.2.1 As noted in 02.1.1, the Greensand Country and its immediate hinterland embraces or clips 55 civil parishes, 39 of which are within the Central Bedfordshire Council local authority area. A further 6 are under the control of Milton Keynes Council, with 5 in Bedford Borough, 3 in Aylesbury Vale District, and one each in Huntingdon District and South Cambridgeshire District. However, this spread does not reflect the distribution of minor sandstone structures which can be found in only 34 parishes, of which 18 contain five or more with just 11 having greater than ten:

Civil Parish	Authority	Number	%
Great Brickhill	Aylesbury Vale	109	21.6
Heath & Reach	Central Bedfordshire	64	12.7
Clophill	Central Bedfordshire	49	9.7
Silsoe	Central Bedfordshire	36	7.1
Little Brickhill	Milton Keynes	35	6.9
Potton	Central Bedfordshire	33	6.5
Maulden	Central Bedfordshire	30	5.9
Bow Brickhill	Milton Keynes	22	4.4
Aspley Guise	Central Bedfordshire	21	4.2
Northill	Central Bedfordshire	13	2.6
Sandy	Central Bedfordshire	11	2.2

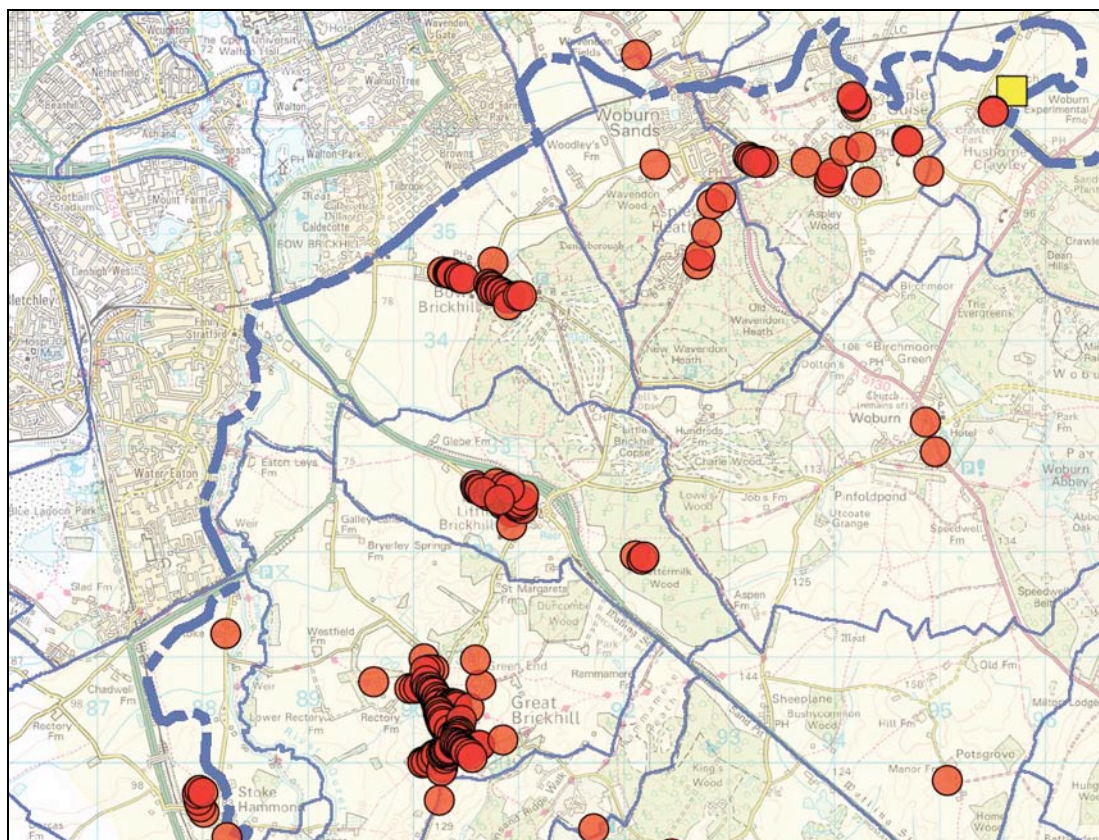
Beyond this there are:

- 10 (2.0%) each in Flitton & Greenfield + Old Warden including 5 structures and 3 walls in the Swiss Garden (4.0%)
- 8 (1.6%) in Stoke Hammond.
- 7 (1.4%) in Leighton Linlade (urban area excluded).
- 6 (1.2%) in Southill including 4 within the designed landscape of Southill Park.
- 5 (1.0%) each in Apsley Heath + Haynes, four at Church End (2%).
- 4 (0.8%) in Tingrith, three grouped with the church.
- 3 (0.6%) each in Lidlington, Ridgmont, Steppingly + Sutton (1.8%).
- 2 (0.4%) each in Flitwick, Husborne Crawley, Woburn + Woburn Sands (1.6%).
- 1 (0.2%) each in Ampthill, Campton & Chicksands, Everton, Gamlingay, Millbrook, Moggerhanger + Potsgrove (1.6%)

In terms of local authorities, this means: 65.0% in Central Bedfordshire; 23.2% in Aylesbury Vale; 11.7% in Milton Keynes; and 0.2% in South Cambridgeshire. Nearly

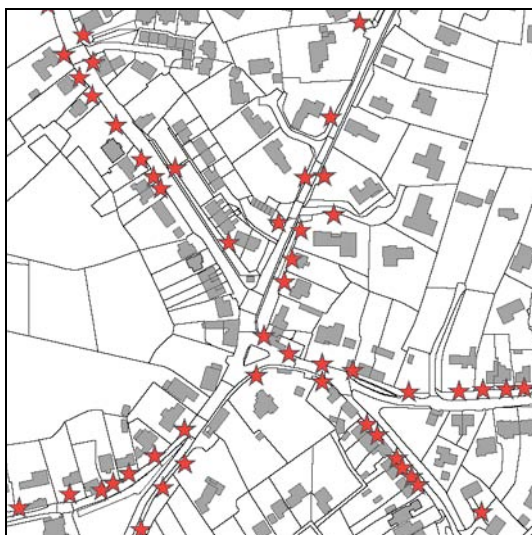
35% are in the county of Buckinghamshire, demonstrating that — in terms of minor sandstone structures — the Greensand Country and its underlying geology is about more than Bedfordshire. Some 80% of the recorded structures are in one of 26 conservation areas (12 in Central Bedfordshire, 2 each in Aylesbury Vale and Milton Keynes); 18 are within Registered parkland (Southill, Old Warden and Hazells).

- 04.2.2 All structures are plotted on the map provided as Appendix A.02, with — by way of context — A.01 showing sandstone churches relative to the Greensand Country.

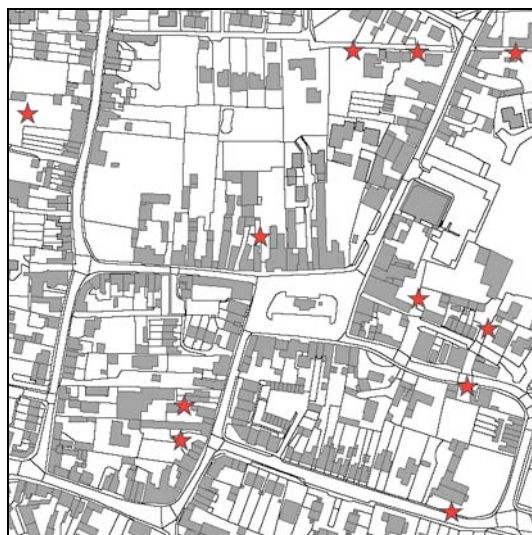


04.17: EXTRACT FROM MAP SHOWING LOCATIONS OF MINOR SANDSTONE STRUCTURES ACROSS THE GREENSAND COUNTRY (APPENDIX A.02)

- 04.2.3 Mapping the minor sandstone structures of the Greensand Country reveals three major concentrations, the greatest being in a rough arc from Junction 13 of the M1 to Old Linslade, mainly on or below the slopes of the Sandstone Scarp. Most of the quarries listed in 03.3.2 are in this area, along with evidence of many small pits. The second concentration is centred on where the A6 crosses the Flit Valley with notable groupings in Maulden, Clophill, Silsoe and — to a lesser extent — Flitton, all in proximity to at least two sources of good building stone. Radiating out from the Lodge Sandpit is the third concentration, spread wider (perhaps due to the influence of parkland and river transport), and — in respect of the diagonal walling slips used in Potton and Sutton — the existence of a localised source of stone, maybe the former Scout Hut sand and gravel quarry to the east of Potton church (TL229494). Squared rubble is concentrated in the central area, while random rubble brought to thin courses dominates the Buckinghamshire end of the Greensand Country.



04.18: DENSELY CLUSTERED MINOR STRUCTURES (GREAT BRICKHILL)

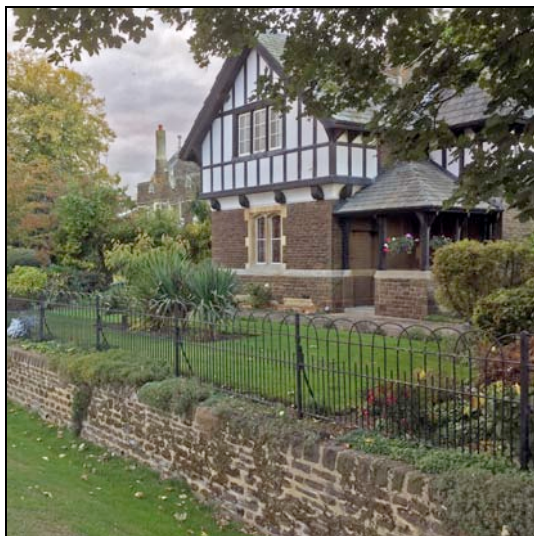


04.19: LOOSELY CLUSTER MINOR STRUCTURES (POTTON)

- 04.2.4 Plotting and analysing distribution of minor sandstone structures — specifically walls — in relation to churches and other buildings also highlights that there are dense and loose concentrations, as well as small but significance groupings. The intensity of the dense groups of walls is evident in villages such as Great Brickhill or Clophill where a large number of highly visible sandstone structures in a small area make a big impression. Conversely, more dispersed groupings are more subtle in their influence, as is the case in Maulden, Potton and the scattered instances of rural and semi-rural walls in Northill parish (Ickwell, Hatch and Upper Caldecote).



04.20: HIGH IMPACT DENSELY CLUSTERED SANDSTONE IN GREAT BRICKHILL



04.21: WALL TO MASTERS HOUSE & SCHOOL AT STEPPINGLEY



04.22: RETAINING WALL SUPPORTING FLITTON CHURCHYARD

04.2.5 In some cases, the presence of a very small number — or even one — minor sandstone structure is important because of its relationship to a significant group of buildings that work together as a whole. For example, the:

- Assortment of houses, farm buildings and walls at Overend Green.
- Church, school, school house, etc. groupings in Potsgrove and Steppingley.
- Relationship between church, churchyard walls, lychgate, lodge and pump at Haynes Church End.

Sandstone churchyard walls related to sandstone churches are always important, there being 22 occurrences across the Greensand Country, for example Stoke Hammond, Little and Great Brickhill, Tingrith and Northill.

04.3 LOCAL DISTINCTIVENESS

04.3.1 Understanding the typology and distribution of sandstone structures, and the way they are grouped and relate to buildings — and ultimately, readily available sources of good stone — is key to appreciating their contribution to the distinctive character of the Greensand County; to specific areas as well as the landscape generally:

- Aside from 'engineered' structures where 'big' stone is needed (bridges and to an extent the larger retaining walls like those on the A6 at Clophill, or that of Little Brickhill churchyard), minor sandstone structures are modest in scale and largely self-effacing. Even lone examples such as the lockup at Silsoe or the well in Old Warden do not make any great statement and are subservient to buildings, sandstone or otherwise (the sandstone churchyard wall at Ridgmont complements a handsome *limestone* church built 1854–5 to the design of George Gilbert Scott).

- Location is crucial. Minor sandstone structures ‘belong’ in some parts of the Greensand Country but not others. They are as alien to the landscapes of the Lowland Sandy Farmland and the Glacial Plateau Estates (as described in the Landscape Character Assessment) as they would be if transplanted to the Shropshire Hills or the Suffolk Coast and Heaths. Sandstone used away from the Greensand Country — in places like Hockliffe and Blunham, and even suburban Luton — does not contribute to the special interest of the area; nor do distant sandstone churches like Soulbury or Upper Stondon.
- The way in which the stone is used is also localised, e.g. squared rubble helps define the character of Silsoe and Clophill but not Great Brickhill or Heath & Reach, and diagonal walling is exclusive to Potton and Sutton.
- Groupings and context are important. There is a big difference between a place with an obviously dense concentration of sandstone walls (Bow Brickhill) and one where their presence is as much felt as seen (Potton). Relationships between minor sandstone structures and buildings — especially sandstone churches — are also of note.

Minor sandstone structures reflect and remind us of the underlying geology of the Greensand Country, even though they do not play as great a role in shaping the distinctive character of its landscape as parkland, estate villages, wooded slopes, river valleys and heathland. In some respects, they are hardly noticed. Yet, it is vital that they are ‘there’ as — if lost — they would be notable by their absence.

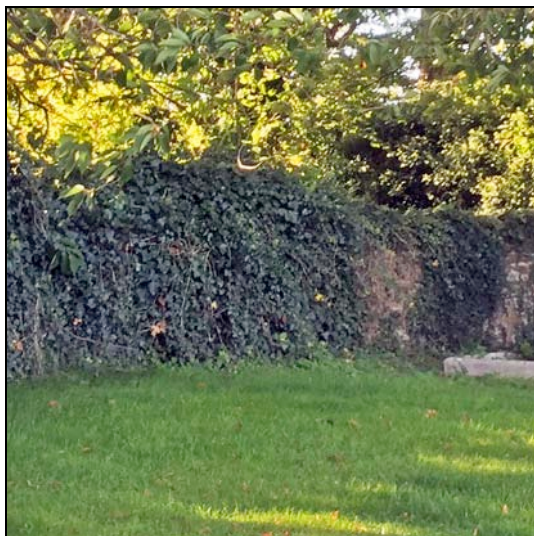


04.23: OLD LINSLANDE CHURCH & (NOW) FREESTANDING LYCHGATE

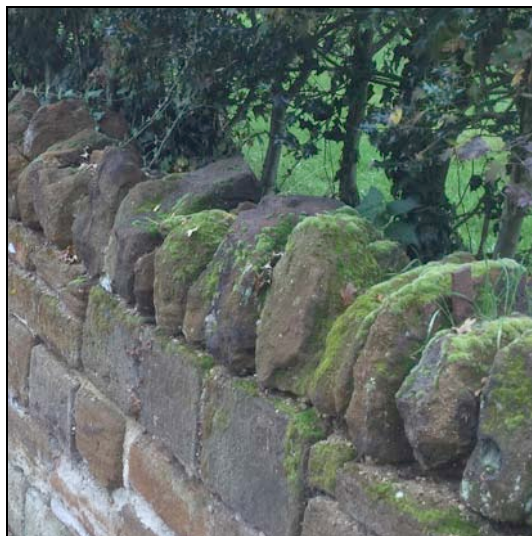
05 VULNERABILITY

05.1 OVERVIEW

- 05.1.1 The audit of minor sandstone structures in and immediately around the Greensand Country has revealed that the majority (87%) are in good or reasonable condition, and while not always maintained or treated as well as they could be, few (2%) are so deteriorated as to be at risk from total loss. This is accepting that freestanding and retaining walls (the majority of structures; refer 04.1.1) are not the same as walls which enclose occupied buildings, and hence are not assessed on the basis that they need to exclude the weather, function in terms of doors and windows, or maintain any level of thermal performance. Wavy or — within reason — leaning masonry, patchy appearance, mosses and lichens (and sometimes ivy), natural erosion and slow decay are key aspects of the character of many walls, and the temptation to remove for its own sake the ‘patina of age’ should always be resisted, especially in historic landscapes and places.



05.01: IVY-COVERED WALL



05.02: THE PATINA OF AGE

- 05.1.2 However, there are a number of conservation issues which if not addressed at a strategic — and sometimes individual — level, have the potential to erode the subtle contribution of minor sandstone structures to the distinctive character and identity of the Greensand Country:

- **Loss:** deliberate or accidental.
- **Neglect:** has the capacity to result in loss.
- **Salts:** resulting in the localised rapid deterioration of sandstone.
- **Inappropriate repairs:** causing damage across the whole of the area.

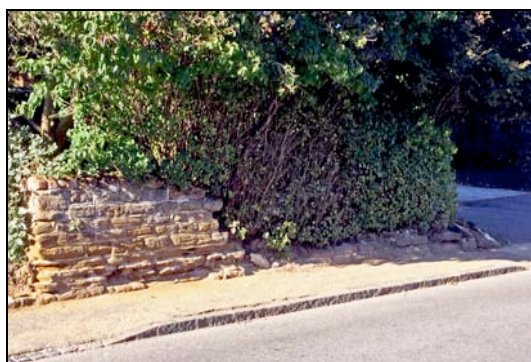
Each of these conservation issues (vulnerabilities) is now discussed.

05.2 LOSS

- 05.2.1 Comparing the records of the 2001 survey with what was observed on the ground in 2015 reveals a small but steady loss of sandstone walls due to changes in land usage or development. For example, on the north side of Watling Street in Little Brickhill where farm usage has ceased (Warren Farm) and agricultural buildings have cleared, and with that the loss of a number of walls.
- 05.2.2 There are also instances of where walls have been knocked-through or demolished to enable access, such as for the building or 5 Heath Road in Great Brickhill and 59 High Street in Clophill where an existing gateway has been widened to create vehicular access to two new houses (57a and 59a) which also illustrates how minor sandstone structures can be at risk due to accidental damage: over half the wall in front of 57a was toppled when carrying out works to form a parking space.



05.03: WALL PART DEMOLISHED TO CREATE ACCESS (GREAT BRICKHILL)



05.04: TOPPLED SANDSTONE WALL IN CLOPHILL HIGH STREET (ON RIGHT)

- 05.2.3 Another example of loss in Clophill is the recent demolition of the arches and deck of the 18th century sandstone bridge that — prior to the realignment of the A6 in the 1930s — carried the Luton to Bedford road over the River Flit.

05.3 NEGLECT

- 05.3.1 The neglect of walls is evident across the whole of the Greensand Country, affecting particularly some churchyard walls (e.g. Steppingley) as well as major parkland walls: Great Brickhill Manor (SP896307), a surviving remnant of the wall to Ickwell Park (TL145448) and Sandy Warren (TL183486 through TL186474 to TL191481).
- 05.3.2 Freestanding and retaining walls are exposed to damp on both sides as well as from above, and as such are more vulnerable to decay than the external walls of enclosed buildings, especially considering the generally friable sandstone from which they are constructed. Furthermore, they are — buttresses or piers aside — not restrained by adjoining elements such as floors or roofs, and as such will have a tendency to lean towards softened and saturated ground (particularly if there is paving hard-up to one side of the wall) and — like chimney stacks — ‘curl’ towards the side which is most exposed to the elements. There is hence always a tendency

for stones to loosen and eventually become dislodged, leaving voids that make walls vulnerable to progressive collapse, as can be seen in the diagonally-laid wall alongside 6 Market Street in Potton and — an extreme example — much of the 2.8 km sandstone wall to the east, south and west of Sandy Warren (Lodge).



05.05: TOTAL COLLAPSE OF WALL



05.06: FALLEN STONES LEAVING VOID



5.07: FALLEN STONES, DETERIORATION OF COPING & INVASIVE VEGETATION LEAVING WALL IN POOR CONDITION + RISK OF EVENTUAL COLLAPSE

- 05.3.3 Copings are exposed to high levels of rain and hence often saturated with exposed beds of mortar highly vulnerable to frost damage and — again — the loosening and eventual loss of coping stones, e.g. Tingrith churchyard wall. And while the relatively high porosity of most sedimentary stones means that freeze-thaw is not generally a

problem, brick copings are particularly susceptible to frost, as can be seen in the massive half-round capping to the wall to Great Brickhill Manor (which being south facing is also leaning towards the prevailing weather).



05.08: LOSS OF COPING STONES



05.09: DETERIORATED BRICK COPING

- 05.3.4 Unused buildings that are left to fall into dereliction can also become as vulnerable as freestanding walls, especially when roofs are lost and wall heads are exposed to the weather. The extent to which neglect can threaten the survival of sandstone buildings is illustrated by the parlous state of a farm buildings at Overend Green and Buttermilk Wood, and the 'stable' to the north of Maulden churchyard (refer 04.1.2). As noted in 03.4, wholly sandstone buildings are a rarity across the Greensand Country with unconverted barns and animal houses being particularly scarce (04.1.2, second bullet). The potential loss of three is a serious issue.



5.10: ABANDONED FARM BUILDING FALLING INTO DERELICTION (LITTLE BRICKHILL)

- 05.3.5 Neglect is bound up with the issue of day-to-day maintenance and management, which other than simple checks and keeping an eye on things, also involves

preventing the build-up of soil and damage caused by unmanaged vegetation, notably the penetration of the masonry by the woody secondary growths of ivy and displacement by the trunks and roots of self-sown trees close to walls. The impact of unmanaged vegetation is particularly notable on the wall of Sandy Warren (including to dressed stone gate piers which are now almost enveloped). However, it must also be appreciated that vegetation is often an essential part of the character of an old wall and that in many instances its presence is benign and therefore managed retention is preferable, e.g. the walls to Husborne Crawley churchyard.



05.11: HARMFUL VEGETATION



05.12: BENIGN, MANAGED VEGETATION

05.4 SALTS

- 05.4.1 All sedimentary stones are susceptible to damage by salts crystallising within their pore structure, and breaking apart the particles to cause powdering or flaking. The situation is exacerbated by wetting and drying, whereby the salts oscillate between solution and crystal, the volume of the latter expanding with each cycle. Known as 'cryptoflorescence', this damaging process is distinct from the (generally) white blooms that result from highly-soluble salts crystallising on the surface of stones, simply termed 'efflorescence' and a purely cosmetic issue.
- 05.4.2 Salt damage to sandstone is not generally a problem in the unpolluted mainly rural environment of the Greensand Country. This is notwithstanding that — until quite recently — brickworks north of the scarp generated large amounts of potentially damaging sulphur dioxide: there is none of the discolouration and 'contour scaling' (detachment of thin layers) which typifies sandstone in dirty urban environments.
- 05.4.3 However, there is a significant problem with the accelerated decay of sandstone at low level alongside roads and pavements due to contamination by de-icing salts (sodium chloride), the impact of which is intensified by hard, impervious surfaces like asphalt adjacent. This is especially the case in Clophill where the bases of some walls on the High Street (57–59) are so deeply eroded as to risk eventual collapse. Similarly — though to a lesser extent — the long retaining wall running back from the High Street on the east side of Mill Lane (the boundary of Clophill House). It is instructive to compare these walls with the barn at Water End, where a grass verge controls contamination and splash-back, and the stone is in excellent condition.



05.13: SALT EROSION BESIDE ROAD



05.14: GRASS VERGE PROTECTS WALL

- 05.4.4 Groundwater can also carry salts, which can result in the premature decay to earth-bound (retaining) walls. This is especially the case around burial grounds due to the fact that approximately 5% of the mass of a decomposed corpse is made up of various mineral salts that are typically released as ground contaminants over a 10–12 year period, albeit over half within the first year (Environment Agency, 2004). It is therefore important that sandstone retaining walls are allowed to as far as possible ‘breathe’, i.e. promote the passage and thence evaporation of salt-contaminated water rather than allow a build-up of contaminants to become trapped behind, though efflorescence and some colouring of surfaces may have to be accepted, as can be seen to the low retaining wall along the east side of Haynes churchyard. Waterborne salts percolating through bridge decks — even if just along the edges — will also accelerate the decay of any stonework below, as evident in the deep erosion of the facing stone to the grade II listed Girtford Bridge.



05.15: DEEP EROSION DUE TO SALTS LEECHING FROM ROAD DECK OF 18TH CENTURY GIRTFORD BRIDGE, EXACERBATED BY CEMENT POINTING

05.5 INAPPROPRIATE REPAIRS

- 05.5.1 Another characteristic of salt damage to sandstone arises from repointing with modern Portland cement mortars, which are high in sulphates and other potentially damaging minerals. Furthermore, cement-based mortars are considerably less pervious than many sandstones, meaning that they inhibit the breathability of the masonry, forcing more water to evaporate through the stones and hence the accelerated deterioration of the facework, an extreme case being the flanks of Girtford Bridge where the mortar — which now sits proud of the stones — adds another agent of decay to the salts and groundwater noted in 05.4. The rigid, impervious nature of cement-based mortars also means that walls are less able to accommodate thermal movement (expansion and contraction, a feature of all building materials and not just masonry) and hence are more prone to cracking.



05.16: DETRIMENTAL IMPACT OF HARD CEMENT POINTING ON GIRTFORD BRIDGE



05.17: THERMAL CRACKING



05.18: FAILED CEMENT MORTAR

- 05.5.2 The use of cement mortar for bedding, jointing and pointing — often failing due to inadequate raking out, poor compaction or feathering — is a major issue in terms of the on-going survival and character of minor sandstone structures across the Greensand Country. It is the most extensive example of inappropriate repair, most evident where mud mortars and open joints that should never have been pointed have been filled. While there are good examples of lime-based pointing and instances where original joints have been ‘left alone’, these are few. Even where lime mortars have been used, poor execution (feathered edges, smearing, closed surfaces, etc.) and a probable lack of protection has resulted in failure. exacerbating which is a tendency to ‘stretch’ on-edge coping stones rather than placing them tight, leaving highly vulnerable mortared gaps to the heads of the walling between.



05.19: FAILURE OF LIME MORTAR DUE TO POOR WORKSMANSHIP



05.20: STRETCHED COPING STONES EXPOSING VULNERABLE MORTAR

- 05.5.3 Inappropriate repairs include also walls rebuilt (in whole or in part) using a different walling technique to the original, e.g. the use of polygonal rubble in lieu of coursed, especially towards the western end of the Greensand Country.

05.6 OTHER MATTERS

- 05.6.1 Poorly selected stone, incorrect bedding, compatibility with other materials and major structural problems such as displacement or cracking are not generally issues with minor sandstone structures across the Greensand Country, save where a result of neglect or inappropriate repairs, e.g. the wall to Great Brickhill Manor, and farm buildings at Little Brickhill (Warren Farm), Overend Green and in Buttermilk Wood.

05.7 NEED FOR ACTION

- 05.7.1 Loss and neglect of minor sandstone structures, the detrimental effect on stone of salts (especially de-icing salts) and the consequences of inappropriate repair have in paragraphs 05.2.1 to 05.5.2 been highlighted and explained. It is these issues (vulnerabilities) — which are in the main the result of human intervention or default — which lead to and justify the Conservation Action Plan set out in Chapter 06.

06 CONSERVATION ACTION PLAN

06.1 STRATEGY

06.1.1 Out of the need for action identified in 05.7.1, is the notion of a Conservation Action Plan, i.e. a strategy for mitigating the negative or potentially harmful impacts of loss, neglect, salts and inappropriate repairs as set out in Chapter 05, and in many ways analogous to a conservation management plan for a specific building or site. The strategy arising out of the sandstone structures audit has five themes:

- **Promoting conservation:** recommendations for preventing loss, encouraging maintenance and management, stimulating appropriate repair, and ensuring the preservation and — where appropriate — enhancement of local distinctiveness.
- **Grant aid:** a framework for two strands of financial support to be delivered via the Greensand Country Landscape Partnership programme, furthering the aims of promoting conservation at the level of individual structures, the emphasis being on preventing loss and encouraging best conservation practice in the repair and (to a limited extent) restoration of minor sandstone structures.
- **Potential projects:** the further development of the major strand of grant aid.
- **Skills and training:** an outline of the scope and potential delivery methods of initiatives needed to raise the level of traditional building and conservation skills that are required to repair sandstone buildings and structures.
- **Implementation:** notes on issues that affect (and to an extent complement) the delivery of the Conservation Action Plan namely ownership, obtaining stone and other materials, the timing of repair works, regulatory frameworks, and the health and safety implications of working with sandstone.

Supported by appendices and combined with the wider aims of the Greensand Country Landscape Partnership programme, these five themes provide information on a range of strategic and specific actions that — individually and in combination — can be incorporated or used to inform the Landscape Conservation Action Plan for the Greensand Country.

06.2 PROMOTING CONSERVATION

Preventing loss

06.2.1 The basis of any strategy for preventing the loss of minor sandstone structures, particularly walls, must be raising awareness of their value as elements of the Greensand Country landscape. This could be achieved in a variety of ways including information leaflets, articles in local newspapers and magazines, talks and presentations to local history societies and other interested groups, as well as the interpretation strand of the Greensand Country Landscape Partnership programme

generally. Reaching the owners of the most significant structures, e.g. the Church of England, the RSPB, and highways authorities with responsibility for structures such as bridges and perhaps roadside retaining walls should also be a priority.

- 06.2.2 Information on the value of minor sandstone structures should also make clear that the demolition or alteration of listed buildings or any structure — including walls — which form a part of their curtilage would require planning permission and listed building consent. Also that demolition or part demolition of walls in conservation areas requires planning permission. In which context, local authority planning and conservation officers need also to be fully aware of the relative value of minor sandstone structures in the Greensand Country; they are able to control and if necessary prevent loss in relation to any proposed development, albeit unauthorised demolition of walls, etc. in conservation areas is a planning enforcement issue, and — if a listed building is involved — a criminal offence.
- 06.2.3 Conservation of minor sandstone structures may also be promoted via the planning system generally, with Councils being encouraged to recognise their existence and value in local planning policy (supplementary planning guidance rather than local plans per se, as well as updated or new conservation area appraisals). And, if for any reason used in the Greensand Country, Neighbourhood Development or Community Right to Build Orders. Similar levels of protection may be introduced if community or business-led planning groups can be persuaded to include provisions within emerging or future Neighbourhood Development Plans. The GIS datasets underlying the mapping provided as Appendix A in this context be crucial.
- 06.2.4 Since Anglican churches are outside of the listed building consent system (but not planning), the relevant Diocesan Advisory Committees (St. Albans and Oxford) should also be asked to raise the profile of sandstone churchyard walls. Given the situation with salt damage to the bases of sandstone walls (refer 05.4.3), a dialogue should also be opened with local authority highways departments with a view to controlling the use of de-icing salts — which also raise environmental concerns — noting that there are a number of alternatives that can be used.

Maintenance and management

- 06.2.5 Tackling neglect by promoting the maintenance and management of historic buildings and structures is fundamental to their conservation at all levels, a principle enshrined in international protocols (e.g. the Venice Charter of 1964) as reflected in the requirements and guidance of bodies such as Historic England and the Heritage Lottery Fund, and influential heritage organisations such as the Society for the Protection of Ancient Buildings. It is hence appropriate that guidance on maintaining and managing sandstone buildings structures is disseminated as part of the Secrets of Sands Landscape Partnership programme, perhaps as an extension of the loss-prevention strategy set out in 06.2.1. To which end information on maintenance and management is included as part of the outline guidance and specification notes provided as Appendix C.

Appropriate repair

- 06.2.6 While there is already an extensive body of available literature and guidance on the appropriate repair of historic building and structures, most notably the Practical Building Conservation series of (10) books recently published (updated) by English Heritage (Historic England), the majority of this is highly technical, and often expensive. Nor is it readily available by homeowners, small builders and professionals who do not usually work in the historic building conservation sector. There is hence an opportunity for the Greensand Country Landscape Partnership programme to promote appropriate repair at a relatively low (practical) level, with a focus purely on what is required for the conservation of sandstone buildings and structures. Hence the outline specification notes provided as Appendix C, which as well as being of general relevance are also seen as integral to the grant regime described in section 06.3 and linked to the training initiatives as set out in 06.5.

Local distinctiveness

- 06.2.7 Promoting local distinctiveness to a large extent embraces much of what is already covered in paragraphs 06.2.1 to 06.2.6, in that conservation will always to some extent concern preserving local character and appearance (in a conservation area context, a statutory obligation placed on local planning authorities). However, the potential of new development — large and small — to both enhance and have negative impacts on local distinctiveness must also be addressed. This relates back to 04.2 and the notion that minor sandstone structures are low key and — most importantly — concentrated in some areas and not others, along with attributes relating to grouping and context. Disseminating this information (knowledge) should also form a part of the strategy for raising awareness of the role of minor sandstone structures in defining the character of the Greensand Country; this is another issue which can be addressed by local planning policy, Neighbourhood planning, etc.

06.3 GRANT AID**Necessary repairs**

- 06.3.1 The purpose of grant aid is to provide financial support for a range of repairs to individual sandstone structures that are to some degree neglected and in danger of further deterioration and eventually loss. As well as being visible and thereby — in a modest way — contributing to the enhancement of the distinctive landscape of the Greensand Country, the repairs must be executed using appropriate materials and techniques, and to a high standard. They must be exemplars of good conservation practice that will help raise standards of repair generally.
- 06.3.2 While not possible to provide ‘standard’ repair solutions applicable to all walls, etc. in every situation, the audit has revealed the need for a finite range of (conservation) repair techniques that — singly or in combination — will cover most circumstances, noting that every repair project will be unique and that subtle judgement on a case-by-case basis will be required. The repairs that it is envisaged will be funded by

grant aid under the aegis of the Greensand Country Landscape Partnership programme are:

- Removal of invasive vegetation that is causing damage to stonework, e.g. woody roots which are penetrating joints, and vegetation that needs to be cleared to carry out repairs.
- Removing cement pointing which has failed or is causing damage, and — if appropriate and needed — repointing in lime-based mortars.
- Cutting out excessively decayed (hollowed) stones and piecing-in new stones, as well as filling and pinning existing voids that threaten stability.
- Reinstating missing or failed coping stones, and lifting and re-bedding those which are loose or poorly placed. Also repairs to other types of coping, e.g. brick or dressed stone.
- Taking down and rebuilding parts of walls re-using as far as possible existing stones, and with a particular emphasis on the heads of walls.
- Restoring collapsed or demolished areas of walling using new stone.
- Crack-stitching and other forms of conservative, insitu structural repair including if needed grouting and the provision of buttressing.

Mortar repairs and stone cleaning are not considered as necessary or appropriate repairs for the types of minor sandstone structure found across the Greensand Country (the former are only suited to fine stonework and the cleaning of sandstone is a complex issue with potentially adverse outcomes).

- 06.3.3 It is anticipated that all repairs in each case will be justified on the basis of a clear understanding of the defects (not just the symptoms) that are to be addressed, e.g. the cause of a crack must be understood and dealt with before the crack itself is repaired. Otherwise, the repair may be ineffective or fail. Grant aid should therefore also contribute to any necessary investigative works such as mortar analysis and structural monitoring. Outline specification notes to guide grant-aided work and which must be followed or adapted are provided as Appendix C.

Basis

- 06.3.4 The process of identifying potential projects to conserve minor sandstone structures across the Greensand Country has revealed:
- In a few instances, the conservation is required on a massive scale, e.g. the complete restoration of the wall to the south side of Great Brickhill Manor, the repair of Girtford Bridge (a major highways issue) or the wholesale restoration of the wall surrounding Sandy Warren.
 - A need for works that is so small as to make targeting impractical; e.g. the desirable yet minimal replacement of cement mortar to the 4 low courses of stone to the water pump in Haynes, or repointing Jacob's Well in Old Warden.

It is therefore recommended that two grant–aid streams are created: one that targets realistic, medium–sized projects that are relatively high impact, and a second that via a dedicated fund invites building owners to undertake small projects on their own properties with Partnership support. At this stage, it is assumed that the (potential) targeted projects will offer grants of up to £10–£15,000 with small projects attracting up to £5,000 in funding, perhaps on a sliding scale of between 50% and 80% of the total cost of the approved works (refer also costs in 06.4.3).

Potential projects

06.3.5 Works that will visibly demonstrate — and help disseminate — best practice in the conservation of significant sandstone buildings and structures that contribute positive to the character and identity of the Greensand Country:

- (1) **Churchyard walls** (usually associated with sandstone churches) in need of extensive repair and generally highly visible to the public, i.e. key elements of local distinctiveness that have a high impact in terms of landscape character.
- (2) **Unoccupied sandstone buildings** (relatively rare and hence a valuable part of the Greensand landscape albeit not always prominent) in poor condition and vulnerable to loss; includes significant ruins.
- (3) **Significant sandstone walls** in conservation areas, listed or — as curtilage structures — directly associated with listed buildings, or of high landscape impact that are in poor condition and vulnerable to loss.

Further (individual) detail on relationship to listed buildings, conservation areas and, where relevant, effect (impact) on landscape character are provided in 06.4.1 and as part of Appendix D.

06.3.6 Ideally, all works should be ‘designed’ and managed by an accredited conservation architect or building surveyor (and if required, structural engineer), who in the case of churchyard projects will already be in place (all Church of England places of worship have an appointed architect or surveyor). Those undertaking the works (contractors) must have proven conservation credentials and be selected by competitive tender. Consents may be required, noting again that the Anglican Church has its own system of listed building approvals, operated by the Diocesan Advisory Committees (refer 06.2.3).

General Grant Scheme

06.3.7 This would be aimed predominantly at the need to repair modest walls to residential properties, though the possibility of other small projects coming forward or being encouraged is not excluded. In purely conservation terms, it is proposed that eligible projects must meet the following criteria:

- (a) Be situated within the Greensand Country Landscape Partnership area, or within a one kilometre buffer zone.
- (b) Listed in itself or part of the curtilage of a listed building, within a conservation area or registered landscape, part of a non–designated (locally listed) heritage

asset, or of group value in an area where sandstone contributes to character, identity and local distinctiveness as defined by reference to the mapping provided as Appendix A and the Landscape Character Assessment.

- (c) Visible to the public or from a public place.
- (d) The proposed works must be justified by a survey report prepared by a suitably experienced conservation architect, surveyor, engineer, conservator or builder.
- (e) Generally confined to works of repair as described in 06.3.1, albeit restoration of lost (demolished) walls may be accepted if justified and supported by evidence of previous existence. All entirely new walling excluded.
- (f) The extent and nature of work to be agreed with the local planning authority, usually as repairs not needing listed building consent or planning permission.
- (g) Specification of materials and workmanship to follow guidelines prescribed and published by the Partnership.
- (h) Work must be carried out by builder or stonemason with demonstrable conservation skills — training and experience — particularly in the use of lime mortars. The Partnership should maintain a register of suitable firms and individuals in order to check credentials, though not to overtly advise those applying for grants.

Finally, the project must have clear local community support via parish council or some other recognised body or mechanism.

06.4 POTENTIAL PROJECTS

06.4.1 Fifteen structures have been identified as having potential for targeted works:

Churchyard walls

A **Woburn:** Old St. Mary's, now Heritage Centre (SP948332)

CURTILAGE OF GRADE II* LISTED BUILDING IN A CONSERVATION AREA.

Renewal (piecing-in) of squared stone blocks to lower two courses of wall and renewal of cement pointing to wall fronting Bedford Street.

01 **Tingrith:** St. Nicholas (TL007324)

CURTILAGE OF GRADE I LISTED BUILDING IN A CONSERVATION AREA.

Extensive repointing (open joints + failure of modern cement mortars) to walls facing onto Church Road. Also removal of penetrating ivy, piecing-in missing stones, reinstatement of missing coping, lifting and resetting of coping stones set too far apart (modern renewal) with new stones to complete run. Possibly some rebuilding. Renewal of missing coping and possibly some repointing of walls adjacent the gateway to the rectory.

02 **Steppingley:** St. Lawrence (TL011353)

CURTILAGE OF GRADE II LISTED BUILDING IN A CONSERVATION AREA.

Renew failing cement pointing and some piecing-in of stonework, along with possible resetting of copings stones and control of vegetation.

03 **Maulden:** St. Mary the Virgin (TL058380)

CURTILAGE OF GRADE II* LISTED BUILDING IN A CONSERVATION AREA.

Partial reduction in ground levels, extensive repointing, removal of corroding iron, crack repair and control of ivy to east-facing wall with gate piers.

04 **Flitton:** St. John the Baptist (TL059358)

CURTILAGE OF GRADE I LISTED BUILDING IN A CONSERVATION AREA.

Partial renewal of cement and failed pointing to walls fronting High Street and Brook Lane, along with crack repair, limited piecing-in of eroded stones, and possibly need for localised stabilisation.

05 **Haynes:** St. Mary the Virgin (TL081412)

CURTILAGE OF GRADE II* LISTED BUILDING IN A CONSERVATION AREA.

Complete repointing and some piecing-in of stone to short retaining wall on north side of churchyard. Also some limited filling of washed-out joints to east side of churchyard.

06 **Sutton:** All Saints (TL219475)

CURTILAGE OF GRADE I LISTED BUILDING IN A CONSERVATION AREA.

Extensive renewal of cement pointing to wall fronting Church Road.

Unoccupied sandstone buildings

07 **Little Brickhill:** Buttermilk Farm (SP921319 & 922319))

UNLISTED BUILDINGS HIDDEN IN WOODLAND.

MINOR CONTRIBUTION TO LANDSCAPE CHARACTER.

Consolidation of ruins (stable or cow house) including clearance + management of vegetation, limited repointing and stone repairs, stabilisation of core and protection of wall heads (soft capping). Building needs to be made safe. Also clearance and stabilisation of remnants of farmhouse walls. Possibly installation of interpretation board. TRAINING OPPORTUNITY.

08 **Heath & Reach:** Barn at Overend Green (SP933285)

UNLISTED BUILDING FORMING PART OF GROUP.

MODERATE CONTRIBUTION TO LANDSCAPE CHARACTER.

Stabilisation, repointing, new temporary roof, ivy and vegetation management, and protecting exposed wall heads; including remains of barn + wall on road.

09 **Maulden:** Building in churchyard (TL058381)

CURTILAGE OF GRADE II* LISTED BUILDING IN A CONSERVATION AREA.

Clearing out, stabilisation of walls including part rebuilding of north wall, crack stitching and repointing; 100% renewal of roof + new gate to control access.

Significant sandstone walls

10 **Great Brickhill:** Wall to Manor Park (SP896307)

MAJOR CONTRIBUTION TO LANDSCAPE CHARACTER & (UNDESIGNATED) PARKLAND.

Vegetation management, stabilisation, repair and partial restoration. Rebuilding of approx. 36 m of wall alongside footpath (Milton Keynes Boundary Walk).

11 **Clophill:** Wall to 57a High Street (TL087380)

POSITIVE CONTRIBUTION TO CHARACTER & APPEARANCE OF CONSERVATION AREA.

Renew deeply eroded stonework (cavernous decay) of bottom 2–3 courses + full repointing. Possibly reinstate (rebuild) missing half of wall (reported to have fallen at time of creating parking space behind) off original footing.

12 **Clophill:** Wall to 59 High Street (TL087380)

POSITIVE CONTRIBUTION TO CHARACTER & APPEARANCE OF CONSERVATION AREA.

Renew deeply eroded stonework (cavernous decay) of bottom 3–4 courses + full repointing full length. Remove course of Fletton brickwork from top of canted brick-on-edge coping, and fully repoint.

13 **Sandy Lodge:** Wall on Stratford Road (TL186476)

CURTILAGE OF GRADE II LISTED BUILDING.

MAJOR CONTRIBUTION TO LANDSCAPE CHARACTER.

Conservation, including vegetation control, piecing-in stones, repair of copings and repointing. Rebuilding off existing footing using reclaimed and new stone of approx. 30 m of wall between Blue Gates and Cottage Farm, including — subject to ecological guidance and advice — repair of gate piers; also repair to benchmarked pier east of Cottage farm (dropped capping) and adjacent stretch of walling. TRAINING OPPORTUNITY.

14 **Potton:** Wall to 6 Market Square (TL223492)

CURTILAGE OF GRADE II LISTED BUILDING IN A CONSERVATION AREA.

Stabilisation of herringbone walling comprising piecing-in fallen (hollow) areas, repairs to coping, repointing, etc. Minor works.

06.4.2 Further details of all projects including photographs, descriptions and summaries of the issues involved are provided as Appendix D.

Costs

- 06.4.3 The costs for each of the identified projects have been estimated on the basis of rough assessments of the amount of works (quantities) needed combined with rates for similar work items on other projects, rates obtained from specialist contractors ('soft' market testing) and stonework suppliers.

PROJECT		Cost (£)
01	Woburn: Old St. Mary's, now Heritage Centre	8,800
02	Tingrith: St. Nicholas	15,400
03	Steppingley: St. Lawrence	9,800
04	Maulden: St. Mary the Virgin	11,200
05	Flitton: St. John the Baptist	10,100
06	Haynes: St. Mary the Virgin	10,500
07	Sutton: All Saints	8,100
08	Little Brickhill: Buttermilk Farm	30,300
09	Heath & Reach: Barn at Overend Green	31,000
10	Maulden: Building in churchyard	16,300
11	Great Brickhill: Wall to Manor Park	34,900
12	Clophill: Wall to 57a High Street	4,600
13	Clophill: Wall to 59 High Street	12,900
14	Sandy Lodge: Wall on Stratford Road	22,700
15	Potton: Wall to 6 Market Square	6,500
TOTAL		233,100

All costs include contractor's preliminaries (scaffolding, temporary works, site costs, etc.), overheads and profit, and where professional fees. Cost are current as of November 2015 with detailed breakdowns provided as Appendix D. ALL ESTIMATED COSTS ARE **EXCLUSIVE** OF VAT AND REPRESENT THE VALUE OF THE WORKS **BEFORE** THE APPLICATION OF ANY GRANT AID, I.E. THEY ARE NOT INDICATIVE OF GRANT LEVELS. NOR DO THEY INCLUDE ANY ELEMENT OF CONTINGENCY.

06.5 SKILLS & TRAINING

Programmes

06.5.1 Different audiences will have different training needs and for the Greensand Country Landscape Partnership programme to make a difference these need to be recognised and addressed:

- **Building owners** and other persons who are not professionals, builders, etc. need of be introduced to the idea of building conservation, and to be given a technical overview that will enable them to procure appropriate repairs.
- **Professionals and practitioners (builders)** with little experience of building conservation will need 'conversion' training to enable them to understand and deliver appropriate, technically sound and economically viable repairs, and to be able to correctly advise building owners.
- **Apprentices (trainees)** who need in-depth, on-the-job experience as part of their wider training in practical heritage skills, possibly part-funded by initiatives such as the HLF *Skills for the Future* programme.
- **Volunteers** who may wish to become involved in restoration projects.

Building owners, etc.

06.5.2 Short, lecture-based training (suggested half day maximum) which outlines: the principals of building conservation; the legislative framework in England (especially listed buildings and conservation areas); the importance of correct and appropriate repair (as opposed to renewal or misconceived interventions), and the importance of lime mortars as opposed to cement; identifying the need for work (and when best left alone); restoration and when it might be justified; and routine maintenance and basic DIY repairs, including the management of vegetation and the issues involved. The model for these courses is seen as the homeowner courses run by the Society for the Protection of Ancient Buildings (SPAB).

Professionals and practitioners

06.5.3 Intensive day or longer 'masterclasses' (e.g. 2–3 day courses) covering:

- **Conservation basics:** including philosophy and legislation (consents).
- **Sandstone:** nature, use and walling styles across Greensand Country.
- **Mechanisms of decay:** understanding failures, e.g. cracks, erosion, etc.
- **Surveying and recording:** identifying and justifying repairs, etc.
- **Lime:** importance in building conservation (and why not cement).
- **Materials:** sourcing and availability, including supply of stone.
- **Managing vegetation:** including clearance and when not appropriate.
- **Stonework repair:** techniques including: re-pointing; stone replacement (piecing-in and localised rebuilding); stabilisation methods (includes void filling;

pinning; crack–stitching and grouting); work to copings (re–bedding, renewal, re–pointing, etc.); and soft capping (use of turf to weather wall heads).

- **Rebuilding and restoration:** including taking down and relaying wall heads, and reinstatement of lost walling on basis of evidence.
- **Archaeological and ecological concerns:** including scheduled monuments; protected species, e.g. great crested newts; and the importance of lichens, mosses, etc. in terms of local character and biodiversity.

The Greensand Country grant scheme and guidance also needs to be introduced, and the value of conservation accretion and other ‘quality’ systems promoted.

- 06.5.4 It is envisaged that the model for these courses would be akin to the three day Building Conservation Masterclasses run by West Dean College. Also the one day courses run by Historic Royal Palaces in conjunction with the SPAB, and proven heritage skills training run by the likes of the Weald and Downland Museum and Essex County Council. Training should provide a balanced mix of theoretical and practical experience, with hands–on working required of all, including professionals.

Apprentices

- 06.5.5 Training under this category is seen as primarily work–based, though could also encompass attendance on the same courses as professionals and practitioners. It would be suited to those employed by contractors engaged on the larger, grant–aided sandstone structure projects. The input of the National Heritage Training Group may be considered.

Volunteers

- 06.5.6 The use of supervised volunteers on large, potentially on–going projects such as the restoration of the wall around Sandy Lodge would require training in:
- Vegetation management.
 - Use of lime mortars.
 - Repointing.
 - Rebuilding (taking down as well as new walls of existing footings).

This could be delivered on site in conjunction with apprentice training, or via dedicated courses modelled on the National Trust volunteer training and the SPAB annual maintenance party week.

06.6 IMPLEMENTATION

Ownership

- 06.6.1 Gaining the co–operation of the owners of minor sandstone structures is vital to the implementation of the Conservation Action Plan. Details of the ownership of structures have been provided separately from this report, in as much as they are

discernible via the Land Registry. In the context of a community-led initiative, the notion of grants to private owners is a sensitive issue that needs careful presentation, though works to structures owned by the Church of England or charities such as the RSPB are likely to have more of a 'community' connotation than others. This is notwithstanding that the preservation of historic buildings and places is a matter of public interest, and of hence of concern to local communities regardless of ownership.

Materials

- 06.6.2 Stone and other materials for repair are rarely available from the majority of builder's merchants and other suppliers. Details of a number of suppliers are hence included in the technical information provided as Appendix C.

Timing

- 06.6.3 Due to the fact that they (in the main) 'set' by reaction with the air rather than entirely chemically, lime mortars are more sensitive to low temperatures and other climatic conditions, especially wind and sun. Hence winter working is rarely advisable, and at all times of the year provision needs to be made for protecting freshly placed mortars and stonework. Further details are provided in Appendix C.

Regulatory framework

- 06.6.4 The control of works to sandstone structures via the planning system and the potential need for consents has already been noted. It is however reiterated that:
- Work to minor sandstone structures that are listed, associated with listed building (curtilage structures) or in conservation areas is controlled by the *Planning (Listed Buildings and Conservation Areas) Act 1990* (as amended), and if involving demolition or new building (however minor), the various provisions of the *Town and Country Planning Act 1990* as amended numerous times by subsequent legislation. However, certain works to walls may be classed as permitted development, though never around or within the curtilages of listed buildings.
 - If planning permission is required (anywhere, not just designated areas), then the heritage and perhaps other provisions of the *National Planning Policy Framework* and associated guidance will apply, as well as the policies set out in the local plans of the relevant local authority. Archaeology may be an issue.
 - For works involving churchyard walls or structures, the relevant Diocesan Advisory Committee should be contacted via the church architect or surveyor.

Building regulations do not apply to buildings that people do not normally enter, or to minor structures such as walls, unless part of — or affecting — a building. This does not however remove the general duty of building owners to ensure buildings and structures are safe, and not a threat to the general public.

- 06.6.5 Historic structures are often host to rare mosses, lichens and other species protected by virtue of the *Wildlife and Countryside Act 1985*. The disturbance of

nesting birds is also controlled, and rough stonework with open joints is often home to newts, all types of which are protected. Additional protection is afforded Great Crested newts, a European Protected Species under the *Conservation of Habitats and Species Regulations 2010*; penalties for disturbance can be severe even if unintentional. Ecological surveys should be considered if major clearance of vegetation is proposed, and (especially) in the case of any walls which are in proximity to still water. If in doubt, the advice of the local authority biodiversity officer should be sought, and perhaps local wildlife groups and charities. Unoccupied, roofed buildings to which works are proposed should be surveyed for bats.

Health and safety

- 06.6.6 If ingested, silica is harmful to human health. It is the cause of the lung disease silicosis and beyond that an increased risk of other chest infections, heart failure, arthritis, kidney disease and lung cancer. Stonemasons and anyone else carrying out stonecutting are particular at risk, especially if working sandstones. Exposure to silica dust is governed by *The Control of Substances Hazardous to Health Regulations 2002* (COSHH); it is the duty of all employers (including the self-employed) to comply. In general terms, there should be no site cutting or dressing of stone used in the repair of minor sandstone structures. If unavoidable, precautions will be necessary to protect the public as well as workers.
- 06.6.7 Lime and lime mortars are — like cement and cement mortars — also hazardous, especially to the eyes or if allowed to remain in contact with skin. Hence the need for washing facilities, etc. which are in any event a requirement of the *Construction (Design and Management) Regulations 2015*, which place duties on all who commission (clients), design (architects, surveyors and anyone else who makes a decision) or construct buildings, albeit in a purely domestic context, client duties generally pass to the contractor. Further information is provided as Appendix E.

06.7 CONCLUSION

- 06.7.1 The Conservation Action Plan set out above provides a realistic strategy for encouraging across the whole of the Greensand Country the survival and — where appropriate — enhancement of the subtle contribution of minor sandstone structures to the character and appearance of the area. It addresses the key vulnerabilities identified in Chapter 05 by way of practical recommendations on a number of fronts, overarching which is the top-level theme of promoting conservation. Implementation via the Greensand Country Landscape Partnership programme as part of the Landscape Conservation Action Plan will it is hoped further the appreciation and survival of a cherished, locally distinctive but often overlooked landscape.

07 BIBLIOGRAPHY

07.1 PUBLISHED WORKS

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07.2 ONLINE (INTERNET) SOURCES

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www.bedfordshiregeologygroup.org.uk/index.html

British Geological Survey
www.bgs.ac.uk/mineralsuk/buildingStones/StrategicStoneStudy/EH_atlases.html
(Historic England county building stone atlases)

Bucks Earth Heritage Group
www.bucksgeology.org.uk/index.html