Review of Somerset's Local Geological Sites (LGS) 2017 – 2022
Final report for South Somerset, June 2022

This Review of Somerset's LGS is a partnership project between Somerset Geology Group (SGG) and Somerset Environmental Records Centre (SERC). Please note that LGS, which may be of regional to local value, are the equivalent of the former Regionally Important Geological Sites (RIGS) and that LGS status does not imply any right of public access. The scope of our review has been to cover existing LGS only, not recommendations for new sites, although some gaps in coverage and potential for future designation have been identified in the process. See DEFRA Guidance on Local Sites published in 2006 for further information on LGS designation and SERC's web page at https://www.somerc.com/local-geological-sites/ for the key questions that we have used in this review for assessing the four criteria (scientific, educational, historic and aesthetic). The information below is completed to the best of our ability, but there may be errors or omissions and/or more recent or more detailed information available. For progress with our review across Somerset as a whole and other area reports see SGG's Updates at http://wp.somerc.co.uk/specialist-groups/somerset-geology-group/.

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Our thanks to all the members of SGG who have assisted voluntarily with preparation of site forms, site visits and desk assessments, knowledge of recent geological research in the area, and Panel review of these LGS in the South Somerset area. This report has been compiled by Wendy Lutley (SGG), based on the information gathered for the review, with Garry Dawson (SGG) acting as lead mentor for this area and those contributing to the site visits and desk assessments in 2020 and 2021 including: Dee Edwards, Dave Williams, Doug Robinson, Garry Dawson, John Kirby and Sheila Alderman (all SGG sourced SERC volunteers), Robert Chandler (national expert on Jurassic strata of Aalenian to Lower Bathonian age) and Wesley Harris (SERC's temporary LGS Project Officer), with Wendy Lutley contributing to the desk research and desk input. Our thanks to everyone who has assisted, including to Wesley Harris for his role at SERC in contacting owners, and carrying out the final post-Panel processing stages of the review.

Contents

1. Introduction

This report covers what are now 47 LGS (previously 49 LGS as two will be de-designated) in South Somerset, plus one at Hatch Beauchamp in Somerset West & Taunton District, but which lies close to South Somerset. The part of the Blackdown Hills AONB that lies within South Somerset has no LGS, but its geological conservation interest is mentioned here, together with brief reference to those LGS in the Somerset West & Taunton part of the AONB.

It is intended to provide an overview of the conservation interest and management needs of these LGS and their potential for education and interpretive use. ***It does not constitute a full geo-diversity action plan:*** the recommendations (R1 to R13) and opportunities for community projects (C1 to C12) summarized in Section 2 result only from our review of the current LGS and the contextual information that we have gathered for that.[1]

Our review of these originally 50 LGS was complicated by the arrival of the Coronavirus pandemic and we were not therefore able to recruit SERC-based graduate volunteers to assist the project in either summer 2020 or 2021. We were however fortunate to be able to continue with the assistance of a team of SGG-sourced SERC volunteers living within or near the area.

SERC was able to obtain permission and site visits were made to 28 of these original 50 LGS and in addition we were able to arrange for national expert for strata of the age that covers the Inferior Oolite, Robert Chandler, to carry out supplementary site visits to four of these LGS. The remaining sites were reviewed as desk studies with reconnaissance visits where possible. In some instances, where for example there was a public footpath, this was quite adequate to both assess and monitor condition. In other cases, for example cuttings on active railway lines, assessment was by desk exercise only, but again these were often straightforward candidates for reconfirmation.[2]

Boundary adjustments have also been made to relatively few of these LGS (in comparison for example to the situation in the Mendip area). There is therefore relatively little substantive change to the original suite of sites in this part of Somerset, but the updated site forms include more detailed evidence-base for their conservation value than was formerly the case.

Most of the LGS (ie former RIGS) were originally adopted in the 1990s. This followed initial work in the late 1980s by graduate workers on a SERC-based Government 'Manpower Services Commission' scheme, with further input from SGG, particularly from Hugh Prudden, its secretary at that time.

[1] It is the fourth in the series of final area reports covering our review. See http://wp.somerc.co.uk/specialist-groups/somerset-geology-group/ appended PDFs.

[2] Of those LGS where no permission was obtained: 13 were due to there being no reply from the ownership details researched; two were where permission was refused; two were where no ownership details were traced; and in three cases ownership was identified but a site visit was not pursued due to H&S considerations (eg mainline railway cuttings). In two cases, where permission had been granted for a site visit, assessment was also by a reconnaissance visit only, for reasons of the Covid situation.

Hugh lived at Montacute in South Somerset, had good contacts with other geologists and published, or contributed to, many research papers on the area's geology. This included advising on and developing a range of interpretative material for Ham Hill Country Park (now out-of-print but with potential for contributing to updated material). A geological trail was established there in 2016 in his memory, with an accompanying leaflet aimed at the non-specialist.[3]

There are only a very few LGS in South Somerset on open access land (on for example, a few small local nature reserves and open spaces) making Ham Hill Country Park a particularly important geo-conservation resource. There are, for example, no LGS within National Trust (NT) or Forestry England ownership in this part of Somerset, although the NT's Montacute House is in close proximity to one and has scope to contribute to the building-stone story of nearby Ham Hill.

The LGS complement 12 nationally important Geological Conservation Review (GCR) sites in South Somerset, all of which are Sites of Special Scientific Interest (SSSIs). See Section 3 for details of how the LGS complement them and Appendix 1 for a list. None of these SSSIs, with the exception of that at Ham Hill, which is adjacent to the LGS there, are on accessible open space – again emphasising the importance of the Country Park.

In addition to the LGS and GCR sites, there are other small outcrops of potential interest, in for example, stream sections, road and track way cuttings and old quarries. Some sites may be of similar calibre to those currently identified as LGS - our review has not considered prospective new LGS. There are however relatively few natural outcrops in this softer rock part of Somerset - in comparison, for example, to the older and harder rock areas of Exmoor and the Quantock and Mendip Hills. Many old quarry areas have also been infilled.

This makes the recording of temporary and new exposures, that may be revealed during work on pipelines, roads and other development, an important consideration, particularly as some formations include important fossil faunas or illustrate particular sedimentary conditions. Active quarries are also important, as away from the coast they often provide the best exposure and valuable sites for both scientific investigation and occasional field group use (if owners and operators are willing and H&S considerations allow). Geological excursion groups have visited the active quarries at Ham Hill, for example, for many years.

There are also interesting stories to tell in South Somerset of how an understanding of the geology was developed from early geologists onward, continuing to contemporary research. For example, William Smith, published his *Geological section from Taunton through Yeovil and into Dorset* in 1819; the early geologist Charles Moore came from Ilminster; and work continues today on developing detailed time zones as reflected by different fossils assemblages. There is however much less *in situ* exposure now than in Victorian and early Edwardian times, when several sites now LGS were first documented.

Another feature of the district is the considerable number of different local building stones, and this contributes significantly to the local distinctiveness of towns and villages[4]. Indeed, buildings often

[3] See also Prudden, H, 2001: *Geology and landscape of Taunton Deane,* published by Taunton Deane Borough Council for information on the geology of the adjacent area of Somerset West & Taunton District.

[4] See https://swheritage.org.uk/historic-environment-service/built-heritage/traditional-building-stone-research/ for research on local building stone for Somerset by Garry Dawson and Peter Wright. Work is currently in hand to complete coverage of South Somerset. There is also a link to Mike Barr's, 2017: *Building Stone Inventories for Devon* (2 vols and including parts of Somerset) which includes maps and photos; and a previously unpublished list of Somerset Church Building Stone compiled by Hugh Prudden. Pevsner's *Guide for*

provide better opportunities to see good exposure of local strata than *in situ* locations, as old quarry areas are often covered with vegetation even if not completely infilled. There is therefore good potential for urban and village geology trails mentioning the stone used in the buildings – and for a 'geological wall' project to illustrate the variety across the area.

South Somerset has also had a well-established programme over recent decades of enhancing its offer for rural tourism, through a variety of projects that have also contributed to regeneration of market towns and villages and community well-being. This has included, for example, long distance footpath projects, such as the River Parrett Trail, with associated participatory community arts projects and interpretive material, on a range of different local themes. The area's geodiversity has not yet featured within this, and there is considerable scope for it to do so.

Ham Hill Country Park therefore provides a potential starting point, not only for its own geological interest, but to signpost visitors to a range of other potential community activities, walks and interpretive material incorporating a geological theme, at different locations across the district.

2. Opportunities for geo-conservation and interpretation and education

Our general recommendations are given below (R1 to R12) followed by C1 to C12 (NB neither in order of priority). C1 to C12 cover the considerable potential for local community-based projects, which would include elements from R1 to R12, such as, for example, developing geo-walks and gathering information on the history of geology. They have considerable scope for the development of interpretative material to contribute to rural tourism and regeneration.

- **R1 Ham Hill Country Park** - Geological interest should be fully integrated into the current proposals for a second stage Lottery bid, and the management plan for the Country Park, including the potential to develop a range of community activities, interpretive and educational material for different levels of interest and types of groups. See Section 3.5. The proposed information centre and on-line resources also have potential to act as a start point for visitors to explore the wider geology and landscapes of this part of Somerset.

- **R2 Geo-diversity action planning -** We recommend that the forthcoming new Somerset unitary authority develop appropriate priorities for geo-conservation across Somerset as a whole, including recognising other important areas for geo-tourism (such as the nationally important north Somerset coastline in the Blue Anchor-Watchet-Kilve area); and new opportunities, such as the forthcoming new annual International Geo-diversity Day, that may assist in recognising the potential of geology to contribute to sustainable rural tourism.

- **R3 Liaison with Natural England** - Liaison with Natural England is essential as part of R1 and R2 to identify any conservation priorities and opportunities for education and interpretation for the nationally important GCR sites in this area and elsewhere in Somerset.

- **R4 Nature Recovery Areas -** It is also important that both LGS and GCR sites are fully integrated into the forthcoming Nature Recovery Areas and their programmes for practical conservation work and community engagement.

Somerset: South and West in the *Buildings of England* series, was also republished in 2014 by Yale, revised and updated by Julian Orbach. It has an introduction to the building stones by Donovan and Prudden.

- **R5 Other small exposures -** We recommend that conservation of other small exposures be incorporated within other wider policies, such as those to protect biological SSSIs, multiple-interest green infrastructure, industrial archaeology and the new Nature Recovery Areas.

- **R6 Temporary exposures and active quarries –** A system is needed to flag up the opportunities provided by temporary exposures (in major road, pipeline, quarrying and other construction work, etc) so that they can be documented if appropriate by research geologists. See Section 3.3 in particular re the Beacon Hill Limestone Formation and, for example, Section 3.2 for the need to develop closer contacts with active quarry owners.

- **R7 Priorities for further LGS review** – There is a need to develop local contacts with owners where site visits have not been possible to date, while priorities for further review include Hadspen Quarry, where the restoration plan for recent quarry extension includes retaining a new face. An extended or new LGS is also needed for interest that is within land that has only recently come under the management of the Ham Hill Country Park.

- **R8 Practical conservation work and teaching sites** - Our review has identified examples with a need for regular practical conservation work to keep the rock exposure clean and/or where the present condition is good, but maintenance may be required in the future. Examples include Ham Hill, a quarry in school grounds at North Perrot (currently in good condition as the quarry base is used for forest school activities) and a roadside cutting east of Wincanton with safe access on a footway. However, requirements for clearance and on-going maintenance for other sites with good potential for field use or interpretation, are best developed in tandem with arrangements for occasional educational field group use and/or the development of interpretative material. It is also important that Network Rail is made aware of the LGS interest of its rail cuttings and liaison established on any conservation management needed there.

- **R9 Local building stones** – The potential for interpretative and display material should be explored, not only at Ham Hill, but at other locations, for example at Hadspen House and the Castle Cary area for Hadspen Stone (see Section 3.6); and in the Somerton area for Blue Lias (see Section 3.2). See also C1-12 below. Again, Ham Hill Country Park provides the ideal opportunity for overarching and signposting information - including the possibility of establishing a 'geological wall' to illustrate the variety across the district, either at Ham Hill or another suitable locality.

- **R10 Urban and village geo-trails -** There is considerable potential for an update of the urban geo-trails at Yeovil and Ilminster (See Section 3.3), and for the inclusion of information on the geology of building stones, and the geological influence on the local landscape, in walks leaflets etc for villages and market towns. For example, in the Corton Beacon area, two geological escarpments can be observed in the view on footpath walking routes, while the historic parkland at Compton Castle Park is influenced considerably by the underlying geology (See Section 3.6). See also C1 to 12 below.

- **R11 History of geology** – There is potential to include stories within interpretative material on: the investigations of early geologists; the fossil faunas represented; the way these fossils have been used to develop detailed time 'zones'; the changing environments in which strata were deposited; and their influence on the contemporary landscape. See, for example, text at the start of Section 3 re William Smith and below: C2 and C3 re Charles Moore; C5 re the development of time zones in the Inferior Oolite; and C10 re Arkell.

- **R12 Training for staff and volunteers** – The new unitary authority should consider including geological expertise within the specification for one of its staff, so that there is always some in-house expertise. A training programme for Ham Hill Country Park staff, would also assist in ensuring that geology is fully embedded in conservation and interpretative projects there, and could range from individual training days on site to studying for OU degree units.

Contribution to rural tourism and regeneration through community projects - In addition to the more detailed recommendations we have made separately for Ham Hill, our review has identified a considerable number of potential community projects at the more local level that could contribute to the area's offer for sustainable rural tourism and regeneration.

- **C1 Polden Hills and the marine transgression of late Triassic times** – There is scope for interpretative information on the geology of the Polden Hills, to explain the major change from terrestrial to marine conditions in late Triassic and Lower Jurassic times. This would enhance enjoyment of the Polden Hills Trail footpath route, nature reserves and other open spaces there. See Section 3.1; and 3.2 for Dundon Hill.

- **C2 Ilminster, the Beacon Hill Formation and Charles Moore** – See Section 3.3 for the potential for interpretation and use of BRSLI exhibition material in the Ilminster area, where the early geologist Charles Moore lived and collected fossils, including ideally identifying a site where a new section could be created for educational use in the general Ilminster area**.**

- **C3 Hatch Beauchamp Cutting, Sparkford Hill Copse and Charles Moore** - See Section 3.1 for the potential for clearance and/or interpretative material (which may be possible either on or off-site according to the individual situation) for late Triassic and Lower Jurassic strata first described by Charles Moore in cuttings on railway lines, then new: on the Yeovil-Castle Cary railway line in the eastern part of South Somerset (now adjacent to open access land); and at Hatch Beauchamp (just in Somerset West & Taunton District, now disused and within an industrial estate). NB Charles Moore also described sections elsewhere in Somerset, including in Somerset West & Taunton and Mendip, so there is scope for a wider Somerset community project based on his life and work.

- **C4 Holloways project** - See Section 3.4. for the scope for a multi-interest 'holloways' community project, to document the characteristic sunk lanes underlain by the 'Yeovil Sands' (Bridport Sand Formation), including historic research, geological and wildlife recording, creative projects and the development of walking routes for local use and sustainable tourism across a wide area of the southern part of the district.

- **C5 The Crewkerne area and the Inferior Oolite** - See Section 3.6 for the potential for potential community projects/interpretative material and walks leaflets to provide an understanding of the landscape in the Crewkerne area (for example at the museum and in local villages), as this area includes some of the most westerly exposures of the Inferior Oolite in Britain with interesting stories to tell of: how time 'zones' have been developed from its fossil faunas; and the influence of geology on the landscape and buildings.

- **C6 Somerton and the Blue Lias quarry villages** – See Section 3.2 for the potential for a community project, covering the geology and quarrying history and including oral history, for the Jurassic Blue Lias quarries in this area, including developing relationships with contemporary quarry owners. There is potential for fossil specimens to be identified for local display (including from museum collections); and walking routes to be developed.

- **C7 The Castle Cary to Langport railway** – See Sections 3.1, 3,2, 3.7 and 3.10 for scope for off-site interpretative material and educational projects, for both GCR sites and LGS along this main-line railway, with the strata documented at the time of its construction in the early 1900s. This could contribute to the C1 Polden Hills and C6 Somerton projects (above) and the C8 Bruton and C9 Langport projects (below) and possibly involve secondary schools at, for example, Bruton and Huish Episcopi.

- **C8 Bruton and the Fullers Earth Formation** – See Section 3.7 for scope for interpretative material in Bruton on the geology of the area, including on the Fullers Earth Formation and Forest Marble. Although there is only one LGS in South Somerset for the Fullers Earth and it is not an ideal site for interpretation, it complements three GCR sites, one being at Bruton Station. There is also nearby interest for the Inferior Oolite (see Section 3.6.).

- **C9 Langport and the Somerset Levels** - See Section 3.10 for scope for a community/interpretive project at Langport (and/or in villages nearby) to explain the Quaternary geological interest of this part of the Somerset Levels, including providing information on changes in climate and sea level. Although there are no LGS for this interest, there are four GCR sites nearby, including Langport Railway Cutting in the town.

- **C10 Wessex Water's Sutton Bingham Reservoir -** See Sections 3.7 and 3.8. Although exposure is poor, it provides an excellent opportunity for interpretive information, both in relation to the geological siting of the reservoir and documentation of the strata at the time of reservoir construction by the geologist Arkell, a leading authority on the Jurassic.

- **C11 Blackdown Hills AONB** – See Section 3.9 for the potential for a community/ local historic landscape project. This part of the AONB includes some of the most westerly inland exposures of the Chalk in southern Britain, some notable springs and villages with buildings constructed from the locally occurring calcareous sandstone of the Upper Greensand.

- **C12 The River Axe Valley and Chard area -** See Section 3.10 for potential for interpretative material at Forde Abbey (adjacent and just into Dorset) and/or in the Chard area on the Quaternary processes that have shaped the Axe Valley - and associated archaeological interest. See also Section 3.9 for Wayford Woods, an open access local reserve in the same area, which also has potential for interpretative material.

3. Formations present and the LGS representing their interest

The overall geology of South Somerset is broadly similar to that on the Jurassic Coast World Heritage Site, but with the rocks mostly hidden beneath superficial deposits, soils and vegetation, The oldest rocks are of Triassic age and are found in the north-west of the district, with younger Jurassic formations present towards the south and east. An understanding of this general arrangement was first illustrated in William Smith's *Geological section from Taunton through Yeovil and into Dorset* published by Cary in 1819[5]. The succeeding Cretaceous strata lies unconformably above, capping,

[5] See www.strata-smith.com , a web site established in 2015 for the bicentenary of the first geological map of England and Wales, produced by William Smith in 1815. Smith was the first person to establish the principles of stratigraphy in Britain. His county map for Somerset was never fully printed, but through comparison with other county Smith maps the bicentenary project team were able to recreate it.

for example, the Blackdown Hills. In addition, there are more recent Quaternary 'superficial' deposits: periglacial 'head', peat deposits, fluvial gravels and alluvium.

The LGS, together with the 12 GCR sites, help to provide a glimpse into this geology. The different formations and the LGS representing them are described in the following Sub-sections 3.1 to 3.10. Fig 1 below gives an overview geological map, with the layers shown separately in the figures in the sub-sections.

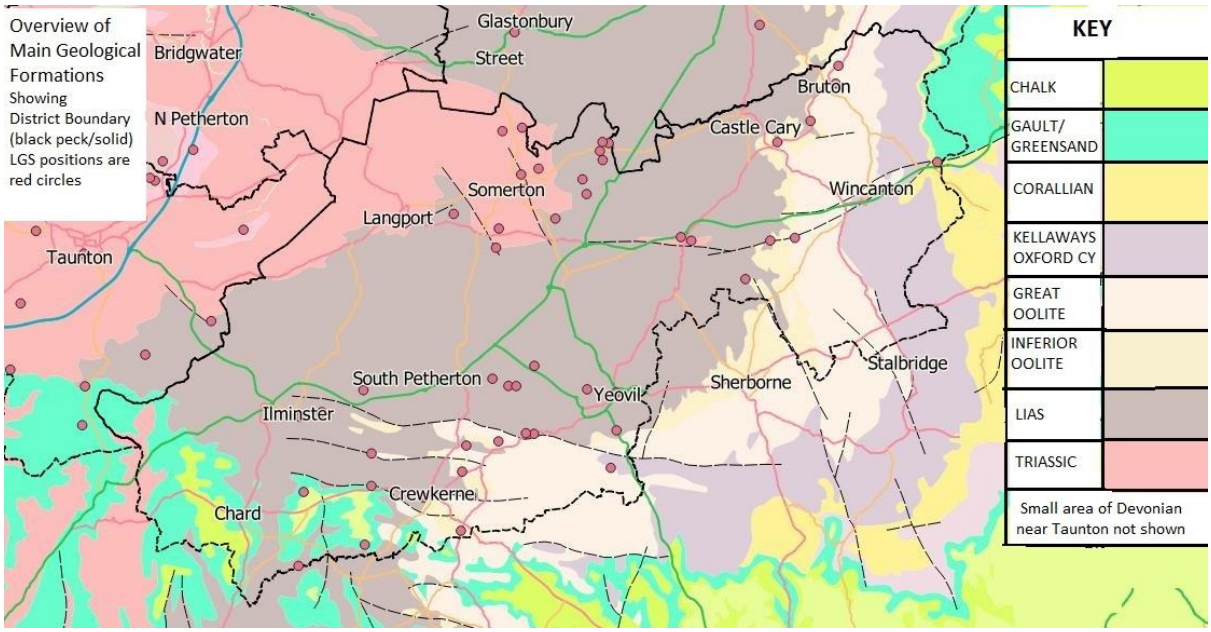

Fig 1: Overview map for South Somerset showing the main geological strata present and distribution of LGS *NB The geological units are shown as separate layers in Figs 2 to 11 (excluding Figs 5 and 6 which are at a more detailed scale) LGS = red circles. South Somerset boundary shown as a black line (pecked against adjacent counties). NB Superficial deposits and LGS in adjacent counties not shown.*

3.1 Triassic: Mercia Mudstone Group (including the Blue Anchor Formation) and the late Triassic Penarth Group

This section covers the conservation interest of strata of Permian-Triassic age in South Somerset, including the former Rhaetic Beds now known as the Penarth Group.

There is only one LGS of importance for exposure of the Triassic Mercia Mudstone Group in South Somerset: Gilling Down, a SWT nature reserve within the Polden Hills. It covers a visually prominent scarp face, with red mudstones of terrestrial origin exposed in the lower part of the slope and greyer Blue Anchor Formation beds, of probable lacustrine origin, in the upper part – with late Triassic Penarth Group beds occupying the more vegetated ground above. There are several other LGS elsewhere in Somerset covering Permian-Triassic strata, but this is the only LGS in Somerset with exposure of the Blue Anchor Formation. It complements a nationally important GCR sites for this interest on the Somerset coast in the Watchet area.

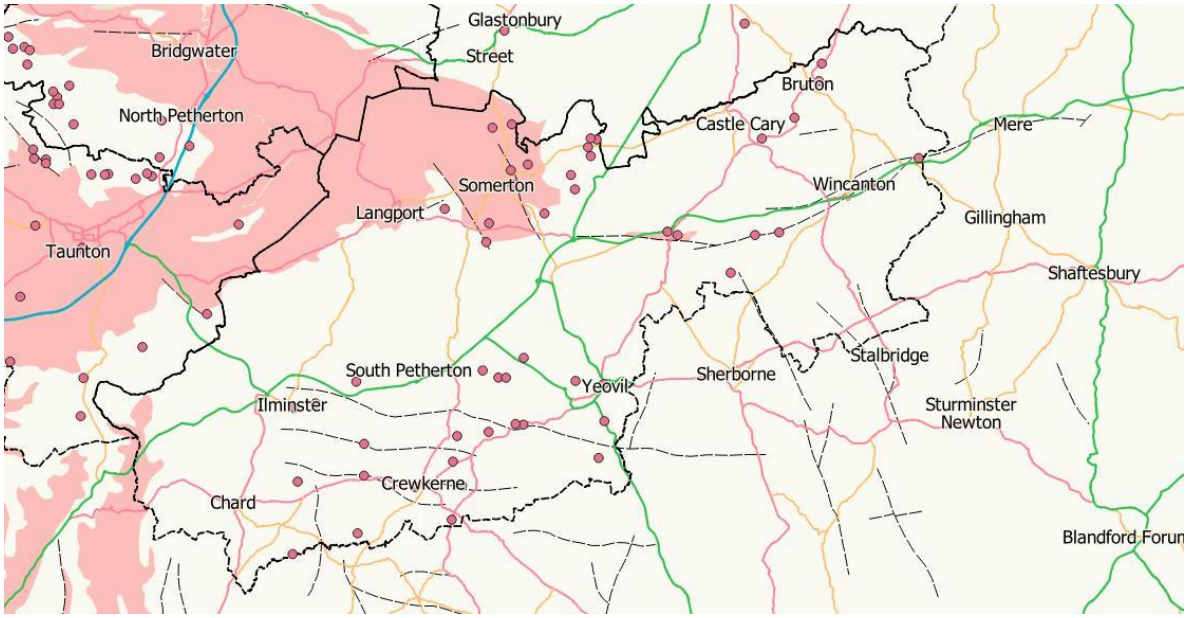

Fig 2: Triassic undifferentiated, including the late Triassic Penarth Group *shown dark pink; LGS shown as red circles.*

Strata of the late Triassic Penarth Group (former Rhaetic Beds) then represent a major marine transgression, following the terrestrial conditions of earlier Triassic times. There are nine LGS in South Somerset that illustrate this interest, with several more in the Mendips area. They lie between nationally important GCR sites to the west on the coast in the Watchet area, and to the east, in the Mendips. There are also nationally important sites for this interest on the Dorset coast.[6]

The Penarth Group has several locally differentiated horizons within it and is divided into the Westbury Formation (mostly shales) and the overlying Lilstock Formation. The latter is sub-divided into the Cotham Beds and the overlying Langport Member. The Cotham Beds sometimes include 'Cotham Marble', first described in the Bristol area and now considered to be a limestone of stromatolitic algal-origin, formed in brackish conditions. The Langport Member includes the marine-origin white limestones formerly called the 'White Lias', mapped in some instances by the BGS as undistinguished from the following Blue Lias Formation. The Blue Lias Formation, whilst traditionally thought to be of Jurassic age, is now understood to be in part of late Triassic age, where beds below the horizon with the fossil ammonite *Psiloceras planorbis* are present.

These beds have been of considerable research interest in the past: for their age; the varying conditions of their deposition; their fossil faunas; and the position in the sequence of the start of the Jurassic period; and they remain of research interest today, for example for their soft sediment deformation features[7]. In some instances, dating has been possible from fossil assemblages; in other situations, the age of the beds remains uncertain.

Some of the LGS in South Somerset are of research interest, rather than useful for education, due to their being, for example, cuttings on the mainline railway line or a busy road. However, several

[6] See Benton, M J & Turner, P, 2002: *Permian and Triassic Red Beds and the Penarth Group of Great Britain*, Geological Conservation Review (GCR) Vol 24 for more detail and context on the Penarth Group.

[7] See for example: Laborde-Casadaban, M, *et al* 2021: *Do soft sediment deformations in the late Triassic and Early Jurassic of the UK record seismic activity during the break up of Pangea?*, Proc Geol Assoc, vol 132, 688-701 for recent research including on the exposures on the Somerset coast.

particularly in the Polden Hills or on open space elsewhere, present opportunities for interpretive material, although not necessarily on site.

For example, in the east of the district, Langport Beds are exposed in old quarry faces in a local open access land near Sparkford, at a site immediately adjacent to the Yeovil-Castle Cary railway line, which opened in 1856, providing a new clean section described in detail by early geologist, Charles Moore. There is therefore good scope for clearance and interpretation on the adjacent LGS. At Hatch Beauchamp (within Somerset West & Taunton district, but close to the boundary with South Somerset) a cutting on a disused railway line, at an old railway station, was also described by the early geologist Charles Moore in 1867. It is now within an industrial estate with the outcrop obscured by thick vegetation and with closely adjacent buildings and industrial activity, but the old station nearby is a listed building and there may be potential for off-site interpretation.

An old quarry at southern end of the Polden Hills lies within the wider biological Polden Hills SSSI and is reported to have been quarried for alabaster in earlier times – again with potential for off-site interpretation. In addition, two of the LGS are mainline railway cuttings, near Langport and Somerton respectively and were described when the Castle Cary to Langport mainline railway was being constructed in the early 1900s. Access for educational use is evidently impracticable, but there is potential for off-site community interest and interpretation on both the scientific and historic interest.

3.2 Lower Jurassic - Blue Lias Formation

The Lower Jurassic is represented in South Somerset by the Lias Group – shown undistinguished on the map below. This section (ie 3.2) covers the conservation interest of the lower part of the sequence which is of Hettangian to Pliensbachian age, and in particular the interest of the Blue Lias Formation, the lowest formation in the sequence.

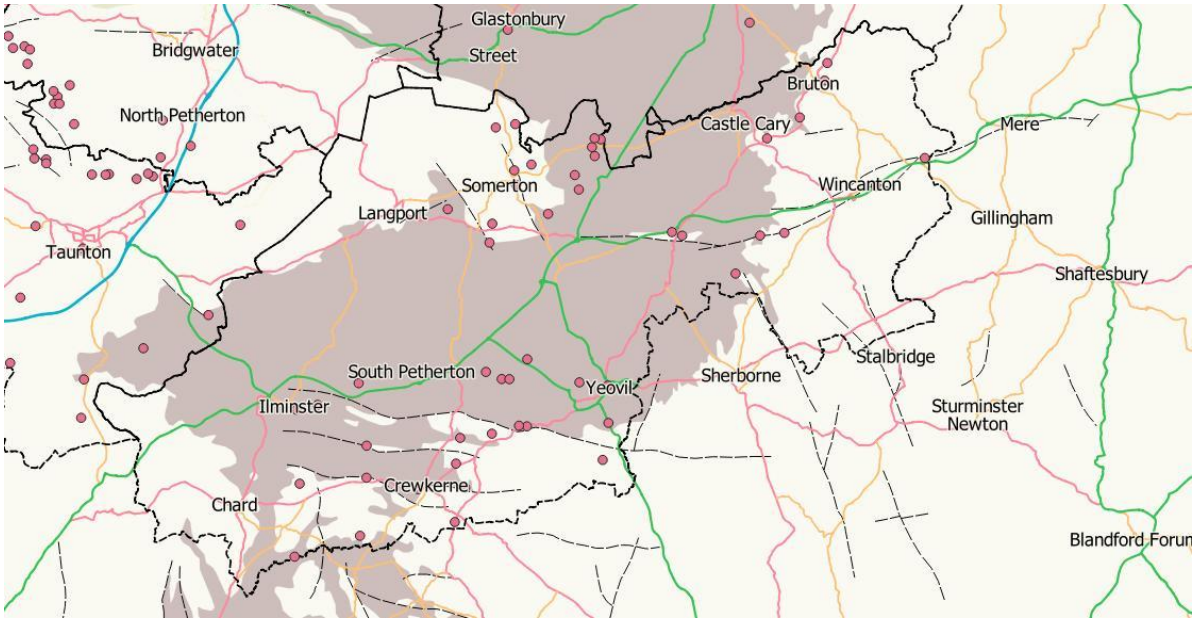

Fig 3: Lower Jurassic (Lias Group) undifferentiated *shown beige-grey (including the Blue Lias, Charmouth Mudstone, Dyrham, Beacon Limestone, Bridport Sand and Ham Hill Limestone Formations). LGS shown as red circles.*

The Blue Lias Formation represents continuing marine sedimentary conditions into Lower Jurassic times and consists largely of mudstones. It is well-known for its characteristic blue-grey flag stones,

extracted from relatively shallow quarries, most of which are in the Somerton to Keinton Mandeville area and many of which have been infilled and returned to agriculture. The formation also includes some more limey horizons locally, and some quarries and exposures may extend down into the underlying 'White Lias' (see 3.1 above). The formation is also well-known for its fossil faunas, while the range of colour of both 'White' and Blue Lias adds variety and distinctiveness of local buildings.[8]

There are six LGS in South Somerset on or over this Formation (plus some of those described above under the Triassic Penarth Group), with some further examples in the Mendips (several of the latter representing shallower more marginal conditions, as the Mendips were then islands).

Several of these South Somerset LGS were designated originally to cover quarries that were then inactive or small-scale, with some having detailed documentation of their sequences made in the 1980s by P Clothier, but not apparently published. During our review (mostly by desk and reconnaissance only for these LGS), we found that some had now become active quarries, while others had been infilled and/or developed. There are also many other old quarries in this area, some of which are recorded on the Somerset Historic Environment Record and there may be fossil specimens in museum collections) [9].

There is therefore scope for a community local oral /industrial history/geology project for the quarrying in this area. The former Lake View Quarry (now deregistered as LGS) has, for example, been developed for housing in recent years, but Keinton Mandeville village hall is immediately adjacent and may provide a location for interpretive material for any future community project. Another example is the LGS on Dundon Hill, a SWT nature reserve on an outlier of the Polden Hills, where there is potential for interpretation in tandem with some minor face clearance.

Such a project could include developing closer relationships with the quarry owners/managers, with potential for example for documentation of temporarily exposed faces and collection of fossil specimens. This could assist in considering in further detail than has been possible in this review, which sites are of most conservation importance, both geologically and historically.

NB There are no LGS for the Charmouth Mudstone and Dyrham Formations that follow the Blue Lias (except minor exposure of the Dyrham Formation at Wayford Woods - see below under Cretaceous) there being limited exposure and no sites of particular conservation interest for these formations.

3.3 Lower Jurassic: Beacon Limestone Formation

Three formations of the Lower Jurassic Lias Group of Toarcian age then follow, which are unique to South Somerset alone or South Somerset and Dorset.

The first of these is the Beacon Limestone Formation, formerly referred to as the 'Junction Bed', which is unique to South Somerset and highly fossiliferous, including lateral variation with fossil faunas of outstanding interest described previously at some locations. It was first explored by the early local geologist Charles Moore in the 1800s in the Ilminster area. Moore grew up, and lived and worked in Ilminster until his later years, when he moved to Bath. A further interest is that a horizon

[8] See Chapter 2 *The Wessex Basin* in Simms, M. J, Chidlaw, N., Morton, N. & Page, K.N., 2004: *British Lower Jurassic Stratigraphy*, Geological Conservation Review Series Vol 30, for more detail on the conservation context. This explains that exposure of the Blue Lias Formation is very limited away from the Somerset and Dorset coasts (where there are nationally important GCR sites).

[9] NB The geological collection of the Alfred Gillett Trust at Street includes fossil specimens of similar age from the Street area, but not from this South Somerset area.

local to the Ilminster area has been quarried for building stone, referred locally as Moolham Stone, while 'Marlstone' appears to be term for its use as a building stone in villages along its wider extent and in the Yeovil area.

Fig 4: Beacon Hill Limestone Formation in the western and central part of South Somerset – shown grey hatched - from Wilson *et al* 1958: *Geology of the Country around Bridport and Yeovil*, British Geological Survey Memoir, see pages 44 -56. See also Fig 5 below.

There is only one nationally important GCR site and four LGS for this important formation in South Somerset (and Somerset more widely), plus two LGS covering town centre buildings in Ilminster and Yeovil. The GCR site is an SSSI covering the banks of a sunken Lane near Shepton Beauchamp and provides the best location currently available for research interest. One of the LGS is immediately adjacent and simply provides a slightly longer section for this research interest – but both GCR and LGS sections have poor exposure.[10]

Another LGS in the Ilminster area is a reported location for previous quarrying of Moolham Stone, also with poor exposure and on privately-owned farm land. There are then two LGS which are stream sections: one where the sequence is thinner in the Montacute area; and one in Yeovil. The two additional town-centre LGS thus provide additional locations where the strata can be seen in town buildings, valuable in view of the current paucity of *in situ* exposure, while many other local village houses are also built with 'Junction Bed' stone, which frequently includes fossils such as belemnites.

Recent geo-conservation activity for this formation has included a temporary site 'dig' in 2019 to explore whether the fossil-rich facies described by Moore in old quarries in Ilminster in 1867 could be relocated. See https://www.brlsi.org/exhibitions/jurassic-ark-spectacular-fossils-from-an-ancient-somerset-sea for further information. A temporary section in the formation was also documented when the Ilminster bypass was constructed in the early 1990s.

There remains the possibility therefore that other temporary exposures of interest may occur - in conjunction with future local development, road works, pipeline work, etc. These could have potential for future research documentation - and possibly for identifying a site where a section

[10] See Chapter 2 *Wessex basin* of Simms, M.J., Chidlaw, N., Morton, N. and Page, K.N., 2004: *British Lower Jurassic Stratigraphy,* Geological Conservation Review Series, Vol 30, p 94 – 98, for a description of this GCR site, which explains this section was the subject of a MSc thesis by Constable (1992, Birkbeck College, London). It also explains the wider context, including the rapid lateral variation within the formation with, for example, a different fauna, described by Moore in old quarries in Ilminster in 1867. Moore's fossil collection is held by the Bath Royal Scientific and Literary Institution (BRSLI) in Bath and has been the subject of a special JESBI (*The Jurassic Ecosystem of Strawberry Bank Ilminster)* project in recent years, including an exhibition and talks.

could be maintained for educational field studies use. There is also potential for community interest and interpretation, including future use of the BRSLI exhibition material locally.

3.4 Lower Jurassic: Bridport Sand Formation

The Bridport Sand Formation overlies the Beacon Limestone Formation and is unique to South Somerset and Dorset. It underlies South Somerset in a broad belt from Barrington and the Crewkerne area in the west, to the Yeovil area in the centre of the district, plus a narrower band in the east (in the Corton Denham and Cadbury area to Castle Cary and beyond). It was formerly known locally as the Yeovil Sands. See Fig 5 below for the main part of its extent in South Somerset.

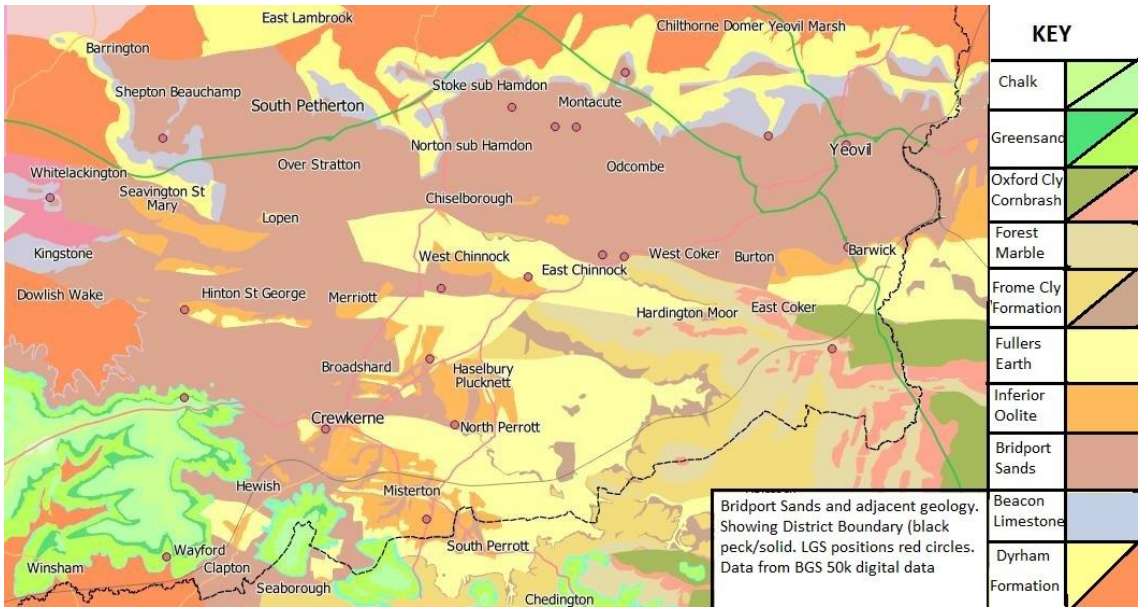

Fig 5: More detailed geological map showing the main extent of the Bridport Sand Formation – *shown pinkish-brown and covering the belt of country from Barrington in the northwest to Yeovil in the east and the Crewkerne area in the south. NB Here also including the Ham Hill Limestone Formation – see Fig 6 for the extent of the latter. Geological map derived from BGS 50k data (https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/). For more detailed key to formations see BGS viewer at http://mapapps.bgs.ac.uk/geologyofbritain/home.html?_ga=2.138656113.371923445.1610012182-153181825.1546632697 . LGS = red circles.*

It is an acidic sand of marine origin that now forms a distinctive contemporary landscape, of well-drained sandy undulating hills characterised by holloways. These sunk lanes are often deeply cut, and can be comparatively well-drained in winter, so provide some excellent local walking routes, both on tarmac lanes and public footpaths and bridleways (celebrated, for example, in Robert McFarlane's nature writing), but can also be prone to periodic landslip locally. The typical features of the Formation can often be seen in these lane and trackway cuttings: soft sands with harder more consolidated 'doggers'. Fossils are confined to a few horizons, but studies in the past have shown that the sands in the Yeovil area are, for example, chronologically older than in the Bridport area. [11]

[11] See Chapter 2 *The Wessex Basin* in Simms, M. J, Chidlaw, N., Morton, N. & Page, K.N., 2004: *British Lower Jurassic Stratigraphy*, Geological Conservation Review Series Vol 30, for a description of the nationally important GCR site (an earth science SSSI) for this formation at Babylon Hill - just to the east of Yeovil, in Dorset. There is also a GCR site at Burton Bradstock near the coast, while the LGS for the Bridport Sand Formation in Dorset are 3 sunk lanes in the Symondsbury area.

There are similar sands in the Bath and Cotswolds areas, but they are of slightly different in age and are less prominent in the contemporary landscape.

These sandy sunk lanes also create a characteristic and rich linear wildlife habitat, which, when considered in terms of acreage only, can be overlooked. Several are spectacularly high sided, and many are almost certainly of ancient origin. There is therefore considerable scope for a 'holloways' community project, which could involve geological recording, historic research, mapping their habitats and wildlife, creative artwork and the developing walking routes for local use and sustainable tourism. Old photos suggest that in the past there was less vegetation cover - so that locating old photographs and oral history might form an interesting part of any community project.

The five sites selected as LGS for this interest in Somerset in the 1990s have all been reconfirmed and provide a variety of different locations across its extent. That near Montacute was described by early geologists visiting Ham Hill (having arrived by train from Montacute station), and provides an almost complete section, where the thickness could be estimated, as it is capped there by the more localised Ham Hill Limestone (See Section 3.5). An A-road cutting south of Yeovil provides good exposure through the sequence, illustrating its typical features, and can be safely observed from the footway. A holloway near East Chinnock was described in the geological literature as including a few fossiliferous horizons, which enabled dating of the sequence there. It featured as the illustration for the dust cover of the 1958, British Geological Survey *Memoir* for the Bridport and Yeovil area, but exposure is now poor due to vegetation and landslip (with a new slip in Feb 2021 closing the road for over a year) and there is no footway. The site in Crewkerne is a location where the Inferior Oolite is recorded at the top of the sequence, although only visible behind a security fence due to instability of the face.

3.5 Lower Jurassic: Ham Hill Limestone Formation

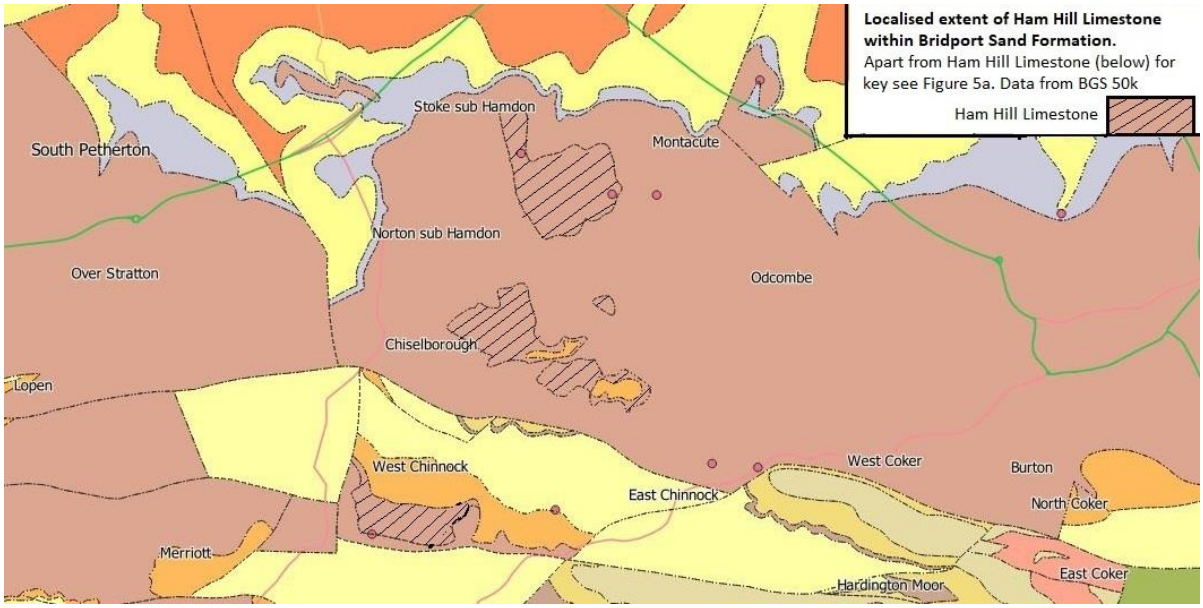

Fig 6: Localised extent of the Ham Hill Limestone within the Bridport Sand Formation – *shown by the hatched areas within the more extensive Bridport Sand Formation. Geological map derived from BGS 50k data (https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/). For key to other formations see Fig 5 above and BGS viewer at*

http://mapapps.bgs.ac.uk/geologyofbritain/home.html?_ga=2.138656113.371923445.1610012182-153181825.1546632697 . LGS = red circles.

The Ham Hill Limestone Formation is a calcareous sand within the Bridport Sand Formation, found only very locally in the Ham Hill area. It is developed at its thickest extent at Ham Hill, where it has been quarried as a good quality building stone for many hundreds of years. Ham Hill was thus of considerable interest to early geologists, has been visited regularly by geologists since then, from both national and more local organisations, with the reason(s) for the deposition of this very local 'reef' of shell-derived sand continuing to provoke discussion. The limestone caps the hill, underpinning the other related interests: calcareous grassland, a hillfort and outstanding views to the surrounding countryside. The limestone is not present further north, east or west and thins rapidly to the south.

There is one GCR site/earth science SSSI for this interest at Ham Hill[12], with the main LGS for this interest being immediately adjacent and covering adjoining parts of the Country Park, where there are numerous outcrops in old quarries, and where a geological trail has already been established. The other three LGS are: a small old quarry immediately east of the Country Park; a site near West Chinnock at the edge of an escarpment where the limestone was previously described at its thinnest southern extent (current condition of exposure not known); and an old quarry in school grounds at North Perrott, which has excellent exposure of the equivalent local 'Perrott' building stone in a separate faulted block of strata, at location also important for the Inferior Oolite overlying it there.

The main Ham Hill LGS is an outstanding site, in particular for education and interpretation, with considerable potential for a range of activities to encourage greater understanding of its geology and related interests, at a wide range of levels and for a wide range of ages and types of group. As part of this review, we have therefore worked with the Country Park and its consultants, to assist with information to help with its second stage Lottery bid (currently in process), which would include developing a small visitor centre and interpretative material [13]. Extension of the LGS boundary is also needed to cover a locality in Hedgecock Hill Wood, recently added to the Country Park, where there is exposure of the basal conglomerate.

3.6 Middle Jurassic: Inferior Oolite Formation

This section covers the conservation interest of strata of Aalenian to Bajocian age in South Somerset, but note that in some instances the upper-most part of the Inferior Oolite Formation may extend into the lowest part of succeeding Bathonian.

[12] See Chapter 2 The Wessex Basin in Simms, M. J, Chidlaw, N., Morton, N. & Page, K.N., 2004: *British Lower Jurassic Stratigraphy*, Geological Conservation Review Series Vol 30, for a description of this nationally important GCR site and its context.

[13] The LGS review form for Ham Hill therefore includes: references to all the geological information that we are aware of for it (including historic papers and interpretive material not currently in use); and all the conservation, educational and interpretive suggestions that we have made for potential use in the future.

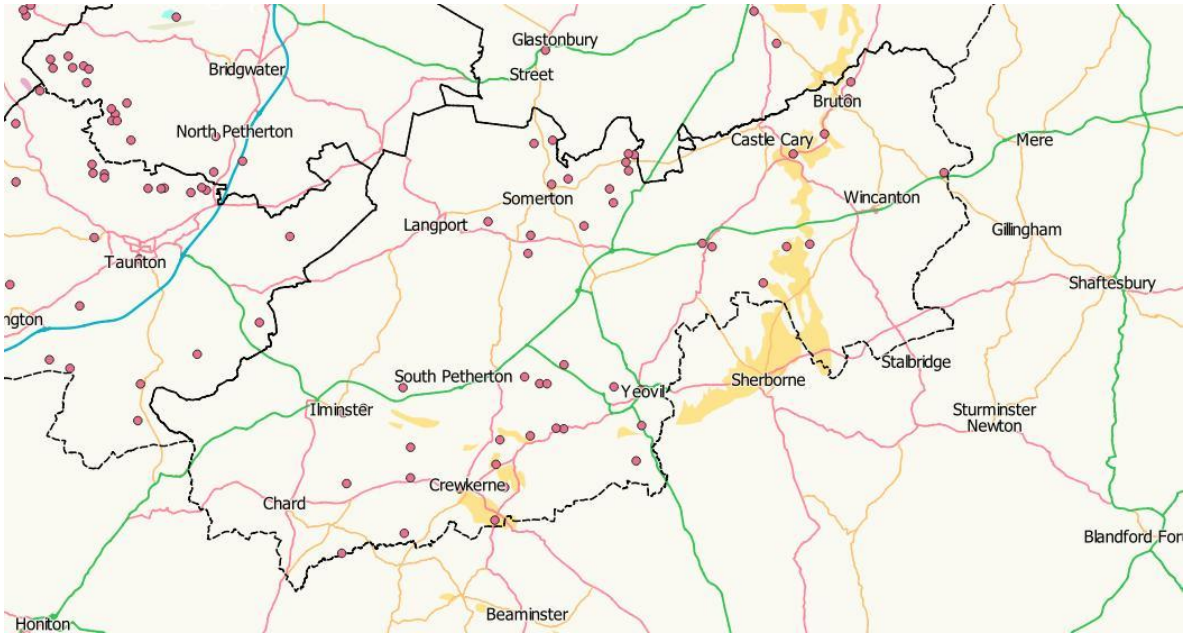

Fig 7: Inferior Oolite Formation *shown yellow. LGS shown as red circles. See also Fig 5 for more detail of its extent in the area south and west of Yeovil.*

There are ten LGS in South Somerset for this interest, complementing three nationally important GCR sites, the latter being: Seavington St Mary Quarry in the west; Godminster Lane Quarry & Railway Cutting near Bruton in the east; and Milborne Wick Section near the Dorset border. There are also several other nationally important GCR sites in Dorset, including Horn Park Quarry SSSI, a National Nature Reserve where Natural England has an agreement to allow conservation management and access, which lies north of Beaminster and therefore not far from the Crewkerne area of South Somerset.

The reason that this Formation is so well represented with LGS and GCR sites in South Somerset and Dorset is because it has been well studied historically in this Mid Jurassic 'Wessex basin' depositional area, by early geologists onward to contemporary research, including study of its rich fossil faunas. A detailed sequence of chrono-stratigraphical zones has been developed from this research, from the different fossil assemblages, which is now used more widely across Europe. There is considerable variation in the zones represented at different localities and in the detail of the lithological sequence across the basin, including units which provide different locally distinctive building stone, such as that used in Hadspen House and in villages in the Maperton area.

The Crewkerne area has the most westerly exposures of this Formation in Britain - slightly further west than on the Dorset coast and covering some of the lower zones in the sequence which are unproven on the coast. Further east the area from Bruton south to the boundary with Dorset includes, in a combination of the various sites, one of the more complete sequences of the formation, complementing that in the adjacent Sherborne area of Dorset.

See Larwood, J G and Chandler, R B, 2016: *Conserving classic geological sections in the Inferior Oolite Formation, Middle Jurassic of the Wessex Basin, south-west England*, Proceedings of the Geologists' Association , vol 127, p 132–145 for background context on the conservation interest of the Inferior Oolite in the Wessex basin, including a sketch map showing its extent and explanation that in the past there were numerous exposures, most of which have now been lost, while there is considerable

variation of the succession at different localities.[14] Its Fig 4 on p135 provides a table of the main ammonite zones now recognised, with the more detailed subzones and ammonite faunal horizons within them. The main zones are as follows (youngest at the top):

Parkinsonii
Garantiana
Niortense
Humphriesianum
Sauzie
Laeviuscula
Ovale
Discites
Concavum
Bradfordensis
Murchisonae
Scissum
Opalinum

We have been fortunate to have the national expert for the Aalenian to Bajocian, Robert Chandler, visit four of the South Somerset LGS as part of this review, as well as providing information on others that he has visited in early years.

Some of the LGS meet the scientific criteria for designation (with in some cases additional interest for the historic criteria for the history of the earth sciences or building stone interest). A smaller number are suitable for field studies use, limited for reasons such as H&S issues relating to busy roads or being on private land with no nearby facilities.

In several cases however, the LGS also provide a 'hook' for potential off-site educational community projects/interpretive material, for example in market towns, such as Crewkerne and Bruton, at visitor attractions, such as Hadspen House, Compton Castle Park or Haselbury Mill, or for walks, as in the Corton Beacon area. There is an interesting story to tell the public, including explaining the diversity of geology in the surrounding area, its influence on the local landscape and use of local building stone; as well as the story of the marine conditions in which this Formation was laid down, its fossil faunas and how the 'zones' have been developed, with work by early geologists onward.

See also the Mendip area report for a few Inferior Oolite sites in Mendip district, including the Doulting Stone area quarries.

3.7 Middle Jurassic: Fullers Earth, Forest Marble and Cornbrash Formations

This section covers the conservation interest of strata of the Middle Jurassic Great Oolite Group in South Somerset, which is of Bathonian age (but may extend into the Callovian).

[14] Further context is provided in Chapter 2 in Cox, B.M. & Sumbler, M.G., 2002: *British Middle Jurassic Stratigraphy,* Geological Conservation Review Series, Vol 26, which includes descriptions of the GCR sites.

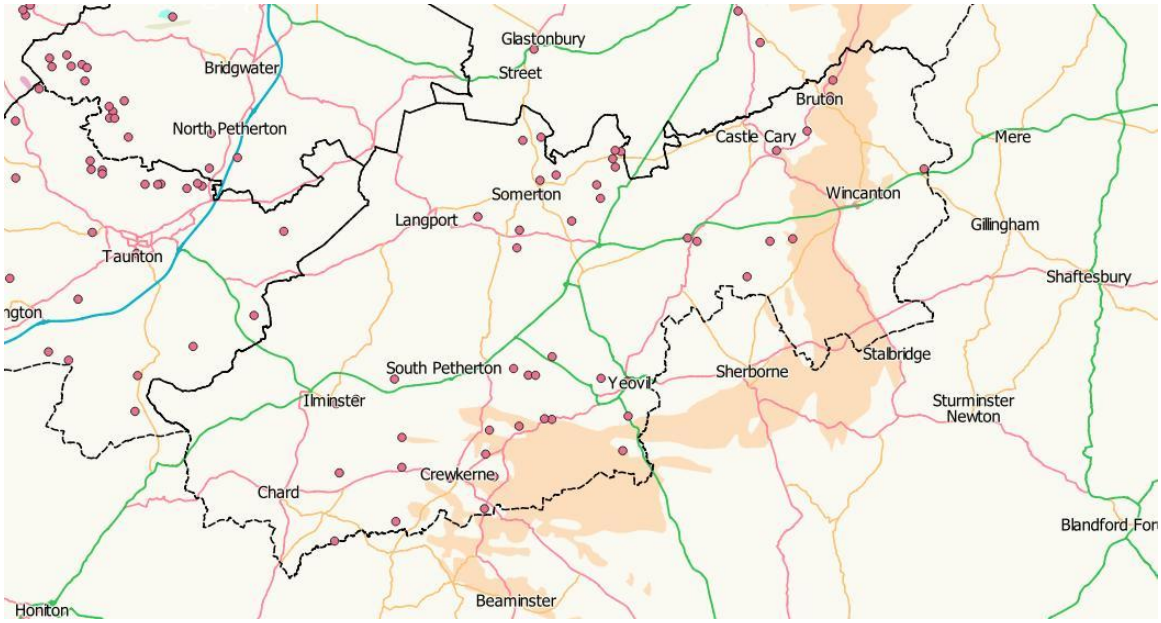

Fig 8: Fullers Earth, Forest Marble and Cornbrash Formations (ie Great Oolite Group undistinguished) *shown pale orange. LGS shown as red circles*. *See also Fig 5 for more detail of the extent of the individual Fullers Earth, Forest Marble and Cornbrash Formations within this grouping.*

There is only one LGS for the Fullers Earth Formation in South Somerset: on the River Brue near Bruton. It is documented in the geological literature and could be of scientific interest for future research, but it is not an ideal site for educational field use or interpretative material, as although it has an adjacent public footpath the exposure is in a small but vertical river cliff. It complements three nationally important GCR sites for this formation in Somerset, the nearest one being Bruton Railway Cutting, which provides a more complete section at Bruton Station, where there is scope for interpretative material (a suggestion for which made at a SANHS field visit to the GCR site in 2019).

The other two GCR sites are Shepton Montague GCR site (3 km to the south of Bruton) and Laycock Railway Cutting. See Cox and Sumbler, 2002[15] for descriptions of each of the nationally important sites and an explanation of how the Fuller's Earth Rock Member (ie the main limestone section of the Formation) in the Wessex basin is considered to show one of the best developments of Middle Bathonian rocks in Europe.

There is also one LGS for each of the Forest Marble and the Cornbrash. That for the Forest Marble is an old quarry just north of Bruton. It is apparently privately owned and has been reviewed as a desk study only, but is reported in the past to have had good exposure. The LGS for the Cornbrash is a valuable road-side cutting with good exposure east of Wincanton. These two LGS are both potentially useful for future research - especially as there are no nationally important sites in Somerset for these formations.

An LGS at Wessex Water's Sutton Bingham Reservoir, south of Yeovil, also includes these two formations (and the Oxford Clay - see below), but with poor exposure. However, it provides an excellent opportunity for interpretive information, both in relation to the geological siting of the reservoir and documentation of the strata at the time of reservoir construction by the famous geologist Arkell, a leading authority on the Jurassic.

[15] See Chapter 2 (p 15-111) of Cox and Sumbler, 2002: *British Middle Jurassic Stratigraphy,* Vol 26 of the GCR Series.

3.8 Upper Jurassic: Oxford Clay Formation and Corallian Group

This section covers the conservation interest of strata of Upper Jurassic Callovian to Oxfordian age in South Somerset.

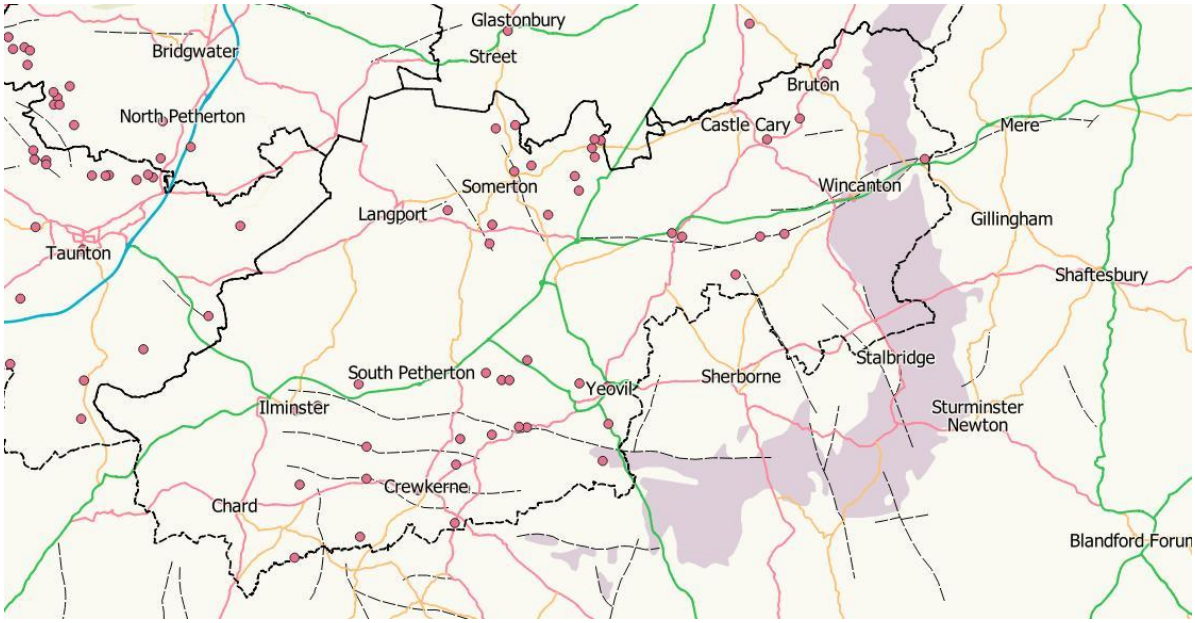

Fig 9: Kellaways and Oxford Clay Formations *shown lilac. LGS shown as red circles.*

The Upper Jurassic Kellaways and Oxford Clay Formations overly the strata of Bathonian age and are at their western extent in South Somerset and Dorset, their main occurrence being further east in southern England. There is only one LGS in South Somerset for this interest, where the Oxford Clay is present at Sutton Bingham Reservoir south of Yeovil (see above), where the sequence exposed at the time of reservoir construction was described by Arkell, a geologist famous for developing an understanding of the Jurassic.

These two formations are followed by the Corallian Group, which occurs only in the eastern part of South Somerset, east of Wincanton. Strata of this age underlie a LGS at Penselwood, but there is no *in situ* exposure there, the LGS having been designated for mass movement (see Section 3. 10).

3.9 Cretaceous - Gault, Upper Greensand and Chalk

This section covers the conservation interest of strata of Aptian to Albian and Cenomanian to Maastrichtian age in South Somerset – and the overall interest of the Somerset part of the Blackdown Hills AONB.

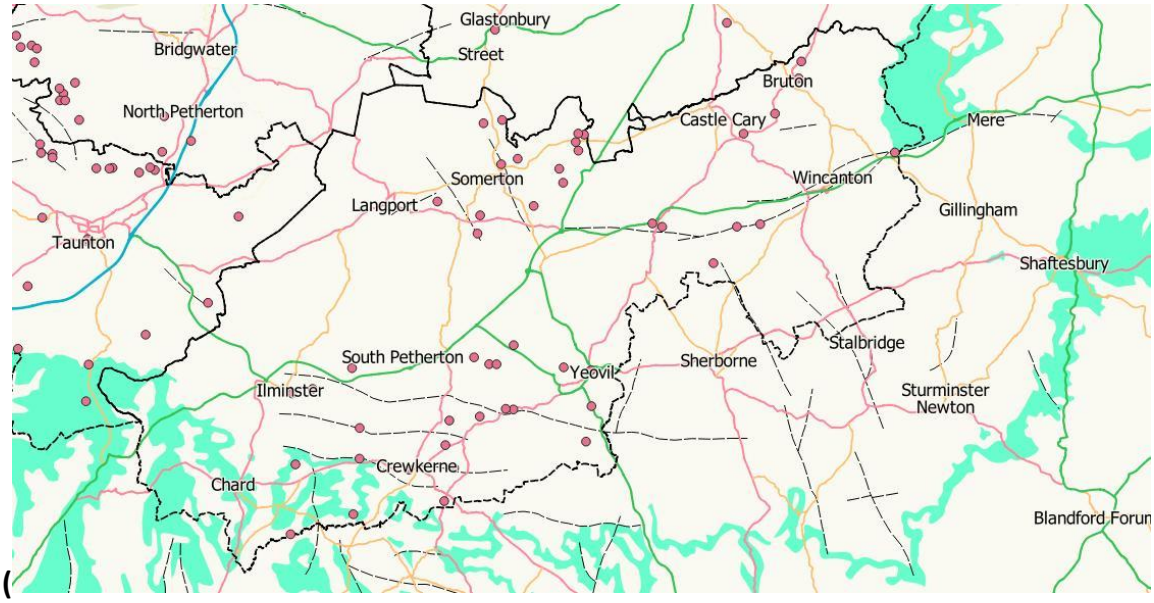

Fig 10: Cretaceous Gault and Upper Greensand *shown turquoise green. LGS shown as red circles.*

The escarpment of the Cretaceous Upper Greensand (Aptian-Albian) overlies the Jurassic unconformably in southern England, with an outlying area in the south-west of South Somerset, between Crewkerne and Chard, which forms the Windwhistle Hill ridge, and further west again, in the Blackdown Hills AONB (see Fig 10 above). The underlying Gault Clay is generally poorly developed.

The overlying Chalk is also largely absent in Somerset, except in a few outlying areas: capping the Windwhistle Hill ridge and then, west of Chard, in for example faulted-in areas in the Combe St Nicholas and Whitestaunton area, in the east part of the Blackdown Hills AONB (see Fig 11 below).

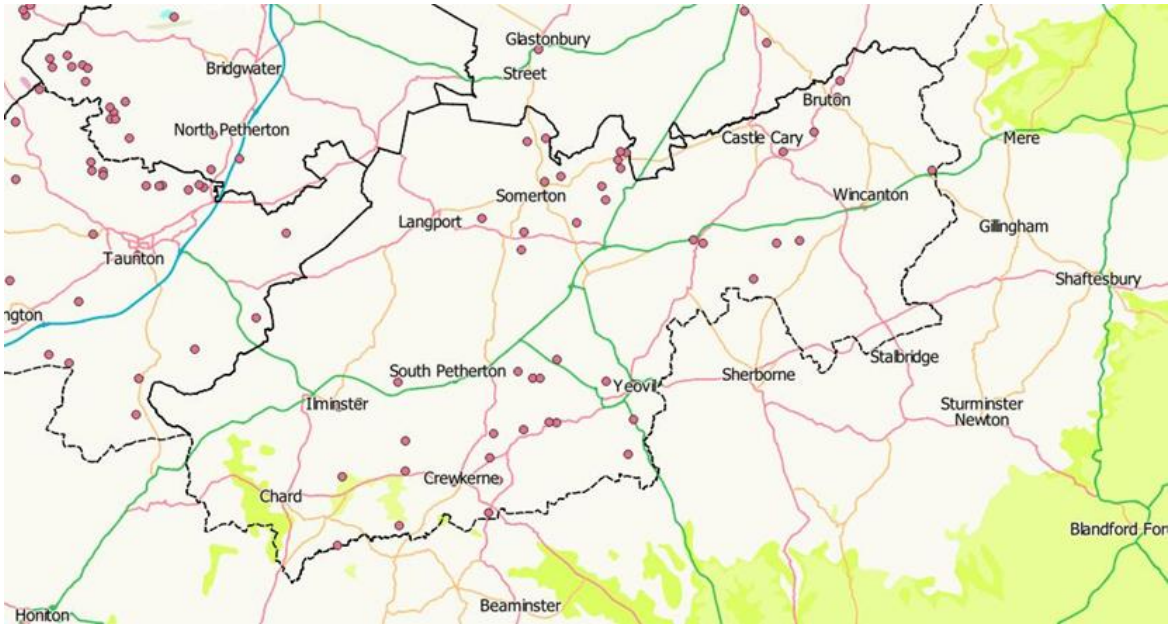

Fig 11: Cretaceous Chalk *shown lime green. LGS shown as red circles.*

The Windwhistle Hill ridge

There are three LGS in the Windwhistle Hill area. One, a cutting on a B-road on the north side of the hill, is a former SSSI. It is of research interest and covers the sequence from the Upper Greensand into the overlying Chalk, but with poor exposure. Another is a privately-owned old quarry, east of Chard, with good exposure reported previously of the calcareous sandstone or 'calcareous gritstone' of the Upper Greensand, again used locally as building stone. The third LGS is Wayford Woods, an open access nature reserve on the south facing slopes, in the Axe Valley, which despite poor exposure has good scope for interpretation to explain how Upper Greensand strata overlying more clayey strata below influences the topography, hydrology and wildlife habitats.

The Blackdown Hills AONB

NB The four LGS in the Devon part of the AONB have not been reviewed for this project. Plus see Appendix 1 for the two GCR sites (earth science SSSIs) there.

There are no LGS currently designated in this South Somerset part of the AONB, although interest may in some instances be covered by other designations. For example, we are aware that one old quarry for the calcareous sandstone of the Upper Greensand lies within a Local Wildlife Site in the Whitestaunton area.

There is still however potential for a community/ local historic landscape project in this part of the AONB as it includes local variations in the Cretaceous Upper Greensand and some of the most westerly inland exposures of the Chalk in southern Britain, with the latter complementing sites in the East Devon part of the AONB and in the East Devon AONB. The area also includes a number of locally notable springs, while local buildings include a range of stone of local origin, including the calcareous sandstone and chert derived from quarries in the Upper Greensand and material from the Chalk. The valleys in the AONB here also cut through the Cretaceous into Jurassic strata below, with a SWT nature reserve in the Bishopswood area including, for example, a lime kiln associated with local quarrying of limestone horizons there.

Snowdon Hill Quarry SSSI, which lies to the west of Chard, just beyond the AONB, is a nationally important GCR site for both the Upper Greensand (Aptian-Albian) and Chalk (Cenomanian-Maastrichtian). It has good exposure and documentation of the strata (and the unconformity between the two), with the calcareous sandstone horizon in the Upper Greensand, a distinctive horizon of localised extent, well developed and previously used as a local building stone in Chard.

There are four LGS in the Somerset West & Taunton part of the AONB. One at Otterhead Lakes covers a small old quarry in the Upper Greensand with overlying periglacial material derived from the Upper Greensand chert beds. There is good potential for interpretative material there (to be included, for example, in the website of the adjacent nature reserve where the hydrogeological interest of the aquifer within the Upper Greensand and its associated springs could also be covered).

The other three LGS in the Somerset West & Taunton part of the AONB cover Upper Greensand and periglacial interest; mass movement on the north facing scarp slope (largely dating from periglacial times); and Tertiary superficial deposits. These LGS were apparently selected originally mainly for their scientific interest, with interpretive material currently available for adjacent open-access areas, with no LGS but where there are car parking facilities and viewpoints[16]. A further LGS immediately adjacent to the AONB, at Staple Fitzpaine, covers the interest of sarsen stones. They are also present within the AONB, for example along the 'Herpath' footpath below Castle Neroche. So again, the scope for interpretative information is not necessarily confined to LGS.

[16] See Prudden, H, 2001: *Geology and landscape of Taunton Deane,* Taunton Deane Borough Council *op cit*.

Cranborne Chase and West Wiltshire Downs AONB

A very small part of the Cranborne Chase and West Wiltshire Downs AONB lies within the eastern part of South Somerset and is also typified by a Cretaceous escarpment of Upper Greensand, with the hill slopes, as in the Blackdown Hills, modified by ancient landslips. The one LGS in this area is of interest for contemporary mass movement over Jurassic clays (see Section 3.10 below).

3.10 Quaternary processes, earlier structural features and hydrogeology

The landscape of southern Somerset is influenced not only by the underlying strata, but by the processes that have happened since they were deposited, particularly those in Quaternary times. These include: the periglacial tundra conditions that prevailed immediately south of the glaciated areas of Britain during the Pleistocene; changes in sea level with related changes in fluvial erosion and deposition; and mass movement (largely inactive and dating from periglacial times, with occasional active landslip locally).

Only two LGS in South Somerset are designated solely for this these types of interest. An LGS on the River Axe provides an example of a meandering section of the river within a narrow alluvial plane with public footpath access, and river terrace gravel deposits nearby. There may be potential for interpretative material at Forde Abbey (adjacent and just into Dorset) or elsewhere locally in the Chard area, as there is an interesting story to tell of the Quaternary processes that have shaped the Axe Valley and its associated archaeological interest. The nationally important GCR sites for these interests, including river terrace gravel deposits and meanders, are further downstream in Dorset and Devon.

The other LGS is that at Penselwood mentioned in Section 3.8. It was designated originally for the interest for contemporary mass movement in the Mere fault area, within the slopes below the Cretaceous escarpment that are more usually typified by mass movement features dating from periglacial times (as mentioned in Section 3.9).

Several other also LGS include 'superficial' deposits and/or geomorphological features of interest and in particular Ham Hill LGS, and the wider Country Park there, provide features where Quaternary processes can be considered, including views over the southern part of the Somerset Levels towards the Langport Gap, with potential to consider the impact of changing sea levels.

This LGS interest complements three nationally important GCR sites for Quaternary interest in South Somerset. Langport Railway Cutting SSSI illustrates cold-stage fluvial sediments and soils from an interglacial period. Low Ham SSSI has superficial deposits that provide evidence of back estuary conditions from higher sea levels in an interglacial period. Hurcott Farm SSSI has shelly river terrace sediments, with molluscs and a pollen flora that indicate an inter-glacial period, and provides evidence of the capture of the River Yeo by the River Parrett from its earlier course of joining the River Cary. These are all at the edge of the Somerset Levels in the Langport to Somerton/southern Polden Hills area, where there is also a further GCR site at Grey Lake within Sedgemoor district.[17]

Structural interest - We are not aware of any recent research on this in South Somerset, but a number of LGS illustrate faults and relatively minor folding and provide a potential research resource for the future. See, for example, faulting shown on the BGS maps and Section 3.1 for the old railway

[17] See Campbell, S, Scourse, J.D, Hunt, C.O., Keen, D.H. & Stephens, N, 1998, *Quaternary of South-West England,* Geological Conservation Review Series, Vol 14 for the GCR site descriptions and further background.

cutting at Hatch Beauchamp, where both faulting and folding, caused by the adjacent regionally significant Watchet-Cothelstone-Cranborne Fault, were documented originally. This fault can be traced to the west Somerset coast, where structural deformation has been studied in some detail in recent years and appears to be related to crustal movements at a variety of times. Faults can, for example, be reactivated over different periods of time. Plus see Section 3.1 for a reference to recent research on the north Somerset coast on soft sediment deformation features.

Hydrogeology - See Section 3.9 for the scope for interpretative material on the aquifer(s) within the Blackdown Hills AONB. A unique situation in Somerset also occurred near East Chinnock in the past where a spring issued saline (NaCl) groundwater at 'Salthole Spring'. This is not known to have run in recent decades and will be deregistered as LGS, but the information we have gathered will be passed to the Somerset HER to be added to that already held for this historic site.

Appendix 1: Geological Conservation Review (GCR) sites in South Somerset

GCR sites are the nationally important sites for earth science conservation in England, designated by Natural England (see http://jncc.defra.gov.uk/page-2947). Some are SSSIs in their own right with the same name, while others are within wider SSSIs of mainly biodiversity interest – and which may be differently named. There are currently 12 GCR sites in South Somerset, selected from a number of different conservation interest 'blocks' (italics below). NB *Many sites are on private land and the designation does not imply any right of public access.*

- *Fluvial processes*
  - No GCR/SSSI in South Somerset (1 GCR/SSSI **River Axe** in lower Axe Valley at Axminster and Whitford in Devon).
- *Mass Movement*
  - No GCR/SSSI in South Somerset.
- *Quaternary of SW England*
  - Three GCR/SSSIs in South Somerset: **Langport Railway Cutting, Hurcott Farm** and **Low Ham** (NB **Grey Lake** is nearby on the Somerset Levels in Sedgemoor district; and **Broom Gravel Pits** is just into Dorset in the Axe Valley).
- *Cenomanian to Maastrichian* (Cretaceous)
  - One GCR/SSSI: **Snowdon Hill Quarry**. NB **Reed's Farm Pit** and **Furley Chalk Pit** GCR/SSSIs lie within the Devon part of the Blackdown Hills AONB.
- *Aptian-Albian* (Cretaceous)
  - One GCR/SSSI*:* **Snowdon Hill Quarry** as above.
- *Callovian* (Upper Jurassic)
  - No GCR/SSSIs in South Somerset.
- *Oxfordian* (Upper Jurassic)
  - No GCR/SSSIs in South Somerset.
- *Bathonian* (Middle Jurassic)
  - Three GCR/SSSIs: **Bruton Railway Cutting, Laycock Railway Cutting** and **Shepton Montague (**plus **Goathill** just into Dorset near Milborne Port).
- *Aalenian – Bajocian* (Middle Jurassic)
  - Three GCR/SSSIs for the Inferior Oolite: **Seavington St Mary Quarry, Godminster Lane Quarry & Railway Cutting** and **Milborne Wick Section** (NB There are others relatively nearby in Dorset, including **Horn Park Quarry,** a National Nature Reserve, north of Beaminster.)
- *Toarcian* (Lower Jurassic)

    - Two GCR/SSSIs*:* **Hurcott Lane Cutting** GCR/SSSI for the Beacon Limestone Formation; and **Ham Hill GCR/SSSI** for the Ham Hill Limestone Formation. (NB **Babylon Hill** GCR/SSSI, east of Yeovil, just into Dorset is scheduled for the Bridport Sand Formation.)
- *Hettangian to Pliensbachian* (Lower Jurassic)
    - No GCR/SSSIs – the nationally important sites are on the Somerset coast.
- *Rhaetian* (Late Triassic Penarth Group*)*
    - No GCR/SSSIs – nationally important sites are on the Somerset coast and in the Mendips.
- *Permian -Triassic*
    - No GCR/SSSIs in South Somerset.

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