

Review of Somerset's Local Geological Sites (LGS) 2017 – 2022 Final report for Vale of Taunton Deane, June 2023

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 LGSs 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. 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 including: graduate and student volunteers, Hugh Galloway and James Voysey in 2017 and Louise Warnes and Wesley Harris in 2018; and SGG sourced SERC volunteers, Garry Dawson, Phil Parker, Saranne Cessford, John Kirby and Martin Doherty and Wesley Harris (SERC's temporary LGS Project Officer) in 2019, 2020 and 2021. Our thanks to everyone who has assisted.

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1. Introduction

This report covers 22 LGSs representing the conservation interest of Permo-Triassic strata that lie in the former Somerset West & Taunton District, primarily in the Vale of Taunton Deane (plus one for the Quaternary and two LGS that cover buildings there). LGS on older strata in this former district are covered in the Exmoor area and Quantock area reports, while those in the Blackdown Hills AONB are mentioned briefly in the South Somerset area report¹.

It is intended to provide an overview of their conservation interest and potential for education and interpretive use. ***It does not constitute a full geo-diversity action plan:*** any recommendations and opportunities for projects result only from our review of the current LGS and the contextual information that we have gathered for that.

Most of the LGS (then known as RIGS) were identified and adopted from 1988 onward through the 1990s, with several sites of interest mentioned by Hugh Prudden in his book on the *Geology and Landscape of Taunton Deane*, published in 2001 by Taunton Deane Borough Council.

All the LGS in this area have been reconfirmed during this review, a few with minor boundary adjustments. In some cases, our review has been by desk and reconnaissance assessment only, where for example the owner could not be traced or permission for a formal site visit could not be obtained in the time available. The scope of this project also covered existing LGSs only – not recommendations for new sites, although some gaps in coverage and potential future sites may have been identified.

The LGS include one with Permo-Triassic interest that lies within the Quantocks Area of Outstanding Natural Beauty (AONB). Two other LGS within the Quantocks AONB also include outcrops of Permo-Triassic strata, but are included in the Quantocks area report, as their main interest is older Devonian strata. These two cover the junction area with the younger Permo-Triassic strata, on respectively the west and east sides of the Quantocks, but the actual junction is not well exposed in either case.

An LGS in Hatch Beauchamp parish, also within the former Somerset West & Taunton district, is covered in the South Somerset area report, as it lies close to South Somerset and its main interest is the late Triassic Penarth Group (former Rhaetic), which mostly occurs further east in Somerset (see the South Somerset area report for this interest).

Three LGS, with similar underlying geology in the Porlock Vale of the Exmoor National Park (ENP) are covered in the Exmoor area report, along with another LGS near Wiveliscombe on older Devonian strata, but which also provides a good view point for the landscape underlain by the Permo-Triassic formations covered in this report.

¹ See <http://wp.somerc.co.uk/specialist-groups/somerset-geology-group/> where these area reports can be found, as appended PDFs, together with the Mendip area report, covering LGS in the former Mendip district and Somerset part of the Mendip Hills AONB.

The most westerly exposure of Carboniferous Limestone in Somerset (well beyond its main occurrence in the Mendip Hills) also occurs as a small inlier within the younger Permo-Triassic strata east of the Quantocks (former Sedgemoor District). The one LGS here should, in retrospect, more appropriately have been included in the Mendip Area report. It is clearly of conservation interest, representing the most westerly exposure of Carboniferous Limestone in South West England.

Relevant Geological Conservation Review (GCR) sites and LGS in Devon

There are four nationally important GCR sites in this area of Somerset, all of which are on the north Somerset coast and fall within the Blue Anchor to Lilstock Coast earth science SSSI. They are: Blue Anchor – Lilstock Coast GCR site for Lower Jurassic strata; Blue Anchor-Watchet-Lilstock for Coastal Geomorphology; Blue Anchor Point for Rhaetic (ie late Triassic Penarth Group) interest; and Doniford for Quaternary of Somerset interest. This coastal area is well known nationally for its geological interest and is used for field studies, with a field guide for it published by the Geologists' Association. The SSSI covers both the cliffs and foreshore, with the part between St Audries and Kilve within the Quantocks AONB, and there may be potential in the future for extension of the adjacent National Nature Reserve to include this geological interest.

There do not however appear to be any coastal or inland GCR sites for the Permo-Triassic strata covered in this area report. The main nationally important outcrops for comparable formations are further south, on the East Devon coast, between Exmouth and Beer, forming part of the Jurassic Coast World Heritage site. There are also no closely adjacent Permo-Triassic LGS sites across the border in Devon (Devon RIGs website table - checked May 2022), the nearest LGS for Permo-Triassic strata in Devon being in the Crediton and Exeter area and including the Exeter Volcanics.

2. Overall recommendations and opportunities for geo-conservation and geo-interpretation

- **A suite of locally important sites** - The LGSs covered in this report therefore form a valuable suite of sites, providing information on the inland extension of the classic Permo-Triassic coastal exposures on the Devon coast (in the Budleigh Salterton and Sidmouth area) as they extend northwards into the western part of Somerset.
- **Permo-Triassic riverine deposits** - The strata are largely of terrestrial origin and reddish in colour. They include conglomerates and breccias (including smooth pebbles and angular fragments, respectively) sourced from varied directions and different older rocks, plus sandstones (with sedimentary features such as cross bedding) and finer mudstones. They are of research interest for the development of terrestrial riverine deposits during this period, including the source and type of the earlier rock fragments included.
- **History of geology** - The North Curry Sandstone Member is of particular interest for its distinctively different green-grey colour, now understood to be of probable brackish water origin. Fossils occur locally within it and it was first investigated by the nineteenth century Somerset geologist, Charles Moore. See the South Somerset area report for other LGS in Somerset described by Moore (who came from Ilminster) and the scope for community project(s) to celebrate his work in Somerset.
- **Holloways and geo-walks** – The varied Permo-Triassic lithologies contribute to the diversity of the local landscape, with several LGS being in holloways or sunk lanes, along footpaths or minor roads. Others are in small old quarries, with local history interest and scope for research into their use for building stone and lime production – with several sites also having remains of limekilns. The use of local building stone is also a major factor in the attractive

and distinctive appearance of local villages and towns. There is scope, therefore, for interpretative material to be developed as, for example, a series of geo-walks, in places such as the Wiveliscombe and Milverton area, the eastern side of the Quantocks and in the North Curry area.

- **Taunton museum as a hub for information** - Taunton Museum provides a potential hub for provision of such information, with a town geo-walk immediately adjacent. Hugh Prudden's book (*op cit*) was available for sale there until recently, in which he mentions possible walks and refers to walks leaflets published previously by the former Taunton Deane Borough Council. These could provide a start point for updated on-line resources. Some LGS may be quarries in private ownership, but their exposure can sometimes be seen from public footpaths or adjacent lanes, without the need to inappropriately encourage access.
- **Practical conservation work and field teaching sites** - The most outstanding LGS for both the Chester Formation (former Budleigh Salterton Pebble Beds) and the overlying Helsby (Otter) Sandstone is privately owned, but is known to those organising geological field studies, with a tradition of the current owner welcoming occasional field study groups and carrying out occasional conservation work to keep the face clean. Our review suggested this site is still in good condition.
- **Developing contacts with owners and the highways authority** – Other priorities and opportunities for practical conservation work may emerge for other LGS, if more local contact with owners can be developed (particularly where site visits have not been possible to date). Similarly, it would be useful to meet with the county highways authority to discuss those LGS on public roads, in case opportunities emerge for conservation work in the future. Practical clearance may not necessarily always be appropriate in these situations, as the vegetation may be assisting stability and/or the LGS may not be viable for field-study use (or volunteer working parties) due to the road traffic.
- **Geo-diversity action planning** - Otherwise our overall recommendations are similar to those for our other area reports. For example, as per the South Somerset area report, we recommend that the new unitary authority develop appropriate priorities for geo-conservation across Somerset as a whole, including recognising important areas for geo-tourism (such as the nationally important coastline in the Blue Anchor-Watchet-Kilve area). The new annual International Geo-diversity Day may also provide an opportunity to raise the profile of the way in which geology could contribute to, for example, sustainable rural tourism and local community projects.
- **Nature Recovery Areas and other small exposures** - the LGS should be fully integrated into the forthcoming Nature Recovery Areas and their programmes for practical conservation work and community engagement. We also strongly recommend that the new unitary planning authority ensures there are appropriate policies to protect LGS in the local plan (and to conserve geo-diversity interest more widely, as more minor geological features contribute to the geo-diversity and bio-diversity of the area as a whole).
- **In-house expertise** – We also recommend that the new unitary authority and South West Heritage Trust consider ways in which they can ensure good geological in-house expertise. The former geological curator role at the Somerset Heritage Centre has not, for example, been replaced in recent years, and the scope to initiate such projects as above, in tandem with displays of the geological materials held in museum storage, is currently much reduced.

- **Temporary exposures and active quarries** – A system would also be useful 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, for example, Section 3 for the contemporary research interest of a recent new exposure of the North Curry Sandstone Member.

3. Formations present and the LGS representing their interest

The LGS are situated on/represent conservation interest in five main formations/members of the Permian and Triassic periods in this area, as indicated in bold in the table below (with the youngest strata at the top and alternative/former names in brackets). There are a variety of alternative and/or former formation names². Plus, it is important to understand that the precise age of the strata can be difficult to determine, because of lack of fossils and as individual formations can cross the major age-based period boundaries. So, for example, the Vexford Breccias are thought now to be largely Lower Triassic, but at some scales of BGS mapping (such as that in Fig 1 below) they are undistinguished from and included with the underlying Permian strata.

Geological Period	Group	Formation or Member within Group	LGS
<i>NB See South Somerset area report for the Late Triassic Penarth Group.</i>			
Triassic	Mercia Mudstone Group (Branscombe Mudstone Formation)	North Curry Sandstone Member (Arden Sandstone)	2 LGS (+ 1 building LGS - see text)
	Mercia Mudstone Group (Sidmouth Mudstone Formation)		<i>No LGS</i>
Lower Triassic	Sherwood Sandstone Group	Helsby Sandstone Formation (former Otter Sandstone)	7 LGS (+ 2 + 2 - see text)
		Chester Conglomerate Formation (former Budleigh Salterton Pebble Beds Formation)	7 LGS
	Aylesbeare Mudstone Group		<i>No LGS</i>
		Vexford Breccias	5 LGS
Permian		Wiveliscombe Sandstone Formation (Tidcombe Sandstone)	1 LGS

Table 1: Formations represented in LGS (formations indicated in bold with alternative names in brackets)

² See, for example: Edmonds E A & Williams B J 1985: *Geology of the country around Taunton and the Quantock Hills*, BGS Memoir for sheet 295; the more recent names in Edwards R A and Gallois R W, 2004: *Geology of the Sidmouth District*, BGS Explanatory guide to map sheets 326 and 340; and the BGS on-line Geology of Britain Viewer and lexicon.

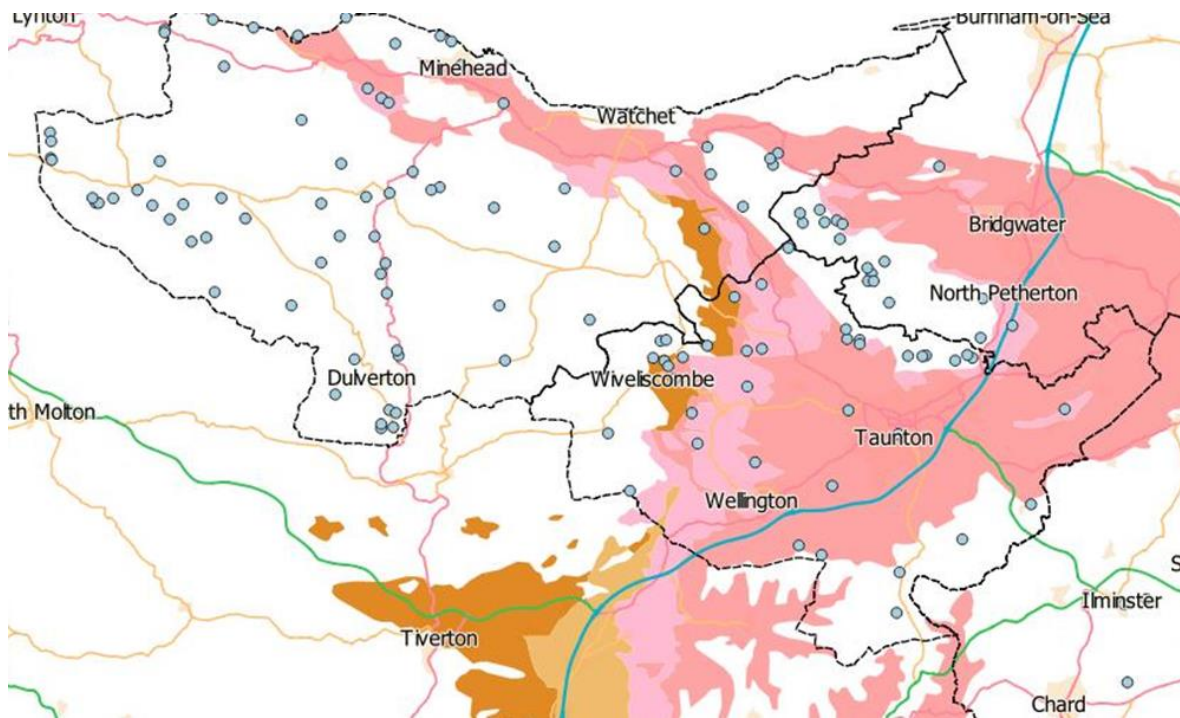


Fig 1: Overview map showing the main Permian and Triassic strata extent and distribution of LGS
 LGS = circles. Former district boundaries = black line (pecked against adjacent county of Devon). LGS in Devon not shown. Geology derived from BGS data. The strata generally dip to the east, with the oldest in the west:

- orange = Permian, including in Somerset the Permian Wiveliscombe Sandstone and at this scale the Lower Triassic Vexford Breccias.
- ochre = Permian and at this scale including some Lower Triassic; formations undistinguished but with mudstone dominant (largely in Devon - no Somerset LGS)
- pink = Triassic Sandstones in Somerset undistinguished, including both the Chester Conglomerate (former Budleigh Salterton Pebble Beds) and Helsby Sandstone (former Otter Sandstone) of the Sherwood Sandstone Group, plus the North Curry Sandstone within the Mercia Mudstone Group.
- red = Triassic mudstone, formations undistinguished, mostly the Mercia Mudstone Group, but also including Aylesbeare Mudstone following the Vexford Breccias in the Wiveliscombe area.
- Permo-Triassic in the Vale of Porlock (see Exmoor area report) is also shown – west of Minehead.

Older and younger formations shown white, including the Late Triassic Penarth Group (former Rhaetic), which is undifferentiated at this scale from the succeeding Lower Jurassic Lias Group.

3.1 Permian: Wiveliscombe (Tidcombe) Sandstone

There is only one LGS for this interest, in a sunken green lane c 1 km NW of Wiveliscombe. It covers terrestrial river-derived deposits of Permian age, close to the source material eroded from the older Devonian strata which lie to the west and has a good exposure of a range of sedimentological features, including cross bedding and microstructures and has potential for educational use.

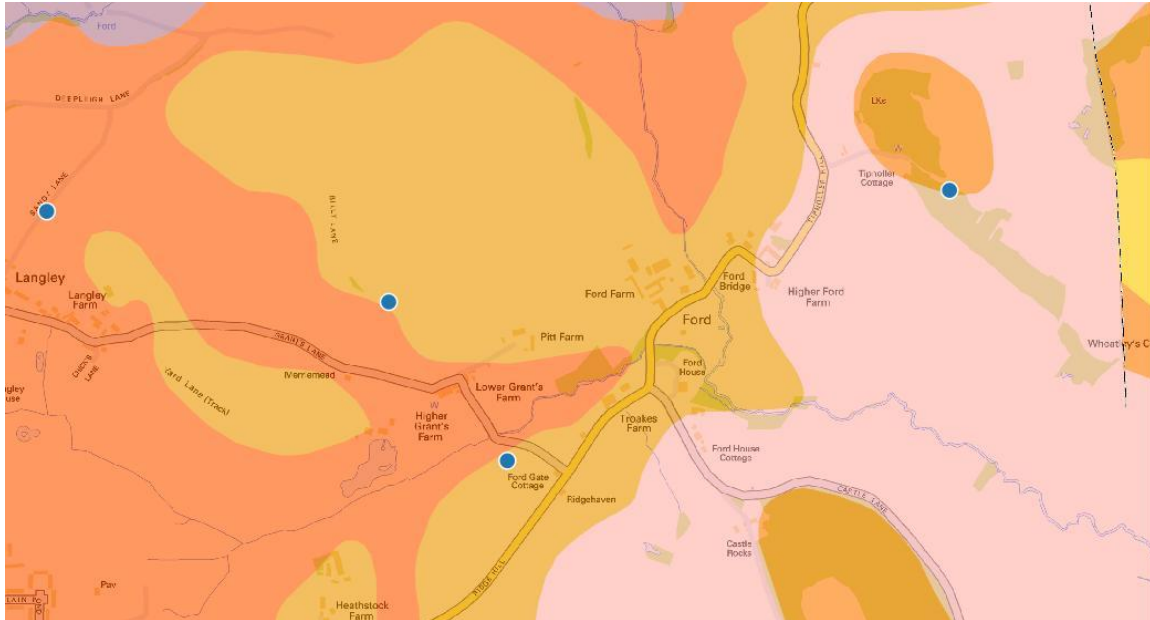


Fig 2: Greater detail of formations in the area north of Wiveliscombe, derived from BGS 50K scale mapping. Orange = Wiveliscombe (or Tidcombe) Sandstone Formation; mustard = Vexford Breccia; pale pink = Aylesbeare Mudstone; pale orange = Chester Conglomerate; yellow = Helsby Sandstone. LGS locations = blue dots.

3.2 Permo-Triassic: Vexford Breccias

See Fig 1 for extent in combination with the Wiveliscombe Sandstone and Fig 2 for more localized detail.

There are five LGS for this interest, three being in the Wiveliscombe area (two within the map area shown in Fig 2 above) and two nearer the Quantock Hills, in the Stogumber and Lydeard St Lawrence area. Four are small old quarries and one in the Wiveliscombe area is along a sunken green lane. They show typical features of terrestrial riverine deposition, including breccia clasts that come from varied source rock types (including sandstones and limestones) and a good range of sedimentary structures, including interbedding with sandstones and cross cutting channels.

The three in the Wiveliscombe area have particular potential for interpretation/geo-walks and possible educational use for small groups, with mention of some localities in Prudden, 2001 (*op cit*) and there are other non-LGS holloway outcrops of Vexford Breccia in that area.

3.3 Triassic: Sherwood Sandstone Group: Chester Formation (former Budleigh Salterton Pebble Beds Formation)

The Chester Formation outcrops for about 15 miles along its strike in Somerset (see Figs 3 a and b below), so that the LGS have considerable potential for research into the Triassic river-systems which deposited it. There are seven LGS for this interest, all of which are old quarries at various locations, including near Wiveliscombe and Milverton, and in the Langford Budville and Ash Priors areas.

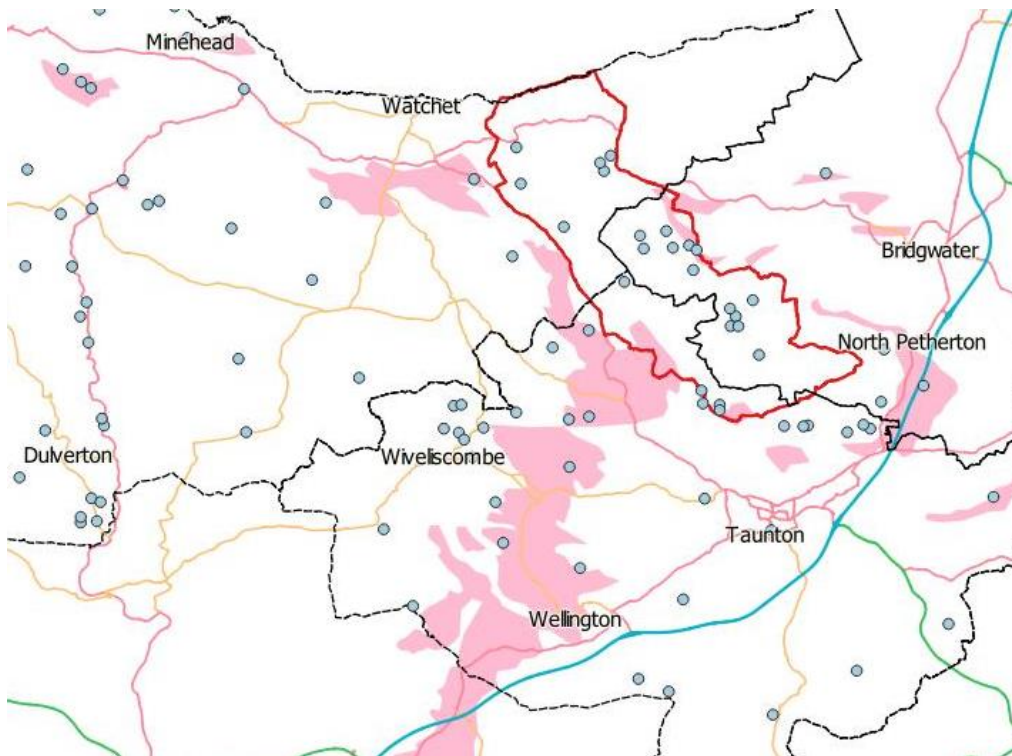


Fig 3a: Triassic Sandstones as shown in Fig 1. ie including both the Chester Formation (former Budleigh Salterton Pebble Beds) and the Helsby Sandstone (Otter sandstone) of the Sherwood Sandstone Group (plus the North Curry Sandstone).

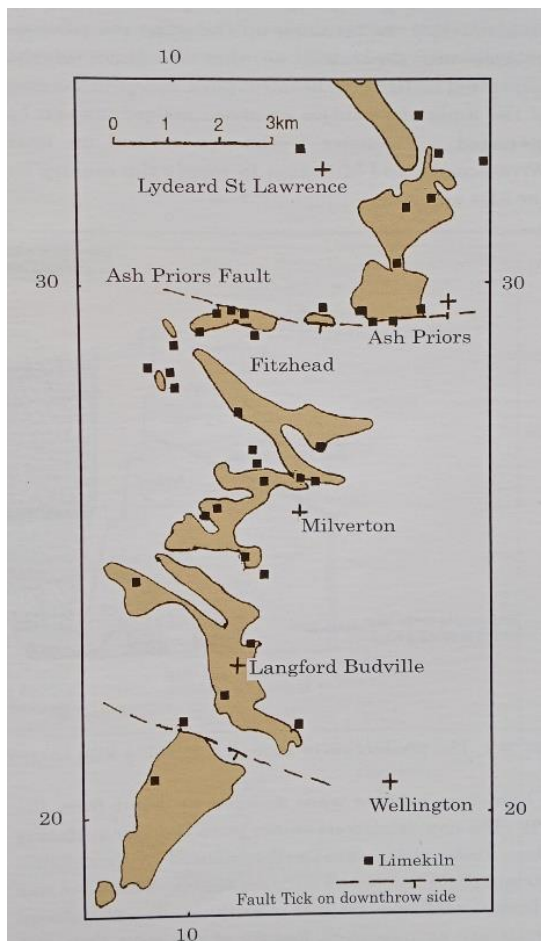


Fig 3b: Fig 8.1 from Prudden, 2001, showing the Chester Formation (Budleigh Salterton Pebble Beds) only and associated lime kilns (black squares).

See Chapter 8 p 32 in Prudden, 2001 (*op cit*) for general background on the quarrying of the Budleigh Salterton Pebble Beds for lime in this area, from both of the matrix and ‘pobbles’ of Carboniferous Limestone that are present locally in the conglomerate; and the associated industrial archaeological interest of lime kilns.

Prudden’s Chapter 13 covers the Ash Priors area and explains the research interest of the source of the pebbles. His Chapter 14 covers a viewpoint near Wiveliscombe³ of the landscape in this area, where a denudation valley cut in the Pebble Beds, which cap Castle Hill, can be seen from higher ground on older strata, while Chapter 21 covers the interest in the Milverton and Langford Budville areas. Prudden also mentions two walks leaflets (published by the former Taunton Deane Borough Council), so there is

³ Included within a LGS for older rock strata interest covered in the Exmoor area report.

considerable potential for updated walking trails in conjunction with any conservation work on both the limekilns and geological exposures.

The most outstanding LGS for this Formation is privately owned, but is known to organisers of field studies, with a tradition of the current owner welcoming occasional field study groups and carrying out occasional conservation work to keep the face clean. It displays a wide variety of sedimentological features associated with fluvial/alluvial processes in an arid environment and is unique in showing the junction between the Chester Formation and the overlying Helsby Sandstone.

3.4 Triassic: Sherwood Sandstone Group: Helsby Sandstone (former Otter Sandstone Formation)

See Figures 1 & 3a above for an indication of extent (undistinguished from the Chester Formation at this scale).

There are seven LGS for this interest, with an additional two included above as also exposing the underlying Chester Formation and two more covered in the Quantocks area report (as also including older strata). These include holloways on lanes/roads and several small old building stone quarries in different parts of the formation's mapped extent: from a quiet street close to Minehead town centre in the north west (relatively close to the older source material of the Devonian Hangman Sandstone); to east of the M5. Several have been assessed as a desk exercise only for this review as they are small privately owned quarries.

As with the Chester Formation, some LGS, such as on the west side of the Quantocks, provide opportunities for geological interpretation within walks on public paths and lanes, without need to encourage access to privately owned sites. In other situations, such as near Nynhead, there may be good exposure, interpreted as deposition in a braided river across an alluvial plain or fan, but the steep-sided holloway on a busy rural road makes it unsuitable for field study use.

3.5 Triassic: Mercia Mudstone Group: North Curry Sandstone Member (Arden Sandstone Formation)

The North Curry Sandstone Member outcrops within the Mercia Mudstone Group, both to the west and east of Taunton (see Fig 4 below) and is a distinctive cross bedded grey-green sandstone with lesser grey-green mudstones. Its hardness when compared to the surrounding, more typically red, Mercia Mudstones, results in small ridges of higher ground and it has been used as a local building stone. There are two LGS for this interest, both holloways in sunk lanes or tracks, one near Trull and the other near North Curry. The former is mentioned in the research by Ruffell *et al*, 2018, but is not a good site for educational use as it is a narrow road with no pavement. The latter is the original type section for the Member, mentioned by Charles Moore as early as 1861. Norton Fitzwarren Church is also a LGS as it is constructed with it and *in situ* exposure is poor. There may also be potential for additional/new LGS, as the Member has been subject to considerable research interest, both in the past, including by the famous Somerset geologist, Charles Moore, and in recent years.

Research in recent decades initially proposed that the strata may represent short periods of wetter riverine sand deposition within the long period of arid Mercia Mudstone conditions. See Ruffell, A, 1991: *Palaeoenvironmental analysis of the late Triassic succession in the Wessex Basin and correlation with surrounding areas*, Proc Ussher Soc, vol 7, p 402-407. However further research identified features such as salt hopper marks at Knapp Quarry (not LGS, but near North Curry and also mentioned by Charles Moore) and unusual breccias at Lipe Hill, that are interpreted as indicative of salt dissolution, so calling into question the interpretation of more humid climates. See Ruffell, A. Benton, M. Simms, M. Tucker, M. and Wignell, P. 2018: *Evaporite Dissolution in the North Curry Sandstone Member (Dunscombe Mudstone Formation, Late Triassic Mercia Mudstone Group), Taunton Deane (Somerset), S. England*. Geoscience in South West England vol 14, p 188-193.

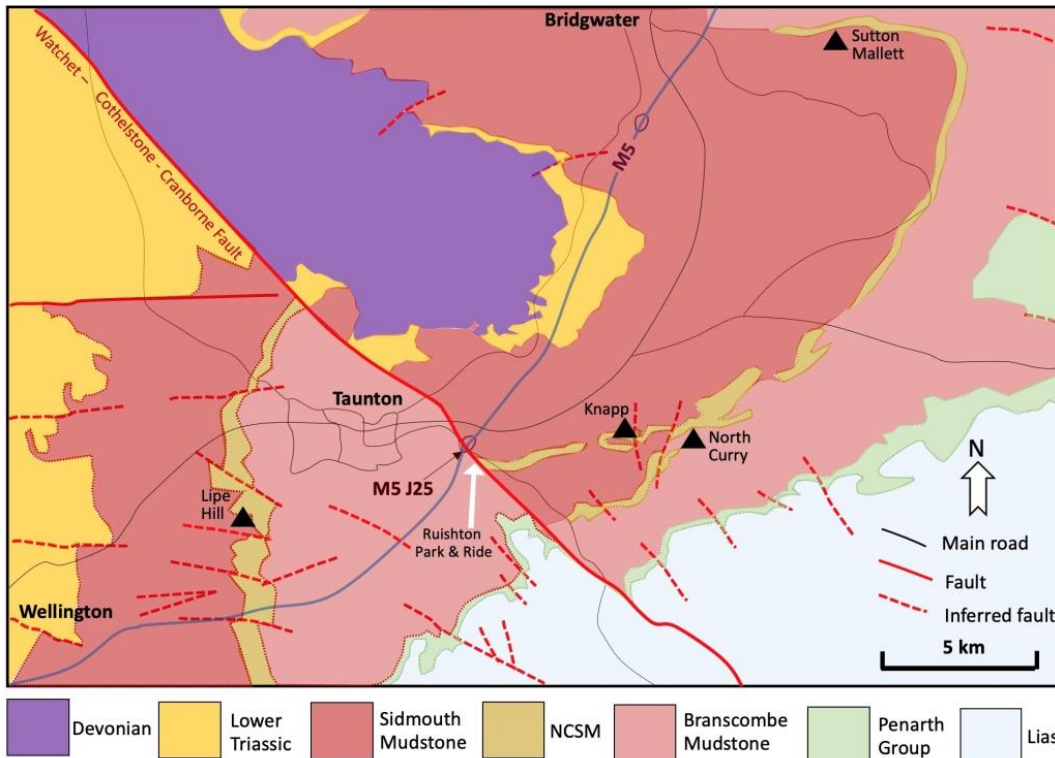


Fig 4: Detail of the extent of the North Curry Sandstone Member (NCSM) and its localities of interest. NB This is Fig 2 from Dawson et al, 2022 (see full ref below), reproduced here with thanks.

Then, in 2021, excavations during road improvements adjacent to the Park & Ride just east of the M5 Junction 25 revealed a new outcrop of grey/green sandstones inter-bedded with red mudstones, now the most complete known section, with several of the sandstone beds having coarse bases, from which shark's teeth and other bone, scale and fin fragments, from fish and also probably reptiles, have been extracted. In 1867 Charles Moore reported similar findings from this area. See Dawson G, Burley S, Ruffell A, Benton M and Duffin C, 2022: *A new exposure of the North Curry Sandstone Member, near Taunton, Somerset (UK): The location of Charles Moore's vertebrate specimens resolved.* Proc Geol Assoc, Vol 133, p 457-618.

3.6 Geomorphology and building stone

There is also one LGS in this area of interest for Quaternary fluvial processes interest - a stream section underlain by Permian/early Triassic strata but, with no exposure, ie only superficial more recent alluvium is exposed. The LGS is situated just downstream of the junction with the older Devonian strata that forms the higher ground of the Brendon Hills.

Then in addition to the church mentioned above under the North Curry Sandstone Member, there is an area in the centre of Taunton designated a LGS to cover exposures of stone in buildings, including the museum, that form a geological trail, where a good range of locally quarried building stones from different strata that can easily be examined, including those from the Permo-Triassic. This is a valuable educational resource, as many source quarries no longer exist or are overgrown and the majority of geological horizons represented cannot be seen easily *in situ* in the field.
