Birmingham & Black Country Local Sites Assessment Report

EcoRecord Reference	Site Name	Grid Reference	Current Status [1]	Survey Date(s)
	Rednal Hill	SO 996 765 (W3W crib.since.lower)	N/A	29.11.20 25.08.22
Planning Authority	**Site Ownership**	**Area/Length**	**Reason for Survey**	**Report Date**
Birmingham CC	Birmingham CC	10m^2	Research	09.03.23

Meets LS Criteria		Type	Geological	i.e. Wildlife/Geological

Amendment(s)	New Site	i.e. None; New Site; Upgrade; Downgrade; Extension; Whole/Part Deletion
Description	A previously unreported unconformity between the Ordovician Lickey Quartzite Formation, and a quartzite breccia of unproven age (probably Triassic), with later silcrete ('hard ground') development.	

Citation (Summary of Value)

Between Kendal End and the A38 at Rubery the Lickey Quartzite Formation is overlain unconformably by rocks of Silurian, Carboniferous and Triassic age: the presence of three distinct unconformities in such a short distance is noteworthy in itself. The latter has only recently been identified, and is exposed most extensively to the south on Bilberry Hill. The presence of a silcrete offers evidence of the prevailing climatic conditions at the time of the deposition of the overlying basal breccia. The resistant silcrete may, in part, be responsible for the long survival of the hills against the forces of weathering and erosion. The breccia unit has not previously been recorded and does not appear on BGS maps of the area.

Local Site Selection Criteria			
Geological			
Intrinsic	**Palaeontology**	**L**	N/A
	Stratigraphy	**H**	A quartz arenite ('quartzite') of the Lickey Quartzite Formation (LQF) is overlain by a breccia of unproven age. The latter is undoubtedly the same as the breccia exposed on Bilberry Hill to the south. It is most likely to date from the Triassic, but as the succeeding strata have been eroded away circumstantial evidence has to be relied upon.
	Structure	**H**	The two formations are separated by an unconformity, demonstrating that the main deformation of the LQF had already occurred prior to an episode of uplift and erosion preceding the deposition of the breccia.
	Physiography & Geomorphology	**H**	The three most prominent hills in the Lickey Hills ridge (Cofton, Bilberry and Rednal) rise to very similar elevations, and dominate the local landscape. While the Lickey Quartzite is very heavily jointed, and easily quarried, the silcrete which caps Rednal and Bilberry Hills may have protected them from more heavy erosion, and may eventually be found to have offered similar protection to Cofton Hill, the southernmost summit on the ridge..
Rarity		**H**	The only other confirmed exposure of this breccia and silcrete is on Bilberry Hill to the south of Rednal Hill.
Ass. with Other Sites		**H**	Dating of the basal breccia is problematic, but it may prove to be the same age as the Bilberry Hill unconformity and fissure infills ('Neptunian Dykes') in Warren Lane and Kendal End Quarries. Excavations in Eachway Lane (Boulton 1933) and Tessal Lane (Wills & Shotton 1938) revealed breccias of Lickey Quartzite that pass upwards into Trias conglomerates: they are likely to be the same age as the Rednal and Bilberry Hills breccias.
Social			
Historical & Cultural		**M**	As a location for recreational activities, the Lickey Hills have always been a popular destination for the people of Birmingham. Faced with the threat of housing development in the nineteenth century, Rednal Hill was secured as a place for public recreation by Mr T Grosvenor Lee, who raised the money through public subscription. The plots into which the hill had been divided were handed over to the city's Baths and Parks Committee in 1888 and 1889. The area is dotted with quarries from which the Lickey quartzite was extracted for use in road building. The last of these closed down in the 1920s.
Access		**H**	Rednal Hill lies within the Lickey Hills Country Park, with free access to the public.
Aesthetic			This is a picturesque site with broad views over the surrounding area.
Recorded History		**L**	No previous record of this unconformity has been found.
Value for Learning		**L**	Extremely valuable for research and project work.

Site Description

The site lies on the eastern edge of the main footpath that runs along the ridge crest. It is a broad, open, more or less flat area, flanked by trees to the east. The visible exposure is less than 1m^2.

Habitats			
Phase 1 Name		**Phase 1 Code**	
Phase 1 Name		**Phase 1 Code**	
Phase 1 Name		**Phase 1 Code**	
Phase 1 Name		**Phase 1 Code**	
Phase 1 Name		**Phase 1 Code**	
Notes			

Habitats of Note [2]						
Phase 1 Name	**Phase 1 Code**	**EHD**	**NERC**	**LBAP**	**Rarity**	**Year**
Notes						

Species of Note [2]							
Flora							
Species	**Statutory**	**NERC**	**LBAP**	**RDL**	**Rarity**	**Axiophyte**	**Year**
Notes							
Fauna							
Species	**Statutory**	**NERC**	**LBAP**	**RDL**	**Concern**	**Rarity**	**Year**
The following Species of Note have been recorded within 500m of the assessment site boundary.							
Notes							

Site/Habitat Suitability for Other Species of Note (not recorded during the survey)	
Description/Notes	

Invasive Species [3]			
Species	**Location**	**Abundance (DAFOR)**	**Year Recorded**
Notes			

Geology	
Solid/Drift Formation	1. Lickey Quartzite Formation 2. Quartzite Breccia (Probably Triassic)
Description	Owing to the limited size of the exposure, and its fragility, no specimens were removed for detailed petrographic analysis. Lithological description is therefore based on related exposures, especially that on Bilberry Hill. **Lickey Quartzite 485-444Ma* [Ordovician]** *The Lickey Quartzite crops out as the north-north-west trending inlier of the Lickey Hills, between Kendal End [SP 001 746] and Holly Hill [SO 991 784]. It is a hard, brittle, jointed and very shattered rock, forming several low, steep-sided hills that are covered with a wash of quartzite chips and which support sparse vegetation. The inlier seems to be fault bounded on all sides, except at Rubery where the Lickey Quartzite is overlain unconformably by the Rubery Sandstone or the Halesowen Formation. Elsewhere, its stratigraphical relationships are unclear and no confident estimate of its thickness can be given. Tuffaceous material occurs most commonly in what are probably the oldest beds exposed, and there may be an upwards passage from the Barnt Green Volcanics (Lapworth 1899). The*

structure of the Lickey Hills is complex locally, and with very variable dips, but in general an anticline trends parallel to the bounding faults of the inlier and plunges gently to the north-north-west. The steepest dips and overfolding occur mainly along the edges of the inlier and may relate to later movements along the bounding faults.

There is no clear relationship between the degree of sorting or the maturity of the sediments and their stratigraphic position in the Lickey Quartzite. The sorting, grain shape and sedimentary structures of the rock suggest deposition in a high-energy marine environment. Primary grain boundaries are still discernible and pressure welding is uncommon, suggesting early silica cementation. The presence of secondary chlorite, sericite and rare authigenic epidote indicates very low grade regional metamorphism.

Strata low in the sequence, exposed in a quarry [SP 001 753] ***[Barnt Green Road Quarry]*** *opposite Reservoir Road, Cofton Hill, comprise pale grey, brown and purple, flaggy, immature to submature quartzites in beds up to 0.6m thick, interbedded with purple sand and micaceous shales. The colour of the quartzite is caused by finely-disseminated, feldspathic, tuffaceous debris, and the shales are largely composed of the same material. This quarry exposes a synclinal overfold, with the beds folded about a near-horizontal axial plane (Plate 2) (Boulton, 1928, diagram p.256).*

Ascending the sequence, the Lickey Quartzite becomes paler and incorporates less tuffaceous material. In the largest quarry, in Rednal Gorge [998 759], massive beds of dark purplish quartzite, each up to 1m thick, are separated by yellowish green and deep purple, sandy clay partings. At the disused Leach Green Quarry (995 769] and at the Bristol Road south cutting [SO 992 774], the Lickey Quartzite varies from fine-grained and white, to coarse, grey and pebbly, and is in massive beds up to about 1m thick, which were lithified and jointed before the transgression of the Llandovery sea, because sands of Llandovery age have infiltrated down cracks. The formation here is cut by a very weathered dyke, which is truncated by, and thus older than Llandovery strata. (BGS - Redditch. Memoir for Sheet E183: Old, R.A. 1991)

On Bilberry Hill, the Lickey Quartzite is a well-sorted quartz arenite (orthoquartzite). This suggests it is likely to be relatively high in the LQF.

Quartzite Breccia [Age uncertain]
On Bilberry Hill the overlying rock is a very poorly-sorted, clast-supported monomict breccia, with clasts derived from the LQF. Irregular patches of finer, matrix-supported sediment contain a proportion of aeolian grains in the sand fraction. The larger clasts are very angular, suggesting minimal transport distance. The breccia and the uppermost LQF have been reinforced by a silica cement to produce a highly resistant silcrete layer. Below this, the LQF is very heavily jointed into blocks of a few centimetres that can be extracted with ease. The presence of this silcrete 'hard ground' may be explained by the LQF being uplifted and exposed to sub-aerial weathering in a climate with prolonged dry spells. Ground water reacting with feldspar grains in the LQF would have released silica (SiO_2) into solution. During episodes of drought the ground water would rise to the surface by capillary action and evaporate, causing the silica to precipitate along joints in the LQF and between grains in the breccia to produce the silcrete layer. Eventually, this would become an impermeable capping, greatly reducing the subsequent rates of weathering and erosion. (See Appendix 1.)

Features of Value	
1	Unconformity
2	Silcrete

Soils

Public Access & Site Usage	
Land Use	Public Open Space
Access Level	Unrestricted
Access Type(s)	Public Footpath Only

Comparison with Previous Survey(s) Results

Summary of Assessment
Despite the very limited extent of the exposure, this site is very important as it demonstrates the northward extent of the breccia previously identified on Bilberry Hill. It provides evidence of the LQF being exposed, probably in the Triassic, and the Lickey Ridge being a topographic feature of great antiquity.

Recommendations (including further survey & site management/enhancement)	
1	No management required.
2	Further trial-pitting to prove the extent of the breccia.

Data Sources		
	Source	**Date**
Species and Habitat Data Source(s)		
Geological Data Source(s)	• BGS, Geology of Britain Viewer; **https://mapapps.bgs.ac.uk/geologyofbritain/home.html** • BGS, Lexicon of Named Rock Units; **https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=LQ** • Boulton, W.S. (1927) The Geology of the Northern part of the Lickey Hills, near Birmingham. *Geological Magazine*, Vol 65, Issue 6, 255-266 • Boulton, W.S. (1933) The Rocks Between the Carboniferous and Trias in the Birmingham District. *Quarterly Journal of the Geological Society*, Vol lxxxix, part 1 • Eastwood, T., Whitehead, T.H., and Robertson, T. (1925). The geology of the country around Birmingham. *Memoir of the British Geological Survey of Great Britain*. NERC • Hardie, W.G. (1954) The Silurian Rocks of Kendal End, near Barnt Green, Worcestershire. *Proceedings of the Geologists' Association*, Vol 65, Part 1, 11-17 • Hardie, W.G. (1971) Lickey Hills*; G.A. Guide No.1 The Area around Birmingham* (2nd Ed.). The Geologists' Association. pp. 12-15 • Hardie, W.G. (1991) A Guide to the Rocks and Scenery of the Lickey Hills Area. The Lickey Hills Society, • Old, R.A., Hamblin, R.J.O., Ambrose, K., and Warrington G. (1991). Geology of the country around Redditch. *Memoir of the British Geological Survey, Sheet 183*. NERC. • Lapworth, C., (1899). Sketch of the geology of the Birmingham district, with special reference to the long excursion of 1898. *Proceedings of the Geologists' Association*, Vol 15, 313-415. • Richardson, A. S. (2023) The Lower Palaeozoic Geology of the Lickey Hills 2nd Ed. Richardson **https://ehtchampions.org.uk/ch/wp-content/uploads/pdfs/Lower%20Pal%20of%20Lickey%202nd%20Ed.pdf** • Wills, L.J. et al (1925*). The Upper Llandovery Series of Rubery. Proc. Birmingham Nat. Hist. & Phil. Soc.* Vol. 15, 67-83 • Wills, L.J. & Laurie, W.H. (1938). Deep Sewer Trench along the Bristol Road from Ashill Road near the Longbridge Hotel to the City Boundary at Rubery, 1937. *Proc. Birmingham Nat. Hist. & Phil. Soc.* Vol. 16, 175-180 • Wills, L.J. & Shotton, F.W. (1938). A Quartzite Breccia at the Base of the Trias Exposed in a Trench in Tessal Lane, Northfield, 1937. *Proc. Birmingham Nat. Hist. & Phil. Soc.* Vol. 16, 181 - 183	
Historic Data Sources(s)	Chinn, C. (2012) *Free Parks for the People.* Studley: Brewin.	
Assessment Author and Organisation	Alan Richardson, Herefordshire & Worcestershire Earth Heritage Trust.	

[1] Definitions of Local Sites in B&BC (SINCs & SLINCs) and Potential Sites of Importance (PSIs)

In Birmingham and the Black Country Local Wildlife and Geological Sites encompass what are termed Sites of Importance for Nature Conservation (**SINCs**) and Sites of Local Importance for Nature Conservation (**SLINCs**). This two-tier system aims to ensure that all sites of substantive local nature conservation and geological value are selected by assessing sites in both a sub-regional (i.e. Birmingham and the Black Country) and metropolitan borough or city context (either Birmingham, Dudley, Sandwell, Walsall or Wolverhampton). The two designations are defined as:

- Site of Importance for Nature Conservation (**SINC**) - Sites of substantive nature conservation value in the context of Birmingham and the Black Country.
- Site of Local Importance for Nature Conservation (**SLINC**) - Sites of substantive nature conservation value in the context of a metropolitan borough.

Potential Sites of Importance (**PSIs**) have not yet been assessed against the Local Wildlife and Geological Sites selection criteria but may potentially support species of note, areas of important semi-natural habitat or valuable geological features. PSIs are identified primarily through the use of aerial photography, but also through reference to old maps, existing records and local knowledge. Commonly these sites will not have been subject to the survey work necessary to undertake a Local Wildlife and Geological Sites assessment.

[2] Habitats/Species of Note Tables – Attribute Definitions

STATUTORY (PROTECTED) - ***EHD*** = EU Habitats Directive (plus where relevant the Annexe II or IV) | ***WCA S1*** = Wildlife & Countryside Act Schedule 1 (birds protected at all times) | ***WCA S5*** = Wildlife & Countryside Act Schedule 5 (animals with various levels of protection) | ***WCA S8*** = Wildlife & Countryside Act Schedule 8 (higher and lower plants with various levels of protection) | ***PBA*** = Protection of Badgers Act 1992 | ***HabRegs2*** = The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) | ***HabRegs4*** = The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4).

NERC – ***Y*** = Habitats/Species included on the current list of Principal Importance in England under Section 41 of the NERC Act (2006 or amended).

LBAP – ***Y*** = Habitats/Species included on the latest B&BC LBAP list of Priority Habitats/Species.

RDL - Species included on Global IUCN & British Red Data Lists: ***BRed*** = Bird Population Status – red | ***BAmb*** = Bird Population Status - amber | ***RLGB.EN*** = IUCN (2001) – Endangered | ***RLGB.VU*** = IUCN (2001) – Vulnerable | ***RDBGB.R*** = IUCN (pre 1994) – Rare | ***RLGB.Lr(NT)*** = IUCN (2001) - Lower risk - near threatened | ***RDBGB.IK*** = RDB - Insufficient known | ***RLGB.DD*** = IUCN (2001) - Data Deficient

RARITY (HABITATS) - BIRMINGHAM & BLACK COUNTRY - ***Y*** = Habitats included on the B&BC list of locally rare habitats (administered by EcoRecord).

RARITY (FLORA SPECIES) - BIRMINGHAM & BLACK COUNTRY - (based on data held and managed by EcoRecord): ***VR*** = Very Rare - a species present in less than 1.0% of 1Km squares, tetrads, or 5Km squares in B&BC | ***R*** = Rare - a species present in 1.0% - 4.3% of 1Km squares, tetrads, or 5Km squares in B&BC | ***U*** = Uncommon - a species present in 4.3% - 12% of 1Km squares, tetrads or 5Km squares in B&BC | ***NRR =*** no recent B&BC records.

AXIOPHYTE - ***BBCF_Ax*** = included on the Birmingham & the Black Country list of axiophytes (administered by EcoRecord).

YEAR - The most recent year the species has been recorded.

[3] Species listed on Schedule 9 part 1 (animals) and part 2 (plants) of the Wildlife and Countryside Act 1981 as amended - this lists animals which may not be released or allowed to escape into the wild and plants which may not be planted or otherwise caused to grow in the wild.

Report Maps

Figure 1. Map of Rednal Hill showing the area of enlargement in Figure 2.

Figure 2. Map of Rednal Hill. The red square shows the location of the exposure.

Target Notes

Target Note Ref.	Target Note Description
TN001	

Fig 3. EcoRecord locations for the Rednal Hill Geological Sites.

Site Photographs

Figure 4. Looking north along the summit ridge of Rednal Hill. The rucksack on the path marks the location of the exposure.

Figure 5. The 2020 excavation of the site.

Figure 6. The exposure, as it appears in the path.

Figure 7. The excavated outcrop.

Figure 8. Close-up of the excavated outcrop, highlighting the location of the unconformity. Note the friability of the Lickey Quartzite below the silcrete layer.

Figure 9. The corresponding exposure of the unconformity and silcrete on Bilberry Hill to the south. The breccia above the Lickey Quartzite has been darkened to clarify its distribution. The Lickey Quartzite has been undercut below the silcrete.

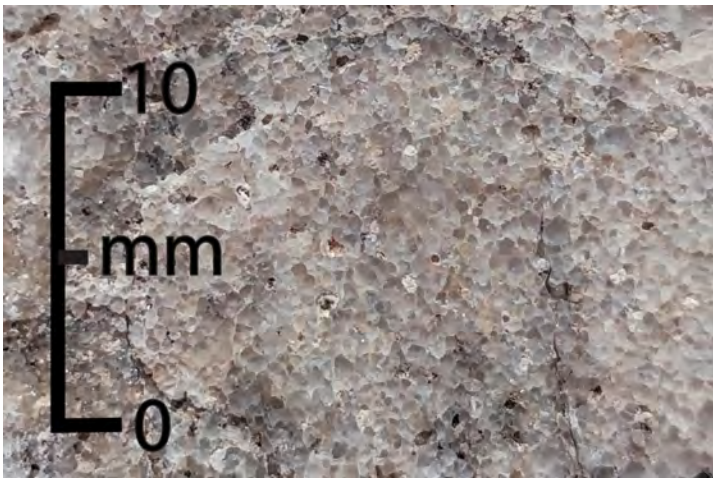


Figure 10. A polished surface of the Lickey Quartzite from Bilberry Hill

Figure 11. The breccia on Bilberry Hill. A large fragment has been digitally lightened to better show its size and angularity.

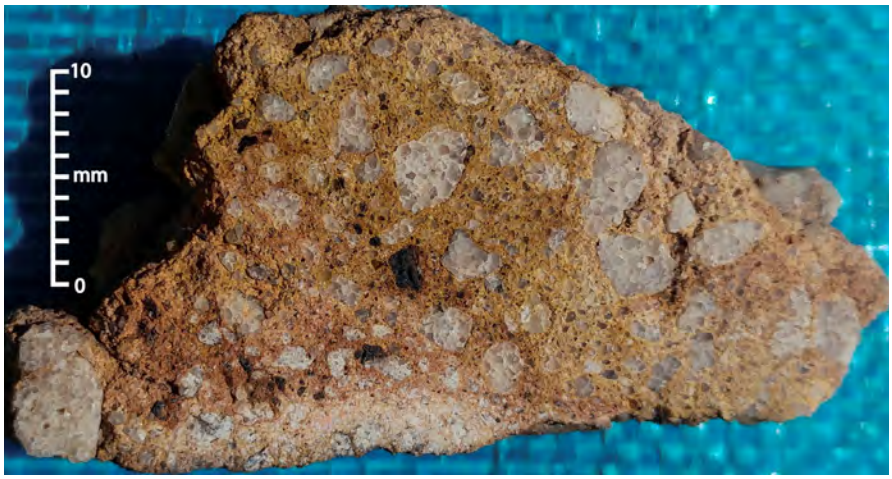
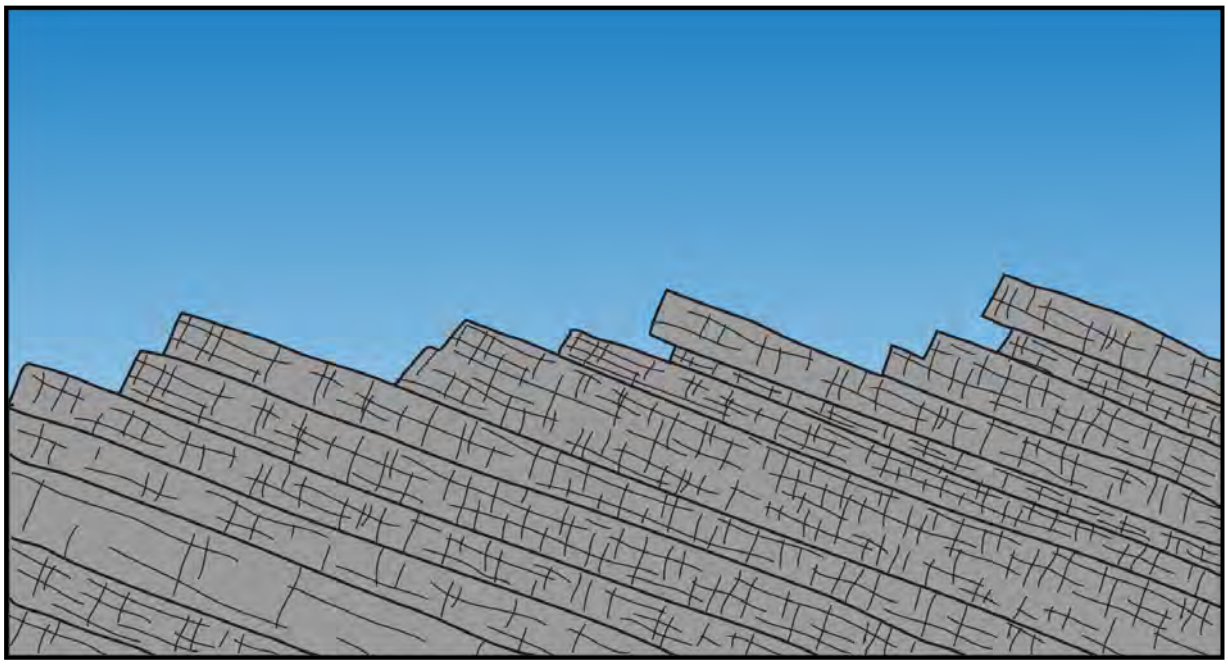


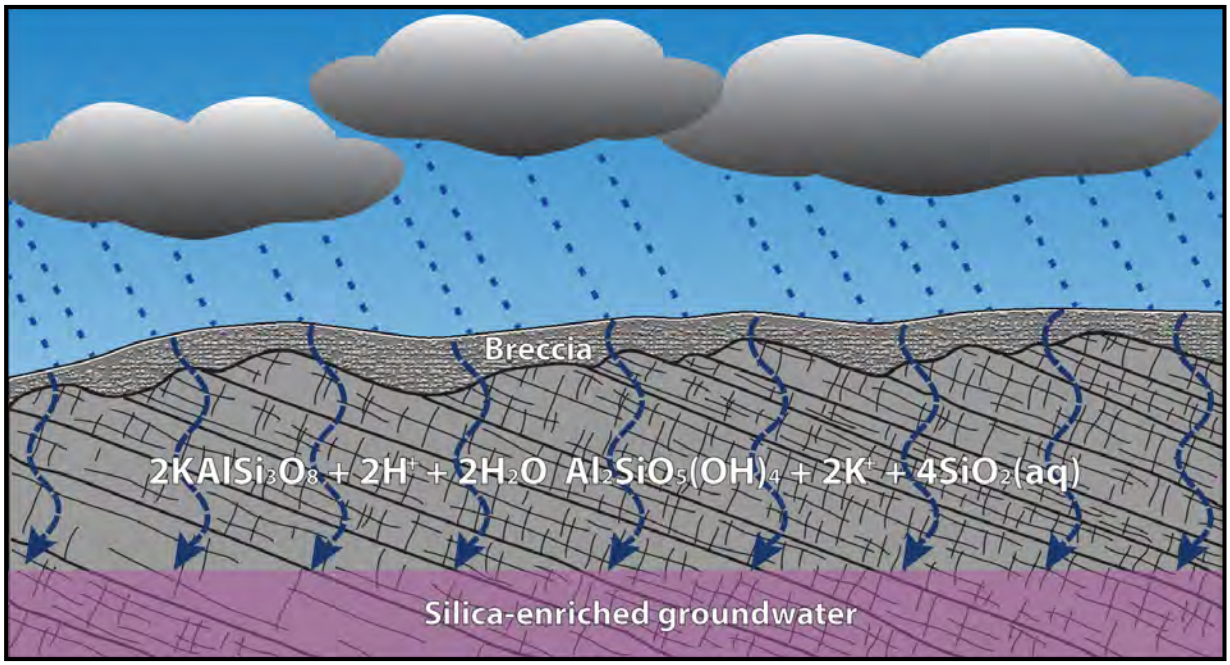
Figure 12. A polished surface of a sample of the finer fraction of the breccia from Bilberry Hill – a matrix supported sediment containing fragments of Lickey Quartzite in a sand matrix that contains some aeolian grains.

Species Records

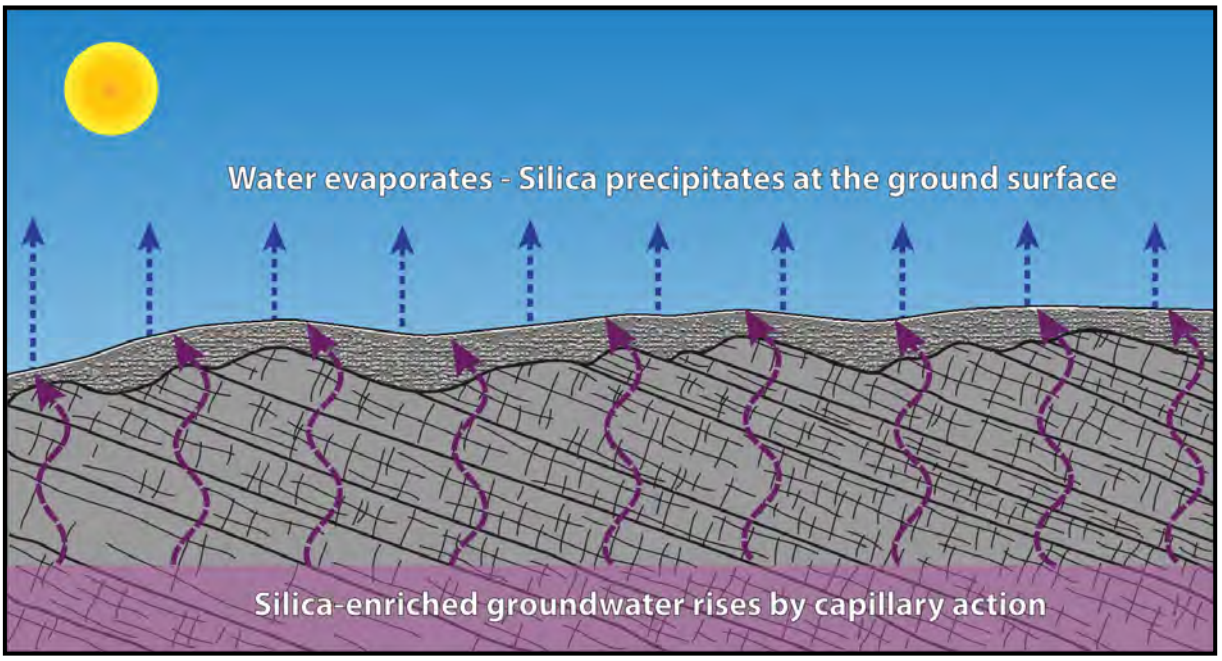
Appendix 1 – *A Model for Silcrete Formation*.



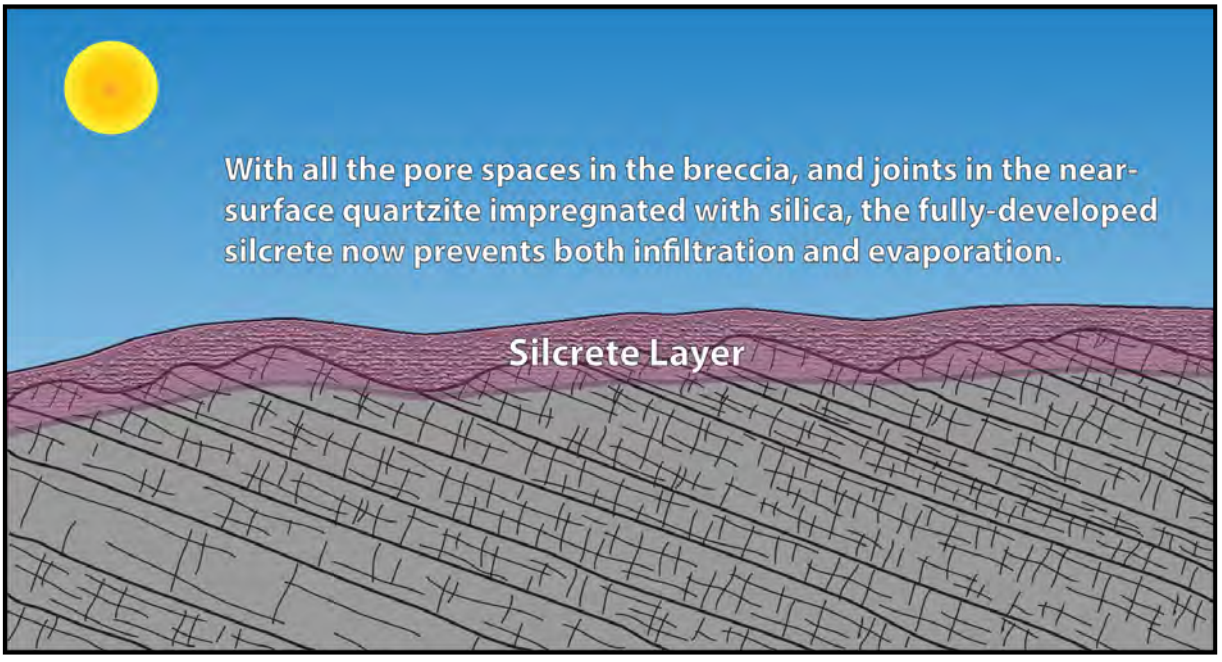
1 – Having been deeply buried, deformed and uplifted, the heavily-jointed Lickey Quartzite is uplifted and eroded.



2 – In a hot, predominantly dry climate, infrequent heavy rain infiltrates the ground and weathers K-feldspar grains to kaolinite, releasing silica into solution. At the surface mechanical weathering of the well-jointed quartzite produces a blanket of poorly-sorted, angular fragments,



3 – During periods of drought, ground water rises through the rock by capillary action. It evaporates at the surface, but any dissolved material is precipitated in near-surface joints in the quartzite, and pore spaces in the breccia.



4 – Eventually all near-surface pores and joints are fully impregnated, and the passage of water, in either direction, ceases. The lithified breccia and reinforced quartzite of the silcrete layer constitute a highly-resistant layer. Any sediments deposited above it are likely to be more easily removed, so that when erosion reaches the silcrete it all but ceases, preserving the topographical features on which the silcrete developed.

Alan Richardson – March 2023