Newsletter #1- 7th April 2020

Amateur Geological Society of the Hunter Valley Inc.

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Editorial

Greetings fellow AGSHV members, families and friends.

As the COVID-19 crisis expands we find ourselves unable to go about "business as usual". Things like field trips are impractical, because we can't allow more than two people to be close together. So, our normal activities are postponed until things improve. The AGSHV Executive wanted a means to keep ourselves in touch with each other, and Richard Bale put out a request for a Newsletter, so I put my up hand to be Editor. Richard's suggestion was fortnightly; that's feasible, let's see what happens.

Maybe the term "Newsletter" isn't quite right. While we are in near-lockdown mode we aren't doing much that our members would deem newsworthy. We will need to make our own news or other content. I'd suggest summaries of the geology of areas which haven't been included in AGSHV trips and field visits yet. Do some homework; this could be a good way to boost your favourite geological area towards inclusion in a future activities list. Another theme might include additional aspects of the geology of an area that we have visited. Some features might have been impractical to see or access when we visited the district. I have included an example of this notion that harks back to the 2018 Safari. We looked at various exposures near Esk on 9th August 2018 (see pp56-58 of *Geo-Log 2018*), but there is much more to Esk's geological development than those exposures alone reveal.

Unless you think it's too private, tell us how you are being productive/whiling-away the time these days. Any tips to make life seem more like fun? Can you recommend any good books? What about a good yarn... fact or fiction, or a joke; especially if the theme is Geology or COVID-19?

One change for the better... The phone calls offering me a new energy supplier/internet service/solar panels/roof restoration have stopped. I suppose the call centres - all those people in a big room - have shut down.

Strangely, we are told to practice "social distancing" (previously "social isolation"). Nonsense! What we need to practice is "*physical* distancing". We should embrace "social togetherness" (via electronic media) rather than "social distancing", as this Newsletter aims to promote.

So, here is a call for anything you want to offer... I prefer Word documents to pdf documents please. I can't guarantee complete fidelity to whatever you send. Naturally, I won't change the sense of, nor trim down what you write, but I might need to swap files into and out of various software packages, and that might involve changes in font style or print size to make things fit on the page. Be careful with your proof-reading too; I won't correct your typos (spelling or grammar) along the way either.

Thanks to David Atkinson and Roz Kerr for your contributions.

Let's see if we can make future Newsletters thicker than this initial effort...

Best Wishes,

Bill D'Arcy.

There's something funny about the streams around Esk.

On the 2018 Safari - *Carnavon Gorge and Beyond* – we spent some time looking at exposures around Esk; but there are some other fascinating details about the development of the district's drainage system. George Winter (who co-led those Esk days) and I have thought a fair bit about the drainage around Esk, and we wrote something. (Well... George wrote the text, and added my name as co-author.)

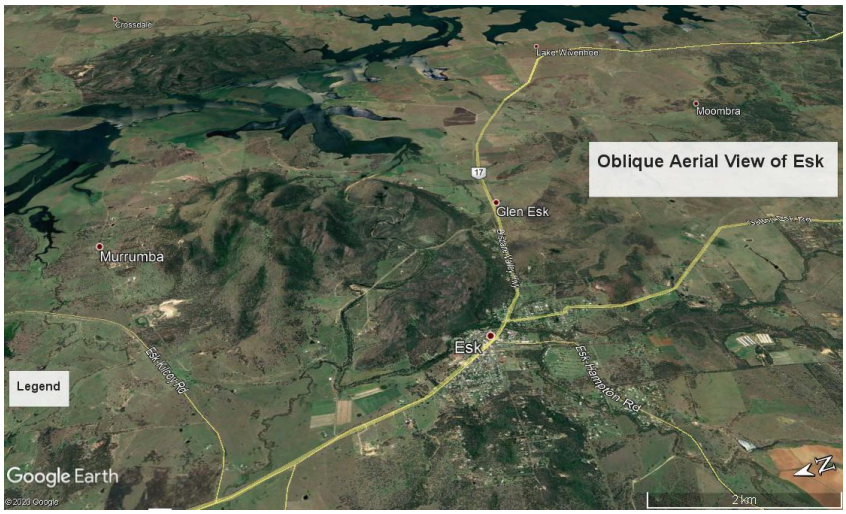
Why Do Creeks Near Esk Cut Through A Mountain?

By George Winter and Bill D'Arcy

Redbank Creek, flowing eastwards, joins Sandy Creek, flowing northwards, near the Esk Showgrounds, and the combined stream flows northwards on the western side of the Esk Igneous Complex as Sandy Creek to meet Gallanani Creek and become Esk Creek near the intersection of Esk Kilcoy Road and the Brisbane Valley Highway. From that point, Esk Creek flows in a south-easterly direction through the Esk Igneous Complex, between Mount Glen Rock and Mount Esk to discharge into Lake Wivenhoe. Prior to the construction of Wivenhoe Dam, Esk Creek turned roughly east to Join the Brisbane River near the present pumping station at the end of Paddy Gully Road.

However, there is an unnamed creek flowing westwards to near the junction of Redbank and Sandy Creeks, while another un-named creek flows eastwards into Lake Wivenhoe. The headwaters of these two creeks are separated by a saddle on the southern outskirts of Esk. Why does not Redbank Creek flow eastwards into Lake Wivenhoe now? Why does Sandy Creek flow northwards, and Esk Creek cut through hard rock on its way to join the Brisbane River? These are questions that puzzled a former geography teacher, the late Mr Bertrand (Cyril) Treloar, who lived in Esk for some years and had an interest in Geology which he had studied some 70 years ago. Cyril and I (George Winter) shared ideas on the geology around Esk, and he thought that Redbank Creek had once continued to flow eastwards along the southern margin of the Esk Igneous Complex, roughly where the two present un-named creeks are located.

There is some evidence to suggest that the Esk Igneous Complex is an intrusion. If so, did the land along Esk Creek between Mount Glen Rock and Mount Esk rise gradually so that the creek could flow downhill from Gallanani Creek to the Brisbane River? Or was the land on the western side of Mount Glen Rock, where Sandy Creek now flows, higher than at present? Or was there always a gap between peaks on the Esk Igneous Complex to allow Esk Creek to flow to the Brisbane River? On the other hand, the Esk Igneous Complex could be a lava flow, or multiple flows, and that poses questions. The present elevation of these creeks is approximately 100 metres above sea level, while elevations of Mount Glen Rock and Mount Esk are 314 metres and 444 metres respectively...



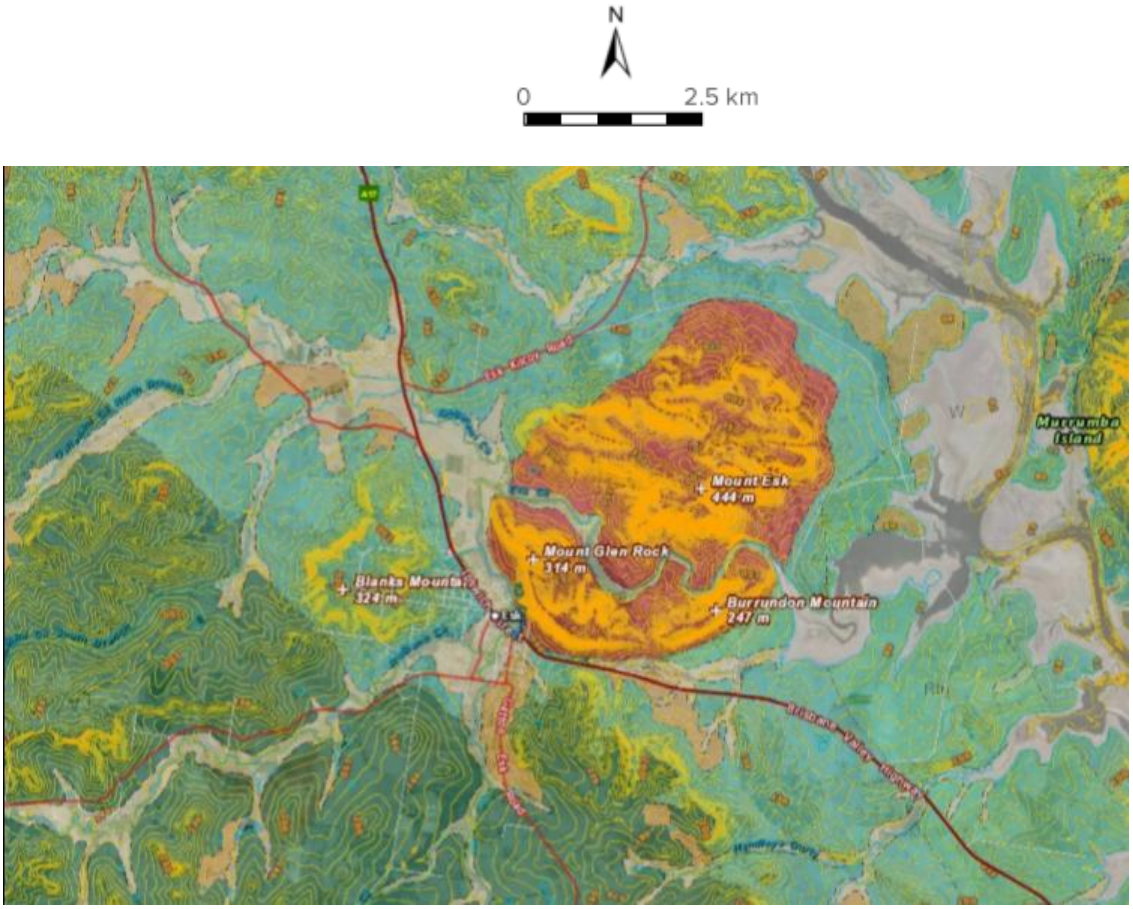
This view towards ESE is dominated by the Esk Igneous Complex, an intrusive rhyolite body. (It may have broken through to surface). In the middle distance (top-left) is the Crossdale Rhyolite body, a similar intrusion. Blanks Mountain is in the foreground, a little right of mid-line. Brisbane River flows from left to right (southwards) along the top margin, via Lake Wivenhoe, at low level in his view. (It is a major water supply to Brisbane.) Esk Showground is the green area in the curve of Esk-Hampton Road.

South Creek flows in from the mid-right, and turns north along the western margin of the igneous complex. Redbank Creek flows in from the bottom-right corner, to join South Creek on the southern outskirts of Esk. The much smaller Gallanani Creek flows SSE, entering the view near the road intersections at lower-left, and joins South Creek. From this confluence, the stream is called Esk Creek, and flows in the same general direction as Gallanani Creek through the Esk Igneous Complex in a gorge about 200m deep, then drains into Lake Wivenhoe east of the Complex. Note the small un-named intermittent stream, prominent from *Glen Esk* and flowing NE into Lake Wivenoe. This stream has the same general alignment as Redbank Creek. It rises between the Complex and the Brisbane Valley Highway about 1km southeast of the Esk CBD, then flows, hidden in timbered country, to *Glen Esk* where it becomes prominent in the cleared paddocks. An even smaller stream flows in the opposite direction (westwards), close to the Brisbane Valley Highway, to join South Creek near the confluence with Redbank Creek. This small stream has the same general alignment as Redbank Creek, but flows in the opposite direction.

For reference, Safari 2018 came into Esk from the top-right corner, and Esk Caravan Park is under the label “Esk”. The morning’s first stops; to view the dipping bedding in Woogaroo Subgroup sandstone (evidence for intrusive emplacement of the Esk Igneous Complex), and the marginal wall of the Complex; are about 1 km southwards out of Esk, a little beyond the prominent kink in the Highway. Morning Tea was at Pipeline Park, across the Highway from the “E” of the “Esk” label. After smoko we looked at rhyolitic tuff with *Phyllotheca* fossil impressions along Outlook Drive, on the eastern flank of Blanks Mountain (near the far rim of the 1-km wide ring of trees in the foreground). The final stop for the morning was to look at the Woogaroo Subgroup sandstones, and microdiorite exposures on Lakeview Drive near the top of Blanks Mountain (bottom edge of view, nearer side of the ring of trees).

The afternoon’s field visit (optional activity) to the plant fragments in the shaly beds on the abandoned railway line (Brisbane Valley Rail Trail) is out of view to the left, along the Brisbane Valley Highway route to Cania Gorge.

GEOLOGY OF THE AREA AROUND ESK



Pale green is the Middle-Triassic Esk Formation (mostly feldspathic sandstone and conglomerate).

Dark green is Early Jurassic Woogaroo Subgroup (mostly quartz sandstone, siltstone, shale and minor conglomerates in the Esk district) which overlies (disconformably) the Esk Formation.

Crimson is Mesozoic Esk Igneous Complex (rhyolite), which intrudes Esk Formation and Woogaroo Subgroup.

Grey on upper-right edge is Mesozoic Crossdale Rhyolite, similar to Esk Igneous Complex.

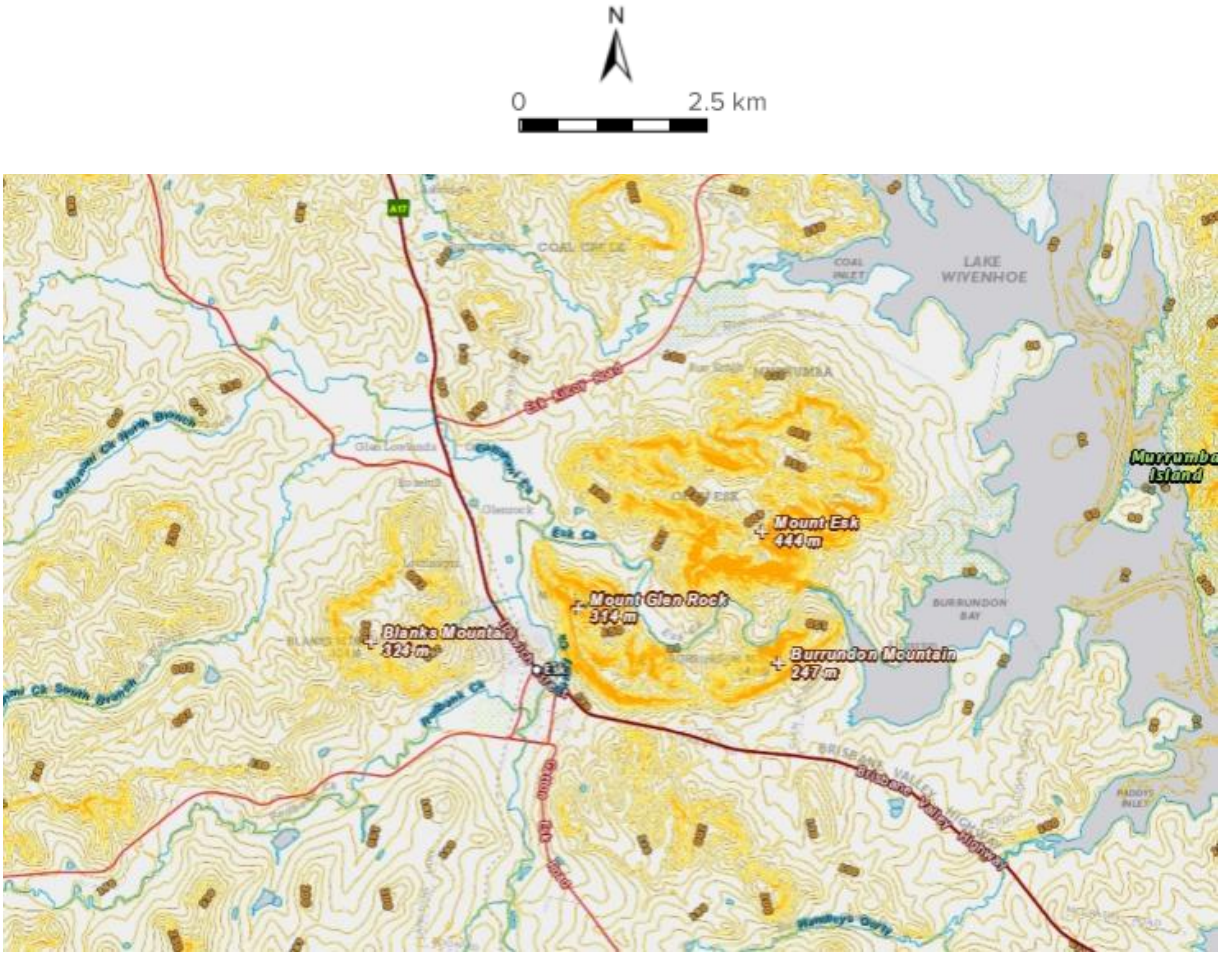
Tan is “Tertiary” unconsolidated sediment. Mostly on valley floors, where it is “old” alluvium of the current stream system. A few patches at higher levels (south of Esk, and in the NW corner) may be lake sediment, hinting at the former presence of an extensive lake (10 km wide? ~50 m deep?) over the low ground north and northwest of Esk.

Cream is Quaternary unconsolidated sediment. Most of this is “young” alluvium of the current stream system.

Contour interval is 10-m.

Note the strip of alluvium along Esk Creek, in a gorge right through the Esk Igneous Complex. Outside the mouth of this gorge (west end), the land is at 100 m AHD; and falls to 70 m AHD at the exit (on the east). High ground of the Esk igneous Complex outside the gorge is up to 444 m AHD at Mount Esk.

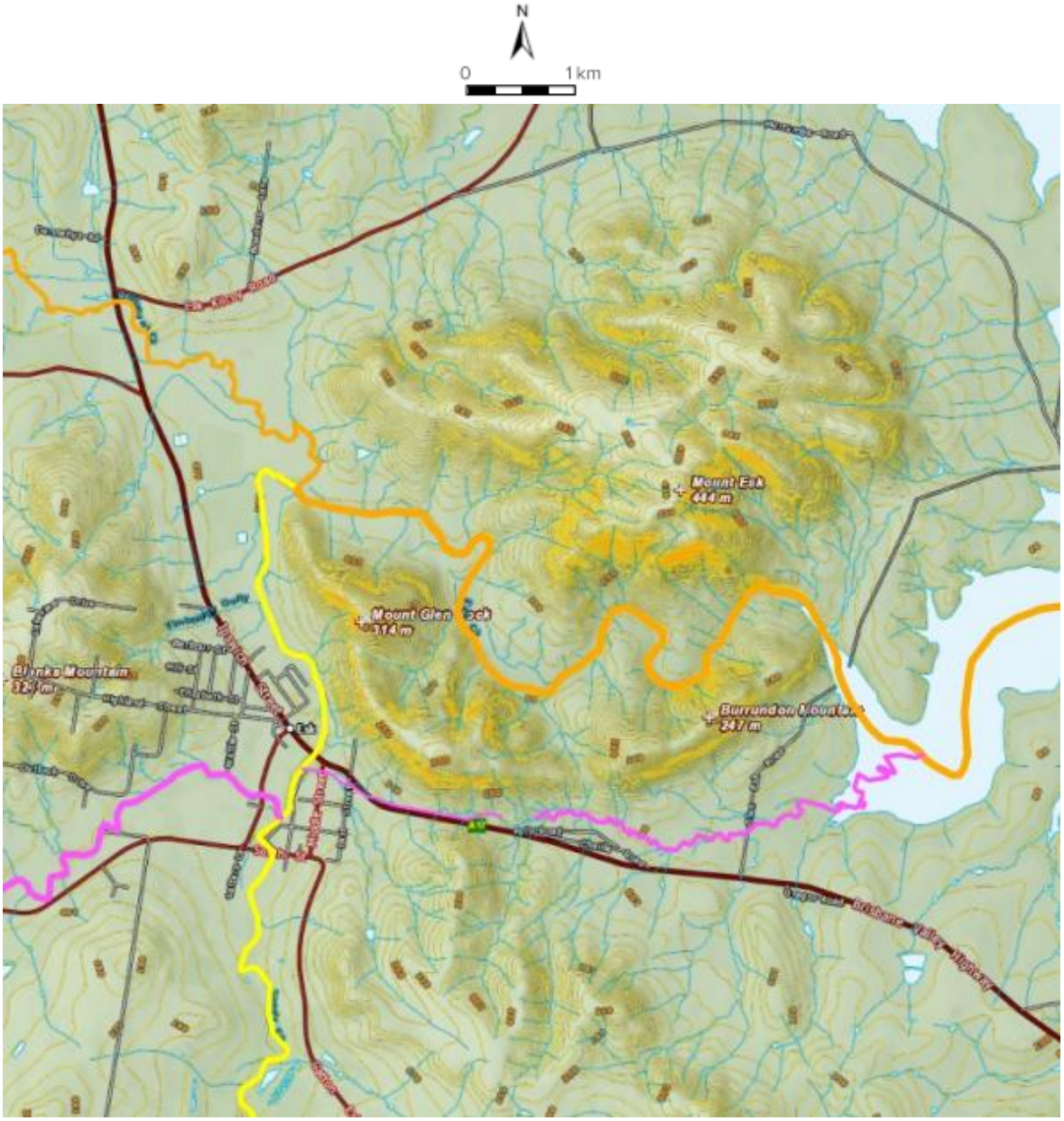
TOPOGRAPHY OF THE AREA AROUND ESK



Main streams around Esk:

- South Creek flows northward through Esk, then turns ESE through the Esk Igneous Complex, to become Esk Creek after being joined by Gallanani Creek. This is the main stream in the area.
- Redbank Creek flows ENE to join South Creek. Projected along the same general trend are two small intermittent streams along the south margin of the Esk Igneous Complex.
- Gallanani Creek (quite small) flows ESE, to join South Creek; the combined stream is called Esk Creek. Gallanani Creek is “in line with” Esk Creek.

TOPOGRAPHY OF THE AREA AROUND ESK (WITH MAIN STREAMS ACCENTUATED)



Yellow: N trend, South Creek.

Orange: ESE trend, Gallanani Creek, then Esk Creek.

Lilac; ENE trend, Redbank Creek and two small intermittent streams.

The lilac and orange trend lines seem to make better geometric “good sense” as streams, but are at odds with the actual stream flow path.

Is it possible to reconcile these two situations?

Is the section of South Creek between Redbank and Gallanani Creeks younger than the other streams? Is this an example of stream piracy?

DETAIL OF STREAMS AROUND ESK (MAIN STREAM TRENDS ACCENTUATED)

A “zoomed-in” view of the streams around Esk.

ANTECEDENT AND SUPERIMPOSED STREAMS, AND STREAM PIRACY

A stream cuts its own channel (and helps to cut its own valley). How does it manage to do this through a hill? (Obviously, the stream cannot flow up and over the hill while beginning to erode its own channel.)

The standard explanation is that the stream is older than the hill (antecedent), and was superimposed on the hill. The model requires that the hill was covered by other rocks, since eroded away. At Esk, the igneous complex is an intrusive body, implying a greater thickness of sedimentary rock (hosting the intrusive body). There is even a good chance that the cover extended completely over the top of the intrusion.

The early version of the stream system was established in these cover rocks (above the intrusion). Continued erosion (possibly accompanied by general overall regional uplift) allowed the floor of the channel to cut down into the underlying rock units (including the intrusion), while remaining confined within the channel walls. Ongoing erosion strips the general widespread sedimentary rock cover units "faster" (difficult to quantify) than the more resistant igneous intrusive rocks; all the while erosion of the channel floor continues, cutting a gorge through the intrusive body. Presumably the orange and lilac trends represent these early streams, flowing eventually into the proto-Brisbane River. In this model the proto-South Creek joined the proto-Redbank Creek, and the combined stream continued ENE, coincidentally above the unexposed southern margin of the intrusive body. There was then no link through to the proto-Gallanani/Esk Creek system in the current position.

The current stretch of South Creek along the western margin of the igneous complex probably came later, and may be an example of stream piracy. A minor north-flowing tributary of proto-Gallanani/Esk Creek (or maybe a south-flowing tributary of the proto-Redbank Creek system) progressively extended (by "headward erosion") to intersect the proto-Redbank Creek system. This tributary of the proto-Gallanani/Esk Creek system "captured" the drainage of the proto-Redbank Creek system, "beheading" the latter. The increased flow along proto-South Creek to the proto-Gallanani/Esk Creek system was at the expense of flow along the proto-Redbank Creek system eastwards beyond proto-South Creek. The reduced flow slowed the erosion rate in this downstream stretch, where erosion lagged behind other areas, leaving a saddle on the south edge of the igneous intrusion. The drainage reversed to westwards for the small stream segment on the outskirts of Esk.

The above explanation should be considered as feasible, but not proven.

Videos for your entertainment.

Roz Kerr sent in a link to a fascinating YouTube clip about some quite old (Proterozoic) rocks – 1,500 million years old, now found at Rocky Cape in Northwest Tasmania. The subtle clue is there in the words "now found".

Click: Geologists explain why Tasmania is different
or https://www.youtube.com/watch?v=_f_Hcyfv5rU

Let me add a few more:

The Origin of the Australian Alps
or https://www.youtube.com/watch?v=Q-nIGTF_M78

Islands of Gold in an Ocean of Land - The Macquarie Arc
or https://www.youtube.com/watch?v=duC_jr1iPp0&t=7s

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or https://www.youtube.com/watch?v=duC_jr1iPp0&t=7s

Gold, Faults and Fluids
or https://www.youtube.com/watch?v=KDexpMBAs6M

Gold Bearing Fluids with Prof Stephen Cox: Part 1
or https://www.youtube.com/watch?v=co8GGqzCzho

Gold Bearing Fluids with Prof Stephen Cox: Part 2
or https://www.youtube.com/watch?v=a2iEjXIUJEI

GEOL120 - Geology of Australia (Part II)
or https://www.youtube.com/watch?v=lF5i7Jwbdw8

Extreme Geological Events that you never knew existed.
or https://www.youtube.com/watch?v=XRiD3KI4hVA

Who was J Harlen Bretz?
or
https://www.youtube.com/watch?v=ykYULOXLCfs&list=PLwNJg2mCrcQSWMxs2jvgp_lvpeffAUd6e&index=9

On the trail of the Ice-age Floods: geotouring in the Channelled Scablands of Eastern Washington State, USA *or*
https://www.dropbox.com/s/dy8g9ysuy9w0h3o/GSAQ%20Technical%20Talk%2025%20February%202020%20On%20the%20trail%20of%20the%20Ice-age%20Floods%20with%20audio1%20compressed.ppsx?dl=0

South African waterfalls that drop into the ocean.

Mfihlelo (Hidden) Fall, Wild Coast, Eastern Cape Province. Rock is Early Permian shallow-marine sandstone of Ecca Group.

31° 26′ 12″ S 29° 47′ 55″ E

Waterfall Bluff, Wild Coast, Eastern Cape Province. Rock is Early Permian shallow-marine sandstone of Ecca Group.

31° 26′ 02″ S 29° 49′ 20″ E

*Something light-hearted from **David Atkinson**:*

Subject: TOILET PAPER :-)

So I have just been to K-Mart...

Honestly, it was shocking. They had no toilet paper at all.

Reluctantly, I headed for customer service and asked if they had any.

A firm NO!...and a look of disgust was the answer.

Walking back to the washroom with my pants around my ankles is a walk I never want to do again!

I'm not up-to-date with COVID-19 restrictions in NSW; here in Qld we are permitted to travel anywhere (but are *advised* to restrict journeys only to those necessary). My son lives in Perth, and works as a hydraulic serviceman (pumps, hoses, valves, control units etc on earth-moving equipment) in the Pilbara iron ore country. He tells me that regional travel is prohibited, unless you have a good reason for the trip, such as a fly-in fly-out job. Grey nomads - don't move! Maybe in NSW you can still get out and about to do your own thing.

David has also shown us a fine piece of initiative, by taking a smaller group up Mt Allyn recently, independently of our AGSHV activity program. This is real news for the Newsletter. His trip report follows overleaf:

An Outing to Mt Allyn

21 March 2020

Our official trip was cancelled but Brian and I were followed up to Mt Allyn by Janece and Lawrie.

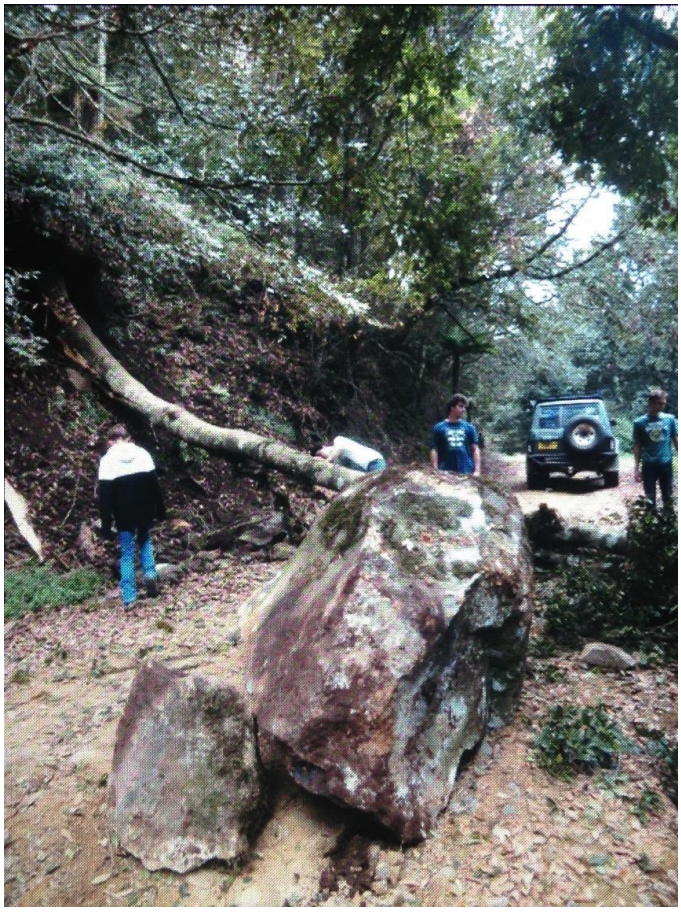
So here is the story:

Way back when I did the "Risk Analysis" due fire concerns I had a bad dream that the group were on top of Mt Allyn and there was a serious rock fall and we were stuck up there.

Scroll forward several months and Covid-19 blocks our way.

We set off at about 9:00am and had a coffee at East Gresford.

On the final ascent to Mt Allyn we were confronted with a small group of young people who were trapped on top of Mt Allyn as they felt and heard a rock fall and this is what confronted them:



Not to be deterred we then proceeded to get our insitu orientated sample from the bottom of the lava flow.

The old flow beneath this flow was not sampled and we will need to get samples from the top of Mt Allyn when we do the official AGSHV trip and also have a better look at the older flow.

A group of FWD folk arrived with chainsaws, winches and all the paraphernalia needed to clear the track.

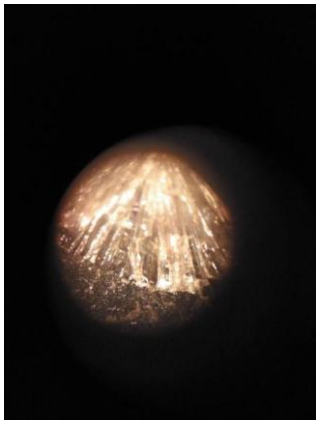
Lessons learnt:

1. Don't do the trip on the weekend as the sheer volume of traffic would make it impossible.
2. Take a chainsaw and ropes to enable minor road clearing.

3. Travel with a reasonable gap between vehicles to enable evasive action.
4. Take and use communications radios in all vehicles.
5. Telstra has coverage from the top of Mt Allyn

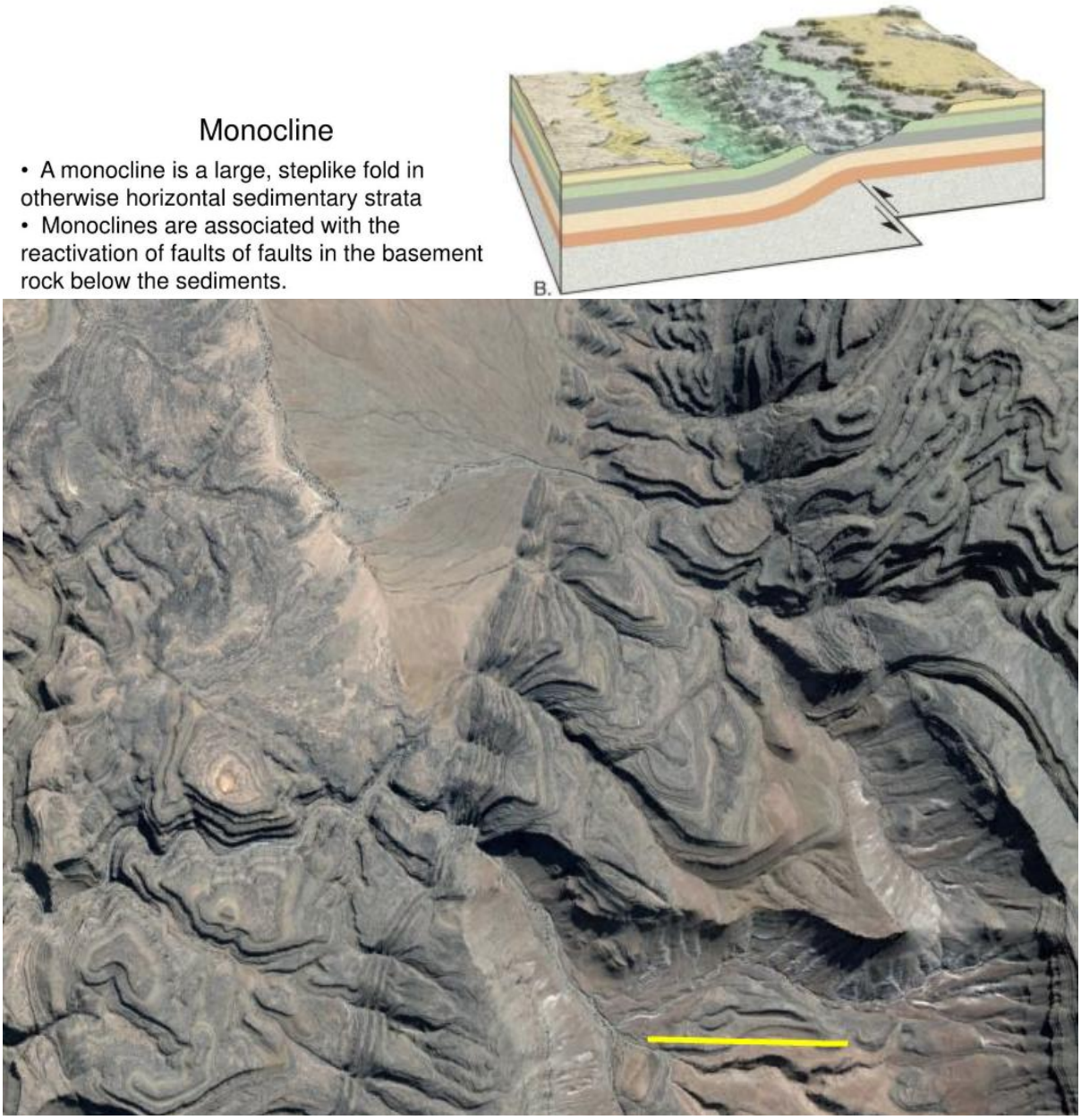
Rock samples

Natrolite on Basalt



Natrolite under the microscope & mobile device camera!

Field examples are rarely this good.



Monocline in southern Namibia. Horizontal sedimentary rocks either side of a linear belt of dipping rocks, very likely above a basement fault. Sharp, smooth boundary between hills and lowland with alluvial fans is a strong hint at the existence and position of a fault. Ediacaran/Cambrian age Nama Group, similar in age to rocks of Flinders Ranges, South Australia. Yellow line is 1 km long. Centered at 27° 41′ 20″S 17° 08′ 35″ E. North is up.