

Expeditions to Selected Fossil Sites at Liffey and Poatina

**October 8th Notes on a tour attended by members of the North-Eastern
Tasmanian Field Naturalists Club Inc.**

&

October 9th (supplementary study)



View from Poatina Chalet towards Drys Bluff and the Liffey area



**Mt Blackwood towers above the HEC pipeline that delivers water to the Poatina
power station turbines**

Introduction

The main focus of the day was to visit 2 sites, one at Liffey and the second at Poatina with a view to exploring fossil finds in sedimentary rocks deposited in both freshwater and marine conditions during the Permian (Palaeozoic Era). Handout reading material provided general information relating to the various stages of global scale geological change (from the Permian to the present day). The principle Period to be considered on the day was the Permian, stratigraphically located in what is termed locally as the Lower Parmeener Super Group (Forsyth et al 1973). Various fossil types were discussed and some examples shown.

The Groups and Formations making up the Permian were briefly discussed and as our field observations were to be conducted in the Quamby region, see Table 1 (Pike et al 1973), the Liffey sandstone (LS) (a freshwater group containing plant fossils deposited approx. 283MY BP)) was chosen by the author as it is a reliable reference point in the landscape. Using LS as marker would, along with local geological maps, provide a useful guide to the identification of other groups (above or below it) in Permian, such as Poatina Group which contains fossils at both Liffey and Poatina¹.

A second aim was to demonstrate the challenges and rewards one encounters during both the practical aspects of field work (such as access, care in extracting specimens, identification and handling) and interpretation of field conditions (map reading, 'reading' the landscape and determining whether potential finds are 'endemic²', that is have their origins within the area generally. Fossil species and fossil bearing rocks and debris may have travelled long distances before deposition and in some cases disturbances due to building or earth moving by humans in years past may have created the impression of 'endemicity'.

The Field Excursions

1. *Liffey*

The day began at about 10.30 a.m. with some 23 persons in attendance. After a half-hour introduction the group proceeded to make its way up a nearby old logging track (known to the author as 'The Bluff Road') in the direction of Drys Bluff (see Map 1). As the going was quite steep the road cutting face offered opportunities to observe various sections of strata. Upon reaching the Liffey sandstone sparse plant finds (carbon and fragments came to hand).

¹ Poatina Group rocks are younger than the Liffey rock. As these are upper part of the marine estimates put these at about maybe 284 to 272 MABP(?). See Appendix 1 for time geological time scale for the Poatina area.

² Note these are terms developed by the author as a self-taught practitioner

Table 1. Permian succession in the Quamby Quadrangle

Source : Pike, G.P. et al, 1973, Quamby Geo Survey, Zone 7, Sheet No.46(8219N). Tas. Dept. Mines

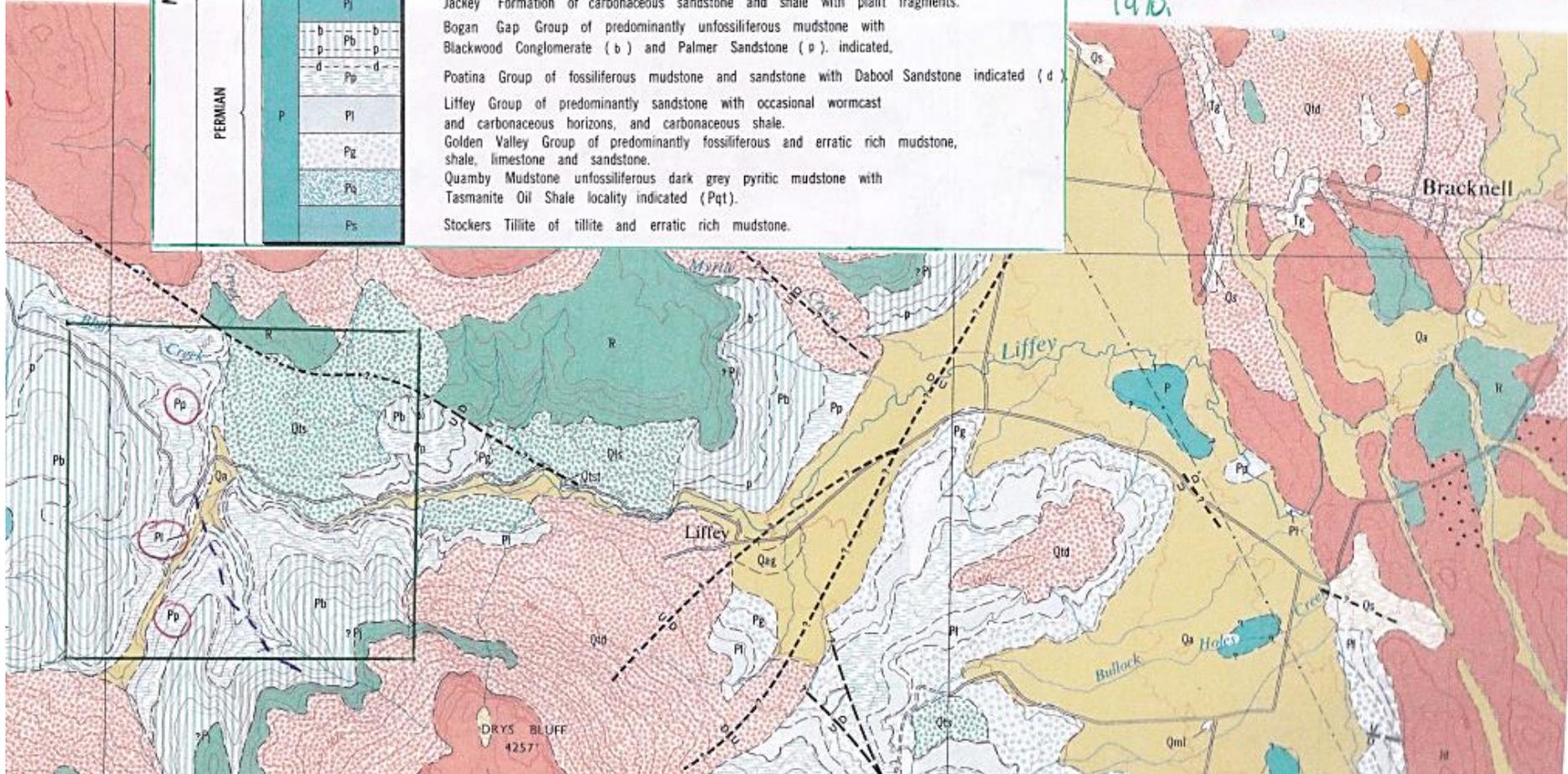
	<i>Formation</i>	<i>Rock Type</i>	<i>Thickness (m)</i>
	Jackey Formation	Sandstone and shale	43
BOGAN	Eden Mudstone	Grey to black micaceous mudstone	6-9
GAP	Blackwood Conglomerate	Granule or pebble conglomerate	1
GROUP	Drys Mudstone	Dark grey to black massive mudstone with some sandy beds	100
	Palmer Sandstone	Unfossiliferous sandstone	3-5
	Springmount Mudstone	Hard dark grey mudstone with occasional pebbles	69
POATINA	Garcia Sandstone	Pebbly to conglomeratic sandstone	9-14
GROUP	Weston Mudstone	Micaceous mudstone with bryozoa	9
	Dabool Sandstone	Highly fossiliferous sandstone with erratics	7
	Meander Mudstone	Sandy siltstone, micaceous mudstone and thin sandstone beds	62
LIFFEY		Sandstone and subordinate shale and thin beds of conglomerate. Mottled quartz-mica sandstone towards top (Creekton Formation)	33-35
GROUP			
GOLDEN	Macrae Mudstone	Siltstone and mudstone	48
VALLEY	Billop Sandstone	Micaceous sandstone with erratics	8
GROUP	Glencoe Formation	Calcareous shale and limestone with erratics	27
	Quamby Mudstone	Pyritic and carbonaceous mudstone with a few pebbles. Tasmanite oil shale.	88-172
	Stockers Tillite	Tillitic conglomerate	0-100

SCALE
1 inch = 1 mile

Reference

Source:
Extracted from Map 'Quamby's'
1:63360 Series, Tas Dept Mines
1970.

MESOZOIC	TRIASSIC	R	Unconformity
	PERMIAN	Pj	Jackey Formation of carbonaceous sandstone and shale with plant fragments.
b		Bogan Gap Group of predominantly unfossiliferous mudstone with Blackwood Conglomerate (b) and Palmer Sandstone (p) indicated.	
Pb			
p			
d		Poatina Group of fossiliferous mudstone and sandstone with Dabool Sandstone indicated (d)	
Pp			
Pi		Liffey Group of predominantly sandstone with occasional wormcast and carbonaceous horizons, and carbonaceous shale.	
Pg		Golden Valley Group of predominantly fossiliferous and erratic rich mudstone, shale, limestone and sandstone.	
Pq		Quamby Mudstone unfossiliferous dark grey pyritic mudstone with Tasmanite Oil Shale locality indicated (Pqt).	
Ps		Stockers Tillite of tillite and erratic rich mudstone.	



Map 1. Locations of Liffey Group (Pi), Poatina Group Pp)

From map it can be seen that the track route (the blue dashed line) cuts across the Liffey and Poatina Groups.

While finds were sparse the team was able to experience the challenges relating to firstly locating fossils and secondly the challenges associated with fossil identification. Some time was also spent interpreting the landscape. As suggested by the layout of Groups on Map 1, one soon discovers complex mixing and overlaying of rocks. This along with the changes introduced by the road work operations (completed in the 1950's to 1970's) simply adds to the challenges.

Finds at the site

1. Liffey Group

Plate 1 shows a section of the site and Plate 2 and image of finds typically found at the site

2. Poatina Group

After a short walk further up the logging road the attendees were greeted by the first indications of marine fossils .

Plate 3 shows some shell impression finds in a brown mud/sandstone matrix. *Martiniopsis* is present as well as a number of other species. A set of diagrams was used as a reference in an attempt at positive identification. Attendees were soon aware of the difficulties associated with positive identification, particularly when only fragments are available. The specimen shown appears to be a member of the (?)Brachiopoda based on the evident ribbing



Plate 1. Liffey sandstone site on the Bluff road Liffey

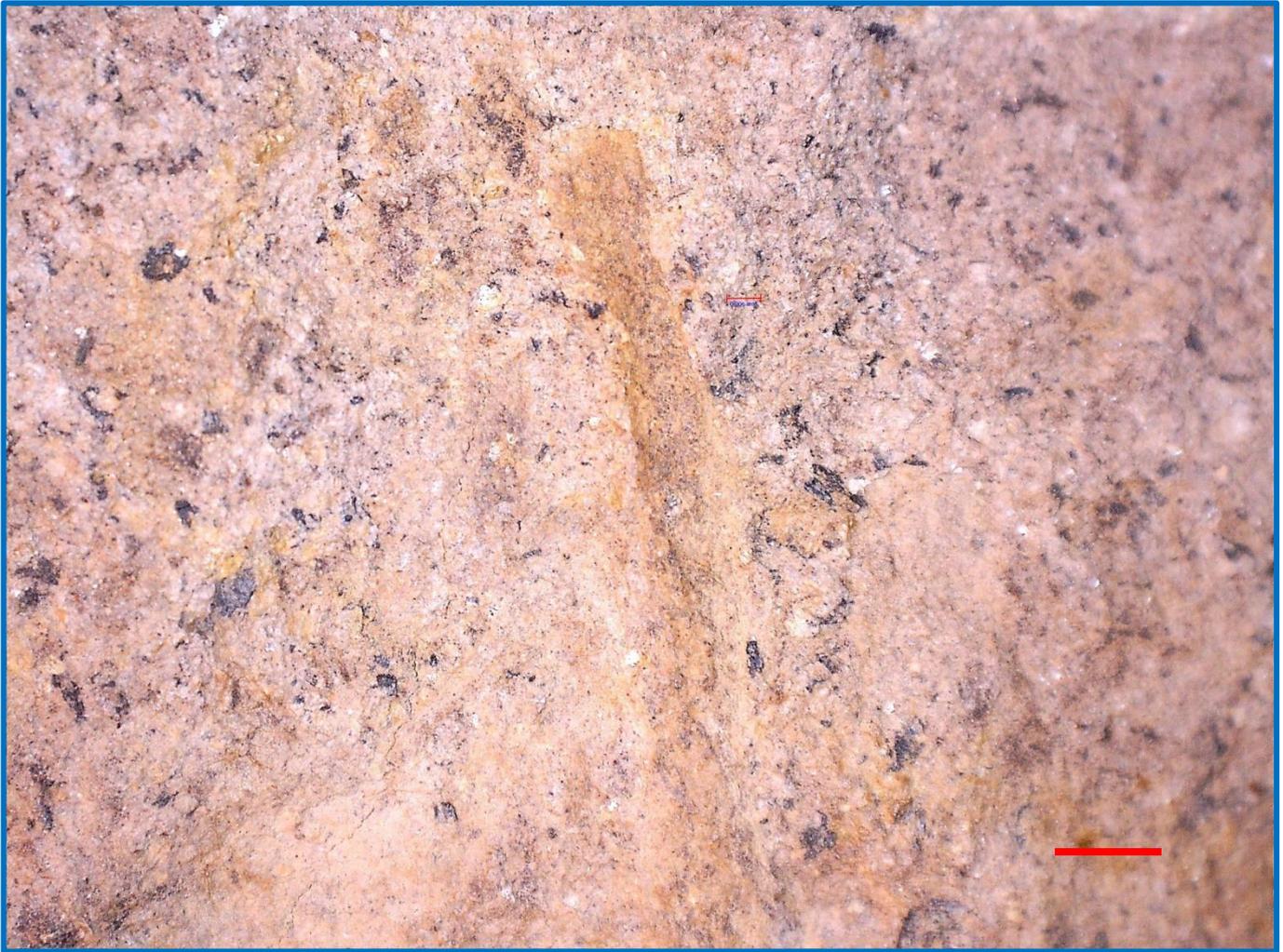


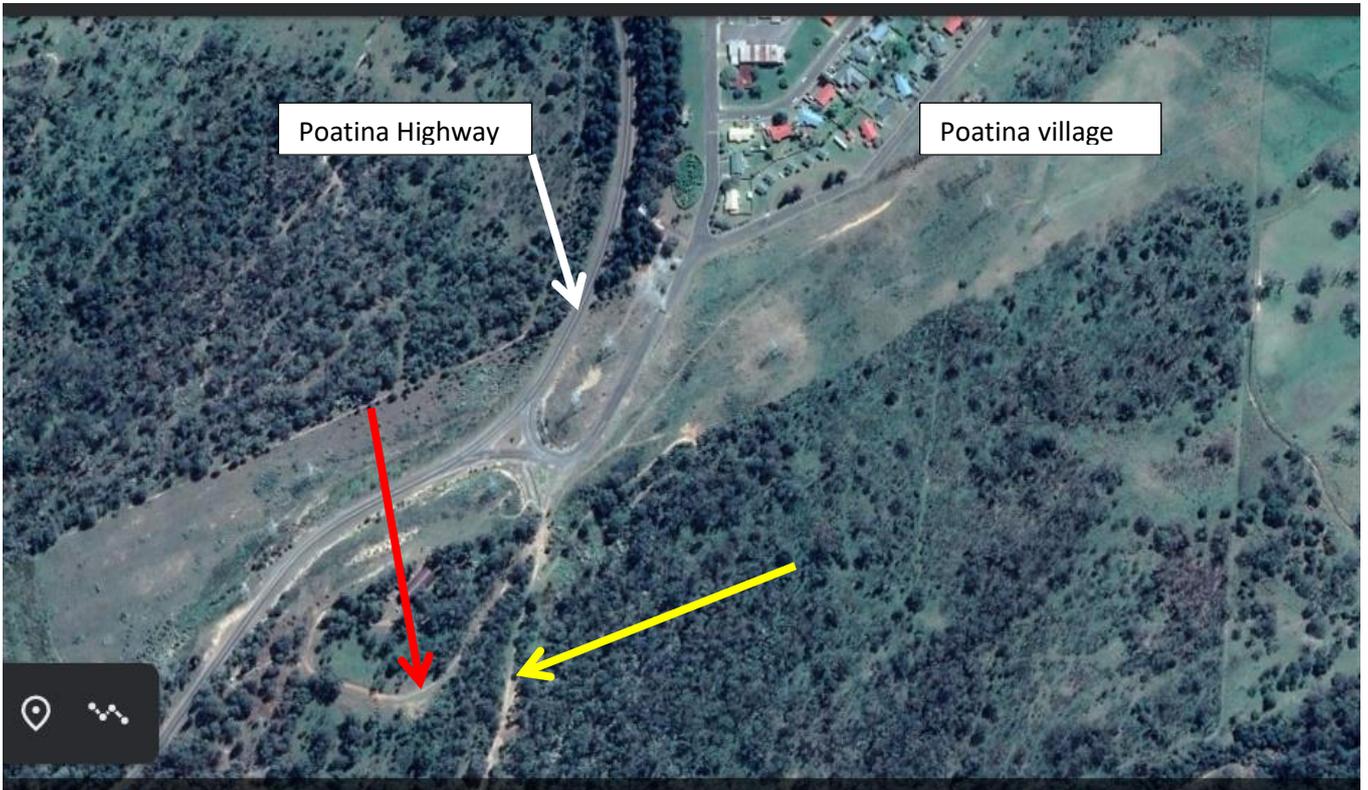
Plate 2. Evidence of plant fragments and carbon fragments in Liffey sandstone (scale bar about 10mm)



Plate 3. An interesting fossil imprint found in what is believed to be material from the Poatina Group.

2. Poatina Site

We arrived at the site in the afternoon (see Google Image 1).



Google Image 1. Red arrow points to the Liffey sandstone on the higher ground and the yellow arrow points to Liffey sandstone strata down slope.

Finds Made on the Day

High Road (Red Arrow)

Fortunately, a drain channel had been prepared some years earlier. The works unearthed a treasure trove of finds much better than those found on the opposite side of the large sandstone deposit covering many square meters. In fact the large cutting on the main road is no less than spectacular in terms of size and grandeur!. That said, as is the case many a time for the fossil researcher there are constraints! The primary one on this occasion being proximity to an, at times, busy main road. But all was not lost on this occasion as the site (red arrow) is on a quite side-track.

The team busily got to and began to make discoveries almost as soon as arriving. Below are some of the images of the finds and the site itself. Also included are further images of the Liffey sandstone cutting on the main road side of the deposit.

Lower Road (Yellow Arrow)

Attendees searched the layers of sandstone for some time and we were unable to find any evidence of plant fossils that would confirm the presence of Liffey sandstone. This was an interesting development given the richness of finds higher up.

Observation revealed plenty of sandstone as one walked along the track in a southerly direction; however the formation tended to progressively dip (see Plate 7).



Plate 4. Plant stem fragments



Plate 5. Beautiful leaf impression. Note a second impression alongside
The literature mentions plat species including *Glossopteris* and
Gangamopteris (Royal Soc. Tas. , 1972).



Plate 6. The site of the finds on the top road (red arrow).



Plate 7. Liffey sandstone cutting Poatina highway (near the entry to the Poatina village)



Plate 8. (?) Liffey sandstone on the lower road (yellow arrow).

Further finds on the lower road (Yellow Arrow)

At one point about 200m along the road a large mound of mudstone was noted. A check of this revealed significant amounts of marine fossil impressions (see Plate 9)



Plate 9. Fossil impression in grey mudstone from lower road (yellow arrow) Specimen appears to be *Martiniopsis*

Field work on October 9th

1. The lower road site.

Further interpretive studies during the following day indicated that the large clump of mudstone was most likely dumped at the site and pushed up against the sandstone formation creating the impression of a mudstone inclusion at the base of the sandstone. While the fossil finds were of much interest it would appear the mudstone had its origin in the Poatina group from nearby country and was move to the site as perhaps road fill(?).

2. Further study at the general site

There was an opportunity to explore sedimentary rocks well below the Liffey group as a new road had been established below the main road. Exploration revealed very soft –crumbly bluish grey mudstone. A good hour was spent at that site and only one questionable fossil came to hand. Images below show the site details.

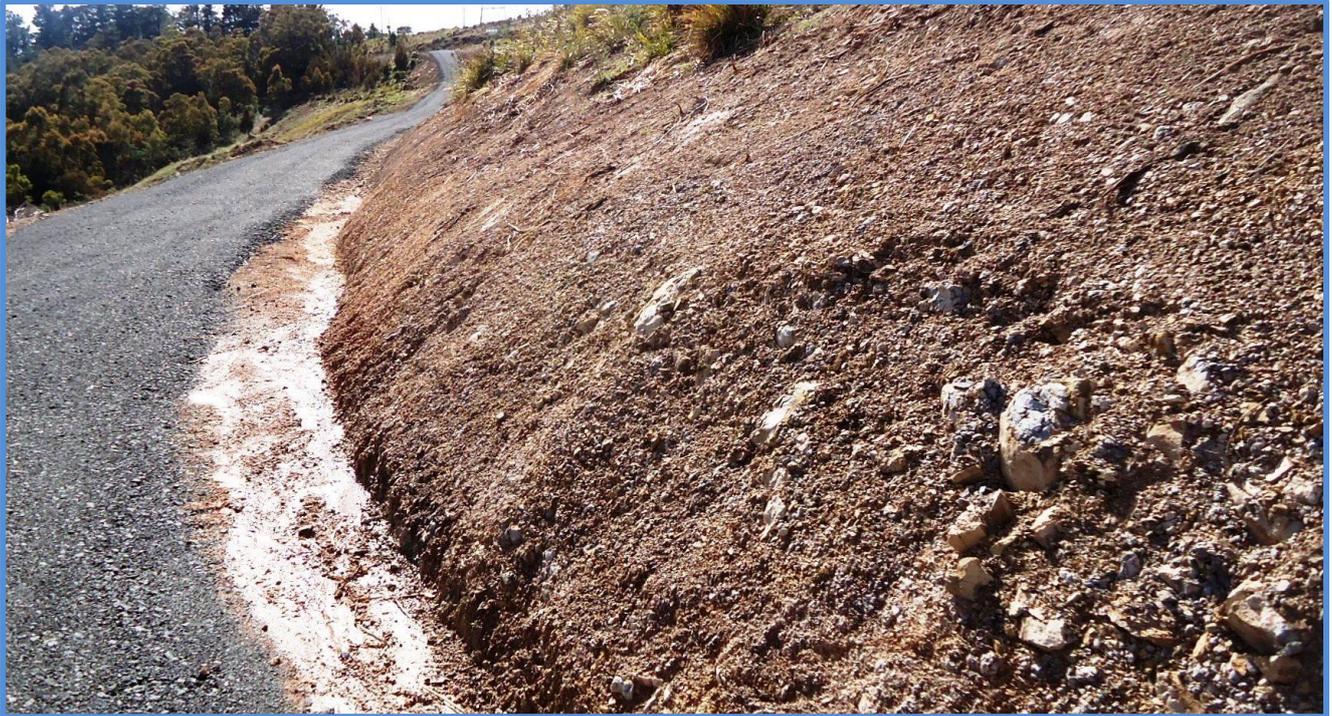


Plate 10. Extensive cutting exposing mudstone material.



Plate 11. Soft crumbly mudstone all through the site and pronounced at cutting base. Suspect it Golden Valley Group, most likely Macrae mudstone. Pike et al, 1973) report that this mudstone is poorly fossiliferous and readily disintegrates on exposure to air. This lends credence to the view that the aforementioned mudstone found at the sandstone site higher up (yellow arrow) is on fact Poatina Mudstone (possibly (?) Weston Mudstone.

References

Forsyth, S. M., Farmer, N., Gulline, A. B., Banks, M. R., Williams, E. and Clarke, M. J. 1974. Status and Subdivision of the Parmeener Super-Group, Papers and Proceedings of the Royal Soc. of Tasmania, vol. 108.

Pike, G.P., 1973, Geological Survey Explanatory Report, Geological Atlas 1 Mile Series, Zone 7, Sheet No, 46 (8219N), Quamby, *Tasmanian Department of Mines*, T.J.Hughes, Government printer, Hobart, Tasmania.

Royal Soc.Tas., 1972, The Lake Country of Tasmania – A symposium arranged by the Royal Society of Tasmania November 1972.

Appendix 1

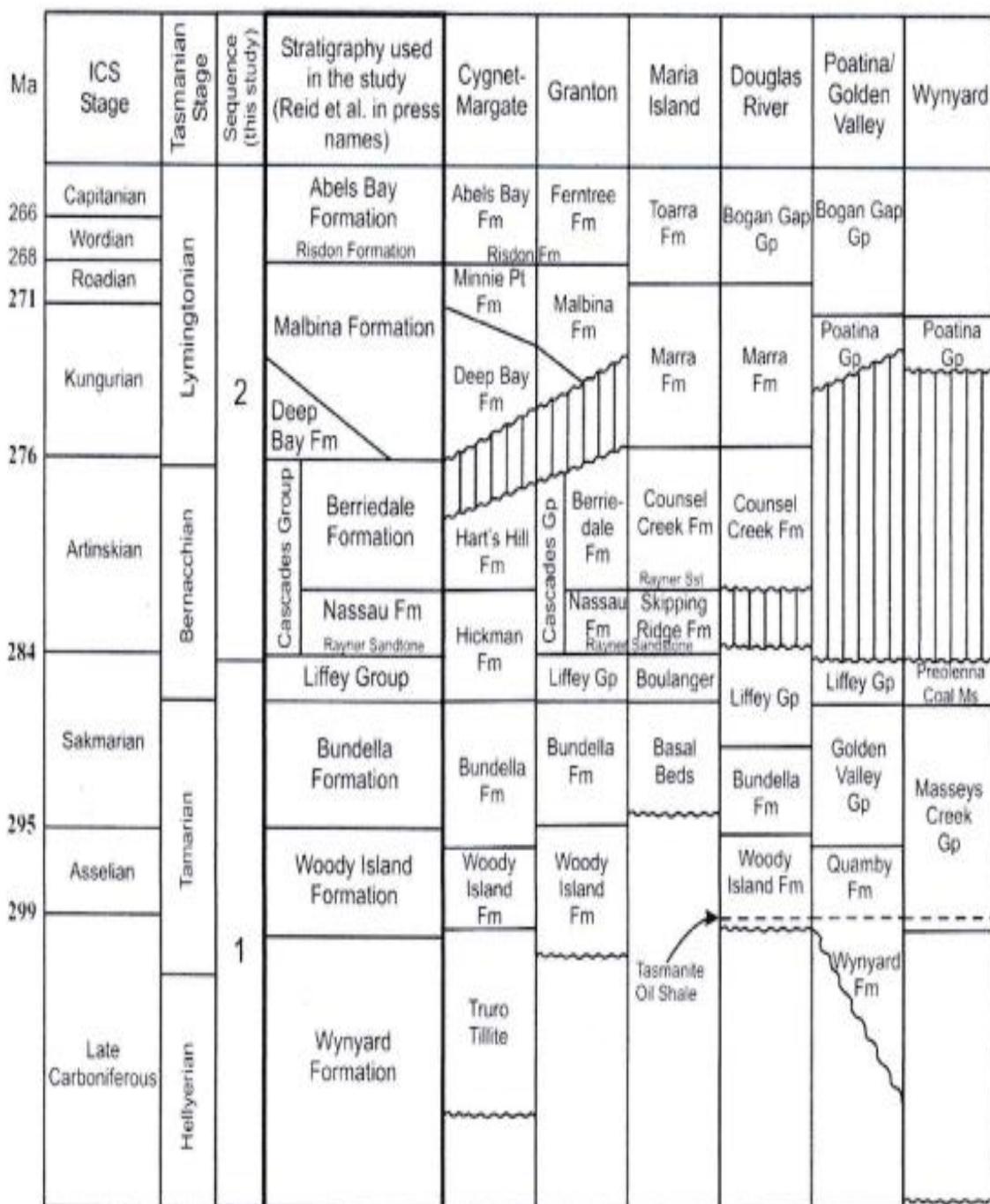


Figure 2.2. Stratigraphic relationships between formations in the Lower Permian Supergroup (after Clarke and Forsyth 1989). The locations referred to are shown on Figure 2.4. Formation names used in this study are provided, corresponding with Reid et al. (in press). Wavy lines and hatched areas represent unconformities.

Source: Becky Rogala (2008) A thesis submitted to the Department of Geological Sciences and Geological Engineering, "Deposition and Diagenesis of the Early Permian Lower Permian Supergroup Limestones, Tasmania", Queen's University Kingston, Ontario, Canada April, 2008

Snapshots of the Group on the day



Time to eat!!



It's tukka time!



The team gathers



Convoy!