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URALLA GROUNDWATER PROJECT

PHASE 1 DESKTOP REVIEW

Prepared for Uralla Shire Council | 6 October 2021

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Subject to the scope of work, the assessment was limited strictly to identifying the environmental conditions associated with the subject property and do not include evaluation of any other issues.

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1. INTRODUCTION

1.1. Background

In 2019 the township of Uralla experienced an extended period of drought which placed the water supply at risk of failure and ultimately contributed to elevated levels of Arsenic contamination in the town water supply. As a result of the contamination, bottled water was shipped by truck to residents in the township until adequate treatment of the supply source could be implemented. The period of contamination lasted from 18-December-2019 to 28-April-2021.

The Uralla Drought Management Plan states the following:

Water supply for Uralla township is sourced from Kentucky Creek Dam with a total storage of 500 ML, of which 75 ML is assumed to be dead storage, leaving an effective storage of 425 ML. Current extraction of raw water for Uralla varies between 230 and 350 ML per annum. Uralla Shire Council is licensed to extract up to 621 ML per annum to meet urban demand from the Kentucky Creek catchment. In 2013, Council commissioned NSW Public Works/SMEC to carry out a secure yield study on the catchment water supplies. The study projected that the modelled unrestricted dry year demand for the Uralla water supply will increase from a current 381 ML to 433 ML in 2044. The outcomes of the secure yield modelling gave an estimated secure yield of between 196 and 228 ML per annum (up to 2015) for the Uralla supply, depending on the security of supply rule that Council adopts. The study concluded that: "The modelling indicates that the Uralla water supply system would need to be augmented to provide a secure yield which matches the dry year demand.

Considering these issues, funding has been allocated by the NSW State Government for providing a safeguard to the security of the Uralla water supply. This funding will be used to investigate the viability of groundwater for supplementation of the Uralla Kentucky Dam water source when needed, or to determine alternative water security options to safeguard the Uralla town water supply.

1.2. Objective

The objective of the project is to investigate the potential for bore sites which could provide an alternative supply of up to 1.5ML/day for the Uralla township potable water supply.

1.3. Scope

The scope for this desktop investigation was as follows:

1. Desktop analysis of existing geology and bores utilising all publicly available information.
2. Aerial analysis and identification of suitable sites for further virtual ground penetrating studies.
3. Identification of a minimum of 15 suitable sites for further investigation.
4. Investigation of identified sites with virtual ground penetration studies with supply of profile reports for each site. Profile report to contain:
    a. Analysis of the expected composition of the sampled area to a depth of 300m.
    b. Minimum vertical profile resolution of 2m.
    c. A 2 and/or 3-dimensional computer aided output representing the area of analysis.
    d. Analysis of the expected water production volumes and total capacity of a bore at each location specifying:
        i. Estimated production output (L/s).
        ii. Estimated total aquifer volume (kL).
        iii. Expected water quality.
        iv. Depth and location of fractures.

v. Expected pump depth and standing water level.

5. Land ownership, land access, power access issues and aspects of assessment or planning provisions which may impact the ability to approve a production bore, and/or issues in accessing entitlement to be considered in the analysis site selection.
6. Inclusion of minimum of 6 sites preferably within close proximity of the Uralla water treatment plant if practicable.

At the completion of the Phase 1, a Virtual Drilling Investigation Review, by Contractor & Council, will be undertaken to determine the viability of moving to Phase 2.

2. DESKTOP ANALYSIS

The desktop analysis has been completed over a 15km radius of the Uralla Water Treatment Plant (WTP) which is located approximately 5.3km southwest of Uralla township, adjacent to the current town water supply of Kentucky Dam. The following publicly available resources have been reviewed:

- Registered Licensed Groundwater Bores as provided in the
  - Bureau of Meteorology Groundwater Explorer (Australian Groundwater Explorer: Groundwater information: Water Information: Bureau of Meteorology (bom.gov.au).
  - WaterNSW Realtime Data (Real-time water data (waternsw.com.au).
- Geology mapping for the area:
  - Dorrigo – Coffs Harbour 1:250,000 Geological Series Sheet SH 56 – 10 & 11 (E.C. Leitch et. al, 1969)
  - Manilla 1:250,000 Geological Series Sheet SH 56 – 9 (W.S. Chestnut et a, 1969).
  - Metallogenic Series Sheet SH/56 – 9, SH/55 – 12 (Royal Australian Survey Corps, 1992)
- Stereoscope
- Historical Mine Sites
- NSW Total Magnetic Intensity Reduced to the Pole (TMI RTP) – Geological Survey of NSW.
- Other publicly available information.

The outcomes of the review are discussed in the subsequent sections.

2.1. Geology

The geology in the area is complex and comprises the following units:

- *Cs* – Sandon Beds – Greywacke, argillite, chert, jasper, basic volcanics.
- ***P-C* – Mudstones, lithic sandstones, hornfels and pebbly conglomerates.**
- ***Pgu* – Uralla Granodiorite**
- *Plh* – Harnham Grove Porphyritic Microtonalite – Porphyritic rock, andesine-labradorite, augite and hypersthene, quartzo-feldspathic groundmass.
- *Plw* – Manuka Farm Prophyritic Microtonatile – Porphyritic rock, andesine-labradorite, augite and hypersthene, quartzo-feldspathic groundmass.
- *Pp* – Porphyries and porphyrites. The intrusives in part belong to *Puga*.
- *Pugu* – Glenburnie Leucoadamelite – Biotite luecoademelillite.
- *Puka* – Khatoun Tonalite – Hornblende-biotite tonalites.
- *Pus* – Standbye Adamellite – Porphyritic hornblende-biotite admelite.

- *Puw* – Wongalee Complex – A complex body of leucogranite and intermediate zonlith rich plutonic breccia.
- *Plt* – Terrible Vale Porphyritic Microtonalite.
- *Pps* – Salsbury Water Porphyrite
- ***Puu* – Uralla Granodiorite – characterised by Hornblende-biotite granodiorite.**
- *Pv* – Annlee Pyroclastics
- ***Qa* – Quaternary Alluvium – mostly sands and clayey sands and clays in present-day streams.**
- ***Tb* – Tholeiitic and alkaline basalts, minor trachyte and dolerite.**
- ***Tc* – Armidale Beds – sands, sandy clays and thin pebbly sands; unconformable on Uralla Granodiorite, overlain by basalt flows.**
- ***Ts* – Conglomerate, greybilly, sandstone and claystone.**
- ***Tv* – Basalt flows and plugs.**

The units highlighted in bold text in the list above are considered to have the highest potential for water in the area.

Tucker (July 1996) describes the geology in the area as follows:

The principal rock unit present is the Permian Uralla Granodiorite (Shaw & Flood,1981). This pluton intrudes rocks of the subduction complex (Sandon Beds), the Permian volcanic rocks (Wandsworth Volcanics) and other plutons of the New England Batholith.

The Uralla Granodiorite and its country rocks are overlain by Tertiary sediments, Tertiary basalts, and Quaternary alluvium. The Uralla Granodiorite is cut by narrow aplite dykes, (up to 50cm wide) which appear to follow joint-directions. The aplites appear to be confined to the Granodiorite.

Small areas of tonalitic rocks (Khatoun tonalite, Manuka Farm Microtonalite) occur in the Wilson's Creek area. These tonalitic rocks intrude both Wandsworth Volcanics and Sandon Beds.

There is also a development of roughly north-west striking dykes along the western contact of the Uralla Granodiorite and the Sandon Beds. The age of the dyke swarm is believed to be Permian.

Within the area of the Rocky River Goldfield (e.g., in Mt Mutton Gully) weathered basic dykes intrude the Uralla Granodiorite.

2.2. Hydrogeology

2.2.1. Registered Licenced Groundwater Bores

A search of the Bureau of Meteorology (BoM) Australian Groundwater Explorer was completed to identify licenced bores within a 15km radius of the water treatment plant (WTP). Figure 4 in Appendix A shows the locations of these bores, and the data is summarised in Appendix B.

The bore search was initially focussed within a 6km radius of the WTP to identify potentially high yielding areas to minimise future infrastructure costs. Licensed bores within 6km of the site are shown on Figure 4 in Appendix A and a summary of the results is provided below:

- 21 bores were identified within 6km of the WTP.
- Reported yields ranged between 0.23L/s and 3.03L/s. Three bores reported yields greater than 1L/s, these were:

Table 1 Highest Yielding Bores within 6km of the Water Treatment Plant

Bore ID	Yield	Location Relative to WTP	Depth	Geology
GW071582.1.1	3.03	2.5km southeast	30.5	Basalt
GW968898.1.1	2.5	3.7km east-southeast	117.4	Granite
GW054652.1.1	1.01	5.6km east	21.3	Sand waddy

The search was then expanded to 15km from the WTP. A summary of the licenced bores is provided below:

- 242 bores were identified between 6km and 15km from the WTP.
- Reported yields ranged between 0.004L/s and 15.16L/s. Bores yielding greater than 1L/s are summarised below:

Table 2 Surrounding Licenced Bore Details

Bore ID	Yield	Location Relative to WTP	Depth	Geology
GW056318.1.1	1.01	6.9km east	36.6	Granite
GW037677.1.1	1.52	6.9km east	29.2	Granite decomposed
GW050594.1.1	2.27	6.9km east-northeast	35.6	Granite
GW071621.1.1	6.2	7.3km north-northeast	15.6	Granite
GW965106.1.1	1.01	8.7km north-northeast	40.9	Basalt, sand and sandstone
GW015462.1.1	1.64	8.9km Northeast	22.9	Basalt, coal, sand and granite
GW037838.1.1	1.26	9.1km southeast	15.2	Sand and river gravel
GW037839.1.1	1.26	9.2km southeast	15.2	Sand and river gravel
GW064093.1.1	1.14	9.24km northeast	30	Basalt
GW065339.1.1	1.5	9.5km northeast	30	unknown
GW015460.1.1	1.9	10.1km northeast	19.2	Sand
GW023835.1.1	1.01	10.5km south	20.1	Granite
GW969183.1.1	2.3	10.6km northwest	86.3	Sand and granite
GW045379.1.1	1.14	11.2km northeast	21.3	Basalt gravel
GW049128.1.1	1.52	11.2km northwest	17.4	Rock
GW022959.1.1	2.02	11.6km south	28	Granite
GW971235.1.1	1.49	11.6km north	93	Granite and sand
GW065308.1.1	1.3	11.7km southeast	22	unknown
GW024201.1.1	1.5	12.4km northeast	21.4	Basalt
GW058384.1.1	2.3	12.4km northeast	35	Shale and basalt
GW023836.1.1	1.9	12.5km south	15.5	Granite
GW060016.1.1	1.14	13.2km northwest	36.6	Granite
GW060910.1.1	1.26	13.2km northeast	29.5	Clay over basalt
GW068160.1.1	1.26	13.2km northeast	66	Basalt
GW047681.1.1	7.58	13.2km north-northeast	30.5	Basalt decomposed
GW029225.1.1	1.9	13.3km north-northeast	76.2	Basalt
GW043948.1.1	1.89	13.3km northeast	30.4	Sandstone
GW068104.1.1	8.8	13.4km northeast	42	Basalt and coal
GW051391.1.1	1.26	13.5km northeast	41.1	Basalt over sand gravel coal
GW068161.1.1	5.05	13.5km northeast	48	Basalt over coal, clay, sand (with wood and coral)*
GW056754.1.1	1.04	1.6km northeast	24.4	Basalt
GW044698.1.1	2.53	13.8km northeast	22.9	Basalt gravel

Bore ID	Yield	Location Relative to WTP	Depth	Geology
GW050546.1.1	1.14	13.9km south	24.3	Sand and granite
GW023332.1.1	1.39	14km south	23.5	Granite decomposed
GW037922.1.1	1.2	14.3km north-northeast	34.1	Basalt decomposed
GW016754.1.1	1.21	14.6km northeast	15.2	Mudstone
GW058380.1.1	2.3	14.6km northeast	27.5	Basalt and sand
GW051498.1.1	1.26	14.7km northeast	28	Basalt
GW050779.1.1	1.26	14.8km northeast	21.3	Basalt with Tuff seam
GW035257.1.1	15.16	14.8km northeast	30.4	Basalt over sand and clay
GW062586.1.1	1.2	15km northeast	34	Basalt

*coral and wood dated to be 30million years old.

it can be seen from the above tables that the highest yield bores are generally in basalt and generally less than 50m below ground level. Some bores installed in the granodiorite are reported to be relatively high yielding, and therefore may be indicative of decent water earing zones.

2.2.2. Springs

The Uralla area is characterised by spring-fed creeks and dams, although these are generally not mapped. The springs are likely a result of geological features such as volcanic intrusions, faults and dykes causing groundwater to flow upwards to the surface.

Real Estate reports for large properties in the area report “spring fed dams” however the flow rates and water quality are not reported. Some examples of these properties are:

- 2 Somerset Close, Uralla – this reports soft granite soils and a spring-fed dam
- 2225 Kingstown Road, Uralla – this reports a spring-fed dam on undulating grazing country
- 'JAMALON' Gostwyck Road Uralla - this reports fine granite property with natural timber shelter and established tree lines. Water availability is a feature of the property - there are 8 dams of which some are supplied by very reliable springs, and in particular, a spring-fed well that provides the water for an exceptional farm reticulation scheme.
- ‘Why Worry” 376 Kingstown Road Uralla – this reports rich red basalt country, with 2 spring fed creeks.
- 446 Balala Road, Balala – details of springs on the site are not provided but photographs show a large amount of water in dams and creeks on the site.

It would be advantageous to visit properties that are known to have spring-fed dams to assess the water quality potential of these water sources.

The Uralla Shire Council “Uralla Water Supply Yield and Water Quality Update” states the following regarding water quality in the springs feeding Kentucky Dam: *During dry periods deep springs can flow, bringing arsenic into creeks*. The presentation does not provide data from the springs to confirm this statement – HEC recommends that springs be sampled for the concentrations of arsenic. Arsenic (from arsenopyrite) has been shown to often associated with granite and contact fault zones within granite.

2.3. Review of Geophysical Survey Data

Airborne magnetics detects the subtle variability in the earth’s magnetic field caused by the presence and absence of ferromagnetic minerals such as magnetite (Fe3O4), maghemite (-Fe2O3), pyrrhotite (FeS) and ilmenite (FeTiO3). These minerals may be associated with stream-bed deposits and volcanic geology such as basalt intrusions.

Figure 5 in Appendix A shows the Total Magnetic Intensity (Reduced to Pole) image for the area. The data is a composite map derived from the merging of individual airborne magnetic surveys. The magnetic

intensity data is shown as a colour-sketch of the total values at a given location and does not provide depth data.

The TMI RTP image indicates isolated pockets of low magnetic responses that line up with areas mapped as basaltic geology. These areas are shown as a dark blue of Figure 5 of Appendix A. Interrogation of the licensed bores in these areas shows the highest yielding bores are also generally located within these zones. They may represent either fractured or weathered zones in the bedrock.

2.4. Current and Historic Mine Sites

The Uralla region is known for its mining potential, mainly for gold, but also other metals such as antimony, tin, copper and zinc. Figure 3 in Appendix A shows the location of known current and historical mine sites in the area. It can be seen from the figure that there are current mine lease areas to the north and east of Uralla township, and numerous derelict mine sites in all directions.

A review of current and historic mine site records was completed to identify the presence of water bearing zones encountered during mine activities in the area. Appendix C provides some excerpts are taken from the historical mining records that relate to the presence of groundwater. From the mining records, the following notes are made:

The local geological formations may be divided into six classes:

- Quaternary alluvials
- Basalt and laterite
- Tertiary alluvials
- Quartzite
- Granite hornblende and intrusive with associated dykes of quartz-porphyry and eurite
- Claystone and granitoid.

An area known as Sydney Flat and Doherty's Hill (northwest of Uralla township) was reported to have a layer of basalt and laterite overlying Tertiary Alluvials. The area is reported to be some 1.5miles wide and 15 to 140 ft thick. The gravel and sand is this area was reported to contain significant water, which flooded the mine shafts at a rate quick enough to force the miners out without enough time to retrieve their tools.

There are similar reports in other parts of Sydney Flat where running sands and water intrusion into the shafts and tunnels forced the miners to abandon works.

A review of the bore logs for licensed bores in this area described the geology as Clay over Granitic Sand (GW052964.1.1 and GW053549.1.1) which correlates with that encountered in the mine shafts. The bore logs at Jones Hill, Sydney Flat and bores to the north east near Arding report yields between 2.5L/s and 15.2L/s in similar geology.

Historical cross-sections produced in the 1800s are provided in Appendix D which show the water bearing zones of Jones Hill and Sydney Flatt.

3. WATER SHARING PLAN

The Uralla area straddles two water sharing plan areas; these are:

- Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources (2020) – New England Fold Belt MDB Groundwater Source.
- Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources (2016) – New England Fold Belt Coast.

3.1. Rules for Water Supply Works Approvals

The bore siting rules described in both of the above Water Sharing Plans are as follows:

Table 3 Water Sharing Plan Rules

Rule	New England Fold Belt MDB Groundwater Source	New England Fold Belt Coast
Rules to minimise interference between bores	No water supply work (bores) to be granted or amended within the following distances: • 200 m of an existing bore that is licensed to extract up to 20 ML/yr; • 400 m of an existing bore that is licensed to extract more than 20 ML/yr; • 200m of an existing bore that is used for basic rights; • 100 m of the boundary of the property (unless consent gained from neighbour); • 500m of a local or major water utility bore; and • 400m of a bore used by the Department for monitoring purposes.	Water supply work (bores) approvals may not be granted or amended if the work is within the following distances: • 200 m of an existing bore, on another landholding, in the same water source, for bores used for basic landholder rights only • 400 m of an existing bore, on another landholding in the same water source that is not used solely for basic landholder rights • 200 m of the boundary of the property (unless written consent gained from neighbour) • 500 m of a local water utility or major water utility bore, in the same water source (unless written consent gained from utility) • 400 m of a government monitoring or observation bore The plan lists circumstances in which these distance conditions may be varied.
Rules for bores located near high priority groundwater dependent ecosystems	No water supply work (bores) to be granted or amended within the following distances of any high priority groundwater-dependent ecosystem (GDE), or a river or stream: • 100 m of a high priority GDE for bores that are used for basic rights; • 200 m of a high priority GDE for bores that are not used for basic rights; • 500 m of a high priority karst environment GDE; • 40 m from the top of the high bank of a river or stream; and • 100 m from an escarpment. The plan lists circumstances in which these distance conditions may be varied. The plan may be amended to add or remove high priority groundwater dependent ecosystems.	Water supply work (bores) approvals may not be granted or amended if the work is within the following distances of any high-priority, groundwater-dependent ecosystem, or a river: • 40 m from the top of the high bank of a river • 200 m of a high-priority, groundwater-dependent ecosystem • 500 m of a high-priority karst environment groundwater-dependent ecosystems • 200 m of other high-priority, groundwater-dependent ecosystems • 500 m of the edge of a high-priority, groundwater-dependent ecosystem escarpment. The plan lists circumstances in which these distance conditions may be varied.
Rules for bores located near groundwater dependent culturally significant sites	No water supply work (bores) to be granted or amended within the following distances of a groundwater-dependent culturally significant site: • 100 m for basic landholder rights bores; and • 200 m for bores not used for basic landholder rights. The plan lists circumstances in which these distance conditions may be varied. Where a culturally significant site is also a high priority GDE, the more restrictive distance	Water supply work (bores) approvals may not be granted or amended if the work is located within the following distances of a groundwater-dependent, culturally significant area: • 200 m for bores not used solely for basic landholder rights. The plan lists circumstances in which these distance conditions may be varied.

Rule	New England Fold Belt MDB Groundwater Source	New England Fold Belt Coast
	restriction applies to the granting or amendment of a water supply work approval.	

3.2. Available Water Determinations

The New England Fold Belt Coast Groundwater Source had 24,532 ML/yr of unassigned water at the publishing date of the Water Sharing Plan (DPIEW 2016).

The available water determinations for the New England Fold Belt Groundwater Source (DPIEW 2020) will be made at the commencement of each water year.

4. POTENITAL BORE SITE SELECTION

Based on the information presented in Section 1 to Section 3, the following site are considered to present a potential of producing water:

Table 4 Recommended Bore Sites

Location	Number of Bores	Location	Anticipated Depth	Rationale	Land Ownership
Sydney Flat	3	Approx. 7km northeast of WTP	30 – 50m	Reports of rapid water ingress into mine shafts.	Private and Crown Land
Vicinity of GW96889.1.1 ("Lake View")	2	Approx. 3.8km south-southeast of WTP	140m	Yield >2.5L/s reported in bore log – corresponds to mapped granite outcrop and airborne magnetic anomaly.	Private and Crown Land (road verge)
High yielding gravels – Arding area	3	Approx. 13km northeast of WTP	20 – 50m	Yield >5L/s reported in bore logs, geology described as basalt overlying gravel.	Private
Cherry Tree Hill	2	2.5km southeast of WTP	30 – 40m	Yields >3L/s and basalt geology reported in bore logs.	Private and Crown Land (road verge)
Spring zones near Kentucky Creek	3	Within 2km of WTP	150m	Springs may be indicative of a geologically controlled constant water bearing zone in the granite.	Private
Regional spring zones	3	Within 5km of WTP	150m		Private

5. CONCLUSIONS

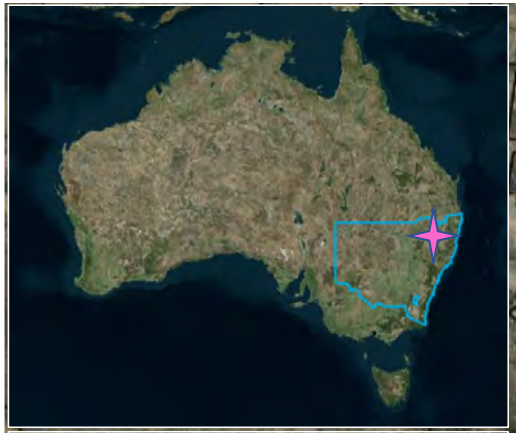
Based on the information reviewed as part of this desktop assessment, there appears to be water bearing zones in tertiary alluvial gravels/sands located under basalt caprock to the northeast of the WTP. Geological mapping indicates the basalt flows extend to the east of the WTP and isolated basalt outcrops are also present which may yield sufficiently high amounts of water for the additional water supply.

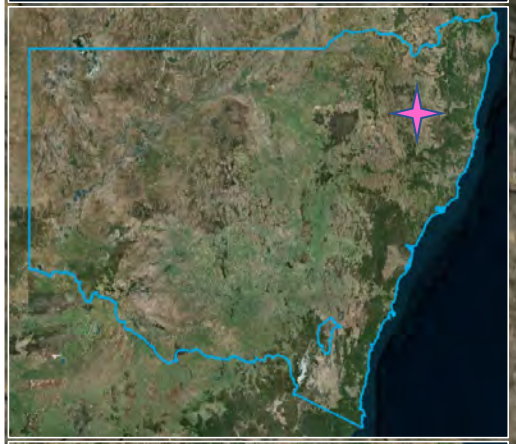
The geology in the immediate vicinity of the WTP comprises granodiorite which, based on the drilling reports for bores in the area, are low yielding and unlikely to provide sufficient water. Spring fed creeks and dams are reported to be present within the granites which may offer a viable water source, however further investigation into the flow rates and water quality will be required to confirm this.

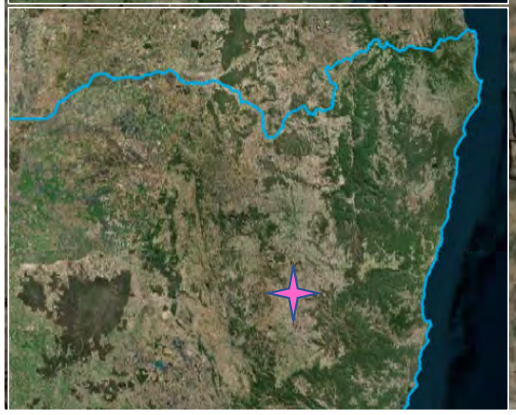
Given the above, there appears to be potential water bearing zones within the district that would be capable of delivering the required 1.5ML/day to augment the current water supply.

APPENDIX A

FIGURES





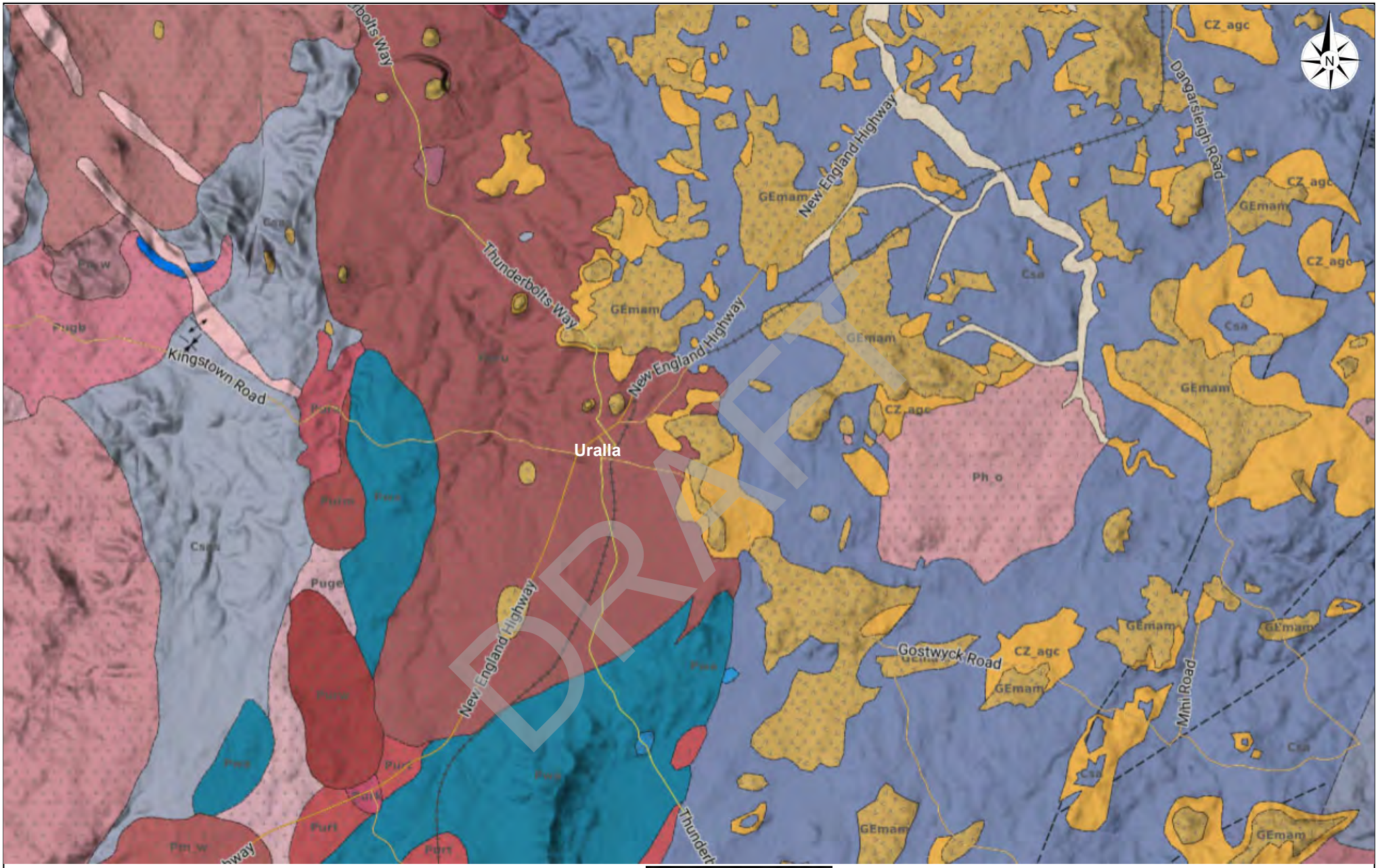


Smart Solutions

Title	|	Uralla Groundwater Assessment
Location	|	Uralla, NSW
Client	|	Uralla Council
Job No.	|	21054
Date	|	23/09/2021

FIGURE 1
Regional Location

Source: https://minview.geoscience.nsw.gov.au/



0m 500m 2,000m

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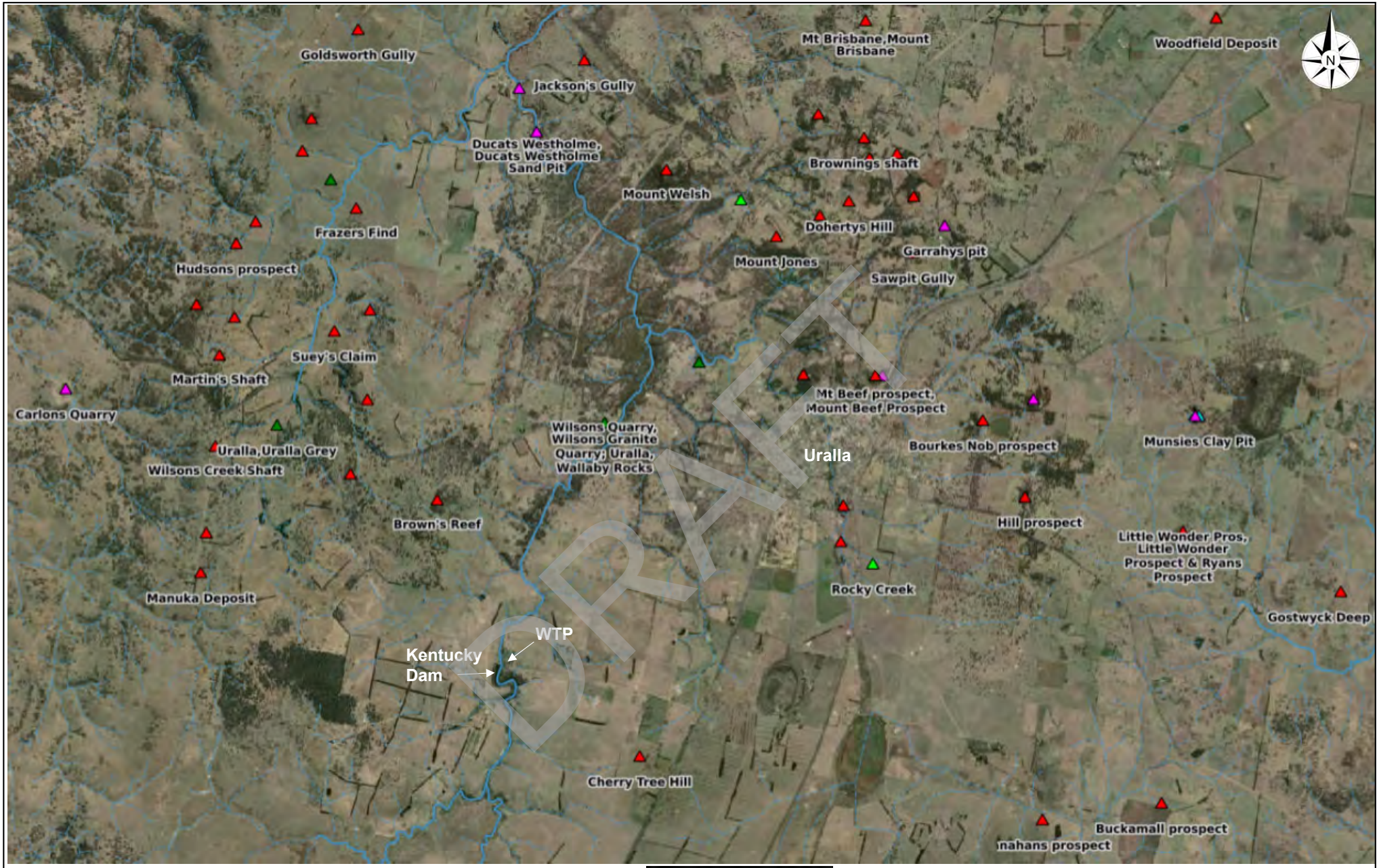
FIGURE 2
Regional Geology

Source: https://minview.geoscience.nsw.gov.au/



- Metallic minerals
- Construction materials
- Gem stones
- Dimension stone

0m 500m 2,000m

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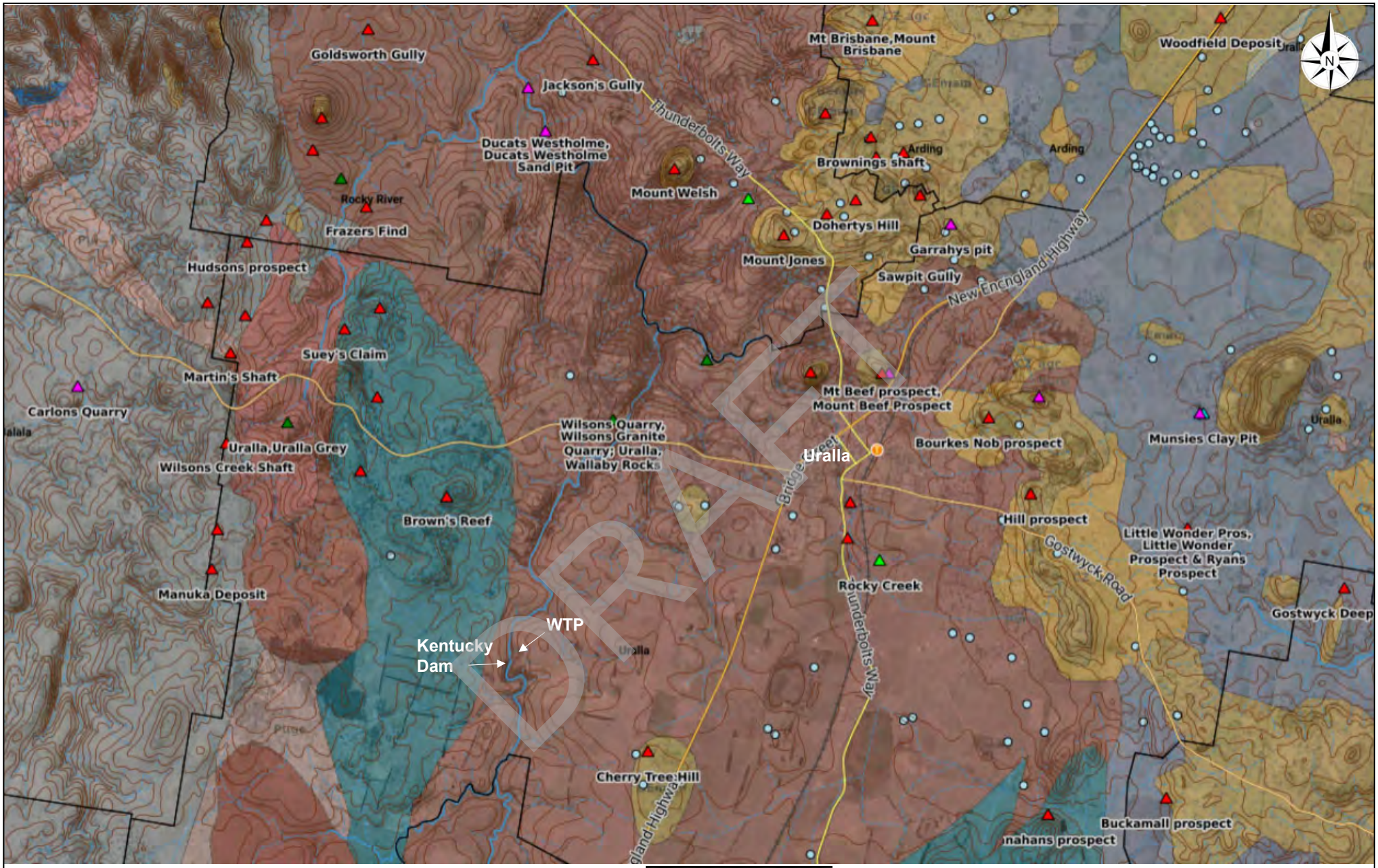
FIGURE 3

Current and Historic Mines

Source: https://minview.geoscience.nsw.gov.au/



Metallic minerals
Construction materials
Gem stones
Dimension stone

Licenced bore

0m 500m 2,000m

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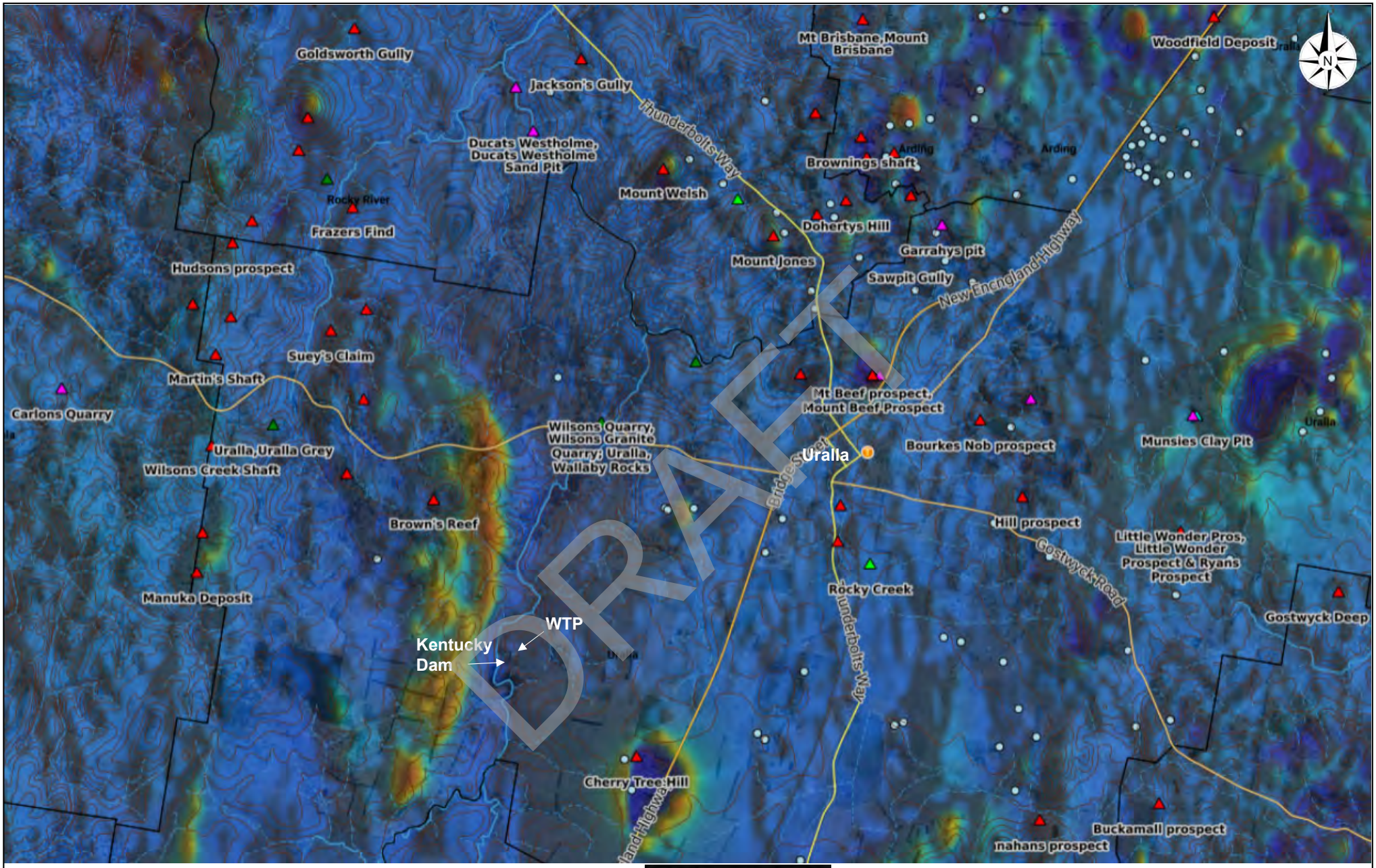
FIGURE 4

Topography, Geology, Groundwater Bores and Mines

Source: https://minview.geoscience.nsw.gov.au/



- Metallic minerals
- Construction materials
- Gem stones
- Dimension stone
- Licenced bore

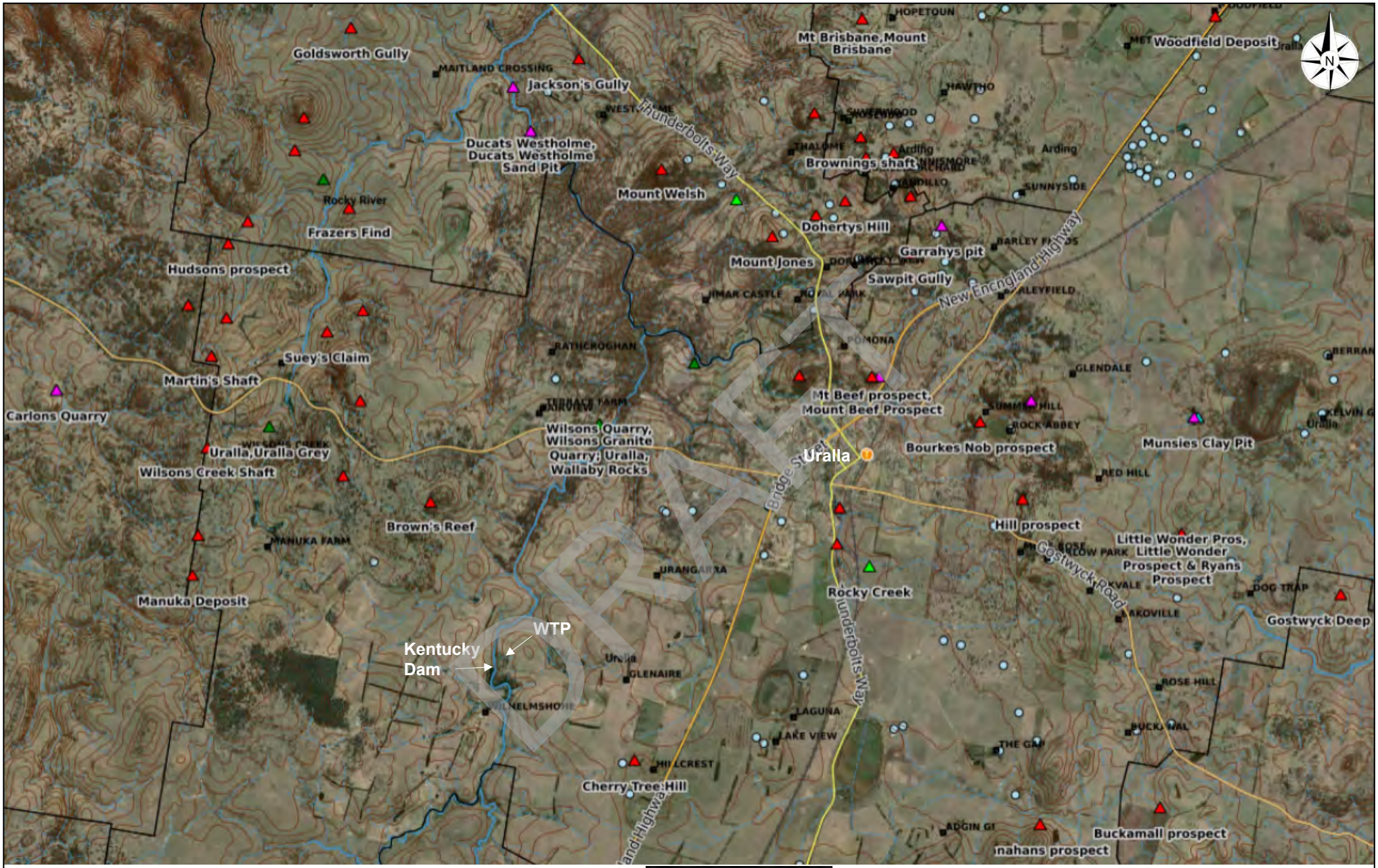
0m 500m 2,000m

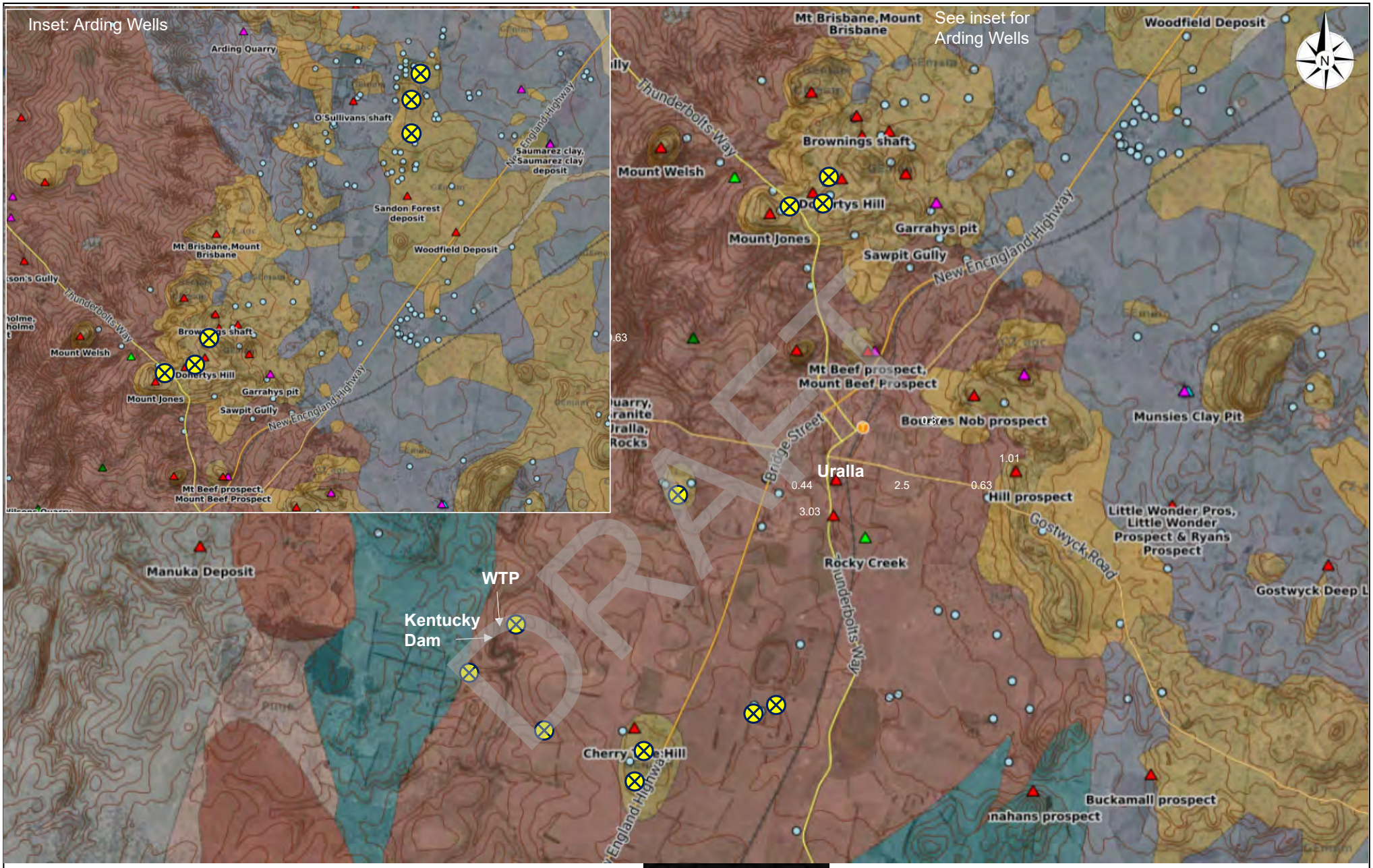
Smart Solutions

Title	|	Uralla Groundwater Assessment
Location	|	Uralla, NSW
Client	|	Uralla Council
Job No.	|	21054
Date	|	23/09/2021

FIGURE 5
Airborne Magnetic Survey

Source: https://minview.geoscience.nsw.gov.au/


Goldsworth Gully
Jackson's Gully
Ducats Westholme, Ducats Westholme Sand Pit
Rocky River
Frazers Find
Hudsons prospect
Suey's Claim
Martin's Shaft
Carlons Quarry
Uralla, Uralla Grey
Wilsons Creek Shaft
Brown's Reef
Manuka Deposit
Wilsons Quarry, Wilsons Granite Quarry; Uralla, Wallaby Rocks
Mount Welsh
Mt Brisbane, Mount Brisbane
Woodfield Deposit
Brownings shaft
Dohertys Hill
Garrahys pit
Mount Jones
Sawpit Gully
Mt Beef prospect, Mount Beef Prospect
Bourkes Nob prospect
Munsies Clay Pit
Uralla
Hill prospect
Little Wonder Pros, Little Wonder Prospect & Ryans Prospect
Gostwyck Deep
Rocky Creek
WTP
Kentucky Dam
Cherry Tree Hill
Buckamall prospect
Thunderbolts Way
New Englang Highway
Gostwyck Road
Bridge Street
DRAFT
Metallic minerals
Construction materials
Gem stones
Dimension stone
Licenced bore
Homestead
0m 500m 2,000m
Smart Solutions
Title | Uralla Groundwater Assessment
Location | Uralla, NSW
Client | Uralla Council
Job No. | 21054
Date | 23/09/2021
FIGURE 6
Topography, Mines and Homesteads
Source: https://minview.geoscience.nsw.gov.au/


Inset: Arding Wells
See inset for Arding Wells
Arding Quarry
O'Sullivans shaft
Saumarez clay, Saumarez clay deposit
Sandon Forest deposit
Woodfield Deposit
Mt Brisbane,Mount Brisbane
Thunderbolts Way
England Highway
Mount Welsh
Doherty's Hill
Garrahys pit
Mount Jones
Sawpit Gully
New Encngland Highway
Mt Beef prospect, Mount Beef Prospect
Brownings shaft
Bridge Street
Uralla
Munsies Clay Pit
Hill prospect
Little Wonder Pros, Little Wonder Prospect & Ryans Prospect
Gostwyck Road
Rocky Creek
Manuka Deposit
WTP
Kentucky Dam
Buckamall prospect
0.44
2.5
0.63
3.03
1.01
DRAFT
Metallic minerals
Construction materials
Gem stones
Dimension stone
Licenced bore
Homestead
Potential Bore Location
0m
500m
2,000m
Smart Solutions
Title | Uralla Groundwater Assessment
Location | Uralla, NSW
Client | Uralla Council
Job No. | 21054
Date | 23/09/2021
FIGURE 7
Potential Bore Locations
Source: https://minview.geoscience.nsw.gov.au/

APPENDIX B

BORE SEARCH

8.00	10.00	2.00	Granite; fractured	Granite	
10.00	21.00	11.00	Granite; grey, hard	Granite	
21.00	22.00	1.00	Granite; weathered	Granite	
22.00	50.00	28.00	Granite; grey, hard	Granite	

Remarks

03/10/2014: Form A Remarks:
Nat Carling, 15-Apr-2015; Coordinates based on location map provided with the Form-A.

***** End of GW971205 *****

WaterNSW
Work Summary

GW971228

Licence: **Licence Status:**

Authorised Purpose(s):
Intended Purpose(s): STOCK

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Down Hole Hammer
Owner Type: Private

Commenced Date: **Final Depth:** 74.00 m
Completion Date: 15/09/2014 **Drilled Depth:** 74.00 m

Contractor Name: TAMWORTH DRILLING CO
Driller: Garry Stanley Strudwick
Assistant Driller: Nigel Hawkins

Property: **Standing Water Level (m):** 36.000
GWMA: **Salinity Description:** Potable
GW Zone: **Yield (L/s):** 0.440

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	SANDON	URALLA	203//755846
Licensed:			

Region: 90 - Barwon **CMA Map:** 9136-1S
River Basin: 418 - GWYDIR RIVER **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6604620.000 **Latitude:** 30°40'55.9"S
Elevation Source: Unknown **Easting:** 353440.000 **Longitude:** 151°28'11.8"E

GS Map: - **MGA Zone:** 56 **Coordinate Source:** Unidentified

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.00	215			Down Hole Hammer
1		Hole	Hole	5.00	74.00	165			Rotary - Percussion - Foam Injection
1		Annulus	Cement Grout	0.00	5.00	215	168		PL:Poured/Shovelled
1	1	Casing	Pvc Class 9	-0.50	74.00	135	125		Cemented, Glued, S: 45.00-74.00m
1	1	Casing	Steel - Erw	-0.50	2.00	168	156		Cemented, Welded - Butt
1	1	Opening	Slots - Horizontal	40.00	50.00	135		0	Mechanically Slotted, PVC Class 9, Glued, SL: 100.0mm, A: 0.25mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
44.00	45.00	1.00	Unknown	36.00		0.44		02:00:00	

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Clay; red	Clay	

1.00	14.00	13.00	Granite; broken	Granite	
14.00	42.00	28.00	Granite; grey	Granite	
42.00	57.00	15.00	Shale; black	Shale	
57.00	74.00	17.00	Granite; grey	Granite	

Remarks

15/09/2014: Form A Remarks:
Nat Carling, 16-Apr-2015; GPS provided on the Form-A was incorrect. Coordinates based in the centre of the authorised land, map sent to owner for true location.

***** End of GW971228 *****

WaterNSW
Work Summary

GW971235

Licence: **Licence Status:**

Authorised Purpose(s):
Intended Purpose(s): STOCK

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date: **Final Depth:** 93.00 m
Completion Date: 09/01/2015 **Drilled Depth:** 93.00 m

Contractor Name: (None)
Driller: Samuel Keen
Assistant Driller: JV Keen, DL: 1635

Property: **Standing Water Level (m):** 18.300
GWMA: **Salinity Description:** Potable
GW Zone: **Yield (L/s):** 2.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	SANDON	ARDING	250//755807
Licensed:			

Region: 90 - Barwon **CMA Map:** 9136-1N
River Basin: 418 - GWYDIR RIVER **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6619060.000 **Latitude:** 30°33'07.4"S
Elevation Source: Unknown **Easting:** 354422.000 **Longitude:** 151°28'56.0"E

GS Map: - **MGA Zone:** 56 **Coordinate Source:** GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.10	254			Rotary Air
1		Hole	Hole	6.10	93.00	170			Rotary Air
1		Annulus	Cement Grout	-0.30	82.00	170	134		PL:Tremie Pipe
1		Annulus	Cement Grout	0.00	6.10	254	178		Graded, PL:Tremie Pipe
1		Annulus	Bentonite	82.00	82.40	170	134		PL:Tremie Pipe
1		Annulus	Waterworn/Rounded	82.40	86.50	170	134		Graded, PL:Tremie Pipe
1		Annulus	Bentonite	86.50	87.00	170	123		PL:Tremie Pipe
1	1	Casing	Galvinised Steel	-0.30	93.00	134	125		Seated on Bottom, Welded - Butt, S: 86.50-93.00m
1	1	Casing	Steel	-0.30	6.10	178	170		Driven into Hole, Welded - Butt
1	1	Opening	Screen - Wedge Wire	83.50	86.50	123		0	Stainless Steel 304, Welded - Butt, A: 0.25mm
1	1	Opening	Slots - Horizontal	83.50	86.30	134		0	Oxy-Acetylene Slotted, Galvenised Steel, Welded - Butt, SL: 200.0mm, A: 0.25mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

67.10	73.20	6.10	Unknown	18.30		1.01		01:00:00	
82.30	88.40	6.10	Unknown			1.49			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Topsoil; brown, coarse grained	Topsoil	
0.30	6.10	5.80	Granite; decaying, yellow, medium/coarse grained	Granite	
6.10	82.30	76.20	Granite; blue, medium/coarse grained	Granite	
82.30	93.00	10.70	Sand; black, fine/medium grained	Sand	

Remarks

09/01/2015: Form A Remarks:
Nat Carling, 17-Apr-2015; Coordinates based on location map provided with the Form-A.

***** End of GW971235 *****

WaterNSW
Work Summary

GW971296

Licence:
Licence Status:

Authorised Purpose(s):
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 20/12/2014
Final Depth: 68.00 m
Drilled Depth: 68.00 m

Contractor Name: TAMWORTH DRILLING CO
Driller: Garry Stanley Strudwick
Assistant Driller: Nigel Hawkins

Property:
GWMA:
GW Zone:
Standing Water Level (m): 27.000
Salinity Description: Potable
Yield (L/s): 0.125

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	SANDON	ARDING	5//203471
Licensed:			

Region: 90 - Barwon
River Basin: 418 - GWYDIR RIVER
Area/District:
CMA Map: 9236-4N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6620980.000
Easting: 357556.000
Latitude: 30°32'06.4"S
Longitude: 151°30'54.5"E

GS Map: -
MGA Zone: 56
Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	12.00	200			Rotary Air
1		Hole	Hole	12.00	68.00	165			Rotary - Percussion - Foam Injection
1		Annulus	Cement Grout	0.00	12.00	200	170		PL:Poured/Shovelled
1	1	Casing	Pvc Class 9	0.00	62.00	135	125		Seated on Bottom, Glued, S: 59.00-68.00m
1	1	Casing	Steel - Erw	0.00	12.00	170	158		Other
1	1	Opening	Slots - Horizontal	30.00	60.00	135		0	Mechanically Slotted, PVC Class 9, Glued, SL: 100.0mm, A: 0.35mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
35.00	36.00	1.00	Unknown	27.00		0.07			
58.00	59.00	1.00	Unknown			0.05		01:00:00	

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

0.00	12.00	12.00	Clay; red	Clay	
12.00	26.00	14.00	Shale; grey	Shale	
26.00	30.00	4.00	Shale; weathered	Shale	
30.00	57.00	27.00	Shale; grey	Shale	
57.00	60.00	3.00	Shale; weathered	Shale	
60.00	68.00	8.00	Shale; hard, grey	Shale	

Remarks

20/12/2014: Form A Remarks:
Nat Carling, 23-Apr-2015; Coordinates based on location map provided with the Form-A.

***** End of GW971296 *****

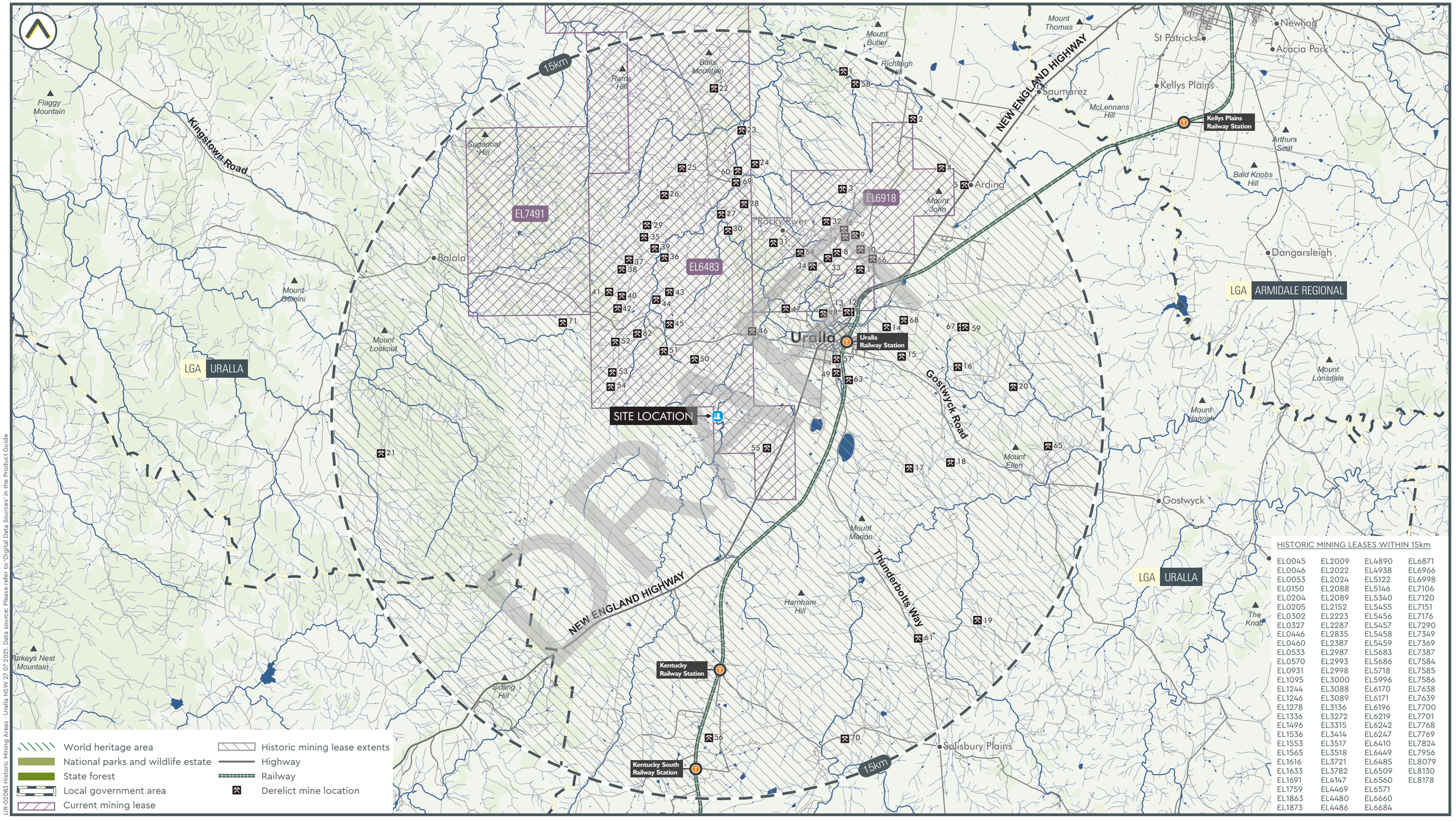
APPENDIX C

HISTORICAL MINE LOCATIONS

HISTORIC MINING INSIGHT

MAP 1

Historic Mining Areas - Uralla NSW



World heritage area
National parks and wildlife estate
State forest
Local government area
Current mining lease
Historic mining lease extents
Highway
Railway
Derelict mine location

HISTORIC MINING LEASES WITHIN 15km

EL0045	EL2009	EL4890	EL6871
EL0046	EL2022	EL4938	EL6966
EL0053	EL2024	EL5122	EL6998
EL0150	EL2088	EL5146	EL7106
EL0204	EL2089	EL5340	EL7120
EL0205	EL2152	EL5455	EL7151
EL0302	EL2223	EL5456	EL7176
EL0327	EL2287	EL5457	EL7290
EL0446	EL2835	EL5458	EL7349
EL0460	EL2387	EL5459	EL7369
EL0533	EL2987	EL5683	EL7387
EL0570	EL2993	EL5686	EL7584
EL0931	EL2998	EL5718	EL7585
EL1095	EL3000	EL5996	EL7586
EL1244	EL3088	EL6170	EL7638
EL1246	EL3089	EL6171	EL7639
EL1278	EL3136	EL6196	EL7700
EL1336	EL3272	EL6219	EL7701
EL1496	EL3315	EL6242	EL7768
EL1536	EL3414	EL6247	EL7769
EL1553	EL3517	EL6410	EL7824
EL1565	EL3518	EL6449	EL7956
EL1616	EL3721	EL6485	EL8079
EL1633	EL3782	EL6509	EL8130
EL1691	EL4147	EL6560	EL8178
EL1759	EL4469	EL6571	
EL1863	EL4480	EL6660	
EL1873	EL4486	EL6684	

0 5km

Land Insight

LR-02083 Historic Mining Areas - Uralla NSW 27 07 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

I. *General Geological character with special reference to the Metalliferous deposits of value.*

The Rocky River Goldfield, which embraces the town of Uralla, and lies principally to the west of it, has an area of 22½ square miles. The field is situated on the western watershed of the Dividing Range, and at the nearest point is only one mile distant from the main line of water-parting. The Dividing Range is here so flat that it is impossible to tell with the unaided eye in which direction the surface slopes. This evenness of surface is chiefly due to the filling up of pre-existing valleys by extensive flows of basalt. Tabular hills, composed of basalt and laterite, rise in places to a height of 150 feet above the general level of the country. At a distance of from 1 to 3 miles west of the main line of water-parting, the basalt has been denuded by the deeply-eroded valleys of the Rocky River and its tributaries, leaving bare the underlying granite and altered Siluro-Devonian claystone.

The local formations may be divided into six classes:—

Quaternary Tertiary: 6. Recent alluvials; 5. Basalt and laterite; 4. Tertiary alluvials; 3. Quartzite; 2. Granite hornblendic and intrusive, with associated dykes of quartz-porphyry and eurite.
Siluro-Devonian: 1. Claystone and granitoid.

RECENT ALLUVIALS 1 to 7m thick

Quaternary: 6. *Recent alluvials.*—These consist chiefly of quartz-sand and quartz-gravel intermixed with greenish micareous soapy clay, derived from the waste of the granite. The thickness varies from a few feet to 20 feet. Pieces of subangular quartz are occasionally found 6 inches in diameter. The sandgrains in these alluvials are more or less angular or subangular, but contain rounded grains and pebbles, derived from the Tertiary alluvials, of quartz, zircon, spinel, and litaniferous iron. Litaniferous iron (= ilmenite) is abundant at Wallaby Gully, where a pebble of that mineral has been found 2 inches in diameter. The gold associated with these beds is coarser and more angular than that contained in the Tertiary alluvials. This formation is principally developed along the banks of the Rocky River and its tributaries, Kentucky and Uralla Creeks, and Green, Cabbagetree, Wallaby, Post-office, Blunt Welsh, and Sawpit Gullies, &c. Volcanic bombs of glassy basalt, called locally "buttonstones," are plentifully distributed through these beds, especially near the junction of the Green Gully with Kentucky Creek. The bombs are spherical discs, shaped like a doubly convex lens, from the size of a sixpence up to that of a penny. The under surface shows spinal grooves, while the upper is cellular. Many of the bombs have delicate rims curved slightly upwards so as to form tiny saucers, and the edges are translucent.

Tertiary: 5. *Basalt and Laterite.*—This formation occurs in oval patches at the outliers of Mts. Mutton, Beef, Welsh, Harris, and Monoply, and at Cherrytree Hill, and in a wedge-shaped mass at Mt. Jones and Sydney Flat, widening to the N. E., where it becomes united at Doherty's Hill to a sheet, 1¾ miles in width. Its thickness ranges from 15 to 140 feet. The color varies from dark-green to dark-blue. In some places this rock can be pierced with a pick, while in others it is so hard as to require blasting powder for its removal. Columnar structure is prevalent, especially at the outlier close to Uralla, called Mt. Beef, where a fine section is exposed in a quarry. At the No. 2 Bullion shaft the basalt, which was soft and friable, contained large erupted fragments of granite, some of them being tons in weight. The granite blocks are roughly rounded, and were described as being rudely bedded in the basalt as though tipped from a cart, the beds dipping steeply northwards.

Laterite, composed of red volcanic dust and fragments of decomposed erupted basalt, forms the capping of the Sugarloaf, near Doherty's Hill, of Doherty's Hill and of a hill near Mount Butler, in portion 26, parish of Ellon. The summits of these hills have a cindery scoriaceous appearance, and have certainly been points of eruption.

4. *Tertiary Alluvials.*—The sands, gravel, and clay of the deep leads. These beds are mostly capped by basalt though not co-extensive with it, as has been proved by several shafts in which the basalt has been found resting directly on the granite. The alluvial beds, as shown on plan No. 2, were found to lie in long hollows in the granite. The width varies from 5 to over 40 chains, and the thickness from a few feet up to 114 feet. The average thickness on the main lead, between Mount Jones and Doherty's Hill, was about 30 feet. The greater part of the beds is composed of a very fine yellowish grey quartz sand, much rounded; and near the bed rock the sand becomes much coarser, passing into a fine gravel, composed of rounded doubly hexagonal quartz crystals, locally called "hailstone gravel." The gravel immediately overlying the wash is cemented in places by brown iron ore, so as to form a hard crust about an inch in thickness. Round lumps of greenish decomposed dolerite (a variety of coarse crystalline basalt) are found in this gravel at Mount Jones, in Mr. French's new tunnel, and at Mount Mutton. These blocks, which are from 3 inches to 2 feet in diameter, are not waterworn, but erupted, and resemble those found in the laterite at Doherty's Hill, and do not therefore imply that the leads in which they occur are younger than those which do not contain such fragments. The gold gravel is usually rich near these blocks, owing probably to eddies having formed round them, in the water by which the gold was drifted.

It is a feature worthy of notice, in connection with the occurrence of these alluvials under outlying patches of basalt, that the bed rock on which they rest has a slight dip on all sides towards the centres of the hills, from which it may be inferred that the preservation of the outliers is due to the fact of their lying in slight hollows, where they would be less exposed to denudations than at higher levels.

The clays are pale greenish grey, yellow, and black. The black and yellow varieties often contain fossil leaves. One of these, given me by Mr. W. Cleghorn, is identical with one of most common occurrence in the deep leads of stream-tin at Rose Valley, near Emmaville. In the long tunnel, a bed of grey clay was noticed by me, over 5 feet in thickness, and with the exception of a few interstratified seams of fine sandy clay, was remarkably pure and free from grit; and being strongly plastic, might form a good pottery clay, though this could not be determined without actual experiment.

There is not sufficient evidence afforded, by the Rocky River lead, to determine whether the tertiary alluvials are of marine or of freshwater origin. The shape of the worked lead is suggestive of an old river channel, with tributaries; but the fineness and clean character of the drift, and the smallness of fall in the bed rock, favour the inference that it is a deposit partly of marine origin, though no marine fossils have ever been found in the beds. There is, however, the most conclusive evidence that the alluvials under Doherty's Hill were laid down on a land surface, as is proved by the great quantities of fossil leaves and wood preserved in dark clays, which were found in sinking the Phoenix, Parker, and Edmonds' shafts, &c., north of Doherty's Hill. From the width of the alluvials at the Bullion shafts, and from the great thickness and persistence of the black carbonaceous clay lying next to the bed rock (37 feet thick at No. 4 Bullion, and about 30 feet in No. 5), as well as from the rapidity of the fall into this deep ground from Sydney Flat, it would appear that this part of the deposit is of lacustrine origin.

Probably all the leads in this neighbourhood were brought into their present positions by the agency of fresh water only, though much of the material in them may have been derived from marine beds.

The main lead appears to have been laid down by one or more rivers, or by one river flowing at different levels at different ages, running from Mount Welsh to Mount Jones, and through Sydney Flat to Doherty's Hill, and thence into a small lake, on the west margin of which was worked the "Sons of Temperance" lead. At Mount Welsh, the bottoms of the channel at both ends of the outline are so nearly on a level, that it is difficult to determine the direction of the flow; and Mr. W. French, who worked part of the lead here, is of opinion that the fall is here from east to west, but the general fall of the main lead is in the direction already indicated.

2. *Granite.*—The granite is of a medium coarseness of grain, composed of quartz, felspar, dark mica, and hornblende. The mica is occasionally aggregated into nests, from ½ to 2 inches in diameter. The granite is jointed in a direction 32° E. of N. and W. of S.; and is intersected by veins of eurite, coursing N. to S., and 15° N. of E. and S. of W., from ½ to 1 foot wide, and by dykes of felspathic and micaceous trap rock. The strike of these dykes is 10° N. of W. and S. of E. The largest dyke observed, in Mount Welsh Gully, is 8 feet wide, and strikes at 20° S. of W. and N. of E., and is highly micaceous. A dyke of trap rock at the S.W. end of Mount Jones contains a little pyrites, but the actual presence of gold in the dyke has not yet been detected. Dykes of quartz-porphyry, probably connected with the granite, have cut the claystone and granitoid on the west side of the main deep lead, in portions 238, 241, and water reserve, 338, parish of Arding. The granite is slightly intrusive at its line of junction with the granitoid. Veins of quartz traverse the granite in places, chiefly composed of white milky quartz, barren of any metal excepting iron. A promising looking reef of porous ferruginous quartz, near the junction of Jackson's Gully with the Rocky River, is 2½ feet wide, and strikes 36° E. of N. and W. of S. A sample of stone selected by me, and assayed by the Government Analyst, showed only a trace of gold under 2 dwts. per ton. A large barren quartz reef about 5 feet wide, and having an E. and W. strike, occurs 1 mile W. of Uralla, about the point shown on the plan.

The only reef in the district in which gold is said to have been found is one situated in portion 91, parish of Devon, at the point shown on the map. From the general non-auriferous character of the quartz veins where the alluvials are richly gold-bearing, and from the fact that the bed-rock in places for a radius of more than a mile from the gold-bearing alluvials, is composed of granite as well as from the fine and crystalline nature of the gold itself, it would appear that the gold was originally derived from the granite.

Siluro-Devonian(?): 1. *Claystone and granitoid.*—The Palaeozoic sedimentary rocks, which have been slightly intruded by the gold-bearing granite, are dark-blue to brownish claystones passing towards the margin of the granite into a fine-grained greenish-brown crystalline rock, in appearance resembling basalt. This rock is seen at O'Brien Sugarloaf, extending thence to the head of Wallaby Gully, and in the parish of Arding in portion 244 (James Bishop's) near Mrs. Bullen's house in portion 90, &c., striking south-easterly across the main road from Uralla to Armidale. It is a true bed-rock and it is useless to search under it for alluvial gold. A shaft has, however, been sunk to a considerable depth with such an expectation in Wiggin's selection, portion 241, parish of Arding.

(a) The main Sydney Flat lead was almost exhausted in a single year by the labour of 3,000 diggers. Since then many attempts have been made to prove the continuation of this lead, the most successful being those conducted by Mr. J. Anderson and others, which led to the discovery of the Sons of Temperance lead. (See plan No.2.) At the base of Doherty's Hill a bar in the bed-rock split the lead, sending one branch easterly and the other northerly. The northerly branch was proved by the Esperanza tunnel, and was picked up further north and followed for a distance of nearly ¼-mile in the Sons of Temperance lead. The sinking here was through basalt, and about 130 feet deep. The lead was from two to three chains wide and the wash from 2 to 3 in. thick, stated as yielding sometimes over 1 oz. per load. The bed-rock was very flat. At Haythorne's shaft, however (No. 14 on No. 2 plan), a perpendicular fall was found in the bed-rock of at least 5 ft. The lead proved payable and was worked up to the edge of the fall. The miners were unable to get down to the bed-rock beyond, owing to the great quantity of water in the sand. The Phoenix shaft (No. 10 on plan No. 2) was sunk in the hope of striking the right branch of the E side of the bar. The shaft was bottomed on to granite at a depth of 166 ft. and then sunk in the granite to a depth of 182 ft. A drive was then put in in an easterly direction at a level of 179 ft. from the surface, which tapped the drift and proved the bed-rock to be still dipping. A monkey-shaft was then sunk in the bottom of the drive, and a second drive put in at a lower level which cut the drift again at a distance of 20 ft. from the main shaft, proving that the bed-rock dipped 24 ft. in that distance. The workings were choked with running sand and water before the prospectors could get down to the bottom of the channel. Parker and Edmond's shaft (No. 9 on 2 plan) was sunk to a depth of 96¼ ft., through 86 ft. of basalt, 2¼ ft. of carbonaceous clay, with fossil leaves, and 8 ft. of compact sand. Water then rose in the shaft so rapidly that the men barely had time to escape, and had to leave their tools behind them. The shaft was subsequently bottomed by Mr. R. Roberts with boring rods at a depth of 106 ft.

Annual Report Compilation – Uralla Division – Manilla/Dorrigo Sheet 1875 – 1975; Geological Survey of New South Wales, 1975

seem to be satisfactory to themselves.

10. At the Rocky River, however, much enterprise is being displayed, but the fruits are not yet apparent. Nearly all the gold-mining operations here are carried out under the sluicing system, and as the miners depend upon their water supply mainly from storm waters, the recent drought has seriously militated against them; I cannot perhaps better allude to the condition of this field than by drawing your attention to Appendix No. 1, kindly furnished me by Mr. Roman. The Long Tunnel Company therein referred to, I may add for your information, was formed to work a large area of ground known in the early history of the field as Sydney Flat. Very good results were obtained in several shafts sunk here; in fact some of the claims proved immensely rich. In certain claims the water beat the miners, and they were compelled to abandon the ground for want of appliances. The object of the party who now propose working this locality is to drain it by means of a tunnel driven through one of the ridges surrounding the flat, and subsequently working the auriferous stratum in the ordinary way. Seeing that the most prominent shareholders in the company are old Rocky River miners and thoroughly familiar with the ground, there is every prospect of the enterprise being singularly profitable.

1879/145

79/145 Rocky River, 29th December, 1879.

Sir,—I have the honor to report for your information, that this company have continued prospecting operations during the present year, and hope to be able to continue them until the rich gold lead of Sydney Flat shall be proved to extend through the deep wet ground to the east of the ground worked and abandoned about twenty years ago, the miners of that period being unable to proceed further on account of excess of water together with a heavy deposit of loose sand, which came away with the water, when the ordinary method of bailing or pumping was adopted. The bed rock (granite) rises to or near the surface on each side of the supposed deep lead, at a distance of about ¾ of a mile apart. When the Bullion company began operations advantage was taken of the soft granite which forms the rim of the deep basin or hollow. The first shaft reached the granite at a depth of sixty feet dry, it was then carried down a further depth of 41 feet in the soft granite, the close greasy texture of which renders it almost impervious to water, after a sufficient well hole had been provided in the bottom of the shaft and the pump duly fixed for work, a tunnel was cut in the direction of the dip, and test holes bored upwards with an auger, when the water and drift were tapped overhead, a tube 3 inches in diameter perforated with ½ inch holes about 1½ inch apart, was driven into the hole made by the auger, and stopped at the bottom with a wooden plug, the tunnel was driven further until five similar tubes were fixed, the plugs were then withdrawn and the water allowed to flow in such quantities as the pump could manage, or altogether stopped at pleasure. This experiment succeeded beyond the most sanguine expectations of the company, as the water came away perfectly clear, soon after the tubes were opened, a few pebbles settled around each hole at the back of the tubes and effectually prevented the fine loose sand from coming through, a shaft was then sunk over the tunnel and the ground being thoroughly drained, could be worked without trouble. It was

Water supply is of course a most momentous question in the prosperity of the company. Our water reservoir, which is capable to a large extent of increased storage, is at present full, and although no water has yet been tapped from the alluvial, yet the constant drainage and leakage through the granite pierced in the workings, amounts to about one-third of a box sluice head, giving indications of a water supply of a most permanent character.

PEEL AND URALLA DISTRICT—URALLA DIVISION.

(*Edward Marriott, Mining Registrar.*) 82/87

Since forwarding you my annual report on the Uralla Division of the Peel and Uralla Mining District for the year 1882, I have received the enclosed report from Mr. S. Betheras, Manager of the Long Tunnel Gold-mining Company, Rocky River, relative to the operations of that Company during the past year. I have now the honor to request you will append the report now forwarded to my report for this district.

"Mr. S. Betheras, of Long Tunnel Gold-mining Company (Limited), Uralla, reports:—"I have the honor to report, for your information, that the above company's tunnel has been driven 1,800 feet from the mouth. The company, for some time past, have tried by various means to get into the wash above, but through the great pressure of water in the drift, found it impossible to do so from the tunnel. They have, within the last two months, sunk a shaft from surface to the water level, then drove two 4-inch pipes through into a jump-up from the tunnel, enabling them to sink the shaft through to the jump-up, and so drain the ground. They are now driving into the wash, and hope to commence sluicing in a week or two. They have now every prospect of having a good payable mine."

The official visit of Mr. David, Geological Surveyor, and Mr. Stonier, of the Mines Department, their survey, inspection, and report thereon, has caused some activity amongst the resident miners, and several blocks of ground have been taken up in the direction pointed out by Mr. David as the probable continuation of the Sydney Flat lead by Mount Doherty. One shaft (Rico's) has been sunk into the bottom drift, showing very favourable indications, as also gold. The water, however, is heavy, and pumping gear and machinery must be obtained before the ground can be fully tested and developed. The sinking is heavy (basaltic) and deep. There

It was hoped that the gold obtained from the worked sands of Sydney Flat would be sufficient to pay for the expense of driving the tunnel. These expectations have, however, not yet been realized, as the worked gold-sands at present are stated to produce only from 1 to 8 dwts. per load, 8 dwts. being about the richest yield. The drift here is a fine ferruginous quartz-sand with some clay. The ultimate success of this Company will, of course, depend on how far the unworked portion of the lead under Doherty's Hill is payable, as the Company have conclusively proved that the percentage of gold in the worked deep lead ground under Sydney Flat is, by itself, quite inadequate to pay the expenses of extending the tunnel. A great deal of work has been done at Mount Jones by Mr. W. French, and he is at present engaged single-handed in the great task of putting a tunnel into Mount Jones at a level of about 70 feet above that of the Sydney Flat gold-wash, to strike what he believes will prove an upper lead of payable auriferous gravel under the basalt of which Mount Jones is formed. Mr. French has already tunnelled into Mount Jones at its N.W. end for a distance of 700 feet, and proved that there exists, between the granite and the basalt a considerable body of fine quartz sand containing a little gold. The sands are composed of clean, well-worn quartz grains, showing current bedding, which, in Mr. French's old tunnel, dip in a direction S. 20° E., as though the currents by which they were deposited flowed from N.N.W. In Mr. French's new tunnel large rounded lumps of dolorite basalt are of frequent occurrence in the sand, and rest immediately on the granite. Similar lumps were observed by me in the gold wash at Mount Mutton, and in the red laterite on the top of Doherty's Hill. They are quite unlike the overlying basalt, though clearly of volcanic origin, and indicate that Mr. French's lead is as old as that at Mount Mutton. Fragments of true basalt tuff are associated with them in the drift in this tunnel. Mr. French is doing a valuable work in testing the payability of these high level auriferous sands. At Fiddler's rush, on Sydney Flat, Mr. John Anderson is working the deep lead sands on the northern edge of the Sydney Flat lead in an open cutting. At Mount Jones Mr. Klindest is working on the edge of the old Mount Jones lead, his shaft being 46 feet deep, giving the following descending section—35½ feet basalt; 3 feet sandy clay; 5½ feet fine yellow clayey sand; 4½ feet fine current bedded quartz sand, resting on a wash of rotten granite.

At Mount Welsh, Mr. James Young is working the recent alluvials in Mount Welsh Gully, and at the S.W. end of Mount Welsh Mr. W. Herbert is tunnelling into the hill. The Messrs. Tebbs are working the gold gravel at the N.E. end of Mount Mutton. The tertiary alluvials here consist of fine red sands and grey sandy clay, with intensely worn pebbles of granite quartz ¼-inch in diameter. The payably auriferous part of the drift (wash) lies next to the red rock, having a thickness of 3 inches, and is composed of fine quartz gravel (="hailstone gravel.") A great deal of mica is mixed with it, making it soapy to the touch. Round lumps of rotten dolorite are found in the wash here as at French's tunnel; and round pebbles of smoky quartz and grains of red and yellow zircon are not uncommon. Above the wash comes reddish brown sand and grey clayey sand; the total thickness of the alluvial beds being about 9 feet, though towards the centre of the hill, as much as 20 feet. The whole is capped by dense columnar basalt, having a thickness of about 45 feet.

(2.) *Tertiary Alluvials* form a vast subterranean reservoir in which a practically inexhaustible supply of water is stored under the line of water-parting of the Dividing Range. Owing to these beds being hidden under thick sheets of basalt, it is impossible to estimate their exact extent. Some idea of it may be formed from the following already ascertained facts. To the north of Doherty's Hill, these beds are water-bearing for a width of at least half a mile, and vary in thickness from 10 to 70 feet. Their length is to be estimated in miles. Numerous wells have been sunk at intervals through the basalt covering these alluvials for over 3 miles northerly from Doherty's Hill, and with few exceptions have struck good supplies of water in the underlying alluvials. At the No. 2 Bullion shaft, the water is 69 feet deep; at the No. 4 Bullion shaft, 70 feet; and at Parker and Edmund's shaft, 38 feet. At the No. 2, Bullion shaft, the flow of water was so strong that a plunge and lift pump, throwing 3,000 gallons of water per hour was barely able to lower the water. As future mining operations on this gold-field will be centred on the deep leads, it appears to me that it should always be possible to obtain water in sufficient quantity for mining purposes from the water-bearing beds contained in the leads. When the leads are worked, it will be obviously necessary to constantly pump large quantities of water to the surface, to drain the mines, and the water so raised might, without further expense, be utilised for sluicing, as was done so successfully by the late Mr. T. Flannery on his tribute area to the Wesley Company, at Rose Valley, on Vegetable Creek, and is now being done here on a small scale by the Long Tunnel Company.

III. I have reported elsewhere on the modification of the present boundaries of the Rocky River and Uralla Gold-field Reserve.

Every assistance was rendered by Mr. Stonier and myself, by Mr. James Glendenning, Secretary of the Miners' League, and Mr. W. Cleghorn, J.P., supplied much valuable information. I have also to acknowledge the kind help afforded by the following residents:—Messrs. John Anderson, Dewson, W. French, J. D. Lace, R. Roberts, H. Roman, A. P. Smith, Tebbs Bros., J. Young, and others.

I have, &c.,

T. W. E. DAVID,
Geological Surveyor.

1887/21

At Doherty's Hill (Uralla) a shaft has been bottomed with great difficulty owing to the quantity of water, and prospects obtained of about 3 oz. per load. Machinery has now been erected for draining the mine. Other companies have sunk shafts and erected machinery, but have not yet overcome the water. A rush to Wallaby Rocks occurred. The ground is now sinking about 20 feet. One party realized at first from [illegible] load: The present average is 11 to 13 dwt. Sluicing operations are steadily

At Doherty's Hill, about 3 miles west of Uralla, a considerable amount of work has been done during the year. It will be remembered that Mr. Surveyor David, when sinking the district at the latter end of 1886, pointed out this locality as one likely to bear rich deposits. Every available piece of land in the vicinity has been secured, either by lease application or under the Mining Board regulations. I am informed by old residents that the ground was tried many years ago, but the water proved an insuperable obstacle, which frustrated all the efforts of the early miners to reach the bed rock and test the ground.

Rice and party, however, have bottomed at a depth of 120 feet, obtaining (with great difficulty, on account of the rising water) prospects of about 3 oz. to the load. In January last pumping gear and machinery were erected at this claim, but proved of so unsatisfactory a character that it had to be removed. A new engine of 12-horse power is now on the ground and ready for work, which will, effectually combat the water, and the party are confident of success in the near future.

[illegible] other parties, have also done

Uralla Division. 1904/19

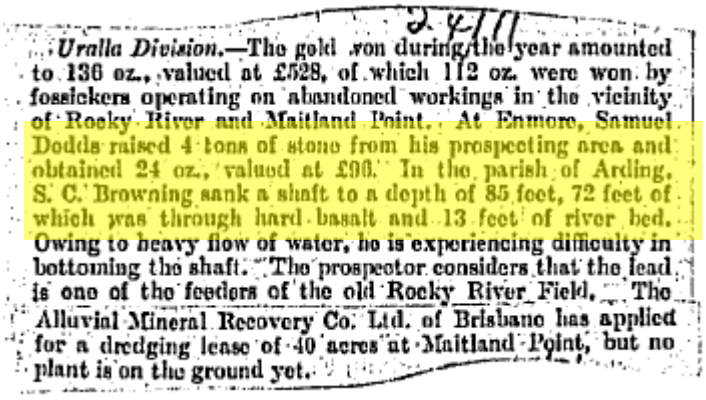
The gold won from the alluvial deposits in this Division amounted to 448 oz. Sluicing operations were conducted with difficulty owing to the scarcity of water.

In quartz mining Fraser and party were engaged sinking a shaft at Dogtrap, near Uralla, but operations were hampered owing to a heavy flow of water being met with. The prospectors were hopeful of being able to cope with the difficulty. At Enmore, Perrott and party were prospecting a reef, and had met with encouraging indications.

The quartz reefs received considerable attention during the year. Further development on the Goldsworth Gold Mines, Limited, reef was carried out in driving on both No. 1 and No. 2 levels. Operations were, however, mainly confined to No. 1 level. From the 1st February the influx of water arising from the connection of No. 1 level with the original syndicate's workings rendered the working of No. 2 level too severe a strain on the plant, and considerably increased the expense of mining therein. A 10-head battery and 50 B.H.P. suction gas plant were installed and commenced running on the 30th July. Since that date 1,600 tons of ore were raised and treated, for a return of 174 oz. 5 dwt., valued at £621 10s. These returns, although low, were considered sufficient to encourage further prospecting. The lode is of a pyritic granite nature, carrying veins of quartz, and averages 3 feet in width. The country rock is granite, and is no great distance from the junction with an altered slate formation. The shareholders are making a determined effort to further prospect this reef. Some further prospecting was also done by the Goldsworth Gold Mining Syndicate in an endeavour to locate this reef in an adjoining lease, but without success.

[illegible] at A. D. Fraser's

It may be better to put all the historical stuff into an Appendix



2.4.11

Uralla Division.—The gold won during the year amounted to 136 oz., valued at £528, of which 112 oz. were won by fossickers operating on abandoned workings in the vicinity of Rocky River and Maitland Point. At Enmore, Samuel Dodds raised 4 tons of stone from his prospecting area and obtained 24 oz., valued at £96. In the parish of Arding, S. C. Browning sank a shaft to a depth of 85 feet, 72 feet of which was through hard basalt and 13 feet of river bed. Owing to heavy flow of water, he is experiencing difficulty in bottoming the shaft. The prospector considers that the lead is one of the feeders of the old Rocky River Field. The Alluvial Mineral Recovery Co. Ltd. of Brisbane has applied for a dredging lease of 40 acres at Maitland Point, but no plant is on the ground yet.

APPENDIX D

CROSS SECTIONS

Plan of

DEEP LEAD WORKINGS

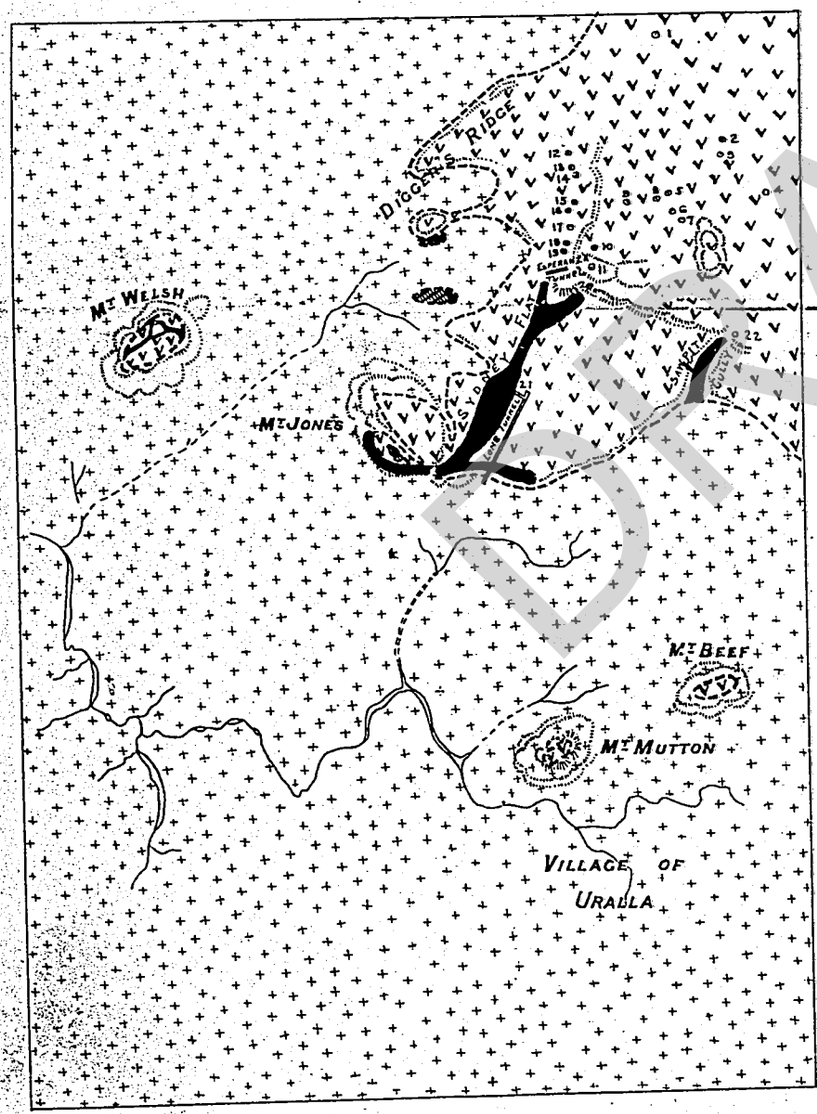
ROCKY RIVER GOLD FIELD

To accompany report by Geological Surveyor **T.W.E. DAVID. B.A.**

JUNE 1886.

SCALE.

10 5 0 10 20 30 40 50 60 70 80 90 Chs



Reference

1 Nº 1 Bullion - 60 ft - water
2 Nº 2 - - 147½ ft - water level 58 ft.
3 Nº 3 - - water at 61 ft
4 Shaft 70 ft - dry
5 Nº 4 Bullion - 154 ft - w.l. 84 ft.
6 Nº 5 - - 188 ft - w.l. 128 ft.
7 Nº 6 - - 126½ ft
8 Long Tunnel shaft 98 ft.
9 Parker & Edmunds' shaft - 106 ft - w.l. 68 ft.
10 Phoenix engine shaft - 166 ft to granite 190 ft to bottom of dip
11 Ingle's shaft - 186 ft.
12 Shaft 82 ft.
13 Whip shaft 95 ft - dry
14 Haythorne's - 95 ft to water
15 Nº 5 Temperance shaft 132 ft.
16 - 4 " " "
17 - 3 " " "
18 - 2 " " "
19 - 1 " " "
20 Shaft 130 ft.
21 - 74 ft
22 - about 130 ft.

Basalt

Granite

Quartzite

Worked deep lead

Drawn by C.A. Stonier. Geological Survey Branch

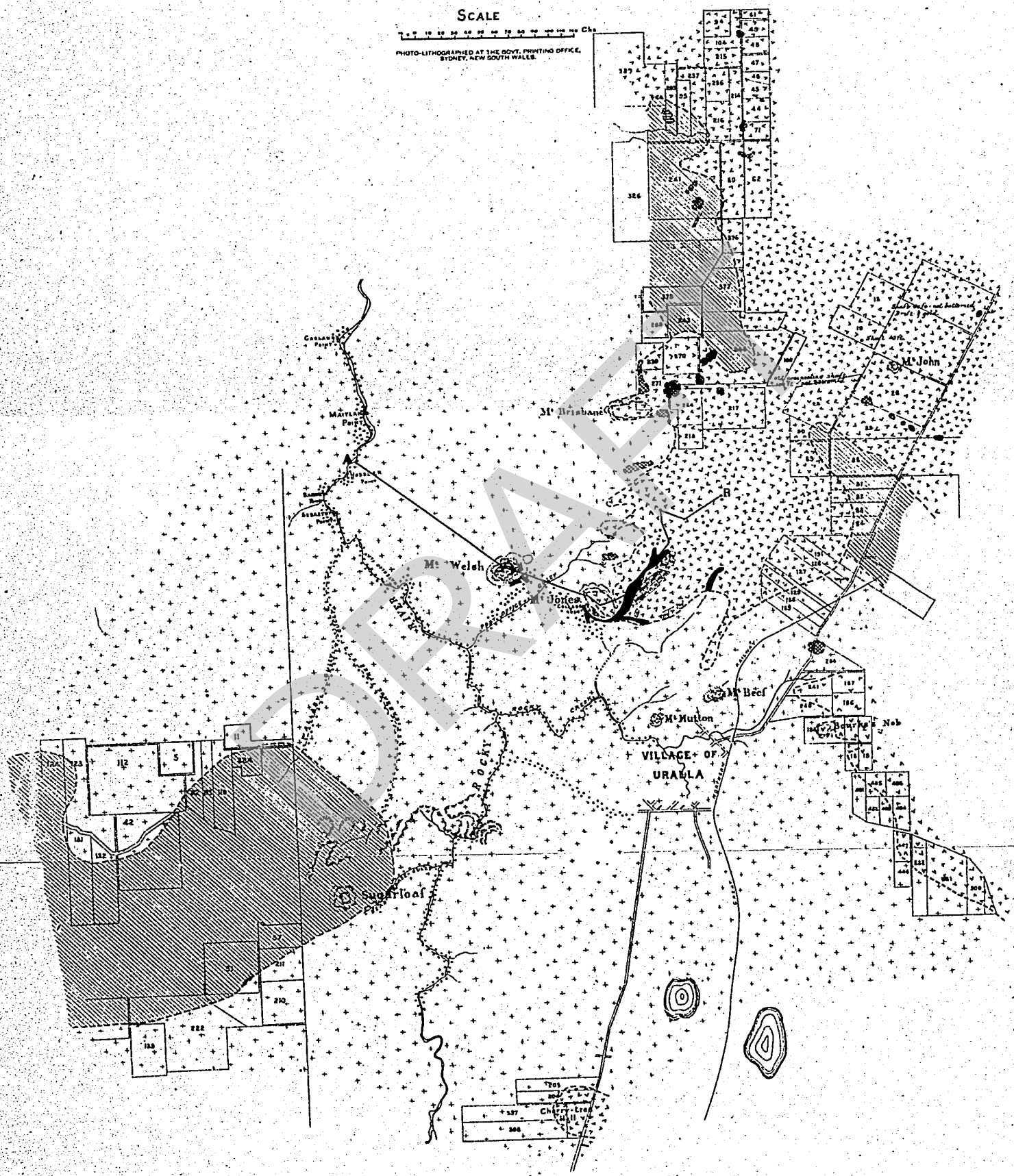
PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.

GEOLOGICAL SKETCH MAP
OF THE
ROCKY RIVER GOLD FIELD

To accompany report by Geological Surveyor T.W.E. David B.A. F.G.S.
June 1886.

SCALE

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.



REFERENCE

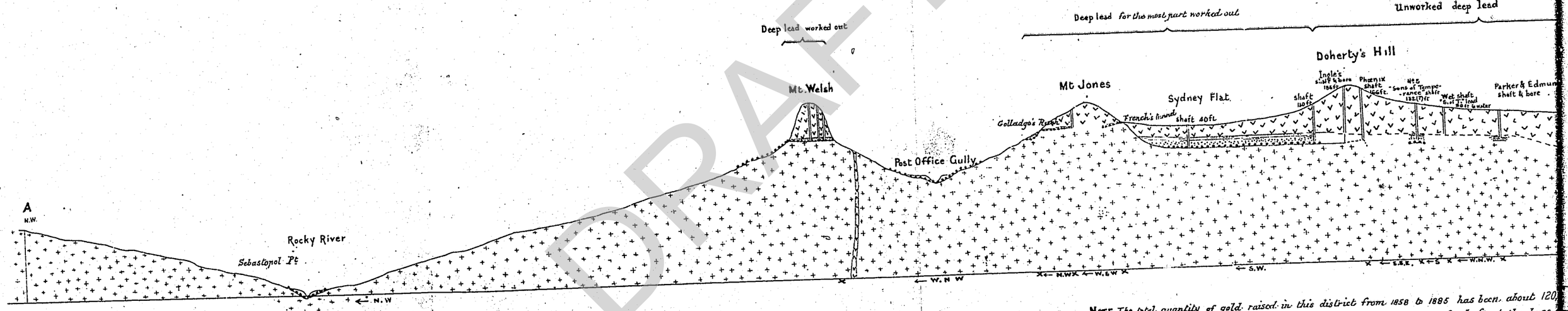
- Silurian ? Claystone (passing into Granitoid near junction with intrusive granite)
- Quartzite (in part overlying & in part underlying basalt)
- Tertiary Basalt (in part capping gold-bearing alluvials)
- Granite (Intrusive gold bearing)
- (Sig 337—)
- Basalt dyke
- Eurite dyke
- Deep lead
- Alluvial gold

SECTION ACROSS
ROCKY RIVER GOLD FIELD

showing relative position of "shallow" and "deep lead" auriferous alluvials

see line A-B Geological Sketch Map

To accompany report by Geological Surveyor T.W.E. DAVID. B.A. F.G.S.



NOTE The total quantity of gold raised in this district from 1858 to 1885 has been about 120,
£455,719. A payable branch lead has been worked between the 130 ft shaft at the base
and the N°5 "Sons of Temperance" shaft.

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.

(Sig 337_)

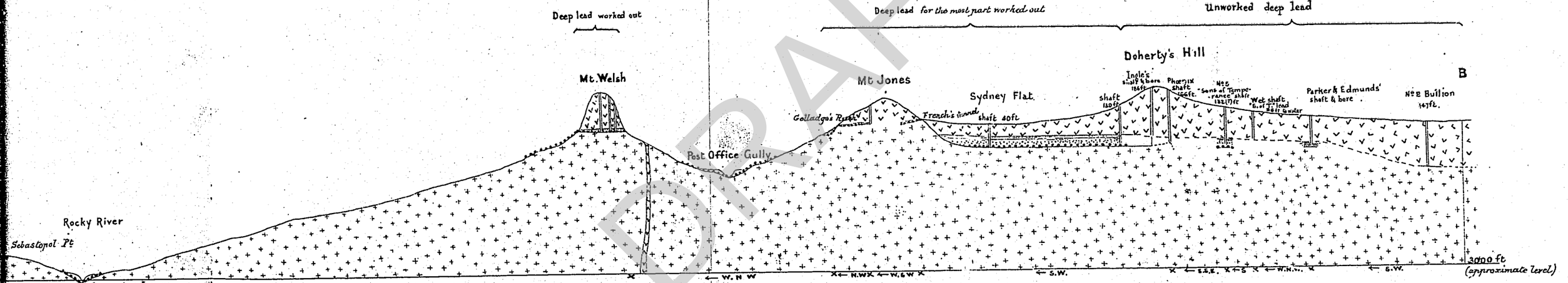
SECTION ACROSS
ROCKY RIVER GOLD FIELD

showing relative position of "shallow" and "deep lead" auriferous alluvials

see line A-B Geological Sketch Map

To accompany report by Geological Surveyor T.W.E. DAVID. B.A. F.G.S.

APPENDIX. I.



VERTICAL SCALE.

Feet 0 60 120 180 240 300 360 420 480 540 600 660 720 780 840 900 960

HORIZONTAL SCALE

Chains 0 5 10 20 40 60 80

NOTE *The total quantity of gold raised in this district from 1858 to 1885 has been about 120,025 ozs valued at £455,719. A payable branch lead has been worked between the 130 ft shaft at the base of Doherty's Hill and the No 5 "Sons of Temperance" shaft.*

old gravel

ting of quartz sand and quartz gravel
y & black clay with fossil leaves

trix of the alluvial gold.

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.

HARWOOD ENVIRONMENTAL CONSULTANTS