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Queenstown Hydrological Map Sheet Update: Butterworth Map Sheet Field Visit and Hydrocensus Report

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1. Introduction

Many years ago, the Department of Water and Sanitation (DWS) produced and published twenty-three (23) 1:500 000 scale Hydrogeological Maps and completed 13 brochures with the aim of characterizing groundwater resources of South Africa, albeit at large scale (thus making them more generalized). Three decades down the line since the publishing of these valuable maps, DWS has opted to revisit the exercise and update the maps once again, utilizing the datasets gathered over this period. The aim isn't just about updates but to refine the maps and offer more detail at a smaller scale i.e. 1: 250 000.

The Department of Water and Sanitation (DWS) initiated a field visit project to the Eastern Cape to conduct hydrocensus. This was in an attempt to remedy the data gaps that existed in the different map sheets i.e. Komani, Mthatha, Bisho, and Butterworth. The aim of the trip was to visit sites that were earmarked for yield and groundwater quality. The hydrocensus further aimed to verify the existence of these boreholes, and their suitability for pump testing.

2. Butterworth Map Sheet Hydrocensus

Before the selection of boreholes to visit, confidence level analysis was done for both yield and groundwater quality to ascertain the representativeness of boreholes in their respective formations. Table 1 below shows the outcome of the confidence level analysis.

Table 1: Data gap analysis on all formations in the Butterworth Map Sheet

Intergranular and Fractured aquifers					
Formation	**Yield boreholes**	**BH needed for yield**	**Quality boreholes**	**BH needed for quality**	**Comments**
Alluvium	9	1	0	4	Moderate yield coverage, bad quality coverage. **One (1)** borehole for yield identified from Butterworth Geosites (G42273) that can be used. In terms of quality, **4** boreholes have been identified for **quality (G42273, EC/T90/0705, EC/T90/0716, and 1000263803).**

Adelaide	220	4	8	1 (maybe 2)	Good yield coverage, Moderate quality coverage. Though yield coverage is good, **four (4)** boreholes would be needed for complete coverage **(3228BB00035, EC/T13/0225, EC/T90/0624, and EC/T90/0960)**. **Two (2)** boreholes may be needed to increase coverage **(1000261915 and 6001903580).**
Takastad	33	0	7	1	Good yield coverage, good quality coverage. **One (1)** borehole might be needed for quality coverage from the **WARMS**.
Karoo Dolerite	94	0 (maybe 1)	7	2	Good yield coverage, Moderate quality coverage. **One (1)** borehole needed for yield **3228BA00024**. For quality **two (2)** boreholes will be necessary **3228CA00046 and EC/T90/0768**.
Dwyka	0	0	0	0	No yield data (small area), no quality coverage. The area of the formation is too small thus a borehole might not be necessary.
Ecca	26	0	2	2	Good yield coverage, and moderate quality coverage. **Two (2)** quality boreholes needed **EC/T90/0775 and 3229AA00011**
BOREHOLES NEEDED		6	N/A	11	

From the table above, it was determined that for the Butterworth Map sheet, 6 boreholes would be visited for yield, and 11 boreholes would be visited for groundwater quality. The 6 yield boreholes would close data gaps in the Alluvium, Adelaide, and Karoo Dolerite formations. The 11 water quality boreholes would close gaps in the Alluvium, Adelaide, Karoo dolerite, and Ecca formations. Figure 1 below shows the spatial distribution of the boreholes earmarked for hydrocensus.

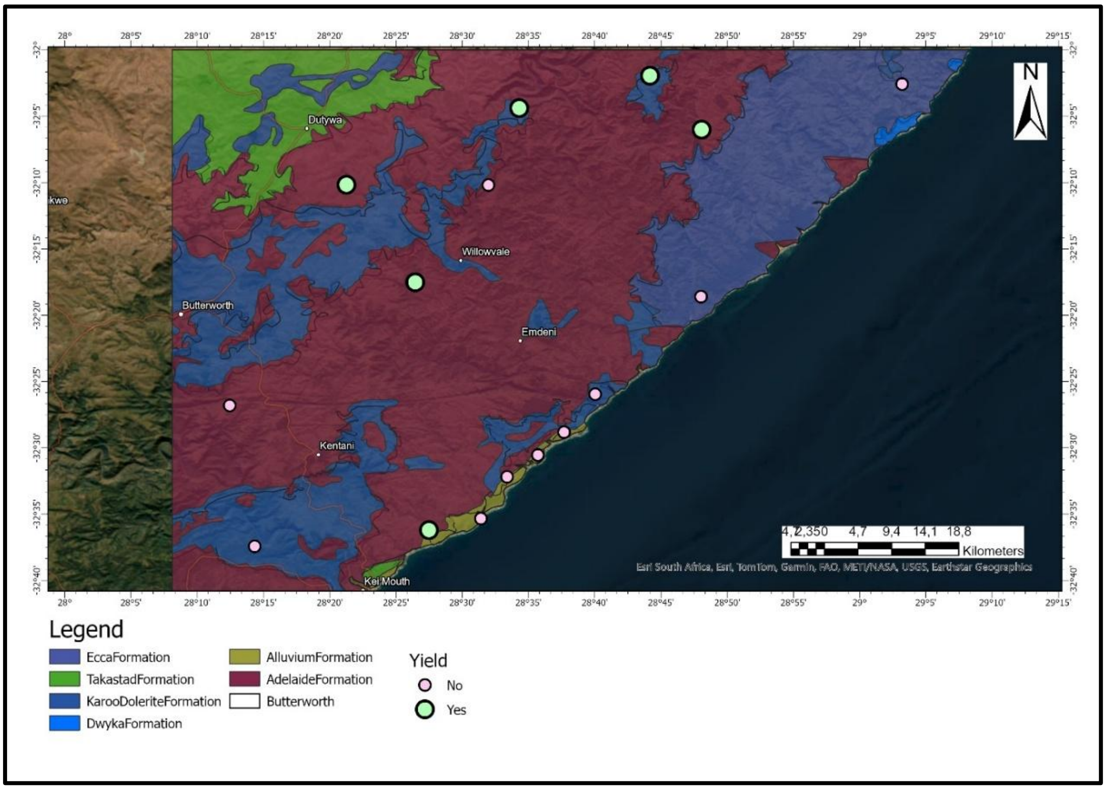

Figure 1: Spatial distribution of boreholes to be visited (16-20 February 2026) in an attempt to improve data coverage.

3. Butterworth Map Sheet Yield Sites

The Butterworth hydrocensus trip was scheduled for the 16-20 Februaruy 2026. The main priority was the yield boreholes to determine which may be used for pump testing. Table 2 below shows the yield boreholes that were visited.

Table 2: Yield boreholes earmarked for hydrocensus

Station ID	latitude	longitude	Formation	Pump Test
G42273	-32.60326	28.45797	Alluvium	Yes
3228BB00035	-32.1002	28.8013	Adelaide	Yes
EC/T13/0225	-32.07308	28.57188	Adelaide	No
EC/T90/0624	-32.29218	28.44078	Adelaide	Yes
EC/T90/0960	-32.1694	28.35432	Adelaide	Yes
3228BA00024	-32.03242	28.73603	Karoo Dolerite	Yes

3.1. Boreholes G42273

Borehole G42273 is a potential yield borehole that would remedy the data gaps in the Alluvium formation of the map sheet. The coordinates that were extracted from the National Groundwater Archive (NGA) database, were not accurate as we were not successful in locating this particular borehole. However, a few kilometers (5.28 km) from Kei Mouth a borehole was found in Seagulls. This borehole was a commercial borehole used by Seagulls beach hotel. The owner did grant access o view the borehole and to take a water sample. The borehole is equipped with a submersible pump. The location of the borehole is not ideal in terms of entry, however, liaison with the property owner may alleviate these concerns. **See fig 2**.

Figure 2: Photo of borehole G42273 equipped with a submersible pump.

3.2. Borehole 3228BB00035

Borehole 3228BB00035 is a potential yield borehole for the Adelaide formation. Similarly, the coordinates for this borehole were incorrect. The borehole that was found was 0.96 km away from the initial location. It is a privately owned borehole which is equipped with a submersible pump. The water level is sitting at 11.86 mbgl. The owner is willing to lend the borehole over to the department for study and has committed to removing the pump at his own leisure. Accessibility to the plot is not the best, however, liaison with the owner may assist. **See fig 3**.

Figure 3: Borehole 3228BB00035 equipped with a submersible pump.

3.3. Borehole EC/T13/0225

Borehole EC/T13/0225 is another Adelaide yield borehole. It was located 1.4 km from the initial coordinates extracted from NGA. It is a community borehole which has been sealed, non-operational for a few years, it is unequipped and has good yield according to the community. However, the new coordinates place it in the Karoo Dolerite formation and not the Adelaide formation. **See fig 4**.


Figure 4: Borehole EC/T13/0225 that is sealed.

3.4. Borehole EC/T90/0624

Borehole EC/T90/0624 is an Adelaide yield borehole that was found 2.06 km from the original coordinates obtained from NGA. It is equipped with a handpump and is operational. It is located in a gently sloping field with access possible. It has not been used by the community for a while now. For yield testing the Ward committee or "Headman" of the village will need to be notified and liaised with before pump testing may commence or removal of the hand pump. **See fig 5**.

Figure 5: Borehole EC/T90/0624 that equipped with a hand-pump.

3.5. Borehole EC/T90/0960

Borehole EC/T90/0960 is a yield borehole in the Adelaide formation. It was found 1.06 km from the initial coordinates from NGA. It is located in a forest (Mazizini Plantation) in an area that is accessible. It was drilled approximately 2 years ago and is reportedly a high yielding borehole. It is sealed however, and the "Headman" or Ward Committee of the village will have to be notified if any work needs to commence. **See fig 6**.

Figure 6: Borehole EC/T90/0960 that is sealed and located in a forest.

3.6. Borehole 3228BA00024

Borehole 3228BA00024 is the last of the yield boreholes and is a data gap borehole for the Karoo Dolerite formation. It was found 0.34 km from the original coordinates. It is located near Jalamba School in a box that is tightly sealed. It does not seem operational as it is not connected to the windmill located nearby. The same procedures would have to be followed regarding any work that needs to be done as it is a community borehole. **See fig 7a and 7b**.

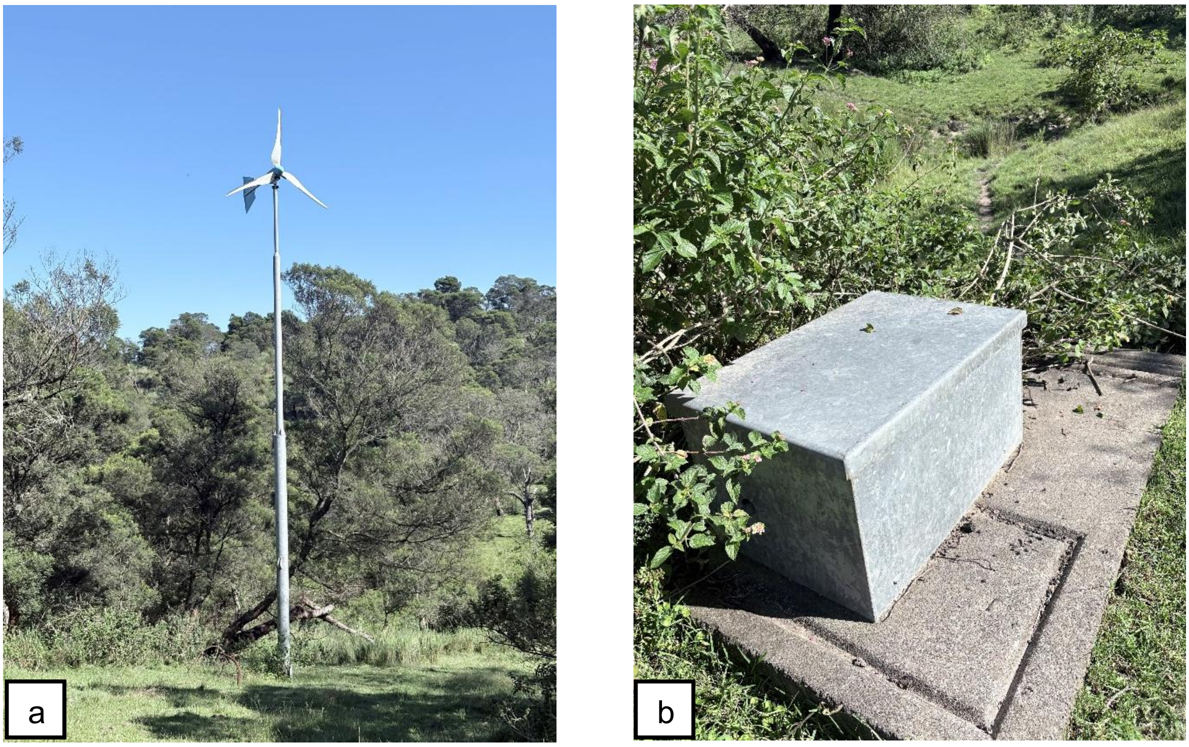

Figure 7a and b: Borehole 3228BA00024 with its windmill and enclosed casing.

4. Butterworth Map Sheet Water Quality Sites

Table 3: Groundwater quality boreholes earmarked for hydrocensus and their respective formations

Station ID	latitude	longitude	Formation	Comments
G42273	-32.60326	28.45797	Alluvium	Sample obtained as this was the same borehole used for yield at Seagulls Beach Hotel.
EC/T90/0705	-32.53656	28.55633	Alluvium	There were no boreholes in the area. The local community rely on rainwater supply.
EC/T90/0716	-32.50905	28.59512	Alluvium	Could not visit this site due to terrain conditions.
EC/T90/0651	-32.5888	28.52361	Alluvium	There was no borehole at the coordinates, only springs used privately. There is a borehole at Cebe Junior Secondary School. The principal did indicate that a sample may be obtained. However, it falls in the Adelaide formation.
EC/T90/0651	-32.48053	28.62821	Alluvium	Local community uses reticulated water supply. There are no boreholes to take samples from.
3228AC00048	-32.44688	28.2077	Adelaide	Sample obtained from a private borehole.

42280	-32.16992	28.53297	Adelaide	Borehole not found initial. Borehole that was found was blocked and dry.
3228CA00046	-32.62381	28.2388	Karoo Dolerite	Borehole located in a Nature Reserve. Could not contact any personnel for access.
EC/T90/0768	-32.43251	28.66706	Karoo Dolerite	There is no borehole in this area.
EC/T90/0775	-32.31018	28.80042	Ecca	Did not visit due to the lack of a borehole. Residents depend on rainfall.
3229AA00011	-32.04306	29.0532	Ecca	Did not visit due to the distance.

Figure 8: Water quality near Cebe JSS

Figure 9: Borehole for water quality at a private residence

Figure 10: Second borehole at the private residence

Figure 11: Pump present at the private residence

Figure 12: Old, non-functional water pump near Cebe JSS

Figure 13: Blocked water quality borehole

Figure 14: Municipal borehole for water quality

Figure 15: Municipal borehole with a mono pump installed

Figure 16: Old unequipped windmill borehole

5. Butterworth Data Gap Sites

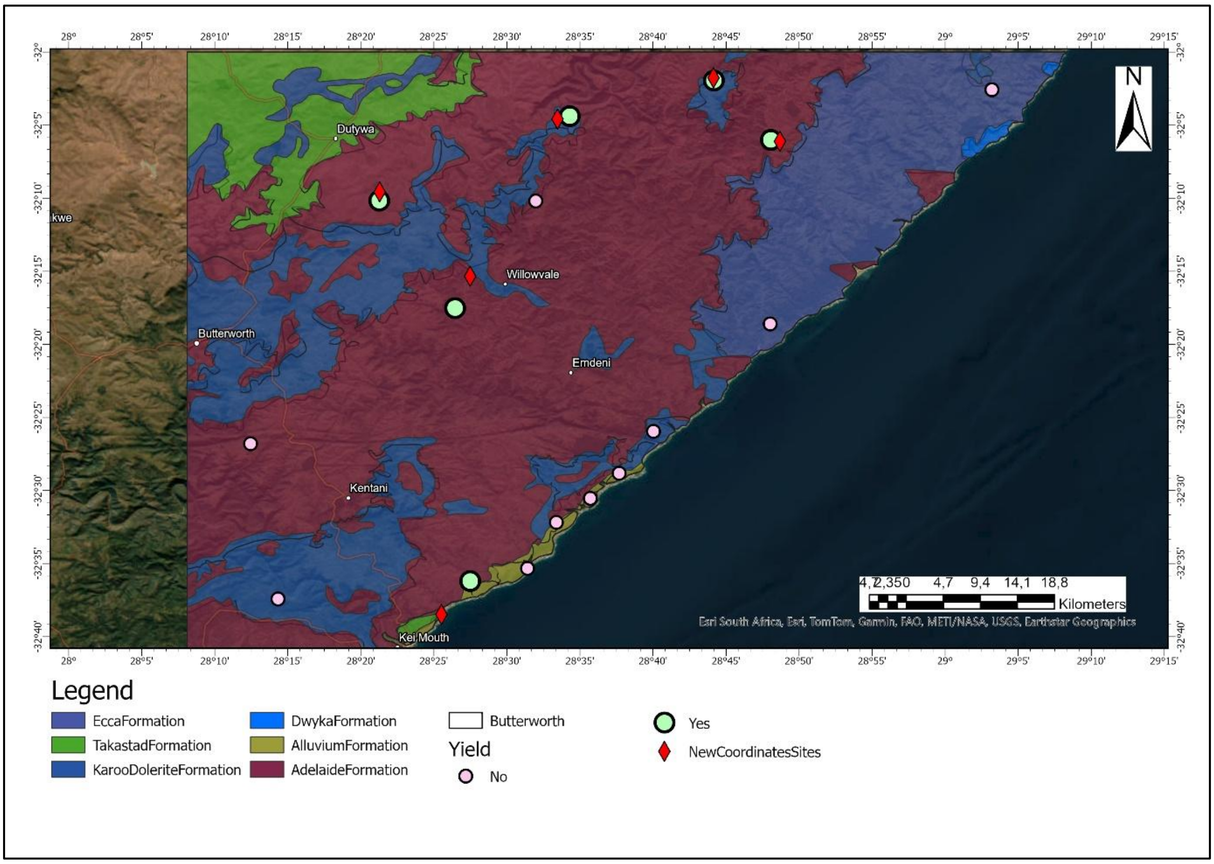

Figure 17: Butterworth map sheet data gap sites with new coordinates for yield.

Conclusion

The Butterworth hydrocensus conducted from 16–20 February 2026 achieved its primary objective of verifying and assessing yield boreholes for potential pump testing within the Butterworth map sheet. Of the six yield boreholes initially identified, five have been confirmed as suitable candidates for pump testing. Borehole EC/T13/0225, although originally classified within the Adelaide Formation, was re-surveyed and found to fall within the Karoo Dolerite Formation based on updated coordinates. Consequently, it is excluded from the Adelaide Formation yield-testing programme.

The field verification process highlighted notable spatial discrepancies between coordinates obtained from the National Groundwater Archive (NGA) and actual borehole positions, with offsets ranging between 0.34 km and 2.06 km, and in one instance (G42273) the original borehole could not be located. Despite these inconsistencies, alternative boreholes were identified in proximity to the recorded positions, and access negotiations with landowners and community representatives were generally positive.

The confirmed pump test candidates provide improved representativity for the Alluvium, Adelaide, and Karoo Dolerite formations within the map sheet. Boreholes such as G42273 (Alluvium) and 3228BB00035, EC/T90/0624, and EC/T90/0960 (Adelaide Formation) offer strategic coverage to address data gaps. Borehole 3228BA00024 strengthens dataset coverage within the Karoo Dolerite Formation.

With respect to water quality monitoring, several earmarked sites were either non-existent, inaccessible, or located in different formations than originally recorded. Nonetheless, samples were successfully obtained from representative Alluvium and Adelaide boreholes, partially fulfilling the quality assessment objectives. Overall, the hydrocensus significantly refined borehole positional accuracy, formation attribution, and operational status, thereby strengthening the reliability of subsequent pump testing and groundwater quality investigations.

Recommendations

1. Proceed with pump testing at the following boreholes:

- G42273 (Alluvium)
- 3228BB00035 (Adelaide Formation)
- EC/T90/0624 (Adelaide Formation)
- EC/T90/0960 (Adelaide Formation)
- 3228BA00024 (Karoo Dolerite Formation)

2. Exclude EC/T13/0225 from the Adelaide Formation pump-testing programme and reclassify it under the Karoo Dolerite dataset.
3. Update the National Groundwater Archive (NGA) coordinates for all verified boreholes to correct spatial inaccuracies identified during the hydrocensus.
4. Conduct formal liaison with:

- Private landowners (e.g., Seagulls Beach Hotel and 3228BB00035 property owner)
- Ward Committees and local Headmen for community boreholes prior to any pump removal or testing activities.