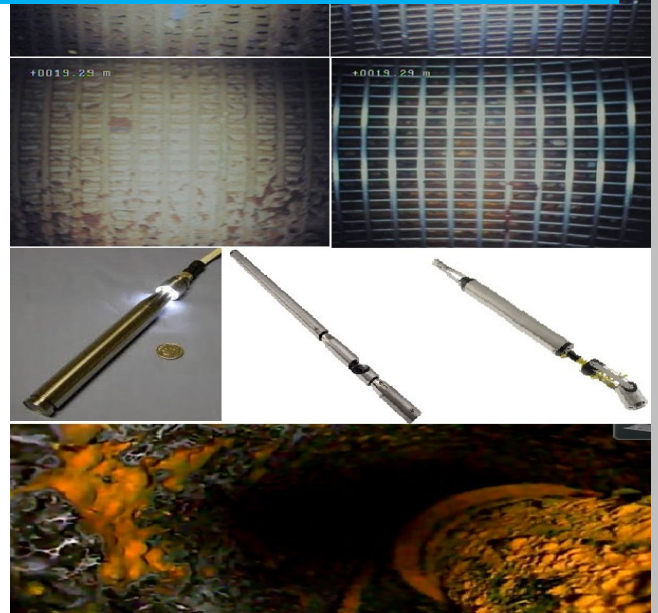


2022

WARRUMBUNGLE SHIRE COUNCIL BUGALDIE BORE ASSESSMENT REPORT 06/12/2022



*Every Bore is unique,
Your proactive preventative maintenance
program should be too!*



Proud Members of the
Water Industry Operators Association of Australia

ACS Equip Pty Ltd

Warrumbungle Shire Council – Bugaldie Bore

Assessment Report 06/12/2022



BUGALDIE BORE

Report No: WARRSC06122022
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Document history and revisions

Revision	Date	Description	Prepared By	Approved By
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Preface

This report was initiated in response to the findings of the ACS Equip Pty Ltd – CCTV Inspection and Bore Condition Assessment service commissioned on the 6th of December 2022 by the Warrumbungle Shire Council.

ACS were engaged by the Orana Water Utilities Alliance on behalf of the Warrumbungle Shire Council to assess the condition of the Bugaldie Bore as part of the bore condition assesment program.

Bore Details:

Bore ID:	Bugaldie Bore
Ground Works Number:	GW001969
Bore Licence:	90CA811513
Date drilled:	01/02/1927
Field:	Lot 1 DP417380, Behind RFS Shed
Location:	Bugaldie NSW
Coordinates:	Not supplied
Bore Type:	Town Water Supply
Casing Outside Diameter:	170mm
Casing Inside Diameter:	160mm
Casing Wall Thickness:	5.00mm
Casing Stickup:	0.20m
Casing Type:	Mild Steel from 0.00m to 83.50m
Screen:	Open through Bedrock
Apertures:	Not Applicable
Slotted From – To:	Not Applicable
Bore Depth:	97.60m encountered depth
Standing Water Level:	74.40m



Works Undertaken:

06/12/2022

- Establish onsite, site setup.
- Existing submersible pump, headworks and equipment removed from bore to allow the CCTV Downhole camera inspection and bore condition assessment to be completed.
- Submersible pump, headworks, and equipment reinstalled into Bore.
- Site pack up and clean up.

Initial CCTV inspection notes

- Bore headworks noted to be of poor design which would fail to meet the NSW health guidelines for groundwater. Bore headworks noted to be unsealed and open at ground level, which would be allowing biological contaminants to enter the bore.
- Upon extraction of the submersible pump the poly pipe rising main was noted to have rub marks and holes present approximately 1m above the pump, this section was subsequently cut and removed prior to reinstallation of the pumping equipment.
- The safety cable crimps located on the pump end were noted to be severely corroded, these were subsequently replaced with bulldog clamps prior to reinstallation of the pumping equipment.
- The submersible electrical power cable was noted to be of an inadequate design lacking the rubber outer sheath. Numerous rub marks were noted over the length of the power cable.
- The Poly fittings on the poly rising main were noted to be of the rural low pressure type with a pressure rating of 115 PSI.
- The Pump set depth was noted to be approximately 90m.
- Submersible pump and poly rising main were noted to have moderate growth levels present.
- Substantial pitting and corrosion noted through mild steel casing wall above standing water table, this indicates that the apparent metal loss has been severe and the casing wall will be extremely thin.



- Bore construction noted to consist of threaded mild steel casing.
- Hole noted through mild steel threaded join at 67.20m.
- Large particles noted to be suspended in the water column and the water column was noted to have high turbidity levels present, visibility was noted to be very poor.
- Standing water table at 74.40m.
- Unable to accurately assess the condition of the mild steel casing below the standing water level due to growth levels present over the casing wall and poor visibility level.
- Corrosion and possible hole through mild steel casing wall at 76.10m.
- Significant corrosion and holes noted through mild steel casing wall between 83.30m and 83.40m.
- Bore construction noted to be of mild steel casing from 0.00m to 83.50m, bore casing then terminates at 83.50m and the remainder of the bore is open through rock.
- Large cavity noted through open section of the bore from 85.40m, loose gravels and rocks noted.
- Open hole section of bore at 86.00m & 86.90m was noted to have rough formation and slight ledges which could be causing the rubbing issues on the electrical cable and poly riser.
- Visibility noted to reduce and become extremely poor from 89.80m.
- Bottom depth encountered was 97.60m.

Screen Section:

Bore open through rock from 83.50m to 97.60m



Illustrations of Bore headworks and Submersible pump:

The following figures are intended to demonstrate the general condition encountered of the bore headworks.



Unsealed headworks as viewed from surface.



Condition of pumping equipment showing Iron Bacteria.





Identification plates as noted on submersible motor and wet end.



Rural poly fittings as noted on bore cap and pump outlet.





Rural poly fittings as noted on bore cap and pump outlet.



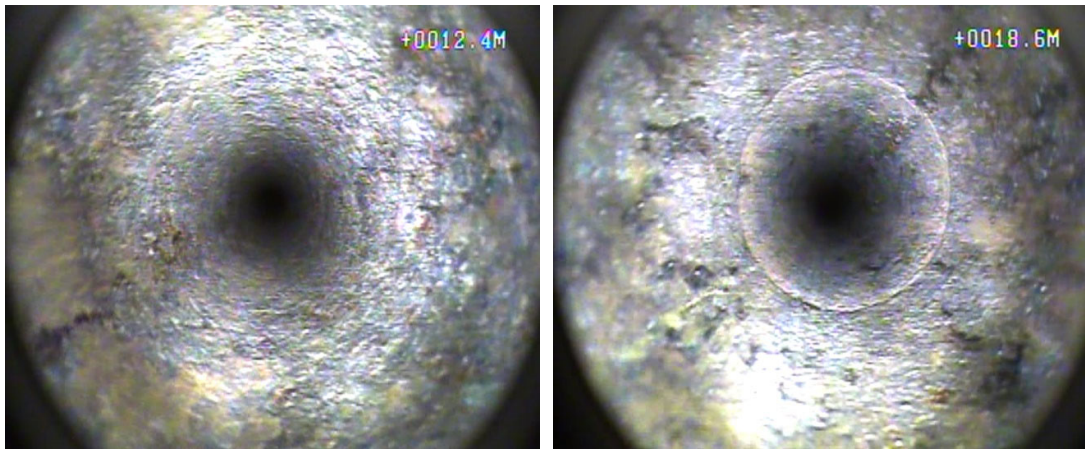
Damaged submersible pump electrical cable.



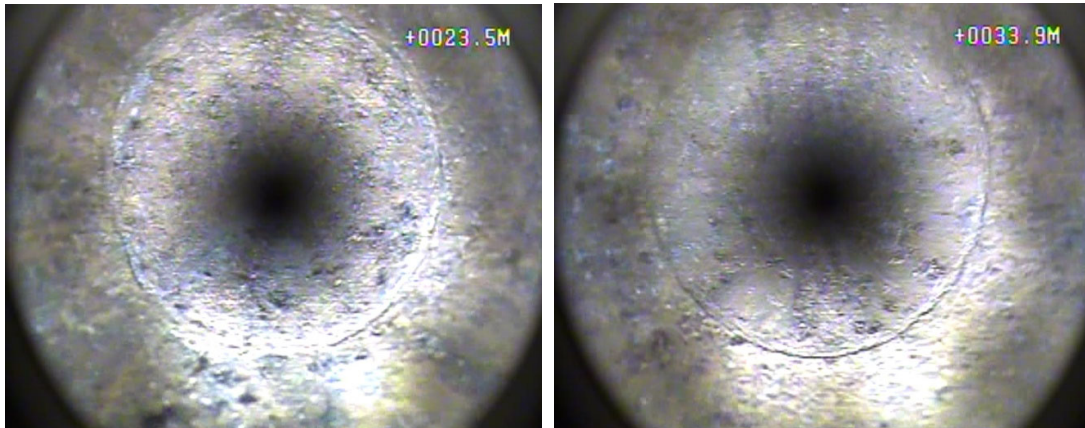
Illustrations of CCTV inspection:

The following figures are a quick reference guide intended to demonstrate the general condition of the bore.

A full copy of the inspection footage has been provided to the Warrumbungle Shire Council for further reference.

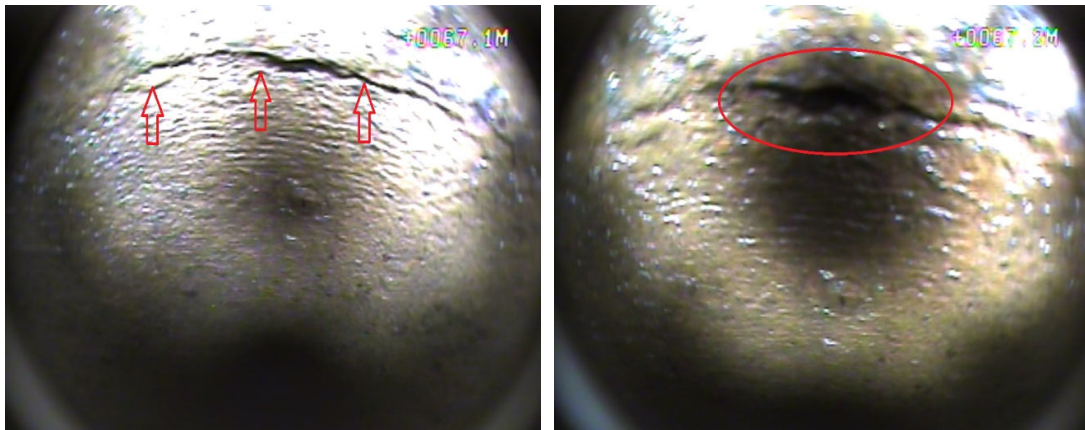


Bore at 12.40m and 18.60m showing condition of mild steel casing above the standing water level and corrosion around the mild steel threaded joints.

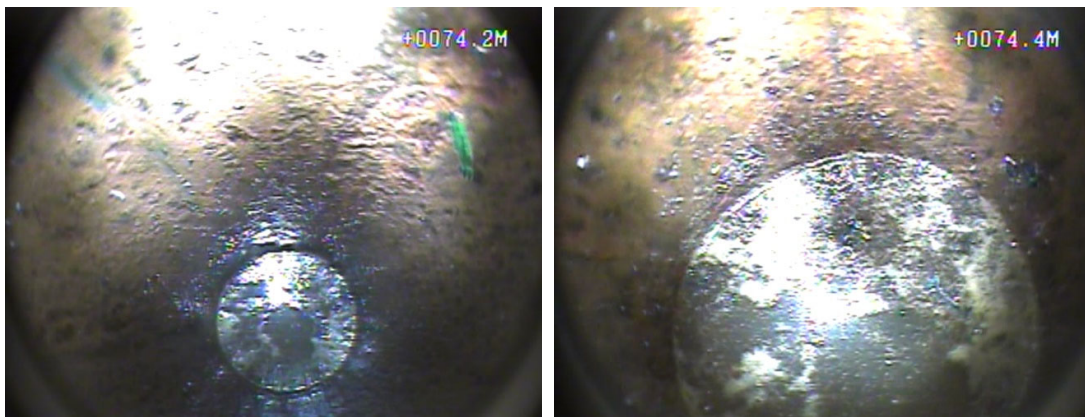


Bore at 23.50m and 33.90m showing condition of mild steel casing above the standing water level and corrosion around the mild steel threaded joints.

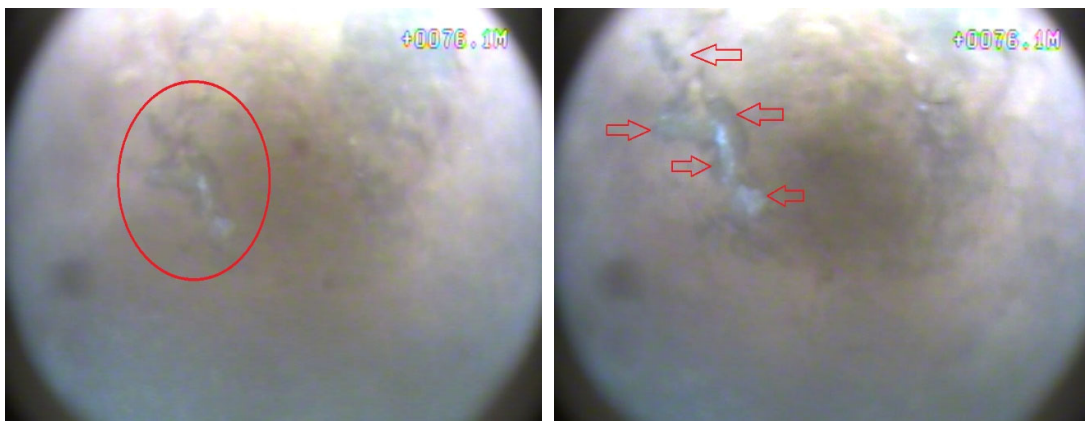




Bore at 67.20m showing corrosion and hole through mild steel threaded joint.

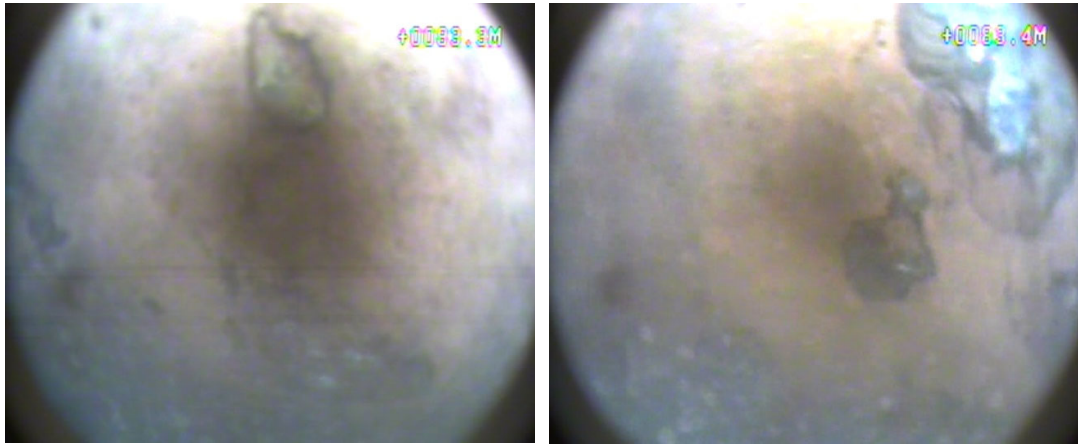


Bore at 74.20m showing condition of mild steel casing and the standing water level at 74.40m.

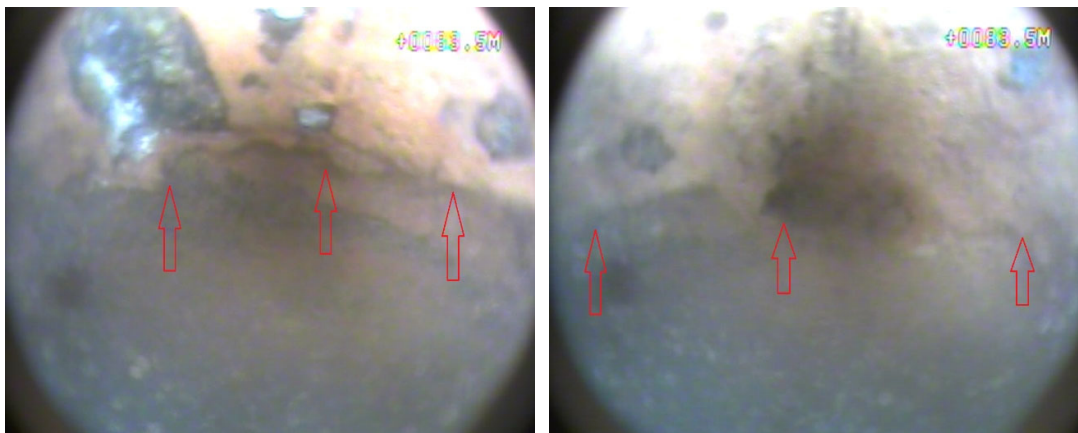


Corrosion and possible hole through mild steel casing wall at 76.10m.

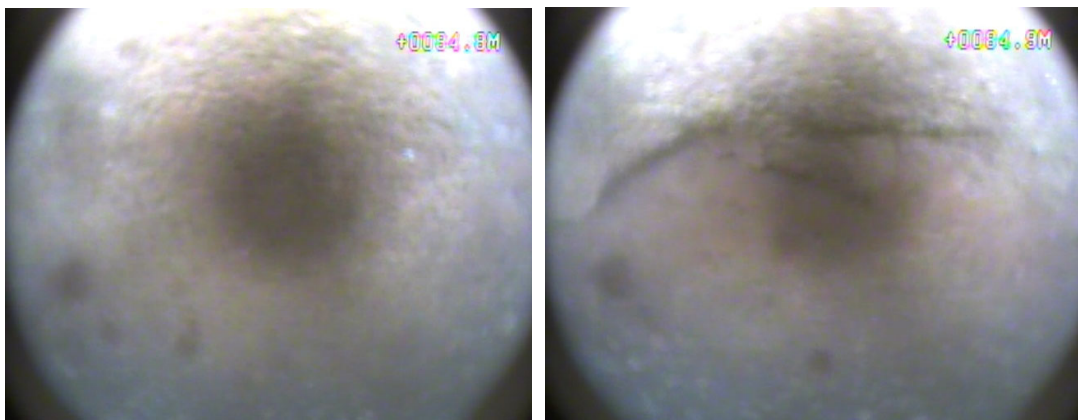




Significant corrosion and holes noted through mild steel casing wall between 83.30m and 83.40m.

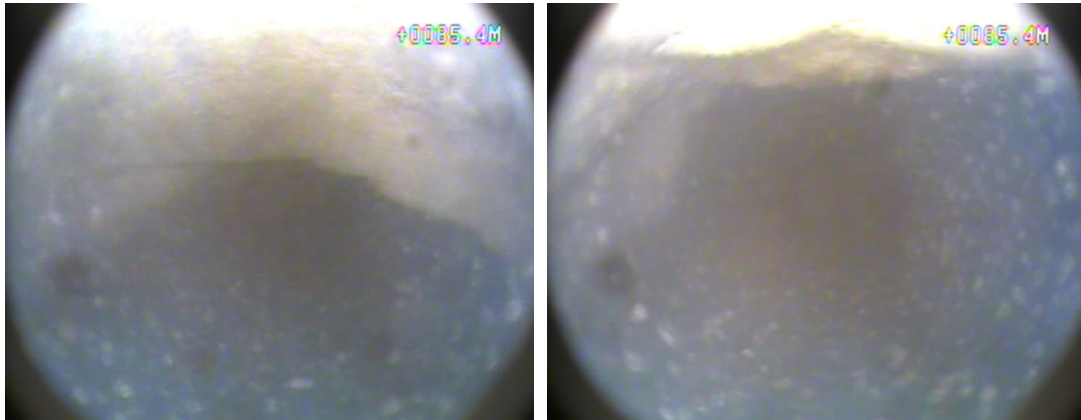


Termination of mild steel casing at 83.50m.

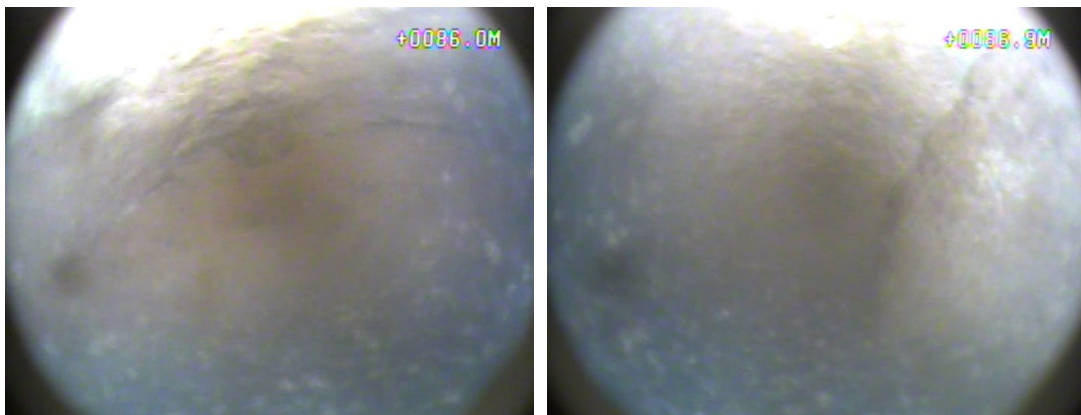


Open hole section of bore at 84.80m & 84.90m.

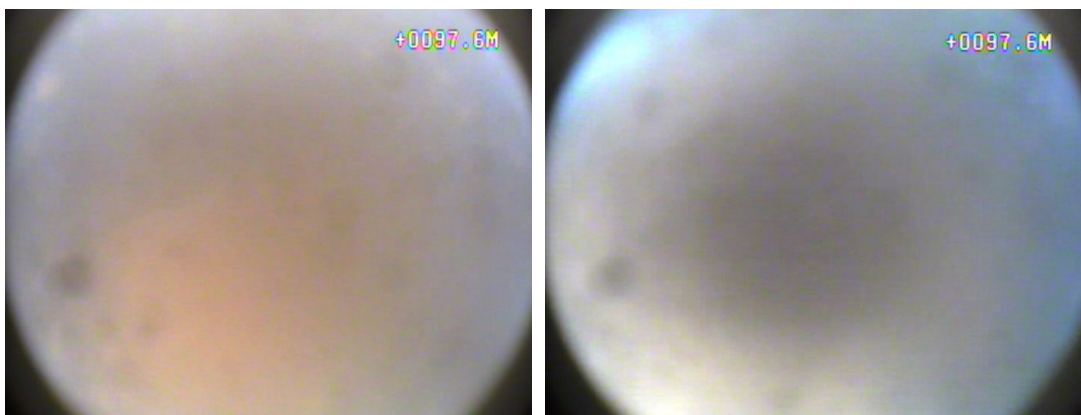




Open hole section of bore at 85.40m, showing large cavity.



Open hole section of bore at 86.00m & 86.90m, showing rough formation and slight ledges.



Bottom of bore encountered at 97.60m.



Findings

During the camera inspection implemented on the 06/12/2022 the condition of the pumping equipment was noted to be poor.

- The poly pipe rising main was noted to have rural fittings with a pressure rating of 115 PSI however the estimated operating pressure at the pump set depth is likely to be around 130 PSI.
- The poly pipe rising main was noted to have holes worn through near the pump which is likely a result of the rough formation noted.
- The electrical power cable was also noted to have rub marks present, these rub marks have almost penetrated the protective shielding of the cable and are also likely caused by the rough formation noted.
- The crimps securing the safety cable to the submersible pump were noted to be severely corroded and loose.

The overall structural condition of the bore was also noted to be poor. Numerous areas of significant corrosion were noted through the mild steel casing wall, and it is anticipated that the mild steel casing has reached the end of its useful lifespan.

The construction of the bore was noted to have the mild steel casing terminate at 83.50m with the remainder of the bore open through rock to 97.60m.



Asset Condition Rating:

The asset condition rating established from the findings of the bore condition assessment undertaken on the 06/12/2022 is as follows;

4 – Poor

This rating has been allocated for the following reasons, Failure likely in short term. Asset not performing required function or not performing function without significant additional maintenance activity on top of normal cyclic maintenance. Risk to safety, environment, or reputation due to asset condition approaching tolerable limits. Significant renewal or replacement required.

Condition Rating Table: IIMM condition rating system of 1 – 5.

Grade	Condition	Description
1	Excellent	New or as new condition. Only normal cyclic maintenance required. Negligible wear and/or undamaged or damaged repaired to original condition.
2	Very Good	Sound condition with some wear and tear. Minor maintenance required along with normal cyclic maintenance. Minor components may need replacement. Low risk to safety, environment, or reputation due to asset condition.
3	Good	Significant deterioration evident. Maintenance other than normal cyclic maintenance required on a regular basis to sustain asset. Minor failures may be occurring. Condition is impacting performance of the asset. Risk to safety, environment, or reputation due to asset condition within tolerable limits but requires high level of maintenance.
4	Poor	Failure likely in short term. Asset not performing required function or not performing function without significant additional maintenance activity on top of normal cyclic maintenance. Risk to safety, environment, or reputation due to asset condition approaching tolerable limits. Significant renewal or replacement required.
5	Very Poor	Failure occurred or failure imminent. Risk to safety, environment, or reputation due to asset condition beyond tolerable limits. Urgent need for renewal of major components, replacement, or removal of asset.

Asset Condition Rating system



Recommendations:

In the bores current condition further long-term use is not advisable (continued use can result in catastrophic bore failure) due to the structural failings identified in the mild steel casing wall;

It is likely that the mild steel casing will continue to develop failures, these failures can result in;

- gravel / sand intrusion into the bore or more likely, catastrophic bore failure which has the potential to result in complete loss of bore asset: bore, submersible pump etc.

The following recommendations are made to maintain a reliable potable town water supply from the Bugaldie Bore that will meet the NSW health guidelines for groundwater.

- Removal of the bore pump to allow the corrective works to be undertaken.
- Removal of any fill in the bottom of the bore and reopening the bore back to its original constructed depth.
- Stainless steel swage relining operations to be undertaken over the full depth of the bore with stainless steel screens installed over the uncased section and stainless-steel casing over the mild steel section. This will effectively create a full stainless steel bore design.
- Redeveloping and reconditioning the water bearing zone via the ACS Equip redevelopment operations consisting of an Aquaclear Bore Cleaner dosage to be injected over the entire length of the bore followed by high pressure redevelopment operations for aquifer development.
- Manufacture and installation of a shroud over the submersible pump to redirect the intake vertically and decrease the suction velocities. This will also force the pump to draw water over the motor during operation which will assist in cooling and prolong the operational life of the pump.
- Corrective works undertaken on the headworks to meet the NSW health guidelines for ground water. This will need to include IP68 rated electrical glands and redesign of the bore cap to allow a weatherproof seal to the top of the bore casing.
- Replacing the electrical submersible pump power cable.
- Replacing the rural poly pipe fittings for blue line poly pipe fittings with a pressure rating of 180 PSI.
- Disinfection and cleaning of the bore pump prior to reinstallation.



Appendices:

Appendix A: Possible Corresponding Groundworks report

WaterNSW Work Summary

GW001969

Licence: 90CA811513

Licence Status: EXPIRED

Authorised Purpose(s): TOWN WATER SUPPLY
Intended Purpose(s): PUBLIC/MUNICIPAL

Work Type: Bore

Work Status:

Construct.Method: Cable Tool

Owner Type: Local Govt

Commenced Date:
Completion Date: 01/02/1927

Final Depth: 91.70 m
Drilled Depth: 91.70 m

Contractor Name: (None)

Driller:

Assistant Driller:

Property: BUGALDIE TWS BUGALDIE 2357
NSW

GWMA: 601 - GREAT ARTESIAN BASIN
GW Zone: 013 - SOUTHERN RECHARGE
GROUNDWATER SOURCE

Standing Water Level
(m):

Salinity Description: Fresh
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: BARADINE
Licensed: BARADINE

Parish
BUGALDIE
BUGALDIE

Cadastre
1 417380
Whole Lot 1//417380

Region: 90 - Barwon

River Basin: 419 - NAMOI RIVER
Area/District:

CMA Map: 8735-N

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)

Northing: 6555292.000
Easting: 701394.000

Latitude: 31°07'08.4"S
Longitude: 149°06'43.2"E

GS Map: -

MGA Zone: 55

Coordinate Source:

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	1	Casing	Threaded Steel	0.00	81.30	152			Suspended in Clamps

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)
89.90	91.10	1.20	(Unknown)	79.20		0.61			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.91	0.91	Soil Black	Soil	
0.91	4.88	3.97	Clay Red	Clay	
4.88	37.49	32.61	Sand Rock	Sandstone	
37.49	39.01	1.52	Boulders Hard	Boulders	
39.01	45.11	6.10	Rock Hard	Rock	
45.11	48.77	3.66	Sandstone	Sandstone	



48.77	52.43	3.66	Sandstone	Sandstone	
52.43	54.56	2.13	Rock Hard	Rock	
54.56	64.01	9.45	Sand Rock	Sandstone	
64.01	67.67	3.66	Sand Rock	Sandstone	
67.67	77.72	10.05	Sand Rock	Sandstone	
77.72	89.92	12.20	Rock	Rock	
89.92	91.14	1.22	Sand Water Supply	Sand	
91.14	91.74	0.60	Rock	Rock	

Remarks

01/11/1983: BUGALDIE VILLAGE WATER SUPPLY
01/11/1983: LOT 6 SEC 6 BUGALDIE VILLAGE

*** End of GW001969 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.



Appendix B: Bore Location

