

2022

WARRUMBUNGLA SHIRE COUNCIL BARADINE BACK-UP BORE ASSESSMENT REPORT 14/12/2022



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



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ACS Equip Pty Ltd

Warrumbungle Shire Council – Baradine Back-
Up Bore Assessment Report 14/12/2022



BARADINE BACK-UP BORE

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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 14th 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 Baradine Back - Up Bore as part of the bore condition assesment program.

Bore Details:

Bore ID:	Baradine Back - Up Bore
Ground Works Number:	GW025187
Bore Licence:	Not Supplied
Date drilled:	01/07/1968
Field:	Not Applicable
Location:	Baradine NSW
Bore Type:	Town Water Supply
Casing Outside Diameter:	203mm from 0.00m to 93.50m 152mm from 93.50m to 206.60m
Casing Inside Diameter:	183mm from 0.00m to 93.50m 140mm from 93.50m to 206.60m
Casing Wall Thickness:	10.00mm
Casing Stickup:	0.20m
Casing Type:	Mild Steel
Screen:	Slotted Mild Steel
Apertures:	3.17mm
Slotted From – To:	See report
Bore Depth:	206.60m encountered depth 220.90m constructed depth
Standing Water Level:	30.00m



Works Undertaken:

08/12/2022

- Establish onsite, site setup.
- Headworks disconnected however non return valve and gate valve not functioning. Test lift completed however pump and column noted to be stuck in position, liaise with council and permission granted to apply further lift.
- Pump noted to become free at approximately 2.4T, after the initial lift the weight was noted to drop to 1.3T. Additional 5m wiper trips were completed with the pump to dislodge any debris.
- Crane truck moved back to council depot for the night.

09/12/2022

- Existing submersible pump, headworks and equipment removed 6m to allow the CCTV Downhole camera inspection to determine the pump depth and composition.
- Pump depth noted as 60m and column noted to have been welded at each coupling.
- Headworks reconnected and permission sought from council for variation to works.

12/12/2022

- Commenced removing pumping equipment to allow the CCTV Downhole camera inspection to be completed.
- Operations placed on hold due to sever lighting storms.

13/12/2022

- Existing submersible pump, headworks and equipment removed from bore to allow the CCTV Downhole camera inspection and bore condition assessment to be completed.
- CCTV Downhole camera inspection and bore condition assessment completed.

14/12/2022

- 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.
- Rising main noted to be suspended at the top of the bore casing with a mild steel clamp, the clamp was noted to be resting on the top of the casing with no form sealing and a large gap present.
- Upon extraction of the pump Biological contamination was noted at the on the pump column, contamination noted to be slugs.
- Rising main construction noted to be 115mm stainless steel column in 3m lengths with threaded couplings. Column noted to have been welded at each coupling across its full depth.
- The Pump set depth was noted to be approximately 60m.
- 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.
- Standing water table at 30.00m.
- 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.
- Significant levels of iron related bacteria growth noted to be present on the mild steel casing wall.
- Hole noted through mild steel casing wall at 54.70m.
- Significant corrosion / hole noted through mild steel casing wall at 86.80m.
- J-Lacth step noted at 93.50m, bore construction noted to step down at this depth from 212.00mm inside diameter to 133.00mm inside diameter.
- Slotted section noted to commence at 95.00m, slotted apertures noted to be significantly corroded and enlarged.



- Slotted aperture at 128.30m noted to be heavily corroded with gravel ingress into bore occurring.
- Significant corrosion and partial separation noted on mild steel threaded join at 130.30m.
- Significant corrosion and partial separation noted on mild steel threaded join at 148.70m.
- Significant corrosion and partial separation noted on mild steel threaded join at 161.50m
- Significant corrosion and partial separation noted on mild steel threaded join at 180.50m
- Slotted section noted to have significant growth and encrustation present over the slotted apertures.
- Slotted apertures suffering from substantial growth resulting in a decreased draw area of the bore and increased suction velocities
- Significant corrosion and holes noted through mild steel casing wall across the entire bore length.
- Bottom depth encountered was 206.60m and the construction depth specified in the Groundworks report is 220.90m indicating that there is 14.30m of debris / fill present in the bottom of the bore.

Slotted Section:

Slotted Section: 95.00m to **220.90m**



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 biological contamination.





Condition of pumping equipment showing welded couplings.



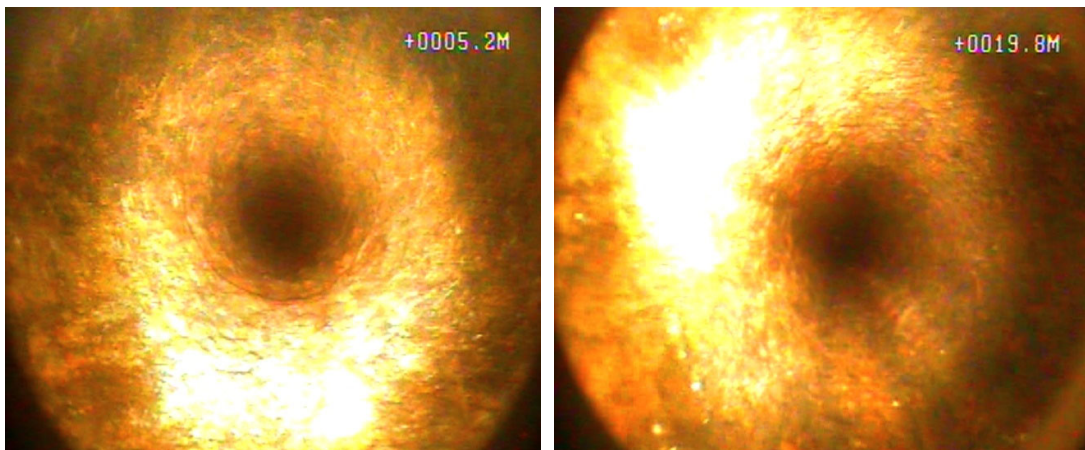
Identification plates as noted on submersible pump.



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.

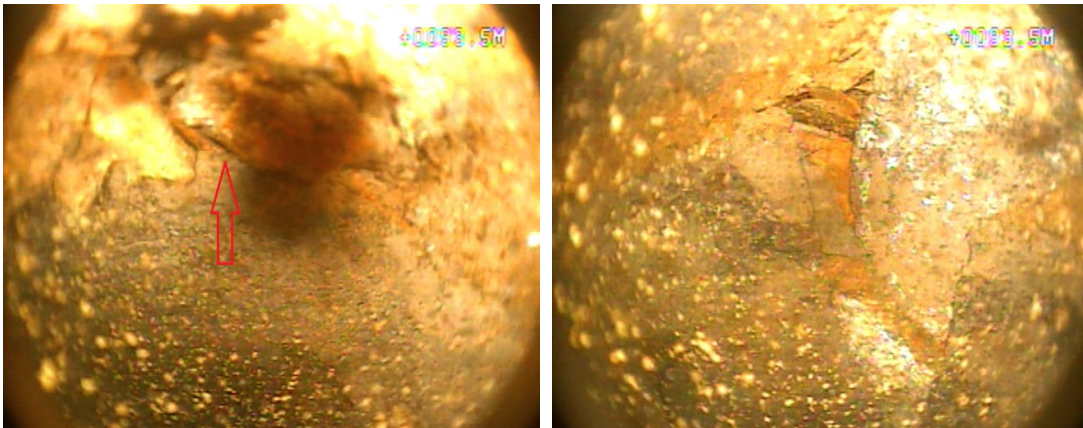


Bore at 5.20m and 19.80m showing condition of mild steel casing above the standing water level.

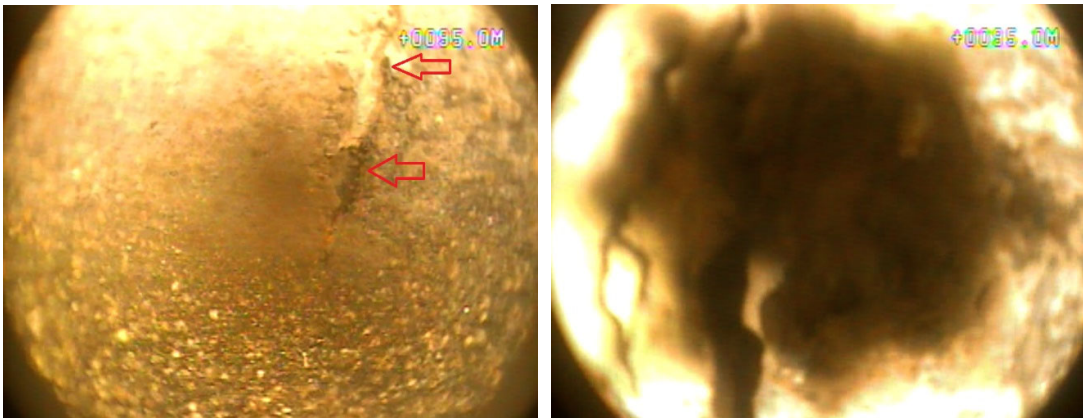


Significant corrosion / hole noted through mild steel casing wall at 86.80m.

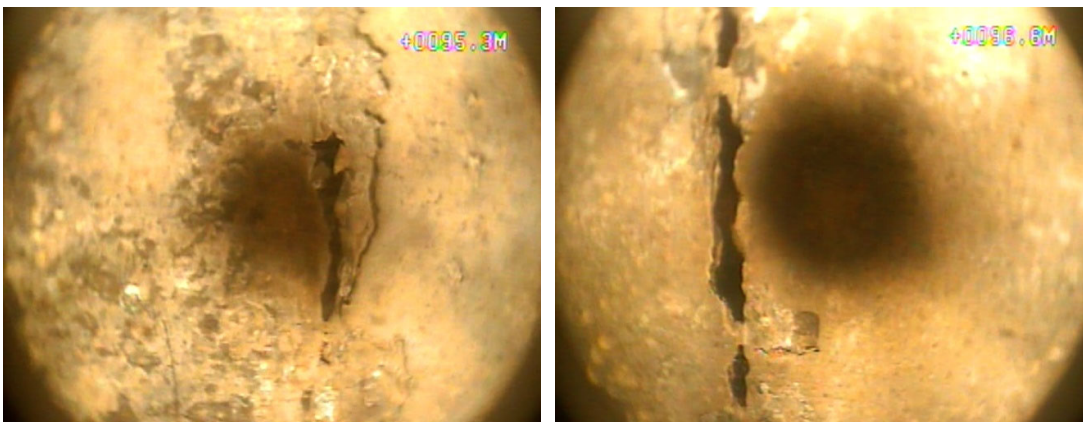




J Latch step noted at 93.50m.

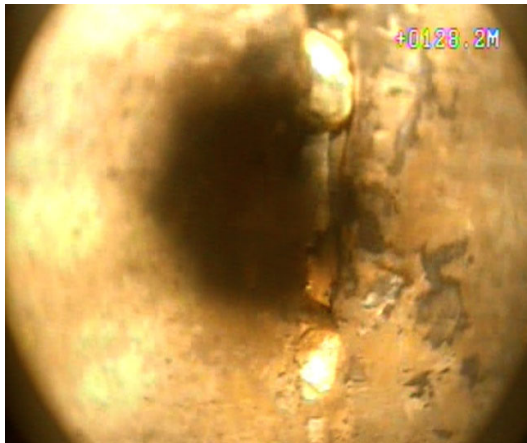


Slotted section noted to commence at 95.00m, slotted apertures noted to be significantly corroded and enlarged.



Slotted section at 95.30m and 96.60m showing corrosion around apertures.

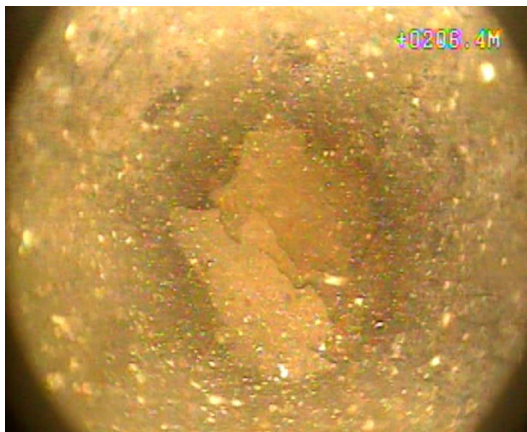




Slotted aperture at 128.30m noted to be heavily corroded with gravel ingress into bore occurring.



Threaded joints at 161.50m and 180.50m showing corrosion present.



Bottom of bore encountered at 206.50m.



Findings

During the camera inspection implemented on the 14/12/2022 the overall structural condition of the bore was noted to be extremely poor. Numerous areas of significant corrosion were noted through the mild steel casing wall. This indicates that the mild steel casing has reached the end of its useful lifespan.

The encountered bottom depth was 206.60m and the construction depth specified in the groundworks report is 220.90m indicating that the bore has 14.30m of fill and debris present in the bottom.



Asset Condition Rating:

The asset condition rating established from the findings of the bore condition assessment undertaken on the 14/12/2022 is as follows;

5 – Very Poor

This rating has been allocated for the following reasons, Failure of the mild steel casing has occurred, and continued failure is imminent. The condition of the asset poses risk to safety, environment, or reputation beyond tolerable limits and the asset is in Urgent need for renewal of major components, replacement, or removal of asset from service.

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 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 Baradine Back Up 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 the fill noted in the bottom of the bore and reopening the bore back to its original constructed depth via bailing operations.
- Stainless steel swage relining operations to be undertaken over the full depth of the bore with stainless steel screens installed over the slotted mild steel 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 gravel pack 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.
- Upgrading the pump rising main from the stainless-steel column to a 4inch 102mm Flexibore 250 crusader hose for ease of future maintenance.
- Disinfection and cleaning of the bore pump prior to reinstallation.



Appendices:

Appendix A: Groundworks report

WaterNSW Work Summary

GW025187

Licence:	Licence Status:
	Authorised Purpose(s): Intended Purpose(s): TOWN WATER SUPPL
Work Type: Bore - GAB Work Status: Supply Obtained Construct.Method: Rotary Mud Owner Type: Local Govt	
Commenced Date: Completion Date: 01/07/1968	Final Depth: 220.90 m Drilled Depth: 221.00 m
Contractor Name: (None) Driller: Assistant Driller:	
Property: GWMA: GW Zone:	Standing Water Level: 28.800 (m) Salinity Description: Yield (L/s): 20.180

Site Details

Site Chosen By:	County Form A: BARADINE Licensed:	Parish BARADINE	Cadastre RD ADJ 2/22/758051
Region: 90 - Barwon River Basin: 419 - NAMOI RIVER Area/District:	CMA Map: 8736-S Grid Zone:	Scale:	
Elevation: 0.00 m (A.H.D.) Elevation Source: Unknown	Northing: 6574148.000 Easting: 697025.000	Latitude: 30°56'58.9"S Longitude: 149°03'45.1"E	
GS Map: -	MGA Zone: 55	Coordinate Source: GD,,ACC.MAP	

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	Welded Steel, Pressure Cemented	0.00	97.20	203			Cemented
1	1	Casing	Welded Steel, Pressure Cemented	0.00	97.20	203			
1	1	Casing	Welded Steel	95.80	220.80	152			
1	1	Opening	Slots - Vertical	97.50	220.90	152		1 A: 3.17mm	

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)
22.50	97.40	74.90	(Unknown)						
97.50	220.90	123.40	(Unknown)	28.80		20.18			

Drillers Log

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



0.00	33.52	33.52	Conglomerate Nominal	Conglomerate	
33.52	102.10	68.58	Sandstone Nominal Water Supply, and sand, rock, hard bands, water supply	Sandstone	
102.10	211.83	109.73	Shale Grey Nominal Water Supply, Sandstone Sand Rock, Hard Bands	Shale	
211.83	220.98	9.15	Sandstone Water Supply	Sandstone	

Remarks

04/02/1976: AQUIFER DEPTHS SUSPECT.
20/07/1984: ADJ LOT 2 SECT 22 BARADINE.
20/07/1984: BARADINE TWS.
14/05/2008: Nat Carling, 14-May-2008: Adjusted cadastre, previously entered Lot/DP was 'SEC 22'.
29/08/2011: Karla Abbs, 29-Aug-2011: Removed duplicates from drillers log

*** End of GW025187 ***

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

