Queensland Government

Department of Regional Development, Manufacturing and Water

Minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland

WSS/2016/3189

Version 1.03 20 September 2023

rdmw.qld.gov.au

Acknowledgement of Traditional Owners

We respectfully acknowledge the Aboriginal and Torres Strait Islander peoples as the Traditional Owners and Custodians of this Country – the lands and seas on which we meet, live, learn, work and play. We acknowledge those of the past, the Ancestors whose strength has nurtured this land and its people, and we recognise their connection to land, sea and community. We pay our respects to them, their culture and to their Elders past and present.

This publication has been compiled by the Department of Regional Development, Water and Manufacturing.

Interpreter statement:

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding this document, you can contact us within Australia on 13QGOV (13 74 68) and we will arrange an interpreter to effectively communicate the report to you.

Version History

Version	Date	Comments
1.00		Document approved
1.01	25/10/2016	Document updated to align with current industry practices.
1.02	19/12/2017	Amendments associated with implementation of the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 which replaced Water Plan (Great Artesian Basin) 2006 on the 2 September 2017 and *Planning Act 2016* (which replaced *Sustainable Planning Act 2009* on 3 July 2017).
1.03	20/09/2023	Amendments associated with implementation of the Water Legislation Amendment Bill 2022 which commenced 20 September 2023.

Approval

Position	Name	Date
Acting Director	Lesley Rogers	20/09/2023

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1. Introduction

This document sets out the standards that apply to a water bore drilling activities that intersect sediments of artesian basins in Queensland. Figure 1 shows the area in which these standards apply[1]. The sediments of artesian basins, to which this standard applies, occur in aquifers within groundwater units of the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 (GABORA Water Plan), except the following groundwater units and sub-areas:

- Betts Creek beds groundwater unit
- Cape Rolling Downs groundwater sub-area
- Normanton groundwater unit
- Winton Mackunda groundwater unit.

The sediments of artesian basins contain aquifers that are tapped by artesian bores in some areas, while in other areas they are tapped by subartesian bores. This document applies to all water bores (either artesian or subartesian) that access sediments of artesian basins under the GABORA Water Plan. It also applies to bores that drill through the sediments of artesian basins to access aquifers below.

The Great Artesian Basin (GAB) is Australia's largest underground water basin, extending beneath 70 per cent of Queensland. The GAB has been a vital resource in the development of Queensland, providing a reliable water source for stock, domestic, town water, industrial and mining purposes. It is a valuable resource that needs to be protected.

Poor practices relating to water bore drilling activities can result in water bores that pose a risk to underground water, through contamination and loss of pressure. Improperly constructed bores can provide a conduit for contamination by surface run-off or by interconnection of flow from aquifers containing water of poorer quality.

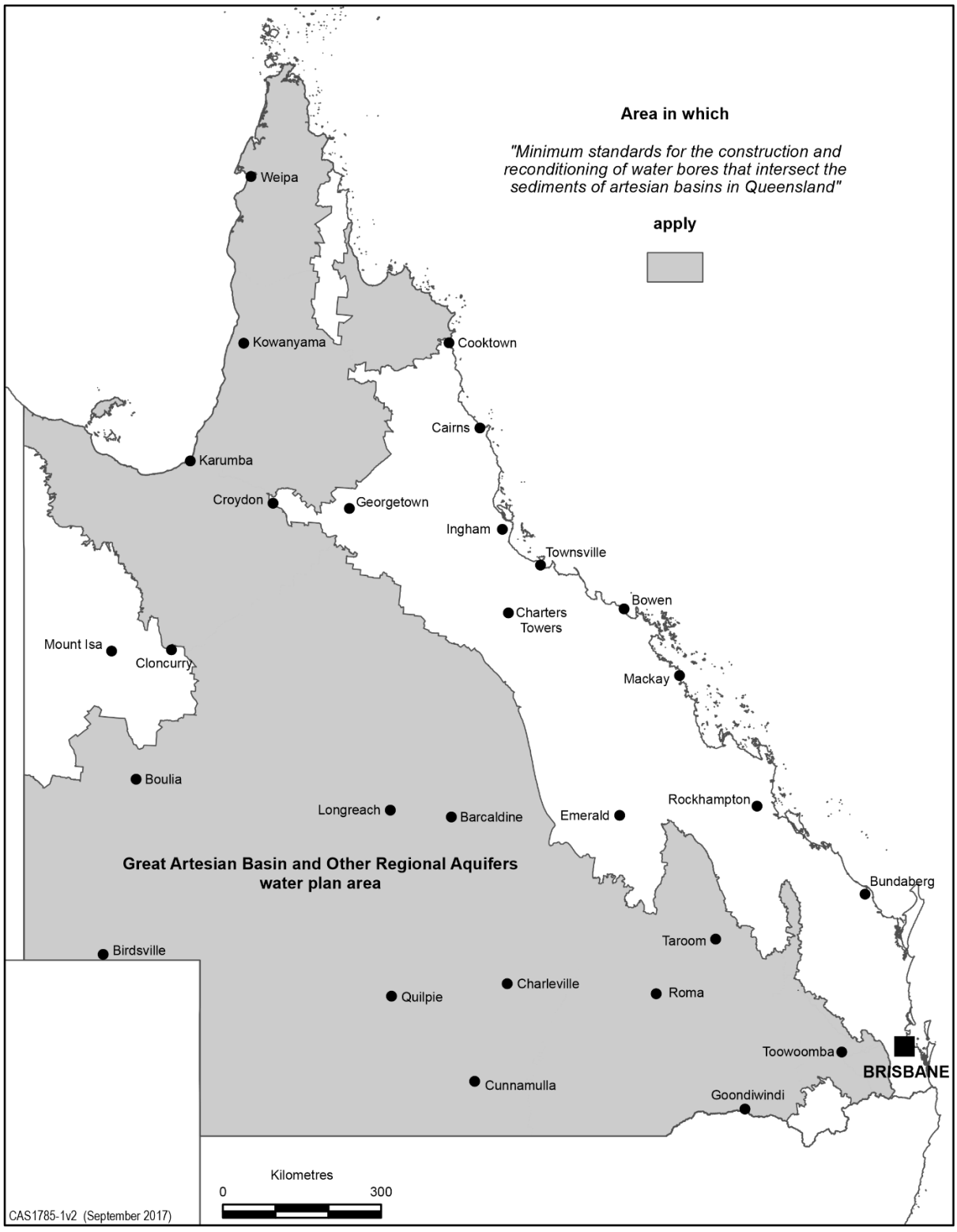
Pressure loss is also a significant issue in the GAB. To prevent any new water bore drilling activities contributing to this problem, specific bore construction standards are required for the GAB to control the flow of water from artesian bores and prevent the interconnection of aquifers and the loss of drilling fluids or cement into particular geological zones.

The purpose of these standards is to set out the construction requirements that will minimise these risks.

The Department of Regional Development, Manufacturing and Water (the department) prepared these standards in consultation with the Queensland Drillers Licensing Review Committee and the Queensland chapter of the Australian Drilling Industry Association.

[1] Interactive information on mapping, zones, units, sub-areas and groundwater dependant ecosystems under the GABORA Water Plan can also be accessed using Queensland Globe.

Figure 1: Areas in which the Minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland apply.



1.1 Legislative background

Queensland legislation separates the authority to take or interfere with water, from the authority to construct works such as water bores. The former is dealt with under the *Water Act 2000* (Water Act), while the latter is dealt with under the *Planning Act 2016* (Planning Act).

1.1.1 *Water Act 2000*

Through the Water Act all rights to the use, flow and control of all water in Queensland are vested in the State. This is the basis on which the department allocates and manages underground water.

Much of the implementation detail of the Water Act relating to the regulation of underground water is contained in the Water Regulation 2016 (Water Regulation) and water plans, which are subordinate legislation to the Water Act.

In aquifers managed as part of groundwater units of the GABORA Water Plan, the taking or interfering with underground water generally requires a water licence, water permit or seasonal water assignment notice. See the GABORA Water Plan for further details about whether an authorisation is required.

1.1.2 *Planning Act 2016*

Under the Planning Act, the construction of bores to take underground water is either assessable development, accepted development with requirements or accepted development without requirements.

Bores that are assessable development require a development approval to authorise construction. Bores that are accepted development do not need a development approval.

Bores that are accepted development with requirements must be constructed in accordance with an accepted development requirement under the Water Regulation. Bores that are accepted development with no requirements have no construction requirements under the Planning Act, however construction still needs to be carried out in accordance with the relevant accepted development requirements.

Water bores constructed by a petroleum tenure holder under the *Petroleum and Gas (Production and Safety) Act 2004* or the *Petroleum Act 1923* are not subject to the Planning Act and do not require development approval.

1.1.3 Other requirements

Local government should be contacted before drilling commences, to determine if there are bore siting requirements that must be complied with under the relevant local government planning scheme.

1.1.4 Licensing water bore drillers

Unless a person has the appropriate driller's licence allowing them to carry out the activity, it is an offence under the Water Act for a person anywhere in Queensland to:

- drill, deepen, enlarge or case a water bore or test hole
- remove, replace, alter or repair the casing, lining or screen of a water bore
- decommission a water bore or test hole.

A water bore driller's licence may not be required if:

- the individual is under constant physical supervision of a licensed water bore driller
- the activity is carried out under
  - the *Petroleum Act 1923* or the *Petroleum and Gas (Production and Safety) Act 2004*

    or

  - the *Mineral Resources Act 1989* where a functional water supply bore will not remain at the end of that activity
- the activity will not result in the water bore being more than six metres deep.

A person who holds a water bore driller's licence must not:

- contravene a condition of the driller's licence
- undertake water bore drilling work or use equipment for which the holder is not licensed.

The Water Regulation sets out the minimum qualifications for licensed water bore drillers. Drilling must be carried out according to:

- the standards in this document
- specifications in the *Minimum construction requirements for water bores in Australia*
- the development approval—if a permit is required
- if the works are undertaken under the accepted development requirements for bores, the accepted development requirements.

For further information on water bore drillers licensing, refer to the Queensland *Water bore drillers licensing handbook* located on Business Queensland.

2. Use of these standards

2.1 Scope and purpose

This document establishes the minimum standards for the construction and reconditioning of water bores intersecting aquifers within the sediments of artesian basins in Queensland.

The purpose of the standards is to protect underground water resources in the sediments of artesian basins from:

- contamination by surface run-off or by interconnection of flow from aquifers containing water of poorer quality
- pressure loss caused by uncontrolled flow to the surface or by leakage to lower pressure aquifers.

Both these effects can result from poorly constructed and decommissioned water bores.

2.2 Application of these standards

Subject to sections 2.3 and 2.4, this document sets the minimum standards for the construction and reconditioning of all water bores that intersect the sediments of artesian basins. This includes tapping these aquifers, as well as drilling through them to access underlying water.

The sediments of artesian basins contain aquifers that are tapped by artesian bores in some areas, while other areas are tapped by subartesian bores. These standards apply to all water bores that access the sediments of artesian basins; both artesian bores and subartesian bores.

Figure 1 shows the extent of the area covered by these standards. Please contact your local business centre for the exact locations of the boundaries of the area shown in Figure 1.

These standards apply equally to all water bores managed under the GABORA Water Plan that intersect the sediments of artesian basins irrespective of the authority under which works are constructed.

The applicable standards tenure holders and water bore drillers must comply with when constructing water bores or converting drill holes to water bores are outlined in Table 1.

Table 1: Applicable standards for water bores either constructed by a tenure holder or converted by a water bore driller from a hole drilled by a tenure holder

Tenure holders	Activity	Applicable standard
Geothermal tenure holders	• Construction of water bores • Conversion of geothermal wells to water bores	*Minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland*
Mineral and coal tenure holders	• Construction of water bores • Conversion of mineral and coal wells to water bores	
Petroleum tenure holders (not CSG)	• Construction of water bores • Conversion of petroleum and gas wells (not CSG wells) to water bores	
Petroleum tenure holders (CSG)	• Construction of water bores	*Code of practice for constructing and abandoning coal seam gas wells and associated bores in Queensland* or *Minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland*
	• Conversion of coal seam gas wells to water bores	*Code of practice for constructing and abandoning coal seam gas wells and associated bores in Queensland*

2.3 Relationship with the national requirements

This document must be read in conjunction with the *Minimum construction requirements for water bores in Australia*. Where there are inconsistencies between the two, the standards in this document must be followed.

If a matter is not dealt with in these standards, then the *Minimum construction requirements for water bores in Australia* must be followed.

2.4 Relationship with development approvals, self-assessable codes and notices

This document must be read in conjunction with:

- any development approval issued under the Planning Act allowing a water bore to be constructed
- any notice given under the Water Act or Planning Act requiring removal or modification of a water bore
- any accepted development requirement covering water bores.

There may be circumstances where the provisions of a development approval, accepted development requirement or notice is inconsistent with this document or the *Minimum construction requirements for water bores in Australia*. In this event, to the extent that the standard(s) are inconsistent, the requirements of the development approval, accepted development requirement, or notice take precedence and must be followed.

If the development approval, accepted development requirement or notice does not cover a matter dealt with in this document or the *Minimum construction requirements for water bores in Australia*, then this document is to be followed in line with Section 2.3.

3. Notification of drilling activities

Before the start of any water bore drilling activities associated with water bores that are drilled under these standards the department must be notified by email to drillers.licensing@rdmw.qld.gov.au.

3.1 When to notify

3.1.1 Commencement of work

A driller proposing to commence a water bore drilling activity must give notice at least one business day, but not more than five business days, before the start of any water bore drilling activity.

3.1.2 Notification of delay in water bore drilling activity

A driller must notify the department immediately of any delay that will result in work not proceeding in line with notification previously given.

Once the driller has notified the department of this, they must notify the department of any recommencement of work. This must be given as if the work was starting for the first time, in accordance with Sections 3.1.1 and 3.1.2 above.

4. Bore drilling and construction

4.1 General information

Water bores other than a multi-port monitoring bore, must be constructed to tap only the aquifer(s) in a single formation.

Where there is any doubt as to whether or not a bore will be an artesian bore, it must be drilled and constructed as an artesian bore.

4.2 Multi-port monitoring

Multi-port monitoring bores may be constructed to tap aquifer(s) in multiple formations.

For full details of multi-port monitoring refer to the *Minimum construction requirements for water bores in Australia*.

4.3 Equipment, materials and follow through fluids

All equipment and materials necessary to reasonably construct each component of the water bore and to control the flow from, or between, aquifers intersected by the bore, both during and after construction, must be on site at the start of the water bore drilling activity. This includes adequate supplies of casing, drilling fluids, fresh cement, suitable quality mixing water and adequate storage for grout mixes and follow through fluids. Adequate storage would allow for the placement of grout and follow through fluids with no interruption to pumping. The work must not commence unless the necessary equipment and materials are on site.

4.4 Drilling fluids

Unless stated otherwise, drilling fluids must comply with the *Minimum construction requirements for water bores in Australia*.

As the addition of calcium chloride or other chloride-based chemicals of any kind can potentially result in corrosion of grout or casing, such chemicals must not be added to any drilling fluid used in the construction of a water bore.

4.5 Cement grouting

Unless stated otherwise, cement grouting must comply with the *Minimum construction requirements for water bores in Australia*.

All zones behind and between the casing(s), other than the production zone, must be properly sealed by cement grout to prevent interconnection or leakage between aquifers and/or borehole zones.

The sealing of bores must be by cement grouting from the bottom upwards in a continuous operation to ensure a complete seal of the annular space behind the casing, from no more than 30 metres above the production zone to the surface. Cement grout must be seen to return to the surface through the annulus behind the casing during the grouting operation.

Where fluid is used to displace grout up the annulus, a suitable working pressure gauge must be fitted to the cementing head to monitor the pressure of the grout follow-through fluid for four hours after cementing procedures, so that the location of the grout can be monitored.

If grouting is occurring solely within the annulus between two new strings of casing, a balance cementing technique is allowed.

All cementing sockets must be threaded and capped with a bung on completion of the bore.

4.5.1 Curing period

A minimum curing period of 24 hours must be allowed after the completion of a cement grouting operation before any down-hole drilling operations may recommence.

4.5.2 Additives

Calcium chloride or other chloride-based accelerants must not be added to the cement grout mix.

4.6 Casing

Unless stated otherwise, casing and all casing fittings and joiners must comply with the specifications in the *Minimum construction requirements for water bores in Australia*.

All casing must be of a suitable diameter to maintain the minimum annulus clearances specified in the cement grouting standards in the *Minimum construction requirements for water bores in Australia*.

The inside diameter of all production casing must be not less than 125 millimetres (mm).

The minimum internal diameter of 125 mm does not apply to monitoring bores provided that annular clearances meet the minimum thickness of cement grout as specified in the *Minimum construction requirements for water bores in Australia*.

Cutting holes in the casing to lower or raise a string of casing in a bore is not permitted.

4.6.1 Casing for new artesian bores

All new artesian bores must be constructed with at least two strings of casing:

- the larger diameter surface control casing
- the smaller diameter production casing that runs inside the surface control casing.

The annular space between surface control casing and production casing must be joined and sealed at the surface with flanges consistent with section 5.3.

The driller may insert more than two strings of casing. In all instances the bore must be fully cased or screened over the total depth.

Where there are corrosive formations, or where a high-pressure shallow aquifer is expected, an additional string of surface casing may be required.

4.6.1.1 Surface control casing for new artesian bores

For all new artesian bores, the surface control casing must be steel and cement grouted before any further drilling proceeds.

In all cases where water is located at depths exceeding 60 metres below ground surface, the surface control casing must be placed from surface to a depth of at least 60 metres below ground surface, and seated at least 20 metres into competent impermeable strata.

In those cases where water is penetrated at depths of less than 60 metres below ground surface, the surface control casing must be seated above the aquifer containing the water, and placed from surface to a minimum depth of 20 metres below ground surface.

4.6.1.2 Production casing for new artesian bores

For all new artesian bores, the production casing must be cement grouted from no more than 30 metres above the production zone to the surface.

4.6.2 Casing for new subartesian bores

All subartesian bores to which these standards apply must be constructed with at least one string of casing and be fully cased or screened over the total depth of the bore. All bores must be cement grouted from no more than 30 metres above the production zone to the surface.

4.6.3 Inner liner casing for the production zone

An inner liner casing of minimum inside diameter of 100 mm may be telescoped from inside the production casing as a casing liner for the production zone. Such a casing must run from the total depth of the borehole and overlap into the production casing by at least 10 metres. It does not need to be cement grouted; it may be slotted and may comprise sections of screen.

The liner must be lowered to bottom using a threaded back-off joint, an internal inflatable grab packer system attached to the top of the liner or similar device that allows the liner to be properly placed in the borehole. J latches must not be used for lowering of a liner. The lowering system must be reported on the drill log form including dimensions and thread details.

4.6.4 Water bore corrosion areas

Figure 2 shows the location of water bore corrosion areas in Queensland. Detailed plans of these areas are available on Business Queensland.

Table 2 shows the aquifers in each of the water bore corrosion areas in Queensland in which production casing and inner liner casing must be manufactured of inert material such as stainless steel, Poly Vinyl Chloride (PVC), or fibreglass. For water bores in these aquifers, mild steel casing is only allowed for use as surface control casing.

4.7 Casing centralisers

The main reason for centralising a casing string is to ensure uniform and sufficient cement thickness, thereby isolating different borehole zones and preventing corrosion of the casing.

Centralisers must centre the casing in the hole to create an annular space and cement thickness consistent with the cement grouting requirements of the *Minimum construction requirements for water bores in Australia*.

To limit corrosion, centralisers must be constructed of inert material such as plastic, or of similar grade steel as the casing to which they are attached. Each centraliser must have a surface area not less than 10 sq cm contact area while maintaining the required clearance. They must be installed at centres not exceeding 12 metres along the casing on:

- the surface control casing
- the production casing—from surface to the full depth of cement grouting.

The minimum number of centralisers in each set are as follows:

- for casing OD 200mm or greater, a minimum number of four centraliser units at 90° spacing
- for casing OD smaller than 200mm, a minimum of three centraliser units at 120° spacing.

Centralisers and their connections to the casing must be strong and durable enough to withstand the rigours of construction and grouting.

4.8 Casing lifting lugs and rings

Lifting lugs or rings may be welded to steel casing and may remain on the casing after installation if they form part of a casing centraliser. Lifting lugs must not form part of the casing joint.

Lifting rings may form part of the casing joint provided that they are properly welded around the entire circumference of the casing.

Figure 2: Water bore corrosion areas in the GABORA Water Plan area. Corrosive aquifers in these areas are listed in Table 2.

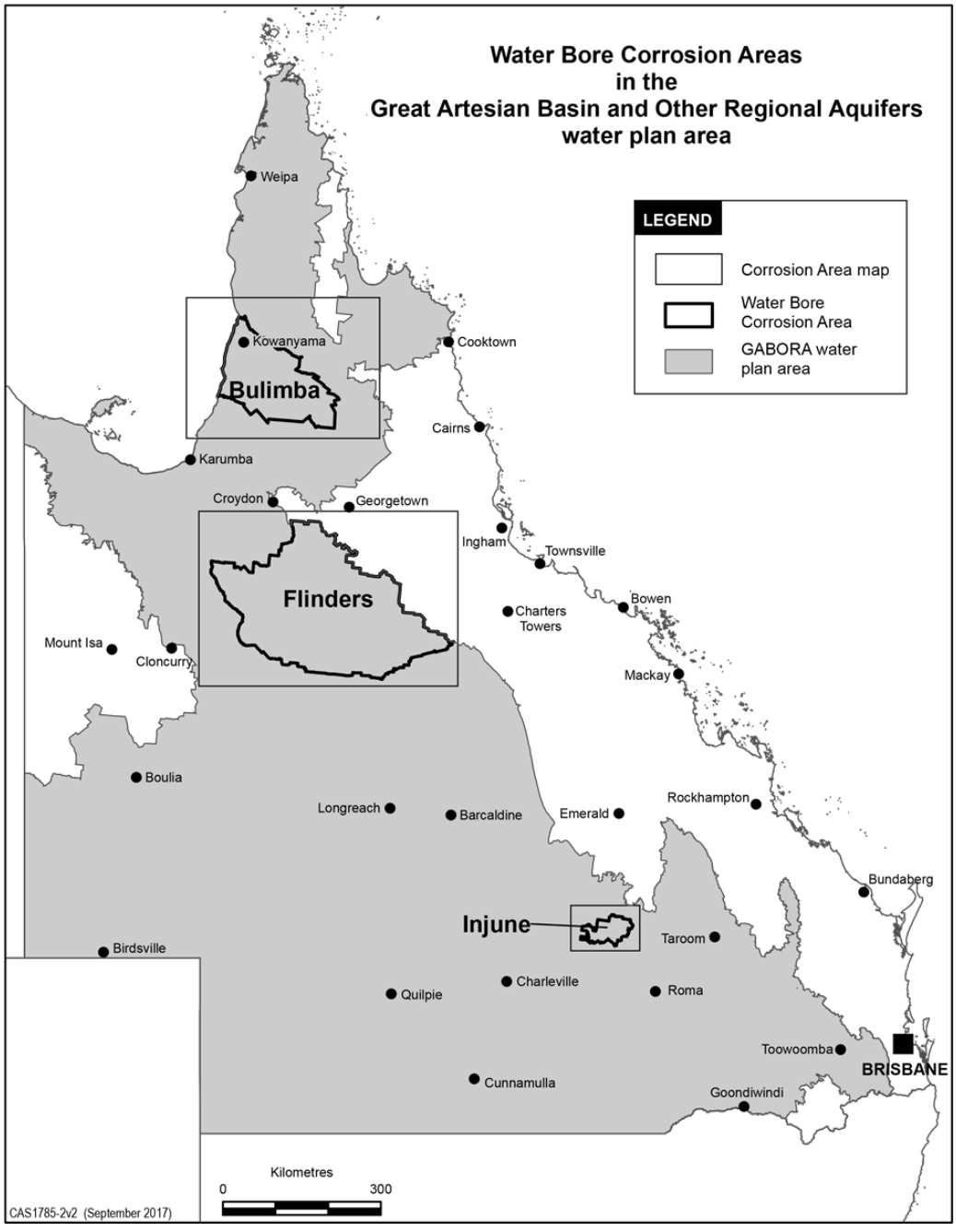


Table 2: Casing requirements for water bore corrosion areas in Queensland

Water bore corrosion area	Department Regional Development, Manufacturing and Water drawing number	Geological formations in which production casing and inner lining casing must be manufactured of inert material
Bulimba	A3–507420	Bulimba Formation only
Flinders	A3–507421	Adori Sandstone
		Birkhead Formation
		Blantyre Sandstone
		Boxvale Sandstone Member
		Cadna-owie Formation
		Clematis Sandstone
		Eulo Queen Group
		Evergreen Formation
		Garraway Sandstone
		Gilbert River Formation
		Hampstead Sandstone
		Helby beds
		Hooray Sandstone
		Hutton Sandstone
		Longsight Sandstone
		Loth Formation
		Moolayember Formation
		Precipice Sandstone
		Ronlow beds
		Warang Sandstone
		Westbourne Formation
		Wyandra Sandstone Member
Injune	A3–507419	Boxvale Sandstone Member
		Birkhead Formation
		Clematis Sandstone
		Eurombah Formation
		Evergreen Formation
		Hutton Sandstone
		Moolayember Formation
		Precipice Sandstone

5. Headworks

The construction of a new or reconditioned artesian bore must include the installation of permanent headworks that control the flow of all water from the bore. The driller must install the headworks before leaving the construction site.

This section details standards for headworks additional to those in the *Minimum construction requirements for water bores in Australia*. Both documents must be referred to for headwork specifications for artesian bores in Queensland.

5.1 Materials

Headworks must be constructed of steel materials. Stainless steel must be used in all cases, where the water produced by the bore is corrosive or there is a risk that it might be corrosive.

5.2 Tubing

The minimum nominal diameter of tubing to be used in headworks is 100 mm except when the nominal diameter of the production casing is less than 100 mm. In this case, the minimum nominal diameter of tubing to be used in headworks is the nominal diameter of the production casing.

The wall thickness of tubing must not be less than 4.76 mm.

5.3 Joining and flanges

A blank flange of the same diameter as the production casing must be installed on the top of the headworks and centred directly over the production casing to allow access to the bore without having to remove the headworks structure or the distribution outlets.

Flanges for headworks up to and including 150 mm diameter must be fabricated to Australian Standard AS 2129-2000 Table D, using M16 galvanised bolts. Flanges for headworks above 150 mm diameter must be fabricated to Australian Standard AS 2129-2000 Table E, using M20 galvanised bolts.

All gaskets must be new and be manufactured of fibrous material, be no less than 2 mm thick and fit for purpose for the pressure and temperature of the bore.

5.4 Valves

All valves fitted to the headworks must comply with either Australian Standards AS1628, AS 2638 or AS3579.

The flow measurement valve must allow free flow from the bore (i.e. without inducing excessive back pressure). It must comply with the minimum valve diameters for defined flow rates specified in Table 3.

Table 3: Minimum valve diameters for defined flow rates

Flow rate	Minimum valve diameter
0–10 litres per second	50 mm
11–30 litres per second	75 mm
>30 litres per second	100 mm

The pressure measurement valve must be 25 mm in diameter.

6. Reconditioning bores

The standards set in this document for the construction of new water bores apply also to the reconditioning of existing water bores.

However, it is not necessary to comply with the standards for the minimum internal diameter of inner lining casing (100 mm) or production casing (125 mm) provided that annular clearances meeting the minimum thickness of cement grout specified in the *Minimum construction requirements for water bores in Australia* are maintained.

It is also acceptable when reconditioning bores to have a minimum 10 mm thickness of cement grout sheathing the pump housing casing where the pump housing casing is constructed of inert material such as plastic. Such pump wells are to be limited to a maximum depth of 60 metres below either:

- the calculated static head at the time of reconditioning for an artesian bore
- the standing water level at the time of reconditioning in a subartesian bore.

The production casing below the pump housing casing is to have a minimum 15 mm thickness of cement grout sheathing it, as per the *Minimum construction requirements for water bores in Australia*.

7. Decommissioning

All decommissioning is to be done in accordance with the *Minimum construction requirements for water bores in Australia*.

8. Reporting on bore cementing

The driller must report on all bore cementing undertaken for water bores drilled under these standards. This report must be on the approved form *Drillers report of cementing a bore tapping artesian sediments* which is available from Business Queensland. These reports must be supplied to the department with the completed drilling log within 60 business days of commencing drilling. An example of a completed cementing report is shown in Attachment 1.

9. Definitions

Aquifer: A geological structure, formation or formations that holds water in sufficient quantity to provide a source of water that can be tapped by a bore.

Artesian bore: Includes a shaft, well, gallery, spear or excavation, and any works constructed in connection with the shaft, well, gallery, spear or excavation, that taps an aquifer and the water flows, or has flowed naturally to the surface.

Casing: All tubular materials inserted in a bore as part of its final construction.

Driller: A water bore driller holding a water bore driller's licence of a class and with endorsements that allow the driller to carry out work to which these standards apply.

Formation: A grouping of rocks with similar characteristics.

Sediments of an artesian basin: Geological formations containing water to which the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 applies, except for formations in the following groundwater units and sub-areas:

- Betts Creek beds groundwater unit
- Cape Rolling Downs groundwater sub-area
- Normanton groundwater unit
- Winton Mackunda groundwater unit.

Production zone: The zone within the target formation that produces the water supply requirements for the bore (Screened/perforated zone).

Standing water level: The level of underground water standing in a bore uninfluenced by pumping in that bore.

Static head: The height, relative to an arbitrary reference level (often ground level), of a column of water that can be supported by the static pressure of the aquifer at a given point (often the point at which a bore taps an aquifer).

Subartesian bore: Includes a shaft, well, gallery, spear or excavation, and any works constructed in connection with the shaft, well, gallery, spear or excavation, that taps an aquifer and the water does not flow, and never has flowed naturally to the surface.

Test hole: means a hole made for the purpose of obtaining information about:

a. the water production capacity, water production quality or hydraulic properties of a geological structure or formation; or

b. the suitability of a geological structure or formation to be tapped by a water bore.

Water bore: Means an artesian or subartesian bore. For the purpose of these standards this includes the headworks.

Water bore drilling activity: means any of the following activities:

a. drilling, deepening, enlarging or casing a water bore or test hole

b. removing, replacing, altering or repairing the lining or screen of a water bore or test hole

c. removing, replacing, altering or repairing the casing of a water bore (other than a subartesian bore casing less than 1.2m below the surface) or test hole

d. decommissioning a water bore or test hole.

10. References

National Uniform Drillers Licensing Committee 2020, *Minimum construction requirements for water bores in Australia*, 4th edition, National Water Commission, Canberra, Australia. Viewed 18 August 2023, on Australian Drilling Industry Association, https://adia.com.au/wp-content/uploads/2020/09/Minimum-Construction-Requirements-Edition-4.pdf.

Department of Regional Development, Manufacturing and Water 2023, *Water bore drillers licensing handbook*, State of Queensland, Brisbane, Australia. Viewed 18 August 2023, on Business Queensland, https://www.rdmw.qld.gov.au/?a=109113:policy_registry/water-bore-drillers-licensing-handbook.pdf.

Department of Natural Resources, Mines and Energy, November 2019, *Code of practice for the construction and abandonment of petroleum wells and associated bores in Queensland*, Version 2, Petroleum and Gas Inspectorate, State of Queensland, Brisbane, Australia. Viewed 18 August 2023 on Department of Resources, https://www.resources.qld.gov.au/__data/assets/pdf_file/0006/1461093/code-of-practice-petroleum-wells-bores.pdf.

Attachment 1 Example of a completed cementing form

Queensland Government

Driller's report of cementing a bore tapping artesian sediments

16245443

Ensure you have generated a Report ID number prior to submitting > | Click to generate report ID

Development Permit Number of Bore 12345 **Driller's Log Sheet Number of Bore** 78910 **Date of grouting** 10/06/2022

Condition of hole *(Choose one)*: **Stable** ☑ **Caving** ☐ **Washouts** ☐ **Is hole losing fluid?** Yes ☐ No ☑

Type of grouting: Outer surface casing ☑ / Inner production casing ☐ / Other *(describe)* ☐

Has the intended production zone for the bore been drilled yet? Yes ☐ No ☑

If waterbeds mudded off, has pressure been tested? Yes ☐ No ☑ Pressure 153 kPa Time 13:30

Was circulation established? Yes ☑ No ☐ Circulation free? Yes ☑ No ☐

S.G. of fluid in hole 1.05 Viscosity of fluid 38 seconds Conductivity of drill fluid? 1100

CASING CENTRALISER DETAILS

Were casing centralisers used? Yes ☑ No ☐ Manufacturer/Description Steel

Number used 5 Spacing 12 Depth from 0 m to 60 m

METHOD OF GROUTING

Pressure cementing down the centre and up the back of casing ☑ Tremmie pipe pressure cementing ☐ Balance Cementing ☐

How was grout mixed? *(Choose one)*: Paddle

How was grout placed? *(Supply details)* Pumped into the centre, returned up the back.

BORE GROUTING DETAILS *(Provide all calculations on back of page)*

Depths to be grouted from 0 m to 60 m Calculated volume of grout 1792 L

MIX RECIPE

Bags/Kg 57 Mix Water 1425 L

Additives (e.g. Bentonite, Fibreglass, Accelerator, Retarder) – **must all be included when used.**

45 kg of Bentonite

Source of water (bore/dam/creek/swamp/other) Dam pH 7.5 Conductivity 800

S.G. of grout mixed 1.45 Viscosity of grout 62 seconds

Follow through fluid 1938 L Type of follow through fluid (drill fluid/water) Water

S.G. of follow through fluid 1 Any spacer fluids used? Yes ☐ No ☑

What was final cementing pressure? 261 kPa Did pressure hold on completion? Yes ☑ No ☐

Did grout reach surface? Yes ☑ No ☐ If no, what caused this?

What action was taken?

How much more grout was mixed?

Did grout recede? Yes ☑ No ☐ Top-up quantity 70 L

NOTE: Top-up should be carried out as soon as possible.

How long after cement placement was top-up carried out? 5 hours

How much grout remained inside bore? 2 m Estimated final location of grout column from 0 m to 60 m

Driller's Name Alex Smith Driller's Licence No. 9876

Driller's signature Date 10/06/2022

The completed report must be provided to the department. It is recommended copies are retained by the land holder and registered driller.

W2F166 v2 © The State of Queensland 2021

BORE CEMENTING CALCULATIONS

Hole Size 274

Outer Casing: OD 219mm Wall Thickness 6.35mm Depth 60m

Inner Casing: OD _____ Wall Thickness _____ Depth _____

% Grout extra 35

OUTSIDE OF CASING

(274 + 219) x (274 – 219) x .0007855

493 x 55 x .0007855 = 21.30 Litres of Grout

21.30 x 60 Metres = 1277.9 Litres of Grout

1277.9 x 35% Extra = 1725.21 Litres of Grout = 1725

INSIDE CASING

206.3 x 206.3 x .0007855 = 33.43 Litres per Metre

2 Metres left inside of Casing 33. x 2 = 66.86 Litres of Grout = 67

TOTAL VOLUME OF GROUT

1725 + 67 = 1792 Total Litres of Grout = 1792

MIX FIGURES - General Purpose Cement (20kg bags), Bentonite Mix SG of 1.45

1792 ÷ 31.65 = 57 bags of Cement

57 x 25 = 1425 Litres of Mixing Water

57 x 0.8 = 45.6 Kg of Bentonite = 45.6

FOLLOW-THROUGH WATER

206.3 x 206.3 x .0007855 x 33.43 Litres per Metre

33.43 x 58 Metres = 1939

Litres of Follow-Through Fluid = 1939

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