

# Guideline

## Bore assessments

*This guideline provides details about the minimum requirements for undertaking a bore assessment and has been authorised under section 413 of the Water Act 2000.*

### Table of contents

<b>1</b>	<b>Introduction and background</b>	<b>2</b>
1.1	Notice of intention to undertake a bore assessment	2
1.2	Make good agreements and make good measures	2
1.3	Impaired capacity of a water bore	2
1.3.1	<b>Water level decline</b>	<b>2</b>
1.3.2	<b>Free gas</b>	<b>3</b>
1.4	Method for undertaking a bore assessment	3
1.5	Bore owner responsibilities	4
1.6	Notice of outcome of bore assessment	4
<b>2</b>	<b>Collection of data and qualifications for all bore assessments undertaken—Parts A and B</b>	<b>5</b>
2.1	Minimum qualifications for persons undertaking bore assessments	5
2.2	Quality assurance and quality control	5
2.3	Independent third party certification	6
<b>3</b>	<b>PART A—Water level decline</b>	<b>7</b>
3.1	Step 1—Field assessment	9
3.2	Step 2—Determining water-level decline	10
3.3	Step 3—Determining if water level declines result from the exercise of underground water rights	11
3.4	Step 4—Determining impaired capacity	12
<b>4</b>	<b>PART B—Free Gas</b>	<b>14</b>
4.1	Minimum requirements	15
<b>5</b>	<b>Definitions/Glossary</b>	<b>16</b>
<b>6</b>	<b>References</b>	<b>18</b>

## **1 Introduction and background**

This guideline provides details about the minimum requirements for undertaking a bore assessment and has been authorised under section 413 of the *Water Act 2000* (Water Act). Undertaking a bore assessment is a key element of a resource tenure holder's make good obligations under Chapter 3 of the Water Act.

Bore assessments are required to establish whether a bore has, or is likely to have, an impaired capacity as a result of resource activities. The bore assessment also determines whether make good measures are required as part of a make good agreement between the tenure holder and the bore owner. Make good agreements ensure that the bore owner is not disadvantaged if their bore is, or is likely to be, impaired as a result of resource activities.

It is an offence to not comply with the minimum requirements set out in this guideline when undertaking a bore assessment:

- The maximum penalty for an individual is 50 penalty units.
- The maximum penalty for a corporation is 250 penalty units.

### **1.1 Notice of intention to undertake a bore assessment**

Under section 415 of the Water Act, at least 10 business days prior to undertaking a bore assessment, the resource tenure holder must give the bore owner a notice stating when the bore assessment will be undertaken. The notice must also include details regarding who will be undertaking the bore assessment.

### **1.2 Make good agreements and make good measures**

A make good agreement is required for all bores that have had a bore assessment undertaken, and a resource tenure holder must exercise best endeavours to enter into an agreement within 40 business days after the bore assessment has been undertaken, or a later day agreed to by the chief executive. However, make good measures are only required if a bore has, or is likely to have, an impaired capacity.

### **1.3 Impaired capacity of a water bore**

The purpose of a bore assessment is to establish whether a bore has, or is likely to have, an impaired capacity. The Water Act recognises two situations when a resource tenure holder's exercise of underground water rights or carrying out of an authorised activity may cause a water bore to have, or likely to have, an impaired capacity:

1. water level decline which impairs the bore's ability to provide a reasonable quantity or quality of water for the water bore's authorised use or purpose; or
2. the water bore is adversely affected by free gas.

#### **1.3.1 Water level decline**

Under section 412 of the Water Act, an existing water bore has an impaired capacity if:

- there is a decline in the water level of an aquifer at the location of the bore and the exercise of underground water rights has, or has likely, caused or materially contributed to the decline; and
- because of the decline, the bore can no longer provide a reasonable quantity or quality of water for its authorised use or purpose.

A new water bore has an impaired capacity if:

- there is a decline in the water level of the aquifer at the location of the bore and the exercise of underground water rights has, or has likely, caused or materially contributed to the decline;
- the decline is more than the decline predicted at the location of the bore in the relevant report; and

- because of the decline, the bore can no longer provide a reasonable quantity or quality of water for its authorised use or purpose.

Certainty that the exercise of underground water rights has caused or will likely cause the bore to be impaired is not needed; it is sufficient that the exercise of underground water rights by the resource tenure holder has likely caused or materially contributed to the decline or adverse effect.

### **1.3.2 Free gas**

Section 412 of the Water Act also provides that an existing water bore or a new water bore has an impaired capacity if there is evidence of any of the following:

- damage to the bore or to the bore's pumps or other infrastructure;
- that the bore poses a health or safety risk;
- that the bore can no longer, or it is likely that the bore can no longer, provide a reasonable quantity or quality of water for its authorised use or purpose; and
- free gas derived from the carrying out of authorised activities under a resource tenure has, or has likely, caused or materially contributed to the adverse effect.

Certainty that the carrying out of the authorised activity has caused or will likely cause the bore to be impaired is not needed; it is sufficient that the resource operations has likely caused or materially contributed to the decline or adverse effect.

## **1.4 Method for undertaking a bore assessment**

This guideline provides two methods (Part A or Part B) for undertaking a bore assessment to determine whether a bore has or is likely to have an impaired capacity.

Part A provides the minimum requirements for undertaking a bore assessment on a water bore where the resource tenure holder is required to evaluate whether water level decline, from its exercise of underground water rights, has caused or is likely to cause the bore to have an impaired capacity. Resource tenure holders must undertake a bore assessment in accordance with Part A in the following situations:

- an UWIR or an amendment of an UWIR takes effect, and the water bore is located in an immediately affected area (IAA)<sup>1</sup>.
- a final report or an amendment of a final report takes effect, and the water bore is located in long-term affected area (LTAA)<sup>2</sup>; or
- the chief executive of the department directs the resource tenure holder to undertake a bore assessment of a water bore under section 418 of the Water Act and specifies that an investigation of whether water level decline from the tenure holder's exercise of underground water rights has caused or is likely to cause the bore to have an impaired capacity.

Part B provides the minimum requirements for undertaking a bore assessment on a water bore where the resource tenure holder is required to evaluate whether the bore is experiencing an adverse impact due to free

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<sup>1</sup> An IAA means an area of an aquifer where the water level is predicted to decline due to the exercise of underground water rights, by more than an identified bore trigger threshold within three years.

<sup>2</sup> A LTAA means an area of an aquifer where the water level is predicted to decline due to the exercise of underground water rights, by more than an identified bore trigger threshold at any time.

gas derived from the resource tenure holder carrying out an authorised activity. Resource tenure holders must undertake a bore assessment in accordance with Part B in the following situation:

- the chief executive of the department directs the resource tenure holder to undertake a bore assessment of a water bore under section 418 of the Water Act and specifies that an investigation of whether free gas has caused or is likely to cause the bore to have an impaired capacity.

### **1.5 Bore owner responsibilities**

Section 416 of the Water Act gives resource tenure holders the power to ask bore owners for information about:

- the location of any water bores on the owner's land; and
- any other information the resource tenure holder reasonably requires to undertake a bore assessment of any bores on the owner's land.

Bore owners with water bores on their land are expected to comply with any reasonable request for information from the resource tenure holder if they possess the information. It is intended that the provision of this information will result in more accurate bore assessments and consequently assist in the negotiation of a make good agreement.

### **1.6 Notice of outcome of bore assessment**

After a bore assessment has been undertaken, the resource tenure holder must give both the bore owner and the Office of Groundwater Impact Assessment a notice of the outcome of the bore assessment within 30 business days. The notice must include whether the bore has, or is likely to have, an impaired capacity.

If the bore assessment was undertaken by the resource tenure holder due to a direction notice from the chief executive, a copy of the notice of outcome must also be given to the department.

It should be noted that the assessment includes analysing data obtained about water level, water quality, bore construction and infrastructure therefore, the 30 business day period commences once laboratory results are received and this information has been analysed.

## **2 Collection of data and qualifications for all bore assessments undertaken—Parts A and B**

### **2.1 Minimum qualifications for persons undertaking bore assessments**

<b>Minimum requirements</b>
<p>Resource tenure holders must ensure that the person undertaking the field measurements required for a bore assessment possess:</p> <ol style="list-style-type: none"> <li>1. a minimum of two years professional experience in at least one of the following fields:               <ol style="list-style-type: none"> <li>a. underground water level monitoring programs, including monitoring of water level in bores equipped with pumping infrastructure;</li> <li>b. the conduct of underground water quality sampling programs; and</li> <li>c. hydrogeology and/or engineering; and</li> </ol> </li> <li>2. a practical knowledge of water bore construction and infrastructure.</li> </ol>

Experience requirements in the fields of water level monitoring, water quality sampling and hydrogeology or engineering ensure that the persons undertaking bore assessments possess a practical knowledge of water bore construction and infrastructure. These minimum qualifications for field data collection personnel are required to ensure integrity and quality of the data collected. Failure to use appropriate field data collection personnel may affect the quality of data collected, and the subsequent make good agreement.

Should the bore owner be concerned that the person(s) conducting the bore assessment does not have the appropriate skills and experience, the bore owner may request that the resource tenure holder provide evidence of the person(s) skills and expertise.

Under section 423 of the Water Act, the resource tenure holder must reimburse the bore owner for hydrogeology costs necessarily and reasonably incurred in negotiating a make good agreement however, the advice must be provided by an appropriately qualified hydrogeologist. An appropriately qualified hydrogeologist is defined in section 423(5) of the Water Act as an individual who has the minimum experience or qualifications stated in the guideline made by the chief executive under section 413 for undertaking a bore assessment.

A hydrogeologist providing reasonable and necessary advice to a bore owner in negotiating a make good agreement, will be considered an appropriately qualified hydrogeologist if the individual meets the minimum requirements in this section of the guideline.

### **2.2 Quality assurance and quality control**

<b>Minimum requirements</b>
<ol style="list-style-type: none"> <li>1. The resource tenure holder must develop a formal quality assurance program, and undertake bore assessments in accordance with this program.</li> <li>2. The formal quality assurance program must include quality control procedures consistent with the principles of the following documents or subsequent versions thereof:               <ol style="list-style-type: none"> <li>a. AS/NZ 9000 Quality management systems series;</li> <li>b. quality assurance/quality control of AS/NZS 5667.11:1998 Water quality - Sampling - Guidance on sampling of groundwaters (Joint Technical Committee EV/8, 2016); and</li> <li>c. Monitoring and Sampling Manual 2009—Environmental Protection (Water) Policy 2009 (Department of Environment and Heritage Protection, 2013).</li> </ol> </li> </ol>

3. The quality assurance program must be provided to the chief executive upon written request within the requested timeframe.

The primary purpose of a formal quality assurance program is to document the procedures and protocols for all aspects of the bore assessment and must include quality control procedures. Quality control procedures may include requirements such as performance of work by two personnel, thus enabling field checks, and analysis of duplicate water quality samples. It is the responsibility of the resource tenure holder to develop relevant best practice quality control procedures.

Considerable literature already exists on the topic of underground water monitoring and sampling. In addition to the minimum requirements for quality assurance and quality control, relevant industry standards that should be referenced include, but are not limited to, the below or subsequent versions thereof:

- EPA Guidelines: Regulatory Monitoring and Testing, Groundwater Sampling (Environment Protection Authority, 2007); and
- Groundwater Sampling and Analysis—A Field Guide (Sundaram, et al., 2009).

### **2.3 Independent third party certification**

<b>Minimum requirements</b>
<ol style="list-style-type: none"><li>1. The bore assessment must be undertaken by an independent third party or be certified by an independent third party.</li><li>2. Independent third parties undertaking bore assessments or providing certification must:<ol style="list-style-type: none"><li>a. not be an employee of, nor have a financial interest or any involvement which would lead to a conflict of interest with the tenure holder whose bore assessments are being certified</li><li>b. have a degree in a relevant science or engineering discipline</li><li>c. have a minimum of five years prior experience in at least one of the following fields:<ol style="list-style-type: none"><li>i. groundwater level monitoring programs (including monitoring of water level in bores equipped with pumping infrastructure);</li><li>ii. groundwater quality sampling programs; or</li><li>iii. groundwater hydrogeology and/or engineering; and</li></ol></li><li>d. have a practical knowledge of water bore construction and infrastructure.</li></ol></li><li>3. If certified by an independent third party, the certification must include a statement that:<ol style="list-style-type: none"><li>a. quality assurance and quality control procedures are being implemented, inclusive of compliance with the relevant standards and manuals referenced above;</li><li>b. all aspects of the bore assessments are undertaken in compliance with this guideline; and</li><li>c. verifies the minimum qualifications, training and experience of all persons conducting bore assessments.</li></ol></li></ol>



All bore assessments must be completed by an independent third party or certified by an independent third party, through signoff on the approved form (Outcome of bore assessment (ESR/2016/2392)<sup>3</sup>) for submitting

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<sup>3</sup> This form is available on the Queensland Government website at [www.qld.gov.au](http://www.qld.gov.au), using the publication number 'ESR/2016/2392' as a search term.

bore assessment information. It should be noted that independent third party certification does not require an independent third party being present in the field for all bore assessments.

### **3 PART A—Water level decline**

The minimum requirements in Part A must be followed by a resource tenure holder undertaking a bore assessment in the following situations:

- an UWIR or an amendment of an UWIR takes effect, and the water bore is located in an IAA;
- a final report or an amendment of a final report takes effect, and the water bore is located in a LTAA; or
- the chief executive of the department directs the resource tenure holder to undertake a bore assessment of a water bore under section 418 of the Water Act and specifies that an investigation of whether water level decline from the tenure holder's exercise of underground water rights has caused or is likely to cause the bore to have an impaired capacity.

Undertaking a bore assessment to determine whether the bore has, or is likely to have, an impaired capacity due to the exercise of underground water rights causing a decline in the water level of the aquifer at the bore's location, must involve the following four steps:

**Step 1**—Field assessment of the current bore condition

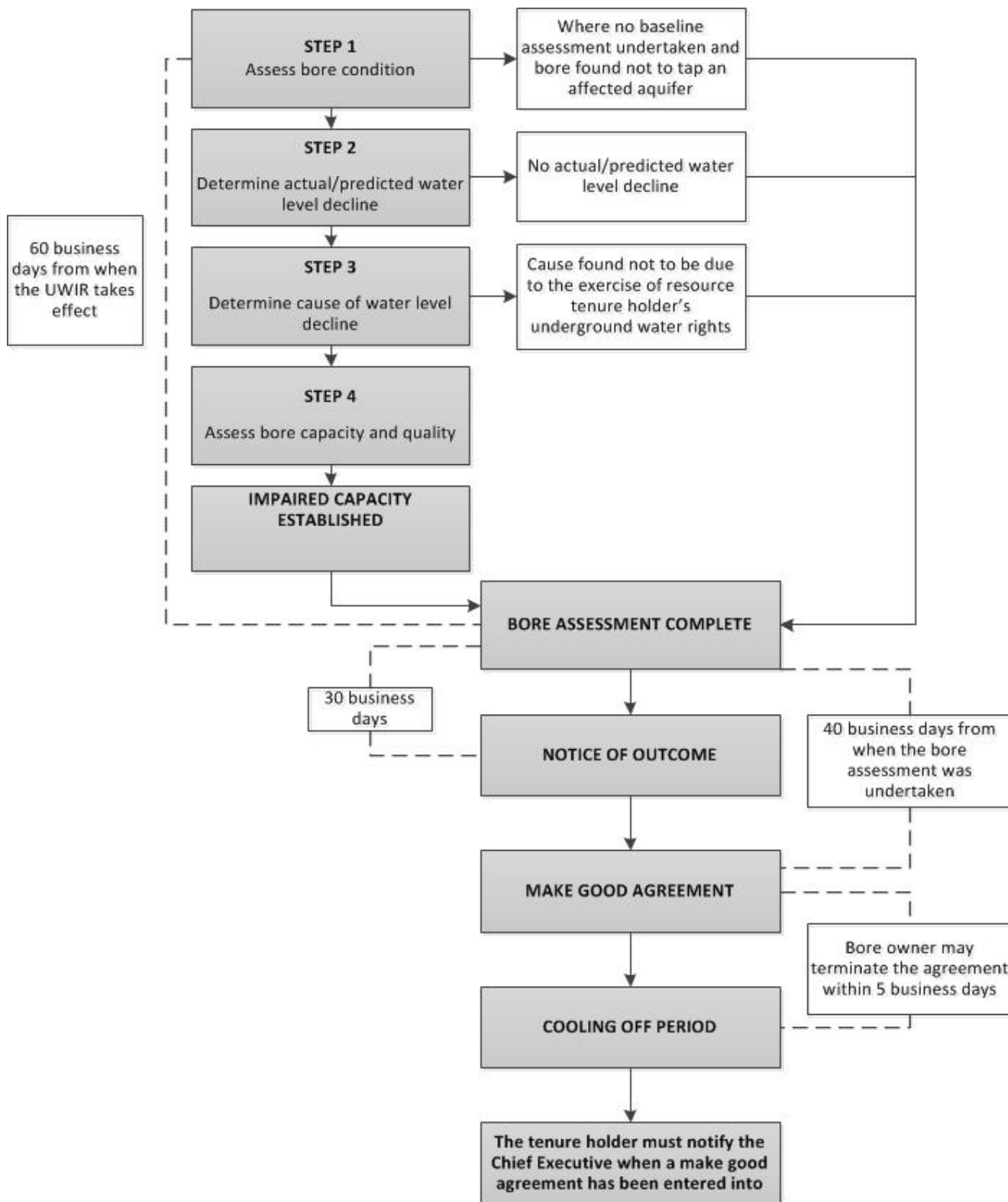
**Step 2**—Determination of whether water levels have declined or are predicted to decline

**Step 3**—Determination of whether declining water levels are due to the exercise of underground water rights by a resource tenure holder

**Step 4**—Determination of whether the bore can or will continue to provide a reasonable quantity and quality of water for its authorised use or purpose.

For steps 1–3, there are certain circumstances where the bore assessment may be completed without progressing through the remaining steps. Figure 1 below summaries the bore assessment steps for determining whether a bore has, or is likely to have, an impaired capacity due to water level decline from a resource tenure holder's exercise of underground water rights. Figure 1 also includes the process for completing a tenure holder's make good obligations after a bore assessment has been undertaken.

Figure 1: Process for undertaking a bore assessment for water level decline





### 3.1 Step 1—Field assessment

The initial step in determining whether a bore has impaired capacity requires the measurement of the current bore condition. This is then compared to the relevant baseline assessment, UWIR and historical water level and water quality data in subsequent steps.

Minimum requirements
<ol style="list-style-type: none"><li>1. When assessing the current bore condition, the bore assessment must be carried out in accordance with the requirements for completing a baseline assessment in the department's guideline Baseline assessments (ESR/2016/1999<sup>4</sup>).</li><li>2. The bore assessment must verify bore details that remain unchanged from the baseline assessment.</li><li>3. The bore assessment must state any variation to the current bore condition from the baseline assessment.</li><li>4. If a baseline assessment has previously been carried out, and the method for carrying out the bore assessment is different, the use of a different method must be fully explained and noted in the form Outcome of bore assessment (ESR/2016/2392).</li></ol>

To enable an accurate determination about whether a bore has an impaired capacity as a result of resource activities, it is essential that bore assessments are carried out in a manner consistent with the requirements for carrying out a baseline assessment. These requirements are outlined in the department's guideline Baseline assessments (ESR/2016/1999).

Where a baseline assessment has been previously carried out, some of the information will likely be unchanged when undertaking the bore assessment (e.g. bore site and construction details). Where this is the case, it is important that the bore assessment verifies these details and notes that they are unchanged.

Where a variation exists, for example where a bore has been reconditioned and the headworks or casing has changed, these details must be clearly noted.

There are a range of circumstances where a bore assessment will have to be carried out differently to how the baseline assessment was conducted. For example, there may be a change in bore equipment or conditions which requires a different sampling method to be employed. All variations must be explained and clearly noted in all recordings to establish the extent to which data can be compared.

An UWIR may identify that a number of bores tap an affected aquifer. If a baseline assessment has not been undertaken for these bores, a field assessment may demonstrate that the bore does not actually tap an affected aquifer. In these circumstances, the responsible tenure holder may finalise the bore assessment without completing any further steps, and submit the outcomes of this step to the Office of Groundwater Impact Assessment (OGIA). If the bore assessment has been undertaken under section 418 of the Water Act, the resource tenure holder must give the chief executive of the department a copy of the notice of outcome of bore assessment.

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<sup>4</sup> This guideline is available on the Queensland Government website at [www.qld.gov.au](http://www.qld.gov.au), using the publication number 'ESR/2016/1999' as a search term.

### 3.2 Step 2—Determining water-level decline

Step two involves determining whether the water level in the bore has declined. To make this determination, comparisons must be made with the relevant baseline assessment, UWIR and historical water levels.

Minimum requirements
<ol style="list-style-type: none"> <li>1. To determine whether the water level in the bore has declined, comparisons must be made with the baseline assessment data collected for the water bore and based on the same reference point.</li> <li>2. Where baseline assessment data is not available, or a baseline assessment has not been carried out, all available water level data must be considered to estimate historic water levels.</li> <li>3. The sources of information used to determine the historical water level must be clearly noted.</li> <li>4. The magnitude and time period of water-level decline must be clearly noted when comparing current water level/data and historic water level/data.</li> <li>5. For new bores, comparisons must be made between any declines in water levels that have occurred for the bore and declines in water levels that were predicted in the relevant approved UWIR.</li> <li>6. For new bores, assumptions about the rate of decline must be stated for overlapping but non-identical time periods.</li> <li>7. To determine if the water level is predicted to decline, the assessment must refer to the drawdown predictions contained in the most recently approved UWIR.</li> <li>8. Where an UWIR is not in effect for the area where the bore is located, the methods proposed in the guideline Underground water impact reports and final reports (ESR/2016/2000)<sup>5</sup> for predicting drawdown must be applied to predict water level declines.</li> </ol>

When estimating historic water levels, available water level data may include but is not limited to the following:

- water levels recorded at the time of drilling;
- water level data from nearby bores tapping the same geological formation (including department bores and bores selected for the UWIR water monitoring strategy);
- groundwater contours; and
- other data collected by private bore owners but certified by an independent third party.

For new bores, it is likely that the actual water level decline is measured over a different time period than the UWIR prediction period, which is commonly three years. To enable comparisons to be made between water-level declines for overlapping but non-identical time periods, assumptions may need to be made about the rate of decline in both cases. The resource tenure holder should determine whether it is appropriate to assume a constant decline in either or both cases. Any assumption therefore must be clearly stated to support the water-level comparison.

If it has been established that the bore does not have an impaired capacity (i.e. no water-level decline has occurred or is predicted to occur) the responsible tenure holder may finalise the bore assessment without completing any further steps and submit the outcomes of the steps that have been taken to the OGIA. If the bore assessment has been undertaken under section 418 of the Water Act, the resource tenure holder must give the chief executive of the department a copy of the notice of outcome of bore assessment.

<sup>5</sup> This guideline is available on the Queensland Government website at [www.qld.gov.au](http://www.qld.gov.au), using the publication number 'ESR/2016/2000' as a search term.

### 3.3 Step 3—Determining if water level declines result from the exercise of underground water rights

Step 3 involves determining if the exercise of underground water rights has, or has likely, caused or materially contributed to a water decline at the location of a bore.

Minimum requirements
<ol style="list-style-type: none"> <li>1. When assessing the extent to which the exercise of underground water rights has, or has likely, caused or materially contributed to a decline in groundwater level, the following information must be referred to:               <ol style="list-style-type: none"> <li>a. whether declines were predicted to occur in the area in the relevant UWIR(s) or final report(s);</li> <li>b. the proximity of the bore to the resource activity(ies);</li> <li>c. assessment of the connectivity between aquifers supporting the water bore and the resource activity(ies);</li> <li>d. any available data on groundwater level trends in bores in the vicinity of the water bore that tap the same aquifer to determine if declines are localised or regional. This could include government monitoring bores and bores selected for the relevant UWIR water monitoring strategy; and</li> <li>e. assessment of regional groundwater elevation contours to determine if there is any evidence of cones of depression expanding outwards from a resource tenure(s).</li> </ol> </li> <li>2. To demonstrate that the exercise of the underground water rights is not the cause, or has not materially contributed to the decline in water levels, an investigation of other possible causes for the declining water levels must be undertaken and documented.</li> <li>3. Notwithstanding 2, if there is uncertainty as to whether the exercise of underground water rights, or another possible cause has, or has likely, caused or materially contributed to the decline in groundwater level, the cause of the decline is deemed to be due to the exercise of underground water rights.</li> </ol>

Responsible tenure holders are only responsible for make good measures where it is determined that the exercise of underground water rights has, or has likely, caused or materially contributed to the decline in water levels.

There are a number of factors in addition to the exercise of resource tenure holder's underground water rights that affect groundwater levels. A bore may not be able to supply a reasonable quantity of water because of natural environmental factors such as drought, or other water extracting industries.

If evidence supports that declining water levels are not due to the exercise of the underground water rights an investigation of other possible causes for the declining water levels must be undertaken to justify this conclusion. It is important to note however, for impaired capacity to be established, it is sufficient if the exercise of underground water rights has or has likely materially contributed to the decline. Therefore the investigation must conclusively demonstrate that the decline in water level is solely caused by another factor.

Appropriate methods for determining other possible causes for declining water levels include but are not limited to:

- determining whether the current water level/measurement falls within the range of previous water level/measurements (or surrounding bores that tap the same target aquifer);
- comparing the recent changes in groundwater levels/to long-term trends in measured groundwater levels (particularly relevant for aquifers that are deep and/or consist of consolidated sediments);
- plotting the available water level data against rainfall (e.g. cumulative departure from mean rainfall); and

- using down-hole cameras and/or geophysical logging (including calliper, neutron/gamma, cement bond log, ultrasonic, temperature, casing collar locator and conductivity logs) to determine whether there are holes in the casing (for example, where the casing has been corroded).

If it has been established that the decline was not a result of the exercise of underground water rights, the resource tenure holder may finalise the bore assessment without undertaking any further steps and submit the outcomes of the steps that have been taken to the OGIA.

If a bore assessment has been undertaken under section 418 of the Water Act, the tenure holder must also submit the outcome of bore assessment to the chief executive of the department.

### **3.4 Step 4—Determining impaired capacity**

At this stage, steps two and three have established that there is, or is likely to be, a decline in the water level of the aquifer at the location of the of the bore and the exercise of underground water right has, or has likely, caused or materially contributed to that decline. The final step to determine the impaired capacity of the water bore is to establish whether the bore can no longer provide a reasonable quantity or quality of water for its authorised use or purpose.

<b>Minimum requirements</b>
<ol style="list-style-type: none"> <li>1. The current bore yield must be determined.</li> <li>2. Comparisons must be made with historical data to determine if bore yield has, or is likely to be, reduced.</li> <li>3. The sources of historical data must be clearly recorded.</li> <li>4. The likelihood of reductions in bore yield occurring due to water-level declines must be evaluated considering:               <ol style="list-style-type: none"> <li>a. magnitude of the water level decline or predicted water decline;</li> <li>b. aspects of the bore construction (including bore depth and screen depth);</li> <li>c. the pump depth; and</li> <li>d. aquifer properties.</li> </ol> </li> <li>5. The following must be referred to when determining if the bore can or will continue to provide a reasonable quantity and quality of water for its authorised use or purpose:               <ol style="list-style-type: none"> <li>a. information about the water licence and metered use; and</li> <li>b. existing plans for any allocated water entitlement.</li> </ol> </li> <li>6. Current groundwater quality must be determined through an analysis of collected groundwater samples.</li> <li>7. Groundwater quality sampling must be undertaken according to the guideline Baseline assessments (ESR/2016/1999) including the analysis of samples by a National Association of Testing Authorities (NATA) accredited laboratory.</li> <li>8. When comparing two sets of water quality data, the detection limits and analytical methods used for water quality analyses must be equivalent.</li> <li>9. Where a bore assessment indicates that the water quality may be affected in the future due to a decline in water level, the assessment must estimate the extent of impact and evaluate the likelihood of these negative impacts occurring.</li> </ol>

To determine the current bore yield, particularly for a water bore frequently utilised by a landholder, the following tests should be conducted:

- pumping tests or flow/pressure tests; or
- measurements of flow rate (only where a pumping test is not possible e.g. because of fixed head works).

There may be situations however, where these tests are not practical (e.g. where a water bore is located in a low permeable formation) and other methods such as slug or bail tests may provide useful information for consideration.

The Australian Standard AS2368—1990 Test pumping of water wells should be used when determining the most suitable type and duration of pumping test (Committee CE/28, 1990). It is important that methods for determining bore yield are supported by a rationale which considers the assumptions and limitations of that method in relation to the water bore and the condition of the water bore itself as established under step 1 of this guideline.

If no other historic information is available, comparisons may be made with the bore capacity as listed in the drillers' records. However, this estimate of bore capacity should be used with caution as it is highly dependent on specific conditions at the time of drilling and on the methods used to determine bore capacity.

If information about the water licence and metered use is not available, water requirements should be estimated. To estimate the water requirements, the guideline Baseline assessments (ESR/2016/1999) may be referred to. Information on estimating water quantity requirements for livestock and domestic use can be found in Appendix 1 of the abovementioned guideline.

Existing plans for using a water entitlement may include seasonal water assignments that have yet to be allocated to the bore owner.

Negative impacts on water quality that may be associated with water-level declines due to the exercise of underground water rights include:

- increases in salinity and/or changes in major ion composition due to induced flow of water from underlying or overlying formations; and/or
- increases in the concentrations of dissolved gas associated with the depressurisation of coal seams.

To estimate the extent of negative water quality impacts and evaluate the likelihood of these occurring, the following contributing factors can be evaluated:

- magnitude of the water level decline;
- the connectivity between the target aquifer for resource activities and the aquifer where the landholder's bore is screened; and
- differences in water quality at the water entry zone (i.e. where the bore is screened, slotted, perforated or open to the aquifer) of the landholder's bore and the water quality in aquifers overlying and/or underlying this aquifer.

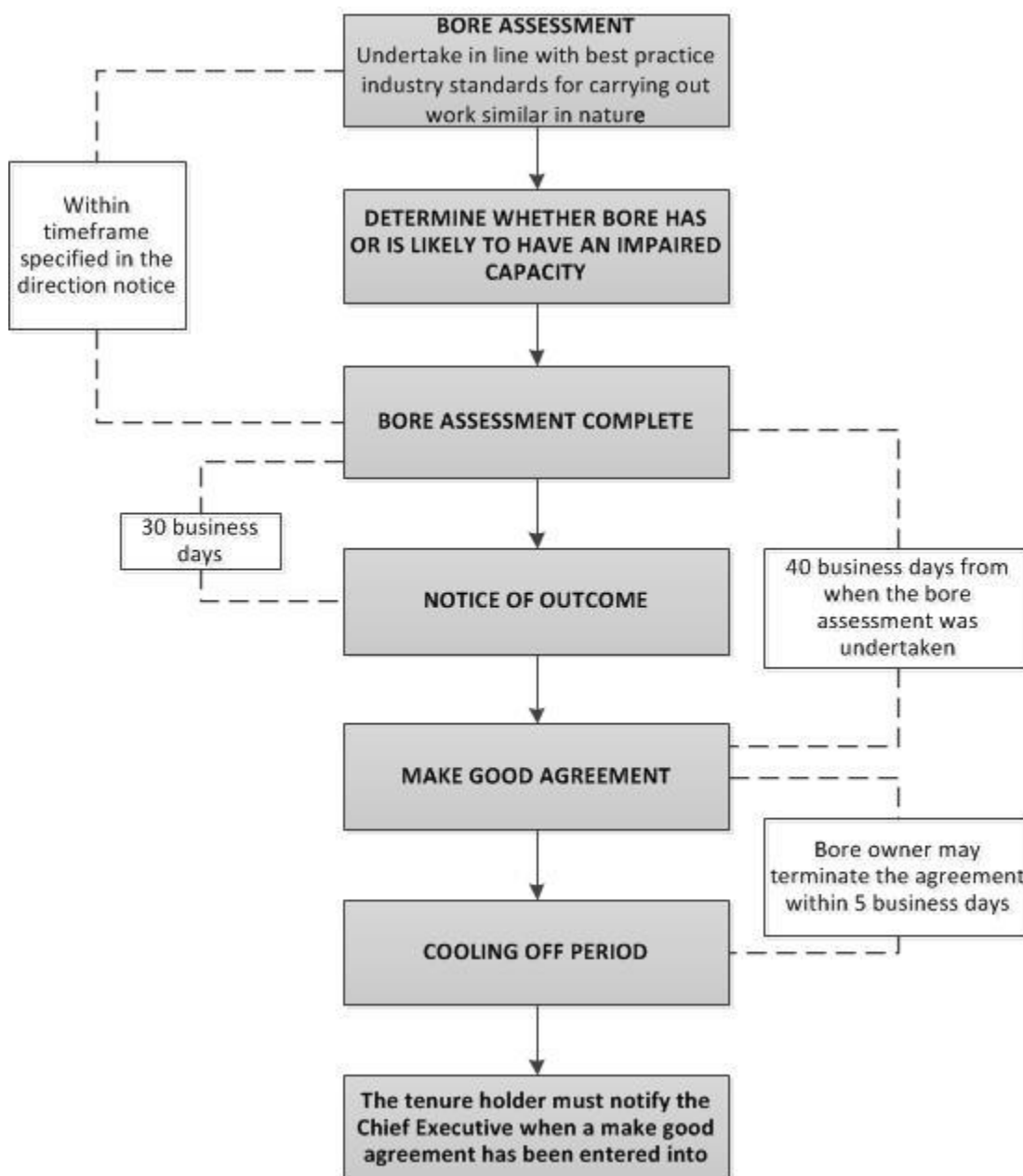
## 4 PART B—Free Gas

Resource tenure holders must undertake a bore assessment in accordance with Part B in the following situation:

- the chief executive of the department directs the resource tenure holder to undertake a bore assessment of a water bore under section 418 of the Water Act and specifies that an investigation of whether free gas has caused or is likely to cause the bore to have an impaired capacity.

Figure 2 below summarises the bore assessment steps for determining whether a bore has or is likely to have an impaired capacity due to free gas from a resource tenure holder's exercise of underground water rights. Figure 2 also includes the process for completing a tenure holder's make good obligations after a bore assessment has been undertaken.

**Figure 2: Process for undertaking a bore assessment for free gas**



#### **4.1 Minimum requirements**

The department is undertaking a targeted consultation process with affected stakeholders to establish minimum requirements for undertaking a bore assessment to determine whether the bore has or is likely to have an impaired capacity due to an impact from free gas. Therefore, while this process is underway, the minimum requirement outlined below must be met.

<b>Minimum requirements</b>
1. When undertaking the bore assessment to determine whether the bore is or is likely to have an impaired capacity due to free gas, the resource tenure holder must follow best practice industry standards for carrying out work similar in nature to that of undertaking a bore assessment.

## 5 Definitions/Glossary

<b>Aquifer</b>	Aquifer has the meaning in Schedule 4 of the Water Act and means 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.
<b>Artesian bore</b>	Artesian bore has the meaning in Schedule 4 of the Water Act and 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.
<b>Authorised water bore</b>	An authorised water bore includes water bores for which the taking of, or interfering with, water is authorised under the Water Act, and if required, a development approval has been granted under the <i>Planning Act 2016</i> (or was granted under the repealed <i>Sustainable Planning Act 2009</i> or <i>Integrated Planning Act 1997</i> ).  This includes water bores from which the taking or interference with water is authorised without the requirement for a water entitlement under Section 20 of the Water Act.
<b>Drawdown</b>	Drawdown means a lowering of the water table of an unconfined aquifer or the potentiometric surface of a confined aquifer caused by extraction of underground water from wells.
<b>Existing water bore</b>	Existing water bore has the meaning in section 412 of the Water Act and means any water bore in existence before the first underground water impact report relating to the area where the bore is located takes effect.
<b>Hydraulic Properties</b>	Hydraulic properties means the quantitative measures of an aquifer's ability to store and transmit water.
<b>Immediately affected area (IAA)</b>	Immediately affected area has the meaning in section 387 of the Water Act and is the area shown on a map required to be produced in section 376 (b)(iv) of the Water Act.  This map depicts the area of an aquifer where the water level is predicted to decline, because of the exercise of underground water rights, by more than the bore trigger threshold within three years after the consultation day for the report.
<b>Long-term affected area (LTAA)</b>	Long-term affected area has the meaning in section 387 of the Water Act and is the area shown on a map required to be produced in section 376 (b)(v) of the Water Act.  The map depicts the area of an aquifer where the water level is predicted to decline, because of the exercise of underground water rights, by more than the bore trigger threshold at any time.
<b>Make good obligations</b>	Make good obligations has the meaning in section 409 of the Water Act and means the obligations of resource tenure holder for an immediately affected area bore, which are: <ul style="list-style-type: none"> <li>• undertaking a bore assessment of the bore;</li> <li>• entering into a make good agreement with the bore owner</li> <li>• complying with the make good agreement; and</li> <li>• if asked to vary the make good agreement, negotiating a variation of the make good agreement.</li> </ul>
<b>New water bore</b>	A new water bore has the meaning in section 412 of the Water Act and means a bore other than an existing bore.



<b>Pumping test</b>	A pumping test involves pumping a well at a certain rate and recording the drawdown (decline) of water level in the pumping well and in nearby observation wells over a certain time period. Pumping tests are conducted to determine performance characteristics of a well and to determine the hydraulic properties of the aquifer.
<b>Relevant report</b>	A relevant report has the meaning in section 412 of the Water Act and means, for a new water bore, the approved underground water impact report in effect when the bore is constructed and relating to the area where the bore is located.
<b>Resource tenure holder</b>	Resource tenure holder has the meaning in Schedule 4 of the Water Act and means a mining tenure holder or a petroleum tenure holder.
<b>Responsible tenure holder</b>	<p>Responsible tenure holder has the meaning in section 369 of the Water Act and means the resource tenure holder identified in an underground water impact report or final report as the holder of the resource tenure.</p> <p>If the report is an underground water impact report for a cumulative management area – the responsible tenure holder is the resource tenure holder identified in an underground water impact report as the responsible tenure holder.</p> <p>A resource tenure holder directed under section 418 of the Water Act to undertake a bore assessment of a water bore is a responsible tenure holder for the make good obligations for the bore.</p>
<b>Sub-artesian bore</b>	Sub-artesian bore has the meaning in Schedule 4 of the Water Act and means 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.
<b>Water level</b>	<p>Water level of an aquifer has the meaning in section 362 of the Water act and means—</p> <ul style="list-style-type: none"> <li>• if the aquifer was tapped by an artesian bore—the level to which the water would rise naturally above the surface of the land at the location of the bore if the water was contained vertically above the surface of the land; or</li> <li>• if the aquifer were tapped by a sub-artesian bore—the level of the water in the bore.</li> </ul>

## 6 References

- Committee CE/28, 1990. *AS2368—1990 Test pumping of water wells*, Sydney: Standards Australia.
- Department of Environment and Heritage Protection, 2013. *Monitoring and Sampling Manual 2009—Environmental Protection (Water) Policy 2009*, Brisbane: Queensland Government.
- Environment Protection Authority, 2007. *Regulatory monitoring and testing—Groundwater sampling*, Adelaide: Environment Protection Authority.
- Joint Technical Committee EV/8, 2016. *AS/NZS 5667:11 1998 Water quality - Sampling - Guidance on sampling of groundwaters*, Sydney: Standards Australia.
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### Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Science should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

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### Version history

Version	Effective date	Description of changes
1.00	26 March 2013	First published version of the guideline.
2.00	26 March 2013	Minor updates.
3.00	2 March 2016	Bore assessment process simplified.
4.00	20 October 2016	Correct minor clerical errors.
5.00	2 March 2017	Updated to reflect changes to Chapter 3 of the Water Act as a result of <i>Water Reform and Other Legislation Amendment Act 2014</i> , <i>Water Legislation Amendment Bill 2015</i> and <i>Environmental Protection (Underground Water Management) and Other Legislation Amendment Bill 2016</i> .
5.01	5 July 2017	Updated to reflect the repeal of the <i>Sustainable Planning Act 2009</i> and the commencement of the <i>Planning Act 2016</i> .
5.02	17 May 2018	The document template, header and footer have been updated to reflect current Queensland Government corporate identity requirements and comply with the Policy Register.