

# Module B – Water level stations

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# 1.0 Application

Module B (this module) of the standard applies where the measurement of water taken is dependent on, or includes, the measurement of water levels in relation to water storages and the Regulation prescribes a water entitlement to be a 'metered entitlement'.

## 1.1 Overland flow water measurement

Module B of the Queensland interim water meter standard for non-urban metering (this standard) details the performance requirements for existing and new water level stations. It applies to the specification and installation of devices used to collect storage water level data where required. This includes, but is not limited to, water licences that authorise the take of overland flow water and which are prescribed as metered entitlements in the Water Regulation 2016 (the Regulation).

The *Water Act 2000* (Water Act) requires that the holder of a metered entitlement must not take water other than through works that have an approved meter attached. This standard sets out the requirements necessary for water level measurement within a water storage. A water level station installed and capable of providing measured water level data for which a completed validation certificate has been supplied to the owner of the works and to the chief executive department, is consistent with the definition of approved meter under the Water Regulation 2016 (s106).

This standard is the first phase in a two-phase measurement and implementation process for measuring the take water using storage water level measurement. This standard (phase 1) outlines the installation of storage water level measurement stations and the transfer of measured data to the department. The second phase of this standard will build on storage water level measurement to create a modular metering system that can determine the volumes of water take using surveyed storage information and recognition of other influences to the measured storage height.

Metering the take of overland flow water is accomplished by employing a metering system to determine volumes taken under the water entitlement. A water level station installed in accordance with this standard, and used in conjunction with accurate information about the stage height-volume relationship of the storage, provides for the continuous measurement of volume in storage. Additional devices and techniques may also be used to account for the movement of water on a property. In this way, the system allows for the accurate determination of the volume of water taken under the water entitlement at a given time.

### 1.1.1 Phase 1

This standard provides the technical requirements measurement of the water level in storages and includes:

- water level sensor requirements
- components of a water level station
- location and installation requirements

Storage water level measurement to determine the volume of overland flow water taken requires continuous recorded data. Instantaneous measurement of storage water level can only provide a current stored volume. For this reason, data loggers are a mandatory component of water level stations as described in this standard.

### 1.1.2 Phase 2

Phase 2 of the measurement standard will outline how storage water level measurement data and other information can inform the determination of the volume of overland flow water taken. Other information required for phase 2 will include but is not limited to:

- survey and preparation of accurate storage height-volume relationships,
- additional recording devices and techniques
- water balance and accounting methods.

### 1.1.3 Water level station

A water level station is to measure and continuously record water level measurements accurately and be capable of storing and transferring recorded water level data. Water level station components include:

- a. the sensor and compatible processor to measure the water level (may sense pressure or proximity)
- b. communications equipment (for communication with data logger or data storage service)
- c. water level output logger
- d. reliable mounting fixtures
- e. power supply.

The installation and continuous function of all water level station components (a to e above) is required for it to be an approved meter (as per section 808 of the *Water Act 2000*).

Figure 1 and Figure 2 show the typical components of a water level station. Some installation and protective parts may not be shown in the diagrams.

**Figure 1 - Elements of a water level station (typical)**

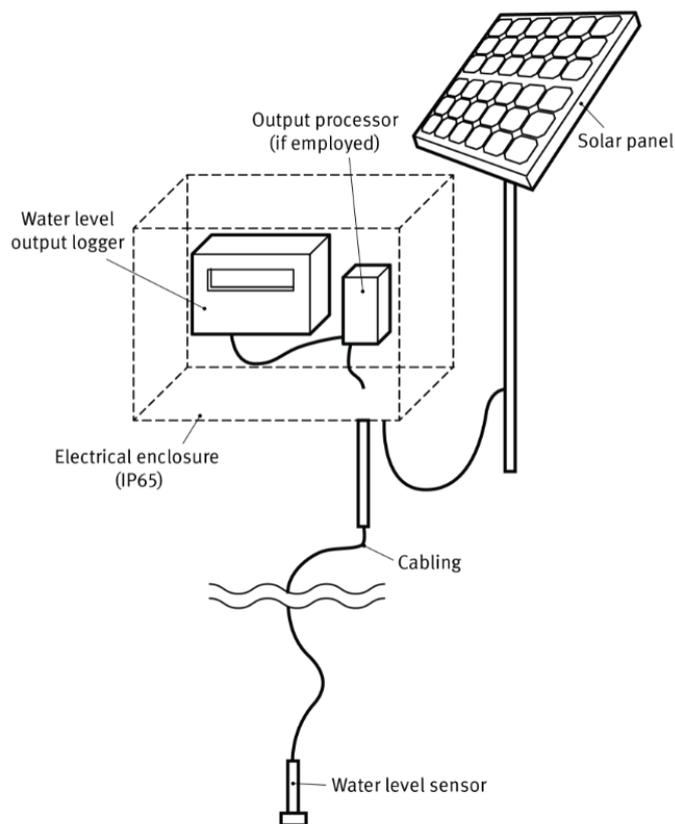
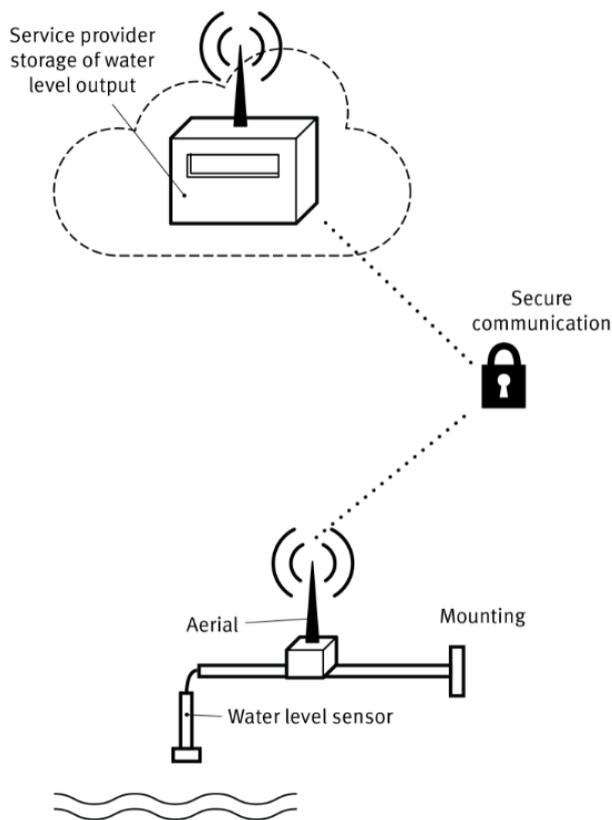


Figure 2 - Elements of a water level station with third party data management



## 2.0 Output requirement

The type of output and the storage of data is important to sound water management. The information being collected is water level information (which increases and decreases rather than accumulating). The department needs the time series record of water levels in storages for water management purposes. To allow this to happen, the water level records need to be stored for later access by the department. Refer to section 3.2.1 Increments and Display for more detail.

## 3.0 Measurement assurance requirements

Water level stations must, at a minimum, comply with the requirements outlined below.

A. A water level station specified in Section 3.1 must be used.
B. The data collection and transfer of the water level station must be in accordance with Section 3.2.
C. The water level sensor must meet the requirements in Section 3.3.
D. Site location and datums must be established as specified in Section 3.4.
E. The installation of the water level station must comply with Section 3.5.

### 3.1 Which water level station can be used?

#### 3.1.1 New water level stations

New water level stations are those which were installed on or after 31 December 2020.

### 3.1.2 Existing water level stations

Existing water level stations are those which were installed prior to 31 December 2020. Existing water level stations that meet this standard can continue to be used.

Existing water level stations that would not otherwise comply with specific requirements of this standard may be deemed to comply when similar performance can be demonstrated. The criteria for demonstrating similar performance for the specific requirements are described in Table 1 below.

**Table 1 - Criteria to assess similar performance for existing water level stations**

Requirement type	Similar performance
<b>For section 3.2 Recording events</b>	Existing water level stations equipped with water level data loggers that cannot be configured to record the events specified, are deemed to have similar performance if: <ul style="list-style-type: none"><li>• it can be shown that the water level data logger has not been replaced on, or after, 31 December 2020.</li></ul>
<b>For section 3.3 Water level sensor</b>	Where an existing water level station cannot measure the complete operating range of the water storage to which it is installed due to the water level sensor being located above the dead storage level it may be deemed to have similar performance if: <ul style="list-style-type: none"><li>• it is configured to measure the water level, from the level at which the sensor is installed, to the top of the storage operating range</li><li>• its range of measurement allows the collection of information required to determine compliance against the associated water entitlement(s).</li></ul>

## 3.2 Data collection and transfer

### 3.2.1 Increments and display

The water level station must:

- record the water level in increments of not greater than 10 millimetres
- display and record the measurements in metric units (e.g. metres or millimetres).

### 3.2.2 Output and data logging

The water level station must:

- measure and record water level data at an interval of at least once each hour as an electronic output
- retain at least 5 years of continuous recorded data before overwriting
- retain recorded data if power or connection to another component is lost
- allow for stored data to be transferred by the department or a person appointed by the department under the Water Regulation 2016.

### 3.2.3 Recording events

A water level data logger must record a description of the event type, time and date for the following events:

- loss of power supply and reconnection of power supply
- occurrence of external access to the stored data or logger control system
- loss of communication and reinstatement of communication between the sensor and the logger
- sensor is disconnected and reconnected.

### 3.2.4 Data security

Where water level data is transmitted to, and stored by, a service provider, the service provider must:

- employ measures to ensure the transmission and storage of water level data is secure
- maintain the legal integrity of the data.

### 3.3 Water level sensor

The water level sensor must:

- a. be installed to provide water level measurements for the operating range of the storage
- b. have an accuracy for measurement of water level to  $\pm 10$  millimetres for any water level within the operating range of the storage
- c. for pressure transducer type (submerged) sensors – be installed to not be affected by silt or other types of sediment.

See Figure 3 which details the operating range for the storage and Figure 4 for a typical installation for a pressure transducer type sensor.

**Figure 3 - Operating range of a typical water storage**

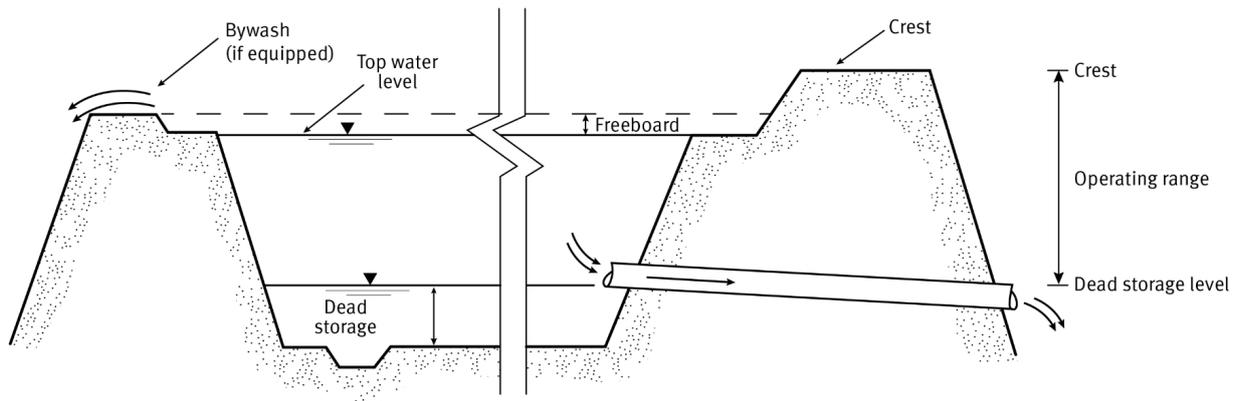
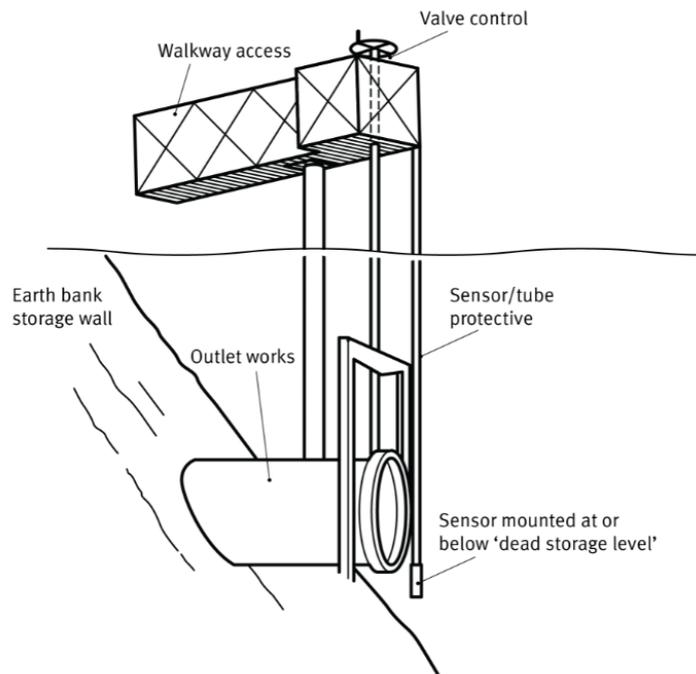


Figure 4 - Location of pressure transducer type sensor

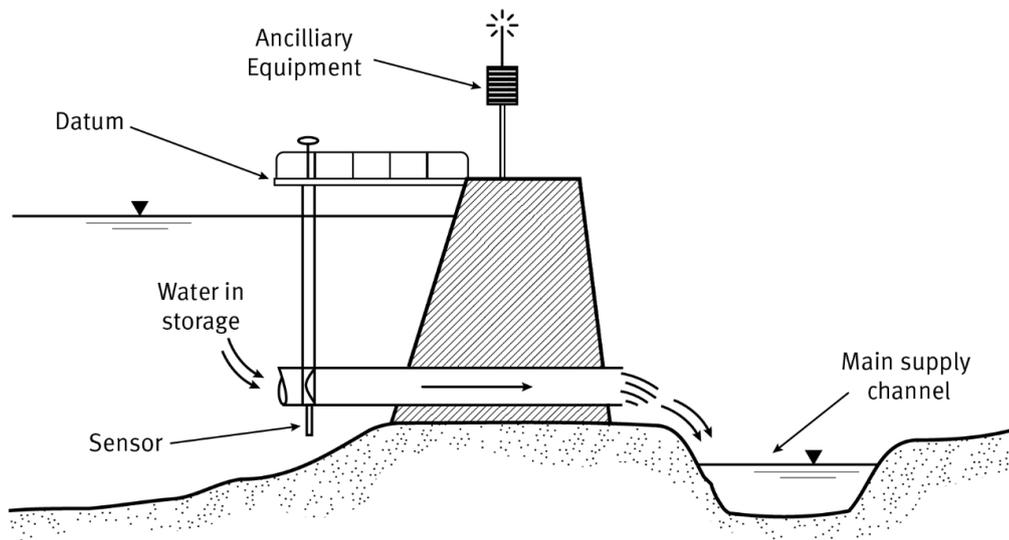


### 3.4 Site location and datums

Datums provide a measured reference level for describing the elevation of all equipment installed at a site. Of particular importance when measuring water levels is the elevation of the water level sensor in relation to the datum and to operating range of the storage.

A typical location for the water level sensor, datum and associated equipment, where equipped, is a storage outlet pipe, gate structure and walk out as shown in Figure 5.

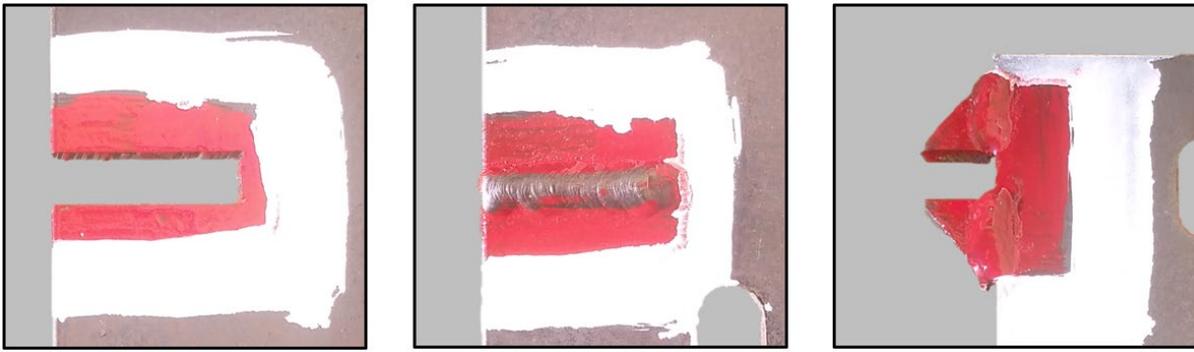
Figure 5 - Typical storage installation and datum location



The datum should be in a location that can be easily and safely accessed. Typical datums could include a weld mark on, or a notch cut into, a permanent structure, such as a walk out, the headwall of a discharge pipe, or a deep bore casing.

Figure 6 shows three examples of datums that are about 10 x 50 millimetres in size.

Figure 6 - Datum examples



Subsequent amendments of this standard will introduce the second phase of requirements for datums and permanent survey marks which deal with:

- survey and preparation of accurate stage height-volume relationships
- configuration of additional devices and techniques
- preparation of water balance and accounting methods.

The water level station must have an associated datum that is:

- a. located close to the site at which the water level sensor is mounted
- b. located above the top water level for the storage
- c. located in a way that permits accurate comparison of the height of the water level sensor
- d. made from durable material such that it is not readily disturbed or destroyed
- e. not subject to movement
- f. distinguished from other marks in the vicinity with red and white markings.

## 3.5 Installation

### 3.5.1 Configuration and power supply

The water level station must be installed such that:

- a. connected to a continuous power supply
- b. each component is configured according to all relevant manufacturer specifications
- c. the measurement processor, data logger and connections to the measurement processor and data logger are contained within a sealed enclosure
- d. all components and enclosures are securely fixed and mounted
- e. is accessible.

### 3.5.2 Cabling

- a. All cables that connect to the sensor, components and power must be:
- b. continuous, or
- c. where joiners are used – must be within a sealed enclosure
- d. protected from damage by being contained within piping or conduit suited to local conditions.

## 4.0 Maintenance

Periodic maintenance is critical to the continued performance of a water level station. More frequent maintenance may be required if the metrological performance of the water level sensor is in doubt or affected by local conditions.

Minor maintenance work that is not likely to affect the metrological performance of the components of the water level station includes, but is not limited to:

- replacement of component parts
- cleaning external parts or removing debris or silt
- checking for signs of normal wear
- changing a battery.

Any minor maintenance should follow relevant work practices and/or maintenance plans.

## 5.0 Validation

### 5.1 Validation certificate

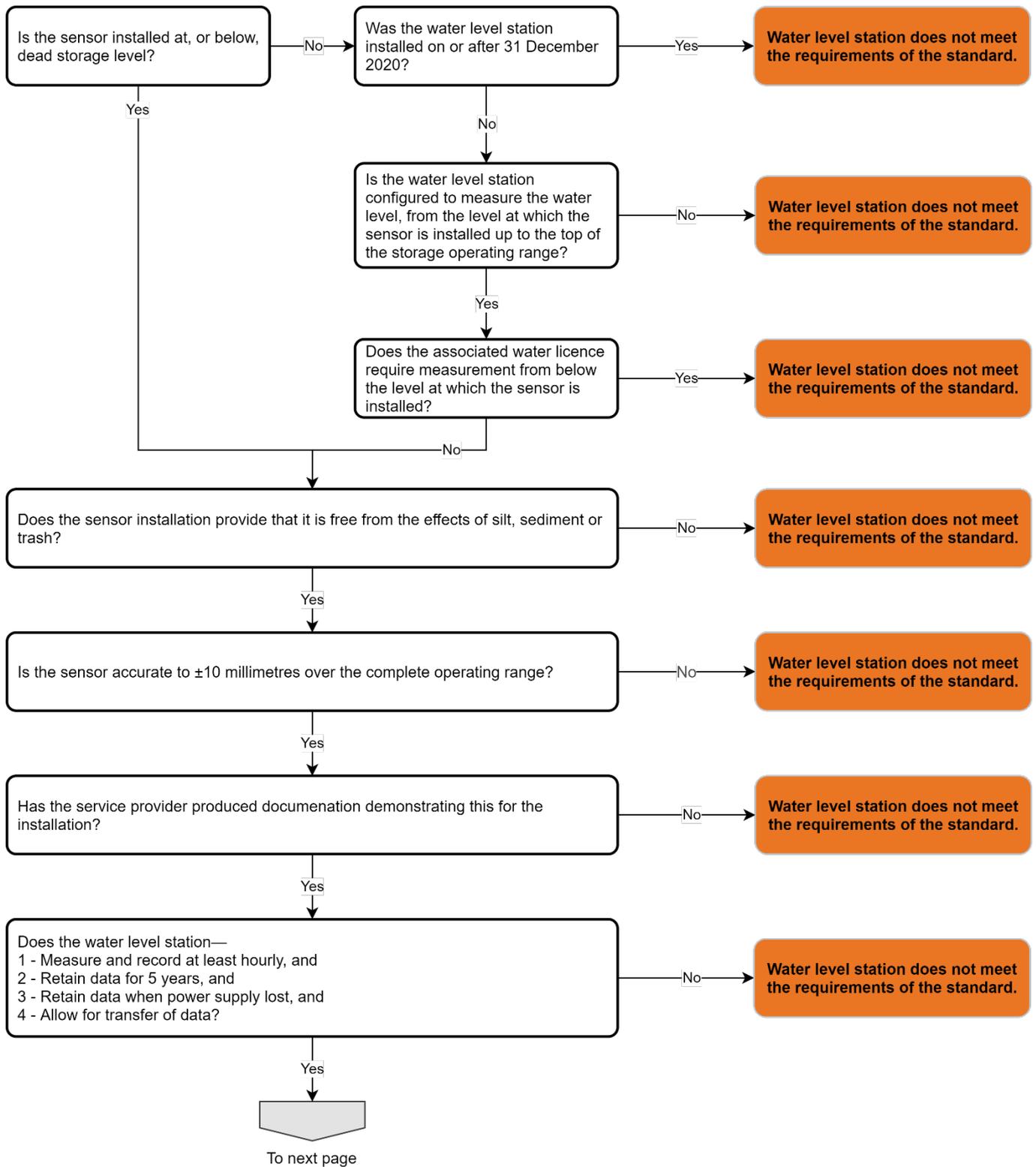
Where a water level station meets the requirements of this module of the standard, a validation certificate must be given to the relevant person within 20 business days of an inspection of a water level station by an authorised meter validator.

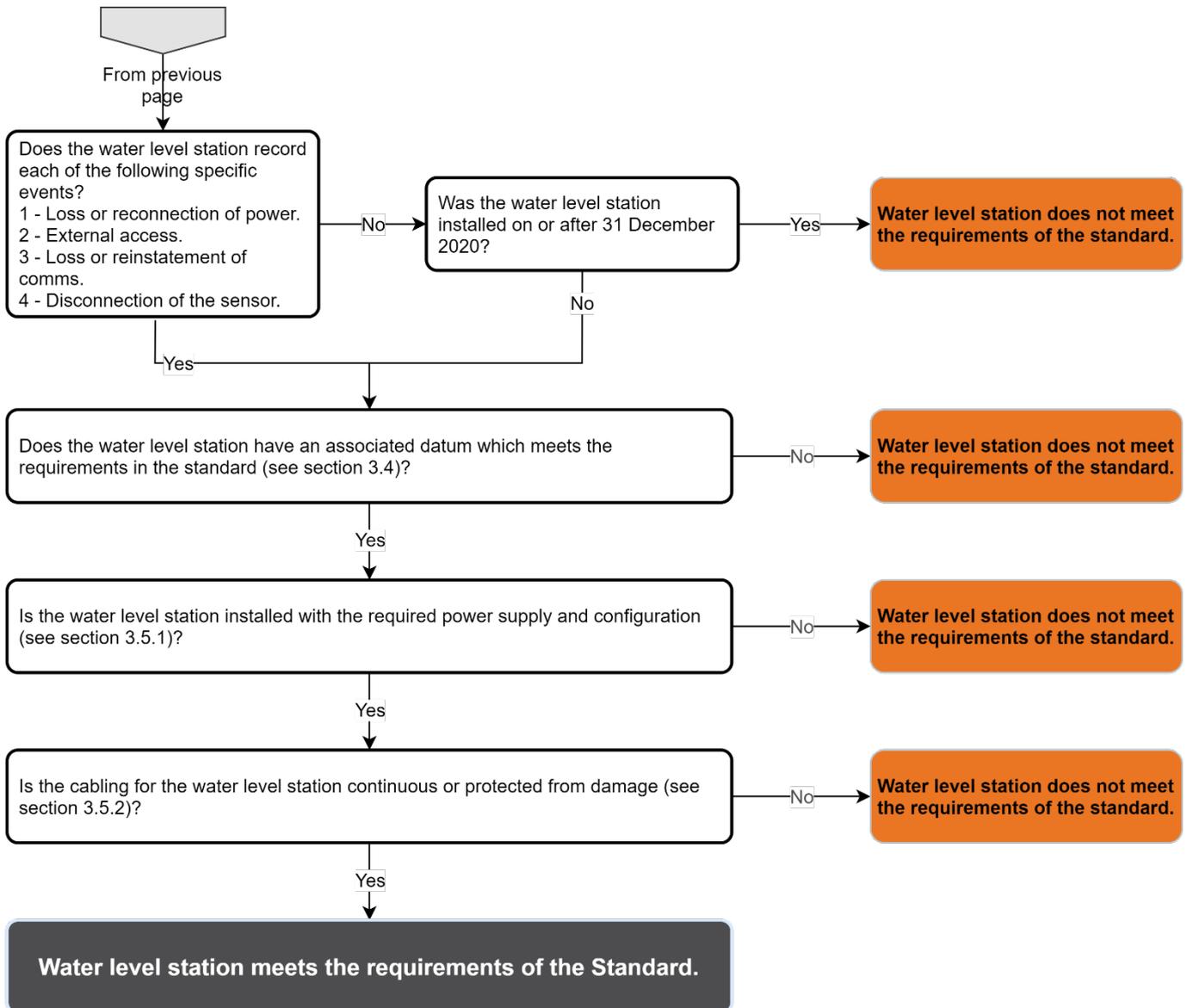
The relevant person must give a copy of the validation certificate to the Department within 20 business days of receipt of the validation certificate.

The Department validation form for this module is *W2F119B Water level station validation certificate*.

Figure 7 describes the process and actions that must be completed by an authorised meter validator when undertaking a process of validation.

**Figure 7 - Validation process**





## 5.2 Tamper evident sealing

Tamper proof seals are used to protect the legal integrity of the water level measurement station.

Tamper proof seals must be used:

- a. to fix the water level sensor to the recorded installed sensor height
- b. to seal closed any enclosures.

Where tamper proof seals are broken (including during the course of undertaking maintenance), the water level station becomes a faulty meter under section 105 of the Water Regulation 2016 until an authorised meter validator installs new tamper proof seals.

## 6.0 Disclaimer

Nothing in this standard is intended to contradict the manufacturer's operating and installation directions that would void manufacturer's warranty or that would indirectly or directly result in loss or liability for which the department expressly disclaims responsibility.

## 7.0 References and useful links

Department Regional Development, Manufacturing and Water, 2022, *Queensland Non-urban Water Measurement Policy*, Queensland Government, Brisbane, 17 July 2023, [https://www.rdmw.qld.gov.au/\\_\\_data/assets/pdf\\_file/0011/1645049/qld-non-urban-water-measurement-policy.pdf](https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0011/1645049/qld-non-urban-water-measurement-policy.pdf).

Irrigation Australia, 2021, 'Certified Meter Installer & Validator', Brisbane, viewed 7 June 2021, <https://www.irrigationaustralia.com.au> .

Murray-Darling Basin Authority, 2021, 'Compliance and enforcement documents', viewed 7 June 2021, <https://www.mdba.gov.au>.

### Legislation

*Water Act 2000* (Qld). Retrieved from <https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-2000-034>.

Queensland Water Regulation 2016 (Qld) Retrieved from <https://www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2016-0216>.

## 8.0 Further information

Further information on water metering is available on the Queensland Government website at [www.business.qld.gov.au](http://www.business.qld.gov.au) or call 13 QGOV (13 74 68).

# Appendix A – Glossary of terms

This glossary contains terms used in this standard.

<b>Term</b>	<b>Definition</b>
<b>Certified meter installer</b>	A person who is accredited by Irrigation Australia Limited as a meter installer (abbreviated to CMI).
<b>Continuous record</b>	For this standard, a continuous record is one where water level measurement is recorded at least once each hour.
<b>Existing water level stations</b>	Existing water level stations are those which were installed before 31 December 2020.
<b>Dead storage level</b>	The level at which water ceases to be able to be released from a storage. It may relate to gravity or pumped outlet works.
<b>Local conditions</b>	The physical environment and environmental conditions and influences at the installed device location. For a component to be suitable for use in local conditions, its longevity and operation would not be affected by extremes of the local environment such as temperature, rain, flooding, humidity, vibration, pests and vermin (insects, birds etc).
<b>Loss of power supply</b>	When the supply voltage for any component of a water level station drops below the minimum voltage required by the manufacturer.
<b>Operating range</b>	The range from the dead storage level to the level of the storage crest or the by-wash if equipped.
<b>Datum</b>	A datum is a mark established at the site of the water level station to allow referencing height of the water level sensor and recorded water levels.
<b>Works</b>	Infrastructure used in the taking or storage of overland flow water, including water storages, pumps and pipes, levees, channels, and surge areas. The works may also be used in the taking of water from a watercourse.