

Secondary metering devices guidelines

Floodplain harvesting measurement

April 2025

Acknowledgement of Country



Department of Climate Change, Energy, the Environment and Water acknowledges the traditional custodians of the land and pays respect to Elders past, present and future.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

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Introduction

The NSW Government has implemented a framework to licence and measure floodplain harvesting to ensure this take occurs within legal sustainable limits.

An important part of this framework is that floodplain take is measured by accurate, auditable, and tamper-evident metering equipment.

The NSW Government has developed a series of guidelines to assist water users and duly qualified persons (DQPs) in understanding their compliance obligations under this framework.

Secondary metering device requirements

Secondary metering devices are optional and act as a back-up measurement system. They will allow you to floodplain harvest in the following circumstances:

- when primary metering equipment is faulty and awaiting repair.

You cannot take floodplain harvesting water if you do not have an approved secondary device installed whilst your primary device is being repaired.

- before the primary metering equipment compliance due date.

Water users have 12 months from having water credited to their water access licence account to install primary metering equipment.

Approved secondary devices

Secondary metering devices must be approved by the Minister. A list of all approved devices is maintained at water.dpie.nsw.gov.au/our-work/floodplain-management/floodplain-harvesting-measurement/secondary-measurement-devices.

There are two types of secondary devices: gauge boards and automated devices equipped with an approved radar or pressure sensor.

Automated secondary devices transmit data directly to the approval holder's private server, rather than to the department's data acquisition service (DAS).

In contrast, primary devices use a local intelligence device (data logger with telemetry) to transmit data to the DAS. Primary devices record changes in storage volume on an hourly basis and transmit this data to the DAS every 24 hours. Secondary devices may transmit data more frequently, in real-time, to the private server. As a result, readings from a secondary device may differ from those of the primary device due to differences in reporting intervals.

Installation and validation

Secondary metering devices may be installed by anyone, including landowners. However, they must be validated by a DQP, in this instance a Certified Storage Meter Validator (CSV), in accordance with the Minister's standards and registered in the WaterNSW online DQP Portal at dqp.watarnsw.com.au.

The datum of each device must be linked to survey benchmarks and utilise the same storage curve as specified in the DQP Portal.

The installation of all secondary devices must comply with the following guidelines and standards:

- Metering equipment (storage) standards 2024
- Secondary metering devices guideline
- Survey benchmarks guideline
- Storage curve guideline

Gauge boards

This guideline outlines the installation process for storage gauge boards. Gauge boards, also known as water depth boards or staff gauges, are instruments used to measure the water depth in various bodies of water, including rivers, reservoirs, tanks, dams, canals, locks, docks, harbours, and navigation channels.

In floodplain harvesting, gauge boards serve as a critical link between the water level in a storage system and the corresponding volume of water. Accurate measurements from these gauge boards are essential for reliable data. Additionally, in floodplain harvesting, gauge boards play a key role in validating the readings from automatic water level sensors.

Before the gauge board is installed you must have a survey benchmark and a storage curve accurate to within $\pm 5\%$ of the overall storage volume. Further information on survey benchmarks and storage curves is available at water.dpie.nsw.gov.au/our-work/floodplain-management/floodplain-harvesting-measurement/secondary-measurement-devices.

Equipment requirements

Gauge boards typically consist of a gauge plate and a backing board attached vertically to a support structure in the water to be measured. The gauge plate is a thin, usually white enamel coated aluminium plate, with printed measurement markings. The two common forms of gauge plates are flat or half circle.

Flat plates are usually fixed to a backing material which is then attached to a support structure. Half round plates are generally attached to 80 mm galvanised pipes via radiator hose clamps. An example of this type of gauge board can be found in Figure 2.

Flat gauge plates attached to a flat gauge board are easier to read but significantly harder to adjust. In contrast, half-round gauge plates attached to pipes are slightly harder to read but easier to adjust.

This definition of a gauge board does not exclude alternative systems for measuring water depth. However, any alternative system must comply with the accuracy standards in section 7.1 of Australian Standard AS 3778.6.5, including specifications for marking sizes and allowable error.



Figure 1. Depth gauge board installed on an elevated walkway



Figure 2. Sectional boards installed on a slope



Figure 3. Half round gauge plate attached to 80 mm galvanised pipe

Installation considerations

All secondary metering devices must be installed in accordance with Schedule 4 of the Metering Equipment (Storage) Standards 2024 (standard). This standard also requires that gauge boards comply with section 7.1 of Australian Standard AS 3778.6.5.

Gauge boards can be mounted on a single structure (Figure 1 and Figure 3) or installed as a multiple staged configuration down a storage batter (Figure 2).

The standard requires that at least one tamper-evident seal on fasteners securing the gauge boards to its support structure. Securing fasteners do not include welds (see Figure 5 and Figure 6). All tamper seals used must be NSW Government-approved seals. Only DQPs can purchase approved seals by logging in to the Irrigation Australia website using their membership details.

When positioning gauge boards, consideration should be given to ability to read the markings. A single tall gauge board in the centre of a storage will present difficulties in obtaining accurate readings. The multiple stage configuration as shown in Figure 2 should be considered where reading difficulties may exist.

Consideration should also be given in the placement of the gauge boards to reducing parallax errors that may be introduced when reading the level as shown in Figure 4.

The gauge board must be installed so that the height markings are facing the nearest storage bank or walkway so that reading the water level and maintenance is facilitated.

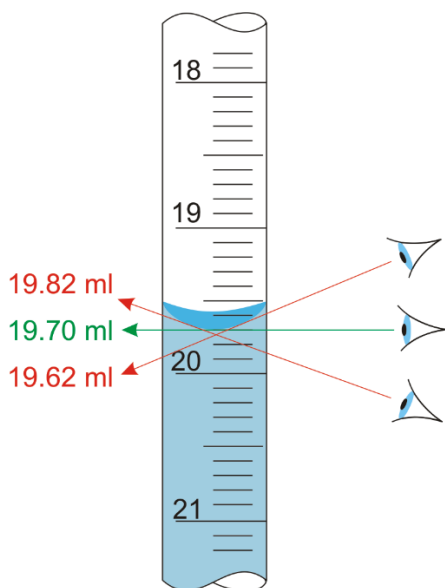


Figure 4. Examples of parallax errors when reading gauge boards



Figure 5. Image shows a tamper evident seal fixed to a pressure sensor on a catwalk



Figure 6. Image depicting a tamper evident seal on a fastening bolt

Installation

The metering equipment standards require that the gauge boards are secure and stable and fixed vertically relative to the water surface. This may be achieved by fixing the gauge board to a structure, such as an inlet/outlet, elevated platform or headwall. Gauge boards near inlet and outlet structures may require extra reinforcing to withstand turbulence around these structures.

If no structure is available, it is recommended that the gauge board be mounted on at least 80 mm diameter galvanised steel post secured into a mass concrete (N25) footing(s) of:

- minimum 1000 mm depth x 600 mm diameter (single board to 10 metres maximum height)
 - consideration should be given to diagonal stays attached to the gauge board to provide extra support and to make the gauge board more stable
- minimum 600 mm depth x 450 mm diameter (sectional boards, each up to 2 metres maximum height), or
- an alternative arrangement recommended by the DQP who validates the secondary metering device.

Note: If half round gauge plates are to be used then 80 mm galvanised steel posts should be used.

If the storage contains water and it is not possible to install concrete footings or it is not recommended, galvanised pipes should be driven into the ground for at least 1000 to 1500 mm.

Figure 7 shows an example of a galvanised pipe installed in a dry storage where it is possible to install a concrete footing.

All equipment and connections should be designed and arranged to minimise the risk of corrosion, including galvanic corrosion, damage, impact by debris, tampering or impacts by wildlife and insects. To assist in the maintenance of the gauge board it is recommended that gauge boards be fitted with stainless steel anti-roosting spikes atop to minimise fouling of the gauge board by bird faeces.

It is possible for gauge boards to be installed in storages which are empty, fully, or partially full of water. The metering equipment requirements for gauge boards installed in a wet and dry storage are the same.

In storages without a gangway structure, sectional gauge boards can be installed down the storage batter. Levels on the gauge boards can either match or overlap (Figure 7). Where there is a gangway structure, the gauge board can be installed via mounting brackets on the gangway, subject to the considerations outlined in the previous section.

It is recommended that the pre-installation checklist below is completed prior to undertaking any installation.

A checklist for installation and surveying has been created to help you install gauge boards according to the department's requirements. You can find a copy of the checklist in Appendix A.

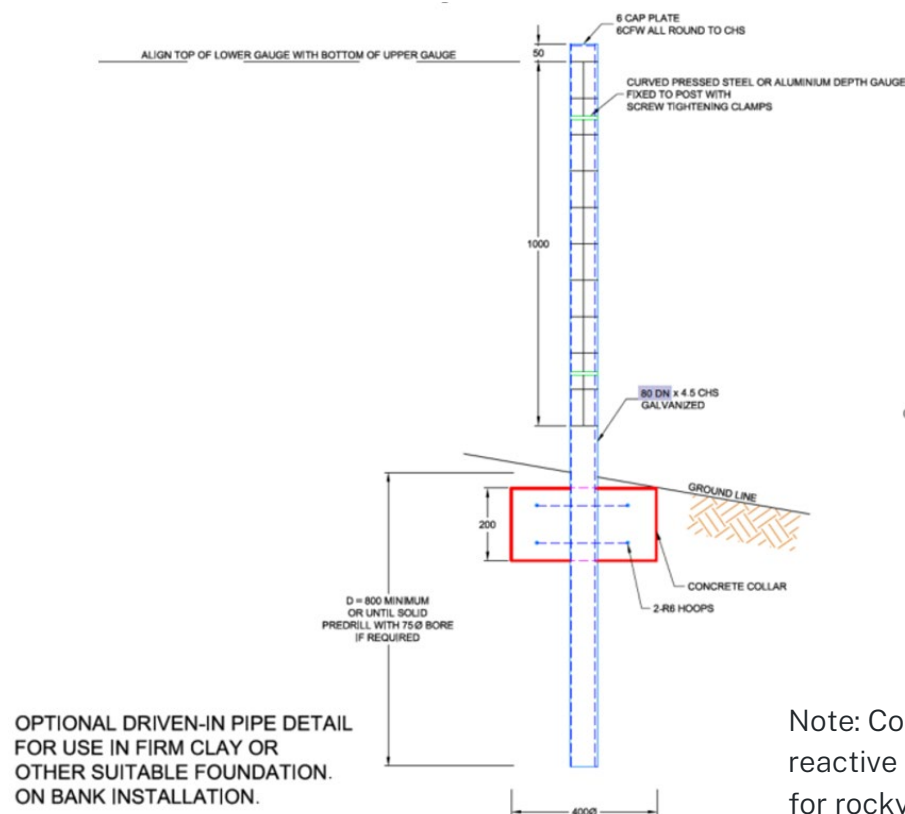
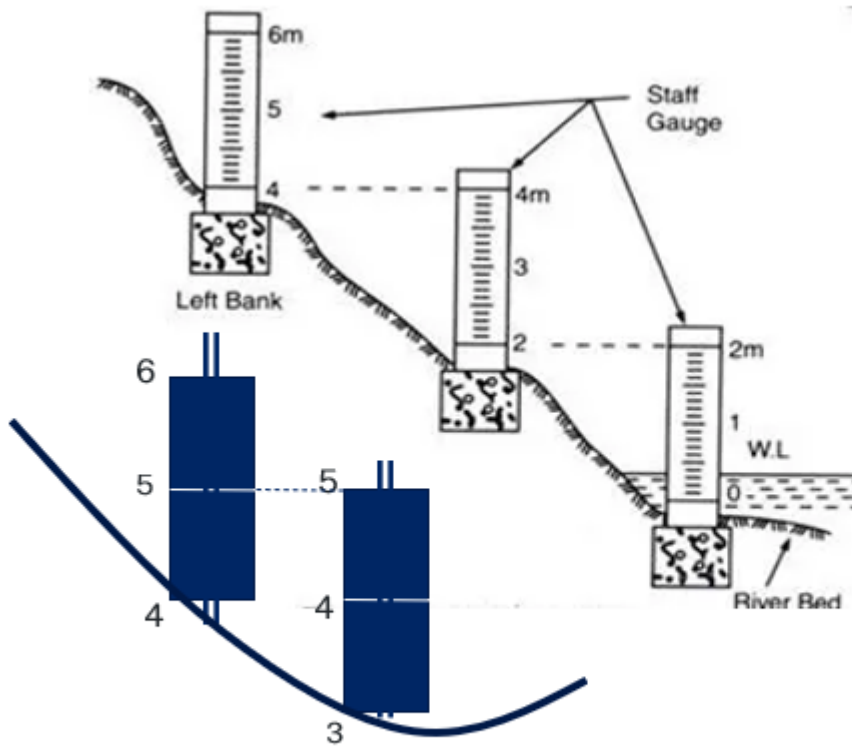


Figure 7. Example of a galvanised pipe gauge board installation



While it is possible to align the top and bottom levels between boards, it is recommended to have an overlap. The levels on each board must line up with levels on adjacent boards.

Figure 8. Example of multiple staged storage gauge boards

Pre-installation checks

Work health and safety obligations

All people undertaking work in NSW have obligations under Work Health and Safety legislation. It is essential that all persons involved in the installation, validation or maintenance of metering equipment are aware of and comply with these obligations.

The following key considerations are important when working in a dry or wet storage:

- access route and reading location
 - gauge boards should be placed where readings can be taken under various weather and site conditions.
- depth of the storage
 - the storage depth will determine how many gauge boards are needed to measure the full water level
 - the location of the low point of the storage will determine where the gauge boards need to be spaced and located
 - consideration should be given to where your survey benchmarks and primary sensor are located.

- current water level
 - when installing gauge boards across the batter, start with the top-most gauge board. This will be the reference point for all other boards and plates
 - the top-most gauge board should be installed high enough to cover the full range of water levels (including freeboard), ensuring that when the storage is empty, the lowest reading is not negative
 - the gauge board should be suitable for the estimated depth of the storage. For example, if the storage depth is estimated at 8.00 metres, the top-most gauge plate should start at least at 10.00 metres.
- operation of the storage during installation
 - if the storage is filling, the water level will rise
 - if the storage is used for irrigation, the water level may drop, allowing additional gauge boards and plates to be installed to keep the lowest board exposed.

Levelling gauge boards

All gauge plates must be referenced (levelled) to meters Australian Height Datum (m AHD) using the survey benchmark or a related temporary benchmark to link depth readings to the storage curve.

Surveying the gauge plates must be done as follows:

- the gauge plate level on the highest gauge board must be levelled to m AHD. Record the gauge plate reading and its corresponding AHD value (this will be needed for validation in the DQP Portal).
- after installing each subsequent gauge plate, level it and adjust the gauge plate to match both the AHD level and the alignment with the plates on the higher or lower boards.
- determine the (GDA20) coordinates (latitude and longitude) of the highest gauge board.

Faulty metering equipment and use of secondary devices

If your primary meter is not working properly, you can use your secondary device to continue floodplain harvesting. If you do not have a secondary device, and your primary stops working you will need to stop harvesting. For details on the required steps if your primary device fails, refer to Section 4.1.

If you use a secondary device because the primary one fails, you need to keep these records:

- the last reading from the primary meter before it failed, and
- the first reading from the secondary meter after the primary meter failed.

If an approval holder uses a secondary metering device because the primary one is faulty, they must follow these rules:

- record the reading from the secondary device:
 - if the primary meter is faulty at the start of the measurement period, within 24 hours of the period starting, or
 - if the primary meter breaks during the period, within 24 hours of realising its faulty
 - record the secondary device's reading within 24 hours after the measurement period ends
 - submit the records to iWAS within 14 days after the measurement period ends
 - keep the records for 5 years after the measurement period ends.
-

How to notify a primary device is faulty

If your primary meter is not working properly, you must notify WaterNSW that it is faulty using a s91i form and you must repair the meter within 21 days.

If only the telemetry part of the meter is faulty, you have 24 days to fix it. You will only need to apply for a s91i if the telemetry is not functioning for at least 72 hours after you noticed the problem.

If you can't repair your metering equipment in time, you need to inform WaterNSW using the s91i form and ask for an extension. When requesting an extension, explain why you can't repair it on time and give a new date when you plan to have it repaired. WaterNSW will work with you so that your water take is recorded and reported during the repair period.

Once the meter is repaired, you must inform WaterNSW providing:

- the date of the repair
- a description of what was done
- proof that the meter was fixed (such as a statement from the person who did the repair)
- the name of the person who did the repair.

For more information, see the WaterNSW website at www.watarnsw.com.au/customer-services/metering/non-urban-metering.

Maintenance of secondary devices

Secondary devices, both gauge boards and other automated devices, need to be maintained in accordance with Schedule 1 of the [Metering Equipment \(Storage\) Standards 2024](#)

Certification of secondary devices

A secondary meter installation is complete when the approval holder receives a validation certificate from the DQP confirming that their equipment is compliant and transmitting data to the DAS. You can download the DAS [user guide here](#).

It is the approval holder's responsibility to ensure the DQP has completed the necessary documents to register each site.

When all information has been entered into the DQP Portal, a validation certificate will be generated. A copy of the certificate will be emailed automatically to the DQP and the approval holder.

Other secondary devices

Other approved secondary measurement devices with automated level measurement technology are listed on the [department's website](#) at water.dpie.nsw.gov.au/our-work/floodplain-management/floodplain-harvesting-measurement. These devices must:

- be installed according to the [Metering Equipment \(Storage\) Standards 2024](#), excluding the requirement for a LID and telemetry to the DAS
- use an approved storage sensor listed on the [department's website](#)
- be levelled according to a survey benchmark and linked to a storage curve that meets the Metering Equipment (Storage) Standards 2024
- be maintained in accordance with the Metering Equipment (Storage) Standards 2024.

Installation and survey checklist

Site details	Details
Landholder name	
Storage ID - work approval number	
Date of installation	
Details of certifying DQP	
Details of qualified person (as defined in Section 3) undertaking survey	

Site prerequisites	Yes	Photo taken	N/A	Comments
WHS				
WHS Risk Assessment completed				
Site selection				
Able to measure lowest accessible point in storage as confirmed by DQP				
Easily and safely accessed for reading and maintenance				
Resistant to damage, tampering or attack				

Installation method	Yes	Photo taken	N/A	Comments
Single gauge board affixed to existing structure				
Single gauge board installed standalone				
Sectional gauge boards affixed to existing structure				
Sectional gauge boards installed standalone				
Gauge board selection	Yes	Photo taken	N/A	Comments
Gauge board construction in accordance with specifications				
Gauge boards increment 100 mm (existing)				
Gauge boards increment 10 mm (new)				
Total height (single or sectional boards combined) allows for measurement from lowest accessible point in storage to embankment crest level				
Gauge board installation	Yes	Photo taken	N/A	Comments
Gauge height (0.00m) set to lowest accessible point in storage (consistent with approved storage curve)				
Securely mounted as per specifications for selected installation method				
Gauge board(s) are installed vertically plumb				

Gauge board installation	Yes	Photo taken	N/A	Comments
Sectional boards only: highest increment on lower board accurately levelled to lowest increment on higher board successively				
Non-corrosive fixings used				
Tamper-seals installed on fixing bolts by DQP				
Survey	Yes	Photo taken	N/A	Comments
Reference survey benchmark ID				
Reference survey benchmark level (mAHD)				
Vertical height difference from 0.00m (gauge height) to survey benchmark (m)				
Level of gauge height 0.00 m (mAHD)				
Level on the storage floor adjacent to the gauge board (mAHD)				
GDA20 coordinates of the top gauge board (latitude and longitude)				

Certification	Yes	Photo taken	N/A	Comments
Site registered on WaterNSW DQP portal by DQP				
Details entered in DQP Portal and validation certificate generated				