Made by the Queensland Bulk Water Supply Authority (trading as Seqwater) under section 24 of the *Bulk Water Supply Code* (BWSC).

This Volume Calculation Methodology contains:

- The methodology for estimating or measuring the volume of bulk water supplied to Bulk Water Customers;
- Volume Estimation Loss Rates;
- Acceptable methods of Data Substitution under section 29 of the BWSC;
- Requirements for the use of meters near Bulk Supply Points.

Version control: This is Version 3.0 of the Volume Calculation Methodology, and contains updates consistent with regulatory changes. No algorithms have changed since the previous version. Invoices are to be issued based on the actual volumes delivered, and the detailed algorithms are now managed by the Bulk Water Supply Authority.

Applicable date: Version 3.0 of the Volume Calculation Methodology shall apply from 1 April 2014 until it is replaced or amended by the Bulk Water Supply Authority.

Introduction

There are some off-take and bulk delivery points in the SEQ bulk supply system that do not have meters necessitating:

- Application of an estimation calculation, using existing upstream bulk meters adjusted for a derived system loss/leakage rate per retailer demand zone, to estimate the volume of water supplied to each demand zone for billing purposes. The calculation approach is specified in Part A (page 3) with individual calculation details for affected retailer demand zones specified as Schedule 1 (page 10).
  - Queensland Urban Utilities – Brisbane City Council zone;
  - Gold Coast City Council;
  - Logan City Council;
  - Unitywater – Caboolture demand zone; and
  - Redland City Council.
- Derivation of a system loss/leakage rates applicable to the bulk supply system in each retailer demand zone where volumes are to be estimated using the alternative methodology. The method of deriving Volume Estimation Loss Rates is specified in **Part B** (page 4).

This volume calculation methodology also sets out accepted methods for using substitute meter data in circumstances where meters are found to be faulty or temporarily inoperable, as required by section 29 of the BWSC. The acceptable methods are specified in **Part C** (page 5).

Section 19 of the BWSC provides that metering and estimation applies to meters within the Bulk Authority's network as well as meters at a bulk supply point. **Part D** (page 9) provides a process enabling Responsible Persons to use meters located near but not at Bulk Supply Points to meet their obligations under Chapter 4 of the BWSC. Responsible Person as used in this document has the same meaning as that set out in section 20 of the BWSC, and is the entity who owns the infrastructure within which the meter is located.

Schedule 2 (page 12) sets out the calculations to be used to determine volumes as required in the Bulk Water Supply Agreements for those Bulk Water Customers (or zones, as appropriate) where delivery volumes are able to be determined without reference to the alternate volume estimation methodology set out in Part A.

- Queensland Urban Utilities – Ipswich City Council zone;
- Queensland Urban Utilities – Lockyer Valley Regional Council zone;
- Queensland Urban Utilities – Scenic Rim Regional Council zone;
- Queensland Urban Utilities – Somerset Regional Council zone; and
- Unitywater – Sunshine Coast Regional Council zone.

Review process

The Volume Estimation Loss Rates are the same as specified in Version 2.0 of this document. Therefore there will be no adjustment to previous invoices in response to this version of this document being made.

Part A – Volume Estimation Calculation

If any Bulk Supply Point at which the following Bulk Water Customers (or respective zones)

- Queensland Urban Utilities – Brisbane City Council zone
- Gold Coast City Council
- Logan City Council
- Redland City Council
- Unitywater – Caboolture demand zone

are supplied water under a Bulk Water Supply Agreement is unmetered, the methodology set out in this Part A must be used to estimate the total volume of bulk water supplied to that Bulk Water Customer. The methodology set out in this Part A may require the use of meter data collected in relation to some, but not all, of the Bulk Water Customer's Bulk Supply Points and may also require the use of meter data collected in relation to another Code-Regulated Entities' bulk supply points. However, all meters must still be used to record the volumes and flows of water through each Bulk Supply Point in accordance with section 21 of the BWSC and such data must be provided to the Bulk Water Supply Authority in accordance with Chapter 4 of the BWSC.

The individual calculations to estimate the volume of water supplied to each Bulk Water Customer by the Bulk Water Supply Authority is contained in Schedule 1. This schedule contains the calculation algorithms for estimation of volumes by Bulk Water Customers which need to use the alternate methodology.

Note that the individual calculations used to determine the volume of water supplied to the Power Stations are contained within each Power Station's Bulk Water Supply Agreement and are not repeated in the Schedule 1.

Part B – Volume Estimation Loss Rates

The five retail demand zones in which an estimation of system losses/leakage rates is required are:

- Queensland Urban Utilities – Brisbane City Council zone;
- Logan City Council;
- Gold Coast City Council;
- Redland City Council; and
- Unitywater – Caboolture demand zone.

These retail demand zones are consistent with those specified in the Operating Protocols made under Chapter 1 of the BWSC and in the Supply Information Notices made under the Bulk Water Supply Agreements. In these zones, system losses/leakage will be determined by apportioning total reported network losses for 2007/08 for the total distribution network between bulk transport and distribution assets on the basis of the ratio of bulk transport pipe length over total network pipe length within the relevant retail demand zone.

The formula is:

$$\text{Zone Loss Rate (LR)} = \frac{\text{Total Zone Network Losses (TNL)}}{\text{Total Zone Network Pipe Length (TNPL)}} \times \text{Zone Bulk Transport Pipe Length (BTPL)}$$

Where:

- Total Network Losses = Real Losses in the retail demand zone (for the immediately preceding financial year) as defined in the National Water Commission's *National Performance Framework – 2007-08 Urban Water Performance Report Indicators and Definitions Handbook*. The Real Losses can be reported in the form of Performance Indicator A11 – Real losses (kL/km water main/day) from the Handbook.
- TNPL = Retailer-owned distribution main length in the zone, defined as per Performance Indicator A2 – Length of water mains (km) from the Handbook plus BTPL.
- BTPL = Bulk Transport Pipe Length owned by the Queensland Bulk Water Supply Authority within the retail demand zone.

Volume Estimation Loss Rate from 1 July 2008

The Volume Loss Rates applicable from 1 July 2008 are contained in the following table.

Supply zone	Volume Loss Rate (ML/day)
Queensland Urban Utilities – Brisbane City Council zone	0.917
Logan City Council	0.039
Gold Coast City Council	0.083
Redland City Council	0.198
Unitywater – Caboolture demand zone	0.032

Part C – Data Substitution

The BWSC (section 27) recognises that meters may, for various reasons, become temporarily or permanently inoperable or inaccurate.

In the case of Bulk Supply Points which are metered, the Responsible Person for the Bulk Supply Point must use the Alternate Methodology made by the Queensland Bulk Water Supply Authority to estimate and substitute volume data for the meter.

This Part sets out meter data substitution methods which may be used to estimate volumes for a Bulk Supply Point where the meter is temporarily inoperable or inaccurate.

The accepted data substitution methods are ranked in order of preference and must be applied in this order, unless to do so is demonstrated as being not operationally feasible.

Method 1 – Check Meter Substitution

Metering Data obtained from another meter at the same measurement point, for the same data periods as that being substituted for, may be substituted.

- E.g. Metering installations where a check meter is installed.
- E.g. A probe or temporary measuring device may be installed and used to provide substitute measurement data until such time as the original meter is repaired. Other data substitution methods as outlined below are to be used for the period between identification of the fault and the installation of a probe or temporary measuring device.
- E.g. If a downstream meter exists and losses and/or off-take volumes between the faulty meter and the downstream meter are known or can be reasonably estimated, the downstream meter together with the intervening off-take and loss data may be used to derive an estimated volume for substitution.

This method of substitution may also include the use of data from similar meters where the flow profile of the second meter is a good match to the flow profile of the meter for which substitutions are being made. The Responsible Person must only use the check meter for data substitution if they can demonstrate to the satisfaction of the Bulk Water Supply Authority that the flow profiles of the original meter and second meter are comparable.

Method 2 – Historical Data Substitution

Where data substitution under Method 1 cannot be carried out, meter data can be substituted using the "Link Month Method" or "Average Month Method".

2(A) "Like Month Method"

Substitutions to be made based on preferred substitute months as detailed below:

Month to be substituted	1st preference substitute month	2nd preference substitute month	3rd preference substitute month	4th preference substitute month
January	Average Month Method	Average Month Method	Average Month Method	Average Month Method
February	Average Month Method	Average Month Method	Average Month Method	Average Month Method
March	Average Month Method	Average Month Method	Average Month Method	Average Month Method
April	March**	Average Month Method	April*	March*
May	April**	Average Month Method	May*	April*
June	May**	Average Month Method	June*	May*
July	June**	Average Month Method	July*	June*
August	July**	Average Month Method	August*	July*
September	August**	Average Month Method	September*	August*
October	September**	Average Month Method	October*	September*
November	October**	Average Month Method	November*	October*
December	November**	Average Month Method	December*	January*

* occurring in the preceding calendar year as the month to be substituted.
** occurring in the same calendar year as the month to be substituted.

In applying the "Like Month Method" due consideration must be given to the level of demand restrictions in place at both the point of substitution and during the substitute month. The "Like Month Method" of substitution cannot be used in circumstances where the preferred substitute month and the month being substituted were subject to differing demand restrictions.

In circumstances where there has been no change of demand restrictions during the preceding three months the preferred substitute months marked with "**" in the table above must be used. In the case where data is to be substituted for the months of January, February and March, the "Average Month Method" is to be used.

2(B) "Average Month Method"

The data substitution can be made on the basis of the rolling average of the immediately preceding three months' available meter data.

E.g. The substitution of July meter data is calculated as the weighted average of the metered volumes for the preceding April, May and June. The weighted average is based on the relative number of days occurring in each calendar month.

In circumstances where there has been a change in demand restrictions within the preceding three months and the impact on the weighted average is *significant* (i.e. the impact of restrictions would cause a greater than 10 per cent variation in the volume calculated using (a) in the table below compared to the volume calculated in (b) – (c) as determined by reference to the month in which the demand restriction changed) then the averaging calculations as set out in (b) – (c) are to be used.

	Restriction Change Scenario	Weighted Average Calculation
(a)	No change in restriction level or change not giving rise to significant impact.	Weighted Average of **M_1** **M_2** and **M_3** metered volumes.
(b)	Change in restriction level in third preceding month.	Weighted Average of **M_1** and **M_2** metered volumes.
(c)	Change in restriction level in second preceding month.	**M_1** metered volume.
(d)	Change in restriction level during preceding month.	**M_1** metered volume.

Where:
M_1 = month immediately preceding month to be substituted;
M_2 = two months preceding month to be substituted;
M_3 = three months preceding month to be substituted.

Example based on a substitution month of July

Restriction Change Scenario	Weighted Average Calculation
No change in restriction level or change not giving rise to significant impact.	Average of preceding April, May and June metered volumes.
Change in restriction level in April.	Average of preceding May and June metered volumes.
Change in restriction level in May.	June metered volume.
Change in restriction level during June.	June metered volume.

Method 3 – Agreed Method

Where data substitution is required for any period greater than three months, consideration, consultation and agreement must take place between the affected parties to resolve any abnormalities that may arise from the use of “Like Month” or “Average Month” methods over an extended period of time.

The Responsible Person must notify the Queensland Bulk Water Supply Authority in writing and seek approval to use the agreed substitution method. Such notification must include:

- the written consent of the parties to use the agreed method;
- any conditions placed upon the use of the agreed method; and
- the timeframe in which the agreed substitution method is expected to be applied.

Part D – Use of Meters near Bulk Supply Points

If a meter is located within 10 meters of a Bulk Supply Point and provided there are no major in-take/off-take points within that distance or change to in-take/off-take points within that distance, the meter is deemed to be at the relevant Bulk Supply Point for the purpose of the BWSC and any relevant Bulk Water Supply Agreement. If there is a change to in-take/off-take points occurring within the 10 metre distance from the Bulk Supply Point, the Responsible Person must notify the Bulk Water Supply Authority of the changed in-take/off-take conditions. The Bulk Water Supply Authority will determine whether meter installation can continue to be used to measure the volume at the Bulk Supply Point or whether an alternate volume estimation method will need to be used.

If a meter is deemed as the meter at a Bulk Supply Point, the Responsible Person for that Bulk Supply Point must certify that the meter complies with, as relevant, the:

- meter standard for new infrastructure (BWSC section 22) or the
- meter standard for existing infrastructure (BWSC section 23).

Schedule 1 – Alternate Methodology – Volume Estimation for Bulk Water Customers where Bulk Transport losses apply

Queensland Urban Utilities – Brisbane City Council zone

Volume Estimate = Supply from Mt Crosby WTP, Enoggera WTP, North Pine WTP and Brisbane Aquifers, Northern Pipeline Interconnector and the Southern Regional Water Pipeline

less volumes from these supply points exported to Ipswich City, Logan City and Moreton Bay Regional Council retail demand zones and volumes exported through the Northern Pipeline Interconnector and the Southern Regional Water Pipeline

less the estimate of system losses/leakage applicable to Bulk Transport System (infrastructure formerly owned by the Bulk Water Transport Authority (LinkWater)) within the Brisbane City Council retail demand zone.

Gold Coast City Council

Volume Estimate = Supply from Molendinar WTP, Mudgeeraba WTP, Logan City retail demand zone, SEQ (Gold Coast) Desalination Plant and Southern Regional Water Pipeline

less volume exported to Logan City retail demand zone and volumes exported through the Southern Regional Water Pipeline

less the estimate of losses in bulk transport system.

Logan City Council

Volume Estimate = Supply from South Maclean WTP, Brisbane supply zone, Gold Coast City retail demand zone and through the Eastern Pipeline Interconnector and the Southern Regional Water Pipeline

less volume exported to Gold Coast City retail demand zone and through the Eastern Pipeline Interconnector and the Southern Regional Water Pipeline

less the estimate of losses in bulk transport system.

Unitywater – Moreton Bay Regional Council zone

Volume Estimate = Supply from Bribie Island WTP, Caboolture WTP, Woodford WTP, Dayboro WTP, Petrie WTP, Banksia Beach WTP and volumes imported through the Northern Pipeline Interconnector

less volume exported through the Northern Pipeline Interconnector

less the estimate of losses in bulk transport system.

Redland City Council

Volume Estimate = Supply from Capalaba WTP, North Stradbroke Island WTP, Amity Point WTP, Dunwich WTP, Point Lookout WTP and volumes supplied through the Eastern Pipeline Interconnector

less volumes exported through the Eastern Pipeline Interconnector

less the estimate of losses in bulk transport system.

Schedule 2 – Volume Estimation for Bulk Water Customers where Bulk Transport losses do not apply

Queensland Urban Utilities – Ipswich City Council zone

Volume Estimate = Supply from Mt Crosby WTP and through the Southern Regional Water Pipeline

less volume exported to Queensland Urban Utilities – Scenic Rim Regional Council zone.

Queensland Urban Utilities – Lockyer Valley Regional Council zone

Volume Estimate = Supply from Boonah-Kalbar WTP, Kooralbyn WTP, Rathdowney WTP, Helen Street WTP, Canungra WTP, Albert River WTP and Ipswich City Council distribution zone

less exports.

Queensland Urban Utilities – Somerset Regional Council zone

Volume Estimate = Supply from Kilcoy WTP, Somerset (Kilcoy) WTP, Linville WTP, Esk WTP, Somerset Dam (Esk) WTP, Toogoolawah WTP, Lowood WTP outlet to Lowood and Jimna WTP.

less exports.

Unitywater – Sunshine Coast Regional Council zone

Volume Estimate = Supply from Image Flat WTP, Landers Shute WTP, Lake Macdonald WTP, Kenilworth WTP, Maleny WTP, Ewen Maddock WTP and volumes imported through the Northern Pipeline Interconnector

less volumes exported through the Northern Pipeline Interconnector.