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# Water Supply Demand Strategy 2012

March 2012

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# 1. Context

## 1.1 What is a Water Supply Demand Strategy

The purpose of Westernport Water's Water Supply Demand Strategy (WSDS) is to identify the optimum mix of supply options and demand reduction measures to maintain a balance between the demand for water and the water available for supply within Westernport Water's region now and into the future. Each urban water corporation in Victoria is required to develop a WSDS, as detailed in their Statement of Obligations under the Water Industry Act 1994.

## 1.2 Previous Water Supply Demand Strategies

Westernport Water's first WSDS was released in March 2007 (Westernport Water, 2007). This strategy identified demand management actions and options for securing additional water in the context of the drought conditions at the time. Following the development of this strategy, a number of the identified options considered in this strategy were implemented. This included the connection of new supplies from Bass River and groundwater bores located in the Corinella aquifer to the system, and a series of water conservation actions.

In 2009, Westernport Water undertook an internal review of the 2007 WSDS. This process reviewed the balance between demand and supply following upgrades to the Westernport Water supply system, and the impacts of the demand management actions that had been implemented. This review found that further action was required to ensure Westernport Water could meet demand under ongoing drought conditions. Following this review Westernport Water has developed a business case to support an upgrade to the capacity of Candowie Reservoir.

## 1.3 Strategy Development

The 2012 WSDS builds upon the work undertaken in 2009 by updating demand and supply forecasts, using the most recent consumption and water resource information. The Department of Sustainability and Environment (DSE) issued guidelines to cover the development of the 2012 strategy (DSE, 2011), to ensure a suitable level of rigour and consistency was used to develop the strategy. Westernport Water has used these guidelines as the basis for the strategy development process.

To date the development of the strategy has involved:

- Review of the strategic aims of Westernport Water, including the level of service it will provide customers with;
- Updating water demand forecasts based on current information about water consumption trends;
- Updating water supply forecasts (system yield) based on current and upgraded Westernport Water supply infrastructure, and updated climate information;
- Consideration of demand management and additional supply options that will allow Westernport to meet its strategic objectives; and
- Consultation with the Westernport Water community through an open forum and the Customer Consultative Panel and other stakeholders about the issues being addressed in this strategy.

The draft strategy was submitted to DSE for review in November 2011. This final strategy, incorporating feedback from DSE and Westernport Water customers, is to be submitted to the Minister for Water by 31 March 2012.

#### **1.4 Overview of Westernport Water**

Westernport Region Water Corporation (Westernport Water) provides water and wastewater services - wherever economically, environmentally and socially practicable - to properties and communities throughout its district. Westernport Water provides services to approximately 13,000 customers (60,000 in peak holiday periods) in an area covering 300 square kilometres encompassing Phillip Island and the district stretching from The Gurdies to Archies Creek.

Westernport Water has access to a diversified water supply shown in Figure 2. Water can be sourced from various Westernport Water managed supplies including:

- The Tennent Creek catchment via Candowie Reservoir;
- Bass River; and
- Groundwater bores in the Corinella Aquifer.

Water from all of these sources is stored in Candowie Reservoir, before being treated at the Ian Bartlett Water Purification Plant. Following treatment the water is pumped to San Remo basin for distribution to Westernport Water customers.

In addition to traditional water supply and wastewater services, Westernport Water also sells recycled water from its treatment plant at Cowes and is upgrading the plant to supply Class A recycled water for dual-pipe systems and other uses.



**Figure 1 Candowie Reservoir**

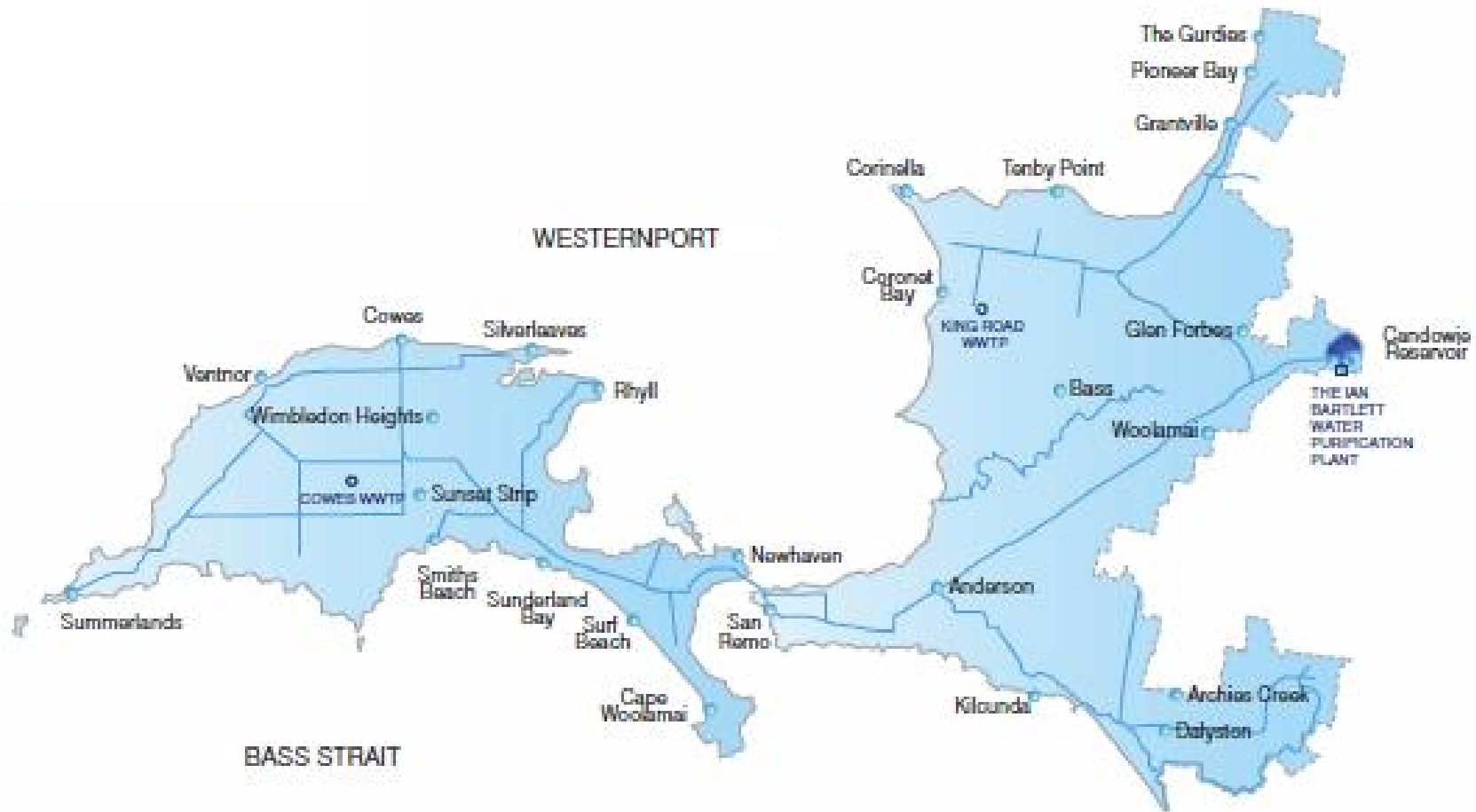


Figure 2 Westernport Water's water supply system (Westernport Water, 2011)

## 2. Water Supply Demand Strategy Objectives

### 2.1 WSDS Strategic Objective

The strategic objectives of Westernport Water's WSDS are to:

- Balance supply and demand at the lowest practical cost; and
- Provide Westernport Water customers with a reliable supply of water.

#### 2.1.1 Balancing supply and demand at the lowest practical cost

Westernport Water has access to a range of local water supply infrastructure to source water. Each of these water supplies has a different cost associated with it. The cost of water from the Metropolitan Pool is currently under negotiation, however, it is expected to be more expensive than water sourced from local supplies managed by Westernport Water. To cost effectively balance supply and demand Westernport Water intends to maximise the use of water available from local sources managed by Westernport Water.

***Westernport Water's objective is to provide the lowest practical cost of water to its customers, by maximising the use of water available from local sources managed by Westernport Water.***

#### 2.1.2 Providing Westernport Water customers with a reliable supply of water

Westernport Water understands that a key element of meeting the needs of its customers is to provide a reliable supply of water. A reliable supply is one where customers can be confident of accessing the volume of water they require. Westernport Water intends to maintain the supply demand balance at a level where the need to restrict access to water by implementing water restrictions is minimised to an agreed level.

It is important to note that achieving a reliable water supply has cost implications. By spending more money, Westernport Water could increase its access to water, and provide a more reliable, but more expensive, water supply. Therefore a balance between cost and reliability is required.

***Westernport Water has adopted a target of maintaining a supply demand balance to ensure, on average, water restrictions are not required 95% of the time.***

This level of service criteria was assessed as part of the community consultation process that has supported the WSDS development. Various community forums (community open day and the customer consultative panel) were asked to comment on the acceptability of various levels of service, and their willingness to pay to achieve higher levels of reliability. Following this consultation, Westernport Water decided to maintain 95% annual reliability as its level of service target.

Measures for reporting against these targets are discussed in Section 5.3.



## 3. Water Supply System

### 3.1 Existing Westernport Water Supply System

#### 3.1.1 Introduction

Westernport Water has historically relied on Tennent Creek inflows to Candowie Reservoir for its potable water supply, with some contingency supply available from South Gippsland Water's Lance Creek Reservoir. Following the severe drought conditions experienced in the Westernport region in 2006/07, Westernport Water augmented its supply system to include an additional surface water supply from Bass River, and a groundwater supply from Corinella Aquifer.

This section details the existing supply system and associated water entitlements, and identifies the potential for expansion of the existing infrastructure where it is currently being considered.

#### 3.1.2 Supply Sources

##### ***Candowie Reservoir***

Candowie Reservoir is the primary source of supply for the Westernport region. It is situated on Tennent Creek, a tributary of the Bass River about 8 km east of Grantville in the South Gippsland Basin. The reservoir currently has a capacity of approximately 2,263 ML. Westernport Water's use of water from Candowie Reservoir is governed by *Bulk Entitlement (Westernport) Conversion Order 1997* (Minister for Water, 1997). The bulk entitlement limits Westernport Water to diverting:

- up to 2,911 ML/year from Candowie Reservoir;
- at a rate not exceeding 50 ML/day.

##### ***Bass River***

Westernport Water holds an entitlement to divert water from Bass River (South Gippsland Basin) at a pump station located on the Grantville – Glen Alvie Road. This water is transferred to Candowie Reservoir. Westernport Water's diversion of water from Bass River is governed by *Bulk Entitlement (Westernport – Bass River) Order 2009* (Minister for Water, 2009). The bulk entitlement limits Westernport Water to diverting:

- up to 3,000 ML/year;
- at a rate not exceeding 25 ML/d; subject to passing flow requirements.

The current pump station and transfer pipeline limit the daily diversion to approximately 15.6 ML/d. Therefore there is scope for Westernport Water to improve its utilisation of this resource by upgrading the pump station and transfer pipeline to allow diversions of up to 25 ML/year when the water is available.

The Bass River diversion has been utilised by Westernport Water since June 2007.

##### ***Groundwater***

Westernport Water holds a licence to extract water from the Corinella Aquifer, located within the Corinella Groundwater Management Area. Westernport Water has commissioned four production bores in the Grantville area that extract water from the aquifer, and transfer the water to Candowie Reservoir. Currently temporary pumps are in place at the production bores.

The groundwater licence covering Westernport Water's extraction from Corinella Aquifer (Southern Rural Water, 2010) limits Westernport Water's extractions to:

- 491 ML/year;
- at a rate not exceeding 3.65 ML/day, subject to specific pump operation rules.

The Corinella Groundwater Management Area has a permissible consumptive volume of 2,550 ML/year (The State of Victoria, 2008).

### 3.1.3 Water Treatment and Distribution

The Ian Bartlett Water Purification Plant, is located at Candowie Reservoir and treats all water supplied within the Westernport Water supply system. The treatment plant has a capacity of 30 ML/d.

Treated water from the treatment plant is piped 37 km via a 650 mm diameter supply main to the main urban demand centres in the region. The capacity of the supply main is 45 ML/d. Offtake pipelines located along the main pipeline deliver water to other smaller urban areas on the mainland and to the rural areas west and south of Candowie Reservoir.

The major towns supplied through the Westernport System, together with population and connection information, is provided in Table 1.

**Table 1 Summary of Westernport region population and connections**

Towns Supplied	Permanent Population (2006) <sup>1</sup>	Estimated Current Population (VIF pop forecast) <sup>2</sup>	Connections <sup>4</sup>		
			Residential	Non-Residential	Total
Grantville	500	560	13,705	1,301	15,006
Corinella / Coronet Bay	1,200	1,350			
San Remo	1,000	1130			
Phillip Island	8,100	9,330 <sup>3</sup>			
Kilcunda	300	340			
Dalyston / Archies Creek	300	340			
<b>Total System</b>	<b>11,400</b>	<b>13,050</b>	<b>13,705</b>	<b>1,301</b>	<b>15,006</b>

1) Based on 2006 Census Data ([www.censusdata.abs.gov.au](http://www.censusdata.abs.gov.au))

2) Based on 2006 Census data multiplied by VIF growth for Bass Coast (Bal) region (DPCD, 2008)

3) VIF population projection for Bass Coast – Phillip Island (DPCD, 2008)

4) 2009/10 Westernport Annual Report (Westernport Water, 2010)

## 3.2 Upgrades Committed to by Westernport Water

### 3.2.1 Candowie Reservoir upgrade

Westernport Water is currently engaged in the Victorian Government Gateway approval process for the upgrade of Candowie Reservoir. The proposed upgrade will increase the storage capacity of the reservoir to 4,463 ML. Associated with this upgrade will be an amendment to the bulk entitlement governing Westernport Water's diversion of water from Candowie Reservoir. The most significant change is anticipated to be the inclusion of environmental flow release requirements to mitigate potential impacts of raising Candowie Reservoir on the environment. This bulk entitlement amendment is yet to be finalised, however environmental flow recommendations (Lloyd, 2011) indicate passing flows could potentially be in the order of:

- The lesser of 5 ML/d or inflows to Candowie Reservoir during May to November (inclusive); and
- The lesser or 0.4 ML/d or inflows to Candowie Reservoir during December to April (inclusive).

Subject to approval of the Business case, the Candowie Reservoir upgrade is an assumed ongoing action for this WSDS.

### 3.2.2 Metropolitan Pool Supply

Westernport Water has been granted an entitlement from the Metropolitan Pool of up to 1,000 ML/year under *Bulk Entitlement (Melbourne Headworks System – Westernport Water) Order 2010*. The Metropolitan Pool comprises water sourced from the Melbourne headworks system, in the Yarra, Thomson and Tarago catchments, in addition to water sourced from the Victorian Desalination Project.

This allocation will come into effect on either 1 July 2012, or at the commissioning of the transfer infrastructure, whichever is sooner.

Westernport Water's allocation from the Metropolitan Pool will be determined on the first day of February each year, and the water will be made available from the first day of July.

## 4. Demand – Supply Balance

### 4.1 System Demand

#### 4.1.1 Approach to demand forecasting

As part of the development of this WSDS, Westernport Water reviewed its water demand forecast to 2060. Demand for water is not easy to forecast. It is influenced by various factors, many of which are outside of Westernport Water's control. The major determinants of demand are population growth, climate and customer behaviour. In general water use is higher in hotter drier years than it is in cooler wetter years. To reflect the uncertainty in forecast demand, Westernport Water has developed a baseline demand forecast with an upper and lower bound to reflect a probable range of demand growth. These forecasts are based on historic water consumption, population growth projections for the area and recent trends in water use.

A key action of the WSDS for Westernport Water is to gain a better understanding of water use behaviours in the region to allow for improved demand forecasts in the future.

#### 4.1.2 Westernport region population growth forecasts

Since the 2009 update of the WSDS, more detailed Victoria in Future (VIF) population growth forecasts have become available for the region. This forecast provides separate estimates for population growth for Phillip Island, and for the remainder of Bass Coast Shire. The population growth forecast for Phillip Island ranges between 1% and 2% between 2006 and 2026, gradually declining in the later years of this period. The population forecast for the remainder of Bass Coast Shire is approximately 3% to 2011, and 2% to 2026. As Phillip Island constitutes a majority of the population of the Westernport region (refer Table 1), the VIF population forecast for Phillip Island is considered to be a better representation of population growth for the Westernport region than the Bass Coast Shire growth forecast used previously.

#### 4.1.3 Recent trends in water use

##### ***Connection growth rates***

Westernport Water's number of residential connections has been increasing at a rate of around 3% per annum in recent years. Residential connections in the Westernport region are increasing at a greater rate than the estimated increase in population. This reflects a forecast reduction in the number of people per household contained in the VIF population forecasts, and may indicate that some of the new residential connections have been holiday houses.

Growth in non-residential water connections is more difficult to determine due to changes in the accounting of non-residential connections in the past. Currently, non-residential consumption constitutes approximately one third of total consumption and therefore changes to the number of non-residential connections may have a significant impact on water consumption in the region.

##### ***Water consumption per connection***

Analysis of recent Westernport Water consumption data has indicated a substantial difference in the water consumption rates between new and old connections. On average new residential connections use around 37 kL/year, approximately half the use of existing connections (73 kL/year). This analysis looked at the annual water consumptions for connections that existed prior to 2008/09, and new connections

since that time. This trend was seen over the full spectrum of water users, with the largest water users amongst the new connections using less water than the largest existing water users.

Assessment of recent consumption trends for non-residential connections is difficult due to changes in the accounting of non-residential connections in the past. Gaining better knowledge of non-residential consumption patterns in the region is an action of the WSDS.

#### **4.1.4 Demand Forecast**

The baseline demand forecast used for the 2012 WSDS has been developed following consideration of recent trends in water use, and the areas of uncertainty discussed previously. To represent the uncertainty surrounding this forecast, upper and lower bounds have been developed to represent a probable range of demand.

##### ***Baseline Demand Forecast***

The baseline demand forecast has been developed on the following assumptions:

- Current unrestricted demand of 1,900 ML/year, being the average (unrestricted) demand over the past three years;
- 1% per annum increase in demand.

The results of this demand forecast are shown in Figure 3. This demand estimate was chosen to align with previous planning work undertaken by Westernport Water, and the demand forecast that is being used to develop the 2013 – 2018 Water Plan. It is noted that the 1% demand growth forecast is similar to applying the VIF population growth forecast for Phillip Island to current rates of water consumption.

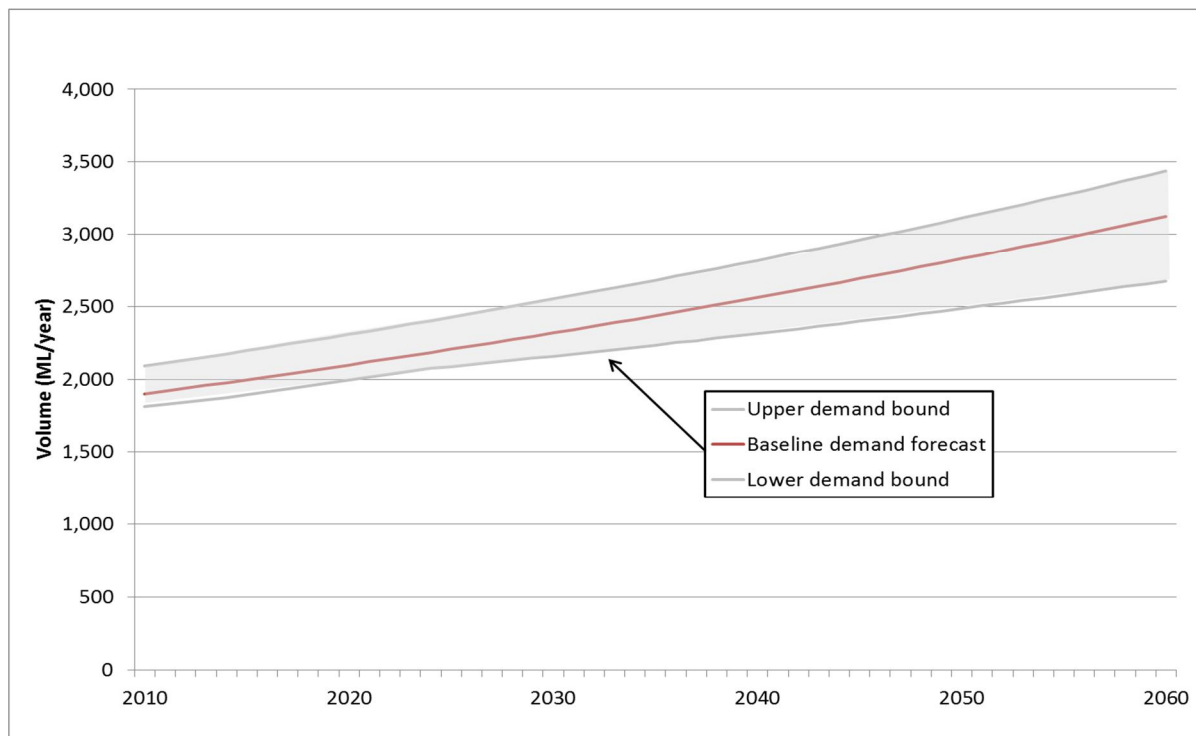
##### ***Lower Demand Bound***

A lower demand bound, shown in Figure 3, has been developed based on the following assumptions:

- Current unrestricted demand of 1,800 ML/year, being the average (restricted and unrestricted) demand over the past 5 years;
- Growth in residential connections in line with VIF population growth forecast for Phillip Island;
- Non-residential water consumption remains steady at 255 ML/year, being the average non-residential water demand for the period 2004/5 – 2009/10;
- Existing residential water connection consumption of 73 kL/year; and
- New water connection consumption of 37 kL/year.

##### ***Upper Demand Bound***

An upper demand bound representing a demand 10% higher than the baseline forecast has been adopted (shown in Figure 3). This represents the various sources of uncertainty that currently exist in the baseline demand forecast.



**Figure 3 Westernport Water WSDS Demand Forecast**

#### 4.1.5 Uncertainty surrounding future water use behaviour

Recent trends in water use help develop a picture of future water use, however large uncertainties still remain. There are some areas of uncertainty that Westernport Water will not be able to predict or manage, such as the impact of climate on water consumption, or government water conservation policy, however there is significant scope for Westernport Water to improve its future demand forecasts through better understanding consumer behaviour. Areas where uncertainty could be reduced include:

- the scope for further household water consumption reduction by rebate schemes targeted at water efficient appliances;
- the potential for water tariff increases to impact water consumption; and
- differences in water consumption habits between permanent residents of the region and temporary (holiday) residents.

Westernport Water will engage with its customers to improve its knowledge of consumer habits and attitudes to water, as an action of the WSDS.

## 4.2 System Supply

### 4.2.1 System yield: how available water is described

For the Westernport region system yield is the highest volume of water that can be extracted from the system on an annual basis without the imposition of restrictions more frequently than agreed (Westernport Water has adopted a level of service of 95% annual reliability for its water supply). Yield is a function of system inflows, storage capacity and demand. System yield generally reflects the amount of supply available to meet demand in drier years. In average and wet years, more water will be available,

while in very dry years (with restrictions) less water will be available.

#### 4.2.2 Approach to supply forecasting

The yield of the Westernport Water supply system has been updated as part of the development of the 2012 WSDS. The major influence on water availability is climate, although other factors including water infrastructure capacity and system operating rules (for example the provision of environmental flows in rivers), can also impact the availability of water.

For the purposes of the WSDS, the Westernport Water supply system has been modelled to include all system augmentations that Westernport Water has committed to at present. The details of the major supply infrastructure as they are included in this yield assessment are contained in Table 2.

To reflect Westernport Water's objective of maximising the use of local resources managed by Westernport Water, yield has been estimated on the basis that Candowie Reservoir, Bass River and Corinella Borefield are used in preference to the Metropolitan Pool.

**Table 2 Westernport Water System Adopted for Supply Forecast**

Infrastructure	Status	Details
Candowie Reservoir	Upgraded Capacity	Storage: 4,463 ML
Bass River	Current Capacity	Max Diversion: 15.6 ML/d
Corinella Borefield	Current Capacity	Max Extraction: 3.65 ML/d
Metropolitan Pool	As at 1 July 2012	Up to 1,000 ML subject to water restrictions in Melbourne.

#### 4.2.3 Yield scenarios

Uncertainty relating to climate change has been incorporated into the yield assessment process by examining four climate scenarios, chosen to represent a bound of possible future supply scenarios:

1. a 'historical' scenario based on historical inflows and climate conditions;
2. a 'median climate change' scenario based on median reductions in future streamflow;
3. a 'dry climate change' scenario based on high reductions in future streamflow; and
4. a 'return to dry' scenario, representing a step change in climate, and based on streamflow and climate conditions experienced during the Millennium Drought 1997 – 2009

The Westernport Water region, like all of Victoria, has experienced the impact of extremes in climate on its water supply. During the Millennium Drought (1997 – 2006) Westernport Water imposed Stage 4 water restrictions from November 2006 to August 2007. A reduction in water availability of this magnitude had not been foreseen in any previous planning work, and therefore Westernport Water had little choice but to implement Stage 4 water restrictions. Since this time, Westernport Water has adopted a conservative 'return to dry' supply forecasting scenario as the basis for their planning.

Results of the yield assessment are presented in Figure 4. To reflect Westernport Water's aim of maximising the use of water from local resources managed by the corporation, the supply estimates include the supply available from locally managed resources, and the total supply available to the region (which includes the contribution of the Metropolitan Pool):

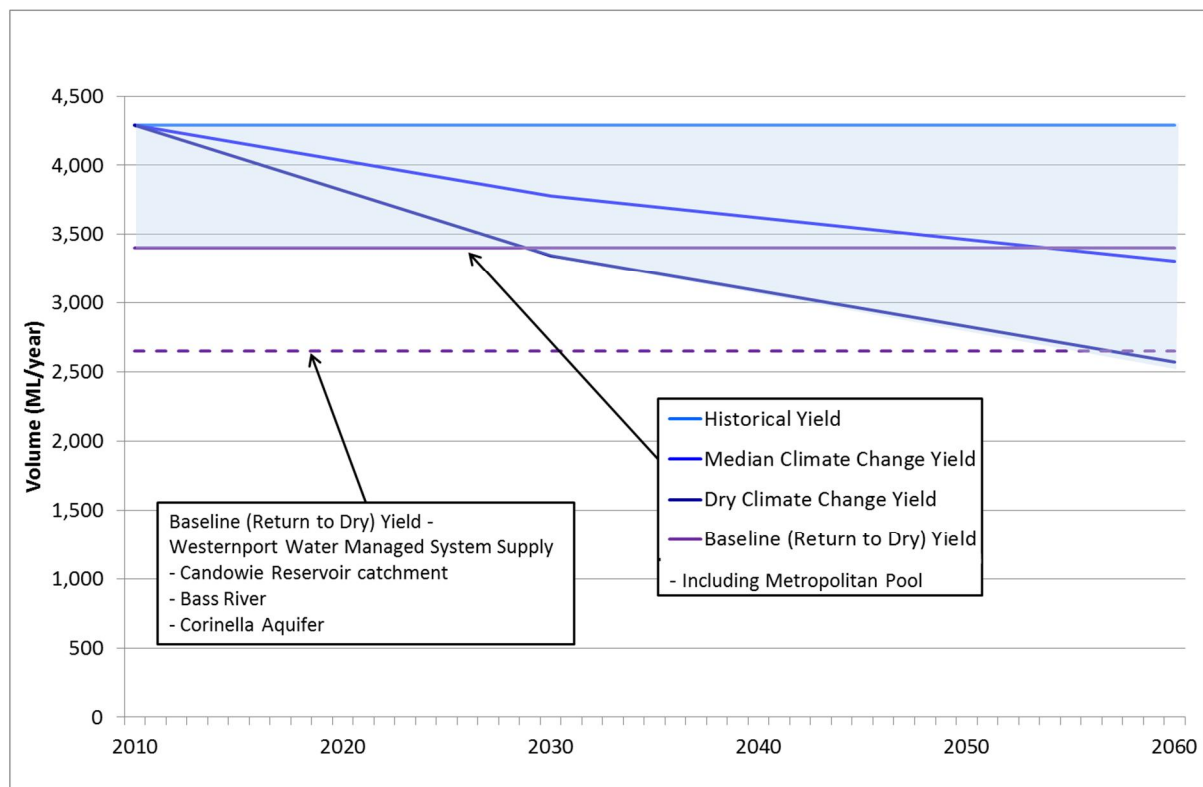
- The estimated system yield for the Westernport supply system under the 'historical' inflow scenario is estimated to be 4,290 ML/year, of which approximately 3,300 ML/year is sourced from local resources managed by Westernport Water.
- The estimated system yield for the Westernport supply system under the 'return to dry' inflow scenario is estimated to be 3,400 ML/year, of which approximately 2,650 ML/year is sourced from local resources managed by Westernport Water.

### **Baseline Supply Forecast**

The 'return to dry' scenario has been adopted as the baseline supply forecast for this WSDS, to align with recent planning work by Westernport Water. It is acknowledged that this is a relatively conservative supply scenario, however recent history has shown that the Westernport supply system is highly vulnerable to the impacts of climate and streamflow variability.

### **Upper and Lower Supply Bound**

The upper bound of the supply yield is represented by the historical yield estimate, while the lower bound is represented by the 'return to dry' baseline yield and 'dry climate change' yield.

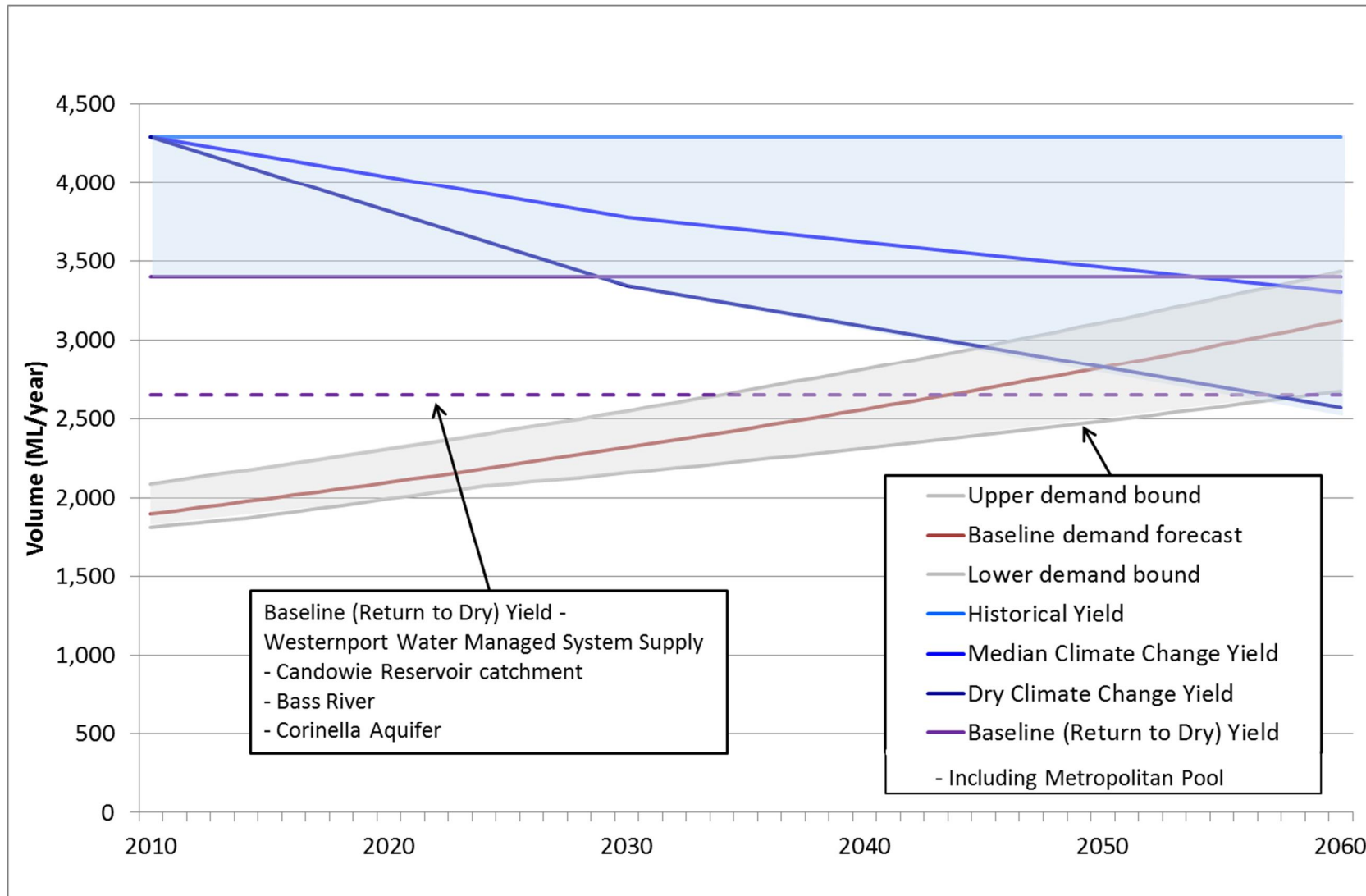


**Figure 4 Westernport Water WSDS Yield Forecast**

### **4.3 Current Demand and Supply Balance**

The current demand and supply balance for the Westernport Water system is shown in Figure 5. This balance reveals that Westernport Water has sufficient supply to meet demand over the 50 year planning period (based on the baseline demand and supply scenarios), and that the supply from Westernport Water managed resources should be sufficient to meet demand for the next 30 years.





**Figure 5 Forecast demand and supply balance**

## 5. Actions to Maintain the Supply and Demand Balance

### 5.1 Why action is required

The demand and supply balance shown in the previous section shows that Westernport Water has sufficient water to meet demand for the short to medium term. However the balance presented above is a forecast only, and the actual supply and demand balance will shift every year depending on climate, population growth and water consumption habits. Therefore Westernport Water will need to ensure it is continually monitoring the supply and demand balance, and undertaking actions to help reduce the uncertainty around these forecasts.

### 5.2 Actions

#### 5.2.1 Demand-Side Actions

Efficient use of water is continually being pursued by Westernport Water through community education programs, the promotion of permanent water savings rules and leakage reduction programs. Westernport Water is also developing a Class A recycled water treatment plant to promote greater use of recycled water.

Given the guidance provided in the Essential Services Commission guidelines for 2013 Water Plans (Essential Services Commission, 2011), the development of new water conservation measures over and above current measures is not considered necessary at this time. Instead Westernport Water demand side actions will focus on reducing the uncertainty related to the demand forecast.

***Westernport Water will undertake community consultation to better understand the water use behaviours and attitudes of its customers. It will aim to determine the uptake of water conservation behaviours and appliances throughout the community to better understand the scope for demand management actions in the future.***

#### 5.2.2 Supply-Side Actions

The demand and supply balance presented in Section 4 indicates that the Westernport Water supply system requires no augmentation in addition to those actions already committed to by Westernport Water and included in this strategy.

##### ***Upgrade Bass River Pump Station***

However, previous planning work undertaken by Westernport Water has indicated that upgrading the capacity of the Bass River pump station and transfer pipeline would improve the system yield by a significant volume.

To allow Westernport Water to supply its customers with the most cost effective water supply, the corporation is aiming to maximise its use of locally managed resources. Therefore Westernport Water has adopted a supply and demand balance that incorporates the upgrade of the Bass River pump station when the local resource may no longer be sufficient to meet demand. Based on the baseline demand scenario this may occur in approximately 2035.

Westernport Water is entitled to divert up to 25 ML a day of water from Bass River, up to a total of 3,000 ML per year. The current Bass River pump station and transfer pipeline can divert approximately 15 ML

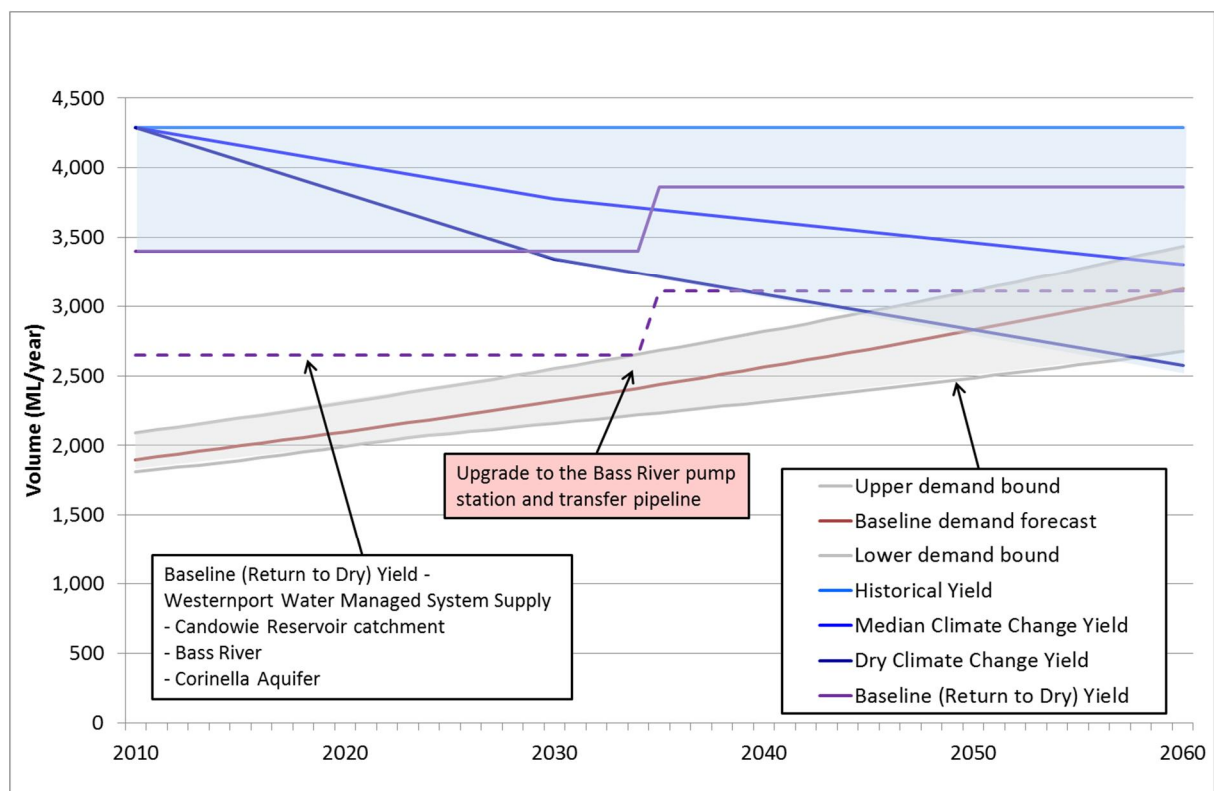
per day of water from the Bass River, which limits Westernport’s ability to divert the full 3,000 ML a year. Upgrading the pipeline capacity would allow Westernport to increase its use of this entitlement.

This upgrade has been previously estimated to improve the yield of the supply system by 460 ML per year (under the conservative supply scenario adopted for this strategy), resulting in the supply and demand balance shown in Figure 6.

**Source Additional Supply from the Metropolitan Pool**

Future imbalances in supply and demand could be managed through an increased entitlement from the Metropolitan Pool. It is noted however that Westernport Water’s preferred approach is to maximise the use of water available from local sources.

The cost of water from the Metropolitan Pool is currently under negotiation, however, it is expected to be more expensive than water sourced from Bass River.



**Figure 6 Demand and supply balance with Bass River pump station upgrade**

***Westernport Water will assess the various supply-side options when the system demand approaches the available supply, and at this time the options will be costed and assessed to determine the preferred option.***

### 5.3 WSDS Monitoring and Reporting

Westernport Water will actively monitor the supply demand balance as part of the implementation of this strategy. This monitoring will focus on comparing elements of supply and demand that may indicate if action is required to maintain the supply – demand balance.

The results of this reporting will be used to determine which, if any actions from the WSDS or the Drought Response Plan are required. This reporting will also form that basis of Westernport Water's Water Security Outlook.

**Table 3 Measures for monitoring the supply and demand balance**

Measure	What this may indicate
Actual demand compared to the forecast demand.	If demand is exceeding the forecast, and therefore action is required.
Actual Candowie Reservoir inflows compared to inflow scenario used for yield calculation.	If actual inflows are less than those used for modelling then the available supply may be less than required
Annual use of water from Corinella Aquifer and Metropolitan Pool.	Increasing use of these resources indicate that the supply from Tennent Creek and Bass River may not be sufficient to meet demand
Volume of water stored in Candowie Reservoir	Indication of the volume of water currently available to meet supply in the short term (1 – 2 years).

***Westernport Water will report against the assumptions that underpin the WSDS annually to monitor deviation from the demand and supply balance presented in this strategy.***

### 5.4 Updating this Strategy

***Westernport Water will update this WSDS within five years of the submission of this strategy.***

## 6. References

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**Document Status**

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	H Clarke	V Ahuja		V Ahuja		10/11/11
1	H Clarke G Savage	S Roach		S Roach		9/03/12