



THE BASIN PLAN IMPLEMENTATION

Namoi Water Resource Plan – Pre basin plan Scenario Report – Peel Regulated River System

Appendix D to Schedule F

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More information

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Glossary

Term	Definition
BDL	Baseline Diversion Limit under the Basin Plan
Cap	The Murray Darling Basin Ministerial Council Cap on Diversions
DPI Water	NSW Department of Primary Industries, Water Division (now Department of Planning, Industry and Environment—Water
EFRG	Environmental Flows Reference Group
EWA	Environmental Water Allowance
HEW	Held Environmental Water
IQQM	Integrated Quantity and Quality Model
LTADEL	Long term Average Annual Extraction Limit
MDB	Murray Darling Basin
MDBA	Murray Darling Basin Authority
MDBC	Murray Darling Basin Commission
MDBSY Project	Murray Darling Basin Sustainable Yields Project
OFS	On farm storage
PBP	Pre-Basin Plan
SDL	Sustainable Diversion Limit
WA 2007	Commonwealth Water Act (2007)
WMA 2000	NSW Water Management Act (2000)
WRP	Water Resource Plan
WSP	Water Sharing Plan

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1 Introduction

The 2012 Basin Plan, established under the WA 2007, defines the maximum limit of consumptive diversions at valley as well as basin scale. WRPs are being developed for each valley to meet Basin Plan requirements. A significant element of the WRP is that the allowable long term average annual diversions have been set as the SDL. This SDL depends on an estimate of the BDL, which is the long term average annual diversion calculated over the period 1895-2009 that was allowable under state water planning law prior to when the Basin Plan was formulated. The SDL is the BDL minus a fixed recovery target.

These long term average annual diversions are estimated using IQQM software models of the river system. These models estimate a range of water balance components such as streamflow and diversions based on climatically derived water availability, levels of water resource development, and water sharing policies.

An estimate of BDL by MDBA published in Schedule 3 of the 2012 Basin Plan has since been revised by NSW, with the changes principally based on improved ungauged inflow and transmission loss estimates informed by millennium drought as well as higher resolution of flow paths at some locations. These improvements are reported in a related technical note.

This revised BDL estimate has resulted in a commensurate revised SDL that the Peel Valley needs to comply with as a part of the Namoi WRP. The Namoi WRP will be developed in the near future with the water sharing arrangements and rules informed by the results of a range of modelled scenarios. For these modelled scenarios to accurately estimate long term average annual diversions, the model needs to better reflect what is driving water use, based on conditions that exist in the valley now, rather than what existed in the valley over a decade ago as is modelled for the BDL. The current condition is better reflected in Pre Basin Plan scenario as introduced next.

1.1 The Pre-Basin Plan Scenario

The PBP scenario is the model configured with the development conditions and management arrangements that currently exist. This includes development conditions such as; public infrastructure, areas developed for irrigation, and the capacity of water users to extract and store water on farm, as well as management arrangements such as the distribution and usage patterns of entitlement holders, the crop area planting decisions of irrigation enterprises, and operation of storages to supply consumptive and environmental water.

The PBP scenario gives the best estimate of long term average water use under current conditions, and forms the baseline for water resource plan scenario development. There are many similarities with the BDL scenario. The similarity includes climatic inputs and the improvements of the physical processes from the revised BDL scenario model. However, the PBP scenario differs from the BDL scenario in its development conditions and management arrangements. The development conditions have evolved since the early 2000s. These includes different planted area, on-farm storages, crop types that are grown and the crop area planting decisions given available water resources.

The results from the PBP scenario will be used to establish what current long term average diversions are compared to SDL. The PBP will further be used to compare scenarios trialled as part of the WRP development process. These scenarios will typically focus on changing some of the water management arrangements to identify where productive and ecological outcomes can be improved, and to identify any trade-offs.

The PBP scenario can also make use of the information in a slightly longer climate data set. While the SDL must be calculated over the 1895-2009 climate period, other climate data, including the 7-year period since 2009 can also be used to identify improved outcomes and associated trade-offs.

This report describes the development of the PBP scenario.

1.2 Purpose of report

This report is intended primarily for Stakeholders Advisory Panel (SAP) as a record of the development conditions and management arrangements that will be a starting point for the preparation of WRP. The purpose of the report is to describe how the PBP Scenario was developed, and fully document what is included in this scenario.

The technical content of this report is kept to only that necessary to meet the intent. The general development and calibration of the model is described in the IQQM Cap Implementation Summary Report (Ribbons et al., 2005).

2 Model Development

The Peel IQQM was initially developed late 1990s using an early version of the IQQM software (Arranz, 2005). The capability of the Peel IQQM to estimate annual and long term diversions was established by the independent review processes under Cap governance arrangements. The model was independently audited by Bewsher Consulting in September 2007 for MDBC. The auditor concluded that the Peel IQQM was sufficiently robust and lacked significant bias for it to be used for the simulation of long-term diversions within the Peel Valley, and as a component of the approved Namoi cap model under Schedule E.

2.1 WSP to BDL

Peel IQQM was used to develop the WSP of Peel Regulated River Water Sources. The gazetted WSP quoted LTAAEL estimate of 15,100 ML at the commencement of the Plan over the simulation time period available then. MDBA used the 2010 version of Peel WSP IQQM for their BDL estimate published in the Basin Plan. The MDBA BDL annual average simulated diversion over the period 1895 to 2009 was 15,300 ML.

A key update to the BDL was the introduction of an area planting decision function to respond to the change in water availability in the model rather than an externally defined function. A summary of the updates carried out in the revised NSW BDL is presented in the report on BDL Scenario for Water Planning in the Peel (DPI Water, 2017). The revised BDL estimate is 16,200 ML over the period 1895 to 2009.

This updated BDL scenario model is the basis for the PBP model.

2.2 BDL to PBP

The PBP is intended to represent the current management and development condition. The most significant change between BDL and PBP in Peel Valley is the completion of Chaffey Dam enlargement in 2016, increasing its maximum capacity from 62,000 ML to 100,000 ML.

Since there is no other significant infrastructure development between the BDL and the PBP, the key difference revolves around the augmentation of Chaffey Dam along with its associated WSP management rules and the updated TRC Drought Management introduced in late 2015.

2.2.1 Chaffey Dam enlargement (WSP Provisions)

The provisions of Chaffey Dam enlargement were included as part of the Peel WSP formulation in 2009. An important feature is the removal of stimulus flow and introduction of 5,000 ML ECA releases which are set aside in Chaffey Dam. The WSP does not specify how this should be utilised. However, it has been advised that this would most likely be used between March-June. This is reflected in the PBP, ensuring current management is embedded within the model.

Different dealing rules for trade between Peel and Lower Namoi Regulated River Water Source are specified in the current WSP as part of the enlargement of Chaffey Dam. However, the Peel IQQM is not configured to represent active trading.

2.2.2 TRC Drought Management Plan 2015

The need for Tamworth Regional Council (TRC) to reliably supply water requires the council to apply water conservation measures (TRC, 2016). The TRC's 2015 Drought Management Plan encompassing the greater Tamworth Council, considers arrangements for supply water from Dungowan (TRC owned and operated) and Chaffey Dam (WaterNSW owned and operated). Chaffey Dam also regulates surface water source for other consumptive users in the Peel River.

An objective of the Drought Management Plan is to minimise risk through an update of operational rules, including revised drought response level according to Chaffey Dam storage volume (primary trigger) and maintaining higher water levels in Dungowan Dam, to maximise the use of water in Chaffey Dam.

Water restrictions to Tamworth based on these management rules are configured in the Peel PBP model.

3 Results

The average annual usage for different components of the models is shown in Table 3-1.

Overall, the total extraction does not show any significant change. The PBP scenario estimates a decrease of supplementary take compared to the BDL. This is because of less surplus flow in the river due to increased regulated for the larger Chaffey Dam. Nevertheless, as shown by an increase in the General Security take, the total take by irrigator does not change significantly. The slight decrease in Tamworth town water supply take can be attributed to the earlier triggering of demand restrictions in the Drought Management Plan.

The average annual flow at Carroll Gap decreases slightly (0.2%). The minimum volume in Chaffey Dam over the long term, increased from 13,600 ML in the BDL to 21,600 ML in the PBP as a result of the larger dam capacity and the updated Drought Management Plan.

Table 3-1. Key results of BDL and PBP simulation (in ML/year)

Category	Scenario	
	BDL	PBP
Entitlements	Long term average usage (ML/yr) [1895-2009]	
General Security	3,835	5,195
Uncontrolled	3,242	1,873
TWS	8,814	8,621
Utilities, Domestic & Stock	252	252
Total	16,143	15,941
Carroll Gap Flow	243,472	243,012
Min Chaffey Dam Volume (ML)	13,600	21,600

4 PBP model parameters

Table 4-1 contains all relevant configuration information for the PBP Scenario.

Table 4-1. Infrastructure and Development Parameters

Items	Description
General	
System File Name	PeelE114.SQQ
IQQM Version developed in	7.91.6
Available Simulation Period	01/01/1892 - 30/06/2016
Water Year	July to June
Valley Development Levels	
Maximum Crop area	2013
Crop Mix	2000
Licence Volume	2005
Catchment Information	
<i>Headwater storages modelled</i>	
Chaffey	
Inactive storage (ML)	2,400
Full supply volume (ML)	100,000
Average annual inflow (ML)	52,200
Dungowan	
Inactive storage (ML)	400
Full supply volume (ML)	6,300
Average annual inflow (ML)	11,200
Entitlements	
<i>General Security Entitlements (ML)</i>	
d/s Chaffey Dam	
Consumptive	30,878
<i>High Security (shares)</i>	
d/s Chaffey Dam	
	601
Town Water Supply (shares)	
d/s Chaffey	16,400
Stock and domestic (shares)	381
Irrigation development	
Maximum planted area (ha)	1,746
Installed reg pump capacity (ML/d)	440
Accounting System Lower Peel	
Type	Annual
Debiting type	Water use
Maximum balance	100%
Maximum use of entitlement	100%
Storage Operation	
Dungowan Dam	Water is released from Dungowan dam to meet Tamworth demand, based on maximum daily limit of 22 ML/d. The TRC Drought

Items	Description												
	Management Plan in 2015 aims to increase water held in Dungowan Dam.												
Chaffey Dam	Demand from Tamworth is restricted during dry years as per advice given by Tamworth Regional Council. Reduction of demand applies according to 2015 TRC Drought management Plan triggers.												
	<table border="1"> <thead> <tr> <th>Dam Level</th> <th>Usage Target</th> </tr> </thead> <tbody> <tr> <td>40%</td> <td>95%</td> </tr> <tr> <td>35%</td> <td>90%</td> </tr> <tr> <td>30%</td> <td>85%</td> </tr> <tr> <td>25%</td> <td>75%</td> </tr> <tr> <td>< 25%</td> <td>65%</td> </tr> </tbody> </table>	Dam Level	Usage Target	40%	95%	35%	90%	30%	85%	25%	75%	< 25%	65%
Dam Level	Usage Target												
40%	95%												
35%	90%												
30%	85%												
25%	75%												
< 25%	65%												
In-stream requirements													
<i>Average annual replenishment flow usages and maximum caps in brackets(ML/y)</i>													
Translucency	5,000 ML/y of ECA account is set aside in Chaffey Dam. The WSP does not specify triggers; however the model releases 700 ML/d in Mar-June (advised to be most likely use period).												
<i>Minimum flow requirements at various locations (ML/d)</i>													
Chaffey Dam release	3												
Dungowan Creek R d/s Dungowan	10												
Carrol Gap	10 (Oct to Feb)												
Environmental Water													
<i>Planned Environmental Water</i>													
Surplus flow sharing	50% as per Water Act 1912												
Surplus flow threshold	As per WSP c62: If AWD < 35% and Carroll Gap Flow > 40 ML/d If AWD >= 35% and Carroll Gap Flow > 50 ML/d												

5 References

Arranz, P, (2005), Peel_Recalibration_2004c2. DIPNR, pp 85

Arranz, P, (2008), Peel 2008 Recalibration, Draft Report # 4 prepared for discussions with Hunter Water only, pp 36

Bewsher Consulting Pty Ltd (2007), Peel Valley IQQM; Independent Audit of Component of Namoi Cap Model. Bewsher Consulting Pty Ltd, pp 40.

Department of Primary Industries Water (DPI Water) (2017), BDL Scenario for Water Planning in Peel, NSW DPI Water, 2017.

Podger, G.M., Barma, D., Neal, B., Austin, K. and Murrphy, E. (2010). River System Modelling for the Basin Plan Assessment of fitness for purpose. CSIRO: Water for a Healthy Country National Research Flagship, Canberra, December 2010, pp 64.

Ribbons, C., Chowdhury, S., and Arranz, P. (April 2006). Peel River Valley; IQQM Cap Implementation Summary Report. DIPNR, pp 100.

Tamworth Regional Council (2015), Drought Management Plan, rev. 1 – adopted 14 April 2016, Tamworth Regional Council, NSW.