



Department of
Primary Industries
Office of Water

Sydney Catchment Authority

Water Licences and Approvals Package

May 2012

EVENTS REGISTER	
Date	Action
23 April 2001	Issue of Water Management Licence to Sydney Catchment Authority
23 October 2001	Statutory six month review of licence undertaken
19 January 2006	Statutory five year review of licence undertaken
1 August 2008	Licence amended to include modification of environmental flow conditions
5 October 2010	Minister's direction under clause 3.6.2 to release 28 ML/d of Banked Environmental Water on the commencement of Replacement Flow releases, takes effect.
29 April 2011	Licence amended in relation to <ul style="list-style-type: none"> • clause 2.2.1 (reference to taking water from water sources identified in the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources, as made on 2 March 2011) • new clause 2.2.6 (defines the annual extraction limits and ten-year average annual extraction limits for each water source identified in the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources, as made on 2 March 2011)
1 May 2012	Issue of Water Licences and Approvals Package to Sydney Catchment Authority under the <i>Water Management Act 2000</i>

This package contains the water access licences and water supply work & use approvals issued under the *Water Management Act 2000* to the Sydney Catchment Authority by the NSW Office of Water on behalf of the Water Administration Ministerial Corporation. Effective from 1 May 2012

Prepared by Corporate Licensing
Licensing and Compliance Group
NSW Office of Water
Penrith, NSW

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LIST OF WATER ACCESS LICENCES AND WORK & USE APPROVALS

List of Sydney Catchment Authority's Water Access Licences and Water Supply Work & Use Approvals under the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011:

Surface water:

	Access Licence Number	Reference Number	Work & Use Approval Number	Water Source
1	WAL 27433	10AL116406	10CA117211	Shoalhaven River
2	WAL 27431	10AL116407	10CA117212	Upper Nepean and Upstream Warragamba Rivers
3	WAL 27434	10AL116408	10CA117213	Hawkesbury and Lower Nepean Rivers
4	WAL 27429	10AL116409	10CA117219	Southern Sydney Rivers

Ground water:

	Access Licence Number	Reference Number	Work Approval Number	Water Source
1	WAL 24974	10AL112069	—	Sydney Basin Nepean Groundwater Source

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Introduction

This package contains four water access licences (WALs), four combined water supply work & water use approvals (CAs) for surface water, and a water supply work approval for groundwater held by the Sydney Catchment Authority (SCA) under the *Water Management Act 2000* (WMA 2000). Although the WALs and CAs are separate regulatory instruments, their management is intrinsically linked. The package recognises the links between these instruments and facilitates the coordinated management of all water related regulatory instruments issued to SCA under WMA 2000.

The main aims of the package are to:

- Provide a repository of all regulatory instruments under WMA 2000 held by SCA
- Assist with the management of SCA's use of water resources in a holistic and efficient manner
- Provide for a single reporting requirement within all of the regulatory instruments and avoid duplication

The WALs and CAs contained in this package:

- define SCA's water access rights and obligations including the releases for environmental and other purposes in accordance with the provisions of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (GMWSP)
- define the monitoring and reporting requirements of SCA to enable assessment of environmental flows on river health

The package does not contain the water access licence certificates which are Certificates of Title held and managed by the Land and Property Information division of the Department of Finance and Services. The regulatory instruments within the package contain the Statement of Approval and Statement of Conditions existing on the date of issue of WALs and CAs.

The WALs and CAs may be amended from time to time in accordance with provisions of the WMA 2000 and GMWSP. All amendments will be recorded in the 'Event Register'. The package will be publically accessible from the NSW Office of Water's website, <http://www.water.nsw.gov.au>.

The package also contains an Operating Protocol document which includes agreed processes and procedures to meet the requirements of SCA's WALs and CAs. The protocol recognises the inherent difficulties and limitations in implementing the WALs and CAs and GMWSP requirements under certain circumstances. It also provides the means to compensate any shortfalls in the measurements or releases. Agreement between SCA and Office of Water to a provision in the Operating Protocol has the same meaning as "manner/methods/procedures as determined/approved in writing by the Minister" as stated in the GMWSP.

The protocol is subordinate to SCA's water access licences and work/use approvals. It provides supporting information and guidance to assist implementation of licence requirements and relevant provisions of the GMWSP. It does not constitute a regulatory instrument.

Words and expressions that appear in this water licences and approvals package have the meanings set out in the Dictionary (Chapter 5). Words and expressions defined in the Dictionary and that appear in the dictionary of the WMA 2000 and GMWSP are the same. A

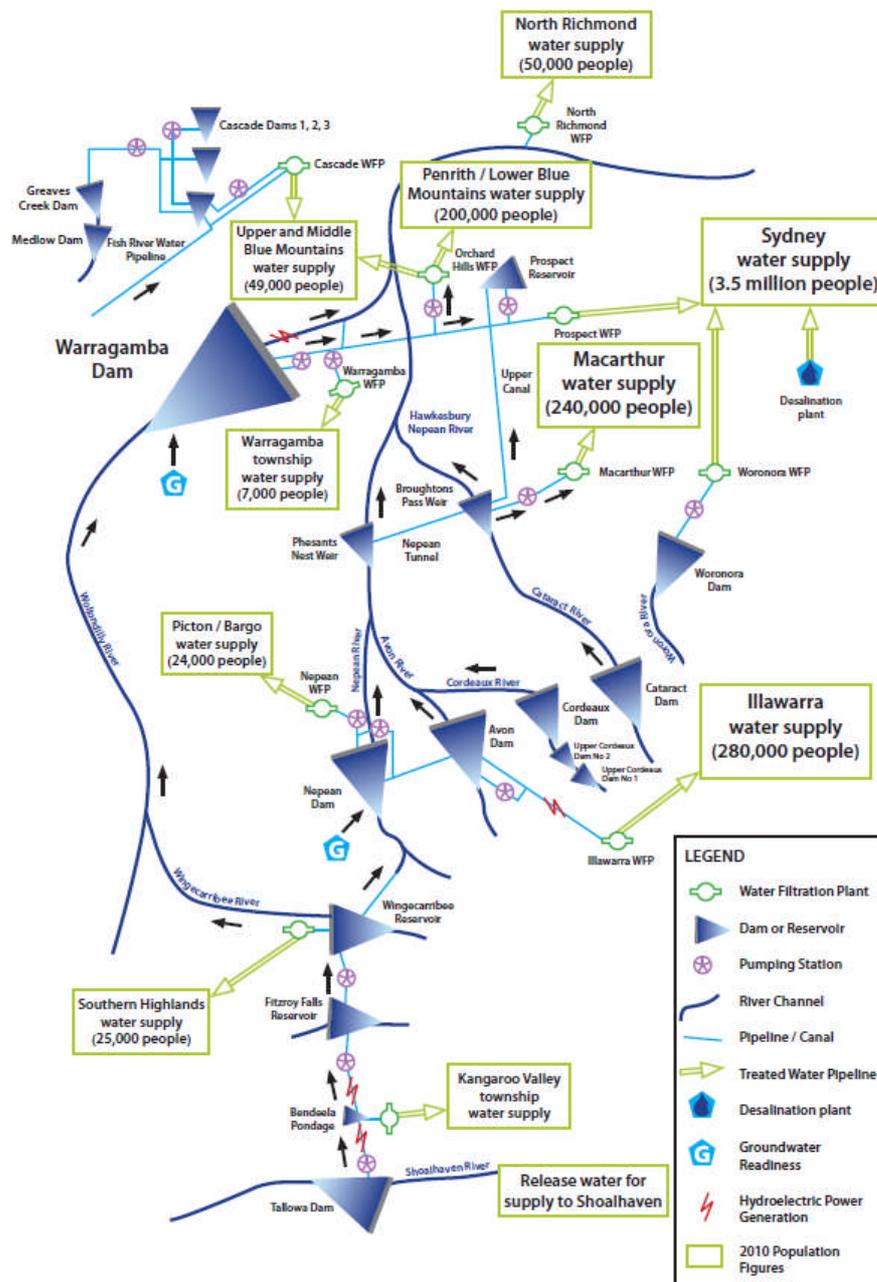
reference in the Dictionary to a section is a reference to a section of the WMA 2000 and GMWSP.

SCA Water Supply System

SCA manages and protects Sydney's drinking water catchments and catchment infrastructure, and supplies bulk water to its customers, including Sydney Water Corporation and a number of local councils. SCA manages a total of 21 storage dams (Figure 1), that hold more than 2.5 million megalitres of water collected from the following four major water sources:

1. Shoalhaven River Water Source
2. Upper Nepean and Upstream of Warragamba Rivers Water Source
3. Hawkesbury and Lower Nepean Rivers Water Source
4. Southern Sydney Rivers Water Source

Figure 1: Schematic diagram of SCA's water supply system.



SCA Water Licensing History

SCA's Water Management Licence was first issued on the 23rd April 2001 under Part 9 of the *Water Act 1912*. The licence underwent a statutory five year public review in 2006 and has been amended several times.

In 2004, the Hawkesbury-Nepean River Management Forum and Expert Panel (Forum) recommended an e-flow strategy and a comprehensive monitoring program for the Hawkesbury-Nepean River. The Forum's recommendations were accepted by the NSW Government through the Metropolitan Water Plan and are gradually being implemented through SCA's Water Management Licence.

The surface and groundwater GMWSPs were gazetted on 25 February 2011 and commenced on 1 July 2011. SCA's Part 9 *Water Act 1912* licence must be converted to WALs and CAs under WMA 2000 following the gazettal of the GMWSPs.

Administration

The Corporate Licensing section of Office of Water is the primary contact for all enquiries regarding the package, notifications, compliance reporting and management of the regulatory instruments generally. Matters relating to the administration of this package should, in the first instance, be referred to Corporate Licensing.

A Licence Working Group, comprising representatives from Office of Water and SCA, meets regularly to discuss operational issues relating to the implementation of the WALs and CAs; and any other issues determined to be relevant by Office of Water and SCA.

Corporate Licensing assesses SCA's compliance with relevant conditions of this package. This includes occasional site visits to inspect and verify SCA's operational procedures and data in relation to implementation of the WALs and CAs. Occasional river gaugings are also carried out by Office of Water to verify the accuracy of SCA's reported releases.

Licence Fees and Charges

SCA is liable to pay Office of Water an annual water management charge in accordance with the provisions of section 114 of the WMA 2000. Water management charges are the ongoing costs incurred by Office of Water in managing the WALs and CAs.

SCA is liable to pay an annual bulk water charge at rates determined from time to time by the Independent Pricing and Regulatory Tribunal (IPART).

Exclusions from this Licence

This package does not cover:

- operations of Warragamba Hydro-electric Power Station.
- water transfers through the Shoalhaven Scheme by Eraring Energy for the purpose of power generation.
- bulk water supply to SCA's Blue Mountain's storages from the Fish River Water Supply Scheme.

1. WATER ACCESS LICENCES

1.1. WATER ACCESS LICENCE FOR SHOALHAVEN RIVER WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Conditions <i>as at 1 May 2012</i> <i>issued under Water Management Act 2000</i>
Water Access Licence No.	WAL27433
Reference No.	10AL116406
Contact Details	
Name	Sydney Catchment Authority
Customer ID	1078449
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750
Licence Details	
Status	Current
Category	Major Utility [Urban Water]
Date of Commencement	01/07/2011
Tenure Type	Specific Purpose
Share Component	329,000 Megalitres per year
Extraction Management Unit	Shoalhaven River (excludes the Kangaroo River extraction management unit as defined in the Water Sharing Plan for the Kangaroo River 2003)
Water Source	Shoalhaven River Water Source
Water Sharing Plan	Greater Metropolitan Region Unregulated River Water Sources 2011
Extraction	Extraction Component: any time or rate.
Extraction From	River, Lake or Surface Water Runoff
Extraction Zone	Shoalhaven River
Conditions	Schedule 1
Notes: 1. The extraction component of this access licence may be amended by the Minister in accordance with the water sharing plan for the water source specified on this licence. 2. A requirement to notify the Minister in writing is satisfied by making a notification in writing to the address shown on this statement.	
Administrative contact details All correspondence and notifications in relation to compliance with the conditions of this licence must be addressed to:	Manager Corporate Licensing NSW Office of Water PO Box 323 PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 66 (1) (a) of the *Water Management Act 2000* this access licence is subject to such conditions as are from time to time required to be imposed on the access licence by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 66 (1) (b) and section 67 (1) of the *Water Management Act 2000* the Minister may impose other conditions on the access licence after it has been granted, including conditions relating to the protection of the environment.

The operating protocol referenced in this licence is a set of agreed documents between the Licence Holder and the Minister. The protocol takes into account the complex nature of operations and procedures that the Licence Holder needs to undertake to implement the requirements of this licence. The protocol is subordinate to the licence and does not constitute a regulatory instrument.

CONDITIONS

1. The Licence Holder must not take water under this access licence otherwise than in compliance with the conditions applying to the water supply work approval for the water supply work nominated by this licence. The nominated water supply work approval for this licence is 10CA117211.
2. The Licence Holder must not take any water using the nominated water supply work approval if the water allocation account of this licence is, or will go into debit in any water year.
3. The Licence Holder must not take water using the nominated water supply work approval in excess of the Licence Holder's long-term average annual extraction limit of 36,000 ML/year over a period of ten years commencing from 1 July 2011.

Notes:

1. Following the purchase and/or cancellation of an access licence in this water source, the Minister may vary the respective long-term average annual extraction limit in the affected extraction management unit.
2. An assessment of average annual extractions against the long-term average annual extraction limit shall be performed in the tenth year.
4. The Licence Holder must keep a Logbook and record the following in the Logbook: each date on which water was taken under the access licence;
 - i. the volume of water taken on that date;
 - ii. the water supply work approval number of the water supply work used to take the water on that date;
 - iv the purpose or purposes for which the water was taken on that date;
 - iv any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this licence. The requirement of this condition will be met when Sydney Catchment Authority continues to measure, record and report its extractions, inflows and measurements as described under the protocol.

5. The Licence Holder must produce the Logbook to the Minister for inspection, when requested.
6. The Licence Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
7. The Licence Holder must notify the Minister, in writing, immediately upon becoming aware of a breach of any condition of the licence. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

The events or circumstances including accident, equipment failure or any other such cause outside the Licence Holder's effective control and planned events such as maintenance and refurbishment are described in the protocol. The event notification template is provided in the protocol.

8. The Licence Holder must, notwithstanding any conditions in this licence, comply with any other conditions required to implement the provisions of the Water Sharing Plan.

1.2. WATER ACCESS LICENCE FOR UPPER NEPEAN AND UPSTREAM WARRAGAMBA RIVERS WATER SOURCE

 <p>Department of Primary Industries Office of Water</p>	<p>Statement of Conditions <i>as at 1 May 2012</i> issued under <i>Water Management Act 2000</i></p>
Water Access Licence No.	WAL27431
Reference No.	10AL116407
Contact Details	
Name	Sydney Catchment Authority
Customer ID	1078449
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750
Licence Details	
Status	Current
Category	Major Utility [Urban Water]
Date of Commencement	01/07/2011
Tenure Type	Specific Purpose
Share Component	620,000 Megalitres per year
Extraction Management Unit	Upper Nepean and Upstream Warragamba
Water Source	Upper Nepean and Upstream Warragamba
Water Sharing Plan	Greater Metropolitan Region Unregulated River Water Sources 2011
Extraction	Extraction Component: any time or rate.
Extraction From	River, Lake or Surface Water Runoff
Extraction Zone	Upper Nepean and Upstream Warragamba
Conditions	Schedule 1
Notes:	
<ol style="list-style-type: none"> The extraction component of this access licence may be amended by the Minister in accordance with the water sharing plan for the water source specified on this licence. A requirement to notify the Minister in writing is satisfied by making a notification in writing to the address shown on this statement. 	
Administrative contact details All correspondence and notifications in relation to compliance with the conditions of this licence must be addressed to:	Manager Corporate Licensing NSW Office of Water PO Box 323 PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 66 (1) (a) of the *Water Management Act 2000* this access licence is subject to such conditions as are from time to time required to be imposed on the access licence by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 66 (1) (b) and section 67 (1) of the *Water Management Act 2000* the Minister may impose other conditions on the access licence after it has been granted, including conditions relating to the protection of the environment.

The operating protocol referenced in this licence is a set of agreed documents between the Licence Holder and the Minister. The protocol takes into account the complex nature of operations and procedures that the Licence Holder needs to undertake to implement the requirements of this licence. The protocol is subordinate to the licence and does not constitute a regulatory instrument.

CONDITIONS

1. The Licence Holder must not take water under this access licence otherwise than in compliance with the conditions applying to the water supply work approval for the water supply work nominated by this licence. The nominated water supply work approval for this licence is 10CA117212.
2. The Licence Holder must not take any water using the nominated water supply work approval if the water allocation account of this licence is, or will go into debit in any water year.
3. The Licence Holder must not take water using the nominated water supply work approval in excess of the Licence Holder's long-term average annual extraction limit of 581,000 ML/year over a period of ten years commencing from 1 July 2011.

Notes:

1. Following the purchase and/or cancellation of an access licence in this water source, the Minister may vary the respective long-term average annual extraction limit in the affected extraction management unit.
 2. An assessment of average annual extractions against the long-term average annual extraction limit shall be performed in the tenth year.
4. The Licence Holder must keep a Logbook and record the following in the Logbook:
 - i. each date on which water was taken under the access licence;
 - ii. the volume of water taken on that date;
 - iii. the water supply work approval number of the water supply work used to take the water on that date;
 - iv. the purpose or purposes for which the water was taken on that date;
 - v. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this Licence. The requirement of this condition will be met when Sydney Catchment Authority continues to measure, record and report its extractions, inflows and measurements as described under the protocol.

5. The Licence Holder must produce the Logbook to the Minister for inspection, when requested.
6. The Licence Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
7. The Licence Holder must notify the Minister, in writing, immediately upon becoming aware of a breach of any condition of the licence. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Licence Holder's effective control and planned events such as maintenance and refurbishment are described in the protocol. The event notification template is provided in the protocol.
8. The Licence Holder must, notwithstanding any conditions in this licence, comply with any other conditions required to implement the provisions of the Water Sharing Plan.

1.3. WATER ACCESS LICENCE FOR HAWKESBURY AND LOWER NEPEAN RIVERS WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Conditions <i>as at 1 May 2012</i> <i>issued under Water Management Act 2000</i>
Water Access Licence No.	WAL27434
Reference No.	10AL116408
Contact Details	
Name	Sydney Catchment Authority
Customer ID	1078449
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750
Licence Details	
Status	Current
Category	Major Utility [Urban Water]
Date of Commencement	01/07/2011
Tenure Type	Specific Purpose
Share Component	6,000 Megalitres per year
Extraction Management Unit	Hawkesbury and Lower Nepean Rivers
Water Source	Hawkesbury and Lower Nepean Rivers
Water Sharing Plan	Greater Metropolitan Region Unregulated River Water Sources 2011
Extraction	Extraction Component: any time or rate
Extraction From	River, Lake or Surface Water Runoff
Extraction Zone	Hawkesbury and Lower Nepean Rivers
Conditions	Schedule 1
Notes: 1. The extraction component of this access licence may be amended by the Minister in accordance with the water sharing plan for the water source specified on this licence. 2. A requirement to notify the Minister in writing is satisfied by making a notification in writing to the address shown on this statement.	
Administrative contact details All correspondence and notifications in relation to compliance with the conditions of this licence must be addressed to:	The Manager Corporate Licensing NSW Office of Water PO Box 323 PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 66 (1) (a) of the *Water Management Act 2000* this access licence is subject to such conditions as are from time to time required to be imposed on the access licence by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan)). Under section 66 (1) (b) and section 67 (1) of the *Water Management Act 2000* the Minister may impose other conditions on the access licence after it has been granted, including conditions relating to the protection of the environment.

The operating protocol referenced in this licence is a set of agreed documents between the Licence Holder and Minister. The protocol takes into account the complex nature of operations and procedures that the Licence Holder needs to undertake to implement the requirements of this licence. The protocol is subordinate to the licence and does not constitute a regulatory instrument.

CONDITIONS

1. The Licence Holder must not take water under this access licence otherwise than in compliance with the conditions applying to the water supply work approval for the water supply work nominated by this licence. The nominated water supply works for this licence is 10CA117213.
2. The Licence Holder must not take any water using the nominated water supply work approval if the water allocation account of this licence is, or will go into debt in any water year.
3. The Licence Holder must not take water using the nominated water supply work approval in excess of the Licence Holder's long-term average annual extraction limit of 6,000 ML/year over a period of ten years commencing from 1 July 2011.

Notes:

1. Following the purchase and/or cancellation of an access licence in this water source, the Minister may vary the respective long-term average annual extraction limit in the affected extraction management unit.
2. An assessment of average annual extractions against long-term average annual extraction limit shall be performed in the tenth year.
4. The Licence Holder must keep a Logbook and record the following in the Logbook: each date on which water was taken under the access licence;
 - i. the volume of water taken on that date;
 - ii. the water supply work approval number of the water supply work used to take the water on that date;
 - iii. the purpose or purposes for which the water was taken on that date;
 - iv. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this licence. The requirement of this condition will be met when Sydney Catchment Authority continues to measure, record and report its extractions, inflows and measurements as described under the protocol.

5. The Licence Holder must produce the Logbook to the Minister for inspection, when requested.
6. The Licence Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
7. The Licence Holder must notify the Minister, in writing, immediately upon becoming aware of a breach of any condition of the licence. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Licence Holder's effective control and planned events such as maintenance and refurbishment are described in the protocol. The event notification template is provided in the protocol.
8. Licence Holder must, notwithstanding any conditions in this licence, comply with any other conditions required to implement the provisions of the Water Sharing Plan.

1.4. WATER ACCESS LICENCE FOR SOUTHERN SYDNEY RIVERS WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Conditions <i>as at 1 May 2012</i> <i>issued under Water Management Act 2000</i>
Water Access Licence No.	WAL27429
Reference No.	10AL116409
Contact Details	
Name	Sydney Catchment Authority
Customer ID	1078449
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750
Licence Details	
Status	Current
Category	Major Utility [Urban Water]
Date of Commencement	01/07/2011
Tenure Type	Specific Purpose
Share Component	32,000 Megalitres per year
Extraction Management Unit	Southern Sydney Rivers
Water Source	Southern Sydney Water Management Area
Water Sharing Plan	Greater Metropolitan Region Unregulated River Water Sources 2011
Extraction	Extraction Component: any time or rate.
Extraction From	River, Lake or Surface Water Runoff
Extraction Zone	Southern Sydney Rivers
Conditions	Schedule 1
Notes: <ol style="list-style-type: none"> The extraction component of this access licence may be amended by the Minister in accordance with the water sharing plan for the water source specified on this licence. A requirement to notify the Minister in writing is satisfied by making a notification in writing to the address shown on this statement. 	
Administrative contact details All correspondence and notifications in relation to compliance with the conditions of this licence must be addressed to:	The Manager Corporate Licensing NSW Office of Water PO Box 323 PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 66 (1) (a) of the *Water Management Act 2000* this access licence is subject to such conditions as are from time to time required to be imposed on the access licence by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 66 (1) (b) and section 67 (1) of the *Water Management Act 2000* the Minister may impose other conditions on the access licence after it has been granted, including conditions relating to the protection of the environment.

The operating protocol referenced in this licence is a set of agreed documents between the Licence Holder and Minister. The protocol takes into account the complex nature of operations and procedures that the Licence Holder needs to undertake to implement the requirements of this licence. The protocol is subordinate to the licence and does not constitute a regulatory instrument.

CONDITIONS

1. The Licence Holder must not take water under this access licence otherwise than in compliance with the conditions applying to the water supply work approval for the water supply work nominated by this licence. The nominated water supply works for this licence is 10CA117219.
2. The Licence Holder must not take any water using the nominated water supply work approval if the water allocation account of this licence is, or will go into debit in any water year.
3. The Licence Holder must not take water using the nominated water supply work approval in excess of the Licence Holder's long-term average annual extraction limit of 13,000 ML/year over a period of ten years commencing from 1 July 2011.

Notes:

1. Following the purchase and/or cancellation of an access licence in this water source, the Minister may vary the respective long-term average annual extraction limit in the affected extraction management unit.
 2. An assessment of average annual extractions against long-term average annual extraction limit shall be performed in the tenth year.
4. The Licence Holder must keep a Logbook and record the following in the Logbook: date on which water was taken under the access licence;
 - i. the volume of water taken on that date;
 - ii. the water supply work approval number of the water supply work used to take the water on that date;
 - iii. the purpose or purposes for which the water was taken on that date;
 - iv. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this licence. The requirement of this condition will be met when Sydney Catchment Authority continues to measure, record and report its extractions, inflows and measurements as described under the protocol.

5. The Licence Holder must produce the Logbook to the Minister for inspection, when requested.
6. The Licence Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
7. The Licence Holder must notify the Minister, in writing, immediately upon becoming aware of a breach of any condition of the licence. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Licence Holder's effective control and planned events such as maintenance and refurbishment are described in the protocol. The event notification template is provided in the protocol.
8. The Licence Holder must, notwithstanding any conditions in this licence, comply with any other conditions required to implement the provisions of the Water Sharing Plan.

2. COMBINED WATER SUPPLY WORK AND WATER USE APPROVALS FOR SURFACE WATER SOURCES

2.1. COMBINED WATER SUPPLY WORK & WATER USE APPROVAL FOR SHOALHAVEN RIVER WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Approval <i>as at 1 May 2012</i> issued under <i>Water Management Act 2000</i> .	
Approval Number	10CA117211	
Approval Holder (See note 1)	Sydney Catchment Authority	ABN: 36 682 945 185
Contact Details		
Name	Sydney Catchment Authority	
Customer ID	1078449	
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750	
Approval Details		
Status (See note 2)	Current	
Water Source	Shoalhaven River Water Source (hereafter described as 'this water source')	
Water Management Area(s)	Shoalhaven River	
Kind of Approval	Water Supply Work and Water Use	
Date of Commencement	01/07/2011	
Expiry Date	30 June 2031	
Authorised Water Supply Works	This approval is for the authorised water supply works described in Schedule 1	
Authorised Water Use	Supply bulk raw water to the customers and use for own facilities and operations as per Schedule 1	
Conditions	This approval is subject to the conditions set out in Schedule 1	

Notes:

1. Pursuant to section 106 of the *Water Management Act 2000*, an approval is taken to be held by, and for the benefit of, each successive landholder for the time being of the land specified in the approval as the land benefited by the approval. Pursuant to section 106 (3) of the *Water Management Act 2000*, a major utility is taken to be a landholder of land in respect of which a water management work approval held by it is in force.
2. The status of an approval may change. An approval may be "current", in addition an approval is no longer in force if it has "expired", been "surrendered", "suspended" or "cancelled".
3. During periods of severe water shortages, the Minister may suspend part or all of the provisions of a management plan under section 49A of the *Water Management Act 2000*. Whilst an order under s49A is in force, depending on the terms of the order, the mandatory conditions applying to this approval may be affected. The Approval Holder must comply with any notification issued by the Minister under section 60 of the *Water Management Act 2000*.
4. See Dictionary in Chapter 5 to interpret words and expressions used in this approval.
5. A requirement to notify the Minister in writing or to provide information or data to the Minister, under this approval, is satisfied by making the notification or providing the information or data in writing to the administrative contact detailed on this Statement.

NOTICE OF CHANGE OF HOLDER OR CONTACT

1. The NSW Office of Water is to be advised of any change of Approval Holder. This will occur whenever there is a change of ownership of works shown in this approval. The advice should be accompanied by evidence of transfer of ownership of the works.
2. If the Approval Holder wishes to nominate a new contact person a written statement signed by the Holder should be submitted to the NSW Office of Water.
3. The contact person should advise the NSW Office of Water of any change of mailing address as soon as possible.

Administrative contact details

All correspondence and notifications in relation to compliance with the conditions of this approval must be addressed to:

The Manager Corporate Licensing
NSW Office of Water
PO Box 323
PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 100 (1) (a) of the *Water Management Act 2000* this approval is subject to such conditions as are from time to time required to be imposed on the approval by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 100 (1) (b) and 102 (1) of the *Water Management Act 2000* this approval is also subject to such other conditions as the Minister may impose on the approval after it has been granted, including conditions relating to the protection of the environment.

The Operating Protocol referenced in this approval is a set of agreed documents between the Approval Holder and the Minister. The Operating Protocol takes into account the complex nature of operations and procedures that the Approval Holder needs to undertake to implement the requirements of this approval. The Operating Protocol is subordinate to the approval and does not constitute a regulatory instrument.

AUTHORISED WATER SUPPLY WORKS

1. The Approval Holder is authorised to construct and use the water supply works listed and described in Attachment 1 of this schedule ('the authorised water supply works') to capture, store, extract, and release water in accordance with the Water Sharing Plan or any direction from the Minister.

Note:

1. Under section 90 (2) of the *Water Management Act 2000* the term 'construct' is defined to include install, maintain, repair, alter or extend the work.
2. The use and operation of the authorised water supply works are subject to the conditions of this approval.
3. Notwithstanding condition one (1) of this approval, the Approval Holder is not authorised to do anything to the authorised water supply works which would change the capacity of the works as described in Attachment 1 of this schedule to affect the flow, volume, quality and behaviour of the water, without the written approval of the Minister.
4. The Approval Holder must not use the authorised water supply works to take water under an access licence unless in compliance with the access rules for the taking of water as specified in the relevant access licence conditions.
5. Subject to the conditions of this approval, the Approval Holder is authorised to use water for the purpose of supplying bulk raw water to its customers, and for its own facilities and operations.

ENVIRONMENTAL RELEASES

6. Environmental releases are not required to be made when storages are spilling at a rate that equals or exceeds the corresponding release requirements.

7. The Approval Holder must make daily releases of water from Fitzroy Falls Reservoir so that by the end of each month the releases must be equal to five thirds of the month's inflows from Wildes Meadow Creek to Fitzroy Falls Reservoir.

Note:

1. Inflows and releases must be measured, calculated and recorded as per the procedures established in the Operating Protocol. The release requirement may be temporarily altered under circumstances described under the Operating Protocol.

8. The Approval Holder must make a daily release of water from Tallowa Dam which is equal to:
 - i. the daily inflows to Lake Yarrunga, when the daily inflow is less than or equal to the monthly 80th percentile flow; and
 - ii. the monthly 80th percentile flow plus 20% of the difference between daily inflows and the monthly 80th percentile flow when the daily inflow is greater than the monthly 80th percentile flow. The 80th percentile flow threshold varies monthly as per Table 1.

Table 1: Monthly environmental release thresholds for Lake Yarrunga.

Month	Monthly 80 th percentile flow threshold (ML/day)
January	150
February	161
March	182
April	259
May	298
June	334
July	371
August	332
September	299
October	281
November	256
December	179

Notes:

1. Lake Yarrunga is the storage created by Tallowa Dam.
2. The monthly 80th percentile flow thresholds may change following periodic reassessment carried out as per the Operating Protocol.
3. Inflows and releases must be measured, calculated and recorded as per the procedures established in the Operating Protocol. The release requirement may be temporarily altered under circumstances described under the Operating Protocol

9. The Approval Holder must create and manage a Banked Environmental Flow account for Tallowa Dam and Fitzroy Falls Reservoir.
10. The Approval Holder must bank and keep a record of the volume of water that is not released in accordance with conditions seven (7) and eight (8) of this approval due to circumstances beyond the Approval Holder's control.

Note:

1. The circumstances referred to in condition ten (10) of this approval are described in the Operating Protocol.

11. The Approval Holder must release water from the Banked Environmental Flow account in accordance with any written direction from the Minister.

Note:

1. The accounting rules for management of the Banked Environmental Flow account are described in the Operating Protocol.
12. The Approval Holder should use its best endeavours to operate its outlet works for environmental and other releases such that the quality of water being released is similar to the quality of water flowing into the respective storages.

RELEASES FOR SHOALHAVEN CITY COUNCIL

13. The Approval Holder must release the water requirements of Shoalhaven City Council from Tallowa Dam.

Note:

1. The release should be managed in accordance with the Raw Water Supply Protocols signed on 5 January 2010 by the Sydney Catchment Authority and Shoalhaven City Council or as subsequently replaced or amended.

TRANSFERS FROM THE SHOALHAVEN RIVER WATER SOURCE

14. The Approval Holder must not commence transferring water from the Shoalhaven River Water Source to the Upper Nepean and Upstream Warragamba Water Source unless:
 - i. the total active storage is less than 75% of the total storage capacity; and
 - ii. the level of water in Lake Yarrunga is equal to or greater than 55.34 metres AHD.

Note:

1. The current total active storage capacity is 2,581,850 ML and 75% trigger is 1,936,388 ML.
15. The Approval Holder must cease transferring water from the Shoalhaven River Water Source to the Upper Nepean and Upstream Warragamba Water Source when either:
 - i. the total active storage is equal to or greater than 80% of the total storage capacity; and
 - ii. the level of water in Lake Yarrunga is less than 55.34 metres AHD.

Notes:

1. The current 80% trigger is 2,065,480 ML.
2. The 55.34 metre level of water in Lake Yarrunga equates to 1 metre below Full Supply Level for Tallowa Dam.

MONITORING

Water Quantity Monitoring

16. The Approval Holder must have metering equipment installed that meets the following requirements:
 - i. the metering equipment must measure and record the flow of all water taken through the water supply work with less than 5% error;

- ii. the metering equipment must comply with the NSW Interim Water Meter Standards (issued by the NSW Office of Water) as may be updated or replaced from time to time;
- iii. the metering equipment must be operated and maintained in a proper and efficient manner at all times;
- iv. the metering equipment must be sited and installed at a place in the pipe, channel or conduit between the water source and the first discharge outlet. There must be no flow of water into or out of the pipe, channel or conduit between the water source and the metering equipment; and
- v. any other requirements as to type, standard or other criteria for the metering equipment specified by the Minister by notice in writing.

Note:

1. Details of the Approval Holder's water quantity monitoring equipment and agreed procedures are described in the Operating Protocol.
17. The Approval Holder must keep a Logbook and record the following in the Logbook:
- i. each date on which water was taken under the access licence;
 - ii. the access licence number of the access licence under which water was taken on that date;
 - iii. the volume of water taken on that date;
 - iv. the volume of water released as environmental flow on that date;
 - v. the volume of water released as spill on that date;
 - vi. the volume of water released for transfer on that date;
 - vii. the data and calculations to determine the daily environmental flow release requirement;
 - viii. where metering equipment has been installed for use in connection with the water supply work, the meter reading before water is taken;
 - ix. the total system storage and volume/level of each storage; and
 - x. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this approval. The requirement of this condition will be met when SCA continues to measure, record and report its extractions, inflows and outflows (releases) as described under the Operating Protocol.
18. The Approval Holder must produce the Logbook to the Minister for inspection, when requested.
19. The Approval Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
20. The Approval Holder must provide access to the Minister to real time stream flow data recorded at all its gauging stations in the Shoalhaven Water Source. Until access to the real time stream flow data is established, the Approval Holder must provide stream flow data to the Minister at every time data is downloaded but not exceeding six months.

Environmental Monitoring

21. The Approval Holder must monitor the effectiveness of environmental flow releases including monitoring water quality parameters for river health purposes to the satisfaction of the Minister.

22. The Approval Holder must undertake all monitoring, data management and reporting consistent with appropriate quality assurance and quality control procedures, to the satisfaction of the Minister. The Approval Holder may include data of acceptable quality from other sources to meet the monitoring requirements of this Approval.

REPORTING

Event Notification

23. The Approval Holder must notify the Minister in writing at the earliest practical possible opportunity following any event, but not exceeding 7 working days that has caused, or is likely to cause, deviation to any of the approval conditions. The notification must include, but need not be limited to, the following information:
 - i. whether the incident has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Approval Holder's effective control and planned events such as maintenance and refurbishment are described in the Operating Protocol. The event notification template is provided in the Operating Protocol.

Monthly Water Quantity Report

24. The Approval Holder must, by or on the 25th day of each month, submit a water quantity report for the previous month. The report must be provided in both electronic and hard copy formats and must contain, but need not be limited to, the following:
 - i. total daily inflows to all reservoirs;
 - ii. total daily environmental and other releases from all reservoirs;
 - iii. total daily extractions;
 - iv. total daily water supply releases;
 - v. storage levels;
 - vi. the banked environmental flow account;
 - vii. a summary of notified events including emergencies, variations from release requirements, failure to measure releases or extractions in accordance with the requirements, altered water release events, and any changes or alterations to water management works; and
 - viii. any alterations to the authorised water supply works in terms of the specifications and descriptions in Attachment 1 of Schedule 1.

Annual Compliance Report

25. The Approval Holder must, by 30 November each year, submit an Annual Compliance Report (ACR) for the preceding water year. The report must contain, but need not be limited to, the following:
 - i. analysis of all environmental and any other flow releases, and water extractions, banked environmental flows and transfers made, and comparisons with data from previous years, and an interpretation of the results;

- ii. an overview of the environmental monitoring program(s) that have been completed, its aims and objectives, methodologies and relevant maps;
- iii. an assessment of the impact of environmental flows and other water releases that have been completed during the water year.
- iv. evidence verifying all monitoring, recording and assessment was conducted using appropriate quality assurance and control standards.
- v. final reports (if any) in relation to conditions 25 (2), 25 (3) and 25 (4) are to be made available to the Minister no later than 1 March of following year.
- vi. evidence verifying that the devices used for measuring and recording extractions and releases were subject to appropriate quality assurance and complied with appropriate or mandatory standards;
- vii. a summary of all notifiable events, including non-compliance; and
- viii. an electronic appendix that includes all raw data used in the preparation of this report.

SCHEDULE 1 – ATTACHMENT 1: THE AUTHORISED WATER SUPPLY WORKS

The following table provides detailed information on the authorised water supply works used by the Approval Holder within this water source.

	Tallowa Dam	Fitzroy Falls Dam	Bendeela Pondage
Description	Mass concrete gravity dam	Zoned earth and rockfill dam with two saddle dams	Earth and rock fill gravity dam
Use	Urban water supply and hydro-electric power generation	Storage and diversion of urban water supply, and hydro-electric power generation	Storage and diversion of urban water supply and hydro-electric power generation
Location	Lot 1, DP 567007; Lot 13, DP 755974 ISG Coordinates: E237031 N1150466 Located on the Shoalhaven River	Lot 1, DP 556596; Lot 1, DP 510632 ISG Coordinates: E252889 N1164626 Located on Yarrunga Creek	Lot 1, DP 534476; Lots B, C and D, DP 103399; Lots 1 and 4, DP 777406; Lot 24 DP 751262 ISG Coordinates: E252230 N1156040 Jack's Corner Road in Kangaroo Valley
Water Source	Shoalhaven River Water Source	Shoalhaven River Water Source	Shoalhaven River Water Source
River	Shoalhaven River	Shoalhaven River	Shoalhaven River
Wall height	43 m	14 m	15.2 m
Crest length	518 m	1,530 m; Length of saddle dams is 1,524 m	2,118 m
Spillway	An uncontrolled ogee crested spillway, located centrally in the crest of the dam	Uncontrolled side channel ogee crested spillway, in centre of main wall	Uncontrolled overfall crested spillway, at the southern end of the pondage
FSL (m) AHD	56.34	663.5	182.83
Total capacity (ML)	90,000	23,500	1,200
Operational capacity (ML)	35,300	10,000	920
Outlet works (ML/d)	50 to 4,000 ML/d at FSL 2 x 1200 mm x 1200 mm regulating gates	Discharge capacity up to 4,400 ML/d.	Nil
Diversion/Extraction works (ML/d)	4,900 ML/d pump diversion to Bendeela Pondage (via Bendeela Pumping/Power Station and Pipeline)	Up to 2,510 ML/d pump/gravity diversion to Wingecarribee Dam	1 ML/d pump diversion to Kangaroo Valley water filtration plant. Up to 2,460 ML/d pump diversion to Fitzroy Falls Dam. Eraring Energy can divert up to 6,000 ML/d to Tallowa Dam via Bendeela Power Station.

Other details	Supply water to Shoalhaven City Council	Eraring Energy can divert up to 3,000 ML/d to Kangaroo Valley Power Station. Raw water provision for use at Morton National Park Visitor's Centre.	Nil
Flow/Level measurement device	Level Sensor + Spillway and overshot gate rating table. Pump curve + hours pumped for transfers to and from Bendeela Pump Station	Level Sensor + Spillway and valve rating table. Pump curve + hours pumped for Transfers to and from Bendeela Pump Station and Burrawang Pump Station	Level Sensor, Hours pumped + Pump Curve for volumes transferred into and out of storage

2.2. COMBINED WATER SUPPLY WORK & WATER USE APPROVAL FOR UPPER NEPEAN AND UPSTREAM WARRAGAMBA RIVERS WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Approval <i>as at 1 May 2012</i> issued under <i>Water Management Act 2000</i> .	
Approval Number	10CA117212	
Approval Holder (See note 1)	Sydney Catchment Authority	ABN: 36 682 945 185
Contact Details		
Name	Sydney Catchment Authority	
Customer ID	1078449	
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750	
Approval Details		
Status (See note 2)	Current	
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source (hereafter described as 'this water source')	
Water Management Area(s)	Upper Nepean and Upstream of Warragamba Rivers	
Kind of Approval	Water Supply Works and Water Use	
Date of Commencement of Conditions	01/07/2011	
Expiry Date	30 June 2031	
Authorised Water Supply Works	This approval is for the authorised water supply works described in Schedule 1	
Conditions	This approval is subject to the conditions set out in Schedule 1	
Authorised Water Use	Supply bulk raw water to the customers and use for own facilities and operations as per Schedule 1	

Notes:

1. Pursuant to section 106 of the *Water Management Act 2000*, an approval is taken to be held by, and for the benefit of, each successive landholder for the time being of the land specified in the approval as the land benefited by the approval. Pursuant to section 106 (3) of the *Water Management Act 2000*, a major utility is taken to be a landholder of land in respect of which a water management work approval held by it is in force.
2. The status of an approval may change. An approval may be "current", in addition an approval is no longer in force if it has "expired", been "surrendered", "suspended" or "cancelled".
3. During periods of severe water shortages, the Minister may suspend part or all of the provisions of a management plan under section 49A of the *Water Management Act 2000*. Whilst an order under s49A is in force, depending on the terms of the order, the mandatory conditions applying to this approval may be affected. The Approval Holder must comply with any notification issued by the Minister under section 60 of the *Water Management Act 2000*.
4. See Dictionary in Chapter 5 to interpret words and expressions used in this approval.
5. A requirement to notify the Minister in writing or to provide information or data to the Minister, under this Approval, is satisfied by making the notification or providing the information or data in writing to the administrative contact detailed on this Statement.

NOTICE OF CHANGE OF HOLDER OR CONTACT

1. The NSW Office of Water is to be advised of any change of Approval Holder. This will occur whenever there is a change of ownership of works shown in this approval. The advice should be accompanied by evidence of transfer of ownership of the works.
2. If the Approval Holder wishes to nominate a new contact person a written statement signed by the Holder should be submitted to the NSW Office of Water.
3. The contact person should advise the NSW Office of Water of any change of mailing address as soon as possible.

Administrative contact details

All correspondence and notifications in relation to compliance with the conditions of this Approval must be addressed to:

The Manager Corporate Licensing
NSW Office of Water
PO Box 323
PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 100 (1) (a) of the *Water Management Act 2000* this approval is subject to such conditions as are from time to time required to be imposed on the approval by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 100 (1) (b) and 102 (1) of the *Water Management Act 2000* this approval is also subject to such other conditions as the Minister may impose on the approval after it has been granted, including conditions relating to the protection of the environment.

The Operating Protocol referenced in this approval is a set of agreed documents between the Approval Holder and Minister. The Operating Protocol takes into account the complex nature of operations and procedures that the Approval Holder needs to undertake to implement the requirements of this approval. The Operating Protocol is subordinate to the approval and does not constitute a regulatory instrument.

AUTHORISED WATER SUPPLY WORKS

1. The Approval Holder is authorised to construct and use the water supply works listed and described in Attachments 1 of this schedule ('the authorised water supply works') to capture, store, extract, and release water in accordance with the Water Sharing Plan or any direction from the Minister.

Note:

1. Under section 90 (2) of the *Water Management Act 2000* the term 'construct' is defined to include install, maintain, repair, alter or extend the work.
2. The use and operation of the authorised water supply works are subject to the conditions of this approval.
3. Notwithstanding condition one (1) of this approval, the Approval Holder is not authorised to do anything to the authorised water supply works which would change the capacity of the works as described in Attachments 1 of this schedule to affect the flow, volume, quality and behaviour of the water, without the written approval of the Minister.
4. The Approval Holder must not use the authorised water supply work to take water under an access licence unless in compliance with the relevant access rules for taking of water as specified in the relevant access licence conditions.
5. Subject to the conditions of this approval, the Approval Holder is authorised to use water for the purpose of supplying bulk raw water to its customers, and for its own facilities and operations.

ENVIRONMENTAL AND OTHER RELEASES

6. Environmental releases are not required to be made when storages are spilling at a rate that equals or exceeds the corresponding release requirements.
7. The Approval Holder must make daily releases of water from Wingecarribee Reservoir, Avon Dam, Cataract Dam, Nepean Dam, Cordeaux Dam, Pheasants

Nest Weir and Broughtons Pass Weir at the corresponding rate as specified in Table 1.

Table 1: Releases for environmental and other purposes in the Upper Nepean and Upstream Warragamba Rivers Water Source.

Water Supply Work	Maximum transparent release rate (ML/d)	Translucency percentage (%)
Wingecarribee Reservoir	4 3 ML/day for environmental release and 1 ML/day for other releases	
Avon Dam	6.8	20
Cataract Dam	14.5	20
Nepean Dam	20.1	20
Cordeaux Dam	4.5	20
Pheasants Nest Weir	4.5 Plus the volume of water released on the same day from Avon, Nepean and Cordeaux Dam	20
Broughtons Pass	4.4 Plus the volume of water released on the same day from Cataract Dam	20

Note:

1. Inflows and releases must be measured, calculated and recorded as per the procedures established in the Operating Protocol. The release requirement may be temporarily altered under circumstances described under the Operating Protocol.
8. The Approval Holder must create and manage a Banked Environmental Flow (BEF) account for Wingecarribee Reservoir, Avon Dam, Cataract Dam, Nepean Dam and Cordeaux Dam.
9. The Approval Holder must bank and keep a record of the volume of water that is not released as requirement under condition 7 due to the circumstances beyond Approval Holder's control.

Note:

1. The circumstances are described in the Operating Protocol.
10. The Approval Holder must release water from the BEF account in accordance with any written direction from the Minister.

Note:

1. The accounting rules of the release and management of BEF water are described in the Operating Protocol.
11. The Approval Holder must from the 1st of July 2011, and in each water year thereafter, set aside a volume of water in Avon Dam, Cataract Dam, Nepean Dam and Cordeaux Dam as a credit into an Environmental Contingency Allowance (ECA) account for each of these dams, or a combination of these dams.

12. The Approval Holder must release water credited to an ECA account established under condition 11 in accordance with the written direction of and for the purpose(s) specified by the Minister, and debit the account for each Dam accordingly. Unreleased volumes (credit) in these accounts may not be carried over from one water year to the next.

Note:

1. The Minister may conduct a review of the rules in this clause for the purpose of determining whether those rules should be amended, including identifying the volume of the ECA and the environmental purpose(s) for which it should be used.
13. The Approval Holder must maintain water release rate limitations when:
- i. reducing releases from any Upper Nepean Dam to Broughtons Pass Weir or Pheasants Nest Weir; and
 - ii. transferring water from Wingecarribee Reservoir to Warragamba and/or any Upper Nepean Dams.

Note:

1. Water release rate limitations for the releases from Upper Nepean Dams and Wingecarribee Reservoir are described in the Operating Protocol.
14. The Approval Holder should use its best endeavours to operate its outlet works for environmental and other releases such that the quality of water being released from the dams/storages is similar to the quality of water flowing into the storages.

Note:

1. Where the same infrastructure is used both for water supply and environmental release (i.e. Avon, Cataract, Cordeaux and Nepean dams), the water supply quality requirements may constrain SCA's ability to meet the requirements under condition 14.

MONITORING

Water Quantity Monitoring

15. The Approval Holder must have metering equipment installed that meets the following requirements:
- i. the metering equipment must measure and record the flow of all water taken through the water supply work with less than 5% error;
 - ii. the metering equipment must comply with the NSW Interim Water Meter Standards (issued by the NSW Office of Water) as may be updated or replaced from time to time;
 - iii. the metering equipment must be operated and maintained in a proper and efficient manner at all times;
 - iv. the metering equipment must be sited and installed at a place in the pipe, channel or conduit between the water source and the first discharge outlet. There must be no flow of water into or out of the pipe, channel or conduit between the water source and the metering equipment; and
 - v. any other requirements as to type, standard or other criteria for the metering equipment specified by the Minister by notice in writing.

Note:

1. Details of the Approval Holder's water quantity monitoring equipment and agreed procedures are described in the Operating Protocol.

16. The Approval Holder must keep a Logbook and record the following in the Logbook:
 - i. each date on which water was taken under the access licence;
 - ii. the access licence number of the access licence under which water was taken on that date,
 - iii. the volume of water taken on that date;
 - iv. the volume of water released as environmental flow on that date;
 - v. the volume of water released as spill on that date;
 - vi. the volume of water released for transfer on that date;
 - vii. the data and calculations to determine the daily environmental flow release requirement;
 - viii. where metering equipment has been installed for use in connection with the water supply work, the meter reading before water is taken;
 - ix. the total system storage and volume/level of each storage; and
 - x. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A “Logbook” means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this Approval. The requirement of this condition will be met when SCA continues to measure, record and report its extractions, inflow and measurements as described under the Operating Protocol.
17. The Approval Holder must produce the Logbook to the Minister for inspection, when requested.
 18. The Approval Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
 19. The Approval Holder must provide access to the Minister to real time stream flow data recorded at all its gauging stations in the Upper Nepean and Upstream of Warragamba Rivers Water Source. Until access to the real time stream flow data is established, the Approval Holder must provide stream flow data to the Minister at every time data is downloaded but not exceeding six months.

Environmental Monitoring

20. The Approval Holder must monitor the effectiveness of environmental flow releases including monitoring water quality parameters for river health purposes to the satisfaction of the Minister.
21. The Approval Holder must undertake all monitoring, data management and reporting consistent with appropriate quality assurance and quality control procedures, to the satisfaction of the Minister. The Approval Holder may include data of acceptable quality from other sources to meet the monitoring requirements of this Approval.

REPORTING

Event Notification

22. The Approval Holder must notify the Minister in writing at the earliest practical possible opportunity following any event, but not exceeding 7 working days that has caused, or is likely to cause, deviation to any of the approval conditions. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;

- ii. the date, time and location of the event, or works involved;
- iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
- iv. any action taken where it was necessary to avoid harm; and
- v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Approval Holder's effective control and planned events such as maintenance and refurbishment are described in the Operating Protocol. The event notification template is provided in the Operating Protocol.

Monthly Water Quantity Report

23. The Approval Holder must, by or on the 25th day of each month, submit a water quantity report for the previous month. The report must be provided in both electronic and hard copy formats and must contain, but need not be limited to, the following:
 - i. total daily inflows to all reservoirs;
 - ii. total daily environmental and other releases from all reservoirs;
 - iii. total daily extractions;
 - iv. total daily water supply releases;
 - v. storage levels;
 - vi. the banked environmental flow account;
 - vii. a summary of notified events including emergencies, variations from release requirements, failure to measure releases or extractions in accordance with the requirements, altered water release events, and any changes or alterations to water management works; and
 - viii. any alterations to the authorised water supply works in terms of the specifications and descriptions in Attachment 1 of Schedule 1.

Annual Compliance Report

24. The Approval Holder must, by 30 November each year, submit an Annual Compliance Report (ACR) for the preceding water year. The report must contain, but need not be limited to, the following:
 - i. analysis of all environmental and any other flow releases, and water extractions, banked environmental flows and transfers made, and comparisons with data from previous years, and an interpretation of the results;
 - ii. an overview of the environmental monitoring program(s) that have been completed, its aims and objectives, methodologies and relevant maps;
 - iii. an assessment of the impact of environmental flows and other water releases that have been completed during the water year.
 - iv. evidence verifying all monitoring, recording and assessment was conducted using appropriate quality assurance and control standards;
 - v. final reports (if any) in relation to conditions 25 (2), 25 (3) and 25 (4) are to be made available to the Minister no later than 1 March of following year.
 - vi. evidence verifying that the devices used for measuring and recording extractions and releases were subject to appropriate quality assurance and complied with appropriate or mandatory standards;
 - vii. a summary of all notifiable events, including non-compliance; and
 - viii. an electronic appendix that includes all raw data used in the preparation of this report.

SCHEDULE 1 – ATTACHMENT 1: THE AUTHORISED WATER SUPPLY WORKS

The following tables provide detailed information on the authorised water supply works used by the Approval Holder within these water sources.

	Warragamba Dam	Wingecarribee Dam
Description	A concrete gravity dam, strengthened with post tensioned anchors	Earth and rockfill embankment with two saddle dams
Use	Storage and diversion of urban water supply and hydro-electric power generation	Storage and diversion of urban water supply
Location	Lot 1 DP 998036 & Lot 3 DP 751294 ISG Coordinates: E262461 N1249277 On the Warragamba River	Lot 1 DP 241697; Lot 1 DP 553468; Lot 2 DP 591791; Lot 4 DP 553088 ISG Coordinates: E252425 N1176238 Located on the Wingecarribee River
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source
River	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers
Wall Height	142 m	19 m
Crest Length	351 m	1,140 m; Length of saddle dams is 720 m
Spillway	Main – central in dam wall; controlled spillway, with one drum gate and four radial gates Auxiliary –within right abutment; controlled concrete lined chute spillway, with fuse plugs	A controlled ogee crested spillway, with a single radial gate, adjacent to right abutment
FSL (m) AHD	116.72	677.52
Total capacity (ML)	2,031,000	25,900
Operational Capacity (ML)	2,027,000 (includes deep water)	24,100
Outlet Works (ML/d)	Nil	Outlet to Wingecarribee River outlet conduit with a capacity of up to 2,690 ML/d Riparian outlet has a capacity of up to 88 ML/d
Diversion/Extraction works (ML/d)	2,600 ML/d gravity diversion via the Warragamba Pipeline. Will include 1,000 ML/d (4 x 250 ML/d) pumps	Up to 2,690 ML/d gravity diversion to Nepean Dam via Glenquarry Cut outlet works Up to 50 ML/d diversion to Wingecarribee Water Filtration Plant from the dam outlets
Other Details	Eraring Energy owned hydro-electric power station discharging up to 5,500 ML/day at FSL	Nil
Flow/Level Measurement Device	Level sensor & Spillway rating table, MAG or Ultrasonic Flow Meters on Warragamba Pipeline sat Cross Connection 3 in conjunction with MAG flow meters at offtakes for	Level sensor & Spillway rating table MAG or Ultrasonic Flow Meter on outlet pipe works

	Warragamba WFP and Orchard Hills WFP	
	Avon Dam	Cataract Dam
Description	A composite cyclopean masonry gravity dam, strengthened with a downstream earth and rockfill embankment	A cyclopean masonry gravity dam, strengthened with post tensioned anchors
Use	Used for the purpose of storage and diversion of urban water supply	Used for the purpose of storage and diversion of urban water supply
Location	Lot 1 DP 830607 ISG Coordinates: E266879 N1197375 Located on the Avon River	Lot 1 DP 830607 ISG Coordinates: E281794 N1206907 Located on the Cataract River
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source
River	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers
Wall Height	72 m	56 m
Crest Length	223 m	247 m
Spillway	An uncontrolled concrete lined chute spillway with labyrinth weir inlet, 400 m west of the left abutment	An uncontrolled, unlined chute spillway through the left abutment
FSL (m) AHD	320.18	289.87
Total capacity (ML)	214,360	94,300
Operational Capacity (ML)	146,700	94,300
Outlet Works (ML/d)	Up to 1,350 ML/d at FSL	Up to 750 ML/d with storage at FSL
Diversion Works (ML/d)	Gravity diversion (with pump boosting) at Upper Avon, for supply to the Illawarra area. Nepean-Avon tunnel – potential to use for transferring water to Nepean Dam.	Nil
Other Details	Nil	Nil
Flow/Level Measurement Device	Level sensor & Spillway rating table, MAG or Ultrasonic Flow Meter on each outlet valve	Level sensor & Spillway rating table, MAG or Ultrasonic Flow Meter on each outlet valve

	Cordeaux Dam	Upper Cordeaux Dam no.1
Description	A curved cyclopean masonry gravity dam	A concrete arch dam with gravity abutments and a small rockfill embankment section
Use	Used for storage of urban water supply	Used for storage of urban water supply
Location	Lot 1 DP 830607 ISG Coordinates: E276579 N1198936 Located on the Cordeaux River	Pt Lots 73 & 301 DP 751278 ISG Coordinates: E279550 N1189120 Located on the Cordeaux River
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source
River	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers
Wall Height	58 m	14.17 m
Crest Length	404.5 m	164.59 m
Spillway	Main – uncontrolled, unlined chute spillway with an ogee weir inlet in left abutment. Auxiliary –uncontrolled, unlined spillway adjoining the southern end of the main spillway	An uncontrolled overflow spillway centrally located in the crest of the dam
FSL (m) AHD	303.73	338
Total capacity (ML)	93,640	775
Operational Capacity (ML)	93,640	Nil
Outlet Works (ML/d)	Up to 660 ML/d at FSL	Nil
Diversion Works (ML/d)	Nil	Decommissioned
Other Details	Nil	Nil
Flow/Level Measurement Device	Level sensor & spillway rating table, MAG or ultrasonic flow meter on each outlet valve	Level sensor & spillway rating table

	Upper Cordeaux Dam no.2	Nepean Dam
Description	A concrete arch dam with straight gravity abutments	A curved cyclopean masonry mass gravity dam, strengthened with post tensioned anchors and a downstream rockfill embankment
Use	Storage of urban water supply	Storage and diversion of urban water supply
Location	Pt Lots 200 & 212 DP 751278 ISG Coordinates: E279740 N1191220 Located on the upper Cordeaux River	Lot 1 DP 830607 ISG Coordinates: E264720 N1199151 Located on the Nepean River
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source
River	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers
Wall Height	21.3 m	82 m
Crest Length	248.4 m	216.4 m
Spillway	Two uncontrolled overflow spillway sections, extending from the centre to the left abutment	An uncontrolled, concrete lined chute spillway with a sill type weir inlet, in the right abutment
FSL (m) AHD	317.13	317.25
Total capacity (ML)	1,180	70,170
Operational Capacity (ML)	Nil	69,810
Outlet Works (ML/d)	Nil	Up to 660 ML/d at FSL
Diversion Works (ML/d)	Decommissioned	Gravity diversion or 190 ML/d pump diversion to Avon Dam, for urban water supply to the Illawarra area. Up to 36 ML/d pump diversion to Nepean Water Filtration Plant
Other Details	Nil	Nil
Flow/Level Measurement Device	Not applicable	Level sensor & Spillway rating table, MAG or Ultrasonic Flow Meter on each outlet valve

	Pheasants Nest Weir	Broughtons Pass Weir	Prospect Dam
Description	A concrete gravity weir	A concrete gravity weir	Zoned earth embankment
Use	Diversion of urban water supply	Diversion of urban water supply	Storage and diversion urban water supply
Location	Lot 1 DP 830607 ISG Coordinates: E269190 N1209130 Located on the Nepean River	Lot 1 DP 830607 ISG Coordinates: E276170 N1211091 Located on the Cataract River	Lot 1 DP 825874 ISG Coordinates: E290504 N1255436 Located on Prospect Creek
Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source	Upper Nepean and Upstream Warragamba Rivers Water Source
River	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers	Upper Nepean and Upstream Warragamba Rivers
Wall Height	5 m	6 m	26 m
Crest Length	Not available	Not available	2,225 m
Spillway	An uncontrolled, flat crested, full width overflow spillway	An uncontrolled, flat crested, full width overflow spillway	Uncontrolled lined spillway with overflow weir
FSL (m) AHD	Not available	Not available	60.43
Total capacity (ML)	25	50	50,200
Operational Capacity (ML)	Not available	Not available	8,870
Outlet Works (ML/d)	Overshot gate 160 ML/d capacity, Fishway slide gate 16ML/d capacity.	Low flow release valve 30 ML/d capacity, Overshot gate 600 ML/d capacity	Nil
Diversion Works (ML/d)	400 ML/d gravity diversion to Cataract River via the Nepean Tunnel	680 ML/d gravity diversion to the Upper Canal via Cataract Tunnel. 300 ML/d pump diversion to Macarthur Water Filtration Plant	Up to 1400 ML/d pump diversion to Prospect WFP
Other Details	Nil	Nil	The southern outlet works has been blocked off from supply
Flow/Level Measurement Device	Level sensor + gate and spillway rating tables	Level sensor + valve, gate and spillway rating tables. MAG Flow meter used for supply to Macarthur WFP	Level sensor & Spillway rating table, MAG or Ultrasonic Flow Meter on pipeline exiting pump station

2.3. COMBINED WATER SUPPLY WORK & WATER USE APPROVAL FOR HAWKESBURY AND LOWER NEPEAN RIVERS WATER SOURCE

 Department of Primary Industries Office of Water	Statement of Approval <i>as at 1 May 2012</i> issued under <i>Water Management Act 2000</i> .	
Approval Number	10CA117213	
Approval Holder (See note 1)	Sydney Catchment Authority	ABN: 36 682 945 185
Contact Details		
Name	Sydney Catchment Authority	
Customer ID	1078449	
Contact Address	Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750	
Approval Details		
Status (See note 2)	Current	
Water Source	Hawkesbury and Lower Nepean Rivers Water Source (hereafter described as 'this water source')	
Water Management Area(s)	Hawkesbury Nepean Rivers	
Kind of Approval	Water Supply Works and Water Use	
Date of Commencement of Conditions	01/07/2011	
Expiry Date	30 June 2031	
Authorised Water Supply Works	This approval is for the authorised water supply works described in Schedule 1	
Conditions	This approval is subject to the conditions set out in Schedule 1	
Authorised Water Use	Supply bulk raw water to the customers and use for own facilities and operations as per Schedule 1	

Notes:

1. Pursuant to section 106 of the *Water Management Act 2000*, an approval is taken to be held by, and for the benefit of, each successive landholder for the time being of the land specified in the approval as the land benefited by the approval. Pursuant to section 106 (3) of the *Water Management Act 2000*, a major utility is taken to be a landholder of land in respect of which a water management work approval held by it is in force.
2. The status of an approval may change. An approval may be "current", in addition an approval is no longer in force if it has "expired", been "surrendered", "suspended" or "cancelled".
3. During periods of severe water shortages, the Minister may suspend part or all of the provisions of a management plan under section 49A of the *Water Management Act 2000*. Whilst an order under s49A is in force, depending on the terms of the order, the mandatory conditions applying to this approval may be affected. The Approval Holder must comply with any notification issued by the Minister under section 60 of the *Water Management Act 2000*.
4. See Dictionary in Chapter 5 to interpret words and expressions used in this approval.

5. A requirement to notify the Minister in writing or to provide information or data to the Minister, under this Approval, is satisfied by making the notification or providing the information or data in writing to the administrative contact detailed on this Statement.

NOTICE OF CHANGE OF HOLDER OR CONTACT

1. The NSW Office of Water is to be advised of any change of Approval Holder. This will occur whenever there is a change of ownership of works shown in this approval. The advice should be accompanied by evidence of transfer of ownership of the works.
2. If the Approval Holder wishes to nominate a new contact person a written statement signed by the Holder should be submitted to the NSW Office of Water.
3. The contact person should advise the NSW Office of Water of any change of mailing address as soon as possible.

Administrative contact details

All correspondence and notifications in relation to compliance with the conditions of this approval must be addressed to:

The Manager Corporate Licensing
NSW Office of Water
PO Box 323
PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 100 (1) (a) of the *Water Management Act 2000* this approval is subject to such conditions as are from time to time required to be imposed on the approval by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 100 (1) (b) and 102 (1) of the *Water Management Act 2000* this approval is also subject to such other conditions as the Minister may impose on the approval after it has been granted, including conditions relating to the protection of the environment.

The Operating Protocol referenced in this approval is a set of agreed documents between the Approval Holder and Minister. The Operating Protocol takes into account the complex nature of operations and procedures that the Approval Holder needs to undertake to implement the requirements of this approval. The Operating Protocol is subordinate to the approval and does not constitute a regulatory instrument.

AUTHORISED WATER SUPPLY WORKS

1. The Approval Holder is authorised to construct and use the water supply works listed and described in Attachments 1 of this Schedule ('the authorised water supply works') to capture, store, extract, and release water in accordance with the Water Sharing Plan or any direction from the Minister.

Note:

1. Under section 90 (2) of the *Water Management Act 2000* the term 'construct' is defined to include install, maintain, repair, alter or extend the work.
2. The use and operation of the authorised water supply works are subject to the conditions of this approval.
3. Notwithstanding condition one (1) of this approval, the Approval Holder is not authorised to do anything to the authorised water supply works which would change the capacity of the works as described in Attachment 1 of this schedule to affect the flow, volume, quality and behaviour of the water, without the written approval of the Minister.
4. The Approval Holder must not use the authorised water supply work to take water under an access licence unless in compliance with the access rules for taking of water as specified in the relevant access licence conditions.
5. Subject to the conditions of this approval, the Approval Holder is authorised to use water for the purpose of supplying bulk raw water to its customers, and for its own facilities and operations.

ENVIRONMENTAL AND OTHER RELEASES

6. Environmental releases are not required to be made when storages are spilling at a rate that equals or exceeds the corresponding release requirements.
7. The Approval Holder must make daily releases of water from Warragamba Dam, Menangle Weir, Camden Weir, Sharpes Weir, Cobbitty Weir, Mount Hunter Rivulet

Weir, Brownlow Hill Weir, Theresa Park Weir, and Wallacia Weir at the corresponding rate as specified in Table 1:

Table 1: Releases for environmental and other purposes in the Hawkesbury and Lower Nepean Rivers Water Source.

Water supply works	Release requirements		
Warragamba Dam	1 April to 31 October – 22 ML/d 1 November to 31 March – 30 ML/d Includes 5 ML/d for environmental flow release for the dilution of effluent discharged by Sydney Water Corporation from Wallacia Sewage Treatment Plant to the Warragamba River		
Nepean River Weirs	The volume of water released in the prior 24-hour period from Pheasants Nest Weir plus the volume of water released in the prior 24-hour period from Broughtons Pass Weir, multiplied by transmission loss adjustment factors specified below:		
	when the total daily inflows to Cataract Dam, Cordeaux Dam, Avon Dam and Nepean Dam are greater than 45.9 ML/d (i.e. 80th percentile* of the total daily inflows to those dams), multiply by:	when the total daily inflows to Cataract Dam, Cordeaux Dam, Avon Dam and Nepean Dam are equal to or less than 45.9 ML/d and greater than 95 th percentile*, multiply by:	when the total daily inflows to Cataract Dam, Cordeaux Dam, Avon Dam and Nepean Dam are equal to or less than the 95th percentile*, multiply by:
Menangle Weir	1.0	0.9	0.8
Camden Weir	1.0	0.878	0.761
Sharpes Weir	1.0	0.871	0.748
Cobbitty Weir	1.0	0.863	0.734
Mount Hunter Rivulet Weir	1.0	0.858	0.726
Brownlow Hill Weir	1.0	0.856	0.721
Theresa Park Weir	1.0	0.837	0.687
Wallacia Weir	1.0	0.810	0.640

Notes:

1. *Current estimate of 80th and 95th percentile total daily inflows to four Nepean dams are provided in the protocol.
2. Inflows and releases must be measured, calculated and recorded as per the procedures established in the Operating Protocol. The release requirement may be temporarily altered under circumstances described under the Operating Protocol.
8. The Approval Holder must create and manage a Banked Environmental Flow account for Warragamba Dam.
9. The Approval Holder must bank and keep a record of the volume of water that is not released in accordance with condition seven (7) of this approval due to circumstances beyond the Approval Holder's control.

Note:

1. The circumstances referred to in condition nine (9) of this approval are described in the Operating Protocol.
10. The Approval Holder must release water from the Banked Environmental Flow account in accordance with any written direction from the Minister.

Note:

1. The accounting rules of the release and management of Banked Environmental Flow water are described in the Operating Protocol.
11. The Approval Holder should use its best endeavours to operate its outlet works for environmental and other releases such that the quality of water being released from the dams/storages is similar to the quality of water flowing into the storages.

Note:

1. Where the same infrastructure is used both for water supply and environmental release (i.e. Warragamba Dam), the water supply quality requirements may constrain SCA's ability to meet the requirements under condition eleven (11) of this approval.
12. The Approval Holder must maintain the fish passages on all weirs along the Nepean River such that they remain operational for 95% of the time i.e. 347 days/year.

MONITORING

Water Quantity Monitoring

13. The Approval Holder must have metering equipment installed that meets the following requirements:
 - i. the metering equipment must measure and record the flow of all water taken through the water supply work with less than 5% error;
 - ii. the metering equipment must comply with the NSW Interim Water Meter Standards (issued by the NSW Office of Water) as may be updated or replaced from time to time;
 - iii. the metering equipment must be operated and maintained in a proper and efficient manner at all times;
 - iv. the metering equipment must be sited and installed at a place in the pipe, channel or conduit between the water source and the first discharge outlet. There must be no flow of water into or out of the pipe, channel or conduit between the water source and the metering equipment; and
 - v. any other requirements as to type, standard or other criteria for the metering equipment specified by the Minister by notice in writing.

Note:

1. Details of the Approval Holder's water quantity monitoring equipment and agreed procedures are described in the Operating Protocol.
14. The Approval Holder must keep a Logbook and record the following in the Logbook:
 - i. each date on which water was taken under the access licence;
 - ii. the access licence number of the access licence under which water was taken on that date,
 - iii. the volume of water taken on that date;
 - iv. the volume of water released as environmental flow on that date;
 - v. the volume of water released as spill on that date;
 - vi. the volume of water released for transfer on that date;
 - vii. the data and calculations to determine the daily environmental flow release requirement;
 - viii. where metering equipment has been installed for use in connection with the water supply work, the meter reading before water is taken;
 - ix. the total system storage and volume/level of each storage; and
 - x. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A “Logbook” means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this approval. The requirement of this condition will be met when SCA continues to measure, record and report its extractions, inflow and measurements as described under the Operating Protocol.
15. The Approval Holder must produce the Logbook to the Minister for inspection, when requested.
16. The Approval Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
17. The Approval Holder must provide access to the Minister to real time stream flow data recorded at all its gauging stations in the Hawkesbury and Lower Nepean Rivers Water Source. Until access to the real time stream flow data is established, the Approval Holder must provide stream flow data to the Minister at every time data is downloaded but not exceeding six months.

Environmental Monitoring

18. The Approval Holder must monitor the effectiveness of environmental flow releases including monitoring water quality parameters for river health purposes to the satisfaction of the Minister.
19. The Approval Holder must undertake all monitoring, data management and reporting consistent with appropriate quality assurance and quality control procedures, to the satisfaction of the Minister. The Approval Holder may include data of acceptable quality from other sources to meet the monitoring requirements of this approval.

REPORTING

Event Notification

20. The Approval Holder must notify the Minister in writing at the earliest practical possible opportunity following any event, but not exceeding 7 working days that has caused, or is likely to cause, deviation to any of the approval conditions. The notification must include, but need not be limited to, the following information: whether the event has resulted in an altered event (at the date of the notification) and details of any altered release:
 - i. the date, time and location of the event, or works involved;
 - ii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iii. any action taken where it was necessary to avoid harm; and
 - iv. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Approval Holder’s effective control and planned events such as maintenance and refurbishment are described in the Operating Protocol. The event notification template is provided in the Operating Protocol.

Monthly Water Quantity Report

21. The Approval Holder must, by or on the 25th day of each month, submit a water quantity report for the previous month. The report must be provided in both electronic and hard copy formats and must contain, but need not be limited to, the following:
- i. total daily inflows to all reservoirs;
 - ii. total daily environmental and other releases from all reservoirs;
 - iii. total daily extractions;
 - iv. total daily water supply releases;
 - v. storage levels; the banked environmental flow account;
 - vi. a summary of notified events including emergencies, variations from release requirements, failure to measure releases or extractions in accordance with the requirements, altered water release events, and any changes or alterations to water management works; and
 - vii. any alterations to the authorised water supply works in terms of the specifications and descriptions in Attachment 1 of Schedule 1.

Annual Compliance Report

22. The Approval Holder must, by 30 November each year, submit an Annual Compliance Report (ACR) for the preceding water year. The report must contain, but need not be limited to, the following:
- i. analysis of all environmental and any other flow releases, and water extractions, banked environmental flows and transfers made, and comparisons with data from previous years, and an interpretation of the results;
 - ii. an overview of the environmental monitoring program(s) that have been completed, its aims and objectives, methodologies and relevant maps;
 - iii. an assessment of the impact of environmental flows and other water releases that have been completed during the water year.
 - iv. performance of the fish passages on all weirs along the Nepean River.
 - v. evidence verifying all monitoring, recording and assessment was conducted using appropriate quality assurance and control standards;
 - vi. final reports (if any) in relation to conditions 22 (2), 22 (3), 22 (4) and 22 (5) are to be made available to the Minister no later than 1 March of following year.
 - vii. evidence verifying that the devices used for measuring and recording extractions and releases were subject to appropriate quality assurance and complied with appropriate or mandatory standards;
 - viii. a summary of all notifiable events, including non-compliance; and
 - ix. an electronic appendix that includes all raw data used in the preparation of this report.

SCHEDULE 1 – ATTACHMENT 1: THE AUTHORISED WATER SUPPLY WORKS

The following tables provide detailed information on the authorised water supply works used by the Approval Holder within these water sources.

	LOWER CASCADE DAM (NO. 1)	MIDDLE CASCADE DAM (NO.2)	UPPER CASCADE DAM (NO.3)
Description	Earthfill embankment with a central concrete core wall	Concrete arch dam	Earthfill embankment with a central concrete core wall
Use	Storage and diversion of urban water supply	Storage of urban water supply	Storage and diversion of urban water supply
Location	Crown Land (Pt WR 59046) ISG Coordinates: E235477 N1271257 Located on Cascade Creek.	Pt Lot 399 DP 751627 ISG Coordinates: E235289 N1270669 Located on Cascade Creek	Crown land (Pt WR 59046) ISG Coordinates: E235116 N1270357 Located on Cascade Creek
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	26 m	15.28 m	30 m
Crest Length	128 m	105 m	247 m
Spillway	An uncontrolled spillway on right abutment	Main - on the left abutment. Secondary - adjoins main spillway	Uncontrolled spillway on right abutment
FSL (m) AHD	926.2	952.46	975.88
Total capacity (ML)	318	159	1,704
Operational Capacity (ML)	318	159	1,704
Outlet works (ML/d)	Nil	Nil	Nil
Diversion/Extraction works (ML/d)	9 ML/d diversion to Upper Cascade Dam	Decommissioned	54 ML/d gravity or pump diversion to Cascade WFP
Other Details	Nil	Nil	Nil
Flow/Level measurement device	Level sensor & spillway rating table, Pump curve + hours pumped to measure volume pumped	Level sensor & spillway rating table	Level sensor & spillway rating table,, MAG or Ultrasonic Flow Meter on supply pipeline to WFP

	LAKE MEDLOW DAM	GREAVES CREEK DAM	WOODFORD CREEK DAM
Description	Concrete arch dam	Concrete arch dam	Concrete arch dam
Use	Storage and diversion of urban water supply	Storage and diversion of urban water supply	Nil
Location	Crown Land ISG Coordinates: E234911 N1274064 Located on Adams Creek	Lots 3 & 4 DP 109609 ISG Coordinates: E235809 N1274563 Located on Greaves Creek	Pt Lots 62 & 74 DP 751670 ISG Coordinates: E252161 N1269738 Located at confluence of Woodford and Bulls Creeks
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	19.8 m	18.59 m	15.7 m
Crest Length	37.8 m	67 m	114.12 m
Spillway	Uncontrolled spillway on left abutment	Uncontrolled spillway on right abutment	Uncontrolled overflow spillway on crest
FSL (m) AHD	930.15	885.76	470.02
Total capacity (ML)	297	311	854
Operational Capacity (ML)	297	311	Decommissioned
Outlet works (ML/d)	Nil	Nil	Scour valve (capacity up to 10 ML/d at FSL)
Diversion/Extraction works (ML/d)	7 ML/d siphonic and gravity (scour outlet) diversions to Greaves Creek Dam. Up to 6.5 ML/d diversion to Megalong Reservoir	8.0 ML/d pumped diversion to Upper Cascade Dam (No.3). or Middle Cascade Dam (no 1)	Nil
Other Details	Nil	Nil	No longer used for urban water supply

	WHIPCORD CREEK DIVERSION WEIR	WARRAGAMBA WEIR	MENANGLE WEIR
Description	Concrete gravity weir	A concrete gravity weir	Earth fill with impermeable masonry core
Use	Diversion of water to Lower Cascade Dam	Control of tailwater levels at Warragamba Dam during floods	
Location	ISG Coordinates: E235320 N1271400 Located on Whipcord Creek	ISG Coordinates: E263526 N1250006 Located on the Warragamba River about one kilometre downstream of Warragamba Dam	Lots 1 and 2 DP 775452 ISG Coordinates: E276170 N1223200 Located on the Nepean River
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	400 mm	21 m	1.7 m
Crest Length	Not available	44.2 m	77.5 m
Spillway	An uncontrolled overflow spillway	Uncontrolled spillway, with ogee crest, located centrally in the weir	Uncontrolled overflow spillway
FSL (m) AHD	Not available	Not applicable	60.95
Total capacity (ML)	Not available	Nil	2,500
Operational Capacity (ML)	Not available	Nil	Not available
Outlet Works	Nil	Uncontrolled diversion tunnel 5.6 m wide 4.3 m high in left weir abutment	FCD Valve 27 ML/d capacity
Diversion Works	Cutting to Lower Cascade Dam diverting up to 1 ML/day	Decommissioned.	Nil
Other Details	Nil	Nil	Not used for urban water supply. Vertical slot fishway

	BERGINS WEIR	THURNS WEIR	CAMDEN WEIR
Description	Concrete weir	A concrete weir with integral downstream apron and curtain wall, plus upstream apron and curtain wall	A sheet steel piling weir with upstream rockfill protection and downstream concrete apron and rockfill mattresses
Use			
Location	Lots 3 and 4 DP 168672 ISG Coordinates: E276040 N1227240 Located on the Nepean River	Lot 1 & 2 DP 168672 ISG Coordinates: E273350 N1227620 Located on the Nepean River	Pt Lot 3 DP752045; Pt Lot 2 Cawdor Estate ISG Coordinates: E272480 N1231030 Located on the Nepean River
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	Not applicable	3.1 m	3.5 m
Crest Length	Not applicable	22.2 m	35.5 m
Spillway	Not applicable	Uncontrolled overflow spillway.	Uncontrolled overflow spillway.
FSL (m) AHD	Not applicable	Not applicable	55.63
Total capacity (ML)	Not applicable	Not applicable	480
Operational Capacity (ML)	Not applicable	Not applicable	Not applicable
Outlet Works	Nil	Nil	FCD Valve 34 ML/d capacity
Diversion Works	Nil	Nil	Nil
Other Details	Weir failed	Not used for urban water supply. Bypassed around left wall in 1991	Not used for urban water supply. Vertical slot fishway on right bank

	SHARPES WEIR	COBBITTY WEIR	MOUNT HUNTER RIVULET WEIR
Description	A sheet steel piling weir with upstream rockfill protection and downstream concrete apron and rockfill mattresses	A mass concrete gravity weir	A concrete weir with upstream and downstream aprons and curtain walls and downstream buttresses
Use			
Location	Lots 1, 2, 3 and 4 DP 791307 ISG Coordinates: E270130 N1231790 Located on the Nepean River	Lot 2 DP 83922 and Lot 3 DP 507970 ISG Coordinates: E270185 N1233475 Located on the Nepean River	Lot 1 DP 733131 ISG Coordinates: E268170 N1234020 Located on the Nepean River
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	4.85 m	8.8 m	3.9 m
Crest Length	43.2 m	49.7 m	33.5 m
Spillway	Uncontrolled overflow spillway	Uncontrolled overflow spillway	Uncontrolled overflow spillway
FSL (m) AHD	54.13	52.95	49.01
Total capacity (ML)	240	360	480
Operational Capacity (ML)	Not applicable	Not applicable	Not applicable
Outlet Works	FCD Valve 35 ML/d capacity	FCD Valve 37 ML/d capacity	FCD Valve 39 ML/d capacity
Diversion Works	Nil	Nil	Nil
Other Details	Not used for urban water supply. Vertical slot fishway on right bank	Not used for urban water supply. Vertical slot fishway on left bank	Not used for urban water supply. Fishway present

	BROWNLOW HILL WEIR	WALLACIA WEIR	THERESA PARK WEIR
Description	A concrete weir with upstream and downstream apron and curtain wall	A concrete arch/gravity weir	
Use			
Location	Lot 1 DP 734543 ISG Coordinates: E267580 N1235430 Located on the Nepean River	Lot 1 DP 775451 ISG Coordinates: E265590 N1251665 Located on the Nepean River	
Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers	Hawkesbury and Lower Nepean Rivers
Wall Height	2.9 m	5.6 m	
Crest Length	51.2 m	45.7 m	
Spillway	Uncontrolled overflow spillway	Uncontrolled overflow spillway	
FSL (m) AHD	44.05	26.73	
Total capacity (ML)	160	2,400	
Operational Capacity (ML)	Not applicable	Not applicable	
Outlet Works	FCD Valve 23 ML/d capacity	FCD Valve 55 ML/d capacity	FCD Valve 56 ML/d capacity
Diversion Works	Nil	Nil	
Other Details	Not used for urban water supply. Central pool-type fishway	Not used for urban water supply. Pool-type fishway on the left abutment	Fishway present

	MEGARRITYS CREEK OUTLET VALVE
Description	Environmental flow release works from Warragamba Pipelines
Use	
Location	
Water Source	Hawkesbury and Lower Nepean Rivers Water Source
River	Hawkesbury and Lower Nepean Rivers
Wall Height	
Crest Length	
Spillway	
FSL (m) AHD	
Total capacity (ML)	
Operational Capacity (ML)	
Outlet Works	Oriface plate sized to release flows based on current dam level. Verified by gauging downstream
Diversion Works	
Other Details	

2.4. COMBINED WATER SUPPLY WORK & WATER USE APPROVAL FOR SOUTHERN SYDNEY RIVERS WATER SOURCE

 <p>Department of Primary Industries Office of Water</p>	<p>Statement of Approval <i>as at 1 May 2012</i> issued under <i>Water Management Act 2000</i>.</p>	
<p>Approval Number</p>	<p>10CA117219</p>	
<p>Approval Holder (See note 1)</p>	<p>Sydney Catchment Authority</p>	<p>ABN: 36 682 945 185</p>
<p>Contact Details</p>		
<p>Name</p>	<p>Sydney Catchment Authority</p>	
<p>Customer ID</p>	<p>1078449</p>	
<p>Contact Address</p>	<p>Penrith Business Centre Level 4, 2-6 Station St (PO Box 323) PENRITH NSW 2750</p>	
<p>Approval Details</p>		
<p>Status (See note 2)</p>	<p>Current</p>	
<p>Water Source</p>	<p>Southern Sydney Rivers Water Source (hereafter described as 'this water source')</p>	
<p>Water Management Area(s)</p>	<p>Southern Sydney Rivers</p>	
<p>Kind of Approval</p>	<p>Water Supply Work and Water Use</p>	
<p>Date of Commencement</p>	<p>01/07/2011</p>	
<p>Expiry Date</p>	<p>30 June 2031</p>	
<p>Authorised Water Supply Works</p>	<p>This approval is for the authorised water supply works described in Schedule 1</p>	
<p>Authorised Water Use</p>	<p>Supply bulk raw water to the customers and use for own facilities and operations as per Schedule 1</p>	
<p>Conditions</p>	<p>This approval is subject to the conditions set out in Schedule 1</p>	

Notes:

1. Pursuant to section 106 of the *Water Management Act 2000*, an approval is taken to be held by, and for the benefit of, each successive landholder for the time being of the land specified in the approval as the land benefited by the approval. Pursuant to section 106 (3) of the *Water Management Act 2000*, a major utility is taken to be a landholder of land in respect of which a water management work approval held by it is in force.
2. The status of an approval may change. An approval may be "current", in addition an approval is no longer in force if it has "expired", been "surrendered", "suspended" or "cancelled".
3. During periods of severe water shortages, the Minister may suspend part or all of the provisions of a management plan under section 49A of the *Water Management Act 2000*. Whilst an order under s49A is in force, depending on the terms of the order, the mandatory conditions applying to this approval may be affected. The Approval Holder must comply with any notification issued by the Minister under section 60 of the *Water Management Act 2000*.
4. See Dictionary in Chapter 5 to interpret words and expressions used in this approval.
5. A requirement to notify the Minister in writing or to provide information or data to the Minister, under this Approval, is satisfied by making the notification or providing the information or data in writing to the administrative contact detailed on this Statement.

NOTICE OF CHANGE OF HOLDER OR CONTACT

1. The NSW Office of Water is to be advised of any change of Approval Holder. This will occur whenever there is a change of ownership of works shown in this approval. The advice should be accompanied by evidence of transfer of ownership of the works.
2. If the Approval Holder wishes to nominate a new contact person a written statement signed by the Holder should be submitted to the NSW Office of Water.
3. The contact person should advise the NSW Office of Water of any change of mailing address as soon as possible.

Administrative contact details

All correspondence and notifications in relation to compliance with the conditions of this approval must be addressed to:

Manager Corporate Licensing
NSW Office of Water
PO Box 323
PENRITH NSW 2751

Schedule 1 – Conditions

INTRODUCTION

Under section 100 (1) (a) of the *Water Management Act 2000* this approval is subject to such conditions as are from time to time required to be imposed on the approval by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (hereinafter referred to as the Water Sharing Plan). Under section 100 (1) (b) and 102 (1) of the *Water Management Act 2000* this approval is also subject to such other conditions as the Minister may impose on the approval after it has been granted, including conditions relating to the protection of the environment.

The Operating Protocol referenced in this approval is a set of agreed documents between the Approval Holder and Minister. The Operating Protocol takes into account the complex nature of operations and procedures that the Approval Holder needs to undertake to implement the requirements of this approval. The Operating Protocol is subordinate to the approval and does not constitute a regulatory instrument.

AUTHORISED WATER SUPPLY WORKS

1. The Approval Holder is authorised to construct and use the water supply works listed and described in Attachment 1 of this Schedule ('the authorised water supply works') to capture, store, extract, and release water in accordance with the Water Sharing Plan or any direction from the Minister.

Note:

1. Under section 90 (2) of the *Water Management Act 2000* the term 'construct' is defined to include install, maintain, repair, alter or extend the work.
2. The use and operation of the authorised water supply works are subject to the conditions of this approval.
3. Notwithstanding condition one (1) of this approval, the Approval Holder is not authorised to do anything to the authorised water supply works which would change the capacity of the works as described in Attachments 1 of this Schedule to affect the flow, volume, quality and behaviour of the water, without the written approval of the Minister.
4. The Approval Holder must not use the authorised water supply work to take water under an access licence unless in compliance with the relevant access rules for taking of water as specified in the relevant access licence conditions.
5. Subject to the conditions of this approval, the Approval Holder is authorised to use water for the purpose of supplying bulk raw water to its customers, and for its own facilities and operations.

ENVIRONMENTAL FLOW RELEASES

6. Environmental releases are not required to be made when storages are spilling at a rate that equals or exceeds the corresponding release requirements.

7. The Approval Holder must make a daily release of water from Woronora Dam which is equal to:
 - i. the daily inflows into Lake Woronora, when the daily inflow is less than or equal to the estimated 80th percentile daily inflow, and
 - ii. the estimated 80th percentile daily inflow plus 20% of the inflow volume above the estimated 80th percentile daily inflow into Lake Woronora when the daily inflow is greater than the estimated 80th percentile daily inflow volume.

Notes:

1. At the time of issue of this approval the estimate of 80th percentile inflow, derived using modelling in daily time steps is 4.1 ML/d.
 2. Inflows and releases must be measured, calculated and recorded as per the procedures established in the Operating Protocol. The release requirement may be temporarily altered under circumstances described under the Operating Protocol.
8. The Approval Holder must make a high flow release from Woronora Dam before 1 February each water year in accordance with procedures, rates and duration determined in writing by the Minister.

Note:

1. Amendment of this approval condition may be considered by the Minister based on further review of the need for the artificial release.

9. The Approval Holder must create and manage a Banked Environmental Flow account for Woronora Dam.
10. The Approval Holder must bank and keep a record of the volume of water that is not released as requirement under condition 7 & 8 due to the circumstances beyond Approval Holder's control.

Note:

1. The circumstances are described in the Operating Protocol.

11. The Approval Holder must release water from the Banked Environmental Flow account in accordance with any written direction from the Minister.

Note:

1. The accounting rules of the release and management of Banked Environmental Flow water are described in the Operating Protocol.

12. The Approval Holder should use its best endeavours to operate its outlet works for environmental and other releases such that the quality of water being released from the dams/storages is similar to the quality of water flowing into the storages.

MONITORING

Water Quantity Monitoring

13. The Approval Holder must have metering equipment installed that meets the following requirements:
 - i. the metering equipment must measure and record the flow of all water taken through the water supply work with less than 5% error;
 - ii. the metering equipment must comply with the NSW Interim Water Meter Standards (issued by the NSW Office of Water) as may be updated or replaced from time to time;

- iii. the metering equipment must be operated and maintained in a proper and efficient manner at all times;
- iv. the metering equipment must be sited and installed at a place in the pipe, channel or conduit between the water source and the first discharge outlet. There must be no flow of water into or out of the pipe, channel or conduit between the water source and the metering equipment; and
- v. any other requirements as to type, standard or other criteria for the metering equipment specified by the Minister by notice in writing.

Note:

1. Details of the Approval Holder's water quantity monitoring equipment and agreed procedures are described under the Operating Protocol.
14. The Approval Holder must keep a Logbook and record the following in the Logbook:
- i. each date on which water was taken under the access licence;
 - ii. the access licence number of the access licence under which water was taken on that date;
 - iii. the volume of water taken on that date;
 - iv. the volume of water released as environmental flow on that date;
 - v. the volume of water released as spill on that date;
 - vi. the volume of water released for transfer on that date;
 - vii. the data and calculations to determine the daily environmental flow release requirement;
 - viii. where metering equipment has been installed for use in connection with the water supply work, the meter reading before water is taken;
 - ix. the total system storage and volume/level of each storage; and
 - x. any other information required to be recorded in the Logbook under the rules of the Water Sharing Plan.

Note:

1. A "Logbook" means a record, kept in hard copy or electronic form, which accurately records all information required to be kept for this Approval. The requirement of this condition will be met when SCA continues to measure, record and report its extractions, inflow and measurements as described under the Operating Protocol.
15. The Approval Holder must produce the Logbook to the Minister for inspection, when requested.
16. The Approval Holder must retain the information required to be recorded in the Logbook for 5 years from the date to which that information relates.
17. The Approval Holder must provide access to the Minister to real time stream flow data recorded at all its gauging stations in the Southern Sydney Rivers Water Source. Until access to the real time stream flow data is established, the Approval Holder must provide stream flow data to the Minister at every time data is downloaded but not exceeding six months.

Environmental Monitoring

18. The Approval Holder must monitor the effectiveness of environmental flow releases including monitoring water quality parameters for river health purposes to the satisfaction of the Minister.
19. The Approval Holder must undertake all monitoring, data management and reporting consistent with appropriate quality assurance and quality control procedures, to the satisfaction of the Minister. The Approval Holder may include

data of acceptable quality from other sources to meet the monitoring requirements of this Approval.

REPORTING

Event Notification

20. The Approval Holder must notify the Minister in writing at the earliest practical possible opportunity following any event, but not exceeding 7 working days that has caused, or is likely to cause, deviation to any of the approval conditions. The notification must include, but need not be limited to, the following information:
 - i. whether the event has resulted in an altered event (at the date of the notification) and details of any altered release;
 - ii. the date, time and location of the event, or works involved;
 - iii. the cause and nature of the event, including details of any environmental harm or damage that may have occurred;
 - iv. any action taken where it was necessary to avoid harm; and
 - v. any action that was, or will be taken to prevent a recurrence of the event.

Note:

1. The events or circumstances including accident, equipment failure or any other such cause outside the Approval Holder's effective control and planned events such as maintenance and refurbishment are described in the Operating Protocol. The event notification template is provided in the Operating Protocol.

Monthly Water Quantity Report

21. The Approval Holder must, by or on the 25th day of each month, submit a report for the previous month. The report must be provided in both electronic and hard copy formats and must contain, but need not be limited to, the following:
 - i. total daily inflows to all reservoirs;
 - ii. total daily environmental and other releases from all reservoirs;
 - iii. total daily extractions;
 - iv. total daily water supply releases;
 - v. storage levels;
 - vi. the banked environmental flow account;
 - vii. a summary of notified events including emergencies, variations from release requirements, failure to measure releases or extractions in accordance with the requirements, altered water release events, and any changes or alterations to water management works; and
 - viii. any alterations to the authorised water supply works in terms of the specifications and descriptions in Attachment 1 of Schedule 1.

Annual Compliance Report

22. The Approval Holder must, by 30 November each year, submit an Annual Compliance Report (ACR) for the preceding water year. The report must contain, but need not be limited to, the following:
 - i. analysis of all environmental and any other flow releases, and water extractions, banked environmental flows and transfers made, and comparisons with data from previous years, and an interpretation of the results;
 - ii. an overview of the environmental monitoring program(s) that have been completed, its aims and objectives, methodologies and relevant maps;
 - iii. an assessment of the impact of environmental flows and other water releases that have been completed during the water year;

- iv. evidence verifying all monitoring, recording and assessment was conducted using appropriate quality assurance and control standards;
- v. Final reports (if any) in relation to conditions 21 (2), 21 (3) and 21 (4) are to be made available to the Minister no later than 1 March of following year;
- vi. evidence verifying that the devices used for measuring and recording extractions and releases were subject to appropriate quality assurance and complied with appropriate or mandatory standards;
- vii. a summary of all notifiable events, including non-compliance; and
- viii. an electronic appendix that includes all raw data used in the preparation of this report.

SCHEDULE 1 – ATTACHMENT 1: THE AUTHORISED WATER SUPPLY WORKS

The following table provides detailed information on the authorised water supply work used by the Approval Holder within the water source.

	Woronora Dam
Description	A curved concrete gravity dam
Use	Storage and diversion of urban water supply
Location	Lot 1 DP 709244 ISG Coordinates: E294012 N1224234 Located on the Woronora River
Water Source	Southern Sydney Rivers Water Source
River	Southern Sydney Rivers
Wall Height	66 m
Crest Length	390 m
Spillway	Uncontrolled concrete lined chute spillway with labyrinth weir
FSL (m) AHD	168.88
Total capacity (ML)	71,790
Operational Capacity (ML)	71,790
Outlet Works (ML/d)	800 ML/d at FSL
Diversion Works (ML/d)	160 ML/d is diverted from Woronora Pipeline to Woronora WFP
Other Details	230 ML/d gravity diversion via Woronora pipeline possible if WFP bypassed
Flow/Level Measurement Device	Level sensor + Spillway rating table. MAG or ultrasonic flow meter on outlets to WFP + E Flow valves. Contingent flow release based on valve rating table + downstream gauging

3. WATER SUPPLY WORKS APPROVAL FOR GROUND WATER SOURCE

**3.1. WATER SUPPLY WORK APPROVAL FOR SYDNEY BASIN NEPEAN
GROUNDWATER SOURCE**

TBA

4. OPERATING PROTOCOL



Operating Protocol

For

Implementation of Sydney Catchment Authority's
water access licences and work & use approvals
issued under the Water Management Act 2000

Version 1

DISCLAIMER

This protocol is subordinate to Sydney Catchment Authority's water access licences and work/use approvals. It provides supporting information and guidance to assist implementation of water licences and approvals consistent with the relevant provisions of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011. It does not constitute a regulatory instrument.

DOCUMENT CONTROL HISTORY

Document Controllers

Graham Attenborough, Senior Manager Water Supply Operations, Sydney Catchment Authority

Salim Vhora, Manager Corporate Licensing, NSW Office of Water

Document History Index

Version	Amendments	Description	Proposed by	Endorsements
1	–	New Document	SCA	Office of Water

Initial approval by

.....
 Fiona Smith
 Group General Manager Operations
 Sydney Catchment Authority

.....
 Salim Vhora
 Manager, Corporate Licensing
 NSW Office of Water

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1. INTRODUCTION

The Sydney Catchment Authority (SCA) has been granted water access licences (WALs) and combined water supply work and water use approvals (CAs) under the *Water Management Act 2000* consistent with relevant provisions of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (GMWSP). Water licences and approvals issued to SCA are listed in table 1:

Table 1. List of water licences and approvals

Water source	Water access licence number	Share component (ML/yr)	Long term average annual extraction limit (ML/yr)	Combined work/use approval number	Relevant major works
Shoalhaven	WAL 27433	329,000	36,000	10CA117211	Tallowa, Fitzroy Falls
Upper Nepean and Upstream Warragamba	WAL 27431	620,000	581,000	10CA117212	Warragamba, Wingecarribee, Cataract, Cordeaux, Avon, Nepean
Hawkesbury and Lower Nepean	WAL 27434	6,000	6,000	10CA117213	Blue Mountains
Southern Sydney	WAL 27429	32,000	13,000	10CA117219	Woronora

The GMWSP requires that the methods for estimating inflows and required releases must be approved in writing by the Minister. This Operating Protocol addresses these requirements and other operational matters as set out in SCA's water licences and approvals.

SCA will be deemed as meeting the relevant water licence and approval conditions provided that the implementation is carried out (e.g. inflow measurements and releases) and other actions (e.g. notifications) are taken in accordance with the provisions of this protocol (as amended from time to time).

1.1. OBJECTIVES OF OPERATING PROTOCOL

The operating protocol recognises the inherent difficulties and limitations in implementing the water licences and approvals and GMWSP requirements under certain circumstances. It also provides the means to compensate any shortfalls in the measurements or releases.

By recognising the inherent difficulties and limitations, SCA is able to implement requirements of water licences and approvals with the most recent available infrastructure and procedures. The event notification process under this protocol streamlines reporting of disruptions to releases. These disruptions generally could not have been avoided by reasonable actions of SCA and has nil or unmeasurable impacts on the environment.

Main objectives of this Operating Protocol are to describe:

1. notification procedures for events resulting in disruption or potential disruption to water licences and approvals requirements;
2. procedures to measure inflows and calculate environmental flow and other release requirements under water licences and approvals;
3. rules for bulk water transfers;

4. water extraction measuring devices including their locations, accuracy and maintenance/calibration regime;
5. accounting rules for environmental flow account

1.2. REVIEW OF OPERATING PROTOCOL

The protocol will be reviewed as and when required to meet the conditions of GMWSP and water licences and approvals. The protocol may also be reviewed following availability of new information that results in an improvement in the implementation of water licences and approvals.

A review proposal could be initiated by either SCA or Office of Water. All amendments resulting from review would require endorsement from Office of Water prior to implementation.

2. EVENT NOTIFICATIONS

2.1. PURPOSE

This chapter describes notifiable and non-notifiable events, procedures of notification to Office of Water and remedial actions to minimise the impact resulting from the event.

2.2. NON-NOTIFIABLE EVENTS

SCA is considered to have met its daily release requirements if the total volume released from the specified water supply work is met over a 24 hour period. As such, any disruptions to releases which can be compensated by increasing flows for the remainder of the 24 hour period (i.e. same day) do not require notification.

2.3. NOTIFIABLE EVENTS

SCA must notify Office of Water (Table 2) in writing of any event that causes or has the potential to cause any deviation from water licence and approval conditions for more than 24 hours.

Table 2. List of Sydney Catchment Authority and NSW Office of Water contacts

SYDNEY CATCHMENT AUTHORITY			
Name	Title	Email	Phone
Fiona Smith	Group General Manager Operations	fiona.smith@sca.nsw.gov.au	4724 2488
Graham Attenborough	Senior Manager, Water Supply Operations	graham.attenborough@sca.nsw.gov.au	4724 2401 0427 497 351
Peter Littlejohns	Manager, System Configuration	peter.littlejohns@sca.nsw.gov.au	4724 2348
David Tomlinson	Senior System Planner	david.tomlinson@sca.nsw.gov.au	4724 2365
Eddie van Capelle	Senior System Planner	eddie.vancapelle@sca.nsw.gov.au	4724 2349
SCA 24 hour			1800 061 069
NSW OFFICE OF WATER			
Salim Vhora	Manager Corporate Licensing	salim.vhora@water.nsw.gov.au	4729 8128
Anisul Afsar	Licensing Officer	Anisul.Afsar@water.nsw.gov.au	4729 8265
Ruth Burton	Senior Licensing Officer	ruth.burton@water.nsw.gov.au	8838 7831

An initial notification may be made by telephone or email. A formal notification using the 'Event Notification Form' (Attachment 4.1) must be submitted to Office of Water at the earliest practical opportunity following any event, but not exceeding 7 working days. Notification for planned events must be submitted at least 7 working days prior to commencement of the planned activity.

Office of Water will acknowledge and may provide comments if necessary. Notwithstanding a response from Office of Water, SCA must take appropriate actions to minimise adverse

impacts to the environment, safety of the work or water supply security and third party property damage.

Examples of planned and unplanned events are provided below as a guide. Office of Water will consider each event on its merits and will consider circumstances involving an event in making its decision and responding to an event.

Examples of planned events include:

- Major maintenance;
- Replacement, refurbishment or modification of works;
- Monitoring activities such as sampling or in-stream gauging requiring a predetermined flow;
- Commencing or ceasing transfers of water from the Shoalhaven and Wingecarribee.

Examples of unplanned events and emergencies include:

- Minor infrastructure failure, e.g. gate, valve, instrumentation or telemetry;
- Delay in completion of any planned works or activities;
- Monitoring or control system failure;
- Operator error;
- Non-release of water due to high levels of cyanobacteria;
- Water contamination incidents that may place SCA in serious breach of either its Operating Licence or the *Protection of the Environment Operations Act 1997*;
- Declared disasters or any other event considered by the Minister to constitute an actual or potential emergency

2.4. EVENT REGISTER

SCA must maintain a register of all notifiable events relating to water licence and approval requirements. The register will be made available to Office of Water on request and reported in the corresponding Monthly Water Quantity Report and Annual Compliance Report.

3. ENVIRONMENTAL AND OTHER RELEASES

3.1. PURPOSE

The primary purpose of this chapter is to describe procedures that will assist SCA in fulfilling environmental and other release requirements under water licences and approvals and GMWSP.

3.2. LICENCE AND APPROVAL REQUIREMENTS

Water licence and approval requirements for environmental and other releases are provided in Attachment 4.2.

3.3. PROCEDURES FOR MEASURING AND ESTIMATING INFLOWS

3.3.1. Inflow measurement sites

Inflows will be measured at hydrometric stations listed in Table 3.

Table 3. Inflow measurement sites.

Water Supply Work	Inflow measurement sites	Comments
Warragamba Dam	212250 Coxs R @ Kelpie Point 212260 Kowmung R @ Cedar Ford 212270 Wollondilly R @ Jooriland 212280 Nattai R @ the Causeway	Combined gauging covers 80% of all catchment inflows.
Nepean Dam	2122051 Nepean R @ Nepean Dam inflow 2122052 Burke R @ Nepean Dam inflow	Combined gauging covers 72.47% of all catchment inflows
Avon Dam	2122111 Avon River @ Summit tank 2122112 Flying Fox Ck @ Fire Rd No 15	Combined gauging covers 11.53% of all catchment inflows
Cordeaux Dam	2122201 Goondarin Ck @ Vent Shaft 2122204 Cordeaux R between U. Cordeaux 1 & 2 2122205 Sandy Ck @ Fire Rd 6C	Combined gauging covers 20% of all catchment inflows
Cataract Dam	2122323 Cataract R @ d/s Angels Ck 2122322 Loddon River at Bulli Appin Road	Combined gauging covers 20.8% of catchment inflows
Pheasants Nest Weir	No gauging	Residual catchment inflow based on 0.38x inflow at Avon Dam
Broughtons Pass Weir	No gauging	Residual catchment inflow based on 0.24x inflow at Avon Dam
Woronora Dam	2132101 Woronora R u/s of storage 2132102 Waratah R @ Flatrock Crossing	Combined gauging covers 44% of all catchment inflows
Tallowa Dam	215220 Kangaroo R @ Hampden Bridge 215207 Shoalhaven R @ Fossickers Flat	Combined gauging is representative of all catchment inflows
Fitzroy Falls Reservoir	215233 Yarrunga Ck @ Wildes Meadow	
Wingecarribee Reservoir	212274 Caalang Ck @ Maugers	

3.3.2. Inflow calculation method

- Inflows will be calculated based on the procedures described in SCA's paper "Steps to calculate e-flows from Cataract, Cordeaux, Avon, Nepean Dams and Broughtons Pass Weir and Pheasants Nest Weir" dated 16 September 2011 (Attachment 4.3) or as amended by agreement between SCA and Office of Water;
- If a gauging station is faulty or telemetry is not available, the most recent available information for that site will be used until the fault can be rectified. Faulty gauging stations are to be investigated within 2 working days;
- An interim inflow cap (Table 4) applies where gauging stations have not yet been rated under a full range of flow conditions.

Table 4: Current caps on gauged inflows and environmental release requirements.

Water management work	Interim inflow cap (ML/d)	Interim environmental release cap (ML/d)
Cataract Dam	1277	267
Cordeaux Dam	687	141
Nepean Dam	2214.6	459
Avon Dam	722.8	150
Broughtons Pass Weir*	302	64
Pheasants Nest Weir*	267	57

* caps at weirs are applied to the estimated inflow from residual catchments downstream of dams and do not affect passage of full releases from dams

3.3.3. Review of interim inflow caps and inflow calculation methods

- SCA will continue to work to improve its methods for measuring inflows and calculating release requirements. An annual review of the methods must be carried out and outcomes must be reported in the annual compliance report or earlier seeking Office of Water's endorsement.
- SCA will make every effort to obtain the necessary flow gauging in order to increase the accuracy of flow measurements and to raise or remove the current caps on inflows and releases. An annual review of the interim inflow caps must be carried out and outcomes must be reported in the annual compliance report or earlier seeking Office of Water's endorsement.

3.4. CALCULATION AND RELEASE OF ENVIRONMENTAL FLOW

3.4.1. Calculation of environmental release requirements

- Environmental release from **dams/storages** will be determined/calculated daily based on calculations recorded in SCA's Daily Returns System (derived from inflow calculation – sec 3.3);
- Environmental releases from **weirs** downstream of the Upper Nepean dams will be determined/calculated daily based on releases from upstream dams on the previous day.

3.4.2. Release of environmental flow

- Environmental releases from **dams/storages** will be made daily between 0800hrs and 1000hrs;
- Environmental releases from **weirs** downstream of the Upper Nepean dams will be made at an appropriate time of day to ensure the upstream dam releases are passed through the weirs.
- No release is required when dam/weir is spilling at a rate that equals or exceeds the environmental release requirement unless advised otherwise by the Office of Water.

3.4.3. Adjustments to environmental flow release

- Any deficit between releases calculated using measured inflows and inflows derived using weekly mass balance that cannot be made up by adjustment in the following week will be kept as banked environmental flow (BEF). Notification is required as per section 2 of this protocol if not released within one week. Details of accounting of BEF are provided in section 6 of this protocol;
- When the inflows are greater than those listed in table 4 (**Interim inflow cap**), the releases will be capped as described in table 4 (**Interim environmental release cap**) and additional releases will be made through adjustment the following week, or converted to BEF water;
- Details on the weekly mass balance can be found in attachment 4.3.

3.4.4. Measurement of releases

Releases from dams (environmental and other releases from dams/weirs/storages) will be measured at hydrometric stations/sites listed in Attachment 4.4

3.4.5. Reassessment of low flow thresholds

- The 80%ile flow thresholds for Shoalhaven and Upper Nepean dams must be reassessed once every five years or following a major climatic event or major improvement in the hydrological model or gauging technology.

4. BULK WATER TRANSFERS

4.1. PURPOSE

The primary purpose of this chapter is to describe requirements and rules for commencing, altering or ceasing bulk water transfers between storages/water sources. Any transfers involving pumping of water from Lake Yarrunga are limited by the transfer constraints in the Combined Approval for the Shoalhaven River Water Source (Chapter 2.1, Condition 14).

This chapter covers bulk water movements for water supply purposes, including:

- Water releases from Wingecarribee Reservoir to Nepean Dam or Warragamba Dam;
- Water releases from Cordeaux, Avon or Nepean dams to Pheasants Nest Weir;
- Water releases from Cataract Dam to Broughtons Pass Weir.

This chapter does not cover:

- Required releases for environmental, riparian or other purposes;
- Interchange of water between Lake Yarrunga, Bendeela Pondage and Fitzroy Falls Reservoir by Eraring Energy for power generation purposes;
- Operation of Shoalhaven Scheme infrastructure for maintenance purposes;
- Transfer of water from the Fish River Water Supply Scheme;
- Release of water for Shoalhaven City Council.

4.2. TRANSFER RULES

4.2.1. Rules for transferring from Upper Nepean Dams

- When water releases made from any Upper Nepean dam to Broughtons Pass or Pheasants Nest weirs exceed 300 ML/d, releases must not be reduced by more than 250 ML/d within 24 hours.
- Where water balancing between SCA impoundments and water quality requirements permit, more than one dam should be used.

4.2.2. Rules for transferring from Wingecarribee Reservoir

- SCA must make the water releases from Wingecarribee Reservoir to Warragamba Dam and/or Nepean Dam according to the rules in Table 5.
- Prior to commencing run of river transfers, other than for emergency or dam safety requirements, the SCA should endeavour to notify potentially affected downstream landowners.

Table 5. Transfer Rules for releases from Wingecarribee Reservoir

Transfer rules	Wingecarribee Link^a	Glenquarry Link^b
Start up phase	250 ML/d over 10 days; & 150 mm/hr rate of rise	50 ML/d; & 150 mm/hr rate of rise
Maximum transfer release rates 15 Sep – 15 Mar 16 Mar – 14 Sep Start-up between 1 Nov & 31 Jan	400 ML/d 600 ML/d 200 ML/d	400 ML/d 600 ML/d 200 ML/d
Minimum transfer release rates 1 Oct – 28 Feb 1 Mar – 30 Sep	20 ML/d 4 ML/d	5 ML/d 0 ML/d
Shut-down phase 600 ML/d transfer 400 ML/d transfer	<70 mm/hr rate of fall over 20 days <70 mm/hr rate of fall over 16 days	<50 ML/d <50 ML/d
Shutdown during heavy rain	Rate that reduces overbank flooding downstream	

Notes:

- a. Measured at Wingecarribee River at Sheepwash Bridge, flow gauge 212275;
- b. Measured at Glenquarry Creek at Alcorns, flow gauge 2122341;

4.2.3. Other Rules

- SCA must manage all transfers between storages to reduce the risk of contamination of the receiving waters by cyanobacteria when levels in source waters exceed the prevailing recreational guideline limit;
- SCA must consider downstream river conditions while increasing flow rate for water transfer. Highest flow rates provided in Table 6 are the maximum allowed;
- SCA must notify Office of Water prior to commencing or ceasing transfers (chapter 2). Office of Water may request that SCA monitor and report on the impacts of any transfers and may request alternative ramp up or ramp down rates.

5. WATER QUANTITY MEASUREMENTS

5.1. PURPOSE

This chapter describes details of SCA's water extraction measurement procedures including type of measuring devices, their locations, accuracy and maintenance/calibration regime. This chapter also explains the various groups of flow meters used by SCA to report on extractions from respective water sources and corresponding WALs.

5.2. LOGBOOK REQUIREMENT

SCA must record details of all daily inflows, extractions, releases and transfers and retain these records for at least 5 years from the date to which the information relates. SCA meets its logbook requirements under the GMWSP and its water licences and approvals by maintaining relevant records in the electronic Daily Returns System and HYDSTRA database.

SCA must provide these records to Office of Water for inspection on request.

5.2.1. Daily Returns System (DRS)

SCA must maintain the following information in the DRS:

- Date on which water was taken under an access licence;
- Volume of water extracted on that day;
- Water supply work used to extract water and relevant work approval number;
- Purpose or purposes of extractions;
- Accuracy of measuring devices and calculations.

5.3. EXTRACTION MEASUREMENTS (Attachment 5)

5.3.1. Shoalhaven River Water Source

SCA extractions for supply to customers:

- Shoalhaven City Council (SCC) Kangaroo Valley Water Filtration Plant (WFP) (A) is supplied from Bendeela Pondage. Volume measured by a flow meter in the pipeline (Attachment 4.5);
- Transfers from the Shoalhaven Water Source to Wingecarribee Dam, and then onto Nepean and Warragamba dams (B), for supply to Sydney Water Corporation (SWC);
- Volume calculated from hours of pumping at Burrawang Pumping Station;
- Retail customers (minor customers with direct metered supply) (C)

Note: Releases from Tallowa Dam for SCC extraction at Burrier not included in SCA's extraction from the Shoalhaven River Water Source.

Extraction from Shoalhaven River Water Source = A + B + C

5.3.2. Upper Nepean and Upstream Warragamba Water Source

SCA extractions for supply to customers:

- Wingecarribee Shire Council (WSC) Bowral WFP (A) is supplied from Wingecarribee Dam;
- Goulburn (B) is supplied raw water from Wingecarribee Dam;
- SWC Nepean WFP (C) is supplied from Nepean Dam;
- SWC Illawarra WFP (D) is supplied from Avon Dam.
- SWC Macarthur WFP (E) is supplied from Broughtons Pass Weir (water sourced from Cataract, Cordeaux, and Nepean dams);
- SWC Warragamba WFP (F) is supplied from Warragamba Dam;
- SWC Orchard Hills WFP (G) is supplied from Warragamba Dam;
- SWC Prospect WFP (H) is supplied with water from Cataract, Cordeaux, Nepean and Warragamba dams.
- Retail customers (minor customers with direct metered supply) (I).

At each of the above supply points the volume is measured by a flow meter in the pipeline, with the exception of Prospect WFP where there are 2 flow meters in parallel.

The extraction from this water source will be the total of the metered supply to customers minus the volume of water transferred from the Shoalhaven River Water Source under condition 5.3.1 (J).

<p>Extraction from the Upper Nepean and Upstream Warragamba water Source $= (A + B + C + D + E + F + G + I) - J$</p>
--

5.3.3. Hawkesbury and Lower Nepean Rivers Water Source

Blue Mountains storages

SCA extractions for supply to customers:

- SWC Cascades WFP (A) is supplied from Upper Cascade Dam.
- The Blue Mountains dams receive water transferred from the Fish River Water Supply (FRWS) scheme (B).

Volume measured by a flow meter in the pipeline.

The extraction from this water source will be the total of the metered supply to Cascades WFP minus the volume of water transferred from the FRWS.

<p>Extraction from the Hawkesbury and Lower Nepean Water Source = A - B</p>

5.3.4. Southern Sydney Rivers Water Source

Woronora storage

SCA extractions for supply to customers:

- SWC Woronora WFP (A) is supplied from Woronora Dam.

Volume measured by a flow meter in the pipeline.

Flow meter details (as per determined in consultation with Office of Water) in attachment 5.

<p>Extraction from the Southern Sydney Rivers Water Source = A</p>
--

5.4. QUALITY ASSURANCE AND QUALITY CONTROL

SCA must undertake all water quantity measurements (including maintenance of water quantity measurement instruments) consistent with appropriate quality assurance and quality control procedures.

6. ACCOUNTING RULES

6.1. PURPOSE

To provide details of accounting rules for Environmental Contingency Allowances (ECA) and Banked Environmental Flow (BEF) accounts.

6.2. Environmental Contingency Allowance (ECA)

- SCA is required to maintain an ECA account for each of Avon, Cataract, Nepean and Cordeaux dams:
- Office of Water may request SCA to credit ECAs with a volume of water to be set aside at the start of any water year.
- The volume of any releases made from an ECA on the request of Office of Water is to be deducted from that ECA.
- Any volumes of water remaining in an ECA at the end of a water year are to be carried into the next water year.
- Details of each ECA account are to be reported in SCA's Annual Compliance Report.

6.3. Banked Environmental Flow (BEF)

SCA must open BEF accounts for each of the following water supply works:

- Tallowa Dam and Fitzroy Falls Reservoir in the Shoalhaven Water Source;
- Warragamba Dam, Wingecarribee Reservoir, Avon Dam, Cataract Dam, Nepean Dam and Cordeaux Dam in the Upper Nepean and Upstream Warragamba Water Source; and
- Woronora Dam in the Southern Sydney Water Source.

6.3.1 Crediting of BEF accounts

SCA must credit water to a BEF account for each water source as per following:

- As agreed by Office of Water in response to any notifiable event under chapter 2;
- Any releases in excess of capacity of release constraints where these cannot be met through weekly adjustments;
- Any releases not made due to inflows exceeding current caps where these cannot be met through weekly adjustments;
- Any deficiency in releases due to errors in inflow measurements due to gauging constraints where these cannot be met through weekly adjustments;

6.3.2 Release of BEF water

- BEF water will be released in accordance with:
 - Release must be \leq inflow;
 - No negative adjustments;
 - Maintaining variability;
 - Ramping up & down to minimise impact on river health (see chapter 4.2.3).

6.3.3 Adjustment of BEF accounts

- BEF accounts are to be adjusted as follows:
 - Deduct the amount of any release requested by Office of Water;
 - Reduce at a rate of 1% per day of the total volume remaining in the BEF account*;

- Reset to zero if any water is spilling from the relevant water supply work.

* Adjustment by 1% per day is to account for evaporation and other losses and mitigates potential risks to the reliability of potable water supply as a result of the long-term storage of environmental water.

- NOW may request or approve of the transfer of BEF water between storages within the same water source (having consideration for operational constraints);

ATTACHMENT 4.1

SCA TRIM Ref D2012/XXXX

EVENT NOTIFICATION FORM

1	Water management work/s affected	Licence condition/s
2	Notification time: XX:XXxm	date: dd/mm/yyyy
	SCA notifying Officer	Office of Water Officer notified
3	Event category: Planned / Unplanned / Emergency	
	Event description and cause	
4	Estimated duration of event	
5	Estimated shortfall in daily requirement	
6	SCA proposal to make up shortfall	
7	Office of Water response	

ATTACHMENT 4.2**ENVIRONMENTAL AND OTHER RELEASE REQUIREMENTS**

Environmental and other release requirements are set out under Schedule 1 of each of SCA's Water Supply Works and Water Use Approvals.

Southern Sydney Rivers Water Source**Release Requirements for SCA's Authorised Water Supply Works in the Southern Sydney Rivers Water Source**

Water Management Work	Maximum Transparency Volume (ML/d)	Translucency Percentage	Releases for other purposes (ML/d)	WSP reference clause
Woronora Dam	4.1	20	Annual contingent high flow	36

SCA is also required to make a high flow release by 1 February each water year. The duration, volume, staging, timing and monitoring of the release is to be agreed between SCA and Office of Water by 1 November each water year. The current pattern of releases is to maintain a maximum flow of 800 ML/d as measured at the Needles (flow gauge 213211) for at least three days, plus ramp up and down to mimic a natural flow pattern.

SCA is to report on the effectiveness of the release in achieving river health objectives. Office of Water will consider the findings of each report prior to setting release requirements for the next water year.

Upper Nepean and Upstream Warragamba Water Source**Release Requirements for SCA's Water Supply Works in the Upper Nepean and Upstream Warragamba Water Source**

Water Management Work	Maximum Transparency Volume (ML/d)	Translucency Percentage	Releases for other purposes (ML/d)	WSP reference clause
Cataract Dam	14.5	20		32(4)
Cordeaux Dam	4.5	20		32(6)
Avon Dam	6.8	20		32(3)
Nepean Dam	20.1	20		32(5)
Broughtons Pass Weir ⁽¹⁾	4.4 plus all environmental flow releases from Cataract Dam	20		32(7)
Pheasants Nest Weir ⁽¹⁾	4.5 plus all environmental flow releases from Avon, Nepean and Cordeaux dams	20		32(7)
Wingecarribee Dam	3.0	nil	1	32(1), 33(1)

(1) Transparency volumes given for Pheasants Nest and Broughtons Pass weirs are for the portion of the catchment between the upstream dam wall(s) and the respective weir.

Hawkesbury and Lower Nepean Rivers Water Source

Release requirements for SCA's authorised water supply works in the Hawkesbury and Lower Nepean Water Source

Water management work	Environmental releases	Releases for other purposes (ML/d)	WSP reference clause	
Warragamba Dam ⁽¹⁾	To be decided ⁽²⁾⁽³⁾	30 (1 Nov-31 Mar) ⁽⁴⁾ 22 (1 Apr-31 Oct) ⁽⁴⁾	35(1) 35(2)	
Compensation weirs	The volume of environmental flows released in the previous 24 hour period from Pheasants Nest and Broughtons Pass weirs is to be multiplied by the following transmission loss adjustment factors:			
	Inflows greater than 80 th percentile	Inflows up to 80 th percentile but greater than 95 th percentile	Inflows up to and including the 95 th percentile	WSP reference clause
Menangle Weir	1.0	0.9	0.8	34(1)
Camden Weir	1.0	0.878	0.761	34(2)
Sharpes Weir	1.0	0.871	0.748	34(3)
Cobbity Weir	1.0	0.863	0.734	34(4)
Mount Hunter Weir	1.0	0.858	0.726	34(5)
Brownlow Hill Weir	1.0	0.856	0.721	34(6)
Theresa Park Weir	1.0	0.837	0.687	34(7)
Wallacia Weir	1.0	0.81	0.64	34(9)

Notes:

- (1) The release from Warragamba Dam may be made from the Warragamba Pipeline into Megarritys Creek using the riparian release valve.
- (2) On the commencement of the Western Sydney recycled water Initiative – Replacement Flows Project (RFP) in 2010, the interim environmental daily flow release of 33.3 ML/d from Warragamba Dam ceased and was provided for through the RFP from Boundary Creek to the Hawkesbury River.
- (3) The nature and timing of variable environmental flows from Warragamba Dam will be determined following the relevant Government decision.
- (4) Daily releases include 5 ML/d for dilution of effluent discharged from Wallacia Sewage Treatment Plant.

Minimum offtake levels have been set for each structure to preserve irrigator access entitlements during periods of low flow. If a weir pool is drawn down below this level due to over-extraction, SCA is not required to make additional releases to downstream weirs.

Office of Water has advised that SCA is deemed to have met its requirements for passing releases through the weirs if it can be demonstrated that the required release volume is passed at Wallacia Weir. This condition is to be reassessed as part of the five year review of the WSP.

Shoalhaven River Water Source

Release requirements for SCA's authorised water supply works in the Shoalhaven River Water Source

Water management work	Maximum transparency volume (ML/d)	Translucency percentage	Releases for other purposes (ML/d)	WSP reference clause
Shoalhaven Water Source				
Fitzroy Falls Dam	Five-thirds of monthly inflows as gauged at Wildes Meadow Creek			28(1)
Tallowa Dam	Monthly 80 th percentile ⁽¹⁾	20	Shoalhaven City Council town water requirements ⁽²⁾	28(2) 29

(1) See table 3.5 for monthly 80th percentile figures.

(2) Refer to Bulk Water Supply Protocols between SCA and Shoalhaven City Council for town water requirements

Environmental release requirements for Tallowa Dam include a maximum transparency volume as set out for each calendar month, plus 20 percent of inflows in excess of that volume. SCA is also required to release town water requirements according to the Bulk Water Supply Protocols between SCA and Shoalhaven City Council.

Monthly transparent environmental release thresholds for Tallowa Dam

Month	Monthly 80 th percentile flow threshold (ML/d)
January	150
February	161
March	182
April	259
May	298
June	334
July	371
August	332
September	299
October	281
November	256
December	179

Note: the estimated 80th percentile inflows for Tallowa Dam should be reassessed once every 5 years after July 2009, in consultation between SCA and NOW.

ATTACHMENT 4.3

STEPS TO CALCULATE ENVIRONMENTAL FLOWS FROM CATARACT, CORDEAUX, AVON AND NEPEAN DAMS AND BROUGHTONS PASS WEIR AND PHEASANTS NEST WEIR

16 September 2011

CATARACT DAM

The automated system in Daily Return System (DRS) will be programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Cataract Dam

- The system picks up latest inflow data up to 8:00 am for the day for the site 2122323 (Cataract River at Corrimal No. 1 which measures runoff from 7% of Cataract Dam catchment) and site 2122322 (Loddon River at Bulli Appin Road which measures runoff from 13.776% of Cataract Dam catchment). If no data is available, system will use the latest available data.
- The sum of daily inflow from the two sites is multiplied by a factor of **3.13** (ie. 0.65 divided by 0.20776 to account for rainfall variability and scaling up of measured flow in sub catchments to the whole catchment) to estimate inflow to the Cataract Dam for the day.

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric site and mass balancing method which causes over or under releases, the environmental flow is calculated using a maximum cap of 267 ML/d as follows:

If **Inflow** ≤ 14.5 ML then Environmental Release = **Inflow** ML

If **14.5** < **Inflow** ≤ 1277 ML then Environmental Release = (**14.5** + 0.2 x (**Inflow** – **14.5**)) ML

If **Inflow** > 1277 ML then Environmental Release = **267** ML

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows:

Adjusted Required Release = Calculated Required Release + Adjusted
Release Required

Step 4: Weekly Thursday Mass Balance for Cataract Dam

- On Thursday every week, system undertakes mass balance for the previous 7 days period (i.e. Thursday 8:00 am to Thursday 8:00 am).
- Using total volume of inflow using mass balance and measured inflows for the previous week, system first corrects the daily inflows calculated using measured flows then calculates Required Total Environmental Flow for the previous week using 80/20 environmental flow rule for Cataract Dam as follows:

If **Inflow** ≤ 14.5 ML then Environmental Release = **Inflow** ML

If **Inflow** > 14.5 ML then Environmental Release = (**14.5** + 0.2 x (**Inflow** – **14.5**)) ML

- System calculates the difference between Actual Total Environmental Flow and Required Total Environmental Release and **Daily Adjustment for Next Week** is calculated by dividing the difference by 7.

After step 4 is complete, step 1 to 3 is repeated to calculate daily environmental releases for the next 7 days.

CORDEAUX DAM

The automated system in Daily Return System (DRS) will be programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Cordeaux Dam

- The system picks up latest inflows up to 8:00 am for the day for three hydrometric sites. If no data is available, system will resort back to previous day 8:00 am data.
- The sum of flows from three sites are multiplied by a factor of **3.5** (ie. 0.7 divided by 0.2 to account for rainfall variability and scaling up of measured flows in upper sub-catchments to the whole catchment) gives the estimated inflow to the Cordeaux Dam for the day.

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric stations and mass balancing method which causes over or under releases, the environmental flow is calculated using a maximum cap of 141 ML/d as follows:

If **Inflow** ≤ 4.5 ML then Environmental Release = **Inflow** ML

If **4.5** < **Inflow** ≤ **687** ML then Environmental Release = (**4.5** + 0.2 x (**Inflow** – **4.5**)) ML

If **Inflow** > **687** ML then Environmental Release = **141** ML

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows:

Adjusted Required Release = Calculated Release + Average Daily Adjusted Release

Step 4: Weekly Wednesday Mass Balance for Cordeaux Dam

- On Thursday every week, system undertakes mass balance for the previous 7 days period (i.e. Thursday 8:00 am to Thursday 8:00 am).
- Using total volume of inflow using mass balance and measured inflows for the previous week, system first corrects the daily inflows calculated using measured flows and then calculates Required Total Environmental Flow for the previous week using 80/20 environmental flow rule for Cordeaux Dam as follows:

If **Inflow** ≤ 4.5 ML then Environmental Release = **Inflow** ML

If **Inflow** > 4.5 ML then Environmental Release = (**4.5** + 0.2 x (**Inflow** – **4.5**)) ML

- System calculates the difference between Actual Total Environmental Flow and Required Total Environmental Release and **Daily Adjustment for Next Week** is calculated by dividing the difference by 7.

After step 4 is complete, step 1 to 3 are repeated to calculate daily environmental releases for the next 7 days.

AVON DAM

The automated system in Daily Return System (DRS) is programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Avon Dam

- The system picks up latest inflows up to 8:00 am for the day for both gauging stations. If no data is available, system will resort back to previous day 8:00 am data.
- The sum of flows from both sites are multiplied by a factor of **6.938** (i.e. 0.8 divided by 0.1153 to account for rainfall variability and scaling up of measured flows upper sub-catchment to the whole catchment) gives the estimated inflow to the Avon Dam for the day. Step 1 shows inflow data and calculated inflows in columns 2 to 5 in top table in Daily Return System (**Attachment 2**).

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric stations and mass balancing method which causes over or under releases, the environmental flow is calculated using a maximum cap of 150 ML/d as follows:

If **Inflow** ≤ **6.8** ML then Environmental Release = **Inflow** ML

If **6.8** < **Inflow** ≤ **722.8** ML then Environmental Release = **(6.8 + 0.2 x (Inflow – 6.8))** ML

If **Inflow** > **722.8** ML then Environmental Release = **150** ML

Column 6 in top table in DRS shows the calculation in step 2 (**Attachment 2**).

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows (**Attachment 2**):

Adjusted Required Release (Col 8) = Calculated Required Release (Col 6) + Adjusted Release Required (Col 7)

Column 9 shows the actual release made from the Avon Dam for the day.

Step 4: Weekly Wednesday Mass Balance for Avon Dam

- On Wednesday every week, system undertakes mass balance for the previous 7 day period (ie. Wednesday 8:00 am to Wednesday 8:00 am).
- Using total volume of inflow using mass balance and measured inflows for the previous week (Column 5), system calculates Required Total Environmental Flow for the previous week (i.e. column 4 in bottom table in DRS) using 80/20 environmental flow rule for Avon Dam as follows:

If **Inflow** ≤ **6.8** ML then Environmental Release = **Inflow** ML

If **Inflow** > **6.8** ML then Environmental Release = **(6.8 + 0.2 x (Inflow – 6.8))** ML

- System calculates the difference between Actual Total Environmental Flow (Column 2) and Required Total Environmental Release (Column 4) and **Daily Adjustment for Next Week** (Column 5) is calculated by dividing the difference by 7.

After step 4 is complete, step 1 to 3 is repeated to calculate daily environmental releases for the next 7 days.

NEPEAN DAM

The automated system in Daily Return System (DRS) is programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Nepean Dam

- The system picks up latest instantaneous inflows up to 8:00 am for the day for both gauging stations. If no data is available, system will resort to previous day 8:00 am data.
- The sum of flows from both sites are multiplied by a factor of **1.103** (ie. 0.8 divided by 0.7247 to account for rainfall variability and scaling up of measured flows in sub catchments to the whole catchment) to determine the estimated inflow to Nepean Dam for the day.
- During transfer from Shoalhaven, estimate daily inflow to Nepean Dam by multiplying measured inflow at Burke River at Nepean Dam Inflow (Site N2) by **2.559** (i.e. 0.7 divided by 0.2735 to eliminate the impact of Shoalhaven transfer on estimation of daily inflow).

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric stations and mass balancing method resulting in over or under releases, the environmental flow is calculated using a maximum cap of 459 ML/d as follows:

If **Inflow** ≤ **20.1** ML then Environmental Release = **Inflow** ML

If **20.1** < **Inflow** ≤ **2214.6** ML then Environmental Release = (**20.1** + 0.2 x (**Inflow** – **20.1**)) ML

If **Inflow** > **2214.6** ML then Environmental Release = **459** ML

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows:

Adjusted Required Release = Calculated Required Release + Adjusted Release Required

Step 4: Weekly Wednesday Mass Balance for Nepean Dam

- On Thursday every week, system undertakes mass balance for the previous 7 day period (i.e. Thursday 8:00 am to Thursday 8:00 am).
- Using total volume of inflow using mass balance and measured inflows for the previous week (Column 5), system calculates Required Total Environmental Flow for the previous week using 80/20 environmental flow rule for Nepean Dam as follows:

If **Inflow** ≤ **20.1** ML then Environmental Release = **Inflow** ML

If **Inflow** > **20.1** ML then Environmental Release = (**20.1** + 0.2 x (**Inflow** – **20.1**)) ML

- System calculates the difference between Actual Total Environmental Flow and Required Total Environmental Release and **Daily Adjustment for Next Week** is calculated by dividing the difference by 7.

After step 4 is complete, step 1 to 3 is repeated to calculate daily environmental releases for the next 7 days.

BROUGHTONS PASS WEIR

The automated system in Daily Return System (DRS) will be programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Broughtons Pass Weir

First daily inflow to Cataract Dam is calculated as per the submission D2009/05406 followed by inflow to Broughtons Pass Weir as follows:

$$\text{Inflow at Broughtons Pass Weir} = 0.24 \times \text{Inflow at Cataract}$$

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric site and mass balancing method which causes over or under releases, the environmental flow is calculated using a maximum cap of 64 ML/d as follows:

If **Inflow** \leq 4.4 ML then Environmental Release = **Inflow** ML

If $4.4 < \text{Inflow} \leq 302$ ML then Environmental Release = $(4.4 + 0.2 \times (\text{Inflow} - 4.4))$ ML

If **Inflow** $>$ 302 ML then Environmental Release = 64 ML

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows:

$$\text{Adjusted Required Release (ER}_{BP}) = \text{Calculated Required Release} + \text{Adjusted Release Required}$$

Step 4: Total Environmental Release

Total daily environmental release from Broughtons pass Weir (**BP**_{Eflow}) would be as follows:

$$\text{BP}_{Eflow} = \text{ER}_{BP} + (\text{ER}_{CATARACT})_{\text{Previous day}}$$

In the absence of actual information, it is assumed that it takes 24 hours for the environmental release from Cataract Dam to arrive at Broughtons Pass Weir.

Step 5: Weekly Thursday Mass Balance for Broughtons Pass

- On Thursday every week, system undertakes mass balance for the previous 7 day period (i.e. Thursday 8:00 am to Thursday 8:00 am).
- Weekly volume of inflow for Broughtons Pass = 0.24 x weekly mass balance for Cataract.
- Using total volume of inflow using mass balance and measured inflows for the previous week, system first corrects the daily inflows calculated using measured flows then calculates Required Total Environmental Flow for the previous week using 80/20 environmental flow rule for Broughtons Pass Weir as follows:

If **Inflow** \leq 4.4 ML then Environmental Release = **Inflow** ML

If **Inflow** $>$ 4.4 ML then Environmental Release = $(4.4 + 0.2 \times (\text{Inflow} - 4.4))$ ML

- System calculates the difference between Actual Total Environmental Flow and Required Total Environmental Release and **Daily Adjustment for Next Week** is calculated by dividing the difference by 7.

After step 5 is complete, steps 1 to 4 are repeated to calculate daily environmental releases for the next 7 days.

PHEASANTS NEST WEIR

The automated system in Daily Return System (DRS) will be programmed to calculate environmental release for a given day using the following steps:

Step 1: Estimate Inflow to Pheasants Nest Weir

First daily inflow to Avon Dam is calculated as per the submission D2008/04269 followed by inflow to Pheasants Nest Weir as follows:

$$\text{Inflow at Pheasants Nest Weir} = 0.38 \times \text{inflow at Avon}$$

Step 2: Calculation of Required Release

In order to minimise discrepancy between weekly volume of inflows using measured flows at hydrometric site and mass balancing method which causes over or under releases, the environmental flow is calculated using a maximum cap of 57 ML/d as follows:

If **Inflow** \leq 4.5 ML then Environmental Release = **Inflow** ML

If **4.5** < **Inflow** \leq 267 ML then Environmental Release = **(4.5 + 0.2 x (Inflow – 4.5))** ML

If **Inflow** > 267 ML then Environmental Release = **57** ML

Step 3: Calculation of Adjusted Required Release

Required release for the day is calculated as follows:

$$\text{Adjusted Required Release (ER}_{\text{PN}}) = \text{Calculated Required Release} + \text{Adjusted Release Required}$$

Step 4: Total Environmental Release

Total daily environmental release from Broughtons Pass Weir (**BP**_{Eflow}) would be as follows:

$$\text{PN}_{\text{Eflow}} = \text{ER}_{\text{PN}} + (\text{ER}_{\text{CORDEAUX}} + \text{ER}_{\text{AVON}} + \text{ER}_{\text{NEPEAN}})_{\text{Previous day}}$$

In the absence of actual information, it is assumed that it takes 24 hours for environmental releases from Cordeaux, Avon and Nepean dams to arrive at Pheasants Nest Weir.

Step 5: Weekly Thursday Mass Balance for Pheasants Nest

- On Thursday every week, system undertakes mass balance for the previous 7 day period (i.e. Thursday 8:00 am to Thursday 8:00 am).
- Weekly volume of inflow for Pheasants Nest = 0.38 x weekly mass balance for Avon.
- Using total volume of inflow using mass balance and measured inflows for the previous week, system first corrects the daily inflows calculated using measured flows then calculates Required Total Environmental Flow for the previous week using 80/20 environmental flow rule for Pheasants Nest Weir as follows:

If **Inflow** \leq 4.5 ML then Environmental Release = **Inflow** ML

If **Inflow** > 4.5 ML then Environmental Release = **(4.5 + 0.2 x (Inflow – 4.5))** ML

- System calculates the difference between Actual Total Environmental Flow and Required Total Environmental Release and **Daily Adjustment for Next Week** is calculated by dividing the difference by 7.

After step 5 is complete, steps 1 to 4 are repeated to calculate daily environmental releases for the next 7 days.

ATTACHMENT 4.4

FLOW RELEASE INFRASTRUCTURE AND CONSTRAINTS

Water management work location	Release arrangements	Release measurement arrangement	Range of safe release	Maximum estimated inflow equivalent
Warragamba Dam	<p>Various sized orifice plates can be fitted on the outlet of a 450mm riparian valve installed on Pipeline No.1 to discharge water into Megarritys Creek.</p> <p>The Hydro Electric Power Station (HEPS) can release flow at a rate of up to 5000 ML/d.(this plant is currently out of commission)</p> <p>Orifice plates can also be fitted on a 250mm valve on an alternate release point on Pipeline #2 at Nepean River crossing.</p>	<p>Theoretical calculations for orifice plates are based on water level in the dam.</p> <p>In-stream verification from gauging (Megarritys Creek)</p>	5 – 120 ML/d	N/A
Nepean Dam	<p>New outlet pipe, DN300 FCD3, connected to an existing tee from the Avon Dam transfer off-take pipe.</p> <p>Higher environmental flows are released through the existing large cone valve outlets DN900 FCD1 and DN900 FCD2.</p>	<p>Low environmental flow outlet: magnetic flow meter.</p> <p>Supply / high flow outlets: ultrasonic flow meters.</p> <p>Readings from all flow meters are displayed both at the site control cabinets and on SWC IICATS system.</p> <p>Flow can also be measured at the Nepean River at Avon Dam Road stream gauging station (Station No. 212204).</p> <p>Main supply outlet valves' Rating table.</p>	1-1340 ML/d	6620 ML/d

Water management work location	Release arrangements	Release measurement arrangement	Range of safe release	Maximum estimated inflow equivalent
Avon Dam	<p>The new outlet works with enlarged existing scour outlet at the base of the dam can access storage up to 55 m below FSL. The new outlet has a combination of three valves, DN900 FCV1501, DN450 FCV1502 and DN300 FCV1503 cone valves that will permit the release of water in the range 1-1330 ML/d at FSL.</p> <p>A new pipe links the upper level outlets with the scour outlet manifold to enable release of low flows (1-135 ML/d) below the current capacity of the upper level outlets.</p> <p>Main supply outlet has two 750 mm FCD Valves. Releases ranging from 17 to 1,350 ML/d can be made when the dam is full and 15 – 1,200 ML/d can be made when the dam is 60% full (6.1 m below FSL).</p> <p>Releases from the upper valves are currently restricted to a minimum flow velocity of around 650 ML/d as lower velocities will not reach the protective apron, resulting in erosion of the channel bed.</p>	<p>Flow can also be measured at flow gauge 212210 Avon River at Avon Weir.</p> <p>Three Magflow meters are fitted at the manifold on the new main eflow outlet. For main supply outlet valves discharge rating table.</p>	1 – 1050 ML/d	5223 ML/d
Cordeaux Dam	<p>The new eflow arrangement has a DN200 FCD valve and a galvanised steel shroud.</p> <p>Higher environmental flows are released through two existing large cone valves: DN750 FCD1, DN750 FCD2</p>	<p>Magnetic flow meter on low environmental flow outlet.</p> <p>Ultrasonic flow meters on high environmental flow outlets. Readings from all flow meters are displayed both at the site control cabinets and on SWC IICATS system.</p>	1 – 750 ML/d	3732 ML/d

Water management work location	Release arrangements	Release measurement arrangement	Range of safe release	Maximum estimated inflow equivalent
		Flow can also be measured at the Cordeaux River at Cordeaux Weir stream gauging station (Station No. 212221). For main supply outlet valves discharge ratings as per rating table.		
Cataract Dam	The new eflow arrangement has a DN100 Globe valve. It was extended with DN100 DICL pipe and features electronically controlled twin solenoid valves to cater for low environmental flows 0-5 ML/d. Main supply outlet, which can also be used to release high environmental flows, has two DN 500 FCD Valves. Releases ranging from 5 to 740 ML/d can be made when the dam is full and 5 to 700 ML/d can be made when the dam is 60% full (5.2 m below FSL).	Magnetic flow meter on low environmental flow outlet. Ultrasonic flow meters on main supply outlets. For main supply outlet valves discharge ratings as per rating table. Flow can also be measured at the Cataract River at Jordans Crossing stream gauging station (Station No. 212231).	1 – 600 ML/d	2942 ML/d
Pheasants Nest Weir	Environmental flow releases can be made as follows: <ul style="list-style-type: none"> • Firstly via a 1.2 m w x 1.1 m d gate with a v-notch. • Secondly through the fishway, • Thirdly through controlled spill. The Nepean Tunnel Gate is used to regulate pool level to meet the environmental flow requirement. Environmental flows can be released on site through an HMIU (Human Machine Interface Unit – touch screen based connected to a PLC) and switches with flow and valve position being	Flow rate is based on theoretical calculation and rating tables.	N/A	

Water management work location	Release arrangements	Release measurement arrangement	Range of safe release	Maximum estimated inflow equivalent
	displayed on the HMIU. Flows can also be released remotely via SCA SCADA system.			
Broughtons Pass Weir	Environmental flow releases can be made as follows: <ul style="list-style-type: none"> • Firstly via a DN300 FCD valve located on weir scour pipe. • Secondly via a 2 w x1.65d vertical slide gate. • Thirdly through controlled spill. Environmental flows can be released on site through an HMIU and switches with flow and valve position being displayed on the HMIU. Flows can also be released remotely via SCA SCADA system.	Flow rate is based on theoretical calculation and rating tables	N/A	
Woronora Dam	Works consist of one DN 375 FCD valve for low flows and two DN900 FCD valves for high flows.	Flow is based on valve rating tables. Flow gauge 213211 at the Needles in the Woronora River is used to measure the high flow releases.	1 – 800 ML/d	3984 ML/d
Tallowa Dam	Environmental releases can be made as follows: <ul style="list-style-type: none"> • DN750 diameter pipeline - surface releases via SWDOF chamber and automatically operated gate 2 m wide — gate range 5.18 below FSL to 1.16 m above FSL. Pipeline capacity physically limited to 200ML/d. • Overshot gate automatically operated 2m wide x 1.5 m deep - capacity 700 ML/d if water level at FSL • Spillway - unchanged capacity • Two manually operated slide gates, located 20 m below FSL, can also control flow releases. When the dam is full, the total 	Curve for the control gates is as per rating tables. Flow gauge 215216 located at Grassy Gully No.2 on the Shoalhaven River just downstream of the release location can also be used to measure the released flow.	1 – 860 ML/d (surface water)	Varies from 3700 ML/d in July to 2816 ML/d in January

Water management work location	Release arrangements	Release measurement arrangement	Range of safe release	Maximum estimated inflow equivalent
	release rate possible is 50-4,000 ML/d.			
Fitzroy Falls Reservoir	<p>Five valves (3 x DN450 and 2 x DN200) are used for environmental releases.</p> <p>An electrically powered actuator operates these valves. The valves are adjusted to provide the required flow rate.</p>	<p>Flows from valves as per rating tables.</p> <p>Flow gauge 215234 located at Fitzroy Falls in Yarrunga Creek measures released flow.</p>	1 - 290 ML/d	N/A
Wingecarribee Reservoir	<p>Environmental and riparian flows are released by a manually operated DN450 FCD valve.</p> <p>A manually operated slide gate can release up to 2690ML/d at FSL</p>	<p>As per rating tables.</p> <p>Flow gauge 212275 in Wingecarribee River at Sheepwash Bridge is used to measure the released flow.</p>	1 – 75 ML/d	N/A

80th Percentile and 95th Percentile Flows for Metropolitan Dams and Water Supply Diversion Weirs.

Dam/Weir	80%ile Flow (ML/d)	95%ile Flow (ML/d)
Cataract	14.5	0.2
Cordeaux	4.5	0.1
Avon	6.8	0.0
Nepean	20.1	0.0
Broughtons Pass	4.4	0.0
Pheasants Nest	4.5	0.0
Woronora	4	1.5

ATTACHMENT 4.5

FLOW METER DETAILS

Plant	Owner/operator of Plant	Location of flow meters	IICATS RTU	IICATS POINT	Flow meter no.	Type	Make	Model	Zone	Easting	Northing	Accuracy of meter
Cascade	SWC	Raw Water Inlet	W.TREATMENT.WT0041 CASCADE.WT0041_A_	RAW_WT R.Flow Totalised	FE2053	Electromagnetic	Siemens	MAG6000	56	250006	6268784	2%
Orchard Hills	SWC	Raw water	W.TREATMENT.WT0014 ORCHARD HILLS WT0014	RAW_WT R.Flow Totalised	F213	Electromagnetic	Danfoss	MAG6000	56	287751	6257420	2%
Warragamba	SWC	Raw water	W.TREATMENT.WT0013 WARRAGAMBA.WT0013	FTX0001. Flow Totalised	WT013F01	Electromagnetic	Siemens	MAG6000	56	277828	6247245	2%
Nepean	SWC	Raw Water Inlet	W.TREATMENT.WT0008 NEPEAN.WT0008	FTX1001. Flow Totalised	F10001	Electromagnetic	Siemens	MAG6000	56	280438	6198182	2%

Plant	Owner/operator of plant	Location of flow meters	IICATS RTU	IICATS POINT	Flow meter no.	Type	Make	Model	Zone	Easting	Northing	Accuracy of meter
Prospect	BOO - Degremont	Discharge - North	W.TREATMENT.WT0015 PROSPECT.WT0015	FTX09.Flow Totalised (Nth)	FE402011	Ultrasonic	Sonoflo	Sono 3000	56	304901	6254077	2%
	BOO - Degremont	Discharge - South	W.TREATMENT.WT0015 PROSPECT.WT0015	FTX08.Flow Totalised (Sth)	FE402021	Ultrasonic	Sonoflo	Sono 3000	56	304901	6254077	2%
Macarthur	BOO - MWPL	Raw Water Sugarloaf	W.TREATMENT.WT0046 MACARTHUR.WF0627	FTX01.Flow Totalised	FE - 2003	Electromagnetic	Siemens	MAG6000	56	294791	6211281	2%
Illawarra (Avon)	BOO - Veolia	Farmborough-raw water	W.TREATMENT.WT0044 KEMBLA.GRANGE.WT0044	RAW_WTR.Flow Totalised	FT2100	Ultrasonic	Danfoss Sonoflo	Sono 3000	56	298643	6184028	2%
	BOO - Veolia	BHP supply - raw water	W.TREATMENT.WT0044 KEMBLA.GRANGE.WT0044	IND_WTR.Flow Totalised	FT8101	Ultrasonic	Danfoss Sonoflo	Sono 3000	56	298643	6184028	2%
Plant	Owner/operator of Plant	Location of flow meters	IICATS RTU	IICATS POINT	Flow meter no.	Type	Make	Model	Zone	Easting	Northing	Accuracy of meter

Woronora	BOO - Veolia	Discharge	W.TREATMENT.WT0048 WORONORA.WT0048	FTX01.Flow Totalised	FT5300	Ultrasonic	Danfoss Sonoflo	Sono 3000	56	309443	6223406	2%
Wingecarribee	SCA	Raw Water Inlet, near riparian release valve	W.SCA. WINGECAR RIBEE.WD0008	FTX01.Flow Totalised	6015457	Electromagnetic	Rosemount	MAG	56	269084	6175146	2%
Shoalhaven	SCC	Raw Water Inlet, inside SCC chlorination room	KANGAROO _WA19RGS 02	FTX01.Flow Totalised	EFT1211A OY1A1A1		ABB	MAG	56	269214	6154649	2%
Goulburn Mulwaree		Raw Water Inlet, near riparian release valve	W.SCA. WINGECAR RIBEE.WD0008	FTX3102. Flow Totalised	3K22/79310	Electromagnetic	ABB	MAG	56	269084	6175146	2%

5. DICTIONARY

Words and expressions that appear in this licensing package including water access licence and water supply work & use approval have the meanings set out in this Dictionary. Words and expressions defined in this Dictionary and that appears in the Dictionary of the Water Management Act 2000 (WMA) are the same. A reference in this Dictionary to a section is a reference to a section of the WMA.

Access licence means an access licence referred to in section 56.

Altered water release events are water releases that vary from the water release rates required under this Approval.

Approval means a water supply work and use approval.

Bulk raw water is water that has not been treated at a water filtration plant.

Compensation weirs are those weirs along the Nepean River between Menangle and Wallacia that were originally built to provide water to landholders along the river during low flows, following the construction of large water supply dams upstream.

Contingency flow is a flow release required to achieve a specific river health outcome, such as enhancing fish breeding or flushing cyanobacterial blooms. It is in addition to normal environmental flow requirements.

Dead storage means the portion of a water storage capacity that is equal to the volume of water below the level of the lowest outlet (the minimum supply level). This water cannot be accessed under normal operating conditions.

Emergency may include an event that is pending, or an event that has already occurred but could not be reasonably foreseen or scheduled, including occurrences such as:

- a) major infrastructure failures, or
- b) a water contamination incident that may place the Approval Holder in serious breach of either its Operating Licence or the *Protection of the Environment Operations Act 1997* (NSW), or
- c) declared disasters or any other event considered by the Ministerial Corporation to constitute an actual or potential emergency.

Environment includes all aspects of the surroundings of human beings, whether affecting them as individuals or in their social groupings.

Environmental contingency allowance (ECA) is a volume of water held in storage from which releases are made for particular environmental purposes or in response to particular environmental circumstances.

Full Supply Level (FSL) means the normal maximum water level of a water storage when not affected by floods.

Logbook in relation to an access licence or water supply work approval, means a written record, kept in hard copy or electronic form, which accurately records all information required to be kept in relation to the access licence or water supply work approval under the rules of this Plan.

Megalitre (ML) means one megalitre, which is equivalent to 1,000,000 litres.

Minister means the Minister responsible for the Water Management Act 2000. The Minister may delegate functions under section 389.

Outlet (works) (conduit) means infrastructure built to control the release of water from a water impoundment or distribution system.

Percentile (flow rate) is the flow rate that is exceeded for that percentage of the relevant unit of time (usually year). The value of the percentile varies depending on the period length analysed. For example, the 95th percentile is the flow that is exceeded 95 percent of the time.

Receiving waters refers to all impoundments, streams, rivers, ponds, lakes, and estuaries that receive water from another impoundment.

River includes:

- a) any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and
- b) any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and
- c) anything declared by the regulations to be a river,

whether or not it also forms part of a lake or estuary, but does not include anything declared by the regulations not to be a river.

Source waters are those impoundments from where water is extracted, for example for transfer to another impoundment (receiving waters).

Spill means the uncontrolled discharge of water from an impoundment to the natural watercourse when the storage level rises above the full supply level.

Start up phase occurs at the beginning of a period of water transfer from the Shoalhaven Water Source to the Hawkesbury Nepean Water Source along a natural watercourse. Very rapid increases in flow may cause environmental, structural or other harm along a river. Increases in flow must be made in a stepped manner.

Total active storage means the entire volume of water in the water storage at Full Supply Level minus the volume of dead storage capacity.

Note: Applicable dams for the calculation of SCA's total active storage are Cataract, Cordeaux, Avon, Nepean, Woronora, Warragamba, Prospect, Wingecarribee, Fitzroy Falls, Tallowa and the combined Blue Mountains storages.

Transparent flow release is a release of water from a dam or weir that is equal to the inflow volume.

Translucent flow release is a release of water from a dam or weir that is equal to a proportion of the inflow volume (e.g. 20%).

Transmission losses are any loss of water volume, through natural influences such as evaporation or seepage, which occurs as water travels down a river.

Unregulated river means a river that is not declared by the Minister to be a regulated river.

Water allocation means the water to which the holder of an access licence is entitled from time to time under the licence, as recorded in the water allocation account for the licence.

Water management area means an area of land that is constituted as a water management area by an order in force under section 11.

Water source means the whole or any part of:

- a) one or more rivers, lakes or estuaries; or
- b) one or more places where water occurs naturally on or below the surface of the ground;

and includes the coastal waters of the State.

Water supply work means:

- a) a work (such as a water pump or water bore) that is constructed or used for the purpose of taking water from a water source;
- b) a work (such as a tank or dam) that is constructed or used for the purpose of:
 - i. capturing or storing rainwater run-off; or
 - ii. storing water taken from a water source;
- c) a work (such as a water pipe or irrigation channel) that is constructed or used for the purpose of conveying water to the point at which it is to be used;
- d) any work (such as a bank or levee) that has the effect of diverting away from a water source any overflow from the water source; or
- e) any work (such as a weir) that has the effect of impounding water in a water source;

including a reticulated system of such works, and includes all associated pipes, sluices, valves and equipment, but does not include:

- f) any work (other than a water supply work under the control or management of the Sydney Water Corporation, the Hunter Water Corporation or a local water utility) that receives water from a water supply work under the control or management of the Sydney Water Corporation, the Hunter Water Corporation or a local water utility; or
- g) any work declared by the regulations not to be a water supply work.

Water supply work approval means an approval referred to in section 90 (2).

Water year means a year commencing 1 July.

ABBREVIATIONS

AHD	Australian Height Datum (elevation relative to standardised mean sea level)
NOW	NSW Office of Water
FSL	Full supply level (as designed)
GPS	Global Positioning System
m	Metre
ML	Megalitre
ML/d	Megalitres per day
NSW	New South Wales