NSW GOVERNMENT | Dams Safety Committee

Dams Safety Committee

Annual Report

2013 / 2014

NSW DAMS SAFETY COMMITTEE

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BUSINESS AND SERVICE HOURS ARE NORMALLY

9.30 am to 4.00 pm MONDAY to FRIDAY

Please note that the NSW Dams Safety Committee (DSC) only has a small number of technical staff who are often away from the office on inspections. Accordingly, technical questions may not be able to be answered immediately, although every effort will be made to pass on messages to ensure a prompt response.

Cover Picture: *Bulga CHPP Dam. This zoned earthfilled dam in the Hunter Valley is owned by Xstrata Bulga Coal Management Pty. Ltd. Completed in 2011, it is 14m high and has a storage capacity of 3,000ML. The dam provides a more secure water supply to the Coal Handling & Preparation Plant (CHPP) at Bulga Coal Mine and also additional onsite storage surge capacity.*

NOTE: In accordance with Premier & Cabinet's Memorandum M2013-09, the Committee has only printed in-house a limited number of hard copies (in black and white). Report distribution will be substantially electronic.

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NSW GOVERNMENT | Dams Safety Committee

ABN 55 079 703 705

The Hon Kevin Humphries, MP
Minister for Natural Resources, Lands and Water
Minister for Western NSW
Parliament House
SYDNEY NSW 2000

Locked Bag 5123

PARRAMATTA NSW 2124
Phone: (02) 9842 8073
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Our Ref: 10.102.007

Dear Mr Humphries,

We have pleasure in submitting to you, for presentation to Parliament, the NSW Dams Safety Committee's Annual Report for the year ended 30th June 2014.

This Annual Report has been prepared in accordance with the *Annual Reports (Statutory Bodies) Act 1984* and the *Annual Reports (Statutory Bodies) Regulation 2010.*

Yours sincerely,

Brian Cooper
Chairman

Jeffrey Gleeson
Deputy Chairman

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Our Objectives

The mission of the NSW Dams Safety Committee (DSC), an independent statutory body, is to ensure the safety of prescribed dams. To achieve its mission, the DSC has set a number of objectives which are defined in the DSC's Strategic Plan for 2009 to 2014 and are aligned with the requirements of the *Dams Safety Act 1978* which constitutes the DSC and defines its functions. Under its Act, the DSC has roles to:

- Protect the safety, welfare and interests of the community from dam failure by ensuring that risks from prescribed dams are tolerable;
- Ensure that DSC safety requirements are met, that risks are properly managed, are regularly reviewed, and are further reduced to a level as low as reasonably practicable; and
- Ensure the risks to dams and their stored waters from the effects of mining are properly managed and tolerable.

The DSC is also empowered with various enabling functions under the *Mining Act 1992* in its role of regulating mining under stored waters to fulfil the last mentioned role.

To achieve its roles, the DSC follows a goals-based approach to dam safety regulation. With such regulation, the means of achieving compliance is not specified but goals are set that allow alternatives for achieving compliance. The responsibility for dam safety lies principally with the dam owner while the DSC has a challenge/audit role. The dams of interest to the DSC are the 378 prescribed dams (as at 30th June 2014) whose failure would threaten lives or have significant economic impacts or cause serious environmental damage.

Water and tailings dams have failed in a number of countries during the year. Some of these international dam incidents resulted in loss of life and all had damaging consequences. It is thus recognised, both in Australia and internationally, that well organised, and regulated, risk based dam safety programs are essential to maintain the requisite levels of dam safety.

Over the last three decades the DSC has continued to ensure that mine owners develop a comprehensive scientific understanding of the effects of mining on stored waters and dams through detailed monitoring and research. This combination of an extensive local knowledge base, in conjunction with greater sophistication in monitoring technology, has resulted in the DSC having improved confidence to support the continued safe extraction of coal from under NSW storages.

Targets

The DSC's targets are presented in Sub-section 5.2 and the associated Table 5.2 of this report. The main focus is on the maintenance of the programs for Surveillance Reports, dam inspections and Dam Safety Emergency Plans (DSEPs). Another main focus is on dam owners having schedules agreed with the DSC for activities leading to safety improvements on dams with higher risks than tolerable or otherwise have not yet met important safety management requirements. In this way the DSC can monitor progress and follow-up issues in a timely manner. The targets stated in the DSC's Strategic Plan were substantially met whilst maintaining DSC expenditure within budget.

Highlights

The DSC continued implementing the strategies and programs presented in the current medium term Strategic Plan. Changes to that Plan, and any necessary subset business plan updates, will be made in the future as the government's current review of the dams safety regulatory framework progresses and ensuing changes to the *Dams Safety Act 1978* follow.

In October 2013 the DSC won a joint award with the SES at the 2013 Resilient Australia Awards – for "Guidelines for Defining Dam Failure Warning and Evacuation Areas". It was the winner in the State and Territory Government Category and one of the major awards for this prestigious annual awards event.

During 2013/14 further works continued at Hume Dam, with the completion of the southern training wall buttressing works. Following the completion of the long awaited and complex hydrology/flood capacity upgrading study, the DSC is working with the owner and operator to determine appropriate final stage flood upgrading works for this dam.

The DSC has continued to liaise closely with Crown Lands on the required investigation studies for its Bethungra Dam. Although it will still need some spillway capacity upgrading works, detailed dambreak and associated studies undertaken during 2013/14 enabled Bethungra Dam's Consequence Category to be lowered and the works extent lessened.

The DSC has also continued to liaise closely with State Water Corporation (SWC) on further reduction of risks at several of its dams. At SWC's Wyangala Dam, safety improvements have been implemented and construction works are underway. At SWC's Chaffey Dam, contract construction work will commence in 2014 and involve a raising of the full supply level for increased water supply/demand purposes and also a raising of the dam wall as the final part of a staged flood security upgrade. During the financial year SWC effectively completed a detailed risk based review of all its dams and the DSC thanks the SWC for the cooperation it has given to the DSC in proceeding with its staged dams upgrade program.

The Sydney Catchment Authority (SCA) continued with investigations relating to safety reviews of Nepean and Warragamba Dams. Construction works for upgrading the embankment of the SCA's Prospect Dam were commenced in 2013/2014 and will be completed by the end of 2014. The DSC thanks the SCA for the cooperation it has given to the DSC in proceeding with its dams upgrade and review program.

During 2011/12 the DSC used its legal avenues to issue an S18 Notice to Mid-Western Regional Council to make safe Redbank Creek Dam, a very old and high risk dam. During 2012/13, a planned resolution of the issue to the DSC's satisfaction was attained. With the assistance of the NSW Office of Water and agreement of the Council, a satisfactory and cost effective solution was developed for remedial works at this old concrete dam. Construction of the ensuing remedial upgrading works (involving a lowering of the central section of the dam wall) was completed by early 2014. This resulted in a very substantial risk reduction for the dam.

There are currently almost 150 prescribed dams and basins owned by local government councils and other local water utilities (LWUs). Work also continued during the year on a prioritised program to improve the safety of various LWU dams. Some of this programmed development is currently done through the auspices and assistance of the NSW Office of Water. Construction of upgrading works at Lake Endeavour Dam commenced in early 2014 and construction of storage augmentation and upgrading works at Suma Park Dam will commence in late 2014. Further investigations and options or design studies are underway on Dumaresq, Imperial Lake, Winburndale and Tenterfield Creek Dams; with the ensuing upgrading constructions generally due for start and completion variously during the period 2015 – 2017. Jerrara Creek Dam is scheduled for decommissioning in 2016.

At 1st July 2013, 19 prescribed dams and basins were under particular review by the DSC due to their being in the highest risk status group. Through extensive continuing DSC liaison with the dam owners and the co-operation and committed work of many of these owners, the total number of dams in this group was reduced to 14 at 30th June 2014 (see Table 7.5), and a significant number of others have definite upgrade programs in place. Two of the dams removed from this highest risk status group during 2013/14 included Bethungra Dam and Redbank Creek Dam. Investigations are in place or well-progressed for the remaining dams in this group, either as an important part of upgrade option planning and/or as part of detailed risk assessments that could show improved (i.e. lower) risk positions.

Although 1 basin was added to the initial 19 in this highest risk dams list in 2013/14, 6 dams and basins were removed. This is a notable net reduction of 5, to a total of 14. In addition, one of the 14 structures has been removed from this list by the time of printing of the annual report. Moreover, it is likely that several other dams in this list will also have had their high risk status downgraded by the end of the calendar year 2014.

Mining continued around and under stored waters at a high rate throughout the year. Further notification areas around dams were established due to the additional numbers of mining applications made. As for the last 5 years, tonnes of coal and hence royalties produced during the 2013/14 financial year in the Notification Areas (NAs) around prescribed dams have once again increased over the preceding year's figures. Approximately 28 million tonnes of coal were extracted from near and under storages (water, tailings and ash storages). There has been an approximate doubling in total annual coal tonnage extracted from the NAs over the last 6 years.

Our People

The DSC members kept their knowledge up-to-date through various professional technical activities external to the DSC. The DSC has a member on the Board of the Mine Subsidence Technological Society. Various DSC members continue to be involved in Australian National Committee on Large Dams (ANCOLD) and International Commission on Large Dams (ICOLD) matters with one member being the ANCOLD Chairman, elected at the end of 2012 for a 3-year term.

Several DSC members and the DSC Executive Engineer attended the 2013 ANCOLD/NZSOLD Conference on Dams in Rotorua, New Zealand. For one year in every six, ANCOLD combines with its NZ counterpart, the New Zealand Society on Large Dams (NZSOLD), to host this dams conference in NZ. The other 5 years in the 6 year cycle for this annual conference event are shared amongst the various Australian States and Territories. These annual ANCOLD Conferences provide valuable forums for exchange of information and updating on dam safety issues as well as providing the annual opportunity for dam safety regulators nationwide to meet and review pertinent issues.

The DSC is concerned to ensure it is maintaining best practice. To this end, staff and members attended various technical exchange meetings, short courses and refresher courses throughout the year – including for example, 4 ANCOLD short courses on different topics, a Dam Failure Exercise Workshop in Nowra, the Mine Subsidence Technological Society (MSTS) 9th Triennial Conference in the Hunter Valley and a workshop on risk assessment of longwall mining. As part of his ANCOLD responsibilities, and sponsored by his employing organisation, a DSC member attended the ICOLD Congress in August 2013 in Seattle (USA) and the June 2014 meeting in Bali (Indonesia). The DSC Chairman also attended for several days of the Seattle ICOLD Congress, including as an invited speaker at a workshop on dam safety portfolio risk management. During the year the DSC also arranged for several presentations to staff on the latest technological developments in dam and mining safety, given by DSC members, consultants and outside organisations. All this has helped greatly to supply highly valuable information and networking on national and international dam safety practices.

The DSC is very reliant on its staff to provide the reviews of the dams' reports and mining applications for the Sub-committees to endorse. These staff reviews of technical documentation have been carried out in an extremely competent and professional manner and this makes the job of the Committee considerably simpler. For these reasons the DSC invests in the training of its staff, with all staff attending some relevant courses in 2013/14. Modifications and expansions to the DSC's databases also continued.

Once again the Committee wishes to record its appreciation of the competence, loyalty and dedication of its staff in meeting the DSC's heavy workload and providing substantial services with few people. During 2013/14 the dam surveillance statistics achieved were very good overall. The Committee acknowledges its high commendation of the DSC's Surveillance and support staff for the very large workload completed in the last 12 months, including all reviews and audits of submitted reports completed in a timely manner. The Committee also acknowledges its high commendation of the DSC's Mining and support staff for the generally large workload completed, including applications processed and conditioned, in the last 12 months.

Our Stakeholders

The DSC values a good working relationship with dam owners, mining companies, and their consultants. The DSC can thus communicate its goals and requirements to engage co-operation in achieving dam safety. Once they understand the DSC's safety benchmarks, most dam owners and mining companies recognise their responsibilities and liability, and have a strong commitment to dam safety.

The DSC believes there is very good value in training the operators of NSW prescribed dams in dams safety and surveillance matters, and so provided 2 training courses relating to operation of water dams, and 2 courses relating to mine tailings and ash dams, with close to 100 attendees in total. Since the inception of the program a number of years ago, these training courses have resulted in a marked improvement in the standard of dam owners' dam safety management. To further improve the courses, the DSC signed an agreement with TAFE NSW to auspice the courses as part of the Water Operators Certificate III Training package. The first such accredited course was undertaken in October 2013 in Tamworth and was fully subscribed in attendance numbers.

The DSC has updated some Guidance Sheets (e.g. *DSC3A Consequence Categories for Dams*). All the DSC's Guidance Sheets are readily available and easily accessible on its website.

The Future

The DSC has completed incorporating the main principles of its risk based policy framework into its Guidance Sheets. Stakeholder consultation will continue. The DSC will continue to engage with other NSW safety, environmental and economic regulators to ensure that its Guidance Sheets fit in a consistent regulatory approach.

Support of research on dam related matters will continue. The DSC will continue to financially support dam safety research, most likely through projects at the University of New South Wales, as it has done for several years.

The DSC will continue its information exchange program with other State dam safety regulators on their dams for which failure could adversely affect NSW communities, and on allied regulatory matters. The DSC's Executive Engineer, Chairman and another DSC member attended the annual State dam safety regulators' meeting in Rotorua (New Zealand) in November 2012 immediately prior to the annual combined ANCOLD & NZSOLD Conference.

With the developed detailed safety benchmarks and guidance that are encompassed within the DSC policy framework, the DSC feels that New South Wales is now one of the world leaders in dam safety management. Indeed, through the risk based regulatory approaches adopted by several Australian States (including NSW) and the influence of ANCOLD and its Guidelines in this important subject, Australia is recognised internationally as at the strategic forefront of this modern dam safety management approach of incorporating a risk based framework.

The risk imposed by dams in NSW will continue to be steadily reduced. Dam safety management programs are well established for all prescribed dams and will be further improved. DSEPs are in place for a large majority of the dams and the DSC will continue to work with owners to ensure that all dams requiring DSEPs have them and that they are regularly updated and that there is periodic testing. Because the consequences of failure for some dams would be catastrophic, the likelihood of their failure needs to be very low – in the order of one chance in a million per annum in some extreme consequence cases. Almost all prescribed dams now have a tolerably low likelihood of failure but some need further risk reduction as soon as reasonably practicable and as applicable to their particular consequence categories. With a risk based approach to dam safety management, dam safety in NSW compares very favourably with the best dam safety programs world-wide.

The *Dams Safety Act 1978* has changed little since its establishment. In 2013 the government embarked on a review of NSW dams safety in general. In late 2013 the government publically released the commissioned KPMG review report on the *Dams Safety Act 1978* and the DSC, as well as the associated NSW Dams Safety Review Community Consultation Paper. The ensuing 33 public response submissions on those documents were later made available on an appropriate government website. The review is ongoing, as the government considers the submissions made and a range of other significant factors. The DSC looks forward to continuing in close partnership with the NSW Government as its current review of the dams safety regulatory framework progresses and ensuing changes to the *Dams Safety Act* are likely made next year. The DSC is particularly willing to assist in addressing any challenges this process may present.

Brian Cooper, Chairman

1. Charter

1.1. Why do we have a Dams Safety Committee (DSC) in NSW?

In the 1970's, international concern over several major overseas dam failures led to the Australian National Committee on Large Dams (ANCOLD) raising the need for dam safety regulation across Australia. There was also significant consideration by the NSW Government as to the extent of mining that should be permitted adjacent to Sydney's major water storages. Against this background, the NSW Government constituted the NSW Dams Safety Committee (DSC) under the NSW *Dams Safety Act, 1978.*

Similar legislation has been progressively implemented interstate and overseas on a basis best summed up by Jenny Bacon (UK Health and Safety Executive Director General, 1999) who noted that *"It is the nature of risk that, frequently, those who create the risk do not bear its consequences or the wider costs. Therefore, the market does not function properly as a distributive mechanism. The State must intervene to regulate risk".*

1.2. What Legislation defines our Functions?

The DSC has statutory functions under the *Dams Safety Act 1978* and *Mining Act 1992*.

1.3. What are the Functions of the DSC?

Amongst other things, the DSC is required to *maintain a surveillance of prescribed dams, to examine and investigate the location, design, construction, reconstruction, extension, modification, operation and maintenance of prescribed dams, to obtain information and keep records* on dams and to *formulate measures to ensure the safety of dams* in NSW. It "prescribes" those dams which if failed have a potential to threaten downstream life, cause extensive property or environmental damage, or have a severe impact on the public welfare.

At 30th June 2014 there were 378 prescribed dams. See Appendix B and also the included map following Appendix B.

For prescribed dams, the DSC adopts a monitoring role to ensure the owners of those dams, and organisations (e.g. mining companies) undertaking significant activities near their storages, conform to appropriate safety benchmarks throughout each dam's life.

The DSC's aim is that the risks from dams to the community and to the environment will be tolerably low for prescribed dams. In this context, a "safe" dam, or associated activity, is one that complies with the DSC's safety benchmarks.

Porters Creek Dam. *DSC members and staff inspected this 17m high post-tensioned concrete gravity dam in October 2013 in conjunction with a DSC country meeting.*

2. Access and Contact

The DSC's access and contact details are outlined in the inside front cover of this report.

3. Aims, Objectives and Values

3.1. Mission and Objectives

In interpreting its legislative charter, the DSC has adopted as its mission "to ensure the safety of dams".

Relevant to this mission statement, the objectives of the DSC are to:

- Protect the safety, welfare and interests of the community from dam failure by formulating measures to ensure that risks from prescribed dams remain tolerable over the long-term, that the risks are regularly reviewed, and further reduced if reasonably practicable;
- Maintain an ongoing surveillance of prescribed dams and their safety throughout each dam's life;
- Keep up-to-date on all relevant aspects of dam safety management;
- Protect the security of dams and their stored waters from the effects of mining or other activities;
- Inspire confidence in our stakeholders and be recognised for our technical excellence; and
- Promote dam safety awareness through the direction, education and training of stakeholders.

3.2. Our Values

To achieve its aims, the DSC is guided by its core values of:

- Safety – we integrate safety into everything we do (e.g. people, dams);
- Integrity – impartial, honest, open and straightforward;
- Service to stakeholders – we seek solutions and build relationships with teamwork and mutual respect;
- Accountability – we take responsibility for our actions; and
- Development – we strive for improvement.

Suma Park Dam

Design of the flood and storage capacity upgrading works for this 31m high concrete arch dam at Orange was completed during the year. DSC staff undertook an audit inspection in November 2013.

Nambucca Off-stream Storage

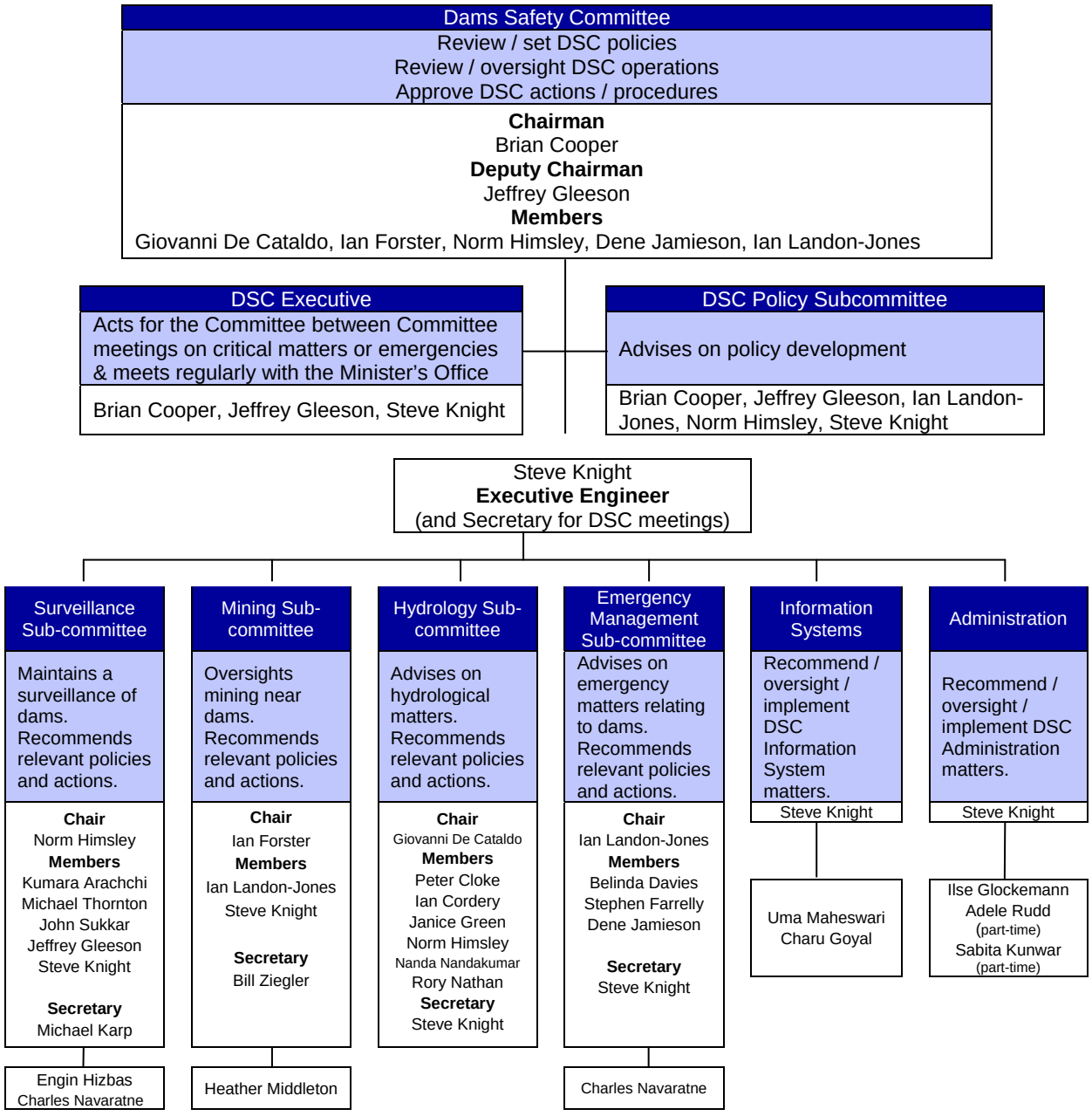
DSC members and staff inspected the construction of this new water supply dam in May 2014 in conjunction with a DSC country meeting. When completed this zoned earthfill dam will be 22m high and have a storage capacity of 4,500ML.

4. Management and Structure

4.1. DSC Structure and Organisation Chart

The DSC is a small independent statutory body which reports directly to the Minister for Land and Water. It has negligible assets or property. It uses staff seconded from NSW Trade and Investment and hires contract staff as required. The DSC operates through two Standing Sub-committees (Dam Surveillance and Mining), along with ad hoc Advisory Sub-committees (Policy, Hydrology and Emergency Management). The following chart outlines its organisation with most business dealt with initially by its Sub-committees, which report to Committee meetings.

Dams Safety Committee Organisation Chart
(as at 30 June 2014)



In routine matters, the Executive Engineer and standing Sub-committees act for the DSC, while its Executive (Chairman, Deputy Chairman and Executive Engineer) deals with urgent business or emergencies between DSC meetings. Policy initiatives originate at any level, but are developed by the Policy Sub-committee before submission for DSC approval.

4.2. Sub-committees

There are two standing Sub-committees, one on Dam Surveillance and one on Mining. There are three ad-hoc Sub-committees, on Policy, Emergency Management and Hydrology, which meet as required. Membership of the Sub-committees is outlined in the DSC's organisation chart (see page 8).

The Executive Engineer, Mr Knight has been appointed to each of the Sub-committees for his technical input, and to provide effective liaison between the Sub-committees and the Committee. He also provides an important role of main liaison with dam owner personnel and other principal stakeholders, with routine liaison delegated to the relevant DSC engineering / technical staff.

4.3. Meetings

The Committee held eight normal meetings during the year, of which six were in Sydney and one each in Nowra and Kempsey, in association with dam inspections. Attendance at Committee meetings was as follows:-

- Mr. B. Cooper (Chairman) attended 8 out of 8
- Mr. J. Gleeson (Deputy Chairman) attended 8 out of 8
- Mr I. Forster attended 7 out of 8
- Mr I. Anderson attended 2 out of 3 (retired in November 2013)
- Mr I. Landon-Jones attended 4 out of 8
- Mr. D. Jamieson attended 6 out of 8
- Mr. N. Himsley attended 8 out of 8
- Mr. G. De Cataldo attended 8 out of 8

There were 8 Surveillance, 8 Mining, 1 Emergency Management, 0 Hydrology and 1 Policy Sub-committee meetings during 2013/14.

Some DSC members and staff with owner and contract representatives during a dam construction site inspection (Nambucca Off-stream Storage) in May 2014. Inspections like these help keep the DSC up to date with current dam construction techniques, as well as furthering valuable liaison with dam owners.

4.4. Committee Members

As at 30 June 2014, the DSC had seven part-time members (with two other vacant positions). All are appointed by the Minister, with all but one of the members nominated for their experience in dams engineering (as required under the *Dams Safety Act 1978*) and one other member typically for experience in coal mining.

Committee membership during 2013/14, with brief member biographies, was as follows:


Brian Cooper

Brian Cooper, BE (Hons), MEngSc, Grad Dip Eng Mgt, MIEAust, CPEng (appointed to December 2014). **Chairman** from 1 April 2009, Nominee of Engineers Australia. Initially appointed 1997. In 2006 Brian retired from his position as Principal Engineer, Dam Safety, with the then Department of Commerce and now practices as a private dam safety consultant with over 40 years water industry experience including extensive dam design works with the Department of Public Works and Services and the Water Resources Commission.


Jeffrey Gleeson

Jeffrey Gleeson, BE Civil, FIEAust, CPEng (appointed to December 2014). **Deputy Chairman**, Nominee of Hunter Water Corporation. Initially appointed 1990. Jeff is Chief Engineering Consultant with Hunter Water Australia. He has over 35 years experience in the water and waste-water field with involvement in various aspects of dam engineering and structural design. Jeff is a long serving member of the DSC's Surveillance Sub-committee. He also lectures part-time in engineering at the University of Newcastle.


Ian Anderson

Ian Anderson, BE (Hons1), ME (Mining), Certificated Coal Mine Manager, Undermanager & Mines Rescueman, Qualified Mine Ventilation Officer (appointed to June 2014). Nominee of the Minister for Mineral Resources. Initially appointed 1994. Ian is a Senior Inspector of Mining Engineering with Trade & Investment (T&I). He has over 30 years experience in coal mining and is a member of the DSC's Mining Sub-committee.

- In November 2013 Ian Anderson retired from T&I and hence also resigned his DSC membership. The DSC has great appreciation for the work he undertook and the valuable contributions he made in serving his Committee roles with substantial distinction over 20 years. The DSC also sincerely appreciates the part of Resources & Energy in allowing Ian to have undertaken the DSC work.


Ian Forster

Ian Forster, BSc, MAIG, RPGeo (appointed to December 2014). Nominee of Minister for Resources and Energy (responsible for the State owned Electricity Generators). Initially appointed 1989. Ian is a specialist dam safety consultant with Aurecon Australasia, responsible for the safety management of dams owned by the NSW State-owned power generators. Ian has over 30 years experience in dam safety management, geotechnical engineering and hydrogeology. He is Chairman of the DSC's Mining Sub-committee and a board member of the Mine Subsidence Technological Society.


Ian Landon-Jones

Ian Landon-Jones, BE (Hons), MEngSc, MIEAust, MAICD (appointed to December 2014). Nominee of Sydney Catchment Authority (SCA). Initially appointed 2001. Ian is Principal Advisor Technical with the SCA with over 35 years experience in the water and dams engineering fields, in the SCA and previously with Sydney Water, with involvement in various aspects of dam engineering and structural design. He is Chairman of the DSC's Emergency Management Sub-committee and a member of the Mining Sub-committee. Ian is also Chairman of ANCOLD, appointed in late 2012 for a 3-year term in that role. He also holds committee roles with ICOLD.

Norm Himsley, BE (Hons), MEngSc, GradDipMgt, MIEAust, CPEng (appointed to December 2014). Nominee of Engineers Australia. Initially appointed 2009. In 2009 Norm retired as Executive Engineer of the DSC and now practices as a private dam safety consultant. He has over 40 years experience in the water and construction industry and extensive involvement in the investigation, design and construction of dams. He is Chairman of the DSC's Surveillance Sub-committee. Norm also sits on two ANCOLD working group committees, including as chair of its professional development working group.


Dene Jamieson

Dene Jamieson, BE (Civil) (appointed to December 2014). Nominee of Treasurer (administering the Public Works Act). Initially appointed 2009. Dene is Principal Engineer in the Dams and Civil Section of NSW Public Works and has over 30 years experience in dams and the water industry. Dene is a member of the DSC's Emergency Management Sub-committee.


Giovanni De Cataldo

Giovanni De Cataldo, BE (Civil) (appointed to February 2015). Nominee of the State Water Corporation (SWC). Initially appointed 2011. In early 2013, Giovanni transferred from the SWC to the SCA as Manager Dam Safety, with his main responsibility comprising safety management of the major dams which deliver bulk water to the Sydney metropolitan area. Giovanni then had over 30 years experience in dams and geotechnical engineering in the water and energy industries related to water & ash storage dams, power stations/transmission lines. He chaired the DSC's Hydrology Sub-Committee.

Vale Giovanni De Cataldo (1958 – 2014)

The DSC here pays tribute to Committee member Giovanni De Cataldo who passed away on 17 August 2014, only shortly after receiving a diagnosis of acute leukaemia. A great loss to his adoring wife Kathy, loving sons Robert, Matthew and Daniel and his extended family, he has also been a heart-felt loss to not only the DSC but also to the wider dams community. Giovanni was well known to the dam safety industry through his extensive work within NSW especially and also through various interstate connections. His dam engineering career extended over 30 years, encompassing from geotechnical and other highly technical analyses through to risk assessments and particularly dam asset safety management.

Of Italian heritage and raised in Sydney, Giovanni obtained his civil engineering qualifications from the University of NSW and continued specialist technical and management training and courses throughout his career. From 1982 to 2001 he worked for the Electricity Commission / Pacific Power International as a geotechnical & dams engineer, including for 13 years with management responsibility for surveillance & monitoring of all that organisation's dams. During the period 2002 to 2012 he held a variety of senior positions within the State Water Corporation, including most significantly as Manager Dam Safety. In this role Giovanni was responsible for the safety management program of 20 prescribed large dams and over 70 major weirs and regulators which deliver water to rural NSW.

From early 2013 until his untimely death, Giovanni was the Manager Dam Safety for the Sydney Catchment Authority. This involved responsibility for the dam safety management program of over 20 large dams comprising the most substantial urban water supply dam asset portfolio in NSW. Giovanni's direct involvement with the DSC commenced in 2009 with his joining of the Surveillance Sub-committee, followed in 2011 by his appointment to Committee membership for a 4-year term and associated work on the Hydrology Sub-committee. As he did to all the organisations for which he worked, Giovanni brought to the DSC not only experience and technical expertise but also able judgment, common sense and an effective affable manner.

Vale Giovanni! A life well spent in engineering excellence but also more importantly in family and community involvement and the forging of many friendships.

4.5. Committee Staff

The Committee is assisted by a staff of eleven, with most employed through NSW Trade & Investment and with temporary contract staff assistance as required. Given the extensive workload of the DSC's activities, this small staff group provides an effective and efficient service to the DSC's functions. During the year the DSC staff comprised:


Steve Knight

Executive Engineer: Steve Knight

BE (Civil), Grad DipEng (started May 2012).
Steve has over 30 years experience in water and dams engineering, including extensive involvement in major dam design works project management in his former role with NSW Public Works.


Ilse Glockemann

Administrative Officer: Ilse Glockemann

(seconded 1995).


Michael Karp

Surveillance Engineer: Michael Karp

BE (Hons), MIEAust (seconded 1999).
Michael has over 30 years investigation, design, construction, surveillance and project management experience in water and dams engineering.


Uma Maheswari

Information Systems Officer: Uma Maheswari

(seconded 2001)


Engin Hizbas

Tailings Dam Engineer: Engin Hizbas

BE, MIEAust, CPEng (seconded 2003).
Engin has over 25 years of experience in investigation, design, construction and project management in civil engineering and dams.


Kathy Zhou

Database Support Officer: Kathy Zhou

(started December 2006; resigned in January 2014 to take a position in the Food Authority).


Charles Navaratne

Small Dams Engineer: Charles Navaratne

BScEng (Hons), CEng MIE (SL) (started April 2009).
Charles has over 25 years of experience in civil engineering design, construction and management.


Adele Rudd

Clerical Support Officer: Adele Rudd

(started April 2008).


Bill Ziegler

Manager, Mining Impacts: Bill Ziegler

BE (started April 2008).
Bill is a mining engineer and has over 25 years of experience in NSW coal industry.


Sabita Kunwar

IT / Admin. Support Officer: Sabita Kunwar

(started July 2009, finished January 2012)
(re-started October 2012).


Heather Middleton

Mining Regulation Officer: Heather Middleton

BSc (started May 2009).
Heather has over 20 years geological and geotechnical experience.


Charu Goyal

Database support Officer: Charu Goyal
(started March 2014).

5. Summary Review of Operations

5.1. Major Achievements for 2013/14

During the year the following milestones and deliverables were attained:

- Management of a substantial workload;
- Updating, on the DSC website, of various Guidance Sheets to assist dam owners, and associated entities, in their incorporation of risk assessment practices into dam safety management in NSW;
- Good progress in reducing the risks posed by dams in NSW, including the completion of remedial upgrading works at Redbank Creek Dam and a net reduction in the highest risk dams number from 19 to 14;
- The DSC won a joint award with the SES at the 2013 Resilient Australia Awards – for "Guidelines for Defining Dam Failure Warning and Evacuation Areas". It was one of the major awards for this prestigious annual awards event, being a winner in the State and Territory Government Category;
- Substantial compliance with core business activities, as shown in Table 5.2;
- Development of risk based investigations and approvals for a number of technically challenging applications for coal mining near dam storages, all of which assisted in allowing 28.1 million tonnes of coal to be extracted from Notification Areas around prescribed dams (and being a fifth successive year of increase in such extracted coal tonnage);
- Running of 4 DSC training courses for dam operators (including the first such course to provide NSW TAFE accreditation), plus another course with the State Water Corporation;
- Upgrading, expanding and consolidating the DSC's records and database systems;
- Review of 89 five-yearly Surveillance Reports (greater than the expected annual average of about 75);
- Dealt with almost 2,400 pieces of formally documented correspondence.

DSC's Award Winning Trophy

The DSC and SES received a joint award as a State Winner in the 2013 Resilient Australia Awards – for the project "Guidelines for Defining Dam Failure Warning and Evacuation Areas".

"A net reduction in the highest risk dams number from 19 to 14"

"Review of 89 five-yearly Surveillance Reports"

5.2. Performance Indicators

During the year the DSC monitored performance indicators, which gauge the achievement of its objectives, as shown in the following Table 5.2 and Figure 5.1. These indicators illustrate how the DSC has effectively managed a substantial workload within its modest budgetary program. Due to the nature of the DSC's work, and the relatively small size of its organisation, quantitative indicators are often not entirely appropriate and some of its significant indicators are therefore qualitative.

5.3. Budget Highlights

A summary of the DSC's financial performance is shown in Table 5.1 with full details given in Section 10 of the report. Budgeted expenditure is used, as the performance yardstick, as DSC expenses were met from the NSW Office of Water's funding allocation.

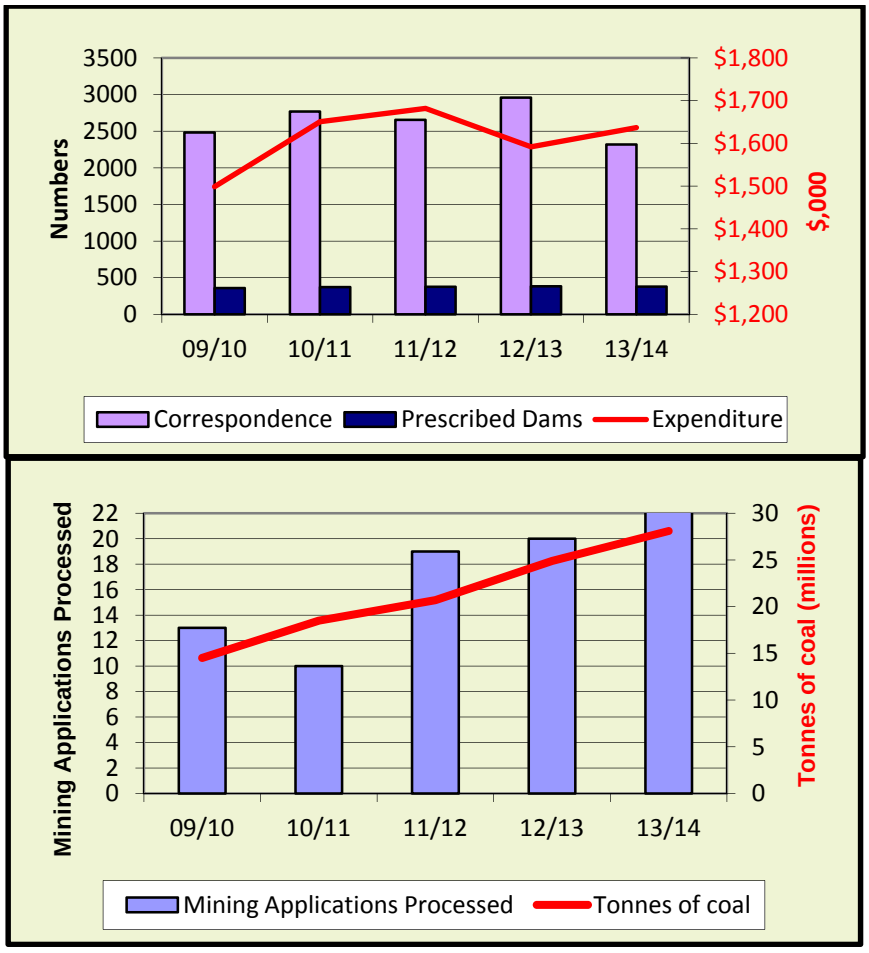
Table 5.1 – 2013/14 Budget Highlights

Item	$ without In-Kind Contribution & Crown Assumed Liabilities	$ incl. In-Kind Contribution & Crown Assumed Liabilities
Budget	1,869,000	-
Actual Income	1,752,000	1,971,000
Actual Expenditure	1,637,000	1,856,000

Table 5.2 - DSC Performance Indicators

#	PERFORMANCE TARGET	PERFORMANCE INDICATOR	RATING
1	Owners programs, agreed by DSC, for safety improvements to significantly high risk dams	Percentage of significantly high risk dams with agreed programs	93% (Good)
2	Follow up action taken within 3 months	Percentage performance	90% (Good)
3	Reports/programs review & respond < 3 mths	Percentage performance	100% (Excellent)
4	Yearly inspections of high risk dams (14)	Number inspected this year	13 (Very good)
5	5-yearly inspections of lower risk dams (364)	Number inspected this year (required 72 per year)	61 (Good)
6	Update DSC information material every 2 yrs	Time since last update issued	Website updated (Very Good)
7	Provide at least one dam safety education course in NSW each year	Number of courses this year	5 (Excellent)
8	Compliance with approved DSC budget	Percentage deviation	Under by ≈ 5% (Very good)
9	Surveillance Sub-committee	Based on policy progression, reports reviewed (average 76 reports/yr) and follow ups	89 (Excellent, given high workload)
10	Mining Sub-committee	Subjective based on monitoring compliance, matters followed up and mining impacts as predicted	95% (Excellent)
	• Process all Applications received	Percentage of applications received finalised	100% (Excellent)
	• Review all monitoring data received	Percentage performance	90% (Very good)
	• Process all SMP / Part 3A / Titles	Percentage performance	100% (Excellent)
11	Emergency Management Sub-committee	Subjective based on policy progression, coordination of matters and emergency plans implementation. Number of DSEPs required (329)	254 current updated DSEPs. (Satisfactory/Good)
12	Compliance with Records Management Standards	Subjective based on progression in updating procedures and systems, and programs achieved	Good
13	Administration	Subjective, based on meeting HR, accounting and logistical needs of the DSC	Very Good

Figure 5.1-DSC Summary Statistics



Expenditure excludes In-Kind Contribution and Crown Assumed Liability Expenses

6. The Future

6.1. Dams Safety Management

The DSC expects the number of prescribed dams in NSW to generally grow in the long term and existing dams will continue to require safety improvements to meet community expectations. The DSC's main objective is to ensure that all prescribed dams present a tolerably low risk to downstream residents, property, the environment and associated community interests.

Redbank Creek Dam

During 2013 remedial upgrade construction contract work was completed on this old concrete dam near Mudgee. This work enabled a substantial lowering of the risks posed by the previously 16m high dam and hence allowed a substantial lowering of its Consequence Category.

In particular, the DSC will:

- Continue to liaise proactively with the NSW Government in its review of the *Dams Safety Act* and associated functions;
- Continue to implement and use its risk based dam safety policy, incorporating currently 22 Guidance Sheets on dam safety requirements;
- Continue to liaise with other NSW Government safety, environmental and economic regulators, to ensure that DSC requirements fit within a consistent regulatory framework;
- Continue close liaison with dam safety regulators in other States including contributing to the annual Australian dam safety regulators' meeting;
- Continue to monitor activity programs for safety improvements to NSW dams identified as not meeting DSC safety requirements (see Tables 7.5 & 7.6);
- Continue to work with dam owners in assessing the priority and urgency of safety improvements and activities, in order to achieve the optimum risk reduction with the available resources and within the DSC's required time frame;
- Continue to support research into dam safety risks;
- Work with NSW dam owners to ensure appropriate dam emergency and security arrangements are in place with Dam Safety Emergency Plans regularly updated and exercised. Liaise with the State Emergency Service (SES) to facilitate these arrangements;
- Continue to ensure dam owners have in place current Operation and Maintenance Manuals for their dams and in particular for gated spillway dams;
- Maintain liaison with NSW dam owners and continue the emphasis on education, including providing training courses for dam owners' personnel. The DSC will also arrange staff and members presentations at meetings and conferences on dam matters, and provide input to ANCOLD Guidelines;
- Continue to advise dam owners of the value of installing rainfall and flow monitoring equipment to enhance flood warning, and to assist in flood analysis and design;
- Support expansion of the earthquake monitoring network in NSW and collaborate with other agencies in the development of improved dam seismic analysis, relevant to Australian earthquake characteristics;
- Review and update DSC internal management procedures;
- Continue to investigate the vast number of non-prescribed dams and retarding basins to determine if any of these dams present a risk to the community and thus need to be prescribed.
- Continue corporate (organisational) membership of ANCOLD and continue subscriptions to journals of various international dam safety organisations to ensure the DSC remains up to date and conversant with the latest relevant national and world practices in dam engineering.

Cambewarra Dam

DSC members and staff inspected this 8.5m high earthfill dam in October 2013 in conjunction with a DSC country meeting. The dam had been recently upgraded for flood security, including the rockfill mattress auxiliary spillway work shown.

6.2. Mining Management near Dams

The number of applications to mine within Notification Areas has remained at historically high levels reflecting the lag between the slight downturn in the general mining industry and the application/monitoring processes that accompany mining. As for the last 5 years, tonnes of coal and hence royalties, produced during 2013/14 financial year in the Notification Areas (NAs) around prescribed dams have once again increased over the preceding year's figures. There has been an approximate doubling in total annual coal tonnage extracted from the NAs over the last 6 years.

The DSC's objective is to advise on mining regulation so as not to unnecessarily restrict extraction of NSW coal resources. It continues to ensure that mine owners develop a comprehensive scientific understanding of the effects of mining on stored waters and dams in order that mining within Notification Areas occurs with negligible impact to existing infrastructure. Through time, DSC staff members have been developing more sophisticated risk analysis tools as an aid to managing the impacts of mining. In addition, an expanding knowledge base and advances in technology have resulted over time, in the DSC having improved confidence to support the extraction of extra coal from under NSW storages, in situations where mining would not have been approved in earlier years.

The DSC's ongoing initiatives to achieve its objective are to:

- Investigate and progressively implement applications of risk management to various aspects of mining developments, and monitor practice and update guidelines accordingly;
- Ensure adequate protection of dam walls and stored waters by reviewing the maximum extent of ground movements induced by coal mining and, if necessary, adjusting the size of Notification Areas;
- Push for adequate security deposits to be held by the State to allow for the timely implementation of dam safety mitigation works in the event that the safety of a prescribed dam or its storage is threatened by mining;
- Promote compliance within the mining industry, and understanding within other Government agencies, of the DSC's mining management requirements through Subsidence Management Plan (SMP) process involvement, and ongoing interaction with stakeholders.

Hillgrove Tailings No. 2 Dam

DSC members and staff inspected this 15m high tailings dam in May 2014 in conjunction with a DSC country meeting. The dam is part of the gold mining operations at Hillgrove in the Armidale region.

6.3. Administration and Information Systems

As it did in 2013/14, the DSC will maintain a commitment in the coming financial year to ongoing implementation of its strategic plans into its business planning process, with procedures and practices formalised and updated progressively.

DSC will continue the implementation of its new information systems including the necessary regular upgrading of desktop hardware and software to meet increasing demands. As occurred in 2013/14, new and updated features will continue to be added to the DSC database and existing sections (e.g. GIS, Notification Areas, overdue reports) will be expanded and consolidated.

Training programs will continue to be conducted for staff and members to facilitate effective and safe work practices (e.g. various computer program courses, finance processes, first aid, work/health/safety).

Progressive updating of the DSC's office will continue to maximise effective use of the resource and old mining reports and plans will continue to be scanned and archived to maximise usable storage space within the DSC's office.

6.4. NSW Dams Safety Review

A substantial passage of time has elapsed since the *Dams Safety Act 1978* and associated Dams Safety Committee (DSC) were established. In 2013 the government embarked on a review of the NSW dam safety regulatory framework. On 8th October 2013 the following documents pertaining to the review were released publically, along with an invitation for written submissions:

- A commissioned review report by KPMG, entitled "Review of the *Dams Safety Act 1978* and Dams Safety Committee" (September 2013);
- A 1-page media release by the DSC's then Minister, The Hon Katrina Hodgkinson MP, Minister for Primary Industries;
- The "NSW Dams Safety Review Community Consultation Paper" under the Trade & Investment (T&I) banner;
- The NSW Government's 1-page invitation sheet for public input to the NSW dams safety review.

The submission period for public comments by individuals or organisations on the released KPMG review report and the associated T&I Community Consultation Paper was open for a period of 28 days until 5th November 2013.

The ensuing 33 public response submissions were made available on the Department of Primary Industries (DPI) website later in November 2013.

During 2013/14, both before and after the release of the review report and associated documents, the DSC liaised with the relevant parts of government and provided requested information and explanations pertinent to the government review of NSW dams safety matters. The review is ongoing, as the government considers the submissions made and a range of other factors, including for example various organisational structure changes and initiatives currently taking shape within the state's water industry. The DSC looks forward to continuing in close partnership with the NSW Government as its current review of the dams safety regulatory framework progresses and ensuing changes to the *Dams Safety Act* are made.

7. Review of Operations

7.1. Dams Safety Management

7.1.1. What Dams are under Surveillance?

The DSC is required to *maintain a surveillance of prescribed dams, to examine and investigate the location, design, construction, reconstruction, extension, modification, operation and maintenance of prescribed dams, to obtain information and keep records on dams* and to *formulate measures to ensure the safety of dams* in NSW. The state has tens of thousands of dams, predominantly farm dams. Because the DSC interprets its charter as being to protect life and significant property, environmental and other community interests, it only "prescribes", and maintains surveillance of the safety of those dams with potential for significant failure consequences, as listed and detailed in Appendix B (378 dams as at 30th June 2014).

7.1.2. Policies and Procedures that Apply to Dams Safety Management

After being informed of a proposed dam, the initial DSC decision is on the need, or otherwise, for prescription of the dam. This will normally be based on the Consequence Category of the dam, which in turn is based predominantly on the possible loss of life in the event of the dam's failure. These matters are outlined in DSC Guidance Sheet *DSC1A DSC Background, Functions and Operations.* Then for prescribed dams, as shown in Table 7.1 below, the DSC has a range of policies and procedures that facilitate its interactions with dam owners and other affected organisations at all stages of the life of that dam. This is outlined further in DSC's Guidance Sheet *DSC2B Documentation and Information Flow over Dam Life Cycle.*

Table 7.1 - Interaction of DSC over Dam Life Cycle

Phase	Interaction
Investigation	Owners provide proposed dam details DSC decides on prescription and provides ongoing requirements (see DSC2B)
Design	DSC reviews suitability of design team DSC requires design report and reviews major design standards (does not review details)
Construction	DSC requires designer involvement during construction in particular to approve any changes DSC requires Construction Report and Construction Completion Certificate, certifying the designer's agreement with changes during construction
Commissioning	DSC requires Surveillance Report one year after construction DSC requires Operation & Maintenance Manual DSC requires Dam Safety Emergency Plan if downstream lives at risk
Operation	DSC requires regular surveillance and reporting by the owner DSC conducts random checks of compliance DSC requires submission of Surveillance Reports at regular intervals (usually 5 yearly) DSC requires Safety Reviews at regular intervals (usually 15 to 20 year intervals) unless needed sooner
Modifications	DSC requirements similar to that for new dam
Decommissioning	DSC reviews proposal DSC requires decommissioning report

For further information on DSC dam safety regulation policies, refer to our Guidance Sheets listed on the following page in Table 7.3 and available on our website www.damsafety.nsw.gov.au for downloading.

Table 7.2 – Amendments to Guidance Sheets

Document	Amendment	Updated
DSC3A – Consequence Categories for Dams	• Definition of PLL amended to "Potential Loss of Life" to be consistent with the ANCOLD *Guidelines on the Consequence Categories for Dams* (Sept. 2012). • New (additional) sixth dot point added to Section 7.4 to define quantifiable boundary conditions between flood severities when using Graham's (1999) method. • Changes to Section 7.5 heading and associated wording to indicate some DSC additions to specifically noted ANCOLD consequences assessment criteria.	May 2014

Table 7.3 - Guidance Sheets for Dams Safety

Document	Description	Update Date
DSC1A	DSC Background, Functions and Operations	June 2010
DSC1B	Background to DSC Risk Policy Context	June 2010
DSC2A	Dam Safety Management System (SMS)	June 2010
DSC2B	Documentation and Information Flow over Dam Life Cycle	June 2010
DSC2C	Surveillance Reports for Dams	June 2010
DSC2D	Demonstration of Safety for Dams	June 2010
DSC2E	Some Legal Considerations for Dam Owners	June 2010
DSC2F	Operation and Maintenance for Dams	June 2010
DSC2G	Emergency Management for Dams	Dec. 2010
DSC2H	Dam Security	June 2010
DSC2I	Community Consultation and Communication (CC&C)	June 2010
DSC3A	Consequence Categories for Dams	May 2014
DSC3B	Acceptable Flood Capacity for Dams	June 2010
DSC3C	Acceptable Earthquake Capacity for Dams	June 2010
DSC3D	Reliability of Spillway Flow Control Systems	June 2010
DSC3E	Flood Retarding Basins	June 2010
DSC3F	Tailings Dams	June 2012
DSC3G	General Dam Safety Considerations	June 2010
DSC3H	Embankment Dams (in abeyance; future planning)	
DSC3I	Concrete Dams (in abeyance; future planning)	
DSC4A	Mining Near Prescribed Dams – Administrative Procedures	March 2011
DSC4B	Mining Near Prescribed Dams – Mining Applications	June 2010
DSC4C	Mining Near Prescribed Dams – Management and Monitoring Matters	June 2010
DSC4D	Mining Near Prescribed Dams – Contingency Plans	June 2010

7.1.3. Changes introduced in 2013/14

During 2013/14 the DSC:

- Continued implementing its Guidance Sheets (Table 7.3 above) outlining the DSC's risk based approach to dam safety management and to assist dam owners in the implementation of risk management for their dams.
- Updated its Guidance Sheet *DSC3A Consequence Categories for Dams*, as noted in Table 7.2 at the bottom of the previous page.

Before the Guidance Sheet updating, the DSC displayed the proposed amendments on its website for a defined period and invited comments – for the Committee's consideration of such comments and any necessary and/or relevant incorporation prior to finalisation. This was in accordance with DSC policy and good regulatory practice principles.

7.1.4. 2013/14 Dams Surveillance Matters

The DSC continually reviews its list of prescribed dams in the light of new proposals, changed conditions, staff inspections and information supplied, to ensure that only dams with the potential for significant or higher failure consequences and/or major dams greater than 15m high are prescribed. During 2013/14 there was a net decrease of 5 prescribed dams (including 10 prescriptions and 15 de-prescriptions), giving a total of 378 prescribed dams at June 2014 (see Appendix A Summary, Appendix B list and the map following Appendix B).

For proposed prescribed dams and dam modifications, the DSC requires dam owners to provide design information for its review before construction. In all, 15 such submissions were processed during 2013/14. The DSC usually confines its review to assurance that major safety criteria (e.g. flood capacity, filter provisions) are satisfied, and that the designers are competent, though the DSC may challenge any design aspect that is of concern. The DSC also requires the submission of copies of design reports and it now also requires independent expert peer reviews for designs, upgrading and safety reviews of High and Extreme Consequence Category Dams.

The DSC requires designers' involvement in the dam construction process, to approve design changes so that the "as-built" design is sound. DSC staff also liaises with, and assists, the dam owners' personnel.

Upon completion of construction, the DSC requires dam owners to submit work-as-executed drawings and the "construction completion certificate" (certifying designer's approval of changes) for the DSC's records.

At a reasonable time after completion of construction the DSC requires dam owners to submit a Construction Report for future reference.

The DSC then requires Surveillance Reports summarising the behaviour of the dam since construction, to be submitted. The first report is to be submitted usually after first filling of the dam, which is a critical phase in dam safety, but no later than one year after construction. Thereafter, Surveillance Reports are required at not more than five-yearly intervals generally. Annual update reports are required for mines tailings dams in the cases where substantial changes to the physical structure of the dam are occurring, and 2.5 yearly intervals for mines tailings dams where no physical change to the dam is occurring.

These reports provide information on the safety status of existing dams and are checked in a staged process by DSC staff, the Surveillance Sub-committee and then a summary advice is provided to the Committee for discussion and/or endorsement by the Committee. The reports enable the DSC to monitor whether dam owners are continuing with a responsible approach to their dams at all stages during the lives of those dams. The reporting extent varies, with comprehensive reporting required for Extreme Consequence Category dams; down to brief pro-forma reports for Low Consequence Category dams (see Guidance Sheet *DSC2C Surveillance Reports for Dams*).

During 2013/14, the DSC reviewed 89 dam Surveillance Reports (see Appendix A). This was above the targeted number to be reviewed to avoid a backlog developing and to minimise the risks that a dam problem may go undetected. However, difficulty still lies with timely submission of reports by some dam owners. To prevent a serious backlog from developing, the Committee can issue notices under Section 15 of the *Dams Safety Act* to those owners where Surveillance Reports or other required investigation reports are more than two years overdue without a valid reason. During 2013/14 one of two previously issued Section 15 notices was withdrawn due to receipt of the required Surveillance Report, and the other notice remains outstanding (see Table 7.7). No new Section 15 notices were issued during 2013/14. However, following DSC liaison with dam owners and warning about possible Section 15 notices, several significantly overdue Surveillance Reports were received during the year.

Surveillance Reports are stored in the DSC's record system and progressively incorporated into the DSC database. Provision of electronic copies of each report is now a standing requirement. The DSC considers that the content and presentation of Surveillance Reports is now of a reasonably high standard and that the majority of owners are responding in a positive and responsible manner to its requirements.

"During 2013/14 there was a net decrease of 5 prescribed dams (including 10 prescriptions and 15 de-prescriptions), giving a total of 378 prescribed dams"

"15 [dam design and dam modification design] submissions were processed during 2013/14"

"74 prescribed dams and basins were inspected [by DSC staff and members] during 2013/14"

The DSC continued with and strengthened its regular programmed staff and Committee member inspection of dams and discussions with owners, throughout the State. Inspections by DSC members in conjunction with the country meetings of the DSC also continued. Country meetings were held in Nowra (mid south coast area) and Kempsey (mid north coast area). 74 prescribed dams were inspected during 2013/14, which was almost a fifth of the total number of prescribed structures. Thirteen (13) of the high risk dams were inspected. Continued emphasis will be placed on staff inspections of these dams every year to ensure recommendations within Surveillance Reports are being carried out, and that mining activities within and near dams are not having adverse effects on the dams. These inspections and country meetings are also essential in the long-term to check the general safety standard of each dam, its consequence category, and the actual performance of each dam owner in complying with DSC requirements. Any non-compliances with requirements or deficiencies in programs detected are brought to the attention of the owner's representative, and any concerns discussed on site. The inspections also provide useful background knowledge and photographs, against which Surveillance Reports can be evaluated and assessed by the DSC.

During 2013/14 the dam surveillance statistics achieved were very good overall. The Committee acknowledges here its high commendation of the DSC's Surveillance and support staff for the very large workload completed in the last 12 months, including all reviews and audits of submitted reports completed in a timely manner.

Talbingo Dam

DSC staff undertook an audit inspection of this 921,000ML storage capacity earth and rockfill dam in May 2014. Located in the Tumut region and part of the Snowy Hydro Scheme, this 162m high dam is the tallest dam in NSW. During the year a detailed risk assessment of Talbingo Dam was completed by the owner, Snowy Hydro Limited.

7.1.5. Examination and Investigation of Dams Safety

Dam owners are legally responsible for the safety of their dams and to ensure the risks from their dams are tolerable. The role of the DSC is to ensure that dam owners discharge this responsibility and that community interests are adequately protected.

The DSC views the risk assessment approach of the national standard AS/NZS ISO 31000:2009 *Risk Management Principles & Guidelines* as providing a framework for comprehensive examination and investigation of dam safety over the whole range of potential failure situations and a better understanding of relative risks and consequences. Accordingly, the Government endorsed in August 2006 a revised dam safety regulatory policy framework, *the Risk Management Policy Framework for Dam Safety*, which integrates the traditional engineering standards based approach to safety with risk assessment methods in determining the safety status of dams in a more rational manner.

The process of risk assessment assists in evaluating the relative safety of each dam, to assess risk reduction options and to assign priority and urgency to any remedial actions required. Risk assessment can better clarify safety and thus provide for more informed decision-making as well as providing upgrading options based logically on risk, consequences and costs. Risk assessment requires that the analysis team work with the decision-maker, and communicate appropriately with the affected community, to arrive at an informed overall judgement of the safety requirements for a dam. In 2013/14 one (1) in-depth detailed risk assessment was submitted to the DSC on a high risk dam in NSW. Various other risk assessments were also submitted. Also during 2013/14 three detailed safety stability reviews and two (2) specific stability studies were submitted to the DSC and reviewed as part of the requisite assessments of various dams' safety status. Various other assessments and reports were also submitted to the DSC for auditing, including design documentation for fifteen (15) dams (mostly pertaining to upgrades and/or raisings). To assist staff with their reviews of those reports a report review checklist has been previously developed to ensure that the reviews have covered all the DSC's requirements, including especially the need for the submission of an independent peer review report for all High and Extreme Consequence Category dams.

However, the DSC will continue its general policy of judging each case on its merits. It will consider any dam safety proposals from dam owners provided they are soundly researched, within the bounds of accepted practice, and would result in a demonstration of tolerable risks.

Bethungra Dam. *The results of extended, updated and supplementary dambreak and associated PLL studies undertaken during the year allowed a substantial lowering of the Consequence Category for this 13m high old concrete gravity dam. DSC staff undertook an audit inspection of the dam in May 2014.*

The Guidance Sheet *DSC1B Background to DSC Risk Policy Context* requires that a dam owner is to keep the risks of a dam under review. The safety of a dam is to be reviewed as a minimum whenever the DSC determines that a review is needed or at a minimum interval of 15 years (for Extreme and High Consequence Category dams) or 20 years (for Significant Consequence Category dams).

An owner is to submit its conclusions on a dam's safety, or proposals for dam safety improvements to the DSC for review. For all supporting data interpretations, analyses, calculations, judgements and conclusions, the DSC relies on the knowledge, skill and diligence of the owner's professional advisors. This policy will not prevent the DSC challenging the owner to justify any aspect of a proposal.

A dam owner is to bring risks into compliance with the DSC's safety requirements as soon as reasonably practical and is to keep the residual risks under review and is to maintain risks as low as reasonably practicable over time.

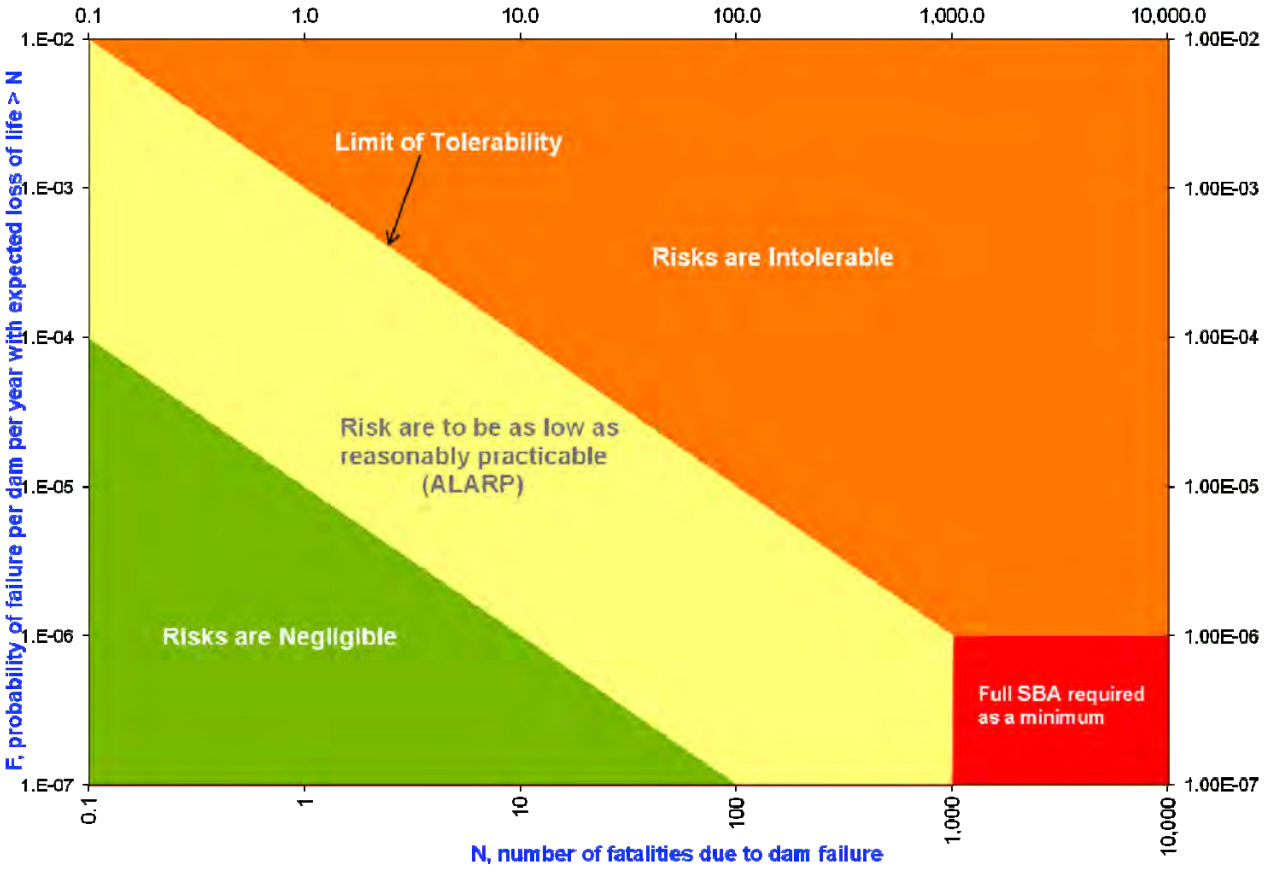
However, safety improvements required by the DSC may be implemented progressively where that would promote more effective risk reduction for the community as regards risks from dams. Short term dam safety improvements are generally required within 2 years, medium term improvements within 10 years and long term improvements are required within 20 years (see Guidance Sheet *DSC1B*).

Also, when required to do so, a dam owner is to demonstrate that risk to public and other interests of the community are tolerable. To be *tolerable*, a risk must be *as low as reasonably practicable (ALARP)*. For *public safety risks*, risk boundaries – the *limit of tolerability and the negligible* level of risk – are relevant in applying the *ALARP* test. See Figure 7.1 below (adapted from Fig. 1 in *DSC1B*).

For a risk to be ALARP, the sacrifice (generally in terms of cost) required in its reduction must be grossly disproportionate to the risk reduction that is achieved and may partially be based on CSSL (Cost to Save a Statistical Life). Other criteria also need to be considered.

"A dam owner is to bring risks into compliance with DSC's safety requirements as soon as reasonably practical"

Figure 7.1 – DSC Societal Risk Requirements: Existing Dams



To provide background data needed for safety assessment studies, the DSC has continued to encourage dam owners and Government agencies to install and maintain rainfall/runoff and seismic monitoring equipment, and to support research into the estimation of piping risks, the derivation of extreme rainfall estimates, and the risk assessment of dam slopes and other important stability criteria.

The effectiveness of emergency response actions is also a consideration in judging the tolerability of risk.

A Dam Safety Emergency Plan (DSEP) is required by the DSC for any dam where lives are at risk from dam failure, to provide a contribution to aiding risk reduction. These plans apply from construction throughout the life of each dam and are aligned to SES planning for river and flash flooding. The DSC liaises with the SES and provides data and information on the highest risk and other significant risk dams, particular through the DSC's Emergency Management Sub-committee. These developed protocols allow the SES to effectively prioritise its emergency planning for dams (see Section 7.1.10).

From information received on dams, the DSC identifies those dams with the highest risks and those with possible risks via the dam safety programs. The DSC then reaches agreements with owners on needed safety improvements, or the activities needed to clarify safety, and a timetable for actions. Once a significant safety shortfall is confirmed, the owner is to submit a program for safety improvement. The DSC regularly updates its provisional risk indexing of dams and the SES is informed to guide them with interim flood planning downstream of various dams. However, the DSC listing is not exhaustive as there may be dams with undetected shortfalls on safety to date. The DSC requirements for dam owners to undertake regular safety reviews have been implemented to minimise the risk of safety shortfalls going undetected.

With most attention on the dams in Tables 7.5 and 7.6, the DSC then monitors activities against the safety improvement program, which can necessarily extend over many years to allow for detailed investigations and community consultation, financing and implementation. This process continued throughout the year.

About 69 dams have been modified for safety improvement following the DSC's establishment, with 45 in the last 15 years as shown in Table 7.4. For some of these dams, there have been staged improvements made. These numbers and the table do not include any planned staged raisings of tailings dams.

Table 7.4 - Dams Modified for Safety Upgrading (since 1999)

Dam	Main Safety Issue	Year Completed	Nature Of Upgrading
Blowering	Flood	2010	Parapet wall on dam, spillway walls raised
Bulli Upper R'way Basin	Flood	2010	Embankment removed (and basin de-prescribed)
Burrendong	Flood	2011	Dam & saddle dams raised
Cecil Park Basin 3A	Flood/Stability	2008	Spillway enlarged, embankment stabilised
Chaffey	Flood	2011	Auxiliary spillway constructed
Chichester	Flood/Stability	1995; 2004	Dam post-tensioned, abutment stabilised
Chifley	Flood	2001	Dam raised and spillway post-tensioned
Clarrie Hall	Flood	2013	Spillway modification works
Coalcliff	Flood/Stability	1999	Spillway enlarged, embankment upgraded
Company	Flood	2006	Spillway enlarged, embankment raised
Copeton	Flood	2013	Auxiliary spillway constructed
Daintree Drive Lower	Flood	2013	Spillway capacity increased (and dam de-prescribed)
Daintree Drive Upper	Flood	2013	Spillway capacity increased (and dam de-prescribed)
Emigrant Creek	Flood	2001	Dam post-tensioned, abutments raised
Googong	Flood	1992; 2011	Dam raised, spillway stabilised
Grahamstown	Flood	2001; 2005	Dam core raised, face armoured, spillway upgraded
Green Meadows Basin	Flood	2003	Embankment & crest stabilised, new spillway
Hamilton Valley 5A	Flood	2009	Embankment stabilised
Hume	Stability/Earthquake	1997-2013 (various stages)	Cut-off wall; embankment stabilising; southern junction works, southern training wall buttressing
Jindabyne	Flood	2006; 2010	New spillway and outlets
Kalingo	Flood	2012	Spillway upgraded
Keepit	Flood	2011	Right abutment spillway &subsidiary wall spillway
Mardi	Earthquake/Flood	1991; 2011	Embankment stabilised; spillway capacity increased and new outlet tower & associated works
Moore Creek	Flood	2007	Dam buttressed
Muirfield Golf Club	Flood	2013	Spillway enlarged
Pacific Palms	Flood	2013	Spillway enlarged (and dam de-prescribed)
Petrochilos	Flood	1989; 2006	Spillway upgraded
Prospect	Earthquake	1997; 2014	Upstream dam embankment stabilised
Quipolly Dam	Flood	2013	Dam raised, spillway augmented
Redbank Creek	Flood	2011; 2014	Outlet conduit for minor flood load; dam wall lowered
Rocky Creek	Flood/Piping	2010	Embankment upgrade to resist piping
Rylstone	Flood	2003	Auxiliary embankments removed
Sooley	Flood	2005; 2010	Dam raised & buttressed, new spillways; other remedial works
Split Rock	Flood	2012	Parapet wall modification works completed
Spring Creek	Flood	2011	Bank strengthened and raised, spillway augmented

Dam	Main Safety Issue	Year Completed	Nature Of Upgrading
St Joseph Sch. R Basin	Flood	2001	Bank stabilisation and new spillway
Tilba	Flood/Stability	1997; 2003	Dam wall raised; toe drained
Tumbarumba	Stability	1999	Embankment drainage installed
Warragamba	Flood	1990; 2002; 2011	Dam post-tensioned & raised 5m; auxiliary fuse plug spillway; gate remediation & upgrade (locking) works
Wentworth Falls	Flood	1993; 2003	Dam raised, spillway augmented
Widemere Det. Basin	Flood	2009	Basin raised, spillway enlarged
Winding Ck 5 Basin	Flood	2011	Parapet wall on embankment
Wingecarribee	Piping, Flood	2012	Piping upgrade, peat barrier flood protection
Wyangala	Flood	2011	Spillway walls raised
Yellow Pinch	Piping	2013	Downstream filter extension in upper crest section

Based on current information available to the DSC, the dams identified as having the apparently highest safety risks (or requiring status checking) are listed in Table 7.5, together with the year in which the apparent or possible shortfall in safety requirements was determined, and the status of the safety improvement program for each dam. Dam owners have commenced safety review studies, improvement options studies or design of improvement works for all of these dams, and the DSC monitors their progress. If owners fail to achieve satisfactory progress, the DSC works with the owners to ensure an improved outcome. Should owners not respond positively, the DSC could issue a notice under Section 18 of the *Dams Safety Act*. Such a notice was issued by the DSC in March 2010 to the owner of the Bulli Upper Railway Embankment. As a result, that old and very high risk dam has since been removed. As part of its policy of being more rigorous in issuing S18 Notices on dam owners with high risk dams on which no significant upgrading has occurred for unjustifiably long periods, the DSC issued an S18 Notice to Mid-Western Regional Council in 2011 to make Redbank Creek Dam safe. Construction of the ensuing remedial upgrading works was completed by early 2014. It involved a lowering of the central section of the dam's concrete wall. The project had successful outcomes in providing a major reduction in the flood failure risk that had been posed by this old dam and being achieved at a very cost effective price. Once the contract work started, it finished ahead of schedule and under budget. It also involved effective collaboration between the Council, the NSW Office of Water, a dams consultant, the DSC and other NSW agencies.

During 2013/14 further works continued at Hume Dam, with the completion of the southern training wall buttressing works. Following the completion of the long awaited and complex hydrology/flood capacity upgrading study, the DSC is working with the owner and operator to determine the appropriate final stage flood upgrading works for the dam. Construction works for upgrading the embankment of Sydney Catchment Authority's Prospect Dam were commenced in 2013/14 and will be completed by the end of 2014.

The DSC has continued to liaise closely with Crown Lands on the required investigation studies for its Bethungra Dam and with State Water Corporation (SWC) on further reduction of risks at several of its dams. Although it will still need some spillway capacity upgrading works, detailed dambreak and associated studies undertaken during 2013/14 enabled Bethungra Dam's Consequence Category to be lowered and the works extent lessened. At SWC's Wyangala Dam, safety improvements have been implemented and construction works are underway. At SWC's Chaffey Dam, contract construction work will commence in 2014 involving a raising of the full supply level for increased water supply/demand purposes and also a raising of the dam wall as the final part of a staged flood security upgrade.

There are currently almost 150 prescribed dams and basins owned by local government councils and other local water utilities (LWUs). Work also continued during the year on a prioritised program to improve the safety of various LWU dams. Some of this programmed development is currently done through the auspices and assistance of the NSW Office of Water. Construction of upgrading works at Lake Endeavour Dam commenced in early 2014 and construction of storage augmentation & upgrading works at Suma Park Dam will commence in late 2014. Further investigations and options or design studies are underway on Dumaresq, Imperial Lake, Winburndale and Tenterfield Creek Dams; with the ensuing upgrading constructions generally due for start and completion variously during the period 2015 – 2017. Jerrara Creek Dam is scheduled for decommissioning in 2016.

In addition, the DSC continues to monitor the progress of dam owners in developing action programs for dams with minor shortfalls in safety aspects and owners' investigations of several other dams to confirm their safety status.

Table 7.5 - Status of Upgrading Activities for Dams under DSC Especial Review (i.e. highest risk and/or particular circumstances as at 30th June 2014). See Note 1.

Dam (Note 2)	Safety Issue		2013/14 Upgrading Progress
	Type	Identified	
Barina Park Detention Basin	F	2013	Awaiting dambreak and flood capacity studies to be done.
Dumaresq	F, S	2000	Awaiting upgrading detailed design and peer review of preferred option.
Gosling Creek	F	2013	Updated hydrology & design flood studies instigated. Foundation evaluation also in investigation program. Awaiting results.
Hume	F, E, S	1994	Spillway southern training wall buttressing works completed in late 2013. Final flood upgrading option design studies in progress. (FWA)
Imperial Lake	F, S	2000	Revised upgrade options study completed. Awaiting design details for preferred option. Anticipate upgrade construction commencement during 2015. (FWA)
Jerrara Creek	F	2011	Council resolved in late 2013 to decommission dam. Completion of decommissioning scheduled in 2016. (FWA)
Lake Pambulong Detention Basin	F, S	1995	Anticipating spillway upgrade by end of 2014. (FWA)
Minmi Road Detention Basin	F	2010	Upgrade/maintenance improvement works effectively completed in late 2014.
Nepean	S	2007	Awaiting stability analysis reassessment; anticipated available by end of 2014 and that a risk reduction position will likely be demonstrated. (FWA)
Prospect	S	2006	Upgrading construction programmed for completion in late 2014. (FWA)
Suma Park	F	1984	Upgrading construction programmed for start in late 2014. (FWA)
Tenterfield Creek	F, S	1995	Detailed design of upgrading option underway. Anticipate construction contract award by early 2016 and upgrade completed in 2017. (FWA)
Warragamba	E	2008	Series of investigations and safety updating reviews underway; programmed for completion by late 2014. (FWA)
Winburndale	F	1995	Detailed design of upgrade option underway. (FWA)

F - Inadequate Flood Capacity

S - Potential Structural Inadequacy under Normal or Unusual Loading Conditions

E - Detailed Seismic Assessment & Capability Studies Required; or Inadequate Earthquake Structural Resistance

FWA - Flood Warning Arrangements in Place

Notes: 1. During 2013/14, the number of dams and basins in Table 7.5 had a significant net reduction by 5 from 19 to 14 (including 1 addition and, notably, 6 removals).

2. Dams are listed in alphabetical order.

3. Moreover, between 30th June 2014 and the printing of the Annual Report one structure (Lake Pambulong Detention Basin) has been removed from the Table 7.5 list.

Barina Park Detention Basin

Based on studies and associated information provided in the 2013 Surveillance Report, this earthfill embankment retarding basin was assessed as having inadequate flood capacity and a higher risk status than previously considered.

Table 7.6 - Status of Activities on Dams issued with S18 Show Cause Notices

Dam	Safety Issues		2012/13 Upgrading Progress
	Type	Identified	
Imperial Lake	F, S	2000	Upgrading options being determined, with upgrade construction works anticipated during 2015 (FWA).

Table 7.7 - Dams issued with S15 Notices

Dam	Owner	Report required	Due since
Lithgow No 2	Lithgow City Council	Stability Analysis (analysis now completed but not yet peer reviewed).	2006

7.1.6. Flood Capacity and Hydrology

Various flood conditions during the last three years in NSW and Australia have focussed dam owners' attention on the security and operation of their dams under these conditions. For example, torrential rain resulted in severe flooding throughout NSW in early 2012 and again in early 2013. These floods caused rapid storage rises in various prescribed dams, and even resulted in the rapid failure due to overtopping at Oaky River Dam in northern NSW in February 2013 (exacerbated by problems with gated spillway operation). That dam had been correctly assessed as a Low Consequence Category structure and, as expected, there was no threat to any lives and only minor environmental damage occurred. However, this incident still indicates the importance of providing adequate spillway capacity (and effective gate operation) for dam structures, even for Low Consequence Category dams where the decision for upgrading is effectively the owner's.

During the 2013/14 period, there was a major dam incident involving partial collapse of the 90m high Tokwe-Mukosi Dam in Zimbabwe. The partial downstream slope failure of this large embankment dam followed a prolonged period of torrential rains and rapid filling of the dam as it neared construction completion. Thousands of people had to be evacuated from the potential dambreak flood risk area downstream after substantial cracks were discovered in the dam embankment. Inspections also suggested the embankment had shifted slightly as water levels rose following the rare and very heavy rainfall in the catchment.

World-wide inadequate flood capacity of dams remains a problem and is still one of the leading causes of dam failure or the main contributing reason for upgrades of existing dams (particularly old ones). The main reason for the many dams world-wide and in Australia now assessed as having inadequate flood capacity is the steady advance in the understanding of extreme events by meteorologists and hydrologists. It is now recognised that flood estimates made some decades ago were generally too low, and analyses using current day flood estimating methods are showing numerous dams in NSW have inadequate flood capacity. The DSC requires NSW dam owners to undertake periodic reviews of the flood capacity of their dams to see if safety improvements are needed. In NSW a number of prescribed dams are under particular review by the DSC (see Table 7.5 for example).

Gosling Creek Dam

Updated flood hydrology studies are being undertaken for this old 8m high concrete gravity dam near Orange. Some necessary geotechnical foundation investigations will also take place. DSC staff undertook an audit inspection of the dam in November 2013.

Initially, generalised Probable Maximum Precipitation (PMP) estimates are required to define extreme storm rainfalls for each dam. The Bureau of Meteorology sets the procedures for this work. These PMP events, while very rare, are plausible and several near PMP events have occurred (e.g. a record storm at Dapto in 1984 dumped 515mm of rain in 6 hours – a near PMP event). Generalised procedures are now available in NSW for PMP storms over any catchment area and for any duration.

Rainfall estimates are converted to flood predictions by the dam owner's hydrologists, using approaches outlined in *Australian Rainfall and Runoff*, produced by Engineers Australia.

DSC Guidance Sheet *DSC3B Acceptable Flood Capacity for Dams* provides information for dam owners and their consultants on the provision of acceptable flood capacity for dams. It takes into account the latest requirements and developments in the Australian National Committee on Large Dam's (ANCOLD) guidelines on dam safety, including greater incorporation of the risk assessment process.

Guidance Sheet *DSC3B* is limited to guidance on the means by which dam owners are to demonstrate to the DSC that the flood risks posed by their dams to community interests are tolerable or will be made tolerable following improvements in safety.

In setting its requirements, the DSC has been guided by the advice of its Hydrology Sub-committee, which maintains a close liaison with ANCOLD, Engineers Australia and hydrologists from various Authorities and academia throughout Australia.

7.1.7. Earthquake Capacity

Historically, several earthquakes up to Magnitude 7 have occurred in Australia and the 1989 Newcastle earthquake (Magnitude 5.4) provided a reminder that large damaging earthquakes can occur. Seismologists indicate that major earthquakes (e.g. up to Magnitude 7.3) could occur anywhere in NSW and that a Magnitude 7.3 earthquake has about 1,000 times the destructive power of the Newcastle earthquake.

Many overseas dams have survived nearby earthquakes up to Magnitude 8 as evidenced in the 2008 Sichuan Chinese earthquake (M 7.9, though that earthquake seriously damaged some dams). More recently Fujinuma Dam in Japan failed due to liquefaction induced by the March 2011 earthquake M 9.0. Experience however has shown that well-constructed concrete and earth/rockfill dams on good foundations are inherently stable during earthquake events. Fortunately, these types form the bulk of NSW prescribed dams.

Whilst it is expected that few dams are vulnerable, earthquake stability reviews are required to be included in the regular safety reviews of all prescribed dams. To provide guidance for designers and reviewers, the DSC issued its Guidance Sheet *DSC3C Acceptable Earthquake Capacity for Dams*.

The DSC goal regarding the seismic safety of prescribed dams is to ensure they have adequate stability and are appropriately designed otherwise and also managed so as to achieve tolerable risks to community interests.

It is for the dam owner to determine how this goal (including DSC requirements) will be achieved and to demonstrate to the DSC that the goal is achieved, or will be achieved following safety improvements.

In 2013/14 the largest seismic events in NSW were two Magnitude 3.5 earthquakes, one near Appin in October 2013 and the other near Cobargo in November 2013. No damage to nearby dams was reported. The maximum recorded seismic event in Australia in 2013/2014 was a Magnitude 4.7 earthquake south of Yunta in South Australia in April 2014.

Scarcity of long-term seismic data in NSW to use as a basis for determining the earthquake design loadings for dams remains a concern for the DSC.

The seismic monitoring network, installed on Sydney Catchment Authority (SCA) dams in the early 1990s, has recorded evidence of minor seismicity in the area and has provided beneficial data for future design use on dams and other structures in the Sydney area.

The SCA network complements the Newcastle network installed after the 1989 earthquake, along with some seismic stations at State Water Corporation and Snowy Hydro Limited dams, and the national grid installations of Geoscience Australia. The DSC has continued to support expansion of this seismic network throughout NSW.

Hume Dam

Buttressing works to strengthening the southern training wall of the spillway of this very important dam were completed in 2013. Located on the Murray River near Albury, this multi-faceted dam is 51m high and has a storage capacity of 3,040,000ML.

7.1.8. Safety under Non-flooding Conditions

Dams are long life structures, with some of the oldest dams in the world over three thousand years old, and the oldest prescribed dam in NSW, Lake Parramatta Dam, being over 150 years old. Given that the average age of major NSW dams is over 40 years; their structural safety under normal operating conditions is mostly satisfactory by current methodology. Where apparent shortfalls in structural adequacy or acceptable flood capacity have been revealed, the DSC has required owners to undertake safety reviews and to implement any consequent improvement action.

Prospect Dam

Upgrade construction works for this very old earthfill dam were commenced in 2013 and will be completed by the end of 2014. This 26m high dam of 50,000ML storage capacity is strategically important within Sydney's water supply and treatment network. DSC staff undertook an audit inspection of the dam in February 2014

Particular areas of concern to the DSC include but are not limited to:

- Older earth dams, without intercepting filters to control piping and seepage. Piping causes almost as many dam failures as inadequate flood capacity. Hume, Mardi, Tilba, Rydal, Tumbarumba, Yellow Pinch and Rocky Creek Dams, and Cecil Park Basin 3A are examples of upgrading in this regard. The upgrading of Prospect Dam that commenced in 2013, and will be completed in 2014, largely involves filter works to control piping and seepage.
- Note that there appears to be no clearly recognised international practice on piping safety for old dams without modern filters. The DSC has a Guidance Sheet *DSC3G General Dam Safety Conditions* that provides some information and references. Analysis of a dam's safety for this aspect is largely based on risk assessment.
- The deterioration, with time, of un-encased pressure conduits through embankments could lead to uncontrolled high-pressure leakage through the embankment, leading to washout and dam failure. A number of large dams have failed from this cause overseas, as have a few small dams in Australia. The DSC requires dam owners to investigate and monitor their conduits (e.g. Tumbarumba and Petrochilos Dams). This is also covered in Guidance Sheet *DSC3G*.
- The need to better understand piping and slope instability risks of embankment dams. A research program initiated some years ago by the University of NSW and sponsored by the DSC and several major dam owning organisations has developed valuable new understanding in this area. A procedure was developed from this research (the tool-box method) by the US Army Corps of Engineers and the US Bureau of Reclamation. This piping tool-box method has recently been modified.
- The reliability of spillway control systems, given several serious incidents and dam failures world-wide involving gate failures. There are only about 20 gated prescribed dams in NSW and the DSC requires their owners to regularly review their gates' safety and to ensure high reliability through systems upgrades, back-ups, proper operation and maintenance procedures. For example, Snowy Hydro Limited is currently undertaking a substantial gate reliability study on its gated dams. A DSC Guidance Sheet *DSC3D Reliability of Spillway Flow Control Systems* on this aspect of dam safety is available and outlines how gate reliability is to be generally considered in the assessment of a dam's discharge control and capacity.
- The safety of mine tailings and ash dams is usually associated with their location, foundation conditions and construction methodology, and which in turn are often directly affected by the mine site layout and earthmoving operations. Many incidents and some failures occurred overseas during 2013/14. This highlights the special vulnerability of these types of dams, the failure of which usually has very significant environmental consequences, and sometimes loss of life. The DSC Guidance Sheet *DSC3F Tailings Dams* covers safety policies and management practices specific to tailings dams. *DSC3F* references the associated ANCOLD *Guidelines on Tailings Dams (2012).*

7.1.9. Operation, Maintenance and Surveillance

Dams require care throughout their lives to keep them in a safe condition, since materials, components and machinery deteriorate with time. Ongoing operation, maintenance and surveillance is essential and cost-effective, otherwise reduced life expectancy or failure could result (e.g. a near piping failure of a Hunter Valley tailings dam in 2003 was averted by timely intervention). In particular, proper operation is an essential component to ensure the safety of upstream-raised tailings dam. The rehabilitation works or decommissioning (e.g. Wellington Dam), as found necessary for some older NSW dams, illustrate the deterioration that can occur as dams age. Concepts developed in other industries, such as Failure Modes and Effects Analysis (FMEA) are now being introduced to dams to provide a more rational and better targeted basis for maintenance and replacement programs.

Jerrara Creek Dam

This 13m earthfill dam in the Kiama region is no longer used for town water supply. Because of its determined limited flood capacity, Kiama Municipal Council has decided to decommission the dam and design work is underway. DSC members and staff inspected this dam in October 2013 in conjunction with a DSC country meeting.

Dam safety specialists throughout the world recognise the necessity for systematic and documented operation and maintenance procedures. The ANCOLD *Guidelines on Dam Safety Management (2003)* set out contemporary requirements in this area, based on industry best practice, and this document provides a basis for a uniform national approach to proper operation and maintenance. The DSC has adopted them as its requirements as outlined in its Guidance Sheet *DSC2F Operation and Maintenance for Dams.*

DSC2F requires dam owners to develop and maintain operation and maintenance (O&M) manuals, based on organised programs and systematic inspections. The DSC maintains an active education program in this area and audits performance through the owner's Surveillance Reports and by regular inspections of dams by DSC members and staff.

O&M Manuals should be prepared by appropriately qualified and experienced personnel including specialists such as civil, mechanical, and electrical engineers as required by the type and complexity of the dam and its equipment.

Owners of prescribed dams are to ensure that there are appropriately trained and experienced personnel available to operate and maintain their dams in accordance with their O&M Manuals.

The DSC also places great emphasis on dam owners properly recording and documenting their dams' O&M activities.

Typical maintenance issues that often need to be addressed by dam owners include removal of trees from embankments, maintaining a short grass cover on the downstream slopes of earthfill dams, keeping spillways clear and maintaining adequate wave protection.

A very important aspect is the proper operation and reading of the dams' instrumentation. Most of the large dams in NSW have various forms of instrumentation, the most common being seepage measurement, piezometers and external surveys. The DSC is therefore very concerned to see that all instrumentation is read regularly and correctly recorded, as well as maintained, operated and analysed such that the resulting readings are as reliable and accurate as possible. In this way the instrumentation readings can be used to help determine the safety of the dam.

Another important issue is the operation of dams with gated spillways which was marked as a significant outcome of the floods at Wivenhoe Dam in Queensland in January 2011. As a result, the DSC issued a letter to all owners of such dams advising them to review their spillway flood handling procedures. The DSC issued similar letters in 2013 following the Oaky River Dam failure in NSW in February 2013.

"Dams require care throughout their lives to keep them in a safe condition"

Oaky River Dam

DSC members and staff inspected this 18m high hydro power dam in May 2014 in conjunction with a DSC country meeting. Located in rugged hilly country east of Armidale, the dam had failed in February 2013 due to flood overtopping. Although a Low Consequence Category dam, it was a salient reminder of the need for proper operation of dams and any spillway gates to maximise dam safety.

7.1.10. Dams Safety Emergency Management

The DSC's primary objective is to protect the public from uncontrolled releases from dam storages; so it requires that dam owners prepare Dam Safety Emergency Plans (DSEPs) for dams posing a risk to downstream residents. The DSC has produced its Guidance Sheet *DSC2G Emergency Management for Dams* to aid dam owners in the preparation of DSEPs.

It should be noted that not all prescribed dams have been yet constructed or have had construction development completed. Of the 204 prescribed dams of High and Extreme Consequence Categories, 199 require DSEPs at this stage. Of those, 167 (i.e. 84%) have current updated DSEPs. Of the 346 prescribed dams of Significant, High and Extreme Consequence Categories, 329 require DSEPs at this stage. Of those, 254 (i.e. 77%) have current updated DSEPs. The DSC is working in conjunction with dam owners to ensure that every such dam has a DSEP or has (preferably) a current updated DSEP in place.

DSEPs cover monitoring procedures, actions to be taken by the owner's personnel, pertinent advice to emergency management agencies, relevant information concerning the nature of dambreak flooding and communication protocols. These plans also take into account the general increase in security world-wide required for strategic assets such as dams. (In 2008 a dam was destroyed by terrorists in Sri Lanka, and special security precautions have also been taken at dams in Iraq and Afghanistan). The DSC has also prepared Guidance Sheet *DSC2H Dam Security* to assist owners in this regard.

To enable the DSEPs to function effectively, the DSC Guidance Sheet *DSC3G General Dam Safety Considerations* requires that all High and Extreme Consequence Category dams have telemetered storage level recorders and where practical, alarms on the downstream seepage measurement weirs to give warning of potential non-flood related failures.

In the event of an emergency at a dam being reported to the DSC (Amber or Red Alerts) the DSC has in place a policy document to guide staff and members on the correct procedures for handling such emergencies. Normally, except in very unusual circumstances, the DSC will not provide dam owners with technical advice during emergencies, as this would normally be sought from the dam owners' own technical experts or specifically engaged consultants.

Responsibility for developing and maintaining flood plans in NSW rests with the State Emergency Service (SES). The DSC looks to dam owners to liaise with the SES in developing flood plans and DSEPs to protect residents against the impacts of major floods that pass through their dams, including a potential dam failure. The value of these plans, even for dams that meet normal safety requirements, was demonstrated in 1999 with activation of the Lyell Dam DSEP. That DSEP activation facilitated the timely evacuation of campers after the unexpected failure of the dam's inflatable spillway section. Further demonstration was also provided during the May 2009 Murwillumbah floods, with the timely evacuation of residents at Uki downstream of Clarrie Hall Dam.

In August 2013 the DSC had joint involvement with the SES in running of a regional 1-day Dam Failure Exercise Workshop in Nowra. It was well attended and considered successful based on the positive feedback obtained.

During 2013/14 the Sydney Catchment Authority (SCA) tested the DSEPs of Warragamba, Prospect, Wingecarribee and Woronora Dams through four separate desktop emergency simulation trials. These involved the participation of relevant SCA staff, SES, DSC and other relevant emergency management agencies.

The DSC will continue to strongly encourage dam owners to test DSEPs regularly, particularly with regard to sunny day failure (i.e. from a non-flood induced mechanism), where failures could come with very little warning.

It is possible that initial White Alerts (i.e. the first of three coloured designated alert conditions) occurred at various dams in NSW during several floods in 2013/14 but the DSC only requires Amber (sometimes alternatively called Orange) and Red Alerts to be reported to it. White Alerts do not necessarily have to be reported to the DSC.

The SES has continued to prepare and update flood plans for communities downstream of deficient NSW dams during the year. An important aspect of flood planning is early and comprehensive public awareness campaigns to inform affected residents of the details of these flood emergency plans.

To mesh the responsibilities of dam owners and the SES, the DSC's Emergency Management Sub-committee meets as necessary to review and monitor the procedures used by the agencies concerned. As a result, dam incident warning protocols have been implemented, with all of the emergency agencies. The Sub-committee also provides a channel for information exchange between the DSC and the SES, giving the SES regular updates on the safety status of dams in NSW. One of the issues that has arisen is the timing of the alerts, as some dam owners have been concerned that some evacuations may have been occurring too early. The DSC is therefore encouraging dam owners, their DSEP consultants and the SES to carefully examine, develop and agree on specific alert level timing at individual dams and to look at other alert triggers than just storage levels (e.g. perhaps in conjunction with rates of storage rise).

7.1.11. Flood Retarding and Detention Basins

Flood retarding basins can have great value in reducing flood magnitude in urban areas. Most are small, typically with an embankment only a few metres high, but they are usually situated in densely populated areas with drainage channels and conducts of limited flow capacity downstream. However, there are some large structures, such as the Loyalty Road Retarding Basin, upstream of Parramatta, which is formed by a roller compacted concrete dam 29m high.

During the short periods that these basins store water they act as dams, and their failure could be damaging to downstream areas. The DSC prescribes those basins that would pose a significant threat to downstream communities or the environment in the event of failure. The potential threat of retarding basins to a community can be as significant as that from a major dam since houses are often located immediately downstream. Because the embankments forming most basins are dry for long periods, their response to floods is as for the "first-fill" phase of dam's life, a period known to be much more prone to dam failure than other periods. Accordingly, retarding basins need to be designed, constructed, maintained and monitored in accordance with good dam engineering practice.

Cecil Hills Basin 100

Although only about 3m high, this retarding basin has a High C Flood Consequence Category. Constructed in 2001, it incorporates a concrete footpath on the crest. Remedial upgrade works in 2006 included some earth stabilisation and the addition of gabion rockfill mattresses to handle design flood discharges in critical areas of the structure.

Traditionally, retarding basins have been treated as an element within an urban drainage scheme. For such schemes the focus has been on floods up to the 1 in 100 Annual Exceedance Probability (AEP) flood, which has been the typical *design flood*. In the past, few owners and stakeholders recognised that a greater flood could occur and would cause a sudden increase in discharge or, in the worst case, could fail the embankment and put those downstream in danger. The community at risk generally does not appreciate the potential for larger floods to occur. Recent examples of events exceeding the 1 in 100 AEP mitigation limit were the storm events in Toowoomba (January 2011), Mudgee (February 2011), across eastern Australia in March 2012 and again in early 2013. In addition, there is also the risk of piping through embankments by flood waters seeping through cracks in the basin embankments caused by drying out of the earthfill during the long dry periods between floods. The DSC has intervened to educate the community of these dangers. These efforts are beginning to pay dividends in improved monitoring of the basins by their owners and improved understanding and experience of engineering consultants.

ANCOLD is currently developing Guidelines on retarding basins, with one DSC member on the Working Group.

It should be noted that with several hundred basins in NSW, there is a strong possibility that one or more basins could be tested annually by an extreme storm. The DSC's requirements aim to ensure that basins will withstand appropriately large floods, or that basin failure does not involve a significant risk to life. The design needs to allow for the effects of future development in the area and any possible "domino effect" of basin failure if there are multiple basins in a cascade arrangement.

The DSC requires that prescribed retarding basins are subject to relevant procedures regarding surveillance, inspection, operation and maintenance but continues to be concerned with the poor maintenance some basins receive. Inspections still reveal basins with partially blocked outlets, which can significantly reduce the basin's flood capacity. This reinforces the need for basins to be inspected at least monthly, as part of their maintenance schedule, as well as after significant flood events

The DSC continues to maintain close liaison with basin owners during the design stage, particularly to oversight urban drainage designers whose experience of dams engineering is often limited to small structures. DSC staff carry out regular basin inspections and the DSC has a Guidance Sheet *DSC3E Flood Retarding Basins* to provide advice on retarding and detention basins.

Fox Hills Retarding Basin. *Constructed in 1990 on the boundary of a golf course, this retarding basin is a 3.3m high grassed earthfill embankment and has a concrete path along its crest. Based on dambreak study modelling completed in 2013 and some associated engineering studies, the DSC endorsed a lowering of the Flood Consequence Category to Significant for this basin.*

Owners, or their consultants, should inform the DSC of proposals for new basins (or un-notified existing basins) so that the DSC can consider their need for prescription. The DSC prescribes all basins whose failure could cause loss of life. The DSC also requires assessment of the incremental consequences of failure of the basin.

Owners are also required to develop an appropriate Dam Safety Emergency Plan (DSEP) in conjunction with the relevant emergency authorities, outlining procedures for owners to follow to mitigate the effects of extreme flood events at their basins.

7.1.12. Small Dams Not Prescribed by DSC

Following reports to the DSC from the SES during early 2010 that evacuations of dwellings downstream of small dams in danger of failure were occurring, which were not known or listed by the DSC, a project began during 2010/11 to find any such dams that pose a risk to the community and should be prescribed by the DSC. To this end a circular letter with a questionnaire attached was sent with the assistance of the Local Government and Shire Association to all Councils in NSW, requesting them to search their records for any development applications for construction of dams in their area or for any dams existing in their area, that would come under the DSC's requirements for prescribing dams. A similar letter was also sent to the NSW Office of Water licensing branch.

To date a substantial majority of the Councils have formally replied, and a number of dams have been prescribed as a result. It is possible that some more such prescribable dams may yet be found from this ongoing investigation/research project.

"A project began during 2010/11 to find [unknown small] dams that pose a risk to the community and should be prescribed by the DSC"

7.2. Regulation of Mining near Dams

7.2.1. Background

In NSW, legislation creates a system where the risks to dams from mining are independently assessed from a civil engineering perspective. Usually this is done under the *Mining Act 1992,* by the DSC advising the responsible Minister, but it may also be done directly by the DSC under the *Dams Safety Act 1978*. The DSC's objective is to ensure that risks to dams and their reservoirs from mining are tolerable in terms of the community's interests.

The most common regulatory mechanism involves declaration of Notification Areas (NAs) around selected prescribed dams (see Prescribed Dams map). Mining within these areas requires Ministerial approval, acting on advice from the DSC, or the DSC may use its powers under the *Dams Safety Act 1978* to direct actions be undertaken to ensure the safety of a prescribed dam.

7.2.2. 2012/13 Overview

"During 2013/14 over 28 million tonnes of coal were extracted near prescribed dams in NSW"

The mining projects considered by the DSC during the year were mainly for mining coal by underground or open-cut methods. There continues to be a strong interest in coal mining near dams and storages. Twenty-seven new applications were endorsed as follows:

Underground Mining	Open-cut Mining	
Ashton (1)	Drayton (1)	Mount Owen (1)
Bulga (1)	Glennies (1)	Mount Thorley (1)
Clarence (3)	Kempfield (1)	Tomingley (1)
Dendrobium (1)	Kimberley (1)	Warkworth (1)
Hera (1)	Mangoola (1)	Wilpinjong (2)
NRE (5)	Maules Creek (1)	
Wambo (2)	Mount Boppy (1)	

During 2013/14, under the DSC's guidelines, over 28 million tonnes of coal were extracted near prescribed dams in NSW, either in Notification Areas or their equivalents, without reducing safety below tolerable levels. Prior to the formation of the DSC, some of these coal deposits would not have been mined due to the safety concerns of dam owners.

7.2.3. Details of New Applications and Currently Monitored Mines

Ashton Mine commenced longwall mining near Ravensworth Inpit Storage Dam in 2010 and will be mining within the Notification Area around the Macquarie Generation's ash dam.

Broula King Gold Mine commenced open cut mining in early 2013, within the Broula King Notification Area around the Broula King Tailings Storage Facility. Mining is now complete.

Bulga Mine commenced extraction of longwalls beneath Bulga Old Tailings Dam during 2013/14.

Bulga Old Tailings Dam

Constructed in 1981, this clay lined earthfill embankment is 14m high and has a storage capacity of 1,750ML. It stores coal tailings from the Bulga Coal Mine in the Hunter Valley.

Clarence Colliery continued extracting first workings and partial pillar extraction within the Notification Area of Lithgow No. 2 Dam up until late 2013. The Lithgow No. 2 Dam supplies water to Lithgow.

Dendrobium Colliery continues extraction of a series of longwalls (currently mining Longwall 10 in Area 3B) adjacent to Avon Dam. Avon Reservoir supplies water to the Illawarra area. Mining to date has indicated no significant impact on the stored waters, although previous mining around Lake Cordeaux has resulted in some localized minor inflows to the mine which appear to be rainfall related.

Drayton Mine continues to successfully expand its open-cut operations adjacent to Liddell Ash Levee. The levee is a dam, which retains ash from a nearby power station and is currently being upgraded.

Duralie Colliery continued open-cut mining further away from its water supply dam and is sufficiently distant from the dam that the DSC has no concerns for mining impacting the dam.

Glennies Creek Colliery continued open cut mining within the Notification Areas of Possum Skin Dam and Camberwell Tailings Dam No. 2. The mine is currently on care and maintenance.

Hera Gold Mine commenced underground mining in late 2013, within the Hera Notification Area around the Hera Tailings Storage Facility.

Kimberley Metals Mineral Hill Mines continue to extract Cu, Au, Zn, Pb ore from within the Mineral Hill Notification Area around the Mineral Hill tailings dams. Using open cut and underground mining techniques the underground is getting closer to the tailings dams through time. No mining impacts on the dams have been detected to date.

Maules Creek Coal began development of an open cut mine within the Maules Creek Notification Area during early 2014.

Mangoola Coal commenced full scale coal extraction by open cut methods adjacent to their own tailings dam in 2011/12 and during 2013/14 has been mining in close proximity to its Raw Water Dam. No significant mining impacts have been noted on any of the Mangoola prescribed dams.

Metropolitan Mine continued extracting first workings within the Woronora Notification Area during 2013 and 2014, entering the Notification Area this financial year. The Mine has been the subject of much controversy in the media, however the great depth of the Mine, which is over 400m below the Woronora Reservoir, means it is exceedingly unlikely it will impact the reservoir. To ensure this is the case, the DSC enforces a very stringent monitoring regimen.

Mount Arthur Coal began extracting coal by open cut methods within the Notification Area of the Mt Arthur North Environmental Dam during 2012, and is slowly moving towards the dam.

Mount Boppy is in the process of commencing mining activities within the Mount Boppy Notification Area.

Mount Owen Coal continued to extract coal by open cut methods within the Mt Owen Notification Area around T2.

Mount Thorley Open Cut has been extracting coal by open cut methods within the Mt Thorley Notification Areas surrounding their prescribed dams. Mining is moving progressively away from its dams.

Russell Vale Colliery (formerly NRE No. 1 Colliery) is continuing to mine within the Cataract Notification Area. Monitoring indicates some minor continuing surface movements but negligible impacts to the reservoir waters, which supply the Sydney metropolitan area. The Colliery commenced development of drivages in the Wongawilli seam within the Cataract Notification Area in 2010. The mine has applied to extract coal by longwall methods within the Cataract Notification Area.

Wongawilli Colliery (formerly NRE Wongawilli Colliery) commenced extracting first workings for LW3 in the Wongawilli Seam within the Cordeaux Notification Area in 2013.

Ravensworth Operations Narama Mine continues mining by open-cut methods within the Notification Area around their Ravensworth Inpit Storage Dam, having been approved to extract coal closer to the dam in 2010. Mining within the Notification Area is scheduled to end this coming financial year.

Ravensworth Operations Underground Mine is currently conducting first workings within the Narama Notification Area surrounding Ravensworth Inpit Storage Dam. Over the coming years Longwalls 10-15 will be extracted, with LWs 12 to 15 being within the Narama Notification Area.

Ridgeway. While a large subsidence bowl is developing over the underground mine, no impacts from this mining activity have been recorded at Cadiangullong Dam over 1km away.

Tomingley Gold Mine began production of ore by open cut mining methods within Tomingley Notification Area in March 2014.

Wambo Colliery. Underground mining continues within the Notification Area of Wambo Tailings Dam and has been occurring within the Notification Area around Wambo South Water Dam since late 2013.

Wonawinta Silver Mine extracted soft oxidised ore close to surface by bulldozer within the Notification Area around their own Wonawinta Tailings Dam. The mine is currently on care and maintenance.

Warkworth Open Cut has been extracting coal by open cut methods within the Warkworth Notification Areas surrounding their prescribed dams. They are mining progressively away from their dams.

7.2.4. Policies, Procedures and Organisational Updates

Resources employed during the year were matched by the continuing heavy operational workload. Existing policies are outlined in the Guidance Sheets listed in Table 7.8 and are available on-line on the DSC's website.

An internal system for checking compliance with mining conditions operates. This is used for workload management and for reminders to mining companies to deliver material on time. There is already evidence that this system has improved the overall level of mining compliance under DSC oversight.

Table 7.8 – Guidance Sheets for Mining near Dams

Document	Title	Date
DSC4A	Mining Near Prescribed Dams – Administrative Procedures	March 2011
DSC4B	Mining Near Prescribed Dams – Mining Applications	June 2010
DSC4C	Mining Near Prescribed Dams – Management and Monitoring Matters	June 2010
DSC4D	Mining Near Prescribed Dams – Contingency Plans	June 2010

7.2.5. Mining Statistics

Table 7.9 - Mining in Notification Areas

Item		2010/11	2011/12	2012/13	2013/14
Coal Removed from Notification Areas (million tonnes)		18.3	20.7	24.9	28.1
Current Approvals:	Actively Mining	18	29	29	34
	Actively Monitoring	24	31	35	39
Applications Processed		10	19	20	16
Variations to Existing Approvals		8	3	12	11
Titles Processed		51	60	78	54
Provide comments on SMP / Part 3A applications		4	16	22	24
New Proposals Discussed		8	8	10	7
Site Inspections (person days)		18	16	16	17

Camberwell Tailings No. 2 Dam. *Initially constructed in 1995, this earth and rockfill dam has risen to 33m high and now has a storage capacity of 5,300ML. It stores coal tailings from Integra Coal Operations in the Hunter Valley.*

Table 7.10 - Monitored Approved Mining 2013/14

Approval	Mine	Dam	Mining Type	Active Mining	Possible Effect on Dam Storage	Possible Effect on Dam Structure	Currently Monitoring
Ashton- 5	Ashton Underground	Macquarie Generations Ash Dam	1st Workings	Yes	No	Yes	Yes
Bellambi-15	NRE#1	Cataract Reservoir	1st Workings	No	Yes	No	Yes
Bulga-1	Bulga Coal	Bulga Old Tailings	1st Workings	Yes	No	Yes	Yes
Bulga-2	Bulga Coal	Bulga Old Tailings	Longwall	Yes	No	Yes	Yes
Broula King-1	Broula King	Broula King RSF	Open-cut	Yes	No	Yes	Yes
Clarence-1	Clarence	Lithgow No 2	Partial Extraction	Yes	Yes	Yes	Yes
Clarence-3	Clarence	Lithgow No 2	Partial Extraction	Yes	Yes	Yes	Yes
Dendrobium-3,	Dendrobium	Cordeaux & Upper Cordeaux 2	Longwall	No	Yes	No	Yes
Dendrobium-4	Dendrobium	Cordeaux & Upper Cordeaux 2	Longwall	No	Yes	No	Yes
Dendrobium-5	Dendrobium	Avon	Longwall	Yes	Yes	No	Yes
Duralie-1	Duralie	Duralie Mine Water	Open-cut	Yes	No	Yes	Yes
Drayton-2	Drayton	Liddell Ash Dam Levee	Open-cut	Yes	Yes	Yes	Yes
Ridgeway-1	Ridgeway	Cadiangullong	Underground Metal Mine	Yes	Yes	Yes	Yes
Glennies-1	Camberwell North	Camberwell TD2 & Possum Skin	Open-cut	Yes	Yes	Yes	Yes
Glennies-5	Camberwell North	Camberwell TD2 & Possum Skin	Open-cut	Yes	No	Yes	Yes
Hera-1	Hera Gold	Hera TSF	Underground Metal Mine	Yes	No	Yes	Yes
Kimberley-2	Mineral Hill	Mineral Hill TSF1&2	Underground Metal Mine	Yes	No	Yes	Yes
Mangoola-3	Mangoola	Raw Water Dam	Open-cut	Yes	No	Yes	Yes
Maules Creek-1	Maules Creek	Maules Creek TSF	Open-cut	No	No	Yes	Yes
Metropolitan-1	Metropolitan	Woronora Reservoir	Longwall	Yes	Yes	No	Yes
Mount Boppy-1	Mt Boppy	Mt Boppy TSF	Open-cut	Yes	No	Yes	Yes
Mt Owen-2	Mt Owen	Mt Owen RailLoop	Open-cut	Yes	No	Yes	Yes
Mt Thorley-1	Mt Thorley-Warkworth	Mt Thorley Central Ramp Tailings	Open-cut	Yes	No	Yes	Yes
NRE1_East_1	NRE#1	Cataract Reservoir	1st Workings	Yes	Yes	No	Yes
NRE1_East_2	NRE#1	Cataract Reservoir	1st Workings	Yes	Yes	No	Yes
Ravensworth-2	Narama	Ravensworth In-pit	Open-cut	Yes	No	Yes	Yes
Ravensworth Underground-2	Ravensworth Underground	Ravensworth Void 5 west Tailings Dam	Longwall	Yes	No	Yes	Yes
Ravensworth Underground-3	Ravensworth Underground	Ravensworth South NA, Void 5 East Ash Dam	Longwall	Yes	No	Yes	Yes
Ravensworth Underground-4	Ravensworth Underground	Ravensworth In-pit	Longwalls	Yes	No	Yes	Yes
Tomingley-1	Tomingley OC	Tomingley TSF	Open-cut	Yes	No	Yes	Yes
Wambo-1	Wambo	Wambo Tails	Open-cut	No	Yes	Yes	Yes
Wambo-2	Wambo	Wambo Tails	Longwall	Yes	No	Yes	Yes
Wambo-3	Wambo	Wambo South	1st Workings	Yes	No	Yes	Yes
Wambo-4	Wambo	Wambo South	Longwall	Yes	No	Yes	Yes
Wambo-6	Wambo	Wambo South	1st Workings	Yes	No	Yes	Yes
Warkworth-1	Mt Thorley-Warkworth	Warkworth North Pit Tailings	Open-cut	Yes	No	Yes	Yes
Wilpinjong-1	Wilpinjong	Wilpingjong TD2	Open	Yes	No	Yes	Yes
Wilpinjong-2	Wilpinjong	Wilpingjong TD5	Open	Yes	No	Yes	Yes
Wonawinta-1	Wonawinta	Wonawinta Tailings	Open-cut	Yes	No	Yes	Yes

7.3. Information Systems

2013/14 Overview

Various support systems were maintained and updated. New features were added to the DSC Database including the Mining Applications database and the DSEP database. Functions and procedures were created or refined for generating various reports and the Mining Application layer was further developed.

Work activities included the following:

- In June 2013 a significant change in the information technology (IT) system arrangement was implemented by linking in to a new larger server as part of the NSW T&I wide network and intranet and the associated leasing of new computers through T&I. During 2013/14 the following related activities occurred:
    - Minor teething problems with computer hardware were rectified and some required software modifications were successfully undertaken;
    - Secure remote access to the network and the DSC dams database for DSC staff and any DSC members requiring it was successfully trialled and introduced. The method uses a very effective process involving both modern gatekeeping-type software and SecurID tokens (constant random number generating devices);
    - The obsolete in-house separate servers were disposed in a suitable manner;
    - Some important data from the old servers were archived as back-up.
- Incoming/outgoing correspondence was processed and kept up to date in the databases:
    - Dealt with almost 2,400 pieces of formally documented correspondence;
- Records in paper format were streamlined and maintained;
- Electronic records, including GIS datasets were captured and updated;
- Metadata information and reports were generated;
- Assistance was provided in the DSC project on “Search for unregistered dams”;
- Surveillance Report request letters were generated and tracked;
- Desktop hardware and software were updated;
- Hard copies of dam and mine related plans, reports and photographs were scanned and archived;
- Planning development and checking were undertaken for an upcoming change to a newer Windows system that is an intended updating by T&I for its overall operating platform.

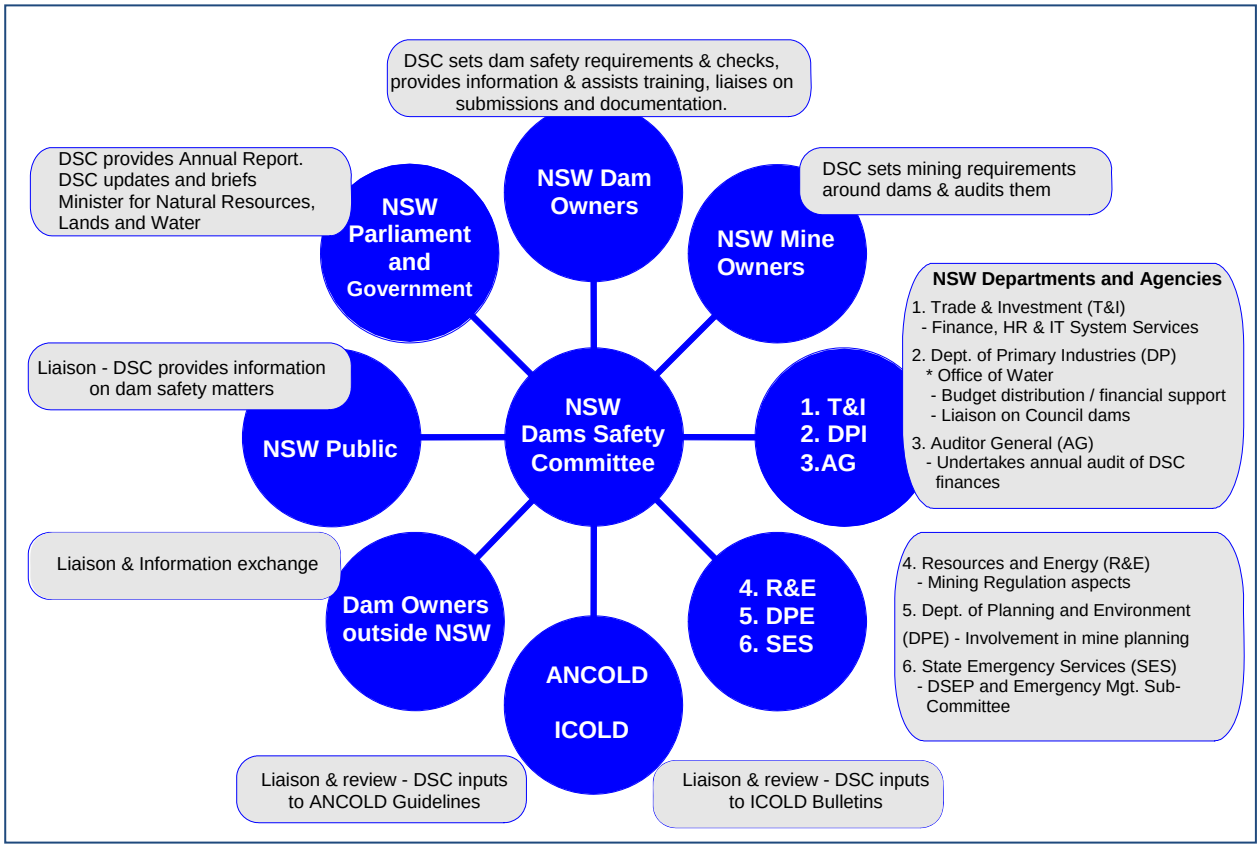
8. Stakeholders

8.1. Liaison with Stakeholders

8.1.1. Stakeholder Liaison Diagram

The DSC's role on dam safety in NSW requires interaction with a wide range of stakeholders as summarised in the following diagram, Figure 8.1.

Figure 8.1 – Stakeholder Liaison Diagram



8.1.2. General

In line with modern principles of good regulation, the DSC has adopted a goal of full transparency and continues to work toward having all its safety policies accessible to all stakeholders, by their incorporation into the Guidance Sheets. These are all readily available and easily accessible on the DSC Internet site (www.damsafety.nsw.gov.au/DSC/infosheets.shtm).

The DSC values a good working relationship with its key stakeholders, including affected communities, dam owners, mining companies and consultants. By this means the DSC can communicate its goals to engage co-operation in achieving dam safety. By understanding and recognising their responsibilities and liabilities, most dam owners and mining companies adopt a strong commitment to dam safety. The DSC maintains regular contacts with its key stakeholders to foster its dam safety roles and to give the DSC an opportunity to gauge their level of satisfaction. The DSC responds to specific public enquiries on relevant dam safety issues as they might arise.

The DSC provides its Annual Report to the Minister and to the NSW Parliament. The DSC provides the minutes of each of its regular meetings to the Minister and briefs the Minister's office on any significant incident involving a prescribed dam, including for example any Red Alert that might be issued as part of a DSEP. In addition the DSC Executive meets periodically with the Minister and/or key ministerial staff members to discuss recent main issues as part of regular updating and liaison with government.

8.1.3. Dam Owners

The DSC has a role to educate and inform dam owners on their responsibilities and on national and international standards, practices and technologies. It communicates its objectives and concerns to dam owners and their representatives through various avenues, such as seminars, presentations and its Internet site. The DSC also continued to assemble a considerable library of publications and videotapes on various aspects of dams and their safety management. This material is available for loan to dam owners within NSW to assist in their management of dams.

Close contact is maintained by the DSC with the NSW dam owners through meetings held during the year to discuss specific dam requirements, general procedures, and to ensure owners are able to communicate their concerns to the DSC. For example, during 2013/14 the DSC inspected 74 dams and held on-site meetings with owners' personnel, including thirteen of the DSC's rated highest risk dams. DSC mining staff also inspected many mine sites and held on-site meetings with personnel from those mines, as well as conducting underground inspections of longwall mining at Wollongong Coal's mining operation adjacent to the Cataract Dam reservoir.

The dam safety education of local government authorities, mining companies and private dam owners is of particular interest to the DSC, because their staffs do not usually have specialist engineering knowledge of dams. Education of these owners is assisted by regular site visits by the DSC and/or its staff to meet owners' representatives to discuss relevant issues. Such meetings are invaluable in reaching a common understanding of the problems facing these owners in regard to asset management and responsibilities to the community, and obtaining feedback for enhancing the DSC's education role. To this end, DSC members and staff had special meetings during 2013/14 with a number of dam owners to discuss various dam related activities (i.e. upgradings, investigations and incidents). Several other dams were discussed in detail during presentations made by owners and their consultants to the DSC (e.g. Suma Park Dam).

In October 2013 the Executive Engineer Steve Knight (for the DSC) and DSC member Ian Landon-Jones (in his role as ANCOLD Chairman) attended by invitation the one-day Dam Forum organised by the Water Directorate (NSW) in Sydney. This is a group of key engineers and other representatives of various dam-owning NSW Councils and other Local Water Utilities (LWUs). Various attendees made presentations, including Messrs. Knight and Landon-Jones.

Nepean Dam

This 82m high concrete gravity dam is an important asset within Sydney's bulk water supply system. Constructed in 1935 and upgraded in 1992, it has a storage capacity of approximately 70,000ML. DSC members and staff inspected this dam in October 2013 in conjunction with a DSC country meeting.

8.1.4. Dam Safety/Surveillance Training Courses

The DSC ran its first dam safety training course in 1991 with the assistance of the then Department of Public Works. Since then regular training courses for dam operators were set up and run by Public Works and later by the then Department of Water and Energy's Water Utilities Performance (WUP) Dams Safety Management group with the assistance of DSC staff. Since 2009 following changes to the structure of WUP, and with a then new DSC Executive Engineer, the DSC has taken over the organisation and running of these courses of typically 3 or 4 days duration. The main trainers for these courses are currently DSC member Norm Himsley and the immediate ex-Executive Engineer Paul Heinrichs, with assistance for some of the training topic elements provided by DSC staff members, DSC member Ian Forster and also Surveillance Sub-committee member John Sukkar.

"Since 1991 over 1,400 operators have been trained or retrained in dam safety inspection, resulting in very notable improvements"

During 2013/14 the DSC was involved in running four dam safety training courses for NSW dam operators. Two 3-day courses for operators of tailings, ash and mine dams were run, one at Port Stephens in September 2013 and the other at Salamander Bay in April 2014. A 4-day dam safety/surveillance course for other dam operators was held at Port Macquarie in February 2014. These three courses each attracted between 20 and 30 operators and other dam staff.

In late October 2013, the DSC additionally ran its first longer 5-day TAFE accredited dam safety/surveillance course. Held in Tamworth, it was attended by a fully subscribed complement of 20 dam operators. Trainers Norm Himsley and Paul Heinrichs were very heavily involved over several preceding years in the development of the syllabus for this course that provides 4 to 5 dam units of competency within the Certificate III in the National Water Industry Operation Training Package NWPO7. This DSC initiative and development of an agreement with TAFE to provide a dams operator training course with full accreditation ensures the needs of all sections of the dams industry are addressed. It provides a more flexible qualification framework for the continuing educational development of dam owners' staff if enough owners' operators elect to attend an accredited course.

As usual, the four 2013/14 courses were well attended. Since 1991 over 1,400 operators have been trained or retrained in dam safety inspection, resulting in very notable improvements in the dam owners' routine and other inspection regimes.

Due to the heavy demand on the normal safety/surveillance inspection courses, a special course was also held during this financial year for State Water Corporation operators. Run under DSC auspices, this training course venue was at Hume Dam.

This training course work is a key part of the DSC's education role for dam owners in NSW.

The increasing emphasis over a number of years by the DSC on owner education in NSW has been reflected in numerous requests from dam owners outside NSW for educational assistance in similar training courses for dam operators. Such involvement is of value to the DSC in broadening its experience of dam safety management issues and in benchmarking its own performance against the procedures and practices of similar authorities. As a by-product and at effectively little cost, it also provides opportunities for inspections of some interstate dams.

8.1.5. NSW State Emergency Service

As well as generally through the Emergency Management Sub-committee (see Section 7.1.10), the DSC continued fostering its close relationship with the State Emergency Service (SES) through joint involvement in running a 1-day Dam Failure Exercise Workshop in Nowra in August 2013. This worthwhile and very well attended workshop was the fourth such regional exercise event held in NSW by the SES and DSC in the last few years. Following its success, it is intended that more will be held in the future.

In October 2013 the Executive Engineer attended the 2013 Resilient Australia Awards Ceremony at NSW Parliament House in Sydney to accept, on behalf of the DSC, a joint award to the DSC and the SES. It was one of the major awards for this prestigious annual awards event, being a winner in the State and Territory Government Category. It was won for "Guidelines for Defining Dam Failure Warning and Evacuation Areas", and is a notable success for the DSC and the SES.

2013 Resilient Australia Awards Trophy

DSC Executive Engineer Steve Knight with the trophy won by the DSC as a joint award winner with the State Emergency Service (SES).

8.1.6. Other Australian States, ANCOLD and ICOLD Matters

Various DSC members continue to be involved in Australian National Committee on Large Dams (ANCOLD) matters, through participation in ANCOLD Guidelines working groups and/or involvement in running ANCOLD short courses. Some DSC members are also involved in International Commission on Large Dams (ICOLD) matters and/or the annual meetings. See Section 8.2 for further outlined details.

As also outlined in Section 8.2, a number of DSC members and staff attended a variety of ANCOLD short courses (most of one day duration) during the 2013/14 year; and in November 2013 several DSC members and the Executive Engineer attended the annual ANCOLD Conference. Moreover, the DSC was represented by the Chairman, another member and the Executive Engineer at the State dam safety regulators' annual meeting held in conjunction with the ANCOLD Conference. The lead-up to this regulators' meeting involved some liaison and afterwards involved some further information exchange follow-ups amongst the other State regulators.

During 2014 the DSC notified the relevant Directorate of the ACT Government of the DSC's agreement to the use of the DSC's Technical Guidance Sheets in conjunction with the drafted update of the ACT Dam Safety Code. That Code was written to require compliance with the DSC Guidance Sheets as well as with the ANCOLD Guidelines. The DSC noted in particular that:

- The ACT Dam Safety Code makes clear acknowledgement of and references to the DSC's Technical Guidance Sheets.
- There is also a clarifying statement in the Code that if there is any conflict between the DSC Guidance Sheets and the ANCOLD Guidelines, then the former shall prevail unless approved otherwise.

8.1.7. Other Liaison and Interaction with Stakeholders

In 2013 the consultant company GHD undertook the 3-yearly Audit of the Sydney Drinking Water Catchment. In August 2013, and at the request of GHD, the DSC provided a submission to this 2013 Audit.

At the request of the Bulk Water Review executive team in 2014, the DSC provided the Review executive with the latest list of NSW prescribed dams and summary data on their consequence categories. This was needed as background information for the Review being undertaken with the support of the inaugural Chairman of Water NSW, the organisation that represents the current merger of Sydney Catchment Authority and State Water Corporation.

In May 2014 the DSC Executive Engineer and several staff met with senior staff members from the Office of the NSW Chief Scientist & Engineer. The meeting was to discuss and answer queries regarding DSC's involvement with coal seam gas extraction and mining around major water storages. The DSC noted that at the end of May 2014 the Office of the NSW Chief Scientist & Engineer (Mary O'Kane) released its report on cumulative impacts of activities which impact ground and surface water in the Sydney water catchment.

During 2013/14 the DSC liaised with and responded to relevant government elements by providing requested information pertinent to the ongoing government review of the NSW dams safety matters generally (see Section 6.4).

8.2. Education and Training of Members and Staff

The DSC's members and staff are required to have extensive and varied experience in dam engineering and mining. However, it is essential in any organisation to keep abreast of modern developments in all the technical and societal fields related to its functions. This is particularly important in the case of the DSC, because of the diverse technical knowledge required from its small staff. Accordingly, the DSC's members and staff attended relevant conferences and courses during the year.

The DSC members kept their knowledge up-to-date through various professional technical activities external to the DSC. For example, DSC member Ian Forster is a member on the Board of the Mine Subsidence Technological Society. Various DSC members continue to be involved in ANCOLD matters, through participation in ANCOLD Guidelines working groups and/or involvement in running ANCOLD short courses. Some DSC members are also involved in International Commission on Large Dams ICOLD) matters. DSC member Ian Landon-Jones is currently the ANCOLD Chairman, elected at the end of 2012 for a 3-year term. He is also a member of some ICOLD committees and attended the ICOLD Congress in August 2013 in Seattle and the ICOLD Annual Meeting in June 2014 in Bali as part of his ANCOLD responsibilities.

DSC Chairman Brian Cooper also attended 4 days of the ICOLD Congress in Seattle including as an invited speaker at a workshop on dam safety portfolio risk management. That particular workshop attracted the most number of foreign attendees. Brian Cooper's presentation provided an Australian dam safety regulator's perspective on dam safety management within a risk framework, focusing on the DSC approach in NSW whilst also providing some background on regulation in the other states.

Several DSC members and the DSC Executive Engineer attended the 2013 ANCOLD/NZSOLD Conference on Dams in Rotorua, New Zealand in November of that year. For one year in every six, ANCOLD combines with its NZ counterpart, the New Zealand Society on Large Dams (NZSOLD), to host this dams conference in NZ. The other 5 years in the 6 year cycle for this annual conference event are shared amongst the various Australian States and Territories. These annual ANCOLD Conference provide valuable forums for exchange of information and updating on

dam safety issues as well as providing the annual opportunity for dam safety regulators nationwide to meet and review pertinent issues.

The Chairman, Brian Cooper, DSC member, Norm Himsley and Executive Engineer, Steve Knight, also attended the State dam safety regulators' annual meeting held in conjunction with (and immediately prior to) the ANCOLD Conference – to discuss and update knowledge of actions undertaken by dam regulators across Australia. There were further information exchange follow-ups amongst the State regulators after the meeting.

Various DSC members and staff attended the following short courses organised by ANCOLD's Professional Development Committee (DSC member Norm Himsley is Chairman of this Committee):

- Hydrology, Dambreak and Dam Failure Consequences – in Sydney over two days in September 2013:
    - In particular, DSC Chairman Brian Cooper convened the first day of this Workshop and gave an overview on dam failure consequence categories on the second day.
- Internal Erosion and Piping of Dams and their Foundations – in Sydney for one day in October 2013.
- Tailings Dams and Sustainable Management – in Newcastle for one day in May 2014:
    - In particular, DSC member Norm Himsley was a co-presenter.
- Dam Safety Emergency Planning – in Sydney for one day in June 2014.

As well as its full organisational membership of ANCOLD, the DSC is also a member for journal and associated subscription purposes of the USA's Association of State Dam Safety Officials (ASDSO), the Canadian Dam Association (CDA) and the journal Hydro Review.

All these experiences and direct significant information sources enable members and staff to improve and update the DSC's dam safety/surveillance practices and also attain greater understanding of latest practices in dams engineering generally. The knowledge gained is very valuable to the DSC by assisting in further development of its policies, strategies and procedures.

To help keep up to date and also add to developments in those aspects of mining which concern the DSC:

- The DSC's Manager Mining Impacts, Bill Ziegler and the Mining Regulation Officer, Heather Middleton attended the Mine Subsidence Technological Society (MSTS) 9th Triennial Conference in the Hunter Valley in May 2014. Bill Ziegler also presented a paper at the conference.
- Heather Middleton attended a 1-day workshop in Sydney organised by the Sydney Catchment Authority on risk assessment of longwall mining.
- Bill Ziegler and Heather Middleton also submitted an abstract for another paper on mining related subsidence around Cataract Reservoir for the ANCOLD 2014 Conference in October in Canberra. The paper was accepted by ANCOLD for publishing.

Steuart McIntyre Dam

Inspection by DSC members and staff of the electronic control & monitoring instrumentation in the modernised outlet works & valve house facilities at this dam near Kempsey. This is an example of the DSC's continuing education of its people in keeping them up to date with current practices.

The DSC's expertise in monitoring mining activities near dams using a broad range of techniques continues to be internationally recognised, with international requests for information on DSC practices and procedures for regulating mining near stored waters.

As part of the DSC's policy on staff development which targets staff training and efficiency, staff attended a variety of in-house and relevant external courses during the year including:

- Dam and Tailings Dam Surveillance Courses;
- Familiarisation with the new Information Technology System upgrade in association with NSW Trade and Investment (T&I);
- Familiarisation with the new SAP / Enterprise Resource Planning (ERP) System, including in particular one staff member attending advanced training at NSW T&I regional office in Orange;
- Gmail applications;
- Refresher courses in Code of Conduct and Ethics; and
- Construction site "White Card" acquisitions.

9. Administration and Human Resources

DSC members are subject to the Department of Premier & Cabinet Conduct Guidelines and the DSC staff are subject to the NSW Trade & Investment (T&I) Code of Conduct, which provides an ethical framework for decisions, actions and behaviour for all department and related employees. As an extension of those requirements, the DSC has established policies on Managing Conflicts of Interest, and on Interactions with Stakeholders and the Public. The DSC has a policy of Delegated Authority, with a Schedule of Delegations, to guide members and staff. The DSC has also developed a policy for handling media enquiries, including necessary synchronisation with the overall T&I policy.

The DSC rents office space in Parramatta from the NSW government, with 2012/13 the first year of the latest four-year lease occupancy agreement between Government Property NSW and the DSC up to 30th June 2016. T&I provides the DSC (under cost-effective reimbursement) with financial processing support, maintenance of the accounting system, the payment of invoices, provision of payroll service, receipting, and the provision of associated taxation services. The DSC has been granted general exemption from TPP09-05, Internal Audit and Risk Management Policy for the NSW Public Sector (see Section 10.4 in this Annual Report).

Several of the organisations that nominate members to the DSC continue to provide technical assistance in specialised areas and in-kind contributions and the DSC wishes to especially acknowledge their valuable assistance.

As part of the DSC's administrative alignment with the NSW Office of Water, the DSC's Government Information Public Access (GIPA) statistics are published in the relevant Annual Report for that Office. There were no requests to the DSC for information under GIPA legislation during the year.

To ensure the maintenance of appropriate standards of Work Health and Safety (WHS) practices in the DSC, the DSC's WHS practices, with necessary minor adaptations, now align with NSW T&I's WHS Policy and which in turn accords with the *Work Health and Safety Act 2011*. The DSC also has in place a policy on the WHS roles of its staff and members. In relation to WHS, there were no work injuries in 2013/14. DSC staff and some members also received various items of personal protective equipment, as necessary, for use in site and field inspections. Various staff and committee members who required them, acquired construction site "White Cards" via undertaking suitable accredited courses.

As part of its contracted administration assistance to the DSC, the NSW Office of Water implements the T&I Equal Employment Opportunity (EEO) and ethnic affairs policies for, and with, the DSC. The DSC is well aware of, and committed to, the associated principles of multiculturalism inherent within these policies. The DSC employs a very culturally and ethnically diverse group of male and female staff as part of the Departmental multicultural policies and services program. The DSC employed 11 staff as at 30th June 2014, including 8 permanent full-time, 1 permanent part-time (but currently on an extended period of leave without pay) and 2 contracted staff members. The staff mix includes 5 males and 6 females. Of these 11 staff, 4 people were born in Australia and the other 7 people were born in 6 different countries.

The DSC is progressively implementing the Government's Waste Reduction and Purchasing Policy by implementing more electronic storage of information and use of recycled paper.

10. Finance

10.1. Dams Safety Committee Certificate

DAMS SAFETY COMMITTEE
Certificate under Section 41C (1B) and (1C) of the Public Finance and Audit Act 1983

Pursuant to the *Public Finance and Audit Act, 1983*, we declare that, in our opinion:

a) The accompanying financial statements exhibit a true and fair view of the financial position of the Dams Safety Committee as at 30 June 2014, and transactions for the year then ended.

b) The financial statements have been prepared in accordance with:

- applicable Australian Accounting Standards (which include Australian Accounting Interpretations);
- other authoritative pronouncements of the Australian Accounting Standards Board; and
- the requirements of the *Public Finance and Audit Act 1983*, Public Finance and Audit Regulation 2010 and the Treasurer's directions.

c) There are no circumstances, which would render any particulars included in the financial statement to be misleading or inaccurate.

For and on behalf of the Committee.

B. Cooper
Chairman
Dated: 17 October 2014

J. Gleeson
Deputy Chairman
Dated: 17 October 2014

10.2. Independent Auditor's Report

AUDITOR-GENERAL NEW SOUTH WALES

INDEPENDENT AUDITOR'S REPORT

Dams Safety Committee

To Members of the New South Wales Parliament

I have audited the accompanying financial statements of the Dams Safety Committee (the Committee), which comprise the statement of financial position as at 30 June 2014, the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, notes comprising a summary of significant accounting policies and other explanatory information.

In my opinion, the financial statements:

- give a true and fair view of the financial position of the Committee as at 30 June 2014, and of its financial performance and its cash flows for the year then ended in accordance with Australian Accounting Standards
- are in accordance with section 41B of the *Public Finance and Audit Act 1983* (the PF&A Act) and the Public Finance and Audit Regulation 2010

My opinion should be read in conjunction with the rest of this report.

The Committee's Responsibility for the Financial Statements

The members of the Committee are responsible for the preparation of the financial statements that give a true and fair view in accordance with Australian Accounting Standards and the PF&A Act, and for such internal control as the members of the Committee determine is necessary to enable the preparation of financial statements that give a true and fair view and that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I conducted my audit in accordance with Australian Auditing Standards. Those Standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation of the financial statements that give a true and fair view in order to design audit procedures appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the members of the Committee, as well as evaluating the overall presentation of the financial statements.

I believe the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

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My opinion does not provide assurance:

- about the future viability of the Committee
- that it has carried out its activities effectively, efficiently and economically
- about the effectiveness of its internal control
- about the security and controls over the electronic publication of the audited financial statements on any website where they may be presented
- about other information which may have been hyperlinked to/from the financial statements.

Independence

In conducting my audit, I have complied with the independence requirements of the Australian Auditing Standards and other relevant ethical pronouncements. The PF&A Act further promotes independence by:

- providing that only Parliament, and not the executive government, can remove an Auditor-General
- mandating the Auditor-General as auditor of public sector agencies, but precluding the provision of non-audit services, thus ensuring the Auditor-General and the Audit Office of New South Wales are not compromised in their roles by the possibility of losing clients or income.

David Nolan
Director, Financial Audit Services

17 October 2014
SYDNEY

10.3. Audited Financial Statement

Statement of comprehensive income for the year ended 30 June 2014

	Notes	2014 $'000	2013 $'000
Expenses excluding losses			
Personnel services expenses	2a	1,169	1,119
Other operating expenses	2b	686	667
Depreciation and amortisation	2c	1	3
Finance costs	2d	-	21
Total expenses excluding losses		**1,856**	**1,810**
Revenue			
Government contributions	3a	1,500	1,450
Other revenue	3b	471	474
Total Revenue		**1,971**	**1,924**
Surplus/(Deficit)		**115**	**114**
Other comprehensive income		-	-
TOTAL COMPREHENSIVE INCOME		**115**	**114**

Statement of financial position as at 30 June 2014

	Notes	2014 $'000	2013 $'000
ASSETS			
Current Assets			
Cash & cash equivalents	4	318	215
Receivables	5	55	238
Prepayments		6	-
Total Current Assets		**379**	**453**
Non-Current Assets			
Plant and equipment	6	5	6
Intangible assets	7	-	-
Total Non-Current Assets		**5**	**6**
Total Assets		**384**	**459**
LIABILITIES			
Current Liabilities			
Payables	8	129	296
Provisions	9	40	63
Total Current Liabilities		**169**	**359**
Total Liabilities		**169**	**359**
Net Assets		**215**	**100**
EQUITY			
Accumulated funds	10	215	100
Total Equity		**215**	**100**

The accompanying notes form part of these financial statements.

Statement of changes in equity for the year ended 30 June 2014

	Notes	Accumulated Funds $'000	Total $'000
Balance at 1 July 2013		**100**	**100**
Surplus / (deficit) for the year		115	115
Other comprehensive income		-	-
Total comprehensive income for the year		115	115
Balance at 30 June 2014	10	**215**	**215**
Balance at 1 July 2012		**(14)**	**(14)**
Surplus / (deficit) for the year		114	114
Other comprehensive income		-	-
Total comprehensive income for the year		114	114
Balance at 30 June 2013	10	**100**	**100**

Statement of cash flows for the year ended 30 June 2014

	Notes	2014 $'000	2013 $'000
CASH FLOWS FROM OPERATING ACTIVITIES			
Receipts			
Receipts from government and customers		1,949	1,571
Interest received		19	8
Total Receipts		**1,968**	**1,579**
Payments			
Payments to suppliers, personnel services and others		(1,866)	(1,382)
Finance costs		-	(21)
Total Payments		**(1,866)**	**(1,403)**
NET CASH FLOWS FROM OPERATING ACTIVITIES	11	**103**	**176**
NET INCREASE / (DECREASE) IN CASH		**103**	**176**
Opening cash and cash equivalents		215	39
CLOSING CASH AND CASH EQUIVALENTS	4	**318**	**215**

The accompanying notes form part of these financial statements.

Notes to the financial statements

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

(a) Reporting Entity

The Dams Safety Committee (the 'Committee') was constituted in 1979, under the *Dams Safety Act 1978* to ensure the owners of the State's major dams conform to appropriate safety requirements in order to prevent uncontrolled loss of their storages with consequent effects on the community, environment and water supply.

The Committee operates in New South Wales, Australia. The office is located on Level 3, 10 Valentine Avenue, Parramatta, NSW 2150.

The Committee is a Statutory Body and separate reporting entity. There are no other entities under its control. The Committee is a not-for-profit entity (as profit is not its principal objective) and it has no cash generating units.

The financial statements have been authorised for issue by the Chairman of the Committee on 17 October 2014.

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Notes to the financial statements

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

(b) Basis of Preparation

The Committee's financial statements are general purpose financial statements which have been prepared in accordance with:

- applicable Australian Accounting Standards (which include Australian Accounting Interpretations) and
- the requirements of the *Public Finance and Audit Act 1983* and Public Finance and Audit Regulation 2010.
- The Financial Reporting Directions published in the Financial Reporting Code for NSW General Government sector entities or issued by the Treasurer.

Judgements, key assumptions and estimations management as made are disclosed in the relevant notes to the financial report.

All amounts are rounded to the nearest one thousand dollars and are expressed in Australian currency.

(c) Statement of Compliance

The financial statements and notes comply with Australian Accounting Standards, which include Australian Accounting Interpretations.

(d) Income Recognition

Income is measured at the fair value of the consideration or contribution received or receivable. Additional comments regarding the accounting policies for the recognition of income are discussed below.

1. Contributions from Government and other bodies are generally recognised as income when the agency obtains control over the assets comprising the contributions. Control over contributions is normally obtained upon receipt of cash.
2. Sale of Goods: Revenue from the sale of goods is recognised as revenue when the agency transfers the significant risks and rewards of ownership of the assets.
3. Rendering of Services: Revenue is recognised when the service is provided or by reference to the stage of completion (based on labour hours incurred to date).
4. Investment income: Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

(e) Personnel Services

1. Personnel Services

   Personnel Services liabilities in respect to salaries and wages (including non-monetary benefits), annual leave and paid sick leave that fall due wholly within 12 months of the reporting date are recognised and measured in respect of employee's services up to the reporting date at undiscounted amounts based on the amounts expected to be paid when the liabilities are settled.

   Personnel Services liabilities covering long-term annual leave are measured at nominal value.

   Unused non-vesting sick leave does not give rise to a liability as it is not considered probable that sick leave taken in the future will be greater than the benefits accrued in the future.

2. Long Service Leave and Defined Benefits Superannuation

   The Committee has no liability for long service leave and defined benefits superannuation as personnel services are acquired from the NSW Office of Water, a division of Department of Primary Industries. The liability of these items has been assumed by the Crown Entity.

(f) Insurance

The Committee's insurance activities are conducted through the NSW Treasury Managed Fund Scheme of self insurance for Government agencies. The expense (premium) is determined by the Fund Manager based on past experience.

(g) Accounting for the Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except:

- The amount of GST incurred by the Authority as a purchaser that is not recoverable from the Australian Taxation Office is recognised as part of the cost of acquisition of an asset or as part of an item of expense.
- Receivables and payables are stated with the amount of GST included.

The net amount of GST recoverable from, or payable to, the Australian Taxation Office is included as part of receivables and payables.

Cash flows are included in the statement of cash flows on a gross basis. However, the GST components of cash flows arising from investing and financing activities which is recoverable from, or payable to, the Australian Taxation Office are classified as operating cash flows.

Notes to the financial statements

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

(h) Acquisitions of Assets

The cost method of accounting is used for the initial recording of all acquisitions of assets controlled by the Committee. Cost is the amount of cash or cash equivalents paid or the fair value of the other consideration given to acquire the asset at the time of its acquisition. Where applicable, the amount attributed to the asset when initially recognised is in accordance with the requirements of other Australian Accounting Standards.

(i) Capitalisation Thresholds

Plant and equipment and intangible assets costing $5,000 and above individually (or forming part of a network costing more than $5,000) are capitalised.

(j) Revaluation of Plant and Equipment

Physical non-current assets are valued in accordance with the 'Valuation of Physical Non-Current Assets at Fair Value' Policy and Guidelines Paper (TPP 14-01). This policy adopts fair value in accordance with AASB 13 Fair Value Management, AASB 116 Property, Plant and Equipment.

Non-specialised assets with short useful lives like plant and equipment are measured at depreciated historical cost, as a surrogate for fair value.

(k) Depreciation and amortisation of Plant and Equipment

Depreciation is provided for on a straight-line basis for all depreciable assets so as to write off the depreciable amount of each asset as it is consumed over its useful life to the Committee. All depreciable assets are depreciated at 25 per cent per year. Leasehold improvements are amortised over the life of the lease.

(l) Intangible Assets

The Committee recognises intangible assets only if it is probable that future economic benefits will flow to the Committee and the cost of the asset can be measured reliably. Intangible assets are measured initially at cost. Where an asset is acquired at no or nominal cost, the cost is its fair value as at the date of acquisition.

The useful lives of intangible assets are assessed to be finite.

Intangible assets are subsequently measured at fair value only if there is an active market. As there is no active market for the Committee's intangible assets, the assets are carried at cost less any accumulated amortisation.

The Committee's intangible assets are amortised using the straight line method over a period of 4 years.

(m) Restoration Cost

The estimated cost of dismantling and removing an asset and restoring the site is included in the cost of an asset, to the extent it is recognised as a liability.

(n) Receivables

Receivables are recognised initially at fair value, usually based on the transaction cost or face value. Subsequent measurement is at amortised cost using the effective interest method, less an allowance for any impairment of receivables. Short-term receivables with no stated interest rate are measured at the original invoice amount where the effect of discounting is immaterial. An allowance for impairment of receivables is established when there is objective evidence that the entity will not be able to collect all amounts due. The amount of the allowance is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the effective interest rate. Bad debts are written off as incurred.

(o) Payables

These amounts represent liabilities for goods and services provided to the Committee and other amounts, including interest. Payables are recognised initially at fair value, usually based on the transaction cost or face value. Subsequent measurement is at amortised cost using the effective interest method. Short-term payables with no stated interest rate are measured at the original invoice amount where the effect of discounting is immaterial.

(p) Other Liabilities

A distinction is made between finance leases which effectively transfer from the lessor to the lessee substantially all the risks and benefits incidental to ownership of the leased assets, and operating leases under which the lessor effectively retains all such risks and benefits. The leasing transactions of the Committee are restricted to operating leases of buildings. Lease payments are recognised as expenses over the lease terms. Operating lease payments are charged to the operating statement in the periods in which they are incurred. Lease incentives are shown as a liability and amortised via a reduction in lease expenditure over the life of the lease.

(q) Comparative Information

Except when an Australian Accounting Standard permits or requires otherwise, comparative information is disclosed in respect of the previous period for all amounts reported in the financial statements.

(r) New Australian Accounting Standards Issued but not effective

At reporting date all the new and revised Standards and Interpretations issued by the Australian Accounting Standards Board (The AASB) that are relevant to the Committee's operations and effective for the current annual reporting period have been adopted.

Australian Accounting Standards and Interpretations that have recently been issued or amended but are not yet effective have not been adopted for the financial reporting period ended 30 June 2014. These are listed as follows:

Notes to the financial statements

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

- AASB 9, AASB 2010-7 and AASB 2012-6 regarding financial instruments
- AASB 127 Separate Financial Statements
- AASB 1031 Materiality
- AASB 2013-3 amendments to AASB 136 - Recoverable Amount Disclosures for Non-Financial Assets
- AASB 2013-6 regarding Reduced Disclosure Requirements
- AASB 2013-9 regarding the Conceptual Framework, Materiality and Financial Instruments (Parts B and C)

The Committee has reviewed the new accounting standards and at this stage does not anticipate any material impact on the figures reported in these financial statements.

2. EXPENSES EXCLUDING LOSSES

		2014 $'000	2013 $'000
(a)	**Personnel services expenses**		
	Salaries and wages (including recreation leave)	946	919
	Superannuation	119	112
	Long service leave	39	30
	Payroll tax	65	58
		1,169	**1,119**
(b)	**Other operating expenses**		
	Auditor's remuneration	10	10
	Committee member's expenses	88	80
	Contractors	118	105
	Fees for services	14	25
	Accommodation	102	102
	Plant / Vehicle	11	13
	Travel	24	30
	Computer expenses	22	16
	Telephones	3	4
	Staff training	33	44
	Equipment	6	5
	Entertainment & events	69	30
	Printing	19	21
	In-kind expenses	149	141
	Other	18	41
		686	**667**
(c)	**Depreciation and amortisation**		
	Depreciation – Computers	-	-
	Depreciation - Intangible Assets	-	1
	Leasehold improvement	-	-
	Plant & Equipment	1	2
		1	**3**
(d)	**Finance Cost**		
	Interest expense on make good provision	-	21
		-	**21**

Notes to the financial statements (continued)

3. REVENUE

		2014 $'000	2013 $'000
(a)	**Government contributions**		
	Recurrent Government Contribution from NSW Office of Water	1,500	1,450
		1,500	**1,450**
(b)	**Other Income**		
	Interest	19	8
	Committee Support In-kind Contribution	149	141
	Course Fee Revenue	210	248
	Other	23	-
	The following liabilities and/or expense have been assumed by the Crown Entity and other government entities		
	Long Service Leave Liability	-	30
	Superannuation	67	45
	Pay-roll Tax	3	2
		471	**474**

4. CURRENT ASSETS – CASH AND CASH EQUIVALENTS

Cash at bank and on hand	318	215
	318	**215**

Refer Note 14 for details regarding credit risk, liquidity risk and market risk arising from financial instruments.
The Committee has a Tape Negotiation Authority of $1.0 million (2012-13: $1.0 million).

5. CURRENT ASSETS - RECEIVABLES

Accrued income receivable	42	218
Goods and Services Tax recoverable from ATO	13	18
Corporate Cards Recoverable	-	2
	55	**238**

Details regarding credit risk, liquidity risk and market risk, including financial assets that are wither past due or impaired, are disclosed in Note 14.

6. NON-CURRENT ASSETS – PLANT AND EQUIPMENT

	Plant and Equipment $'000	Leasehold Improvement $'000	Total $'000
At 1 July 2013 – fair value			
Gross carrying amount	43	40	83
Accumulated depreciation	(37)	(40)	(77)
Net carrying amount	6	-	6
At 30 June 2014 – fair value			
Gross carrying amount	43	-	43
Accumulated depreciation	(38)	-	(38)
Net carrying amount	5	-	5

Reconciliation

A reconciliation of the carrying amount of each class of plant and equipment at the beginning and end of the current reporting period is set below.

Notes to the financial statements (continued)

	Plant and Equipment $'000	Leasehold Improvement $'000	Total $'000
Year ended 30 June 2014			
Net carrying amount at 01 July 2013	6	-	6
Additions	-	-	-
Depreciation expenses	(1)	-	(1)
Net carrying amount at 30 June 2014	5	-	5
Year ended 30 June 2013			
Net carrying amount at 01 July 2012	8	-	8
Additions	-	-	-
Depreciation expenses	(2)	-	(2)
Net carrying amount at 30 June 2013	6	-	6

7. NON-CURRENT ASSETS – INTANGIBLE ASSETS

	Software $'000
At 1 July 2013 – fair value	
Gross carrying amount	31
Accumulated amortisation	(31)
Net carrying amount	-
At 30 June 2014 – fair value	
Gross carrying amount	31
Accumulated amortisation	(31)
Net carrying amount	-

Reconciliation

A reconciliation of the carrying amount of software at the beginning and end of the current reporting period is set.

Year ended 30 June 2014	
Net carrying amount at 01 July 2013	-
Additions	-
Amortisation expenses	-
Net carrying amount at 30 June 2014	-

	Software $'000
Year ended 30 June 2013	
Net carrying amount at 01 July 2012	1
Additions	-
Amortisation expenses	(1)
Net carrying amount at 30 June 2013	-

8. CURRENT LIABILITIES - PAYABLES

	2014 $'000	2013 $'000
Accrued personnel services	89	211
Creditors	13	1
Accrued expenditure	27	75
Other	-	9
	129	**296**

Details regarding credit risk, liquidity risk and market risk, including a maturity analysis of the above payables, are disclosed in Note 14.

9. CURRENT LIABILITIES - PROVISIONS

	2014 $'000	2013 $'000
Restoration Costs	40	63
	40	**63**

Notes to the financial statements (continued)

10. EQUITY

	Accumulated Funds		Total Equity	
	2014 $'000	2013 $'000	2014 $'000	2013 $'000
Balance at the beginning of the year 1 July 2013	100	(14)	100	(14)
Surplus / (Deficit) for the year	115	114	115	114
Balance at the end of the year 30 June 2014	**215**	**100**	**215**	**100**

11. NOTES TO THE STATEMENT OF CASH FLOWS

Cash

For the purpose of the Statement of Cash Flows, cash includes cash on hand and cash at bank. Cash at the end of the financial year as shown in the Statement of Cash Flows is reconciled to the Statement of Financial Position in Note 4.

Reconciliation of Cash Flows from Operating Activities to Net Result

	2014 $'000	2013 $'000
Net result	115	114
Depreciation and amortisation	1	3
Changes in operating assets and liabilities		
(Increase) / decrease in accounts receivable	179	(127)
Increase / (decrease) in accounts payable & provisions	(192)	186
Net cash used on operating activities	**103**	**176**

12. CONTINGENT LIABILITIES

The Committee is not aware of any material contingent liabilities.

13. COMMITMENTS FOR EXPENDITURE

	2014 $'000	2013 $'000
Operating lease commitments		
Future non-cancellable operating lease rentals not provided for and payable: not later than 1 year	120	126
later than 1 year, but not later than 5 years	122	243
	242	**369**

Commitments above include input tax credits of $22,007 (2013: $33,549) that are expected to be recovered from the Australian Taxation Office.

14. FINANCIAL INSTRUMENTS

The Committee's principal financial instruments are outlined below. These financial instruments arise directly from the Committee's operations or are required to finance Committee's operations. The Committee does not enter into or trade financial instruments for speculative purposes. The Committee does not use financial derivatives.

The Committee's main risks arising from financial instruments are outlined below, together with the Committee's objectives, policies and processes for measuring and managing risk. Further quantitative and qualitative disclosures are included throughout these financial statements.

The Committee members have overall responsibility for the establishment and oversight of risk management and reviews and agree on policies for managing each of these risk. Risk management policies are established to identify and analyse the risks faced by the Committee, to set risk limits and controls and to monitor risk.

Compliance with policies is reviewed by the Committee members on a continuous basis.

(a) Financial instrument categories

Financial Assets	Note	Category	Carrying Amount 2014 $'000	Carrying Amount 2013 $'000
Class:				
Cash and cash equivalents	4	N/A	318	215
Receivables[1]	5	Receivables	42	220
			360	435

Financial Liabilities	Note	Category	Carrying Amount 2014 $'000	Carrying Amount 2013 $'000
Class:				
Payables[2]	8	Financial Liabilities measured at amortised cost	129	287
			129	287

Notes to the financial statements (continued)

Notes:

[1] Excludes statutory receivables and prepayments (i.e. not within scope of AASB 7). Therefore, the 'receivables' total in the above table may not reconcile to the receivables total recognised in the Statement of financial position.

[2] Excludes statutory payables and unearned revenue (i.e. not within scope of AASB 7). Therefore, the 'payables' total in the above table may not reconcile to the payables total recognised in the Statement of financial position.

(b) Credit Risk

No collateral is held by the Committee. The Committee has not granted any financial guarantees.

Cash

Cash comprises bank balances. Interest is earned on daily bank balances at the monthly average NSW Treasury Corporation (TCorp) 11am unofficial cash rate, adjusted for a management fee to NSW Treasury.

PAFA approval includes a bank credit card facility, with a limit of $20K.

Receivables – trade debtors

All trade debtors are recognised as amounts receivable at balance date. Collectability of trade debtors is reviewed on an ongoing basis. Procedures as established in the Treasurer's Direction are followed to recover outstanding amounts. No interest is earned on trade debtors. Sales are made on 30 day terms.

An allowance for impairment has not been established as it is considered by the Committee that all debts owing are recoverable.

(c) Liquidity Risk

Liquidity is the risk that the entity will be unable to meet its payment obligations when they fall due.

The Committee manages its liquidity risk as much as practicable through the effective application of cash management practices. These practices aim to reduce the exposure to liquidity risk by ensuring the Committee has sufficient funds available to meet supplier obligations at all times. This is achieved by ensuring that minimum levels of cash are held within Committee's operating bank account so as to match the expected duration of the various supplier liabilities.

The liabilities are recognised for amounts due to be paid in the future for goods or services received, whether or not invoiced. Amounts owing to suppliers (which are unsecured) are settled in accordance with the policy set out in NSWTC 11/12. If trade terms are not specified, payment is made no later than the end of month following the month in which an invoice or a statement is received. Treasurer's Direction 219.01 allows the Minister to award interest for late payment. During the year there were no interest charges for late payment.

The table below summarises the maturity profile of the Committee's financial assets and liabilities, together with the interest rate exposure.

	Interest Rate Exposure			Maturity Dates		
	Weighted Average Rate	Non Interest Bearing	1 year or less	1 to 5 years	Greater than 5 years	Total
	%	$'000	$'000	$'000	$'000	$'000
30 June 2014						
Financial Liabilities						
Payables	N/A	129	129	-	-	129
Total Financial Liabilities		**129**	**129**	**-**	**-**	**129**
30 June 2013						
Financial Liabilities						
Payables		287	287	-	-	287
Total Financial Liabilities		**287**	**287**	**-**	**-**	**287**

(d) Market Risk

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices. The Committee has no exposure to market risk at it holds no financial instruments that are impacted by market prices. The Committee has no exposure to foreign currency risk and does not enter into commodity contracts.

Interest rate risk

The Committee does not hold any interest bearing liabilities and is not exposed to interest rate risk in relation to financial liabilities. Therefore, for these financial instruments, a change in interest rates would not affect profit and loss or equity. For financial assets which are impacted by interest rate fluctuations a reasonably possible change of +/- 1% is used, consistent with current trends in interest rates. The basis will be reviewed annually and amended where there is a structural change in the level of interest rate volatility. The Committee's exposure to interest rate risk is set out below.

Notes to the financial statements

14. FINANCIAL INSTRUMENTS (continued)

	Carrying Amount	-1%		1%	
		Profit	Equity	Profit	Equity
	$'000	$'000	$'000	$'000	$'000
2014					
Financial assets					
Cash and cash equivalents	318	(3)	-	3	-
Receivables	55	(1)	-	1	-
Financial liabilities					
Payables	129	(1)	-	1	-
2013					
Financial assets					
Cash and cash equivalents	215	(2)	-	2	-
Receivables	238	(2)	-	2	-
Financial liabilities					
Payables	287	(3)	-	3	-

(e) Fair Value

The amortised cost of financial instruments recognised in the balance sheet approximates fair value, because of the short-term nature of those financial instruments.

15. AFTER BALANCE DATE EVENT

There are no known after balance date events that would have an effect on the financial statements.

End of audited financial statements

10.4 Internal Audit and Risk Management Attestation for the 2013/14 Financial Year

The Dams Safety Committee is funded from a NSW Treasury approved grant via the NSW Office of Water which is within the Department of Primary Industries and in turn the wider umbrella of NSW Trade & Investment. The annual grant is based on an approved budget calculated to allow the DSC to meet the cost of its operations as they are incurred. During 2013/14 the NSW Office of Water continued to provide financial support to the DSC, including the budgetary grant distribution and associated internal audit services.

In February 2013 The Hon. Katrina Hodgkinson MP, Minister for Primary Industries (and the DSC's then Minister), formally supported the DSC's request for exemption from the Treasury Policy Paper TPP09-05, Internal Audit and Risk Management Policy for the NSW Public Section (the Policy) on the basis that compliance with the Policy would impose costs and administrative burden not commensurate with the size and risk profile of the DSC. This exemption had been backed by NSW Trade & Investment.

After an ensuing application to NSW Treasury by the DSC, in June 2013 Treasury granted the NSW Dams Safety Committee a general exemption from TPP09-05 and the requirement to attest to governance arrangements prescribed by the Policy. The exemption commenced in the 2012/13 financial year and is ongoing. The exemption therefore applied during the 2013/14 financial year.

10.5 Dams Safety Committee 2013/14 – Budgetary Information

Item	2013/14 Budget ($)	2013/14 Actual ($)
Revenue		
Consolidated Fund Income	1,589,000	1,500,000
Interest Income	5,000	19,000
Other Income	275,000	233,000
Total Income **(excluding In-Kind Contributions and Crown Assumed Liability Contributions)**	**1,869,000**	**1,752,000**
In-kind Committee Contributions		149,000
Crown Assumed Liability Contributions		70,000
Total Revenue		**1,971,000**
Expenses		
Total Expenditures **(excluding In-Kind Expenses and Crown Assumed Liability Expenses)**	**1,869,000**	**1,637,000**
In-Kind Committee Expenses		149,000
Crown Assumed Liability Expenses		70,000
Total Expenses		**1,856,000**
Operating Surplus / (Deficit)	**0**	**115,000**

Appendix A – Dam Owner and Consequence Category Summary - 30 June 2014

Dam Owner	Prescribed Dams	Surveillance Reports received/reviewed 2013/14	DSC inspections 2013/14
Water Corporations (Government owned) (includes State Water, SCA, Sydney Water, HWC)	59	14	12
Snowy Hydro Ltd (part Govt. owned) and other Power Generating Companies	35	9	8
Local Government (Councils & Water Utilities)	146	17	36
Other NSW Government Authorities	8	0	2
Mining Companies (Water & Tailings Dams)	99	47	12
Private Owners	27	2	4
Others	4	0	0
TOTAL	**378**	**89**	**74**

Note: The ownership of prescribed dams has been updated, and the numbers of dams amended due to prescription/de-prescription, and as a result differs from previous Annual Reports.

Note: The ownership of prescribed dams has been revised and updated, and as a result differs from previous Annual Reports. Of the 378 prescribed dams and basins, the break-down by Consequence Category is as follows:

- **Extreme** = **28**
- **High** = **176**; comprising
  - A. High A = 44
  - B. High B = 15
  - C. High C = 114
  - D. High – other = 3 (Category to be confirmed)
- **Significant** = **142**
- **Low & Very Low** = **31** (Note: Generally prescribed if height >15m)
- **To be categorised** = **1**

TOTAL = **378**

Appendix B – 2014 - Current Prescribed Dams in NSW

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Abbotsbury Park Pond 2	F10	1970/2004	TE	6	18	Western Sydney Parklands Trust
Aldridges Creek	D11	1994	TE/ER	23	1,250	Consolidated Pastoral Company P/L
Antiene Lease Tailings*	E11	1999	TE/ER	35	10,000	Liddell Coal Operations Pty Ltd
Ashton Coal Clean Water Dam 1*	E10	1985	TE	15	360	Ashton Coal Operations Ltd
Avon*^	G10	1927/71/95	PG/ ER	72	214,400	Sydney Catchment Authority
Bagnalls Beach Road Basin	E12	2002	TE	3.5	22	Port Stephens Council
Bakers Road Detention Basin^	C13	2010	TE	6.5	200	Coffs Harbour City Council
Bamarang*^	G10	1983	TE	26	3,800	Shoalhaven City Council
Banks Rd Basin	F10	1997	TE	3	60	Liverpool City Council
Barden Ridge Lower	F10	2008	PG	22	36	Sutherland Shire Council
Barina Park Detention Basin [R]	G10	1982	TE	7	5.4	Wollongong City Council
Bayswater Ash*	E10	1985	TE	39	22,000	Macquarie Generation
Bayswater Brine Decant*	E10	1986	TE	22	650	Macquarie Generation
Bayswater Cooling Makeup*	E10	1984	TE	11.5	460	Macquarie Generation
Bayswater Main*	E10	1979	TE	20	1,120	BHP Billiton
Beardy Waters	B11	1932/60/87	VA	8.5	480	Glen Innes Severn Council
Beargamil	F8	1912/1924	TE	16	480	Parkes Shire Council
Ben Boyd*^ [I]	J9	1978/82	TE	29	800	Bega Valley Shire Council
Bendeela Pondage*	G10	1973	TE/ER	15	1,200	Sydney Catchment Authority
Bengalla Stage Discharge*^	E10	2000	TE	10	280	Bengalla Mining Company
Bennetts Road Detention Basin^	C13	2013	TE	8	149	Coffs Harbour City Council
Bethungra*^	G7	1895	PG	13	600	NSW Department of Lands
Blackbutt Reserve*	G10	1957/95	TE	6	17	Shellharbour City Council
Bloomfield U Cut Tailings Dam*	E11	2010	TE	15	4,000	Bloomfield Collieries Pty Ltd
Blowering*^	H8	1968/2011	TE/ER	114	1,631,400	State Water Corporation
Boorowa	G8	1940	PG/TE	7	180	Boorowa Council
Bootawa*^ [I]	D12	1968	TE	25	2,280	Midcoast Water
Borenore Creek*	F8	1928/43	VA	17	200	Cabonne Shire Council
Bosnjak Park US	F10	1980-	TE	1.9	22.5	Fairfield City Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Brennans Creek*	G10	1976	DR	17	320	Illawarra Coal
Brogo*	I9	1976	DR	43	8,980	State Water Corporation
Brokers Road Retarding Basin*^	G10	1999	TE	7.5	70	Wollongong City Council
Brooklyn Retarding Basin*	F11	1995	ER	4.8	3.7	Railcorp
Broughton's Pass Weir*	G10	1885	PG	6	50	Sydney Catchment Authority
Broula King Gold Mine Tailings 2	F8	-	TE/ER	18	25	Broula King Joint Venture Pty Ltd
Broula King Gold Mine Tailings^	F8	2012	TE/ER	18	25	Broula King Joint Venture Pty Ltd
Bucklands Retarding Basin	G10	1992	TE	5	2	Matt Crossingham
Bulga CHPP Dam*	E11	2008	TE	14	3,000	Glencore Bulga Coal Management P/L
Bulga Mine Water	E11	-	TE	20	3,000	Glencore Bulga Coal Management P/L
Bulga Old Tailings*	E11	1981	TE/Claylined	14	1,750	Glencore Bulga Coal Management P/L
Bundanoon*	G10	1959	VA	35	2,000	Wingecarribee Shire Council
Burrendong*	E9	1967/2011	TE/ER	76	1,190,000	State Water Corporation
Burrinjuck*	H8	1928/57/94	PG	93	1,026,000	State Water Corporation
Cadia Nth Waste Dump Detention Basin	F8	2003	ER	18	50	Cadia Holdings Pty Ltd
Cadia South Tailings Storage Facility*	F8	2001-	TE/ER	69.5	75,000	Cadia Holdings Pty Ltd
Cadia Tailings*	F8	1997-	TE/ER	82	93,000	Cadia Holdings Pty Ltd
Cadiangullong*	F8	1997	PG	43	4,200	Cadia Holdings Pty Ltd
Camberwell Tailings 2*	E11	1995/2004/2013	TE/ER	33	5,300	Integra Coal Operations Pty Ltd
Cambewarra ^[l]	G10	Pre 1930	TE	8.4	50	Shoalhaven City Council
Campbelltown Link Area Basin 1	G10	2004	TE	5.7	30	Campbelltown City Council
Campbelltown North Detention Basin	G10	2000	TE	5.4	28	Campbelltown City Council
Captains Flat*	H9	1939/95	PG	16	820	Palerang Council
Carcoar*^	F9	1970	VA	52	35,800	State Water Corporation
Cascade 1*	F10	1905/15	VA	15	159	Sydney Catchment Authority
Cascade 2*	F10	1926	TE	26	318	Sydney Catchment Authority
Cascade 3*	F10	1938	TE	30	1,700	Sydney Catchment Authority
Cataract*	G10	1907/1987	PG	56	94,300	Sydney Catchment Authority
Cecil Hills Basin 100	F10	2001	TE	2.6	29	Liverpool City Council
Cecil Park Basin 3A*	F10	1952/2007	TE	6.1	310	Liverpool City Council
Cecil Park Basin 3B	F10	-	TE	7.2	250	Liverpool City Council
Centennial Pk Res No. 1*	F11	1899/92	PG	7	81	Sydney Water Corporation
Centennial Pk Res No. 2*	F11	1925	PG/ TE	10	89	Sydney Water Corporation
Chaffey*	D11	1979/2004/11	TE/ ER	56	62,000	State Water Corporation
Chichester*	E11	1923/84/94/2003	PG	44	22,000	Hunter Water Corporation Ltd
Chifley*	F9	1957/2001	TE	35	31,000	Bathurst Regional Council
Chinamans	G8	Pre 2012	TE	4.5	65	Young Shire Council
Clarrie Hall*^	A13	1983	DR	43	16,000	Tweed Shire Council
Clear Paddock Creek Basin C	F11	2004/09	TE	5.2	82	Fairfield City Council
Clear Paddock Creek Basin W2	F10	2009	PG	3.3	60	Fairfield City Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Clear Paddock Creek Basin W3	F10	2004/09	TE	2.6	47	Fairfield City Council
Coalcliff*	G10	1971/98	TE	9	97	Illawarra Coke Company
Cochrane*	I9	1958	TE	29	4,320	Green State Power Pty Ltd
Colongra Creek Ash*	F11	1965	TE	5.7	5,500	Delta Electricity
Comberton Grange Ret. Basin	G10	1991	TE	15	65	Shaolin Temple Foundation (Aust) Ltd
Comin Place Detention Basin	F10	2000	TE	4.5	20	Fairfield City Council
Company*	F8	1867/2005	TE	5	95	Weddin Shire Council
Copeton*	B10	1976/2012	TE/ ER	113	1,365,000	State Water Corporation
Cordeaux*	G10	1926/77/88	PG	57	94,000	Sydney Catchment Authority
Cowal Gold Mine Reservoir D9	F7	2007	TE	7	800	Barrick (Cowal) Ltd
Cowal Northern Tailings Dam*	F7	2005/09	TE	14.7	6,600	Barrick (Cowal) Ltd
Cowal Southern Tailings Dam*	F7	2007	TE	18.4	14,500	Barrick (Cowal) Ltd
Cowarra^*	D12	2002	TE	41	10,000	Port Macquarie Hastings Council
Cowarra Creek Tailings*	H9	1986/11	ER	23	52	NSW Department of Industry & Investment
Crookwell	G9	1937	PG/VA	15	450	Upper Lachlan Shire Council
CSA South Tailings*	D5	1960/71/07/14	TE	16	6,000	Cobar Management Pty Ltd
CSIRO Retarding Basin	F10	1993/2003	TE	6	124	Stockland
Cumnock Tailings Storage Facility*	E10	2013	ER	10	1,500	Ravensworth Operations Pty Ltd
Danjera*	G10	1971	CB/ER	30	7,800	Shoalhaven City Council
Dapto Heights Ret. Basin	G10	1991	TE	6	16	Wollongong City Council
Dargues Reef Gold Project Tailings*	H9	-	TE	30	640	Unity Mining Limited
Dartbrook Mine Water*	E10	2000/06	TE	11	450	Anglo Coal (Dartbrook Mgt) Pty Ltd
Daruk Park Retarding Basin	F10	1987	TE	2.5	48	Liverpool City Council
Deep Creek Snowy	I8	1961	PG	21	8	Snowy Hydro Limited
Deep Creek*	H10	1984	TE	32	4,900	Eurobodalla Shire Council
Delegate Flood Retarding Basin*^	J8	1985	TE	5	200	Bombala Shire Council
DEP Retarding Basin	F10	1993/2005	TE	9.5	250	Blacktown City Council
Dover Heights Reservoir*	F11	1928	PG/ TE	8	85	Sydney Water Corporation
Drayton Water Supply*	E10	1980	TE	13	780	Anglo Coal (Drayton Mgt) Pty Ltd
Dumaresq*^ [R]	C11	1896	PG	12	380	Armidale Dumaresq Council
Dungowan* [I]	D11	1957/1992	TE	31	6,300	Tamworth Regional Council
Duralie Coal Auxiliary Dam No. 1*	E11	2009	TE	20	500	Stratford Coal Pty Ltd
Duralie Coal Auxiliary Dam No. 2*	E11	2011	TE	30	2,900	Stratford Coal Pty Ltd
Duralie Coal Mine Water*	E11	2003	TE	18	1,405	Stratford Coal Pty Ltd
East West Road	C12	-	TE	6	61	Roads & Maritime Services
Edgewood Detention Basin	G10	2002	TE	4.8	19.2	Wollongong City Council
Edgeworth Detention Basin	E11	-	TE	2.6	12	Lake Macquarie City Council
Edmondson Park Basin 12^	F10	2013	TE	3.9	48	Liverpool City Council
Elanora Country Club Main	F11	2002	TE	10	80	Elanora Country Club
El Klaros [I]	E11	1993	TE	20	200	Mawipalivier Pty. Limited
Elura Tailings	E11	1997	TE	8	19,000	Endeavor Operations Pty Ltd
Emigrant Creek*	A13	1968/2002	TE/ PG	13	820	Rous Water

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Emma James Basin	A13	-	TE	3.6	14	Gosford City Council
Eraring Ash*	F11	1982	TE	25	21,000	Origin Energy
Eraring Attemperating Cooling Water*	F11	2010	TE	32	820	Origin Energy
Eucumbene*	I8	1958/78	TE/ ER	116	4,800,000	Snowy Hydro Limited
Fairfield Golf Course Basin	F10	Prior to 1980s	TE	2.1	152	Fairfield City Council
Fitzroy Falls*	G10	1974	TE/ ER	14	23,500	Sydney Catchment Authority
Floraville Road Det. Basin	F11	1992	TE	4	20	Lake Macquarie City Council
Foothills Estate Ret. Basin 1	G10	1995	TE	7	21	Wollongong City Council
Foothills Estate Ret. Basin 3	G10	1995	TE	7.8	21	Wollongong City Council
Foothills Rd Basin	G10	1979/95	TE	4	17	Wollongong City Council
Fountaindale* [I]	G10	1915	VA	15	61	Kiama Municipal Council
Fox Hills Retarding Basin	F10	1990	TE	3.3	230	Blacktown City Council
Freislichs	D1	1976	TE	13	230	University of New South Wales
Galambine	E9	1982/1999	TE	15	227	Gooree Park Group of Companies
Gannet Place Retarding Basin	G10	1993	TE	5	5	Wollongong City Council
Garden Suburb Det. Basin No. 2	E11	2000	TE	9	14	Lake Macquarie City Council
Geehi*	I8	1966	ER	91	211,000	Snowy Hydro Limited
George Bass Drive Det. Basin	H10	1990/08	TE	2.5	10	Eurobodalla Shire Council
Georgia Terrace Detention Basin	F10	-	TE	4	2	The Hills Shire Council
Glenbawn*	E10	1958/87	TE/ER	100	750,000	State Water Corporation
Glenmore Park Retarding Basin 4	F10	1997	TE	5.5	270	Penrith City Council
Glennies Creek*	E11	1980-83	DR	67	283,000	State Water Corporation
Glenquarry Cut Control Structure*	G10	1974	PG	18	24,100	Sydney Catchment Authority
Gooden Reserve Detention Basin	F10	1997	PG	5	380	The Hills Shire Council
Googong*^	H9	1977/92/2010	ER	66	124,000	ACTEW Water
Gosling Creek^[R]	F9	1890	PG	8	650	Orange City Council
Grahamstown*^ [I]	E11	1964/96/01/05	TE	15	185,000	Hunter Water Corporation Ltd
Greaves Creek*	F10	1942	VA	19	310	Sydney Catchment Authority
Green Meadows Retarding Basin^	G10	1981/93/03	TE	5.4	120	Shellharbour City Council
Greenway Drive Retarding Basin 10 A-B^	F10	1995/96	TE	4.5	132	Liverpool City Council
Gunyah Park Basin	G10	1993	TE	4	4.5	Wollongong City Council
Guthega*	I8	1955	PG	34	1,830	Snowy Hydro Limited
Hamilton Valley Retarding Basin 5B	I6	1995	TE	3.3	130	Albury City Council
Hamilton Valley Retention Basin 5A	I6	1995/09	TE	4.8	164	Albury City Council
Hera Tailings*^	C6	-	TE	9	1700	Aurelia Metals Ltd
Hillgrove Eleanora*^	C11	1980	TE/ER	10	68	Hillgrove Mines Pty Ltd
Hillgrove Tailings No. 1*^	C11	1982	TE/ER	45	1,200	Hillgrove Mines Pty Ltd
Hillgrove Tailings No. 2*^	C11	2007	TE/ER	15	280	Hillgrove Mines Pty Ltd
Honeysuckle Creek^	F11	1984/91	PG	9.3	12	Killara Golf Club Ltd
Horningsea Park Detention Basin^	G10	2011	TE	3.5	36	Liverpool City Council
Houston	E10	-	TE	2.0	2275	Anglo American Metallurgical Coal
Howell Close Retarding Basin	F11	-	TE	2.5	4.6	Pittwater Council
Hoxton Park Basin 6^	F11	2012	TE	5.7	142	Liverpool City Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Hume*[R]	I7	1936/67 /87/2003/11 /2012	PG/TE	51	3,050,000	Murray-Darling Basin Authority
Humphries Creek Tailings*	A12	1989	TE/ ER	17	1,100	White Rock Minerals Ltd
Humphries Creek*	A12	1989	TE	15	680	White Rock Minerals Ltd
Hungerford Hill*	E11	1970	TE	7	300	Roche Group
Hunter Valley Operations Lake James*	E11	2010	TE	8	715	Rio Tinto Coal Australia Pty Ltd
Imperial Lake* [R]	D1	1967	TE	8.2	700	Essential Water
Island Bend	I8	1965/2001	PG	49	3,020	Snowy Hydro Limited
Jerrara Creek*^[R]	G10	1955	TE	13	270	Kiama Municipal Council
Jindabyne*	I8	1967/2008	ER	72	690,000	Snowy Hydro Limited
Jordan Springs Village Lake	F10	2013	TE	5	55	St Marys Land Ltd
Jounama*^	H8	1966/68	TE/ER	44	555	Snowy Hydro Limited
Junction Reefs*	F8	1898	MB	19	2,500	NSW Department of Lands
Kalingo* [I]	E11	1920/2012	TE	9	110	Austar Coal Mine Pty Ltd
Kanahooka Retention Basin	G10	1993	TE	1.5	20	Forest Grove Community Association
Kangaroo Pipeline Control Structure*	G10	1975	ER/PG	19	24,000	Sydney Catchment Authority
Karangi*^	C13	1980/96	TE/ER	38	5,600	Coffs Harbour City Council
Keepit*	C10	1960/2011	PG/ TE	55	424,000	State Water Corporation
Kentucky Creek	C11	1942/84	PG	12	500	Uralla Shire Council
Khancoban*	I8	1966	TE	18	21,500	Snowy Hydro Limited
Killara Reservoir*	F11	1930/95	PG/ TE	11	166	Sydney Water Corporation
King Park Basin	F10	-	TE	1.7	102.5	Fairfield City Council
Lake Canobolas*^	F9	1918	VA/PG	13	450	Orange City Council
Lake Endeavour*	F8	1940	TE	21	2,400	Parkes Shire Council
Lake Ettamogah Winter Storage*^	H6	1994	TE	13	2,100	Norske-Skog Paper Mills (Aust) Ltd
Lake Inverell*[I]	B11	1940/45	PG	11	1,500	Inverell Shire Council
Lake Medlow*	F10	1907	VA	20	300	Sydney Catchment Authority
Lake Pambulong Det. Basin*^ [R]	E11	2003	TE/ER	5.5	63	Roche Group Pty Limited
Lake Parramatta*	F11	1857/98	MB/VA	15	590	Parramatta City Council
Lake Rowlands*	F9	1954	CB/TE	20	4,000	Central Tablelands Water
Lake Tullimba	C11	1982	TE	18	1,200	University of New England
Leewood Ponds*^	C9	2014-	TE	5	800	Santos Ltd
Lemington Mine Tailings	E10	1991	TE/ ER	8	1,000	Coal & Allied Operations Pty Ltd
Lidcombe Basin No. 6	F11	2003	TE	3.6	11	Australand Industrial Pty Ltd
Liddell Ash Disposal*	E10	1971/82/13	TE	41	28,500	Macquarie Generation
Liddell Ash Levee*	E10	1988/2003/12	TE/ER	16	29,000	Anglo Coal (Drayton Mgt) Pty Ltd
Liddell Cooling Water*	E10	1968	TE	44	150,000	Macquarie Generation
Liddell Water Supply*	E10	1970	TE	31	4,500	Macquarie Generation
Lithgow No. 2* [I]	F10	1907/14	VA	26	440	Lithgow City Council
Lithgow No. 1	F10	1896/14	VA	12	77	Lithgow City Council
Lostock*	E11	1969-71	TE/ ER	38	20,000	State Water Corporation
Loyalty Road Retarding Basin	F11	1996	PG	30	1,500	Hawkesbury Nepean CMA

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Lyell*^	F10	1983/96	ER	50	34,000	EnergyAustralia NSW
Malpas*^	C11	1968	TE/ ER	31	12,300	Armidale Dumaresq Council
Mangoola Coal Raw Water*^	E10	2010	TE/ER	26	2,000	Glencore Mangoola Coal Pty Limited
Mangoola Pit Water dam*^	E10	2010	TE/ ER	12	1700	Glencore Mangoola Coal Pty Limited
Mangoola Start-Up tailings dam*^	E10	2011	ER	35	3,900	Glencore Mangoola Coal Pty Limited
Mangrove Creek* [I]	F11	1982	DR	80	190,000	Gosford City Council
Manly*	F11	1892/1922/84	PG	20	2,000	Sydney Water Corporation
Mannering Creek Ash*	F11	1963	TE	11	38,000	Delta Electricity
Mardi*	F11	1962/91/2011	TE	25	7,300	Wyong Shire Council
Maroubra Reservoir*	F11	1966	PG/ TE	12	128	Sydney Water Corporation
Marrickville Oval Retarding Basin	F11	1997	TE	1.8	27	Marrickvllle Council
Maules Creek Mine - MWD2*	C10	-	TE	9	400	Whitehaven Coal Pty Ltd
Maules Creek Mine - RWD2*	C10	-	TE	6	200	Whitehaven Coal Pty Ltd
McCoy Park Retarding Basin	F11	1987/2005	TE	5.5	450	Parramatta City Council
McKinnons Gold Mine Tailings^	D5	1996	ER	20	4,000	Redbank Mines
Medway*	G10	1964	VA	25	1,300	Wingecarribee Shire Council
Menindee Lakes Storage*	E2	1960	TE	15	2,270,000	State Water Corporation
Mimosa Road Basin	F10	-	TE	1.7	40	Fairfield City Council
Mineral Hill Southern Tails*^	E6	2012	TE	20	1750	Kimberley Metals Ltd
Mineral Hill Tailings*^	E6	1989	TE	24	1928	Kimberley Metals Ltd
Minmi Road Detention Basin[R]	E11	1986	TE	4	46	Newcastle City Council
Molong Creek* [I]	F9	1986	PG	16	1,000	Cabonne Council
Mooney Lower [I]	F11	1937	VA	13	150	Gosford City Council
Mooney Upper*	F11	1961	VA	28	4,600	Gosford City Council
Moore Creek*	C10	1898/2007	VA	19	220	NSW Department of Lands
Mount Owen North Void Tailings*	E10	1998	TE/ ER	14	2,500	Glencore Mt Owen Pty Limited
Mount Owen Rail Loop Tailings*	E10	2003	TE	11.7	5,000	Glencore Mt Owen Pty Limited
Mount View Detention Basin	E10	1983/2000	TE	5.7	250	Cessnock City Council
Mt Annan Wetland No 1*	E11	2006	TE	7	76	Camden City Council
Mt Arthur North Environmental*	E11	2002	TE	17	1,250	Hunter Valley Energy Coal Pty Ltd
Mt Arthur Tailings Storage Facility*	E11	2013-	ER	90	112,000	Hunter Valley Energy Coal Pty Ltd
Mt Boppy Gold Mine Tails*^	D5	-	DR	19	900	Polymetals (Mt Boppy) P/L
Mt Thorley Abbey Green South TSF*	F11	2007	ER	10	5,800	Rio Tinto Coal Australia Pty Ltd
Mt Thorley Central Ramp Tailings*	F11	1993/2001	ER	70	3,500	Rio Tinto Coal Australia Pty Ltd
Mt Thorley South Out Of Pit Water	D10	2011	TE/ER	20	2100	Rio Tinto Coal Australia Pty Ltd
Muirfield Golf Club	F11	1969/85/2013	TE	7	19	Muirfield Golf Club Limited
Muirfield Golf Course Detention Basin	F11	1969/93	TE	4	12	The Hills Shire Council
Murray 2	I8	1968	VA	43	1,800	Snowy Hydro Limited
Murrurundi	D10	1984	TE	10.4	180	Upper Hunter Shire Council
Nambucca Off-Stream Storage^	C12	-	TE	22	4,500	Nambucca Shire Council
Narranbulla^	G9	1966	TE	7.3	1,450	Divall's Earthmoving & Bulk Haulage

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Nepean*^[R]	G10	1935/47/92	PG	82	70,000	Sydney Catchment Authority
Newstan Contingency Tailings	E11	1990/94	ER	20	80	Centennial Newstan
Newstan Southern REA Main Tailings*	E11	2007	TE	33	5,200	Centennial Newstan
Nixon	C10	1971	TE	16	220	J. Nixon
Norbrik Detention Pond	F10	2010	TE	4	16	Mulpha FKP P/L
North Turramurra Golf Course	F11	2004	TE	4	12	Ku-ring-gai Council
Northmead Reserve Detention Basin	F10	1983	TE	6	30	The Hills Shire Council
Northparkes E27 - Estcourt Tailings*	E8	2012	TE/ER	20	34,000	Northparkes Mines
Northparkes Rosedale Tailings Storage Facility	E8	-	TE	27	51,000	Northparkes Mines
Northparkes Tailings Dam 2*	E8	1996	TE/ER	25	3,900	Northparkes Mines
Northparkes Tailings*	E8	1993/94/2009	TE/ER	27	3,900	Northparkes Mines
Nyrang Park Retarding Basin^	G10	1992	TE	3.5	20	Wollongong City Council
Oak Flats Reservoir*	G10	1978	TE	11	56	Sydney Water Corporation
Oaky River^	C12	1956	PG/ ER	18	2,700	Essential Energy
Oberon*	F9	1946/57/96	CB	35	45,000	State Water Corporation
Old Quipolly	D10	1932	VA	19	850	Liverpool Plains Shire Council
Orange Research Station	F9	1993/97	TE	6.1	200	Orange Agricultural Institute
Palm Tree Grove Retarding Basin^	F11	1976/90	TE/ER	4	3	Gosford City Council
Peak Gold Mine Tailings	D5	1991-	TE/ER	5.5	300	Peak Gold Mines
Pecan Close Retarding Basin	F11	1998/03	TE	5	100	Gosford City Council
Pejar* [I]	G9	1979	TE/ ER	23	9,000	Goulburn Mulwaree Council
Petrochilos*^	A12	1969/06	TE	13.3	55	Kyogle Council
Pied Piper playground Detention Basin	F11	2010	TE	4	5	Blacktown City Council
Pindari*	B11	1969/95	DR	85	312,000	State Water Corporation
Pine Trees Detention Basin	Off Map	-	TE	1.6	25	Lord Howe Island Board
Plashett*	E10	1987	TE	46	65,000	Macquarie Generation
Port Macquarie*^	D12	1979	TE	19	2,500	Port Macquarie Hastings Council
Porters Creek*^	H10	1968	PG/TE	17	1,900	Shoalhaven City Council
Possum Skin Dam*	C11	2004	TE	13.5	1,300	Glennies Creek Coal Management Pty Ltd
Potts Hill Res. 2*	F11	1923/2000	PG/TE	5	570	Sydney Water Corporation
Prospect*^[R]	F10	1888/79/97	TE	26	50,200	Sydney Catchment Authority
Puddledock Creek	C11	1928	VA	19	700	Armidale Dumaresq Council
PWCS Fines Disposal	E11	1990	TE	5	1,800	Port Waratah Coal Services Limited
Quipolly*	D10	1955/2012	TE	21	5,400	Liverpool Plains Shire Council
Ravensworth Inpit Storage*	E11	1994	TE	13	1,000	Ravensworth Operations Pty Ltd
Ravensworth South Tailings*	F10	2008	TE	48	9,000	Ravensworth Operations Pty Ltd
Ravensworth Void 3*	E11	2001	TE	20	12,000	Macquarie Generation
Ravensworth Void 4 East Tails - Saddle Dam*	E11	2007/09	TE/ER	10	5,000	Ashton Coal Operations Ltd
Ravensworth Void 5*	E11	2013	TBA	70	12,000	Macquarie Generation
Redbank Creek*	E9	1899/2011	VA	16	180	Mid-Western Regional Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Riverview Void In-pit Water Storage	E11	2013	ER	65	6750	RTCA Hunter Valley Operations
Rocky Creek*	A13	1953/2010	ER	28	14,000	Rous Water
Rouse Hill Retarding Basin 13	F10	1994	TE	4.5	90	Sydney Water Corporation
Rouse Hill Retarding Basin 16 AB^	F10	2000	TE	4	17	Sydney Water Corporation
Rouse Hill Retarding Basin 5	F10	1994/95	TE	4.6	140	Sydney Water Corporation
Rouse Hill Retarding Basin 9^	F10	1994	TE	4.9	46	Sydney Water Corporation
Rouse Hill Retarding Basin 9B^	F10	2000	TE	8	90	Sydney Water Corporation
Rushforth Road 100ML Reservoir	B12	1985	TE	8.5	100	Clarence Valley Council
Rydal*	F10	1957/94	TE	16	370	State Water Corporation
Rylstone*	E9	1954/03	VA	15	3,300	Mid-Western Regional Council
Sawyers Swamp Creek Ash*^	F10	1979	TE	40	8,500	EnergyAustralia NSW Pty Ltd
School House Creek Basin	F10	1989	TE	7	65	Penrith City Council
SE Tailings Storage*	E10	2002-	TE/ ER	30	1,200	RTCA Hunter Valley Operations
Shannon Creek^	B12	2008	TE	51	30,000	Clarence Valley Council
Shellcove Estate Detention Basin 1	G10	2005	TE	5	24	Shellharbour City Council
Shellharbour City Centre Basin	G10	2001	TE	5	41.5	Shellharbour City Council
Sierra Place Detention Basin^	G10	1989/2001	TE/ ER	8.4	440	The Hills Shire Council
Site D Tailings*	E1	1996/2009	TE	15	14,000	Perilya Broken Hill Limited
Smiths Creek Ret Basin 1	G10	2001	TE	8.8	70	Campbelltown City Council
Smiths Creek Ret Basin 2	C10	1996	TE	7.9	50	Campbelltown City Council
Smiths Creek Ret Basin 3	F10	1996	TE	6.4	32	Campbelltown City Council
Snapper Startup Water Dam	F2	2010	TE	13.5	600	Cristal Mining Australia
Sooley*	G9	1930/61 /2005/11	PG	20	6,300	Goulburn Mulwaree Council
South Bulli Basin 1	G10	-	ER	6	50	Allied Coal Pty Ltd
South Bulli Stormwater	G10	1992	TE	9	60	Wollongong Coal Pty Ltd
Spagnolos Road Detention Basin	C13	-	TE	5.5	200	Coffs Harbour City Council
Split Rock*	C10	1988/2012	DR	66	397,000	State Water Corporation
Spring Creek*	F9	1931/47/69	TE/VA	20	4,700	Orange City Council
St Josephs School Retarding Basin	G10	1990/2001	TE	5	16	Shellharbour City Council
Stephens Creek*	D1	1892/1909	TE	15	20,000	Essential Water
Steuart McIntyre Dam*^	D12	2000	TE	24	2,500	Kempsey Shire Council
Stockdale Basin	F10	-	TE	1.6	31	Fairfield City Council
Stockton Borehole Tailings*^	E11	1982/1985	TE/ ER	18	5,000	Oceanic Coal Australia Pty Ltd
Suma Park*^[R]	F9	1962	VA	31	18,000	Orange City Council
Talbingo*^	H8	1970	ER	162	921,000	Snowy Hydro Limited
Tallong Railway*^	G10	1883/1917/75	MB	5	70	John Holland Rail
Tallowa*^	G10	1976	PG	43	90,000	Sydney Catchment Authority
Tantangra Dam*	H8	1960	PG	45	250,000	Snowy Hydro Limited
Tenterfield Creek [R]	B12	1930/74	PG	15	1,200	Tenterfield Shire Council
The Cove*	F11	1972	TE	7	140	Old Sydney Town
Thompsons Creek*^	F9	1992	TE/ ER	54	28,000	EnergyAustralia NSW Pty Ltd
Thornleigh Reservoir*	F11	1971	ER	14.3	400	Sydney Water Corporation
Tilba* [I]	I10	1970/94/97 /2003	TE	18	140	Bega Valley Shire Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Timor	D9	1962	VA	19.5	1,100	Warrumbungle Shire Council
Tomingley Residue Storage Facility*^	E8	2013	ER	15	133	Tomingley Gold Operations P/L
Tooma*	I8	1961	TE	67	28,000	Snowy Hydro Limited
Toonumbar*	A12	1971	TE/ ER	44	11,000	State Water Corporation
Tritton Tailings Dam	D6	2004	TE	14.5	5,500	Straits Tritton Mines
Tumbarumba^	H8	1972/99	TE	20	70	Tumbarumba Shire Council
Tumut 2	H8	1961	PG	46	3,000	Snowy Hydro Limited
Tumut 3*^	H8	1969-71	PG	35	921,000	Snowy Hydro Limited
Tumut Paper Mill Freshwater	H8	2001	TE	27	200	Visy Pulp & Paper Pty. Ltd.
Tumut Paper Mill Wastewater	H8	2001	TE	10	500	Visy Pulp & Paper Pty. Ltd.
Tumut Pond*	H8	1959	PG	86	53,000	Snowy Hydro Limited
Umberumberka	D1	1914	PG/VA	41	8,000	Essential Water
United Colliery Tailings Dam 2*	E10	2006	TE	20	800	Glencore United Collieries Pty Ltd
Upper Cordeaux 2*	G10	1915	VA	21	1,200	Sydney Catchment Authority
Upper Rodds Creek	F8	2001/2012	ER/TE	31	3,700	Cadia Holdings Pty Ltd
Upper Shephards Lane Detention Basin	C13	-	TE	7	100	Coffs Harbour City Council
Vales Point Ash*	F11	1984	TE	6	145,000	Delta Electricity
Valley View Detention Basin	F8	2005	TE	5	10	Cowra Shire Council
Wallerawang*^	F10	1978	TE	14.4	4,300	EnergyAustralia NSW Pty Ltd
Wambo Chitter Dump Water Dam*	E11	2009	TE/ER	8.8	800	Wambo Coal Pty Limited
Wambo Hunter Pit Tails Dam	E11	2005	ER	50	8,300	Wambo Coal Pty Limited
Wambo South Water*	E11	2010	TE	8	840	Wambo Coal Pty Limited
Wambo Tailings*	E11	1997/2002	TE	50	5,600	Wambo Coal Pty Limited
Warkworth Mine Tailings*	E11	1980/92/94	TE/ER	26	4,800	Rio Tinto Coal Australia Pty Ltd
Warkworth North Pit Tailings*	E11	1997/2012	TE/ER	65	9,300	Rio Tinto Coal Australia Pty Ltd
Warragamba*[R]	F10	1960/90/2002	PG	142	2,030,000	Sydney Catchment Authority
Warringah Reservoir*	F11	1936/95	PG/TE	9.8	80	Sydney Water Corporation
Waverley Reservoir WS133*	F11	1917	PG/TE	8.3	19	Sydney Water Corporation
Wentworth Falls Lake*	F10	1906/91/2003	TE	10	300	Blue Mountains City Council
Werris Creek Void Water 1*	D10	2012	TE	5.4	250	Werris Creek Coal P/L
Werris Creek Void Water 3*	D10	2012	TE	5	214	Werris Creek Coal P/L
Werris Creek Void Water 4*	D10	2012	TE	5	145	Werris Creek Coal P/L
Whitford Road Retarding Basin	F10	1997	TE	2.9	38	Liverpool City Council
Widemere Detention Basin	F11	2009	TE	9	220	Boral Recycling P/L
Wilpinjong TD1-East*^	E9	2007	ER	14	370	Wilpinjong Coal Pty Ltd
Wilpinjong TD1-West*^	E9	2008	ER	18	650	Wilpinjong Coal Pty Ltd
Wilpinjong TD2*^	E9	2011	TE	20	4,000	Wilpinjong Coal Pty Ltd
Wilpinjong TD6*^	E9	2013-	TE	22	2,000	Wilpinjong Coal Pty Ltd
Winburndale* [R]	F9	1936	PG	22	1,700	Bathurst Regional Council
Windamere*	E9	1984	TE/ER	67	370,000	State Water Corporation
Winding Creek 5 Retarding Basin	E11	1994/2011	TE	6.5	240	Hunter Water Corporation Ltd
Wingecarribee*^	G10	1974/2012	TE/ER	19	31,600	Sydney Catchment Authority

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Wollondilly Washery 1*	G10	1985-	TE/ ER	18	70	Burragorang Valley Coal P/L
Wollongong High School Retarding Basin	G10	1993/2001	TE	5	80	Wollongong City Council
Wonawinta Tailings*	E5	2013	ER/TE	11	1,100	Cobar Consolidated Resources Ltd
Woodford Creek*	F10	1928/48	VA	16	850	Sydney Catchment Authority
Woodlawn Mine Evaporation No. 1*	H9	1989	TE	6	750	Veolia Environmental Services
Woodlawn Mine Evaporation No. 2*	H9	1989	TE	10	290	Veolia Environmental Services
Woodlawn North Tailings*	H9	1977	TE/ ER	18	2,100	Veolia Environmental Services
Woodlawn South Tailings*	H9	1982	TE/ ER	17	2,400	Veolia Environmental Services
Woodlawn West Tailings*	H9	1989	TE/ER	35	2,400	Veolia Environmental Services
Woolgoolga	C13	1967	TE	12	270	Coffs Harbour City Council
Woronora*	G10	1941/88	PG	66	71,800	Sydney Catchment Authority
Wyangala*	F8	1961-71	TE/ ER	85	1,220,000	State Water Corporation
Wyong Road Detention 3Basin	F11	1975	TE	2.7	150	Wyong Shire Council
Yarrawonga Weir*	I6	1939/2001	PG/TE	7	117,500	Murray-Darling Basin Authority
Yass*	G8	1927	VA/PG	12	875	Yass Valley Council
Yellow Pinch*	I9	1987	ER	40	3,000	Bega Valley Shire Council
Young Retirement Village Basin	G8	1980	TE	5	21	Southern Cross Care

LEGEND: Applicable as at 30 June 2014 (not including changes between then and printing of Annual Report)

Dams added this year to Schedule 1 of the Dams Safety Act 1978 are highlighted rows.

* : Dams with Notification Areas

[I]: Dam under investigation

[R]: Significant Risk Dam or requiring specific investigations for particular circumstances

^ : DSC inspected – 2013/2014

CB: Concrete buttress

DR: Decked rockfill

ER: Rockfill dam

MB: Masonry buttress

\- : Not Built

PG: Concrete Gravity

TE: Earthfill dam

VA: Concrete arch

Bamarang Dam

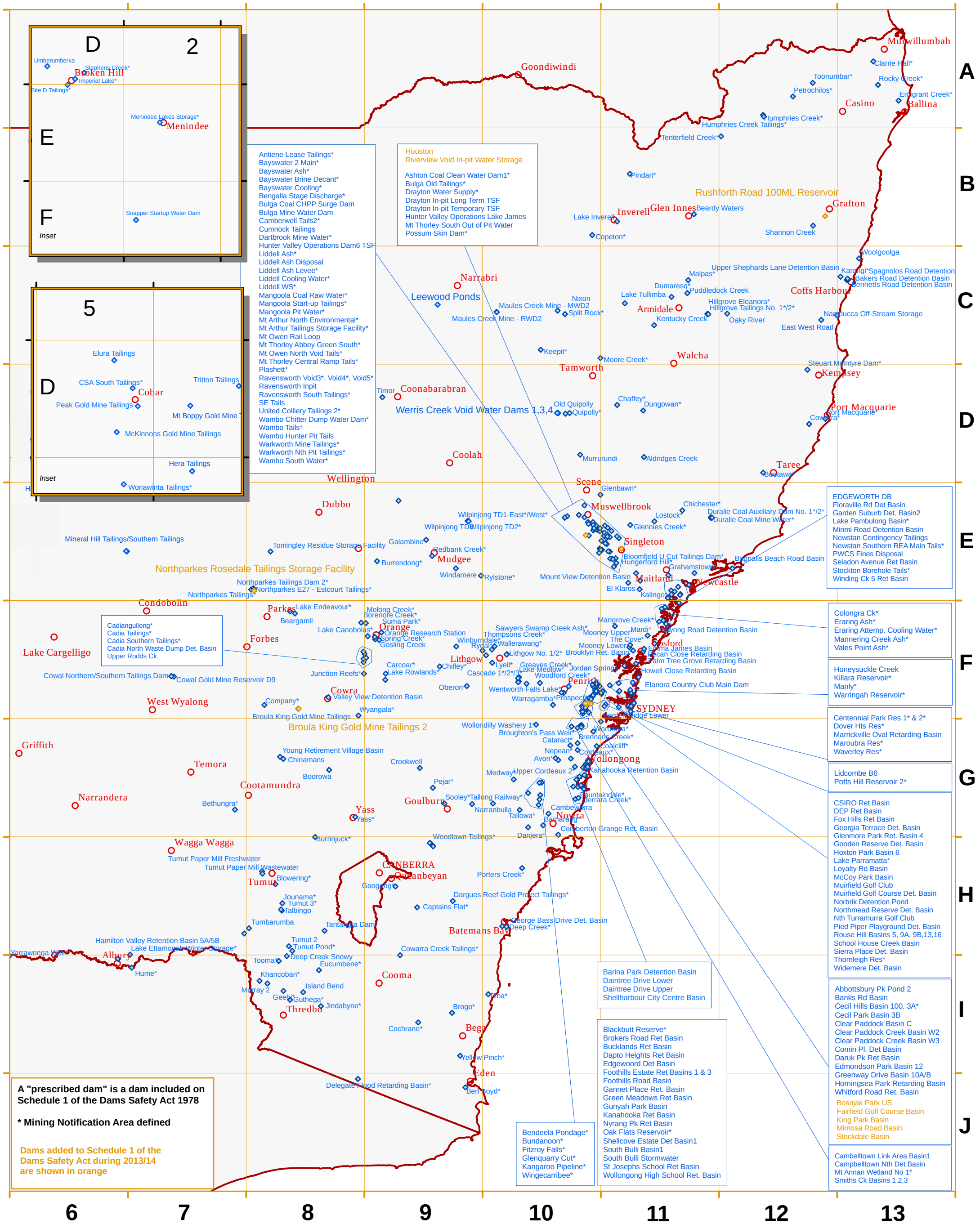
DSC members and staff inspected this 26m high zoned earthfill dam in October 2013 in conjunction with a DSC country meeting. Located west of Nowra, it has a storage capacity of 3,800ML.

Bootawa Dam. *Some investigation studies have been undertaken regarding a possible raising of this dam in the long term. Located in the Taree region, this is a 25m high zoned earthfill dam of about 2,300ML storage capacity. DSC members and staff inspected this dam in May 2014 in conjunction with a DSC country meeting.*

Grahamstown Dam

DSC members and staff inspected this 15m high earthfill dam in May 2014 in conjunction with a DSC country meeting. A very important water supply dam for Newcastle, this dam has a storage capacity of 185,000ML and some of its crest forms a busy public road. The owner, Hunter Water Corporation, will construct a 1.2km long gabion wall along the southern part of the crest to prevent erosion from wave action during high winds and storms.

NSW Dams Safety Committee
PRESCRIBED DAMS IN NSW
JULY 2014



A "prescribed dam" is a dam included on Schedule 1 of the Dams Safety Act 1978

*** Mining Notification Area defined**

Dams added to Schedule 1 of the Dams Safety Act during 2013/14 are shown in orange