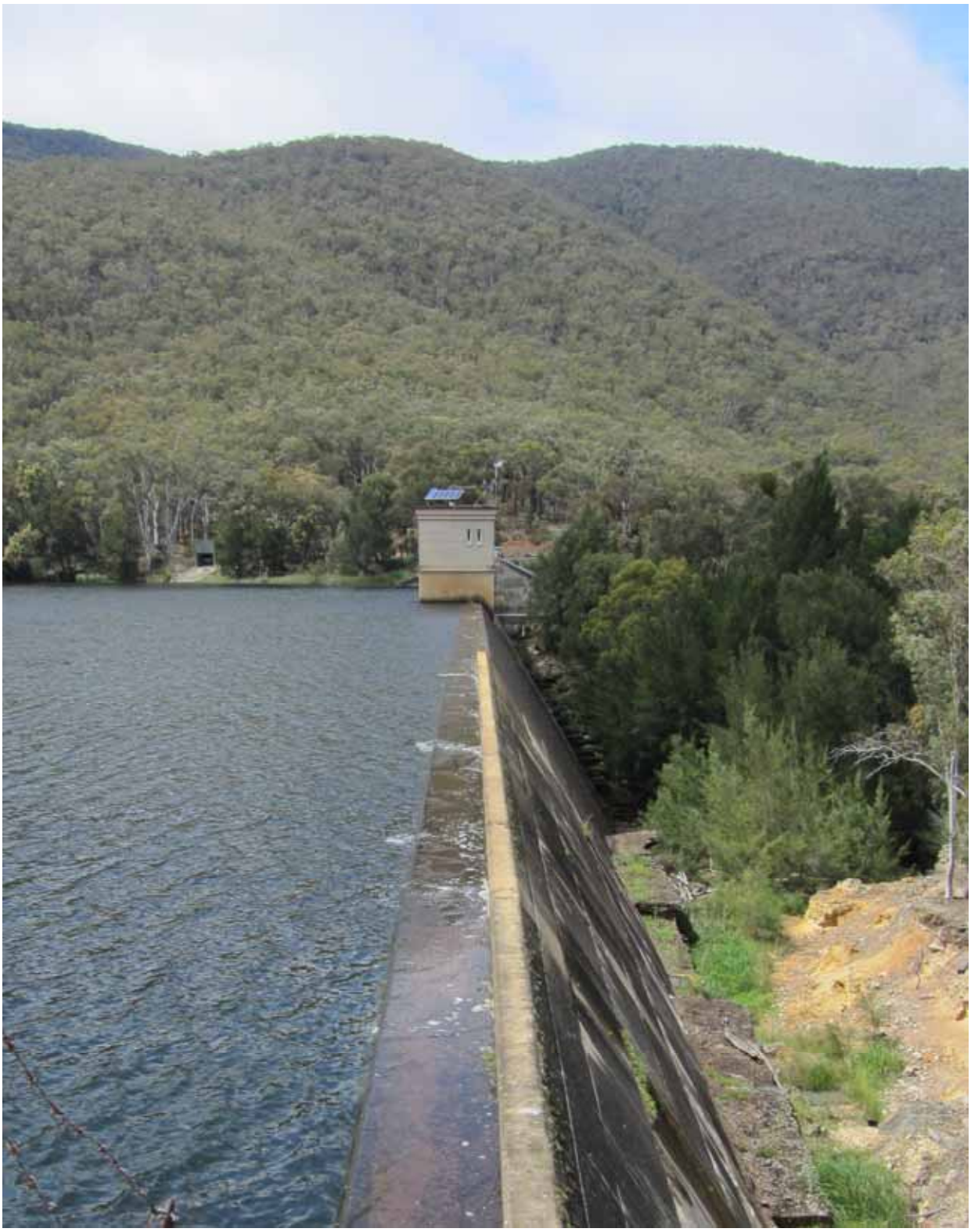
Dams Safety Committee

Annual Report

2011/2012

NEW SOUTH WALES



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: *Winburndale Dam. This 22m high concrete gravity dam provides water supply for Bathurst. It is 75 years old and has been determined to have a significant flood capability deficiency. Drilling investigations are currently being carried out to determine concrete and foundation properties to feed into analyses to determine upgrading options for the dam.*

NOTE: The Committee has prepared 75 copies of this report for distribution to Parliament, relevant organisations, and the public, at a cost of $1,584.00 (i.e. $21.12 per copy).

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NEW SOUTH WALES

ABN 55 079 703 705

The Hon Katrina Hodgkinson, MP
Minister for Primary Industries
Parliament House
SYDNEY NSW 2000

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PARRAMATTA NSW 2124
Phone: (02) 9895 7363
Fax: (02) 9895 7354

Our Ref: 10.102.007

Dear Ms Hodgkinson,

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 2012.

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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Overview by Chairman

Our Objectives

The mission of the NSW Dams Safety Committee (DSC), an independent statutory body, is to ensure the safety of 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
- Protect the security of dams and their stored waters from the effects of mining or other activities.

The DSC is 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 376 prescribed dams whose failure would threaten lives or have significant economic impacts or cause serious environmental damage.

In NSW during 2011/12, there were no prescribed dam failures, but several incidents involving large floods resulting in Dam Safety Emergency Plans alerts and downstream warning and evacuations, did occur (e.g. Warragamba, Suma Park, Clarrie Hall and Jerrara Creek Dams). Interstate a number of serious flood related incidents occurred and, internationally, dams failed in Brazil, Bulgaria, Turkey and the USA, as well as a tailings dam in China. Some of these international dam incidents resulted in loss of life and all had dreadful environmental effects. It is thus recognised both in Australia and internationally, that well organised regulated risk based dam safety programmes are essential to maintain the requisite levels of dams' safety.

As international practice has been able to provide little detailed understanding of the more subtle effects of mining impacts on infrastructure, 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 extraction of coal from under NSW storages.

Targets

The DSC's targets are presented in Sub-section 5.2, Table 2, of this report. The main focus is on the maintenance of the programs for Surveillance Reports, dam inspections and Dam Safety Emergency Plans, and on dam owners having schedules agreed with the DSC for activities leading to safety improvements on dams with significant deficiencies. 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 Strategic Plan. This contained a Business Plan for 2011/12 and the DSC has been working in accordance with it.

Most of the storages in NSW either filled or spilled during the floods in 2011 through to early 2012. Consequently greater emphasis was placed on the safety surveillance of these dams, and in particular those dams with gated spillways were brought under close scrutiny and their owners were requested to review their gate operating procedures following the Wivenhoe Dam experience in Queensland in early 2011.

The year 2011/12 saw the DSC follow through on its legal avenues to enforce a Section 18 Notice under the NSW Dams Safety Act, 1978. The DSC had issued the local Council owner with several 'show cause' letters as to why a Section 18 Notice should not be issued. On this occasion though, the urgency, the very lengthy delay in the achievement of any risk reduction action, and the seriousness of the situation demanded that the Section 18 Notice be issued. The DSC is concerned at the lack of the cooperation given to it by the dam owner and resolution of the issue to the DSC's satisfaction will have to occur during the coming year. The DSC is also tracking now acceptable progress in proceeding with dam upgradings of two other dam owners who had been issued with Section 18 "show cause" letters due to unsatisfactory delays in proceeding with necessary dam upgradings.

State Water Corporation (SWC) continued with the construction phase of its dam upgrade program. Construction at Split Rock Dam was completed and works at Hume, Copeton and Chaffey Dams are well underway. Construction of Stage 1works at Keepit Dam was also completed. Stage 1A works at Burrendong Dam were completed in mid 2011 and Stage 1B design is now well advanced. Construction of Stage 1 works at Wyangala Dam is due for imminent start. The DSC thanks the SWC for the cooperation it has given to the DSC in proceeding with its dam upgrade program.

The embankment piping protection of Sydney Catchment Authority's (SCA) Wingecarribee Dam was completed during the year and work is currently underway at the dam to minimise the risks posed by a "peat island" in the storage. The SCA also continued with investigations relating to safety reviews of Prospect, Nepean and Warragamba Dams. The DSC thanks the SCA for the cooperation it has given to the DSC in proceeding with its dam review program.

Good progress has also been made on the investigation and requisite upgrading works on several Local Government Council dams including Suma Park, Winburndale, Jerrara Creek and Lake Endeavour while construction commenced on the upgrading and raising of Quipolly Dam.

During the last two years, the DSC was made aware of small, non-prescribed dams that were having residents downstream potentially being evacuated by State Emergency Services (SES) during the floods that occurred during the reporting year. This gave the DSC some concerns as to other dams that could pose a risk to downstream residents and should be prescribed. In 2011, the DSC sent a questionnaire to all Councils in NSW requesting their assistance in searching their records for such dams resulting in a positive response from Councils with several newly detected dams identified for consideration and follow-up by the DSC.

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. Approximately 20.7 million tonnes of coal were extracted from near and under storages (water, tailings and ash storages). This was a 10% increase over the previous year and over forty times the tonnage extracted only ten years ago. As an example of longwall mining within Notification Areas around major water storages, the Dendrobium Mine completed further extraction from Cordeaux Dam Notification Areas without adverse effects.

Our People

The DSC Executive Engineer, Paul Heinrichs, retired in mid 2011 after providing great support to the DSC and the DSC wishes him well in his retirement. For the major part of 2011/12, the DSC's Manager Mining Impacts, Bill Zeigler, acted as the DSC's Executive Engineer and the DSC would like to thank him for his great work during this period. In May 2012, Steve Knight was appointed the DSC's new Executive Engineer and the DSC welcomes him to this role bringing a wealth of experience from his years of working on dam projects with the NSW Government.

The DSC members kept their knowledge up-to-date through various professional technical activities external to the DSC. The DSC has members on the Board of the Mine Subsidence Technological Society, and continues to be involved in ANCOLD (Australian National Committee on Large Dams) and ICOLD (International Commission on Large Dams) matters with one member also on the ANCOLD Executive. Most DSC members and some technical staff attended the 2011 ANCOLD Conference on Dams in Melbourne. 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. Other training for members and staff included attendance at various relevant seminars (e.g. ANCOLD Tailings Guidelines workshop) and refresher courses (e.g. DSC staff attended "Code of Conduct and Ethics Briefing" in September 2011 and some staff attended an Advanced Excel course in-house in May 2012).

The DSC placed greater emphasis during the year on maintaining its technical expertise by arranging several presentations to be given to staff on the latest technological developments in dam and mining safety by DSC members and outside organisations. The DSC is also concerned to ensure it is maintaining best international practice and to this end, staff attended various technical exchange meetings and seminars. During the year the DSC's Tailings Dam Engineer attended the United States Bureau of Reclamation (USBR) dam safety evaluation seminar in Denver, the Small Dams Engineer attended the Safety Evaluation of Existing Dams seminar in Brisbane and the Manager Mining Impacts made a presentation to a "Water in Coal Mines" course in Brisbane. This has supplied invaluable information and networking on 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 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 members attending relevant courses in 2011/12.

The level of Administration and IT support has also continued to rise during the year with a large increase in written correspondence dealt with, administration of the DSC's training courses, and expansion of the data base being just some of the increased services provided. Once again the Committee wishes to record its appreciation of the competence, loyalty and dedication of its staff in meeting the DSC's ever increasing workload with few people.

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 tremendous value in training NSW dams' safety operators, and so provided 4 training courses relating to operation of water dams, and 2 courses relating to mine tailings dams, with over 170 attendees. These courses have resulted in a marked improvement in the standard of dam owners' dam safety management since they began. 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 DSC has updated some Guidance Sheets (i.e. Consequence Assessment, Tailings Dams), which are on the DSC's website. The DSC also assists stakeholders in obtaining relevant dam safety literature.

The Future

The DSC has completed incorporating the 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 projects at the University of New South Wales.

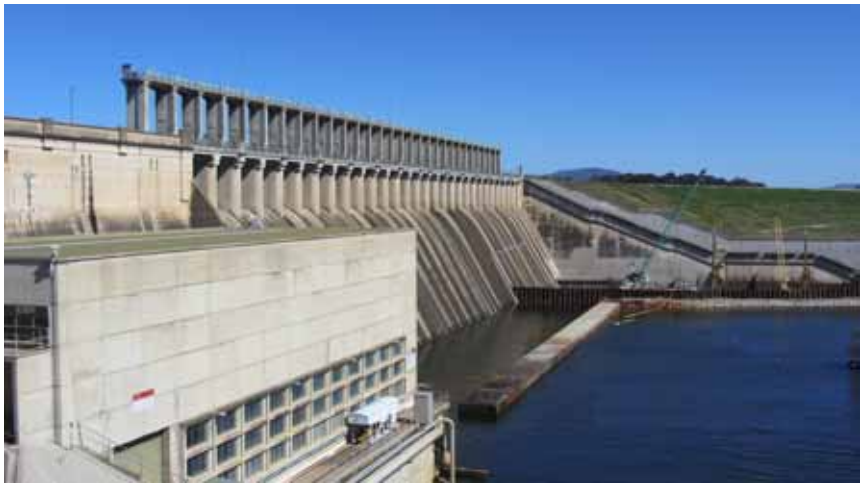
The DSC will strengthen its information exchange program with other State dam safety regulators on their dams whose failure could adversely affect NSW communities, and on allied regulatory matters.

The DSC's 2009/2014 Strategic Plan will be implemented progressively. The Business Plan incorporated in the Strategic Plan will be updated for the future financial years. With the overhaul of the DSC policy framework and the development of detailed safety benchmarks and guidance completed, the DSC feels that New South Wales is now a world leader in dam safety management.

The risk imposed by dams in NSW, will 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 work with owners to ensure that all dams requiring DSEPs have them and that they are regularly updated and tested. 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 cases. All prescribed dams now have a quite low likelihood of failure but some need further risk reduction as soon as reasonably practicable. With a new approach to dam safety, the dam safety in NSW compares very favourably with the best dam safety programs world-wide.

The DSC also looks forward to continuing in close partnership with the Government, including its proposed review of the Dams Safety Act, and addressing the challenges this presents.

Brian Cooper, Chairman



Hume Dam. Over the last 10 years there have been significant works undertaken at this dam near Albury to upgrade its "sunny day" safety status in a long-term project under the DSC's oversight. Currently works are being undertaken to stabilise the southern training wall of the spillway while options are being investigated in parallel to upgrade the flood capability of the dam.

1. Charter

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

Wilpinjong Mine Site

Several tailings and water supply dams were constructed at this mine site north of Mudgee during the year to facilitate the opening and operation of this new mine site.

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. So 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?

"A safe dam is one that complies with the DSC's safety benchmarks"

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 with a potential for failure that could threaten downstream life, cause extensive property or environmental damage, or have a severe impact on the public welfare.

Currently there are 376 prescribed dams (see Appendix B and centre pull-out map).

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.

2. Access

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

3. Aims 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; and
- 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;
- Promote dam safety awareness through the direction, education and training of stakeholders.

3.1. 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 straight forward;
- 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.

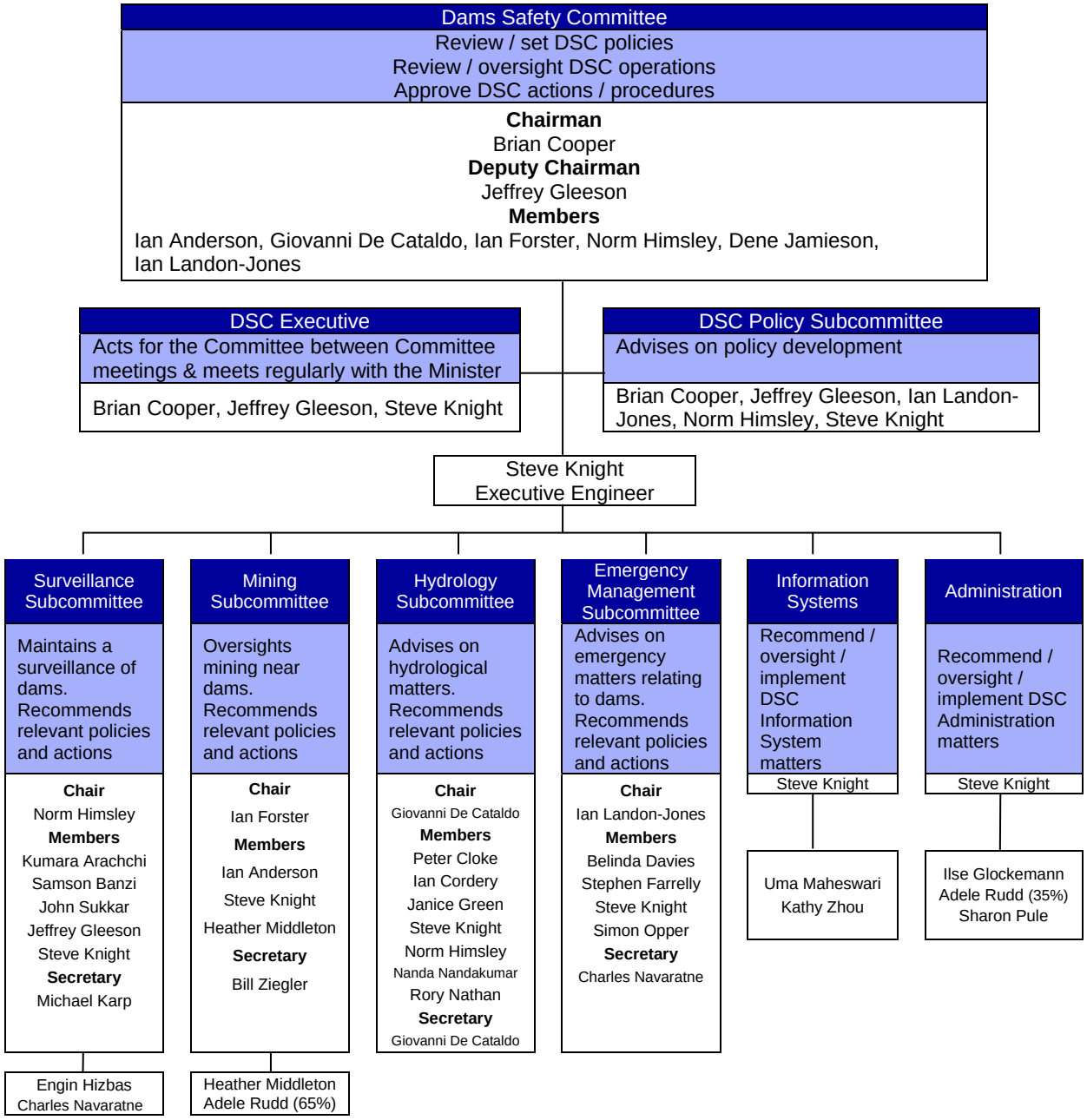
Redbank Creek Dam
Partial upgrading works for this 16m high arch dam at Mudgee were completed in 2011. The DSC is currently working with various interested parties to finalise the upgrading of this dam.

Copeton Dam
DSC members and staff inspected the construction of this new auxiliary spillway for this major water supply dam near Inverell during an inspection tour in May 2012.

4. Management and Structure

The DSC is a small independent statutory body which reports directly to the Minister for Primary Industries, with negligible assets or property. It uses staff seconded from NSW Office of Water (NOW) and hires contract staff as required. It 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 2012)



4.1. Committee Members

The DSC's nine part-time members are now appointed by the Minister for Primary Industries for four-year terms with eight members nominated for their experience in dams engineering and one for experience in coal mining. In routine matters, the Executive Engineer and standing Sub-committees act for the DSC, while its Executive 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.


Brian Cooper


Jeffrey Gleeson


Ian Anderson


Ian Forster


Ian Landon-Jones


Brian Mayhew


Norm Himsley


Giovanni De Cataldo


Dene Jamieson

Committee membership during 2011/12, with brief member biographies, was as follows:

Brian Cooper, BE (Hons), MEngSc, Grad Dip Eng Mgt, MIEAust, CPEng (appointed to December 2012). **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 forty years water industry experience including extensive dam design works with the Department of Public Works and Services and the Water Resources Commission.

Jeffrey Gleeson, BE Civil, FIEAust, CPEng (appointed to December 2013). Deputy Chairman, Nominee of Hunter Water Corporation. Initially appointed 1990. Jeff is Manager, Engineering with Hunter Water Australia. He has over twenty-five years experience in the water and waste-water field with involvement in various aspects of dam engineering and structural design. He is a member of the DSC's Surveillance Sub-committee.

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 the Department of Trade & Investment. He has over thirty years experience in coal mining and is a member of the DSC's Mining Sub-committee.

Ian Forster, BSc, MAIG, RPGeo (appointed to December 2012). Nominee of the State owned Electricity Generators. Initially appointed 1989. Ian is a specialist dam safety consultant with Aurecon responsible for the safety management of dams owned by the NSW State-owned power generators. Ian has over thirty 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, BE (Hons), MEngSc, MIEAust, CPEng, MAICD (appointed to December 2012). Nominee of Sydney Catchment Authority (SCA). Initially appointed 2001. Ian is Principal Advisor Technical with the SCA with over thirty 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 and Senior Vice Chairman of ANCOLD.

Brian Mayhew, BE (Hons1), GradDipMaths, MIEAust, CPEng (appointed to June 2011 – and interim to November 2011 - re-appointment pending review of DSC Act). Nominee of Snowy Hydro Ltd. Initially appointed 2007. Brian is the Manager, Projects and Civil Engineering, with Snowy Hydro. He has over twenty-five years experience in the water and mining infrastructure fields.

Norm Himsley, BE (Hons), MEngSc, GradDipMgt, MIEAust, CPEng (appointed to June 2013). Nominee of Engineers Australia. Initially appointed 2009. In 2009 Norm retired as Executive Engineer of the NSW Dams Safety Committee and now practices as a private dam safety consultant with over thirty five years experience in the water and construction industry and extensive involvement in the investigation, design and construction of dams.

Giovanni De Cataldo, BE (Civil) (appointed to February 2015). Nominee of the Water Administration Ministerial Council. Initially appointed 2011. Giovanni is the Manager Dam Safety with State Water Corporation. He is currently responsible for the safety management of major dams and weirs which deliver bulk water to rural NSW. Giovanni has over thirty years experience in dams and geotechnical engineering in the water and energy industries related to water and ash storage dams, power stations/transmission lines and wind farms. He is the Chairman and Secretary of the DSC's Hydrology Sub-Committee.

Dene Jamieson, BE (Civil) (appointed to December 2012). Nominee of Minister for Financial Services. Initially appointed 2009. Dene is Principal Engineer in the Dams and Civil Section of the Department of Finance & Services with over thirty years experience in dams and the water industry.

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4.2. Committee Staff

The Committee is assisted by a staff of eleven seconded from, or employed through NSW Office of Water with temporary contract staff assistance as required, primarily in recent years to cater for a burgeoning workload in mining related matters. 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:

Executive Engineer: Steve Knight

BE (Civil), Grad DipEng (started May 2012). Steve has over thirty 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.

Surveillance Engineer: Michael Karp

BE (Hons), MIEAust (seconded 1999). Michael has over twenty-five years design, construction and surveillance experience in water and dams engineering.

Tailings Dam Engineer: Engin Hizbas

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

Small Dams Engineer: Charles Navaratne

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

Manager, Mining Impacts: Bill Ziegler

BE (started April 2008).
Bill has over 20 years of experience in NSW coal industry.

Mining Regulation Officer: Heather Middleton

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

Administrative Officer: Ilse Glockemann

(Seconded 1995).

Information Systems Officer: Uma Maheswari

(Seconded 2001)

Database Support Officer: Kathy Zhou

(started December 2006).

Clerical Support Officer: Adele Rudd

(started April 2008).

IT Support Officer: Sabita Kunwar

(started July 2009, finished January 2012)
(started April 2008).

Executive Engineer (Retired): Paul Heinrichs

BE, MEngSc, MIEAust, CPEng (seconded 2009). Paul retired in August 2011, with over thirty-five years design, construction, surveillance and management experience in dams and water engineering. He had formerly been the Manager Dams Safety for the NSW Office of Water and had also served on the DSC's Surveillance Sub-Committee since 1999.

Ilse Glockemann

Uma Maheswari

Kathy Zhou

Adele Rudd

Sabita Kunwar

Paul Heinrichs

4.3. 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).

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 liaison with dam owner personnel and other stakeholders.

4.4. Meetings

The Committee held eight normal meetings during the year, of which six were in Sydney and one each near Batemans Bay and Copeton Dam, 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 6 out of 6 (plus one as observer)
- Mr I. Anderson attended 8 out of 8
- Mr I. Landon-Jones attended 6 out of 8
- Mr B. Mayhew attended 2 out of 3
- Mr. D. Jamieson attended 7 out of 8
- Mr. N. Himsley attended 8 out of 8
- Mr. Giovanni De Cataldo attended 8 out of 8

There were 8 Surveillance, 8 Mining, 2 Emergency Management, no Hydrology, 1 Policy and 2 Executive Sub-committee meetings during 2011/12.

DSC meeting at Copeton Dam in May 2012. The DSC holds two meetings each year in regional centres to liaise locally with dam owners and to inspect dams in the region.

5. Summary Review of Operations

"Management of a substantially increased workload largely due to the current mining boom"

Wingecarribee Dam

This 19m high earthfill dam was one of over 75 dams inspected by the DSC staff during the year as part of its audit inspection program. The dam was also substantially upgraded during the year.

"Review of 82 five yearly Surveillance Reports"

Wentworth Falls Lake Dam

This 10m high earthfill dam was one of 75 dams inspected by the DSC staff during the year as part of its audit inspection program.

5.1. Major Achievements for 2011/12

During the year the following milestones and deliverables were attained:

- Management of a substantially increased workload largely due to a transfer of functions from the NSW Office of Water in 2009 and the implementation of a risk based approach to dam safety management,
- Updating on the DSC website, of a suite of 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 deficient dams in NSW with the completion of upgrading of Split Rock and Wingecarribee Dams, and significant work being carried out on State Water's portfolio of dams.
- Substantial compliance with core business activities, as in Table 2 following;
- 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 20.7 million tonnes of coal to be extracted from dams Notification Areas;
- Running of six training courses for dam operators and progressing accreditation of the courses by NSW TAFE;
- Upgrading, expanding and consolidating the DSC's record and database systems;
- Satisfactorily dealing with a number of alerts at various dams during several floods during the year;
- Review of 82 five yearly Surveillance Reports (only 75 required annually);
- Inspection by DSC members and staff of 75 prescribed dams;
- Ensuring 88% of all High and Extreme Consequence Category dams now have Dams Safety Emergency Plans (DSEPs);
- Undertaking investigations of several unprescribed dams not initially known to the DSC, whose failure could have significant consequences;
- Dealt with 2,656 pieces of correspondence.

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 2 and Figure 1. These indicators illustrate how the DSC has effectively managed a marked increase in 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 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 NOW's funding allocation.

Table 1 – 2011/12 Budget Highlights *

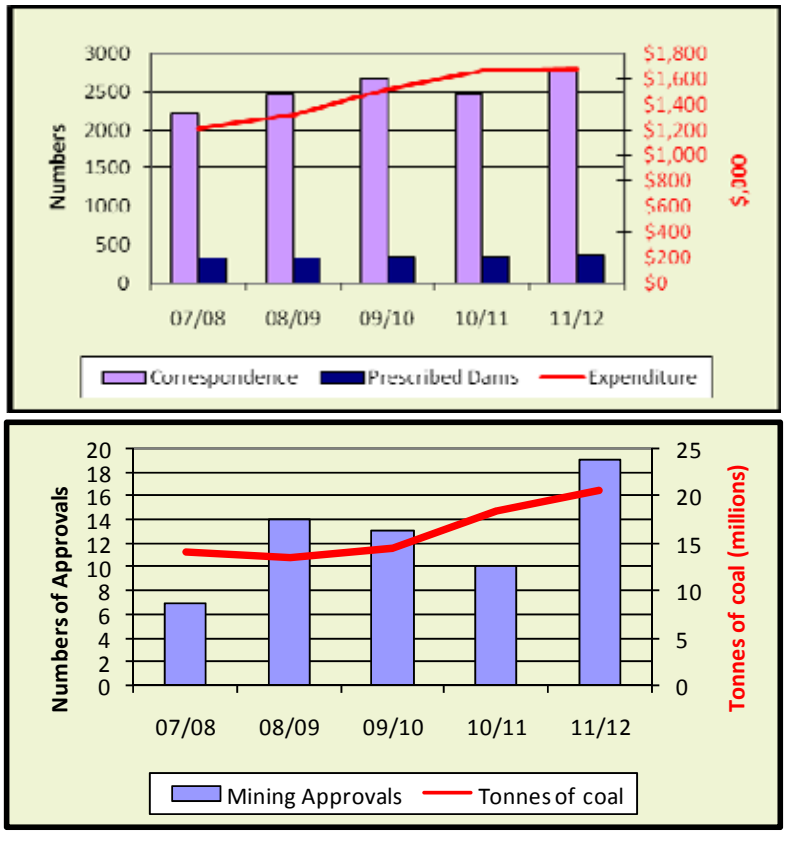
Item	$
Budget	1,662,000
Actual Income	1,656,000
Actual Expenditure	1,682,000

(* Does not include In-Kind Committee Contribution and Crown Assumed Liabilities)

Table 2 - DSC Performance Indicators

#	PERFORMANCE TARGET	PERFORMANCE INDICATOR	RATING
1	Owners programs, agreed by DSC, for safety improvements to significantly deficient dams	Percentage of significantly deficient dams with agreed programs	95% (Good)
2	Follow up action taken within 3 months	Percentage performance	80% (Satisfactory)
3	Reports/programs review & respond < 3 mths	Percentage performance	100% (Excellent)
4	Inspect significant risk dams (24) yearly	Number inspected this year	15 (below average)
5	Inspect medium risk dams (14) every 2-3 years	Number inspected this year (required 5 per year)	3 (below average)
6	Inspect low risk dams (338) every five years	Number inspected this year (required 68 per year)	57 (Good)
7	Request programs for preparation of dam safety documentation for each dam	Percentage of dams with requisite documentation supplied	100% (Excellent)
8	Update DSC information material every 2 yrs	Time since last update issued	Website updated (Good)
9	Provide at least one dam safety education course in NSW each year	Number of courses this year	6 (Excellent)
10	Compliance with approved DSC budget	Percentage deviation	<1% (Good)
11	Surveillance Sub-committee	Subjective based on policy progression, reports reviewed (average 76 reports/yr) and follow ups	Excellent, given high workload (82)
12	Mining Sub-committee	Subjective based on monitoring compliance, matters followed up and mining impacts as predicted	Good, given high workload
13	Process all Applications received	Percentage of applications received finalised	100% (Excellent)
14	Review all monitoring data received	Percentage performance	95% (Good)
15	Process all SMP / Part 3A / Titles	Percentage performance	95% (Good)
16	Emergency Management Sub-committee	Subjective based on policy progression, coordination of matters and emergency plans implementation. Number of DSEPs required (300)	237 Satisfactory (Needs improvement)
17	Compliance with Records Management Standards	Subjective based on progression in updating procedures and systems, and programs achieved	Good
18	Administration	Subjective, based on meeting HR, accounting and logistical needs of the DSC	Good

Figure 1-DSC Summary Statistics



6. The Future

Burrendong Dam

During the year the crest of this 76m high earth/rockfill dam, near Wellington, was upgraded to meet current safety criteria as the first stage in a planned upgrading of the dam by State Water Corporation.

"Continue to monitor activity programs for safety improvements"

Puddledock Dam

Committee members and staff inspecting this 20m high arch dam which forms part of Armidale's water supply. Council is investigating the structural stability of the dam under revised flood loadings.

"Continue the emphasis on education including providing training courses for dam owner's personnel"

6.1. Dams Safety Management

The DSC expects the number of prescribed dams in NSW to grow 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.

In particular, the DSC will:

- Liaise proactively with the NSW Government in its necessary proposed review of the Dams Safety Act and associated functions;
- Continue to implement its new risk based dam safety policy incorporating the 24 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 annual Australian dam regulators meetings;
- Continue to monitor activity programs for safety improvements to NSW dams identified as not meeting DSC safety requirements (Tables 5A/B);
- 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 owner's 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 in particular implementation of the Internal Audit Risk Management Policy; and
- 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 to arrange meetings with national and international dam owners and dam safety monitoring equipment suppliers to ensure the DSC remains up to date and conversant with the latest world practice.

6.2. Mining Management near Dams

Volatility in the global economy at this stage has not had a significant effect on the number of applications by mines in NSW, to operate within Dam Notification Areas. The number of applications to mine within Notification Areas has remained high reflecting the ongoing boom in the mining industry within NSW. The lag time between the cessation of mining and cessation of monitoring, dictates that the current high workload will continue for some years in to the future.

"DSC's objective is to advise on mining regulation so as not to unnecessarily restrict extraction of NSW coal resources"

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.

Camberwell Tailings 2 Dam
In February 2012, Committee staff inspected the raising and remedial works for this 33m high tailings dam in the Hunter Valley near Singleton.

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;
- Revise its Guidance Sheets on administration of mining near prescribed dams, management of mining, and contingency and closure plans for mining;
- Ensure adequate protection of dam walls and stored waters by reviewing the maximum extent of ground movements induced by coal mining and, if necessary, increasing the size of Notification Areas;
- 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;
- Explore the use of new equipment and techniques for prediction and monitoring, to provide a clearer picture of mining induced ground behaviour.

6.3. Administration and Information Systems

The DSC will maintain a commitment in 2012/2013 to ongoing implementation of its strategic plans into its business planning process, with procedures and practices formalised and updated progressively.

"Many new features were added to the DSC database"

DSC will continue to update its information systems including the necessary regular upgrading of desktop hardware and software to meet increasing demands. New and updated features will continue to be added to the DSC database and existing sections (e.g. GIS, Notification Area, 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, first aid).

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 space within the DSC's office.

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 376 dams with potential for significant failure consequences, as detailed in Appendix B.

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 the DSC's Guidance Sheet - DSC1A. Then for prescribed dams, as shown in the chart 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.

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 page 17 and available on our website www.damsafety.nsw.gov.au.

Table 3A – Amendments to new Guidance Sheets

Document	Amendment	Updated
DSC3A – Consequence Categories for Dams	Loss of Life and Population at Risk tables updated to align with proposed new ANCOLD Guidelines on Consequence Categories for Dams	June 2012
DSC 3F – Tailings Dams	Various updated to align with the new ANCOLD Guidelines on Tailings Dams issued in May 2012	June 2012

Table 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	December 2010
DSC2H	Dam Security	June 2010
DSC2I	Community Consultation and Communication (CC&C)	June 2010
DSC3A	Consequence Categories for Dams	June 2012
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 (being compiled)	
DSC3I	Concrete Dams (being compiled)	
DSC4A	Mining Near Prescribed Dams – Administrative Procedures	September 2010
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 2011/12

During 2011/12 the DSC:

- Continued implementing its new Guidance Sheets (Table 3 above) outlining the DSC's new Risk based approach to dam safety management and to assist dam owners in the implementation of risk management for their dams.
- Guidance Sheet DSC3A (Consequence Categories for Dams) was updated in anticipation of the release of the new ANCOLD Guidelines on Consequence Categories for Dams. DSC3F (Tailings Dams) was upgraded to align with the new ANCOLD Guidelines on Tailings Dam issued in May 2012.

"Continued implementing its new Guidance Sheets outlining the DSC's new Risk-based approach"

7.1.4. 2010/11 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 failure consequences are prescribed. During the year 10 dams were prescribed and 6 dams were de-prescribed, giving a total of 376 prescribed dams at June 2012 (see Appendix B and centre pull-out map).

For proposed prescribed dams and dam modifications, the DSC requires dam owners to provide design information for its review before construction. In all, 28 such submissions were processed during 2011/12. 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 of significant dam proposals.

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 liaise with and assist 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. To date Construction Reports on Shannon Creek Dam, Chifley Dam, Cowarra Dam and some recently completed State Water dam upgrades are outstanding.

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 (with annual update reports also 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 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 DSC2C).

During 2011/12, the DSC reviewed 82 dam Surveillance Reports (Appendices A and B). 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 issued 3 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 (see Table 5 C).

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.

Tilba Dam Safety Review

A detailed review of the safety of Tilba Dam near Bermagui was completed for Bega Valley Shire Council during the year. The Council is preparing a long-term program to address the report's findings.

"10 dams prescribed, 6 dams de-prescribed and 28 dam designs processed in 2011/12"

"The Committee issued 3 notices under Section 15 of the Dams Safety Act where Surveillance Reports are more than 2 years overdue"

"75 prescribed dams inspected during 2011/12"

The DSC continued with and strengthened its regular programmed staff and Committee inspection of dams and discussion 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 the Batemans Bay and Copeton Dam areas). Overall 75 prescribed dams were inspected during the year (see Appendices A and B) against a target number of 97 dams. However, inspections of significant risk dams (15) were still below target (24). Greater emphasis will be placed on staff inspections of these dams in future 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 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 deficiencies 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.

A special inspection of the upgrading works on Hume Dam was carried out by some DSC members and staff in March 2012. Satisfactory progress on the work was noted.

Deep Creek Dam

Committee members and staff inspecting this 32m high earthfill dam which provides water supply for Batemans Bay and surrounding areas.

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.

Cataract Dam

In September 2011, Committee staff were invited to the owner's surveillance inspection of this 56m high concrete gravity dam that forms part of Sydney's water supply.

The process of risk assessment will assist 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 will 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 2011/12 two (2) in depth risk assessments were submitted to the DSC on deficient dams in NSW. Also during 2011/12 two (2) stability reviews were submitted to the DSC and reviewed as part of the requisite assessments of various dams' safety status. To assist staff with their reviews of those reports a report review checklist has been developed to ensure that the reviews have covered all the DSC's requirements, especially the need for the submission of a peer review report before the report is reviewed by DSC staff.

"The process of risk assessment will assist in evaluating the relative safety of each dam"

However, the DSC will continue its general policy to judge 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 tolerable risks.

The new Guidance Sheet DSC1B, "Background to DSC Risk Policy" 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.

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 DSC's safety requirements as soon as reasonably practical"

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 DSC1B).

Also, when required to do so, a dam owner is to demonstrate that risks to public safety 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 2.

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).

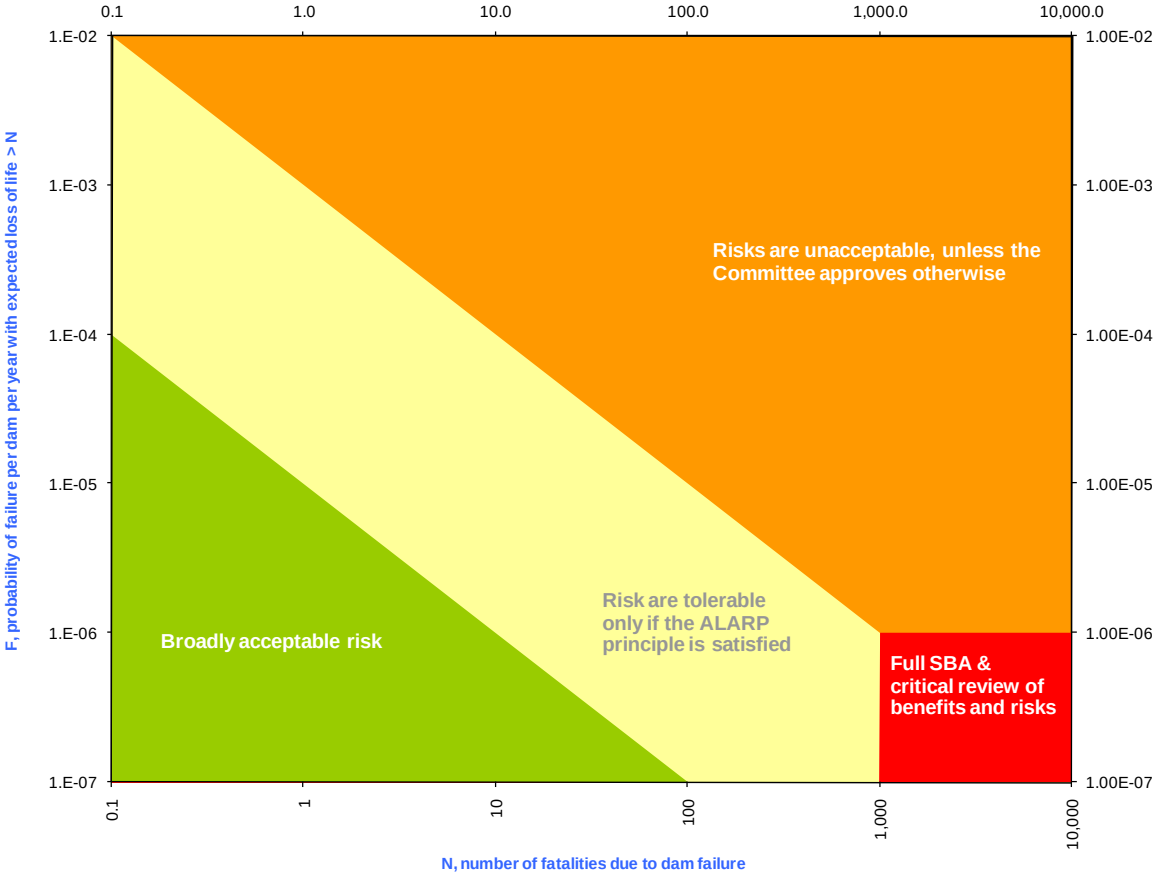


Figure 2 – DSC Societal Risk Requirements: Deficient Dams

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's slopes.

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 core contribution to risk reduction. These plans apply from construction throughout the life of each dam and are aligned to SES planning for river and flash flooding. For dams with a significant safety deficiency, there is an additional contribution by the SES, where the DSC through its Emergency Management Sub-committee, has developed a protocol with the SES for the development of interim emergency response plans (see Section 7.1.10).

From information received on dams, the DSC identifies those dams with possible safety deficiencies and reaches agreements with owners on needed safety improvements, or the activities needed to clarify safety, and a timetable for actions. Once a significant safety deficiency is confirmed, the owner is to submit a program for safety improvement. To focus the attention of the DSC across owners, it regularly updates its provisional risk index ranking of dams and the SES is informed to guide them with interim flood planning downstream of deficient dams. However, the DSC listing is not exhaustive as there may be dams with undetected deficiencies to date. The DSC requirements for dam owners to undertake regular safety reviews have been implemented to minimise the risk of safety deficiencies going undetected.

With most attention on the dams in Tables 5A and 5B, 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.

Over sixty (60) deficient dams have been modified for safety improvement following the DSC's establishment, with 45 in the last 15 years as shown in Table 4. For some of these dams, there has been a series of improvements made.

Table 4 - Dams Modified for Safety Upgrading (since 1996)

Dam	Upgrade Cost ($M)	Deficiency	Year Completed	Nature Of Upgrading
Blowering	10-100	Flood	2010	Parapet wall on dam, spillway walls raised
Bulli Upper R'way Basin	<1	Flood	2010	Embankment removed and De-Prescribed
Burrendong	10-100	Flood	2011	Dam & saddle dams raised
Burrinjuck	10-100	Flood	1995	Dam raised 15m and post-tensioned
Cecil Park Basin 3A	<1	Flood/Stability	2008	Spillway enlarged, embankment stabilised
Chaffey	10-100	Flood	2011	Auxiliary spillway constructed
Chichester	1-10	Flood/Stability	1995, 2004	Dam post-tensioned, abutment stabilised
Chifley	10-100	Flood	2001	Dam raised and spillway post-tensioned
Coalcliff	<1	Flood/Stability	1999	Spillway enlarged, embankment upgraded
Company	<1	Flood	2006	Spillway enlarged, embankment raised
Emigrant Creek	1-10	Flood	2001	Dam post-tensioned, abutments raised
Foothills Rd	<1	Flood	1997	Embankment stabilised, new spillway
Glenbawn	10-100	Flood	1988	Dam raised, storage augmented, new spillway
Googong	10-100	Flood	1992, 2011	Dam raised, spillway stabilised
Grahamstown	10-100	Flood	2001, 2005	Dam core raised, face armoured, spillway upgraded
Green Meadows Basin	<1	Flood	2003	Embankment & crest stabilised, new spillway
Hamilton Valley 5A	<1	Flood	2009	Embankment stabilised
Hume	10-100	Stability/Earthquake	2003, 2011	Spillway, Southern Junction & dam strengthening works
Jindabyne	10-100	Flood	2006, 2010	New spillway and outlets
Kalingo	<1	Flood	2012	Spillway upgraded
Keepit	10-100	Flood	2011	Right abutment spillway &subsidiary wall spillway
Lyell	10-100	Flood	1996	Dam raised, spillway and storage augmented
Mardi	1-10	Earthquake	1991, 2011	Embankment stabilised
Moore Creek	<1	Flood	2007	Dam buttressed
Oberon	10-100	Flood	1996	Dam raised, additional spillway
Orange Research	<1	Flood	1997	Spillway augmented
Petrochilos	<1	Flood	1989, 2006	Spillway upgraded
Prospect	10-100	Earthquake	1997	Upstream dam embankment stabilised
Redbank Creek	1-10	Flood	2011	Outlet works installed for minor flood load
Rocky Creek	1-10	Flood/Piping	2010	Embankment upgrade to resist piping
Rylstone	<1	Flood	2003	Auxiliary embankments removed
Sooley	10-100	Flood	2005, 2010	Dam raised and buttressed, new spillways
Split Rock	1-10	Flood	2012	Parapet wall completed

Contin.

Dam	Upgrade Cost ($M)	Deficiency	Year Completed	Nature Of Upgrading
St Joseph Sch. Basin	<1	Flood	2001	Bank stabilisation and new spillway
Tilba	<1	Flood/Stability	1997, 2003	Dam wall raised, toe drained
Tumbarumba	<1	Stability	1999	Embankment drainage installed
Warragamba	>100	Flood	2002	Dam post-tensioned, raised 5m, new spillway
Wentworth Falls	<1	Flood	1993, 2003	Dam raised, spillway augmented
Wellington	<1	Flood/Stability	1996, 2002	Dam demolished
Widemere Basin	<1	Flood	2009	Basin raised, spillway enlarged
Winding Ck 5 Basin	<1	Flood	2011	Parapet wall on embankment
Wingecarribee	1-10	Piping	2012	Piping Upgrade
Wollondilly Washery	<1	Flood	1998	Dam raised, emergency spillway installed
Woronora	<1	Flood	1988	Internal drainage improved
Wyangala	1-10	Flood	2011	Spillway walls raised

Based on current information available to the DSC, the dams identified as having apparent significant safety risks are listed in Table 5A and 5B, together with the year in which the apparent deficiency was determined, and the status of the safety improvement program for each dam. Dam owners have commenced safety deficiency studies, improvement options studies or design of improvement works for all of these deficient 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 owners of the Bulli Upper Railway Embankment. When the DSC was informed of the very high risk of failure associated with the dam it took this rarely used action. As a result the 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 June 2011 to make Redbank Creek Dam safe. Action is currently being delayed due to a clarification over the ownership of the dam. In addition, the DSC is monitoring owners' progress in developing action programs for dams with minor deficiencies, and owners' investigations of several other dams to confirm their safety status (see Appendix B).

During 2011/12 further works continued on Hume Dam. The spillway southern junction upgrading construction works was completed in 2011, and the works for upgrading the southern training wall is well under way. The long awaited hydrology / flood capacity upgrading program was completed in late 2011 and the DSC is working with the owner to determine appropriate flood upgrading works for the dam.

The DSC has continued to liaise closely with the NSW Treasury on the required upgrading of Bethungra Dam and with State Water on the reduction of risks at Keepit, Chaffey, Copeton, Split Rock and Wyangala Dams. At Keepit, Chaffey and Burrendong Dams, interim safety improvements have been implemented and construction works are underway. Upgrading works have been completed in early 2012 at Split Rock Dam and Copeton and Wyangala upgrading works are progressing on program.

Upgrading works on Wingecarribee Dam's embankment were completed by the Sydney Catchment Authority in early 2012.

Work also continued, during the year, on a prioritised program to improve the safety of deficient dams in the portfolio of dams owned by local government councils. This program has been under the jurisdiction of the then Department of Water and Energy. Design of safety improvement works for Redbank Creek dam was completed in 2009/10 and some initial upgrading work was done in 2011. Further investigations and options studies were underway and generally due for completion in 2012 on Lake Endeavour, Imperial Lake, Winburndale, Dumaresq, Tenterfield and Suma Park Dams. Construction works on the raising and upgrading of Quipolly Dam commenced in mid 2012.

Table 5A - Status of Upgrading Activities for Dams under DSC Review

Dam	Deficiency		2011/12 Upgrading Progress
	Type	Identified	
Bethungra	F, S	2000	Awaiting design report and peer review by December 2012 (FWA)
Burrendong	F	2003	Stage 1B design upgrading programmed for completion in 2012 (FWA)
Copeton	F	2006	Stage 1 upgrading construction works programmed for completion in early 2013 (FWA)
Dumaresq	F, S	2000	Awaiting upgrading detailed design and peer review by June 2013 (FWA)
Fox Hills Ret. Basin	F	2011	Awaiting revised dambreak study
Hume	F, E, S	1994	Spillway southern Training Wall buttressing works in progress. Final flood upgrading option concept design programmed for late 2012 (FWA)
Imperial Lake	F	2000	Revised upgrade options study completed. Decommissioning under consideration (FWA)
Jerrara Creek	F	2011	Decommissioning study and program scheduled for December 2012 (FWA)
Keepit	F	1995	Stage 1 upgrading construction works completed. Stage 2 upgrading design scheduled for completion in late 2012 (FWA)
Lake Pambulong Detention Basin	F, E, S	1995	Awaiting flood assessment, dambreak studies and dam crest remediation works (FWA)
Minmi Road DB	F, E	2010	Awaiting dambreak study and geotechnical report on protection measures
Muirfield Golf Club	F	2009	Spillway upgrade report completed in Dec. 2011. Awaiting works to be undertaken
Narara Horticultural	F	2010	Updated dambreak study undertaken. Awaiting additional information
Nepean	S	2007	Awaiting stability analysis reassessment (FWA)
Quipolly	F	1993	Upgrading construction works commenced in mid 2012 (FWA)
Prospect	S	2006	Safety risk assessment and concept upgrade options report scheduled for mid 2012 (FWA)
Redbank Creek	F	1996	Negotiations underway regarding a proposed remedial works option (FWA)
Suma Park	F	1984	Awaiting upgrade detailed design report and peer review by December 2012 (FWA)
Talbingo	F, S	2005	Updated flood study scheduled for mid 2012. Risk assessment programmed for late 2012 (FWA)
Tenterfield Creek	F, S	1995	Stability analysis and peer review completed in June 2012. Awaiting additional checking information (FWA)
Warragamba	E	2008	Series of investigations and safety reviews underway; programmed for completion by late 2013 (FWA)
Winburndale	F	1995	Geotechnical investigation completed in mid 2012. Structural analysis and option study scheduled for 2012/13 (FWA)
Wingecarribee	F	2010	Upgrading construction work programmed for completion in 2012. Peat barrier design documentation scheduled for mid 2012 (FWA)
Wyangala	F	2006	Stage 1A upgrading design works completed in December 2011 and construction works to tender in mid 2012. Design for embankment parapet wall stage scheduled for completion in mid/late 2012 (FWA)

F - Inadequate Flood Capacity
S - Structural Inadequacy under Normal Operating Conditions
E - Inadequate Earthquake Structural Resistance
FWA - Flood Warning Arrangements in Place

Table 5B - Status of Activities on Dams issued on S18 Show Cause Notices

Dam	Deficiency		2011/12 Upgrading Progress
	Type	Identified	
Bethungra	F, S	2000	Awaiting design report and peer review by December 2012 (FWA)
Redbank Creek	F, E, S	1996	Negotiations underway regarding a proposed remedial works option

Table 5C - Dams issued with S15 Notices

Dam	Owner	Report required	Due since
Loyalty Rd. Retarding Basin	Upper Parramatta River Catchment Trust	Surveillance Report	2005
Pacific Palms	Calmjoy Pty. Ltd.	Surveillance Report & DSEP	2009

7.1.6. Flood Capacity and Hydrology

"Torrential rain resulted in severe flooding in NSW"

The recent flood conditions during 2011/12 in NSW and Australia have focussed dam owners' attention on the security and operation of their dams under these conditions. Torrential rain resulted in severe flooding in NSW and in particular in the Riverina district in October 2010; throughout NSW in November 2010 to January 2011; in the South Coast of NSW in March and November 2011 and again throughout NSW in June 2011 and March 2012. These floods caused rapid rises in various prescribed dams, and even resulted in the failure due to overtopping at Mannus Lake Dam near Tumbarumba due to insufficient spillway capacity. As this dam had been analysed as a LOW consequence category dam (i.e. no Loss of Life expected in a failure) there had been no direction or requirement from the Committee to upgrade the dam's spillway capacity. As expected no loss of life and only minor damage to downstream property and infrastructure occurred. This indicates the importance of providing adequate spillway capacity even for low consequence dams where the decision for upgrading is basically the owners.

Interstate, heavy flooding also occurred in the Gippsland region in Victoria in August 2011, across the whole east coast of Australia in March 2012 and again in Gippsland and Melbourne in June 2012.

World-wide inadequate flood capacity of dams remains a problem and is still one of the leading causes of dam failure. During the 2011/12 period heavy floods resulted in dam failures, a few examples are Sichuan Minjian Electrolytic Manganese Plant Dam in China in July 2011 (water supply to 200,000 people affected), several dams in the USA (e.g. White Oak Creek), Ivanovo Dam in Bulgaria in February 2012 (8 killed) and Kopru Dam in Turkey in February 2012 (10 killed).

In NSW many prescribed dams are under critical review by the DSC (Tables 5 A/B). The main reason for the many dams 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 analysis using current day flood estimating methods is showing numerous dams in NSW have inadequate flood capacity and the DSC requires NSW dam owners to undertake regular reviews of the flood capacity of their dams to see if safety improvements are needed.

"A record storm at Dapto in 1984 dumped 515 mm of rain in 6 hours" – a near PMP event

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 (i.e. a record storm at Dapto in 1984 dumped 515mm of rain in 6 hours). 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 the Institution of Engineers Australia.

Guidance Sheet DSC3B provides information for dam owners and their consultants on the provision of acceptable flood capacity for dams. It supersedes DSC11, August 1992. 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.

This Guidance Sheet 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 this regard the spillway gate upgrade works at Warragamba Dam to cater for PMF were completed in 2011 and tested twice under small flows in 2012.

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 with hydrologists from various Authorities, and Academia, throughout Australia.

Googong Dam

Upgrading of the spillway of this 66m high dam upstream of Queanbeyan was completed in 2012, just a few days before a large flood gave the spillway a good christening.

Split Rock Dam

Committee members and staff inspecting Split Rock Dam, upstream of Manilla, after the recent completion of a substantial flood upgrading of the dam by construction of a concrete wave wall across the dam's crest.

7.1.7. Earthquake Capacity

"The DSC goal regarding seismic safety is to ensure dams have adequate stability"

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 7.5) could occur anywhere in NSW and that a Magnitude 7.5 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.

The DSC initially directed its earthquake capacity concerns to the owners of the few vulnerable dams with the result that earthquake capacity improvement works were completed at Mardi, Prospect and Hume 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 are appropriately designed (e.g. have adequate stability) and managed to result in 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 2011/12 the largest seismic event in NSW was a Magnitude 4.2 earthquake near Tamworth in June 2012. No damage to dams was reported.

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 and Snowy Hydro dams, and the national grid installations of Geoscience Australia. The DSC has continued to support expansion of this seismic network throughout NSW.

Keepit Dam

Construction of new fuse-plug spillways were completed at the dam in late 2012 as the first stage of improving the dam's flood capability. On 8th June 2012 a Magnitude 4.2 earthquake occurred near the dam triggering an immediate inspection of the dam by State Water Corporation personnel. No damage to the dam was detected.

7.1.8. Safety under Normal Operating 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 generally satisfactory by current methodology. Where deficiencies have been revealed, the DSC has required owners to undertake safety reviews and to implement any consequent improvement action.

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 and Rocky Creek Dams, and Cecil Park Basin 3A, have been upgraded in this regard. In addition, there appears to be no clearly recognised international practice on piping safety for old dams without modern filters. The DSC has Guidance Sheets (DSC3G) and plans in future to issue Guidance Sheet DSC3H to guide owners on safety against piping. Analysis of a dam's safety is largely based on risk analysis.

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Prospect Dam

The Sydney Catchment Authority is investigating options to improve the piping resistance and upstream drawdown stability of this 26m high earthfill dam which forms an important function in the delivery of Sydney's water supply.

- The deterioration, with time, of unencased pressure conduits through embankments could lead to uncontrolled high-pressure leakage through the embankment, leading to washout and dam failure. A number of dams have failed from this cause overseas. The DSC requires dam owners to investigate and monitor their conduits. 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 in 1996 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.
- The reliability of spillway control systems, given several serious incidents and dam failures world-wide involving gate failures. There are only a small number of gated 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. A DSC Guidance Sheet DSC3D on this aspect of dam safety is available and DSC3B sets out how gate reliability is to be considered in the assessment of a dam's flood capacity.
- The safety of tailings dams is usually associated with mining. Many incidents overseas occurred during 2011/12, including the failure of Sichuan Minjiang Tailings Dam in China where over 200 people were evacuated and over 200,000 people left without a safe water supply. This has highlighted the special vulnerability of these types of dams, the failure of which usually has very significant environmental consequences, and often loss of life. The DSC therefore concluded that there was a need to develop safety policies specific to tailings dams and Guidance Sheet DSC3F "Tailings Dams" was developed, and is on the DSC's website for dam owner guidance.
- A notable world non-flood related dam failure in 2011/12 included the failure of the outlet tunnel at Kozan Dam in Turkey in March 2012. This clearly demonstrates the need for close surveillance at all times of dams by their owners.

Farm Dam piping. *(Internet photo)*

An example of piping failure along the outlet conduit of a farm dam.

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

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). 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.

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 provide 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.

McCoy Park Retarding Basin

An example of good maintenance of this 6m high retarding basin on the outskirts of Parramatta.

Typical maintenance issues that often need to be addressed by dam owners include removal of trees from embankments, maintaining a short grass cover, 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, and maintained and operated and analysed such that the resulting readings are as reliable and accurate as possible so they can be used to help determine the safety of the dam.

Another important issue is the operation of dams with gated spillways which arose as an outcome of the floods at Wivenhoe Dam QLD, 2010. As a result the DSC issued a letter to all owners of such dams advising them to review their spillway flood handling procedures.

Garden Suburb Detention Basin 2

The need for continuous maintenance of dams is highlighted by the repairs undertaken during the year on the abutment slip immediately upstream of this 9m high basin in Newcastle.

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 (DSEP) 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. To date 130 out of 148 High and Extreme Consequence Category dams have DSEPs and 249 out of 307 prescribed dams of significant consequence category and above have DSEPs, and the DSC is working in conjunction with dam owners to ensure that all such dams have a DSEP in place.

"130 out of 148 High and Extreme Consequence Category dams have DSEPs"

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 required world-wide 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 prepared Guidance Sheet DSC2H (Dam Security) to assist owners in this regard.

To enable the DSEPs to function effectively the DSC Guidelines (DSC3G) requires that all High and Extreme category dams have telemetered storage level recorders and were practical, alarms on the downstream seepage weirs, to give warning of potential non-flood related failures.

Jerrara Creek Dam

This13m high dam on the outskirts of Kiama used to be used for town water supply but now has only recreational uses. Because of its determined limited flood capacity (backed up by several flood alarms to the SES over the past year) Kiama Council is looking at options to upgrade or remove the dam.

In the event of an emergency at a dam being reported to the DSC (orange or red alert) 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, facilitating 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.

During 2011/12 State Water tested the DSEPs at Blowering, Chaffey, Split Rock, Keepit, Copeton, Hume, Burrinjuck, Carcoar and Wyangala Dams. No other dam owning authorities reported having carried out DSEP exercises. However, many dam owners had significant flood events at their dams during the year (e.g. Warragamba, Clarrie Hall, Chichester, Jerrara Creek, Suma Park Dams) which enabled practical on site testing of warning and communication systems, between owners and the SES, which form an essential core component of their DSEPs. The DSC will continue to strongly encourage dam owners to test the DSEPs regularly, particularly with regard to sunny day failure, where failures could come with very little warning.

Also during 2011/12, DSEP trigger alerts were implemented at Suma Park, Jerrara and Clarrie Hall Dams due to heavy flooding. The DSC and the Minister for Water were advised during these events, and evacuations were carried out by the SES. This was effectively the same as carrying out a test of the DSEPs.

Flood alerts also occurred at Warragamba and several coastal NSW dams. It is possible that other white flood alerts occurred during the several floods in 2011/12 but the DSC does not require these to be reported. In all these cases no further action was required as the flood waters subsided before reaching red alert levels.

"DSEP trigger alerts were implemented at three dams requiring downstream evacuations"

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 but at least twice a year, 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 arose during the above alerts was the timing of the alerts, as some dam owners were concerned that evacuations were occurring too early. The DSC is therefore encouraging dam owners, their DSEP consultants and the SES to develop and agree on alert level timing.

Sierra Place Detention Basin

This 9m high basin upstream of Parramatta was built in 1991. It was subsequently raised and upgraded in 2001 to maintain flood retention capability with the construction of the M2 motorway through the rear of the basin.

7.1.11. Flood Retarding 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 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 concrete dam over 20m 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.

"During the short period that these basins store water they act as dams and their failure could be damaging"

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) and across eastern Australia in March 2012. 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.

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 the "domino effect" of basin failure if there are multiple basins in a cascade arrangement, as is commonly the case.

The DSC requires that the 110 existing and 17 proposed 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) to provide advice on flood retarding basins.

Lidcombe Retarding Basin 6

This 4m high basin was build in 2003 as one of a series of basins to limited flooding effects of construction work in the Sydney Olympic Park.

Owners, or their consultants, should inform the DSC of proposals for new basins (or unnotified 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 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.

A project began during 2011 to find small dams that pose a risk to the community and should be prescribed"

To date 120 Councils out of 152 have formally replied, and 5 new dams have been prescribed to date, with more anticipated in the future.

This is an ongoing project and further investigation / research will be required during 2012/2013 to ensure that dams in NSW that could pose a threat to life are prescribed by the DSC.

Small Dams *(internet photo)*

There are tens of thousands of small dams scattered throughout NSW. The DSC only prescribes those whose failure would affect downstream life or seriously affect property or the environment

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 ensures 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 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.

Woronora Dam

In 2012 Metropolitan Colliery commenced underground coal mining, under close DSC oversight, in the Notification Area of this Sydney water supply dam.

7.2.2. 2010/11 Overview

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 two new applications were endorsed as follows:

Underground Mining	***Open-cut Mining***
Dendrobium (1)	Mt Owen (1)
Bellambi (1)	Warkworth (1)
Mannering (4)	Mt Thorley (1)
Metropolitan (2)	Ravensworth (1)
NRE (1)	Mangoola (2)
Clarence (3)	
Ravensworth Underground (2)	
Appin (1)	

"During 2011/12…over 20 million tonnes of coal were extracted near prescribed dams in NSW"

During 2011/12, under the DSC's guidelines, over 20 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.

Wambo Tailings Dam

Over the past several years, under DSC oversight, there has been extensive longwall mining under, and open-cut mining immediately downstream of this dam in the Hunter Valley with no loss of tailings from the dam.

7.2.3. Details of New Applications and Currently Monitored Mines

Appin Colliery commenced longwall mining in 1988 near Broughtons Pass Weir, which is an important part of Sydney's water delivery system. Initially minor cracking of the weir was recorded, although the safety of the structure was maintained at all times. No movement or additional cracking has occurred at the weir in the last four years as mining has progressively moved away from the dam.

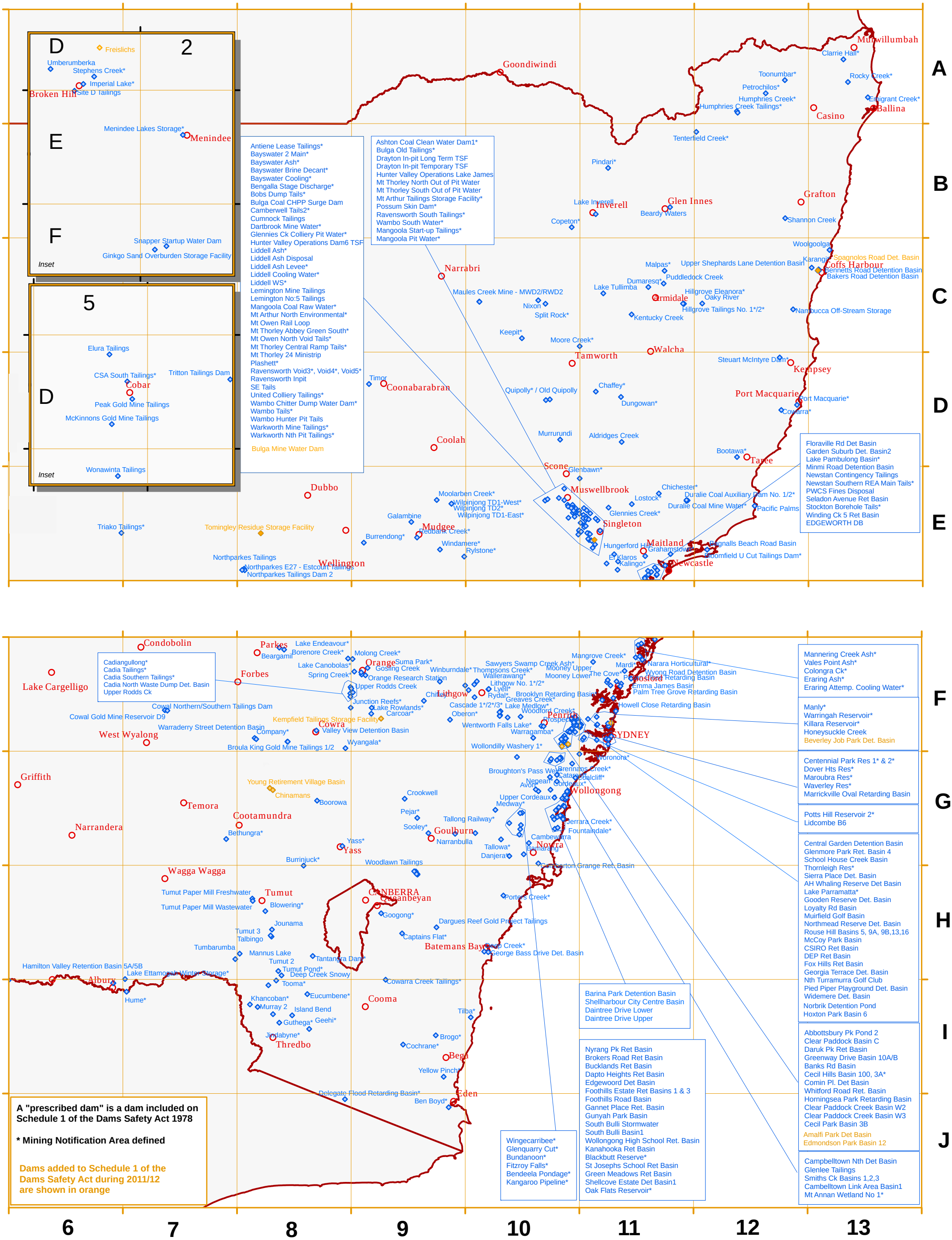
Ashton Mine commenced longwall mining near Ravensworth Inpit Storage Dam in 2010. This dam is part of Ravensworth Operations and has the Narama open cut to its west.

Clarence Colliery continues first workings and commenced partial pillar extraction within the Notification Area of Lithgow No. 2. This dam supplies water to Lithgow.

Dendrobium Colliery continues extraction of a series of longwalls (currently mining longwall 8 in Area 3A) adjacent to Cordeaux Reservoir and Upper Cordeaux No. 2 Dam. Cordeaux Reservoir supplies water to the Sydney metropolitan area. Mining to date has indicated no significant impact on the stored water although some localised minor inflows to the mine have occurred 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.

NSW Dams Safety Committee
PRESCRIBED DAMS IN NSW
JULY 2012



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 2011/12 are shown in orange

Liddell Ash Levee

This levee embankment is being raised to store more waste ash from the power stations while protecting miners in the open cut pit immediately downstream (on the right).

"In 2012 Metropolitan began extracting first workings within the Woronora Notification Area. The mine is over 400m below the Woronora Reservoir and currently in excess of 7km from the dam wall"

Lithgow No. 2 Dam

The DSC is closely monitoring the effects of mining currently being undertaken at the back of the storage of this 26m high arch dam which provides water supply to Lithgow.

Duralie Colliery continued open-cut mining further away from its water supply dam. A management plan has been implemented to minimise the risk resulting from the active open-cut pit located near the dam.

Glennies Creek Colliery continued open cut mining within the Notification Areas of Possum Skin Dam and Camberwell Tailings Dam No. 2.

Liddell Colliery is slowly winding down open-cut mining operations near Liddell Cooling Water Dam. Monitoring shows that mining activities have no significant impact on the dams.

Mannering Colliery continued to mine by bord and pillar methods adjacent to Mannering Creek Ash Dam, which stores ash from a nearby power station. Monitoring to date indicates the continuing impacts on the dam are minimal.

Metropolitan Mine has been approved to begin first workings within the Woronora Area around the Woronora Dam, the only water supply for Sutherland. In 2012 Metropolitan began extracting first workings within the Woronora Notification Area. The mine is at over 400m below the Woronora Reservoir and currently in excess of 7km from the dam wall.

Moolarben Mine commenced mining by open cut methods adjacent to the Moolarben Creek Dam in 2010. The dam is owned by the neighbouring Ulan Mine.

Mangoola Coal commenced full scale coal extraction by open cut methods adjacent to their own Tailings dam in 2011/12 and has recently been approved to open cut mine up to 500m from the Mangoola Raw Water Dam.

Mt Arthur Coal is about to commence coal extraction by open cut methods within the Notification Area of the Mt Arthur North Environmental Dam.

NRE No. 1 Colliery is continuing to mine bord and pillar workings adjacent to, and under, Cataract Reservoir. Monitoring indicates some minor continuing surface movements but negligible impacts in 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.

NRE Nebo Colliery has been approved to extract longwalls 1-6 within the Wongawilli Seam, part of long wall 3 falls within Cordeaux Notification Area.

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.

Ravensworth Operations Underground Mine is nearing completion of extraction of the Pikes Gully Seam by longwall mining within the Notification Area around Ashton's Tailings Dam (Saddle Dam).

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.

Wambo Colliery continued to extract coal both by open-cut pit mining immediately downstream of Wambo Tailings Dam, and by longwall mining within Notification Area of Wambo Tailings Dam. Although disused, the Wambo Tailings Dam contains tailings which may still be able to flow hence the need for ongoing monitoring and management of the risk to the dam.

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 6 below and are available on-line on our web page (www.damsafety.nsw.gov.au/Mining/Publications/mine_infosheets.shtm).

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 6 –Guidance Sheets for Mining near Dams

Document	Title	Date
DSC4A	Mining Near Prescribed Dams – Administrative Procedures	September 2010
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 - Mining in Notification Areas

Item		2008/9	2009/10	2010/11	2011/12
Coal Removed from Notification Areas (million tonnes)		13.5	14.5	18.3	20.7
Current Approvals:	Actively Mining	17	18	18	29
	Actively Monitoring	16	23	24	31
Applications Processed		14	13	10	19
Variations to Existing Approvals		4	4	8	3
Titles Processed		72	162	51	60
Provide comments on SMP / Part 3A applications			13	4	16
New Proposals Discussed		11	7	8	8
Site Inspections (person days)		25	28	18	16

Table 8 - Monitored Approved Mining 2011/12

Approval	Mine	Dam	Mining Type	Active Mining	Possible Effect on Dam Storage	Possible Effect on Dam Structure	Currently Monitoring
Ashton-2	Ashton Underground	Ravensworth Inpit Storage	Longwall	Yes	Yes	Yes	Yes
Ashton-3	Ashton Underground	Ravensworth Inpit Storage	Longwall	Yes	Yes	Yes	Yes
Bellambi-15	NRE#1	Cataract Reservoir	1st Workings	Yes	Yes	No	Yes
Dendrobium-3	Dendrobium	Cordeaux & Upper Cordeaux 2	Longwall	No	Yes	Yes	Yes
Dendrobium-4	Dendrobium	Cordeaux & Upper Cordeaux	Longwall	Yes	Yes	Yes	Yes
Duralie-1	Duralie	Duralie Mine Water	Open-cut	Yes	Yes	Yes	Yes
Drayton-1	Drayton	Liddell Ash Dam Levee	Open-cut	Yes	No	Yes	Yes
Ridgeway-1	Ridgeway	Cadiangullong	Longwall	Yes	Yes	Yes	Yes
Liddell-2	Liddell	Antiene Tails	Open-cut	No	No	Yes	Yes
Liddell-3	Liddell	Liddell Cooling Water	Open-cut	Yes	No	Yes	Yes
Clarence-1	Clarence	Lithgow#2	Underground	Yes	Yes	Yes	Yes
Clarence-2	Clarence	Lithgow#2	Underground	Yes	Yes	Yes	Yes
Clarence-3	Clarence	Lithgow#2	Underground	Yes	Yes	Yes	Yes
Glennies-1	Camberwell North	Camberwell TD2 & Possum Skin	Open-cut	Yes	Yes	Yes	Yes
Mannering-4	Mannering	Mannering Ck Ash	1st Workings	Yes	No	Yes	Yes

contin.

Approval	Mine	Dam	Mining Type	Active Mining	Possible Effect on Dam Storage	Possible Effect on Dam Structure	Currently Monitoring
Mangoola-1	Mangoola	Pit Water Dam	Open-cut	Yes	No	Yes	Yes
Mangoola-2	Mangoola	Tailings Dam 1	Open-cut	Yes	No	Yes	Yes
Mangoola-3	Mangoola	Raw Water Dam	Open-cut	Yes	No	Yes	Yes
Metropolitan-1	Metropolitan	Woronora Reservoir	Longwall	Yes	Yes	No	Yes
Metropolitan-2	Metropolitan	Woronora Reservoir	Longwall	Yes	Yes	No	Yes
Moolarben-1	Moolarben	Moolarben Creek	Open-cut	Yes	No	Yes	Yes
Mt Owen-1	Mt Owen	Mt Owen Rail Loop TD	Open-cut	Yes	No	Yes	No
Mt. Thorley-1	Mt Thorley – Warkworth	Mt Thorley Central Ramp Tailings	Open-cut	Yes	No	Yes	Yes
NRE-Nebo	NRE#1	Cataract Reservoir	Longwall	Yes	Yes	No	Yes
Ravensworth-2	Narama	Ravensworth In-pit	Open-cut	Yes	Yes	Yes	Yes
Ravensworth Underground-1	Ravensworth Underground	Ravensworth Void 4 Tailings Dam (saddle dam)	Longwall	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	Longwall	Yes	No	Yes	Yes
Wambo-1	Wambo	Wambo Tails	Open-cut	Yes	Yes	Yes	Yes
Wambo-2	Wambo	Wambo Tails	Longwall	Yes	No	Yes	Yes
Warkworth-1	Mt Thorley – Warkworth	Warkworth North Pit Tailings	Open-cut	Yes	No	Yes	Yes

7.3. Information Systems

"In 2011/12 the DSC continued upgrading its databases and computer facilities"

2011/12 Overview

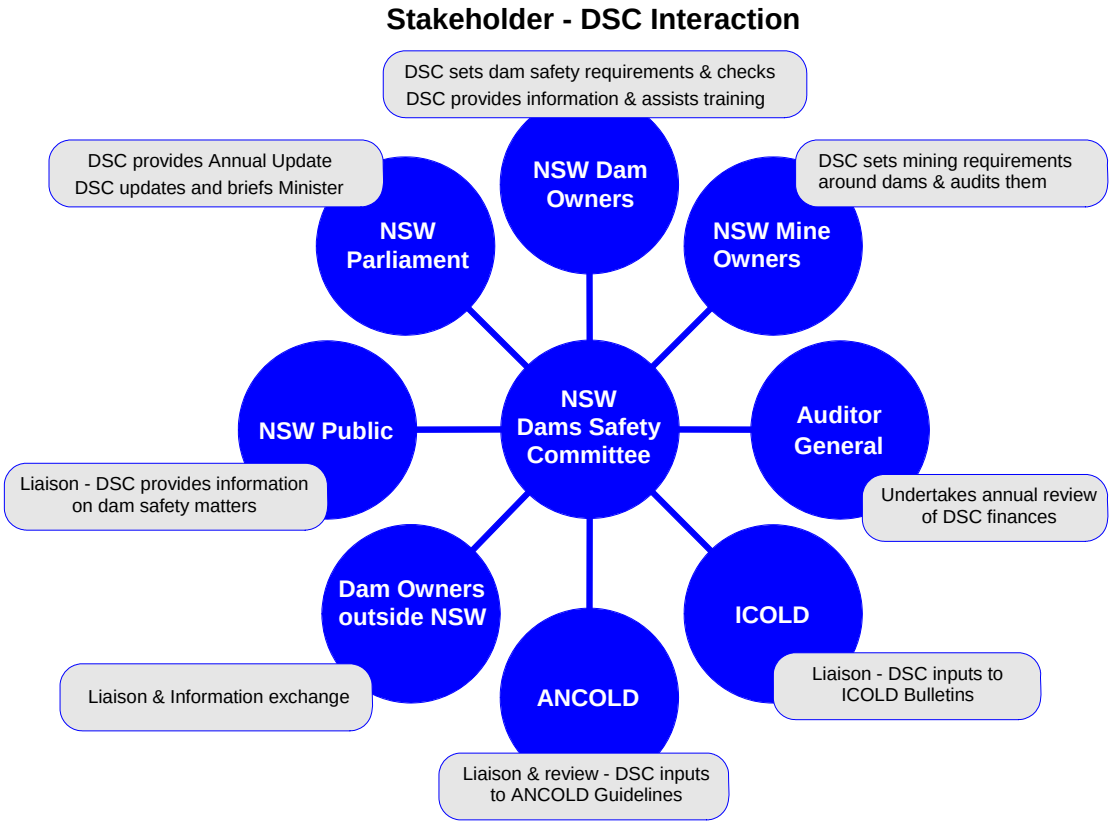
Various support systems were maintained and updated. Many new features were added to the DSC Database including the Mining Applications database. Functions and procedures were created for generating various reports and a Mining Application layer was developed and integrated.

Some of the work activities were:

- Incoming and outgoing correspondence processed and kept up to date in the database.
- Records in paper format were streamlined and maintained.
- Electronic records including GIS datasets were captured and updated.
- Metadata information and reports generated.
- Digital data in the form of tapes archived.
- Assisted in the DSC project on "Search for unregistered dams".
- Surveillance Report request letters generated and tracked.
- DVD and online version of Minutes and Legal database updated.
- Desktop hardware and software were updated.
- Hard copies of dam and mine related plans, reports and photographs were scanned and archived.

8. Stakeholders

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



8.1. Liaison with Stakeholders

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, now available on the DSC Internet site (www.damsafety.nsw.gov.au/DSC/infosheets.shtm).

"The DSC values a good working relationship with its key stakeholders"

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 liability 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 also has a role to educate and inform dam owners on their responsibilities and on international standards, practice and technology. 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.

"DSC staff were involved in running six dam safety training courses for NSW dam operators in 2011/12"

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 2011/12 the DSC arranged a meeting with National Parks & Wildlife Service, Mid-Western Regional Council & Office of Water to expedite upgrading works for Redbank Creek Dam.

Mining staff also inspected various mine sites and tailings dams including a visit to inspect underground workings of the Metropolitan Mine, which has proposals to mine by longwall methods below Woronora Reservoir was organised.

"Since 1992 over 1,200 operators have been trained in dam safety inspection, resulting in very notable improvements"

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. DSC members and staff met with various dam owners and also addressed Council meetings on a number of occasions during the year.

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 the Department of Public Works and later by the Department of Water and Energy's Water Utilities Performance (WUP) Dams Safety Management group with the assistance of DSC staff. Since 2009 with changes to the structure of WUP, and with a new DSC Executive Engineer, the DSC has taken over the organisation and running of these 4 day courses, and two courses were run at Port Macquarie in late 2011 with 60 attendees and a further two in early 2012 with 60 attendees. Courses are always very well attended, and since 1992 over 1,200 operators have been trained in dam safety inspection, resulting in very notable improvements in the day to day dam owners' inspection regimes.

Newstan Southern REA Main Tailings Dam

Dam operators inspecting this dam under construction near Toronto as part of the DSC's tailings dam operator course held in March 2012.

In addition, the DSC ran two - three day courses for tailings dam operators in March and April 2012 at Port Stephens attended by 55 operators.

The immediate ex-Executive Engineer and DSC member Himsley have also been very heavily involved in the development of the syllabus for the 5 dam units of competency within the Certificate III in the National Water Industry Operation Training Package NWPO7, to ensure the needs of all sections of the dams industry are addressed, and to provide a more flexible Qualification Framework for the continuing development of structured accredited training arrangements.

The DSC has also developed an agreement with TAFE NSW whereby full accreditation of the DSC's courses will occur. This will allow dam owners to obtain 4 units of the Certificate III of the Water Operators course if their operators elect to attend the accredited course. An option to attend the shortened non-accredited courses will also be available.

"A visit to inspect underground workings of the Metropolitan Mine, which has proposals to mine by longwall methods below Woronora Reservoir was organised"

Due to the very heavy demand on the normal surveillance inspection courses, the DSC ran a special course for State Water at the Hume Dam in February 2012 which was attended by over 20 State Water operators. Another special tailings dam operators' course was held for Newcrest Mining at Orange, attended by thirty mine operators.

This work is a key part of the DSC's education role for dam owners in NSW and, accordingly, the DSC runs these sessions on a cost recovery basis.

The increasing emphasis by the DSC on owner education in NSW has been reflected in numerous requests from dam owners outside NSW for educational assistance. 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. It also provides an opportunity for inspections of interstate dams.

Cotter Dam, ACT

DSC members and staff inspecting the construction of this enlarged roller compacted concrete dam as part of the DSC's continuing education of its people keeping them up to date with current practice.

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.

In October 2011, the Chairman, Executive Engineer, Tailings Dam Engineer and the Small Dams Engineer attended the ANCOLD Conference on Dams and an associated workshop on Emergency Planning for Dams, held at Melbourne in Victoria. Many of the other DSC members also attended, as representatives of their own organisations.

During the year the Tailings Dam Engineer, Engin Hizbas, attended the United States Bureau of Reclamation (USBR) Safety Evaluation and Visual Inspection of Existing Dams International Technical Seminar and Study Tour, August 2011, in Denver USA and also gave a presentation on NSW dams safety management, and inspected 4 major dams including Guernsey Dam, Glendo Dam, Hoover Dam and Grand Coulee Dam. These experiences enable staff to improve and update the DSC's surveillance practices, and the knowledge gained will be invaluable to the DSC by assisting in developing its policies, strategies and procedures.

"In August 2011 Hizbas....gave a presentation on NSW Dams Safety Management at the USBR International Technical Seminar in the USA"

Keeping abreast of developments in mining, in November 2011 Manager Mining Impacts Bill Ziegler and Mining Regulation Officer Heather Middleton attended the National Centre for Groundwater Research and Training (NCGRT) Surface – Groundwater Interaction Workshop in Sydney extending their knowledge on application of modelling techniques. While in May 2012 Tailings Dam Engineer Engin Hizbas attended the ANCOLD/AusIMM workshop on Tailings Dams in Adelaide. The workshop provided a comprehensive presentation on issues in tailings storage and launched the new ANCOLD Guidelines – Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure – 2012.

"The DSC's expertise in monitoring mining activities near dams using a broad range of techniques continues to be internationally recognised"

The DSC's expertise in monitoring mining activities near dams using a broad range of techniques continues to be internationally recognised, with Ziegler and Middleton's technical paper on 'Analysis of Mine Water Origins using Geochemistry, Tritium Isotopes and Algae' published in the highly respected International Mine Water Associations Congress Proceedings held in Germany in September 2011. Promoting an exchange of knowledge between regulatory agencies and coal mining project proponents in industry, Manager Mining Impacts Bill Ziegler continues to bring his expertise in regulation of mining activities near dams as a presenter at the Water in Coal Mines Courses run by the International Centre of Excellence in Water Resources Management (ICE WaRM)

As part of the DSC's Policy on Staff Development which targets staff efficiency, staff have attended Advanced Microsoft Office courses and participated in a Staff reconciliation programme in September 2011 "Code of Conduct and Ethics Briefing".

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9. Administration and Human Resources

DSC members are subject to the Premier's Department Conduct Guidelines and the DSC staff are subject to the NSW Office of Water (NOW) Code of Ethics and Conduct. 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 is also currently developing a policy for handling Media Enquiries.

The DSC rents office space with NOW in Parramatta and, to maximise the effectiveness of DSC staff, reimburses that Department for its administration and human resources assistance, accounting, insurance scheme and legal services. In addition, ServiceFirst – Department of Finance and Services provided the DSC with financial processing support, maintaining the accounting system, the payment of invoices, and provision of payroll service, receipting, and the provision of taxation services for the 12 month period to 30 June 2012 and provided a letter at the conclusion of the year indicating satisfactory performance of DSC functions supported by ServiceFirst. The organisations that nominate members to the DSC continue to provide technical assistance in specialised areas and the DSC wishes to acknowledge their assistance.

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

The DSC has adopted NOW's Occupational Health, Safety and Rehabilitation (OHS&R) practices, with necessary minor adaptations, to ensure the maintenance of appropriate standards of work practice in the DSC. The DSC has also in place a policy on the OH&S roles of its staff and members. In relation to OHS&R there were no working injuries. DSC staff and members also received various items of personal protective equipment for use at field inspections.

As part of its contracted administration assistance to the DSC, NOW implements Equal Employment Opportunity (EEO) and Ethnic Affairs matters for, and with, the DSC. The DSC is aware of, and committed to, the principles of multiculturalism, but all policies relating to this area are programmed under NOW's overarching banner. The DSC employs a very culturally and ethnically diverse group of male and female staff as part of its Multicultural Policies and Services program.

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 2012, and transactions for the year then ended.

b) The report has 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* and Public Finance and Audit Regulation 2010.

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: 09 October 2012

J. Gleeson
Deputy Chairman
Dated: 09 October 2012

10.2. Auditor General's Certificate

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 2012, 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 2012, 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 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 Committee'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 Committee'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.

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

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.

M T Spriggins
Director, Financial Audit Services

9 October 2012
SYDNEY

10.3. Audited Financial Statement

Statement of comprehensive income for the year ended 30 June 2012

	Notes	2012 $'000	2011 $'000
Expenses excluding losses			
Personnel services expenses	2a	1,197	1,214
Other operating expenses	2b	785	682
Depreciation and amortisation	2c	27	29
Finance costs	2d	-	1
Total expenses excluding losses		**2,009**	**1,926**
Revenue			
Government contributions	3a	1,300	1,450
Other revenue	3b	683	453
Total Revenue		**1,983**	**1,903**
Net results		**(26)**	**(23)**
Other comprehensive income		-	-
TOTAL COMPREHENSIVE INCOME FOR THE YEAR		**(26)**	**(23)**

Statement of financial position as at 30 June 2012

	Notes	2012 $'000	2011 $'000
Current Assets			
Cash & cash equivalents	4	39	103
Receivables	5	111	65
Total Current Assets		**150**	**168**
Non-Current Assets			
Plant and equipment	6	8	27
Intangible assets	7	1	9
Total Non-Current Assets		**9**	**36**
Total Assets		**159**	**204**
LIABILITIES			
Current Liabilities			
Payables	8	130	141
Provisions	9	43	43
Other	10	-	8
Total Current Liabilities		**173**	**192**
Total Liabilities		**173**	**192**
Net Assets		**(14)**	**12**
EQUITY			
Accumulated funds	11	(14)	12
Total Equity		**(14)**	**12**

The accompanying notes form part of these financial statements.

Statement of changes in equity for the year ended 30 June 2012

	Notes	Accumulated Funds $'000	Total $'000
Balance at 1 July 2011		**12**	**12**
Surplus / (deficit) for the year		(26)	(26)
Other comprehensive income		-	-
Total comprehensive income for the year		(26)	(26)
Balance at 30 June 2012	11	**(14)**	**(14)**
Balance at 1 July 2010		**35**	**35**
Surplus / (deficit) for the year		(23)	(23)
Other comprehensive income		-	-
Total comprehensive income for the year		(23)	(23)
Balance at 30 June 2011	11	**12**	**12**

Statement of cash flows for the year ended 30 June 2012

	Notes	2012 $'000	2011 $'000
CASH FLOWS FROM OPERATING ACTIVITIES			
Receipts			
Receipts from government and customers		1,607	1,618
Interest received		3	4
Total Receipts		**1,610**	**1,622**
Payments			
Payments to suppliers, personnel services and others		(1,674)	(1,569)
Finance costs		-	1
Total Payments		**(1,674)**	**(1,570)**
NET CASH FLOWS FROM OPERATING ACTIVITIES	12	**(64)**	**52**
CASH FLOWS FROM INVESTING ACTIVITIES			
Purchases of plant and equipment		-	(9)
NET CASH FLOWS FROM INVESTING ACTIVITIES		**-**	**(9)**
NET INCREASE / (DECREASE) IN CASH		**(64)**	**43**
Opening cash and cash equivalents		103	60
CLOSING CASH AND CASH EQUIVALENTS	4	**39**	**103**

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 09 October 2012.

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 Entitlements or issued by the Treasurer.

Judgements, key assumptions and estimations management has 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 07-1). This policy adopts fair value in accordance with AASB 116 *Property, Plant and Equipment*. Plant and equipment is measured on an existing use basis, where there are no feasible alternative uses in the existing natural, legal, financial and socio-political environment.

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) 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 Boards (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 2012. These are listed as follows:

Notes to the financial statements

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

- AASB 9 and AASB 2010-7 regarding financial instruments
- AASB 10 *Consolidated Financial Statements*
- AASB 11 *Joint Arrangements*
- AASB 12 *Disclosure of Interest in Other Entities*
- AASB 13 and AASB 2011-8 regarding fair value measurement
- AASB 119, AASB 2011-10 and AASB 2011-11 regarding employee benefits
- AASB 127 *Separate Financial Statements*
- AASB 128 *Investments in Associates and Joint Ventures*
- AASB 1053 and AASB 2010-2 regarding differential reporting
- AASB 2010-8 regarding deferred tax
- AASB 2010-10 regarding removal of fixed dates for first time adopters
- AASB 2011-2 regarding Trans Tasman Convergence - RDR
- AASB 2011-3 regarding orderly adoption of changes to the ABS GFS Manual
- AASB 2011-4 removing individual KMP disclosure requirements
- AASB 2011-6 regarding RDR and relief from consolidation
- AASB 2011-7 regarding consolidation and joint arrangements
- AASB 2011-9 regarding presentation of items of other comprehensive income
- AASB 2011-12 regarding Interpretation 20
- AASB 2011-13 regarding AASB 1049 and GAAP/GFS harmonisation
- AASB 2012-1 regarding fair value measurement

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

		2012 $'000	2011 $'000
(a)	Personnel services expenses		
	Salaries and wages (including recreation leave)	1,038	1,018
	Staff on-cost	159	196
		1,197	**1,214**
(b)	**Other operating expenses**		
	Auditor's remuneration	9	6
	Committee Member's expenses	138	81
	Contractors	107	62
	Fees for services	43	53
	Accommodation	99	105
	Plant / Vehicle	14	18
	Travel	34	48
	Computer expenses	30	29
	Telephones	5	4
	Staff training	12	41
	Equipment	3	1
	Entertainment & events	105	66
	Printing	27	22
	In-kind expenses	117	110
	Other	42	36
		785	**682**

Notes to the financial statements

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

		2012 $'000	2011 $'000
(c)	**Depreciation and amortisation**		
	Depreciation – Computers	5	5
	Depreciation - Intangible Assets	8	8
	Leasehold improvement	12	16
	Plant & Equipment	2	-
		27	**29**
(d)	Interest expense on make good provision	-	1
		-	**1**

3. REVENUE

(a)	**Government contributions**		
	Recurrent Government Contribution from NSW Office of Water	1,300	1,450
		1,300	**1,450**
(b)	**Other Income**		
	Interest	3	4
	Committee Support In-kind Contribution	117	110
	Other	353	174
	The following liabilities and/or expense have been assumed by the Crown Entity and other government entities		
	Long Service Leave Liability	158	87
	Superannuation	49	74
	Pay-roll Tax	3	4
		683	**453**

4. CURRENT ASSETS – CASH AND CASH EQUIVALENTS

Cash at bank and on hand	39	103
	39	**103**

Refer Note 15 for details regarding credit risk, liquidity risk and market risk arising from financial instruments.
DSC has a Tape Negotiation Authority of $1.0 million (2010-11: $1.0 million).

5. CURRENT ASSETS - RECEIVABLES

Accrued income receivable	100	49
Goods and Services Tax recoverable from ATO	11	3
Corporate Cards – Recoverable	-	13
	111	**65**

Details regarding credit risk, liquidity risk and market risk, including financial assets that are wither past due or impaired, are disclosed in Note 15.

6. NON-CURRENT ASSETS – PLANT AND EQUIPMENT

	Plant and Equipment $'000	Leasehold Improvement $'000	Total $'000
At 1 July 2011 – fair value			
Gross carrying amount	43	40	83
Accumulated depreciation	(28)	(28)	(56)
Net carrying amount	15	12	27
At 30 June 2012 – fair value			
Gross carrying amount	43	40	83
Accumulated depreciation	(35)	(40)	(75)
Net carrying amount	8	-	8

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

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

	Plant and Equipment $'000	Leasehold Improvement $'000	Total $'000
Year ended 30 June 2012			
Net carrying amount at 01 July 2011	15	12	27
Additions	-	-	-
Depreciation expenses	(7)	(12)	(19)
Net carrying amount at 30 June 2012	8	-	8
Year ended 30 June 2011			
Net carrying amount at 01 July 2010	11	28	39
Additions	9	-	9
Depreciation expenses	(5)	(16)	(21)
Net carrying amount at 30 June 2011	15	12	27

7. NON-CURRENT ASSETS – INTANGIBLE ASSETS

	Software $'000
At 1 July 2011 – fair value	
Gross carrying amount	31
Accumulated amortisation	(22)
Net carrying amount	9
At 30 June 2012 – fair value	
Gross carrying amount	31
Accumulated amortisation	(30)
Net carrying amount	1

Reconciliation

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

Year ended 30 June 2012	
Net carrying amount at 01 July 2011	9
Additions	-
Amortisation expenses	(8)
Net carrying amount at 30 June 2012	1

	Software $'000
Year ended 30 June 2011	
Net carrying amount at 01 July 2010	17
Additions	-
Amortisation expenses	(8)
Net carrying amount at 30 June 2011	9

8. CURRENT LIABILITIES - PAYABLES

	2012 $'000	2011 $'000
Accrued personnel services	20	15
Creditors	5	2
Accrued expenditure	105	67
Other	-	57
	130	**141**

Details regarding credit risk, liquidity risk and market risk, including a maturity analysis of the above payables, are disclosed in Note 15.

9. CURRENT LIABILITIES - PROVISIONS

	2012 $'000	2011 $'000
Restoration Costs	43	43
	43	**43**

10. CURRENT LIABILITIES - OTHER

Lease incentive	-	8
	-	**8**

Notes to the financial statements

11. CHANGE EQUITY

	Accumulated Funds		Total Equity	
	2012 $'000	2011 $'000	2011 $'000	2011 $'000
Balance at the beginning of the year 1 July 2011	12	35	12	35
Changes in equity – other than transactions with owners as owners				
Surplus / (Deficit) for the year	(26)	(23)	(26)	(23)
Balance at the end of the year 30 June 2012	**(14)**	**12**	**(14)**	**12**

12. 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

	2012 $'000	2011 $'000
Net result	(26)	(23)
Depreciation and amortisation	27	29
Changes in operating assets and liabilities		
(Increase) / decrease in accounts receivable	(46)	(6)
Increase / (decrease) in accounts payable & provisions	(19)	52
Net cash used on operating activities	**(64)**	**52**

13. CONTINGENT LIABILITIES

The Committee is not aware of any material contingent liabilities.

14. COMMITMENTS FOR EXPENDITURE

	2012 $'000	2011 $'000
Operating lease commitments		
Future non-cancellable operating lease rentals not provided for and payable: not later than 1 year	109	96
later than 1 year, but not later than 5 years	317	19
	426	**115**

Commitments above include input tax credits of $42,545 (2011: $10,459) that are expected to be recovered from the Australian Taxation Office.

15. 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 agrees 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 2012 $'000	Carrying Amount 2011 $'000
Class:				
Cash and cash equivalents	4	N/A	39	103
Receivables[1]	5	Receivables	100	62
			139	165

Financial Liabilities	Note	Category	Carrying Amount 2012 $'000	Carrying Amount 2011 $'000
Class:				
Payables[2]	8	Financial Liabilities measured at amortised cost	130	87
			130	87

Notes to the financial statements

FINANCIAL INSTRUMENTS (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 cash on hand and 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.

The Committee has a PAFA approved credit card facility with a limit of $20,000. The Committee has used $19,000 of the credit card facility as at 30 June 2012.

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.

The outstanding amount of debtors is all within payment terms and not past due. An allowance for impairment has not been established as it is considered by the Committee that all debts owing are recoverable.

(c) Liquidity Risk

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 Treasurer's Direction 219.01. 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 2012						
Financial Liabilities						
Payables	N/A	130	130	-	-	130
Total Financial Liabilities		**130**	**130**	**-**	**-**	**130**
30 June 2011						
Financial Liabilities						
Payables		141	141	-	-	141
Total Financial Liabilities		**141**	**141**	**-**	**-**	**141**

(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

15. FINANCIAL INSTRUMENTS (continued)

	Carrying Amount	-1%		1%	
		Profit	Equity	Profit	Equity
	$'000	$'000	$'000	$'000	$'000
2012					
Financial assets					
Cash and cash equivalents	39	-	-	-	-
Receivables	111	-	-	-	-
Financial liabilities					
Payables	130	-	-	-	-
2011					
Financial assets					
Cash and cash equivalents	103	-1	-1	1	1
Receivables	65	-	-	-	-
Financial liabilities					
Payables	141	-	-	-	-

(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.

16. 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 2011/12 Financial Year

For the 2011/12 financial year, the Dams Safety Committee was unable to fully comply with Treasury's requirements to implement an *Internal Audit and Risk Management Policy for the NSW Public Sector* exclusively by itself. In mitigation however, and as outlined below, the DSC attests that it operates under an effective internal audit function and risk management system.

In early 2011 the Dams Safety Committee was granted approval by the then Minister for Water Phillip Costa MP for an exception for the DSC from the internal audit and risk management core for the financial year ending 30 June 2011, subject to appropriate inclusion within the internal audit and risk management framework of the NSW Office of Water (NOW). Agreement for such inclusion had been obtained for the DSC from NOW in December 2010.

Since then, NOW's *Risk Management and Policy Procedures* document has included the DSC in its formalising and implementation of enterprise–wide risk management. That document meets *Core Requirement 5* of the *NSW Treasury Circular 09/08 Internal Audit and Risk Management Policy* and is consistent with *ISO 3100 Risk Management 2009*. As associated documentation, NOW has a risk register that includes risk assessments, controls and mitigation strategies. As part of its risk management system, the DSC developed its own risk register in the same format and which has been included within NOW's overall risk register.

The DSC operates under NOW with respect to funding allocation and budgetary distribution and also permanent staffing positions, which (as from June 2012) are all within NOW's structure. The small size and nature of the DSC are not amenable to the compliance cost and administrative burden of a fully separate internal audit function. The Committee's budget is several folds less than that for which Treasury can grant permanent exemption with the relevant Minister's concurrence. NOW provides effective and compliant internal audit services to the DSC. These services include advice on risk management, review of the effectiveness of the DSC's risk management system and the incorporation, where appropriate, of DSC projects in NOW annual Audit Plans.

For the above reasons, the DSC intends to submit an application to Treasury seeking an exemption from full separate compliance with the *Internal Audit and Risk Management Policy for the NSW Public Section*.

10.5 Dams Safety Committee 2011/12 – Budgetary Information *

Item	2011/12 Budget ($)	2011/12 Actual ($)	20012/13 Budget ($)
Income			
Consolidated Fund	1,540,000	1,300,000	1,540,000
Interest Income	2,000	3,000	3,000
Other Income	258,000	353,000	297,000
Total	**1,800,000**	**1656,000**	**1,840,000**
Expenditure			
Administration (incl. Audit-$9,000)	536,000	420,000	460,000
Dam Surveillance	725,000	822,000	900,000
Mining Investigations	539,000	440,000	480,000
Total	**1,800,000**	**1,682,000**	**1,840,000**
Operating Surplus / (Deficiency)	**0**	**(26,000)**	**0**

(* Does not include In-Kind Committee Contribution and Crown Assumed Liabilities)

Appendix A – Dam Owner Summary 30 June 2012

Dam Owner	Prescribed Dams	Surveillance Reports received/reviewed 2011/12	DSC inspections 2011/12
Councils	151	28	33
SCA / Sydney Water	37	11	7
State Water Corporation	22	5	6
Delta, Macquarie Gen., Eraring & Country Energy	19	4	3
Snowy Hydro	16	3	0
Other State Authorities	10	1	1
Non State Authorities	3	0	1
Mining Companies	99	28	20
Other Ownership	19	2	4
TOTAL	**376**	**82**	**75**

Appendix B – 2012-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
AH Whaling Reserve Detention Basin	F10	-	TE	1.3	6.5	The Hills Shire Council
Aldridges Creek	D11	1994	TE/ER	23	1,250	Consolidated Pastoral Company P/L
Amalfi Park Detention Basin	F10	-	TE	4.9	48	Liverpool City Council
Antiene Lease Tailings*	E11	1999	TE/ER	35	10,000	Liddell Coal Operations Pty Ltd
Ashton Coal Clean Water Dam 1*	E10	-	TE	15	362	Ashton Coal Operations Ltd
Avon*	G10	1927/71/95	PG/ ER	72	214,400	Sydney Catchment Authority
Bagnalls Beach Road Basin^	E12	1998/2002	TE	3.5	22	Port Stephens Council
Bakers Road Detention Basin	C13	-	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^	G10	1982	TE	4	4.2	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	Mt. Arthur Coal, 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	-	TE	8	149	Coffs Harbour City Council
Bethungra* [R]	G7	1895	PG	13	600	NSW Department of Lands
Beverley Job Park Detention Basin	F11	-	TE	2	18	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	112	1,631,000	State Water Corporation
Bobs Dump Tailings*	E10	-	TE/ER	26	1,840	Rio Tinto Coal Australia Pty Ltd
Boorowa	G8	1940	PG/TE	8	180	Boorowa Council
Bootawa* [I]	D12	1968	TE	25	2,280	Midcoast Water
Borenore Creek*^	F8	1928/43	VA	17	200	Cabonne Council
Brennans Creek*	G10	1976	DR	17	320	Endeavour Coal Pty Ltd
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

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Bucklands Retarding Basin	G10	1992	TE	5	2	Diane Ramsey
Bulga CHPP Dam*	E11	2008	TE	14	3,000	Xstrata Bulga Coal Management P/L
Bulga Mine Water	E11	-	TE	20	3,000	Xstrata Bulga Coal Management P/L
Bulga Old Tailings*	E11	1981	TE/Claylined	14	1,750	Xstrata Bulga Coal Management P/L
Bundanoon*	G10	1959	VA	35	2,000	Wingecarribee Shire Council
Burrendong*^ [R]	E9	1967/2011	TE/ER	76	1,190,000	State Water Corporation
Burrinjuck*	H8	1928/57/95	PG	93	1,026,000	State Water Corporation
Cadia North Waste Dump Detention Basin	F8	2003	ER	18	50	Cadia Holdings Pty Ltd
Cadia Southern Tailings Storage Facility*^	F8	2001-	TE/ER	67	64,000	Cadia Holdings Pty Ltd
Cadia Tailings*^	F8	1997-	ER	73	93,000	Cadia Holdings Pty Ltd
Cadiangullong*^	F8	1997	PG	43	4,200	Cadia Holdings Pty Ltd
Camberwell Tailings 2*^	E11	1995/2004	TE/ER	33	5,300	Integra Coal Operations Pty Ltd
Cambewarra [I]	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	1915	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	94,000	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
Central Garden Detention Basin	G10	-	TE	3.8	40	Holroyd City Council
Chaffey*	D11	1979/2004 /11	TE/ ER	56	62,000	State Water Corporation
Chichester*	E11	1923/84 /95/2003	PG	44	22,000	Hunter Water Corporation Ltd
Chifley*	F9	1957/2001	TE	35	31,000	Bathurst Regional Council
Chinamans	G8	-	TE	4.5	65	Young Shire Council
Clarrie Hall* [M]	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
Clear Paddock Creek Basin W3	F10	2010	TE	2.6	47	Fairfield City Council
Coalcliff*	G10	1971/98	TE	9	97	Illawarra Coke Company
Cochrane*	I9	1958	TE	29	4,320	Eraring Energy
Colongra Creek Ash*	F11	1965	TE	5.7	5,500	Delta Electricity
Comberton Grange Ret. Basin^	G10	1991	TE	15	65	Shaolin Temple Foundation (Australia) Ltd
Comin Place Detention Basin	F10	2000	TE	4.5	20	Fairfield City Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Company*	F8	1867/2005	TE	5	95	Weddin Shire Council
Copeton*^ [R]	B10	1976/2012	TE/ ER	113	1,360,000	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	11.5	6,600	Barrick (Cowal) Ltd
Cowal Southern Tailings Dam^	F7	2007	TE	15	14,500	Barrick (Cowal) Ltd
Cowarra Creek Tailings* [M]	H9	1986/11	ER	23	52	NSW Department of Industry & Investment
Cowarra*^	D12	2002	TE	41	10,000	Port Macquarie Hastings Council
Crookwell	G9	1937	PG/VA	15	450	Upper Lachlan Shire Council
CSA South Tailings*	D5	1960/71 /2007	TE	16	6,000	Cobar Management Pty Ltd
CSIRO Retarding Basin^	F10	1993/2003	TE	6	124	Stockland
Cumnock Tailings Storage Facility	E10	-	ER	10	1,500	Ravensworth Operations Pty Ltd
Daintree Drive Lower^	G10	Pre-2000	TE	4.8	21	Mr S L & Mrs D Caunt
Daintree Drive Upper^	G10	Pre-2000	TE	4.5	17	Mr S J Harrison & Ms G J Staniforth
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	Cortona Resources Limited (t/a Big Island Mining)
Dartbrook Mine Water*	E10	2000/06	TE	11	450	Anglo Coal (Dartbrook Management) 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*[M]	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 In-Pit Long Term TSF	E10	-	ER	45	5,000	Anglo Coal (Drayton Management) Pty Ltd
Drayton In-Pit Temporary TSF	E10	-	ER	30	460	Anglo Coal (Drayton Management) Pty Ltd
Drayton Water Supply*	E10	1980	TE	13	780	Anglo Coal (Drayton Management) 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	Duralie Coal Pty Ltd
Duralie Coal Auxiliary Dam No. 2	E11	2011	TE	30	2,700	Duralie Coal Pty Ltd
Duralie Coal Mine Water*	E11	2003	TE	18	1,200	Duralie Coal Pty Ltd
Edgewood Detention Basin^	G10	2002	TE	4.8	17.5	Wollongong City Council
Edgeworth Detention Basin	E11	-	TE	2.6	12	Lake Macquarie City Council
Edmondson Park Basin 12	F10	-	TE	3.9	48	Liverpool City Council
El Karros [I]	E11	1995	TE	20	200	Mawipalivier Pty. Limited
Elura Tailings	E11	1997	TE	8	10,000	Endeavor Operations Pty Ltd

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Emigrant Creek*	A13	1968/2002	TE/ PG	13	820	Rous Water
Emma James Basin	A13	-	TE	3.6	14	Gosford City Council
Eraring Ash*^	F11	1982	TE	25	21,000	Eraring Energy
Eraring Attemperating Cooling Water*	F11	2010	TE	32	820	Eraring Energy
Eucumbene*	I8	1958	TE	116	4,800,000	Snowy Hydro Limited
Fitzroy Falls*	G10	1974	TE/ ER	14	236,000	Sydney Catchment Authority
Floraville Road Det. Basin	F11	1992	TE	7	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	1982/97	TE	4	17	Wollongong City Council
Fountaindale* [I]	G10	1915	VA	15	61	Kiama Municipal Council
Fox Hills Retarding Basin^ [R]	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	10	Lake Macquarie City Council
Geehi*	I8	1966	ER	91	21,000	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
Ginkgo Sand Overburden Storage Facility	F2	2007	TE	14.5	1.5	Bemax Resources Limited
Glenbawn*	E10	1958/88	TE/ER	100	750,000	State Water Corporation
Glenlee Tailings [I]	G10	1983	TE	23	90	Sada Services Pty Ltd
Glenmore Park Retarding Basin 4	F10	1997	TE	5.5	270	Penrith City Council
Glennies Creek* [M]	E11	1980-83	DR	67	283,000	State Water Corporation
Glenquarry Cut Control Structure	G10	1974	PG	18	34,200	Sydney Catchment Authority
Gooden Reserve Detention Basin	F10	1997	PG	5	380	The Hills Shire Council
Googong*	H9	1977/92 /2011	ER	66	124,000	ActewAGL
Gosling Creek [M]	F9	1890	PG	8	650	Orange City Council
Grahamstown* [I]	E11	1964/96 /2001/05	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
Hillgrove Eleanora*	C11	1980	TE/ER	10	68	Straits (Hillgrove) Gold Pty Ltd
Hillgrove Tailings No. 1* [M]	C11	1982	TE/ER	45	1,200	Straits (Hillgrove) Gold Pty Ltd
Hillgrove Tailings No. 2*	C11	2007	TE/ER	15	280	Straits (Hillgrove) Gold Pty Ltd
Honeysuckle Creek^	F11	1984/91	PG	9.3	12	Killara Golf Club Ltd

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Horningsea Park Detention Basin	G10	2011	TE	3	25	Liverpool City Council
Howell Close Retarding Basin	F11	1986	TE	2.5	4.6	Pittwater Council
Hoxton Park Basin 6	F11	2012	TE	5	137	Liverpool City Council
Hume* [R]	I7	1936/67 /87/2003/11 /2012	PG/TE	51	3,040,000	Murray-Darling Basin Authority
Humphries Creek Tailings* [M]	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	2011	TE	8	775	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	81	Kiama Municipal Council
Jindabyne*	I8	1967/2010	ER	72	690,000	Snowy Hydro Limited
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*^ [R]	C10	1960/2011	PG/ TE	55	424,000	State Water Corporation
Kempfield Tailings Storage Facility	F9	-	TE	44	12,700	Argent Minerals Ltd
Kentucky Creek	C11	1942/84	PG	12	500	Uralla Shire Council
Khancoban* [M]	I8	1966	TE	18	21,500	Snowy Hydro Limited
Killara Reservoir*	F11	1930/95	PG/ TE	11	166	Sydney Water Corporation
Lake Canobolas*^ [M]	F9	1918	VA/PG	13	450	Orange City Council
Lake Endeavour* [M]	F8	1940	TE	21	2,400	Parkes Shire Council
Lake Ettamogah Winter Storage*	H6	1994	TE	13	2,100	Norske-Skog Paper Mills (Australia) Ltd
Lake Inverell*^	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*^ [M]	F9	1954	CB/TE	20	4,000	Central Tablelands Water
Lake Tullimba	C11	1982	TE	18	1,200	University of New England
Lemington Mine Tailings	E10	1991	TE/ ER	8	1,000	Coal & Allied Operations Pty Ltd
Lemington No.5 Tailings	E10	2000	ER	15	2,000	Rio Tinto Coal Australia Pty Ltd
Lidcombe Basin No. 6^	F11	2003	TE	3.6	11	Australand Industrial Pty Ltd
Liddell Ash Disposal*	E10	1971/82	TE	41	28,500	Macquarie Generation
Liddell Ash Levee*^	E10	1988/ 2003/12	TE/ER	16	29,000	Anglo Coal (Drayton Management) Pty Ltd
Liddell Cooling Water*	E10	1968	TE	44	150,000	Macquarie Generation
Liddell Water Supply*	E10	1970	TE	31	4,500	Macquarie Generation

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
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	1971	TE/ ER	38	20,000	State Water Corporation
Loyalty Road Retarding Basin	F11	1996	PG	30	1,500	Sydney Metropolitan CMA
Lyell*^	F10	1983/96	ER	50	34,000	Delta Electricity
Malpas*^	C11	1968	TE/ ER	31	12,300	Armidale Dumaresq Council
Mangoola Coal Raw Water*^	E10	2010	TE/ER	26	2,500	Xstrata Mangoola Coal Pty Limited
Mangoola Pit Water dam*^	E10	2010	ER	12	1,700	Xstrata Mangoola Coal Pty Limited
Mangoola Start-Up tailings dam*^	E10	2011	ER	24	6,600	Xstrata 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	Aston Coal 2 Pty Ltd
Maules Creek Mine - RWD2	C10	-	TE	6	200	Aston Coal 2 Pty Ltd
McCoy Park Retarding Basin^	F11	1987	TE	5.5	415	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* [M]	E2	1960	TE	15	2,270,000	State Water Corporation
Minmi Road Detention Basin^ [R]	E11	1995	TE	4	16	Newcastle City Council
Molong Creek*^ [I]	F9	1986	PG	16	1,000	Cabonne Council
Moolarben Creek*	E9	1957/95	DR	10	375	Ulan Coal Mines Limited
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	14	2,500	Xstrata Mt Owen Pty Limited
Mount Owen Rail Loop Tailings*	E10	2003	TE	11.7	5,000	Xstrata 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	Mt. Arthur Coal, BHP Billiton
Mt Arthur Tailings Storage Facility*	E11	-	ER	90	112,000	Hunter Valley Energy Coal Pty Ltd
Mt Thorley 24 Ministrip Dam	E11	2005	ER	50	2,500	Rio Tinto Coal Australia Pty Ltd
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 North Out Of Pit Water	I8	2011	TE/ER	10	650	Rio Tinto Coal Australia Pty Ltd
Mt Thorley South Out Of Pit Water	D10	2011	TE/ER	20	1,800	Rio Tinto Coal Australia Pty Ltd
Muirfield Golf Club [R]	F11	1969/85	TE	7	19	Muirfield Golf Club Limited
Muirfield Golf Course Detention Basin	F11	1969/93	TE	4	12	The Hills Shire Council

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
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
Narara Horticultural*^ [R]	F11	1985	TE	9	43	Gosford Primary Industries Institute
Narranbulla	G9	1966	TE	7.3	1,450	Narranbulla P/L
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	5,000	Centennial Newstan
Nixon	C10	1971	TE	16	220	J. Nixon
North Turramurra Golf Course	F11	2001	TE	3.4	10	Ku-ring-gai Council
Northmead Reserve Detention Basin	F10	1990/94	TE	6	30	The Hills Shire Council
Northparkes E27 - Estcourt Tailings*^	E8	-	TE/ER	20	34,000	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	Country Energy
Oberon*	F9	1946/57/ 1996	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
Pacific Palms [I]	E12	1975	TE	6	8	Calmjoy P/L
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	Not in 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	PG/TE	5	570	Sydney Water Corporation
Prospect*^ [R]	F10	1888/79 /97	TE	26	50,000	Sydney Catchment Authority
Puddledock Creek^ [M]	C11	1928	VA	19	700	Armidale Dumaresq Council
PWCS Fines Disposal	E11	1990	TE	5	1,800	Port Waratah Coal Services Limited

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Quipolly* [R]	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 Tailings - Saddle Dam*	E11	2007/09	TE/ER	10	5,000	Ashton Coal Operations Ltd
Ravensworth Void 5*	E11	-	TBA	70	12,000	Macquarie Generation
Redbank Creek*^ [R]	E9	1899/2011	VA	16	180	Mid-Western Regional Council
Rocky Creek*	A13	1953/2011	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
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	Delta Electricity
School House Creek Basin	F10	1989	TE	7	65	Penrith City Council
SE Tailings Storage*	E10	2002-	ER	35	1,200	Rio Tinto Coal Australia Pty Ltd
Seladon Avenue Ret. Basin	E11	1994	TE	1.3	3	Newcastle City Council
Shannon Creek	B12	2007	TE	51	30,000	Clarence Valley Council
Shellcove Estate Detention Basin 1^	G10	2003	TE	5	2	Shellharbour City Council
Shellharbour City Centre Basin	G10	2001	TE	4.6	50,000	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	26	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	725	Bemax Resources Limited
Sooley*^	G9	1930/61 /2005/10	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	Gujarat NRE Minerals Limited
Spagnolos Road Detention Basin	C13	-	TE	5.5	200	Coffs Harbour City Council
Split Rock*^	C10	1988/2012	DR	66	400,000	State Water Corporation
Spring Creek*^	F9	1931/47 /69	TE/VA	16	5,000	Orange City Council
St Josephs School Retarding Basin	G10	1990/2001	TE	5	16	Shellharbour City Council
Stephens Creek* [M]	D1	1892/1909	TE	15	20,000	Essential Water
Steuart McIntyre Dam*	D12	2000	TE	24	2,500	Kempsey Shire 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

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
Talbingo [R]	H8	1970	ER	162	921,000	Snowy Hydro Limited
Tallong Railway*^	G10	1883/1917/75	MB	5	70	State 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	Delta Electricity
Thornleigh Reservoir*	F11	1971	ER	14.3	400	Sydney Water Corporation
Tilba* [I]	I10	1970/94 /97/2003 /2003	TE	18	140	Bega Valley Shire Council
Timor	D9	1962	VA	19.5	1,100	Warrumbungle Shire Council
Tomingley Residue Storage Facility	E8	-	ER	15	133	Tomingley Gold Operations Pty Ltd
Tooma*	I8	1961	TE	67	28,000	Snowy Hydro Limited
Toonumbar*	A12	1971	TE/ ER	44	11,000	State Water Corporation
Triako Tailings*	E6	1989	TE	24	2,000	Kimberley Metals Limited
Tritton Tailings Dam	D6	2004	TE	14.5	5,500	Tritton Resources Limited
Tumbarumba	H8	1972/99	TE	10	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	12	400	United Collieries Pty Ltd
Upper Cordeaux 2*	G10	1915	VA	21	1,200	Sydney Catchment Authority
Upper Rodds Creek	F8	2001	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	42,000	Delta Electricity
Valley View Detention Basin	F8	2005	TE	5	10	Cowra Shire Council
Wallerawang*	F10	1978	TE	14.4	4,300	Delta Electricity
Wambo Chitter Dump Water Dam*	E11	2011	TE	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	2011	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	TE/ER	59	9,300	Rio Tinto Coal Australia Pty Ltd
Warraderry Street Detention Basin	E9	-	TE	2	10	Weddin Shire Council
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

Dam	Map Ref	Built	Type	Height (m)	Storage (ML)	Owner
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
Whitford Road Retarding Basin	F10	1997	TE	1.6	40	Liverpool City Council
Widemere Detention Basin^	F11	2009	TE	6.5	150	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
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	5	80	Hunter Water Corporation Ltd
Wingecarribee* [R]	G10	1974/2012	TE/ER	19	34,500	Sydney Catchment Authority
Wollondilly Washery 1*	G10	1968/98	ER	18	70	Burragorang Valley Coal Pty Limited
Wollongong High School Retarding Basin	G10	1993/2001	TE	5	80	Wollongong City Council
Wonawinta Tailings	E5	-	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*^ [R]	F8	1971/2011	TE/ ER	85	1,200,000	State Water Corporation
Wyong Road Detention Basin	F11	1975	TE	2.7	150	Wyong Shire Council
Yarrawonga Weir*	I6	1939/2001	PG/TE	7	117,600	Murray-Darling Basin Authority
Yass*	G8	1927	VA/PG	12	875	Yass Valley Council
Yellow Pinch* [I]	I9	1987	ER	40	3,000	Bega Valley Shire Council
Young Retirement Village Basin	G8	-	TE	5	21	Southern Cross Care

LEGEND:

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

* : Dams with Notification Areas	^ : DSC inspected – 2011/2012	- : Not Built
[I]: Dam under investigation	CB: Concrete buttress	PG: Concrete Gravity
[M]: Medium Risk Dam	DR: Decked rockfill	TE: Earthfill dam
[R]: Significant Risk Dam	ER: Rockfill dam	VA: Concrete arch
	MB: Masonry buttress	

Molong Creek Dam
The 16m high concrete dam provides Molong's water supply. The DSC has requested Cabonne Council to review the dam's stability in the light of new flood and foundation pressure information.

Lake Rowlands Dam. *This 20m high concrete buttress dam provides water supply for towns in the central west of NSW. The DSC has requested the owner to investigate options to upgrade the dam to meet current flood safety criteria.*

Lake Pambulong Detention Basin. *The 5m high basin on the outskirts of Newcastle is in a neglected state and the DSC has requested the basin's owner to review its safety and advsise of any necessary works to upgrade the basin.*