

Dams Safety Committee

Annual Report

2008/2009



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: *Emigrant Creek Dam. DSC members and staff inspected this upgraded 12m high concrete gravity dam near Ballina after severe local flooding in early 2009.*

NOTE: The DSC has printed, in-house, 200 copies of this report for distribution to Parliament, relevant organizations, and the public, at a cost of \$900.00 (ie \$4.50 per copy).

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NEW SOUTH WALES

ABN 55 079 703 705

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Minister for Water
Parliament House
SYDNEY NSW 2000

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PARRAMATTA NSW 2124
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Our Ref: 10.102.007

Dear Mr Costa,

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 2009.

This Annual Report has been prepared in accordance with the *Annual Reports (Statutory Bodies) Act 1984* and the *Annual Reports (Statutory Bodies) Regulation 2005*.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Brian Cooper'.

Brian Cooper
Chairman

A handwritten signature in black ink, appearing to read 'Jeffrey Gleeson'.

Jeffrey Gleeson
Deputy Chairman

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Overview by Chairman

Our Objectives

The NSW Dams Safety Committee's mission is to develop and implement effective policies and procedures for:

- dams safety; and
- mining that could affect dams or stored waters.

The Dams Safety Committee (DSC) follows a goals-based approach to dam safety to ensure that risks to community interests from dams are tolerable, kept under regular review, and further reduced where reasonably practicable. Tolerable risk levels take account of modern industrial safety regulation principles, international dam safety practices, and Australian National Committee on Large dams (ANCOLD) guidelines. A prescribed dam is considered safe if it meets the DSC's requirements.

No prescribed dam has failed but there have been some safety-related incidents in NSW and there are continuing dam failures in other States and overseas, including the developed Western democracies. To keep dam failure risks tolerable it is internationally recognized that systematic dam safety programs are needed involving risk assessment, responsible operations, maintenance and emergency preparedness practices, regular surveillance, periodic safety reviews and implementation of necessary risk reduction measures. Owners of prescribed dams have such programs in place.

For the effects of mining on stored waters or dam structures, there is limited guidance from international practice. Over time, the DSC has extended the existing scientific knowledge of these effects through careful monitoring of mining around NSW dams. The resulting DSC requirements enable the extraction of coal and mineral resources from more extensive and challenging mining operations around and under dams, with minimal effects on the dams and their storages, and significant economic benefit to the State.

Targets

Targets are in Sub-section 5.2, Table 2, of this report. The main focus is on maintenance of the Surveillance Report program 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 any issues in a timely manner.

Highlights

The DSC managed an unprecedented workload within its modest budget (see Figure 1).

The DSC completed a strategic planning review by developing a five-year strategic plan to ensure DSC operations remain appropriate in the contemporary societal environment.

Following the Government's endorsement in 2006 of the DSC's *Risk Management Policy Framework for Dam Safety*, the DSC has largely completed the first suite of Guidance Sheets to guide dam owners and their consultants in the new DSC approach to dam safety management. Consultative drafts were released to representative stakeholders for comment during the year and the resulting feedback is being incorporated in these sheets. The DSC also continued preparing new Guidance Sheets dealing with dam security, spillway control structures and community consultation.

A safety improvement proposal was finalized for Redbank Creek Dam, and a safety upgrade was commenced on Blowering Dam. There were further detailed investigations and design of upgrading options for Hume and Keepit Dams. The DSC commends the owners for their commitment to public safety. Planning of risk reduction for other dams continued.

Around the world, there were damaging floods and earthquakes as well as dam failures with loss of life, but there were no such incidents in NSW. Though no dam failed, the May 2008 Magnitude 7.9 earthquake in Sichuan Province, China, damaged some 1,500 dams, some seriously. Significant dam failures during the year included:

- Kentucky, USA, Dec. 2008 - Failure of a large power station ash dam with extensive damage; and
- Bedford Weir, QLD, Australia, Nov. 2008 - Failure of inflatable spillway killed one person and injured others.

Mining around stored waters continued at an unprecedented level throughout the year, without any significant adverse effects and the DSC established a significant number of new mining Notification Areas around dams. Under DSC oversight, over 13.5 million tonnes of coal was won from under and near dams – in line with the significant tonnage of the previous year and over thirty times the tonnage of 2003/2004. The Dendrobium Mine completed the successful extraction of two further longwall panels without adverse effects on the reservoir of Cordeaux Dam.

All targets were substantially met although some Surveillance Report submissions were late. DSC follow-up action, combined with planned additional resources, is expected to improve the situation in the coming year.

Our People

The DSC members kept their knowledge up-to-date by professional technical activities external to the DSC. The DSC has members on the Board of the Mine Subsidence Technological Society and Engineers Australia, and continues to be involved in ANCOLD 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 2008 ANCOLD Conference on Dams in Queensland. 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 and refresher courses.

Len McDonald stepped down from his role as DSC Chairman during the year and retired from the DSC in June 2009. Len has provided outstanding service during his 22 years on the DSC. Adrian Williams and Ross Barrie also retired from the DSC in late 2008 after significant roles and service with the DSC. Everyone on the DSC wishes them well in their retirement. Norm Himsley retired from his role as Executive Engineer on the DSC in mid 2009 after 23 years service with the DSC and has been nominated to succeed Len McDonald as the Engineers Australia nominee on the DSC.

Once again, the DSC wishes to record its appreciation of the dedication, loyalty and innovation of its staff in meeting a large workload with few people. To assist in these matters the DSC office was upgraded during the year to promote greater efficiencies.

Our Stakeholders

The DSC values a good working relationship with dam owners, mining companies, and their consultants. By this means the DSC can 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 recognize their responsibilities and liability, and have a strong commitment to dam safety. Regular contact with dam owners and mining companies gives the DSC an opportunity to gauge the level of satisfaction of these key stakeholders.

Education of dam owners and operating staff is especially valuable in improving dam safety. The DSC has embarked on a complete revamp of its Guidance Sheets. Current sheets remain available to stakeholders on the DSC's web site and the draft revised sheets will be posted on the site for a period before final adoption. The DSC also assists stakeholders in obtaining relevant dam safety literature and, as in previous years, dam operator training courses were conducted jointly with Department of Water and Energy personnel this year in December 2008, February 2009 and April 2009.

The Future

The DSC has effectively completed incorporating the safety principles of its new policy framework into a first suite of revised and new Guidance Sheets. Stakeholder consultation and the subsequent finalization of these sheets will be a priority effort in the coming year. The DSC will continue to engage with other NSW safety, environmental and economic regulators to ensure guidance sheets fit within a consistent regulatory approach.

Support of research on dam related matters will continue. The approach to assessment of piping (internal erosion) safety being developed at the University of New South Wales with DSC support is now being trialled by major US Federal dam owner agencies such as the Army Corps of Engineers and the Bureau of Reclamation.

The DSC will continue to strengthen its information exchange program with other State dam safety regulators on those dams whose failure would adversely affect NSW communities and on allied regulatory matters.

The DSC's 2009/2014 strategic plan will be implemented progressively and efforts will continue in the search for a budgetary mechanism that can cope with marked fluctuations in mining activity. In addition, the DSC is investigating strategies to deal with impending generational change impacts on the DSC.

When the overhaul of the DSC policy framework and the development of detailed safety benchmarks and guidance are completed, New South Wales will be a world leader in dam safety management.

The risk posed by dams in NSW are being steadily reduced. Dam safety management programs are well established for all prescribed dams and will be further improved. 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 still need further risk reduction as soon as reasonable practicable in accordance with programs agreed with the DSC. The status of dam safety in NSW now compares very favourable with that of the best dam safety programs world-wide.



Brian Cooper, Chairman

1. Charter



Lostock Dam

The DSC has approved a revised surveillance program for this 38m high earth and rockfill dam near Dungog.

The DSC is required to “formulate measures to ensure the safety of dams in NSW”

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

In the 1970's, international concern at 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?

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 346 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 organizations (eg mining companies) undertaking significant activities near their storages, conform to appropriate safety benchmark throughout each dam's life.

The DSC's aim is that the risks from dams to the community and to the environment will be tolerable 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 develop and implement effective policies and procedures for dams safety, and for mining that could affect dams or their stored waters.”

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

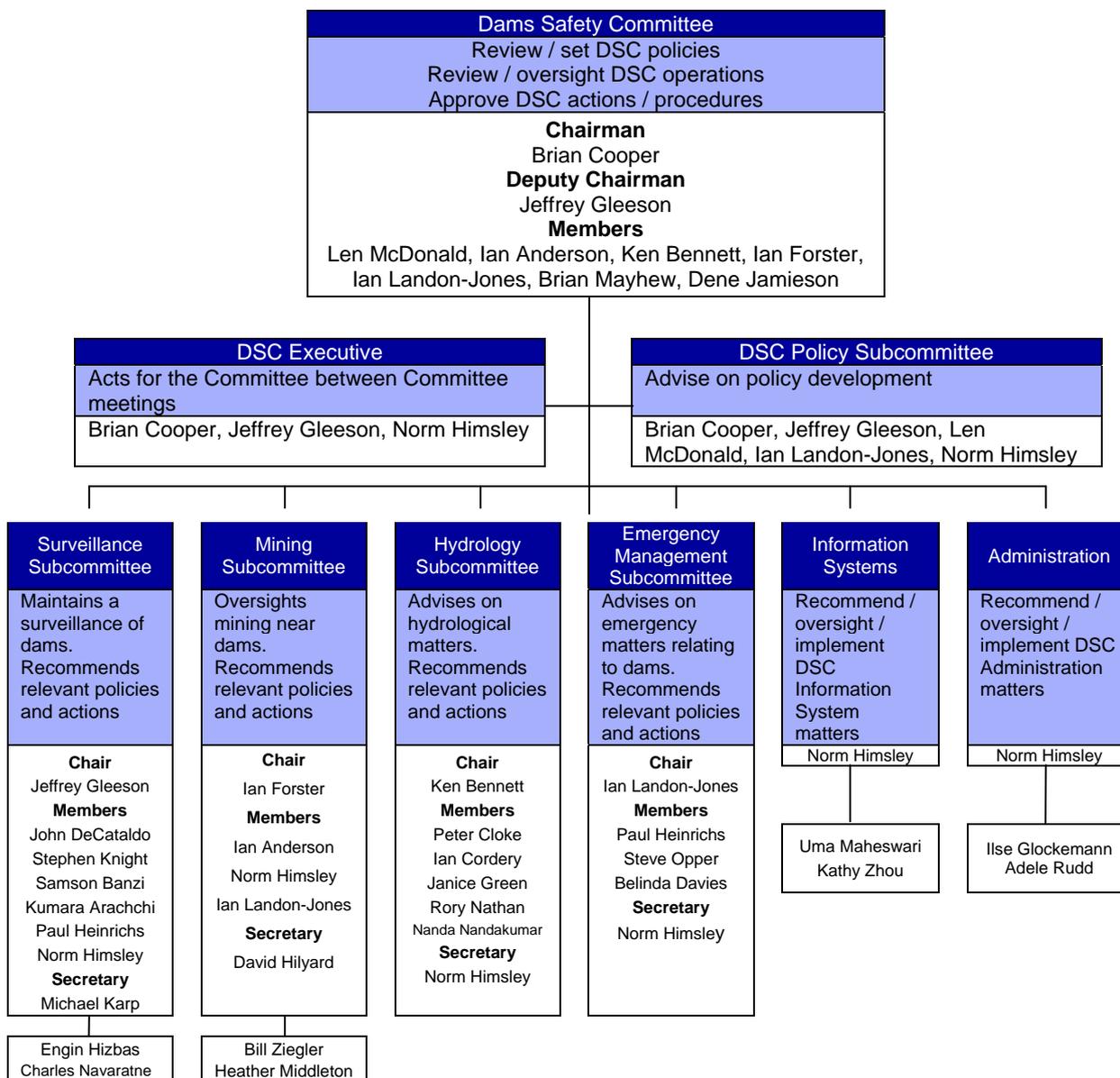
- Protect the safety, welfare and interests of the community from dam failure by formulating measures to ensure that risks from prescribed dams remain tolerable over the long-term, that the risks are regularly reviewed, and further reduced if reasonably practicable;
- Maintain an ongoing surveillance 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.

4. Management and Structure

The DSC is a small statutory body with negligible assets or property. It uses staff provided through the Department of Water & Energy and hires contract staff when 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 organization with most business dealt with initially by its Sub-committees, which report to Committee meetings.

Dams Safety Committee Organization Chart

(as at 30 June 2009)



4.1. Committee Members

The DSC's nine part-time members are appointed by its Minister 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.



Len McDonald



Brian Cooper



Adrian Williams



Ian Anderson



Ross Barrie



Ian Forster



Jeffrey Gleeson



Ian Landon-Jones



Brian Mayhew

Committee membership during 2008/2009, with brief member biographies, was as follows:

Leonard McDonald, BE, MEngSc, FIEAust, CPEng, LGE (appointed to June 2009). Chairman until 30 March 2009, Nominee of Engineers Australia. Initially appointed 1987. He took over the Chairmanship of the DSC in mid-1997. Len has practised as a private dam consultant since his retirement from the NSW Department of Public Works and Services and has thirty-three years continuous experience in dams engineering with involvement as a full-time specialist in the design and safety evaluation of many dams. He was the Assistant Secretary to ANCOLD and a member of the ICOLD Committee on Dam Safety.

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 Department of Commerce and now practices as a private dam safety consultant with over thirty 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 2009). 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 Chairman of the DSC's Surveillance Sub-committee.

Adrian Williams, BE, FIEAust, CPEng (retired in December 2008). Nominee of Engineers Australia. Initially appointed 1986. Adrian was General Manager, Dam Safety in the SCA until retiring in December 2000. He had over thirty years investigation, design and construction experience with dams, through work with AWT/Sydney Water and the former Water Conservation and Irrigation Commission. He is a past Chairman of ANCOLD, past Vice-President of ICOLD and was Chairman of the DSC's Hydrology Sub-committee.

Ian Anderson, BE (Hons1), ME (Mining), Certificated Coal Mine Manager, Undermanager & Mines Rescueman, Qualified Mine Ventilation Officer (appointed to June 2010). Nominee of the Minister for Mineral Resources. Initially appointed 1994. Ian is a Senior Inspector of Coal Mines with the Department of Primary Industries. He has over thirty years experience in coal mining and is a member of the DSC's Mining Sub-committee.

Ross Barrie, BE, MEngSc, MBA, MIEAust, CPEng (retired in December 2008). Nominee of the Water Administration Ministerial Corporation. Initially appointed 1999. Ross was the Assets Services Manager of State Water and Chairman of the DSC's Emergency Management Sub-committee, until retiring with over thirty years water industry experience.

Ian Forster, BSc, MAIG, RPGeo (appointed to October 2011). Nominee of the State owned Electricity Generators. Initially appointed 1989. Ian is a specialist dam safety consultant with Auricon 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 (appointed to December 2012). Nominee of Sydney Catchment Authority (SCA). Initially appointed 2001. Ian is General Manager, Technical Services 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 Junior Vice Chairman of ANCOLD.

Brian Mayhew, BE (Hons1), GradDipMaths, MIEAust, CPEng (appointed to June 2011). Nominee of Snowy Hydro Ltd. Initially appointed 2007. Brian is the Manager, Civil Infrastructure and Dam Safety, with Snowy Hydro. He has over twenty-five years experience in the water and mining infrastructure fields.



Ken Bennett

Ken Bennett, BScEng (Civil), MIEAust, CPEng (appointed to Mach 2011). Nominee of the Water Administration Ministerial Council. Initially appointed 2009. Ken recently retired as the Dam Safety Manager of State Water Corporation with over thirty years dam investigation and design experience and is Chairman of the DSC's Hydrology Sub-committee.

Dene Jamieson, BE (Civil) (appointed to December 2012). Nominee of Minister for Commerce. Initially appointed 2009. Dene is a Senior Engineer in the Dams and Civil Section of the Department of Commerce with over 30 years experience in the water industry.



Dene Jamieson

4.2. Committee Staff

The Committee is assisted by a staff of eleven seconded or employed through the Department of Water and Energy, with temporary 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 provides an effective and efficient service to the DSC's functions. During the year the DSC staff comprised:



Norm Himsley

Executive Engineer: Norman Himsley

BE, MEngSc, GradDipBus, FIEAust, CPEng (seconded 1986). Norm has over thirty years, design, construction and management experience in dams and engineering services.



Charles Navaratne

Surveillance Engineer: Michael Karp

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



Michael Karp

Engineering Geologist and Information Systems Coordinator:

Peter Reid (on extended leave from January 2009)

BSc BA (seconded 1987). Peter has over twenty years mining and geological experience and extensive IT experience.



Bill Ziegler

Manager Mining Impacts: David Hilyard

(filling mining role of Reid during his absence)

BA (Hons), MAppSci (started 2003). David has over thirty years mining and geological experience.



Peter Reid



Heather Middleton

Tailings Dam Engineer: Engin Hizbas

BE, MIEAust, CPEng (seconded 2003).

Small Dams Engineer: Charles Navaratne

BScEng (Hons), CEng, MIE (started April 2009).



David Hilyard

Mining Project Officer: Bill Ziegler

BE (started April 2008).



Ilse Glockemann

Project Officer – Mining Regulation: Heather Middleton

BSc (started May 2009 as assistance during Reid's absence).



Engin Hizbas

Administrative Officer: Ilse Glockemann

(Seconded 1995).

Information Systems Officer: Uma Maheswari

(Seconded 2001).



Uma Maheswari



Kathy Zhou

Database Support Officer: Kathy Zhou

(started December 2006).

Clerical Support Officer: Adele Rudd

(started April 2008).



Adele Rudd

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 organization chart (see page 6).

Mr Himsley 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 Dungog and Tenterfield, in association with dam inspections. Attendance at Committee meetings was as follows:-

- Mr L.A. McDonald attended 7 out of 8
- Mr A.C. Williams attended 3 out of 4
- Mr I. Forster attended 8 out of 8
- Mr I. Anderson attended 7 out of 8
- Mr J. Gleeson attended 7 out of 8
- Mr R. Barrie attended 4 out of 4
- Mr B. Cooper attended 8 out of 8
- Mr I. Landon-Jones attended 7 out of 8
- Mr B. Mayhew attended 7 out of 8
- Mr. D. Jamieson attended 4 out of 4
- Mr. K. Bennett attended 4 out of 4

5. Summary Review of Operations

“provision of a suite of Guidance Sheets to assist dam owners...in incorporating risk assessment practices into dam safety management”



Tillegra Dam

DSC members and staff inspecting the site geology for this proposed 70m high decked rockfill dam near Dungog.

“commencement of the upgrading of Blowering Dam”

“DSC updated its record, website and database system”

5.1. Major Achievements for 2008/2009

During the year the following milestones and deliverables were attained:

- Management of a substantially increased workload largely due to the current mining boom, within a modest budget (see Figure 1);
- Significant progress in the provision 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, following the policy framework endorsed by the NSW Government in August 2006;
- Further progress in reducing the risks posed by deficient dams in NSW with the commencement of upgrading of Blowering Dam and finalization of the upgrading proposal for Redbank Creek Dam;
- Substantial compliance with core business activities, as in Table 2 following;
- Completion of a strategic planning review by developing a five-year strategic plan to ensure the DSC operations remain appropriate;
- Investigation and approvals for an unprecedented number of technically challenging applications for coal mining near dam storages;
- Running of three training courses for dam operators and assisting major dam owners in their training programs;
- Upgrading and consolidation of the DSC office and computer systems;
- Upgrading and documentation of DSC procedures;
- Substantial progress on compiling new Guidance Sheets on dam security, spillway control structures and community consultation, and
- Provision of a new DSC website and upgrading the DSC’s record and database systems.

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 organization, 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 DWE’s funding allocation while new funding strategies are being explored with Treasury.

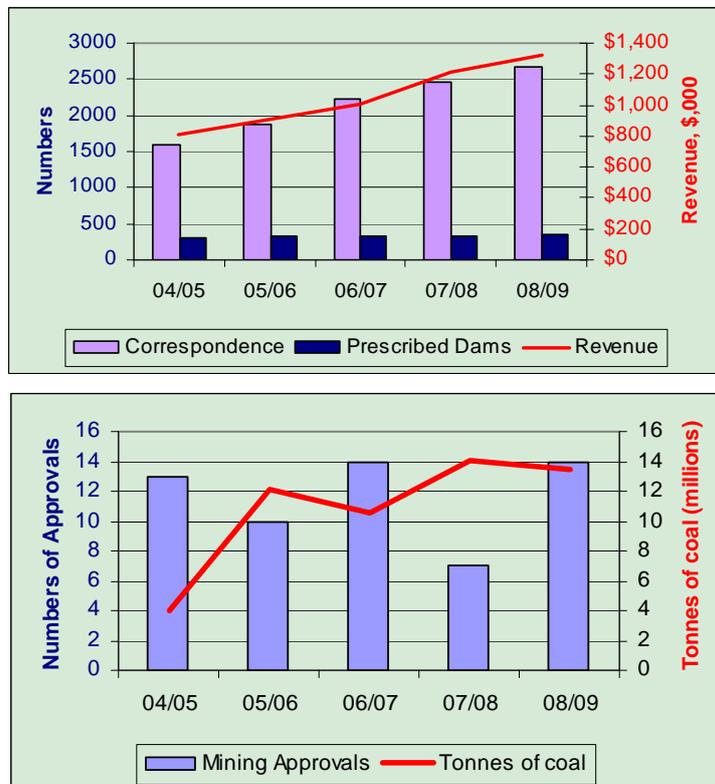
Table 1 – 2008/09 Budget Highlights

Item	\$
Budget	1,320,000
Actual Income	1,332,000
Actual Expenditure	1,335,000

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 (18) yearly	Number inspected this year	10 (Below average)
5	Inspect medium risk dams (15) every 2-3 years	Number inspected this year (average 6 per year)	3 (Below average)
6	Inspect low risk dams (296) every five years	Number inspected this year (average 59 per year)	56 (Good)
7	Request programs for preparation of dam safety documentation for each dam	Percentage of dams with documentation requested	100% (Excellent)
8	Update DSC information material every 2 yrs	Time since last update issued	Preparing updates for website review (Good)
9	Provide at least one dam safety education course in NSW each year	Number of courses this year	3
10	Compliance with approved DSC budget	Percentage deviation	<1% (Excellent)
11	Surveillance Sub-committee	Subjective based on policy progression, reports reviewed (average 68 reports/yr) and follow ups	Satisfactory, for high workload but reports down (57)
12	Mining Sub-committee	Subjective based on monitoring compliance, matters followed up and mining impacts as predicted	Satisfactory, given high workload
13	Hydrology Sub-committee	Subjective based on policy progression, research oversight and updating of procedures	Satisfactory
14	Emergency Management Sub-committee	Subjective based on policy progression, coordination of matters and emergency plans implementation	Good
15	Compliance with Records Management Standards	Subjective based on progression in updating procedures and systems, and programs achieved	Good
16	Administration	Subjective, based on meeting HR, accounting and logistical needs of the DSC	Good

Figure 1-DSC Summary Statistics



6. The Future

6.1. Dams Safety Management

The DSC sees that the number of dams in NSW will continue to grow and existing dams will continue to have 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:

- Continue with its dam safety policy development, with a view to having Guidance Sheets on updated safety requirements (eg *Management of Dam Safety Risks and Demonstration of Dam Safety*) in place in late 2009. These are part of a revised suite of 24 Guidance Sheets;
- Continue to engage with other NSW safety, environmental and economic regulators, such as Department of Environment and Climate Change and Department of Planning to ensure that DSC requirements fit within a consistent regulatory framework;
- Continue liaison with dam safety regulators in other States;
- Circulate proposed Guidance Sheets on the DSC website to allow stakeholder consideration and to receive feedback before finalization of detailed safety requirements.
- Finalize new Guidance Sheets on spillway control systems, community and other stakeholder consultation and dam security in late 2009;
- 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;
- Continue support of research into dam safety risks, in particular methods for assessing the vulnerability of dams to piping (internal erosion);
- 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;
- Maintain the program to ensure dam owners have in place current Operation and Maintenance Manuals for their dams;
- Maintain liaison with NSW dam owners and continue the emphasis on education, including arranging training courses for dam personnel. The DSC will also arrange staff presentations at meetings and conferences on relevant 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 catchment/storage management and flood warning, and to assist in flood analysis and design. The DSC will continue to promote research into flood estimation and probability;
- 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; and
- Review and update DSC internal management procedures.

“DSC requires NSW dams to present a tolerably low risk to downstream residents, property, the environment and associated community interests”

“The DSC will continue to monitor activity programs for safety improvements to NSW dams”

“DSC will seek to have updated and new Guidance Sheets in place on key revised policy aspects during the coming year”

6.2. Mining Management near Dams

The current world economic situation has had no significant effect on coal mining in NSW and, as one mining project winds down, more major projects are planned to start. There is also a lag time between the cessation of mining and of monitoring, so it is likely the current high workload will continue for some years. The DSC is exploring alternative funding options to resource its predicted ongoing high operational workload and has re-prioritized certain tasks (eg a review of its mining policies was re-programmed for later in 2009).

The DSC's objective is to advise on mining regulation so as not to restrict extraction of NSW coal resources, within the constraint that risks to dams, and their stored waters, are tolerable. It continues to urge mine owners to develop a more scientific approach to prediction of the effects of mining, with the result there has been an increasing sophistication of mining applications reviewed by the DSC. At the same time, DSC staff have been developing more sophisticated risk analysis tools as an aid to managing the impacts of mining. In addition, improved knowledge and technology is resulting, over time, in the DSC having improved confidence to support the extraction of extra coal from under NSW storages, in situations where mining would not have been approved in earlier years.

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

- Investigate and progressively implement applications of risk management to various aspects of mining developments, and monitor practice and update guidelines accordingly;
- 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;
- Push for adequate security deposits to be held by the State to allow for the timely implementation of dam safety mitigation works in the event that the safety of a prescribed dam or its storage is threatened by mining;
- Promote compliance within the mining industry, and understanding within other Government agencies, of the DSC's mining management requirements through SMP process involvement, and ongoing interaction with stakeholders;
- Develop a basis for funding its mining management function which allows for the variations in workloads due to potentially rapid industry changes; and
- 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

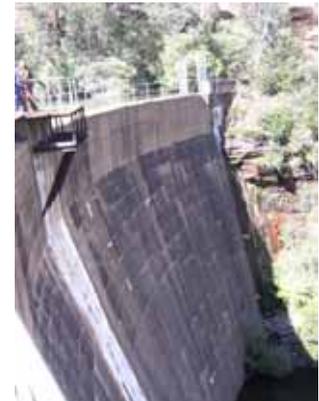
The DSC will maintain a commitment in 2009/10 to ongoing implementation of Total Quality Management principles into its business planning process, with procedures and practices formalized and updated progressively.

The Corporate Knowledge Systems Upgrading launched in 2007 will continue in 2009/10 with the new server installation being consolidated and the DSC's database on dam information upgraded, and extended, to ensure the timely provision of dam safety information. In addition, further development of the DSC's Geographical Information System is planned to support the DSC's operational needs.

Training of DSC staff will be kept up-to-date with appropriate requirements to facilitate effective and safe work practices.

The DSC will keep dam owners informed of its current requirements by regularly releasing updated Guidance Sheets on the DSC website.

“The DSC will investigate applications of risk management to various aspects of mining developments”



Lithgow 2 Dam

DSC staff inspecting this 27m high arch dam near Lithgow as a precursor to consideration of a proposed coal mining application near the dam.

“The DSC continues to urge mine owners to develop a more scientific approach to prediction of the effects of mining”

“The DSC aims to keep dam owners informed by regularly releasing updated Guidance Sheets”

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 346 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. These matters are outlined in the DSC’s Information Sheet DSC1 (currently being updated as 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 organizations 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 DSC14)
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 Information Sheets listed below & available on our website www.damsafety.nsw.gov.au. Current Information Sheets will be progressively replaced in 2009/10.

Table 3 - Information Sheets for Dams Safety

Document	Description	Update Date
DSC01	General Information	April 2005
DSC02	Role, Policies and Procedures	April 2005
DSC03	Glossary of Terms	April 1998
DSC05	Advice on Legal Matters for Dam Owners	August 1996(a)
DSC11	Acceptable Flood Capacity for Dams	Interim, June 2002
DSC12	Operation, Maintenance and Emergency Management Requirements for Dams	April 2005
DSC12-1	Addendum to DSC12	April 2003(a)
DSC13	Consequence Categories for Dams	March 2002 (c)
DSC14	Requirements for Submission of Information by Dam Owners	April 2005
DSC15	Requirements for Surveillance Reports	January 2003(a)
DSC16	Requirements for Earthquake Assessment of Dams	February 2000(c)
DSC17	Requirements for Assessment of Flood Retarding Basins	April 2005
DSC18	Dam Design and Construction Issues requiring Particular Consideration	April 2005
DSC18-1	Addendum to DSC18	April 2005
DSC19	Tailings Dams	December 2005

Note: (a) & (c) indicate revisions of initial Guidance Sheets. Date changes only when there is a Policy change.

7.1.3. Changes introduced in 2008/2009

During 2008/2009 the DSC:

- Completed drafts of new Guidance Sheets needed to outline the new DSC approach to dam safety management and to assist dam owners in the implementation of risk management for their dams. This followed the Government's endorsement of the DSC's *Risk Management Policy Framework for Dam Safety*, which provides for implementation of risk assessment methodologies into dam safety management;
- Completed new Guidance Sheet drafts replacing, and upgrading, the majority of the DSC's existing suite of Guidance Sheets under a new Index System to align with the new risk policy framework; and
- Completed drafts of new Guidance Sheets on *Spillway Control Systems*, *Community Consultation* and *Dam Security* for stakeholder review.

7.1.4. 2008/2009 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 9 dams were prescribed and 1 dam was de-prescribed, giving a total of 346 prescribed dams at June 2009 (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, 29 such submissions were processed during 2008/2009. The DSC usually confines its review to assurance that major safety criteria (eg 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 independent expert 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 check on construction and maintain close contact with, and assistance to, the owner's 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 with 11 certificates received in 2008/2009.

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 most mining and ash dams).

These reports provide information on the safety status of existing dams and are checked in a staged process by DSC staff, its Surveillance Sub-committee and then 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 reports for low consequence category dams (see DSC15, currently being updated as DSC2C).

During 2008/2009, the DSC reviewed 57 dam Surveillance Reports (Appendices A and B). This was down on the number that ought to be reviewed to avoid a backlog developing and to minimize the risks that a dam problem may go undetected. The difficulty lies with timely submission of reports by the dam owners particularly for the mining dams. The DSC has written to owners with a view to preventing a serious backlog developing and employed an additional engineer in 2009 to expedite follow-up of these matters with dam owners. 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 generally high standard and that the majority of owners are responding in a positive and responsible manner to its requirements.

"Staged implementation of risk assessment proposed for dam safety regulation"



Tenterfield Dam

DSC members and staff inspecting this 11m high concrete gravity dam as part of a combined country meeting and inspection tour.

"9 dams prescribed, 1 dam de-prescribed and 29 dam designs processed in 2008/2009"

"57 dam surveillance reports reviewed in 2008/2009"

“69 dams inspected during 2008/2009”



Spring Creek Dam

DSC staff inspecting this recently upgraded 16m high earthfill dam which forms a vital part of Orange’s water supply.

“..revised and new DSC Guidance Sheets are progressively issued to assist dam owners”



Rocky Creek Dam

DSC members and staff inspecting this 28m high earthfill dam immediately prior to upgrading works to improve the dam’s safety.

The DSC continued with its regular programmed staff inspection of dams, and discussion with owners, throughout the State. Inspections by DSC members in conjunction with country meetings also continued. Overall 69 prescribed dams were inspected during the year (see Appendices A and B) against a target number of 82 dams. However, inspections of significant risk dams were slightly below target, with the continued high level of effort on policy review and mining oversight again diverting resources from dam inspections. This should be corrected in the coming year now additional staff have been employed. These inspections and meetings, whilst temporarily not meeting all targets, are 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.

7.1.5. Examination and Investigation of Dams Safety

Dam owners, in some situations through their agents, 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 4360:2004 *Risk Management* 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, after several years of intensive policy review by the DSC, 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.

The DSC is now in a transitional phase in the examination and investigation of dam safety. Dam owners will finally see the impact of changes in safety requirements as revised and new DSC Guidance Sheets are progressively issued to assist dam owners. Owners will have the opportunity to contribute in the development of these detailed requirements through the DSC process of stakeholder consultation.

The proposed 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. 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.

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.

To assess owners’ proposals adequately, the DSC needs to keep itself updated in all areas of dam safety regulation and management. All DSC members continue to be professionally active outside their DSC role. Also staff and members attend relevant technical symposia, along with meetings with representatives of various dam organizations, and of hazardous industries generally.

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 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.

From information received on dams, the DSC identifies those 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 has been implemented to minimize the risk of safety deficiencies going undetected.

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

Forty seven deficient dams have now been modified for safety improvement following the DSC's establishment, as shown in Table 4. For some of these dams, there has been a series of improvements made. In 2008/2009 Stage 1, upgrading works were commenced on Blowering Dam and the risks downgraded on Khancoban and Clarrie Hall dams after detailed investigations.

Table 4 - Dams Modified for Safety Upgrading

Dam	Upgrade Cost Order(\$M)	Deficiency	Year Upgrading Completed	Nature Of Upgrading
Ben Chifley	10-100	Flood	2001	Dam raised and spillway post-tensioned
Burrinjuck	10-100	Flood	1996	Dam raised 15m and post-tensioned
Blackbutt	<1	Flood	1995	Spillway upgraded
Bonalbo	<1	Flood	1989, 2006	Spillway upgraded
Captains Flat	1-10	Flood/Stability	1993	Dam post-tensioned
Cataract	10-100	Flood/Stability	1987	Dam post-tensioned
Cecil Park Basin 3A	<1	Flood/Stability	2008	Spillway enlarged, embankment stabilized
Chichester	1-10	Flood/Stability	1995, 2003	Dam post-tensioned, abutment stabilized
Coalcliff	<1	Flood/Stability	1999	Spillway enlarged, embankment upgraded
Company	<1	Flood	2006	Spillway enlarged, embankment raised
Cordeaux	<1	Flood	1988	Internal drainage improved
Dungowan	1-10	Flood	1992	Spillway augmentation, dam raising
Dunn Swamp	<1	O&M	1995	New outlet, wall repair
Emigrant Creek	1-10	Flood	2001	Dam post-tensioned, abutments raised
Foothills Rd	<1	Flood	1997	Embankment stabilized, new spillway
Glenbawn	10-100	Flood	1986	Dam raised, storage augmented, new spillway
Googong	10-100	Flood	1992	Dam raised, spillway stabilized
Grahamstown	10-100	Flood	2001, 2005	Dam core raised, face armoured, spillway upgraded
Green Meadows Basin	<1	Flood	2003	Embankment & crest stabilized, new spillway
Honeysuckle Ck	<1	Flood	1991	Post-tensioned and raised
Hume	10-100	Stability/Earthquake	1973, 2003	Embankments stabilized, gates/outlets upgraded
Jindabyne	10-100	Flood	2006	New spillway and outlets
Killara	1-10	Stability	1994	Embankment walls stabilized
Lyell	10-100	Flood	1996	Dam raised, spillway and storage augmented
Manly	1-10	Flood	1984	Dam post-tensioned
Mardi	1-10	Earthquake	1991	Embankment stabilized
Moolarben	<1	Flood	1993	Spillway augmented
Moore Creek	<1	Flood	2008	Dam buttressed
Nepean	10-100	Flood/Stability	1992	Spillway augmented, dam post-tensioned
Northmead Basin	<1	Flood	1994	Embankment raised, strengthened
Oberon	10-100	Flood	1996	Dam raised, additional spillway
Orange Agricultural	<1	Flood	1997	Spillway augmented
Palm Tree Grove	<1	Flood	1990	Embankment raised, strengthened
Pindari	10-100	Flood	1993	Dam raised, storage augmented, new spillway
Prospect	10-100	Earthquake	1997	Upstream dam embankment stabilized
Rydal	1-10	Stability/Flood	1993	Dam wall stabilised, spillway augmented
Rylstone	<1	Flood	1995, 2003	Auxiliary embankments removed
Sooley	10-100	Flood	2005	Dam raised and buttressed, new spillways
St Joseph Sch. Basin	<1	Flood	2001	Bank stabilization and new spillway
Tilba	<1	Flood/Stability	1997, 2003	Dam wall raised, toe drained
Tumbarumba	<1	Stability	1999	Embankment drainage installed
Warragamba	>100	Flood	2001	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
Wollondilly Washery	<1	Flood	1998	Dam raised, emergency spillway installed
Woronora	<1	Flood	1988	Internal drainage improved

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. The deficiencies are described as “apparent” because new understanding, arising from more detailed studies, sometimes demonstrates that a dam has a lesser deficiency or, is in fact, tolerably safe. 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*. It was not necessary to issue any Section 18 notices during the year, but the DSC did issue four “show cause” letters to dam owners (see Table 5B) as a possible precursor to issuing a Section 18 notice. 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).

As mentioned in previous DSC Annual Reports, significant “sunny day” safety improvement works (eg to cater for piping, earthquake and stability deficiencies) at Hume Dam have been substantially completed at a cost of over \$80 million. A DSEP by the owner, and downstream flood plans by the relevant emergency agencies, have been instituted and tested to minimise the remaining risks to downstream residents. The remaining safety evaluation areas for the dam, the southern training wall, the concrete dam / No. 1 bank junction area and the dam’s flood capacity, are currently nearing the end of investigations as a prelude to development of improvement options.

The DSC has continued to liaise closely with the Department of Lands on the required upgrading of Bethungra Dam and with State Water on the reduction of risks at Keepit and Chaffey Dams. At Keepit and Chaffey Dams, interim safety improvements have been implemented and community consultations continued to facilitate planning for long-term safety improvements.

Work 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 Department of Water and Energy. In 2007/8 investigations downgraded the risk status of Lake Rowlands and Malpas Dams and design of safety improvement works for Redbank Creek dam were completed in 2008/09.

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

Dam	Deficiency		2008/2009 Upgrading Progress
	Type	Identified	
Blowering	F	1996	Stage 1 Upgrading works commenced (FWA).
Bulll Upper Rail Embankment	F,S	2008	Investigations identified deficiencies, removal of dam planned.
Burrendong	F,S	2003	Upgrading options report completed, identified studies progressing (FWA).
Chaffey	F	1995	Geotech and environmental studies completed (FWA).
Clarrie Hall	F	2006	Safety status downgraded and long-term upgrading plan approved (FWA).
Copeton	F	2006	Upgrading concept design completed (FWA).
Dumaresq	F,S	2000	Upgrading design programmed for 2010 (FWA).
Hume	F, E, S	1994	Studies for final stage stability and flood completed (FWA).
Imperial Lake	F	2000	Upgrading options being investigated (FWA).
Keepit	F	1995	Stage 1 upgrade design being finalized for construction start in 2009 (FWA).
Khancoban	F	2001	Piping risks downgraded, investigating flood safety options (FWA).
Lake Endeavour	F,E,S	1995	Upgrading options being investigated (FWA).
Split Rock	F	2006	Preliminary upgrade options report completed (FWA).
Talbingo	F, S	2005	Risk assessment completed (FWA).
Winburndale	F	1995	Revised dambreak studies finalized (FWA).
Wyangala	F	2006	Concept design for upgrading components being finalized (FWA).
F - Inadequate Flood Capacity			E - Inadequate Earthquake Structural Resistance
S - Structural Inadequacy under Normal Operating Conditions			FWA - Flood Warning Arrangements in place

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

Dam	Deficiency		2008/2009 Upgrading Progress
	Type	Identified	
Bethungra	F, S	2000	Investigating removal/upgrade options after delays. Decision expected in late 2009 (FWA).
Quipolly	F	1993	Upgrading design commenced after delays (FWA).
Redbank Creek	F, E, S	1996	Upgrade tender not let-reviewing options-DSC concerned with delays.
Suma Park	F	1984	Revised upgrade strategy endorsed by DSC after delays in finalizing upgrading design (FWA).

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



Wentworth Falls Lake Dam

DSC staff inspected this 10m high earthfill dam as part of a review of a proposal to upgrade the dam's flood mitigation ability.

“Seismologists indicate that major earthquakes up to Magnitude 7.5 could occur anywhere in NSW”

7.1.6. Flood Capacity and Hydrology

The continuing drought in NSW has dam owners pre-occupied with drought security. However, floods can occur at any time as evidenced on the NSW North Coast on several occasions in 2008/09. Accordingly, the DSC is maintaining the effort to eliminate intolerable levels of flood capacity as soon as reasonably practicable.

World-wide, inadequate flood capacity continues to be one of the leading causes of dam failure. This is the experience in NSW also, as reflected in the dams under critical review by the DSC (Tables 5A/B). The main reason for the many dams with inadequate flood capacity is the steady advance in the understanding of extreme events by meteorologists and hydrologists. It is now recognized that flood estimates made some decades ago were generally too low. Because of advancing knowledge about floods, the DSC requires NSW dam owners to undertake regular reviews of the flood capacity of their dams to see if safety improvements are needed.

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 (ie a record storm at Dapto in 1984 dumped 515mm of rain in 6 hours). Generalised procedures are now available in NSW for PMP storms of any duration and area.

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

The DSC has put on its Internet site an interim revision of its flood requirements (Information Sheet DSC11), which it plans to finalize in the near future as Guidance Sheet DSC3B. 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.

As rainfall and flow data are very limited in Australia, the DSC has continued to encourage dam owners to install hydrologic instrumentation around their dams to assist in calibration of hydrologic models, and to contribute to the improvement of knowledge of rainfall/runoff processes within the industry. The DSC is also liaising with the Bureau of Meteorology in its proposed expansion of stream flow monitoring in NSW under the federally funded Murray-Darling Basin agreements. The data will also assist in estimating available yield for water supply, as well as providing valuable input to planning and warning for flood conditions.

7.1.7. Earthquake Capacity

Historically, several earthquakes up to Magnitude 7 have occurred in Australia and the 1989 Newcastle earthquake (Magnitude 5.4) provided a reminder that large damaging earthquakes can occur. Seismologists indicate that major earthquakes (eg 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 12 May 2008 Chinese earthquake, though that earthquake seriously damaged some dams. Experience 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 having been 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 revised earthquake safety requirements in Information Sheet DSC16 in 2000 (and is in the process of updating this Sheet as DSC3C).

In 2008/2009 the largest seismic event in NSW was a Magnitude 3.6 earthquake near Denman in March 2009. The largest national event was a Magnitude 4.6 earthquake near Korumburra in Victoria in March 2009.

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.

7.1.8. Safety under Normal Operating Conditions

Dams are long life structures, with the oldest dam in Europe some three thousand years old, and the oldest prescribed dam in NSW, Lake Parramatta Dam, being 150 years old in 2007. 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:

- The safety of older earth dams, without intercepting filters to control piping and seepage, which may require buttressing and/or supplementary drainage. Piping causes almost as many dam failures as inadequate flood capacity. Hume, Mardi, Tilba, Rydal and Tumbarumba Dams, and Cecil Park Basin 3A, have been upgraded in this regard. In addition, there appears to be no clearly recognized international practice on piping safety for old dams without modern filters. The DSC has plans for an Guidance Sheets (DSC3E & 3H) to guide owners on safety against piping.
- 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.
- 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 organizations has developed valuable new understanding in this area. A procedure developed from this research is currently being trialled 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 and proper operation and maintenance procedures. A DSC Guidance Sheet (DSC3D) on this aspect of dam safety is being drafted and the proposed update of DSC11 (to be issued as DSC3B in 2009) will set out how gate reliability is to be considered in the assessment of a dam's flood capacity.
- The safety of tailings dams usually associated with mining. Many incidents overseas, and some on prescribed tailings dams, have highlighted the special vulnerability of these types of dams. The DSC has concluded that there is a need to develop safety policies specific to tailings dams and an Information Sheet (DSC19, currently being updated as DSC3F) has been completed and placed on the DSC's website for dam owner guidance.

“In 2008/2009 the largest seismic event in NSW was a Magnitude 3.6 earthquake near Denman in March 2009”

“The largest national event was a Magnitude 4.6 earthquake near Korumburra in Victoria in March 2009”



Mardi Dam

DSC members and staff inspecting this 26m high earthfill dam as part of a review of a proposal to upgrade the dam's inlet and outlet works.

“The average age of major NSW dams is over 40 years with the oldest nearly 150 years old”

“The DSC continually promotes the need to develop and maintain basic operations and maintenance programs and manuals for NSW dams”



Chichester Dam

DSC staff inspecting repairs to a localized abutment slip immediately upstream of this 44m high concrete gravity dam near Dungog.

“The DSC has produced an Information Sheet DSC13 (currently being updated as DSC2G) to assist dam owners in the preparation of DSEPs”

“The value of these plans, even for dams that meet normal safety requirements, was demonstrated during the May 2009 Murwillumbah floods, with the timely evacuation of residents downstream of Clarrie Hall Dam”

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 (eg a near piping failure of a Hunter Valley tailings dam in 2003 was averted by timely detection). The rehabilitation works (eg Redbank Creek Dam), or decommissioning (eg Wellington Dam), 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 recognize 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 Information Sheet DSC12 (currently being updated as DSC2F).

DSC12 requires dam owners to develop and maintain operation and maintenance (O&M) manuals, based on organized 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.

7.1.10. Dams Safety Emergency Management

The DSC's primary objective is to protect the public from uncontrolled releases from dam storages and it requires that dam owners prepare Dam Safety Emergency Plans (DSEP) for dams posing a risk to downstream residents. The DSC has produced an Information Sheet DSC13 (currently being updated as DSC2G) to assist dam owners in the preparation of DSEPs and most dams now have such plans.

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. The DSC is preparing a Guidance Sheet (DSC2H-*Dam Security*) to assist owners in this regard.

Responsibility for developing and maintaining flood plans in NSW rests with the State Emergency Service (SES). The DSC looks to dam owners to assist the SES in developing flood plans 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. Also further demonstration was provided during the May 2009 Murwillumbah floods, with the timely evacuation of residents downstream of Clarrie Hall Dam.

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

To mesh the responsibilities of dam owners and the SES, the DSC's Emergency Management Sub-committee meets, as necessary, to review and monitor the procedures used by the agencies concerned. As a result, dam incident warning protocols have been implemented, with all of the emergency agencies. The Sub-committee also provides a channel for information exchange between the DSC and the SES, giving the SES regular updates on the safety status of dams in NSW.

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 life, a period known to be much more prone to dam failure than other periods. Accordingly, retarding basins need to be designed and constructed in accordance with good dam engineering practice.

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 recognized that a greater flood could occur and would cause a sudden increase in discharge or, in the worst case, could fail the embankment to 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 Wollongong (August 1998), Mudgee (February 2003) and the several recent North Coast storm events (2008/09) and in the Newcastle area (April 2001 and June 2007). 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 protect the community from these dangers and to educate all involved. These efforts are beginning to pay dividends in improved protection.

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 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 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 prepared an Information Sheet on retarding basins (DSC17-updated in 2000 and currently being updated as DSC3G).

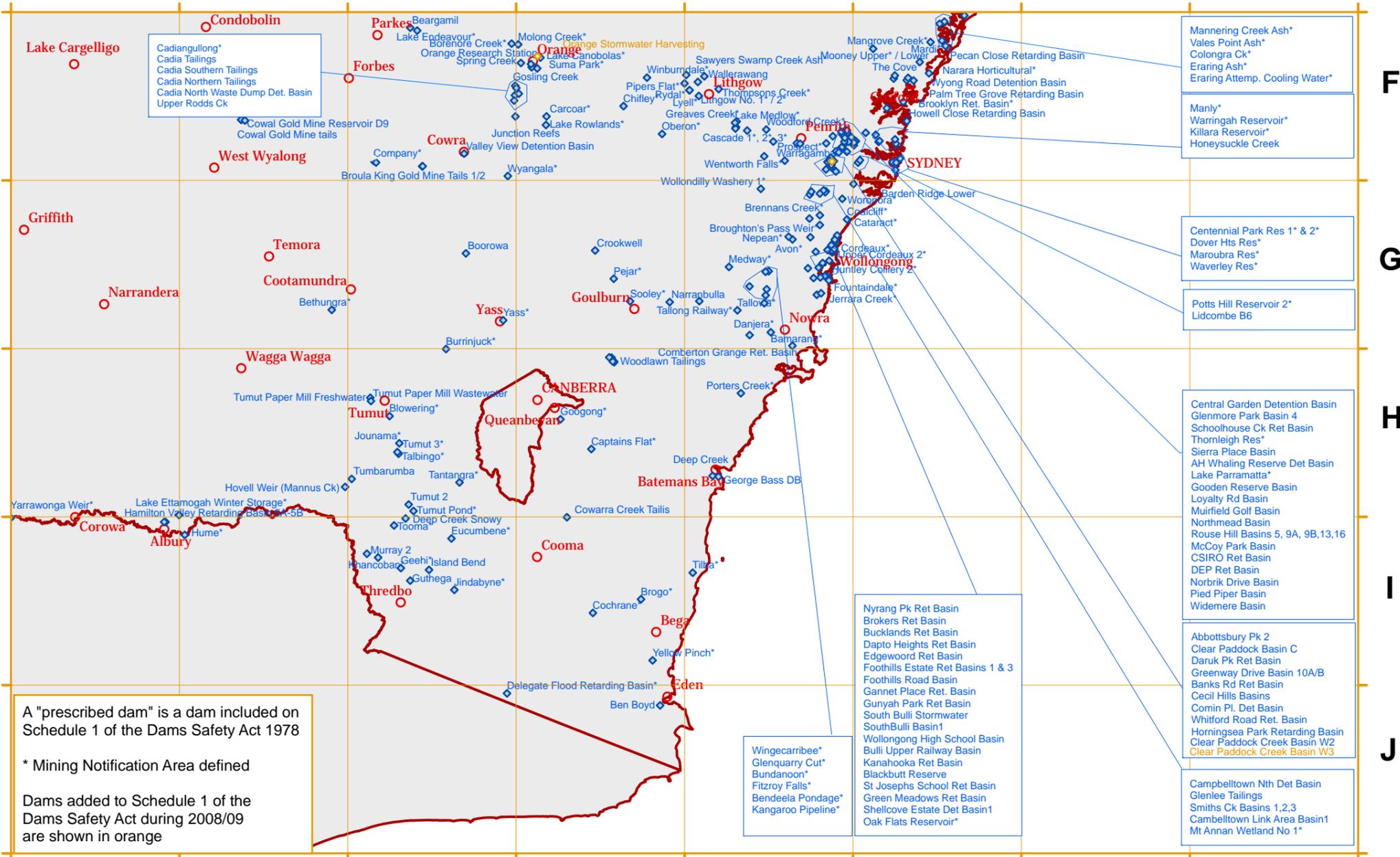
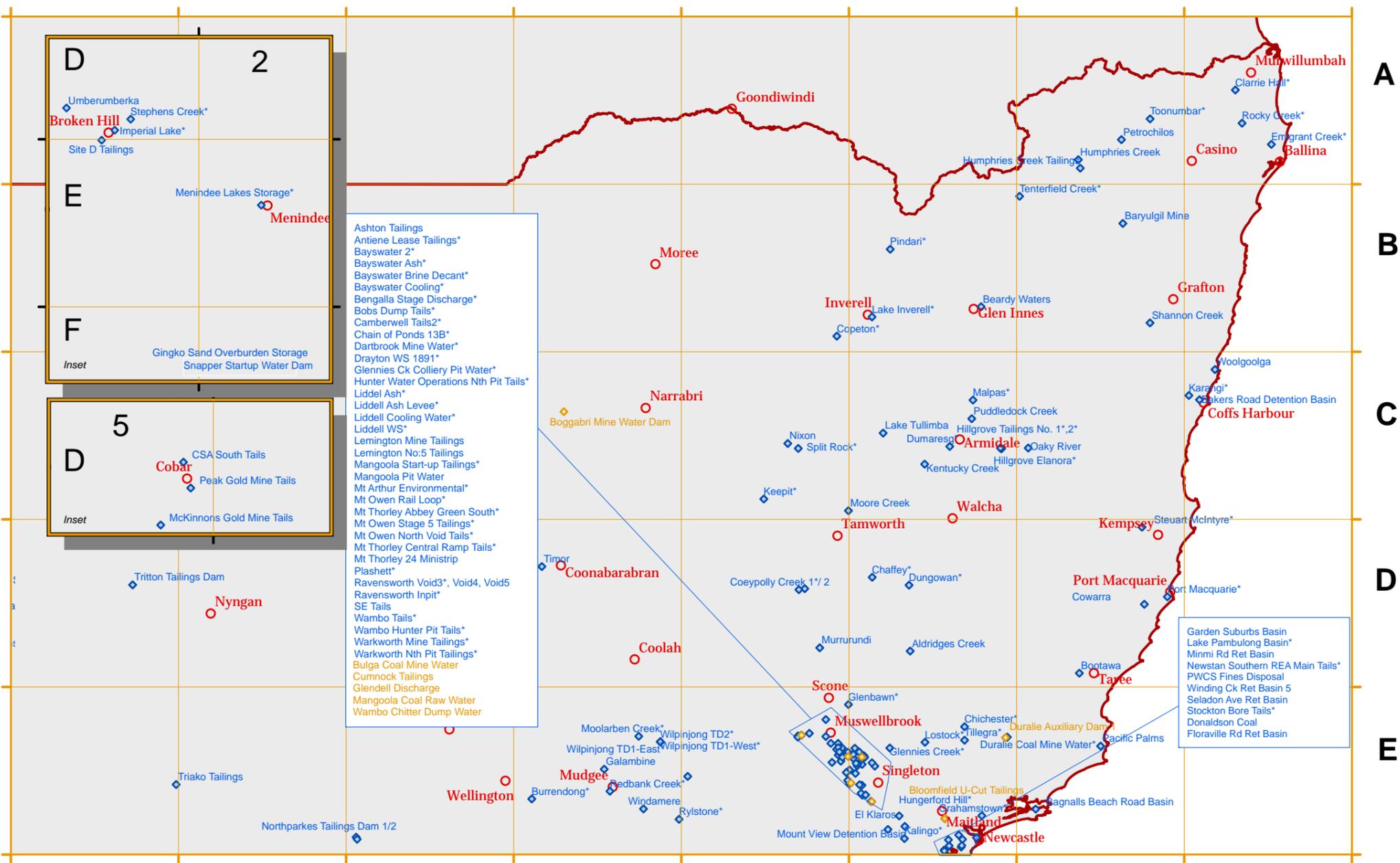


“The DSC requires that flood retarding basins are designed and constructed in accordance with good dams engineering practice”

“The DSC is concerned with the poor degree of maintenance of some flood retarding basins”

*Loyalty Road Retarding Basin
DSC staff inspecting this 27m
high concrete dam as a
precursor to reviewing the
Surveillance Report and DSEP
for the basin.*

NSW Dams Safety Committee PRESCRIBED DAMS IN NSW JULY 2009



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 2008/09 are shown in orange

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.

7.2.2. 2007/8 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. Fourteen new applications were endorsed as follows:

Underground Mining

NRE (3)
Dendrobium (2)
Mannering
United (2)

Open-cut Mining

Drayton
Glennies
Lidell (2)
Moolarben
Potts Hill

During 2008/09, under the DSC's guidelines, over 13.5 million tonnes of coal were extracted near prescribed dams in NSW, either in Notification Areas or their equivalents, without reducing safety below limits. 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. Additional DSC's resources have been allocated to mining regulation in response to an increasing workload over the past three years with appropriate funding obtained from Treasury.

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. Small movements, but no additional cracking, have been reported as mining progressively moves away from the dam.

Dendrobium Colliery commenced mining a series of longwalls (currently mining longwall 5 in Area 2) in February 2007, adjacent to Cordeaux Reservoir and Upper Cordeaux No. 2 Dam, and has recently commenced development work for Area 3. Cordeaux Reservoir supplies water to the Sydney metropolitan area. Mining to date has indicated no significant impact on the stored waters although some localized inflows to the mine have occurred which appear rainfall related.

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 on the reservoir waters, which supply the Sydney metropolitan area.

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

“The DSC ensures that risks to dams from mining are tolerable in terms of the community's interests”



Longwall Mining

A typical longwall coal mining operation as over sighted by the DSC within the Notification Areas of several prescribed dams.

“During 2008/9...over 13.5 million tonnes of coal were extracted near prescribed dams in NSW”



Humphreys Creek Tailings Dam

DSC members and staff inspecting this 15m high earth and rockfill dam as a precursor to consideration of dam decommissioning proposals.

“In 2008/9, United Colliery continued mining a series of longwalls under Wambo NE Tailings Dam and Wambo Colliery continued open-cut mining immediately downstream of the dam”

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

United Colliery continued mining a series of longwalls under Wambo Tailings Dam and near United Tailings Dam No. 2. Although disused, the Wambo Tailings Dam contains tailings which may still be able to flow and the risks, to an active open-cut pit immediately downstream, need to be managed. The embankment remains stable and monitoring is increased and management procedures triggered, as the longwalls pass under the embankment.

Wambo Colliery continued open-cut pit mining immediately downstream of Wambo Tailings Dam, which is also being undermined by United Colliery. In addition, further longwall mining is proposed near the dam, with a management plan implemented and development workings commenced.

Drayton Mine implemented a management plan aimed at minimizing the blast vibration risk from its open-cut mining adjacent to Liddell Ash Levee. The levee is a dam, which retains ash from a nearby power station.

Ravensworth Colliery continued mining by open-cut methods within the Notification Area around their water storage 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.

Liddell Colliery undertook open-cut mining, near Antiene Lease Tailings Dam and Liddell Cooling Water Dam, which had not been notified to the DSC before commencement. This resulted in the need for the DSC to act to manage the risk. Monitoring shows that mining activities are having no significant impact on the dams.

Potts Hill. Compaction trials were undertaken for a housing development adjacent to Potts Hill Reservoir No. 2 which plays a major role in Sydney’s water supply. The DSC required a management plan and monitoring showed negligible impact on the reservoir.

7.2.4. Policies, Procedures and Organizational Updates

Additional resources employed during the year were matched by the continuing heavy operational workload and the proposed review of mining policies was postponed. Existing policies are outlined in the Information Sheets listed in Table 6 below and are available on-line on our web page (www.damsafety.nsw.gov.au). However, a new Information Sheet Index System is being implemented over the coming year and DSC 32 to DSC 35 will become DSC 4A to DSC 4D.

An internal system for checking compliance with mining conditions was upgraded during the year. Checking compliance is now faster, and a timetable for future reports is generated. The latter 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. In addition, a significant number of new Notification Areas were gazetted around prescribed dams in NSW to cater for future potential mining activities.

Table 6 - Information Sheets for Mining near Dams

Document	Title	Date
DSC 32	Notes on the Administrative Role of the Dams Safety Committee in the Granting of Mining Leases and Approval of Mining Applications	June 1998
DSC 33	Mining in Notification Areas of Prescribed Dams	June 1998
DSC 34	Typical Monitoring Program Requirements for Mining near Prescribed Dams	August 2000
DSC 35	Mining Contingency Plans to Minimize Loss of Stored Waters from Dams	June 1998

7.2.5. Mining Statistics

Table 7 - Mining in Notification Areas

Item	2005/6	2006/7	2007/8	2008/9
Coal Removed from Notification Areas (million tonnes)	12.1	10.5	14.1	13.5
Current Approvals:				
Actively Mining	14	12	11	17
Actively Monitoring	14	15	13	16
Applications Processed	10	14	7	14
Variations to Existing Approvals	8	8	13	4
Titles Processed	6	17	151	72
New Proposals Discussed	9	6	5	11
Site Inspections (person days)	19	16	18	25

Table 8 - Monitored Approved Mining 2008/2009

Approval	Mine	Dam	Mining Type	Possible Effect on			Currently Monitoring
				Active Mining	Dam Storage	Dam Structure	
Bellambi-15	NRE#1	Cataract	1 st Workings	Yes	Yes	No	Yes
Wambo-1	Wambo	Wambo Tails	Open-cut	Yes	Yes	Yes	Yes
Wambo-2	Wambo	Wambo Tails	Longwall	Yes	No	Yes	Yes
Appin-2	Appin	Broughtons Pass Weir	Longwall	No	Yes	Yes	Yes
Dendrobium-2, 3, 4	Dendrobium	Cordeaux & Upper Cordeaux 2	Longwall	Yes	Yes	Yes	Yes
United-6	United	Wambo Tails	Longwall	Yes	Yes	Yes	Yes
Mannering-1, 3	Mannering	Mannering Ck Ash	1 st Workings	Yes	No	Yes	Yes
Duralie-1	Duralie Open-cut	Duralie Mine Water	Open-cut	Yes	Yes	Yes	Yes
Drayton-1	Drayton	Liddell Ash Dam Levee	Open-cut	Yes	Yes	Yes	Yes
Ridgeway-1	Ridgeway	Cadiangullong	Underground	Yes	Yes	Yes	Yes
Liddell-2	Liddell	Antiene Tails	Open-cut	Yes	No	Yes	Yes
Liddell-3	Liddell	Liddell Cooling Water	Open-cut	Yes	No	Yes	Yes
Potts Hill-1	N/A	Potts Hill 2	Civil works	Yes	No	Yes	Yes
Ravensworth-1	Ravensworth	Ravensworth In-pit	Open-cut	Yes	Yes	Yes	Yes

7.3. Information Systems

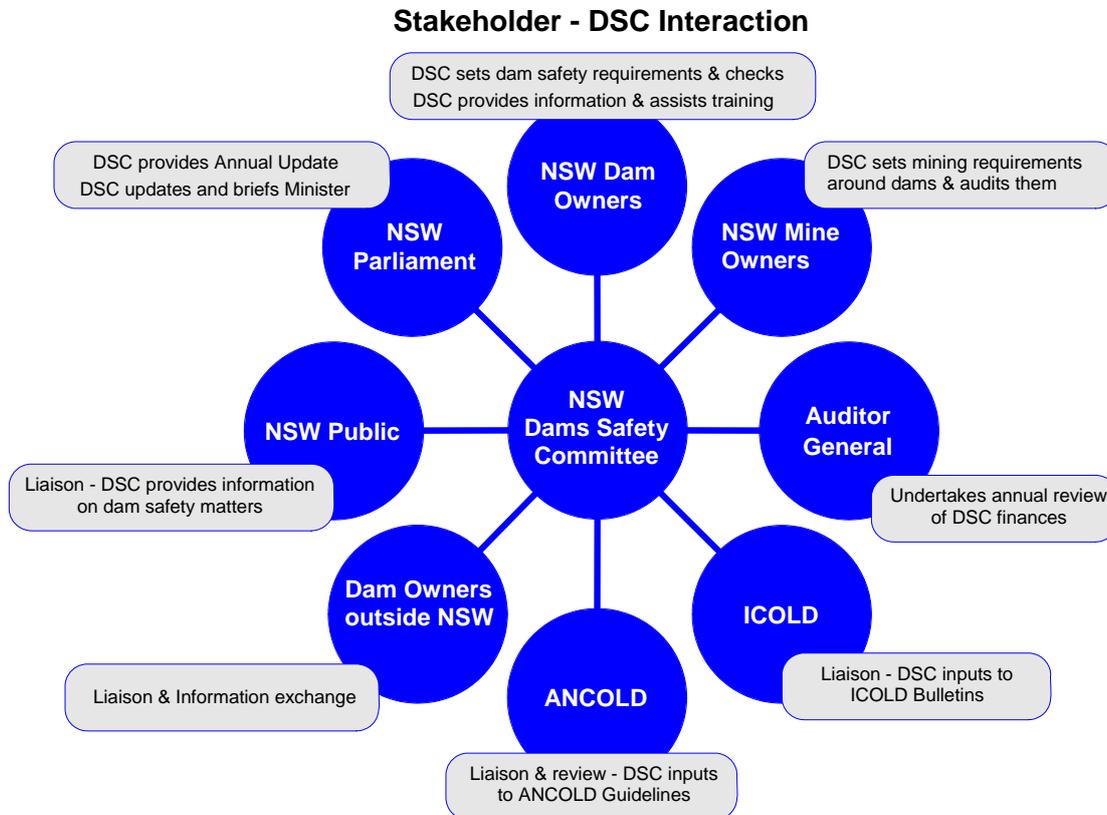
“In 2008/9 the DSC continued upgrading its databases and computer facilities”

During 2008/9 the DSC information systems personnel:

- Updated the DSC’s public documents (eg Guidance Sheets, Annual Report);
- Implemented a new DSC website (<http://www.damsafety.nsw.gov.au>);
- Continued implementation of a new Corporate Knowledge System;
- Produced a range of internal reports for use by the DSC members and staff;
- Commenced implementation of a Geographical Information System;
- Continued to digitise critical technical information on dams to improve access and create a backup (ie GIS dam mapping, updated mining approval plans);
- Upgraded and maintained computer facilities for staff and members including implementation of a new server system;
- Continued to upgrade and document DSC procedures;
- Undertook a series of training courses; and
- Continued to maintain and upgrade the DSC’s record system (eg correspondence lists, automatic requests for Surveillance Reports).

8. Stakeholders

The DSC's role on dam safety in NSW requires interaction with a wide range of stakeholders as summarized 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 Guidance Sheets, available on the DSC Internet site.

The DSC recognizes that to be effective in its surveillance of dam safety, it needs to give all stakeholders an opportunity to comment on its policies. During the year, policy proposals were placed on the DSC's Internet site and comments were invited. The DSC proposes to continue to liaise with dam owners and stakeholders, including partner NSW regulatory authorities, to finalise detailed policies and requirements. These will be enunciated in new Guidance Sheets as part of the progressive roll-out of the DSC's Government endorsed risk policy framework.

The DSC has a role to educate 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, including its Internet site. The DSC has assembled a considerable library of publications and videotapes on various aspects of dams and their safety management. This material is available for loan to dam owners within NSW to assist in their management of dams.

Close contact is maintained by the DSC with the major NSW dam owning authorities, for example through meetings held during the year to discuss specific dam requirements and general procedures.

“The DSC considers it essential to give all stakeholders an opportunity to comment on its policies”

“DSC staff were involved in running three dam safety training courses for NSW dam operators in 2008/9”



Cowarra Dam

Dam operators inspecting this 40m high earthfill dam near Wauchope as part of their training assessment in a course jointly run by the DSC and the DWE.

“DSC members and staff attended relevant conferences and courses during the year to keep abreast of modern developments”

The dam safety education of local government authorities, mining companies and private dam owners is of particular interest to the DSC, because their staff 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 and community meetings on a number of occasions during the year.

The DSC ran its first training course in 1991 for Local Government and private dam owners. The positive feedback received led to the institution of regular training courses for dam operators run in NSW with the assistance of DSC staff. Four-day courses for dam operators were run by the Department of Water and Energy (DWE) in December 2008 and February 2009 at Port Macquarie as part of this program. In addition, the DSC ran a three day course for tailings dam operators in April 2009 at Port Stephens with DWE assistance and Norm Himsley assisted State Water, Sydney Water, Hunter Water and Sydney Catchment Authority in running training courses for their staff during the year. This work is a key part of the DSC's educational 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. DSC staff assisted in training courses in Queensland and New Zealand during the year in this regard.

8.2. Education and Training of Members and Staff

The DSC's members and staff have extensive and varied experience in dam engineering and mining. However, it is essential in any organization 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 November 2008, the Chairman, Executive Engineer, Surveillance Engineer and Dams Engineer attended the ANCOLD Conference on Dams, and an associated workshop on Dams Safety Management issues, held on the Gold Coast in Queensland. Several other DSC members also attended, as representatives of their own organizations. Papers were presented on community, legal and environmental concerns with dams, along with recent developments in dam engineering.

During the year, DSC staff also attended relevant local technical seminars to update their proficiencies.

In May 2009, Ian Landon-Jones attended the ICOLD 77th Annual Meeting, and associated technical committee meetings, held in Brazil. During the year, Brian Cooper attended several workshops convened by major USA dam regulators and gave presentations outlining DSC and Australian practice on risk management. Whilst these attendances were not arranged or funded by the DSC, the knowledge gained benefits the DSC's policy development.

9. Administration and Human Resources

DSC members are subject to the Premier's Department Conduct Guidelines and the DSC staff is subject to the Department of Water and Energy's (DWE) 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 rents office space with the DWE in Parramatta and, to maximize the effectiveness of DSC staff, reimburses that Department for its administration and human resources assistance, accounting, insurance scheme and legal services. In addition, Service First - NSW Department of Services, Technology & Administration (DoSTA) 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 2009 and provided a letter of comfort at the conclusion of the year indicating satisfactory performance of DSC functions supported by ServiceFirst. Other authorities, 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 the DWE, the DSC's Freedom of Information (FOI) statistics are published in that Department's Annual Report. A supplement, pursuant to the Annual Reporting Requirements issued by the Premier's Department on 27 June 1991, will accompany the DSC's statistics. There were no requests for information under FOI legislation during the year.

The DSC has adopted DWE'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. Also DSC staff updated their first aid training to facilitate safe inspection practices. In relation to OHS&R there were no work injuries to DSC staff during the year.

As part of its contracted administration assistance to the DSC, the DWE implement Equal Employment Opportunity (EEO) and Ethnic Affairs matters (including Ethnic Affairs Priorities Statement program) for, and with, the DSC. The DSC is aware of, and committed to, the principles of multi-culturalism, but all policies relating to this area are programmed under the DWE's overarching banner. The DSC has employed a new migrant professional, Kathy Zhou, as a follow on to her successful and beneficial training by the DSC in a scheme organized by the Office of Employment, Equity and Diversity of the NSW Premier's Department.

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.



Dumaresq Dam

DSC staff inspected this 12m high concrete gravity dam as a background check for reviewing upgradings proposed by Armidale Dumaresq Council.

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 report exhibits a true and fair view of the financial position of the Dams Safety Committee as at 30 June 2009, 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 2005.
- c) There are no circumstances, which would render any particulars included in the financial report to be misleading or inaccurate.

For and on behalf of the Committee.



B. COOPER
CHAIRMAN
Dated: 09 October 2009



J. Gleeson
DEPUTY CHAIRMAN
Dated: 09 October 2009

10.2. Auditor General's Certificate



GPO BOX 12
Sydney NSW 2001

INDEPENDENT AUDITOR'S REPORT

Dams Safety Committee

To Members of the New South Wales Parliament

I have audited the accompanying financial report of the Dams Safety Committee (Committee), which comprises the balance sheet as at 30 June 2009, the income statement, statement of changes in equity and cash flow statement for the year then ended, a summary of significant accounting policies and other explanatory notes.

Auditor's Opinion

In my opinion, the financial report:

- presents fairly, in all material respects, the financial position of the Committee as at 30 June 2009, and its financial performance for the year then ended in accordance with Australian Accounting Standards (including the Australian Accounting Interpretations)
- is in accordance with section 41B of the *Public Finance and Audit Act 1983* (the PF&A Act) and the Public Finance and Audit Regulation 2005.

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

The Committee's Responsibility for the Financial Report

The members of the Committee are responsible for the preparation and fair presentation of the financial report in accordance with Australian Accounting Standards (including the Australian Accounting Interpretations) and the PF&A Act. This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial report that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

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

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the Committee's preparation and fair presentation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Committee's internal controls. 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 report.

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

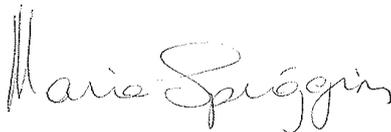
My opinion does *not* provide assurance:

- about the future viability of the Committee
- that it has carried out its activities effectively, efficiently and economically, or
- about the effectiveness of its internal controls.

Independence

In conducting this audit, the Audit Office of New South Wales has complied with the independence requirements of the Australian Auditing Standards and other relevant ethical requirements. The PF&A Act further promotes independence by:

- providing that only Parliament, and not the executive government, can remove an Auditor-General, and
- 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 role by the possibility of losing clients or income.



M T Spriggins
Director, Financial Audit Services

13 October 2009
SYDNEY

10.3. Audited Financial Report

Operating Statement for the Year Ended 30 June 2009

	Notes	2009 \$'000	2008 \$'000
Revenue			
Government contributions	3a	1,260	1,240
Other revenue	3b	395	429
Total Revenue		1,655	1,669
Expenses excluding losses			
Personnel services expenses	2a	1,088	1,011
Depreciation and amortisation	2b	19	3
Finance costs	2c	0	1
Other operating expenses	2d	551	555
Total expenses excluding losses		1,658	1,570
SURPLUS/ (DEFICIT) FOR THE YEAR		(3)	99

Balance Sheet as at 30 June 2009

Current Assets			
Cash & cash equivalents	4	34	2
Receivables	5	80	193
Total Current Assets		114	195
Non-Current Assets			
Plant and equipment	6	28	38
Intangible assets	7	24	31
Total Non-Current Assets		52	69
Total Assets		166	264
LIABILITIES			
Current Liabilities			
Payables	8	109	198
Provisions	9	19	17
Other	10	8	8
Total Current Liabilities		136	223
Non-Current Liabilities			
Other	11	16	24
Total Non-Current Liabilities		16	24
Total Liabilities		152	247
Net Assets		14	17
EQUITY			
Accumulated funds	12	14	17
Total Equity		14	17

The accompanying notes form part of these financial statements.

Statement of Recognised Income and Expense for the Year Ended 30 June 2009

	Notes	2009 \$'000	2008 \$'000
TOTAL INCOME AND EXPENSE RECOGNISED DIRECTLY IN EQUITY		-	-
Surplus / (Deficit) for the year		(3)	99
TOTAL INCOME AND EXPENSE RECOGNISED FOR THE YEAR	12	(3)	99

Cash Flow Statement for the Year Ended 30 June 2009

	Notes	2009 \$'000	2008 \$'000
CASH FLOWS FROM OPERATING ACTIVITIES			
<i>Receipts</i>			
Receipts from government and customers		1,443	1,476
Interest received		2	3
Total Receipts		1,445	1,479
<i>Payments</i>			
Payments to suppliers, employees etc.		(1,411)	(1,452)
Finance costs		-	(1)
Total Payments		(1,411)	(1,453)
NET CASH FLOWS FROM OPERATING ACTIVITIES	13	34	26
CASH FLOWS FROM INVESTING ACTIVITIES			
Purchases of plant and equipment		(2)	(72)
NET CASH FLOWS FROM INVESTING ACTIVITIES		(2)	(72)
NET INCREASE / (DECREASE) IN CASH		32	(46)
Opening cash and cash equivalents		2	48
CLOSING CASH AND CASH EQUIVALENTS	4	34	2

The accompanying notes form part of these financial statements

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS 2008-2009

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.

This financial report has been authorised for issue by the Chairman of the Committee on 09 October 2009.

(b) Basis of Preparation

The Committee's financial report is a general purpose financial report which has 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 2005.

The financial report is prepared in accordance with the historical cost convention.

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.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009**SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)****(c) Statement of Compliance**

The financial report 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 Department of Water and Energy. 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:

- where the amount of GST incurred by the agency 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.
- where receivables and payables are stated with the amount of GST included.

Cash Flows are included in the cash flow statement 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.

(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 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 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 material separately identifiable components of assets are depreciated over their shorter useful lives.

(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.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

(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) Other Assets

Other assets are recognised on a cost basis.

(p) 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.

(q) 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.

(r) New Australian Accounting Standards Issued but not Effective

At reporting date, the following list of Australian Accounting Standards and Interpretations adopted by the Australian Accounting Standards Board had been issued, but were not yet operative. These accounting standards have not been early adopted by the Committee on the basis that NSW Treasury Mandate (TC 09/03) precludes this.

Accounting Standard	Issue Date	Application Date for Annual Reporting Periods Beginning on or after
AASB 3 Business Combinations, AASB 127 Consolidated and Separate Financial Statements and AASB 2008-3 Amendments to Australian Accounting Standards arising from AASB 3 and AASB 127	March 2008	1 July 2009
AASB 8 Operating Segments and AASB 2007-3 Amendments to Australian Accounting Standards arising from AASB 8	February 2007	1 January 2009
AASB 101 Presentation of Financial Statements, AASB 2007-8 Amendments to Australian Accounting Standards arising from AASB 101 and AASB 2007 – 10 Further Amendments to Australian Accounting Standards arising from AASB 101	September 2007 and December 2007	1 January 2009
AASB 123 Borrowing Costs and AASB 2007-6 Amendments to Australian Accounting Standards arising from AASB 123	June 2007	1 January 2009
AASB 2008-2 Amendments to Australian Accounting Standards - Puttable Financial Instruments and Obligations arising on Liquidation [AASB 7, AASB 101, AASB 132, AASB 139 & Interpretation 2]	March 2008	1 January 2009
AASB 2008-5 Amendments to Australian Accounting Standards arising from the AASB 2008-6 Further Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 1 & AASB 5]	July 2008	1 January 2009
AASB 2008-9 Amendments to AASB 1049 for Consistency with AASB 101	September 2008	1 January 2009
AASB 2009-2 Amendments to Australian Accounting Standards – Improving Disclosures about Financial Instruments	April 2009	1 January 2009
AASB 2009-4 Amendments to Australian Accounting Standards arising from the Annual Improvements Project	May 2009	1 July 2009
AASB 2009-5 Further Amendments to Australian Accounting Standards arising from the Annual Improvements Project	May 2009	1 January 2010
AASB 2009-6 Amendments to Australian Accounting Standards	June 2009	1 January 2009
AASB 2009-7 Amendments to Australian Accounting Standards	June 2009	1 July 2009
AASB Interpretation 17 Distributions of Non-cash Assets to Owners and AASB 2008-13 Amendments to Australian Accounting Standards arising from AASB Interpretation 17	December 2008	1 July 2009
Interpretation 18 Transfers of Assets from Customers	March 2009	1 July 2009

The Committee has assessed these new accounting standards and it is anticipated that, other than matters pertaining to presentation, there will be no material financial impact from their adoption in future periods on the financial report.

2. EXPENSES EXCLUDING LOSSES

	2009	2008
	\$'000	\$'000
(a) Personnel services expenses		
Salaries and wages (including recreation leave)	897	822
Staff on-cost	191	189
	1,088	1,011
(b) Depreciation and amortisation		
Depreciation-Computers	4	-
Depreciation-Intangible Assets	7	-
Depreciation-Low Value Assets	4	-
Leasehold improvement	4	3
	19	3
(c) Interest expense on makegood provision	-	1
	-	1
(d) Other operating expenses		
Auditor's remuneration	9	8
Committee Member's expenses	35	36
Contractors	48	70
Fees for services	35	22
Accommodation	116	51
Plant / Vehicle	13	1
Travel	35	26
Computer expenses	24	68
Telephones	4	6
Staff training	8	31
Maintenance contract – office equipment	2	4
Equipment	1	2
Entertainment & events	2	22
Printing	11	5
In kind expenses	160	181
Other	48	22
	551	555

3. REVENUE

	2009	2008
	\$'000	\$'000
(a) Government Contributions		
Department of Water and Energy	1,260	1,240
	1,260	1,240
(b) Other Income		
Interest	2	2
Long Service Leave Liability – assumed by Crown	62	69
Superannuation – assumed by Crown	101	101
Pay-roll Tax – assumed by Crown	-	6
Committee Support In Kind Contribution	160	181
Other	70	70
	395	429

4. CURRENT ASSETS – CASH AND CASH EQUIVALENTS

Cash at bank and on hand	34	2
Closing Cash and Cash Equivalents	34	2

Refer Note 16 for details regarding credit risk, liquidity, risk and market risk arising from financial instruments.

5. CURRENT ASSET - RECEIVABLES

Accrued income receivable	75	177
Goods and Services Tax recoverable from ATO	5	16
	80	196

Details, regarding credit risk, liquidity risk and market risk, including financial assets that are wither past due or impaired, are disclosed in Note 16.

6. NON-CURRENT ASSETS – PLANT AND EQUIPMENT

	Plant and Equipment \$'000	Leasehold Improvement \$'000	Total \$'000
At 1 July 2008 – fair value			
Gross carrying amount	35	16	51
Accumulated depreciation	(10)	(3)	(13)
Net carrying amount	25	13	38
At 30 June 2009 – fair value			
Gross carrying amount	35	18	53
Accumulated depreciation	(18)	(7)	(25)
Net carrying amount	17	11	28

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009

6. NON-CURRENT ASSETS – PLANT AND EQUIPMENT (Cont'd)

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.

	Plant and Equipment \$'000	Leasehold Improvement \$'000	Total \$'000
Year ended 30 June 2009			
Net carrying amount at 01 July 2008	25	13	38
Additions	-	2	2
Depreciation expenses	(8)	(4)	(12)
Net carrying amount at 30 June 2009	<u>17</u>	<u>11</u>	<u>28</u>
Year ended 30 June 2008			
Net carrying amount at 01 July 2007	-	-	-
Additions	25	16	41
Depreciation expenses	-	(3)	(3)
Net carrying amount at 30 June 2008	<u>25</u>	<u>13</u>	<u>38</u>

7. NON-CURRENT ASSETS – INTANGIBLE ASSETS

	Software \$'000
At 1 July 2008 – fair value	
Gross carrying amount	31
Accumulated amortisation	-
Net carrying amount	<u>31</u>
At 30 June 2009 – fair value	
Gross carrying amount	31
Accumulated amortisation	(7)
Net carrying amount	<u>24</u>

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 2009	
Net carrying amount at 01 July 2008	31
Additions	-
Amortisation expenses	(7)
Net carrying amount at 30 June 2009	<u>24</u>
Year ended 30 June 2008	
Net carrying amount at 01 July 2007	-
Additions	31
Amortisation expenses	-
Net carrying amount at 30 June 2008	<u>31</u>

8. CURRENT LIABILITIES - PAYABLES

	2009 \$'000	2008 \$'000
Accrued personnel services	10	6
Creditors	(3)	42
Accrued expenditure	102	142
Other	-	8
	<u>109</u>	<u>198</u>

Details regarding credit risk, liquidity risk and market risk, including a maturity analysis of the above payables, are disclosed in Note 16.

9. CURRENT LIABILITIES - PROVISIONS

Leasehold obligations - provision	19	17
	<u>19</u>	<u>17</u>

10. CURRENT LIABILITY - OTHER

Lease incentive	8	8
	<u>8</u>	<u>8</u>

11. NON-CURRENT LIABILITIES - OTHER

Lease incentive	16	24
	<u>16</u>	<u>24</u>

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009

12. CHANGE EQUITY

	Accumulated Funds		Total Equity	
	2009 \$'000	2008 \$'000	2009 \$'000	2008 \$'000
Balance at the beginning of the year 1 July 2008	17	(82)	(17)	(82)
<u>Changes in equity – other than transactions with owners as owners</u>				
Surplus / (Deficit) for the year	(3)	99	(3)	99
Balance at the end of the financial year	14	17	14	17

13. NOTE TO CASH FLOW STATEMENT

Cash

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

Reconciliation of surplus / (deficit) for the year to net cash flows from operating activities

	2009 \$'000	2008 \$'000
Net operating result	(3)	99
Depreciation and amortisation	19	3
Changes in operating assets and liabilities		
(Increase) / decrease in accounts receivable	113	(190)
Increase / (decrease) in accounts payable & provisions	(95)	114
Net cash provided by (used in) operating activities	34	26

14. CONTINGENT LIABILITIES

The Committee is not aware of any material contingent liabilities.

15. COMMITMENTS FOR EXPENDITURE

	2009 \$'000	2008 \$'000
Operating lease commitments		
Future non-cancellable operating lease rentals not provided for and payable:		
not later than 1 year	98	57
later than 1 year, but not later than 5 years	173	164
	271	221

Commitments above include input tax credits of \$24,656 (2008: \$20,088) that are expected to be recovered from the Australian Taxation Office.

16. 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 this financial report.

The Committee members have overall responsibility for the establishment and oversight of risk management and reviews and agrees 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	
			2009 \$'000	2008 \$'000
Class:				
Cash and cash equivalents	4	N/A	34	2
Receivables ¹	5	Receivables	75	193
			109	195
Financial Liabilities	Note	Category	Carrying Amount	
			2009 \$'000	2008 \$'000
Class:				
Payables ²	8	Financial Liabilities measured at amortised cost	109	198
			109	198

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009

16. 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 will not reconcile to the receivables total recognised in the balance sheet.

² Excludes statutory payables and unearned revenue (i.e. not within scope of AASB 7). Therefore, the 'payables' total in the above table will not reconcile to the payables total recognised in the balance sheet.

(b) Credit Risk

Credit risk arises from the financial assets of the Committee, including cash, receivable, and authority deposits. 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.

Receivables – trade debtors

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

The outstanding amount of debtors are 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 recognized 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		Total
	Weighted Average Rate	Non Interest Bearing	1 year or less	1 to 5 years	Greater than 5 years	
	%	\$'000	\$'000	\$'000	\$'000	\$'000
30 June 2009						
Financial Liabilities						
Payables	N/A	109	109	-	-	109
Total Financial Liabilities		109	109	-	-	109
30 June 2008						
Financial Liabilities						
Payables		198	198	-	-	198
Total Financial Liabilities		198	198	-	-	198

(d) Market Risk

Market risk is the risk that the fair value of future cash flows of a financial instrument will fluctuate because of changes in market prices. The Committee has no exposure to market risk as 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.

	Carrying Amount	-1% Profit	Equity	Profit	1% Equity
	\$'000	\$'000	\$'000	\$'000	\$'000
2009					
<i>Financial assets</i>					
Cash and cash equivalents	34	-	-	-	-
Receivables	75	-	-	-	-
<i>Financial liabilities</i>					
Payables	109	-	-	-	-

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENT 2008-2009

16. FINANCIAL INSTRUMENTS (continued)

	Carrying Amount	-1% Profit	Equity	Profit	1% Equity
	\$'000	\$'000	\$'000	\$'000	\$'000
2008					
<i>Financial assets</i>					
Cash and cash equivalents	2	-	-	-	-
Receivables	193	-	-	-	-
<i>Financial liabilities</i>					
Payables	198	-	-	-	-

(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.

17. AFTER BALANCE DATE EVENT

There are no known post balance date events that would have an effect on the Financial report.

END OF AUDITED FINANCIAL REPORT

10.4 Dams Safety Committee 2008/2009 – Budgetary Information

Item	2008/9 Budget (\$)	2008/9 Actual (\$)	2009/10 Budget (\$)
Income			
Consolidated Fund	1,260,000	1,260,000	1,340,000
Interest Income	2,000	2,000	2,000
Miscellaneous (eg Training etc)	58,000	70,000	2,000
Total	1,320,000	1,332,000	1,344,000
Expenditure			
Administration (incl Audit-\$8,000)	311,000	313,000	331,000
Dam Surveillance	558,000	562,000	548,000
Mining Investigations	451,000	460,000	465,000
Total	1,320,000	1,335,000	1,344,000
Operating Surplus / (Deficiency)	0	(3,000)	0

Appendix A – Dam Owner Summary 30 June 2009

Dam Owner	Prescribed Dams	Surv. Reports Rec'd 08/09	DSC inspections 08/09
Councils	134	11	31
Sydney Water / Catchment Authority	37	5	5
Delta, Macquarie Generation, Eraring Energy	19	7	5
State Water	22	4	8
Other State Authorities	10	2	5
Snowy Hydro	15	3	2
Non State Authorities	3	-	-
Mining Companies	84	25	8
Other Ownership	22	-	5
TOTAL	346	57	69

Appendix B – 2009-Current Prescribed Dams in NSW

Dam	Map Ref	Presc. 2008/9	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Abbotsbury Park Pond 2	F10				2004	TE	6	18	RTA
AH Whaling Reserve Basin	F10				-	TE	2	7	Baulkham Hills Council
Aldriges Creek	D11				1994	TE	24	1200	Hunter Pastoral
Antiene Mine Lease Tails	E11				2000	TE/ER	15	3000	Rio Tinto Coal
Anvil Hill Start Up Tails	E10				-	TE	16	1300	Centennial Hunter
Anvil Hill South Inpit Tails	E10				-	ER	24	6600	Centennial Hunter
Ashton Tails	E11				2004	TE	5	96	Ashton Coal
Avon	G10				1927/71	PG/ER	72	214400	SCA
Bagnalls Beach Rd Basin*	E12				1998	TE	2	5	Port Stephens Council
Bakers Road Basin*	C13				-	TE	7	200	Coffs Harbour Council
Bamarang	G10				1983	TE	26	3800	Shoalhaven Council
Banks Rd Basin	F10				1997	TE	4	40	Liverpool Council
Barden Ridge Lower*	F10				2007	TE	18	35	Sutherland Council
Baryulgil Mine	B12				1996	TE	8	70	Yugilbar Station
Bayswater Ash	E10				1985	TE	39	22000	Macquarie Generation
Bayswater Brine Decant	E10				1986	TE	21.5	650	Macquarie Generation
Bayswater Cooling Makeup	E10				1984	TE	16	460	Macquarie Generation
Bayswater 2 Main	E10				1979	TE	27	1200	Bayswater Colliery
Beardy Waters*	B11				1932/60	PG	8.5	500	Glen Innes Municipal Ccl
Beargamil	F8				1914	TE	16	480	Parkes Council
Ben Boyd	J9				1978	TE	29	800	Bega Valley Council
Ben Chifley	F9				1957/2001	TE	27	30000	Bathurst Council
Bendeela Pondage	G10				1973	TE/ER	18	1200	SCA
Bengalla Mine Raw Water	E10				2000	TE	11	270	Bengalla Mining Co P/L
Bethungra *	G7			R	1895	PG	13	580	Department of Lands
Blackbutt Reserve	G10				1957/95	TE	6	25	Shellharbour City Council
Bloomfield U-Cut Tails	E11	P			-	TE	14	4000	Bloomfield Collieries
Blowering *	H8			R	1968	TE/ER	112	1628000	State Water
Bobs Dump Tails	E10				2001/4/7	TE/ER	25	2100	Coal & Allied
Boggabri Coal Mine Water	C9	P			2009	TE	10	175	Boggabri Coal P/L
Bonalbo (Petrochilos)*	A12				1969/89	TE	13	55	Kyogle Council
Boorowa	G8				1940	PG/TE	8	180	Boorowa Council
Bootawa	D12			I	1967	TE	25	2270	North Power
Borenore Creek	F8				1928	VA	17	230	Cabonne Council
Brennans Creek	G10				1976	DR	17	320	Coal Cliff Collieries Pty Ltd
Brogo	I9				1976	DR	43	9800	State Water
Brokers Rd Retarding Basin	G10				2000	TE	5	70	Wollongong Council
Brooklyn Retarding Basin	F11				1995	ER	5	5	State Rail Authority
Broughton Pass Weir	G10				1888	PG	6	50	SCA
Broula King Tails 1	F8				-	TE/ER	18	138	Broula King Joint Venture
Broula King Tails 2	F8				-	TE/ER	18	25	Broula King Joint Venture
Buckland's Retarding Basin	G10				1991	TE	5	2	P. Buckland
Bulga Coal Mine Water	E11	P			-	TE	14	3020	Xstrata-Bulga Coal
Bulli Upper Rail Embankment*	G10			R	C1920	TE	5	28	Multiplex Developments
Bundanoon	G10				1960	VA	35	2040	Wingecarribee Council
Burrudong	E9			R	1967	TE/ER	76	1188000	State Water
Burrinjuck	H8				1928/56/96	PG	93	1026000	State Water
Cadiangullong	F8				1997	PG	45	4200	Cadia Holdings Pty Ltd
Cadia NorthernTails	F8				1997-	TE/RE	79	91000	Cadia Holdings Pty Ltd
Cadia Southern Tails	F8				2001-	TE/ER	56	40000	Cadia Holdings Pty Ltd
Cadia-Upper Rodds Ck	F8				2001	TE	31	3000	Cadia Holdings Pty Ltd
Cadia Waste Dump Basin	F8				2002	TE/ER	18	50	Cadia Holdings Pty Ltd
Camberwell Tails 2	E11				2002	TE/ER	40	1660	Camberwell Coal P/L
Campbelltown Link Basin*	G10				2003	ER	6	26	Landcom
Campbelltown Nth Basin*	G10				2001	TE	3	30	Campbelltown Council
Captains Flat	H9				1939/93	PG	16	820	Yarrowlumla Shire Council
Carcoar	F9				1970	VA	46	35800	State Water
Cascade 1*	F10				1915	VA	15	160	SCA
Cascade 2*	F10				1926	TE	26	320	SCA
Cascade 3*	F10				1938	TE	30	1700	SCA
Cataract	G10				1907/87	PG	56	94300	SCA
Cecil Hills Basin 100 *	F10				2001	TE	4	30	Liverpool Council
Cecil Park Basin 3A *	F10				1992	TE	6	52	Liverpool Council
Centennial Pk Res No. 1	F11				1899	PG	7	82	Sydney Water
Centennial Pk Res No. 2	F11				1925	PG/TE	11	89	Sydney Water
Central Garden Ret. Basin	G10				-	TE	3	28	Holroyd City Council
Chaffey*	D11			R	1976	TE/ER	54	61800	State Water

Dam	Map Ref	Presc. 2008/9	Surv. Report	Safety	Built	Type	Height (m)	Storage (ML)	Owner
Chain of Ponds 13B	E11				-	TE	18	4000	Liddell Coal operations
Chichester *	E11				1923/84/95	PG	41	21000	Hunter Water Corporation
Clarrie Hall	A13			M	1982	DR	43	16000	Tweed Council
Clear Paddock Ck Basin C	F11				2005	PG/TE	6	70	Fairfield Council
Clear Paddock Ck Basin W2	F10				2007	-	5	50	Fairfield Council
Coalcliff	G10				1971	TE	7	130	Illawarra Coke Co Pty Ltd
Cochrane	I9				1958	TE	29	3085	Eraring Energy
Coeypollly Ck 1 (Old Quipolly)*	D10				1932	VA	19	860	Liverpool Plains Council
Coeypollly Ck 2 (Quipolly)*	D10			R	1955	TE	21	5435	Liverpool Plains Council
Colongra Ck Ash	F11				1965	TE	6	5550	Delta Electricity
Comberton Grange Basin	G10				1990	TE	15	65	Shoalhaven Council
Comin Place Basin	F10				2000	TE	5	20	Fairfield Council
Company	F8				1867/2006	TE	6	113	Weddin Council
Copeton*	B11			R	1976	TE/ER	113	1364000	State Water
Cordeaux	G10				1926/77/88	PG	49	93600	SCA
Cowarra*	D12				2001	TE	40	10000	Hastings Council
Cowarra Creek Tails	H9			M	1986	ER	23	52	Horizon Pacific Ltd
Crookwell	G9				1937	PG/VA	15	450	Crookwell Council
CSA Tails	D5				1960	TE	8	1932	Cobar Management / DMRes
CSIRO Retarding Basin	F10				1990	TE	6	58	Holroyd Council
Cumnock Tails	E11	P			-	ER	10	1500	Xstrata-Cumnock Mgt P/L
Danjera	G10				1971	CB/ER	30	7700	Shoalhaven Council
Dapto Heights Basin	G10				1991	TE	7	16	Wollongong Council
Dartbrook Mine Water	E10				2000	TE	11	450	Dartbrook Mine
Daruk Park Basin	F10				1987	TE	3	47	Liverpool Council
Deep Creek	H10				1983	TE	31	4500	Eurobodalla Council
Deep Creek (Snowy)	I8				1961	PG	21	5	Snowy Hydro
Delegate Retarding Basin	J8			M	1984	TE	7	7	Bombala Council
DEP Retarding Basin	F10				1990	TE	9	110	Blacktown Council
Dover Heights Reservoir	F11				1929	PG/TE	8	85	Sydney Water
Drayton W.S.	E10				1980	TE/ER	18	390	Drayton Coal Pty Ltd
Dumaresq*	C11			R	1896	PG	12	440	Armidale Council
Dungowan	D11				1957/92	TE	31	5900	Tamworth Council
Duralie Auxiliary 1*	E11	P			2009	TE	20	500	Duralie Coal P/L
Duralie Mine Water*	E11				2003	TE/ER	18	1100	Duralie Coal Pty Ltd
Edgewood Retarding Basin	G10				2002	TE	7	19	Illawarra Land Development
Edgeworth Ret. Basin	E11				-	TE	3	12	Lake Macquarie Council
Elanora (Hillgrove)*	C11				1982	TE	7	100	Hillgrove Mine
El Klaros	E11				1995	TE	25	200	Mawipalivier P/L
Emigrant Creek*	A13				1968/2001	TE/PG	12	820	Rous County Council
Eraring Ash *	F11				1982	TE	25	20500	Eraring Energy
Eraring Attemp. Cooling*	F11				-	TE	27	1400	Eraring Energy
Eucumbene	I8				1961	TE/ER	116	479800	Snowy Hydro
Fitzroy Falls	G10				1974	TE/ER	14	22200	SCA
Floraville Road Basin	F11				1992	TE	4	20	Lake Macquarie Council
Foothills Estate Basin 1	G10				1994	TE	5	20	Wollongong Council
Foothills Estate Basin 3	G10				1995	TE	5	20	Wollongong Council
Foothills Rd Basin	G10				1982/97	TE	5	24	Wollongong Council
Fountaindale	G10			I	1915	VA	15	61	Kiama Council
Fox Hills Basin	F10				1990	TE	4	127	Blacktown Council
Galambine	E9				1982	TE	18	227	Gooree Pastoral Co
Gannet Place Basin	G10				1992	TE	10	5	Wollongong Council
Garden Suburbs Basin 2	E11				2000	TE	8	17	Lake Macquarie City Council
Geehi	I8				1966	ER	91	21100	Snowy Hydro
George Bass Drive Basin	H10				2000	TE	3	11	Eurobodalla Council
Glenbawn	E10				1958/86	TE/ER	100	750000	State Water
Glendell Discharge	E11	P			-	TE	11	200	Xstrata Coal, Mt Owen
Glenlee Tails	G10				1982-	ER	29	1500	Sada Pty Ltd
Glenmore Park Basin	F10				1997	TE	4	232	Penrith Council
Glennies Creek *	E11			I	1983	DR	67	283000	State Water
Glennies Ck-Possum Skin	E11				2004	TE	14	1250	Glennies Ck Joint Venture
Glenquarry Cut	G10				1974	PG	18	34510	SCA
Gooden Reserve Basin*	F10				1997	PG	5	380	Baulkham Hills Council
Googong	H9				1977/1992	ER	67	124000	ACT Electricity & Water
Gosling Creek	F9			M	1890	PG	8	650	Orange Council
Grahamstown*	E11				1964/96/01	TE	11	132000	Hunter Water Corporation
Greaves Creek*	F10				1942	VA	17	320	SCA
Green Meadows Basin	G10				1981/93	TE	4	165	Shellharbour Council
Greenway Dve Basin 10A/B*	F10				2000/3	TE	5	132	Landcom
Gunyah Park Basin	G10				1992	TE	4	5	Wollongong Council
Guthega	I8				1955	PG	34	1550	Snowy Hydro
Hamilton Valley Basin 5A	I6				1993	TE	4	135	Albury Council
Hamilton Valley Basin 5B	I6				1993	TE	3	62	Albury Council

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Hillgrove Tails 1 *	C11			M	1982	TE/ER	40	700	Hillgrove Gold NL
Hillgrove Tails 2 *	C11				2007	TE/ER	40	1280	Hillgrove Gold NL
Honeysuckle Creek*	F11				1962/91	PG	9	12	Killara Golf Club Ltd
Horningsea Park Ret Basin	G10				-	TE	3	25	Liverpool Council
Hovell Weir (Mannus Lake)	H7			I	1986	TE	8	2000	Tumbarumba Council
Howell Close Ret Basin	F11				-	TE	3	5	Pittwater Council
Hume*	I7			R	1936/1967	PG/TE	51	3038000	MDBC
Humphreys Creek*	A12				1988	TE	15	750	Norminco Ltd
Humphreys Creek Tails*	A12			I	1989	TE/ER	15	1100	Norminco Ltd
Hungerford Hill*	E11				1970/2002	TE	8	545	Southcorp Wines P/L
Hunter Valley 6 Tails	E11				-	ER	10	3250	Rio Tinto Coal
Hunter Valley Nth Pit Tails	E10				2003	TE/ER	50	20000	Coal & Allied Operations
Huntley Colliery 2	G10				1973	TE	28	59	Powercoal
Imperial Lake*	D1			R	1967	TE	8	700	Country Water
Island Bend	I8				1965	PG	49	3020	Snowy Hydro
Jerrara Creek	G10				1955	TE	13	270	Kiama Council
Jindabyne*	I8				1967	ER	72	690000	Snowy Hydro
Jounama	H8				1968	ER	44	43500	Snowy Hydro
Junction Reefs	F8				1898	MB	19	300	State Water
Kalingo	E11			I	1920	TE	9	81	Southland Mining Ltd
Kanahooka Basin	G10				1993	TE	5	26	Forest Grove Estate
Kangaroo Pipeline	G10				1974	ER/PG	20	23500	SCA
Karangi	C13				1980/96	TE/ER	38	5600	Coffs Harbour Shire Council
Keepit *	C10			R	1960	PG/TE	55	423000	State Water
Kentucky Creek	C11				1944/84	PG	12	500	Uralla Shire Council
Khancoban*	I8			M	1966	TE	18	21500	Snowy Hydro
Killara Reservoir*	F11				1931/94	PG/TE	11	166	Sydney Water
Lake Canobolas	F9			M	1918	VA	12	700	Orange City Council
Lake Cowal Gold Tails	F7				2004	TE	20	3600	Barrick Gold Australia
Lake Cowal Gold D9	F7				2007	TE	9	800	Barrick Gold Australia
Lake Endeavour	F8			R	1940	TE	21	2400	Parkes Shire Council
Lake Ettamogah	H6				1993	TE	13	2100	ANM Mill
Lake Inverell	B11				1938	PG	13	1500	Inverell Shire Council
Lake Medlow	F10				1907	VA	20	290	SCA
Lake Pambulong Basin	E11				2002	TE	5	57	Hammersmith Mgt
Lake Parramatta*	F11				1857/98	VA	14	490	Parramatta Council
Lake Rowlands	F9			M	1953	CB/TE	20	4690	Central Tablelands Council
Lake Tullimba	C11				1982	TE	18	1200	New England Uni
Lemington Mine Tails	E10				1991	TE/ER	12	2000	Lemington Mine
Lemington Mine Tails 5	E10				2000	TE/ER	22	2000	Lemington Mine
Lidcombe Ret Basin 6	F11				2003	TE	4	11	Sydney Olympic Park Auth.
Liddell Ash	E10				1971/82	TE	31	28500	Macquarie Generation
Liddell Ash Levee	E10				2003	TE/ER	21	Variable	Mac. Gen / Drayton Coal
Liddell Cooling Water	E10				1968	TE	43	148000	Macquarie Generation
Liddell Water Supply	E10				1970	TE	31	4500	Macquarie Generation
Lithgow 1*	F10				1896	VA	11	69	Lithgow Council
Lithgow 2 *	F10			I	1907	VA	27	440	Lithgow Council
Lostock*	E11				1971	TE/ER	38	20000	State Water
Loyalty Rd. Ret Basin*	F11				1995	PG	27	1520	Upper Parramatta Trust
Lyell	F10				1983/96	DR	50.5	33500	Delta Electricity
Malpas	C11				1968	TE/ER	31	13000	Armidale Council
Mangoola Coal Raw Water	E10	P			-	TE/ER	26	2500	Xstrata-Mangoola Coal
Mangrove Creek	F11			I	1983	DR	80	170000	Gosford Council
Manly	F11				92/1922/84	PG	18	2000	Sydney Water
Manning Ck Ash*	F11				1963	TE	12.5	20000	Delta Electricity
Mardi*	F11				1963/91	TE	26	7280	Wyong Council
Maroubra Reservoir	F11				1966	PG/TE	12	128	Sydney Water
McCoy Park. Basin	F11				1989	TE	6	500	Parramatta Council
McKinnons Gold Project	D5				1996	TE	17	3030	Burdekin Resources
Medway	G10				1964	VA	23	1270	Wingecarribee Council
Menindee Storages	E2			M	1960	TE	12	2287280	State Water
Minmi Rd Retarding Basin	E11				1995	TE	5	55	Newcastle City Council
Molong Creek	F9			I	1987	PG	16	1000	Cabonne Council
Moolarben Creek	E9				1957/93	ER	12	166	Ulan Coal Mines Ltd
Mooney Lower	F11			I	1937	VA	13	310	Gosford Council
Mooney Upper	F11			I	1961	VA	27	4630	Gosford Council
Moore Creek	C10				1898	VA	19	220	State Water
Mt Annan Wetlands 1	G10				-	TE	7	80	Landcom
Mt. Arthur Nth Environment	E10				2002	TE	17	1260	Coal Operations Aust

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Mt Owen Nth Void 2 Tails	E10			2003	TE/ER	14	2000	Hunter Valley Coal Corp.
Mt Owen Rail Loop Tails	E10			2003	TE/ER	12	5000	Hunter Valley Coal Corp.
Mt Owen Tails 5	E10			-	TE	11	5000	Hunter Valley Coal Corp.
Mt Thorley AG Tails	E11			2007	ER	10	5800	Coal & Allied
Mt Thorley Ministrip Tails	E11			2005	ER	50	2520	Mt Thorley Operations
Mt. Thorley Ramp Tails	E11			U2005	TE	75	4700	Mt Thorley Operations
Mt View Basin	E11			1987	TE	4	247	Cessnock Council
Muirfield Golf Club	F11			1969	TE	8	6	Muirfield Golf Club
Muirfields Golf Ret Basin*	F11			1993	TE	4	12	Baulkham Hills Council
Murray 2	I8			1968	VA	43	2310	Snowy Hydro
Murrurundi	D10			1984	TE	11	170	Murrurundi Council
Narara Horticultural	F11		I	1985	TE	9	43	Dept of Primary Industries
Narranbulla	G9			1966	TE	7	1445	Narranbulla Pastoral Co.
Nepean	G10			1935/92	PG	81	81400	SCA
Newstan Sth REA Tails	E11			2007	TE	53	5316	Centennial Coal
Nixon	C10			1971	TE	16	222	J. Nixon
Norbrik Drive Basin	F11			-	TE	5	9	Norwest Land
Northmead Ret Basin	F10			1990/94	TE	6	30	Baulkham Hills Council
North Parkes Tails 1 & 2	E8			1993	TE	22	25000	North Parkes Mines
Nth Turrumurra Golf	F11			2001	TE	5	10	Ku-ring-gai Council
Nyrang Park Basin	G10			1993	TE	4	21	Wollongong Council
Oak Flats Reservoir	G10			1978	TE	15	56	Sydney Water
Oaky River	C12			1956	PG/ER	18	2700	New England County Cncl
Oberon	F9			1949/96	CB	34	45400	State Water
Orange Research Station	F9			1993/97	TE	7	175	NSW Agriculture Dept
Orange Storm Harvest*	F9	P		2009	TE	10	200	Orange City Council
Pacific Palms*	E12			1970	TE	6	8	Calmjoy P/L
Palm Tree Grove Basin	F11			1975/90	TE/ER	3	3	Gosford Council
Peak Gold Mine Tails	D5			1991-	TE	13	4200	Peak Gold Mines P/L
Pecan Close Basin	F11			1998/03	TE	5	100	Gosford Council
Pejar*	G9		I	1979	TE/ER	23	9000	Goulburn-Mulwaree Council
Pied Piper Basin	F11			-	TE	5	5	Blacktown Council
Pindari	B11			1969/93	DR	85	312000	State Water
Pipers Flat	F10		M	1920	TE	10	645	Centennial Coal Pty Ltd
Plashett	E10			1987	TE	46	70000	Macquarie Generation
Porters Creek	H10			1968	TE/PG	17	2541	Shoalhaven Council
Port Macquarie*	D12			1980	TE	19	2500	Hastings Council
Port Waratah Fines Disp	E11			1990	TE	5	1750	Port Waratah Coal
Potts Hill Res. 2	F11			1923	PG/TE	8	799	Sydney Water
Prospect	F10			1888/1979/97	TE	26	50200	SCA
Puddledock Creek	C11		M	1928	VA	21	1730	Armidale Council
Ravensworth Mine Inpit	E11			1994	TE	12	1000	Peabody Resources
Ravensworth Void 3 Ash	E11			2001	TE	20	12000	Macquarie Generation
R'worth Void 4 Ash Saddle	E11			-	TE	10	4500	Ashton Coal
Ravensworth Void 5 Ash	E11			-	TE	70	12000	Macquarie Generation
Redbank Creek	E9		R	1899	VA	16	180	Mudgee Council
Rocky Creek*	A13		M	1953	TE	28	14000	Rous County Council
Rouse Hill Ret Basin 5	F10			1993	TE	4	72	Sydney Water
Rouse Hill Ret Basin 9	F10			1993	TE	5	46	Sydney Water
Rouse Hill Basin 9B	F10			2001	Te	7	55	Sydney Water
Rouse Hill Ret Basin 13	F10			1994	TE	5	99	Sydney Water
Rouse Hill Ret Basin 16	F10			2000	TE	4	13	Sydney Water
Rydal	F10			1957/96	TE	15	370	State Water
Rylstone	E9			1953	VA	15	3210	Rylstone Council
Sawyers Swamp Creek Ash*	F10			1979	TE	40	8500	Delta Electricity
School House Ck Ret Basin	F10			1989	TE	4.5	138	Penrith Council
Seladon Ave Ret Basin	E11			1993	TE	2	3	Newcastle Council
SE Tails	E10			2002-	ER	35	1200	Coal & Allied
Shannon Creek*	B12			2007	TE/ER	44	30000	North Coast Water
Shellcove Estate Basin	G10			2003	TE	7	27	Shell Cove Estate
Sierra Place Basin	G10			1991/2001	TE/ER	9	213	Baulkham Hills Council
Site D Tails	E1			1998	TE	26	6600	Pasminco Broken Hill Mine
Smiths Ck Ret Basin 1	G10			2001	TE	9	55	Campbelltown Council
Smiths Ck Ret Basin 2	G10			1996	TE	8	50	Campbelltown Council
Smiths Ck Ret Basin 3	F10			1996	TE	7	32	Campbelltown Council
Snapper Mine Water	F2			-	TE	23	4300	Bemax Resources P/L
Sooley *	G9			1930/61/2006	PG	15	4500	Goulburn-Mulwaree Council
South Bulli Basin 1	G10			-	TE	6	50	Gujurat NRE Aust.
South Bulli Stormwater	G10			1992	TE	9	89	Gujurat NRE Aust.
Split Rock	C10		R	1987	DR	66	397370	State Water
Spring Creek*	F9			1931/47/69	TE/VA	16	4700	Orange Council
Stephens Creek	D1		M	1892/1909	TE	15	20400	Country Water
Steuart McIntyre	D12			2000	TE	25	2500	Kempsey Council
St Josephs School Basin	G10			1990/2001	TE	5	17	Shellharbour Council

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Stockton Borehole Tails*	E11			1982/1985	TE/ER	21	360	Broken Hill Prop. Co Ltd
Suma Park *	F9		R	1962	VA	34	18000	Orange Council
Talbingo	H8		R	1970	ER	162	921400	Snowy Hydro
Tallong Railway	G10			1883/1975	MB	7	318	State Rail Authority
Tallowa	G10			1976	PG	46	110200	SCA
Tantangara	H8			1960	PG	45	254000	Snowy Hydro
Tenterfield Creek*	B12		M	1930/74	PG	11	1170	Tenterfield Shire Council
The Cove	F11		M	1972	TE	7	140	Old Sydney Town
Thompsons Creek	F9			1992	TE/ER	53.5	27500	Delta Electricity
Thornleigh Reservoir	F11			1971	TE	9	409	Sydney Water
Tilba	I10			1970/97	TE	17	135	Bega Valley Council
Tillegra*	E11			-	TE/ER	70	450000	Hunter Water Corporation
Timor	D9			1961	VA	19.5	1140	Coonabarabran Council
Tooma	I8			1961	TE	67	28100	Snowy Hydro
Toonumbar	A12			1971	TE/ER	44	11000	State Water
Triako Tails	E6			1989	TE	12.5	950	Triex Ltd
Tritton Tails	D6			2004	TE	14	5500	Tritton Resources Ltd
Tumbarumba	H8			1972	TE	6	68	Tumbarumba Council
Tumut Mill Freshwater	H8			2001	TE	11	190	Visy Pulp & Paper
Tumut Mill Winter Storage	H8			2001	TE	11	700	Visy Pulp & Paper
Tumut Pond	H8			1959	VA	86	52800	Snowy Hydro
Tumut 2	H8			1961	PG	46	2700	Snowy Hydro
Tumut 3 Inlet	H8			1971	PG	35	160000	Snowy Hydro
Umberumberka	D1			1914	PG	26	8180	Aust. Inland Energy & Water
United Collieries Tails 2	E10			2006	TE	12	400	United Colliery
Upper Cordeaux 2	G10			1915	VA	19	1200	SCA
Vales Point Ash*	F11			1984	TE	6	42000	Delta Electricity
Valley View Ret Basin	F8			2006	TE	5	10	Cowra Council
Wallerawang	F10			1978	TE	14	4300	Delta Electricity
Wambo Chitter Dump Water	E11	P		-	TE	9	800	Wambo Mining Corp.
Wambo Hunter Pit Tails	E11			2005	ER	50	8300	Wambo Mining Corp.
Wambo NE Tails	E11			2002	TE	26	2060	Wambo Mining Corp
Warkworth Tails	E11			1992/94	TE	24	3500	Warkworth Mining
Warkworth Nth Pit Tails	E11			1997	TE	21	1900	Warkworth Mining
Warragamba	F10			1960/92/02	PG	113	2091800	SCA
Warringah Reservoir	F11			1936/95	PG/TE	8	77	Sydney Water
Waverley Res. WS133	F11			1917	PG/TE	8	19	Sydney Water
Wentworth Falls Lake*	F10			1906/93	TE	10	300	Blue Mountains Council
Whitford Rd Basin	F10			1997	TE	4	44	Liverpool Council
Widemere Basin	F11			-	TE	7	152	Boral Recycling P/L
Wilpinjong TD1-East	E9			-	ER	14	370000	Wilpinjong Coal P/L
Wilpinjong TD1-West	E9			-	ER	18	653000	Wilpinjong Coal P/L
Wilpinjong TD2	E9			-	ER	13	1400000	Wilpinjong Coal P/L
Winburndale	F9		R	1936	PG	25	1850	Bathurst Council
Windamere	E9			1984	TE/ER	67	368000	State Water
Winding Creek 5 Basin*	E11			1993	TE	5	72	Hunter Water Corp
Wingecarribee	G10		M	1974	TE/ER	20	34510	SCA
Wollondilly Washery	G10			1968	ER	18	150	Sada Pty Ltd
Wollongong High Basin	G10			2001	TE	5	80	Wollongong Council
Woodford Creek	F10			1928/48	VA	18	850	SCA
Woodlawn Mine Evap	H9			1989	TE	6	750	Woodlawn Mines
Woodlawn Mine Evap. 2	H9			1989	TE	10	290	Woodlawn Mines
Woodlawn Nth Tails	H9			1977	TE/ER	18	2100	Woodlawn Mines
Woodlawn Sth Tails	H9			1982	TE/ER	25	2400	Woodlawn Mines
Woodlawn West Tails	H9			1989	ER	35	2400	Woodlawn Mines
Woolgoolga	C13			1967	TE	14	270	Coffs Harbour Council
Woronora	G10			1941/88	PG	63	71800	SCA
Wyangala	F8		R	1971	TE/ER	85	1220000	State Water
Wyong Road Basin	F11			1975	TE	3	50	Wyong Council
Yarrowonga Weir	I6			1939/2001	PG/TE	7	120000	MDBC
Yass	G8			1927	VA/PG	12	1125	Yass Council
Yellow Pinch	I9			1987	ER	40	3000	Bega Valley Council

LEGEND:

*: DSC Inspected - 2008/9
R: Sig. Risk Dam
M: Medium Risk Dam
I: Dam under Investigation

TE: Earthfill dam
DR: Decked rockfill
PG: Concrete Gravity
CB: Concrete buttress

ER: Rockfill dam
MB: Masonry buttress
VA: Concrete arch



Suma Park Dam

Orange Council is investigating upgrading options for this 34m high arch dam which forms a vital part of Orange's water supply.



Beardy Waters Dam. *During a recent inspection tour, DSC members and staff inspected this 9m high concrete gravity dam which forms the heart of Glen Innes' water supply.*

Petrochilos (Bonalbo) Dam

DSC members and staff inspecting this recently upgraded 13m high earthfill dam which is the principal water source for the township of Bonalbo.

