

Complete list of Final Report recommendations

Chapter 2 Floodplain management

- 2.1 The steering committee of the Wivenhoe Dam and Somerset Dam Optimisation Study should consider whether it would be more effective for the floodplain management investigation to be removed from the Wivenhoe Dam and Somerset Dam Optimisation Study.
- 2.2 Brisbane City Council, Ipswich City Council and Somerset Regional Council and the Queensland Government should ensure that, as soon as practicable, a flood study of the Brisbane River catchment is completed in accordance with the process determined by them under recommendation 2.5 and 2.6. The study should:
- be comprehensive in terms of the methodologies applied and use different methodologies to corroborate results
 - involve the collation, and creation where appropriate, of the following data:
 - rainfall data including historical and design data and radar
 - stream flow data
 - tide levels
 - inundation levels and extents
 - data on the operation of Wivenhoe and Somerset dams
 - river channel and floodplain characteristics including topography, bathymetry, development and survey data
 - involve determining the correlation between any of the data sets above
 - produce suitable hydrologic models run in a Monte Carlo framework, taking account of variability over the following factors:
 - spatial and temporal rainfall patterns
 - saturation of the catchment
 - initial water level in dams
 - effect of operating procedures
 - physical limitations on the operation of the dams
 - tidal conditions
 - closely occurring rainfall events
 - validate hydrologic models to ensure they reproduce:
 - observed hydrograph attenuation
 - probability distributions of observed values for total flood volume and peak flow
 - timing of major tributary flows
 - observed flood behaviour under no dams conditions and current conditions
 - produce a suitable hydraulic model or models that:
 - are able to determine flood heights, extents of inundation, velocities, rate of rise and duration of inundation for floods of different probabilities

- are able to deal with movement of sediment and changes in river beds during floods
 - are able to assess historical changes to river bathymetry
 - are able to be run in a short time to allow detailed calibration and assessment work
 - characterise the backwater effect at the confluence of the Brisbane and Bremer rivers and other confluences as appropriate
 - involve analysis of the joint probability of floods occurring in the Brisbane and Bremer rivers (and any other pair of rivers if considered appropriate)
 - be iterative, and obtain a short-term estimate of the characteristics of floods of different probabilities in all significant locations in the catchment (at least Brisbane City, Ipswich City and at Wivenhoe Dam) in order to determine the priorities for the rest of the study.
- 2.3 Ipswich City Council should determine whether the results, models and maps produced by the Brisbane River flood study are sufficient for its floodplain management. If they are not, Ipswich City Council should ensure appropriate work is done by way of data collection and creation and hydrologic and hydraulic modelling for use in its floodplain management.
- 2.4 A recent flood study should be available for use in floodplain management for every urban area in Queensland. Where no recent study exists, one should be initiated.
- 2.5 The Queensland Government, in consultation with councils, should determine which urban areas in Queensland do not have access to flood information from a current flood study. The Queensland Government should rank those areas in order of priority in accordance with their need for updated flood information by reference to factors including:
- a. population
 - b. sophistication of land use planning and emergency management measures already in place in those areas
 - c. currency of any flood risk information available to the council
 - d. approximate frequency of damaging floods in the area according to the historical record.
- 2.6 By reference to the order of priority determined in accordance with recommendation 2.5, the Queensland Government and councils should together ensure that the council responsible for each urban area in Queensland has access to current flood study information. This will include determining:
- a. a process or processes by which the flood studies will be completed, including the involvement of the Queensland Government and relevant councils
 - b. how, and from whom, the necessary technical and financial resources will be obtained
 - c. a reasonable timeframe by which all flood studies required will be completed.
- 2.7 As far as is practicable, councils should maintain up-to-date flood information.
- 2.8 When commissioning a flood study, the body conducting the study should:
- check whether others, such as surrounding councils which are not involved in the study, dam operators, the Department of Environment and Resource Management, and the Bureau of Meteorology, are doing work that may assist the flood study or whether any significant scientific developments are expected in the near future, and decide whether to delay the study
 - discuss the scope of work with the persons to perform the flood study as well as surrounding councils which are not involved in the study, dam operators, the Department of Environment and Resource Management, and the Bureau of Meteorology.
- 2.9 Elected representatives from councils should be informed of the results of each flood study relevant to the council's region, and consider the ramifications of the study for land planning and emergency management.
- 2.10 Elected representatives from all agencies involved in a flood study should be informed of recommendations made for future work, and determine, on a risk basis, whether that further work is to be completed.

- 2.11 The Queensland Government and Commonwealth Government should ensure the existence and maintenance of a repository of data of the type used in flood studies. The database should include the types of data which the expert panel specified as needed for a comprehensive flood study. Councils, Queensland and Commonwealth Government agencies and dam operators should be able to deposit and obtain access to data.
- 2.12 Councils in floodplain areas should, resources allowing, develop comprehensive floodplain management plans that accord as closely as practicable with best practice principles.
- 2.13 For urban areas or areas where development is expected to occur:
- a. councils with the requisite resources should develop a flood map which shows 'zones of risk' (at least three) derived from information about the likelihood and behaviour of flooding
 - b. councils without the requisite resources to produce a flood behaviour map should develop a flood map which shows the extent of floods of a range of likelihoods (at least three).
- 2.14 For non-urban areas or areas where limited development is expected to occur councils should consider, on a risk basis, what level of information about flood risk is required for the area, and undertake the highest ranked of the following options which is appropriate to that need and within the capacities (financial and technical) of the council:
- a. a map showing 'zones of risk' (at least three) derived from information about the likelihood and behaviour of flooding
 - b. a map showing the extent of floods of a range of likelihoods (at least three)
 - c. a flood map based on historic flood levels that have been subjected to a flood frequency analysis to estimate the annual exceedance probability of the selected historical flood
 - d. a historic flood map without flood frequency analysis
 - e. the Queensland Reconstruction Authority Interim Floodplain Assessment Overlay as a way to determine those areas for which further flood studies are required, or
 - f. the Queensland Reconstruction Authority Interim Floodplain Assessment Overlay (preferably refined using local flood information) as a trigger for development assessment.
- 2.15 Councils should ensure that areas for which there has been no assessment of the likelihood of flooding are indicated on a map and that, as part of the development assessment process for these, there is at least some enquiry into whether a site proposed for development could be subject to flooding.
- 2.16 Councils and the Queensland Government should display on their websites all flood mapping they have commissioned or adopted.
- 2.17 Flood maps, and property specific flooding information intended for use by the general public, should be readily interpretable and should, where necessary, be accompanied by a comprehensible explanatory note.
- 2.18 Councils that do not currently do so should consider offering an online database which allows the public to conduct a search on a parcel of land to find development approvals relevant to that parcel of land.
- 2.19 The Queensland Government should consider implementing a mechanism by which prospective purchasers of property are alerted to the issue of flood risk. To that end, the Queensland Government should consider consulting the Real Estate Institute of Queensland and the Law Society of Queensland as to the appropriateness of amending standard contract conditions so as to include a 'subject to flood search' condition, or other means of achieving the same objective.
- 2.20 The Queensland Government should endeavour to ensure that Queensland conditions are appropriately considered in the National Flood Risk Advisory Group's review of best practice principles.
- 2.21 In the event that the review does not adequately account for Queensland conditions, the Queensland Government should produce a document that provides appropriate guidelines for floodplain management in the Queensland context.
- 2.22 The Queensland Government should determine whether existing guidelines are sufficient for councils to understand best practice in the performance of flood studies and the production of flood maps. If a lack of current guidelines is identified, the government should create and circulate guidance material for councils.

Chapter 4 State planning instruments

- 4.1 The Queensland Government should:
 - a. narrow the definition of ‘development commitment’ in State Planning Policy 1/03: *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* to ensure more development applications are assessed for compatibility with flood, and
 - b. investigate whether the compensation provisions of the *Sustainable Planning Act 2009* act as a deterrent to the inclusion of flood controls in a planning scheme and consider whether they ought be amended.
- 4.2 If, as part of a state interest review process, the Department of Local Government and Planning decides that no condition should be imposed requiring a council’s proposed planning scheme to incorporate the effect of the Department of Community Safety’s comments about State Planning Policy 1/03: *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, it should advise the Department of Community Safety of the reasons for its decision.
- 4.3 The Department of Community Safety should put in place administrative arrangements which ensure it can readily ascertain whether its comments are being reflected in council planning schemes. If the Department of Community Safety becomes aware that its comments are not being adequately addressed, it should take steps to follow this up with the Department of Local Government and Planning.
- 4.4 The Queensland Government should ensure that the circumstances in which the Department of Community Safety is to consult the Department of Environment and Resource Management about a planning scheme’s flood modelling and flood mapping are clear.
- 4.5 The Queensland Government should change Temporary State Planning Policy 2/11: *Planning for stronger more resilient floodplains* to remove the possibility of councils’ using the interim floodplain assessment overlay mapping and Model Code as part of a permanent amendment to their existing planning scheme or as part of a new planning scheme.
- 4.6 Councils should consider using the limited development (constrained land) zone in their planning schemes for areas that have a very high flood risk.
- 4.7 The Queensland Government should consider amending the *Sustainable Planning Act 2009* to require that consideration be given to the risk of flooding in the preparation or revision of a regional plan.

Chapter 5 Local planning instruments

- 5.1 The Queensland Government should draft model flood planning controls, using a similar format and structure to that in the Queensland Planning Provisions, that councils can adapt for local conditions. The Queensland Government should require these controls to be reflected in new planning schemes. This may be achieved by including the controls in either:
 - a state planning policy dealing with flood, with an accompanying amendment to the *Sustainable Planning Act 2009*, or
 - the Queensland Planning Provisions.

The Queensland Government should consult councils to determine which of the two state planning instruments is the more appropriate to include the model flood planning controls.

- 5.2 The Queensland Government should include in the model flood planning controls a requirement that councils have a flood overlay map in their planning schemes. The map should identify the areas of the council region:
 - that are known not to be affected by flood
 - that are affected by flood and on which councils impose planning controls (there may be subsets in each area to which different planning controls attach)
 - for which there is no flood information available to council.

- 5.3 If the Queensland Government does not include a requirement for such an overlay map in the model flood planning controls, councils should include a flood overlay map in their planning schemes. The map should identify the areas of a council region:
- that are known not to be affected by flood
 - that are affected by flood and on which councils impose planning controls (there may be subsets in each area to which different planning controls attach)
 - for which there is no flood information available to council.
- 5.4 The Queensland Government should include in the model flood planning controls a model flood overlay code that consolidates assessment criteria relating to flood.
- 5.5 If the Queensland Government does not include such a code in the model flood planning controls, councils should include in their planning schemes a flood overlay code that consolidates assessment criteria relating to flood.
- 5.6 The Queensland Government should include in the model flood planning controls a model planning scheme policy that:
- for development proposed on land susceptible to flooding, outlines what additional information an applicant should provide to the assessment manager as part of the development application, or
 - for development proposed on land where the potential for flooding is unknown, requires an applicant to provide:
 - as part of the development application, information to enable an assessment of whether the subject land is susceptible to flooding, and
 - upon a determination the subject land is susceptible to flooding, more detailed information, to allow an assessment of the flood risk.
- 5.7 If the Queensland Government does not include such a policy in the model flood planning controls, councils should include in their planning schemes a planning scheme policy that:
- for development proposed on land susceptible to flooding, outlines what additional information an applicant should provide to the assessment manager as a part of the development application, or
 - for development proposed on land where potential for flooding is unknown requires an applicant to provide:
 - as part of the development application, information to enable an assessment of whether the subject land is susceptible to flooding, and
 - upon a determination the subject land is susceptible to flooding, more detailed information to allow an assessment of the flood risk.
- 5.8 The Queensland Government should consider amending the *Sustainable Planning Act 2009* to expressly provide either a power to remake or a power to extend a temporary local planning instrument containing interim flood regulation for a further limited period. The power to remake or extend should:
- a. permit the modification of the temporary local planning instrument to the extent required to ensure its provisions remain relevant, having regard to any requirement that may have been introduced or any information that may have become available while the original temporary local planning instrument was in force
 - b. be contingent on the Minister's being satisfied that the circumstances listed in section 105 of the *Sustainable Planning Act* continue to exist and that there are proper grounds for the failure to make a permanent scheme amendment while the original temporary local planning instrument was in force.
- 5.9 The Queensland Government should consider allowing councils to amend a planning scheme to update existing flood mapping information by way of the minor amendment process, provided that adequate public consultation has occurred.

Chapter 6 Satellite planning systems

- 6.1 The Queensland Government should consider amending the *Urban Land Development Authority Act 2007*, the *South Bank Corporation Act 1989*, the *State Development and Public Works Organisation Act 1971* insofar as it governs state development areas, and other legislation which establishes alternative planning systems that operate independently of the *Sustainable Planning Act 2009*, to require that:
- any planning scheme, interim or otherwise, appropriately reflects any state planning policy with respect to flood
 - flood risk be considered in the assessment of any development application.
- 6.2 The Coordinator-General should amend the guideline for preparing an ‘initial advice statement’ for a significant project under the *State Development and Public Works Organisation Act 1971* so that it specifically requires an applicant to consider and provide information about the project’s flood risk.

Chapter 7 Development and flood considerations

- 7.1 The Queensland Government should consider extending the application of a state planning policy dealing with flood to the types of community infrastructure which are identified in the *Sustainable Planning Regulation 2009* and which the community needs to continue functioning, notwithstanding flood.
- 7.2 The Queensland Government should draft assessment criteria to be included in the model flood planning controls that require community infrastructure (including the types of community infrastructure which are identified in the *Sustainable Planning Regulation 2009* and which the community needs to continue functioning, notwithstanding flood) to be located and designed to function effectively during and immediately after a flood of a specified level of risk.
- 7.3 If the Queensland Government does not include such assessment criteria in model flood planning controls, councils should include assessment criteria in their planning schemes that require community infrastructure (including the types of community infrastructure which are identified in the *Sustainable Planning Regulation 2009* and which the community needs to continue functioning, notwithstanding flood) to be located and designed to function effectively during and immediately after a flood of a specified level of risk.
- 7.4 The Queensland Government should draft assessment criteria to be included in the model flood planning controls that require the impact of flood on commercial property to be minimised.
- 7.5 If the Queensland Government does not include such assessment criteria in the model flood planning controls, councils should include assessment criteria in their planning schemes that require the impact of flood on commercial property to be minimised.
- 7.6 The Queensland Government should ensure that the criteria under the *Environmental Protection Act 1994* that apply to the assessment of development applications for material change of use for environmentally relevant activities include consideration of the risk of flooding at the site on which the activity is proposed to occur.
- 7.7 The Department of Environment and Resource Management should amend its information sheet about applications for a material change of use for environmentally relevant activities so that applicants are prompted to include information (if any) about the risk of flooding at the site where the activity is proposed to occur.
- 7.8 The Department of Environment and Resource Management should amend the template assessment report used to assess applications for a material change of use for environmentally relevant activities so that it prompts departmental officers to give specific consideration, as part of the assessment process, to the risk of flooding at the site where the activity is proposed to occur.
- 7.9 The Department of Environment and Resource Management should ensure that, when applications for a material change of use for an environmentally relevant activity are approved by the department, the details of those activities, including their nature and location, are provided to the council within whose area the activity will be conducted.

- 7.10 Councils should ensure that, when applications for environmentally relevant activities are approved by a council, the details of those activities, including their nature and location, are provided to the Department of Environment and Resource Management.
- 7.11 The Queensland Government should draft assessment criteria to be included in the model flood planning controls that require that:
- a. the manufacture or storage of bulk hazardous materials (as defined in State Planning Policy 1/03) take place above a certain flood level, determined following an appropriate risk based assessment, or
 - b. structures on land susceptible to flooding and used for the manufacture or storage of bulk hazardous materials (as defined in State Planning Policy 1/03) be designed to prevent the intrusion of floodwaters.
- 7.12 If the Queensland Government does not include such assessment criteria in the model flood planning controls, councils should include assessment criteria in their planning schemes that require that:
- a. the manufacture or storage of bulk hazardous materials (as defined in State Planning Policy 1/03) take place above a certain flood level, determined following an appropriate risk based assessment, or
 - b. structures on land susceptible to flooding and used for the manufacture or storage of bulk hazardous materials (as defined in State Planning Policy 1/03) be designed to prevent the intrusion of floodwaters.
- 7.13 When approving applications for development which involve the manufacture or storage of hazardous materials, councils should not restrict the conditions imposed to ones which are solely reliant on human intervention to remove the materials in the event of flood.
- 7.14 The Queensland Government should review the code for development applications for prescribed tidal work in the Coastal Protection and Management Regulation 2003 to consider whether the design and construction standards should be made more stringent than the existing standards.
- 7.15 Councils (particularly Brisbane City Council) should consider including in their planning schemes more stringent standards for the design and construction of prescribed tidal work than those in the code for development applications for prescribed tidal work in the *Coastal Protection and Management Regulation 2003*.
- 7.16 The Queensland Government should consider drafting assessment criteria to be included in the model flood planning controls which require that works in a floodplain:
- do not reduce on-site flood storage capacity
 - counteract any changes the works will cause to flood behaviour of all floods up to and including the applicable defined flood event by measures taken within the subject site (for example, use of compensatory works, detention basins or other engineering mechanisms)
 - do not change the flood characteristics outside the subject site in ways that result in:
 - loss of flood storage
 - loss of/changes to flow paths
 - acceleration or retardation of flows, or
 - any reduction in flood warning times elsewhere on the floodplain.
- 7.17 If the Queensland Government does not include such assessment criteria in the model flood planning controls, councils should consider including assessment criteria in their planning schemes which require that works in a floodplain:
- do not reduce on-site flood storage capacity
 - counteract any changes the works will cause to flood behaviour of all floods up to and including the acceptable defined flood event by measures taken within the subject site (for example, use of compensatory works, detention basins or other engineering mechanisms), and
 - do not change the flood characteristics outside the subject site in ways that result in:
 - loss of flood storage
 - loss of/changes to flow paths
 - acceleration or retardation of flows, or
 - any reduction in flood warning times elsewhere on the floodplain.

- 7.18 The Queensland Government should consider amending the *Sustainable Planning Regulation 2009* so that operational work or plumbing or drainage work (including maintenance and repair work) carried out by or on behalf of a public sector entity authorised under a state law to carry out the work is not exempt development under the *Sustainable Planning Act 2009* if the development has the potential to reduce floodplain storage.
- 7.19 Levees should be regulated.
- 7.20 The Queensland Government should consult with councils to determine an effective method for the regulation of the construction of levees in Queensland. In particular, the Queensland Government should consider:
- requiring a development permit for the construction of a levee by designating levees as assessable development in the *Sustainable Planning Regulation 2009*, or
 - requiring, by way of a state planning policy or mandatory provision in the Queensland Planning Provisions, that councils nominate the construction of a levee as assessable development in their planning schemes.
- 7.21 The Queensland Government should consult with councils to formulate a definition of ‘levee’ to identify what should be regulated.
- 7.22 There should be a consistent process for the determination of applications to build levees. That process should include:
- consulting landholders who may be affected by the proposed levee
 - obtaining or commissioning appropriate hydrological and hydraulic studies to assess the impacts of the proposed levee.
- 7.23 There should be a common set of considerations in the decision whether to approve an application to build a levee, including:
- the impacts of the proposed levee on the catchment as a whole
 - the benefits of the proposed levee to the individual or entity applying to build the levee and to any nearby community as a whole
 - any adverse impacts on other landholders, including the risk of levee failure
 - the implications of the proposed levee for land planning and emergency management procedures
 - whether any structural, land planning or emergency management measures can be taken to mitigate the adverse impacts of the proposed levee.
- 7.24 The Queensland Government should draft assessment criteria to be included in the model flood planning controls that address:
- the prospect of isolation or hindered evacuation
 - the impact of isolation or hindered evacuation.
- 7.25 If the Queensland Government does not include such assessment criteria in the model flood planning controls, councils should consider including assessment criteria in their planning schemes that address:
- the prospect of isolation or hindered evacuation
 - the impact of isolation or hindered evacuation.

Chapter 8 Development assessment in practice

- 8.1 Councils should, resources allowing, maintain flood maps and overland flow path maps for use in development assessment. For urban areas these maps should be based on hydraulic modelling; the model should be designed to allow it to be easily updated as new information (such as information about further development) becomes available.
- 8.2 Councils should make their flood and overland flow maps and models available to applicants for development approvals, and to consultants engaged by applicants.

- 8.3 The Queensland Government should draft a model planning scheme policy to be included in the model flood planning controls that sets out the information to be provided in development applications in relation to stormwater and flooding. The policy should specify:
- the type of models and maps to be provided
 - the substantive information required to be shown in the development application
 - how the assumptions and methodologies used in preparing the models and maps should be presented
 - the form in which the information on stormwater and flooding is to be presented in the application.
- 8.4 If the Queensland Government does not include such a policy in the model flood planning controls, councils should include a planning scheme policy in their planning schemes that sets out the information to be provided in development applications in relation to stormwater and flooding. The policy should specify:
- the type of models and maps to be provided
 - the substantive information required to be shown in the development application
 - how the assumptions and methodologies used in preparing the models and maps should be presented
 - the form in which the information on stormwater and flooding is to be presented in the application.
- 8.5 Councils should review their assessment processes to ensure that:
- the person with primary responsibility for the assessment of the development application considers what expert input is required
 - where a development application is subject to comment by a number of professionals, the responsibilities and accountability of each contributor are clear
 - where flood-related information is referred to an expert for advice, the expert is required to comment on the extent of compliance by reference to each relevant assessment criteria and identify and explain any inability to comment.
- 8.6 Councils should take care when imposing conditions to ensure that each condition has purpose; standardised conditions should not be included where they have no application to the development in question.
- 8.7 Councils should not rely on a condition requiring an evacuation plan as the sole basis for approving a development susceptible to flooding.
- 8.8 Councils should consider providing advice to development applicants during pre-lodgement meetings, and at the time of receiving a development application, about the way in which the development will be assessed for flood risk and what flood information council will be relying on to make this assessment.

Chapter 9 Building controls

- 9.1 The proposed new part of the Queensland Development Code, Mandatory Part 3.5 'Construction of buildings in flood hazard areas', should be amended so that the performance requirement relating to building design and construction (Performance Requirement P1) for building on a lot will only be triggered where the council has:
- designated part of its area as a natural hazard management area (flood) under section 13 of the Building Regulation 2006, and
 - either:
 - declared a height to be the expected flood level under section 13 of the Building Regulation 2006, or
 - adopted a highest recorded flood level for the lot, and
 - either:
 - declared a velocity to be the expected maximum velocity of flood water for the area in which the lot is located, or
 - designated the area in which the lot is located an inactive flow or backwater area.

- 9.2 The proposed new part of the Queensland Development Code, Mandatory Part 3.5 ‘Construction of buildings in flood hazard areas’, should be amended so that the performance requirements about utilities and sanitary drains (Performance Requirement P2 and P3) for building on a lot will only be triggered where the council has:
- designated part of its area as a natural hazard management area (flood) under section 13 of the Building Regulation 2006, and
 - either:
 - declared a height to be the expected flood level under section 13 of the *Building Regulation 2006*, or
 - adopted a highest recorded flood level for the lot.
- 9.3 The Queensland Government should consider amending the ‘Limitation’ section of the proposed new part of the Queensland Development Code, Mandatory Part 3.5 ‘Construction of buildings in flood hazard areas’, to allow for the possible application of ‘acceptable solution A1’ to a building located on a lot if:
- it is reasonable to expect the part of the lot on which the building work is proposed to be subjected to a maximum velocity of less than 1.5 metres per second, or
 - the part of the lot on which the building work is proposed is located in an inactive flow or backwater area.

Chapter 10 Essential services

- 10.1 The Queensland Government should consider including in the criteria in the Queensland Plumbing and Wastewater Code a requirement that the risk of leakage from private on-site sewerage systems during floods be minimised.
- 10.2 Authorities responsible for the construction of sewerage infrastructure should, when embarking on new works, undertake risk and cost/benefit assessments to determine the level at which electrical infrastructure that may be vulnerable to inundation should be placed.
- 10.3 Authorities responsible for the management of sewerage infrastructure should conduct a review of their existing infrastructure to identify electrical infrastructure that may be vulnerable to inundation and perform risk and cost/benefit assessments to determine if it should be relocated to a higher level.
- 10.4 Queensland Urban Utilities should make the results of its trials on the use of caps for overflow relief gully grates available to other authorities responsible for sewerage infrastructure. Consideration should be given by those authorities as to how the results can be used to improve the flood resilience of their sewerage networks.
- 10.5 If the Queensland Development Code is amended to include provisions requiring homeowners to install sewage reflux valves, the Queensland Government should develop and make available to homeowners appropriate guidance material to assist them in meeting their responsibilities to maintain reflux valves.
- 10.6 Queensland Urban Utilities, and other distributor-retailers and councils, that have identified a practice of stormwater drains being connected to sewerage infrastructure, should conduct a program of education to raise public awareness that this practice is illegal and impedes the operation of the sewerage infrastructure.
- 10.7 Councils and distributor-retailers should agree to protocols for the exchange of information about suspected illegal connections, the steps being taken to investigate them or the basis for concluding that no investigation is required, and the results of any investigations or enforcement actions.
- 10.8 The Department of Environment and Resource Management should review the Queensland Urban Drainage Manual to determine whether it requires updating or improvement, in particular, to reflect the current law and to take into account insights gained from the 2010/2011 floods.
- 10.9 All councils should, resources allowing, map the overland flow paths of their urban areas.
- 10.10 Councils should consider amending their planning schemes to include provisions directed to consideration of the flood resilience of basements as a factor in determining the appropriateness of a material change of use.

- 10.11 In assessing and determining development applications for material change of use in areas susceptible to flood, councils should consider whether the new developments locate essential services infrastructure above basement level, or, alternatively, whether essential services infrastructure located at basement level can be constructed so that it can continue to function during a flood.
- 10.12 SunWater and the Central Highlands Regional Council should determine the issues of ownership and responsibility for maintenance of the LN1 drain system in Emerald.
- 10.13 The Bundaberg Regional Council should investigate the adequacy of the drain and take reasonable steps to ensure the Moore Park area is effectively served.
- 10.14 All councils should periodically conduct risk assessments to identify areas at risk of backflow flooding. In respect of such areas, councils should consider how such risks can be lessened, including in that process consideration of the installation of backflow prevention devices. Backflow devices should not, however, be installed unless and until a full risk based assessment has been undertaken.
- 10.15 Councils should conduct education campaigns directed to ensuring that all residents and property owners in areas identified as being at risk of backflow flooding are aware of the circumstances in which backflow flooding can occur, the hazard it presents and what should be done if it occurs.
- 10.16 The Queensland Government should draft assessment criteria to be included in the model flood planning controls that require critical infrastructure in assessable substation developments is built to remain operational during and immediately after a flood of a particular magnitude. That magnitude should be determined by an appropriate risk assessment.
- 10.17 If the Queensland Government does not include such assessment criteria in the model flood planning controls, councils should include assessment criteria in their planning schemes that require critical infrastructure in assessable substation developments is built to remain operational during and immediately after a flood of a particular magnitude. That magnitude should be determined by an appropriate risk assessment.
- 10.18 The Queensland Government should consider measures to ensure that requirements are included in the designation of land for community infrastructure under the *Sustainable Planning Act 2009* to ensure that critical infrastructure for operating works under the *Electricity Act* is built to remain operational during and immediately after a flood of a particular magnitude. That magnitude should be determined by an appropriate risk assessment.
- 10.19 Electricity distributors should consider installing connection points for generators to provide electricity supply to non-flooded areas that have had their supply cut during floods.
- 10.20 The Queensland Government should consider whether there should be a legislative requirement that customer dedicated assets be built at or above the applicable defined flood level and if so, the Queensland Government should consider which legislation should contain such a requirement.
- 10.21 The Queensland Government should consider implementing mandatory requirements to ensure that all conduits for the purpose of providing electrical supply below the applicable defined flood level are sealed to prevent floodwaters from entering them or flowing into them.
- 10.22 Carriers, councils and the Australian Communications and Media Authority should take into account the risk of flooding when considering the placement of telecommunications facilities.
- 10.23 Queensland Rail and QR National should continue to investigate opportunities for increasing the flood resilience of their networks, including raising the height of critical equipment.

Chapter 11 Buy-backs and land swaps

- 11.1 Councils should consider implementing a property buy-back program in areas that are particularly vulnerable to regular flooding, as part of a broader floodplain management strategy, where possible obtaining funding from the Natural Disaster Resilience Program for this purpose.

Chapter 12 Performance of private insurers

- 12.1 When a policy-holder makes a claim, the insurer should ascertain the policy-holder's preferred method of contact and ensure that it is used (with other modes of communication if necessary) to keep the policyholder informed about the progress of the claim. However, important decisions regarding the claim – for example, determinations about the outcome of the claim and settlement sums – should always be confirmed in writing.
- 12.2 Insurers should review their existing systems and processes and implement any improvements necessary to ensure that accurate and complete records of conversations with policy-holders are made.
- 12.3 Letters notifying policy-holders that their claims have been denied should, at a minimum, state the information upon which the insurer has relied in making the decision. These letters should also advise policy-holders that copies of the information will be made available upon request (in accordance with clause 3.4.3 of the General Insurance Code of Practice) and indicate how policy-holders can make a request.
- 12.4 The Insurance Council of Australia should consider an amendment to Part 3 of the code which requires insurers to notify policy-holders of the information on which they relied in assessing claims.
- 12.5 The Insurance Council of Australia should amend clause 3.4.3 of the General Insurance Code of Practice so that it requires insurers to inform policy-holders of their right to request a review of an insurer's decision to refuse to provide access to information on which it relied in assessing claims.

Chapter 13 Mining

- 13.1 Mine operators should obtain all public seasonal forecasts issued by the Bureau of Meteorology relevant to the regions in which their operations are located.
- 13.2 Any mine operator of a site at high risk of flood should obtain the best forecast information available (seasonal and short term) for the region in which the mine is located.
- 13.3 The Department of Environment and Resource Management should prepare a list of relevant considerations to be taken into account in performing a risk assessment to decide which sites to inspect. Bureau of Meteorology forecasts should be one consideration.
- 13.4 The Department of Environment and Resource Management should conduct risk assessments in time for site inspections, and the implementation of solutions to problems identified at inspections, to take place before 1 November of each year.
- 13.5 The Queensland Government should work collaboratively with the Commonwealth Government and mine operators to ensure co-ordinated and effective monitoring of salts, metals and other contaminants in marine environments that may be affected by mine discharges.
- 13.6 The Queensland Government should determine, as far as possible, the impact of mine discharges during the 2010/2011 wet season on freshwater and marine water quality and fauna and flora.
- 13.7 The Department of Environment and Resource Management should assist mine operators in their applications for amended environmental authorities to ensure, as far as possible, that each environmental authority contains a tailored version of Table 4 of the model conditions. The Department of Environment and Resource Management should provide to mining companies its monitoring data and its suggested values for Table 4 on the basis of an assessment of the catchment which takes into account the cumulative effect of different operators' releases.
- 13.8 Unless the Department of Environment and Resource Management has decided not to permit discharges, it should assist each mine operator in its application for an environmental authority to ensure, as far as possible, that each authority includes provisions for discharges during times of heavy rainfall and flood.
- 13.9 The Queensland Government should legislate to clarify the purposes for which a transitional environmental program can be granted. In particular, if the government considers the transitional environmental program the appropriate regulatory mechanism to deal with the discharge of water from mines during flood, section 330 of the *Environmental Protection Act 1994* should be clarified to make it clear that it extends to that use.

- 13.10 The Queensland Government should refine the criteria which must be considered in assessment of applications for relaxation of environmental authority conditions, by transitional environmental program or otherwise, in response to flood.
- 13.11 The Queensland Government should consider amending the *Environmental Protection Act 1994* so that it allows for the relaxation of environmental authority conditions, by transitional environmental program or otherwise, as to discharge of water:
- pre-emptively, in advance of rainfall or flooding events, or
 - for all mines in a catchment that is flooding.
- 13.12 The Queensland Government should prepare a procedural guide for officers deciding whether to grant a relaxation of environmental authority conditions, by transitional environmental program or otherwise, with guidance as to:
- the meaning of each criterion
 - examples of the types of things that may be relevant to each criterion
 - the priority, if any, to be afforded to different criteria.
- 13.13 The Queensland Government should make public the procedural guide used by Department of Environment and Resource Management officers to decide whether to grant a transitional environmental program.
- 13.14 The Queensland Government should consider amending the *Environmental Protection Act 1994* to provide a definition of the term ‘emergency’ for the purposes of section 468 of that Act.
- 13.15 The Queensland Government should make public the procedural guide used by Department of Environment and Resource Management officers to decide whether to grant an emergency direction.
- 13.16 The Queensland Government should amend the *Environmental Protection Act 1994* so as to permit an emergency direction to be given orally where it is not practicable to provide the direction in writing, with provision for its subsequent confirmation in writing.
- 13.17 The Queensland Government should determine which of its agencies should take responsibility for the management of all existing and new abandoned mine sites in Queensland.
- 13.18 The Department of Employment, Economic Development and Innovation should assemble all information currently available to the abandoned mine land program into a single database. The Queensland Government should ensure, using whatever information is available, that the list of abandoned mines is as complete as possible. This should at least include a review of all information held by the Department of Environment and Resource Management and the Department of Employment, Economic Development and Innovation.
- 13.19 The Queensland Government should seek information about the size, features and condition of abandoned mines, including whether the mine or its surrounding environment were adversely affected by flood, from private landholders who have abandoned mines on their properties.

Chapter 15 Emergency response and other interim report issues

- 15.1 Councils should support and encourage business owners to develop private flood evacuation plans by providing the following to business owners in areas known to be affected by flood:
- information about the benefits of evacuation plans
 - contact details of relevant council and emergency service personnel for inclusion in evacuation plans.
- 15.2 Councils should consider making available to business owners locality specific information that would assist them to develop evacuation plans for commercial premises, for example, any evacuation sub-plan created under Emergency Management Queensland’s disaster evacuation guidelines.

- 15.3 The fire service should ensure that station officers are familiar with the procedure for contacting management when requesting the calling in of additional staff; and, in particular, that they have available to them the names and current telephone numbers of the officers to be contacted in the first instance, with alternative contact details in the event that those officers prove unavailable.
- 15.4 The Queensland Fire and Rescue Service should require that each region records in writing the results of its risk assessment undertaken as part of its annual review of its special operations functional plan.
- 15.5 The *Disaster Management Act 2003* should be amended to give the chief executive of the department administering the Act (or his or her delegate) the authority to appoint an officer of Emergency Management Queensland to direct SES operations in extraordinary circumstances.
- 15.6 Emergency Management Queensland, in consultation with councils, should develop a directive that makes clear the authority of an officer of that agency to command a major SES operation. This could be expected to occur when a deployment of additional SES members is made to a region because the response needed is beyond the capacity of its local units. The directive should make clear the powers of the officer and his or her reporting responsibilities to disaster managers in these circumstances. Emergency Management Queensland must also ensure that any officer who assumes such a role has adequate training and skills in the conduct of disaster operations.
- 15.7 Emergency Management Queensland should ensure its staff, SES members and disaster managers are familiar with the directive when it is developed.
- 15.8 Emergency Management Queensland, in consultation with councils, should develop clear directives about:
- the communication and reporting that should take place between the SES and disaster managers, including in relation to task allocation and completion, once disaster management groups have been activated
 - the communication and reporting that should take place between the SES and disaster managers, including in relation to task allocation and completion, once disaster management groups have been activated
 - the process for dealing with requests for assistance that exceed an SES unit's capacity to respond them
 - the process for seeking extra support for an SES unit that has been overwhelmed by a disaster (whether by way of Emergency Management Queensland or the disaster management arrangements or both)
 - the role of SES liaison officers in communications with disaster managers about SES disaster operations
 - the role of incident controllers, and their teams, relative to those SES (or Emergency Management Queensland) personnel charged with the command of SES operations.
- 15.9 Emergency Management Queensland should ensure its staff, SES members and disaster managers are familiar with the directives it develops in relation to these matters.
- 15.10 Emergency Management Queensland should develop and implement a new formula for the distribution of its recurrent SES subsidy, which takes into account relevant factors including the size of a local SES contingent and the population, area and natural hazard risk profile of the local government area concerned.
- 15.11 Emergency Management Queensland should pursue the execution of the 'Local Arrangements' with councils where a Memorandum of Agreement is in place. The contents of the arrangements should be reviewed and updated regularly.
- 15.12 Emergency Management Queensland should simplify the process by which SES members gain recognition for prior qualifications so that unnecessary duplication of training can be avoided.

Chapter 16 Operation of Wivenhoe and Somerset dams

- 16.1 The Crime and Misconduct Commission should investigate whether the conduct of Mr Tibaldi, Mr Ayre and Mr Malone relating to:
- preparation of documents surrounding the January 2011 flood event, including the 17 January 2011 brief to the Minister, the 2 March 2011 flood event report, and statements provided to the Commission
 - oral testimony given to the Commission
- evidences offence/s against the Criminal Code, and/or official misconduct under the *Crime and Misconduct Act 2001* committed by any, or all, of them.
- 16.2 Seqwater should ensure that proper support and oversight mechanisms are put in place around both the substantive and procedural aspects of drafting flood event reports. Seqwater should consider engaging consultants with expertise in the production of reports following significant events to advise on these mechanisms. Measures to be considered should include:
- ensuring appropriate systems are in place to ensure the recollections of flood engineers and other parties are recorded immediately after the event, perhaps by engaging an external party to interview the flood engineers and other parties
 - ensuring that a methodology for writing the report is set out clearly in advance, in writing, and that the final report includes a statement of that methodology
 - putting in place systems to ensure that members of senior management have sufficient understanding of both the methodology and process by which the report is prepared to allow themselves to be satisfied that these are appropriate.
- 16.3 The Department of Environment and Resource Management should ensure that an independent and appropriately qualified person immediately starts the task of reviewing the March flood event report to ensure that the review is completed before the start of the 2012/2013 wet season.
- 16.4 Seqwater should ensure that any future peer review process:
- is co-ordinated by someone independent of those who wrote the report
 - entails the provision of all relevant information to the peer reviewers
 - permits sufficient time for the review
 - documents all contact between those whose actions are under review and the reviewers.
- 16.5 The Queensland Government should resolve the discrepancy in recorded peak river height for the January 2011 flood of the Brisbane River between the Brisbane City and Port Office gauges.

Chapter 17 Other dam issues

- 17.1 The steering committees of the Wivenhoe Dam and Somerset Dam Optimisation Study and the North Pine Dam Optimisation Study should consider removing the water supply security investigation from each study.
- 17.2 The steering committee of the North Pine Dam Optimisation Study should consider whether it would be beneficial for the floodplain management investigation to be removed from the North Pine Dam Optimisation Study.
- 17.3 The Queensland Government should ensure that, when it considers options for the operational strategies to be employed at Wivenhoe and Somerset dams, and North Pine Dam, it is presented with a wide range of options which prioritise differing objectives. The Queensland Government should determine the operational strategies by considering the implications of each option over a range of flood events for at least:
- inundation of urban and rural areas
 - water supply security
 - dam safety
 - submerging of bridges

- bank slumping and erosion
 - riparian fauna and flora.
- 17.4 Seqwater should, in creating the new Wivenhoe and North Pine flood mitigation manuals, comprehensively consider:
- the amount of discretion that is able to be exercised by the flood engineers and the senior flood engineers, and the description of the circumstances in which such discretion may be exercised
 - the circumstances in which it might be appropriate to release water in advance of an impending flood on the basis of forecasts from the Bureau of Meteorology
 - if strategies of the form of strategy W2 and W3 in Revision 7 are included in the revised manual, or any strategy defined as a ‘transition strategy’, when and how those strategies should be implemented
 - if the concept of ‘urban inundation’ is relevant to the operation of the dam, how it should be defined, and if the definition involves diverse concepts, how those concepts can be related back to the strategies, so that flood engineers can reach a clear understanding of their objectives and primary considerations
 - if the concept of ‘natural peak flow’ is relevant, how it should be defined.
- 17.5 The conditions for the use of a particular strategy in all flood mitigation manuals should reflect objective standards.
- 17.6 The Queensland Government should ensure that all flood mitigation manuals include the requirement that those operating the dam during flood events hold current registrations as professional engineers.
- 17.7 Seqwater should consider engaging a technical writer to develop completely new manuals after the operational strategies for Wivenhoe, Somerset and North Pine dams are set by the Queensland Government.
- 17.8 Seqwater should ensure a legal review of the Wivenhoe manual and the North Pine manual is completed before the manual is submitted for approval.
- 17.9 The Queensland Government should consider whether North Pine Dam should be operated as a flood mitigation dam when it considers possible operating strategies and full supply levels as part of the longer term review of the Manual of Operational Procedures for Flood Mitigation at North Pine Dam.
- 17.10 The Queensland Government should amend the *Water Supply (Safety and Reliability) Act 2008* to designate the Minister as the person who must approve a flood mitigation manual.
- 17.11 The assessment of flood mitigation manuals should be completed by a person with appropriate expertise who has had no involvement in its development, at any stage, and who can be seen to be independent of all individuals who were so involved.
- 17.12 The Queensland Government should continue to assess and review the adequacy of work procedures DS 5.1 and 5.3, having regard to the need for flood mitigation manuals to reflect the will of the executive.
- 17.13 Prior to approving a flood mitigation manual, the Queensland Government should be satisfied that its terms are expressed in a manner that allows a determination of compliance with it to be made by reference to objective standards.
- 17.14 The Department of Environment and Resource Management should prepare formal work procedures for the review of flood event reports created under emergency action plans and flood mitigation manuals. These should include procedures for:
- making enquiries with the owners of referable dams that have catchments that have been subject to heavy rainfall (or where there is other reason to believe the emergency action plan has been triggered) as to whether the emergency action plans have been triggered
 - reminding owners of referable dams that have had emergency action plans triggered of their obligation to submit a flood event report
 - upon receipt of a flood event report, reviewing it, identifying any dam safety or other issues or areas where insufficient detail has been provided, raising those matters with the dam owner or other affected party and identifying appropriate remedial steps

- raising any issues identified in the report that are beyond the expertise of the Department of Environment and Resource Management, or are likely to be of particular interest to another body, with the appropriate body
 - keeping a record of the process and results of the review of the flood event report
 - fixing an appropriate timeline for the completion of each of the above steps: the time required may depend on specific circumstances, but must allow for any potential safety issues to be identified and remedied efficiently.
- 17.15 As part of the longer term review of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam the Queensland Government should consider whether the dam operators should be able to extend the drawdown of the lake beyond seven days in order to reduce downstream bank slumping.
- 17.16 CS Energy should supplement physical monitoring of Splityard Creek Dam with visual monitoring by installing surveillance cameras or similar devices.
- 17.17 CS Energy and Seqwater should agree upon and adhere to a formal communication protocol that requires CS Energy personnel to advise Seqwater, through the Flood Operations Centre, of water movements between Splityard Creek Dam and Wivenhoe Dam or Pryde Creek once a flood event is declared under the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam. The protocol should ensure that a direct line of communication is established between CS Energy personnel physically located at the power station and the Flood Operations Centre.
- 17.18 The protocol should make provision for the use of telephone and/or radio where communication by email is not possible. Where necessary, CS Energy and Seqwater should make additional radio equipment available to relevant personnel.
- 17.19 CS Energy should put in place contingency measures to ensure email and telephone communications at Wivenhoe Power Station are not entirely dependent on a network located off-site.
- 17.20 CS Energy should review its emergency action plan and business procedures to ensure they are wholly consistent and give appropriate consideration to flooding as a possible emergency event.
- 17.21 CS Energy should amend its business procedure to remove any ambiguity as to the establishment of communications with Seqwater and to acknowledge the formal communications protocol regarding releases.
- 17.22 The Queensland Government should consider whether to empower Seqwater, through the flood operations centre, to direct CS Energy to stop or delay releases from Splityard Creek Dam where a flood event is declared under the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam.
- 17.23 Seqwater should consider commissioning an investigation into the extent of cracking below the level of the upper gallery of Somerset Dam and the impact of any such cracking on the dam's stability and, in turn, its operation.
- 17.24 Seqwater should ensure that the Somerset Dam gallery is not susceptible to flooding during overtopping events.
- 17.25 The Department of Transport and Main Roads, in conjunction with Brisbane City Council and Somerset Regional Council, should investigate options for the upgrade of Brisbane River crossings between Wivenhoe Dam and Colleges Crossing and undertake a cost-benefit analysis of these to determine the outcome which best serves the public interest.
- 17.26 As part of the longer term review of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam, the Queensland Government should consider the impact of possible upgrades of bridges downstream of Wivenhoe Dam on different operating strategies for the dam.
- 17.27 Wide Bay Water should, in addition to its usual wet season preparations and maintenance, undertake the following activities in advance of each wet season:

- conduct training for personnel on dam operation, including contingency plans for the situation in which one or more of the gates is inoperable
 - hold meetings of key personnel of Wide Bay Water involved in the operation of the dam during floods, which:
 - in addition to any other matters, inform staff about the current status of the gates, dam operation strategies and contingency plans for the situation in which one or more of the gates is inoperable
 - are recorded in minutes which document the information provided and are made available to all operational staff.
- 17.28 The Department of Environment and Resource Management should require Wide Bay Water, in advance of every wet season, to provide details of its expectation as to the operability of the crest gates if a flood occurs, until such time as all gates have been demonstrated to work as designed.
- 17.29 Toowoomba Regional Council should engage external consultants to carry out failure impact assessments on the detention basins along East Creek.
- 17.30 Toowoomba Regional Council and the Department of Environment and Resource Management should continue to co-operate to assess the referable dam status of existing detention basins and any future detention basins constructed in the West Creek and East Creek catchment areas.
- 17.31 The Queensland Government should legislate to oblige each owner of a referable dam to have an emergency action plan approved by the appropriate Queensland Government agency. Such plans should be reviewed periodically.
- 17.32 The Queensland Government should, in consultation with the Department of Environment and Resource Management and Emergency Management Queensland, determine which agency is appropriate to review and approve emergency action plans for referable dams.
- 17.33 Prior to each wet season, the Department of Environment and Resource Management should audit the compliance of each owner of a referable dam with the obligation to have an emergency action plan approved by the Queensland Government.
- 17.34 The Department of Environment and Resource Management should prioritise dam safety audits according to risk. The risk assessment should be informed by criteria including:
- structure and materials used in construction
 - age of the dam
 - time since last inspection
 - occurrence of a flood event since last audit and the size of that flood event
 - population at risk if the dam were to fail
 - experience and capability of dam owner
 - dam owner compliance history
 - time since last audit.
- 17.35 The Department of Environment and Resource Management and Emergency Management Queensland should ensure that each has copies of current emergency action plans for all dams in Queensland.
- 17.36 The Department of Environment and Resource Management should conduct periodic dam safety information and education sessions with emergency management personnel including those from Emergency Management Queensland, local and district disaster management groups and local councils. Priority should be given to sessions if the Bureau of Meteorology forecasts a wet season with a greater than 50 per cent chance of above median rainfall.