When the water level in Ibis Dam reaches 826.1m AHD, the following automatic messages will be sent from the DERM Hydstra hydrographic sytem:-

email message to be sent to:-

1. [redacted] - EMQ Far Northern Regional Duty Officer

Message: -

"Ibis Dam has reached a water level of 826.1m AHD. It is recommended that the Population at Risk in Irvinebank be evacuated."

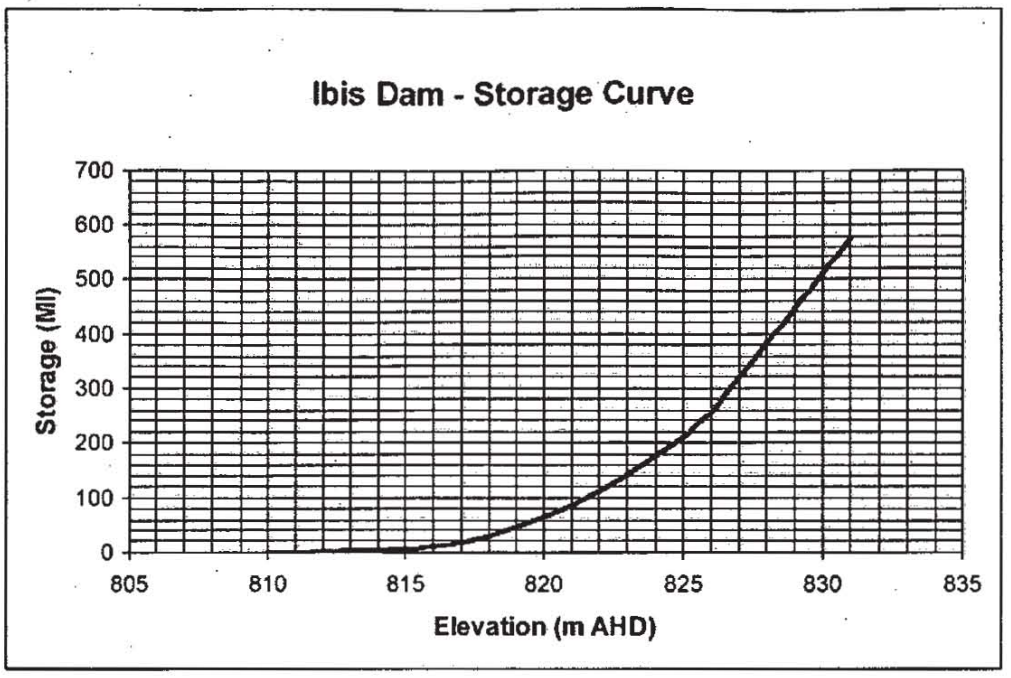
sms text message to be sent to:-

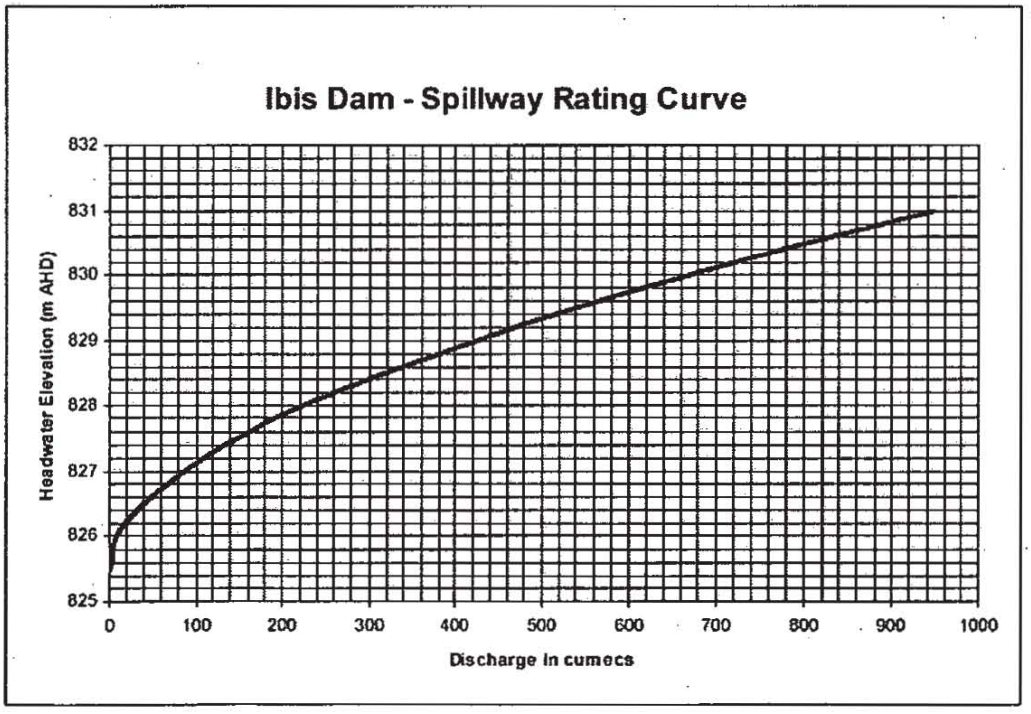
1. [redacted] – District Police Inspector Rolf Stratamier
2. [redacted] – Chair of LDMG – Deputy Mayor Chris Adams
3. [redacted] – Local Disaster Coordinator, Tablelands LDMG – Sarah Dean
4. [redacted] – Watch Desk Officer – Emergency Management Queensland
5. [redacted] – Principal Engineer, DERM

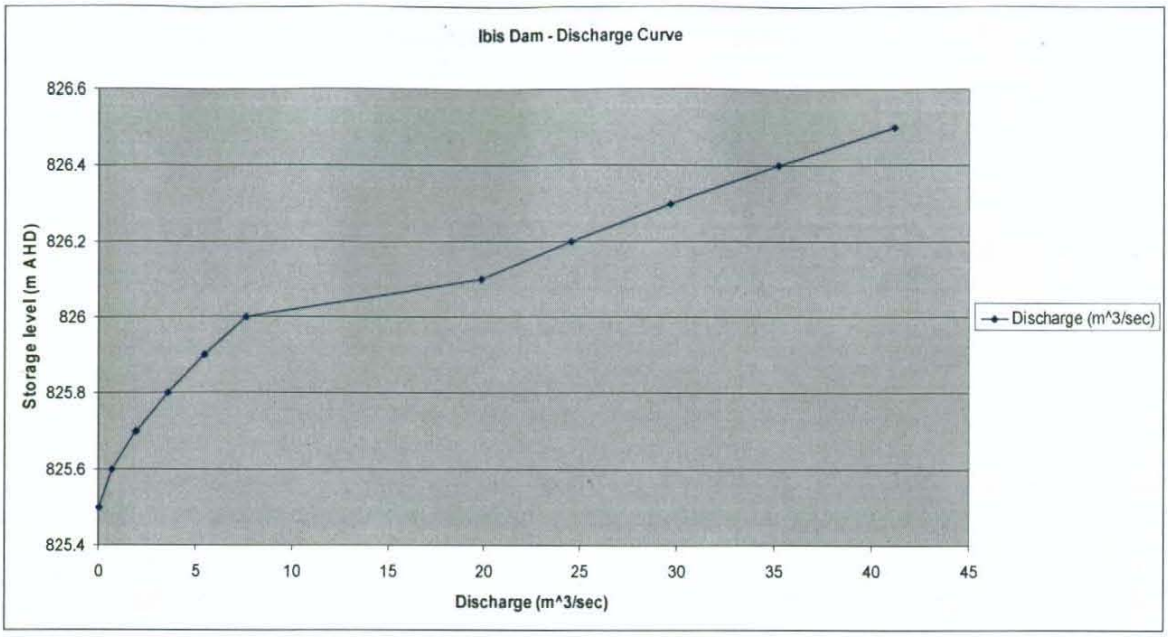
Message:-

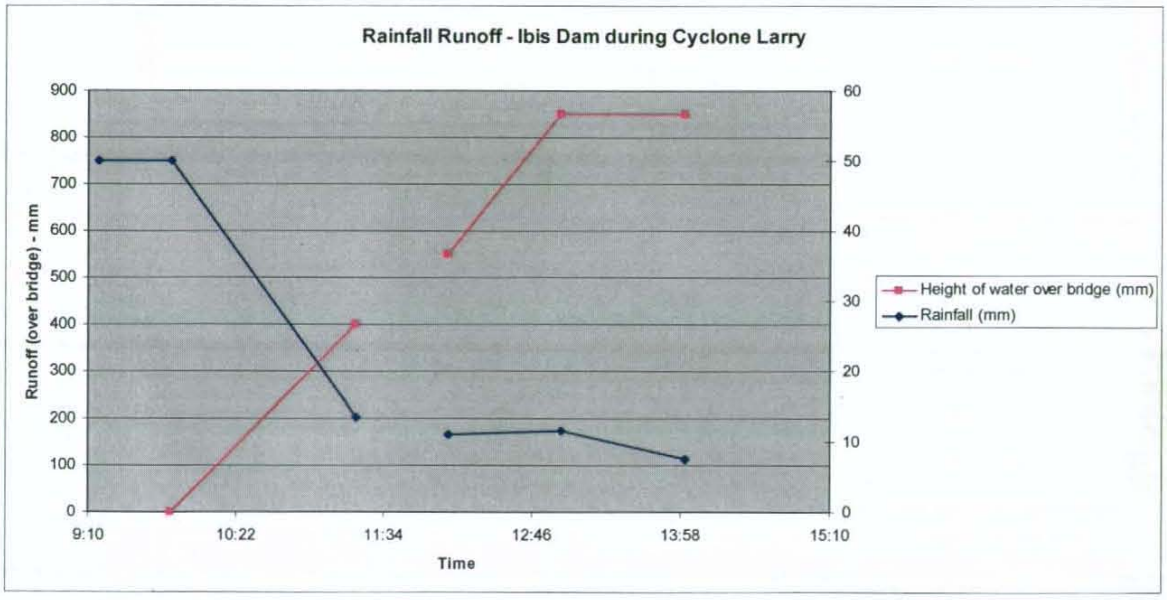
"Ibis water level 826.1m. Recommend evacuate PAR in Irvinebank."

DATA


Ibis Dam - Storage Curve
Storage (Ml)
700
600
500
400
300
200
100
0
805
810
815
820
825
830
835
Elevation (m AHD)


Ibis Dam - Spillway Rating Curve
Headwater Elevation (m AHD)
832
831
830
829
828
827
826
825
0
100
200
300
400
500
600
700
800
900
1000
Discharge in cumecs


Ibis Dam - Discharge Curve
826.6
826.4
826.2
826
825.8
825.6
825.4
Storage level (m AHD)
0
5
10
15
20
25
30
35
40
45
Discharge (m^3/sec)
Discharge (m^3/sec)


Rainfall Runoff - Ibis Dam during Cyclone Larry
900
800
700
600
500
400
300
200
100
0
Runoff (over bridge) - mm
60
50
40
30
20
10
0
9:10
10:22
11:34
12:46
13:58
15:10
Time
Height of water over bridge (mm)
Rainfall (mm)

'DERM-10'

Queensland Government Flood Studies (DERM Library)

Flood hydrology and modelling including establishment of design events and probable maximum floods

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Queensland Government
Flood Risk Management Activities Audit

Prepared by the Department of Environment and Resource Management
in consultation with Queensland Government agencies

September 2010

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Executive summary

Flood risk management is a complex policy matter that spans across a number Queensland Government jurisdictions. As a result the arrangements associated with the various flood related projects are complex. The Department of Environment and Resource Management (DERM), in consultation with other Queensland Government agencies, has undertaken an audit of flood risk management related activities in an attempt to understand the full nature of the State's flood management framework currently implemented by the Queensland Government.

Part one of this report sets the policy context for flood management in Queensland and outlines the key roles and responsibilities for flood risk management across the Queensland Government. More detail can be found in Appendix A.

Part two of this report summarises where possible enhancements could be made to the current State flood risk management framework including where new policies and projects might be scoped in the future. More detail can be found in Appendix B.

Summary of the flood risk management activities – part one

By way of summary for part one, the Departments of Community Safety (DCS), Infrastructure and Planning (DIP) and DERM have significant responsibilities for flood risk management. Other agencies including the Departments of Transport and Main Roads (DTMR), Communities (DoC) and the Department of the Premier and Cabinet (DPC) also play a role.

The DCS has a very public role as it leads disaster prevention, preparedness and response and recovery. DCS ensures that the state and local governments have disaster management plans, and prepares the *State Counter Disaster Plan* that provides a blueprint for the prevention, preparedness, and response and recovery arrangements for disasters in Queensland. DCS coordinates and leads the states response in the event of a disaster including the provision of short, medium and longer term recovery strategies and services. The DPC assists with whole-of-government coordination during emergencies and plays a key role in managing the State's response to disasters and major incidents, including flood.

DIP has responsibilities related to planning, infrastructure and local government matters of flood risk management. DIP ensures that state and local government planning instruments adequately address flood and flood risk issues. For example, DIP ensures that building works consider and mitigate the impact of flooding on structures. DIP also oversights the funding of local government to facilitate the provision of flood management infrastructure and services which includes administering a number of flood related grants.

DERM has a lead role in managing coastal hazards; in policy and planning for the changed flood risk under climate change; in managing the beneficial effects of flooding, including take and interference with water and overland flow, floodplain management, wetlands management, water quality and riverine protection. The department also collects data and operates a network of flow gauging and rainfall stations; and regulates the safety of referable dams.

Queensland Health (QH) mitigates the health impacts associated with flooding, such as mosquito borne diseases. This is implemented through the *Queensland Health*

Disaster Plan that provides for a comprehensive whole-of-government approach to emergency management.

DTMR ensures that roads within the States jurisdiction are both flood resistant and do not contribute negatively to the effects of flooding or minimise interference with natural flow.

The Queensland Rural Adjustment Authority provides flood assistance to primary producers and small businesses.

Summary of the audit findings – part two

The audit has identified a number of areas where enhancements could be made to the current flood risk management framework. For example, the State does not have an overarching strategic Queensland flood risk management framework or policy encompassing both the planning for and response to a flood event. While the disaster management response is generally well coordinated across the Queensland Government; the flood mitigation issues are often not well coordinated.

Similarly, there is no clearly identified lead agency that can champion the responsibility for overall strategic coordination of flood management across Queensland or provide input into the national flood management agenda.

In addition, there is no regulatory requirement or methodology at present for the integration of climate change projections into flood management policy or plans. However, the revision of *State Planning Policy SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (SPP1/03) and an *Inland Flood Study* will go some way towards addressing these issues. Appendix B documents other shortcomings and provides a list of potential enhancements to the existing framework identified through consultation which include.

Possible enhancements to the existing Queensland flood risk management framework

- Determination of a lead agency within the Queensland Government to 'champion' the overall development of a strategic Queensland flood risk management policy;
- Identification of a lead agency within the Queensland Government to represent Queensland on the National Flood Risk Advisory Group;
- A more coordinated, strategic investment strategy for the administration of flood related grants i.e. Natural Disaster Recovery Relief Arrangements (NDRRA);
- Enhanced implementation of a 'catchment approach' to flood and floodplain management across the State and local government levels i.e. integration of NRM activities, Land and Water Management Plans, water resource plans etc;
- Greater alignment with groups such as the regional NRM bodies in flood management activities;
- Greater incorporation of flood risk impacts in State planning instruments;
- Development of comprehensive guidelines to facilitate local government in their flood planning;
- Development of a process to audit local government flood plans;
- Further investigation into a regulatory focus for the management of extreme pollution events during and after flood;
- Development of a greater understanding of the probability of coincident riverine flooding and storm tide inundation and/or dam break in planning;
- More consistent data collection standards and information sharing protocols across the state in relation to flood risk management data;

- Identification of point of truth flood data and mapping, which can be updated as new data becomes available and which can be made publicly available;
- Better integration and dissemination of information across all levels of government regarding the positive environmental benefits of flood;
- Greater information dissemination and education about flood risk;
- A review of the construction standards associated with the building and management of non-referable dams; and
- Establishment of an inter-departmental committee that can further investigate and prioritise possible enhancements to the current flood risk management framework.

These possible enhancements are not exhaustive and serve to create further discussion about how the Queensland Government might drive flood risk management in the future.

Background

Flood management is a complex matter that spans many Queensland Government jurisdictions and involves a number of activities including: land and water planning; urban and regional planning; disaster management and recovery; infrastructure design; and environmental protection. Accordingly a number of Queensland Government agencies have a role in flood risk management and as a result there are complex arrangements and some confusion over these roles.

This audit attempts to open further discussion about this issue and address where possible better integration of flood risk management at the state government level by clearly defining the Queensland Government's roles and responsibilities.

The audit consists of two key elements. Part one is a review of the roles and responsibilities of each Queensland Government department. Part two provides a gap analysis of the implementation of flood responsibilities; particularly in terms of their scope and adequacy. This section also puts forward proposed recommendations for discussion.

Audit objectives and methodology

The objectives of part one of the audit were:

- To clarify the roles and responsibilities of each Queensland Government department with respect to flooding activities.

The objectives of part two of the audit were:

- To identify any gaps and/or duplications in the current flood risk management framework including the capacity of the framework to address climate change related risks; and
- To identify the Queensland Government agencies that may have responsibility to address the gaps based on the roles and responsibilities as identified by the audit.

It should be noted that the scope of this audit is limited to Queensland Government and does not include in-depth analysis of Commonwealth, local government or regional natural resource management (NRM) activities. Part one however, does make mention of the Commonwealth, local governments and NRM activities and their respective roles in order to set the context for the Queensland Government.

The audit used criteria developed by the Associated Program on Flood Management[1] --a joint initiative of the World Meteorological Organisation and the Global Water Partnership[2]-- to evaluate the effectiveness of flood management activities in the Queensland Government.

The criteria is consistent with both Australian and international trends and took the position that effective flood management is an integrated approach that must consider land and water use planning as well as the beneficial aspects of flooding.

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[1] Associated Program on Flood Management (2004) "Integrated Flood Management, Concept paper", World Meteorological Organisation and the Global Water Partnership, Geneva, Switzerland

[2] Associated Program on Flood Management (2006) "Legal and Institutional Aspects of Integrated Flood Management", World Meteorological Organisation, the Global Water Partnership and the International Water Law Research Institute, Geneva, Switzerland.

Data used in the audit was collected from a literature search, two workshops and feedback from experts across the Queensland Government spanning from 2009 to 2010. The initial workshop involved DERM representatives only, the second workshop involved representatives from DCS, DIP and DTMR.

Part one – Audit of Queensland Government flood risk management activities

Flooding by its nature in Australia can be both beneficial and destructive. There are significant ecological and economic benefits caused by flooding. The sustainable management of this resource and associated floodplains is an important objective for the community and governments. Queensland Government flood management activities in terms of the beneficial effects of flooding include: the management of overland flow and the allocation of water; the sustainable management of floodplains (alongside landholders); and the preservation and management of water ways and wetland environments.

Flooding can also be destructive causing significant economic loss and threatening human lives and property. The Queensland Government has a broad objective to reduce and / or mitigate the impact of the destructive effects of flooding. Queensland Government flood management activities in relation to reducing the negative impacts include: providing leadership in, and establishing priorities for, disaster mitigation; flood risk management and planning; flood mitigation (including works such as dams and levees); flood warning; and emergency response dam safety (to prevent catastrophic failure and consequent flash flooding). It also sets the policy parameters for investment in infrastructure and for many funding programmes associated with flood management.

The broader policy context

The Queensland Government operates a flood management framework in a broad policy context involving the Australian and local governments, and regional natural resource management bodies.

The Australian Government provides national leadership on flood mitigation strategies and provides financial assistance to the States, Territories and local government to assist them in meeting requirements for priority disaster risk management and disaster mitigation responsibilities. The Australian Government also provides tactical, rapid response satellite data and information as required through Geoscience Australia, and activates defence forces to support flood mitigation or disaster management.

Primary responsibility for effective flood risk management in Queensland rests with local government. Local governments have an important role at the community level in assessing flood risk; determining local investment priorities; planning and implementing disaster mitigation measures to achieve more sustainable communities; stormwater management and reducing the loss of life, damage and cost to communities from flood events.

Natural Resource Management (NRM) groups are funded by the Australian Government for the purpose of managing significant catchments and bioregions identified within each State and Territory. There are currently 14 regional NRM groups in Queensland, some of which represent areas of vast and highly productive floodplains. However, flood management is largely addressed as an indirect priority under the regional NRM plans through water quality, riparian and land management planning or as a monitoring activity.

The Queensland Government policy context

Key legislation

Flood issues in Queensland are managed through a range of legislation and associated planning and policy instruments, namely:

- The *Sustainable Planning Act 2009* (SPA) and associated SPA planning instruments including State Planning Policies— State Planning Policy for Natural Disaster Mitigation, including flood mitigation (SPP 1/03); State Planning Policy Protecting Wetlands of High Ecological Significance in the Great Barrier Reef Catchments; and Strategy for the Conservation and Management of Queensland's Wetlands;
- Statutory and non-statutory Regional Plans;
- The *Local Government Act 2009* and *Local Government Transitional Regulation 20010; and*
- The *Disaster Management Act 2003.*

Other Acts and subordinate legislation that have relevance for specific flood-related activities, such as: works in or on a watercourse for the mitigation of floods; habitable floor levels for development; works in tidal waters; and development on coastal floodplains, are:

- The *Building Act 1975* and Building Regulation 2006;
- The *River Improvement Trust Act 1940* and River Improvement Trust Regulation 1998;
- The *Water Act 2000*, Water Regulation 2000 and associated Water Resource Plans;
- The *Water Supply (Safety and Reliability) Act 2008*;
- The *Environmental Protection Act 1994* and Environmental Protection Regulation
- Environmental Protection Policy (Water);
- The *Coastal Protection and Management Regulation 2003;*
- The *Vegetation Management Act 1999* and associated Development Codes; and
- The *Rural and Regional Adjustment Regulation 2000 (Part 22 Special Disaster Flood Assistance Scheme).*

The Queensland Government has a comprehensive range of compulsory acquisition of land powers relating to the access rights for authorities responsible for flood defence operation and maintenance, over private property. These are contained within the River Improvement Trust and the Disaster Management Acts.

Other issues associated with flood risk and its mitigation that fall outside the control of planning schemes and development assessment under *Sustainable Planning Act (2009)* include;

- liability arising from taking certain actions (including providing information and works);
- state-wide oversight of flood risk and flood risk management practice; and
- coordination across local government boundaries.

The key elements of flood management, for the purposes of this report, can be classified into 5 interlinked roles:

1. **Flood disaster management planning and recovery**

- Covers aspects of disaster management and response
- Key agencies –DCS with DoC, DERM, QH and local government

- Flood recovery is a whole of government response with DCS and DoC in conjunction with local governments

2. **Flood mitigation planning and strategic planning relating to flood**
- Covers state planning tools under the *Sustainable Planning Act (2009) (SPA)* i.e. State Planning Policy (SPP1/03) *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*), Regional Plans, and development conditions for infrastructure under the SPA Integrated Development Assessment System (IDAS). Strategic planning also includes mitigation grants and climate change impacts
- Key agencies – DIP, DCS and local government. DERM is an advice agency

3. **Environmental, natural resource and health planning/regulation relating to flood**
- Covers a range of regulatory and policy instruments under the *Environmental Protection Act (1994)*, *Environmental Protection Regulation (2008)*, and *Environmental Protection Policy Water (2009)*, water quality planning, Great Barrier Reef water quality and Wetlands policies and programs
- Key agencies – DERM and QH (minor role)

4. **Provision and adequacy of data/information, research & modelling relating to flood**
- Covers water data and other information which informs flood modelling and management e.g.: stream flow data, topographic information, flood modelling
- Key agencies – DERM, Bureau of Meteorology, some local government, research bodies and the insurance industry

5. **The planning and management of the beneficial aspects of flooding**
- Covers the management of riverine, wetland, floodplain and overland flow through a range of regulatory and policy tools including provisions under the *Water Act 2000*, *Water Regulation (2002)* and statutory water planning e.g. State Planning Policy Protecting Wetlands of High Ecological Significance in the Great Barrier Reef Catchments and the Strategy for the Conservation and Management of Queensland's Wetlands
- Key agencies – DERM

Summary of flood related activities by Department

The key activities across the Queensland Government are summarised below. For more detail refer to Appendix A.

Department of Communities (DoC)

The DoC has lead agency responsibility for the coordination of community recovery efforts after disasters. This includes the provision of short, medium and longer term recovery strategies and services.

Department of Community Safety (DCS)

The DCS is the coordinating agency for disaster management through Emergency Management Queensland (EMQ). While EMQ's role is focussed on response, it is also involved in the coordination and policy development across the spectrum of prevention, preparedness, response and recovery.

Department of Employment, Economic Development and Innovation (DEEDI)

DEEDI coordinates a range of financial assistance to primary producers affected by flooding and cyclone events. This includes one off grants to ongoing programs.

Department of Environment and Resource Management (DERM)

DERM has a lead role in managing coastal hazards; in policy and planning for the changed flood risk under climate change; in managing the beneficial effects of flooding, including take and interference with water and overland flow, floodplain management, wetlands management, water quality and riverine protection. The department also collects data and operates a network of flow gauging and rainfall stations; and regulates the safety of referable dams.

Department of Infrastructure and Planning (DIP)

DIP has responsibilities for both planning and local government matters in relation to flood management. As a result its role is twofold: ensuring that the state and local government planning regimes adequately address flood issues, including any future flood risk, and building works are able to mitigate the impact of flooding on built structures; and overseeing the funding of local governments to facilitate the provision of infrastructure and services, including flood related grants.

Department of the Premier and Cabinet (DPC)

DPC assists with whole of government coordination during emergencies and plays a key role in managing the state's response to disasters and major incidents, including flooding.

Department of Transport and Main Roads (DTMR)

DTMR has the responsibility for ensuring roads within the states' jurisdiction are both flood resistant, do not contribute negatively to the effects of flooding and minimise interference with natural flow.

Queensland Health (QH)

QH plays an important role in mitigating and responding to the health impacts associated with flooding, such as mosquito-borne diseases.

QRAA (formally Queensland Rural Adjustment Authority)

QRAA administers a range of natural disaster—including flood—assistance and recovery measures for primary producers. QRAA Natural Disaster Relief & Recovery Assistance (NDRRA) includes measures for small businesses and primary producers.

Other projects identified

During the audit a number of projects recently announced, in progress or under development were identified that sit within, or have relevance to, the flood management framework and may potentially impact on the state's flood management regime. These include:

- The remake of the SPP 1/03 (DIP lead);
- Proposed transition of the River Improvement Trusts from the Queensland Government to local government (DERM lead) and associated review of the River Improvement Trust Act;

- Review of state and national flood-related guidelines (DSC to review Emergency Management flood manuals);
- A review of the effectiveness of existing planning tools in addressing the increased risk from climate change (DERM – Office of Climate Change);
- Investigation of greater integration between groundwater and flood water management (DERM);
- Revised Coastal Plan and development of an associated new SPP (DERM);
- Development of an integrated waterways quality monitoring framework for Queensland (shortly to be submitted to the Premier for endorsement) (DERM/DEED/GBRMPA);
- *Great Barrier Reef Protection Amendment Act* and supporting implementation package (DERM);
- A project to look at both the climate change science and the planning and development responses to inland flooding (joint State government and LGAQ);
- National Council of Australian Government (COAG) guideline under development to incorporate climate variability and change into assessment of future flood risk; and
- Preparation of the SPP Healthy Waters and remake of the EPP Water dealing with stormwater quality management.

Part two - the current flood management framework in the Queensland Government

The second part of the audit identified possible gaps in the Queensland Government's current flood risk management framework. A detailed description of the existing approach (including relevant legislation and policies and programs) and all identified gaps and comments on the approach is located in Appendix B. This next section below outlines key gaps according to the five key flood management roles

Summary of gaps

By way of summary, the state does not have an overarching strategic 'Queensland flood risk management policy' encompassing the planning and response to a flood event. While the disaster management response is generally well coordinated across the Queensland Government; the flood mitigation issues are often not well coordinated.

Similarly, there is no clearly identified lead agency that champions the responsibility for overall strategic coordination of flood management policy across Queensland. The roles and responsibilities of departments and institutions are not clear; with many overlapping interests and gaps. There is no integrated strategic approach to mitigating all types of flood risk—existing, future and residual.

The audit also identified the need for Queensland to have clear representation at the National Flood Risk Advisory Group. A lead agency is required to take responsibility for the development and oversighting of strategic policy and planning responses relating to flood risk management from a national perspective.

The audit also identified that the majority of agencies are heavily committed to delivering 'non-flood' responsibilities and often do not have the capacity to fulfil flood management roles. There appears to be the need for a more strategic approach to resource allocation across the Queensland Government.

In addition, there is no regulatory requirement or methodology at present for the integration of climate change projections into flood management policy or plans, however the revision of *State Planning Policy SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (SPP1/03) and an *Inland Flood Study* will go some way towards addressing these issues.

There is no readily available flood mapping and data available which can be easily updated and made publicly available.

1- Flood disaster management planning and recovery gaps

On the whole disaster management is effectively managed by DCS through the Disaster Management Act and associated committees. However, a number of gaps and other issues have been identified by the audit as detailed below.

Integration of stakeholders in disaster preparation/planning and response

There is no overarching, strategic coordination between local government and the Queensland Government for disaster response when a flood event occurs. Local disaster management plans, developed by local government, for emergency response, are generally in place (as a requirement of the Disaster Management Act) but the plans do not address the coordination of managing a response to a flood; nor do they adequately reflect the planning necessary associated with flood. There is also little recognition of flood events rarer than the 1% AEP[3] (or 1in 100 year) flood event.

Post flood community recovery

A Memorandum of Understanding between the DoC and the DCS is in operation for post emergency operations. This structure is operating well. The DoC provides short, medium and longer term flood recovery strategies and services including personal support services and community engagement and development services.

Roles of authorities in disaster response, triggers for evacuation, and public security in temporary shelters and evacuated areas

There is a need for greater clarity around evacuation processes; however there is a guideline that will deal with this matter under development at present.

Flood mitigation grants

Each year the Queensland Government invests in the order of $600M through the Natural Disaster Recovery and Relief Arrangements (NDRRA) program in response to flood and cyclone related events. Given impacts of climate change and the likelihood for more extreme weather events and the forecast increased wet seasons over the next few decades, the audit has identified that it would be advantageous to review the NDRRA arrangements to ensure the funding is best used to future proof the state against flood related impacts.

This might mean that local governments and other recipients of funding are required to prepare more in-depth flood management plans or documents to minimise the risk

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[3] ***Annual exceedance probability (AEP)***: the likelihood of occurrence of a flood of a given size or larger in any one year; usually expressed as a percentage. For example, if a peak flood discharge of 500 cubic metres per second has an AEP of 5%; it means that there is a 5% risk (i.e. probability of 0.05 or a likelihood of 1 in 20) of a peak flood discharge of 500 cubic metres per second or larger occurring in any one year. The AEP of a flood event gives no indication of when a flood of that size will occur next.

of flooding as a precondition of eligibility for the maximum amount of support under NDRRA. It might also mean changing the rules to allow the money to be spent in part to improve the resilience of the reinstated infrastructure to future flood events.

Further investigation into a coordinated approach for the administration of flood mitigation grants should be undertaken to maximise impact on Queensland's flood risk—investing in areas where there is the greatest need.

Disaster response and recovery implementation

The DSC has identified that there are variances between information held at the state and local government level with regards to response and recovery implementation. There are gaps in arrangements for transitioning between response and recovery and a gap in arrangements that reflect current expectations for re-supply of isolated communities, particularly under periods of long isolation.

River basin planning institutions

Water Authorities and River Improvement Trusts (RITs)—created under the Water Act)—whilst not specifically established for managing flood, do have a broad range of powers and responsibilities including: stormwater drainage; flood prevention; and floodwater control.

The water authorities and RITs are currently being transferred to alternative institutional arrangements, primarily local government. This may allow for greater integration of flood planning and management, however, the institutional boundaries of local governments are not based on river catchments as are the RITs. This means some catchments are likely to cross several local government areas, which might prove problematic in terms of coordination of flood management planning and recovery.

Erosion protection - reducing the likelihood of mudslides or landslides with floods

SPP1/03 sets the policy for reducing the likelihood of mudslides and landslides. However, there is little technical expertise in the Queensland Government to assist development proponents on this matter.

2 - Flood mitigation planning / strategic planning relating to flood - gaps

Land use planning—control of development on floodplains

The Queensland Government has a comprehensive planning regime implemented through the Sustainable Planning Act and associated State planning instruments. The key planning related tool is '*State Planning Policy 1/03 on Mitigating the Adverse Impacts of Flood, Bushfire and Landslide'* (SPP 1/03) which is reflected in statutory regional plans and local government planning schemes.

The audit has found that although there is a framework in place it is subject to the quality of flood information. Where SPP 1/03 is fully integrated into local government planning schemes new development is generally well controlled. However, SPP1/03 only applies when triggered, for example: for new works or for a material change of use. The SPP deals with future risk. Existing and residual risk are not managed. SPP 1/03 generally does not address existing developments below 1:100 year flood levels. For example some of the existing developed areas are below 1:20 year or

1:50 year flood levels. Estimates of these levels vary with time as more information becomes available.

Infrastructure built before the commencement of the SPP1/03 may be in areas of high flood risk. Similarly where planning decisions have balanced the risk and cost of locating infrastructure in a hazard management area infrastructure may be located in areas of higher risk.

The audit also noted that the control of development on rural floodplains is considered very patchy, varying from one local government area to the next. This is often due to the capacity of local governments to commit resources to undertake adequate modelling.

The construction of main roads and related infrastructure is managed by DTMR who consider flood management and drainage issues in accordance with the SPA and a range of design manuals and guidelines.

Other land planning related tools regarding flood—both at the property scale and regional scales—includes the *Land Act 1994* (mainly through the "Delbessie Agreement") and Regional Natural Resource Management (NRM) plans.

Building control standards

The Building Act and the associated Building Regulation regulates structures in flood hazard areas. The audit has identified that structures are subject to 'wind loads', but there are no similar requirements in relation to 'flood flow'. This may be an area for future consideration.

Dam construction, management and safety

Referable dams are actively regulated in Queensland. A referable dam is one that would, in the event of failure, put population at risk. This is determined by conducting a failure impact assessment. Such a dam is assigned a Category 1 or Category 2 failure impact rating, and is considered 'referable' under the provisions of the Water Supply (Safety and Reliability) Act.

Dams that have not already been assessed as having a Category 2 failure impact rating must be periodically reassessed at least every five years if they are more than eight metres high and have:

- a storage capacity of more than 500 mega litres; or
- a storage capacity of more than 250 mega litres and a catchment area more than three times the maximum surface area of the dam at full supply level.

If there is no population at risk, a dam is not referable and is not subject to the referable dam provisions of the Water Supply (Safety and Reliability) Act. Development permits are required for all new referable dams and for all modifications to existing referable dams which increase the storage capacity by more than 10%.

Standards for new dam construction and maintenance

While safety conditions (the ANCOLD[4] guidelines) apply to the design and construction of referable dams, no such conditions apply to non-referable dams. There is also an absence of knowledge about dams that fall outside of the referrable category but that could still cause community impact if they fail. The number of instances in recent years of actual or threatened collapses of non-referable dams is not known.

Integration of basin flood risk in drainage planning/design

There are a range of legislative and policy tools available for the management of drainage basins between the state and local governments. They range from the Sustainable Planning Act (including state planning instruments such as SPPs) and the *Queensland Urban Drainage Manual*—a guideline to assist local governments in planning urban drainage. Primarily drainage in urban areas is a local government responsibility and its effectiveness varies from jurisdiction. The manual does promote an integrated basin approach however.

The Soil Conservation Act affects drainage on agricultural land. The Act is limited to the conservation of soil resources and facilitates the implementation of soil conservation measures by landholders for the mitigation of soil erosion. Where it does apply it is usually in rural settlings. In certain circumstances it can control or directing run-off water flow. This Act is geographically limited in its application.

Location of sewage treatment plants on flood plain/prevention of flooding of infrastructure

The Sustainable Planning Act, with SPP 1/03, is the main legislative tool for the prevention of flooding when planning for infrastructure. Local governments are required to reflect SPP1/03 in their planning schemes and take SPP1/03 into consideration when assessing development applications in flood prone areas.

Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on the designation of "Flood Hazard Management Areas" and these in turn rely on good flood data modelling for the mapping.

Wetland protection

The recently introduced temporary State Planning Policy: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments requires anyone conducting high risk earthworks activities within a wetland protection area and which may interfere with the hydrological regime of the wetland to make an application for assessment under the SPA.

Regional NRM group flood management planning

Regional NRM groups have significant planning benchmarks, monitoring activities, partnerships and forums for flood management. For example, the Condamine Alliance Regional Investment Strategy prioritises risk analysis of built infrastructure to flooding and salinity and the delivery of a digital elevation model assessment to improve planning and management across the highly productive Condamine floodplain.

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[4] Australian National Committee on Large Dams – guidelines include risk assessment, dam safety management and construction and operation etc

However, there is a tendency for flood management to be addressed reactively due to the acute nature of these events. This is evident in the significant flood management activities undertaken by the Northern Gulf Region in 2009, when many areas in the lower gulf catchments were inundated for over 2 months. For example, one of the steps undertaken by the Northern Gulf NRM Group included designing a monitoring program to undertake with graziers to measure the impact and the recovery of the landscape. Accordingly, there is an identifiable gap in the role of NRM bodies towards flood management although significant planning, coordination and activities are undertaken by these groups.

3 - Environmental, natural resource and health planning matters relating to flood - gaps

Water resource use management – a catchment approach

The Queensland Government has a range of legislative and statutory planning tools and a number of policies for the management and use of water resources. This is primarily achieved through the Water Act. The Act allows for a range of statutory instruments such as Water Resource Planning (WRP)—which manages environmental flow and water allocation security objectives—Resource Operation Plans (ROP); and Water Use Plans (WUPs). Other legislation such as the River Improvement Trust Act and Wild Rivers Act also has a role in the management of rivers and catchments.

Generally the Water Act focuses on water resource planning and water allocation and use but not on flood management or the active management of the beneficial elements of flooding. Chapter 4 of the Water Act has provisions to create water authorities whose activities include flood prevention and floodwater control. Apart from incorporating the broad management of the beneficial effects of flooding such as overland flow, generally there is little integration of flood management into water management planning regime.

There is currently no integrated catchment approach to flood management in Queensland. While River Improvement Trusts have some powers to manage flood issues at a catchment scale these only operate east of the Great Dividing Range and have had limited success. Professor Barry Hart in the "*Review of the Fitzroy River Water Quality Issues*" report to the Queensland Premier (November 2008)—the Hart review—recommended that "*the Queensland Government appoint a lead agency to be the responsible "caretaker" of river health in the Fitzroy catchment…and for DERM to develop a "catchment management plan" and coordinated monitoring and assessment program for the Fitzroy catchment*". The report noted similar limitations in management and governance structures of catchments are likely to be found throughout Queensland.

Integration of surface and groundwater management (relating to flood events)

The Water Act has a number of provisions which can allow the Queensland Government to integrate the management of ground and surface water if required. These include "Declared Areas" provisions, Water Resource Planning, Resource Operation Planning and Chapter 4 Water Authorities (at present there are a number of Water Authority that manage ground water resources).

The integration of surface and groundwater management as it relates to flooding is generally not a consideration of water resource planning. This overlooks the importance of flood events in recharging some aquifers. It should be noted however

the North Burdekin and South Burdekin Water Boards (water authorities) do oversee the management of replenishment of subterranean water in order to secure adequate supplies for irrigation, domestic, stock and industrial purposes.

Pollution/discharge control provisions during flood

There are a significant number of policy and legislative tools to deal with pollution. Point and non-point source water quality issues and pollution management are mainly dealt with through the Environmental Protection Act and a range of other legislation and policies including the Vegetation Management Act and to a limited extent the Soil Conservation Act. In recent years there has been a significant focus on run-off and pollution into the Great Barrier Reef. This has culminated with the Great Barrier Reef Protection Amendment Act (which amends the Environmental Protection Act). This includes a range of policy and planning initiatives including Reef Wise program, the Reef Water Quality Protection Plan, Reef Water Quality Partnership, Reef rescue process.

The 2008 Encham Mine (Fitzroy River Flood) incident review (DERM 2009) noted a range of limitations in the management of pollution discharge during or after flood events. The independent 'Hart' review also recommended that the Queensland Government develop a set of 'Emergency Response Principles' relevant to the mining industry to be applied in future situations. These principles could include the identification of a lead agency that would be responsible for risk assessment, coordination of other key agencies, development of action and communications plans, and the nomination of a key spokesperson.

Licensing of hydrological works

There are a range of tools to regulate hydrological works. The Water Act and associated Water Regulation regulate the "take and interference of water". The Water Act, in conjunction with the Sustainable Planning Act, regulates (to extent of these Acts) flood mitigation and operational works in drainage and embankment areas. The Water Supply (Safety and Reliability) Act regulates safety conditions for referable dams and sets out flood mitigation responsibilities for dam owners, including the preparation of flood mitigation manuals. The *Transport Infrastructure Act 1994* also has provisions for the diversion and construction of watercourses to carry out road works.

A limitation of the existing regime is that hydrological works are licensed only where work is in a water course or for the safety of referable dams. There is a view that flood management implications are generally not taken into consideration when these works are licensed.

Quarry and dredging in riverine ecosystems

Quarrying and dredging is generally well managed under the Water Act in association with the Sustainable Planning Act. Flood is considered broadly from a stream integrity point of view.

Land use practices that increase/decrease flood peaks

Some land use practices can exacerbate pollution caused by flooding (for example, storage of chemicals, use of pesticides/other compounds, slurry disposal). A range of legislative tools are available to Government to manage this type of pollution, through the Environmental Protection Act and associated Environmental Protection Regulation which regulates the storage of chemicals other than crude oil, natural gas

and petroleum products. The safe storage and handling of dangerous goods are also regulated through the *Dangerous Goods Safety Management Act 2001* and *Dangerous Goods Safety Management Regulation 2001* and associated *Guidelines for Industry.*

The effectiveness of these regulatory tools may be weakened by inadequate flood modelling and appropriate application of risk management. The approvals for Environmentally Relevant Activity licences (e.g. chemical storage) are often based on the land zoning as set by the local government. The quality of the local area plans often influences such decisions. If local government modelling does not adequately reflect areas at flood risk, chemical storage could be granted in areas which may lead to environmental impact. Risk assessment should ensure that areas at high risk of flood events are subject to more stringent licensing control.

Aquatic ecosystems

The audit has identified that the protection of aquatic ecosystems from pollution associated with floods is patchy across the state.

Wetlands and floodplains

The Water Act, Wild Rivers Act, and Sustainable Planning Act have a role in the management of these areas. The Queensland Wetlands Program specifically deals with wetland management issues. DERM also has wetland mapping including the impact of overland flow. This focuses on environmental protection rather than flood mitigation. For wild rivers, flood plans are managed through 'floodplain management areas' as required by the Wild Rivers and Sustainable Planning Acts.

Operational works (in wetlands in a watercourse, lake or spring) are regulated to extent specified in the Water and Sustainable Planning Acts. Vegetation clearing in and around wetlands is controlled by vegetation code assessment. Under the *Coastal Protection and Management Plan* there is a policy for coastal wetlands that states that further loss or degradation of coastal wetlands is to be avoided and impacts on coastal wetlands prevented, minimised or mitigated.

There was a view expressed during the audit that floodplain management has not been adequately addressed. Some believe that adopting a comprehensive approach to integrated water cycle management involving the infrequent high /flood flows to recharge wetlands and ground water is required.

Riparian management and protection

A framework exists for the management of riparian areas, namely through the Water; River Improvement Trust; Wild Rivers; Vegetation Management; and Sustainable Planning Acts.

This framework however is patchy through out Queensland. Declared wild rivers are protected through some prohibited development within the riparian zone. River Improvement Trusts (with the power of the River Improvement Act *(RIT)*) can also manage elements of riparian areas within a RIT catchment (but not always) and the Water Act (in association with the Sustainable Planning Act) manages works approvals on drainage embankment areas. There is however no coordinated approach to manage riparian vegetation throughout Queensland.

Integration of flood and storm surge

The Coastal Protection and Management Act and the associated planning policy including the new SPP deals with flood and storm surge. However, the workshop noted that there needs to better integration of flood, storm surge and storm tide modelling to enhance the framework.

4 - Provision and adequacy of data/information/advice, and research & modelling relating to flood - gaps

Modelling

The audit has identified that there is no consistent approach for flood modelling and planning across the state. Some local governments have excellent and comprehensive modelling while others do not. This is often due to the size of the local government and its capacity to develop the required modelling and mapping.

Some models plot inundations for historical floods while models others adopt the 1% AEP flood[5]. There is virtually no recognition of rarer flood events which may have a catastrophic impact. There is no central register of flood modelling or mapping. There is also a difficulty in determining the risks to individual properties from flooding with any precision. Some local governments do offer tools to the community to assist individuals in determining flood risk (e.g. Brisbane City Council's Flood Flag Map[6] and FloodWise Property Report[7] programs) however.

Flood modelling also varies from one regional planning area to another resulting in flood planning that can not be integrated across regional boundaries. In most case the statutory regional planning could be one vehicle to address these issues.

Similarly, there are no comprehensive guidelines to help local government facilitate flood planning and no audit framework for local government flood management plans. At present, some local governments do not have comprehensive flood management plans while others have effectively addressed both existing and future flood risk (e.g. Brisbane City Council).

Some flood modelling needs to incorporate storm surge and storm tide data. The audit also identified that there is a need to incorporate climate change projections into flood modelling and planning.

Availability of hydro-meteorological and other related data

DERM collects data from approximately 400 water flow monitoring sites around Queensland. The Bureau of Meteorology also utilises these sites for its flood warning network across regions of Queensland. Other hydrological flow data is collected by local government. DERM makes this data available to the public through its website.

However, there are no data collection standards or clear information sharing protocols across the three levels of government. The audit also identified that there is a need for spatial information on flood heights that can be used to develop flood

[5] Annual exceedance probability 1% e.g. 1 in 100 year flood event
[6] Brisbane City Council - Flood Flag Map - http://www.brisbane.qld.gov.au/community-support/emergency-management/flooding/flood-flag-map
[7] Brisbane City Council – FloodWise Property Report - http://flood.brisbane.qld.gov.au/floodwise_property_report

models. Such information would better assist local government in preparing planning schemes and in making development decisions where flooding is an issue.

Incorporation of climate variability and change into assessment of future flood risk

While the Office of Climate Change continues to address matters associated with climate variability, there appears to be more work required to incorporate climate variability into the assessment of future flood risk. A national guideline is currently under development through Council of Australian Governments (COAG) but this is not anticipated to be available for some time. In the meantime, Queensland will need to consider adopting interim measures.

Climate variability will also have implications for the existing Natural Hazard Management Areas (NHMA). Climate variability may result in a greater number of properties being at risk to flood. These matters are likely to be addressed in the review of SPP 1/03.

Public awareness and stakeholder participation in decision-making

Generally local government plays a key role in informing the public about flood risk. The effectiveness of this process is dependent on the resources available to local governments (e.g. Brisbane City Council has a very well resourced public awareness program). Many Queensland Government departments carry out some public awareness activities; however there is no coordinated approach.

The audit noted that there is need to educate the community to plan for floods in excess of the 1:100 year floods and understand what a 1:100 year flood means in terms of recurrence intervals. There is also need to educate the community with regards to acceptable, tolerable and intolerable risks and risks associated with climate variability and the possible increased risk of flood events across Queensland—particularly in wet periods.

Access to flood risk/hazard data

The Sustainable Planning Act requires local government to keep registers of resolutions about land liable to flooding, made under the Building Act, and development information relating to flooding. Information generally contained in registers includes: site characteristic information; flood level, limitations on the capacity of sewerage, stormwater and water supply services; location of any erosion control districts; location of contaminated land; location of land-slip areas. This is a useful resource for flood planning.

There is a general view however that there is a poor availability of flood data to the general public. In cases there is limited access to some local governments flood modelling data to the Queensland Government.

5 - The planning and management of the beneficial aspects of flooding - gaps

Gaps identified in relation to the beneficial aspect of flooding include the lack of coordinated management of flood plains. It is thought that better management of floodplains with regards to trapping and assimilating sediment, nutrients and other contaminants during flood/overland flows could be achieved. Adopting a comprehensive approach to integrated water cycle management involving the infrequent high /flood flows to recharge wetlands, ground water etc was also identified.

Conclusions

In drawing conclusions for the audit, it is apparent that there is a requirement to clarify the Queensland Government's role in strategic policy and planning responses to flood risk management. There is a clear need to identify a lead agency who can take on the responsibility for managing flood risk and offer jurisdictional representation on the National Flood Risk Advisory Group. There is also a clear need to better integrate the administration of flood related funding.

This report recommends that the issues and gaps raised by the audit be further analysed across the Queensland Government. As Queensland enters into a wetter period (El Nina), it is imperative that a strategic, coordinated approach for flood planning and mitigation is established.

This report recommends that an interdepartmental committee is established to further scope out the issues and potential enhancements to the current flood risk framework; and prioritise a series of actions over the coming months. A number of other recommendations for possible enhancements are provided below.

Recommendations

- Determination of a lead agency within the Queensland Government to 'champion' the overall development of a strategic Queensland flood risk management policy;
- Identification of a lead agency within the Queensland Government to represent Queensland on the National Flood Risk Advisory Group (likely to be DIP);
- Consideration be given to developing a more coordinated approach between the state and local government for disaster management planning including for example evacuation processes;
- A more coordinated, strategic investment strategy for the administration of flood related grants i.e. Natural Disaster Recovery Relief Arrangements (NDRRA);
- Enhanced implementation of a 'catchment approach' to flood and floodplain management across the State and local government levels i.e. integration of NRM activities, Land and Water Management Plans, water resource plans etc;
- Consideration for regulatory requirements for the integration of climate change projections into flood management policy or planning;
- Greater alignment with groups such as the regional NRM bodies in flood management activities;
- Greater incorporation of flood risk impacts in state planning instruments;
- Development of comprehensive guidelines to facilitate local government in their flood planning;
- Development of a process to audit local government flood plans;
- A greater regulatory focus for the management of extreme pollution events during and after flood; and
- Development of a greater understanding of the probability of coincident riverine flooding and storm tide inundation and/or dam break in planning;
- More consistent data collection standards and information sharing protocols across the state in relation to flood risk management data;
- Identification of point of truth flood data and mapping, which can be updated as new data becomes available and which can be made publicly available;
- Better integration and dissemination of information across all levels of government regarding the positive environmental benefits of flood;
- Greater information dissemination and education about flood risk; and
- A review of the construction standards associated with the building and management of non-referable dams.

Appendix A

DERM Business Units with Flood Management Activities

Business Unit	Flood Management Activities
Office of Climate Change	
Office of Climate Change	- Policy and planning for the changed flood risk under climate change - Provision of climate change factors for rainfall intensity to improve flood risk assessment processes
Queensland Climate Change Centre of Excellence – Coastal unit	- Storm tide monitoring - Wave monitoring - Coastal sciences project - Inland Flooding
Environment and Natural Resource Regulation	
Office of the Water Supply Regulator Business Group	
Dam Safety Unit	- Safety of referable dams - Approval of flood mitigation manuals - Policy advice/setting re: technical matters
Water Infrastructure and Asset Management and Standards	- Guidelines on the assessment of tangible flood damages - Developed and published by DERM to assist local governments in applying for government flood subsidy funds (originally under the Regional Flood Mitigation Program) - Queensland Urban Drainage Manual - Developed with industry and published by DERM. Adopted by most Qld Councils (and jurisdictions elsewhere) as the basis for their stormwater planning and design - Advice to support DCS's administration of : • SPP 1/03 (implemented through local government planning schemes); and • Subsidy funds from the State and Commonwealth governments for flood mitigation works and/or flood studies - Secretariat for the Queensland Flood Consultative Committee.
Water and Ecosystem Outcomes	
Strategic Water Initiatives Business Group	
Water Legislation Policy and Pricing	- Dam safety policy (amendments to the Water Supply (Safety and Reliability) Act 2008) - RIT policy - Metering policy
Strategic Water Policy	- RIT transfer of functions and powers to LGs (Webbe-Weller Review

Appendix A

DERM Business Units with Flood Management Activities

	Implementation)
Urban Water Policy and Management	
Urban Water Policy	- Urban stormwater management - DERM membership of the Urban Stormwater Management Working Group - Operational oversight of River Improvement Trusts (RITs) under the River Improvement Trust Act 1940
Water Quality and Accounting	
Water Accounting	- Data collection and operating a network of flow gauging and rainfall stations that provide real time and historic stream flow, stream height and rainfall data. This information feeds in to the: 1. National flood warning system 2. Bureau of Meteorology Strategic Water Information and Monitoring Plan.
Healthy Waters Policy	- State Planning Policy (Healthy Waters) - Protection of water quality - Water quality guidelines
Water Allocation and Planning	
Water Planning	- Development assessment and approval Design for flooding control and management is considered under DERM's development assessment and approval process (*Environmental Protection Act 1994* and *Sustainable Planning Act 1997*)
Water Allocations	- Water authorisations (permits / entitlements)
Wild rivers	
Wild rivers policy/reform	Floodplain management areas
Queensland Parks and Wildlife Service	
	- National Park visitor management and construction of infrastructure Ensures compliance with State regulatory controls and Australian Standards for flood conditions - Flood mitigation banks and levees in National Parks Direct flood mitigation works and structures on DERM managed areas, land purchased and/or converted to DERM tenure (particularly in western areas).
	- Managing coastal hazards including storm tides, cyclone effects and inundation
	- Flood disaster relief and community assistance in concert with SES & EMQ
Natural Resources and Environment	

Appendix A

DERM Business Units with Flood Management Activities

Wetlands team	Queensland Wetlands Program - State Planning Policy: Protecting Wetlands of High Ecological Significance in the Great Barrier Reef Catchments - Strategy for the Conservation and Management of Queensland's Wetlands - Wetlands mapping program - Impact of overland flow
Reef team	- Great Barrier Reef Protection Amendment Act – pollution/discharge controls during flooding
Coastal policy	- Coastal Protection and Management Act - DRAFT state policy Coastal Management – land use planning in coastal zones
Clean Environment	- Environmental Protection Policy (Water)
Environment Planning	- Environmental Protection Policy (Water)
Land and Indigenous Services	
Land and Water Management Plans – land practices to decrease/manage flood peaks	- Land and water management plans - Guidelines for land and water management plans - Regional NRM plans
Environment and Resource Sciences	
Water planning sciences, water quality and ecosystem health	- Riverine flooding and hydrology (ERS monitors water quality).
Regional Service Delivery	
Water Services	
Regional Science	- Healthy Headwaters program - delivery of critical natural resource information and technical advice / support
Water Information	- Water quality and quantity of ambient surface and groundwater - Aquatic ecosystem monitoring (monitoring flow regimes) - GAB monitoring – bore pressure testing
Water Management	- Water entitlement licensing and permitting - Licensing of hydrological works – Water Act (take and interference with water)
Non Commercial Assets	- Management and maintenance of several dams, weirs and pipelines on state land where the ownership has been defaulted to the state
Environmental Services	
Incident Response	- Provide 24 hour on-call incident response service to the local area and monitoring impacts for significant incidences
Coastal Operations	- Coastal operations development assessment and compliance (storm surge preparation?)

APPENDIX B

Flood management activities and potential gaps by subject matter

*** Table adapted from a guide developed by the Associated Program on Flood Management, a joint initiative of the World Meteorological Organisation (WMO) and the Global Water Partnership (GWP).*

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
1 - Flood disaster management planning and recovery			
Disaster management/ civil defence	Integration of State and local government stakeholders in disaster preparation/planning and response at various levels	**Legislative framework** **DCS** ▪ *Disaster Management Act 2003.* **Procedures, policies and plans** **DCS** *Disaster response coordination* ▪ Major Incidents Group (Premier is the Chair) ▪ Queensland State Disaster Management Group – (CEO DP&C is Chair) ▪ Queensland Flood Consultative Committee - DCS is chair ▪ Coordinate Whole of Government Disaster Managers activities – DCS ensure systems and processes are in place to provide disaster managers with the best information on which to base their decisions ▪ Coordination of disaster management arrangements (DCS) ▪ Provide support for key disaster coordination groups - Emergency Management Queensland (EMQ), provides the core policy and support staffing for the following State Groups; ▪ The State Disaster Coordination Group (SDCG) ▪ The State Disaster Management Group - Note that the Executive Director of EMQ is the executive officer is group ▪ State Emergency Services (SES) – Coordinate the operations of the SES. Note that the Executive Director of EMQ is also the Director of the SES ▪ Major Incidents Group (MIG). ▪ Operate State Disaster Coordination Centre (SDCC) – DCS manage flood events/operations and compilation & provision of information (e.g. situation report). ▪ Commonwealth National Disaster Management Program (DCS also manage, administer and coordinate) **Programs and grants** **DCS** ▪ Natural Disaster Mitigation Program (new) – DERM gives technical	**Comments** ▪ There is little connection between local governments and state government response teams ▪ There are plans for emergency response but not for planning ▪ There is virtually no recognition of events rarer than the 1% AEP flood event **Primary jurisdiction** ▪ DPC has responsibility for whole of government coordination in emergency response ▪ The CEO of the DPC is the Chair The State Disaster Management Group which is the principal organisation under the Disaster Management Act 2003 ▪ Department of Community Safety provides services covering all phases of emergency and disaster management - prevention, preparedness, response and recovery.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		advice, DCS is Lead **DIP** ▪ Local Governing Bodies' Capital Works Subsidy Schemes Program – DERM gives technical advice, DIP is Lead	
	Post flood community recovery	**Legislative framework** ▪ *Disaster Management Act 2003.* **Procedures, policies and plans** **DoC and DCS** ▪ MOU between DoC and DCS deals with these issues ▪ Short, medium and longer term flood recovery strategies and services including personal support services and community engagement and development services (Department of Communities) **Programs and grants** **DoC** ▪ Assistance for people whose property are uninsured and have been damaged as a result of disasters such as storms and flooding (Department of Communities). This includes: – Emergent Assistance Grant: For basic needs in the first few days after a natural disaster this is not means tested. – Essential Household Contents Grant - For replacement or repair of uninsured, household contents. An income and asset test applies. – Structural Assistance Grant – for uninsured flood/storm damaged homes. An income and assets test applies.	**Primary jurisdiction** The Department of Communities has lead agency responsibility
	Roles of authorities in disaster response, triggers for evacuation, and public security in temporary shelters and evacuated areas	**Legislative framework** **DCS** ▪ *Disaster Management Act 2003* – three tiered disaster management system in Queensland **Procedures, policies and plans** **DCS** ▪ Queensland Disaster Management Alliance – joint initiative between LGAQ and DES in establishing a collaborative approach to disaster management planning, preparedness, mitigation, response and recovery in Queensland. ▪ **Emergency Management Australia** (EMA) (Commonwealth of Australia, Attorney General's Department) is responsible for the	**Comments** ▪ Need to ensure planning and location of shelters met requirements for floods rarer than 1:100 year frequency ▪ Gap: greater clarity required over evacuation; a framework and guidelines are under development.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		preparation and maintenance of a number of Australian Government emergency management plans. These emergency management plans include: Australian Emergency Management Arrangements; Australian Government Disaster Response Plan (COMDISPLAN) ▪ **Australian Emergency Management Arrangements** — each sphere of government, including the Commonwealth and Local Government, has responsibility within its own jurisdiction for emergency planning, preparedness and mitigation in relation to land, property and the environment, assets and infrastructure, agencies and programmes **Programs and grants**	
	Disaster response planning and flood management planning (including mitigation)	**Legislative framework** **DCS** ▪ *Disaster Management Act 2003-* Sets out the broad framework for disaster management throughout the State. Under this Act each local government, or alternatively a combination of local governments, must prepare a local disaster management plan for disaster management in the relevant local government area or areas. Disaster events includes flood. ▪ State Planning Policy 1/03 on Mitigating the Adverse Impacts of Flood, Bushfire and Landslide **Procedures, policies and plans** *Planning* **DCS** ▪ State Disaster Management Plan - DCS develop and maintain; ▪ District Disaster Management Plans – DCS provides guidance to District Disaster Management Groups on their development ▪ Local Disaster Management Plans – DCS Provides guidance to Local Government Agencies on their development ▪ Flood Warnings - DCS monitor river levels; promulgate details; and active involvement on the Queensland Flood Warning Consultative Committee ▪ State Flood Hazard Profile – DCS Compile and Manage. Also develop base profile of State flood hazard ▪ Local Government Hazard Profiles - DCS Compile and Manage. Also develop base Local Government profile of flood hazard and vulnerability	**Comments** ▪ The SPP requires all local governments to amend their planning schemes to reflect the SPP and until such time as this is done, assessment authorities must apply the SPP during assessment of specified development applications. In this way, the SPP can address future flood risks but does not address existing and residual flood risks. ▪ Gaps o There is a difference between the intent of the SPP and the perception of its effectiveness on the ground. Further analysis would be useful that looks at the effectiveness of SPP in the 5 years since its introduction o Extent of information available on flooding to provide warnings. Extensive coverage across most QLD exposes gaps in those areas where it is less good o Variance between information held at State and local government level.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		DT&MR ▪ Construction of Main Roads and related infrastructure - management of flood and drainage issues (including construction and drainage) in accordance of Design Manuals and Guides; – Road Drainage Design Manual (June 2002). – Main Roads Environmental Management Policy Strategy 2002-2007; – Road Project Environmental Processes Manual (2004); – Guideline for Assessment of Road Impacts of Development (2006). – Queensland Urban Drainage Manual (2007) **QH** ▪ Queensland Health Disaster Plan – QH Prepares, maintains and implements ▪ Queensland Health Specific Plan and Response Protocols – e.g. Dengue Fever Management Plan for North Queensland (2005 – 2010)". **DERM** ▪ Referable dams – Emergency Action Planning for dam break events is a responsibility of referable dam owners under dam safety conditions applied under the *Water Supply (Safety & Reliability) Act 2008*. ▪ DERM, via the OWSR, has a long standing agreement with DCS to provide advice/support to DCS on adequate incorporation of SPP 1/03 by a local government in their planning scheme (or regarding individual development applications where the relevant planning scheme has not yet adequately reflected SPP 1/03) *Preparation* **DCS** ▪ Ensure Disaster Managers are trained and exercised – DCS Conduct disaster managers training and exercises ▪ Guides to Disaster Risk Management – DCS Prepare and maintain e.g. "A Guide to Disaster Risk Management in Queensland Aboriginal and Torres Strait Islander Communities (2004) ▪ Community Education – DCS Produces & provides brochures and web-based information **Other** **DCS**	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Emergency Management Queensland Committees –DCS Lead; – State Disaster Coordination Group – DCS Lead – State Disaster Management Group – DCS Lead – Local Disaster Management Group – Members of various groups throughout Queensland **DERM** ▪ The Office of Water Supply Regulator has a long standing agreement with DCS to provide advice/support regarding flood mitigation projects that seek Government funding through programs that DCS administers **Inter-government** ▪ Queensland Flood Warning Consultative Committee – DERM Member, DCS / Bureau of Meteorology (BoM) Lead ▪ National Flood Risk Advisory Group – Commonwealth Lead DERM Member ▪ Queensland Flood Consultative Committee – DERM member	
	Disaster response and recovery implementation	**Legislative framework** **DCS** ▪ *Disaster Management Act 2003* **Procedures, policies and plans** *Disaster Response* **DCS** ▪ Media communication during flood events – DCS provide media updates/ statements during flood events ▪ Assist Local and District levels – DCS endure deployment of appropriate resources to affected area; ▪ Flood event response - SES operational and emergency response to flood events including; sandbagging; flood barriers; search and rescue; recovery operations; and re-supply ▪ Flood event mapping – DCS map flood event during SDCC operations to assist response planning ▪ Monitor impact on community – DCS Arrange for State (funded) Disaster Relief Arrangements or Commonwealth/State Natural Disaster Relief Arrangements activation. ▪ Temporary Flood Barriers – DCS mitigate effects of flooding through use of temporary flood barriers- Coordinate deployment of flood-barriers	Gaps: ▪ Variance between information held at State and local government level ▪ Policy and guidelines are currently under development to address the arrangements for transition between response and recovery ▪ There are gaps in arrangements that reflect current expectations for resupply of isolated communities, particularly under periods of long isolation

Not Government Policy

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		– Develop guidelines/ protocol for Temporary Flood Barriers - NB - Joint DCS/DERM/ Bureau of Meteorology *Disaster Recovery* **DCS** ▪ Disaster Recovery Planning – DCS develop an all-hazards recovery policy ▪ Community assistance and recovery – DCS ensure the re-supply of essential foodstuffs, medications, fuel etc, including Isolated Communities Policies and Procedures. **DT&MR** ▪ Management and Maintenance of Main Roads during flooding – address any safety concerns (DT&MR) – Controlling Traffic during flood emergencies to minimise risk to community – (closing roads to traffic while flood waters cover them, re-open them as soon as practicable) – minimise infrastructure damage, – repair damage, – clear debris Intergovernmental ▪ Support Disaster Response and Recovery efforts - Main Roads, principally through its commercial arm, also assists local government and other agencies where needed. DERM through QPWS and other region staff from Land Use and Forestry **Programs and grants** **QRAA** ▪ Natural Disaster Relief & Recovery Assistance (Floods, Cyclones, Storms etc) - Small Business (QRAA) ▪ Natural Disaster Relief & Recovery Assistance (Floods, Cyclones, Storms etc) -Primary Producers (QRAA)	
2 - Flood mitigation planning and strategic planning relating to flood			
Strategic planning	Integration of flood management with other relevant policy areas in decision-making at a strategic level (such as basin/river	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* ▪ State Planning Policy 1/03 on Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03) **DCS** ▪ *Disaster Management Act 2003*	**Comments** ▪ Framework only partially addresses flood management **Relevant current projects** ▪ State & national flood-related guidelines – (DSC

Not Government Policy

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	planning and climate change)	**Policies, procedures plans and guidelines** ▪ State & national flood-related guidelines (DSC to review of Emergency Management Australia (EMA) flood manuals) **DIP** ▪ SPP 1/03 Guideline ▪ Statutory Regional Plans (administered by DIP) o In Operation – South East Queensland Regional Plan 2006-2026 *(In Review)* – NB -Office of Urban Management administers this regional land use plan o In Development – FNQ 2025 regional plan – North West regional plan – Central West regional plan – South West regional plan – Maranoa and Districts regional plan ▪ Non-statutory regional plans – Central Queensland (CQANM) – Eastern Downs (EDRPAC) – Gulf Region (GRDP) – Townsville-Thuringowa – Whitsunday – Hinterland and Mackay (WHAM) – Wide Bay-Burnett	participating in review of Emergency Management Australia (EMA) flood manuals ▪ Proposed revision of SPP 10/3 will further define roles ▪ A review evaluating the effectiveness of existing planning tools in addressing the increased risk from climate change (DERM)
	Integration of flood and storm surge	**Legislative framework** **DERM** *Coastal Protection and Management Act 1995* **Procedures, policies and plans** **DERM** ▪ Draft Queensland Coastal Plan - Draft State Policy Coastal Management - prepared under the Coastal Protection and Management Act 1995. The purpose of the draft management policy is to provide policy direction and guidance on managing coastal land in Queensland in line with the objectives of the Coastal Act. The Draft State Policy Guideline Coastal Management (draft management guideline) provides advice on how to implement the draft management policy.	**Comments** ▪ There needs to be integration of flood and storm surge modelling. However this is a complex task. This is a basic component of real time flood modelling ▪ Further investigation into this area would be useful for policy development.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Draft State Planning Policy Coastal Protection - protects the coastal resources of the coastal zone by setting out criteria for land-use planning and development assessment— enabling Queensland to manage development within the coastal zone including land below tidal waters. This aims to satisfy, in part, the objectives of the Coastal Protection and Management Act 1995). ▪ Draft State Policy Guideline Coastal Management - provides information and advice on interpreting and implementing the Draft State Policy Coastal Management (draft management policy). ▪ Draft State Planning Policy Guideline Coastal Protection - seeks to reduce risks to the community from coastal hazards, taking into account the likely effects of climate change. Coastal hazards refer to coastal erosion, permanent inundation by the sea due to sea level rise, and storm tide inundation. ▪ Draft Queensland Coastal Plan Draft Guideline Coastal Hazards - provides advice and information about the methodology used to determine coastal hazard areas under the Draft Queensland Coastal Plan— incorporating the Draft State Policy Coastal Management and Draft State Planning Policy Coastal Protection	
	Location and protection of key/strategic infrastructure on flood plains	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* (DERM gives 3rd party / technical advice for floodplain management issues) ▪ Local planning schemes of Local Government Bodies (DERM gives 3rd party / technical advice for floodplain management issues) ▪ State Planning Policy 1/03 Mitigating the adverse impacts of flood, bushfire and landslip (DERM gives 3rd party / technical advice for floodplain management issues) **Procedures, policies and plans** **DIP** ▪ SPP 1/03 Guideline **DERM** • Queensland Urban Drainage Manual 2nd edition 2007 – a guide for planning and design of urban stormwater systems. **DT&MR** ▪ Construction of Main Roads and related infrastructure -	**Comments** ▪ SPP provision for future works only ▪ Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on 'Hazard Management Areas – Flood' and these in turn rely on good flood data modelling which is not consistent across the state ▪ The AR&R handbook is the key source of technical information in Australia for designing infrastructure to withstand the impact of extreme rainfall, flooding and storm surge

Not Government Policy

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		management of flood and drainage issues (including construction and drainage) in accordance of Design Manuals and Guides; • Road Drainage Design Manual (June 2002). • Main Roads Environmental Management Policy Strategy 2002-2007; • Road Project Environmental Processes Manual (2004); • Guideline for Assessment of Road Impacts of Development (2006). **Programs and grants** **DERM** ▪ Input into the Institute of Australian Engineers review of the Australian Rainfall and Runoff Handbook	
	Control of development on flood plains	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009 (SPA)* (DERM gives 3rd party / technical advice for floodplain management issues) **Procedures, policies and plans** **DIP** ▪ Planning Schemes of Local Government Bodies (DERM gives 3rd party / technical advice for floodplain management issues) ▪ State Planning Policy 1/03 Mitigating the adverse impacts of flood, bushfire and landslip (DERM gives 3rd party / technical advice for floodplain management issues) **Programs and grants**	**Comments** ▪ Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on 'Hazard Management Areas – Flood' and these in turn rely on good flood data modelling. Which is not consistent across the state ▪ Control of development on *rural* floodplains is patchy **Relevant current projects** ▪ DIP's review of SPP1/03
	Incorporation of flood considerations in urban land use decision-making	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009 (SPA)* (DERM gives 3rd party / technical advice for floodplain management issues) **Procedures, policies and plans** **DIP** ▪ Planning Schemes of Local Government Bodies (DERM gives 3rd party / technical advice for floodplain management issues) ▪ State Planning Policy 1/03 Mitigating the adverse impacts of flood, bushfire and landslip (DERM gives 3rd party / technical advice for	**Comments** ▪ Depends on the development or activity ▪ Some local governments only have flood prone land ▪ Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on 'Hazard Management Areas – Flood' and these in turn rely on good flood data modelling which is inconsistent across the state ▪ There needs to be the better spatial information

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		floodplain management issues) **Programs and grants**	on flood height that can be used to develop flood models that will allow local government and Queensland Government agencies to prepare their planning schemes/instruments and make development decisions where flooding is an issue ▪ Reflecting flood modelling in regional plans is problematic where flood models vary from one local government area to another
	Harmonisation of local planning with strategic plans	**Legislative framework** **DIP** *Sustainable Planning Act 2009 (SPA)* **Procedures, policies and plans** **DIP** ▪ Statutory Regional Planning (through SPA) ▪ Local planning schemes – these determine a local government's development intent for a particular local government area. Local planning schemes set out future plans for the area spanning 20 years. ▪ strategic land use plan (through SPA) **Programs and grants**	**Comments** ▪ There are many players
Building control standards	Adoption of flood damage minimisation standards (materials, design) for new and old structures in flood hazard areas (especially flood proofing)	**Legislative framework** **DIP** ▪ *Building Act 1975* (DIP oversees the development of legislation and related policies and standards). ▪ Building Regulation 2006 (DIP oversees the development of legislation and related policies and standards). ▪ Building Code of Australia (DIP on behalf of the Australian Government and State and Territory Governments)	**Comments** ▪ Gap – codes applies to houses with regards to wind loads but not flood flow ▪ Problem with existing structures, they don't allow for climate change and don't keep up with current best practice ▪ There was a lot of work done on this a few years ago with DES and DLG
Dam construction, management and safety	Standards for new dam construction	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* (SPA) - A development permit under the SPA is required for the construction of a new referable dam. Schedule 3 of SPA lists the construction of a referable dam, (as defined in the Water Act 2000), or works that will increase the storage capacity of a referable dam by more than 10 per cent, as	While safety conditions (the ANCOLD guidelines) apply to the design and construction of referable dams, no such conditions apply to non-referable dams.

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		assessable development which requires a development permit. **DERM** ▪ *Water Supply (Safety and Reliability) Act 2008* - Design, construction and ongoing operation of dams that would put population at risk in the event of failure are regulated under the provisions of the Water Supply (safety and Reliability) Act 2008. A referable dam is one that would, in the event of failure, put population at risk. This is determined by conducting a failure impact assessment. Such a dam is assigned a Category 1 or Category 2 failure impact rating, and is considered 'referable' under the provisions of the Water Act 2000. Also any dam assessed as having two or more people at risk in the event of a dam failure will be regulated through dam safety conditions applied under the Water Supply (Safety and Reliability) Act 2008 ▪ *Environmental Protection Act 1994* - Code of Environmental Compliance for Environmental Authorities for High Hazard Dams Containing Hazardous Waste – the Minister, pursuant to section 549, of the Environmental Protection Act 1994 has approved the standard environmental conditions contained in this Code. **Procedures, policies and plans** **DERM** *Policy-* • *Requiring A Dam to be Failure Impact Assessed - Provide a framework for deciding whether a dam should be required to be failure impact assessed under s.483(2).* • Requiring a Dam to be Failure Impact Assessed - Provide a framework for deciding whether a dam should be required to be failure impact assessed under s.483(2). • Issuing an emergency powers compliance notice for a referable dam - A framework for using emergency powers, issuing emergency powers compliance notices and taking action to prevent failure of referable dams. • Flood mitigation manual for a dam *Information Sheets* – DERM • Planning your farm dam • Farm dam construction • Gully dams—estimating earthworks and storage volumes • Wild rivers - Guide for self-assessable stock and domestic dams	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		• Regulation of Referable Dams • Referable Dams and Development Permits • Overland flow water • Construction of new works for taking overland flow water **Programs and grants**	
	Standards of existing dam maintenance	**Legislative framework** ▪ Referable Dams - Regulation of dams that would, in the event of failure, put population at risk – *Water Supply (Safety and Reliability) Act 2008 (*Regulation of Dam Flood Mitigation Manuals and Development of Emergency Action Plans for referable dams and interaction with emergency planners ▪ Management of conditions relating to dam safety including applying for and changing of safety conditions **Procedures, policies and plans** **Programs and grants**	Gap: Absence of knowledge about dams that fall under the referrable category but that could still cause community impact. There have been a number of instances in recent years of threatened collapses in smaller dams that were not known about ▪ Policy - Requires amendment for a flood mitigation manual for a dam – under development
	Reservoir operation rules	**Legislative framework** **DERM** ▪ Referable Dams - Regulation of dams that would, in the event of failure, put population at risk – *Water Supply (Safety and Reliability) Act 2008 (*Regulation of Dam Flood Mitigation Manuals and Development of Emergency Action Plans for referable dams and interaction with emergency planners **Procedures, policies and plans** **Programs and grants**	Dam safety issues are addressed under the WS (S&R) Act 2008.
	Contingency planning or emergency procedures for dam failure	**Legislative framework** **DERM** ▪ Referable Dams - Regulation of dams that would, in the event of failure, put population at risk – *Water Supply (Safety and Reliability) Act 2008 (*Regulation of Dam Flood Mitigation Manuals and Development of Emergency Action Plans for referable dams and interaction with emergency planners	Dam safety issues are addressed under the WS (S&R) Act 2008.

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		Procedures, policies and plans ▪ Dam Break Plans – DCS hold authorised copies and provide coordinating support activity in the event of activation (at both regional and state level). EMQ role is to ensure they are prepared in association with the Local Disaster Management Groups. **Programs and grants**	
	Role in coordinating water discharge with flood management authorities and downstream communities	**Legislative framework** **DERM** ▪ Referable Dams - Regulation of dams that would, in the event of failure, put population at risk – *Water Supply (Safety and Reliability) Act 2008 (*Regulation of Dam Flood Mitigation Manuals and Development of Emergency Action Plans for referable dams and interaction with emergency planners **Procedures, policies and plans** **Programs and grants**	There is some provision in the WS(S&R) Act for the approval of flood mitigation manuals which set out rules for reservoir operation. This provision currently only applies to three major south east corner dams
Landslide	Role in reducing likelihood of mudslides or landslides with floods	**Legislative framework** **DIP** ▪ State Planning Policy 1/03 – This SPP sets out the State's interest in ensuring that the natural hazards of flood, bushfire and landslide are adequately considered when making decisions about development. The SPP has effect when development applications are assessed, when planning schemes are made or amended and when land is designated for community infrastructure. Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on Hazard Management Areas – Flood and these in turn rely on good flood data modelling ▪ Standard Building Regulation 1993 -the assessment manager is required, when applicable, to impose conditions necessary for management on the development approval for building work carried out anywhere within an erosion prone area. Section 30A – Conditions for building work in an erosion prone area; S52 – Earthworks and retaining walls; S53 – Land liable to flooding – a local government, by resolution, may declare (a) land to be liable to flooding (including tidal surge or sewerage discharge).	

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		DERM ▪ *Vegetation Management Act 1999* (VMA) – *Section 10A* - The Minister may make an interim declaration of, or prepare a declaration of, an area to be an area vulnerable to land degradation only if the Minister considers the area is subject to 1 or more of the following— (a) soil erosion; (b) rising water tables; (c) the expression of salinity, whether inside or outside the area; (d) mass movement by gravity of soil or rock; (e) stream bank instability; (f) a process that results in declining water quality. ▪ Regional Vegetation Management Codes under the VMA – regulate clearing in watercourses and regulate clearing in a way that does not cause land degradation including erosion and mass movement. **DT&MR** ▪ Road Drainage Design Manual provides guidance in relation to the planning, design, construction, maintenance and operation of road drainage structures in all urban and rural environments for Main Roads, Queensland. Chapter 5 is designed to assist contractors in managing drainage and preventing erosion and sedimentation whilst undertaking road or drainage works. This is achieved by preparing and implementing Erosion and Sediment Control Plans. **Procedures, policies and plans** **Programs and grants**	
Coastal protection (relating to the marine coast or large inland lakes)	Construction, operation and maintenance of coastal protection works	**Legislative framework** **DIP** *Sustainable Planning Act 2009* **DERM** *Coastal Protection and Management Act 1995* **Procedures, policies and plans** The State Coastal Management Plan (as required by the *Coastal Protection and Management Act 1995*) outlines directions for effective protection and management of the coastal zone.The Plan has the effect of a State planning policy under the *Sustainable Planning Act 2009*. • 2.1.4 Canals and dry land marinas - In the past, adverse impacts from the development of canals and dry land marinas have included: ... increased tidal volumes and associated erosive actions of tidal waters; increased risk of flooding due to loss of flood storage or increase in peak flood levels. Policy - further	**Comments** ▪ Mainly for erosion **Current relevant projects** ▪ The Coastal plan and associated new SPP

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		development of canals and dry land marinas should proceed only if it does not adversely affect coastal resources and their values, in particular if it does not contribute to: (b) an increased risk of flooding. • 2.2 Physical coastal processes - Coastal management outcome - The coast is managed to allow for natural fluctuations to occur, including any that occur as a result of climate change and sea level rise, and provide protection for life and property. **Principles 2A** Trends in climate change including sea level rise, more extensive storm tide flooding and associated potential impacts are taken into account in planning processes. **2B** Erosion prone areas which exist on open coasts and along tidal waterways are secured and maintained largely free from development. **2C** The consequences of physical coastal processes are recognised and such processes generally are allowed to occur naturally. **2D** Risks associated with all relevant hazards including storm tide inundation and cyclone effects are minimised. **2E** The natural topography and physical features of coastal dune systems which provide adjacent areas with protection from inland erosion are to be protected and managed on an ecologically sustainable basis. • *2.2.4 Coastal hazards*- Coastal hazards include events such as storm tides, cyclone effects and related inundation – *Policy:* When determining new areas for urban land uses on the coast, an evaluation is to be carried out to identify the level of potential risk to life and property from coastal hazards. This evaluation should be based on mapping of storm tide hazard areas in addition to considering the impact of physical coastal processes, including any impacts from potential sea level rise. Development in areas on the coast identified as having a risk9 of being affected by coastal hazards needs to be carefully considered and wherever possible, be retained undeveloped. Where areas vulnerable to storm tide inundation have been developed, further development in these areas needs to address: its vulnerability to sea level rise and storm tide inundation; and u the proposed access to and protection of evacuation routes. In such areas, local government should have in place counter-disaster plans to address these coastal hazards. • *2.8.2 Coastal wetlands* - are a vital element of coastal areas and are valued for a wide range of ecological, economic and cultural reasons. Some wetlands provide coastal protection against destructive natural events such as cyclones and storm tide	

Not Government Policy

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		inundations and contribute to flood mitigation. Policy - Further loss or degradation of coastal wetlands is to be avoided and impacts on coastal wetlands prevented, minimised or mitigated. ▪ Mitigating the Adverse Impacts of Storm Tide Inundation – – The assessment manager must consider the State Coastal Planning Policy 2.2.4 (DERM) ▪ Guidance Note - Mitigating the Adverse Impacts of Storm Tide Inundation (DERM)	
	Rights of construction on foreshore/ Integration of flood risk considerations in the construction of foreshore/coastal works	**Legislative framework** **DERM** ▪ *Land Act 1994* - Before making a decision to allocate tenure to land in the coastal zone, a land planning evaluation must be carried out in accordance with section 16 of the Act. Allocating Most Appropriate Use and Tenure of State Land in Coastal Areas PUX/952/096 - In both urban and non-urban coastal areas, USL should not be allocated to HWM for private use although consideration may be given to the allocation of USL to HWM for a project of State significance. ▪ *Coastal Protection and Management Act 1995* - A coastal building line is used to regulate building work within the coastal management district. For development applications involving building work on land that is completely or partly seaward of a coastal building line declared under the *Coastal Protection and Management Act 1995* the applicant is required under the *Sustainable Planning Act 2009* to refer the application to DERM as a concurrence agency. The *Coastal Protection and Management Regulation 2003* fixes the existing setback lines established under the repealed *Beach Protection Act 1968* as the coastal building lines for relevant coastal management districts. ▪ *Coastal Protection and Management Act 1995* - (s69) (1) A person must not damage vegetation on State coastal land without written approval... or lawful authority. ▪ An erosion prone area is declared under the Coastal Act to be an area within the coastal zone that may be subject to erosion or tidal inundation (s70(1)). Under the *Standard Building Regulation 1993* (s30A), for a development application for building work in an erosion prone area, the assessment manager must impose certain	**Current relevant projects** ▪ The Coastal plan and associated new SPP

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		conditions on a development approval for the application: (1) all material excavated from land for the building work must be stabilised against wind erosion (2) stormwater and roof water drainage systems must not be erected or altered in a way that is likely to cause erosion. **DIP** *Sustainable Planning Act 2009* **Procedures, policies and plans** **Programs and grants**	
3 - Environmental, natural resource and health planning relating to flood			
Water resources use/management settings	Catchment approach to water resources management	**Legislative framework –** **DERM** ▪ *Water Act 2000, - Broad management powers of water* • *s.19 -_ "All rights to the use, flow and control of all water in Queensland are vested in the State* Interest in • *"take and interference with water"* • *management of "overland water flow"* • *riverine protection* ▪ *River Improvement Trust Act 1940*,- Catchment management where declared* ▪ *Wild Rivers Act 2005 – Management of rivers or catchments where declared* ▪ *NB: other Acts and agreements have modifying effects on allocation of water or the management of rivers (e.g. Queensland Nickel Agreement Act, Cape York Peninsula Heritage Act 2007)* **Procedures, policies and plans –** **DERM** ▪ *Water Resource Planning (WRP) (environmental flow objectives and water allocation security objectives),* ▪ *Resource Operation Plans, (ROP),* ▪ *Water Use Plans (WUPs)* ▪ *Wild river declarations* ▪ *Queensland Wetlands Program: guidelines for wetland delineation, wetland buffer guidelines* ▪ *Urban development policies*	**Comments** ▪ There is effectively no catchment approach to flood management ▪ There is a catchment approach for water resource management but not for flooding ▪ There is no catchment approach to floodplain management ▪ DERM provides advice to other Queensland Government agencies and local government regarding floodplain management, although this is ad hoc ▪ Poor integration of flood management into Water Management regime (other than the broad management of the beneficial effects of flooding eg overland flow etc.) ▪ Where overland flow is managed in some catchments; there is a catchment based flood management approach, but this is from the perspective of water available for use not flood risk * Note Government Response To Webb / Weller Report 2009– The River Improvement Trusts should be abolished and their functions transferred or incorporated into

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		Programs and grants **DERM** Regional water supply strategies Queensland Government's *Water sector action plan* DERM administers the following Grant Programs - • *The Caring for our Country initiative* • *Reef Rescue* • *Queensland complementary program*	local governments, with all responsibilities and powers required to undertake their activities. Qld Government supports the transfer and retention by local government. Further detailed consultation will be undertaken prior to implementation.
	Integration of surface and groundwater management (as it relates to flood events)	**Legislative framework –** **DERM** ▪ Water Act 2000 ▪ Declared groundwater areas are listed in Schedule 11 of the Water Regulation 2002 ▪ Groundwater management areas can be identified in a water resource plan **Procedures, policies and plans –** **DERM** Water Resource Planning (WRP) – (not in all cases) ▪ Resource Operation Plans, (ROP) – (not in all cases) **Programs and grants** **Other** **DERM** ▪ *Water Act 2000* - Provisions for Water Authorities Chapter 4 –Provides a framework for the establishment and operation of water authorities. Water activity, for a water authority, includes an activity for the following— (a) water conservation; (b) water supply; (c) irrigation; (d) drainage, including stormwater drainage; (e) flood prevention; (f) floodwater control; (g) underground water supply improvement or replenishment; (h) sewerage; (i) anything else dealing with water management.	**Comments** ▪ Interest potentially only in declared groundwater areas and areas identified in a water resource plan ▪ DERM is looking at integration of SW and GW for water management – but this is not achieved yet. This would probably be relevant with respect to flood in the context of beneficial flooding. ▪ Poor integration of surface and groundwater management in some areas as it relates to flood (NB – importance of flooding for the recharge of some aquifers) Note Government Response To Webb / Weller Report 2009– The Category 2 Water Boards should be abolished and their responsibilities transferred to local governments, which should have the flexibility to determine between delivering local water services themselves, delegating them to local boards or using alternative (non-government) institutional arrangements, such as establishing local cooperatives or incorporated associations. – Qld Government supports in principle. Further detailed consultation with affected local governments will need to be undertaken. Will take some time to determine which institutional arrangement is appropriate having

Not Government Policy

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		At present there are 68 Water Authorities which includes - ▪ 14 Drainage Boards – which provide a co-ordinated drainage system for the removal and disposal of excess water from agricultural lands ▪ 9 Irrigation Boards – Which supply water for irrigation purposes to landholders in the Board's area ▪ 1 Bore Water Board – for the Supply of Bore Water ▪ 26 Surface Water Boards – for stock and Domestic Use ▪ 2 - North Burdekin Water Board and South Burdekin Water Board – replenish subterranean water for irrigation, domestic, stock & industrial purposes. ▪ 16 River Improvement Trusts	regard to local circumstances, amend legislation etc.
	Pollution/discharge control provisions during floods	**Legislative framework** **DERM** ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB* amends the *Environmental Protection Act 1994)* - This legislation is a mix • of strict controls on farm chemicals and regulations to improve farming practices. Under the new Act; o Sugarcane farmers and graziers in the Mackay-Whitsunday, Burdekin Dry Tropics and Wet Tropics must apply no more than the optimum amount of fertiliser to their soil. They must also keep annual records on soil testing results and their use of chemicals and fertilisers. o These farmers must follow —a range of new controls and restrictions for the pesticides atrazine, diuron, ametryn, hexazinone and tebuthiuron. o Property owners whose —activities are considered high risk to the reef will be required to prepare and implement environmental risk management plans showing how they are improving their practices as necessary to achieve a standard compatible with reef health. • *Environmental Protection Act 1994* **Environmental Risk Management Plan (ERMP)** - Section 88 of the new reef protection measures included in the *Environmental Protection Act 1994.* An ERMP is a property	**Comments** ▪ Ensham Resources Mine dam safety for water supply and tailings dam ▪ This is managed for local government systems (e.g. sewage) but perhaps not for others (e.g. mines) **Relevant current projects**

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		plan that specifies management actions aimed at reducing the risk of sediment, fertiliser and chemicals leaving farm properties and entering the waters of the Great Barrier Reef. Sugarcane farmers with more than 70 hectares in the Wet Tropics catchment or graze cattle on more than 2000 hectares in the Burdekin Dry Tropics, by30 September 2010 must prepare and submit an ERMP **Procedures, policies and plans** **Reef Water Quality Protection Plan** The Australian and Queensland Governments have developed the Reef Water Quality Protection Plan (Reef Plan) to address water quality of catchments discharging to the Reef lagoon. The Reef Plan aims to halt and reverse the decline in water quality entering the Reef lagoon, especially as it relates to excess sediment, nutrient and pesticides. The Reef Plan contains strategies and actions to address catchment land uses, building on existing Australian, state, regional and local government programs. A key part of Reef Plan is coordinating existing and planned water quality monitoring to contribute to the setting of water quality targets, based on the best available science. Monitoring and predictive modelling will be used to evaluate the effectiveness of catchment, regional and Reef-wide activities in achieving Reef Plan objectives. To this end the Reef Water Quality Partnership will: ▪ support the development of science-based targets; ▪ coordinate water quality monitoring and predictive modelling activities; and ▪ develop a Reef and catchment reporting system. **Programs and grants** **Reef Water Quality Partnership** Established to improve coordination and collaboration between governments and regional natural resource management (NRM) bodies to improve water quality entering the Reef. The Reef Water Quality	

Not Government Policy

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		Partnership members include Australian and Queensland Government agencies and the regional NRM bodies of the Reef catchments. The Reef Water Quality Partnership also seeks close collaboration with industry in implementing management solutions. **Australian Government partners** include: the Department of the Environment and Water Resources, Department of Agriculture, Fisheries and Forestry, and the Great Barrier Reef Marine Park Authority. **Queensland Government partners** include: Department of Natural Resources and Water, Environmental Protection Agency, Department of Primary Industries and Fisheries and the Department of the Premier and Cabinet. **Regional NRM Body partners** include: Terrain Natural Resource Management, Burdekin Dry Tropics NRM, Fitzroy Basin Association, Mackay Whitsunday NRM Group and the Burnett Mary Regional Group for NRM. **Caring for Country Grant Program** - Caring for our Country is the way the Australian Government funds environmental management of our natural resources. Caring for our Country supports communities, farmers and other land managers protect Australia's natural environment and sustainably produce food and fibre. **Reef Rescue** - objective are to improve the water quality of the Great Barrier Reef lagoon by increasing the adoption of land management practices that reduce the run-off of nutrients, pesticides and sediments from agricultural land. An investment of $200 million over five years will be available to Queensland farmers, agricultural, tourism, fishing and aquaculture industries, Indigenous communities, conservation groups, research organiser's actions that protect the Great Barrier Reef. Reef Rescue is made up of five integrated components: ▪ Water Quality Grants ($146 million over five years) ▪ Reef Partnerships ($12 million over five years) ▪ Land and Sea Country Indigenous Partnerships ($10 million over five years)	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Reef Water Quality Research and Development ($10 million over five years) ▪ Water Quality Monitoring and Reporting, including the publication of an annual Great Barrier Reef Water Quality Report Card ($22 million over five years) **Reef Wise** The Qld Government program that supports the *Great Barrier Reef Protection Amendment Act 2009* **DERM** ▪ Reef water quality Queensland the Smart State Protection Plan: For catchments adjacent to the Great Barrier Reef World Heritage Area ▪ Water quality monitoring in Great Barrier Reef catchments 2007 **Other** **DERM** ▪ A study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin, April 2009 ▪ Review of Fitzroy River Water Quality Issues November 2008 - completed	
	Authorisation of hydrological works	**Legislative framework** **DERM** ▪ Water Act 2000 & Sustainable Planning Act 2009 – Take and interference with water ▪ Water Regulation 2002 ▪ *Water Act 2000* & *Sustainable Planning Act 2009* - Flood mitigation and operational works in drainage and embankment (regulated to extent of these acts) ▪ *Transport Infrastructure Act 1994* (s39)Diversion and construction of watercourses to carry out road works **Procedures, policies and plans** **DERM** ▪ Self-assessable development of water-related works according to the codes stated under s. 62 of the Water Regulation 2002 ▪ SPA- Under this Act, assessable development includes: ▪ Works that take or interfere with water in a watercourse, lake or spring (e.g. pump, gravity diversion, stream redirection, weir or	**Comments** ▪ No clear responsibilities except for where work is in a managed groundwater area, a watercourse or for Referable Dams but not from a flood management perspective

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		dam) ▪ artesian bores anywhere in the state ▪ subartesian water bores used for stock or domestic purposes in certain declared subartesian areas ▪ subartesian bores used for purposes other than stock or domestic use in declared subartesian areas. **Programs and grants**	
	Prioritisation of various water uses	**Legislative framework** **DERM** ▪ *Water Act 2000,* **Procedures, policies and plans** **DERM** ▪ Water Resource Planning (WRP) (environmental flow objectives and water allocation security objectives), ▪ Resource Operation Plans, (ROP), **Programs and grants**	**Comments** ▪ This is DERM (resource management) core business (as far as water taken directly from the natural resource in water resource management areas)
Sewerage/drainage provision	Integration of basin flood risk in drainage planning/design	**Legislative framework** **DERM** ▪ *Soil Conservation Act 1986* – (Can effect drainage on agricultural land) **Procedures, policies and plans** **DERM** ▪ Queensland Urban Drainage Manual (QUDM) –second edition 2007 ▪ Total water cycle management i.e. provision of water supply from treated stormwater sources **Programs and grants** **DERM** ▪ Preparation of the State Planning policy Healthy Waters and remake of the Environmental Protection (Water) Policy dealing with stormwater quality management, WSUD etc ▪ Determination and scheduling Environmental values and Water Quality objectives ▪ Development and implementation of water quality improvement plans, e.g. SEQ Healthy Waterways Strategy, in partnerships ▪ Contribution to regional NRM Plan regarding wetlands and	**Comments** ▪ *Soil Conservation Act* is limited to the conservation of soil resources and to facilitate the implementation of soil conservation measures by landholders for the mitigation of soil erosion. Where it does apply it is usually in rural settlings. In certain circumstances it can control or directing run-off water flow ▪ *Soil Conservation Act* is geographically limited in it's application ▪ Planning is for sewage schemes only. ▪ This varies. Primarily a local government responsibility and varies from jurisdiction ▪ Integrated basin approach is promoted in QUDM ▪ Total water cycle management – provision of water supply via treated stormwater implemented via the SEQ Water Strategy and Queensland Development Code i.e. stormwater supply infrastructure in greenfield development sites.

Not Government Policy

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		waterways ▪ Secretariat support for the CEOs Committee for NRM in SEQ and its Working Group on urban stormwater quality management.	
	Location of sewage treatment plants on flood plain/prevention of flooding of infrastructure	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DIP** State Planning Policy 1/03 (SPP) **Programs and grants**	**Comments** ▪ Variable. Primarily a local government responsibility and varies from jurisdiction ▪ SPP has provision for future works only ▪ Where SPP 1/03 is fully integrated into local government planning schemes new development should be well controlled. However, SPP1/03 relies on Hazard Management Areas – Flood and these in turn rely on good flood data modelling
Quarry and dredging	Quarry and dredge in riverine ecosystems	**Legislative framework** **DERM** ▪ *Water Act 2000* - criteria and code assessment ▪ *Sustainable Planning Act 2009* - Quarry material allocation notices (authorisation to access a share of the state's resource) Note- DERM is SPA's assessment manager (if quarry is not called up in a planning scheme as assessable development or part of a larger development that requires material change of use) **Procedures, policies and plans** **DERM** ▪ Guidelines ▪ Management plans **Programs and grants**	**Comments** ▪ Floodplain quarrying/dredging can be an Environmentally Relevant Activity and is not covered by the Water Act, which covers only quarrying in a watercourse or lake ▪ Some gaps for dredging and sandmining ▪ In a watercourse/lake this is generally well managed under the Water Act. Flood is considered broadly and mainly from a stream integrity point of view. ▪ Need to address the community perception that dredging a river will lead to flood mitigation – this is not supported by science ▪ Also quarrying under the Forestry Act
Land use/management	Spatial and land use planning to include flood considerations	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009 (SPA)* A State interest can be communicated through one or a combination of State planning instruments. These State planning instruments are: - regional plans; - State planning regulatory provisions; - standard planning scheme provisions; and - State planning policies.	**Comments** ▪ Some local governments may not have plans and there is no consistent approach across the state ▪ SPP 1/03 only applies when triggered (eg new works, change of material use etc) and therefore deals with future risk. Existing and residual risk are not managed

Not Government Policy

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		Key Flood Planning Tools - State Planning Policy 1/03 on Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03) - Statutory Regional Plans In Operation o South East Queensland Regional Plan 2009-2031 o Far North Queensland Regional Plan 2009–2031 o South West Regional Plan In preparation o North West regional plan - Draft Regional Plan out for comment, June 2009 o Central West regional plan; Draft Regional Plan out for comment, August 2008 o Maranoa and Districts regional plan - Draft Regional Plan out for comment, August 2008 **DERM** ▪ *Land Act (1994)* ▪ Planning Schemes of Local Government Bodies - DERM gives 3rd party / technical advice for floodplain management issues ▪ State Planning Policy 1/03 Mitigating the adverse impacts of flood, bushfire and landslip - DERM gives 3rd party / technical advice for floodplain management issues *Codes* • Code for self-assessable development for taking overland flow water using limited capacity works • Code for self-assessable development for taking overland flow water for stock and domestic purposes • Code for self-assessable development for taking overland flow water to satisfy the requirements of an environmental authority or a development permit for carrying out an environmentally relevant activity • Code for self-assessable development for taking overland flow water using limited capacity works • Code for assessable development for operational works for taking overland flow water	▪ There is no auditing of plans ▪ These need to incorporate climate change projections into planning ▪ SPP 1/03 does not address existing developments below 1:100 year flood levels. (eg some of the existing developed areas are below 1:20 year, 1:50 year flood levels) ▪ This is only partly managed – i.e. where flood information already exists. Therefore State needs to drive improvement in flood information, quality, coverage and availability. Note – SPP 1/03 is presently under review.

Not Government Policy

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		Procedures, policies and plans **DIP** ▪ *SPP 1/03 Guideline* ▪ *Non-statutory regional plans* o Central Queensland (CQANM); o Eastern Downs (EDRPAC); o Gulf Region (GRDP); o Townsville-Thuringowa; o Whitsunday, o Hinterland and Mackay (WHAM); o Wide Bay-Burnett. **DERM** *(oversight)* ▪ *Regional NRM Planning* Regional NRM groups promote sustainable NRM through community-based processes and activities. They deal with many issues including land and water management, biodiversity, agricultural practices and regional development. They often provide mapping and planning support to landholders. Most groups support existing industry-led programs within their regions and have specific partnership programs to assist different sectors. Each NRM group has a different name for their regional land management planning program—Planscapes (South West NRM), Neighbourhood Catchments (Fitzroy Basin Association), Water Quality Improvement Plans etc Regional NRM plan and accompanying investment strategy for the following areas - Burdekin Dry Tropics - Burnett Mary Region - Condamine catchment - Desert Channels catchment - Fitzroy Basin - Mackay Whitsunday Region - Northern Gulf Region - Queensland Murray-Darling catchment - SEQ Catchments	<u>Regional NRM Plans</u> Regional plans identify the regions' major NRM issues and ways of addressing them, including land and water management, biodiversity and agricultural practices. They also outline the contributions that all involved groups will make. Regional investment strategies provide details on the specific actions, costs and timeframes that are required to implement a regional plan and achieve targets.

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		- Southern Gulf Catchments - South West Region - Wet Tropics Region - Torres Strait **DSC** ▪ State and local hazard profiles (DCS review compile and manage) ▪ Disaster Resilience Australia Package_ (DCS is Qld representative) **DERM** ▪ *Delbessie Agreement* ▪ *Land Management agreements* ▪ *Land Condition assessment* ▪ *Property Planning* ▪ *Aquatic Conservation Assessments* **Other Industry Plans (Industry)** ▪ Queensland Primary Industries and Fisheries (QPIF), Department of Employment, Economic Development and Innovation has a property planning support initiative (Property Management Systems Initiative or PMSI) that is assisting some industries develop and implement their FMS programs. ▪ Catchment-based programs • Mary River Catchment PMSI - This is a program specific to the middle Mary and Kin Kin sub-catchments. It assists with the uptake of property management systems for a range of industries and incorporates best practice implementation. ▪ Cotton - Cotton Best Management Practices (Cotton BMP) ▪ Dairy - Dairying Better 'n' Better for Tomorrow ▪ Forestry – • Forest production property management plan • Farm forestry program - ▪ Grains - Grains Best Management Practices (Grains BMP) ▪ Grazing, meat and livestock • Grazing Land Management (GLM) • Stocktake • Making more from sheep • Going into goats.	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Horticulture - • Growcom Farm Management System (FMS) (under Land and Water project) • Nursery Production FMS • Turf and Flower FMS. ▪ Organics – • Organic farm management • Organic certification. ▪ Sugarcane - • BMP booklets produced as a reference for cane growers and advisors • good practice tools designed specifically for cane growers. • Three regional PMSI projects are assisting FMS implementation in the cane industry: ▪ Isis Canegrowers ▪ Reef Catchments (O'Connell River & Bakers Creek—Mackay Whitsunday Region) ▪ The Lower Burdekin.	
	Integration with water resource planning	**Legislative framework** **DERM** *Water Act 2000* **Procedures, policies and plans** **DERM** ▪ Water Resource Planning (WRP) (environmental flow objectives and water allocation security objectives), ▪ Resource Operation Plans, (ROP), ▪ Water Use Plans (WUPs) **DIP** ▪ Statutory Regional Planning (through SPA) **Programs and grants**	**Comments** ▪ Many players ▪ Water Act provides for Water use and land and water management plans – not normally related to floodplain management ▪ Water planning and Land Use Planning is poorly integrated ▪
	Land use practices that increase/decrease flood peaks	**Legislative framework** ▪ *Soil Conservation Act 1986* – limited to drainage ▪ *Water Act 2000* ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB amends the Environmental Protection Act 1994) – (see 1c above for details)* ▪ *Vegetation Management Act 1999 – manages clearing of native*	**Comments** No integrated process to manage land use practices at a catchment level except water use plans and land and water management plans in water resource plan areas

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		vegetation which has a direct impact on run off. **Procedures, policies and plans** **DERM** ▪ Land and Water Management Plans under the Water Act ▪ Guidelines for Land and Water Management Plans ▪ *Regional NRM Planning (see 4a above for details)* **Programs and grants**	
	Land use practices that exacerbate/mitigate pollution caused by flooding (for example, storage of chemicals, use of pesticides/other compounds, slurry disposal)	**Legislative framework** **DERM** ▪ *Environmental Protection Act 1994* ▪ *Environmental Protection Regulation 1998 regulates the storage of chemicals other than crude oil, natural gas and petroleum products* ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB amends the Environmental Protection Act 1994) – (see 1c above for details)* ▪ *Water Act* – section 273 allows for a notice to be given to a person to remove litter, refuse or a matter that has or would significantly impact on the quality of water in a watercourse lake or spring. This power extends to any land that is, out onto the floodplain. **JAG** ▪ Safe Storage and Handling of dangerous Goods: Guidelines for Industry – Dec 2001 – under the *Dangerous Goods Safety Management Act 2001* and Dangerous Goods Safety Management Regulation 2001 ▪ Store Above Flood Levels –"As most dangerous goods and combustible liquids are hazardous to the environment, areas where they are stored and handled should as far as practicable be above recorded flood levels. Where this is not practicable, the dangerous goods and combustible liquids should be in closed, impervious containers that are appropriately restrained. Consultation with local government." **Procedures, policies and plans** ▪ Australian Dangerous Goods Code 7th Edition - National Transport Commission - detailed technical specifications, requirements and recommendations applicable to the transport of dangerous goods in Australia by road and rail.	**Comments** ▪ GBR Act- re chemicals ▪ Lack of compliance activity and enforcement of licences ▪ ERA licences (e.g. chemical storage) – the approvals are often based on the land zoning as set by the local government. Therefore the quality of the local area plans influences the decision
Irrigation	Role of irrigation/drainage	**Legislative framework** **DERM**	**Comments**

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Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
	institutions in flood alleviation efforts	▪ Water Act - Chapter 4 - Provisions for Water Authorities including • Drainage Boards - To provide a co-ordinated drainage system for the removal and disposal of excess water from agricultural lands. • Irrigation Boards - To supply water for irrigation purposes to landholders in the Board's area. **DIP** *Local Government Act 1993* - Chapter 13 Local government infrastructure - Part 7 deals with Stormwater drainage **Procedures, policies and plans** **DERM** Land and Water Plans **Programs and grants**	▪ These institutions have a role but believe only localised works should be on interest to them
Nature conservation/ environmental protection/sites of special interest	Protection of sites of special natural or archaeological interest – integration with flood planning	**Legislative framework** **DERM** ▪ *Nature Conservation Act 1992*, the *Nature Conservation (Administration) Regulation 2006*, *Nature Conservation (Protected Areas Management) Regulation 2006* and *Nature Conservation (Protected Areas) Regulation 1994* -protect land and wildlife in Queensland. Under the Act, areas which represent Queensland's biological diversity, outstanding natural and cultural features and wilderness can be declared protected areas. ▪ *Queensland Heritage Act 1992* & Queensland Heritage Regulation 2003 ▪ *Aboriginal Cultural Heritage Act 2003* & *Torres Strait Islander Cultural Heritage Act 2003* ▪ *Coastal Protection and Management Act 1995* **DIP** ▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DERM** ▪ Master Plan for Queensland's Parks system ▪ Queensland Urban Drainage Manual – second edition 2007 - The primary aim of an urban stormwater management system	**Comments** Patchy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		is to ensure stormwater generated from developed catchments causes minimal nuisance, danger and damage to people, property and the environment. ▪ Coastal Management Policies and Guidelines o Draft Queensland Coastal Plan - Draft State Policy Coastal Management - prepared under the *Coastal Protection and Management Act 1995*. The purpose of the draft management policy is to provide policy direction and guidance on managing coastal land in Queensland in line with the objectives of the Coastal Act. The Draft State Policy Guideline Coastal Management (draft management guideline) provides advice on how to implement the draft management policy. o Draft State Planning Policy Coastal Protection - protects the coastal resources of the coastal zone by setting out criteria for land-use planning and development assessment— enabling Queensland to manage development within the coastal zone including land below tidal waters. This aims to satisfy, in part, the objectives of the *Coastal Protection and Management Act 1995*. o Draft State Policy Guideline Coastal Management - provides information and advice on interpreting and implementing the Draft State Policy Coastal Management (draft management policy). o Draft State Planning Policy Guideline Coastal Protection - seeks to reduce risks to the community from coastal hazards, taking into account the likely effects of climate change. Coastal hazards refer to coastal erosion, permanent inundation by the sea due to sea level rise, and storm tide inundation. o Draft Queensland Coastal Plan Draft Guideline Coastal Hazards - provides advice and information about the methodology used to determine coastal hazard areas under the Draft Queensland Coastal Plan— incorporating the Draft State Policy Coastal Management and Draft State Planning Policy Coastal Protection	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		Programs and grants	
	Use of wetlands as floodwater retention areas	**Procedures, policies and plans** **DERM** • Queensland Urban Drainage Manual – second edition 2007 • Draft Coastal Management Policies and Guidelines (see above) • SPP for wetlands **Programs and grants**	**Comments** ▪ DERM has wetland mapping. This is slanted towards environmental protection rather than flood mitigation
	Protection of aquatic ecosystems from pollution associated with floods	**Legislative framework** ▪ *Soil Conservation Act 1986* – limited to drainage ▪ *Water Act 2000* ▪ *Environmental Protection Act 1994* ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB amends the Environmental Protection Act 1994) – (see 1c above for details)* ▪ *Vegetation Management Act 1999 – manages clearing of native vegetation and buffer strips which has a direct impact on run off.* *NB- Great Barrier Reef Protection Amendment Act 2009* and supporting implementation package. This regulatory intervention aims to minimise the impact of diffuse source agricultural pollution affecting the Great Barrier Reef. Cane and grazing operations occurring on floodplain areas that are caught by the regulation may contribute positively (as a default outcome) to flood management through optimum application of best practices – e.g. practices that encourage greater soil stability, prevent massive sediment movement/loss during flood events and minimise risks to infrastructure – roads, bridges etc. **Procedures, policies and plans** **DERM** ▪ *Reef Water Quality Protection Plan (see 1c)* **Programs and grants** **DERM** ▪ *Great Barrier Reef Protection supporting implementation package including -* ▪ Reef Water Quality Partnership ▪ Australian Government partners	**Comments** ▪ This is patchy **Relevant current projects** ▪ DERM/DEED/GBRMPA is in the process of finalising a significant piece of work in the development of an integrated waterways quality monitoring framework for Queensland (shortly to be submitted to the Premier for endorsement). ▪ Part of the work for this has involved a spatial risk assessment analysis of pressures on waterways and the outputs include state-wide maps of areas at risk from both ongoing and "incident" releases into waterways. This provides the location of point sources, mining operations, etc, contributing to potential 'incidents' should flood cause over-flows. This work is being overseen by co-chairs of the Waterways Monitoring Committee

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Queensland Government partners ▪ Regional NRM Body partners ▪ Caring for Country Grant Program ▪ Reef Rescue ▪ Reef Wise (see 1c for more details) ▪ Reef water quality Queensland the Smart State Protection Plan: For catchments adjacent to the Great Barrier Reef World Heritage Area ▪ Water quality monitoring in Great Barrier Reef catchments 2007 ▪ **Other** **DERM** ▪ Water Quality Research Projects; – QScape, – SEQ Health Waterways Strategy 2007-2012; – Queensland Acid Sulfate Soils; – Water Borne Pollutants, Sources and Pathways; – Healthy Headwaters Program; – Great Barrier Reef Water Quality Protection Plan ▪ A study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin, April 2009 ▪ Review of Fitzroy River Water Quality Issues November 2008 - completed	
	Wetlands and floodplains	**Legislative framework** **DERM** ▪ *Wild Rivers Act 2005* ▪ *Water Act 2000* ▪ *Vegetation Management Act 1999* ▪ *Coastal Protection and Management Act 1995* **DIP** ▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DERM** ▪ Wild Rivers - Floodplain management areas *(Wild Rivers Act 2005 & Sustainable Planning Act 2009 (SPA))* ▪ Operational works regulated to extent specified in Water Act 2000 and SPA (wetlands in a watercourse, lake or spring)	**Comments** ▪ DERM has wetland mapping. This is probably slanted towards environmental protection rather than flood mitigation ▪ Floodplains are not really addressed ▪ Adopting a comprehensive approach to integrated water cycle management involving the infrequent high /flood flows to recharge wetlands, GW etc.

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Riverine protection ▪ Vegetation clearing in and around wetlands—code assessment ▪ *Coastal Protection and Management* - Coastal wetlands Policy - Further loss or degradation of coastal wetlands is to be avoided and impacts on coastal wetlands prevented, minimised or mitigated. ▪ **Programs and grants** **DERM** Queensland Wetlands Programme (QWP) Aquatic Conservation Assessments Attribution of wetland values and services of high ecological significance	
	Riparian management and protection	**Legislative framework** **DERM** ▪ *Water Act 2000* ▪ *River Improvement Trust Act 1940* ▪ *Wild Rivers Act 2005* ▪ *Vegetation Management Act 1999* ▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DERM** ▪ Riparian Management issues as a portfolio interest ▪ River improvement trust – DERM Oversee operation of Trusts; o Oversee Minister's works program approvals (*River Improvement Trust Act 1940*) o technical approvals (*River Improvement Trust Act 1940*) o Riverine Protection –A purpose of water planning and allocation and riverine protection include protecting water quality and protecting watercourses from degradation (S.10 *Water Act 2000*) o Riverine protection permit and water licence approvals *(Water Act 2000)* • Drainage and embankment areas - works approvals_*(Water Act 2000 & Sustainable Planning Act 2009) (*	**Comments** ▪ In some areas ▪ In Water Act but reactive and limited to within the watercourse **Current relevant projects** Review of *River Improvement Trust Act 1940*
	Overland flow	**Legislative framework** **DERM** ▪ *Water Act 2000*	

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DERM** ▪ Management of Overland Flow - Water Resource Plans *(Water Act 2000 and Statutory Plans) (DERM)* *Codes* ▪ Code for assessable development for operational works for taking overland flow water ▪ Code for self-assessable development for taking overland flow water using limited capacity works ▪ Code for self-assessable development for taking overland flow water for stock and domestic purposes ▪ Code for self-assessable development for taking overland flow water to satisfy the requirements of an environmental authority or a development permit for carrying out an environmentally relevant activity *Information Sheets* ▪ Overland flow water ▪ Construction of new works for taking overland flow water **Other** ▪ Urban Stormwater Quality Management Working Group	
Pollution control	Control of sewerage systems and polluted discharges during flood events	**Legislative framework** Waste Strategy, Environmental Protection Act **Procedures, policies and plans** **Programs and grants**	**Comments** ▪ If some properties are in flood areas the sewage treatment plant will most likely flood
	Regulations for handling and storage of hazardous substances in flood-prone areas	**DERM** ▪ *Environmental Protection Act 1994* ▪ *Environmental Protection Regulation 1998 regulates the storage of chemicals other than crude oil, natural gas and petroleum products* ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB amends the Environmental Protection Act 1994) – (see 1c above for details)* **JAG** ▪ Safe Storage and Handling of dangerous Goods: Guidelines for Industry – Dec 2001 – under the *Dangerous Goods Safety*	▪ ERA licences (e.g. chemical storage) – the approvals are often based on the land zoning as set by the local government. Therefore the quality of the local area plans influences the decision

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		Management Act 2001 and Dangerous Goods Safety Management Regulation 2001 ▪ Store Above Flood Levels –"As most dangerous goods and combustible liquids are hazardous to the environment, areas where they are stored and handled should as far as practicable be above recorded flood levels. Where this is not practicable, the dangerous goods and combustible liquids should be in closed, impervious containers that are appropriately restrained. Consultation with local government." **Procedures, policies and plans** ▪ Australian Dangerous Goods Code 7th Edition - National Transport Commission - detailed technical specifications, requirements and recommendations applicable to the transport of dangerous goods in Australia by road and rail.	
	Control of point source and non point source pollution	**Legislative framework** **DERM** ▪ *Soil Conservation Act 1986* – limited to drainage ▪ *Water Act 2000* ▪ *Environmental Protection Act 1994* ▪ *Great Barrier Reef Protection Amendment Act 2009 (NB amends the Environmental Protection Act 1994) – (see 1c above for details)* ▪ *Vegetation Management Act 1999 – manages clearing of native vegetation and buffer strips which has a direct impact on run off.* (see 1c for details) **Procedures, policies and plans** **DERM** ▪ *Reef Water Quality Protection Plan (see 1c)* **Programs and grants** **DERM** ▪ *Great Barrier Reef Protection supporting implementation package including -* ▪ Reef Water Quality Partnership ▪ Australian Government partners ▪ Queensland Government partners ▪ Regional NRM Body partners ▪ Caring for Country Grant Program ▪ Reef Rescue	**Comments** • Greater recognition of the importance of flood flows in determining aquatic ecosystem health in freshwater, estuarine and marine waters, e.g. Flood event study on the Logan/Albert catchment in SEQ in Jan. 08 • Better management of the flood plain for its beneficial use in trapping and assimilating sediment, nutrients and other contaminants during flood/overland flows. This is also a current gap in our work on water quality improvement planning • Adopting a comprehensive approach to integrated water cycle management involving the infrequent high /flood flows to recharge wetlands, GW

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Reef Wise ▪ Reef water quality Queensland the Smart State Protection Plan: For catchments adjacent to the Great Barrier Reef World Heritage Area ▪ Water quality monitoring in Great Barrier Reef catchments 2007 ▪ Preparation of the SPP Healthy Waters and remake of the EPP Water dealing with stormwater quality management, WSUD etc ▪ Determination and scheduling Environmental values and Water Quality objectives ▪ Development and implementation of water quality improvement plans, e.g. SEQ Healthy Waterways Strategy, in partnerships ▪ Contribution to regional NRM Plan regarding wetlands and waterways **Other** **DERM** ▪ Water Quality Research Projects; – QScape, – SEQ Health Waterways Strategy 2007-2012; – Queensland Acid Sulfate Soils; – Water Borne Pollutants, Sources and Pathways; – Healthy Headwaters Program; – Great Barrier Reef Water Quality Protection Plan ▪ A study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin, April 2009 ▪ Review of Fitzroy River Water Quality Issues November 2008 - completed	
	Construction of drains and flood considerations	**Legislative framework** **Procedures, policies and plans** **Programs and grants** **DERM** Queensland Urban Drainage Manual - guide for planning and design of urban stormwater systems	**Comments** ▪ Have to balance the cost design for the 5-20 year flood events
Erosion protection	Role in maintaining stable slopes and reducing flood risk	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* • *Standard Building Regulation 1993* – (see above) **DERM**	

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		• *Vegetation Management Act 1999* – (see above) • Regional Vegetation Management Codes under the VMA – (see above) **Procedures, policies and plans** **Programs and grants**	
	Role of cultivation of particular flora for slope stability/water retention capacity	**Legislative framework** **Procedures, policies and plans** **DERM** ▪ Regional NRM Plans **Programs and grants** ▪ Caring for Country Grant Program	
Environmental Impact assessment/ Strategic environmental Assessment	Flood considerations included?	**Legislative framework** • Environmental Impact Assessments are required for environmentally relevant activities under the o *State Development and Public Works Organisation Act 1971* **DIP** o the *Nature Conservation Act 1992,* **DERM** o *Marine Parks Act 1982,* **DERM** o *Environmental Protection Act 1994.* **DERM** **Process Policies and plans** • The DERM Terms of reference for an environmental impact statement require a consideration of potential impacts and mitigation measures in relation to climate, land, water resources, and coastal environment and includes issues such as sewerage, stormwater drainage, waste management, water supply and storage, erosion and stability. **Programs and grants**	
	Developments on flood plains	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* **Procedures, policies and plans** **DIP** ▪ SPP 1/03 ▪ Local Government Plans **Programs and grants**	

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
	Incorporation of flood considerations into Strategic Environmental Assessments	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* ▪ *State Development and Public Works Organisation Act 1971* **DERM** ▪ *Environmental Protection Act 1994* **Process, policies and plans** **DERM** ▪ DERM's operational policy for licensing waste water discharge to Queensland waters provides policy advice and technical information for assessing development applications or environmental authority applications under the *Environmental Protection Act 1994*, Environmental Protection (Water) Policy 1997, *Sustainable Planning Act 2009* and *State Development and Public Works Organisation Act 1971* for environmentally relevant activities discharging residual waste water to Queensland Waters. ▪ Development assessment and approval - Design for flooding control and management is considered under DERM's development assessment and approval process *(Environmental Protection Act 1994 and Sustainable Planning Act 2009)* ▪ Regional Coastal Management Plans – DERM implement the State Coastal Management Plan's policy framework at the regional level and identify key coastal sites requiring special management within the region.	
4 - Provision and adequacy of data/information, research & modelling relating to flood			
Data	Availability of hydro-meteorological and other related data	**Legislative framework** **DERM** *Water Act 2000* **Procedures, policies and plans** *Data collection, research and modelling* **DERM** ▪ Local government flood modelling - ▪ Storm Tide monitoring network (DERM) ▪ Wave monitoring network (DERM) ▪ Coastal Science Projects (DERM) – Storm Tide Information Resource – Tropical Cyclone Storm Tide Warning - Response System	**Comments** ▪ Not in all areas ▪ This is addressed via BOM and DERM (Resource Management) data. However flood inundation mapping is patchy and poor. ▪ There needs to be the necessary spatial information on flood heights and other relevant information that can be used to develop flood models that will allow regional councils and government agencies to prepare their planning schemes and make development decisions where flooding is an issue. ▪ Reflection of flood mapping in regional plans is

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		Handbook 8th ed. – Coastal Hazard Guideline (Storm tide, Erosion, and Sea Level Rise) – Wave and storm tide assessment (primarily for the BoM and EMQ) ▪ Networks of stream gauging stations across the state (DERM) ▪ Stream data (DERM) – real time stream flow, stream height and rainfall data (Water Act 2000) – historic stream flow, stream height and rainfall data (Water Act 2000) – provide information on flood warnings to assist emergency response for a specific event on a needs basis. ▪ Point and non point source Water Quality Data – including surface water quality, sediment transport and; aquatic ecology **DERM / DCS** ▪ Qld Climate Change and Community Vulnerability to Tropical Cyclones study 2004 (partnership with BoM / DERM / DCS) **Programs and grants** **DCS (administered)** ▪ National Disaster Management Program Grants – Research Projects – Gulf Storm Tide Study – DERM project – Coastal Inundation Modelling Guideline – DERM project – Tsunami impact modelling – DERM project – Maximum Storm Tide Level Recorders Pilot – DERM project ▪ Project to assess required changes to Probable Maximum Precipitation estimates due to climate change (Joint DERM-Australian Greenhouse Office- BoM)	problematic where flood models vary from one local government area to another ▪ Currently local governments are under no statutory obligation to undertake flood studies and/or make information available to the public. However, enquiries are generally made to local governments by conveyancers in carrying out property searches ▪ Local governments have been reluctant to provide flood data in the past due to concerns that: o the information may reduce property values, leading to claims for compensation; or o if the information provided is relied upon to a person's detriment, a claim against the local government for compensation may be made. ▪ Even where data is historically accurate, it is difficult to determine the risks to individual properties from flooding with any precision. This is due to the inherent limitations of flood modelling, as well as to inaccuracies in historically recorded flood heights, topographic data, and in assumed property boundaries and the difficulty in predicting damaging peak velocities at a local scale ▪ IQMM modellers could provide modelled AEP period of record data and the delineation of the modelled floodplains for 1 in 100 year flood events
	Connections with other flood management bodies – procedures for	**Legislative framework** **DERM** Water Act 2000 (part) **Procedures, policies and plans**	**Comments** ▪ This is addressed to some extent

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
	information exchange	**Programs and grants** **Other –** Agreement between DERM and BoM on Flood Warning Data Queensland Flood Consultative Committee	
	Incorporation of climate variability and change into assessment of future flood risk	**Legislative framework** **Procedures, policies and plans** **Programs and grants** **DERM** ▪ Assess projected changes in patterns and trends of extreme weather events (DERM) ▪ Project to assess required changes to Probable Maximum Precipitation estimates due to climate change (Joint DERM-Australian Greenhouse Office- BoM) ▪ Australian Rainfall and Run-off Study **Other**	**Comments** ▪ Variable, only partially addressed – The potential effect climate change may have on rainfall and consequent floods is not well understood and may not be so for a number of years ▪ Need a more strategic input from other state governments. There is a current national guideline underway through COAG but this is a long process and we need interim measures for Queensland ▪ Only as far as guidelines such as AR&R provide **Relevant current projects** ▪ National guideline underway through COAG BoM is responsible for quantitative flood warning on major river systems. Qualitative warnings are only available for 'flash flooding' situations in minor river systems
Liability regarding data provision	Governments risk/liability in use of flood risk maps to assess policyholder's risk-including climate projections	**Legislative framework** **DIP** *Sustainable Planning Act 2009 (SPA)* **Procedures, policies and plans** **DIP** ▪ Statutory Regional Planning (through SPA) ▪ Local planning schemes – These determine a local governments planning intent for the area spanning 20 years ▪ strategic land use plan (through SPA) **Local Government** ▪ Some Local Government Flood Risk Mapping (e.g. BCC) **Industry Groups** ▪ Insurance Industry Risk Modelling and Mapping (generally not in the public domain)	**Comments** ▪ Lack of guidelines and awareness ▪ Problems with the modelling- lack of calibration ▪ There are also problems in consistency. Some plot inundations for historical floods others adopt the 1% AEP flood. Virtually no recognition of rarer flood events.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		Programs and grants **Other**	
Public awareness and stakeholder participation in decision-making processes	Authority's responsibility to raise the awareness of the population about flood hazard areas	**Legislative framework** **No Legislation** **Procedures, policies and plans** **Programs and grants** **DERM** ▪ Pre cyclone and storm season storm tide education and awareness seminars (DERM) QH ▪ Public Information – fact sheets on the health implications of flooding; alerts during flooding of health risks; and fact sheets on being prepared for flood	**Comments** ▪ Need to educate the community to plan above the 1:100 year floods and understand what a 1:100 year flood means in terms of recurrence intervals. An agency needs to take lead responsibility for this. ▪ Need education on tolerable risks
Access to information	Access to flood risk/hazard data	**Legislative framework** **DIP** ▪ *Sustainable Planning Act 2009* (SPA) - Section 724 - Documents local government must keep available for inspection and purchase: s724.1(zb) - its register of resolutions about land liable to flooding, made under the Building Act 1975; s724.1(ze)all development information it has about building development applications, other than information that may be purchased from the registrar of titles – s724.8(c)-development information, for a building development application, means information about any of the following: site characteristic information likely to affect the assessment of the application – including: flood level information, limitations on the capacity of sewerage, stormwater and water supply services; location of any erosion control districts; location of contaminated land; location of land-slip areas. **Procedures, policies and plans** **DCS** ▪ The DCS compile and manage a State and Local Hazard profile ▪ Local government flood mapping - **Programs and grants**	**Comments** The State Hazard Profile needs more work before it is a useful document for all but the most basic local planning Referable dam emergency action plans could be made publicly available Limited access to flood modelling data to Queensland State Government. Poor availability to the general public of flood data No standardised form for the presentation of flood risk data Referable dam emergency action plans are not publicly available Only a basic State flood hazard profile and no State flood risk profile Possible legal liability issues – Local Government making flood risk data available to the public No free access to data (in some cases) Consideration should be given to make referable dam

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
			emergency action plans publically available.
	Availability of hydro-meteorological data (free or not)	**Legislative framework** **DERM** ▪ *Water Act 2000* - s.36 (obtain water information) **Procedures, policies and plans** **Programs and grants** **DERM** ▪ **DERM** operates a network of over 400 stream flow gauging stations and provides real time and historic stream and rainfall data.	**Comments** ▪ There should be free access to data ▪ Data and reports published by Queensland Government generally available. (NB - There is an issue relating to the availability of data collected by some local governments however
5 - The planning and management of the beneficial aspects of flooding			
	Management of floodplains	**Legislative framework** **Procedures, policies and plans** **Programs and grants**	**Comments** ▪ Better management of floodplains with regards to trapping and assimilating sediment, nutrients and other contaminants during flood/overland flows could be achieved
6 – Other flood activities			
Rights, powers and responsibilities			
Compulsory purchase and access	Ability of authorities to purchase land for flood defence works/sacrificial areas prior to and during flood events	**Legislative framework** **DERM** ▪ *Acquisition of Land Act 1967*(**Procedures, policies and plans** **Programs and grants** ▪ Voluntary Home Purchase Scheme - Brisbane City Council allocates funding to purchase residential properties which flood the most frequently. This scheme is not a forced resumption of land and selling is the choice of the property owner	
	Access rights of authorities responsible for flood defence operation and maintenance, over private property	**Legislative framework** **DERM** ▪ *River Improvement Trust Act 1940* (***DCS*** ▪ *Disaster Management Act* 2003 **Procedures, policies and plans** **Programs and grants**	
	Rights of private property owners to	**Legislative framework** ▪ Common Law Rights	NB- Liability issues

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
	claim compensation, etc.	**DERM** ▪ *Acquisition of Land Act 1967* **DIP** ▪ *Sustainable Planning Act 2009,* Section 704 Compensation for reduced value of interest in land - (1) An owner of an interest in land is entitled to be paid reasonable compensation by a local government if— (a) a change reduces the value of the interest; Section 705- An owner of an interest in land is entitled to be paid reasonable compensation by a local government if because of a change the only purpose for which the land could be used, other than the purpose for which it was lawfully being used when the change was made, is for a public purpose.. To be entitled to make a claim for compensation however, a number of conditions must be met, and there are a number of limitations set out in section 706- Limitations on compensation The right to claim compensation is further limited by section 706 (1) the provisions of that section, compensation is not payable if the change to the planning scheme (i) affects development that, had it happened under the superseded planning scheme— (i) would have led to significant risk to persons or property from natural processes (including flooding, land slippage or erosion) and the risk could not have been significantly reduced by conditions attached to a development approval; or (ii) would have caused serious environmental harm and the harm could not have been significantly reduced by conditions attached to a development approval; **Procedures, policies and plans** **Programs and grants**	Based on legal advice from 2007, the Department understands that a local government would not be liable to compensate property owners for the reduction of property values resulting merely from the publication of flood information/mapping. It is assumed that this would also apply to the State (NRW) where the generation and publication of flood data is done without negligence. A claim could still lie against a local government or the State for damages if negligence in the generation and dissemination of flood information was proved. A successful claim would result in a damages award. Therefore it will be important that due care is taken in giving information and that any caution regarding the accuracy and limitations of the data is clearly stated. The *Water Act 2000* (Qld) contains a range of provisions that deal with liability issues. Generally, where the Act expressly provides that liability does not attach to an entity or person (other than where negligence is proved), there is ability to apply to the State for compensation, or, the Act provides that the liability attaches instead to the State. Section 4 of the *Legislative Standards Act 1992* defines 'fundamental legislative principles' which are the principles relating to legislation that underlie a parliamentary democracy based on the rule of law. Legislation should not breach fundamental legislative principles (FLPs) unless there is adequate justification. A breach of fundamental legislative principles would occur if legislation conferred immunity from proceeding or prosecution without adequate justification (s.4(3)(h)). Generally a provision attempting to protect an entity from liability should not extend to liability for dishonesty or negligence. The entity should remain liable for damage caused by the dishonesty or

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
			negligence of itself, its officers and employees. If protection is needed for persons administering Queensland legislation, the preferred provision provides immunity for actions done honestly and without negligence. In this case, if liability is removed from a person, it is usually declared to be shifted to the State. In this regard, section 1010 of the Water Act provides that an 'official' is not civilly liable for an act done, or omission made, honestly and without negligence under the Act. However, if the effect of this provision prevents liability attaching to a person, the liability attaches instead to the State. Gaps – It is unnecessary to provide new 'no liability' provisions in relation to planning scheme decisions because such protection is already in place under the *Sustainable Planning Act 2009*.
Penalties	Penalties for damaging flood defences such as dams, levees, temporary floodwalls, etc. (and possibly other penalties that include stopping flow? Unauthorised flood barriers?)	**Procedures, policies and plans** **Programs and grants**	No such penalties exist in the Water Act and water Act would not have jurisdiction over land outside a watercourse – restricted to the rights to the use, flow and control of water
Integration and institutional arrangements			
Institutions	River basin planning institutions	**Legislative framework** **DERM** ▪ *River Improvement Trust Act 1940* - River Improvement Trusts Purpose of the trusts is to carry out works designed to improve the flow of water in the rivers and tributaries within it's area to correct erosion	**Comments** ▪ Historically, this is not well addressed. Recent local government amalgamations may have improved this. DERM basin planning is based on water as a resource

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		and provide flood mitigation Operational River Improvement Trusts - - Burdekin Shire Rivers Improvement Trust - Cairns River Improvement Trust - Cardwell Shire River Improvement Trust - Clifton Shire River Improvement Trust - Don River Improvement Trust - Herbert River Improvement Trust - Ipswich Rivers Improvement Trust - Johnstone Shire River Improvement Trust - Jondaryan Shire River Improvement Trust - Pioneer River Improvement Trust - Scenic Rim Rivers Improvement Trust - Stanthorpe Shire River Improvement Trust - Wambo Shire River Improvement Trust - Warwick Shire River Improvement Trust - Whitsunday Rivers Improvement Trust ▪ *Water Act 2000* - Provisions for Water Authorities Chapter 4 –Provides a framework for the establishment and operation of water authorities. Water activity, for a water authority, includes an activity for the following— (a) water conservation; (b) water supply; (c) irrigation; (d) drainage, including stormwater drainage; (e) flood prevention; (f) floodwater control; (g) underground water supply improvement or replenishment; (h) sewerage; (i) anything else dealing with water management. At present there are 52 Water Authorities which includes - ▪ 14 Drainage Boards – which provide a co-ordinated drainage system for the removal and disposal of excess water from	Note Government Response To Weller Report – 1) The River Improvement Trusts should be abolished and their functions transferred or incorporated into local governments, with all responsibilities and powers required to undertake their activities. Qld Government supports the transfer and retention by local government. Further detailed consultation will be undertaken prior to implementation. 2) The Category 2 Water Boards should be abolished and their responsibilities transferred to local governments, which should have the flexibility to determine between delivering local water services themselves, delegating them to local boards or using alternative (non-government) institutional arrangements, such as establishing local cooperatives or incorporated associations. – Qld Government supports in principle. Further detailed consultation with affected local governments will need to be undertaken. Will take some time to determine which institutional arrangement is appropriate having regard to local circumstances, amend legislation etc.

Not Government Policy

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		agricultural lands ▪ 11 Irrigation Boards – Which supply water for irrigation purposes to landholders in the Board's area **Procedures, policies and plans** **Programs and grants** **Other** DERM Riverine Management Working Group	
	Definition of roles of institutions (for example, flood management, environmental control, disaster management, local authorities) and setting out of rights, powers and obligations	**Legislative framework** **DIP** ▪ Sustainable Planning Act 1997 ▪ Local Government Act 1993 & Local Government Regulation 2005 **DCS** ▪ Disaster Management Act 2003 **DERM** Water Act (2000) – Chapter 4 **Procedures, policies and plans** **Programs and grants** **Other** ▪ Natural Disaster Mitigation Program (funding is broken down 1/3 Commonwealth, 1/3 State Government & 1/3 Implementing Agency) ▪ Regional Flood Mitigation Program (funding is broken down 1/3 Commonwealth, 1/3 State Government & 1/3 Implementing Agency)	**Comments** ▪ Only partially addressed. Some issues have clear roles and responsibilities e.g. Disaster Management Response. In other areas such as flood risk management the roles and responsibilities of involved State Government departments are unclear ▪ Departments may not have the capacity to fulfil these roles ▪ Need a more strategic approach to resource allocation across departments ▪ At a state level the roles of departments and institutions is not clear **Relevant current projects** ▪ Queensland Flood Roles and Responsibilities Audit (led by Strategic Policy) ▪ Technical advice to agencies and local government by the Flood Risk and Stormwater Management section of the Office of Water Supply Regulator, Environment and Natural Resource Regulation.
	Ability of these institutions to fulfil role with available resources	**Legislative framework** **Procedures, policies and plans** **Programs and grants -** ▪ Departmental Budgets ▪ Budget Allocations to Statutory Bodies ▪ Local Government Rates **DIP**	**Comments** ▪ Not clear if this is the case ▪ No this is not addressed all agencies are heavily committed with 'non-flood' responsibilities. ▪ DERM provides technical advice for DIP on EIRP and EIP,

Subject	Relevant issues for integrated food management	Existing approach – relevant legislation/policy or program	Comments (adequacy etc) and relevant current projects
		▪ Environmental Infrastructure Research Program (EIRP). ▪ Environmental Infrastructure Program (EIP), **DCS** ▪ Natural Disaster Mitigation Program (funding is broken down 1/3 Commonwealth, 1/3 State Government & 1/3 Implementing Agency) ▪ Regional Flood Mitigation Program (funding is broken down 1/3 Commonwealth, 1/3 State Government & 1/3 Implementing Agency)	

'DERM-12'

Reilly Bob

From: Reilly Bob
Sent: Tuesday, 18 January 2011 4:29 PM
To: Peter Borrows
Cc: [redacted]
Subject: RE: Revised Flood Operations Strategy - Lowood Pump Station at 15:30 on Tuesday 18 January 2011

Hi Peter

I confirm my verbal approval at approximately 3 pm this afternoon as indicated in your email below. Please note that this approval only covers the Flood Mitigation Manual-related approval, and not any other approval that you may require from DERM.

Regards

Bob

From: Peter Borrows [mailto:pborrows@seqwater.com.au]
Sent: Tuesday, 18 January 2011 4:18 PM
To: Reilly Bob
Cc: [redacted]
Subject: RE: Revised Flood Operations Strategy - Lowood Pump Station at 15:30 on Tuesday 18 January 2011

Bob, this E Mail is to confirm that Seqwater requested you to approve a variation to the flood release regime prescribed in the Flood Mitigation Manual for Wivenhoe/Somerset dams, and that you had verbally approved this.

I recommended this variation to enable a constant flow for the Lowood WTP off-take as we have been having difficulties in supplying water from this off-take to the Lowood treatment plant. The plan is to maintain the current releases for a further 12 hours to 'stabilize' the off take for the treatment plant, and to then enable a reasonable 'final close down', to minimise bank slump issues. This close down proposal is consistent particularly with the Brisbane City Council request associated with concerns at Coronation Drive. I note that the WGM's letter to me dated 24 December 2011, advised that the WGM had no in principle objection to Wivenhoe and Somerset dams being drawn down to 95 per cent of their combined full supply level.

When we verbally discussed this, we discussed a final level of 95% FSL at Wivenhoe, and the assumption was 100%FSL at Somerset. Please note that this scenario has now been calculated, and the resulting FSL will be 94.6% at Wivenhoe and 97.3% at Somerset.

Could you please confirm your approval.

Thanks.

Regards, Peter.

Peter Borrows
Chief Executive Officer
Queensland Bulk Water Supply Authority *trading as* Seqwater

seqwater
WATER FOR LIFE

[redacted]
Level 3, 240 Margaret St, Brisbane City QLD 4000
PO Box 16146, City East QLD 4002
Website | www.seqwater.com.au

From: Duty Engineer [mailto:dutyseq@uqconnect.net]
Sent: Tuesday, 18 January 2011 3:36 PM
To: [redacted]
Subject: Revised Flood Operations Strategy - Lowood Pump Station at 15:30 on Tuesday 18 January 2011

Rob/Peter

Revised shutdown sequence applied at 15:00 on Tuesday 18 January 2011 to accommodate a 12 hour hold at current gate settings (Release is 1,450 cumecs)) This will equate to a volume of 62,640 ML resulting in a lake level of around EL 66.85 mAHD by 03:00 on Wednesday 19 January 2011.

If release is then ramped down using 45 minute gate closure intervals the volume released is estimated to be 52,630 ML resulting in a lake level of EL 66.40 mAHD or 94.6% of capacity at 06:00 on Thursday 20 January 2011. This assumes no further runoff from rainfall and that Somerset regulator continues until Thursday morning as well leaving, Somerset dam at EL98.75 mAHD or 97.3%

The closedown sequence could be modified, but I am concerned we get bank slumping if we push too much harder.

Regards

[redacted]

Duty Engineer
Flood Operations Centre

Phone [redacted]
Fax:

please contact the sender immediately and delete the material from your email system. QLD Bulk Water Supply Authority ABN75450239876 (Trading as Seqwater).

'DERM-13'

10 February 2011

seqwater
WATER FOR LIFE

Mr John Bradley
Director-General
Department of Environment and Resource Management
Level 13, 400 George Street
BRISBANE QLD 4000

Dear John,

Further to our Chairman's letter to the Honourable Stephen Robertson MP, Minister for Natural Resources, Mines and Energy, and Minister for Trade, of 4 February 2011, I advise that the SEQ Water Grid Manager informed Seqwater by the attached letter, received yesterday, 9 February 2011, that it has no objection, from a water security perspective, to Wivenhoe Dam being drawn down to 75% of its Full Supply Level (***FSL***) and that such a draw down, if temporary, would be unlikely to impact its obligations.

You will recall that, pursuant to Minister Robertson's earlier request, Seqwater undertook modelling of various potential flood events (which included approximately 90 permutations in respect of 3 previous flood events and 6 design flood events) and confirmed to you that a reduction in Wivenhoe Dam's storage level to 75% of its FSL will provide appreciable flood mitigation benefits. Reducing storage to this level will effectively increase the capability of the dam to further mitigate flood events (depending on rainfall conditions downstream of the dam).

By way of example, the simulation modelling undertaken by Seqwater, which was peer reviewed by independent experts and submitted to you with Seqwater's letter dated 7 February 2011, demonstrated, subject to the qualifications referred to in that letter, that the reduction in storage level of the Wivenhoe Dam to 75% of its FSL achieved (approximately):

(a) a flow reduction from 3900 cumecs to 2400 cumecs (being a 39% reduction) in the case of a 36 hour 1 in 200 design flood event; and

(b) a flow reduction from 5100 cumecs to 3700 cumecs (being a 28% reduction) in the case of a 36 hour 1 in 500 design flood event.

Seqwater notes the extreme January 2011 flood event resulted in 2,650,000 ML of flood water passing through Somerset and Wivenhoe Dams, which was 1,240,000 ML more than the 1974 floods.

In light of the SEQ Water Grid Manager's abovementioned advice to Seqwater, the extreme nature of the January 2011 event and the abovementioned modelling results, Seqwater recommends that Wivenhoe Dam's storage level be temporarily reduced to 75% of its FSL in order to temporarily increase its flood mitigation capacity. Should the State agree with this recommendation, Seqwater will then confer with your Departmental officers to explore the various options by which this outcome can most promptly be achieved.

I look forward to receiving your response.

Yours sincerely,

Peter Borrows
Chief Executive Officer

Attach.

SEQ Water Grid manager

TRIM ref: D/11/502

Secure and efficient water through partnership and innovation

9 February 2010

Peter Borrows
Chief Executive Officer
Seqwater
PO Box 16146
City East QLD 4002

Dear Mr Borrows

I refer to Seqwater's Chair's letter to Minister Robertson dated 4 February 2011, regarding Seqwater's consideration of the appropriate Full Supply Levels (FSL) for Wivenhoe and Somerset dams. We acknowledge having recently received a copy of this letter from you.

I write regarding the water security impacts of lowering the FSL of Wivenhoe Dam, in light of the SEQ Water Grid Manager's obligation to manage water supplied from its water entitlements in accordance with Sections 6 and 7 (Desired Levels of Service Objectives and Risk Criteria) in the *South East Queensland System Operating Plan*. We understand that this is being considered as an interim measure for the current wet season.

I confirm previous verbal advice that, from a water security perspective, the SEQ Water Grid Manager has no objection to Wivenhoe Dam being drawn down to 75 per cent of its FSL. The water security implications of a temporary draw down are unlikely to impact our ability to comply with the *South East Queensland System Operating Plan* or our Grid Contract obligations.

If a permanent reduction of Wivenhoe Dam's FSL is later considered, this may have an impact on the *South East Queensland System Operating Plan's* desired levels of service objectives and we would suggest that you also engage with the Queensland Water Commission on this matter.

I trust that this advice is sufficient. If you have any questions, please do not hesitate to contact me by telephone on [redacted] or via email at [redacted]@seqwgm.com.au.

Yours sincerely

Barry Dennien
Chief Executive Officer

CC: Karen Waldman, Chief Executive Officer, Queensland Water Commission.

– Regional Service Delivery Division overview of flood preparedness and response with regards to the management of dams in Queensland and managing the health and safety impacts of mines and coal seam gas water

Issue	General overview of how RSD administers this issue	Specific reference to legislation, etc	A brief account of key decisions/actions in relation to preparedness and the response	Any other matters you think are relevant	Types and classes of relevant documentation that you hold or are aware of
Management of Dams in Qld	Manages 23 water structures (including 4 Referable Dams) and ensures that they are safe to the public and comply with relevant legislation.	*Water Supply (Safety and Reliability) Act 2008* *Water Act 2000* Guidelines for Acceptable Flood Capacity of Dams Queensland Dam Safety Management Guidelines Guidelines for Failure Impact Assessment of Water Dams	• Annual review and distribution of Emergency Action Plan (EAP) • Annual training of EAP Officers • Scenario exercise with Tablelands Regional Council (TRC) in 2010 to check EAP preparedness for Ibis Dam • Installation of a gauging station on Ibis Dam to provide early warning to EAP Officers and TRC. • Advice to TRC on 25 Dec 2010 to evacuate people at risk in Irvinebank because Ibis Dam reached trigger point set in EAP • Advice to TRC on 2 Feb 2011 to carry out pre-emptive evacuation in Irvinebank due to approach of cyclone Yasi • Advice to Police on 22 January 2011 not to evacuate Mt Garnet due to SES concerns about small mining dams upstream of Crooks and Wyndham Dams	The pre-emptive evacuation for Ibis Dam was in-effective - only 4 people moved out of their homes. It is understood that TRC is reviewing its Emergency Planning post Cyclone Yasi.	Full suite of Dam Safety Documentation (including Emergency Action Plan) for each Referable Dam.
Health and safety impacts of mines and CSG water	**Proactive:** RSD is responsible for undertaking compliance checks to ensure that mines and CSG operations adhere to the conditions of their environmental authority concerned with managing the public health and safety issues associated with discharges of mine and CSG water. **Reactive:** RSD undertakes	*Environmental Protection Act 1994*	**Mines:** In anticipation of a severe wet season, the department began working with coal mines, primarily in the Fitzroy Basin, to identify suitable on-site water storage management options before the wet season began. The department urges mining companies to be proactive in managing water on mines sites and ensuring they meet their environmental obligations. Since 1 December 2010 the department has approved 47 Transitional		EcoTrack Daily internal departmental reports to DERM executives on mines and CSG potential Environmental Authority breaches, and status reports on progress of TEP applications. Website information on the Fitzroy River (includes information about water quality, TEPs) http://www.

'DERM-14'

	investigations of suspected breaches and prosecutes where necessary. **Reactive:** On a case by case basis, RSD evaluates proposed Transitional Environmental Programs to allow companies to discharge water outside the conditions of their environmental authority. In making decisions on those applications, RSD consults with Queensland Health on any proposals that could have an impact on human health, and may modify the TEP conditions or refuse the application based on this advice. The cumulative impacts of multiple discharges are also considered when assessing individual TEPs		Environmental Programs or amended programs allowing mines to manage water. Most of the TEPs issued to coal mines in the Fitzroy Basin since December last year allowed the mines to take advantage of higher stream flows to discharge waters of higher Electrical Conductivity (EC) than allowed by the EA. The aim was to allow the mines to "dewater" in a manner that does not cause unacceptable environmental harm or health issues. **CSG:** Since 1 December 2011 the department has issued three TEPs to CSG companies to allow them to address water management issues on site by allowing discharge of water to watercourses under a strict set of conditions. There were few incidents of unplanned release, and all had an extremely low potential for causing environmental harm due to the amount of floodwaters in the area. **General:** The department is aware of potential breaches of environmental authority by 39 mine, conventional gas and CSG operations across the state this wet season. All breaches will be investigated. Initial assessment indicated that all potential breaches had a low potential to cause environmental or health issues due to the volumes involved and the very high level of dilution by floodwaters		fitzroyriver.qld.gov.au/
Disposal of Waste	Waste disposal activities are regulated by DERM as environmentally relevant	*Environmental Protection Act 1994* *Environmental Protection*	In relation to preparedness, waste disposal sites are located outside of flood prone areas. This is evidenced by	Local government's managing community clean up operations have	EcoTrack Incident SITREPs

	activities (ERA) pursuant to the definitions provided within the *Environmental Protection Regulation 2008*. Where either a local government or a company proposes to use a site for waste disposal development approval is required through the *Sustainable Planning Act 2009*, which triggers assessment and conditioning of the activity by DERM typically in a role of a concurrence agency for the application. Local governments are typically Assessment Managers for such applications. A registration certificate is also required under the *Environmental Protection Act 1994*. Administration of registration certificates for ERAs is the sole responsibility of DERM, except in cases where activities have been devolved to other entities via regulation. DERM remains responsible for regulation of the activity within the jurisdictions of its concurrence trigger for the life of the activity.	*Regulation 2008* *Sustainable Planning Act 2009*	the flood impacts on waste disposal sites being mainly related to impacts on access roads. Key decisions related to understanding the capacity of existing authorised waste disposal facilities to absorb the significant increase in volume associated with flood waste collected from inundated areas. This involved regular liaison through the State Recovery Coordination Committee with the Local Government Association of Queensland and local governments across the State to ensure issues at approved waste disposal facilities were identified and considered throughout the response phase of the flood disaster. Local waste disposal options were found to be sufficient for coping with the additional waste volumes generated through the inundation of properties. In some locations it was necessary to establish temporary waste storage areas while access to waste disposal sites was re-established and transport of waste could be recommenced. In highly populated areas impacted by the floods, such as Brisbane and Ipswich, it was necessary to establish temporary collection points for community flood waste. These areas were used as staging areas to facilitate high volume transport runs to waste disposal facilities. DERM liaised with relevant local governments to ensure appropriate decommissioning of these sites was undertaken to remove and residual environmental / public risks. DERM authorised extended operating	generally done a tremendous job to remove and dispose of flood waste from flood affected communities. DERM has identified a need for ongoing monitoring of landfill sites following increased disposal activity at a time for significant inundation at these sites themselves. Consideration of leachate sampling results as required by DERM approval conditions will assist this process.	Regional office file records.

			hours at waste disposal sites in Brisbane and Ipswich to cater for the additional demand for waste disposal. DERM did not receive any complaints from the community in relation to these decisions. In Brisbane it was necessary to dispose of some amounts of flood waste at two decommissioned landfill sites, still covered by development approvals and registration certificates. DERM was consulted by Brisbane City Council on this proposal and endorsed to proposal after inspecting the sites and considering existing waste management infrastructure systems in place at these sites. In Brisbane DERM is leading a project to identify and remove hazardous material containers from waterways in the vicinity of the Rocklea industrial areas that were inundated by flood waters. This is being done in consultation with Brisbane City Council, Queensland Fire and Rescue Service and Queensland Health.		

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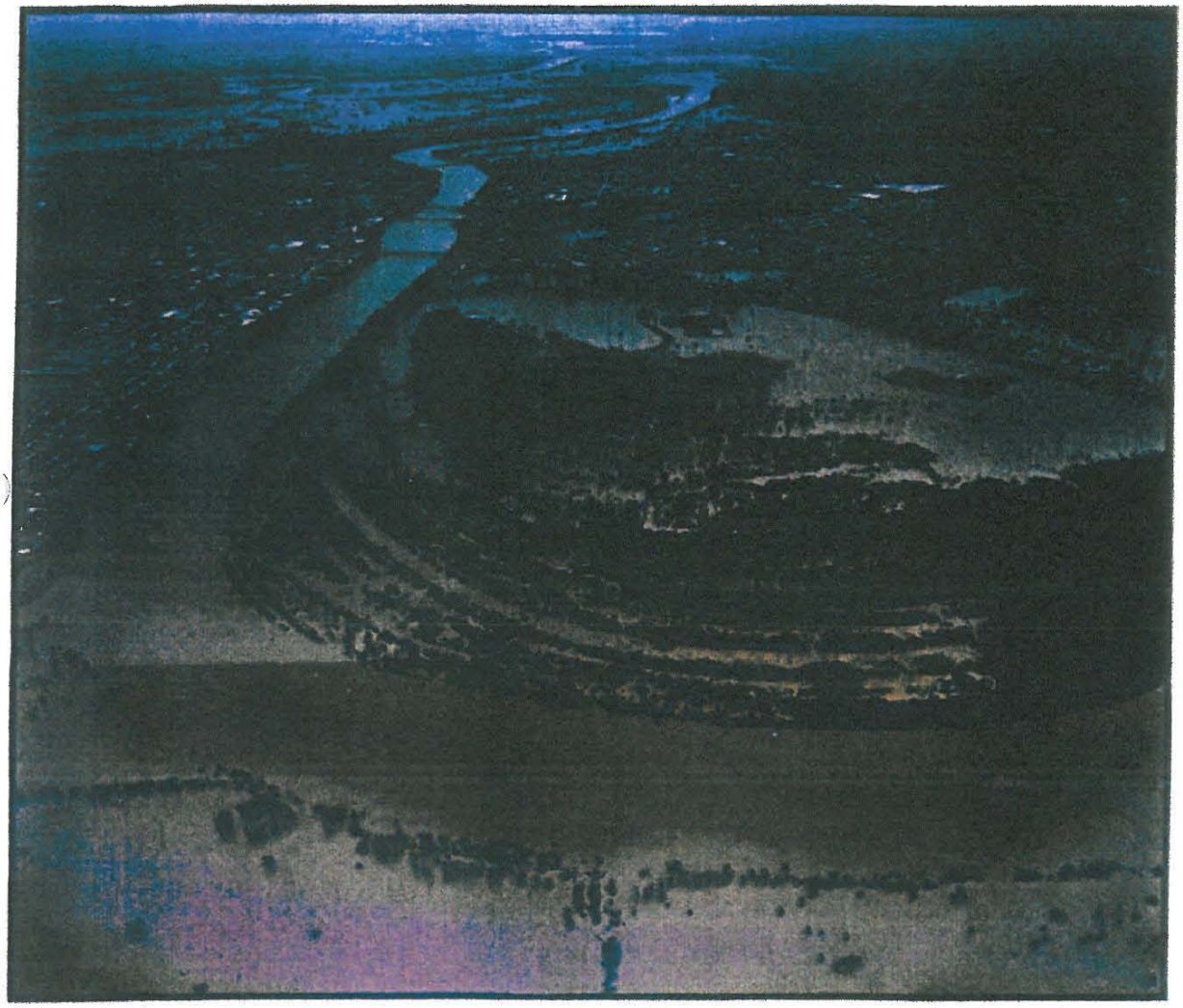
WATER RESOURCES COMMISSION



ROCKHAMPTON FLOOD MANAGEMENT STUDY

SUMMARY OF RECOMMENDATIONS

CAMP SCOTT FURPHY PTY LTD
ACN 004 939 548

NOVEMBER 1992

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WATER RESOURCES COMMISSION

ROCKHAMPTON FLOOD MANAGEMENT STUDY

SUMMARY OF RECOMMENDATIONS

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ROCKHAMPTON FLOOD MANAGEMENT STUDY

PREFACE

The Rockhampton Flood Management Study was an outcome of the January 1991 flooding at Rockhampton. This flood caused major economic and social problems in the Rockhampton area. Homes and businesses were flooded and the city was isolated from the rest of Queensland for 12 days. Communities right along the Queensland coast were affected by this severing of the coastal road and rail links.

The three levels of Government – local, state and federal – then agreed that a study was needed to allow better management of the Fitzroy River flooding at Rockhampton. The Water Resources Commission then arranged for this study and a Steering Committee, comprising the main authorities concerned with the flooded areas near Rockhampton, was formed. This Steering Committee, which provided direction during the study, consisted of representatives from the following bodies:

QDPI – Water Resources Commission
Rockhampton City Council
Livingstone Shire Council
Fitzroy Shire Council
Department of Transport
Queensland Railways
Commonwealth Department of Primary Industries and Energy

Consultant – Camp Scott Furphy Pty Ltd – was engaged to carry out this study.

The consultant considered recent Fitzroy River flow records, along with the historical flood levels since 1859, to assess the likely frequency of different flood levels at Rockhampton. The economic losses of the 1991 flood were assessed. These two aspects in combination then allowed assessment of the likely annual damages from flooding at Rockhampton. The effects of the existing major works in the flooded area were reviewed, while the social and environmental impacts of flooding were also considered.

From a whole range of possible flood mitigation options, the consultant has recommended a number of both structural and non-structural measures to best reduce the impacts of flooding at Rockhampton. The structural measures recommended are those with the highest benefit to cost advantage, whilst having acceptable hydraulic impacts. The non-structural measures recommended are those areas which need improving, based on the experiences gained from the 1991 flood.

The consultant regularly referred their findings back to the Steering Committee during the course of the study. They have also held public meetings and displays to allow input from the general public and to keep them informed. This report is the final outcome of the consultants extensive studies and its findings are endorsed by the Steering Committee. This study now allows a better understanding of the mechanisms and likely occurrence of flooding at Rockhampton, the damages flooding causes and recommends ways to better manage this flooding.

Nevertheless, the release of this study report does not imply any immediate commitment by the various authorities to carry out the recommended measures. These bodies each have ongoing work commitments, responsibilities and financial constraints which may restrict what action they take here. A statement by the Department of Transport on how they determine priorities for road works is contained in the main report.

Each authority will, no doubt, give due consideration to the study's detailed findings and recommendations in their planning and control of future works in these flood affected areas. Readers of this report should be aware, though, that it is still up to each authority to determine what measures it takes to reduce these flooding problems and for the timing of these measures.

M B McKenna
Regional Manager
Water Resources Commission
ROCKHAMPTON

&

Chairman
Rockhampton Flood Management Study
Steering Committee

ROCKHAMPTON FLOOD JANUARY 1991
Yeppen Crossing

ROCKHAMPTON FLOOD JANUARY 1991
Rockhampton Airport

ROCKHAMPTON FLOOD JANUARY 1991
Fitzroy River looking downstream to Rockhampton City

ROCKHAMPTON FLOOD JANUARY 1991
Depot Hill Area

ROCKHAMPTON FLOOD MANAGEMENT STUDY

SUMMARY OF RECOMMENDATIONS

INTRODUCTION

The Rockhampton Flood Management Study has been undertaken over the period September 1991 to October 1992. The study was divided into two phases which have been reported upon separately, as follows:

- Phase 1 Report – April 1992 – 3 volumes, namely Executive Summary, Report and Appendices;
- Phase 2 Report – November 1992 – 3 volumes as above.

The Phase 1 report contained a review of flood characteristics of the Fitzroy River; an assessment of flood damages; a review of flood management issues; and preliminary recommendations in regard to both non-structural and structural flood management measures, the latter being subject to refinement and confirmation in Phase 2.

The Phase 2 report concentrated on hydraulic model studies to establish the impact of a range of short-listed flood mitigation measures, identified in Phase 1, leading to firm recommendations in regard to measures aimed at reducing the impact of future floods.

This brief document provides a short overview of both Phase 1 and Phase 2 Reports, consisting essentially of a list of the main findings and recommendations of the study. Reference should be made to the Phase 1 and Phase 2 Reports for further information and for discussion regarding study findings.

The recommended measures provide the opportunity for substantial reduction in the economic and social costs of flooding in Rockhampton. The recommended works are capable of providing these improvements with minimal adverse impact.

FLOOD CHARACTERISTICS

The Fitzroy River at Rockhampton and adjacent areas and townships have been subjected to flooding on many occasions as a result of heavy rainfalls in the Fitzroy River basin. The worst flood since records commenced in 1859 was in 1918, when the river level at Rockhampton reached 10.11 m on the City flood gauge (8.66 m AHD). The second highest peak was 9.40 m gauge height (7.95 m AHD) in 1954. Rockhampton again suffered major flooding in January 1991 due to heavy rainfalls associated with Cyclone Joy. The peak flood level on this occasion reached 9.30 m gauge height (7.85 m AHD), but due to changes in the floodplain characteristics in recent years this level cannot be compared directly with that of previous major floods. In river discharge terms, the 1991 flood had a peak flow at Yaamba of about 14,200 m^3/s, only slightly less than the 1954 peak discharge of 15,000 m^3/s. Both of these were substantially less than that of about 18,000 m^3/s in 1918.

On the basis of the flood frequency analysis carried out as part of the study, the 1991 peak discharge is equivalent to a 2% Annual Exceedance Probability (AEP) flood, that is a flood with a 2% chance in every year of being equalled or exceeded in magnitude. This is equivalent to an average recurrence interval (ARI) of 50 years, although this terminology is not preferred as it is often misinterpreted. The 1954 flood was found to have an AEP of 1.8% (55 year ARI). The differences in flood levels in Rockhampton and in the floodplain between these events is attributable to developments in the river and in the floodplain in the period between these floods, as well as to the slight difference in magnitude. In probability terms, the 1918 flood was found to be substantially more extreme at 0.6% AEP (160 year ARI).

FLOOD DAMAGES

The flood damage in the 1991 flood was estimated to be about $50 million, although this figure is imprecise. Of this the direct damage, ie. that caused by direct contact with floodwaters was estimated to about $15 million, made up of residential sector damage of $1 million, commercial/industrial sector damage of $5 million, and public sector damage of $9 million. By way of contrast, the indirect damages were estimated to be about $35 million resulting mainly from the disruption to business by the simultaneous closure of road, rail and air links for 12 days.

The mean annual flood damage (MAD), that is the long term average of flood damage over a period of time which includes the likely range of floods, was estimated to be $5.2 million per annum at 1992 prices. Thus the cost to the national economy, of doing nothing to improve flood management or mitigate flood damage is $5.2 million every year. This is not all attributable to the local economy as it includes the impact throughout the central and north Queensland coastal districts of road and rail closures.

This ongoing level of flood damage should be borne in mind when considering the proposals for non-structural and structural flood management measures.

RECOMMENDATIONS REGARDING NON-STRUCTURAL FLOOD MANAGEMENT MEASURES

A summary of the recommendations in regard to non structural flood management measures are given below. These are relatively low cost items which will reduce the cost and social impact of future floods.

a) Flood Maps

Flood Maps have been prepared showing the extent of inundation in 2%, 1% and 0.5% AEP floods. Also flood hazard maps showing floodways, flood storage and flood fringe areas have been prepared. These are recommended for adoption by Rockhampton City Council, initially on an interim basis. This will allow allow any anomalies to be rectified before adoption of the maps as formal planning documents.

b) **Development Control**

It is recommended that a flood standard of the 1% AEP flood be adopted for planning purposes. It is further recommended that no new development of a residential, commerical or industrial nature be permitted in designated floodways. Where new development is permitted in other flood liable areas, the minimum habitable floor level should be 0.5 m above the 1% AEP flood level. Access routes to any new development should be provided to the above standard.

c) **Measures for Immediate Implementation**

The following non-structural measures are recommended for immediate implementation:

- Flood warning
  - installation of telephone telemetry at Rockhampton Flood Gauge;
  - installation of a river level telephone telemetry station in the Pink Lily area to give warning regarding flows in the floodplain;
  - installation of river level and rainfall telephone telemetry stations on Alligator Creek and rainfall telemetry in the Neerkol Creek catchment;
  - development of a flood forecasting model.
- Flood Warning Dissemination
  - installation of street markers throughout the urban area and the floodplain. These should be plates marking the level reached by the 1991 flood at the point of installation;
  - installation of a recorded telephone message service at the Local Operations Emergency Centre which should be the single point of contact for the public;
  - discussions with local media to clarify the flood warning system and their role within it.
- Counter Disaster Planning and Operations
  - clarify respective roles of the District and Local counter disaster organisations, and maintain both centres in a permanent state of readiness;
  - the recent establishment of SES groups at Gracemere, Alton Downs and Yaamba is supported. Consideration should be given as to how best to ensure adequate SES presence in Depot Hill and Port Curtis;

- counter disaster pre-planning should consider in detail the consequences of a flood more severe than that of 1991.

- Increasing Public Flood Preparedness and Community Flood Response

  - preparation and issue of a pamphlet explaining flooding in the area, what to do in the event of flooding to minimise damage, how to use street markers to estimate flood level at individual properties, contact telephone numbers;

  - preparation of summary information similar to the above for publication in the Rockhampton District Telephone Directory;

  - when flooding is imminent publish flood maps, flood awareness/preparedness information in the local print media;

  - business operators should be urged to prepare 'flood action plans'.

  - request Department of Family Services to review its disaster subsistence scheme with a view to making it more equitable in such situations as flooding in Rockhampton;

  - improvement to 'Operation Recovery' type response.

RECOMMENDATIONS REGARDING STRUCTURAL FLOOD MITIGATION MEASURES

A wide range of flood mitigation measures, ranging from storage dams on the Fitzroy River to dredging were considered in Phase 1. Many of these were discounted from further consideration on the grounds of their limited effectiveness, high cost and/or high environmental impact. Options discounted from further consideration were:

- flood mitigation storage;
- major upstream diversions;
- major bypass floodway;
- channel enlargement works.

Reconstruction of the Alligator Creek crossing on the Bruce Highway near Yaamba has been included by the Department of Transport in its current works program, and the contribution this will make to reducing the isolation of Rockhampton during major floods, and hence a reduction in indirect flood damage in Rockhampton and areas north of Rockhampton, is recognised.

A short list of measures was identified in Phase 1 as being worthy of detailed consideration in Phase 2. These were:

- Improvement of flood immunity at Yeppen Crossing;
- Levees to protect Lower Dawson Road – Port Curtis – Depot Hill and the lower part of the Central Business District;
- Levees to protect Rockhampton Airport.

In Phase 2, a mathematical hydraulic model (computer model) was set up to investigate and report on the effect of these measures on flood levels elsewhere in the system. This is discussed at length in the Phase 2 Report. Cost estimates and cost-benefit analyses for these measures were refined from those given in Phase 1. As a result of the Phase 2 studies, the following final recommendations are made in regard to structural flood mitigation works:

a) Yeppen Crossing

Improving the flood immunity at Yeppen is regarded as the highest priority. The current crossing on both the Bruce Highway and the North Coast railway have a flood immunity of 8.5% AEP, that is the average period between closures is 12 years. The average closure time is 0.58 days per annum. The actual performance of the crossing in the 1988 and 1991 floods together with modelled performance in the 1918 and 1954 floods are in agreement with these design criteria.

The hydraulic model study has demonstrated that the flood immunity of the crossing can be improved to 2% AEP (50 year ARI) by doubling the bridge waterway area which involves increasing the length of the bridges from 420 m to about 840 m, together with raising the highway/rail height of the embankment sections between the bridges to that at the bridges.

The estimated cost of this (road and rail crossings) is $16.5 million on the basis of existing road width (ie. no allowance has been made for widening Lower Dawson Road to the Yeppen roundabout to four lanes as recommended in the recent Rockhampton Transport Study). Taking account of the significant reduction in indirect damages caused by the frequent closure of this crossing, the proposed upgrading is cost-effective with an estimated reduction in mean annual damages of $1.3 million per annum. This is equivalent to a net present value, at 5% discount rate, of $24.7 million ($18.2 million at 7%), and a benefit-cost ratio (BCR) of 1.5 at 5% (or 1.1 at 7%).

Time of submergence would be zero for 2% AEP (compared to 10 days under current conditions) and about 7 days at 1% AEP (compared to 13 days under present conditions). The long term average closure period would be reduced to 0.15 days per annum. The combination of embankment raising and additional waterway area would reduce levels upstream by 0.05 m at the Airport, to 0.17 m just upstream of the crossing for a 2% AEP flood and 0.02 m to 0.05 m respectively for a 1% AEP flood.

b) **Levee to protect Lower Dawson Road, Port Curtis, Depot Hill and the Lower CBD**

This is also strongly recommended as a high priority measure. The construction of this levee should follow the proposed improvement to Yeppen Crossing rather than precede it, as it partly relies on the latter to offset the impact on flood levels this would otherwise cause.

The recommended level of protection is against the 1% AEP (100 year ARI) flood. That is, the whole of the area within the levee would not be flooded should a 1% AEP flood occur. This level of protection is intermediate between the 1991 flood (2% AEP) and the 1918 flood (0.6% AEP). Floods more extreme than 1% AEP would cause the levee to overtop but proper design will ensure this occurs in a controlled, and not a catastrophic way. Protection to a higher level, say 0.5% AEP would provide a slightly better BCR at a significantly higher capital cost, but would cause flood levels in the floodplain to be greater than those under existing conditions for a flood of this magnitude. As this was considered to be unacceptable, 1% AEP is the recommended level of protection.

Construction of this levee would significantly reduce flood damage and social impacts for the bulk of the urban area on the south side of the river. In economic terms, the mean annual damage would be reduced by $0.5 million per annum. The associated capital cost is estimated to be $7.4 million. The net present value (NPV) (at 5% discount rate) would be $9.3 million, and the benefit cost ratio (BCR) 1.25. Using a 7% discount rate, the NPV would be $6.9 million, and the BCR 0.93. These are very high benefit-cost ratios for flood mitigation schemes, illustrating the high level of effectiveness in reducing flood damages.

Built in combination with the Yeppen crossing upgrade and also with the removal of the odd railway embankment adjacent to the Old Bruce Highway between Port Curtis and Roopes bridge, and of the old Burnett Highway bridge across the floodplain, the nett effect of this levee on flood levels upstream would be reductions of 0.28 m upstream of Yeppen, 0.15 m at Fairybower Road and 0.09 m at the Airport for a 2% AEP flood. Corresponding values for 1% AEP flood would be reductions of 0.02 m at the each of the above.

One end of the levee would be tied to higher ground along Blackall Street near to Lower Dawson Road, which itself would be raised locally, then along Jellicoe Street to Port Curtis. At Port Curtis the levee would pass on the floodway side of Hastings Deering Pty Ltd, and then cross the Old Bruce Highway to include all the residential area of Port Curtis. The route of the levee would then be across mainly rural land to Gavial Creek near the Sewage Treatment Works. The levee would then extend along the river terminating near William Street. Some sections adjacent to Quay Street will need to be in the form of a low retaining wall, but elsewhere the levee will be low earth embankment. The bulk of the levee would be below 3 m in height with a maximum height of 3.8 m at a low point near Lower Dawson Road. As such, it is not anticipated that the levee will be very intrusive.

It is proposed that the levee be constructed on an easement basis, rather than by land resumption, thereby minimising the impact on landowners. The proposed route is shown on Figure 1. It is emphasised that the levee route is not finalised and that final route selection would be carried out during the design stage.

Not only would this levee protect existing properties, it would also allow development of the currently undeveloped area within the levee. The benefits of this have not been taken into account in the economic analysis.

In summary, this levee offers substantial benefits in terms of reduced flood damage and social impact to the most flood liable parts of Rockhampton. In combination with upgrading the Yeppen Crossing it will not worsen levels for 2%, 1% AEP floods. Construction on an easement basis will minimise impacts on landowners. Should construction of the levee proceed, it will be important to undertake a public awareness/education campaign to clearly state the advantages and limitations of levee protection.

c) Levee to Protect Rockhampton Airport

A lower level of priority has been allocated to this levee which is not justifiable in purely economic terms. A levee to protect the airport, which would also protect the adjacent residential areas, would need to be justified primarily on the intangible benefits of maintaining an operational airport during major floods to enable the ferrying of supplies, medical evacuations etc.

The estimated cost of this levee is $4.3 million with protection to 1% AEP but the BCR would be only 0.45 at 5% discount rate (0.33 at 7%). This levee would raise flood levels in that part of the floodplain between Pink Lily and Lion Creek by a maximum of 0.3 m at 2% AEP and 0.5 m at 1% AEP. The small number of houses along Nine Mile Road may need to be raised or otherwise flood proofed to compensate for this effect. The increase in level along the Rockhampton-Ridgelands Road is 0.05 m at 2% AEP and 0.12 m at 1% AEP. This levee would cause a minor reduction in flood level at Yeppen as it marginally reduces the flow in that part of the floodplain by increasing flow in Lion Creek.

d) Priority 3 Works

Third priority works which are recommended in the medium term are:

- a levee to prevent direct overflow from the Fitzroy River into Splitters Creek;
- the stabilisation of the high bank at Pink Lily.

e) Priority 4 Works

Fourth Priority works which are recommended are the fitting of flood gates on creeks on the northern river bank and flood valves on the storm drainage outlets.

SUMMARY OF ESTIMATED COSTS OF RECOMMENDED WORKS

PRIORITY 1 MEASURES	
NON-STRUCTURAL	
• Floodplain Management Policy	$30,000
• Upgrading of flood warning system	$53,000
• Installation of Flood Markers	$25,000
• Recorded message service	$30,000
• Community awareness programme	$25,000
SUB-TOTAL	$163,000
CAPITAL WORKS	
• Upgrade Yeppen Crossing to increase embankment height to that of the bridges, plus increase waterway area by increasing bridging length to 840 m (BCR 1.5)	$16.5 m
• Construction of levee from Blackall Street to Quay Street protecting Lower Dawson Road, Port Curtis, Depot Hill and the lower CBD (BCR 1.25)	$6.9 m
• Removal of disused railway embankment adjacent to Old Bruce Highway (material may be used in levee works) Demolition and removal of bridge/causeway on Old Burnett Highway	$0.5 m
SUB-TOTAL	$23.9 m
TOTAL PRIORITY 1	$24.063 m

PRIORITY 2 MEASURES	
NON STRUCTURAL	
• Development of Flood Forecasting model	$80,000
• Commercial Flood Proofing Pilot Study	$40,000
SUB-TOTAL	$120,000
CAPITAL WORKS	
• Construction of levee to protect airport extending from Savage Street to Denham Street Extd (BCR 0.45)	$4.3 m
TOTAL PRIORITY 2	$4.42 m

PRIORITY 3 MEASURES	
• Construction of levee to prevent overflow from River to Splitters Creek (BCR approximately 0.7)	$0.14 m
• Bank stabilisation works at Pink Lily	$0.9 m
TOTAL PRIORITY 3	$1.04 m

PRIORITY 4 MEASURES	
• Flood gates on Splitters Creek, Moores Creek, Frenchmans Creek and Thozet Creek	$2.0 m
• Flood valves on stormwater drainage outfalls	$0.5 m
TOTAL PRIORITY 4	$2.5 m

OVERALL TOTAL RECOMMENDED WORKS	$32.023 m
Note: BCRs at 5% discount rate.	

FUNDING OF WORKS

In recent years flood mitigation works have been eligible for funding under the Federal Water Resources Assistance Program (FWRAP). From 1993/94 flood mitigation works and measures are expected to be eligible for funding under the National Landcare Program (NLP) which will integrate FWRAP and other programs.

In Queensland, it is the responsibility of the relevant Local Authority to apply for funding under the program to the State Government in the first instance through the Water Resources Commission, customarily by December each year. The State Government will integrate and prioritise applications and submit those programs it supports as part of a Partnership Agreement with the Commonwealth Government. Notification of successful applications is made following the Federal Budget each August.

Projects funded under this program normally require a 20% contribution from the Local Authority with 40% each being contributed by both Federal and State Government. The local authority is responsible for maintenance costs.

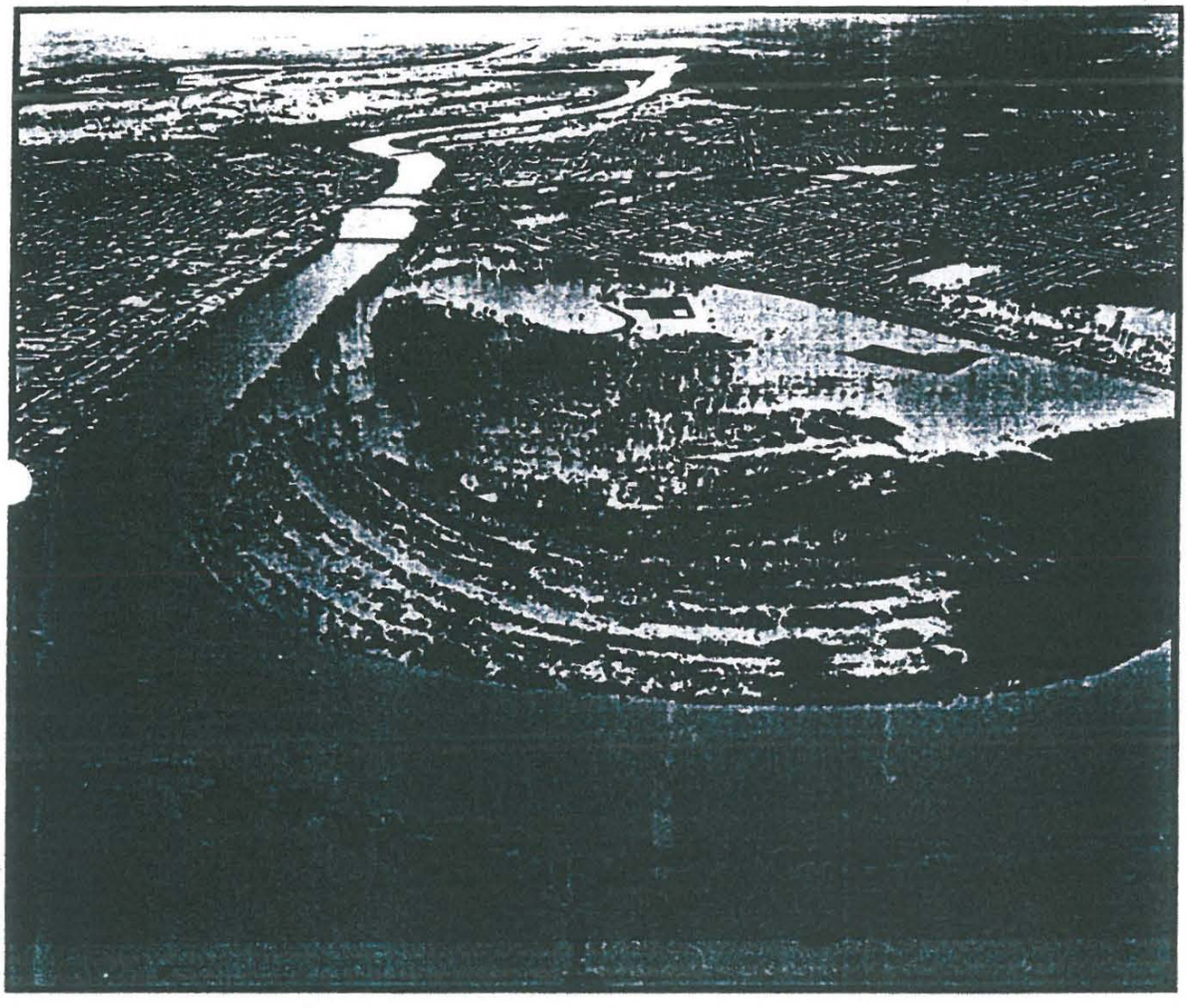
It should be noted that NLP funds are limited, and that submissions for funding are considered on their merits and cost-effectiveness and also on the basis of priority with other state projects as this program is placing increasing emphasis on well integrated land and water resource management projects and non-structural flood mitigation measures. However, due to the magnitude of flood damages in the recent flood and the isolation of a city of the size of Rockhampton which results from such floods, it may be expected that the chances of a support by the State would be high, but would of course depend on the State's priorities in the particular year. Criteria for Commonwealth support under the new NLP may evolve from those under FWRAP with increasing emphasis on Commonwealth funds being used to stimulate micro-economic reform or improvements in procedures and perceptions of natural resource management issues. Consequently, successful projects would need to engender new local and regional financing schemes and viable, beneficial, community-based flood management strategies.

Thus if funding were obtained under NLP for all the first priority works, the Local Authority Contribution would be expected to be $4.8 million. However, if only the levee works and the non-structural works were funded in this way, for example, this would reduce to $1.5 million.

Whilst the proposed upgrading at Yeppen principally relates to flood mitigation in respect of reduction of indirect damages, it would be expected that part of the upgrading costs would be met by the Department of Transport. This would be the subject of negotiation between relevant Government Departments and Local Authorities. A statement setting out the Department of Transport's perspective in this regard is given in the Phase 2 Report.

ROCKHAMPTON FLOODS 1991

WATER RESOURCES COMMISSION



ROCKHAMPTON FLOOD MANAGEMENT STUDY

PHASE 2 REPORT

VOLUME 1
EXECUTIVE SUMMARY

CAMP SCOTT FURPHY PTY LTD
ACN 004 939 548

NOVEMBER 1992

CMPS&F.
Rockhampton Flood Management Study
:Phase 2 report.

7190 WRC 45330951 Vol.1

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WATER RESOURCES COMMISSION

ROCKHAMPTON FLOOD MANAGEMENT STUDY

PHASE 2 REPORT

VOLUME 1
EXECUTIVE SUMMARY

CAMPS&F

CAMP SCOTT FURPHY PTY LTD
ACN 004 939 548

NOVEMBER 1992

ROCKHAMPTON FLOOD MANAGEMENT STUDY

PREFACE

The Rockhampton Flood Management Study was an outcome of the January 1991 flooding at Rockhampton. This flood caused major economic and social problems in the Rockhampton area. Homes and businesses were flooded and the city was isolated from the rest of Queensland for 12 days. Communities right along the Queensland coast were affected by this severing of the coastal road and rail links.

The three levels of Government - local, state and federal - then agreed that a study was needed to allow better management of the Fitzroy River flooding at Rockhampton. The Water Resources Commission then arranged for this study and a Steering Committee, comprising the main authorities concerned with the flooded areas near Rockhampton, was formed. This Steering Committee, which provided direction during the study, consisted of representatives from the following bodies:

QDPI - Water Resources Commission
Rockhampton City Council
Livingstone Shire Council
Fitzroy Shire Council
Department of Transport
Queensland Railways
Commonwealth Department of Primary Industries and Energy

Consultant - Camp Scott Furphy Pty Ltd - was engaged to carry out this study.

The consultant considered recent Fitzroy River flow records, along with the historical flood levels since 1859, to assess the likely frequency of different flood levels at Rockhampton. The economic losses of the 1991 flood were assessed. These two aspects in combination then allowed assessment of the likely annual damages from flooding at Rockhampton. The effects of the existing major works in the flooded area were reviewed, while the social and environmental impacts of flooding were also considered.

From a whole range of possible flood mitigation options, the consultant has recommended a number of both structural and non-structural measures to best reduce the impacts of flooding at Rockhampton. The structural measures recommended are those with the highest benefit to cost advantage, whilst having acceptable hydraulic impacts. The non-structural measures recommended are those areas which need improving, based on the experiences gained from the 1991 flood.

The consultant regularly referred their findings back to the Steering Committee during the course of the study. They have also held public meetings and displays to allow input from the general public and to keep them informed. This report is the final outcome of the consultants extensive studies and its findings are endorsed by the Steering Committee. This study now allows a better understanding of the mechanisms and likely occurrence of flooding at Rockhampton, the damages flooding causes and recommends ways to better manage this flooding.

Nevertheless, the release of this study report does not imply any immediate commitment by the various authorities to carry out the recommended measures. These bodies each have ongoing work commitments, responsibilities and financial constraints which may restrict what action they take here. A statement by the Department of Transport on how they determine priorities for road works is contained in the main report.

Each authority will, no doubt, give due consideration to the study's detailed findings and recommendations in their planning and control of future works in these flood affected areas. Readers of this report should be aware, though, that it is still up to each authority to determine what measures it takes to reduce these flooding problems and for the timing of these measures.

M B McKenna
Regional Manager
Water Resources Commission
ROCKHAMPTON

&

Chairman
Rockhampton Flood Management Study
Steering Committee

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