

Queensland Floods
Commission of Inquiry

Supplementary Submission by
Queensland Bulk Water Supply Authority
trading as Seqwater

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A Preliminary

1. The Queensland Floods Commission of Inquiry was announced on 17 January 2011.
2. The Terms of Reference¹ require the Commission to make full and careful inquiry in an open and independent manner with respect to the following matters:
 - (a) the preparation and planning by federal, state and local governments, emergency services and the community for the 2010/2011 floods in Queensland;
 - (b) the performance of private insurers in meeting their claims responsibilities;
 - (c) all aspects of the response to the 2010/2011 flood events, particularly measures taken to inform the community and measures to protect life and private and public property, including:
 - (i) immediate management, response and recovery;
 - (ii) resourcing, overall coordination and deployment of personnel and equipment;
 - (iii) adequacy of equipment and communications systems; and
 - (iv) the adequacy of the community's response;
 - (d) the measures to manage the supply of essential services such as power, water and communications during the 2010/2011 flood events;
 - (e) adequacy of forecasts and early warning systems particularly as they related to the flooding events in Toowoomba, and the Lockyer and Brisbane Valleys;
 - (f) implementation of the systems operation plans for dams across the state and in particular the Wivenhoe and Somerset release strategy and an assessment of compliance with, and the suitability of the operational procedures relating to flood mitigation and dam safety;
 - (g) all aspects of land use planning through local and regional planning systems to minimise infrastructure and property impacts from floods.
3. On 11 February 2011, the Commission called for:
 - (a) written submissions relating to issues of flood preparedness relevant to next summer's wet season (particularly dam operations, early warning systems and responses), such submissions to be received by the Commission by 5.00pm on 11 March 2011;
 - (b) written submissions relating to any other matters in the Inquiry's terms of reference, such submissions to be received by the Commission by 5.00pm on 4 April 2011.

¹ See Queensland Government Gazette Vol. 356, No. 12, dated 17 January 2011.

Opening Submission

4. An opening submission was filed on behalf of Seqwater on 11 March 2011 in respect of the issues of flood preparedness relevant to next summer's wet season.

Supplementary Submission

5. In addition to managing the Flood Operations Centre, Seqwater has a number of other important tasks to play in a flood event. The focus of this document is largely on those other activities and is a supplementary submission on behalf of Seqwater in respect of:
 - (a) the maintenance of drinking water supplies throughout the 2010/2011 flood event;
 - (b) Seqwater's role and participation in the applicable emergency response systems during the 2010/2011 flood event; and
 - (c) the adequacy of the communications systems utilised by Seqwater during the 2010/2011 flood event.
6. This supplementary submission also provides additional information in relation to peer reviews commissioned by Seqwater from independent experts, in respect of Seqwater's compliance with the Wivenhoe Manual during the January 2011 Flood Event.
7. In this submission, capitalised terms have the meaning set out in Annexure A.

Further Submissions

8. At the time of this submission, no notice has been received by Seqwater of any potentially adverse matters that the Commission may put to Seqwater during the course of the public hearings the Commission has scheduled. Seqwater's responses to the general suggestions that have been made in the media remain as set out in Seqwater's opening submission². Seqwater reserves the right to file further submissions and evidence.
9. Seqwater is committed to assisting the Commission carry out its investigations and will provide such further submissions, documents and assistance as the Commission requires.

² Seqwater, Opening Submission, [182-191].

B Executive Summary

10. In addition to managing the Flood Operations Centre, Seqwater has a number of other important tasks to play in a flood event. The focus of this submission is largely on those other activities and follows Seqwater's opening submission filed with the Commission on 11 March 2011.

Maintenance of Drinking Water Supplies to the Grid

11. Seqwater operated its integrated suite of catchment, water storage, dam and water treatment assets during and after the January 2011 Flood Event to successfully maintain drinking water supplies to the South East Queensland Water Grid, and thereby the Grid customers.
12. Throughout and following the January 2011 Flood Event the Brisbane area was not subjected to water restrictions or boiled water notices, with the exception of limited areas serviced by Atkinson Dam WTP and Lowood WTP.
13. Impacts of the flood events on the Wivenhoe, Somerset and North Pine Dams and on Seqwater's portfolio of water treatment plant assets were monitored and managed in an efficient and proactive manner, in accordance with the applicable emergency response plans.
14. The maintenance of drinking water supply via the Grid by Seqwater, in collaboration with other Grid Participants, was achieved notwithstanding intermittent power outages, limited access, poor raw water quality and damage to physical infrastructure associated with Seqwater's water treatment facilities.
15. To achieve this continuity of supply, Seqwater teams were airlifted to locations where access had been cut and water treatment facilities inundated to complete restoration works and reinstate treatment operations. Seqwater developed contingency supply arrangements in conjunction with other Grid Participants to ensure supply was maintained during periods when ordinary water treatment operations had been interrupted, including at the Mount Crosby WTPs which are essential to the Grid's ability to provide drinking water to customers.
16. Accordingly, Seqwater was an active participant in the Grid during the relevant flood events and was integral to ensuring the response to those flood events:
- (a) was timely in the management of the emergency incidents declared in respect of its assets; and
 - (b) minimised impacts on, and preserved at all times, drinking water supply to the Grid.

Emergency Response and Communications

17. Seqwater operates under a hierarchical structure of emergency response and communication plans, including Grid ERP and its IERP.

18. The January 2011 Flood Event was designated Severity Level 3 using the OCA Incident Manager system under the Grid ERP on 10 January 2011, and increased to Level 4 the following day. The Grid Manager notified Seqwater that it was to continue to forward copies of the TSRs to the Grid Manager, who was acting as Emergency Manager with responsibility for communications. Under the Grid ERP, the Grid Manager assumed strategic command, key stakeholder management, coordination of internal and external communications and coordination of whole-of-Grid operations and support.
19. As far as Seqwater is aware, it has complied in all material respects with its obligations under the Market Rules, the Grid Contract, the Grid ERP, its IERP, and its obligation to supply water to the Grid Manager both during the January 2011 Flood Event and otherwise.

Peer Reviews

20. Seqwater has commissioned independent peer reviews of the operational decisions made in respect of its releases from Wivenhoe and Somerset Dams during the January 2011 Flood Event³ from:
 - (a) Emeritus Professor Colin Apelt;
 - (b) Leonard McDonald;
 - (c) Greg Roads; and
 - (d) Brian Shannon.
21. Seqwater's analysis of the peer reviews:
 - (a) confirmed its compliance with the requirements of the Wivenhoe Manual; and
 - (b) identified aspects of the Wivenhoe Manual where further clarification of the requirements should be addressed in the next review of the Wivenhoe Manual.
22. Seqwater will participate in the next review of the Wivenhoe Manual in conjunction with government agencies and relevant stakeholders once the findings of the Commission are available.

Seqwater's ongoing response

23. Seqwater is engaged in the following ongoing responses to the January 2011 Flood Event:
 - (a) participating in a post-event review of the Grid ERP commissioned by the Grid Manager;
 - (b) participating with relevant government agencies on finalising the Draft Communications Protocol;
 - (c) investigating whether additional rain gauges should be installed in the Brisbane River Basin to improve the level of data recorded during flood events;
 - (d) reviewing Seqwater's telecommunications systems to assess whether there is any need for upgrade or replacement; and

³ Seqwater, Opening Submission, [188].

- (e) developing a further draft TSR template and is currently liaising with EMQ, DERM and the Grid Manager on the document, prior to finalisation.

C. Provision of drinking water

24. Section C outlines the steps taken by Seqwater and other Grid Participants to maintain drinking water for South East Queensland during the January 2011 Flood Event.
25. This section ought to be read in conjunction with the following parts of the Opening Submission:
- (a) Sections C1, C2 and C3 which describe Seqwater's role in the supply of water to the South East Queensland region via the Grid; and
 - (b) Annexure 4 which outlines the regulatory framework for water supply and water resource planning in the region.

C1 Background

26. Prior to Seqwater's establishment, catchment, water storage, dam and treatment operations in South East Queensland were performed by separate entities.
27. All essential catchments, bulk water storage, dam and treatment facilities in the region owned by those entities were transferred to Seqwater after it was established as part of the institutional reform for water supply infrastructure and management under the Restructuring Act.⁴
28. Figure 1 below shows the indicative location of Seqwater's storage, dam and treatment assets throughout the region, including 46 operational water treatment plant facilities⁵ (WTPs). Details of these assets are provided at **Annexure 2**.
29. The main operating functions at Seqwater's WTPs are the⁶:
- (a) operation of pumps and valves to control the source of raw water (where applicable), the flow rate (where applicable), and the direction of water and waste products within the facility;
 - (b) monitoring of raw and treated water quality characteristics to ensure compliance with relevant parameters;
 - (c) alteration of chemical dosing rates in response to changes in flow rates and raw and treated water quality parameters; and
 - (d) timing of backwash operations as required.
30. These functions are undertaken in accordance with site-specific HACCP (Hazard Analysis and Critical Control Points) plans⁷ and within the regulatory framework discussed in detail in Section C2 below.

⁴ Seqwater, Opening Submission, [49].

⁵ Seqwater, *Annual Report 2009/10*, p6; Seqwater, *Drinking Water Quality Management Plan (Draft)*, p9. In addition to the WTPs listed in Annexure 2, Seqwater will operate the Wyalong Dam WTP once constructed.

⁶ Seqwater, *Strategic Asset Management Plan* (May 2009), p51.

⁷ HACCP is an internationally recognised risk management system used extensively in the food industry and increasingly in the water industry for managing and monitoring water quality by (a) first identifying hazards to acceptable water quality;

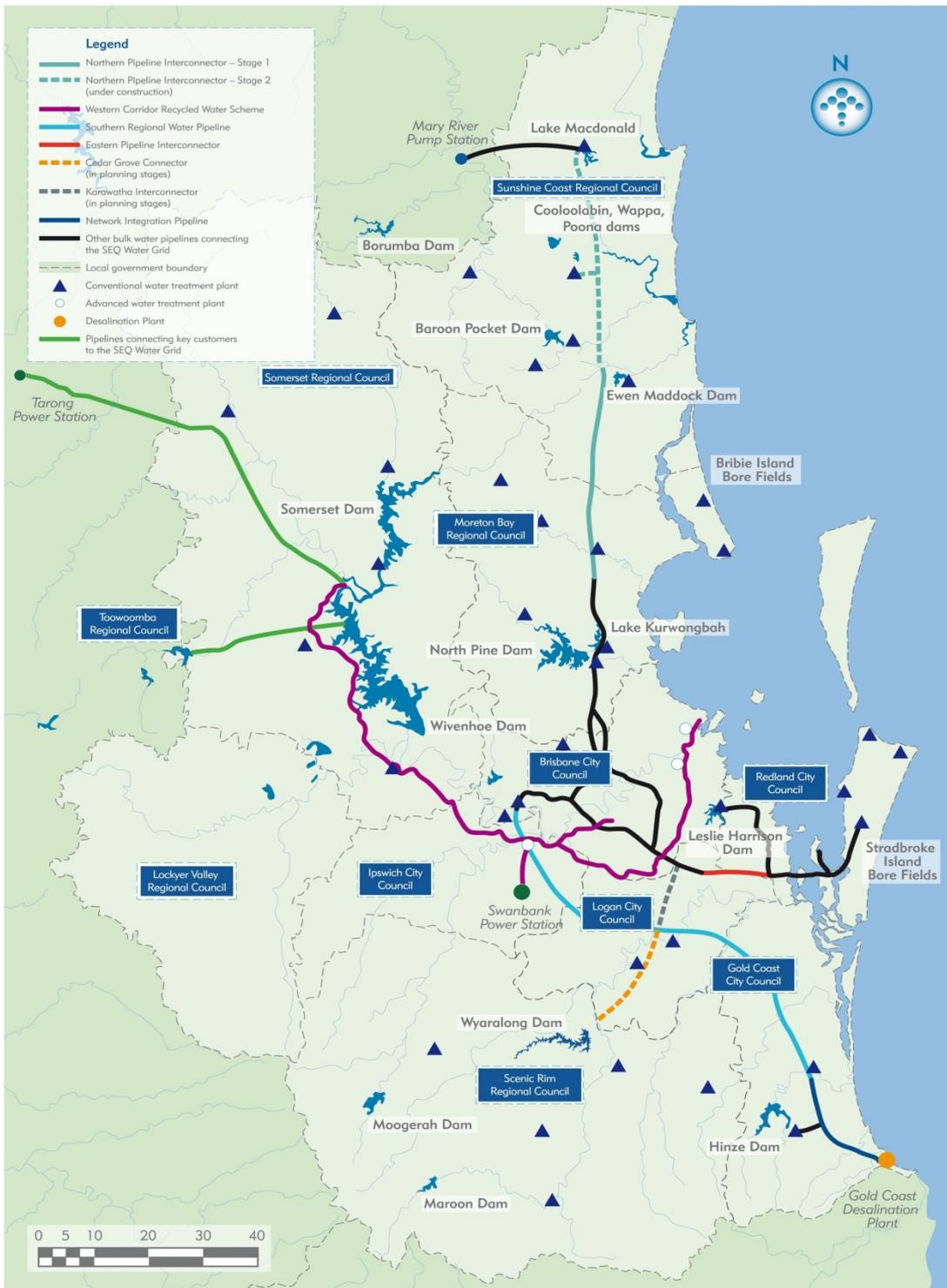


Figure 1: SEQ Water Grid map

(Source: SEQ Water Grid website,
<http://www.seqwgm.qld.gov.au/Water-Grid-Operations/About-the-Water-Grid/Connected-Assets.aspx>)

(b) then identifying critical control points at different parts of the process; and (c) triggering corrective action once water quality parameters exceed critical limits. HACCP also identifies potential weakness and can pre-empt preventive action to avoid critical limits being exceeded in the future: Seqwater, *Strategic Asset Management Plan* (May 2009), p 59.

31. As a result of owning and managing catchments, water storages, dam and treatment facilities, Seqwater is able to incorporate the integrated, multiple-barrier approach and framework for water quality management as recommended in the Australian Drinking Water Guidelines (*ADWG*) (**Attachment 1**) in its governance and operational models.
32. The multiple-barrier approach is universally recognised as the foundation for ensuring safe drinking water. The multiple-barrier approach takes all water quality risks into account and ensures there are “barriers” in place to either eliminate them or minimise their impact. It involves selecting the best available water source and protecting it from contamination, using effective water treatment, and preventing water quality deterioration in the distribution system. The multiple-barrier approach is based on the overarching principles that:
 - (a) catchment management and water supply storages are critical in terms of the water quality and treatment; and
 - (b) water quality management should, wherever possible, address prevention of any degradation or potential adverse impact on water quality at the source, rather than relying on downstream pollution control alone.
33. Figure 2 below illustrates, as an example, the multiple-barriers of the Wivenhoe water supply system.

Figure 2 Multiple barriers for the Wivenhoe system. Barrier 1: all inflow streams and catchment lands. Barrier 2: waters within the impounded lake upstream of the Wivenhoe Dam. Barrier 3: the operations of the dam, and waters released downstream of the dam.

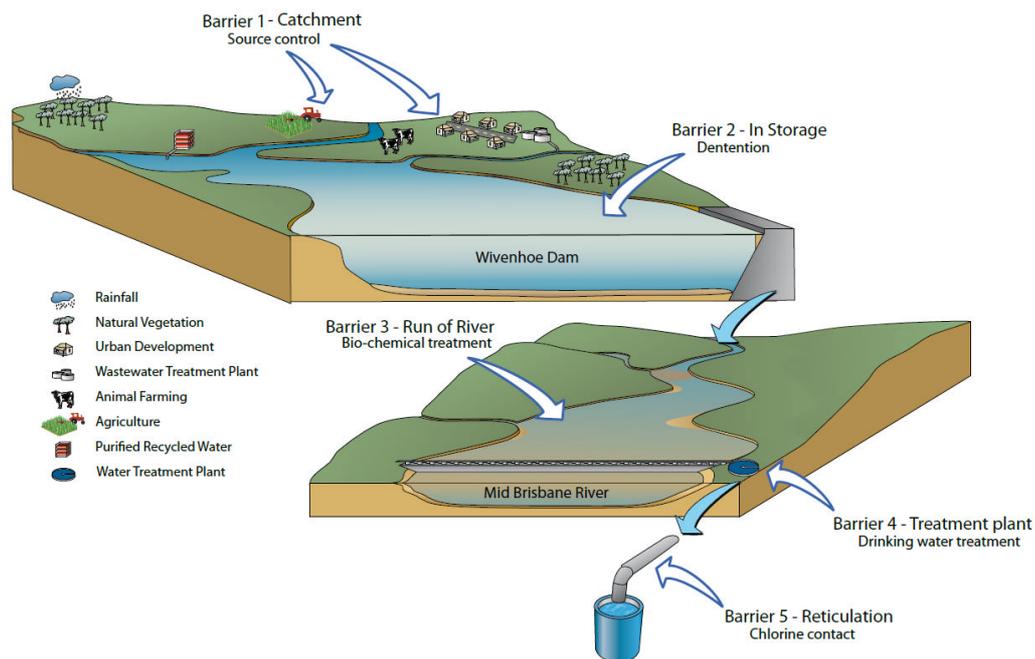


Figure 2: Multiple-barriers for water quality in the Wivenhoe System

(Source: Seqwater, *Drinking Water Quality Management Plan (draft): Lakes Wivenhoe and Somerset, mid-Brisbane River and Catchments* (April 2010), p9)

34. Seqwater is responsible for the first 4 of these barriers, which include catchments, storages, water treatment and disinfection. Other Grid Participants are responsible for the bulk transport and reticulation of the treated water.
35. The adoption of the multiple-barrier approach has been incorporated into Seqwater's Strategic Plan⁸, Water Quality Policy (**Attachment 2**) and Sustainability Charter (**Attachment 3**) and guided the development of its Recreation Management Framework (**Attachment 4**) and Development Guidelines (**Attachment 5**).
36. The bulk of Seqwater's treated water is supplied to the Grid for drinking water use around the region.
37. While this submission will focus on the provision of drinking water to the region via the Grid, Seqwater also supplies:
 - (a) untreated water for use by the Grid's industrial customers;
 - (b) treated water for use at its recreation facilities; and
 - (c) untreated water for irrigation purposes to approximately 1,000 rural customers operating in the Logan/Albert River, Warrill Valley, Lockyer Valley and Mary Valley catchments.

C2 Regulatory framework for water quality and supply

Water quality under the Water Supply Act

38. Seqwater is a deemed "water service provider" for the purposes of the Water Supply Act⁹ and accordingly is:
 - (a) not liable for an event or circumstance beyond its control where it has otherwise acted reasonably and without negligence¹⁰; and
 - (b) required to comply with an approved:
 - (i) strategic asset management plan (**SAMP**)¹¹;
 - (ii) system leakage management plan (**SLMP**)¹²; and
 - (iii) drought management plan (**DMP**)¹³.

⁸ See Opening Submission, Attachment 2.

⁹ *South East Queensland Water (Restructuring) Act 2007*, ss72, 73(4); the registration provisions in the Water Supply Act do not apply to Seqwater (see *South East Queensland Water (Restructuring) Act 2007*, s73(5); *Water Supply (Safety and Reliability) Act 2008*, ss21-22).

¹⁰ *Water Supply (Safety and Reliability) Act 2008*, s49.

¹¹ *Water Supply (Safety and Reliability) Act 2008*, s77; Seqwater was required to prepare this plan within 18 months of its establishment: *South East Queensland Water (Restructuring) Act 2007*, s74(1). The SAMP was submitted to DERM on 18 May 2009 and approved on 13 July 2009.

¹² *Water Supply (Safety and Reliability) Act 2008*, s91; Seqwater was required to prepare this plan within 2 years of its establishment: *South East Queensland Water (Restructuring) Act 2007*, s74(2). The SLMP was submitted to DERM on 1 September 2009. A further SLMP was submitted to DERM on 4 March 2010 and approved on 20 May 2010.

39. Seqwater's SAMP, SLMP and DMP have each been approved in accordance with the Water Supply Act and are provided at **Attachment 6**, **Attachment 7** and **Attachment 8** respectively.
40. Seqwater is required to comply with drinking water quality management plans (*DWQMPs*) in relation to its supply of drinking water, once approved by the Regulator¹⁴.
41. Under the transitional arrangements of the Water Supply Act, Seqwater is not required to have an approved DWQMP until 1 July 2011¹⁵. Until such time as a DWQMP is approved, Seqwater is required to:
 - (a) undertake monitoring in accordance with its existing program¹⁶ and the water quality standards specified in the Public Health Regulation¹⁷; and
 - (b) report monitoring results to the Regulator each quarter and otherwise following an incident that will, or is likely to, adversely affect drinking water quality.
42. Seqwater's existing monitoring and verification program and HACCP plans meet the water quality standards required under regulation. A recent review of the Seqwater monitoring program shows that approximately 163 different parameters (including microbiological, chemical, physical and radiological) are analysed annually, with a total of approximately 130,000 individual tests undertaken each year.
43. Further, and notwithstanding the transitional arrangements, Seqwater has prepared:
 - (a) a draft DWQMP in relation to Seqwater's overall WTP portfolio (provided at **Attachment 9**); and
 - (b) a draft DWQMP specific to the Wivenhoe system (relevant to the Mount Crosby, Esk, Lowood and Wivenhoe Dam WTPs) which will be, as necessary, augmented with purified recycled water (provided at **Attachment 10**).
44. Seqwater provided both drafts to the Regulator for comment in September 2010 and is currently in the process of finalising its DWQMPs in accordance with the comments received from the Regulator.
45. Seqwater's draft DWQMPs and existing HACCP plans:
 - (a) contain water quality standards that meet, or exceed, the:
 - (i) "water quality criteria for drinking water" required for such plans under the Water Supply Act¹⁸; and

¹³ *Water Supply (Safety and Reliability) Act 2008*, s130. Seqwater was required to prepare this plan within 18 months of its establishment: *South East Queensland Water (Restructuring) Act 2007*, s74(1). The DMP was submitted to the DERM on 17 August 2009 and registered on 26 October 2009.

¹⁴ *Water Supply (Safety and Reliability) Act 2008*, ss92-93; See Schedule 3 for definition of "drinking water service".

¹⁵ *Water Supply (Safety and Reliability) Act 2008*, s628.

¹⁶ Seqwater has provided a copy of its existing monitoring and verification program to the Regulator.

¹⁷ *Public Health Regulation 2005*, s18AC.

¹⁸ *Water Supply (Safety and Reliability) Act 2008*, Schedule 3: *water quality criteria for drinking water* means: (i) the standards for the quality of drinking water prescribed in a regulation under the Public Health Act; (ii) the criteria stated in a

- (ii) standards specified in the ADWG; and
 - (b) adopt the multiple-barrier approach recommended in the ADWG, which is explicitly referred to in the *Drinking Water Quality Management Plan Guideline* (September 2010) and is otherwise consistent with the requirements for a DWQMP under the Water Supply Act¹⁹.
46. As far as it is aware, Seqwater has complied in all material aspects with the abovementioned regulatory framework for water quality and supply.

Water Supply to the Grid under the Water Act

47. The Water Act establishes the South East Queensland Water Market (*Market*) for:
- (a) the supply of declared water services by Grid service providers, such as Seqwater²⁰, to the Grid Manager; and
 - (b) the subsequent sale of supplied water by the Grid Manager to Grid customers²¹.
48. The operation of the Market is regulated by:
- (a) the SOP, which provides the hydrological principles to be applied by the Grid Manager to ensure the optimum conjunctive use of water storages and manufactured water resources;
 - (b) the South East Queensland Water Market Rules (*Market Rules*), which are administered by the QWC and govern the operational and commercial aspects of the Market;
 - (c) the 'grid contracts' made by the Minister under section 360ZDD of the Water Act which govern the specific commercial transactions between the Grid Manager and each Grid participant; and
 - (d) any Operating Protocols approved under the Market Rules which establish agreed operational interactions between Grid Participants that interact with one another in the day-to-day management of the physical supply of drinking water to the region²².
49. The Market Rules are provided at **Attachment 11**.
50. The grid contract between the Grid Manager and Seqwater dated 28 June 2010 is provided at **Attachment 12 (Grid Contract)**.

guideline, if any, made by the regulator about the quality of drinking water; (iii) the criteria for the quality of drinking water stated in a condition applying to a drinking water quality management plan. For the "standards for the quality of drinking water prescribed in a regulation under the Public Health Act" see *Public Health Regulation 2005*, s18AC; For the "criteria stated in a guideline, if any, made by the regulator about the quality of drinking water" see DERM's *Water Quality and Reporting Guideline for a Drinking Water Service* (September 2010), Chapter 3.

¹⁹ See *Water Supply (Safety and Reliability) Act 2008*, s95(3)(b); See also DERM, *Drinking Water Quality Management Plan Guideline*, September 2010 available at http://www.derm.qld.gov.au/water/regulation/pdfs/dw_mgmt_plan_gline.pdf.

²⁰ *Water Act 2000*, Schedule 4: A 'grid service provider' is a water service provider supplying a 'declared water service'; See Queensland Government Gazettes dated 27 June 2008 and 24 October 2008 for declarations.

²¹ *Water Act 2000*, ss360ZCL, s360ZDG.

²² Explanation drawn from Market Rules, cl. 1.5.

51. Seqwater has a number of obligations under the Market Rules²³ which include:
- (a) providing the Grid Manager with a monthly forecast notice specifying:
 - (i) the expected water treatment capacity of its WTPs; and
 - (ii) the existing volume of water in its bulk water storages²⁴;
 - (b) complying with:
 - (i) Grid Instructions issued by the Grid Manager²⁵ which specify how much water should be produced from each of its Grid-connected WTPs within a 20% margin;
 - (ii) Operating Instructions issued in accordance with the Market Rules or Operating Protocols²⁶;
 - (iii) the Water Grid Emergency Response Plan prepared by the Grid Manager (*Grid ERP*) (provided at **Attachment 13**) as necessary²⁷;
 - (iv) its own approved Incident and Emergency Response Plan (*IERP*) (provided at **Attachment 14**) which is consistent with the Grid ERP as necessary²⁸; and
 - (c) supplying water that meets the water quality specifications in any approved DWQMP²⁹.
52. Further to the obligation noted at paragraph 51(c) above, the Grid Contract requires Seqwater to supply the Grid with treated water that meets the quality requirements in the ADWG and otherwise endeavour to meet specified "additional quality parameters"³⁰. Currently, the water quality standards in Seqwater's existing HACCP plans and draft DWQMPs meet the "additional quality parameters" specified in the Grid Contract.
53. Operating Protocols under the Market Rules are under development. Representatives of all Grid Participants have met on several occasions to develop the basis for final Operating Protocols to be completed by 31 January 2012³¹.

²³ See, generally Market Rules, cl 3.7 and 3.8. It is an offence to contravene the Market Rules: *Water Act 2000*, s360ZDj; see also Market Rules, cl 3.7(a).

²⁴ Market Rules, cl 4.4; other Grid Participants, including LinkWater and the Distribution Authorities, are under similar obligation to provide monthly forecasts for capacity and demand as relevant.

²⁵ Market Rules, cl. 3.8(b),3.22: see also exception under cl. 4.13.

²⁶ Market Rules, cl. 3.8(d), 3.21, 3.22, 4.20.

²⁷ Market Rules, cl 4.32(a), 4.33(b). Water Grid Emergency Response Plan is provided at **Attachment #**.

²⁸ Market Rules, cl 4.32(b); 433(a). Seqwater's Incident and Emergency Response Plan is provided at **Attachment #**.

²⁹ Market Rules, cl 3.8(c).

³⁰ Grid Contract, cl 10.2, Schedule 3.

³¹ Queensland Water Commission, Administrator's Annual Market Rules Review for the SEQ Water Market: 2009-2010, p2 available at <http://www.qwc.qld.gov.au/reform/pdf/Market-Rules-Review-0910.pdf>.

C3 Operation of Grid during the January Flood Event

54. Seqwater's water treatment operations were interrupted to varying degrees at different locations across its asset network during the January 2011 Flood Event. Interruptions were caused where:
- (a) access or power was cut;
 - (b) damage was sustained to the physical infrastructure that ordinarily supplies raw water to the WTP for treatment, including instances where infrastructure was inundated or washed away; or
 - (c) raw water quality was adversely impacted by rainfall and inflows to an extent that the WTP:
 - (i) could not treat the water to meet the water quality parameters in Seqwater's relevant HACCP plan or procedures; and
 - (ii) was shutdown until raw water quality improved.
55. **Annexure 3** details the impact of the January 2011 Flood Event on Seqwater's WTPs and the actions taken by Seqwater and, where relevant, the Grid Manager.

Impact to Access, Plant and Equipment

56. Where road access to WTP sites had been cut, Seqwater arranged for helicopters and marine craft to transport:
- (a) operational staff to the WTPs that remained operational; and
 - (b) maintenance and operational staff to those WTPs that were not operating to develop restoration and contingency plans and otherwise assess supply levels.
57. Damage to WTP-associated infrastructure was generally limited to the WTPs in the Somerset and Lockyer region and along the Brisbane River. Notable instances are summarised below.

Lowood WTP

58. The raw water wells, pumps and associated electrical equipment for the Lowood WTP was inundated, damaged or otherwise swept away by floodwaters on 11 January 2011 which rendered the WTP inoperable.
59. Treated water from the Lowood WTP is generally supplied to Queensland Urban Utilities (*QUU*) for distribution.
60. Seqwater operational staff accessed the site by helicopter and marine craft on 13 January 2011 and installed temporary supply infrastructure including pipework and a diesel pump to supply raw water to the WTP until such time as the permanent infrastructure was repaired or replaced.
61. From 15 January 2011, Seqwater was able to supply the WTP with raw water via the temporary supply infrastructure however was initially forced to intermittently shutdown the WTP to relocate the temporary infrastructure on several occasions to meet rapidly declining river levels.

62. **Attachment 15** includes a photograph taken from the Lowood intake tower site on 23 January 2011 which shows how far the river level declined after its peak, as indicated by the brown high water line on the white roller door of the tower.
63. As a precaution to ensure the pump station could remain operational, Seqwater sourced a second diesel pump from Sydney Water as a contingency. A boiled water notice was issued by QUU as a precautionary measure due to damage sustained to the local distribution network.
64. The temporary raw water supply infrastructure remained in place until 10 February 2011, following the completion of repairs to the permanent supply infrastructure.

Mount Crosby East Bank WTP

65. The pump station for the Mount Crosby East Bank WTP was inundated on 12 January 2011, at which time there was also a temporary loss of power, which rendered the pump station inoperable. Further, the pump station was isolated by floodwaters and inaccessible by road at this time.
66. Mount Crosby East Bank WTP is the largest WTP in Queensland from which bulk treated water supplies to LinkWater are distributed around the Grid. No other WTP or combination of WTPs can provide a comparable amount of treated water to the Grid. Accordingly, the WTP is considered essential to the ability of the Grid to meet customer demand for any length of time.
67. To ensure the WTP was reinstated as quickly as possible, Seqwater airlifted operational and maintenance crews to the pump station by helicopter to complete restoration works.
68. These works included dewatering a series of pump wells and dismantling and reconditioning bearings on pump motor shafts.
69. Site crews also manually read river levels and relayed the information to the flood engineers during this entire period as some of the automatic stations that ordinarily provide this data had been damaged by a combination of water inundation, debris damage and loss of power³².
70. Mount Crosby East Bank WTP was reinstated on 14 January 2011. Whilst the WTP was inoperable, water was being supplied from a combination of other assets including the Mount Crosby West Bank WTP.
71. The efforts made by the Seqwater site crew to reinstate the Mount Crosby East Bank WTP to maintain water supply to the Grid were recognised by the Minister for Natural Resources, Mines and Energy and Minister for Trade, the Honourable Stephen Robertson MP in response to a question without notice in the Queensland Parliament³³, reproduced at **Attachment 16**.

³² Seqwater, *January 2011 Flood Event: Report on the Operation of Somerset and Wivenhoe Dam* (2 March 2011), p 51.

³³ Queensland Parliamentary Counsel, *Hansard, Record of Proceedings, Wednesday, 16 February 2011*, p122.

Kilcoy, Jimna and Linville WTPs

72. The raw water supply infrastructure at the Kilcoy, Jimna and Linville WTPs were inundated on 10 January 2011 which rendered each of the WTPs inoperable³⁴.
73. The treated water from these WTPs is ordinarily supplied to Queensland Urban Utilities for distribution.
74. At Kilcoy, Seqwater was able to operate a contingency WTP for a short period after dragging a diesel pump above flood waters with the assistance of local farmers. The Kilcoy WTP was otherwise reinstated on 15 January 2011.
75. The Jimna and Linville WTPs were reinstated on or about 14 January 2011 when access was restored. At Linville, power to the WTP was provided via an electrical generator with water tankers used initially to replenish reservoirs.

Dayboro and Kenilworth WTPs

76. The raw water supply infrastructure at Dayboro and Kenilworth WTPs was also inundated on 10 January 2011, at approximately the same time power was cut, which rendered each of the WTPs inoperable.
77. The treated water from both WTPs is ordinarily supplied to Unity Water for distribution.
78. When access was restored, water tankers were used initially to replenish reservoirs. Kenilworth WTP was reinstated on 14 January 2011. Dayboro WTP was reinstated on 15 January 2011 with power sourced from an electrical generator.

Atkinson Dam WTP

79. Finally, the raw water bore at Atkinson Dam WTP was also inundated on 10 January 2010³⁵.
80. The treated water from this WTP is ordinarily distributed by Seqwater, as owner of the related distribution infrastructure connected to the facilities in the recreation area at the dam and approximately 3 nearby houses.
81. Seqwater shutdown the WTP temporarily to carry out water quality tests, issued boil water notices to the small number of affected residents and recreational users and arranged for water tankers to supply clean water until such time as the water quality tests were completed and the WTP reinstated.

Impact to Raw Water Quality

82. Under its suite of HACCP plans, Seqwater does not operate a WTP where critical raw water quality limits are reached. This operational procedure ensures the quality of treated water from the WTP.
83. The significant rainfall and storage inflows associated with the January 2011 Flood Event adversely impacted the quality of the raw water available in a number of Seqwater's storages.

³⁴ SEQ Water Grid Manager, *Northern Asset Inundation – 1602EST-10JAN11, incident report* (10 January 2011).

³⁵ SEQ Water Grid Manager, *Atkinson Dam WTP inundation – 1230EST-10JAN11, incident report* (10 January 2011).

84. By way of example, Figure 3 below shows the indicative levels of colour and turbidity in the Brisbane River at the raw water source point for the Mount Crosby WTPs.
85. The raw water at this source is, on average, 7 PCU for colour and 7 NTU for turbidity³⁶.

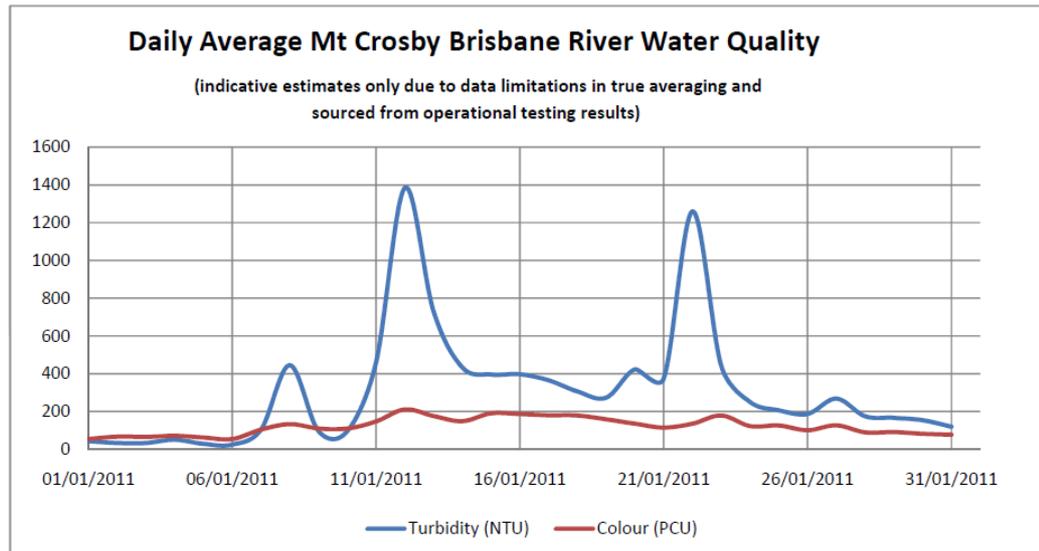


Figure 3: Indicative daily average water quality levels at source point for Mount Crosby WTPs
(Source: Seqwater – Derived from routine sampling sheets undertaken by WTP operators.)

86. Despite the adverse impacts to raw water quality during the January 2011 Flood Event, Seqwater was able to operate the majority of its WTPs throughout January within the raw water quality parameters specified in relevant HACCP plans.
87. Seqwater did, however, shutdown the following WTPs for periods in and around the January 2011 Flood Event before critical HACCP limits were reached to ensure treated water quality was not compromised:
- (a) Caboolture WTP (from 8 January 2011);
 - (b) Mount Crosby WTPs (for intermittent periods during the January 2011 Flood Event);
 - (c) Capalaba WTP (for intermittent periods during the January 2011 Flood Event); and
 - (d) Canungra WTP (from 11 January 2011 to 13 January 2011).
88. Further:
- (a) the production capacity at the North Pine and Lowood WTPs was limited at times. **Attachment 17** includes an aerial photograph of the raw water source point for the Lowood WTP on 23 January 2011 which demonstrates the poor quality of raw water;

³⁶ Seqwater, *Mt Crosby Eastbank Water Treatment Plant: HACCP Plan* (August 2010), pp 26-28.

- (b) due to the poor raw water quality downstream of North Pine Dam, Seqwater sourced raw water from the alternative Lake Kurwongbah to maintain supply from the Petrie WTP; and
- (c) due to poor raw water quality at the source for the Mount Crosby WTPs on 12 January 2011 and concerns the plants may not meet critical HACCP limits, Seqwater met with the Grid Manager, other Grid Participants, Regulator, Queensland Health and two national experts. Accepting the advice from the national experts, Queensland Health recommended a short term temporary relaxation of Seqwater's treatment standards to allow for continued water supply out of the Mount Crosby WTPs without increasing the acceptable level of risk to the community. Notwithstanding the relaxation, the treated water ultimately produced from the Mount Crosby WTPs was at the lower end of the relaxed range (i.e. of a higher quality than the relaxation otherwise allowed) and Seqwater was able to revert back to the water quality parameters under its ordinary HACCP plan from 14 January 2011.

Other Impacts

- 89. During the January 2011 Flood Event, recreation infrastructure at Somerset, Wivenhoe, and Moogerah dams was inundated. In the interest of public safety, Seqwater closed the recreation areas at those dams and evacuated the camping grounds at Wivenhoe. With the exception of the spillway common at Wivenhoe Dam, each of these areas was reopened within a month of the January 2011 Flood Event.
- 90. Furthermore, Seqwater Rangers mobilised teams to complete a series of fish rescues following the January 2011 Flood Event. These teams accessed damaged areas downstream of Wivenhoe Dam, with a particular focus on rescuing stranded Australian lungfish in accordance with a Lungfish Management Program that Seqwater developed in partnership with Fisheries Queensland (which now forms part of the Department of Employment, Economic Development and Innovation) and universities. Ultimately, Seqwater teams were able to rescue approximately 1000 lungfish.

Substitution of Supply

- 91. As detailed in Annexure 2, the supply from a number of Seqwater's WTPs are able to be substituted from other facilities connected to the Grid.
- 92. In order to substitute the supply to the Grid from WTPs interrupted by the January 2011 Flood Event, Seqwater:
 - (a) in consultation with LinkWater and the Grid Manager:
 - (i) temporarily increased supply from the Molendinar WTP on 12 January 2011 and from the Mudgeeraba WTP on 13 and 14 January 2011 to substitute supply via the Southern Regional Pipeline;
 - (ii) began operating the Ewen Maddock WTP from 14 January 2011, which was not operational prior to the January 2011 Flood Event, to substitute supply via the Northern Pipeline Interconnector;

- (iii) increased supply from the Landers Shute WTP from 15 January 2011 to substitute supply via the Northern Pipeline Interconnector; and
 - (b) in consultation with Unity Water and Queensland Urban Utilities:
 - (i) was able to identify and prioritise where water tankers ought to be deployed to replenish distribution infrastructure until such time as relevant WTPs were reinstated as required to meet demand.
- 93. The collaboration and decision making in relation to the continuation and substitution (where necessary) of drinking water supply was facilitated through the arrangements under the IERP, Grid ERP and existing operating arrangements between Seqwater and relevant Grid Participants.
- 94. This involved daily, at times hourly, meetings and teleconferences between relevant Grid Participants and meetings of the overarching Emergency Response Team established under the Grid ERP and managed by the Grid Manager.
- 95. This collaborative approach was in place prior to, and remained in place for some time after, the January 2011 Flood Event to manage the potential interruption to WTP operations associated with releases from the Wivenhoe and Somerset dams. These releases had the potential to interrupt water treatment operations due to the poor raw water quality in the dam storages following the inflows associated with the extreme rainfall in the catchments.

Compliance with Market Rules

- 96. The flexibility to supply and distribute water from different WTPs connected to the Grid to align with updated capacity and demand forecasts is the key water security function of the Grid.
- 97. To achieve this flexibility, the Market Rules provide a mechanism for Grid Instructions to be amended by the Grid Manager after they are initially issued³⁷. The mechanism involves Grid Participants lodging 'Inability to Comply' notices with the Grid Manager which can then lead to the Grid Manager issuing an amended Grid Instruction which supersedes any initial instruction³⁸.
- 98. Figure 4 below illustrates the Grid Instruction process under the Market Rules.
- 99. On 25 January 2011, Seqwater lodged Inability to Comply notices with the Grid Manager to recognise the:
 - (a) increase in supply from the Landers Shute WTP to substitute the Grid;

³⁷ Market Rules, cl. 4.14-4.15; see also cl. 4.13: "A Grid Instruction is valid and a Grid Service Provider or Distribution Service Provider must, to the extent possible, comply with a Grid Instruction in the manner and within the time specified in the Grid Instruction notwithstanding: (a) a failure by the Water Grid Manager to comply with the process for preparation and issue of a Grid Instruction specified in sections 4.11 and 4.12; or (b) the issue of a notice under section 4.14(a), unless in the Grid Service Provider's or Distribution Service Provider's reasonable opinion, to do so would be a hazard to public safety, risk materially damaging equipment, or contravene any other law or Document including a Flood Mitigation Manual which has a higher priority in accordance with section 1.10 than the Grid Instruction".

³⁸ Market Rules, cl. 4.14(b)(i).

- (b) unforeseen supply from the Ewen Maddock WTP to substitute the Grid; and
- (c) varied impacts of the January 2011 Flood Event on production from the Caboolture, North Pine, Capalaba and Mount Crosby WTPs.

100. Subsequently, the Grid Manager issued an amended Grid Instruction provided at **Attachment 18 (January Grid Instruction)**³⁹.

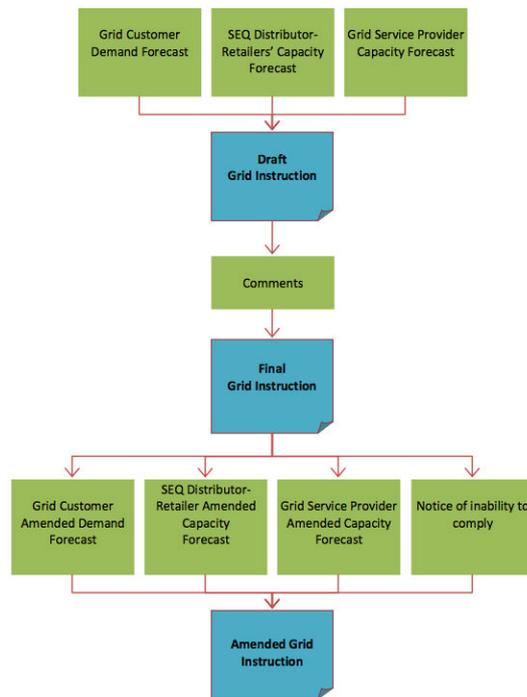


Figure 4: Flowchart of Grid Instruction process under Market Rules

(Source: SEQ Water Grid Manager, *SEQ Water Grid Operating Strategy, Version 3 - February 2011* (March 2011), p 25)

101. Ultimately, Seqwater successfully complied with its supply obligations under the January Grid Instruction, as shown in Table 1.

³⁹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011).

Table 1: Initial and Final Grid instructions and actual end of month volumes

(Source: Grid Manager, *Final January 2011 Grid Instruction* (23 December 2010); Grid Manager, *Amendment January 2011 Grid Instruction* (28 January 2011); Seqwater, *Operations Report: January End of Month Water Treatment Plant Production Volumes* (1 February 2011).)

WTP	Grid Instruction Volume		End of Month Volume		
	<i>Grid Instruction dated 23/12/10</i>	<i>Grid Instruction (as amended) dated 28/01/11</i>	<i>January End of Month Volume</i>	<i>-/+20% Variance Achieved</i>	<i>Variance (%)</i>
Caboolture	109	8	8	<input checked="" type="checkbox"/>	-1%
Ewen Maddock	0	110	103	<input checked="" type="checkbox"/>	-6%
Image Flat	465	465	450	<input checked="" type="checkbox"/>	-3%
Landers Shute	2,129	2,400	2,534	<input checked="" type="checkbox"/>	6%
North Pine	3,110	2,600	2,525	<input checked="" type="checkbox"/>	-3%
Petrie	388	388	383	<input checked="" type="checkbox"/>	-1%
Capalaba	410	250	227	<input checked="" type="checkbox"/>	-9%
Mt Crosby	7,426	7,431	6,704	<input checked="" type="checkbox"/>	-10%
Molendinar	3,833	3,833	3,631	<input checked="" type="checkbox"/>	-5%
Mudgeeraba	1,409	1,409	1,595	<input checked="" type="checkbox"/>	13%
North Stradbroke Island	744	744	874	<input checked="" type="checkbox"/>	17%
TOTAL	20,023	19,638	19,034	<input checked="" type="checkbox"/>	-3%

102. Consequently, and in conjunction with the other Grid Participants operating within the ambit of the Market Rules, drinking water supply via the Grid was maintained throughout January, during and notwithstanding the January 2011 Flood Event.
103. Further, during this entire period the Brisbane area was not subjected to water restrictions or boiled water notices of any kind. It was Seqwater's objective to ensure this essential service was not disrupted if at all possible. Through an extended and co-ordinated effort this objective was achieved.
104. As far as Seqwater is aware, it has complied in all material respects with its obligations under the Market Rules, the Grid Contract, the Grid ERP, Seqwater's IERP, and Seqwater's obligation to supply water to the Grid Manager during the January 2011 Flood Event and otherwise.

D. Emergency response systems

D1 Queensland Disaster Management Framework

105. At 10.00 am on 11 January 2011, the Queensland Premier and the Minister for Police, Corrective Services and Emergency Services approved the declaration of a Disaster Situation for Brisbane, Bundaberg, Dalby, Gladstone, Gold Coast Gympie, Ipswich, Logan, Maryborough, Rockhampton, Roma, Sunshine Coast, Toowoomba, Warwick and Redcliffe Disaster Districts, in accordance with section 69 of the Disaster Act.⁴⁰
106. Queensland's primary disaster management instrument is the Disaster Act. The Disaster Act does not compel Seqwater to perform specific functions in the event of a disaster being declared.
107. The objects of the Disaster Act are to:
- (a) help communities—
 - (i) mitigate the potential adverse effects of an event;
 - (ii) prepare for managing the effects of an event; and
 - (iii) effectively respond to, and recover from, a disaster or an emergency situation;
 - (b) provide for effective disaster management for the State; and
 - (c) establish a framework for the management of the State Emergency Service and emergency service units to ensure the effective performance of their functions.⁴¹
108. The Disaster Act provides that these objects are to be primarily achieved by:
- (a) establishing disaster management groups for the State, disaster districts and local government areas;
 - (b) preparing disaster management plans and guidelines;
 - (c) ensuring communities receive appropriate information about preparing for, responding to and recovering from a disaster;
 - (d) declaring a disaster situation;
 - (e) establishing the State Emergency Service and emergency service units;
 - (f) ensuring the State Emergency Service and emergency service units can effectively perform their functions.⁴²

⁴⁰ See Queensland Government Gazette, Extraordinary, Vol 356, No. 6, dated 11 January 2011.

⁴¹ s.3, Disaster Act.

⁴² s.4, Disaster Act.

109. Relevantly, the District Disaster Management Group's functions include:
- (a) to ensure the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovering from a disaster;⁴³ and
 - (b) to establish and review communications systems in the group, and with and between local groups in the district, for use when a disaster happens.⁴⁴
110. Local Government Disaster Management Group's functions include:
- (a) to ensure the community is aware of ways of mitigating the adverse effects of an event, and preparing for, responding to and recovering from a disaster;⁴⁵
 - (b) to establish and review communications systems in the group, and with the relevant district group and other local groups in the disaster district of the relevant district group, for use when a disaster happens;⁴⁶ and
 - (c) to ensure information about a disaster in the area is promptly given to the relevant district group.⁴⁷
111. Consequently, local government underpins the Queensland disaster management system.⁴⁸ During a disaster, local government provides initial support for the affected community until its resources are fully committed.⁴⁹ State support is then available, and is provided by State agencies in accordance with their core function through the Disaster District structure.⁵⁰ Commonwealth support can be requested if State resources are exhausted or not available.⁵¹
- D2 Grid Manager's and Seqwater's Emergency Management Responsibilities**
112. The Market Rules require:
- (a) the Grid Manager to prepare, implement and maintain a Grid ERP;⁵² and
 - (b) Seqwater to prepare and submit to the Grid Manager for approval, an emergency response plan that is consistent with the Grid ERP.⁵³
113. The Market Rules are a statutory instrument.⁵⁴ The Market Rules took effect on 1 July 2008 and amendments to the Market Rules took effect on 1 July 2010.⁵⁵

⁴³ s.23(f), Disaster Act.

⁴⁴ s.23(j), Disaster Act.

⁴⁵ s.30(e), Disaster Act.

⁴⁶ s.30(i), Disaster Act.

⁴⁷ s.30(j), Disaster Act.

⁴⁸ Brisbane City Council, *Disaster Management Plan – Preliminaries* (2007), p 14.

⁴⁹ Brisbane City Council, *Disaster Management Plan – Preliminaries* (2007), p 14.

⁵⁰ Brisbane City Council, *Disaster Management Plan – Preliminaries* (2007), p 14.

⁵¹ Brisbane City Council, *Disaster Management Plan – Preliminaries* (2007), p 14.

⁵² s4.24, Water Market Rules.

⁵³ s4.26, Water Market Rules.

114. On 17 November 2010, the Grid Manager confirmed that in accordance with the Market Rules, Seqwater's IERP was consistent with the Grid ERP.⁵⁶

Grid ERP

115. The purpose of the Grid ERP is to coordinate an effective response across the Grid in the event of an incident which is defined as an emergency in the Grid ERP.⁵⁷

116. As detailed in the Table below, during the critical periods of the January 2011 Flood Event (i.e. from 10 January 2011 onwards) the events were unequivocally defined as an emergency for the purposes of the Grid ERP, with a severity level of 3 or greater.

117. Relevantly, in the event of an emergency with a severity level of 3 or greater, Seqwater and other Grid Participants are:

- (a) not to present a public face independent of the Grid Manager (or other agency appointed as the Emergency Manager);⁵⁸ and
- (b) not to issue releases of information independent of the Grid Manager (or other agency appointed as the Emergency Manager).⁵⁹

118. Additionally, Seqwater was advised by the Grid Manager that from 6 December 2010, the OCA Incident Manager was to be used for Alert, Level 3-5 emergency notification, management and closure.⁶⁰

119. Accordingly, in the event of an emergency, Seqwater and other Grid Participants (subject to any other statutory obligations they may have), are required to:

- (a) manage the on-site response to the incident itself;⁶¹ and
- (b) work cooperatively with the Grid Manager's Emergency Coordination Team and any appointed Emergency Manager.⁶²

120. The strategic command, key stakeholder management, coordination of internal and external Grid communications, and coordination of whole of Grid operations and support are the responsibility of the Grid Manager and/or another Emergency Manager appointed for the event.

⁵⁴ s360ZCX, Water Act.

⁵⁵ s.3, s.5, *Water (Market Rules) Notice 2008*.

⁵⁶ Letter from Grid Manger to Seqwater, 17 November 2010.

⁵⁷ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 6.

⁵⁸ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 46.

⁵⁹ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 46.

⁶⁰ Letter from Grid Manager to Seqwater, 17 November 2010.

⁶¹ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 13.

⁶² Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 13.

Table 2: Events under the Grid ERP prior to, during and after the January 2011 Flood Event.

(Source: derived from Grid Manager, *OCA Incident Manager* (Software System).)

Event	Commenced	Finished	Severity Level	Lead Agency	Comments
Wivenhoe/Somerset Dam Releases	17/12/2010	07/01/2011	Alert	Grid Manager	<ul style="list-style-type: none"> • Initiating Agency – Seqwater • Emergency Manager – Grid Manager • Communications – Grid Manager
Wivenhoe Dam Releases	06/01/2011	11/02/2011	3 ¹	Grid Manager	<ul style="list-style-type: none"> • Initiating Agency – Seqwater • Emergency Manager – Grid Manager • Communications – Grid Manager • Initial Direction to Seqwater from the Grid Manager - Continue to copy TSRs to Grid Manager
Atkinson Dam WTP Inundation	10/01/2011	14/02/2011	3	Grid Manager	<ul style="list-style-type: none"> • Initiating Agency – Seqwater • Emergency Manager – Grid Manager • Communications – Grid Manager • Other agencies notified – Qld Health and Office of Water Supply Regulator
Northern Region Asset Inundation	10/01/2011	11/02/2011	3	Grid Manager	<ul style="list-style-type: none"> • Initiating Agency – Seqwater • Emergency Manager – Grid Manager • Communications – Grid Manager • Other agencies notified – State Disaster Coordination Committee, Unity Water, Energex • Initial Direction to Seqwater from the Grid Manager.
Extreme Weather Event	11/01/2011	11/02/2011	4	Grid Manager	<ul style="list-style-type: none"> • Initiating Agency – Queensland Urban Utilities • Emergency Manager – Grid Manager • Communications – Grid Manager • Other agencies notified – Local Disaster Management Group, District Disaster Management Group, Seqwater.
Wivenhoe Dam Releases	18/02/2011	N/A	Alert	Grid Manager	<ul style="list-style-type: none"> • Reported Severity level was 3. This was changed by the Grid Manager to Alert. The reason given was that releases are only required to be notified initially as an "Alert". • Initiating Agency – Seqwater • Emergency Manager – Grid Manager • Communications – Grid Manager • Initial Directions to Seqwater from the Grid Manager – Keep the Grid Manager informed with daily TSR and that initial management of communication would be per the Grid ERP Alert Level protocols.

¹Note: The event was initially notified as an Alert severity level on 6 January 2011. This severity level was confirmed by the Grid Manager on the same day. Although it was an Alert severity level, the Grid Manager's acknowledgement notice confirmed that the Emergency Manager was the Grid Manager; communications were directed to the Grid Manager and the Initial Direction to Seqwater from the Grid Manager was to continue to copy the TSRs to Grid Manager. On 10 January 2011 the severity level was increased to Level 3. On 11 January 2011 the severity level was increased to Level 4. The severity level remained at Level 4 until after 25 January 2011.

121. Relevantly, in relation to Table 2 above:

- (a) Technical Situation Reports (*TSRs*) provided to the Grid Manager and other agencies regarding the Wivenhoe Dam releases that commenced on 6 January 2011 also contained information regarding Somerset and North Pine Dam releases; and
- (b) the Grid Manager instructed Seqwater on 17 December 2010 that releases from Wivenhoe Dam should be notified to the Grid Manager using the OCA Incident Manager as an 'Alert' under the Grid ERP.

Classification of Events

122. Whether an event is regarded as an 'incident' or an 'emergency' is important in determining the relevant responsibilities of the Grid Manager or a Grid Participant (such as Seqwater) in responding to an event.
123. The ERP defines an 'emergency' as:⁶³
An incident that impacts on water quality, water supply reliability and/or public reassurance, and has an overall severity rating of Level 3, 4 or 5 under the severity classification approach outlined in [the Grid ERP].
124. An emergency is usually called by the impacted Grid Participant on initial identification. However, the Grid Manager reserves an overriding right to call or escalate emergencies.⁶⁴

⁶³ SEQ Water Grid, *Emergency Response Plan* v2.1 (24 September 2010), p 12.

⁶⁴ SEQ Water Grid, *Emergency Response Plan* v2.1 (24 September 2010), p 12.

125. Table 3 below clarifies the difference between an incident and an emergency for the purposes of the Grid ERP.

Table 3: Table of classification of incident or emergency for Grid ERP.

(Source: SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 12.)

	Incident	Emergency
Definition	Any occurrence that has resulted in, or has the potential to result in adverse consequences to water supply, water quality, people, the environment, property, reputation or a combination of these	A situation or occurrence that happens as a consequence of an incident and demands immediate action
General nature	Physical event	Broader whole-of-Grid and public interface outcomes – may be physical and/or intangible
Location	Site-based	Not usually location-based
Management focus	Operational – physical rectification	Corporate/supporting services – e.g. coordinating whole-of-Grid assistance, stakeholder management, communications, etc.
Relevant severity levels	■ 1, 2 ■ Alert ■ 3 ■ 4, 5	■ 3 ■ 4, 5

126. Level 1, 2 and Alert incidents, as smaller-scale events, do not typically have broader impacts and therefore are not subject to the Grid ERP. The exception to this is when an Emergency Management Team has been formed to respond to a level 3 to 5 emergency, then the Level 1 to Alert incident will fall under the Grid ERP.⁶⁵

127. Examples of events and the corresponding severity levels detailed in the Grid ERP are detailed in Table 4 below.

⁶⁵ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 12.

Table 4: Table of classification of incident or emergency for Grid ERP.

(Source: derived from SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 19-24.)

Severity Level	General Principle	Example of Event
Level 1 – Insignificant	<ul style="list-style-type: none"> Little disruption to normal operating events 	<ul style="list-style-type: none"> Minor storm damage to asset. Minor spike in discharge concentrations.
Level 2 – Minor	<ul style="list-style-type: none"> Incident can be dealt with by the resources of the Grid Participant 	<ul style="list-style-type: none"> Storm causes minor interruptions due to loss of power supply. Short-term adverse media at a local level.
Alert	<ul style="list-style-type: none"> Classification for incidents with a possible severity of 3-5 where the consequences have not yet occurred. 	<ul style="list-style-type: none"> Natural disasters, such as cyclone, flood, fire that is forecast or in progress and likely to cause an impact, though this has not yet happened.
Level 3 –Moderate	<ul style="list-style-type: none"> Minor impact for a large population. Major impact for a small population. 	<ul style="list-style-type: none"> Unplanned halt to production by water treatment plant for longer than 24 hours, resulting in failure to meet Grid Contract obligations and interruption to customer supply to a small population for less than 8 hours.
Level 4 – Major	<ul style="list-style-type: none"> Single or multiple regions affected. Multiple Grid Participants and the Grid Manager with State Government departments involved. 	<ul style="list-style-type: none"> Localised natural disaster or security event.
Level 5 – Catastrophe	<ul style="list-style-type: none"> Large-scale impact across South-East Queensland, other utilities affected. Requires Government intervention at State and Federal levels to manage the incident. 	<ul style="list-style-type: none"> Dam wall breach.

128. Figure 4 and Table 5 below detail the Grid ERP emergency response hierarchy and the command and control function responsibilities in the event of an emergency as detailed in the Grid ERP.



Figure 5: Grid ERP – Emergency Response Hierarchy

(Source: SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 14.)

Table 5: Table of command and control functions and responsibilities for Grid ERP.

(Source: SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 15.)

Function	Description	Responsible entity
Incident management	Managing the physical incident on-site	Impacted Grid Participant/s
Technical coordination	Coordinating whole-of-Grid operations and support	Water Grid Manager
Communications coordination	Coordinating Water Grid internal and external communications	Water Grid Manager
Emergency management	Strategic command and key stakeholder management	Normally the Water Grid Manager (In some circumstances this function may be assumed by another agency with relevant expertise or a strong interest in the incident)

Seqwater's External Communication During Alert Period

129. Ordinarily, the Grid ERP provides that during an incident with an 'Alert' severity level, Grid Participants such as Seqwater are to:

- (a) formulate any appropriate communications strategy messaging at their discretion;
- (b) designate a spokesperson; and
- (c) manage media at their own discretion, including responding to media enquiries and commenting on an incident to the extent it relates to their assets. However, a Grid Participant may not comment on whole-of-Grid issues.⁶⁶

130. Relevantly, in respect of the Wivenhoe Dam releases that commenced on 6 January 2011, the acknowledgement notice of notification of the incident from the Grid Manager provided that the allocated emergency team is:

- (a) Emergency Manager - Grid Manager;
- (b) Communications - Grid Manager; and

the initial direction to Seqwater was to continue to forward copies of the TSRs to the Grid Manager.

131. Seqwater sent all required TSRs to the Grid Manager during the 2010/2011 flood events. Seqwater also updated a Water Grid 1800 information line on behalf of the Grid Manager that provided information on water releases and the status of Seqwater's recreation facilities.

D3 Emergency Management Responsibilities Specific to Seqwater

132. In addition to Seqwater's obligations pursuant to the IERP, Seqwater also has other notification obligations that may trigger in extraordinary circumstances, including notification requirements pursuant to the:

- (a) Dam Safety Conditions;

⁶⁶ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 45.

- (b) the Manuals;
 - (c) Water Supply Act; and
 - (d) Water Act.
133. This part of the submission will address matters (a) and (b) above. Matters (c) and (d) are dealt with in Part C of this submission.

Dam Safety Conditions

134. Each of Wivenhoe, Somerset and North Pine Dams are subject to Dam Safety Conditions.
135. For each of the Dams, Dam Safety Conditions 2 and 13 require Seqwater to notify the Dam Safety Regulator within 48 hours of the occurrence of a relevant incident, failure or emergency.
136. At the commencement of the January 2011 Flood Event, on 6 January 2011, and throughout the event, the Dam Safety Regulator was advised by the Duty Flood Operations Engineers of the gate operations strategies, and actual and projected water releases from Wivenhoe Dam.⁶⁷

Manuals

137. The Manuals also detail Seqwater's and other agencies' responsibilities regarding communications during a Flood Event.
138. In particular, Seqwater is responsible for:
- (a) providing and maintaining equipment to allow adequate channels of communication to exist at all times between the Flood Operations Centre and site staff at the Dams;⁶⁸
 - (b) providing adequate and timely information to agencies responsible for the operation of facilities affected by flooding and for providing warnings and information to the public. Agency requirements for the Dams are detailed in the Tables below;⁶⁹
 - (c) the Senior Flood Operations Engineers and Flood Operations Engineers must supply information to each of the agencies during Flood Events;⁷⁰

⁶⁷ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 42-43.

⁶⁸ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam*, November 2009, p 15; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.

⁶⁹ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam*, November 2009, p 15; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.

⁷⁰ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam*, November 2009, p 15; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.

- (d) liaising and consulting with the agencies with a view to ensuring all information relative to the Flood Event is consistent and used in accordance with agreed responsibilities;⁷¹ and
 - (e) the issue of information regarding storage conditions and current and proposed releases from the dam to the public and the media.⁷²
139. Regarding paragraph 138(e) above, it should be recalled that in the event of an emergency that is the subject of the Grid ERP, Seqwater is not to:
- (a) present a public face independent of the Grid Manger (or other agency appointed as the Emergency Manager);⁷³ and
 - (b) issue releases of information independent of the Grid Manger (or other agency appointed as the Emergency Manager).⁷⁴
140. The Manuals additionally provide that:
- (a) agencies other than Seqwater have responsibilities for formal flood predictions, the interpretation of flood information and advice to the public associated with Flood Events;⁷⁵
 - (b) the Bureau of Meteorology has responsibility for issuing flood warnings;⁷⁶ and
 - (c) the Emergency Services Response Authorities, under the Disaster Act, have responsibility for the preparation of a local counter disaster plan and the interpretation of flood forecast information for inclusion in their local flood warnings prepared under the flood sub-plan of the counter disaster plan.⁷⁷
141. The Manuals are consistent with the Grid ERP in that Seqwater's role is to support other agencies who have the primary responsibility for providing communications to the public at large.
142. Table 6 and Table 7 below detail the agency information requirements in the Manuals.

⁷¹ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenboe Dam and Somerset Dam*, November 2009, p 15; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.

⁷² Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenboe Dam and Somerset Dam*, November 2009, p 16; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 15.

⁷³ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 46.

⁷⁴ SEQ Water Grid, *Emergency Response Plan v2.1* (24 September 2010), p 46.

⁷⁵ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenboe Dam and Somerset Dam*, November 2009, p 15; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.

⁷⁶ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenboe Dam and Somerset Dam*, November 2009, p 16; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 15.

⁷⁷ Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenboe Dam and Somerset Dam*, November 2009, p 16; Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 15.

Table 6: Table of Agency Information Requirements for Wivenhoe Dam and Somerset Dam.

(Source: Seqwater, *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam*, November 2009, p 15.)

AGENCY INFORMATION REQUIREMENTS

Agency	Activity	Information Required from Flood Operations Centre	Trigger
Bureau of Meteorology	Issue of flood warnings for Brisbane River basin	Actual and projected discharges from Wivenhoe Dam Actual and projected discharges from Somerset Dam	Initial gate operations and thereafter at intervals to suit forecasting requirements
Department of Environment and Resource Management	Review of flood operations and discretionary powers	Actual and predicted lake levels and discharges	
Somerset Regional Council	Flood level information upstream of Somerset Dam and upstream and downstream of Wivenhoe Dam	Actual and predicted lake levels, Somerset Dam and actual and predicted lake levels and discharges, Wivenhoe Dam	Somerset Dam water level predicted to exceed EL 102 m AHD and initial Wivenhoe Dam gate operation
Ipswich City Council	Flood level information for Ipswich City area	Nil (information obtained from BOM)	
Brisbane City Council	Flood level information for Brisbane City area	Nil (information obtained from BOM)	

Table 7: Table of Agency Information Requirements for North Pine Dam.

(Source: Seqwater, *Manual of Operational Procedures for Flood Mitigation at North Pine Dam*, August 2010, p 14.)

AGENCY INFORMATION REQUIREMENTS

Agency	Activity	Information Required from Flood Operations Centre	Trigger
Bureau of Meteorology	Issue of flood warnings	Actual and predicted lake levels and discharges	Initial gate operations and thereafter at intervals to suit forecasting requirements
Department of Environment and Resource Management	Review of flood operations and discretionary powers	Actual and predicted lake levels and discharges	Initial gate operations
Moreton Bay Regional Council	Flood level information downstream of North Pine Dam	Actual and predicted lake levels and discharges	Initial gate operations
Brisbane City Council	Flood level information for Brisbane City area	Nil (information obtained from BOM)	

D4 Draft Communication Protocol between Agencies

143. During water releases from Wivenhoe Dam in October 2010, communications to the public regarding the impact of the releases were not consistent between different agencies and organisations.
144. As a result negotiations lead by DERM commenced on development of a communication protocol for the Brisbane, Ipswich and Somerset Councils, the Bureau of Meteorology and relevant Queensland Government agencies, including Seqwater, to ensure the provision of consistent information to the community about potential flooding impacts for the Brisbane River catchment, including the release of floodwater from Wivenhoe and Somerset Dams.
145. On 22 November 2010, the Queensland Premier wrote to Brisbane City Council, Ipswich City Council and Somerset Regional Council suggesting that the Draft Communication Protocol should be implemented on an interim basis pending its finalisation and formal sign-off by the parties to the protocol (**Attachment 19**).
146. Negotiations regarding the communication protocol had not concluded at the time the January 2011 Flood Event occurred. As a result, Seqwater operated in accordance with the Draft Communication Protocol during the event and will participate in the continuing process to refine and settle the protocol.
147. The Draft Communication Protocol document version as at 22 November 2010 is provided at **Attachment 19**, and the version as at 23 November 2010 is provided at **Attachment 20**.
148. The Draft Communication Protocol is not presently linked to any statutory instrument and once finalised, the emergency response plans and associated communication requirements under the Manuals should then be updated to ensure conformity.
149. Separately to the Draft Communication Protocol, a Draft Natural Hazards Protocol has been proposed by Emergency Management Queensland (**Attachment 21**). The Draft Natural Hazards Protocol is not intended to replace the Draft Communication Protocol and Seqwater's responsibilities under both draft protocols is consistent.
150. Additionally, following the January 2011 Flood Event, the Queensland Department of Transport and Main Roads proposed a Memorandum of Understanding with Seqwater regarding communications relating to road closures (**Attachment 22**). Negotiations regarding this Memorandum, and its relationship with the Draft Communication Protocol, is ongoing.

D5 Seqwater's Internal Communication Procedures

151. Flood Event communication within Seqwater is detailed in the Flood Operations Manual.
152. The relevant responsibilities for Seqwater's internal personnel are:
 - (a) At the onset of a Flood Event, the Flood Operations Centre notifies Seqwater's Operations Manager that a flood event has commenced and advises of the current

flood release strategy adopted to manage the event and the expected magnitude and impacts of the event;⁷⁸

- (b) The Flood Operations Centre also notifies Seqwater's Dam and Source Operations Manager of any changes to adopted flood release strategies throughout the event and provides regular updates in relation to the likely impacts of the event;⁷⁹
- (c) Seqwater's Dam and Source Operations Manager is responsible for relaying this advice to Seqwater's Public Affairs and Media Manager, Seqwater's General Manager Water Delivery and Seqwater's Chief Executive Officer;⁸⁰
- (d) Based on the likely magnitude and impacts of the event, Seqwater's Public Affairs and Media Manager, in consultation with Seqwater's General Manager Water Delivery and Chief Executive Officer, is responsible for providing appropriate information to the following Seqwater personnel and external agencies:
 - (i) Seqwater Executive General Managers;
 - (ii) Seqwater Chairperson;
 - (iii) Grid Manager;
 - (iv) QWC;
 - (v) Offices of the Premier and Seqwater's shareholding Ministers; and
 - (vi) the public.⁸¹

153. Figure 6 below indicates likely information flows during a Flood Event.

⁷⁸ Seqwater, *Flood Procedure Manual for Wivenboe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010), p 47.

⁷⁹ Seqwater, *Flood Procedure Manual for Wivenboe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010), p 47.

⁸⁰ Seqwater, *Flood Procedure Manual for Wivenboe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010), p 47.

⁸¹ Seqwater, *Flood Procedure Manual for Wivenboe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010), p 47.

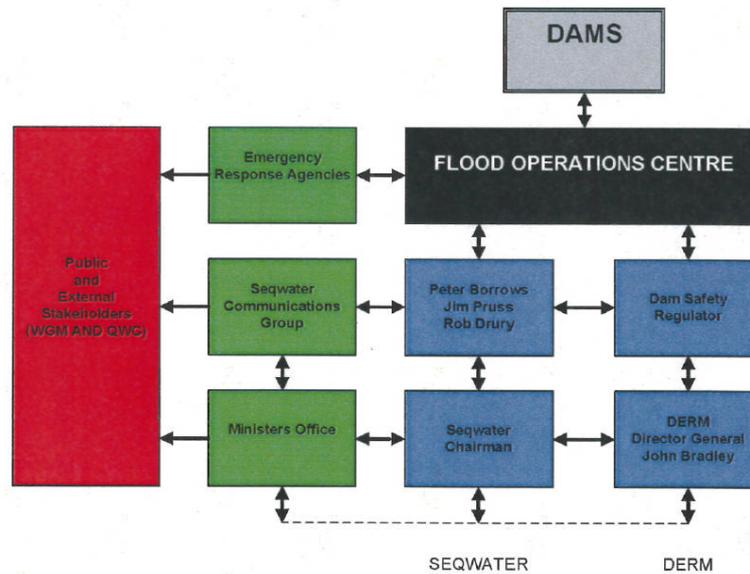


Figure 6: Seqwater Internal Flood Event Communications Flow Chart.

(Source: Seqwater, *Flood Procedure Manual for Wivenhoe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010), p 48.)

154. In addition to the internal communication procedures detailed in the Flood Operations Manual, the IERP details the internal management structure for incidents identified pursuant to the IERP.
155. For alerts and level 1 to 3 incidents, a team based approach is utilised to manage and respond to alerts and incidents as they occur.⁸²
156. Level 4 and 5 incidents are managed through an executive crisis team.⁸³
157. For the management of level 4 and 5 incidents, Seqwater has adopted a structure of clear delegation to ensure that all management and information functions, including incident control, operations, planning and logistics, are appropriately performed.⁸⁴ The structure also provides for the command and coordination of multi-agency incidents which would be expected for level 4 and 5 incidents: refer to Figure 7 below.

⁸² Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 39.

⁸³ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 39.

⁸⁴ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 40.

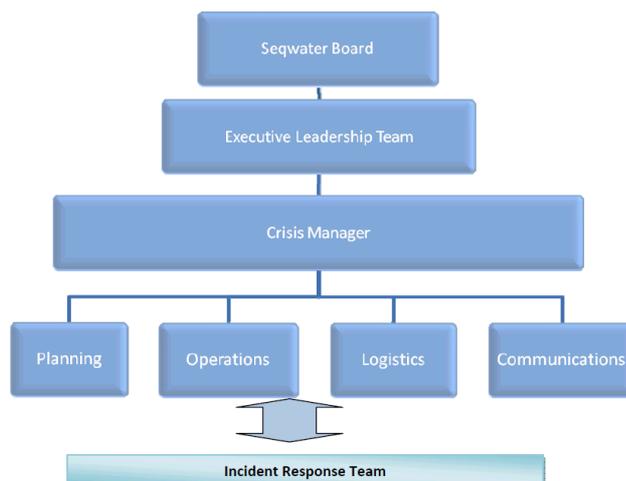


Figure 7: Seqwater Internal Flood Event Communications Flow Chart.

(Source: Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 40.)

158. An Executive General Manager is in most cases appointed as the Incident Manager, and manages all incidents declared as a level 4 or 5. In event that a level 4 or level 5 incident is declared and the Australian Inter-service Incident Management System (AIIMS) structure is put into place, there is also a requirement for Seqwater to provide support to the Incident Manager and incident management and response team.⁸⁵
159. The Chief Executive Officer and Executive General Managers of Seqwater are advised of all incidents and incident alerts as they are declared and provide input and advice when required.⁸⁶
160. If the impact severity of an incident escalates to a level 4 and the manager or coordinator is required to attend to more operational aspects of the incident, the management of the incident is passed to an Executive General Manager.⁸⁷

D6 Seqwater's Performance during the January 2011 Flood Event

Action taken by Seqwater Prior to the January 2011 Flood Event

161. In August and September 2010, Seqwater held meetings with a number of local council officers to discuss emergency management arrangements for the 2010/11 wet season for Seqwater's Dams and Dam Safety EAPs.

⁸⁵ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 41.

⁸⁶ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 45.

⁸⁷ Seqwater, *Incident and Emergency Response Plan v5* (25 October 2010), p 45.

162. Between 28 September 2010, and 7 October 2010, Seqwater sent letters to local councils, including Brisbane City Council, Ipswich City Council, Gold Coast Regional Council, Lockyer Valley Regional Council, Somerset Regional Council and Moreton Regional Council.⁸⁸
163. Each of the letters confirmed:
- (a) the contact details for the relevant council for a flood event or dam safety emergency; and
 - (b) that during an emergency event:
 - (i) Seqwater is responsible for coordinating any actions required at its dam sites;
 - (ii) the council's Local Disaster Management Group will coordinate all emergency response actions downstream of the dam within the relevant council's area; and
 - (iii) if requested, Seqwater staff will assist the council during these circumstances, noting however that Seqwater's available resources may be limited, due to Seqwater's primary responsibilities associated with ensuring the integrity and security of water supplies.⁸⁹

Actions taken by Seqwater during the January 2011 Flood Event

164. As detailed in the Table 2 above, there were a number of events that occurred just prior to and during the January 2011 Flood Event:
165. Despite the number of severe events occurring concurrently, Seqwater performed important communications functions in accordance with its responsibilities, in particular:
- (a) Grid ERP Communication Actions:
 - (i) As requested by the Grid Manager, TSRs were sent to the Grid Manager. During the period of the January 2011 Flood Event (i.e. 6 January 2011 to 19 January 2011) a total of 36 TSRs were sent to the Grid Manager. TSRs were provided more frequently during critical periods of the January 2011 Flood Event.
 - (ii) Members of Seqwater actively participated in all teleconferences, meetings and other Grid-wide processes as required.
 - (iii) As requested by the Grid Manager, Seqwater updated a Water Grid 1800 information line that provided information on water releases and the

⁸⁸ Letter from Seqwater to Brisbane City Council, 28 September 2010; Letter from Seqwater to Ipswich City Council, 28 September 2010; Letter from Seqwater to Gold Coast Regional Council, 28 September 2010; Letter from Seqwater to Lockyer Valley Regional Council, 7 October 2010; Letter from Seqwater to Somerset Regional Council, 28 September 2010; Letter from Seqwater to Moreton Regional Council, 28 September 2010.

⁸⁹ Letter from Seqwater to Brisbane City Council, 28 September 2010; Letter from Seqwater to Ipswich City Council, 28 September 2010; Letter from Seqwater to Gold Coast Regional Council, 28 September 2010; Letter from Seqwater to Lockyer Valley Regional Council, 7 October 2010; Letter from Seqwater to Somerset Regional Council, 28 September 2010; Letter from Seqwater to Moreton Regional Council, 28 September 2010.

status of Seqwater's recreation facilities on a daily basis and more frequently during critical periods of the January 2011 Flood Event.

- (iv) In addition, Seqwater provided water release email updates and alerts to irrigators downstream of Wivenhoe Dam during the period of the January 2011 Flood Event.
- (b) Dam Safety Condition Actions:
 - (i) During the event, Situation Reports⁹⁰ were sent to the Dam Safety Regulator.
- (c) Manual Actions:
 - (i) Provided each TSR to the Grid Manager. As noted in each TSR, BoM, Brisbane City Council, Ipswich City Council and Somerset Regional Council had been advised of the matters detailed in the TSR. The details in each TSR address the information that Seqwater is required to provide to these agencies.
 - (ii) Regarding North Pine Dam, Moreton Bay Regional Council was contacted by the Flood Operations Centre at regular intervals and provided information using the agreed contact methods in the North Pine Dam EAP.⁹¹
- (d) As outlined in the Draft Communication Protocol, Seqwater also:
 - (i) Modelled implications of the inflows on the necessary floodwater releases from Wivenhoe and/or Somerset Dam.⁹²
 - (ii) Calculated floodwater releases according to the Manuals and regularly provided actual and projected release information to BoM and Brisbane City Council.⁹³
 - (iii) Issued situation reports to BoM, Councils and internal Seqwater recipients up to four times each day during the formative stages of the January 2011 Flood Event. The frequency reduced following the peak of the January 2011 Flood Event at Wivenhoe Dam.⁹⁴
 - (iv) Complied TSRs regarding the floodwater release and provided these to the Grid Manager.

⁹⁰ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), Appendix E.

⁹¹ Seqwater, *January 2011 Flood Event – Report on the Operation of North Pine Dam* (11 March 2011), p 129-130.

⁹² Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 206.

⁹³ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 206.

⁹⁴ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 206.

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- (v) Updated the Water Grid Water Grid 1800 information line on behalf of the Grid Manager that provided information on water releases and the status of Seqwater's recreation facilities.
 - (e) Seqwater's Internal Communication Processes:
 - (i) As the event was classified as a Level 3 severity incident under the Grid ERP, the Grid Manager notified Seqwater that it was to continue to forward copies of the TSRs to the Grid Manager, who was acting as Emergency Manager with responsibility for communications. Under the Grid ERP, the Grid Manager assumed strategic command, key stakeholder management, coordination of internal and external communications and coordination of whole-of-Grid operations and support.
 - (ii) Due to flooding impacts in Brisbane, relevant Seqwater personnel mobilised to and operated from the LinkWater incident centre in conjunction with other Grid Participants and the Grid Manager.

E. Adequacy of communications systems

E1 Draft Communication Protocol

166. As detailed in Part D of this submission, Seqwater is currently required to comply with a number of emergency response processes which are not consistent in all respects.
167. The proposed Draft Communication Protocol (once finalised) is likely to resolve this concern, and associated plans and requirements, such as the Manuals, should then be updated to ensure conformity.
168. Seqwater will continue to actively participate with relevant government agencies in finalising the Draft Communication Protocol.

E2 Technical Situation Reports

169. Seqwater has developed a further draft TSR template and is currently liaising with EMQ, DERM and the Grid Manager on the document, prior to finalising it.

E3 Other Matters

170. Seqwater uses a number of communication tools to ensure all parts of its network including WTPs and the Flood Operations Centre can communicate during a flood event. During the January 2011 Flood Event, some communication methods were impacted, for example:
- (a) the email server in the Flood Operations Centre exceeded its limit causing a short and temporary pause in email communications to and from the Flood Operations Centre; and
 - (b) landline phones and facsimiles at the Somerset and Wivenhoe Dams were unavailable for short periods due to physical flooding impacts in the Dams catchments.
171. Notwithstanding these impacts to some communication methods, lines of communication were maintained between the Flood Operations Centre and the Dams at all times through the use of satellite phones, two-way radio, mobile phones and email.⁹⁵
172. Seqwater will also be commencing a detailed feedback process on the effectiveness of Seqwater's communication with other agencies.
173. Seqwater is investigating whether additional rain gauges should be installed in the Brisbane River Basin to improve the level of data recorded during flood events. It is recognised that installing additional gauges may not guarantee the rain gauge network will detect all instances of very intense or extreme rainfall that could occur in the Brisbane River Basin area.⁹⁶

⁹⁵ Seqwater, *January 2011 Flood Event: Report on the Operation of Somerset and Wivenhoe Dam* (2 March 2011), p 43-44.

⁹⁶ Seqwater, *January 2011 Flood Event: Report on the Operation of Somerset and Wivenhoe Dam* (2 March 2011), p 51.

174. Seqwater is also considering the possible use of social media as a means of disseminating information to the public if it can be demonstrated to be appropriate.

F. Peer reviews in respect of the January 2011 Flood Event

175. At paragraph 188 of Seqwater's Opening Submission, Seqwater noted that it had commissioned independent peer reviews of the operational decisions made in respect of releases from Wivenhoe and Somerset Dams during the January 2011 Flood Event.
176. Seqwater has received peer reviews in respect of the operational decisions from:
- (a) Emeritus Professor Colin Apelt;
 - (b) Leonard McDonald;
 - (c) Greg Roads; and
 - (d) Brian Shannon.
177. The curriculum vitae for each of the above is shown in **Attachment 23**. As evident from **Attachment 23**, each of the above are experts in dam operations. Emeritus Professor Colin Apelt is renowned for his experience and expertise in Brisbane River flows.
178. Seqwater also commissioned an independent peer review of the key hydrological findings reported in the Wivenhoe Flood Report. This peer review was provided by Dr Rory Nathan of Sinclair Knight Merz. Dr Nathan's curriculum vitae is also shown in **Attachment 23**.
179. Seqwater comments on each peer review below.

Emeritus Professor Colin Apelt

180. Professor Apelt's report is **Attachment 24**. It concludes that the release of water from Wivenhoe and Somerset Dams was in accordance with the Wivenhoe Flood Manual.

Leonard McDonald

181. Mr McDonald's report is **Attachment 25**. It concludes "*The release of water from Wivenhoe Dam and Somerset Dam during the January 2011 Flood Event was in accordance with the [Wivenhoe Flood Manual] with one possible exception. The decision to not implement strategy W2 at period 4, and possibly subsequent periods, does not appear to comply with the Manual flow chart on page 23.*"
182. As explained in the Wivenhoe Flood Report,⁹⁷ Strategy W2 was bypassed early in the event because it was not possible to limit the flow in the Brisbane River to less than the naturally occurring peaks at Lowood and Moggill. This was because the releases from Wivenhoe Dam at that time already exceeded the naturally occurring peaks at Lowood and Moggill.
183. The conditions for the adoption of Strategy W2 are set out on page 27 of the Wivenhoe Manual and the conditions for the adoption of Strategy W3 are set out on page 28 of the Wivenhoe Manual. The flow chart on page 23 of the Wivenhoe Manual is a shorthand guide to the strategies which are explained in more detail later in the Manual; it does not supersede or override that more detailed explanation. Seqwater accepts that the flow chart on page 23 of the Wivenhoe Manual does not accurately record the requirements of

⁹⁷ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 13.



Strategy W2 as detailed on page 27 of the Wivenhoe Manual. The flow chart will be corrected in the next version of the Wivenhoe Manual.

184. There was no failure to comply with the Wivenhoe Manual because the requirements of Strategy W2 could not be fulfilled at the relevant time, so the appropriate course was to invoke Strategy W3, which is what Seqwater did.
185. Put another way, there was no failure to comply with the Wivenhoe Manual because:
- (a) the Wivenhoe Manual does not require Strategy W2 to be adopted unless the conditions for its adoption are met;
 - (b) in this case, those conditions were never met, and there was no point in attempting to invoke Strategy W2; and
 - (c) the Wivenhoe Manual does not prevent the adoption of Strategy W3 as soon as its conditions are met.

Greg Roads

186. Mr Roads' report is **Attachment 26**. It concludes (see page 5) that "*Seqwater has operated Wivenhoe Dam and Somerset Dam in accordance with the [Wivenhoe] Manual over the period 6 January 2011 and 19 January 2011. Two minor deviations from the [Wivenhoe] Manual appear to have occurred over the period. This may be due to a lack of clarity in the manual rather than non-compliance.*"
187. The two minor deviations identified by Mr Roads are explained in section 3.2 of Mr Roads' report.
188. The first is a suggestion that Strategy W4 should have been invoked at around 0100 on 10 January 2011 because a flood model run at that time including forecast rainfall suggested Wivenhoe Dam's storage level would exceed 74.0 AHD. But the flood engineers have very clearly explained (in their statements to the Commission) that they do not make operational decisions to release water (or in this case invoke Strategy W4) on model results including rainfall forecasts because of the inherent unreliability of forecasts. This is even more particularly the case when the very serious decision to invoke Strategy W4 is to be made. This strategy necessarily involves moving to flows which will cause urban damage and such a decision should not be made lightly, and certainly not on one model run based on a rainfall forecast. The Wivenhoe Manual did not require the invoking of Strategy W4 at 0100 on 10 January 2011. Indeed, as Mr Roads himself concludes "*it would appear that it was appropriate for Seqwater to persist with using Strategy W3 and protect urban areas from inundation at that time*" (see page 4).
189. The second minor deviation identified by Mr Roads is a suggestion that the gates were closed too quickly between 0500 and 0800 on 12 January 2011 (see page 4). But there was no deviation from the Wivenhoe Manual at this time. The Wivenhoe Manual provides that "*rapid closure of radial gates is permissible where there is a requirement to reduce downstream flooding*".⁹⁸

⁹⁸ Seqwater, *January 2011 Flood Event – Report on the operation of Somerset Dam and Wivenhoe Dam* (2 March 2011), p 32, last paragraph.

Brian Shannon

190. Mr Shannon's report is **Attachment 27**. It finds, relevantly⁹⁹:

- (a) *“Overall the Manual was followed closely during the whole flood event.”*
- (b) *“The only improvement possible for the operations was in the earlier opening of Wivenhoe gates at the beginning of both peak flows. The overall effect would have been minor.”*
- (c) *“In the exercise of “reasonable discretion”, whilst not enacted, the Chairman, Seqwater does not appear to have been consulted as stipulated.”*

191. The finding referred to in paragraph 190(b) does not amount to a suggestion of non-compliance with the Wivenhoe Manual. This is evident from the last paragraph on the third page of Mr Shannon's report, which states:

“While the dam releases were within the limits of the Manual, the only improvement that could have been made was in the earlier timing of gate openings ...”

192. Accordingly, Mr Shannon actually finds that *“the dam releases were within the limits of the Manual”*, but suggests that one possible improvement could have been made. It appears that the possible improvement suggested by Mr Shannon relates to the timing of invoking Strategy W4 (see the second and third last paragraphs on the third page of Mr Shannon's report). Seqwater rejects the proposition that Strategy W4 should have been invoked earlier for the reasons given by the flood engineers in their statements given to the Commission.

193. Mr Shannon also seems to suggest that there was a failure by the Senior Duty Flood Engineer to consult with the Chairman of Seqwater when exercising reasonable discretion not invoke Strategy W4 on 10 January 2011. However, the Senior Duty Flood Engineer did not in fact exercise any discretion under the terms of clause 2.8 of the Wivenhoe Manual during the January 2011 Flood Event. There was a preliminary discussion with the Dam Safety Regulator about the possibility of exercising that discretion. However, that possibility was overtaken by events and the discretion was never exercised. As a result, there was no requirement to consult the Chairman of Seqwater. Accordingly, Mr Shannon's suggestion of non-compliance is mistaken.

Dr Rory Nathan and Peter Hill

194. Dr Nathan and Mr Hill's report is **Attachment 28**. In summary, it concludes:

- (a) the data network is comprehensive;
- (b) the configuration and calibration of the flood model is consistent with established practice; and
- (c) Seqwater's preliminary assessment of the magnitude of the event is defensible.

⁹⁹ See the heading "Findings" on the final page of the report.

195. Dr Nathan and Mr Hill express it this way:

"... the density and spatial coverage of the data network is comprehensive, though the installation of additional gauges, particularly in the downstream reaches of the catchment, would reduce interpolation uncertainty. A robust approach has been taken with the design and operation of the network, and this is evident in the high availability of the equipment during the event."

- (a) *"... The configuration and calibration of the flood simulation model, which is the core of the system, is consistent with established practice. The manner in which historic and forecast rainfalls are input to the model is adequate, and the method used to adjust rainfall losses during the event is soundly based on observed data. ..."*
- (b) *"... The data system successfully processed over 130,000 packages of data on rainfall and streamflow conditions at different points in the catchment, while losing only around 10% of gauges due to the extreme conditions. This is an outstanding outcome that is testament to the appropriateness of the design and operation of this system. ... Analysis shows that there is generally good agreement between data processed in real time and other independent data available subsequent to the event. ... Best available information on rainfall forecasts were used [sic] during the event, though these forecasts significantly underestimated the average depths of rain over the most critical three days of importance..."*
- (c) *"The conclusions drawn by Seqwater are considered to be broadly defensible. It is considered that the annual exceedence probability of the rainfalls for the whole dam catchment is around 1 in 100 to 1 in 200, though the annual exceedence probability of the most extreme point rainfalls that occurred in the centre of the Brisbane River catchment is likely to be between 1 in 500 and 1 in 2000. When compared with historical events, flood volumes indicate the volume of the January 2011 event was almost double that of the January 1974 flood, and rivals the February 1893 flood. Peak water levels at gauging stations in the Brisbane River above Wivenhoe Dam were the highest on record. In the Lockyer Valley, peak water levels exceeded the 1974 levels and may well have been larger than those of 1893. A comparison of the recorded peaks, volumes and peak levels at Somerset and Wivenhoe Dams indicate the January 2011 flood event exceeds 1 in 100 AEP."*

Annexure 1

Glossary

In this submission the following terms are defined as below:

"**Acceptable Flood Capacity**" means the overall flood discharge capacity required of a dam determined in accordance with the DERM AFC Guidelines including freeboard as relevant, which is required to pass the critical duration storm event without causing a failure of the dam;

"**ADWG**" means the Australian Drinking Water Guidelines (2004) (as endorsed by National Health and Medical Research Council);

"**AEP**" means Annual Exceedence Probability, the probability of a specified event being reached or exceeded in anyone year. This may be expressed as a ratio (e.g. 1 in Y) or a percentage;

"**AHD**" means Australian Height Datum;

"**ALERT**" means Automated Local Evaluation in Real Time System, a system of monitoring and displaying rainfall and water level data. It is a combination of field stations, communications networks and data collection software;

"**AMTD**" means the Adopted Middle Thread Distance, which is the distance along the centre line of the mainstream from a junction. usually in kilometres;

"**ANCOLD**" means the Australian National Committee on Large Dams;

"**ANSI**" means the American National Standards Institute;

"**AR&R**" means *Australian Rainfall and Run-off (Book 6)*, The Institution of Engineers Australia (Engineers Australia) national guidelines for the estimation of design flood characteristics;

"**BoM**" means the Bureau of Meteorology;

"**Cumecs**" means a rate of water flow measured in cubic metre of water per second or 1,000 litres of water per second;

"**Chairperson**" means the Chairperson of Seqwater;

"**Chief Executive**" means the Director-General of the Department of Environment and Resource Management or nominated delegate;

"**Dams**" means Somerset Dam, Wivenhoe Dam and North Pine Dam;

"**Dam Crest Flood**" means the flood event which, when routed through the storage with the storage initially at Full Supply Level, results in the still water level in the storage reaching the lowest point in the dam embankment excluding wind and wave effects;

"**Dam Safety Conditions**" means the conditions imposed by the Dam Safety Regulator in respect of the Dams in accordance with the Water Supply Act;

"**Dam Supervisor**" means the senior on-site officer at Somerset or Wivenhoe Dam as the case may be;

"**DERM**" means the Department of Environment and Resource Management;

"**DERM AFC Guidelines**" means Guidelines on Acceptable Flood Capacity for Dams, February 2007;

"**DERM Failure Assessment Guidelines**" means Guidelines for Failure Impact Assessment of Water Dams, June 2010;

"**DERM Safety Guidelines**" means Queensland Dams Safety Management Guidelines, February 2002;

"**Development Guidelines**" means the Seqwater Development Guidelines: Development Guidelines for Water Quality Management in Drinking Water Catchments (2010);

"**Disaster Act**" means the *Disaster Management Act 2003* (Qld);

"**DMP**" means the Seqwater *Drought Management Plan* (14 August 2009);

"**Draft Communication Protocol**" means the draft 'Protocol for the Communication of Flooding Information for the Brisbane River Catchment – including Floodwater Releases – from Wivenhoe and Somerset Dams';

"**Draft Natural Hazards Protocol**" means the draft 'Public Communications Protocol for Natural Hazards affecting the Community';

"**Duty Flood Operations Engineer**" means the Senior Flood Operations Engineer or Flood Operations Engineer rostered on duty to be in charge of Flood Operations at the Dams;

"**DWQMP**" means drinking water quality management plans approved in accordance with the Water Supply Act;

"**EAP**" means the Emergency Action Plan required to be developed by the Dam Safety Conditions;

"**EL**" means elevation in metres Australian Height Datum;

"**Emergency Manager**" means the Grid Manager or other agency appointed to perform emergency management functions in accordance with the Grid ERP;

"**Flood Event**" is a situation where the Duty Flood Operations Engineer expects the water level in either of the Dams to exceed the Full Supply Level;

"**Flood Operations Centre**" means the office location used by Flood Operations Engineers during a flood event to manage the event;

"**Flood Operations Engineer**" means a person designated to direct flood operations at the Dams in accordance with Section 2.4 of the Manual;

"**Flood Operations Engineers**" means the collective group of persons who individually have designation as either a Flood Operations Engineer or a Senior Flood Operations Engineer;

"**Flood Operations Manager**" means the Senior Flood Operations Engineer or Flood Operations Engineer designated responsibility for the overall management of the Flood Operations Centre leading up to or during a flood event;

"**Flood Operations Manual**" means the Seqwater, *Flood Procedure Manual for Wivenhoe Dam, Somerset Dam, North Pine Dam, Leslie Harrison Dam and Uncontrolled Spillways* (January 2010);

"**FSL**" or "**Full Supply Level**" means the level of the water surface when the reservoir is at maximum operating level, excluding periods of flood discharge;

"**Gauge**" when referred to in (m) means river level referenced to AHD or a local datum, and when referred to in (m³/s) means flow rate in cubic metres per second;

"**Grid**" means the South East Queensland Water Grid;

"**Grid Contract**" means the contract between Seqwater and the Grid Manager dated 28 June 2010 as made by the Minister in accordance with section 3602DD of the Water Act;

"**Grid ERP**" means the SEQ Water Grid Emergency Response Plan version 2.1: Whole-of-Grid response (2010, prepared by the Grid Manager);

"**Grid Instruction**" means a grid instruction issued under the Market Rules;

"**Grid Manager**" means the South East Queensland Water Grid Manager;

"**Grid Participant**" has the meaning given by section 2.3 of the Water Market Rules;

"**Grid QMP**" means the Water Grid Quality Management Plan prepared by the Grid Manager;

"**HACCP**" means Hazard Analysis and Critical Control Points plan;

"**IERP**" means Seqwater's Incident & Emergency Plan Version 5.1 (1 December 2010) approved by the Grid Manager;

"**January 2011 Flood Event**" means, in the case of the Wivenhoe and Somerset Dams, the flood event which commenced on 6 January 2011 and concluded on 19 January 2011, and in the case of North Pine Dam, the flood event which commenced on 6 January 2011 and concluded on 14 January 2011;

"**January Grid Instruction**" means the Grid Instruction issued by the Grid Manager to Seqwater on 28 January 2011 under the Market Rules;

"**LinkWater**" means the Queensland Bulk Water Transport Authority trading as LinkWater;

"**LOS**" means the desired levels of service objectives detailed in the RWSP;

"**Manuals**" means the Wivenhoe Manual and the North Pine Manual;

"**Market**" means the South East Queensland Water Market;

"**Market Rules**" means the South East Queensland Water Market Rules;

"**Minister**" means the Minister for Environment and Resource Management;

"**Moreton ROP**" means the Moreton Resource Operations Plan, which is a statutory instrument issued under the Water Act;

"**Mount Crosby WTPs**" means the Mount Crosby East Bank WTP and Mount Crosby West Bank WTP;

"**m³/s**" means a rate of water flow being one cubic metre of water per second or 1,000 litres of water per second;

"**NP Flood Report**" means the January 2011 Flood Event Report on the Operation of North Pine Dam dated 11 March 2011;

"**North Pine Manual**" means the "*Manual of Operational Procedures for Flood Mitigation at North Pine Dam*" (Revision 5);

"**OCA Incident Manager**" means the emergency response IT solution implemented for all emergency responses pursuant to the Grid ERP;

"**OOA**" means 'out of action' in relation to the operation of a rainfall or river height gauge that provides catchment data;

"**Opening Submission**" means the submission on behalf of Seqwater filed with the Commission on 11 March 2011;

"**Operating Target Line**" means the Wivenhoe/Somerset Operating Target Line from Strategy S2 of the Manual;

"**PAR**" means Population At Risk as defined by the Water Supply Act;

"**PMF**" or "**Probable Maximum Flood**" means the flood resulting from the PMP and, where applicable, snowmelt, coupled with the worst flood producing catchment conditions that can be realistically expected in the prevailing catchment meteorological conditions;

"**PMP**" or "**Probable Maximum Precipitation**" means the theoretical greatest depth of precipitation for a given duration meteorologically possible for a given size storm area at a particular location at a particular time of the year, with no allowance made for long term climatic trends;

"**Protocol**" means draft Communication Protocol prepared by DERM to ensure information is effectively communicated to the public during flood events impacting Somerset Dam and Wivenhoe Dam;

"**Public Health Regulation**" means the Public Health Regulation 2005 (Qld);

"**QPF**" means Quantitative Precipitation Forecast provided by the Bureau of Meteorology and is an estimate of the predicted rainfall in millimetres, usually in the next 24 hours;

"**QWC**" means the Queensland Water Commission;

"**Recreation Management Framework**" means Seqwater's Recreation Management Framework;

"**Regulator**" means the regulator of the Water Supply Act;

"**Restructuring Act**" means South East Queensland Water (Restructuring) Act 2007 (Qld);

"**ROL**" means Resource Operations Licence issued under the Water Act;

"**RTFM**" means Real Time Flood Model and is a combination of Flood-Col. Flood-Ops and other ancillary software;

"**RWSP**" means the Regional Water Security Program;

"**SAMP**" means the Seqwater, *Strategic Asset Management Plan* (May 2009);

"**SD**" means State Datum, which is a level height datum that is different from AHD;

"**Senior Flood Operations Engineer**" means a person designated in accordance with Section 2.3 of the Manual under whose general direction the procedures in the Manual must be carried out;

"**Seqwater**" means the Queensland Bulk Water Supply Authority, trading as Seqwater;

"**SLMP**" means the Seqwater, *System Leakage Management Plan* (February 2010);

"**SOP**" means the System Operating Plan made by QWC;

"**Sustainability Charter**" means the Sustainability Charter endorsed by Seqwater on 17 September 2010;

"**TSR**" means a Technical Situation Report referred to the Draft Communication Protocol;

"**Water Act**" means *Water Act 2000* (Qld);

"**Water Quality Policy**" means the Water Quality Policy endorsed by Seqwater on 22 April 2009;

"**WaterSecure**" means the Queensland Manufactured Water Authority trading as WaterSecure;

"**Water Supply Act**" means the *Water Supply (Safety and Reliability) Act 2008* (Qld);

"**Wivenhoe Flood Report**" means the January 2011 Flood Event Report on the Operation of Somerset Dam and Wivenhoe Dam dated 2 March 2011;

"**Wivenhoe Manual**" means the "*Manual of Operational Procedures for Flood Events at Wivenhoe Dam and Somerset Dam*" (Revision 7);

"**WRP**" means Water Resource Plans, which are subordinate legislation to the Water Act;

"**WTP**" means water treatment plant facility.

Annexure 2

Raw water storages connected to the Grid and Seqwater's treatment assets

Annexure 2 contains two tables which have been adapted from tables contained in SEQ Water Manager, *SEQ Water Grid Quality Management Plan: draft* (November 2010).

Table 1 - Summary of raw water sources connected to the Grid.

Raw Water Source	Description	Capacity (Megalitres (ML))
Sunshine Coast		
Mary River (Kenilworth)	Off-stream well	NA
Obi Obi Creek (Melany)	Weir on creek	NA
Borumba Dam	Located on Yabba Creek, raw water transfer to Lake MacDonald	45,952
Lake MacDonald	Dam on Six Mile Creek	8,018
Cooloolabin Dam	Dam on Rocky Creek	13,800
Wappa Dam	Dam on South Maroochy River at Kiamba	4,694
Ewen Maddock Dam	Dam on Addlington Creek at Glenview	16,587
Baroon Pocket Dam	Dam on Obi Obi Creek at Montville	61,000
Moreton Bay		
North Pine River	Pump station weir on river (Dayboro)	NA
Stanley River Weir	Weir on Stanley River in Woodford	68

Raw Water Source	Description	Capacity (Megalitres (ML))
Bribie Island Aquifer	Bores located around Banksia Beach	NA
The Trench and Black Hole	Located on Bribie Island	NA
Caboolture Weir	Located on Caboolture River	820
Moodlu Quarry	Off stream storage located in Caboolture	NA
Lake Kurwongbah	Dam on Sideling Creek	14,370
North Pine Dam	Dam on North Pine Dam	214,302
Brisbane		
Mt Crosby Weir	Weir on Upper Brisbane River	3 ^m ,430
Brisbane Aquifers	Bores located around Brisbane	NA
Enoggera Reservoir	Dam on Enoggera Creek	4,567
Somerset Dam	Dam on Stanley River near Kilcoy	379,849
Lake Manchester	Dam on Cabbage Tree Creek west of Brisbane	26,217
Logan		
South Maclean Weir	Weir on Logan River	153
Redland		
Herring Lagoon	Located on North Stradbroke Island	NA
Leslie Harrison Dam	Dam on Tingalpa Creek	24,868
Stradbroke Island Bores	Bores located in sand aquifer	NA

Raw Water Source	Description	Capacity (Megalitres (ML))
Gold Coast		
Hinze Dam	Dam on Nerang River	161,073
Little Nerang Dam	Dam on Little Nerang Creek	9,280 ¹⁰⁰
Scenic Rim		
Moogerah Dam	Dam on Reynolds Creek near Boonah	83,765
Maroon Dam	Dam on Burnett Creek south of Beaudesert	44,319
Bigfoot Lagoon	Located off Canungra Creek	NA

¹⁰⁰ Cannot supply the Water Grid, however the Water Grid can supply alternate source

Table 2 - Summary of the Seqwater WTPs, grouped by region.

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Sunshine Coast¹⁰¹				
Ewen Maddock (<i>Ewen Maddock Dam</i>)	pH correction and potassium permanganate pre-treatment, coagulation, flocculation, sedimentation, rapid media filtration, Ozone BAC, chlorination, fluoridation, pH correction	20	Unity Water	Yes – via Northern Pipeline Interconnector which is supplied by Landers Shute WTP
Image Flat (<i>Cooloolbin Dam; Wappa Dam</i>)	Aeration, Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, fluoridation, pH correction	18	Unity Water	No
Landers Shute (<i>Baroon Pocket Dam</i>)	pH correction and potassium permanganate pre-treatment coagulation, flocculation, sedimentation, rapid media filtration, Ozone BAC, chlorination, fluoridation, pH correction	130	Unity Water LinkWater	No
Noosa (<i>Borumba Dam; Lake McDonald</i>)	Potassium permanganate pre-treatment, coagulation, flocculation, sedimentation, rapid media filtration, Ozone BAC, chlorination, fluoridation, pH correction	40	Unity Water	No

¹⁰¹ Seqwater recently decommissioned the Maleny WTP in this region. Seqwater also owns the Borumba Downs WTP in this region.

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Kenilworth (<i>Kenilworth River</i>)	Greensand filtration, pH correction chlorination	0.4	Unity Water	No
Moreton Bay¹⁰²				
Banksia Beach (<i>Bribie Island bores</i>)	Aeration, coagulation, flocculation, sedimentation, Ozone BAC, chloramination, fluoridation, pH correction	3.6	Unity Water	Yes – via Northern Pipeline Interconnector
Caboolture (<i>Caboolture River</i>)	Activated Carbon pre-treatment, coagulation, flocculation, Dissolved Air Flotation, sedimentation, primary and secondary rapid media filtration, chlorination, chloramination, fluoridation, pH correction	12	Unity Water	Yes – via Northern Pipeline Interconnector
North Pine (<i>North Pine Dam</i>)	Activated Carbon and potassium permanganate pre-treatment, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, chloramination, fluoridation, pH correction	200	Unity Water LinkWater	Yes – via Linkwater and Queensland Urban Utilities supply networks which are supplied from Mount Crosby WTPs and Northern Pipeline Interconnector

¹⁰² Seqwater also owns the Woorim WTP on Bribie Island in this region. The WRP will not be operated until a future upgrade is completed.

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Petrie (<i>North Pine River downstream of North Pine Dam; Lake Kurwongbah</i>)	pH correction and potassium permanganate pre-treatment, coagulation, flocculation, sedimentation rapid media filtration, chlorination, fluoridation, pH correction	45	Unity Water	No
Woodford (<i>Stanley River; Woodford Creek stream storage</i>)	Primary coagulation, flocculation, direct filtration, pH correction, chlorination, secondary coagulation, flocculation, sedimentation, rapid media filtration, chloramination, fluoridation	3	Unity Water	Yes – via Unity Water supply network which is largely supplied from Northern Pipeline Interconnector
Dayboro (<i>North Pine River upstream of North Pine Dam</i>)	pH correction, greensand filtration, chlorination, fluoridation	2	Unity Water	No
Somerset and Lockyer				
Esk (<i>Wivenhoe/Somerset Dam</i>)	pH correction, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, ph correction, fluoridation,	1	Queensland Urban Utilities	No
Jimna (<i>Yabba Creek</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	0.2	Queensland Urban Utilities	No
Kilcoy (<i>Kilcoy Creek; Off stream storage</i>)	Aeration, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, fluoridation, pH correction	2	Queensland Urban Utilities	No

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Kilcoy (Somerset Dam) (<i>Somerset Dam</i>) ¹⁰³	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	TBC	Contingency only	No
Linville (<i>Upper Brisbane aquifer</i>)	Chlorination	0.2	Queensland Urban Utilities	No
Lowood (<i>Wivenhoe Dam via mid-Brisbane River</i>)	Potassium permanganate pre-treatment, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, fluoridation pH correction.	18	Queensland Urban Utilities	No
Somerset Dam Township (<i>Somerset Dam</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, ph correction	0.5	Queensland Urban Utilities	No
Atkinson Dam (<i>Buaraba Creek Catchment Alluvial Aquifer</i>) ¹⁰⁴	Chlorination	-	Recreational (Seqwater)	No
Kirkleagh (<i>Somerset Dam</i>) ¹⁰⁵	Coagulation, flocculation, sedimentation, rapid sand filtration, chlorination ph correction	-	Recreational (Seqwater)	No
Wivenhoe (<i>Wivenhoe Dam</i>) ¹⁰⁶	Coagulation, flocculation, sedimentation,	-	Recreational	No

¹⁰³ This Recreational WTP is not connected to the Grid.

¹⁰⁴ This Recreational WTP is not connected to the Grid.

¹⁰⁵ This Recreational WTP is not connected to the Grid.

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
	rapid sand filtration, chlorination		(Seqwater)	
Brisbane				
Brisbane Aquifer (comprising 5 WTPs at Algester, Runcorn, Forest Lake, Chandler and Sunnybank) (<i>groundwater aquifer bores</i>)	Aeration, coagulation, direct media filtration, chloramination, pH correction	18	Queensland Urban Utilities	Yes – via Queensland Urban Utilities supply network
Enoggera (<i>Enoggera Dam</i>)	Coagulation, flocculation, Dissolved Air Flotation, chlorination, rapid media filtration, chloramination, pH correction.	6	Queensland Urban Utilities	Yes – via Queensland Urban Utilities supply network
Mt Crosby Eastbank (<i>Brisbane River at Mt Crosby Weir</i>)	Coagulation, flocculation, sedimentation, chlorination, rapid media filtration, chlorination, pH correction, fluoridation chloramination	750	LinkWater	Partly - via Southern Regional Pipeline and Queensland Urban Utilities supply network
Mt Crosby Westbank (<i>Brisbane River just upstream of Mt Crosby Weir</i>)	Coagulation, flocculation, sedimentation, chlorination, Dissolved Air Flotation, rapid media filtration, chlorination, pH correction, fluoridation chloramination	250	LinkWater	Partly - via Southern Regional Pipeline and Queensland Urban Utilities supply network
Logan				
South Maclean (<i>Logan River</i>)	Coagulation, flocculation, sedimentation,	8	Allconnex	Yes – via Allconnex supply network which

¹⁰⁶ This Recreational WTP is not connected to the Grid.

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
	rapid media filtration, chlorination			is supplied by Southern Regional Pipeline
Redland				
Capalaba (<i>Leslie Harrison Dam</i>)	Activated Carbon pre-treatment, Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	20	LinkWater	Yes - via LinkWater and Allconnex supply networks for a limited time from North Stradbroke Island WTP and the Eastern Pipeline Interconnector
North Stradbroke Island (<i>North Stradbroke Island bore fields; Herring Lagoon</i>)	Bores: pH correction, chlorination Herring Lagoon: Coagulation, flocculation, DAF, rapid media filtration, chlorination, pH correction	35	LinkWater	Yes - via LinkWater and Allconnex supply networks for limited time from Capalaba WTP and the Eastern Pipeline Interconnector
Amity Point (<i>Amity Point bores</i>)	pH correction, chlorination	1	N/A (Allconnex)	No
Dunwich (<i>Dunwich bores</i>)	pH correction, chlorination, iron filtration	1	N/A (Allconnex)	No
Point Lookout (<i>Point Lookout bores</i>)	pH correction, chlorination	2	N/A (Allconnex)	No

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Gold Coast				
Molendinar (<i>Hinze Dam</i>)	Activated Carbon and pH correction pre-treatment, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	180	LinkWater Allconnex	Partly - via Southern Regional Pipeline
Mudgeeraba (<i>Hinze Dam; Little Nerang Dam</i>)	Activated Carbon and pH correction, coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	110	LinkWater Allconnex	Partly - via Southern Regional Pipeline and Desalination Plant (WaterSecure)
Hinze Dam (<i>Hinze Dam</i>) ¹⁰⁷	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination,	0.08	Recreational (Seqwater)	No
Scenic Rim¹⁰⁸				
Beaudesert (<i>Logan River</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination	5	Allconnex	No

¹⁰⁷ Not included in Grid

¹⁰⁸ Seqwater also owns and operates the Maroon Dam (Recreation) WTP and Moogerah Dam (Recreation) WTP

WTP (<i>Source(s)</i>)	Treatment Description	Nominal Capacity (ML/d)	Grid Participant Supplied	Ability to substitute supply
Boonah-Kalbar (<i>Reynolds Creek</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination, pH correction	3	Allconnex	No
Canungra (<i>Canungra Creek</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination	1	Allconnex	No
Kooralbyn (<i>Logan River; Bigfoot Lagoon offstream storage</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination	3	Allconnex	No
Rathdowney (<i>Logan River</i>)	Coagulation, flocculation, sedimentation, rapid media filtration, chlorination	0.4	Allconnex	No

Annexure 3

Impact on WTPs during January 2011 Flood Event

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Sunshine Coast			
Ewen Maddock	<ul style="list-style-type: none"> WTP was not operational due to remedial works being undertaken. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: variable, limited at times 	<ul style="list-style-type: none"> Seqwater advises Grid Manager that WTP could be commissioned to substitute supply (11/01/11). Seqwater commissions WTP (11/01/11-13/01/11). Despite raw water quality, Seqwater able to

¹⁰⁹ The dates included in this Annexure are indicative and have been derived from a variety of sources including the Grid Manager, *OCA Incident Manager* Software System and notes taken by Seqwater operational staff during the January 2011 Flood Event. References to Distribution Authority have the same meaning as contained in the Grid Instructions.

¹¹⁰ South East Queensland Water Grid Manager, *Final January-2011 Grid Instruction – Seqwater*, (23 December 2010), Attachment 1, Table 3.

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<ul style="list-style-type: none"> Accordingly, no supply volume specified for production from WTP under initial Grid Instruction¹¹⁰. 	<ul style="list-style-type: none"> Impact to raw water source: variable, generally high in colour and turbidity 	<ul style="list-style-type: none"> operate WTP within water quality parameters under HACCP plan (14/01/11-31/01/11). To formalise supply to Grid, Seqwater lodges notice with Grid Manager to include a Grid Instruction for the WTP in accordance with Market Rules (25/01/11). Grid Manager issues amended Grid Instruction to supply 110ML from WTP to Distribution Authority in January (28/01/11)¹¹¹. Seqwater ultimately provides 103ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
Image Flat	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply 465ML from WTP to Distribution Authority during January¹¹². 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water source: variable, generally high in colour and turbidity 	<ul style="list-style-type: none"> Despite raw water quality, Seqwater able to operate WTP within water quality parameters under HACCP plan during January. Seqwater ultimately provides 450ML from WTP, within 20% supply margin, in accordance with January Grid Instruction.
Landers Shute	<ul style="list-style-type: none"> WTP was operational. 	<ul style="list-style-type: none"> Impact to infrastructure: 	<ul style="list-style-type: none"> Despite access issues, WTP manned 24/7

¹¹¹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹¹² South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<ul style="list-style-type: none"> Initial Grid Instruction to supply 2,129ML from WTP to LinkWater during January¹¹³. 	<p>none</p> <ul style="list-style-type: none"> Impact to access: variable; inaccessible at times due to landslips (10/01/11-11/01/11) Impact to raw water source: variable, generally high in colour and turbidity 	<p>(10/01/11-11/01/11).</p> <ul style="list-style-type: none"> Despite raw water quality, Seqwater able to operate WTP within water quality parameters under HACCP plan throughout January. Seqwater advises Grid Manager that WTP could increase production to substitute supply via Northern Pipeline Interconnector, subject to receiving further deliveries of treatment chemicals (12/01/11). Seqwater increases production from WTP (13/01/11-31/01/11), except for a temporary shutdown for a period on 15/01/11 associated with a chemical line blockage. Additional treatment chemicals delivered to WTP (15/01/11). To formalise increased supply to Grid, Seqwater lodges notice with Grid Manager to increase Grid Instruction for the WTP in accordance with the Market Rules (25/01/11). Grid Manager issues January Grid Instruction to supply 2,400ML from WTP to LinkWater in

¹¹³ South East Queensland Water Grid Manager, *Final January-2011 Grid Instruction – Seqwater*, (23 December 2010), Attachment 1, Table 2

¹¹⁴ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
			<p>January (28/01/11)¹¹⁴.</p> <ul style="list-style-type: none"> Seqwater ultimately provides 2,534ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
Noosa	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹¹⁵. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: variable Impact to raw water source: variable, generally high in colour and turbidity 	<ul style="list-style-type: none"> Despite access issues along ordinary routes, WTP accessed via alternate routes in early stages of January 2011 Flood Event (in and around 10/01/11). Despite raw water quality, Seqwater able to operate WTP within water quality parameters under HACCP plan throughout January as demand required.
Kenilworth	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹¹⁶. 	<ul style="list-style-type: none"> Impact to infrastructure: raw water well inundated and power supply cut (10/01/11) Impact to access: variable; inaccessible for a period Impact to raw water 	<ul style="list-style-type: none"> WTP was not operational for several days due to the inundation of the raw water well, power supply outage and lack of access (10/01/11-14/01/11). When access restored, following consultation with Distribution Authority, distribution reservoirs replenished by water tankers until WTP reinstated (13/01/11-14/01/11).

¹¹⁵ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹¹⁶ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
		source: variable, generally high in colour and turbidity with low alkalinity	<ul style="list-style-type: none"> Despite raw water quality, Seqwater able to operate WTP within water quality parameters under HACCP plan once reinstated (15/01/11) as demand required.
Moreton Bay			
Banksia Beach	<ul style="list-style-type: none"> WTP has not been fully commissioned. Accordingly, supply volume specified for production from WTP under the January Grid Instruction was for commissioning activities¹¹⁷. 	<ul style="list-style-type: none"> Impact to infrastructure: none material (temporary loss of communications on or about 15/01/11) Impact to access: variable; however local operator able to access WTP Impact to raw water source: none material 	<ul style="list-style-type: none"> N/A
Caboolture	<ul style="list-style-type: none"> WTP was operational. Initial Grid Instruction to supply 109ML from WTP to Distribution 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to infrastructure: none 	<ul style="list-style-type: none"> Due to poor raw water quality, Seqwater shutdown the WTP before water quality limits under its HACCP plan were reached (from 08/01/11).

¹¹⁷ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 7

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>Authority during January¹¹⁸.</p> <ul style="list-style-type: none"> Due to poor raw water quality following rain events in and around the New Year, Seqwater shutdown the WTP for a period prior to the January 2011 Flood Event before water quality limits under its HACCP plan were reached (01/01/11-05/01/11) 	<ul style="list-style-type: none"> Impact to raw water source: variable, with significantly high colour and turbidity, and low alkalinity, levels at times 	<ul style="list-style-type: none"> Seqwater operational staff from WTP were moved to other WTPs to offer support as required during January 2011 Flood Event. Seqwater advises Grid Manager that supply from WTP could be substituted via Northern Pipeline Interconnector (12/01/11). To formalise substitution of supply, Seqwater lodges notice with Grid Manager to decrease Grid Instruction for the WTP in accordance with the Market Rules (25/01/11). Grid Manager issues January Grid Instruction to supply 8ML from WTP to Distribution Authority in January (28/01/11)¹¹⁹. Seqwater ultimately provides 8ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
North Pine	<ul style="list-style-type: none"> WTP was operational. Initial Grid Instruction to supply 3,110ML from 	<ul style="list-style-type: none"> Impact to infrastructure: none material Impact to access: 	<ul style="list-style-type: none"> Due to poor raw water quality, Seqwater operated WTP at a reduced capacity throughout January to ensure water quality parameters in its

¹¹⁸ South East Queensland Water Grid Manager, *Final January-2011 Grid Instruction – Seqwater*, (23 December 2010), Attachment 1, Table 3

¹¹⁹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹²⁰ South East Queensland Water Grid Manager, *Final January-2011 Grid Instruction – Seqwater*, (23 December 2010), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>WTP to LinkWater during January¹²⁰.</p>	<p>variable; inaccessible for a period (11/01/11)</p> <ul style="list-style-type: none"> • Impact to raw water source: variable, with significantly high colour and turbidity levels at times 	<p>HACCP plan were maintained.</p> <ul style="list-style-type: none"> • Seqwater advises Grid Manager about reduced capacity at WTP and proposed temporary chemical dosing facilities to potentially improve treatment capacity (14/01/11). • Due to limitation to production capacity, Seqwater lodges notice with Grid Manager to reduce Grid Instruction for WTP in accordance with the Market Rules (25/01/11). • Grid Manager issues January Grid Instruction to supply 2,600ML from WTP to LinkWater in January (28/01/11)¹²¹. • Seqwater ultimately provided 2,525ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
<p>Petrie</p>	<ul style="list-style-type: none"> • WTP was operational. • January Grid Instruction to supply 388ML from WTP to Distribution Authority during January¹²². 	<ul style="list-style-type: none"> • Impact to infrastructure: raw water screens blocked temporarily • Impact to access: none • Impact to raw water 	<ul style="list-style-type: none"> • Despite raw water quality, Seqwater was able to operate WTP within water quality parameters under its HACCP plan until 11/01/11, at which time the WTP was shutdown temporarily when raw water screens were blocked (11/01/11-13/01/11).

¹²¹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

¹²² South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
		<p>source: variable, generally high in colour and turbidity</p>	<ul style="list-style-type: none"> • Seqwater sourced raw water from Lake Kurwongbah, the alternate source for WTP, and operated the WTP after the screens were cleared until supply reservoirs were reinstated to normal levels (15/01/11). • Seqwater ultimately provided 383ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
Woodford	<ul style="list-style-type: none"> • Due to poor raw water quality following rain events in and around the New Year, Seqwater shutdown WTP prior to the January 2011 Flood Event before water quality limits under its HACCP plan were reached. • January Grid Instruction to supply "as required to meet demand" from WTP to Distribution 	<ul style="list-style-type: none"> • Impact to infrastructure: raw water pump inundated • Impact to access: variable; cut at times • Impact to raw water source: variable, with significantly high colour and turbidity, and low alkalinity, levels at times 	<ul style="list-style-type: none"> • Due to raw water quality, WTP not operated during January in accordance with HACCP plan. • Supply from WTP able to be supplemented via Unity Water supply network and Northern Pipeline Interconnector.

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	Authority during January ¹²³ .		
Dayboro	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹²⁴. 	<ul style="list-style-type: none"> Impact to infrastructure: raw water well and electrical switchboard inundated (10/01/11) Impact to access: variable; inaccessible at times Impact to raw water source: variable, with significantly high colour and turbidity levels at times, and low alkalinity 	<ul style="list-style-type: none"> WTP was not operational for several days due to inundation of the raw water well and associated pumps and power supply outage (10/01/11-14/01/11). When access restored, following consultation with Distribution Authority, distribution reservoirs replenished by water tankers until WTP reinstated with power from an electrical generator (13/01/11-15/01/11). Following tests of restored raw water pumps, and despite poor raw water quality, the WTP was reinstated and operational from 15/01/11, at which time water tankering eased. Despite raw water quality, Seqwater able to operate WTP within water quality parameters under HACCP plan once reinstated as demand required.
Somerset and Lockyer			
Esk	<ul style="list-style-type: none"> WTP was operational. 	<ul style="list-style-type: none"> Impact to infrastructure: 	<ul style="list-style-type: none"> Due to power outage, Seqwater unable to

¹²³ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹²⁴ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<ul style="list-style-type: none"> January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹²⁵. 	<ul style="list-style-type: none"> power outage (10/01/11) Impact to access: variable; inaccessible at times Impact to raw water source: generally high colour and turbidity 	<ul style="list-style-type: none"> operate WTP (11/01/11-12/01/11). Despite power outage and access issues, adequate supply system storage met demand until WTP restored (on or about 13/01/11).
Jimna	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹²⁶. 	<ul style="list-style-type: none"> Impact to infrastructure: raw supply pumps and associated pontoons inundated and otherwise washed away, plus power outage (10/01/11) Impact to access: variable; inaccessible initially Impact to raw water source: variable, with generally high colour 	<ul style="list-style-type: none"> Seqwater notifies Grid Manager under IERP and Grid ERP following inundation of WTP and other WTPs in region (namely Linville and Kilcoy WTPs) and limited supply storage (10/01/11). Seqwater unable to access WTP to reinstate until 14/01/11, when raw water supply infrastructure was replaced. Once WTP operation was reinstated, Seqwater was able to meet supply as required and operate in accordance with its HACCP plan.

¹²⁵ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹²⁶ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
		and turbidity	
Kilcoy and Kilcoy (Somerset Dam) (<i>Contingency WTP</i>)	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from Kilcoy WTP to Distribution Authority during January¹²⁷. 	<ul style="list-style-type: none"> Impact to infrastructure: raw water supply infrastructure inundated and power outage (10/01/11-14/01/11) Impact to access: variable; inaccessible initially Impact to raw water source: variable, with generally high colour and turbidity 	<ul style="list-style-type: none"> Seqwater notifies Grid Manager under IERP and Grid ERP following inundation of Kilcoy WTP and other WTPs in region (namely Jimna and Linville WTPs) and limited supply storage (10/01/11). Despite access issues, Seqwater with local farmers assistance drag Contingency WTP diesel raw water pumps above flood waters to repair (11/01/11). Contingency WTP operated for short period before failing due to damage (12/01/11). Power supply to Kilcoy WTP restored on or about 15/0/11. Once Kilcoy WTP reinstated, Seqwater was able to meet supply as required and operate in accordance with its HACCP plan. Adequate system supply storage met demand until Kilcoy WTP was restored, assisted significantly by large industrial user not using water supply.
Linville	<ul style="list-style-type: none"> WTP was operational. 	<ul style="list-style-type: none"> Impact to infrastructure: 	<ul style="list-style-type: none"> Seqwater notifies Grid Manager under IERP and

¹²⁷ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<ul style="list-style-type: none"> January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹²⁸. 	<ul style="list-style-type: none"> raw water supply bores inundated and power outage (10/01/11) Impact to access: variable; inaccessible initially Impact to raw water source: variable, with generally high colour and turbidity 	<ul style="list-style-type: none"> Grid ERP following inundation of WTP and other WTPs in region (namely Jimna and Kilcoy WTPs) and limited supply storage (10/01/11). Seqwater unable to access WTP to reinstate until 14/01/11, when electrical generator utilised to reinstate WTP (15/01/11-21/01/11) and water tankers utilised initially to replenish reservoirs. Once WTP reinstated, Seqwater able to meet supply as required and operate WTP in accordance with its HACCP plan.
Lowood	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹²⁹. 	<ul style="list-style-type: none"> Impact to infrastructure: raw water intake and supply infrastructure inundated and otherwise washed away, with associated power outage (11/01/11) Impact to access: variable; cut initially Impact to raw water source: variable, with 	<ul style="list-style-type: none"> Due to poor raw water quality, Seqwater shutdown the WTP before water quality limits under its HACCP plan were reached following which power was lost to intake infrastructure due to inundation (11/01/11). Following consultation with Distribution Authority, water tankers were used to replenish storages (11/01/11-13/01/11) and boil water notices were issued by Queensland Urban Utilities. Seqwater operational staff subsequently accessed

¹²⁸ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹²⁹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
		<p>significantly high colour and turbidity</p>	<p>WTP site via helicopters and boats to assess damage and install temporary raw water supply infrastructure comprising pipe work from the source to the WTP and an associated diesel pump (13/01/11).</p> <ul style="list-style-type: none"> • Despite poor raw water quality, Seqwater was able to operate WTP utilising temporary supply infrastructure for short period (14/01/11) until rapid declines in river levels meant temporary supply infrastructure had to be relocated on several occasions to maintain supply of raw water to WTP (18/01/11). • Seqwater and Grid Manager discussed options to source a contingency pump, which ultimately lead to sourcing of second diesel pump from Sydney Water (21/01/11) and the Grid Manager accepting a repair program developed by Seqwater. • Poor raw water quality limited the WTP's capacity, however Seqwater continued to utilise temporary raw water supply infrastructure for a considerable period after the January 2011 Flood Event to enable continued supply demand to be met (14/01/11-10/02/11).

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Somerset Dam Township	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹³⁰. 	<ul style="list-style-type: none"> Impact to infrastructure: localised flooding with power supply cut. Impact to access: variable; initially cut Impact to raw water source: variable 	<ul style="list-style-type: none"> Due to cut to power supply, WTP was not operational from 09/01/11 until 14/01/11. In light of limited initial access, Seqwater operational personnel accessed site via helicopter to assess storage levels which were adequate notwithstanding WTP inoperable without power due to very low demand.
Atkinson Dam	<ul style="list-style-type: none"> Recreation WTP was operational (not subject to Grid Instruction) 	<ul style="list-style-type: none"> Impact to infrastructure: supply bore (10/01/11) Impact to access: variable; initially cut Impact to raw water source: significantly high turbidity 	<ul style="list-style-type: none"> Seqwater notifies Grid Manager under IERP and Grid ERP after WTP shutdown due to elevated turbidity levels detected in raw water and unclear whether WTP treating water to standard required under HACCP plan (10/01/11). Seqwater met with Grid Manager to discuss quality testing program and issuance of boil water notices to small number of affected people (approximately 20). WTP remained offline for considerable period due to limited access for testing and raw water quality, during which time water tankers were arranged by Seqwater to meet demand (until early February).

¹³⁰ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Kirkleagh	<ul style="list-style-type: none"> Recreation WTP was operational (not subject to January Grid Instruction) 	<ul style="list-style-type: none"> Impact to infrastructure: power cut (09/01/11) Impact to access: variable; initially cut Impact to raw water source: variable 	<ul style="list-style-type: none"> Seqwater operational personnel accessed site via helicopter to assess storage levels which were adequate notwithstanding WTP inoperable without power due to very low demand by few campers WTP reinstated mid-January
Wivenhoe	<ul style="list-style-type: none"> Recreation WTP was operational (not subject to Grid Instruction) 	<ul style="list-style-type: none"> Impact to infrastructure: power cut (09/01/11) Impact to access: variable; initially inaccessible Impact to raw water source: variable, generally high in colour and turbidity 	<ul style="list-style-type: none"> Seqwater shutdown WTP from 11/01/11 until 27/01/11 due to limited initial access and inability to treat water in accordance with HACCP parameters without continuous manning. Supply during this period was supplemented by tankering water to the site which otherwise met demand.

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Brisbane			
Brisbane Aquifer Project	<ul style="list-style-type: none"> Project comprises 5 WTPs (Runcorn; Forest Lake; Algester; Chandler; Sunnybank) January Grid Instruction did not specify any supply volume therefore WTPs offline¹³¹. 	N/A	<ul style="list-style-type: none"> N/A
Enoggera	<ul style="list-style-type: none"> January Grid Instruction did not specify any supply volume therefore WTPs offline¹³². 	N/A	<ul style="list-style-type: none"> N/A
Mount Crosby (East Bank and West Bank)	<ul style="list-style-type: none"> January Grid Instruction to supply to supply 7,431ML from WTPs to LinkWater in January¹³³. From mid-December 2010 until immediately prior to the January 	<ul style="list-style-type: none"> Impact to infrastructure: various; pump station for East Bank WTP flooded (12/01/11) Impact to access: variable; with both WTPs inaccessible at 	<ul style="list-style-type: none"> Generally, Seqwater operates East Bank WTP in first instance, with West Bank WTP made operational as required to meet demand. The WTPs can generally be operated in tandem or independently of each other subject to conditions and demand. Due to variable raw water quality, Seqwater

¹³¹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹³² South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹³³ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>2011 Flood Event, Seqwater intermittently shutdown the respective WTPs as necessary in accordance with its HACCP plans due to varying raw water quality levels associated with significant rain fall in and around the New Year.</p> <ul style="list-style-type: none"> Seqwater notifies Grid Manager in accordance with the IERP and Grid ERP in light of the actual and predicted impact of such raw water quality levels (17/12/10). The Grid Manager lead coordination of related supply from late December. 	<p>times. For example, on 10/01/11, access between the WTPs was cut due to floodwaters over Mount Crosby weir and, later, East Bank WTP was isolated for a period from 11/01/11-14/01/11 with West Bank WTP also isolated for a slightly shorter period.</p> <ul style="list-style-type: none"> Impact to raw water source: generally high in turbidity and colour, with spikes in turbidity levels at times. 	<p>shutdown and reinstated the respective WTPs for intermittent periods on various dates during the initial stages of January 2011 Flood Event in accordance with water quality parameters under its HACCP plan (07/01/11-11/01/11).</p> <ul style="list-style-type: none"> For example, on 08/01/11, the East Bank WTP was shutdown for a period due to a spike in raw water turbidity levels. Concurrently, Seqwater increased production from the West Bank WTP to meet demand. Later that day, the East Bank WTP was reinstated following a fall in turbidity levels and the West Bank WTP shutdown as demand did not require both WTPs to be operational. Details of conditions and operations were communicated to the Grid Manager during daily (several times a day at times) meetings and teleconferences. Despite the isolation of WTPs at various times, operational staff manned the WTPs at all times with staff residing locally initially manning the WTPs and then with staff airlifted to and from the WTPs by helicopters as necessary (12/01/11-18/01/11). A three man team was located onsite 24/7 from 12/01/11 and undertook the local incident

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
			<p>manager role. A dedicated chemical supply logistics coordinator was appointed to manage chemical supply and identification of supply routes for all of Seqwater's WTPs.</p> <ul style="list-style-type: none"> • West Bank WTP was restarted on 12/01/11 after the East Bank WTP pump station was flooded but Seqwater later shutdown the West Bank WTP before critical water quality limits under its HACCP plan were reached. • Due to poor raw water quality at the source for the Mount Crosby WTPs on 12/1/11 and concerns the plants may not meet critical HACCP limits, Seqwater met with the Grid Manager, other Grid Participants, Regulator, Queensland Health and two national experts. Accepting the advice from the national experts, Queensland Health recommended a short term temporary relaxation of Seqwater's treatment standards to allow for continued water supply out of the Mount Crosby WTPs without increasing the acceptable level of risk to the community. • Seqwater reinstated operations at East Bank WTP following restoration works to pump station (14/01/11) and operated the WTPs as necessary in accordance with demand for remainder of

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
			<p>January 2011 Flood Event.</p> <ul style="list-style-type: none"> • Notwithstanding the relaxation of the water quality parameters provided by Queensland Health, the water ultimately produced from the Mount Crosby WTPs was at the lower end of the relaxed range (ie. of a higher quality than the relaxation allowed) and Seqwater was able to revert back to the water quality parameters under its ordinary HACCP plan from 14.01.11 • Treatment chemicals delivered to replenish supplies with logistical assistance from other state agencies (on or about 15/01/11) and continued as required. • In the latter stages of the January 2011 Flood Event, Seqwater sought and received relevant emergency directions from DERM to release water treatment residues from East Bank WTP into the river to maintain the treatment capacity of the WTP (18/01/11; 20/01/11-24/01/11). • Seqwater ultimately provides 6,704ML from WTPs, within 20% supply margin, and in accordance with January Grid Instruction.

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Logan			
South Maclean	<ul style="list-style-type: none"> WTP was not operational after Seqwater shutdown the WTP in accordance with HACCP plan due to poor raw water quality following rain events in and around the New Year. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹³⁴. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water source: on-going variability, with high colour and turbidity levels at times 	<ul style="list-style-type: none"> Due to raw water quality, WTP not operated during January 2011 in accordance with HACCP plan. Alternative supply from WTP implemented via Southern Regional Pipeline with agreement of Distribution Authority to meet demand.
Redland			
Capalaba	<ul style="list-style-type: none"> WTP was operational. Initial Grid Instruction to supply 410ML from 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none 	<ul style="list-style-type: none"> Due to poor and variable raw water quality, Seqwater operated the WTP at varying levels of capacity during the January 2011 Flood Event in accordance with its HACCP plan and to meet

¹³⁴ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>WTP to LinkWater during January¹³⁵.</p> <ul style="list-style-type: none"> Due to poor raw water quality following rain events in and around the New Year, Seqwater shutdown the WTP intermittently prior to the January 2011 Flood Event before water quality limits under its HACCP plan were reached (03/01/11). Grid Manager advised that supply from WTP could be substituted via the Eastern Pipeline Interconnector. 	<ul style="list-style-type: none"> Impact to raw water source: variable, with high colour and turbidity levels at times associated with rainfall 	<p>demand.</p> <ul style="list-style-type: none"> Due to reduced supply demand and limitation on production capacity, Seqwater lodges notice with Grid Manager to reduce Grid Instruction for WTP in accordance with the Market Rules (25/01/11). Grid Manager issues January Grid Instruction to supply 250ML from WTP to LinkWater in January (28/01/11)¹³⁶. Seqwater ultimately provided 227ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
North Stradbroke Island	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction 	<ul style="list-style-type: none"> Impact to infrastructure: none 	<ul style="list-style-type: none"> Seqwater able to operate WTP throughout January within water quality parameters under

¹³⁵ South East Queensland Water Grid Manager, *Final January-2011 Grid Instruction – Seqwater*, (23 December 2010), Attachment 1, Table 2

¹³⁶ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	to supply 744ML from WTP to LinkWater during January ¹³⁷ .	<ul style="list-style-type: none"> Impact to access: none Impact to raw water source: none material 	<ul style="list-style-type: none"> HACCP plan. Seqwater ultimately provides 874ML from WTP, within 20% supply margin, in accordance with January Grid Instruction.
Amity Point	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹³⁸. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water source: none material 	<ul style="list-style-type: none"> Seqwater able to operate WTP throughout January within water quality parameters under HACCP plan as required to meet demand.
Dunwich	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹³⁹. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water source: none material 	<ul style="list-style-type: none"> Seqwater able to operate WTP throughout January within water quality parameters under HACCP plan as required to meet demand.
Point Lookout	<ul style="list-style-type: none"> WTP was operational. 	<ul style="list-style-type: none"> Impact to infrastructure: 	<ul style="list-style-type: none"> Seqwater able to operate WTP throughout

¹³⁷ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

¹³⁸ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹³⁹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<ul style="list-style-type: none"> January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴⁰. 	<ul style="list-style-type: none"> none Impact to access: none Impact to raw water source: none material 	<ul style="list-style-type: none"> January within water quality parameters under HACCP plan as required to meet demand.
Gold Coast			
Molendinar	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply 3,833ML from WTP to LinkWater during January¹⁴¹. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water source: none material 	<ul style="list-style-type: none"> Despite changes to turbidity levels (11/01/11), Seqwater able to operate WTP within water quality parameters under HACCP plan throughout January. Seqwater temporarily increases production from WTP in accordance with request from LinkWater aimed at partly supplementing supply from Mount Crosby WTPs (on or about 12/01/11). Seqwater ultimately provides 3,631ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
Mudgeeraba	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction 	<ul style="list-style-type: none"> Impact to infrastructure: none 	<ul style="list-style-type: none"> Despite some changes to turbidity levels (11/01/11), Seqwater able to operate WTP within

¹⁴⁰ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹⁴¹ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	to supply 1,409ML from WTP to LinkWater during January ¹⁴² .	<ul style="list-style-type: none"> • Impact to access: none • Impact to raw water source: none material 	<ul style="list-style-type: none"> • water quality parameters under HACCP plan throughout January. • Seqwater temporarily increases production from WTP in accordance with request from LinkWater aimed at increasing supply to Gold Coast to allow increased 'export' to the Southern Regional Pipeline (13/01/11-14/01/11). • Seqwater ultimately provides 1,595ML from WTP, within 20% supply margin, and in accordance with January Grid Instruction.
Hinze	<ul style="list-style-type: none"> • Recreational WTP was operational. 	N/A	<ul style="list-style-type: none"> • N/A

¹⁴² South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 2

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
Scenic Rim			
Beaudesert	<ul style="list-style-type: none"> WTP was operational. A standby portable diesel pump was used as required when high river levels otherwise impacted the capability of the WTP's pump station. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴³. 	<ul style="list-style-type: none"> Impact to infrastructure: running on diesel pumps on 10/01/11 due to high river levels Impact to access: none Impact to raw water quality: increased turbidity 	<ul style="list-style-type: none"> Despite some changes to raw water turbidity levels, Seqwater was able to operate WTP within water quality parameters under HACCP plan throughout January as required to meet demand.
Boonah-Kalbar	<ul style="list-style-type: none"> WTP was operational. A temporary raw water pump was used as required when high river levels otherwise impacted the capability 	<ul style="list-style-type: none"> Impact to infrastructure: none material Impact to access: none Impact to raw water quality: increased turbidity 	<ul style="list-style-type: none"> Despite some changes to raw water turbidity levels, Seqwater was able to operate WTP within water quality parameters under HACCP plan throughout January as required to meet demand.

¹⁴³ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹⁴⁴ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>of the WTP's intake structure.</p> <ul style="list-style-type: none"> January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴⁴. 		
Canungra	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴⁵. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water quality: variable, with high turbidity levels at times 	<ul style="list-style-type: none"> Due to high turbidity levels, WTP shutdown for short period during January 2011 Flood Event (11/01/11-13/01/11). Seqwater otherwise able to operate WTP within water quality parameters under HACCP plan throughout January as required to meet demand.
Kooralbyn	<ul style="list-style-type: none"> WTP was operational. Due to raw water quality, Seqwater intermittently sourced raw water from alternative Bigfoot 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water quality: increased 	<ul style="list-style-type: none"> Despite some changes to raw water turbidity levels, Seqwater was able to operate WTP within water quality parameters under HACCP plan throughout January as required to meet demand. As required, Seqwater sourced raw water from the alternative source at Bigfoot Lagoon

¹⁴⁵ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

¹⁴⁶ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3

WTP	Status Pre-Event	Impact During Flood Event	Action Taken ¹⁰⁹
	<p>Lagoon Offstream storage to maintain the treatment capability of WTP.</p> <ul style="list-style-type: none"> January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴⁶. 	<p>turbidity</p>	<p>Offstream storage to maintain the treatment capability of WTP.</p>
Rathdowney	<ul style="list-style-type: none"> WTP was operational. January Grid Instruction to supply "as required to meet demand" from WTP to Distribution Authority during January¹⁴⁷. 	<ul style="list-style-type: none"> Impact to infrastructure: none Impact to access: none Impact to raw water quality: variable, with high turbidity levels at times 	<ul style="list-style-type: none"> Despite some changes to turbidity levels (10/01/11-11/01/11), Seqwater able to operate WTP within water quality parameters under HACCP plan throughout January as required to meet demand.

¹⁴⁷ South East Queensland Water Grid Manager, *Amendment January-2011 Grid Instruction – Seqwater*, (28 January 2011), Attachment 1, Table 3