

7 Lockyer Valley and Toowoomba

7.1 The December/January floods in the Toowoomba region

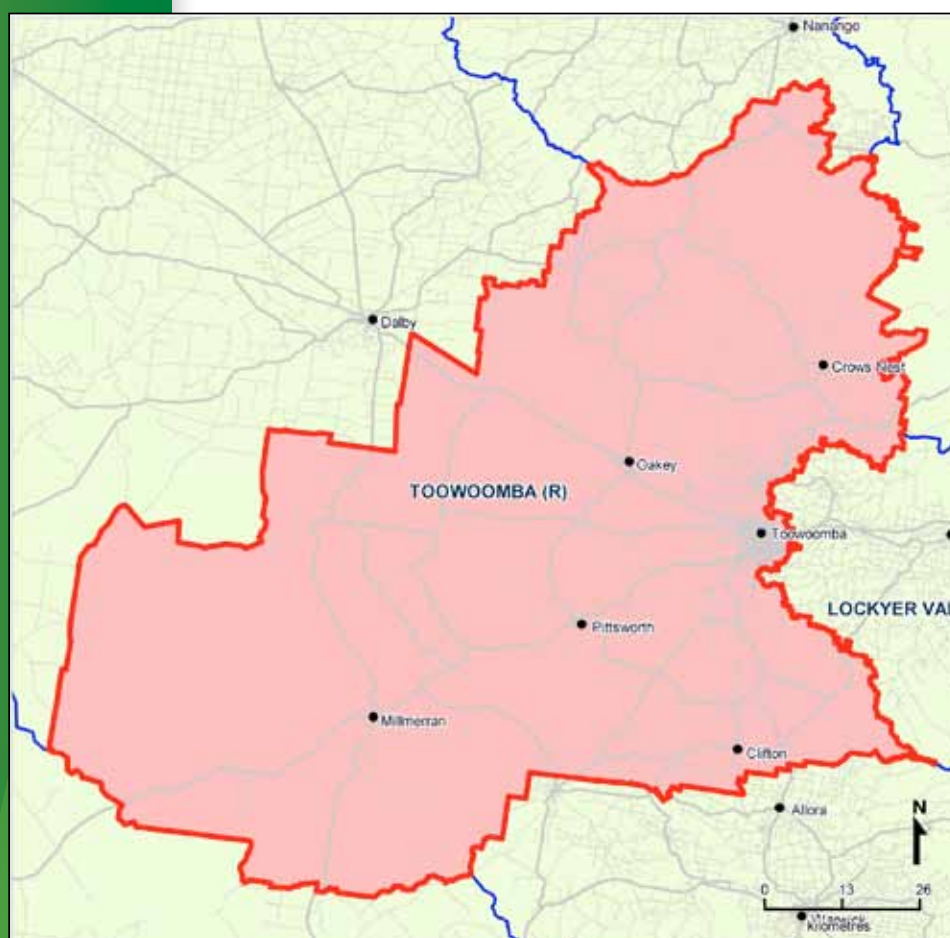
7.1.1 The region

Toowoomba city is located on an escarpment on the western side of the Great Dividing Range, approximately 700 metres above sea level. The local government region of Toowoomba (12 973.3 square kilometres in area) is situated to the west of Brisbane and the Lockyer Valley.

The Toowoomba Regional Council was formed on the amalgamation, in March 2008, of the Toowoomba Council with seven other local councils: Cambooya, Clifton, Crows Nest, Jondaryan, Millmerran, Pittsworth and Rosalie. At 30 June 2010, the population of the council area was estimated at 162 057.²

The city of Toowoomba is drained by Gowrie Creek and its tributaries, East Creek, West Creek and Black Gully. The catchments of the four creeks cover an area of approximately 56 square kilometres within the

Figure 7(a)



Toowoomba local government area¹

Toowoomba regional council area. The Gowrie Creek system flows into the Condamine River, which then flows into the Murray-Darling system. East and West creeks flow through the southern part of the city and meet north of the central business district. Black Gully joins Gowrie Creek approximately two kilometres downstream of where East and West creeks converge. Gowrie Creek and its three tributaries have steep channel gradients and catchments that are also steep. In consequence, the Gowrie Creek catchment is likely to respond swiftly to heavy rainfalls, and the rise of the water in the waterways of the creek system is also likely to occur quite quickly.³

7.1.2 Toowoomba Regional Council disaster preparation and planning

The Toowoomba Regional Council's local disaster management plan and evacuation and welfare management sub-plan were adopted in December 2009. By mid-2010 they had been distributed to all members of the local disaster management group and its evacuation and welfare committee and had been posted on the council's disaster management website for public reference.⁴ Other information about emergency contacts, disaster preparation, and the state of the dams supplying Toowoomba was also displayed on the website, the existence of which was publicised in the council's quarterly newsletters.⁵ Public education programs were delivered, with talks to schools and community groups. In July 2010, standard operating procedures were approved for the Toowoomba disaster coordination centre.

The Toowoomba local disaster management group met three times over the course of 2010, with most members attending each meeting. The local disaster management group took part in two exercises (Ember and Orko) in October and November 2010, designed to simulate activation of the disaster coordination centre and to test its software and communication links with other agencies.⁶

The evidence indicates that the Council had taken proper steps (both as required of it by the disaster management legislation and in meeting its broader local government responsibilities) for natural disaster preparation before the 2010/2011 floods.

7.1.3 December 2010/early January 2011 floods

In December 2010, most areas in the Toowoomba region experienced significant rainfall, with local media reporting that it was the wettest December in 68 years. North Toowoomba recorded 544 millimetres; East Toowoomba 517 millimetres; Pittsworth 434 millimetres; Yarraman 332 millimetres; Crows Nest 307 millimetres; Millmerran 325 millimetres and Oakey 304 millimetres.⁷ The rainfall in Oakey was more than three times the average December rainfall of 93 millimetres.⁸ The high rainfall caused flooding in Millmerran to the west, and northern areas of the region including Yarraman.⁹ Cecil Plains and Tummaville were isolated by flood waters.¹⁰

Toowoomba receives much of its water from the Cooby, Perseverance and Cressbrook dams. In the recent past those dams were at extremely low levels. However, as a result of the rainfall that the city experienced over December, the combined dam levels between 20 and 27 December 2010 reached 53.2 per cent.¹¹

A similarly high level of rainfall occurred in early January 2011. On 3 January 2011, 46.8 millimetres was recorded at Toowoomba airport; on 6 January, 67.8 millimetres of rainfall was recorded at Toowoomba airport, while 54.6 millimetres was recorded at Middle Ridge.¹² Media reports provided to the Commission show localised flooding across Toowoomba's central business district on 6 January 2011 as a result of this sustained rainfall.¹³

The large volumes of rain in early January 2011 left the Toowoomba catchment saturated.¹⁴ The combined dam levels rose to 75.2 per cent in the 12 days ending 9 January 2011.¹⁵ A milestone was reached, in that both the Cooby and Perseverance dams individually reached 100 per cent capacity.¹⁶ By the end of 10 January 2011 the combined dam level had risen to 127.2 per cent.

On 10 January 2011, between 9.00 am and 9.30 am, two intense thunderstorms crossed the south-east coast of Queensland.¹⁷ The storms joined together to form one concentrated storm at about 11.00 am;¹⁸ it continued in a south-westerly direction towards the Toowoomba range. The rainfall intensities continued to increase between 11.48 am and 12.36 pm.¹⁹ Those high rainfall intensities were observed on both sides of the Great Dividing Range, with runoff being generated to the east and west of the range. The runoff on the eastern side of the escarpment flowed into the upper tributaries of the Lockyer Creek in the Lockyer Valley; that which fell on the escarpment itself flowed into the catchments of the Gowrie and Oakey creeks to the east and west of Toowoomba.

7.1.4 Flooding in Toowoomba on 10 January 2011

On 10 January, the Gowrie Creek catchment experienced intense rainfall between 1.00 pm and 2.30 pm. In the city of Toowoomba itself, heavy rain began falling at about 12.45 pm, and peaked between 1.45 pm and 2.15 pm.²⁰ The most severe rain fell in a northeast - southwest band that covered the middle and lower parts of East and West creeks, where they crossed Toowoomba's central business district.²¹ This concentration of rain in the East Creek and West Creek catchments continued for approximately 60 to 90 minutes. It had largely ceased between 2.15 pm and 2.45 pm.²²

The intense rainfall over the catchment of the three creeks caused a severe flash flood in the city between 1.30 pm and 2.45 pm. Closed circuit television footage provided by Toowoomba Regional Council shows water rising at extraordinary speed and flowing over the roadways. It also demonstrates the speed with which the water rose. It is clear that this was not a situation in which any agency could have effectively warned residents of what was to come.

Water covered all the roadway crossings of East, West and Gowrie Creeks, making them impassable to pedestrians and vehicles. The rapidity of the flooding caught people by surprise: in city streets they found themselves surrounded by water, or were trapped in their vehicles. A woman and her teenaged son lost their lives when their car was caught in the flooding in a city intersection. A number of buildings in and around the city were extensively damaged, and numerous parked cars were swept away or inundated by the flooding.²³

7.1.5 Toowoomba Regional Council and other agencies' response to events

The extent of the rainfall in the preceding days had caused the Toowoomba Regional Council to call a meeting at 1.00 pm on 10 January to consider activating the local disaster management group and coordination centre. Representatives from the Toowoomba council, Queensland Ambulance Service, Queensland Police Service, Queensland Fire and Rescue Service, Emergency Management Queensland, Telstra and the ABC were present. During the course of the meeting the attendees received numerous calls about the torrential rain and flash flooding in the city. Because of the unexpectedness and the speed of the flooding, the immediate response as events unfolded was handled directly by the Queensland Police Service and Queensland Fire and Rescue Service.

The local disaster management group and the disaster coordination centre were activated in order to commence the response in the aftermath of the flash flooding. An operational monitoring and support group chaired by the council's chief executive officer was set up, and met twice daily to monitor local disaster coordination centre activities and to ensure efficient deployment of council resources. The local disaster management group met every morning in the week following 10 January 2011, and the local disaster coordination centre operated 24 hours a day.²⁴

The council (and through it the local disaster management group and the disaster coordination centre) operated as a single point of coordination to direct emergency services personnel in responding to calls for help. An evacuation centre was established at the Toowoomba Grammar School. There were difficulties in providing assistance across the region immediately after the events of 10 January, because flooding had closed road access from the east and the severe weather prevented fixed-wing aircraft and some helicopters from flying into Toowoomba until 12 January.²⁵ The council issued a number of media releases dealing with road and council building closures, emergency procedures to be observed by the community, emergency numbers to call and flooding west of the range in and around Oakey.²⁶

7.1.6 Oakey

Oakey is a small town located on the Darling Downs approximately 27 kilometres north-west of Toowoomba and 160 kilometres west of Brisbane. It was located within the Jondaryan Shire until, with the amalgamation of Queensland councils, the Toowoomba Regional Council was formed in 2008.

Oakey Creek bisects Oakey through the centre of the town. Westbrook Creek runs south of the town until meeting with Oakey Creek downstream of the Oakey bypass. Tributaries further upstream – Cooby Creek, Meringandan Creek and Gomaran Creek – feed into Oakey Creek.

Between 10 and 11 January 2011, Oakey experienced flooding as Oakey Creek burst its banks. On 10 January, water levels rose and fell twice. On 11 January, water levels peaked at 7.5 metres, with both the bridge on Bridge Street and the railway bridge overtopping. One hundred and twenty-eight homes were inundated by flood water; the town's industrial area was also affected.²⁷

As a result of the flooding, Oakey residents were evacuated initially to the Oakey Cultural Centre which was set up as an assembly point. The first evacuees arrived at around 10.30 am; because of difficulties in procuring food, bedding and staff, residents unable to find alternative accommodation (about 60 of them) were evacuated by bus to the Toowoomba Grammar School. They were able to return to their homes in Oakey on 13 January 2011.²⁸

7.1.7 Cooby Dam

Background

Cooby Dam is one of the three dams which Toowoomba Regional Council owns and operates for urban water supply (the others being the Cressbrook and Perseverance dams²⁹). Cooby Dam is located on Cooby Creek, upstream of Oakey, with any overspill feeding back into the creek. In addition to the inflow from Cooby Creek, Cooby Dam receives the flows of Geham, Klein and Reedy creeks, as well as capturing runoff from the west of the Dividing Range.

The dam has an ungated spillway whose dimensions govern the otherwise unrestricted outflows of flood waters during flood events. Unlike Wivenhoe Dam, Cooby Dam is not operated for flood mitigation purposes and its outflows cannot be modified during a flood event. Nonetheless, during a flood event the dam does provide some flood mitigation benefit to communities downstream.³⁰ (See 4.1.4 *Warnings about dam spillway outflow* for an explanation of dams that have flood mitigation capacity.)

Toowoomba Regional Council has an emergency action plan for Cooby Dam to identify emergency conditions which could endanger the dam's integrity. The plan prescribes procedures the council should follow in the event of an emergency. A primary focus is 'to provide timely warning to appropriate emergency response and management agencies, to allow these agencies to implement protection measures for downstream communities'.³¹

The impact of the Cooby Dam on downstream flooding in January 2011

The heavy rain which fell in south-east Queensland in early January 2011 saturated creek catchments. The Oakey area recorded its most intense rainfall between 9.00 am on 9 January and 9.00 am on 10 January 2011.³² On 11 January 2011, the Cooby Creek rainfall gauge recorded its highest rainfall since it was installed in 1990.³³

The Commission received evidence from a farmer living 10 kilometres east of the Cooby Dam, who believed that spillway overflow from the dam had caused significant flooding on his property on 11 January 2011. He did not receive any prior warning of the flooding from the council, emergency services or the Toowoomba local disaster management group.³⁴ (Other residents of Oakey and the Oakey district similarly complained of a lack of warning that their properties would be inundated.³⁵ However, on 10 January 2011, Toowoomba Regional Council did issue a media release regarding possible flooding in Oakey: 'Toowoomba Regional Council is advising Oakey residents to take precautions against possible flooding in the town. Flooding may occur due to significant rises in Gowrie and Oakey creeks caused by heavy rain. Residents should regularly check any water on their property to ensure that water levels are not rising'.³⁶)

The Commission engaged an independent hydrological expert, Dr Phillip Jordan, who investigated whether Cooby Dam increased the impact of flooding on downstream residents. He found (in simple terms) that although unregulated outflows from the dam occurred during the flood events of 10 and 11 January 2011, the peak rate of outflow from the dam was less than the peak rate of inflow; it followed that the dam had mitigated the flow of water to residents downstream.³⁷ Neil Collins, a hydraulic engineer who prepared a report for the Local Government Association of Queensland,³⁸ reached a similar view. The Commission accepts their conclusions.

Compliance with the Cooby Dam's emergency action plan

Under the dam's emergency action plan, once the water level reaches 0.5 metres above the spillway crest, stage one of the plan is activated.³⁹ The dam operators (the individuals who physically operate and oversee the dam on the Toowoomba Regional Council's behalf) must, through a reporting chain, advise the council of the overflow. The council in turn, through its disaster coordination committee coordinator, alerts all residents within five kilometres downstream of the dam wall. (Only two properties fall within this category.⁴⁰)

At approximately 9.00 pm on 9 January 2011, the dam's water level reached 0.5 metres above the spillway crest and downstream residents within five kilometres were notified.⁴¹ One of those residents confirmed that a council officer maintained regular contact with him, advising the heights of the dam from 9 to 12 January 2011.⁴²

Dam levels again exceeded the spillway by 0.5 metres with a minor peak in the early hours of the morning on 10 January 2011, reaching 1.3 metres above the spillway at approximately 4.30 pm on 10 January 2011.⁴³

On 11 January 2011, at 7.13 am, the dam level reached 1.52 metres above the spillway, peaking half an hour later at 1.55 metres above the spillway (approximately three metres below the crest of the main dam embankment and almost four metres below the crest of the wave wall⁴⁴).

Under the dam's emergency action plan, the dam operator, upon a reading exceeding 1.5 metres above the spillway, is to advance to stage two of the plan by sealing the dam intake tower door, and regularly reporting dam levels to the council. The council is to take a number of steps, which include requesting closure of access roads to the dam and notifying residents downstream of expected flood levels. Having reviewed the dam's status, it must, 'if required', advise the police and State Emergency Service (SES) to evacuate residents of the downstream floodplain.⁴⁵

However, as the dam level began to stabilise and then recede within a few minutes of the peak, falling to 1.46 metres by 9.15 am,⁴⁶ and council officers saw there was no significant rainfall expected in the dam's catchment,⁴⁷ the decision was made that stage two of the plan would not be activated. That decision, and the consequent non-fulfilment of the requirements of stage two of the emergency action plan, were reasonable in the circumstances.

If the dam level exceeds 0.5 metres above the spillway crest, it is probable that other catchments are saturated and that residents beyond the five kilometre point can expect flooding from upstream creeks and waterways.

Recommendation

- 7.1 The Toowoomba Regional Council should consider amending stage one of the Cooby Dam emergency action plan to extend the five kilometre limit for alerting residents downstream of the Cooby Dam.

7.2 The December/January floods in the Lockyer Valley region

7.2.1 The region

The Lockyer Valley is situated to the east of Toowoomba and west of Brisbane. The Lockyer Valley Regional Council was produced by the amalgamation in 2008 of the shire of Gatton and the shire of Laidley, covering a land area of 2272.3 square kilometres.

At 30 June 2010, the estimated total resident population of the Lockyer Valley regional council area was 36 591.⁴⁸ Lockyer Valley region towns include Murphys Creek, Laidley, Helidon, Withcott, Grantham and Gatton.

The Lockyer Valley drainage network comprises Lockyer Creek and its tributaries. Lockyer Creek generally flows east and enters the Brisbane River at Lowood. It is the largest tributary of the Brisbane River and has a catchment area of 2,600 square kilometres. Its northern tributaries include Murphys Creek, Fifteen Mile Creek and Alice Creek, while to the south it is joined by Flagstone Creek, Ma Ma Creek, Tenthill Creek and Laidley Creek.

Figure 7(b)



*Lockyer Valley local government area (2008)*⁴⁹

7.2.2 Lockyer Valley Regional Council preparation and planning

The Lockyer Valley Regional Council has seven elected councillors, including the Mayor and Deputy Mayor. It employs between 340 and 350 staff, about half of whom were available over the Christmas break in 2010/2011.⁵⁰

In accordance with the *Disaster Management Act 2003*, the council, after amalgamation, set up a local disaster management group and in September 2009 adopted a local disaster management plan. The general impression from the evidence, however, is that once the plan was adopted, little more was done in the way of disaster planning for some time thereafter.

According to the Lockyer Valley Regional Council Mayor and chair of the local disaster management group, Stephen Jones, he became aware when he attended a Local Government Association of Queensland conference in May 2010 of impending changes to the disaster management legislation which would require an upgrading of disaster preparation and a revised disaster management plan. Soon after that conference, he said, the council began to focus on disaster preparation, and began to work on revision of its disaster management plan.⁵¹

In July 2010, the council gave responsibility for its disaster planning to its engineering services department and its director, Gerry Franzmann (who was eventually appointed as local disaster coordinator), and a disaster management working group was set up. On 15 July 2010, Mr Franzmann attended a meeting with the area director of

Emergency Management Queensland, at which the council's disaster management plan was discussed. On 5 August 2010, representatives of the Lockyer Valley Regional Council attended a four hour session run by Emergency Management Queensland in which the changes to the amended legislation were discussed, including the role and membership of disaster management groups and the necessary alterations to disaster management plans.⁵²

Mr Franzmann conducted a disaster management working group meeting the following day. The minutes note that changes were to be made to the existing disaster management plan, after which it would be reviewed by Emergency Management Queensland, which would advise on any further changes needed. The subject of sub-plans, including evacuation plans, was raised; it was noted that Emergency Management Queensland would assist with their development, and that the Red Cross might give advice in relation to the evacuation plan.

On 22 September 2010, a council meeting considered the report of a member of the disaster management working group, who pointed out that 'since amalgamation little work [had] been done to improve [Lockyer Valley Regional Council] LVRC's disaster response capability'. There had been no disaster management meetings for 12 months; the disaster management plan required updating; there were no sub-plans for emergencies; the council had not established a dedicated disaster response command centre; and there was no contingency planning for the possibility that key staff would be away on leave or physically unable to attend in the event of a disaster. The council resolved to note his report and to amend the council's budget to include \$65 000 for disaster management operations.⁵³ (A large part of the money was earmarked to develop a control centre for emergencies at Gatton.⁵⁴)

The council's response to the issues raised in the report was not otherwise recorded, but a local disaster management group meeting was held the following day.⁵⁵ It was the first, on the material produced by the council, since 18 September 2009, although section 30 of the *Disaster Management Act 2003* requires meetings at least once every six months. At that meeting, a revised version of the disaster management plan was distributed, noted in a table to have been updated in July 2010 (although the changes made from the September 2009 document seem to have been minor). The participants were invited to review it over the following fortnight. The plan, with minor changes, was next reproduced on 26 October 2010.

In early November 2010, Lockyer Valley Regional Council participated, with four other councils, in Exercise Orko, conducted by Emergency Management Queensland. The exercise, which involved the simulation of a major flood and storm event over a three day period, was designed to test disaster preparation in the region. Later that month, Mr Franzmann attended a district disaster management group meeting; his notes record some concern that the council would need training from Emergency Management Queensland to get its plans 'up to speed'.⁵⁶ In early December, a council staff member attended a flood planning workshop at which Emergency Management Queensland and the Bureau of Meteorology made presentations.

The revised draft disaster management plan remained in draft form for the remainder of 2010. On 23 December, in light of forecasts of intense rainfall, it was circulated to members of the local disaster management group in anticipation of the group's possible activation.⁵⁷ By email on 24 December, Mr Franzmann advised councillors and staff where sand bags could be obtained, provided telephone numbers to contact in the event of road blockages, and informed them of where the local disaster management group would establish its co-ordination centre if it were activated. Flooding in fact began on the night of 26 December. On 5 January, when the crisis was perceived to have passed, the area director of Emergency Management Queensland held a debriefing meeting with representatives of the district disaster management group and the council.

The disaster management plan had still not received council approval. According to Mr Jones, however, a final version was produced on 6 January and circulated with a 'flying minute' (no copy of which is available) to councillors. It was then in some way adopted, receiving formal ratification on 23 February 2011.⁵⁸

Evacuation plans

Section 58 of the *Disaster Management Act 2003* requires a local disaster management plan to be consistent with disaster management guidelines, which are made under section 63 of the Act. The *Queensland Disaster Management Planning Guidelines for Local Government 2005* nominate evacuation plans among a list of plans which should be prepared in the response phase 'to detail arrangements for functional support'.

The council had not, prior to the flooding at the end of 2010 and the beginning of 2011, prepared any evacuation plan. It possessed a pro forma document into which some inconsequential details had been inserted; but no information of substance, such as the location of possible shelters or centres, had been included.⁵⁹ The council in

fact relied on the Gatton hall as its sole evacuation facility, although Mr Jones acknowledged that it was not possible for all those in the council region needing accommodation to make their way there.⁶⁰ That certainly proved to be the case in the January floods, when informal centres emerged in communities isolated by the events.

Mr Jones proposed, for the future, the nomination of collection points at which people could assemble for transport to a central evacuation centre with facilities for their accommodation over days or weeks. The details of both the collection points and the evacuation centres should, he accepted, be formally recorded in an evacuation plan.⁶¹

It must be noted that Lockyer Valley Regional Council was by no means the only council which had not met its obligations under the disaster management legislation, and that it was not a wealthy or well-resourced council. Had the council met the legislative requirement to hold disaster management group meetings at no greater than six month intervals, acted more expeditiously to review and endorse its disaster management plan or produced an evacuation plan, it would not have prevented the tragic deaths of early January 2011. However, better planning and preparation would have assisted in the response to the disaster (see recommendations about evacuations in chapter 5 *Emergency response* and section 7.2.5 *Lockyer Valley Regional Council response*).

7.2.3 December 2010/early January 2011 floods

Around 26 December 2010, Laidley, Forest Hill and Grantham were flood affected. As a result the local disaster management group was activated on 27 December 2010. The Gatton evacuation centre was also activated on the evening of 27 December; between 10 and 20 people were registered there. It was closed the following morning, with bedding kept on site in case of further evacuations.⁶²

On 28 December 2010, a number of properties at Brightview, Glenore Grove and Lockrose in the Lockyer Valley were isolated by road closures. Aerial re-supplies were needed for residents on Black Duck Creek Road and East Haldon Road, and seven people were evacuated by air from Black Duck Creek.⁶³

Localised flooding in the region was significant enough to activate the Lockyer Valley's local disaster management group and disaster coordination centre on 6 January 2011 and again between Friday 7 January and Sunday 9 January.⁶⁴

The council and police coordinated road closures, while the SES and rural fire fighters carried out sandbagging work. In response to rises in Sandy Creek, some Grantham residents were evacuated on 9 January 2011, but were able to return to their homes soon after.⁶⁵ The disaster coordination centre closed at 3.30 am on the morning of 10 January 2011 and reopened a little after noon the same day.⁶⁶

Flooding in the Lockyer Valley on 10 January 2011

Weather radar data shows that intense rainfall would have started in the northern parts of Fifteen Mile Creek, Murphys Creek and Alice Creek at approximately 12.00 pm. Because that catchment was in steep terrain and was already saturated from earlier rain, runoff and overland flows in those watercourses may have commenced within minutes. By approximately 1.00 pm, all catchments in the Upper Lockyer Valley would have been experiencing extremely heavy rainfall.⁶⁷

The rainfall produced flash floods in Murphys Creek, Rocky Creek and Monkey Waterholes Creek, and the upper and middle reaches of Lockyer Creek, which gained width and velocity as they moved downstream. Upstream of Helidon, Rocky Creek delivered its flows to Lockyer Creek, while immediately downstream of Helidon, Monkey Waterholes Creek added its flows. This flash flood then moved downstream towards Grantham.⁶⁸

There are no flood warning rainfall stations in the upper Lockyer Creek catchment, such as in the tributary creek areas of Murphys Creek, Six Mile Creek and Rocky Creek. The radar information for the day suggests that the higher rainfalls and rainfall intensities occurred between the top of the range and the Helidon area, missing the rain gauge network.⁶⁹

There were gauges operating at Spring Bluff and Helidon, but none in between. That paucity of gauge information makes it difficult to establish at exactly what time the flash floods struck each township. In Spring Bluff, the streamflow gauge recorded water levels rising at 1.20 pm, peaking at 4.96 metres by 1.40 pm. A resident there described seeing the creek in flood in the early afternoon. She lost both her parents when part of their house, near hers, was swept away. That witness recalled the water knocking down and swallowing up massive gum trees; bits of shed were washing down the creek. Water was also coming with force down the hills and down the road.⁷⁰



Floodwaters at Spring Bluff, near Murphys Creek, 10 January 2011 (photo courtesy the Matthews family)

The Department of Environment and Resource Management (DERM) owns the Spring Bluff stream flow gauge and records its data, but the gauge is not telemetric (it does not report automatically). Consequently, the data was not available to either DERM or the Bureau of Meteorology while the flood was actually happening.⁷¹

At the township of Murphys Creek, flooding began between approximately 1.45 pm and 2.00 pm. A witness who lived at Upper Lockyer near the town said that at about 1.47 pm he saw a wave of water in the creek breaking in the distance; the force of the approaching water was ripping out trees in its path.⁷² The level of the creek rose about 12 metres in 12 minutes. By 2.51 pm, the water level had receded significantly.⁷³

A resident in the Murphys Creek township said that at about 2.00 pm, water started coming down the road carrying rain water tanks and other large items.⁷⁴ Two people drowned at Murphys Creek.

At about the same time (between 1.45 pm and 2.00 pm) Withcott, at the base of the Toowoomba range approximately 11 kilometres south of Murphys Creek, was beginning to experience flooding of sufficient strength to carry cars with it.⁷⁵

At Postman's Ridge, flooding began at approximately 2.00 pm. A witness there described seeing Murphys Creek escape its banks at a bend, sending water along the road and into her house.⁷⁶ Two houses near the bridge at Postman's Ridge were washed away in the flash flood, killing two people.

At Helidon, there is a telemeter gauge and an ALERT gauge. Both began to record fast water level rises at about 2.20 pm, when the creek was at four metres. At 2.50 pm the Helidon telemeter gauge failed, with a reading of 12.66 metres. The ALERT gauge failed at 2.53 pm with a peak of 12.7 metres. DERM undertook a survey in the weeks following the flood event, concluding that the Helidon peak was approximately 13.88 metres and occurred about 3.10 pm.⁷⁷ The Warrego Highway near Helidon was flooded by fast-flowing water, and the driver of a car, with his family, was swept away. His wife and son were rescued; he was lost.

Residents suggest that flooding in Grantham occurred between approximately 3.20 pm and 4.00 pm. The flood appeared as a wave, sweeping from the Lockyer Creek across the paddocks and through the town. In the opinion of hydrologists consulted by the Insurance Council of Australia,⁷⁸ the floodwaters were about two to two and a half metres deep. At an estimated rate of rise of 12 metres per hour they would have taken only 10 to 15 minutes to reach full depth. They were moving at an estimated two to three metres per second.

Emergency calls were made; just after 4.00 pm the police communications centre directed helicopters to perform rescues at Grantham. A rescue helicopter left Archerfield airbase at 4.28 pm and arrived over Grantham at 4.48 pm. It rescued a number of people from roofs and trees. Some residents were able to make their way to safety at the local school, on the higher side of the town. Others were later retrieved from their homes by front end loaders and taken to the evacuation centre at Helidon. Ten people, adults and children, are known to have lost their lives to the torrent of water. Two others have not been found.

In Gatton, the telemeter gauge indicated there was a water level rise of about seven metres at approximately 5.00 pm. The gauge failed around 7.00 pm. The Bureau of Meteorology advises, on its reconstruction of flood data, that it is likely that the water level peaked around 8.00 pm, reaching approximately 14.38 metres.

On the following day, significant flooding occurred in Sandy Creek around Forest Hill and in Laidley Creek around Laidley.⁷⁹ Two hundred and fifty nine people were evacuated from Forest Hill and 75 from Laidley.⁸⁰

7.2.4 Lockyer Valley disaster response – agency response

Rescue

Immediately following the Lockyer Valley floods, a number of agencies responded to the disaster; in particular, Emergency Management Queensland helicopter rescue, Queensland Police Service and the Australian Defence Force.

Emergency Management Queensland helicopter rescue employees performed rescues over Grantham from 4.48 pm on 10 January until approximately 6.15 pm, when the aircraft exhausted its fuel.⁸¹ By the time the pilot and crew returned to Archerfield, they had winched 28 people and one cat to safety from rooftops and other locations around Grantham. Another crew in a second Emergency Management Queensland helicopter took over the task and performed 15 rescues over Grantham before fading light and low fuel supplies forced them to finish for the day at 7.30 pm.⁸²

On 11 January 2011, Australian Defence Force helicopters evacuated over 400 people from the Lockyer Valley and Toowoomba regions, including the entire population of Forest Hill when the town was evacuated due to rising flood waters. In the course of the day they completed 24 hoist recoveries. Army trucks were also involved, taking 75 people from Laidley Hospital to the Plainland Hotel on the Warrego Highway.⁸³



Grantham resident and dog on rooftop awaiting rescue, 10 January 2011 (photo courtesy Wendy Friend)

The search for missing people

One of the most important aspects of the response in the Lockyer Valley was the search for people missing after the floods swept through. Hundreds of Queensland police officers, with assistance from the Australian Defence Force, the Federal Police and the SES, were involved in the search. On 13 January 2011 approximately 120 defence personnel came to Grantham to help; because of the size of the task, a further three platoons were requested and arrived in Grantham on 15 January 2011.⁸⁴ The search area included over 663 square kilometres and 131 kilometres of creek line.⁸⁵ It covered Spring Bluff to Grantham; the greater town area of Grantham; and the area east of Grantham to the Brisbane River. Defence force members walked the entire 131 kilometres of creek line on three occasions.⁸⁶ The defence force provided search helicopters and machinery for use in the search. One area of debris which had to be searched was described as being at least 2000 square metres in area and several metres deep.⁸⁷ In addition to foot searches, air and boat searches of sections of the Brisbane River and Moreton Bay were carried out; but all those found were located by searchers on foot.⁸⁸



*Members of the Australian Defence Force at Grantham assisting in the aftermath of the floods, 13 January 2011
(photo courtesy Geoff Purton)*

7.2.5 Lockyer Valley Regional Council response

The Lockyer Valley Regional Council's response, through its local disaster management group, to the flash flooding disaster in its region on 10 January 2011 was the subject of a number of criticisms. The most serious of these were that it had failed to give warning of the flash flood in Lockyer Creek to downstream residents, that it had inadequately responded to the disaster in smaller, isolated valley communities, particularly Murphys Creek, and that it had failed to identify and establish evacuation centres.

The absence of warning

Once the disaster co-ordination centre was re-opened just after midday on 10 January, the local disaster management group's running log indicates that it received reports of general flooding at Forest Hill, Laidley, Grantham and Withcott and anticipated that evacuations would be needed. Forest Hill was a particular concern; at 1.45 pm the local area commander for the Queensland Fire and Rescue Service undertook to have doorknocking carried out to warn residents there. Shortly before, at 1.35 pm, the Lockyer Valley Mayor, Mr Jones, had reported heavy rain at Withcott, and by 2.20 pm, flooding of such proportions that it was carrying cars away.⁸⁹ It does not seem that he (or the disaster management group) attributed any wider significance to the Withcott event; he thought it the product of an isolated cloudburst.⁹⁰

At 2.30 pm, the SES controller directed the Gatton SES group to undertake doorknocking at Grantham, in the expectation that flooding there would be of the type the town had been experiencing intermittently in preceding weeks. They left Gatton for that purpose at 2.50 pm, stopping to warn one household on the Gatton side of Grantham as to the possibility of water rises, but then found themselves unable to get into Grantham because of the rising water.⁹¹

There is a 2.10 pm note in the running log of advice from the district disaster management group of a house flooded at Spring Bluff; that 'people may be stuck', and that rescuers (presumably Queensland Fire and Rescue Service swift water rescue) were 'unable to get to it'. At 2.45 pm, the district disaster coordinator contacted the local disaster group to advise of cars being swept away in Toowoomba and asked whether anyone was missing from Murphys Creek.⁹² There was further confirmation from an unknown source, relayed to the local disaster group at 3.30 pm, of two houses at Postman's Ridge having been swept away.⁹³ It does not appear, though, that any detailed information about the state of Lockyer Creek was conveyed to the local disaster group or the council. In particular, there is no record of their being alerted by anyone who saw the rapid rise in the creek at Helidon.



Flash flooding in Grantham, 10 January 2011 (photo courtesy Geoff Purton)

The Lockyer Valley Regional Council received three-hourly river height bulletins from the Bureau of Meteorology. The 3.30 pm bulletin for the Brisbane River and its tributaries gave the heights of the Lockyer Creek at Helidon as 12.66 metres R (for rising) at 2.50 pm and 12.68 metres at 3.02 pm. The local disaster group's running log shows that at about 3.40 pm the rise in the Helidon levels had been observed on the Bureau's website. A more perceptive disaster management group might earlier have deduced that flooding of the proportions experienced in the Murphys Creek waterway had serious implications for Lockyer Creek, and made efforts to keep abreast of exactly what was happening along the creek. Against that, it should be said that the disaster management group was, it is evident from the running log entries, trying to respond to flooding reports from numerous sources.

The next running log entries show that at 3.45 pm, doorknocking by council staff was arranged for Gatton. At 4.07 pm, the local area commander of the Queensland Fire and Rescue Service offered to direct the local rural fire brigade to doorknock Grantham. That, of course, was too late for Grantham.

Three Grantham residents paying close attention to the Bureau of Meteorology website said they noticed the sharp rise reported there in the level of Lockyer Creek at Helidon. One was uncertain of the time at which he did so. In disbelief he logged off the site and logged on again to see if the reading (over 12 metres) was still there, as it was. He and his family had not enough time to do more than assemble some personal effects before the water swirled into their yard.⁹⁴ Another had the reading reinforced when his daughter told him she had heard of a vehicle being washed off the road at the Helidon bridge. That made him think that flooding levels at Grantham would be similar

to those reached in the 1974 flood. He and his daughter set about moving their vehicles to an area which on that assumption would be beyond the flood's reach. He had stopped to talk to someone about the expected flooding when they both saw the water approaching across the paddocks. He was washed away in his utility, but was eventually able to get into a tree where he stayed until the waters receded.⁹⁵

The third resident watching the website telephoned the council to ask if the gauge was broken and spoke to someone unknown in the council office, who said it was the Bureau of Meteorology's concern (assuming, apparently, that it was simply a faulty gauge). That resident established by a call to a local councillor that there had been serious flooding at Withcott, and a family member driving towards Helidon confirmed that there was a great deal of water coming. Her family had time to shift their vehicles to what they thought was a safer area in the town before the water came rushing into their yard and house.⁹⁶

Other Grantham residents received warnings of the water coming down the Lockyer Creek through telephone calls from friends and relatives at Helidon; a number were told to expect a 'wall' of water. Many reacted by trying to move their belongings higher and their vehicles to safe ground; some assembled belongings with the intention to leave; others went to warn neighbours. The common experience was that no-one had time to do much before the water arrived; it was then a fight for survival.⁹⁷

The Lockyer Valley disaster management group made one unsuccessful attempt to warn Grantham residents of imminent flooding (sending SES volunteers at 2.40 pm). It does not seem to have occurred to it to contact residents there by telephone. It expected that any flooding would be problematic, not catastrophic. It is unfortunate that it was not better informed, but given the patchy nature of the reports it received, the many incidents to which it was attempting to respond, and the fact that there was no precedent for the Lockyer Creek to surge through Grantham as it did that day, it is not surprising that the disaster management group did not appreciate the real nature of the emergency. An effective warning would have been one which told Grantham residents that they should flee at once to preserve their lives. The Commission does not consider that the local disaster management group, or the Lockyer Valley Regional Council, should now be regarded as culpable for failing to recognise how dire the risk was, or to give such a warning.

Two deaths occurred at Spring Bluff and two deaths at Murphys Creek, both communities very close to the eastern side of the Dividing Range. Given the speed and strength of the water rise there, it does not seem likely that any warning could have been given in time to people living there. It is noteworthy however, that these communities, and other communities within the Lockyer Valley such as Black Duck Creek, have very little internet or mobile phone access.

Recommendation

- 7.2 Lockyer Valley Regional Council should investigate the feasibility of installing alarm-activating gauges in the creeks at Spring Bluff, Murphys Creek and other communities where communication systems are poor and there is a risk of rapid and unexpected water rise.

Murphys Creek

The Lockyer Valley Regional Council remained unaware of (and does not seem to have enquired about) circumstances at Murphys Creek until 12 January 2011, when it received a report from Emergency Management Queensland.⁹⁸ Although the council sent two council employees to the township on 13 January 2011 and the Mayor, Mr Jones visited on 14 January 2011,⁹⁹ the council failed to allocate permanent staff until 21 January 2011.¹⁰⁰ When staff were allocated they were in an administrative capacity only and were unable to coordinate resources and personnel or act as a liaison point for the community.¹⁰¹

Because there was no effective local government presence in the Murphys Creek and Spring Bluff region in the days that followed 10 January 2011, hotel staff set up an evacuation centre at the Murphys Creek tavern, which also came to serve as a coordination centre. Within a couple of days, a resident with military experience, Peter Souter, had taken charge of coordination activities there; he developed a structure to ensure that resources and assistance provided by volunteers, private companies and government agencies reached residents.¹⁰² The coordination centre operated with help from state government entities such as Emergency Management Queensland and the

Queensland Police Service, and support agencies like Centrelink, Lifeline and the Australian Red Cross, but it received very little assistance from the Lockyer Valley Regional Council. Mr Jones, the Lockyer Valley Mayor, acknowledged in giving evidence that in the absence of any community liaison officer from the council, Mr Souter filled the role.¹⁰³

Witnesses observed,¹⁰⁴ and it is evident, that the Lockyer Valley Regional Council was overwhelmed by what it had to deal with and struggled with effective response. On a suggestion from the Emergency Management Queensland area director,¹⁰⁵ on 18 January 2011 the Lockyer council sought help from the Murweh Regional Council. The disaster coordinator for that council, together with five staff experienced in disaster management, came to the Lockyer Valley to assist.¹⁰⁶ Mr Souter and police officers involved in the response effort observed that the Lockyer council's management of resources, and particularly its contribution to managing the recovery at Murphys Creek, improved markedly after the Murweh council staff members arrived.¹⁰⁷

There is no doubt that the Lockyer Valley Regional Council and the local disaster management group were put under extraordinary pressure by the scale of the disaster in the Lockyer Region, and that even better-resourced councils would have struggled to cope in the circumstances. However, notwithstanding the proportions of the disaster and the difficulties it faced in responding, the local disaster management group should have assessed the needs of communities in its region isolated in the aftermath of the flooding as a priority. In particular, it should have arranged for a liaison officer (preferably a councillor or senior council officer) to coordinate the response and immediate recovery effort in Murphys Creek, where it was known that the community had been hard-hit and that deaths had occurred. If its resources were insufficient for it to do so, it should have sought assistance from the district disaster coordinator.

The circumstances in which Murphys Creek found itself highlight the need for councils to identify in advance those communities which may be isolated in the event of a disaster and ensure a local capacity to cope.

For recommendations on this issue see chapter 5 *Emergency response*.

Evacuation centres

On 27 December 2010, the Lockyer Valley Regional Council placed a notification on its website of the Gatton Hall's status as an evacuation centre. It had been necessary to open or 'activate' it before the events of 10 January 2011 because of previous flooding in the area. On 10 and 11 January, residents of Grantham and Forest Hill were evacuated to the hall. There were no other designated evacuation centres or assembly points. However, by necessity, a number of makeshift evacuation centres came into existence.

Situation reports sent by the local disaster management group to the district group in January 2011 show that by 12.15 am on 11 January, the council was aware that evacuation centres had been established in the Gatton Shire Hall, Helidon Community Centre and the Glenore Grove Hall.¹⁰⁸ By 5.37 am that same day Grantham State School was added to this list.¹⁰⁹ By 9.50 pm the council reported further evacuation centres at Laidley Hospital, Laidley State High School, Gatton Sports Centre, Woolworths Shopping Centre Plainland, Withcott Fire Station and self evacuations to the Murphys Creek tavern, Postman's Ridge Hall and the Lutheran Hall at Lockrose.¹¹⁰ Some of those centres were established by community members isolated by flood waters; others – but it is unclear how many – were opened on the initiative of council, once the need arose. People housed in the centres came from Grantham, Withcott, Helidon, Murphys Creek, Glenore Grove, Forest Hill, Postman's Ridge, Lockyer Waters, Lockrose, Laidley and Toowoomba.¹¹¹

Following the flooding of Grantham in the afternoon of 10 January, residents used the local school as an evacuation centre. A local police officer and his wife, the school principal, set up the evacuation centre using donated bedding, towels and food from residents.¹¹² The officer kept a handwritten record of people who took refuge at the centre. On the first night 32 people stayed at the school. The following day, 56 people were evacuated by air to Helidon. Some residents remained at the school another night and were evacuated to Gatton the next day.¹¹³ Because the school was not an official evacuation centre it lacked essentials: showers, cooking facilities and communications equipment. There was no power; generators were obtained from locals to run water pumps, lights and other equipment.¹¹⁴ After the immediate need for an evacuation centre had passed, the centre continued to be used to provide meals to displaced residents and to coordinate assistance and services for the town.¹¹⁵ A marquee placed in parkland next to the school became Grantham's relief centre, where the community could meet and receive assistance from various agencies such as Centrelink, banks and counselling services.¹¹⁶

The usual congregation point for the Murphys Creek community was the local school; because the school was flooded on 10 January, the Murphys Creek tavern became a makeshift evacuation centre. The tavern provided accommodation, food and other basic necessities to residents of Murphys Creek and emergency services personnel involved in the search and rescue efforts. By 13 January, only one family remained living in the tavern; other residents were able to return to their homes.¹¹⁷ Because there was no expectation that the tavern would operate as an evacuation centre, it had no back-up power to operate water pumps, lights, fridges and other necessary appliances; a local man supplied his generator. A further difficulty was that the owner of the tavern was not covered under his insurance arrangements for liability while the tavern was being operated as an evacuation centre. He was eventually able to secure insurance from another insurer.¹¹⁸ (For a discussion of indemnity and insurance for informal evacuation centres see 5.5.5 *Indemnity insurance for makeshift evacuation centres*.)

The Postman's Ridge Pioneer Memorial Hall was used by the community there as a short-term evacuation centre from 11 January, never having been used previously for the purpose. It does not appear that local people were aware that there was an official evacuation centre at Gatton or what government agencies they should contact. The Rural Fire Brigade provided a generator for electricity, and food and bedding was donated by local residents. The centre was used to house people who had lost their homes as well as to provide meals to other people in the community who were flood affected. People also used the centre to charge their mobile phones, the only means of communication because landlines were down. There was no official record kept of who came and went from the centre. It remained open until 13 January, when it was closed by the Lockyer Valley Regional Council and all the bedding and other material was transported to the Gatton evacuation centre. Thereafter anyone needing accommodation went to the Gatton evacuation centre.¹¹⁹

In Helidon, members of the community opened up the Helidon Community Centre on the evening of 10 January for a dozen people displaced by flooding. Overnight, evacuees continued to arrive, many from Grantham, dropped off by helicopter. At first the Helidon community provided bedding and food for those who came to the centre. The town was isolated; the local disaster group running log shows that it was trying in the early hours of the following morning to get a load of supplies through to the Helidon centre, which was said to be holding 150 people, but was prevented by road closures.¹²⁰ Supplies were flown in by helicopter, including drinking water when the water supply was later lost. The centre was suitable for use as an evacuation centre: it was large, and had showers and toilets as well as a large kitchen. However, the facilities became overburdened by the large numbers needing accommodation. By 13 January, the council had taken over management of the centre.

The Withcott State School was also briefly pressed into service as an evacuation centre to house people from the town and from the Murphys Creek area and also to accommodate motorists stranded on the Warrego Highway, which runs through the town. Its occupants were moved on to other evacuation centres once the highway was reopened on 13 January.¹²¹

As already observed, the Lockyer Valley Regional Council's evacuation plan was a pro forma document into which no substantial detail had been inserted. No formal nomination of evacuation sites was published by the council or circulated throughout the community other than the identification of the Gatton Hall on its website on 27 December 2010. Consequently, on 10 January, Lockyer Valley residents had no knowledge of where to congregate or evacuate to, apart from the Gatton Hall. And although it may have been the best resourced site for the purpose, it was simply unreachable for many people needing shelter after the floods on 10 and 11 January.

Communities throughout the Lockyer Valley had little option but to establish their own evacuation centres, which were not properly equipped for the purpose with necessary facilities such as power, kitchens, toilets and bedding. This lack of planning caused unnecessary confusion and emotional upset for the community. It also placed a strain on local council, emergency services, police and private enterprise to provide the makeshift centres with essential goods and services.

Recommendation

- 7.3 Lockyer Valley Regional Council should identify those areas vulnerable to flooding within its region, should identify appropriate evacuation collection points and centres accordingly, and consider whether it should make those known to the community.

For more information and recommendations about evacuation centres and auditing of disaster preparation by councils see chapter 5 *Emergency response*.

7.3 Other issues raised by communities in the Lockyer Valley

7.3.1 The effect of debris

Lockyer Valley residents identified vegetation and debris remaining in waterways as a major concern should further flooding occur. During the January flood, items picked up by the torrents of water were a serious danger to life and property as they were carried at speed downstream, and blocked the escape of water as they were caught against culverts and bridges.

As Dr Jordan, an expert hydrologist consulted by the Commission, observed in evidence, it seems unlikely that vegetation growing in or immediately adjacent to watercourses contributed significantly to the amount of debris washed downstream as compared with the amount of debris comprised of other vegetation stripped from land beyond creek beds and banks and, of course, man-made objects.¹²² In any case, clearing of existing live vegetation in waterways is not something which should be embarked on without consultation with, and any necessary approval from, DERM.

Recommendation

- 7.4 Lockyer Valley Regional Council should immediately develop a plan for the removal of debris, man-made and natural, from waterways in the Lockyer Valley and put it into effect so as to minimise the risk should flooding recur in the coming wet season.

7.3.2 The Grantham railway line

The Grantham railway embankment formed a barrier impeding the flow of water north from the Lockyer Creek on 10 January 2011. It was suggested by some residents that culverts under the railway line would have allowed the passage of flood water. That is undoubtedly true; the question is, to what extent they would have helped. The evidence of Dr Jordan, which the Commission accepts, was that the volume of water that flowed through Grantham on 10 January 2011 would have required hundreds of culverts or a very large area of waterway opening to be an effective flood mitigation strategy and that additional culverts would also have increased flooding to the north of the railway line at Grantham.¹²³

The issue of flood mitigation through infrastructure is one which will be dealt with in the Commission's final report, but the Commission does not presently regard the building of culverts below the Grantham railway line as a feasible means of flood mitigation.

7.3.3 The Grantham quarry

Some Grantham residents raised the question of whether stockpiles, earthen banks and buildings at Wagners' quarry west of Grantham contributed to or caused the flooding of the town on 10 January 2011.¹²⁴ The Lockyer Creek broke its banks both south and north of the quarry. Dr Jordan's preliminary opinion was that the quarry and its features might have had some very local influence, causing a marginal increase in flood levels immediately upstream from Grantham, but was unlikely to have had a significant influence on the downstream flow of water into Grantham.¹²⁵ However, without further modelling it was not possible to give an unequivocal opinion.

Recognising that the question is one of real and legitimate concern to the residents of Grantham, the Commission has engaged Dr Jordan to undertake the necessary modelling to enable conclusions to be drawn for its final report.

The Commission understands that the Lockyer Valley Regional Council has commissioned a detailed hydraulic model of the Grantham area, which may also provide further information.

7.3.4 Mobile phone reception in and around Murphys Creek, Spring Bluff and Postman's Ridge

Residents in Murphys Creek, Spring Bluff and Postman's Ridge raised concerns about the lack of mobile phone reception in these areas. This was of particular concern on 10 January 2011.¹²⁶ The Commission understands from submissions provided by telecommunications providers Optus and Telstra that there is limited mobile coverage in these areas because of the terrain, and because they regard it as not economically viable to provide more base stations, given the sparsity of the population.¹²⁷

Since the floods, Optus has placed a temporary 2G mobile base station at Murphys Creek and has committed to leaving this in place until a permanent site can be built. A new base station at Helidon is due for completion by the end of 2011 and will provide improved coverage for Helidon and Postman's Ridge. Optus has advised that once the new stations at Murphys Creek and Helidon are built it will reassess the need for a specific station to cover Spring Bluff.¹²⁸

Telstra has had a temporary mobile base station at Murphys Creek since 20 January 2011 and this is planned to be made permanent by July 2011. It does not plan any further increases in coverage in the region in the foreseeable future.¹²⁹

7.3.5 Grantham residents' exclusion from their properties

Grantham residents raised concerns that police had prevented them from entering Grantham to inspect their properties for eight days after the flood event. They complained that the damage was made much worse because their houses had been locked up for over a week with mud and water trapped inside.¹³⁰

Police had secured the town following 10 January while the search for bodies continued. The police officer commanding the search activities explained that the police did not want residents to return and discover bodies; they were also concerned that allowing people to clean up their properties before the search was complete would hamper efforts to locate the missing. In addition the area was rendered unsafe by the gas bottles, farming chemicals and other debris strewn throughout it. Queensland police attended the evacuation centres at Gatton and Helidon and explained the complexity of the search to Grantham residents housed there.¹³¹

Police offered to photograph premises for the excluded residents, so they had at least some idea of the damage to their properties, and arranged access for some primary producers and business owners for purposes such as attending to machinery or stock. They also retrieved items such as medical equipment for some residents.¹³²

Some searches of Grantham houses were performed five times. On 16 January every residence was re-searched with a view to allowing the residents to return. On that search a body was located in a residence which had previously been searched a number of times. Another body was located on 17 January 2011 in debris behind a residence.

The exclusion of Grantham residents from their properties added to the stress of an already horrific experience. It was not, however, something which the Queensland Police Service could responsibly have avoided.

(Endnotes)

1 OESR <http://www.oesr.qld.gov.au/products/maps/qld-lga-2008/qld-lga-2008-toowoomba.pdf>

2 OESR, 2010 – <http://www.oesr.qld.gov.au/products/profiles/pop-housing-profiles-lga/pop-housing-profile-toowoomba.pdf>

3 Exhibit 75, BMT WBW Pty Ltd, *Technical Report on the Toowoomba flood of 10 January 2011 – prepared for Local Government Association of Australia*, April 2011 [p2-1]; Exhibit 69, Insurance Council of Australia, *The Nature and Causes of Flooding in Toowoomba 10 January 2011*, 14 February 2011 [p17].

4 Exhibit 79, Toowoomba Regional Council Disaster Management Plan; Exhibit 80, Toowoomba Regional Council Evacuation and Welfare Management Plan; Exhibit 86, Toowoomba Regional Council Local Disaster Management Group minutes [19 August 2010]; http://disaster.toowoombarc.qld.gov.au/index.php?option=com_docman&task=cat_view&gid=48&Itemid=74.

5 Exhibit 87 'Council Connections' newsletters, Summer 2009; Exhibit 88 'Council Connections' Summer 2010.

- 6 Exhibit 86, Toowoomba Regional Council Local Disaster Management Group minutes, [19 August 2010, 11 November 2010, 2009/10 District Disaster Management Group Report 25 June 2010].
- 7 Exhibit 82, Confidential Report on the Flood Event of 10 January 2011 by Toowoomba Regional Council, 25 January 2011 [p2].
- 8 Exhibit 76, BMT WBM Pty Ltd, *Technical report on the Oakey flood of 10-11 January 2011 – prepared for Local Government Association of Queensland Ltd*, April 2011 [p2-1].
- 9 Exhibit 82, Confidential Report on the Flood Event of 10 January 2011 by Toowoomba Regional Council, 25 January 2011 [p2].
- 10 Exhibit 86, Toowoomba Regional Council, Local Disaster Management Group Minutes [10 January 2011, 1:00 pm].
- 11 Exhibit 82, Confidential Report on the flood event of 10 January 2011 by Toowoomba Regional Council, 25 January 2011 [p3].
- 12 Exhibit 69, Insurance Council of Australia, *The Nature and Causes of Flooding in Toowoomba 10 January 2011*, 14 February 2011 [p24].
- 13 Submission of Susan Murphy, 11 April 2011 [p2].
- 14 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p1].
- 15 Exhibit 82, Confidential Report on the flood event of 10 January 2011 by Toowoomba Regional Council, 25 January 2011 [p3].
- 16 Exhibit 82, Confidential Report on the flood event of 10 January 2011 by Toowoomba Regional Council, 25 January 2011 [p3].
- 17 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p17].
- 18 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p17].
- 19 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p17].
- 20 Exhibit 69, Insurance Council of Australia, *The Nature and Causes of Flooding in Toowoomba 10 January 2011*, 14 February 2011[i].
- 21 Exhibit 69, Insurance Council of Australia, *The Nature and Causes of Flooding in Toowoomba 10 January 2011*, 14 February 2011 [p i].
- 22 Exhibit 69, Insurance Council of Australia, *The Nature and Causes of Flooding in Toowoomba 10 January 2011*, 14 February 2011[p i].
- 23 Exhibit 75, BMT WBW Pty Ltd, *Technical Report on the Toowoomba flood of 10 January 2011 – prepared for Local Government Association of Australia*, April 2011 [p3-1].
- 24 Exhibit 77, Statement of Kenneth Gouldthorp, 1 April 2011 [p3, 5].
- 25 Exhibit 140, Statement of Assistant Commissioner Stephan Gollschewski [p25].
- 26 Exhibit 92, Toowoomba Regional Council bundle of media releases, 10 January 2011.
- 27 Exhibit 76, BMT WBM Pty Ltd, *Technical report on the Oakey flood of 10-11 January 2011 – prepared for Local Government Association of Queensland Ltd*, April 2011 [p3-1; p3-4].
- 28 Exhibit 212, Statement of Kevin John Wruck, 16 April 2011 [p4-5].
- 29 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p31].
- 30 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p21; p31].
- 31 Exhibit 83, Toowoomba Regional Council, Emergency Action Plan, Cooby Dam, Section 4 [p1].
- 32 Exhibit 76, BMT WBM Pty Ltd, *Technical report on the Oakey flood of 10-11 January 2011 – prepared for Local Government Association of Queensland Ltd*, April 2011 [p3-1].
- 33 Exhibit 76, BMT WBM Pty Ltd, *Technical report on the Oakey flood of 10-11 January 2011 – prepared for Local Government Association of Queensland Ltd*, April 2011 [p3-1].
- 34 Exhibit 94, Statement of Roy Inwood, 22 March 2011 [p3]; Exhibit 96, Submission of Roy Inwood; Transcript, Roy Inwood, 19 April 2011, Toowoomba [p627: line 34].
- 35 Exhibit 205, Statement of Bernard Earsman, 29 March 2011 [p5]; Submission P & C Faulkner, 11 April 2011; Submission M Jensen, undated.

36	Exhibit 92, Toowoomba Regional Council bundle of media releases, 10 January 2011.	50	Exhibit 161, Record of interview with Mayor Stephen Jones, 7 April 2011 [p39: line 1].
37	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p21-24].	51	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p910: line 25]; Exhibit 161, Record of interview with Mayor Stephen Jones, 7 April 2011 [p 7-8].
38	Exhibit 76, BMT WBM Pty Ltd, <i>Technical report on the Oakey flood of 10-11 January 2011 – prepared for Local Government Association of Queensland Ltd</i> , April 2011 [p3-2; p3-3].	52	Exhibit 494, Statement of Bruce Grady, 24 March 2011, Attachment BG-6; Exhibit 168, General Flood Planning Prior to 2010 [p1].
39	Exhibit 83, Toowoomba Regional Council, Emergency Action Plan, Cooby Dam, Section 4 [p7].	53	Exhibit 160, Lockyer Valley Regional Council Ordinary Council Meeting Minutes, 22 September 2010.
40	Exhibit 189, Statement of Alan Kleinschmidt, 15 April 2011 [p3].	54	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p974: line 35].
41	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p43].	55	Exhibit 159, Local Disaster Management Group Meeting Minutes, 23 September 2010.
42	Exhibit 206, Statement of Gary Peters, 10 April 2011 [p1-4].	56	Exhibit 168, General Flood Planning Prior to December 2010 [p199].
43	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [pp43-44].	57	Exhibit 169, Flood Planning in 2010 Email Madonna Brennan, 23 December 2010 [p11].
44	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p44]; Exhibit 84, Toowoomba Regional Council Emergency Event Report, Cressbrook, Perseverance and Cooby Dams Flood Event [Attachment 1].	58	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p904: line 5, p907: line 30; p908: line 30, p942: lines 15-20].
45	Exhibit 83, Toowoomba Regional Council, Emergency Action Plan, Cooby Dam, Section 4 [p10-12].	59	Exhibit 162, Lockyer Valley LDMG Evacuation & Welfare Management Sub-Plan, xx/09/08; Transcript, Mayor Stephen Jones 28 April 2011, Toowoomba [p920: line 20].
46	Exhibit 84, Toowoomba Regional Council Emergency Event Report, Cressbrook, Perseverance and Cooby Dams Flood Event, Attachment 1; Exhibit 189, Statement of Alan Charles Kleinschmidt, 15 April 2011 [p3].	60	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p921: line 10].
47	Transcript, Alan Kleinschmidt, 29 April 2011, Toowoomba [p1116: line 10].	61	Transcript, Mayor Stephen Jones 28 April 2011, Toowoomba [p920: line 30; p972: line 20].
48	OESR, 2010 – Population and housing profile, Lockyer Valley Regional Council. http://www.oesr.qld.gov.au/products/profiles/pop-housing-profiles-lga/pop-housing-profile-lockyer-valley.pdf .	62	Exhibit 165, EMQ Situation Reports dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 8, 28 December 2010, 1545].
49	OESR http://www.oesr.qld.gov.au/products/maps/qld-lga-2008/qld-lga-2008-lockyer-valley.pdf .	63	Exhibit 165, EMQ Situation Reports dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 8, 28 December 2010, 1545; Situation Report No 12, 1 January 2011, 1300].
		64	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 7 January 2011 - 9 January 2011; Exhibit 165, EMQ Situation Reports dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 1, 9 January 2011, 2330].

65	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 9 January 2011 [p6-8]; Exhibit 140, statement of Assistant Commissioner Stephan William Gollschewski [p13].	79	Exhibit 70, Insurance Council of Australia – Flooding in the Brisbane River Catchment January 2011, Volume 4, Flooding in Lockyer Valley, 20 February 2011 [piii].
66	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 9 January 2011 [p9].	80	Exhibit 338, Statement of Air Vice-Marshals Kevin Paule, 10 May 2011 [p16].
67	Transcript, Phillip Jordan, Toowoomba, 18 April 2011, [p501: line 50]; Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p24].	81	Exhibit 180, Statement of Mark Kempton, 17 February 2011 [p2, 5]; Transcript, Mark Kempton, 29 April 2011, Toowoomba [p1051: line 30].
68	Exhibit 70, Insurance Council of Australia – Flooding in the Brisbane River Catchment January 2011, Volume 4, Flooding in Lockyer Valley [p iii].	82	Statement of Peter Row, 14 February 2011 [p3].
69	Exhibit 38, Provision of Preliminary Meteorological and Hydrological Information: Background briefing for the Queensland Floods Commission Inquiry, February 2011 [p12].	83	Exhibit 338, Statement of Air Vice-Marshals Kevin Paule, 10 May 2011 [p16].
70	Exhibit 184, Statement of Sarah Norman, 13 January 2011 [p3].	84	Exhibit 338, Statement of Air Vice-Marshals Kevin Paule, 10 May 2011 [p17].
71	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p24].	85	Exhibit 154, Statement of Inspector Mark Kelly, 30 March 2011 [p4].
72	Exhibit 175, Statement of Peter Souter, 15 February 2011 [p2].	86	Exhibit 154, Statement of Inspector Mark Kelly, 30 March 2011 [p9].
73	Exhibit 175, Statement of Peter Souter, 15 February 2011 [p3].	87	Exhibit 154, Statement of Inspector Mark Kelly, 30 March 2011 [p7].
74	Exhibit 192, Statement of Susan Haughey, 10 February 2011 [p2].	88	Transcript, Mark Kelly, 27 April 2011, Toowoomba [p885: line 50].
75	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 10 January 2011 [p10-11].	89	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 10 January 2011 [p11].
76	Exhibit 178, Statement of Ruby Jensen, 23 March 2011 [p2].	90	Exhibit 161, Record of interview with Mayor Stephen Jones, 7 April 2011 [p28: line 42].
77	Exhibit 38, Provision of Preliminary Meteorological and Hydrological Information: Background briefing for the Queensland Floods Commission Inquiry, [p14]; Exhibit 37, Statement of James Davidson, Annexure JD-1 Bureau of Meteorology Report to Queensland Floods Commission of Inquiry, March 2011 [p43].	91	Statement of Gary Dorr, 8 July 2011.
78	Exhibit 70, Insurance Council of Australia, Flooding in the Brisbane River Catchment January 2011, Volume 4, Flooding in Lockyer Valley, 20 February 2011 [piii, iv].	92	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 10 January 2011 [p11].
		93	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 10 January 2011 [p12].
		94	Exhibit 179, Statement of Daniel Brian Watkins, 30 January 2011 [p6].
		95	Statement of Gilbert Kilah, dated 22 January 2011 [p2, 3, 5].
		96	Exhibit 153, Statement of Bronwyn Faith Darlington, dated 20 January 2011 [pp5-6].
		97	Exhibit 181, Statement of Kathleen Mahon, 8 February 2011 [p5]; Exhibit 149, Statement of Martin Warburton, 20 January 2011 [p10]; Exhibit 146, Statement of Robert Wilkin, 24 January 2011 [p4]; Exhibit 181, Statement of Ian Gordon, 9 February 2011 [p2-3]; Statement of Julie Bellette, 31 January 2011 [p2]; Statement

	of Gilbert Kilah, 21 January 2011 [p2]; Statement of Danyel Harman, 27 January 2011 [p2]; Statement of Wayne Geeves, 4 February 2011 [p2]; Statement of Darlene Jenckel, 20 January 2011 [p2]; Statement of Susanne Steinhardt, 19 January 2011 [p2]; Statement of Kelvin Wood, 26 January 2011 [p3]; Statement of Rebecca Sparkes, 21 January 2011 [p2]; Exhibit 153, Statement of Bronwyn Darlington, 20 January 2011 [p5]; Exhibit 179, Statement of Daniel Watkins, 30 January 2011 [p5]; Exhibit 203, Statement of Lance Richardson, 16 March 2011 [p2].		
98	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p932: line 15].	108	Exhibit 165, EMQ Situation Report dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report, No 5, 10 January 2011 2415].
99	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p 932: line 10; p933: line 20].	109	Exhibit 165, EMQ Situation Report dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 6, 11 January 2011, 0537].
100	Exhibit 176, Murphy’s Creek Flood Recovery Centre Operations January 2011, Summary of Operations Report [p5]; Exhibit 159, Lockyer Valley Local Disaster Management Group meeting minutes dated from 18 September 2010 to 8 March 2011[p63].	110	Exhibit 165, EMQ Situation Report dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 8, 11 January 2011, 2150].
101	Transcript, Peter Souter, 28 April 2011, Toowoomba [p991: line 30].	111	Exhibit 165, EMQ Situation Report dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 9, 12 January 2011, 1030].
102	Exhibit 176, Murphy’s Creek Flood Recovery Centre Operations January 2011, Summary of Operations Report [p4].	112	Exhibit 198, Statement of Christie Minns, 27 January 2011 [p4].
103	Transcript, Mayor Stephen Jones, 28 April 2011, Toowoomba [p937: line 35].	113	Exhibit 199, Statement of Rodney Minns, 27 January 2011 [pp8-12].
104	Exhibit 140, Statement of Assistant Commissioner Stephan Gollschewski, 10 March 2011 [p48]; Exhibit 204, Statement of Senior Sergeant James McDonald, 14 March 2011 [p7]; Transcript, Robert Bundy, 29 April 2011, Toowoomba [p1017: line 40].	114	Exhibit 150, Statement of Martin Warburton, dated 17 March 2011 [p4].
105	Transcript, Robert Bundy, 29 April 2011, Toowoomba [p1017: line 40]; Exhibit 177, Statement of Robert Bundy, 6 April 2011 [p4]; Exhibit 164, Lockyer Valley Request for Assistance Running Log, 10 January 2011 – 11 February 2011.	115	Exhibit 198, Statement of Christie Minns, 27 January 2011 [p5].
106	Exhibit 177, Statement of Robert Bundy, 6 April 2011 [p4].	116	Exhibit 197, Statement of Julie Johnson, 8 March 2011 [p5].
107	Exhibit 182, Statement of Inspector Benjamin Marcus, 16 March 2011 [p9]; Transcript, Peter Souter, 28 April 2011, Toowoomba [p990, 991]; Transcript, Inspector Michael Crowley, 28 April 2011, Toowoomba [p980].	117	Exhibit 193, Statement of Susan Haughey, 15 March 2011 [p3].
		118	Statement of James Barnes, 24 March 2011 [p6].
		119	Exhibit 178, Statement of Ruby May Jensen, 23 March 2011 [pp3-4]; Transcript, Ruby Jensen, Toowoomba, 29 April 2011 [p1040: line 40].
		120	Exhibit 163, Lockyer Valley LDMG Reactivation of Centre, 11 January 2011.
		121	Exhibit 161, Record of interview with Stephen Jones, 7 April 2011 [p60-61]; Exhibit 165, EMQ Situation Report dated 28 December 2010, 6 January 2011, 9 January 2011 [Situation Report No 11, 13 January 2011, 0900].
		122	Exhibit 67, Dr Phillip Jordan, SKM, <i>Hydrological advice to Queensland Floods Commission of Inquiry</i> , 12 April 2011 [p53]; Transcript, Dr Phillip Jordan, 18 April 2011, Toowoomba [p503].

- 123 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p68]; Transcript, Dr Phillip Jordan, 18 April 2011, Toowoomba [p504-505].
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- 124 Queensland Floods Commission of Inquiry community consultation, Grantham, 15 March 2011.
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- 125 Exhibit 67, Dr Phillip Jordan, SKM, *Hydrological advice to Queensland Floods Commission of Inquiry*, 12 April 2011 [p27-28]; Transcript, Dr Phillip Jordan, 18 April 2011, Toowoomba [p504].
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- 126 Queensland Floods Commission of Inquiry community consultation, Murphys Creek, 17 March 2011.
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- 127 Exhibit 214, Submission of Optus, 4 April 2011 [p2]; Exhibit 215, Supplementary submission of Telstra, 8 April 2011 [p19-20].
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- 128 Exhibit 214, Submission of Optus, 4 April 2011 [p3].
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- 129 Exhibit 215, Supplementary submission of Telstra, 8 April 2011 [p19].
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- 130 Submission of PJ Gallagher, 10 June 2011 [p3].
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- 131 Exhibit 154, Statement of Inspector Mark Kelly, 30 March 2011 [p6-7].
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- 132 Exhibit 182, Statement of Inspector Benjamin Marcus, 16 March 2011 [p8].
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