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Date: 29/4/11

Exhibit Number: 215

In the matter of COMMISSION OF INQUIRY ORDER (No. 1) 2011

FURTHER SUPPLEMENTARY SUBMISSION OF TELSTRA CORPORATION LIMITED IN RELATION TO THE IMPACT OF THE QUEENSLAND FLOODS ON TELSTRA CORPORATION LIMITED'S TELECOMMUNICATIONS NETWORKS

INTRODUCTION

1. Telstra Corporation Limited (**Telstra**) and its staff experienced many of the impacts of the Queensland floods in December 2010 and January 2011 first hand. In Queensland, Telstra has a significant number of staff, an extensive mobile and fixed network, a large retail presence and a large number of consumer and business customers. The floodwaters and cyclonic weather conditions had an inevitable impact on the performance of our networks and our ability to provide services to customers.

2. From the time the first floodwaters began impacting on Central Queensland in December 2010, through the floods in South East Queensland and the subsequent cyclone in North Queensland, Telstra staff were in the field, restoring services, assisting customers and supporting communities. Our immediate focus was on ensuring our network infrastructure and services were preserved, and when interrupted, restored as quickly as possible. During the course of the natural disasters, numerous Telstra exchanges and mobile base stations were impacted and many customers were left without fixed and/or mobile services.

3. While the vast majority of customers have now had services restored, there remain, as at the date of this submission, some isolated issues with certain services. We continue our efforts to restore the network to ensure consistent, high quality of service to our customers.

4. We have not concluded our final assessment of the costs of the events in Queensland. Indeed, current conditions in North Queensland indicate the prospect of further costs to the company. However, it is clear that Telstra faces a cost of many tens of millions of dollars.

5. In addition to restoring our network, we have put in place assistance packages for our customers impacted by natural disasters. We continue to review these arrangements to ensure they are appropriate for the circumstances.

6. Telstra also assisted communities and the State Government by setting up communications services in evacuation centres, providing phone cards and handsets, distributing satellite handsets, enabling payphones to provide free calls and setting up a dedicated call centre at no cost to the Government to support the Queensland Government flood relief effort.

7. It is of course important to consider the impact on Telstra's network performance in the context of the scale of the extreme weather events. In Queensland, an area greater than the size of France and Germany combined was impacted by the floods. The area inundated

and otherwise affected was constantly changing as the flood waters moved across the land. Torrential rain and flood impacted not only Queensland, but New South Wales and Victoria. The multi state impact stretched resources and created logistical challenges. Unlike many other recent natural disasters, the impact unfolded over a long period with multiple critical impacts on a large number of communities.

8. This submission is prepared on behalf of Telstra to assist the Commission in relation to the following matters:

   a) Telstra's telecommunications networks;

   b) flood risk for telecommunication networks;

   c) how Telstra monitors the operation of its networks;

   d) the general steps that Telstra takes to restore its networks following natural disasters; and

   e) mobile coverage in the Murphy's Creek, Spring Bluff and Postman's Ridge areas.

TELSTRA'S TELECOMMUNICATIONS NETWORKS

9. Telstra owns and operates a number of networks to provide the full range of telecommunications services in Australia. They include:

   (a) fixed line (or land line) networks, including the public switched telephone network (**PSTN**);

   (b) mobile (or wireless) networks, including the Next G (3G) and GSM (2G) networks;

   (c) radio networks, including managed radio networks provided to a range of organisations, including Maritime Safety Queensland and Energex; and

   (d) data networks, including the Integrated Services Digital Network (**ISDN**).

A. Telstra's PSTN Network

10. Telstra's fixed line network delivers a range of carriage services to, from and between end-users. End-users are the consumers of carriage services and of other services the delivery of which are facilitated by means of carriage services. Such services may include voice telephony, internet access and other data carriage services.

11. This section of the submission describes how the fixed line network operates. It simplifies some of the more technical information about the network architecture in an attempt to make the network description more accessible.

12. The key fixed line network operated by Telstra in Australia is referred to as the PSTN. A PSTN is a telephone network accessible by the public which provides switching and transmission facilities utilising analogue and digital technologies.

13. The Telstra PSTN is a nationwide fixed line telecommunications network used, among other things, to provide local loop carriage services on a retail and wholesale basis to, from and between end users. It is capable of carrying a range of voice and data carriage services to end users connected to that network.

14. The PSTN network has three main elements. The first is the Customer Access Network (**CAN**), which provides the physical connection from the customer to the telephone exchange. The second is the telephone exchanges themselves that provide switching functionality, and the third is the Inter Exchange Network (**IEN**). The IEN provides transmission paths that interconnect the telephone exchanges. The IEN also allows any end user to be able to connect to other end users (including mobile customers) serviced by other exchanges. The IEN provides interconnectivity between towns, cities, states and other countries. The CAN has traditionally been, and remains predominantly, a copper network. The telephone exchanges contain digital switching equipment. The IEN is a combination of digital, optical fibre and radio transmission networks.

15. Some aspects of the Telstra PSTN commenced operating in some Australian cities in the 1880s. Most telephones that are connected in residential and business premises in Australia are the manifestation of the PSTN infrastructure.

16. The following are summary diagrams of the common configurations of the CAN in various Queensland settings:

Figure 1. The traditional Customer Access Network in built up areas.

Figure 2. The rural Customer Access Network in sparse areas that cover longer distances.

Figure 3. The modern Customer Access Network where the main cable has been replaced with optic fibre and remote electronics.

17. This structure will change as the Commonwealth Government proceeds with its proposal to connect fibre all the way to each customer premises, known as fibre to the home (**FTTH**), as part of the National Broadband Network (**NBN**).

B. Exchanges

18. Telstra owns and operates approximately 5,000 exchange buildings around Australia. In rural areas, they are typically brick or tin buildings, usually without windows. A photograph of the St George exchange is Slide 9 of Annexure 1. This photograph shows the work done in preparation for the floods (the sandbagging and plastic wrapping). The flood water did not reach the exchange.

19. Each exchange typically contains:

    (a) a Main Distribution Frame (**MDF**), which provides a cable termination and cross connection point for the 'line side' connection to the Local Loops and the 'equipment side' connection to the switching equipment;

    (b) copper wires known as 'jumpers', each of which connects a 'line side' termination point with an 'equipment side' termination point;

    (c) interconnection cables, which connect equipment side termination points to the equipment in the exchange forming part of the Telstra PSTN;

    (d) a Customer Access Module, which is an item of equipment that provides ring tone, ring current and battery feed to an end user's equipment connected to a Local Loop; and

(e) equipment for switching the carriage services between exchanges.

C. ADSL Internet Services

20. In addition to standard voice carriage services, the Telstra network delivers broadband internet services utilising Asymmetric Digital Subscribers Line (**ADSL**) modem technology, which has for several years been replacing the slower dial-up modem technology.

21. ADSL, ADSL2 and the newer ADSL2+ introduced in 2006 provide broadband internet connectivity to end users, subject to CAN distance restrictions and performance.

22. All Telstra's ADSL variants connect the end user to the ADSL exchange equipment (usually a Customer Multiplexer (**CMUX**) or Digital Subscriber Line Access Multiplexer (**DSLAM**)) using the same CAN as standard PTSN voice services.

D. ISDN Services

23. ISDN is used primarily as a data transmission service (which is provided by technology that pre-dated ADSL) but can also carry voice telephony. Domestic customers who have an ISDN connection are normally also connected to the PSTN for voice telephony. In some business applications, voice telephony is provided over ISDN.

E. Mobile telecommunications networks in Australia

24. Mobile telecommunications networks use radio signals as a means of connectivity between mobile phone devices (for example, handsets or data cards) and base stations. Individual base stations are connected to the mobile network by fixed lines or microwave radio links, each known as 'backhaul', and mobile networks are interconnected with other fixed line and mobile networks to achieve 'any-to-any' connectivity. Any-to-any connectivity is the principle that allows a mobile phone to call any other mobile phone or fixed phone, and any fixed phone to call any other fixed phone or mobile phone, regardless of what different networks the calling party and the called party may be on.

25. Radio spectrum is a resource that is managed by the Australian Communications and Media Authority (**ACMA**). Radio spectrum is useful for a range of different functions, such as television broadcasting, radio broadcasting, mobile telephony, emergency radio communications, and short range data networks. Radio spectrum is a finite resource that must be used efficiently, and different parts of the available radio spectrum are allocated to different types of uses.

26. Radio signals are transmitted by different operators in the same area at different frequencies to avoid interference with each other. Different frequencies of radio spectrum have different characteristics. Whilst other factors are involved, generally speaking lower frequencies of radio spectrum are able to carry (propagate) a usable signal further, and be

less impacted (attenuated) by obstructions such as terrain (for example, hills or cuttings), vegetation (for examples trees) or manmade objects (for example buildings). This effect can be seen in the way "AM" low frequency radio can operate over long distances (sometimes hundreds of kilometres) as compared with commercial "FM" radio (which operates at a higher frequency and is limited to transmitting over tens of kilometres).

27. The radio signals providing the connectivity between mobile handsets and base stations can use analogue or digital technology. All of the mobile networks currently operating in Australia use digital technology.

28. The number and positioning of base stations determines when mobile phones have "coverage". Generally speaking, in the context of mobile telecommunications services "coverage" refers to the area in which service is usable. The number and positioning of base stations have a key role to play in network coverage. This is because the number and/or density of base stations directly influences signal strength, which is one of the key determinants of usability of network coverage. Generally, having more base stations in a network:

    (a) extends network coverage by enlarging the geographical reach of the network;

    (b) enables the network to cater for higher levels of traffic in the areas surrounding the base stations; and

    (c) increases the level or depth of coverage provided by the network within the areas surrounding the base stations (particularly if more base stations are constructed within dense populations centres, such as inner city metropolitan areas and CBD locations).

29. However, increasing the number of base stations in a particular region also increases the requirement for management of interference between base stations. Such interference may result in a handset or the network being unable to process the large number of competing signals and so lead to the device "dropping-out". Telstra manages its networks to minimise areas where a handset may receive signals from too many cells.

30. The extent of mobile phone coverage provided by an individual base station is influenced by a range of factors: for example, the elevation of the position on which the base station is built; the height and direction of base station antennas on the tower or building structure; the surrounding environment (e.g. other obstacles such as building or hills); and the curvature of the earth. There are inherent limitations on the coverage performance of wireless radio communications. In particular, signal levels will vary due to local weather/atmospheric conditions, physical structures (such as buildings, tunnels or bridges), building materials (such as tin roofs) or geographic features (such as hills, forests, lakes or

rocks). This is compounded in a mobile wireless network by moving objects, such as the user himself or herself, and other moving objects such as vehicles on roads.

Coverage of Telstra's mobile networks

31. Because of the variability of radio signal propagation, predictive models are used to determine coverage and produce coverage maps. Not every particular location within a coverage area has been individually tested for coverage.

32. Coverage areas are depicted on Telstra's coverage maps as two contours:

    (a) an inner contour which describes the area where reliable coverage is predicted when using a device without an external antenna; and

    (b) an outer contour which describes the area where reliable coverage is predicted when using a device with an external antenna.

33. The minimum coverage levels which are used to describe these contours are based on the standards for minimum signal levels required for network operation, as defined by the world governing standards body for 3GSM technology. A prediction tool is then used to account for a range of factors including terrain, vegetation and physical structures (all referred to as "clutter") and a large number of technical factors including physical and electrical characteristics of the network and customer devices to statistically estimate where reliable coverage is predicted to be received.

34. Coverage will often occur with mobile telecommunications networks outside the coverage areas depicted on published coverage maps. That is, a signal may be received by a user in areas in which the predictive model indicates that there is no coverage. This is because the provision of a usable signal within a defined area will often result in signal extending beyond that area due to the very nature of radio propagation. This is referred to as "fortuitous coverage". While fortuitous coverage is likely to fall below the minimum performance standards adopted by Telstra, it may well still be usable, to a greater or lesser degree, for more or less of the time.

35. Optus, Telstra and Vodafone Hutchinson Australia (**VHA**) each publish interactive coverage maps on their websites. Telstra publishes two interactive maps:

    (a) one showing coverage of the Next G network; and

    (b) one showing coverage of Telstra's 2G (or GSM) network and the 3GIS (or 3G) network (the latter being limited to metropolitan areas and major regional centres).

36. A print out of the search screen for Telstra mobile coverage maps provided on Telstra's website at http://www.telstra.com.au/mobile/networks/coverage/maps.cfm is annexed to

this statement and marked **Annexure 2.** Among other things, the search screen webpage includes the following statements (which also appear as a 'disclaimer' on the maps):

> ***Things you need to know***
>
> *All mobile devices have been tested to operate within the handheld coverage contours of the advertised coverage maps. Mobile telephone coverage depends on where you are, the handset you are using and whether it has an external antenna attached. For tips on maximising your coverage, visit the Maximise Your Coverage page.*
>
> *Customers should be aware that the Telstra wireless coverage maps displayed have been created using tools that predict the likely areas of coverage. Not every particular location within the identified coverage areas has been individually tested for coverage. This means that while the footprint of coverage outlined on the maps is generally accurate, there will be specific areas described as being within a coverage area where a customer's device will not work. This is a common characteristic of wireless systems. For example, coverage could be degraded or not existent in specific locations due to certain physical structures or geographic features or as a result of the device used. Physical structures which may block or inhibit coverage could include basements, lifts, underground car parks, concrete buildings, tunnels and road cuttings. Geographic features which may block or inhibit coverage could include formations such as hills and mountains or even trees.*

37. Telstra, like other commercial providers of telecommunications networks, will invest in expanding coverage where it expects to make an acceptable return on such investment. The commercial viability of putting base stations in particular locations changes constantly because of changes to the cost of equipment, changes to population, demographics, network use, access to utilities such as power and water, and improved access to the back haul network as fibre optic cable is rolled out for other purposes.

38. There are also satellite mobile networks operating in Australia. These networks use specialised handsets to receive and send signals to and from satellites orbiting the earth. Given the additional costs involved, satellite mobile services are generally only used by persons who plan to spend extensive periods of time in areas where there is no, or no reliable, terrestrial network.

39. In this submission references to mobile networks mean terrestrial cellular networks rather than satellite networks, unless otherwise specified.

40. Optus and VHA also provide mobile services on their own mobile network infrastructure in Australia. Arrangements exist between telecommunications carriers (those who own the

telecommunications networks) and carriage service providers (those who provide telecommunications services) for the resale of some mobile services.

FLOOD RISK FOR TELECOMMUNICATIONS NETWORKS

41. There are two primary ways in which telecommunications network functionality can be lost or impacted as a result of a large scale flood. They are:

    (a) loss of mains power, which is necessary for the continuing operation of various network elements; and

    (b) direct damage to the infrastructure caused by the flood.

A. Power Loss

42. All telecommunications networks need power to operate. Power loss is a very significant issue confronted by Telstra in maintaining the operation of its networks during extreme weather events, including flooding and cyclones.

43. Key elements of Telstra's networks rely on a continuous supply of power. These include exchanges and mobile base stations. If power supply is disrupted, functionality may be lost to that equipment, and to services supported by that equipment. These network elements are powered by batteries to ensure continuity of service during mains power interruptions. Mains power is used to constantly charge the batteries. In this way, the telecommunications equipment will continue to operate for a time (typically around 8 hours) after mains power is interrupted without any manual intervention until the batteries expire. Telstra has a regime of regularly checking and replacing these batteries.

44. Generators can also be used to supply the power at exchanges if mains power is lost. Some exchanges have onsite generators that will automatically start if mains power is lost, and supply power for as long as the generator has fuel. Where a facility does not have an onsite generator, a mobile generator may be deployed at the site if required and if the site is accessible. Silcar, an organisation with which Telstra contracts, has at its disposal a range of generators ranging from smaller petrol generators to larger 50kva diesel mobile generators coupled with 4000 litre long range fuel tanks. These generators are available for use during power outages, which Silcar is able to install at sites nominated by Telstra at short notice, subject to access to those sites being available. If the fuel in a generator is depleted, battery power cannot be maintained. Under normal conditions, power is restored before battery power runs out. Where mains power is interrupted for a prolonged period and access is not able to be secured to the site, for instance because it is unsafe (for example, where roads have been washed away), the battery power will eventually fail and the network element will cease operating. If mains power to an exchange or mobile base station is lost, a network alarm will alert Silcar staff to that event at Telstra's Global Operations

Centre (**GOC**). This ordinarily prompts Telstra to arrange a service person to visit the site to attend to the power loss or to recharge the batteries, which will become depleted and eventually exhausted without mains power to recharge them. In an ongoing flood situation, it is often not feasible or is too dangerous to immediately attend the site, and the site may eventually lose power and cease operating. Loss of functionality at an exchange will normally mean that PSTN, ADSL and ISDN services connected to that exchange or RAU will cease to operate.

45. If power is lost at the customer premises, or access point, service may be impacted depending on the type of phone used by the customer. A standard landline phone draws the power it needs from the wires that connect the phone to the network. Therefore, a loss of power at the customer access point will not ordinarily impact service. It is important to note that if a customer is using a telephone that requires its own source of electricity, such as a cordless phone, service will be impacted during a power outage. In this case, no calls can be made, including calls to emergency services.

B. Damage caused by flood

46. Flood poses a threat to all property, and telecommunications infrastructure is no different. Indeed, telecommunications infrastructure often contains a large amount of electronic equipment which may be susceptible to damage or destruction by flood. If physical elements of the network are damaged by flood, functionality may be lost. The impact of such loss is dependent on a number of factors including the nature of the network element impacted, the extent of the damage and the location of the network element in relation to customers.

47. As a general rule, damage or loss of functionality:

    (a) at the customer premises, can only impact on that customer's telecommunications service;

    (b) in the CAN, will impact on multiple services within that specific locality – the numbers impacted will depend on how close to the exchange the damage or loss of functionality occurs;

    (c) at the switching equipment at the exchange, may impact upon all customers serviced by that switch; and

    (d) in the IEN, may impact on a much larger number of customers in multiple exchange areas.

48. A number of features of Telstra's network and infrastructure assist to minimise the risk of flood damage and the impact of any damage that occurs. Those parts of Telstra's network which service large numbers of customers are generally designed to have significant

'redundancy' or duplication of traffic routing options. If a fault or damage occurs to one such route, then another can ordinarily carry the traffic without any service interruption or impact on customers. It is not always practical to provide this level of duplication between network elements, nor within the CAN.

49. Similarly, Telstra has sought over time to adapt its infrastructure in such a way as to minimise the risk of flood damage. In flood prone areas, this often includes locating roadside cabinets and pillars at higher elevations. For instance Slides 11 and 12 of Annexure 1 shows a cabinet in Rockhampton which is located on an elevated area, and which avoided flood damage. Where Telstra can locate equipment is subject to local planning laws.

50. In known flood zones, Telstra endeavours to elevate exchanges or provide other flood protection. For example in Ipswich, the equipment in the exchange is located on the second floor. The flood waters in Ipswich did not impact the exchange equipment. A photograph of the exchange is Slide 8 of Annexure 1. Other precautions may be taken to protect exchanges from floods. In Charleville, steel plates can be bolted into the walls of the exchange to prevent water getting in. The exchange at St George flooded in 2009. In 2011, Telstra took steps to sandbag the exchange and wrap it in plastic to prevent water ingress. The flood waters did not reach the exchange equipment.

51. Additional steps were taken to protect the key switches within the Brisbane CBD in anticipation of the floods. This involved leaving some staff in the building overnight to ensure vital communications were maintained, especially to emergency service organisations (**ESOs**) that remained after the city had been evacuated. Their role was to ensure battery power did not run out and to take preventative measures to keep water out of the buildings. When the electricity failed at Telstra's Charlotte Street exchange, electric pumps stopped and it became necessary to use buckets to manually remove water from the exchange. The exchange continued operating and no live television was lost, ensuring vital flood reporting could continue to support the impacted communities.

52. In addition to exchange buildings, other network structures such as pillars, cabinets and mobile base stations can suffer flood damage, and this can destroy or damage critical network equipment and result in loss of service. Flood water is generally not clean. The combination of silt, chemicals and fuels (diesel, oil, etc) carried by flood water can corrode network elements. The network structures which are connected by pits with underground conduit act as a large drainage system, with silt and sludge entering the pits and flowing to the lowest point.

53. The vast majority of Telstra's cabling is laid underground, whether it be copper cables or fibre (laid inside conduits and pits). Generally, the only time when aerial cables are used is

when the terrain is not suitable for underground cabling. As an example, where the terrain is solid rock it is not practical to lay underground cabling. In some areas, it is not possible to lay an underground cable without an environmental impact and so aerial cables are used. Only a small percentage of the network is aerial. Telstra's experience is that underground cabling is more robust than aerial cabling even in a flood, as the combination of excessive rain and wind, especially in the cyclone season, can cause considerable damage to aerial cabling.

54. As noted above, mobile traffic is also carried on the IEN. Any loss of transmission caused by flood damage (whether to underground cables or above ground radio infrastructure) may impact on the ability of the network to complete both fixed-line and mobile calls.

NETWORK MONITORING

55. Telstra monitors its networks' performance at the GOC 24 hours a day, 7 days a week. Slide 2 of Annexure 1 provides an overview of the GOC. Staff at the GOC are expert in the full range of technologies utilised throughout Telstra's networks, and it is their job to identify and address network faults or events. Many of these can be remedied remotely, while some require staff to attend the site of the fault or event to restore services.

56. The assessment of the performance of the networks from moment to moment is achieved through remote monitoring devices and alarms built into the networks. Staff at the GOC can identify, for example, when mains power is lost to an exchange, when battery power is getting low, or where transmission lines fail. The alarms have certain limitations. They generally do not, for example, continue to function when the transmission path to the exchange has been lost. As a result, it is not possible to determine from the GOC whether a site has been 'lost' in the sense of inundated by flood, or in the sense only that the alarms have lost transmission and are not delivering any information.

57. Another feature of the network monitoring tools available at the GOC is that they do not permit assessment on a 'customer premises by premises' basis. Accordingly, staff at the GOC will only be alerted to an issue when it impacts on normal traffic volumes or exchange and other network sites. Normal customer fault reporting is relied on to identify difficulties experienced by individual customers.

58. Telstra has a well-established system for dealing with network events. These events may be caused by natural disasters such as fires, cyclones and floods, or other incidents such as software malfunctions, cables being cut inadvertently by diggers, or power loss. The process of monitoring and optimising network performance and restoring services after faults and other events occurs constantly and consistently.

59. Telstra uses a system of grading network events according to the number of services impacted. Different responses occur internally depending on the severity of the customer impact of the fault or event. Using PSTN as an example, the relevant thresholds are:

(a) a severity 4 event involves loss of service to no more than 100 services;

(b) a severity 3 event involves loss of service to between 100 and 2,000 services;

(c) a severity 2 event involves loss of service to between 2,000 and 20,000 services; and

(d) a severity 1 event involves loss of service to more than 20,000 services.

60. Telstra's Major Incident Management (**MIM**) team is set up specifically to monitor and manage Telstra's networks in times of significant incidents and events, and generally gets involved in resolving severity 1 and 2 events. There is also an Emergency Management Team within MIM which is specifically tasked with managing Telstra's response to the impact of an emergency on its networks. Slide 3 of Annexure 1 sets out at a high level the approach that Telstra takes to managing incidents and the inter-relationship between the GOC, MIM and Emergency Management.

RESPONDING TO DISASTERS

61. Telstra is proud of its long history of working with the Queensland Government and ESOs in responding to natural disasters.

62. Following Cyclone Larry, Telstra developed an Emergency Management Framework to ensure a co-ordinated response in time of emergencies. It provides the basis for effective incident management, based upon a single incident management structure and uniform-agreed procedures. The attributes of this system include:

(a) a single national point of backup contact – the GOC – which operates on a '24 x 7' basis to handle Emergency Communications Support escalations;

(b) a dedicated senior staff member identified as the National Lead to ensure work is properly focused;

(c) adaptable and scalable processes;

(d) defined incident management structure;

(e) clearly defined roles and responsibilities;

(f) clearly defined communication flows using uniform terms;

(g) competency-based approach to filling positions;

(h) a system for review and modification; and

(i) a system that caters for all incidents and events.

63. Key to effective operation of this model is interaction both within the organisation and externally, particularly with government and ESOs. The key interface externally is the Emergency Services Liaison Officer (**ESLO**) who liaises closely with Emergency Management Queensland. The Emergency Management Liaison Officer (**EMLO**) was not used in the Queensland Floods. The EMLO is only usually used if there is a need to co-ordinate multiple ESLO's, in for instance a disaster involving multiple states. Slide 4 of Annexure 1 sets out the interactions between Telstra and external parties during an emergency

64. In addition to the ESLO liaising with ESOs, the Regional Director of Service Delivery works with the State Disaster Management Group to ensure that there is sufficient information given by Telstra to the appropriate levels of government.

65. The co-ordination of the recovery response is managed via Regional Emergency Council (**REC**) meetings with support from the Crisis Management Team. The purpose of the REC is to implement a structure within the company to coordinate the restoration of Telstra's services. Initial issues addressed by the REC include:

(a) a more comprehensive assessment of the impact of the floods on Telstra's infrastructure;

(b) the monitoring of the floods to ensure the safety of our staff;

(c) an assessment of how that infrastructure damage is impacting on the telecommunications services able to be provided to customers;

(d) an assessment of which sites are accessible to be immediately attended to, and where the ongoing flood waters prevent access;

(e) assessment of weather forecasts;

(f) prioritising the allocation of available Telstra staff and equipment to the relief centres and providing support to those needing and those providing assistance;

(g) the monitoring of progress to ensure prompt provisioning of DISPLAN services;

(h) ensuring Telstra's radio network received priority if required; and

(i) ensuring other critical services, such as Triple Zero and emergency services, are accorded priority in restoration work.

66. This model, supported by an outstanding effort from a large number of Telstra staff, worked exceptionally well.

67. Set out below is a summary of the network impacts of Cyclone Larry in 2006, the Black Saturday Bushfires in Victoria in 2009, the Queensland Floods of 2011 and Cyclone Yasi in 2011. It is however, important to note that while there was extensive damage to infrastructure, redundancy in the networks (such as overlapping cell coverage in the Next G® network) and action such as the priority recovery of mobile base stations meant that actual customer impacts were minimised where possible.

SEVERE TC LARRY '06	**BLACK SATURDAY VICTORIAN BUSHFIRES '09**	**QLD FLOODS '11**	**SEVERE TC YASI '11**
28,000 PSTN services impacted	8,000 PSTN services impacted	23,200 PSTN services impacted	94,000 PSTN services impacted
40 mobile base stations impacted	27 mobile base stations impacted	74 mobile base stations impacted	80 mobile base stations impacted
3000 ADSL services impacted	2700 ADSL services impacted	13,600 ADSL services impacted	32,000 ADSL services impacted
190 network sites lost mains power	40 network sites lost mains power	375 network sites lost mains power	680 network sites lost mains power
40 portable generators deployed	53 portable generators deployed	70 portable generators deployed	110 portable generators
104 red zones	43 red zones	450 red zones	268 red zones

The reference to"red zones" is a reference to "no-go" areas for all Telstra staff (and contractors employed by Telstra). Staff may only work in a red zone under exceptional circumstances when authorised to perform emergency priority tasks and when supported/escorted by an ESO, e.g. a police escort. A red zone will be declared when the **entire** exchange area is a no-go area. In floods, a key consideration is whether there is road access to sites, or how access can be obtained by other means (eg helicopter), if safe

to do so. Telstra also classifies zones as "amber" and "green". An amber zone is created when part of an exchange area is affected by an incident, e.g. flood. However, work can still safely proceed in other parts of the exchange area if the dispatch of tasks to the field is managed appropriately by the Incident Staff Control Centre. A green zone indicates an exchange area that is now safe and can be entered as per normal working conditions.

68. Telstra provided internal 'Emergency Management Updates' in relation to the impact of the floods on its networks. Set out below is a sample of updates provided between 11 January 2011 and 14 January 2011:

'11 January 2011

- *There have been a number of Telstra Network sites impacted by flood waters in the areas from Toowoomba to Brisbane. ... Most of these are currently in declared Red Zones where it has been difficult for Emergency Services to access due to the extreme weather conditions today in the South East of QLD.*
- *Sentinar is working with Energex to reduce the impact on the Telstra Network as power is disconnected in Brisbane and Ipswich*
- *Red Zones – 440 ESA's (Exchange Service Areas)*
- *Amber Zones – 146 ESA's'*

'12 January 2011

- *Red Zones – 273 ESA's*
- *Amber Zones – 194 ESA's*
- *Sentinar / Telstra are working to reduce the impact of flood waters on our main exchanges in Brisbane at Edison, Gabba and Charlotte – there has been some water inundation in the basements at Charlotte and Edison, however this has been controlled with the use of pumps. A request has been made to the QLD Fire and Rescue to assist with additional pumps at these exchanges tomorrow*
- *Ipswich exchange has been inundated with water – cooling units were impacted by floods – Network equipment was not impacted*
- *Withcott, Helidon, and Murphy's Creek exchanges were brought back online this morning with generators*
- *Bribie Island exchange was hit by lightning yesterday and damaged the rectifiers – technicians have been onsite today and restored services*

- *Additional Cells on Wheels (COWS) are being made available from interstate for areas where the Telstra Network had significant damage*
- *Lowood exchange is not operational and Telstra is working with Emergency Services to gain access*
- *Police assisted Telstra with access to Grantham to assess the damage to the exchange – area is designated a crime scene and police provided special access for Telstra*
    - *Exchange hut still firmly on stumps and shows no signs of movement*
    - *Exchange hut had between 400 and 500mm of water through the exchange all equipment lower than that will be unserviceable*
    - *A layer of silt approximately 10-15mm covers the complete floor surface*
    - *No power to site and Power Meter ripped from backboard*
    - *Fences destroyed and debris around yard'*

'13 January 2011

- *Red Zones – 217 ESA's*
- *Amber Zones – 193 ESA's*
- *The Australian Defence Force have provided a charter flight from Brisbane to Kingaroy tonight for 2 of our C&M Technicians to assess the issues with the fibre link between Kingaroy and Dalby*
- *Fixed and mobile services restored at Gympie*
- *Sentinar managed to keep the water out of the Charlotte and Edison Exchange*
- *Checks being done on the Ipswich exchange to ensure that the fuel supply has not been contaminated*
- *Services restored at the Lowood Exchange and Karalee Exchange late today*
- *The Premier of QLD was provided with an overview of the impact on the Telstra Network and Telstra's recovery program*
- *Police assistance has been requested to provide access to Telstra staff to complete a more detailed assessment of the Grantham Exchange and commence the restoration of services to the exchange*

- *Assistance provided to restore service to 51 mobile base stations in the Brisbane CBD'*

'14 January 2011

- *Red Zones – 166 ESA's*
- *Amber Zones – 229 ESA's*
- *Mobile services restored at* ***Grantham***
- *Optic Fibre Cable damage between* ***Dalby and Kingaroy*** *was repaired around 8pm tonight – a helicopter was required to transport staff to the location where the cable was damaged*
- *Services restored at the* ***Fernvale Exchange*** *and* ***Mt Crosby Exchange*** *today*
- *Power has been restored to* ***Derri Derra****, although there are still issues with the transmission path – a Telstra Technician will be attending the site on Saturday*
- *Assistance provided by Telstra Team Managers to restore Police services in the* ***Brisbane CBD***
- *Request made to Telstra to provide PSTN services to a new recovery centre in* ***Grafton*** *– these services will be connected tomorrow'*

69. In addition to this summary of high level impacts, a number of "mass service disruptions" (**MSDs**) were declared as a result of the 2010 to 2011 Queensland floods. A MSD exempts a carriage service provider from its obligations under the performance standards set out by the ACMA's Telecommunications Customer Service Guarantee Standard 2000. As a result of the floods 8 of MSDs were issued.

70. The flood restoration work is ongoing.

MOBILE COVERAGE IN THE MURPHYS CREEK, SPRING BLUFF AND POSTMANS RIDGE AREAS

71. Telstra has been received the following request from the Commission:

> *'An issue that has arisen in submissions received by the Inquiry is the lack of mobile phone reception in Murphy's Creek, Spring Bluff and Postman's Ridge as you proceed down the range into the Lockyer Valley.*
>
> *I would like an assessment of the reception in this area, why proper coverage had not been provided as at the 2010/2011 flood event and any matters preventing*

comprehensive coverage being implemented before the next flood season in 2011/2012.'

72. Telstra provides mobile coverage on its Next G Network in the Murphys Creek, Spring Bluff and Postman's Ridge areas. Coverage via Telstra's Next G Network has been provided in these areas since approximately the end of 2006 when Telstra completed the roll out of its Next G network. Next G coverage maps of this region are annexed to this submission The maps show "Voice, Picture, TV, Video & Broadband" areas shaded brown, "Voice, Picture, TV, Video & Broadband with an external antenna" areas shaded beige and "Telstra Mobile Satellite" areas shaded light yellow. These maps are subject to the same disclaimer set out in paragraph 36 of this submission.

73. Annexure 3 shows advertised Next G Network coverage at Murphys Creek, Spring Bluff and Postman's ridge. This map predicts that in a small part of the area, mobile phone coverage can only be obtained from Telstra via a satellite phone. The majority of the area between Murphys Creek and Spring Bluff is shaded brown, showing that there is predicted mobile phone coverage, providing an external aerial is used. The remaining darker orange shows that there is good predicted hand held coverage to the north of Spring Bluff and Murphys Creek and to the south of Murphys Creek, through to Postman's Ridge.

74. Following the floods in 2011 additional coverage was provided at Murphys Creek. The coverage was provided at the request of ESOs operating in that area. The coverage was to support the Command and Control Centre located at the Murphys Creek Hotel. The additional coverage was provided by means of a temporary mobile base station, where additional equipment was located in the Murphys Creek exchange, and what Telstra colloquially calls a 'Thunderbird' (a truck, with a mobile antenna) has been used to provide the additional coverage. The additional coverage has been provided since 20 January 2011. Slide 14 of Annexure 1 shows the exchange, the Thunderbird and a mobile tower. Annexure 4 shows comprehensive coverage is currently being provided in the immediate vicinity of the town centre of Murphys Creek. Telstra plans for this coverage to become permanent by July this year. There are no further planned coverage increases in this region for the foreseeable future.

75. It is, with respect, unhelpful to refer to 'proper coverage' in the context of wireless networks. This language suggests that there is mobile coverage that should be provided if the network functions 'properly' . It does not take account of the many and complex reasons why a particular level of coverage may or may not be available in a particular area. These factors include commercial considerations which are based on the expected voice and data traffic a base station in the area is expected to carry, and topographical limitations. Whilst Telstra's Next G network provides coverage to over 99% of the population of Australia, this

represents approximately 28% of the land mass of mainland Australia or 2,100,000 square kilometres. There will always be some areas of the country and some of the population that do not receive good (or in some cases any) mobile coverage. The topography of the Murphys Creek area is very hilly, and the hills and valleys create barriers to the propagation of mobile signals from Telstra's Next G base station located at Toowoomba, Withcott and Carbarlah. To date there have been insufficient business drivers to date to justify major improvements to coverage in the area shaded light yellow on the attached map. Annexure 5 is an extract from "Google Maps" showing the topography of the area.

WHAT WORKED WELL? WHAT COULD BE IMPROVED?

76. Telstra has been asked by the Commission to identify what worked well in the 2010/2011 Queensland floods, and what lessons have been learned.

77. As a result of lessons learned during previous natural disasters, a number of aspects of Telstra's response to the 2010/2011 floods worked very well:

(a) Telstra staff have developed excellent working relationships with all levels of emergency services, including Emergency Management Queensland, Queensland Police and the Australian Defence Force. As a result of that relationship, and via the ESLO, Telstra was able to work constructively to identify the key priority sites for emergency services personnel;

(b) Telstra's experience with disasters has led to the development of innovative technology solutions, such as Cells on Wheels (**COWs**) and Mobile Exchanges on Wheels (**MEOW**). A COW is a temporary mobile base station that provides temporary coverage if a mobile site is lost; alternatively it can provide a temporary expansion of mobile coverage. A MEOW is portable ADSL2+ enabled temporary exchange. Both solutions can operate using generators, batteries or mains power. and enable the quick installation of temporary communication solutions, especially for those communities hardest hit by the disaster. They were deployed very promptly Photographs of MEOWs are on slides 15 and 16 of Annexure 1;

(c) Telstra, via its Telstra Consumer and Countrywide business unit, has an effective network of retail outlets and service representatives available 'on the ground' to provide services in emergency evacuation centres (see slide 5 of Annexure 1). Telstra also augmented its work force in addressing the vast impact of the floods. This saw Telstra adding 228 field staff including 30 from New Zealand to its workforce on a temporary basis to address the needs of its customers;

(d) the overall Emergency Management Framework proved very effective in co-ordinating the various resources within Telstra towards their most pressing need; and

(e) establishing effective communications at the evacuation centres, comprising both voice and data services, proved valuable to users of those centres to connect with their friends and family.

(f) Telstra received very positive feedback from amongst others, the Lord Mayor of Brisbane, the Australian Defence forces, and Emergency Services, including the Queensland Police on the reliability and breadth of the Next G network.

78. Telstra gave daily updates to media outlets to keep communities informed of when services in their area were likely to be restored. Such communication is vital. Telstra is exploring how to provide more timely and targeted information so that it is easier for customers in particular regions to get up to date information about network impacts on them.

79. Since Cyclone Larry Telstra has developed a response to disasters based on a 3 x 3 x 3 model. This involves:

(a) within 3 days, restoring all accessible core network sites to operational status, and provision of service to individuals or families through restoration of their land line or through interim means such as Next G and satellite handsets;

(b) within 3 weeks, temporary restoration of all elements of the network to ensure individuals and families who have continued to occupy or returned to their properties have the same access to fixed and mobile services as they had prior to the disaster; and

(c) within 3 months, permanent restoration of all infrastructure damaged by the disaster to meet existing and planned needs.

80. One of the significant learnings from the 2010 to 2011 Queensland floods was that this model, while effective for disasters which impact over a few days(such as the Victorian Black Saturday Bushfires), it is not a model that can be applied without modification where a disaster unfolds over a longer period and such a large area. Telstra is adapting this model to what it is calling the 5R model – Ready (focusing on preparation), Respond, Restore and Repair (focusing on the immediate impact of the disaster, identifying what needs to be restored or repaired) and Reconstruct (which recognises what can be a long period if significant damage is sustained).

Date: 8 April 2011

[redacted]

Sue Laver

General Counsel Dispute Resolution

Legal Services, Telstra Corporation Limited

[redacted]

GLOSSARY

ACMA	Australian Media and Communications Authority
ADSL	Asymmetric Digital Subscribers Line, used to provide broadband internet connectivity
CAN	Customer Access Network, part of the PSTN
CMUX	Customer Multiplexer, a type of RAU
DSLAM	Digital Subscriber Line Access Multiplier
ESA	Exchange Service Area
ESLO	Emergency Service Liaison Officer
ESO	Emergency Service Organisation
GOC	Global Operation Centre, from which Telstra's networks are monitored
IEN	Inter Exchange Network
ISDN	Integrated Services Digital Network, predominately a data network
Kva	Kilo Vault Amps
LAS	Local Access Switch (a large exchange)
MDF	Main Distribution Framework
MIM	Major Incident Management, a team within Telstra based at the GOC
PSTN	Public Switched Telephone Network, or fixed line network
RAU	Remote Access Unit, being digital transmission equipment within the CAN
REC	Regional Emergency Council