

The Weather Bomb 21 June 2002



Final Technical Report

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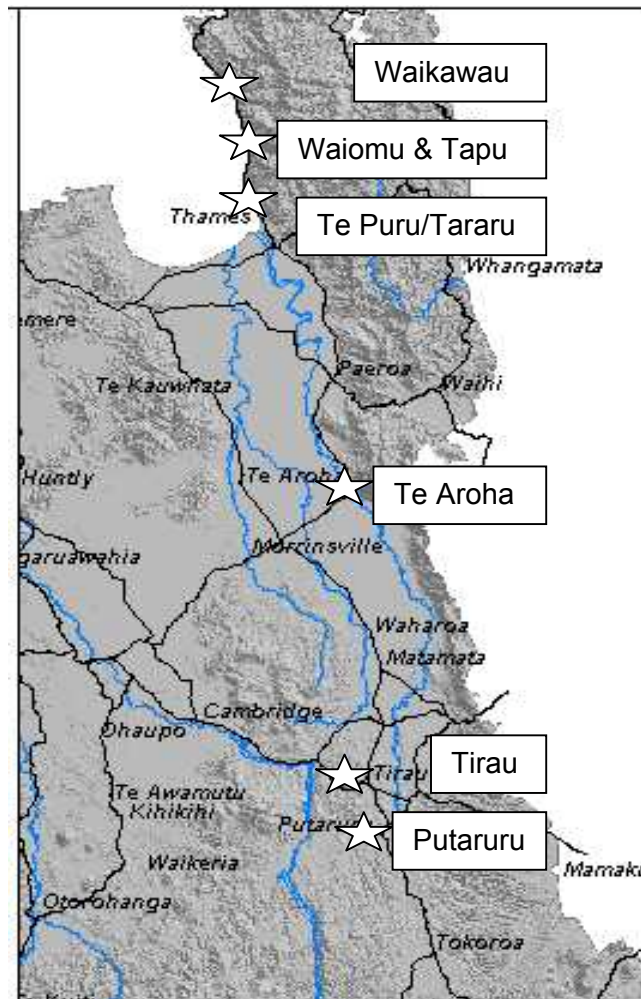
1 Introduction

This report examines the key aspects of the “**Weather Bomb Event, June 21 2002**”, which resulted in two Civil Defence emergencies being declared for the Thames Coromandel and South Waikato Districts. It has been produced as part of Environment Waikato’s internal reporting requirements.

The purpose of the report is to provide a comprehensive overview of the storm event that brought torrential rain and strong winds to many parts of the region, particularly the Thames Coromandel (TCDC) and South Waikato (SWDC) Districts. As a result, both districts declared states of civil defence emergencies. TCDC declared at 2.30am on Friday June 21 due to a significant number of homes being flooded (forcing evacuations), widespread power cuts, and water treatment issues. SWDC declared at 8am on the same morning due to public health concerns, public safety issues, and unknown extent of damage.

The event produced rainfall intensities in the order of 100mm in one hour registering return periods of 100 years and creating river levels ranging from 5 year to 100 year return interval events. Trickling hillside streams became raging torrents in just a few minutes, carrying fallen trees, boulders, and many thousand tonnes of mud through homes, properties and roads.

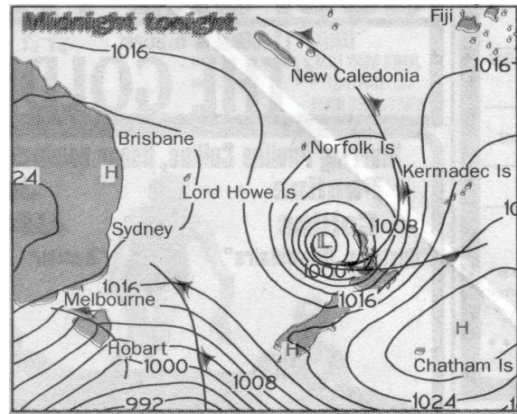
The report also discusses how the event was managed, what lessons were learnt, recommendations for operational improvements, and the drawing together of general event information to ensure responses to future emergencies are carried out to the best extent possible.



Areas worst affected by the storm

2 The Storm

At about 8.30am on Wednesday, June 19, the first of many severe weather warnings were issued by the MetService advising that a potentially damaging low (called a Weather Bomb) was likely to affect northern New Zealand. Areas particularly at risk from heavy rain and strong winds were Northland, Waikato and the Coromandel Peninsula. It was predicting wind gusts up to 120 km/hr and rainfall totals of 150 - 200mm in the Coromandel Ranges (with intensities up to 15-20 mm/hr).



A weather bomb is simply defined as a low pressure system which rapidly deepens causing barometric pressure to drop by at least 25 hPa in a 24 hr period (see above weather map).

On Thursday, June 20, the predictions came true as the Weather Bomb made landfall bringing high winds and torrential rain across most parts of the upper North Island. The resulting floods and damage led to many communities being evacuated from their homes, and in one case, loss of life. There was also disruption to sewage, water supply and power services. The feature of this storm was the speed at which it developed.

3 Rainfall

Rainfall recorded in this event was exceptional (particularly during the last two hours of the event). It fell throughout much of the afternoon and evening of Thursday 20 June before easing off about 11.00pm. However, between 11.00pm and 2.00am, a short but intense band of extremely heavy rain passed over a wide area of the region dumping rainfall with peak intensities up to 125 mm in 25 mins (see Table 1). Seven 24 hour totals topped 200mm. On top of already saturated catchments and swollen river levels, flash floods were experienced over many areas (see Section 6 for river level data).

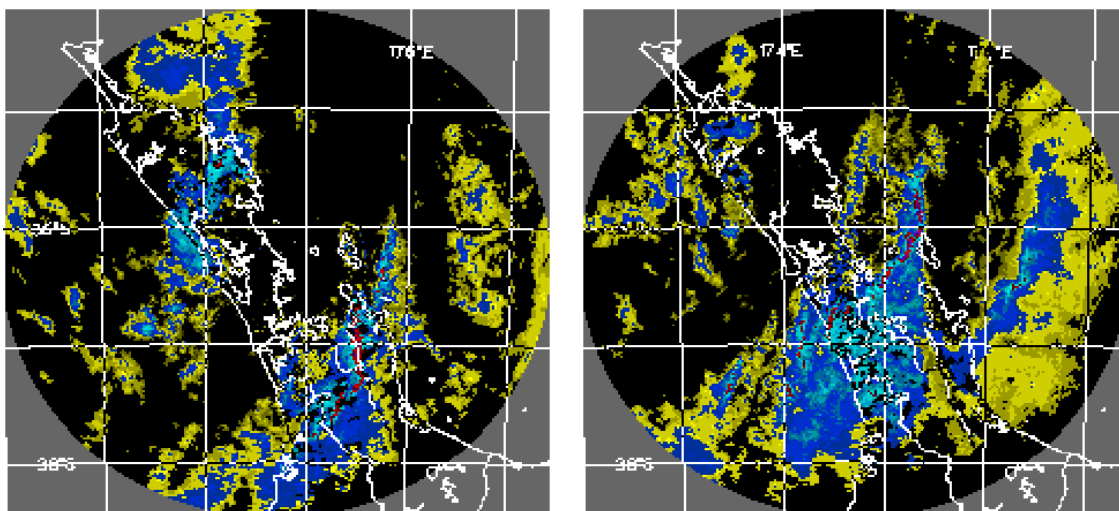


Figure 1: Auckland Weather Radar images showing heavy rainfall bands during the evening of Thursday 20 June.

3.1 Severe Weather Warnings

The first heavy rainfall and wind warning (Severe Weather Warning) for this event was issued on Wednesday June 19, 2002 at 8.20am. It stated:

POTENTIALLY DAMAGING LOW LIKELY TO AFFECT NORTHERN NEW ZEALAND

MetService forecasters are watching the area northwest of the North Island for signs of a developing depression. Indications are that a low will develop and deepen very quickly in this area on Thursday, and unleash stormy conditions in many parts of the North Island.

Residents and travellers in Northland, Auckland, Coromandel Peninsula, Waikato and Bay of Plenty should prepare for a period of heavy rain and severe gales sometime on Thursday and early Friday. The bad weather may spread to some other North Island areas later, so people in the northern half of the North Island in particular should keep abreast of the latest forecasts and any further warnings.

HEAVY RAIN WARNING

COROMANDEL PENINSULA AND WESTERN BAY OF PLENTY

In the 18 hours from noon Thursday to 6am Friday, rain should become heavy at times with thunderstorms, resulting in accumulations of up to 150mm about the ranges. Intensities are likely to reach 15 to 20mm per hour.

STRONG WIND WARNING

COROMANDEL PENINSULA, WESTERN BAY OF PLENTY AND WAIKATO

Between 4pm Thursday and 6am Friday, conditions becoming very windy, with gusts 120 km/h in exposed places in the northeast flow, especially over the tops and in the lee of the ranges.

The severe weather warning for the Region was finally lifted at 8.45 am on Friday, June 21. In total, six warnings affecting the Region were issued for this event (see Appendix A).

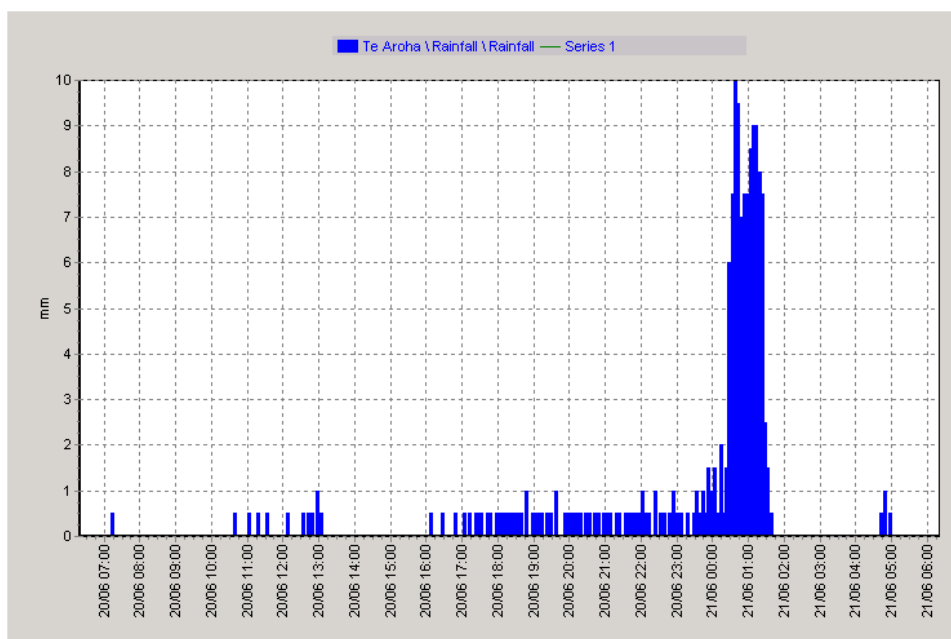


Figure 2: Plot of rainfall intensities recorded at Te Aroha.

Table 1: Summary of rainfall sites and recorded totals from key sites. Refer Appendix B for a more comprehensive list of the region’s rainfall totals and analyses.

Location	24 hr Total (9am – 9am)	Peak Intensity	Return Period for one hour	1985 Event* 24 hr Totals)
Coromandel	205 mm	125 mm in 25 minutes (11.35pm – 12.00am)	100 years	182 - 331 mm
Tapu	200 mm	83 mm in 1 hour (11.30pm – 12.30am)	100 years	205 - 271 mm
Wharepoa	114 mm	60 mm in 1 hour (12.00am – 1.00am)	100 years	N/A
Paeroa	120 mm	33 mm in 1 hour	5 years	135 - 170 mm
Te Aroha	157 mm	97 mm in 1 hour	100 years	130 - 250 mm
Hamilton	54 mm	16 mm in 15 mins	10 years	N/A
Waharoa	91 mm	74 mm in 1 hour (12.45 – 1.45am)	100 years	134 mm
Putaruru	150 - 260 mm	120 mm in 2 hrs	100 years	61 mm

* Rainfall data from the 1985 event is presented here as a comparison since both events were similar in effects and magnitude (i.e. blanketed effects north of Thames).

4 Wind

Strong winds were experienced across the entire Region, with peak gusts ranging from 80 km/hr in Hamilton and Tokoroa up to 120 km/hr at Thames. Damage reported included lost roof-tops and toppled trees (especially across the plains). During the early stages of the event, the predominant wind direction was northeast, however, as the centre of the “Bomb” tracked southeastwards, the wind turned southwest. Fortunately, no significant storm surge effects were reported in this event.

Note that when wind speed and barometric pressure fell sharply (as the centre of the storm passed overhead), that’s when the highest rainfall intensities and worst flooding were recorded. In total, there were six wind warnings issued by the MetService for this event (Appendix B).

5 Barometric Pressure (BP)

As the storm progressed southeastwards over New Zealand, the centre of the “Bomb” deepened to about 980 hPa. Immediately preceding the storm, BP hovered between 1015 and 1020 hPa and after the storm had passed through, BP quickly increased to 1012 hPa. The lowest (unconfirmed) barometric pressure recorded in the region for the event was 984 hPa at Tapu (between 3am and 6am, 21 June). Figure 2 shows the “dipping effect” on BP as the storm passed over Thames and Waharoa.

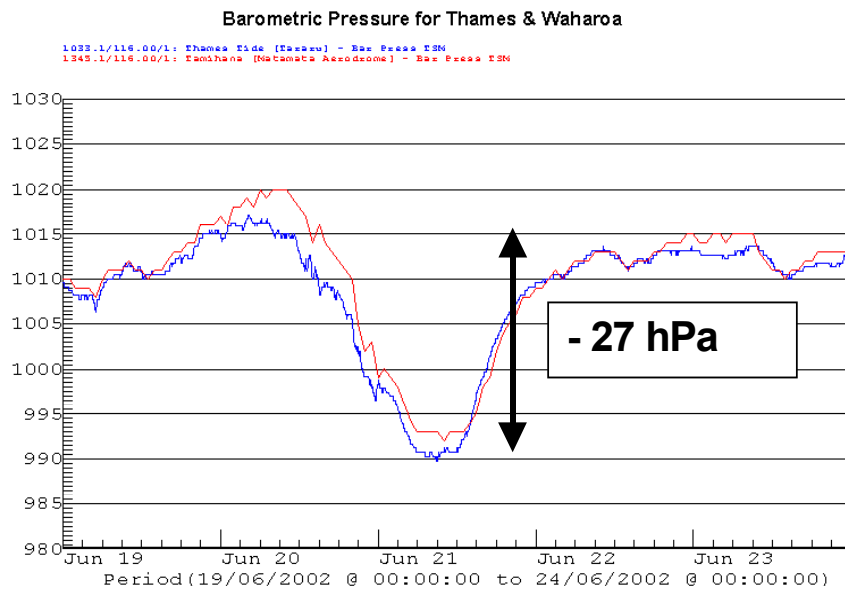


Figure 3: Barometric Pressure readings from Thames and Waharoa.

6 River Levels

While the major river systems across the Region generally coped very well with the deluge, it was the smaller streams north of Thames (associated with short, steep catchments) that bore most of the storm's sting. The Tararu, Te Puru, Tapu, Waiomu, and Waikawau Rivers (and many streams in-between) all burst their banks sending tonnes of mud and debris through homes and properties. To put it in perspective, peak flows estimated for several of these streams exceeded the annual mean flow for the Waikato River through Hamilton (by up to 80 cumecs). Severe infilling occurred as a result of heavy bedload movement and slipping. Lateral erosion was evident throughout most catchments and the flood struck with enough force to move caravans, garages, boats and cars (see Figure 4 below).

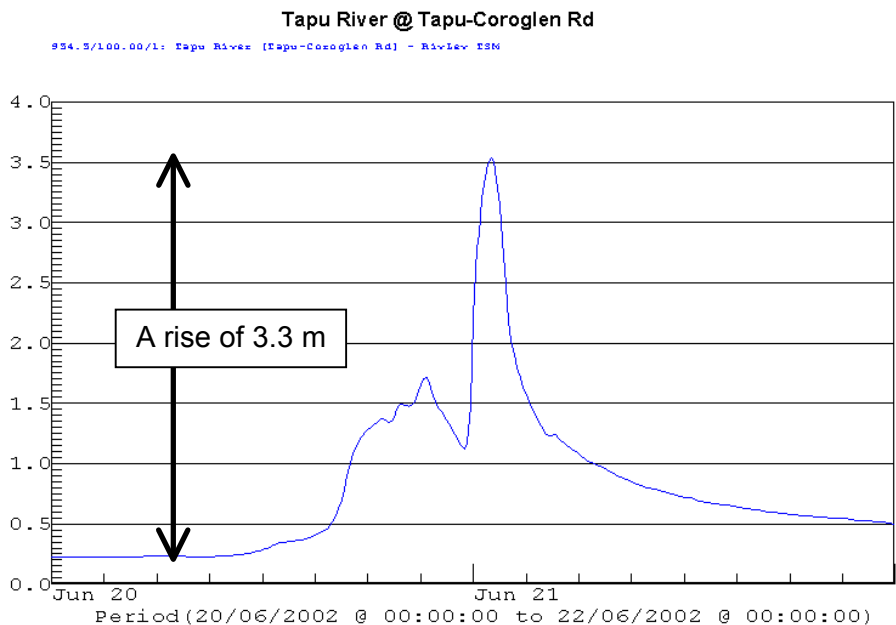


Figure 4: The Waiomu Motor Camp, which was devastated by the flood.

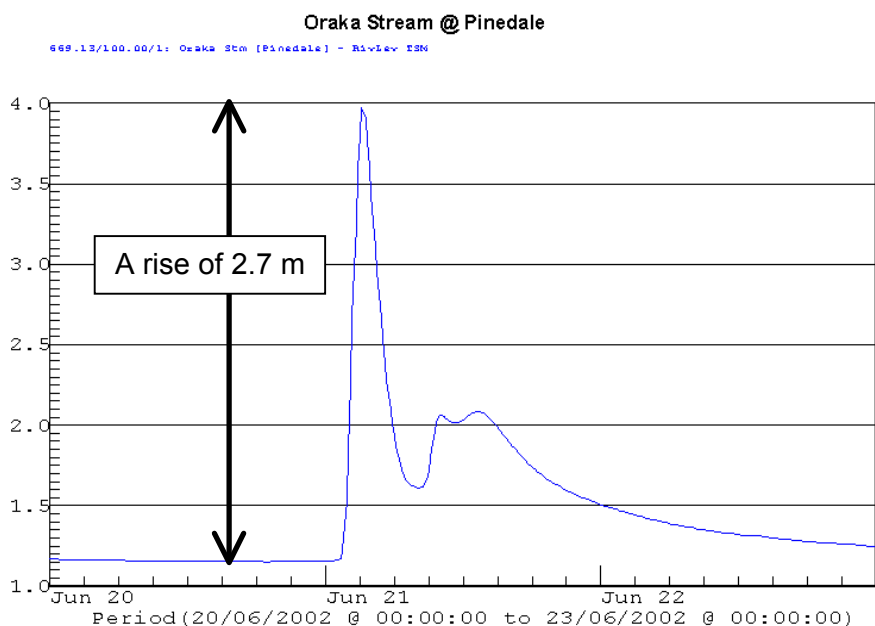
Specific discharges, where peak flow is divided by the catchment area, were in the order of 10-15 cumecs/km² (with the highest being 17 cumecs/km² on the Tararu Stream). The 1985 event recorded similar discharges.

A summary of the region's river systems that bore the brunt of the storm follows. Appendix C details the river level and peak flow estimates information in more detail.

- Tapu River: similar to 1985 event, 20-30 year event (see hydrograph below)



- Waiomu: 20 - 30 year event (similar to 1985)
- Te Mata: 20 - 30 year event
- Te Puru: similar to 1985 event (20 - 30 year event)
- Tararu: similar to the January 2002 event (100 year event)
- Thames: 100 year event (Karaka Stream)
- Tairua River: 5 year event
- Kauaeranga River: 5 year event
- Waitoa River: 50 – 100 year event
- Pokaiwhenua River: 100 year event
- Oraka River: 100 year event (see hydrograph below)



	Waikawau	Tapu	Te Mata	Waiomu	Te Puru	Tararu	Karaka
Peak Flow Estimate in cumecs (@SH25)	340	275	330	145	345	260	80
Catchment Area (km ²)	34	26	27	11	24	16	5
Specific Discharge (m ³ /s/km ²)	10	10	12	14	15	17	16
Estimated Return Period (years)	30	30	30	30	30	100	100

Table 2: Catchment statistics for the streams north of Thames.

All other regional river systems generally experienced mean annual events or less. These included the Piako, Waikato, Waipa, Mangawara, Waihou, Ohinemuri, and Awakino Rivers.

6.1 June Climate Update

According to the June climate update from NIWA, it was the third warmest June in New Zealand since records began in the 1850s (1.5 °C above the normal of 9.8 °C). In fact, Hamilton was 3.5 °C above normal, it's warmest June since 1907. Above average rainfalls in June reduced or eliminated remaining root zone soil moisture deficits in most parts of the country.

According to a monthly weather report written for the Taupo Times, June 2002 was the mildest on record for the Taupo district. In fact it was the first time that the mean average temperature exceeded two digits. Although the total rainfall (137mm) was well above average, it was not the wettest (1968 had that honour with 187mm). 1979 was the driest with only 33mm. June 20 was the wettest day with 51mm. Rainfalls over 50mm are rare in winter for the Taupo district as its only happened three times since 1962.

6.2 July to September Outlook

The evidence for a developing El Nino event, which is expected to influence New Zealand 's climate over spring and summer 2002/03, continues to strengthen, though the magnitude remains uncertain. Rainfall is expected to be near normal in many regions, but may be above normal in the north of the North Island. Normal soil moisture levels and river flows are predicted for all regions of the country except for the north of the North Island where above normal levels will apply.

7 Flood Warnings

Over 40 alarms (warnings) were issued automatically by Environment Waikato's river level, rainfall and climate monitoring system (HydroTel) throughout the event. Warnings included wind speed, barometric pressure, river levels, and rainfall. Overall, the flood monitoring system performed very well with no major problems reported.

The first warning issued in the event was at 6.00pm on Thursday 20 June when 62.5 mm of rain in 180 minutes was recorded at the Pinnacles rainfall recorder. The last warnings were issued a few days later for the Hauraki Rivers (i.e. Piako, Waitoa, and Waihou) as the flood waters slowly worked their way through the lower catchments and out into the Firth of Thames.

8 Civil Defence Response

The civil defence and flood warning team were sparked into action by the Regional Controller at 9.00am on Thursday, June 20 following the release of the severe weather warning, concerns from the Thames Valley Civil Defence Officer, and already saturated

catchments. As a result, precautionary actions were immediately put into place including a press release, placing the civil defence staff on partial activation, setting up the Waikato Room as the Flood Control Centre (24 hrs), and advising general staff. A debrief involving the Civil Defence Team and external agencies (including Police, Fire Service and Transit New Zealand) was held later in the day as a last minute check to ensure "all the boxes were ticked".

9 Media Releases

The Regional Controller issued four media releases for the event. The first one was issued on Thursday June 20 at 11.00am, with the others following on Friday, June 21 at 7.00am, 9.30am and midday (Appendix D).

10 Extent of Damage

Damage to properties and infrastructure from this event was extensive, particularly in the Thames Coromandel (TCDC) and South Waikato (SWDC) Districts. Environment Waikato's flood, drainage and erosion protection works in the Thames Valley area were also significantly damaged. This section details observations, comments, experiences, and extent of damage from each key agency (derived in most cases from the regional debrief on 26 July).

10.1 Environment Waikato (EW)

The damage and extent resulting from the 21 June 2002 event was substantial and in some cases extreme and was spread from Coromandel to Putaruru involving both assets for which Environment Waikato is responsible and those for which other agencies and private individuals have responsibility.

10.1.1 Coastal Areas

The badly affected communities of the Thames coastal reach outside the Waihou Valley Scheme area and north of Tararu suffered from stream flooding, erosion, channel infilling and debris deposits.

As part of the Civil Defence emergency, Environment Waikato took responsibility for urgent response works on the main channels of Tapu, Te Mata and Waiomu.

10.1.2 Waihou Valley Scheme

The Scheme assets suffered widespread and in some areas severe damage from the 21 June 2002 event and to further varying degrees from the 12 July 2002 event. The number of reported sites yet to be addressed is in the order of 100 plus.

- (a) Northern Area: Damage suffered was highlighted by the urban areas of Thames including the Tararu, Moanataiari, Karaka, Hape and Waikiekie Streams. The Kauaeranga and tributaries and the Puriri River were the worst of the rural catchments affected. Problems involved erosion, channel infilling, debris trap blockages, rip-rap protection removal, fencing, culverts, bridges and piped channels.
- (b) Urgent response works were initiated immediately, generally involving Tararu and Thames urban channels.
- (c) Central Area: Damage relating to the worst hit areas involved the Hikutaia, Kuaaiti and drainage areas where lack of electricity caused problems to those pumpstations not serviced by diesel. The immediate response and concentration of operations was on pumps and floodgates and monitoring of the Ohinemuri River. The 12 July 2002 event caused flash flooding in urban areas of Paeroa where a decision was made to operate the Main Drain pumps through the

'penalty period'. This event also necessitated the decision to erect the Criterion Bridge stoplogs and therefore close State Highway 26.

- (d) Southern Area: Widespread damage to assets within the Scheme's area of responsibility occurred from Tirohia in the north to Putaruru in the south and in excess of 70 sites yet to be addressed.

The Te Aroha urban area main Scheme streams coped very well, some erosion and channel infilling of the Tunakohoia and the debris traps on the Tutumangao completely filled while some smaller streams caused some local damage.

The Waitoki to Te Aroha streams to the north of Te Aroha suffered severe damage including erosion, channel infilling, wind damage to trees, blockages and fencing.

In the reach Te Aroha south to Okauia all channels received moderate to severe damage. In the southern reach the Mangawhero, Oraka and Waihou rivers suffered the worst damage with the Tirau/Putaruru area being particularly heavily hit, resulting in wind damage blockages, erosion, channel diversion and gully erosion, and one large and spectacular gully formed immediately south of Tirau.

10.1.3 Piako River Scheme

The heaviest falls within the Piako River Scheme occurred in the Waitoa catchment and the Richmond Downs/Piakoiti areas of the Piako River catchment. Damage was moderate in the upper reaches and confined to mainly flooding and drainage failures. The Waitoa River overtopped its natural overflow levels downstream of Waitoa and caused flooding in the Springdale area. The Plains area problems were generally confined to pumping and floodgates.

10.1.4 Thames Valley Drainage Area

The event of 21 June 2002 caused major damage to drainage systems from Matamata to Springdale. The initial response was to repair major washouts at culverts and bridges and tree removal. Follow up works involve erosion and scour problems. Sites yet to be addressed could number in excess of 50.

10.1.5 Scheme Performances

While the above created widespread damage and expenditure and raised several issues, there were also many positives with regard to Environment Waikato Scheme works.

- (a) The Thames urban streams handled internal flows over a 50 year return period with limited damage to property.
- (b) The urban areas of Paeroa and Te Aroha did not suffer major damage from Scheme streams.
- (c) The widespread surface flooding and ponding which occurred throughout the total period with the culmination on Friday 12 July 2002 being handled effectively by the pumps and floodgates.
- (d) The very effective operation of some past problem areas within the Waihou Valley Scheme such as Wharepoa drainage, Wainui Road outlets, and Stocks and Mill Road pumped outlets.

10.1.6 Issues

Various issues have been raised as a consequence of the events, some of which are:

- (a) The sheer number of incidents and reported problem sites have impacted on resources. This has necessitated works having to be prioritised and categorised. The issue being that while all requests have been acknowledged it could be several months before remedial works can be completed. In some cases this could be contrary to public expectations.
- (b) Initial assessments are that these very high intensity storms are out of the ordinary and have affected the catchment stability of some streams and may require a change in focus to upper catchment erosion control.
- (c) Catchment instability contributing to continuing infilling of channels producing potentially dangerous flood situations especially in urban areas and the associated and continuous expenditure.
- (d) Many flood pumps sat idle due to power outages (although 4 of the 60 in operation are diesel operated covering 70% of the total capacity)
- (e) Upper urban catchment stability and the inclusion of further areas of operation within Schemes to achieve objectives, possibly with shared responsibilities with property owners being given consideration.
- (f) The extent of damage within both the Waihou Valley Scheme and Thames Valley Drainage areas, especially with regard to erosion, that is requiring review of the scope of usual Scheme remedial works, while still aiming to not compromise Scheme standards.
- (g) The requirements to evaluate catchment management within the area of the Piako catchment outside the direct benefit area.
- (h) The need to identify a flood damage allowance within annual budgets.
- (i) The impact of the additional expenditure on the 2002/03 works budget and on the normal operational programme.

10.1.7 Emergency Works Undertaken

Tararu Stream

Environment Waikato / Asset Management Group is the owner of and the authority responsible for the Waihou Valley Scheme assets, of which the Tararu Stream erosion control and bank stabilisation works are part.

The Tararu Stream is located four kilometres north of the Thames Township. The stream experienced an unprecedented flood event on June 21 during the early hours of Friday morning as a result of heavy rainfalls within a very short period of time. The flood has caused moderate damage to the fabriform and rock lining of the stream banks. The emergency work carried out was located between Victoria Street and the bridge on State Highway 25.

These protection works were designed to protect the residential properties from being washed by floods. While the works have protected some properties from being washed away, some protection works were undermined and damaged to the extent that they need to be reinstated immediately. Also, some properties experienced flooding, silt and debris damages. Reinstatement of these works provides protection for the properties and stream banks from similar events, which could occur at any time.

Asset Management Group started the preparation works to reinstate the protection structures on Monday 24 June. These works included the removal of debris and bed load deposited on the bed and banks of the Tararu stream and reshaping the streambed and banks. Rock was placed by diggers along the banks and is keyed into the streambed to a depth of approximately two metres, as required by the design standard. Rip rap is currently being placed to stabilise stream banks that were scoured out during the flood event.

The works undertaken involved two diggers operating in the bed and on the banks of the stream and eight trucks shifting the debris and bed load. Trucks were used to transport rock to the bottom of Wilson Street, where it was deposited behind an old coastal protection wall located on the foreshore.

No modifications to the original scheme standard were made.

Waiomu Stream

The Waiomu Stream is located at the settlement of Waiomu, approximately 13.7 kilometers north of Thames on State Highway 25. This stream also experienced an unprecedented flood event on June 21 during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Channel re-instatement commenced on June 24. Works included pushing gravel, sand and rock (deposited in the main channel during the storm event) in scour holes left in the channel bed. Additional channel debris is used to stabilise the banks of the channel where erosion scours were left.

These works are causing some disturbance of the streambed and suspension of sediment into the stream. However, the water is currently carrying a lot of sediment due to erosion in the upper catchment.

While debris removal is a permitted activity, some works will include reshaping of small sections of the stream channels, to its existing design. No modifications to the original scheme standard will take place.

The foreshore zone at the mouth of the channel has been opened up to allow for the flow of water.

Thames Township

Moanatairi Stream

The Moanatairi Stream erosion control and bank stabilisation works are also part of the Waihou Valley Scheme.

The Moanatairi Stream is located within the Thames Township. The stream experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Channel re-instatement commenced on June 24. Works include the removal of vegetation at debris trap sites, stabilisation of bank erosion through the placement of rock from within the channel.

No modifications to the original scheme standard took place.

Karaka Stream

The Karaka Stream erosion control and bank stabilisation works also forms part of the Waihou Valley Scheme.

The Karaka Stream is located within the Thames Township. The stream also experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Channel re-instatement commenced on June 24. Works included the removal of vegetation at debris trap sites, stabilisation of bank erosion through the placement of rock from within the channel.

Works were completed during the first week following the event. No modifications to the original scheme standard took place.



Figure 5: Clean up works in progress on the Hape Stream in Thames.

Hape Stream

The Hape Stream erosion control and bank stabilisation works form part of the Waihou valley scheme.

The Hape Stream is located within the Thames Township. The stream experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Activity of works included the removal of debris at the bridge, located on State Highway 25 by excavator (Figure 5), which commenced during the afternoon of June 21, immediately following the flood event. Protection of stream banks that were eroded during the flood event was completed with the placement of infill channel material. Works were completed during the week of June 21.

No modifications to the original scheme standard took place.

Waikiekie Stream

The Waikiekie Stream erosion control and bank stabilisation works form part of the Waihou Valley Scheme.

The Waikiekie Stream is located within the Thames Township. The stream experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Channel re-instatement commenced on June 24. Works included the removal of vegetation obstructing the stream, stabilisation of bank erosion through the placement of rock from within the channel. Works were completed during the week following the flood event. No modifications to the original scheme standard took place.

Te Aroha

Tatumangao Stream

The Tatumangao Stream erosion control and bank stabilisation works form part of the Waihou Valley Scheme.

The Tatumangao Stream is located east of the Te Aroha Township. The catchment originates in the foothills of the western side of the Kaimais. The stream experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

Channel re-instatement commenced on June 24. Works included the removal of vegetation at debris trap sites, stabilisation of bank erosion through the placement of gravel and small boulders from within the channel.

Works were completed during the week following the flood event. No modifications to the original scheme standard took place.

Tunakohoia Stream

The Tunakohoia Stream erosion control and bank stabilisation works form part of the Waihou valley scheme.

The Tatumangao Stream is located east of the Te Aroha Township. The catchment originates in the foothills of the western side of the Kaimais. The stream experienced an unprecedented flood event on June 21, during the early hours of Friday morning as a result of heavy rainfalls within a short period of time.

No modifications to the original scheme standard took place.

10.2 Thames Coromandel District Council (TCDC)

10.2.1 Observations

Response procedures, damage and effects reported include:

- Tapu, Tararu, Karaka and Te Puru all experienced major flooding shortly after 1am
- A Civil Defence Declaration was made at 3am.
- Evacuees were sent to Thames Hospital shortly after 3am.
- One fatality in Waiomu motor camp.
- Widespread power failures and damage to wastewater and water supply systems.
- Over a dozen people required temporary (emergency) accommodation.
- Between Tararu and Waikawau, 356 properties inundated
 - 118 houses (35 suffered structural damage)
 - 148 basements/sheds
 - 90 properties
 - 1/3 businesses in Thames (main street) flooded.
- Victoria Street in Tararu devastated.
- 50 homes in Coromandel and 23 in Port Charles inundated.
- Roof tops lost in Coromandel.
- A Whangapoua house partly destroyed.
- Iron blown off a number of homes in Hahei.
- Flood waters washed across SH25 at Wade Road restricting access to trucks and 4x4 vehicles only.
- 50 pines trees felled in Matarangi, some damaging caravans and houses.
- Wood shed lifted and blown over boats near Pauanui.
- Significant infilling and damage to streams.
- Kopu-Hikuai Road closed from both ends, as was the Tapu-Coroglen Rd.
- Surface flooding reported throughout the district.

10.2.2 Proposed Actions

- Response procedures and recovery planning processes will be reviewed.
- Volunteer efforts will be formally recognised.
- A formal consultation process will be implemented.
- Scope and implement a long term “Reduction” Strategy.
 - A debrief on the event was held on August 28 (see Appendix E for Environment Waikato’s reports). Some key points worth noting are:
 - Clarifying response/recovery limits (what will be provided and to what extent - such as ongoing stream management)
 - Additional warning systems (to allow individual, proactive response)
 - Longer term solutions needed
 - Long term health impacts (water supply vs septic tanks)
 - Recognise significance of weather bomb event
 - Regional Civil Defence Plan needs a clear framework under CIMS for a major event
 - Staff have to deal with affected people – need to understand the trauma aspect (how do we deal with it?)
 - Maintain an understanding of community resilience (keep local communities informed and involved)
 - Need to manage catchment issues
 - The Mayoral Relief Fund has topped \$300,000
- On July and August, five public meetings (community debriefs) were held at various venues on the Thames Coast. The purpose of the forums were to produce comments and suggestions for forwarding to the Thames Community Board, Thames Coromandel District Council, DOC, Transit New Zealand, Environment Waikato, and the local MP. They collectively raised the following points/issues:
 - Culverts should for regularly cleared
 - A local map of catchpits, stormwater pipes, and drains could be available to locals who could assist contractors locates same and contribute local knowledge
 - How does TCDC provide a risk assessment for each property
 - Kerbs and channels are needed before footpaths
 - Properties could have their own storage tanks to ensure provision of clean water
 - The warning siren did not function so an independent system needs to be put in place (e.g. gas fired fog horn)
 - Permits for any construction in the floodways should be consistent in the granting of consents
 - Can funds be allocated to mitigating damage to private property and securing same in evacuation?
 - Will the Te Puru Flood Management Plan be fully implemented?
 - Can sightseers be discouraged? Bow waves from their vehicles exacerbates flood damage
 - Who will be removing rubbish from parks and reserves?
 - Need additional rubbish collections
 - The removal by the flood waters of the rip rap on stream banks would be less if it was mortared in place with large rocks
 - The Te Puru Creek Rd could be raised and armoured against scouring at the first corner from SH25
 - Does Tapu need a flood management plan? What would be the cost?
 - Does the Tapu-Coroglen Road need to be raised about 1 metre to act as a stopbank?

- There was no “jumbo” bin available at Tapu for rubbish
- A council staff member could be delegated as a contact person for certain areas (Civil Defence?)
- Need to educate residents as to works allowed under emergency conditions and clarify responsibilities for waterways

The letter specifically addressed to Environment Waikato covered the following issues:

1. Who is responsible for clearing and maintaining stream beds?
2. Is there any regular survey of Coast streams to note a possible danger danger to residents and property downstream?
3. Large logs were washed down in the event. Who do they belong to?
4. One suggestion was to hire a person with a chainsaw to walk up the stream to cut fallen logs into shorter lengths that would float out under the road bridges without blocking them and causing water to divert down unnatural flow paths.
5. Straighter paths leading to and from culverts and bridges would improve the flow of water.

10.3 South Waikato District Council (SWDC)

10.3.1 Observations

Response procedures, damage and effects reported include:

- Police requested an emergency declaration on the evening of Thursday June 20.
- Power losses had a major impact on water and sewage systems.
- There was confusion as to which power company had responsibilities in the district.
- A Civil Defence Emergency was declared at 8am with danger to residents, health risks and the full extent of damage unknown (due to loss of telemetry).
- 11 houses inundated (Putaruru/Tirau).
- 40 homes needing new carpet (from sewage contamination).
- Scouring of roads, some closed by slips (Figure 6).
- 30 vehicles damaged or written off.
- Woolworths Supermarket flooded in Putaruru.
- Approach to the Horahora Bridge washed away.
- Many of the emergency services in the district have to report to headquarters outside the region (e.g. fire service, health, and police). This can lead to confusion.
- Extensive stream bank erosion (see below)



Figure 6: Stream bank erosion in the South Waikato District.

10.3.2 Proposed Actions

- A debrief on the event was held on 22 July.
- Response procedures and recovery planning processes will be reviewed
- Emergency Services Coordinating Committee will meet on a more regular basis

10.4 New Zealand Fire Service

Thursday 20 June

- Involvement commenced with the monitoring of 7 calls in Thames during the day due to wind related problems
- Brigade received multiple calls due to flooding around Thames. Unable to attend some call outs due to roads being flooded
- Placed other appliances in the Bay-Waikato Area on standby

Friday 21 June

- Control point set up at the Thames Station
- CIMS was established
- Arranged response to rescue a person washed out to sea at Waiomu
- Multiple calls being made into the control centre
 - Coromandel evacuated people from Albert Street
 - Evacuated people from Motor Camp and bottom of Tapu-Coroglen Rd to Tapu Hall
 - Thames and Puriri assisting evacuating people from Tararu Creek area
- Attended Civil Defence debrief meetings
- Civil Defence Emergency declared at 0300 hrs

Saturday 22 June

- Attended Civil Defence debrief meetings
- Assisted in the cleaning up of flooded homes
- Arranged crews to bring in fresh water supplies (via tanker)

Sunday 23 June

- Attended Civil Defence debrief meetings
- Assisted in the establishment of a control point at Te Puru
- Arranged lunches for crews working in Te Puru and Waiomu
- Crews continued to wash and clean flooded homes

Monday 24 June

- Attended Civil Defence debrief meetings
- Tapu crews were still attending to four homes, two each in Waiomu and Tapu
- Thames and Puriri tankers attended two homes in Te Puru
- 1715 hrs - Civil Defence Declaration lifted

Proposed Actions

- Upgrading radio sets
- Enhancing the Thames fire station

10.5 WEL Energy

Damage and other impacts reported include:

- 32 11kV feeders and one 33 kV radial circuit outage
- 11 main circuits were knocked out (very unusual - normally only have 1 or 2 affected). Priority is to restore main feeders first, then spur lines
- 95% of lost supply was restored by 7am on Friday.
- Longest outage time was 14.5 hrs.
- Despite weather predictions, the storm's intensity and affect on WEL's network were greater than anticipated.
- Most of the problems were the result of fallen trees and broken lines. Most of the faults occurred where vegetation had been assessed as being well outside the growth limit zone.
- WEL was constrained by insufficient resources (internal and field) for a 10 hour period following the outages incurred during the storms peak.
- The call centre received 39,000 calls over the four day period to Sunday 23rd June.
- Call and control centre communications were constrained by overloading of telephone and RT facilities.
- The call and control centres would have benefited from additional experienced personnel to manage the dispatch and monitoring of field resources.

Lessons Learnt

- In future, err on the side of over-preparation and resourcing for predicted storm or emergency conditions.
- Prepare assigned personnel for specified emergencies.
- Implement more regular training for emergency situations.
- Improve procedures and systems for dispatch and management of field personnel.

10.6 United Networks

Damage and other impacts reported include:

- Worst storm in about 20 years to affect electricity network.
- Outages resulted from trees falling onto or touching lines, power poles being undermined or swept away during floods.
- Flooding and slips hampered restoration efforts.
- Access to sites was a big issue.
- Multiple effects on one line were common.
- Around 75,000 end consumers were affected (Eastern Region).
- Around 50,000 end consumers affected (Northern Region).
- National Service Desk received 2,650 incoming phone calls, 2,750 electronic services requests, 8,000 faxes (service requests from retailer call centres).
- Power outages had to be prioritised (based on public safety and hardest hit areas).

Lessons Learnt

- This event stretched the industry and local communities.
- Debriefing sessions with key parties initiated.
- Retailers and line companies need to work together.
- Review the communications systems in a crisis to benefit end-consumers.
- Provide general education for end-consumers on structure of electricity industry.

10.7 Tranzrail

- Tranzrail suffered a significant washout on the Kinleith rail branch near Tirau
- Damage reports were handled by Transfield Services and Tranzrail as part of their normal emergency provisions
- Transfield services is responsible for the rail response in the circumstances of a civil defence declaration at the local level when damage occurs, or is likely to occur to the rail infrastructure. Track maintenance staff are required to carry out inspections when weather problems are likely to occur
- Rail operations are still controlled centrally by Tranzrail from their Train Control Centre and this is the location for all calls in any civil defence emergency. Contact numbers are listed in the Phone Book
- The only issue was in relation to the washout at Tirau where a local farmer apparently contacted Civil Defence about the washout but is not clear whether this information was passed onto Tranzrail. Local track staff found the washout during an emergency inspection at 11.00 pm

10.8 Transit New Zealand

Damage to the region's state highway network was only superficial. Flooding and slips on the state highways were localised and only caused some minor inconveniences (e.g. SH1 at Putaruru and SH25 on the Coromandel Peninsula).

10.9 Telecom

Damage to the landline network was minor. The only damage reported was at Tapu and Puketurua where fibre optic cables were severed. They were repaired almost immediately. No major issues were reported on the cell phone network.

10.10 Insurance Industry

Numerically, this was the largest insurance claim suffered by New Zealand in one event. There were about 14,000 claims lodged nationally (totalling \$25 million) as a result of damage caused by the Weather Bomb (the Edgecumbe earthquake only had about 6,000 claims lodged). The Royal and SunAlliance insurance group (which doesn't include AA Insurance but includes AMP & SIS) had the following numbers for the North Island:

Domestic	1117
Commercial Property	288
Trailercraft	3
Moored Craft	12
Motor Vehicle	33
TOTAL	1453

242 claims were lodged within the TCDC area, with another 316 being claimed in the greater Waikato (over and above normal work).

Issues arising:

- There was difficulty in getting access to information
- Unfortunately, the changing face of the insurance industry means policies are being sought from banks, Internet, shopping schemes, and telephone call centres. Many underwriters are only represented in the main centres
- Due to the sheer number of claims, there were major delays in getting damage assessed
- It was hard to locate insurance assessors (there were no more available)
 - can only inspect 10 houses per day

- Underwriters are looking at ways to draw in extra resources (from Australia?)
- It was difficult to locate goods (such as fridges, freezers, TVs, etc) due to depleted stocks
- The high level of uninsured cases was a major concern

Note: While meeting most (if not all) claims lodged from this event, insurance companies may opt to cancel or refuse to renew policies for properties located within high flood risk zones (unless the risks are reduced).

10.11 Work and Income New Zealand (WINZ)

- 1 in 4 people affected were WINZ clients
- Most areas hit hardest involved residents in low incomes
- Must link in with other key agencies involved in the event

10.12 Health Waikato Limited

- The benefits of contingency plans and CIMS were very apparent
- Thames Hospital experienced minor flooding (main concern was water pouring in through the kitchen ceiling - shorting out equipment)
- The Thames Hospital dining hall became the temporary home for many evacuated residents. Blankets, meals, hot drinks, dry clothes, and general assistance were also provided
- It was hard for staff not to ignore what may have happened to their own properties
- Thames Hospital emergency facilities certainly proved their worth. The generator for emergency power and the independent water supply provided the only decent water in the town before tanks had to be topped up on the 6th day with 193,000 litres brought in by Tankers from the Waitoa Dairy Factory
- As for services at Thames Hospital, the only disruption was the closing of the operating theatre on the Friday – otherwise it was business as usual

10.13 Damage Reported from other Areas

Hamilton City Council

- Shop verandah collapsed on Heaphy Terrace
- Roof tops lost and some trees felled.
- Top floor of Environment Waikato's office flooded.
- Surface water flooding on River Road (from blocked stormwater outlets).
- Balfour Crescent residents without power.
- Minor road accidents.
- Power cut to southern outskirts.

Waikato District Council

- Power lines downed, roof tops lost and trees felled in and around Huntly.
- Boat foundered in Raglan Harbour after slipping its moorings (this incident involved a response from Environment Waikato's Marine Oil Spill team).

Matamata-Piako District Council

- SH25 near Te Aroha was closed (due to flooding from the Mangaiti Stream).
- A trampoline was blown into a house at Matamata
- 15 elderly residents in a Matamata retirement village had to be evacuated due to flooding
- Strong winds blew over a silo, numerous trees, fences, and power lines around Matamata.

- 40 power lines downed in the Piako area (power cut off to Te Aroha).
- Shops flooded and roof tops lost in Matamata.
- Roof tops lost and trees felled in Te Aroha.

According to the Insurance Council, insurance companies will pay out more than \$24 million to flood and/or wind damaged homes nation-wide (from 14,000 claims). As expected, most of the claims have been received from the South Waikato and Coromandel districts.

11 Summary of Costs

Please regard all information in this section as estimated only. Damage assessments and associated costs were still being compiled at the time this report was written.

11.1.1 Estimated Costs to Repair Scheme Assets (EW)

TE AROHA

Tutumangao	\$10,000
Tunakohoa	5,000
Sub-total	\$15,000

THAMES

Waikiekie	\$2,000
Hape	10,000
Karaka	
Upper debris trap	\$4,000
Lower debris trap	\$14,000
Outfall	\$5,000
Sub-total	\$23,000
Moanatairi	\$5,000
Tararu	
Infill	\$63,000
Rock	\$40,000
Sub-total	\$103,000
Waiomu	\$6,000
Sub-total	\$161,000

TOTAL \$176,000

General Damage: TE AROHA

Waitoki	\$10,000
Patuwahao	\$4,000
Mangaiti	\$10,000
Omahu	\$6,000
Tunakohoa	\$15,000
Tutumangao	\$3,000
Waiorongomai	\$15,000
Waipupu	\$5,000
McGill	\$10,000
Kakahu	\$5,000
Oraka	\$25,000
Mangawhero	\$20,000
Waihou	\$27,000

Sub-total \$155,000

PAEROA

Hikutaia	\$50,000
Kaouiti	\$15,000
Komata	<u>\$10,000</u>

Sub-total \$75,000

KEREPEHI

Moanatairi	\$5,000
Karaka	\$ 10,000
Warahoe	\$ 1,000
Puriri	\$ 15,000
Kauaeranga	\$ 15,000
Tararu	\$62,000
Hape	\$ 10,000
Kirikiri	\$ 1,000
Sub-total	\$119,000
TOTAL	\$349,000
GRAND TOTAL	\$525,000

Drainage repairs could top \$70,000 in the Thames Valley (about \$20,000 was initially spent undertaking emergency work to reinstate culverts and access to farms)

11.1.2 TCDC Response & Damage Costs

- Estimated final response costs are:
 - TCDC \$1.8 million
 - House/Property Damage will top \$6 million
- Estimated TOTAL = \$7.8 million

11.1.3 SWDC Response & Damage Costs

- Estimated final response costs are:
 - \$800,000 (mainly roading repairs)
 - House/Property Damage \$220,000
- TOTAL = \$1 million

11.1.4 Agency Response Costs (Summarised)

EW	= \$525,000	(emergency and remedial works only)
TCDC	= \$1,800,000	
SWDC	= \$800,000	
Transit NZ	= \$750,000	(TCDC only & excludes Tararu Bridge assessment)

TOTAL = \$3.87 million

11.1.5 Total Cost of Weather Bomb Event

Agency Responses	\$3.87 million
Non-Agency Damage	\$6.22 million
TOTAL	~\$10 million

12 Operational Improvements

12.1.1 Emergency Management Room set-up.

The successful operation of the Emergency Management Room (Waikato Room) is contingent upon ready and reliable access to the services that are now an integral part of the Emergency Management Warning / Monitoring service. These now comprise:

- Environment Waikato Telephone, Fax and email
- Hydrotel Telemetry network and base station
- Hydrol Hydrometric database

It is proposed that the following arrangements be made for the Emergency Management (Flood) Operations Room

- A simple floor layout plan that specifies an area where technical services such as computers, phones can be set up and a checklist to ensure all equipment and services are available.
- Arrangements for two suitably configured PCs to be set up, one to handle the Hydrotel/warning alarm messages, the other one for the Hydrol database so hydrometric data can be retrieved for technical assessment/ monitoring of flood events.
- Linking of the Hydrotel computer to a data show projector so individual hydrographs, rainfall reports etc can be projected on to a wall for all to see. This would be particularly useful during briefing sessions.

While it is unlikely that the above hardware could be committed on a permanent basis to the Emergency Management Room it may be necessary to have designated PCs within Environment Waikato and other hardware that are correctly configured and can be re located quickly to the EM Room.

12.1.2 Emergency Management Staff Roster

Environmental Monitoring staff participate in the Emergency Management Roster but during a flood event they need to engage in field duties to ensure the flood warning system level/flow calibrations are updated. It is recommended that additional EMO 2 staff are recruited so Environmental Monitoring staff who also double as EMO 2s can be released for field duties during such events.

Note: A standalone "initial response" room has been developed in the Asset Management Group Office to free up the Waikato Room (which is the nominated Civil Defence/Flood Operations Centre).

12.1.3 Review of the Flood Warning Telemetry System

Coromandel Peninsula

The Coromandel Peninsula has been an area that is difficult to monitor rainfall and water levels in real time, as it has been difficult and expensive to obtain reliable communication links. Presently real time rainfall monitoring for the Coromandel Peninsula north of Thames relies on one telemetered rain gauge at the Pinnacles hut.

This rain gauge does not have all weather access and could not be re-instated quickly during a storm event if a failure was to occur. With the improvements to cellphone networks and technology more cost-effective options are becoming available, which may make monitoring of existing installations in this area a viable proposition.

Proposed upgrades to the telemetry network include:

Castle Rock at Castle Rock Rd

Rainfall (has been telemetered previously but had equipment stolen on several occasions.)

Tairua at Broken Hills

Rainfall

Thames Catchment Divide

Rainfall for Tararu, Te Puru, Karaka, Hape, Mangakiriri and Mangarehu catchments

Tapu River at Tapu

Water level

South Waikato

The South Waikato district has generally been regarded as an area of low flood hazard, but in recent years there's been an increase in high intensity rainfall events occurring in the lowland areas. It would be possible to add rainfall/water level sensors and telemetry to some existing installations to increase our real time data in such areas.

Oraka Stream at Pinedale
Rainfall and water level

Tokoroa AQ Station
Rainfall

Piako at Kiwitahi
Rainfall

Pokaiwhenua at Puketurua
Rainfall (NIWA/MRP site)

The proposed upgrades will be carried out over the next two years and mainly financed from the normal capital budget provision for upgrades and replacements. Priority would be given to reinstating the Castle Rock rain gauge and installing a rainfall recorder at Tokoroa.

The above recommendations will be incorporated into a wider (regional) review of the existing coverage provided by the flood warning telemetry service. This will be undertaken within the Natural Hazards and Emergency Management Programme.

13 Follow-up Actions Required

- A Regional Civil Defence Technical debrief was convened by Environment Waikato on Friday, July 26. The purpose of the debrief was to receive information from the Thames Coromandel and South Waikato District Councils (and from the other agencies involved/affected in the event), particularly regarding lessons learnt and experience gained. Key points raised include:
 - Electricity Industry Contact Listings will be distributed to all Civil Defence Officers in the Waikato Region
 - If the event had occurred just a month later, impacts on the farming economy would have been serious. This has implications for both the regional and national economies
- Collate event-related information for final reporting
 - River Levels (slope area assessments for flows)
 - Rainfall Totals
 - Areas affected (mapping extent of flooding for Waiomu, Tapu, Tararu, and Te Puru)
 - Damaged property and assets
- Welfare/Recovery issues.
- Complete stream clearance works
- A stream management strategy will be proposed with the aim of:
 - Identifying river management and erosion issues on the Coromandel
 - Assessing extent of work required to resolve issues

- Consider hazard planning implications on communities (in consultation with TCDC and SWDC)
 - develop long term strategies for affected communities
 - Hazard Management Plans are already in place for Te Puru, Thames, and Tararu (which will provide a good basis for addressing other areas)
- Review the flood warning telemetry network
 - Assess adequacy of existing coverage
 - Identify gaps
 - Recommend new sites or upgrade existing recorders (from a cost/benefit analysis)
 - Decommission redundant sites
- An investigation into the potential impact of climate change will be considered

14 Conclusions

The severe rainfall events in the early morning of Friday 21 June 2002 and to a lesser extent the afternoon and early evening of Friday 12 July 2002, brought torrential rain with very strong winds resulting in widespread and exceptional damage, particularly across the Thames Coromandel and South Waikato Districts.

As a result, two Civil Defence emergencies were declared in both areas due to water supply and health concerns and the extent of damage. One fatality occurred at the Waiomu Caravan Park where a woman was swept out to sea.

The event produced rainfall intensities in the order of 100mm in one hour registering return periods of 100 years and creating river levels ranging from 5 year to 100 year return internal events.

Generally, damage to scheme assets was only moderate. Major damage did however occur at Tararu, Te Puru, and Waiomu and the streams within the Thames township (namely the Karaka, Moanatairi, and Hape Streams). Based on the rainfall intensities recorded at some locations, damage could easily have been a lot worse especially if the storm's duration had been longer.

Scheme assets elsewhere (in particular between Te Aroha, Paeroa, and Thames) only suffered minor-moderate damage. Immediately after the event, emergency work was initiated which involved the clearing of streams (debris and infill), unblocking culverts and debris traps, repairing scoured drains, and generally reinstating flood and erosion works.

Scheme works therefore performed above expectations in some localities (given peak flow estimates, quantity and size of debris, and damage reported). Remedial works had largely been completed at the time of writing this report.

Appendix A: Severe Weather Warnings

{SWW Event 2002/29.3}

URGENT - IMMEDIATE BROADCAST IN:

NORTHLAND AUCKLAND COROMANDEL PENINSULA WAIKATO BAY OF
PLENTY TARANAKI TAIHAPE WAITOMO TAUPO TAUMARUNUI WANGANUI

NOT TO BE BROADCAST AFTER 9:00pm Thursday 20-Jun-2002

SEVERE WEATHER WARNING

ISSUED BY MetService AT 8:31 am 20-Jun-2002

WEATHER BOMB ON TRACK TO AFFECT NORTHERN NEW ZEALAND - WIND
WARNING NOW EXTENDED SOUTHWARDS

Deepening has commenced in the low northwest of the North Island, and it still appears to be on track to bring stormy conditions to many parts of the North Island today (Thursday).

MetService is warning residents and travellers in Northland, Auckland, Coromandel Peninsula, Waikato and Bay of Plenty to prepare for a spell of damaging winds and heavy rain. The wind warning has now been extended southwards to western North Island areas and the central plateau.

The bad weather may spread to a few other North Island places later. People over the northern half of the North Island in particular should keep abreast of the latest forecasts and any further warnings.

MORE DETAILED INFORMATION FOR EMERGENCY MANAGERS AND
TECHNICAL USERS FOLLOWS:

HEAVY RAIN WARNING

AREA/S AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA
WESTERN BAY OF PLENTY

FORECAST:

COROMANDEL PENINSULA AND WESTERN BAY OF PLENTY

Rain is intensifying. In the 21 hours from 9am Thursday to 6am Friday, expect 150-200mm rain in the ranges. Intensities are likely to reach 15 to 20mm per hour in thunderstorms.

AREA/S AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA
WAIKATO BAY OF PLENTY TARANAKI WAITOMO TAUMARUNUI TAUPO
TAIHAPE WANGANUI

FORECAST:

COROMANDEL PENINSULA, WESTERN BAY OF PLENTY, AND WAIKATO

Between 3pm Thursday and 6am Friday, expect east or northeast winds gusting 120km/hr in exposed places, especially over the tops and in the lee of the ranges.

WAITOMO TARANAKI TAUPO TAUMARUNUI TAIHAPE WANGANUI

Between 4pm Thursday and 3am Friday, expect easterly winds gusting 115 km/h in exposed places.

NEXT SEVERE WEATHER WARNING WILL BE ISSUED AT OR BEFORE
9:00pm Thursday 20-Jun-2002

{SWW Event 2002/29.4}

URGENT - IMMEDIATE BROADCAST IN:

NORTHLAND AUCKLAND COROMANDEL PENINSULA WAIKATO WAITOMO
BAY OF PLENTY TAUPO TAUMARUNUI TARANAKI TAIHAPE WANGANUI
MANAWATU GISBORNE

NOT TO BE BROADCAST AFTER 9:00pm Thursday 20-Jun-2002

SEVERE WEATHER WARNING ISSUED BY MetService AT 11:23 am 20-Jun-2002

{MEDIA}

RAIN WARNING EXTENDED TO EASTERN BAY OF PLENTY AND NORTHERN
GISBORNE, WIND WARNING EXTENDED TO MANAWATU

Rapid deepening has commenced in the low northwest of the North Island, and it is still on track to bring stormy conditions to many parts of the North Island during Thursday and Friday.

MetService is warning that the heavy rain in Northland, Auckland, and Coromandel Peninsula should spread to other parts of the Bay of Plenty, and also to northern Gisborne, later on Thursday.

A period of potentially damaging winds is likely later Thursday and early Friday in northern and western parts of the North Island as far south as Manawatu, also about the central plateau. Northland and Auckland residents are also warned that there could be a sting in the tail of this system. A period of gale force southwesterlies is likely for a time about the middle of Friday.

MORE DETAILED INFORMATION FOR EMERGENCY MANAGERS AND
TECHNICAL USERS FOLLOWS:

HEAVY RAIN WARNING

AREA/S AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA BAY
OF PLENTY GISBORNE NORTH OF TOKOMARU BAY

FORECAST:

COROMANDEL PENINSULA AND THE KAIMAIS

In the 13 hours from noon Thursday to 1am Friday, expect another
90-120mm rain.

**THE RANGES OF BAY OF PLENTY EXCEPT THE KAIMAIS, AND THE GISBORNE
RANGES NORTH OF TOKOMARU BAY**

In the 12 hours from 6pm Thursday to 6am Friday, expect 100-120mm.
Intensities may reach 15mm per hour.

STRONG WIND WARNING

AREA/S AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA
WAIKATO WAITOMO BAY OF PLENTY TAUPO TAUMARUNUI TARANAKI TAIHAPE
WANGANUI MANAWATU

FORECAST:

COROMANDEL PENINSULA, WESTERN BAY OF PLENTY, AND WAIKATO
Between 3pm Thursday and 6am Friday, expect east or northeast winds gusting 120km/hr in exposed places, especially over the tops and in the lee of the ranges.

WAITOMO, TARANAKI, TAUPO, TAUMARUNUI, TAIHAPE,
Between 4pm Thursday and 3am Friday, expect easterly winds gusting 115 km/h in exposed places.

NEXT SEVERE WEATHER WARNING WILL BE ISSUED AT OR BEFORE
9:00pm Thursday 20-Jun-2002

{SWW Event 2002/29.5}

URGENT - IMMEDIATE BROADCAST IN: NORTHLAND AUCKLAND COROMANDEL
PENINSULA WAIKATO WAITOMO BAY OF PLENTY GISBORNE TAUPO
TAUMARUNUI TARANAKI TAIHAPE WANGANUI MANAWATU WAIRARAPA
WELLINGTON MARLBOROUGH

NOT TO BE BROADCAST AFTER 9:00pm Thursday 20-Jun-2002

SEVERE WEATHER WARNING ISSUED BY
MetService AT 5:05 pm 20-Jun-2002

{MEDIA}

HEAVY RAIN HEADING SOUTH. WARNING EXTENDED TO WAIRARAPA AND
MARLBOROUGH

The low heading for northern North Island continues to deepen and rain has becoming widespread over the North Island. MetService forecasters expect heavy rain in Northland to spread south over Auckland, Bay of Plenty and northern Gisborne tonight and into Wairarapa and eastern Marlborough for a time on Friday morning. In addition, easterly gales which have already affected the area from Northland to the Coromandel Peninsula, are likely to spread as far south as Manawatu and the central plateau overnight. Auckland and Northland residents are also warned that there could be a sting in the tail of this system with a period of southwesterly gales is likely for a time about the middle of Friday.

MORE DETAILED INFORMATION FOR EMERGENCY MANAGERS AND
TECHNICAL USERS FOLLOWS:

HEAVY RAIN WARNING

AREAS AFFECTED:

NORTHLAND, AUCKLAND, COROMANDEL PENINSULA, BAY OF PLENTY,
GISBORNE NORTH OR TOKOMARU BAY, WAIRARAPA, MARLBOROUGH

FORECAST:

COROMANDEL PENINSULA AND THE KAIMAIS

In the 12 hours from 5pm Thursday to 5am Friday, expect another
90-120mm rain in the ranges.

THE RANGES OF BAY OF PLENTY EXCEPT THE KAIMAIS, AND THE GISBORNE
RANGES NORTH OF TOKOMARU BAY

In the 12 hours from 9pm Thursday to 9am Friday, expect 100-120mm.
Intensities may reach 15mm per hour.

STRONG WIND WARNING

AREA/S AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA
WAIKATO
WAITOMO BAY OF PLENTY TAUPO TAUMARUNUI TARANAKI TAIHAPE
WANGANUI MANAWATU

FORECAST:

COROMANDEL PENINSULA, WESTERN BAY OF PLENTY, AND WAIKATO
Between 5pm Thursday and 6am Friday, expect east or northeast winds
gusting 120km/hr in exposed places, especially over the tops and in
the lee of the ranges.

WAITOMO, TARANAKI, TAUPO, TAUMARUNUI, TAIHAPE,
Between 5pm Thursday and 3am Friday, expect easterly winds gusting
115 km/h in exposed places.

NEXT SEVERE WEATHER WARNING WILL BE ISSUED AT OR BEFORE
9:00pm Thursday 20-Jun-2002

{SWW Event 2002/29.6}

URGENT - IMMEDIATE BROADCAST IN:

NORTHLAND AUCKLAND COROMANDEL PENINSULA WAIKATO WAITOMO BAY
OF PLENTY GISBORNE TAUPO TAUMARUNUI TAIHAPE TARANAKI WANGANUI
MNUB WAIRARAPA WELLINGTON MARLBOROUGH

NOT TO BE BROADCAST AFTER 9:00am Friday 21-Jun-2002

SEVERE WEATHER WARNING ISSUED BY
MetService AT 8:17 pm 20-Jun-2002

{MEDIA}

STORMY WEATHER HEADING SOUTHWARDS BUT EASING IN THE NORTH
OVERNIGHT.

The deep low which has been bringing stormy weather to northern areas from Northland to Coromandel Peninsula today now lies west of Northland and MetService forecasters expect it to track across the southern part of the North Island during Friday morning. Winds and rain are starting to ease in northern parts of Northland this evening and this improvement should spread southwards over Auckland and the Coromandel Peninsula overnight and Bay of Plenty by late morning. However, easterly gales are likely to spread to exposed areas of the central North Island and as far south as Manawatu for a time overnight, and rain could become heavy for a time in the morning in Wairarapa and eastern Marlborough. In Auckland and Northland, west or southwest winds are likely to become gale force again in some exposed places for a time on Friday afternoon.

MORE DETAILED INFORMATION FOR EMERGENCY MANAGERS AND
TECHNICAL USERS FOLLOWS:

HEAVY RAIN WARNING

AREAS AFFECTED: NORTHLAND AUCKLAND COROMANDEL PENINSULA BAY
OF PLENTY NORTHERN GISBORNE WAIRARAPA MARLBOROUGH

FORECAST:

COROMANDEL PENINSULA AND THE KAIMAIS

In the 9 hours from 8pm Thursday to 5am Friday, expect another 100mm in some high parts of the ranges with intensities 15-20mm/hour, and 40 to 60mm lower down in the east.

THE RANGES OF BAY OF PLENTY EXCEPT THE KAIMAIS, AND THE GISBORNE RANGES NORTH OF TOKOMARU BAY

In the 12 hours from 9pm Thursday to 9am Friday, expect 100-120mm. Intensities may reach 15mm per hour.

STRONG WIND WARNING

AREAS AFFECTED: AUCKLAND COROMANDEL PENINSULA WAIKATO
WAITOMO BAY OF PLENTY TAUPO TAUMARUNUI TARANAKI TAIHAPE
WANGANUI MANAWATU

FORECAST:

COROMANDEL PENINSULA, WESTERN BAY OF PLENTY, AND WAIKATO

Between 8pm Thursday and 3am Friday, expect east or northeast winds gusting 120km/hr in exposed places, especially over the tops and in the lee of the ranges.

WAITOMO, TARANAKI, TAUPO, TAUMARUNUI, TAIHAPE,

Between 8pm Thursday and 3am Friday, expect easterly winds gusting 110 km/h in a few exposed places.

NEXT SEVERE WEATHER WARNING WILL BE ISSUED AT OR BEFORE

9:00am Friday 21-Jun-2002

Appendix B: Regional Rainfall Totals

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Tuateawa	59 mm	24 hours	-	-	Kindly supplied by Graham Tailby (Ph 025 318 294). 37 mm on 19/6
Tuateawa	51 mm	24 hours	-	-	24 mm on 20/6
Opito Bay Road (No. 84)	73 mm	24 hrs	-	-	42 mm on 19/6
Whitianga (SH25 & Mill Creek Rd)	103 mm	24 hrs	-	-	Kindly supplied by Robyn Lee. 33 mm on 19/6
Whitianga	67 mm	48 hrs	-	-	20-22 June 57 mm on 21/6, 10 mm on 21/6
Whenuakite	135 mm	24 hrs	-	-	Kindly supplied by Jock Peacock (Ph 07 866 3825). 35 mm on June 19, 7mm on June 21
Te Kouma Bay	190 mm	7 hrs	-	-	Kindly supplied by Hilary Mathews (Ph 07 866 8046). Max wind gust 87 km/hr on 19/6 (E), 82 km/hr on 20/6 (SW)
Manaia SH25	230 mm	24 hrs	-	-	Kindly supplied by Barabara Petty (Ph 07 866 8790)
Papa Aroha	112 mm	24 hrs	-	-	Kindly supplied by Ian Wilkinson (Ph 07 866 8951). 20 mm on 19/6
Coromandel (Tramway Rd)	205 mm	24 hrs	-	-	Kindly supplied by Val Grey (Ph 07 866 8911) Majority fell between 11.00pm and 3.00am. 69 mm fell on 19/6, 21mm on 18/6

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Terry Laughton (Rings Rd)	250 mm	48 hrs (19-20 June)	-	-	Kindly supplied by Terry Laughton (Ph 07 866 7646)
Coromandel (Rings Rd)	270 mm	48 hours 19/6 – 21/6	125 mm in 25 mins (?) 11.35pm – 12.00am	100 years	Kindly supplied by Jennifer Stone (Ph 07 866 8733). Associated with lightening and thunder. Flash flood on wet catchment.
Tapu	215 mm	24 hrs	160 mm in 2 hours	-	Kindly supplied by Gary Blake (Ph 07 868 2336)
Tapu	200 mm	24 hrs	83 mm in 1 hour 11.30pm – 12.30am	100 years	42 mm recorded in the previous 3 days. Total for June 323 mm.
Waiomu	80 mm	1 hr	11.30pm – 12.30am 30 mm in 15 mins	-	Kindly supplied by Wayne Bowman
Waiomu	160 mm	24 hrs	145 mm in 9 hrs	-	Kindly supplied by Heather Glauser (Ph 07 868 2898) 37.5 mm recorded in the previous 3 days 20 June 40mm, 18-19 June 20 mm
Thornton Bay	>150 mm	2 hrs	11.00pm to 1.00am	-	Kindly supplied by Dave Griffiths (Ph 07 868 2713)
Thames (Rolleston Rd)	130 mm	24 hrs	-	-	Kindly supplied by Harry Wolf (Ph 07 868 8039) 15 mm on 18/6, 20 mm on 19/6
Thames (Hape Rd)	119 mm	24 hrs	-	-	Kindly supplied by Jamie Coates (Ph 07 868 8519) 19 mm on 19/6, 38 mm on 20/6
Pinnacles	200 mm	24 hrs	37 mm in 1 hour 12.00 – 1.00am	-	60 mm in 1.5 hrs. Total for June 585 mm
Pauanui	110 mm	24 hrs	-	-	-

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Whangamata	154 mm	24hrs	-	-	100 mm on 21/6
Wharepoa (Katinga)	114 mm	24 hrs	60 mm in 1 hour 12.00 – 1.00am	100 years	-
Kauaeranga Valley	133 mm	24 hrs	-	-	23 mm recorded during previous day
Golden Cross	150 mm	24 hrs	20 mm in 1 hour 3.30 – 4.30pm	-	Upper Ohinemuri (Waihi) not really affected. Total for June 376 mm
Paeroa	120 mm	48 hrs	33 mm in 1 hour 12.00 – 1.00 am	10 years	20-22 June 59 mm on 20/6, 61 mm on 21/6
Te Aroha (MPDC)	115 mm	1 hour	115 mm in 1 hour (12.00 – 1.00am)	100 years	
Te Aroha (EW)	157 mm	24 hrs	97 mm in 1 hour 12.30 – 1.30 am	100 years	Largest event on record. Total for June 235 mm
Kinleith	58 mm	24 hrs	-	-	34 mm in 2 hours (between 2 am and 4am)
Hamilton	54 mm	24 hrs	34 mm in 1 hour 11.35pm – 12.35am	10 years	CEO's office at Environment Waikato flooded. Total for June 115 mm
Waharoa	91 mm	24 hrs	74 mm in 1 hour 12.45 – 1.45am	100 years	80% of the 24 hrs total fell in 1 hour. 10 mm on 19/6, 25 mm on 20/6. Total for June 206 mm
Kaimai	120 mm	24 hrs	22 mm in 1 hour 1.05 – 2.05am	-	Total for June 269 mm
Matamata	101 mm	24 hrs	-	-	Pers comms from G. Graham

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Okororie (Waiomu Rd)	120 mm	24 hrs	-	-	Most falling on the evening of 20/6
Tirau (Buddy's Rd)	135 mm	24 hrs	-	-	Kindly supplied by Jim Duncun (Ph 07 883 1774) Total for June 217 mm
Tirau	117 mm	24 hrs	-	-	Kindly supplied by Rosemary Shaw (Ph 07 883 1252)
Tirau (south)	180 mm	24 hrs	-	-	Kindly supplied by Les Hill (Ph 07 883 1535). Most fell between 12.00 – 3.00am.
Tirau (McMillans Rd)	133 mm	24 hrs	-	-	Kindly supplied by Dalton Poppy (Ph 07 883 1202).
Tirau Treatment Plant	200 mm	24 hrs	-	-	-
Okororie	102 mm	24 hrs	-	-	Kindly supplied by Campbell Langlands (Ph 07 883 4870)
Okororie	43mm	24 hrs	-	-	33 mm measured overnight. Only 8.5 mm for previous day
Putaruru Treatment Plant	150 mm	24 hrs	120 mm in 2 hours 11.35pm – 12.35am	100 years	80% of the 24 hrs total fell in 2 hours. Large falls experienced near Arapuni
Putaruru (Tee Street)	~175 mm	24 hrs	-	-	Kindly supplied by Jack Hodgson (Ph 07 883 8629)
Putaruru	166 mm	24 hrs	-	-	Kindly supplied by Mr Drummond (Ph 07 883 8443). Total for June 300 mm. Highest on his record (20 yrs)
Putaruru (east)	158 mm	12 hrs (6pm – 6am)	-	-	Kindly supplied by Stephanie John (Ph 07 883 7565)
Putaruru	160 mm	<2 hrs	-	-	Kindly supplied by Ian Sinclair 6 mm on 21/6

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Putaruru (Terere Rd)	260 mm	10 hrs 10pm – 8am	-	-	Mostly fell midnight to 2am on 21/6
Arapuni (Derby Rd)	43 mm	24 hrs	-	-	Kindly supplied by Eve Gilliver (Ph 07 883 5885)
Lichfield	80 mm	24 hrs	-	-	Kindly supplied by Karen Mexted 4mm on 19/6, 10mm on 21/6
Lichfield	116 mm	24 hrs	-	2-5 years	9 mm on 21/6
Puketurua (X-Roads)	42 mm	24 hrs	-	-	Kindly supplied by Andrew McIntosh Email: andymc@paradise.net.nz
Puketurua (MRP Site)	54 mm	4 hrs	37 mm in one hour 1.00 – 2.00am	10 years	70% of the 24 hrs total fell in 1 hour. Total for June 149 mm
West of Putaruru	80 mm	24 hrs	-	-	Kindly supplied by Cyril Head (Ph 07 883 2829). Total for June 253 mm (last June 109 mm)
Tokoroa (north on SH1)	61 mm	24 hrs	-	-	Kindly supplied by Graeme Wilkinson (Ph 07 886 8591)
Tokoroa (central)	74 mm	24 hrs	-	-	Kindly supplied by Ian Johnston (Ph 07 886 9328)
Tokoroa (Melrose Place)	59 mm	24 hrs	-	-	Kindly supplied by Susan and Fred Young (Ph 07 886 5414). Total for June 243 mm. 13 mm on 20/6
Tokoroa (Bed Rd)	80 mm	24 hrs	-	-	
Tokoroa	72 mm	24 hrs	-	-	Kindly supplied by Nicol Wynn. Total for June 227 mm

Location	Total	Duration (9am – 9am)	Peak Intensity	Return Period for one hour	Comments
Tokoroa Treatment Plant	73 mm	24 hrs	-	-	-
Te Kuiti	38 mm	24 hrs	14 mm in 1 hour 12.00 – 1.00am	-	-
Mangatangi	78 mm	24 hrs	30 mm in 1 hour 10.30 – 11.30pm	-	Total for June 192 mm
Taupo	65 mm	24 hrs	25 mm in 1 hour 2.00 – 3.00am	-	Total for June 144 mm
Mangakino	53 mm	24 hrs	28 mm in 2 hours 1.00 – 3.00am	-	Total for June 192 mm
Kawhia	39.5 mm	24 hrs	-	-	Kindly supplied by Trevor Alexander (Ph 07 871 0856)
Tauranga-Taupo	8.6 mm	24 hrs	-	-	Total for June 28 mm
Kiko Road	35 mm	24 hrs	16 mm in 2 hours 2.00 – 4.00am	-	Total for June 212 mm

Appendix C: Regional River Levels

River	Recorder Site	Peak Level	Level above Mean Annual Normal	Date/Time of Peak	Peak Flow	Return Period	Comments
Waikawau	-	-	-	-	340 cumecs*	20-30 years	Taken at SH25. Catchment Area = ~ 34 sq. kms Specific Discharge = 10 m ³ /s/km ²
Te Mata	-	-	-	-	330 cumecs*	20-30 years	Taken at SH25. Catchment Area = 27 sq. kms. Specific Discharge = 12.2 m ³ /s/km ²
Tapu	Tapu	3.55 m	3.40 m	21/6 @ ~1.00am	270 cumecs*	20-30 years	Similar to 1985 event. Duration of event was less than two hours. Catchment Area = 26 sq. kms Specific Discharge = 10 m ³ /s/km ²
Waiomu	-	-	-	-	120 cumecs*	20-30 years	110 cumecs recorded in 1985 event (50-100 year return period) Catchment Area = 9.6 sq. kms Specific Discharge = 14 m ³ /s/km ²
Te Puru	-	-	-	-	345 cumecs*	20-30 years	170 cumecs recorded in 1985 event (10-20 year return period) Catchment Area = 26 sq. kms Specific Discharge = 15 m ³ /s/km ²
Tararu	-	-	-	-	240 cumecs	100 years	Similar to January 2002 event Catchment Area = 15.3 sq. kms Specific Discharge = 17m ³ /s/km ²
Karaka	-	-	-	-	80 cumecs	100 years	Highest flows recorded since establishment Catchment Area = 5 sq. kms Specific Discharge = 16 m ³ /s/km ²
Tairua	Broken Hills	4.25 m	2.92 m	21/6 @ 2.20am	344 cumecs	5 years	550 cumecs recorded in 1985 event
Kauaeranga	Smiths	10.34 m	4.12 m	21/6 @ 2.00am	582 cumecs	5 years	Just 0.16m short of the spillway level. 1200 cumecs recorded in 1985 event

River	Recorder Site	Peak Level	Level above Mean Annual Normal	Date/Time of Peak	Peak Flow	Return Period	Comments
Ohinemuri	Karangahake	15.24 m	2.84 m	21/6 @ 1.50am	346 cumecs	Mean Annual	Stop logs placed on standby. 560 cumecs recorded in 1985 event
Waihou	Te Aroha	10.44 m	2.94 m	23/6 @ 11.00 am	172 cumecs	Less than a mean annual	
Waitoa	Mellon Rd	8.60 m	2.33 m	22/6 @ 8.30am	94 cumecs	50 years	
	P-T Road	4.33 m	N/A	N/A	101 cumecs	50-100 years	
Pokaiwhenua	-	N/A	N/A	N/A	120 cumecs (normal = 5 cumecs)	100 years (?)	Recorder washed away at about 5am. Site owned by MRP, serviced by NIWA
Oraka	Pinedale	3.90 m	2.7 m	21/6 @ 3.00am	40 cumecs	100 years	SH1 partially blocked at the north end of Putaruru
Mangaokewa	Te Kuiti	50.82 m	2.15 m	21/6 @ 8.30am	46 cumecs	Less than a mean annual	
Waipa	Whatawhata	15.53 m	4.47 m	23/6 @ 12.00am	385 cumecs	Less than a mean annual	
Waikato	Hamilton	14.74 m	1.84 m	22/6 @ 12.00am	493 cumecs	Mean Annual	
	Ngaruawahia	11.63 m	1.68 m	22/6 @ 4.30am	790 cumecs	2-5 years	
	Control Structure	4.24 m	1.66 m	23/6 @ 12.20pm	870 cumecs	2-5 years	
Mangawara	Jefferis	20.00 m	2.99 m	21/6 @ 4.40am	50 cumecs	Mean Annual	Waiti Stream and Paranui Drain were the key contributors. Rainfall missed the upper Mangawara

River	Recorder Site	Peak Level	Level above Mean Annual Normal	Date/Time of Peak	Peak Flow	Return Period	Comments
Matahuru	-	7.95 m	2.18 m	21/6 @ 8.20pm	27 cumecs	-	
Mangatangi		12.66 m	3.83 m	21/6 @ 5.00am	75 cumecs	Mean Annual	
Awakino	SH3	3.60 m	1.90 m (?)	21/6 @ 7.30pm	108 cumecs	Less than a mean annual	

* data is estimated only

Note: The mean annual flow in the Waikato River through Hamilton is 262 cumecs.

Appendix D: Media Releases

1. Region Braces for Weather Bomb - June 20 @ 11am

Environment Waikato's Flood Response Team is on alert for the "weather bomb" approaching from the north.

A deepening low is bringing stormy conditions to many parts of the North Island, with severe winds and heavy rain already pounding the Thames Coast.

The MetService is warning residents and travellers in Northland, Auckland, the Coromandel, Waikato and Bay of Plenty to prepare for a spell of damaging winds and rain up to 20mm an hour in places.

Environment Waikato spokesman Adam Munro said the rain is falling on an already wet catchment throughout the Waikato after weeks of rain. Rivers are coping so far but will react more quickly. Lake Taupo is two thirds full so there is still some storage capacity.

In Thames, Victoria Street is already closed at the first ford with 450mm of floodwaters flowing across the road, and at Kennedy Bay floodwaters are crossing the road near the Whareora Stream, preventing a school bus from reaching its destination.

2. One Missing, Emergency Declared for Thames - June 21 @ 7.00am

One person is missing and a civil defence emergency has been declared in the Thames Coromandel area after a night of wild weather.

An elderly woman at Waiomu is missing after a caravan was swept away by floodwaters in the early hours. An elderly man was also admitted with injuries to Thames hospital. A civil defence emergency was declared in the Thames area about 3am and the area is now without power, water and the sewerage system is shut down.

The coast road is inaccessible from Ngarimu north and Thames Coromandel civil defence is warning traffic to stay away.

Many people have evacuated from areas such as Tapu, Tararu and Te Puru where there is extensive flooding, cars and caravans under water.

Thames civil defence staff, emergency services and Environment Waikato's Flood Response Team have been on duty throughout the night. Environment Waikato acting controller Scott Fowlds said the most severe damage appears to have been confined to the western coast of the Thames Coromandel peninsula, although Hamilton city and areas further south received an overnight pounding from rain and high winds.

"Power cuts are widespread but emergency services are operating well. Flood schemes are working, pumps operating to move water and so far river flooding is confined to surface flooding and over topping of berms."

3. Emergencies Declared - Thames, South Waikato - June 21 @ 9.30am

One person is missing and a civil defence emergency has been declared in the South Waikato and Thames Coromandel areas after a night of wild weather.

An elderly woman at Waiomu is missing after a caravan was swept away by floodwaters in the early hours. An elderly man was also admitted with injuries to Thames hospital. A civil defence emergency was declared in the Thames area about 3am and the area is now without power, water and the sewerage system is shut down.

South Waikato declared an emergency about 7.30am as water and electricity were lost in both Tirau and Arapuni. Schools and factories are closed in the area until further notice and it could be this afternoon before power can be restored.

At Thames, the coast road is inaccessible from Ngarimu north and Thames Coromandel civil defence is warning traffic to stay away. State Highway 5 to Rotorua is closed and while State Highway One is passable, it is regarded as marginal with slips. Many people have evacuated from areas such as Tapu, Tararu and Te Puru where there is extensive flooding, cars and caravans under water. There are many reports of damage throughout the South Waikato.

Civil defence staff, emergency services and Environment Waikato's Flood Response Team have been on duty throughout the night.

4. Helicopter Search Fails to Find Thames Woman - June 21 @ 12.00pm

A helicopter search early this morning has found no trace of an elderly woman swept away in her caravan at Waiomu after a night of storms.

A ground search began late this morning for any trace of the woman, whose husband was injured when their caravan was swept away by floodwaters in the early hours.

A Civil defence emergency has been declared in the South Waikato and Thames Coromandel areas following the "weather bomb" throughout the upper North Island.

A civil defence emergency was declared in the Thames area about 3am and the area has now been without power and water since last night, although the sewerage system has been restored.

South Waikato declared an emergency about 7.30am as water and electricity were lost in both Tirau and Arapuni. Schools and factories are closed in the area until further notice and it could be this afternoon before power can be restored. Water tankers are bringing water into the area, along with public notices about where to get water.

At Thames, the coast road is closed except to emergency vehicles, and many local roads in the area are closed. SH 5 from Tirau to Rotorua is closed, SH 1 is passable with caution needed near Putaruru, SH26 is closed near Mangaiti, and the Kopu Bridge on the Thames coast has no re-opened.

Many people have evacuated from areas such as Tapu, Tararu and Te Puru where there is extensive flooding, cars and caravans under water. There are many reports of damage throughout the South Waikato.

Civil defence staff, emergency services and Environment Waikato's Flood Response Team have been on duty throughout the night. Fire service crews in the South Waikato have been sent home to rest, with replacement crews arriving to continue the clean up.

Appendix E: Debrief Memos

File No: 31 03 04
Date: 28 August 2002
To: TCDC Weather Bomb Debrief
From: Bob Priest
Subject: **Environment Waikato's Response & Involvement Details**

Background

The severe rainfall events of early morning Friday 21 June 2002 and to a lesser extent of the afternoon and early evening of Friday 12 July 2002, brought torrential rain with very strong winds resulting in widespread and exceptional damage, particularly across the Thames Coromandel and South Waikato Districts.

As a result, two Civil Defence emergencies were declared in both areas due to water supply and health concerns and the extent of damage. One fatality occurred at Waiomu where a woman was swept out to sea.

The event produced rainfall intensities in the order of 100mm in one hour registering return periods of 100 years (Figure 1) and creating river levels ranging from 5 year to 100 year return interval events.

Initial Response (Flood Warning & Civil Defence)

- The Flood Management team was activated for two full days to monitor river levels, rainfall, and weather forecasts – and to provide technical advice to TCDC staff 24 hrs/day
- As a result of two declared civil defence emergencies being in progress (unprecedented for the Waikato), the regional civil defence HQ team was placed on standby in case the situation worsened

Performance of Scheme Assets

Generally, damage to scheme assets was only moderate. Major damage did however occur at Tararu, Te Puru, and Waiomu and the streams within the Thames township (namely the Karaka, Moanatairi, and Hape Streams). Based on the rainfall intensities recorded at some locations, damage could easily have been a lot worse especially if the storm's duration had been longer.

Scheme assets elsewhere (in particular between Te Aroha, Paeroa, and Thames) only suffered minor-moderate damage. Immediately after the event, emergency work was initiated which involved the clearing of streams (debris and infill), unblocking culverts and debris traps, repairing scoured drains, and generally reinstating flood and erosion works.

Scheme works therefore performed above expectations in some localities (given peak flow estimates, quantity and size of debris, and damage reported). Remedial works had largely been completed at the time of writing this report.

Event Costs

Final costs to repair scheme assets damaged in the event will be approximately \$525,000 (covering the area from Tirau to Thames) of which about \$136,000 relates to

direct response/emergency works carried out in Thames. Another \$200,000 may be required for additional works. Environment Waikato is working with TCDC to recover some of the response costs from the central government grant which was lodged shortly after the event.

Post Event Technical Initiatives

- A Regional Civil Defence Technical debrief was convened by Environment Waikato on Friday, July 26. The purpose of the debrief was to receive information from the Thames Coromandel and South Waikato District Councils (and from other agencies involved in the event), particularly regarding lessons learnt and experience gained. Key points raised include:
 - Electricity Industry Contact Listings will be distributed to all Civil Defence Officers in the Waikato Region
 - If the event had occurred just a month later, impacts on the farming economy would have been serious. This has implications for both the regional and national economies
- Collate event-related information for final reporting
 - River Levels (slope area assessments for flows)
 - Rainfall Totals
 - Areas affected (mapping extent of flooding for Tararu, Tapu, Waiomu, & Te Puru)
 - Damaged property and assets
 - Welfare/Recovery issues.
- Complete stream clearance works
- Review the flood warning telemetry network
 - Assess adequacy of existing coverage
 - Identify gaps
 - Recommend new sites or upgrade existing recorders (from a cost/benefit analysis)
 - Decommission redundant sites
- An investigation into the potential impact of climate change will be considered

Hazard Mitigation Initiatives

The events of 21 June 2002 have highlighted the immediate hazard mitigation needs of the Thames Coast. Environment Waikato recognises the importance of addressing Thames Coast flood hazards as a priority this year. The flood risks of the Thames Coast outweigh those in other parts of the Coromandel because of the high vulnerability to flood events and high consequences of these events (due to large flows and intense development). EW recognises the importance of reducing the risks Thames Coast communities.

Our plan for Coromandel river management this financial year is to focus on flood hazard issues at Tararu, Te Puru, Waiomu and Tapu. The following actions have been undertaken to date:

- Preliminary discussions with EW and Thames Coromandel District Councillors and staff to highlight the importance of flood hazards along the Thames Coast
- Formation of a working group in partnership with Thames Coromandel District Council to set a clear strategy and determine actions required for dealing with the flood hazards
- Community consultation and technical work at Tararu in preparation for a community meeting to discuss flood hazard mitigation
- Response to numerous flood hazard enquiries from Coromandel communities

In the near future we will confirm actions for this year, and begin mitigation work along the Thames Coast in partnership with local communities and Thames Coromandel District Council. EW also recognises the need for clearly defining roles and responsibilities for river and stream management in the Coromandel. We will take steps towards this goal this year by:

- Establish a baseline understanding of river and stream management issues in the Coromandel (mapping, assessment of streambank erosion, basic assessment of soil erosion)
- Initiating discussions with Thames Coromandel District Council.

It is important to take a strategic approach when considering the range of mitigation options open to mitigating Thames Coast flood hazards. There are numerous risk reduction options available, and consideration should be given to the various options:

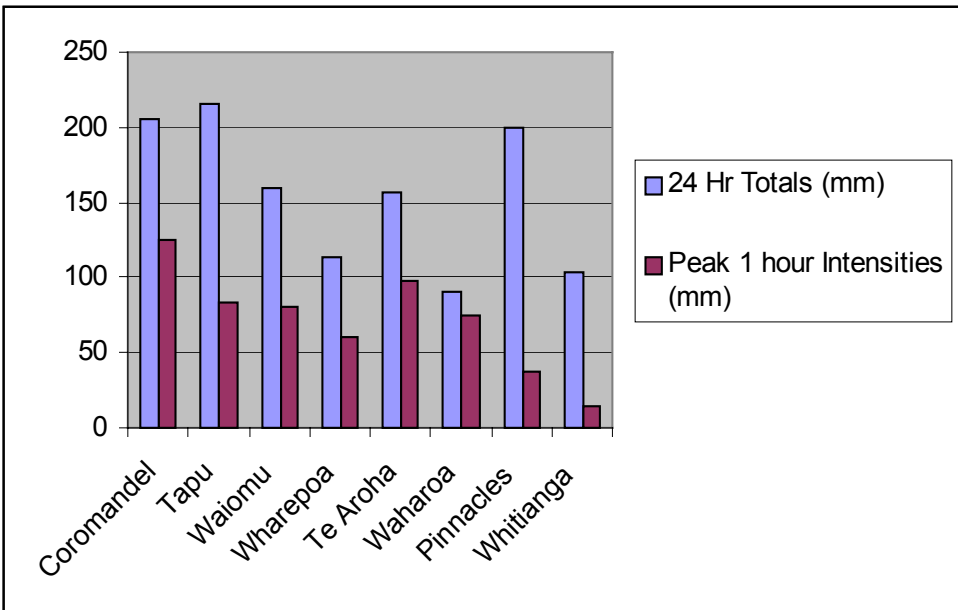
- River management works e.g. channel improvements
- Catchment management
- Land use management (development controls and changing land use in high risk areas)
- Property purchase
- Warning systems

It is also important to note the difficulty in trying to effectively mitigate flooding and erosion issues on the Thames Coast by engineering options alone – it is almost inevitable that flooding will occur again, and engineering options may not be socially or economically sustainable.

Bob Priest
Regional Controller

Please refer next page for a brief overview of rainfall and river level information.

Figure 1: Plot showing rainfall totals and peak one-hour intensities across the Thames Valley area.



File No: 82 00 01
Date: 28 August 2002-08-28
To: TCDC Weather Bomb Debrief
From: Owen Passau
Subject: Environment Waikato's Operational Response and Involvement

Introduction

From an operational viewpoint the assets and waterways within the emergency area, for which Environment Waikato is directly responsible under the Waihou Valley Scheme, performed very well.

What Was Done

- The works group were involved immediately problems notified by Ron White
- Ian Sara liaised with Civil Defence prior to declaration
- Liaison continued throughout the event and communications and co-ordinated actions worked very well
- Environment Waikato responded to Waihou Valley Asset responsibilities at Tararu and Thames involving the Moanataiari, Karaka, Hape and Waikiekie
- Environment Waikato responded to emergency situations as part of Civil Defence Emergency Response on coastal areas of Te Mata, Tapu and Waiomu

How Carried Out

- Close working relationship developed on operational side between Civil Defence, Thames Coromandel District Council and Montgomery Watson Harza
- Co-ordinated approach to evaluating and carrying out Emergency Response works in coastal areas
- Environment Waikato works area of responsibility organised through Paeroa based works group staff

What Could Be Done Better

- I don't think much operationally could be done better but there were some issues raised by the event.

Issues

(a) Operational

- Urban access, restricted space
- Debris disposal – Montgomery Watson very co-operational in Thames dump site but how long is this to be available, coastal disposal consents
- Public expectations
 - Private property protection

- Ongoing continuation of works e.g. excavation of infilling
- Protection standards expected

(b) Management

- River and risk management and awareness
 - Communities aware
 - Councils involvement
 - Building sites hazard identification
 - Building restriction lines
 - Flood levels etc.
- Community liaison regarding hazard potential
- Funding – No local rating area for flood works
- Problems affecting coastal communities cannot be practically solved by physical engineering type works alone

Conclusion

Overall Environment Waikato operational management went very well and what developed from the event was a good and closer working relationship between the various agencies. As far as the coastal areas outside of the Waihou Valley Scheme Environment Waikato sees its position in an overview roll in facilitating hazard management solutions.

O D Passau

Works Manager Rivers and Drainage