NSW STATE EMERGENCY SERVICE

Tweed Shire

Local Flood Plan

FloodSafe

TWEED SHIRE FLOOD EMERGENCY SUB PLAN

A Sub-Plan of the Tweed Shire Local Emergency Management Plan (EMPLAN)

Volume 1 of the Tweed Shire Local Flood Plan

AUTHORISATION

The Tweed Shire Flood Emergency Sub Plan is a sub plan of the Tweed Shire Local Emergency Management Plan (EMPLAN). It has been prepared in accordance with the provisions of the ***State Emergency Service Act 1989*** (**NSW**) and is authorised by the Local Emergency Management Committee in accordance with the provisions of the ***State Emergency and Rescue Management Act 1989*** **(NSW)**.

Recommended

NSW SES Tweed Shire Local Controller

Date: 28/5/14

Approved

Chair, Local Emergency Management Committee

Date: 27/5/14.

CONTENTS

AUTHORISATION ..... **i**

CONTENTS ..... **ii**

LIST OF TABLES ..... **iii**

DISTRIBUTION LIST ..... **iv**

VERSION HISTORY ..... **v**

AMENDMENT LIST ..... **v**

LIST OF ABBREVIATIONS ..... **vi**

GLOSSARY ..... **viii**

PART 1 - INTRODUCTION **1**

1.1 Purpose 1
1.2 Authority 1
1.3 Area Covered by the Plan 1
1.4 Description of Flooding and its Effects 2
1.5 Responsibilities 2
1.6 Cross-Border Assistance Arrangements 16

PART 2 - PREPAREDNESS **17**

2.1 Maintenance of this Plan 17
2.2 Floodplain and Coastal Risk Management 17
2.3 Development of Flood Intelligence 17
2.4 Development of Warning Systems 17
2.5 Public Education 18
2.6 Training 18
2.7 Resources 19

PART 3 - RESPONSE **20**

3.1 Control Arrangements 20
3.2 Operational Management 20
3.3 Start of Response Operations 20
3.4 Response Strategies 21
3.5 Operations Centres 23
3.6 Liaison 23
3.7 End of Response Operations 23
3.8 Collating Situational Information 24
3.9 Provision of Flood Information and Warnings 27
3.10 Aircraft Management 30
3.11 Assistance for Animals 30
3.12 Communication Systems 30
3.13 Preliminary Deployments 31
3.14 Road and Traffic Control. 31
3.15 Stranded Travellers 32
3.16 Managing Property Protection Operations 32

3.17 Managing Flood Rescue Operations 32
3.18 Managing Evacuation Operations 33
3.19 Managing Resupply Operations 39

PART 4 - RECOVERY 41

4.1 Recovery Coordination at the Local level 41
4.2 Arrangements for Debriefs / After Action Reviews 41

ATTACHMENT 1 - Resupply Flowchart 42

ATTACHMENT 2 - Dam Failure Alert Notification Arrangements Flowchart 43

ATTACHMENT 3 - Tweed Shire LGA MAP 44

LIST OF TABLES

Table 1: Dam Failure Alert Levels 29

DISTRIBUTION LIST

Recipient	Number of copies
NSW SES Tweed Shire Local Controller	1
NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit Controller(s)	1
NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit(s)	1
NSW SES Richmond Tweed Region Headquarters	1
NSW SES State Headquarters	1
Tweed Shire, Local Emergency Operations Controller	1
NSW Police Force, Tweed/Byron Local Area Command	1
Tweed Shire, Local Emergency Management Committee Members	4
Tweed Shire, Local Emergency Management Officer	1
Tweed Shire, Local Emergency Operations Centre	1
Tweed Shire Council, Mayor	1
Tweed Shire Council, General Manager	1
Tweed Shire Council, Technical Services Department	1
Fire and Rescue NSW, Region North 1 Zone - Northern Rivers	1
NSW Rural Fire Service, Far North Coast Zone	1
Ambulance Service of NSW, Kingscliff, Murwillumbah, Tweed Heads	1
Volunteer Rescue Association, Tweed District Rescue Squad	1
Surf Life Saving NSW	1
Office of Environment and Heritage	1
Evacuation Centres	1 each
Hospitals	1 each
Schools	1 each
Caravan Parks	1 each
Council Libraries	1 each
Child Care Centres and Preschools	1
Australian Volunteer Coast Guard - Kingscliff	1
Marine Rescue NSW, Point Danger	1
Total	

VERSION HISTORY

The following table lists all previously endorsed versions of this plan.

Description	Date
Tweed Shire Local Flood Plan	November 2008

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

The Tweed Shire Local Controller
NSW State Emergency Service
C/O- PO Box 4044
GOONELLABAH NSW 2480

Amendments promulgated in the amendments list below have been entered in this plan.

Amendment Number	Description	Updated by	Date

Document Issue: V28112012

LIST OF ABBREVIATIONS

The following abbreviations have been used in this plan:

AAR	After Action Review
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AIIMS	Australasian Inter-service Incident Management System
ARI	Average Recurrence Interval (Years)
ALERT	Automated Local Evaluation in Real Time
AWRC	Australian Water Resources Council
BUREAU	Australian Government Bureau of Meteorology
CBR	Chemical, Biological or Radiation
DCF	Dam Crest Flood
DSC	Dams Safety Committee
DSEP	Dam Safety Emergency Plan
DVR	Disaster Victim Registration
EMPLAN	Emergency Management Plan
FRNSW	Fire and Rescue NSW
GIS	Geographic Information System
GRN	Government Radio Network
IAP	Incident Action Plan
IFF	Imminent Failure Flood
LEMC	Local Emergency Management Committee
LEOCON	Local Emergency Operations Controller
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory

NOW	NSW Office of Water
NSW SES	NSW State Emergency Service
OEH	Office of Environment and Heritage (previously DECCW)
PMF	Probable Maximum Flood
PMR	Private Mobile Radio
PMP	Probable Maximum Precipitation
RMS	Roads and Maritime Services
RFS	Rural Fire Service
SEOCON	State Emergency Operations Controller
SERCON	State Emergency Recovery Controller
SEWS	Standard Emergency Warning Signal
VRA	Volunteer Rescue Association

GLOSSARY

Annual Exceedance Probability (AEP). The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood level (height) has an AEP of 5%, there is a 5% chance (that is, a one-in-20 chance) of such a level or higher occurring in any one year (see also Average Recurrence Interval).

Assistance a**nimal.** A guide dog, a hearing assistance dog or any other animal trained to assist a person to alleviate the effect of a disability (Refer to Section 9 of the Disability Discrimination Act 1992).

Australian Height Datum (AHD). A common national surface level datum approximately corresponding to mean sea level.

Average Recurrence Interval (ARI). The long-term **average** number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods reaching a height as great as, or greater than, the 20 year ARI flood event will occur **on average** once every 20 years.

Catchment (river basin). The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Coastal erosion. The loss of land along the shoreline predominantly by the offshore movement of sand during storms.

Dambreak Study. A Dambreak Study is undertaken to determine the likely downstream inundation areas in case of a dam failure. Modelling is undertaken for a range of dam breach possibilities and design floods. The dambreak study includes information such as the extent of flooding, flood travel times and flood water velocities. The study can assist dam owners, regulators, and emergency agencies in the preparations of evacuation plans, dam break and other flood warning systems, and hazard classification of affected areas.

Dam failure. The uncontrolled release of a water storage. The failure may consist of the collapse of the dam or some part of it, or excessive seepage or discharges. The most likely causes of dam failure are:

- **Flood Induced Dam Failure**: Dam failure caused by flood, either due to overtopping erosion or by subsequent structural failure.

- **Sunny Day Dam Failure**: Dam Failure as a result of factors other than flood ie other than flood flow into the reservoir. Causes of "Sunny Day" dam failure can include internal erosion, landslide, piping, earthquake or sabotage.

Dam Safety Emergency Plan (DSEP). A DSEP outlines the required actions of owners and their personnel at dams in response to a range of possible emergency situations. The NSW Dam Safety Committee requires a quality controlled DSEP, with associated dambreak warning procedures to be prepared for prescribed dams where persons may be at risk downstream, if the dam failed.

Design flood (or flood standard). A flood of specified magnitude that is adopted for planning purposes. Selections should be based on an understanding of flood behaviour and the associated flood risk, and take account of social, economic and environmental considerations. There may be several design floods for an individual area.

Emergency Alert. A national telephony based alerting system available for use by emergency service agencies to send SMS and voice messages to landlines and/or mobile telephones (by billing address) in times of emergency.

EMPLAN (Emergency Management Plan). The object of a EMPLAN is to ensure the coordinated response by all agencies having responsibilities and functions in emergencies.

Essential services. Those services, often provided by local government authorities, that are considered essential to the life of organised communities. Such services include power, lighting, water, gas, sewerage and sanitation clearance.

Evacuation. The temporary movement of people from a dangerous or potentially dangerous place to a safe location, and their eventual return. It is a safety strategy which uses distance to separate people from the danger created by the hazard.

Evacuation Order. Notification to the community, authorised by the NSW SES, when the intent of an Incident Controller is to instruct a community to immediately evacuate in response to an imminent threat.

Evacuation Warning. Notification to the community, authorised by the NSW SES, when the intent of an Incident Controller is to warn a community of the need to prepare for a possible evacuation.

Flash flooding. Flooding which is sudden and often unexpected because it is caused by sudden local or nearby heavy rainfall. It is sometimes defined as flooding which occurs within six hours of the rain that causes it.

Flood. Relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences, including Tsunami.

Flood classifications. Locally defined flood levels used in flood warnings to give an indication of the severity of flooding (minor, moderate or major) expected. These levels are used by the State Emergency Service and the Australian Government Bureau of Meteorology in flood bulletins and flood warnings.

Flood intelligence. The product of collecting, collating, analysing and interpreting flood-related data to produce meaningful information (intelligence) to allow for the timely preparation, planning and warning for and response to a flood.

Flood fringe. The remaining area of flood prone land after floodway and flood storage have been defined.

Flood liable land (also referred to as flood prone land). Land susceptible to flooding by the Probable Maximum Flood (PMF) event. This term also describes the maximum extent of a **floodplain** which is an area of a river valley, adjacent to the river channel, which is subject to inundation in floods up to this event.

Flood of record. Maximum observed historical flood.

Floodplain Management Plan. A plan developed in accordance with the principles and guidelines in the New South Wales Floodplain Development Manual. Such a plan usually includes both written and diagrammatic information describing how particular areas of flood prone land can be used and managed to achieve defined objectives.

Flood Plan. A response strategy plan that deals specifically with flooding and is a sub-plan of a Emergency Management Plan. Flood plans describe agreed roles, responsibilities, functions, strategies and management arrangements for the conduct of flood operations and for preparing for them. A flood plan contains information and arrangements for all floods whereas an IAP is for a specific flood/event.

Flood rescue. The rescue or retrieval of persons trapped by floodwaters.

Flood storage areas. Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation.

Floodway. An area where a significant volume of water flows during floods. Such areas are often aligned with obvious naturally-defined channels and are areas that, if partially blocked, would cause a significant redistribution of flood flow which may in turn adversely affect other areas. They are often, but not necessarily, the areas of deeper flow or the areas where higher velocities occur.

Flood Watch. A Flood Watch is a notification of the potential for a flood to occur as a result of a developing weather situation and consists of short generalised statements about the developing weather including forecast rainfall totals, description of catchment conditions and indicates streams at risk. The Bureau will also attempt to estimate the magnitude of likely flooding in terms of the adopted flood classifications. Flood Watches are normally issued 24 to 36 hours in advance of likely flooding. Flood watches are issued on a catchment wide basis.

Flood Warning. A Flood Warning is a gauge specific forecast of actual or imminent flooding. Flood Warnings specify the river valley, the locations expected to be flooded, the likely severity of flooding and when it will occur.

Functional a**rea.** A category of services involved in the preparations for an emergency, including the following:

- Agriculture and Animal Services;
- Energy and Utility Services;
- Engineering Services;
- Environmental Services;
- Health Services;
- Public Information Services;
- Telecommunication Services;
- Transport Services; and
- Welfare Services.

Geographic Information System (GIS). A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analysing, and displaying all forms of geographically referenced information.

Incident Action Plan (IAP). An action plan for managing a specific event. Information from the Local Flood Plan is used to develop the flood IAP.

Indirect e**ffect.** Indirect effects are generally a consequence of infrastructure damage or interruption of services and can affect communities distant from the actual flood

footprint i.e. floodplain. Indirect effects can also refer to indirect losses due to disruption of economic activity, both in areas which are inundated or isolated. Indirect effects are one of the three primary sources of risk in the context of flooding (the other two are inundation and isolation).

Inundation. See definition for Flood.

Isolation. Properties and/or communities where flooding cuts access to essential services or means of supply. Isolation is one of the three primary sources of risk in the context of flooding (the other two are inundation and indirect effects).

Local overland flooding. Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

Major flooding. Flooding which causes inundation of extensive rural areas, with properties, villages and towns isolated and/or appreciable urban areas flooded.

Minor flooding. Flooding which causes inconvenience such as closing of minor roads and the submergence of low-level bridges. The lower limit of this class of flooding, on the reference gauge, is the initial flood level at which landholders and/or townspeople begin to be affected in a significant manner that necessitates the issuing of a public flood warning by the Australian Government Bureau of Meteorology.

Moderate flooding. Flooding which inundates low-lying areas, requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered.

Peak height. The highest level reached, at a nominated gauging station, during a particular flood event.

Prescribed d**am.** "Prescribed" dams are those listed in Schedule 1 of the Dams Safety Act 1978. The NSW Dam Safety Committee will prescribe those dams with the potential for a failure which could have a significant adverse effect on community interests.

Probable Maximum Flood (PMF). The largest flood that could conceivably be expected to occur at a particular location, usually estimated from probable maximum precipitation. The PMF defines the maximum extent of flood prone land, that is, the floodplain. It is difficult to define a meaningful Annual Exceedance Probability for the PMF, but it is commonly assumed to be of the order of 10^4 to 10^7 (once in 10,000 to 10,000,000 years).

Runoff. The amount of rainfall which ends up as stream flow, also known as 'rainfall excess' since it is the amount remaining after accounting for other processes such as evaporation and infiltration.

Stage height. A level reached, at a nominated gauging station, during the development of a particular flood event.

Stream gauging station. A place on a river or stream at which the stage height is routinely measured, either daily or continuously, and where the discharge is measured from time to time so as to develop a relationship between stage and discharge or rating curve.

PART 1 - INTRODUCTION

1.1 PURPOSE

1.1.1 This plan covers preparedness measures, the conduct of response operations and the coordination of immediate recovery measures from flooding within the Tweed Shire Council area. It covers operations for all levels of flooding within the council area.

1.1.2 The plan also covers arrangements for the management of coastal erosion in the council area resulting from severe weather events.

1.2 AUTHORITY

1.2.1 This plan is issued under the authority of the *State Emergency and Rescue Management Act 1989* (NSW) and the *State Emergency Service Act 1989* (NSW). It has been approved by the NSW SES Tweed Shire Local Controller and the NSW SES Richmond Tweed Region Controller as a NSW SES plan and endorsed by the Tweed Shire Council Local Emergency Management Committee as a sub plan of the Local EMPLAN.

1.3 AREA COVERED BY THE PLAN

1.3.1 The area covered by the plan is the Tweed Shire Council area which includes:

a. The towns of;

- Murwillumbah,
- Tweed Heads.

b. The townships of;

- Burringbar,
- Condong,
- Tumbulgum,
- Chillingham,
- Tyalgum,
- Uki,
- Chinderah,
- Mooball.

c. The coastal communities of;

- Cabarita-Bogangar,
- Fingal,

- Hastings Point,
- Kingscliff,
- Pottsville,
- Wooyung.

1.3.2 The council area and its principal rivers and creeks are shown in Attachment 3.

1.3.3 The council area is in the NSW SES Richmond Tweed Region and for emergency management purposes is part of the North Coast Emergency Management Region.

1.4 DESCRIPTION OF FLOODING AND ITS EFFECTS

1.4.1 The NSW SES maintains information on the nature of flooding and effects of flooding on the community in the Tweed Shire Council area.

1.5 RESPONSIBILITIES

1.5.1 The general responsibilities of emergency service organisations and supporting services (functional areas) are listed in the Local and State Emergency Management Plans (EMPLAN). Some specific responsibilities are expanded upon in the following paragraphs. The extent of their implementation will depend on the severity of the flooding. Specific responsibilities of agencies and organisations as they relate to tsunami are detailed in the State Tsunami Emergency Sub Plan.

1.5.2 **NSW SES Tweed Shire Local Controller.** The NSW SES Tweed Shire Local Controller is responsible for dealing with floods as detailed in the State Flood Plan, and will:

Preparedness

a. Maintain a Local Headquarters at 81-83 Riverview Street, Murwillumbah in accordance with the NSW SES Controllers' Guide and the NSW SES Operations Manual. Maintain an alternate Local Headquarters at Pioneer Parade, Banora Point.

b. Ensure that NSW SES members are trained to undertake operations in accordance with current policy as laid down in the NSW SES Controllers' Guide and the NSW SES Operations Manual.

c. Coordinate the development and operation of a flood warning service for the community.

d. Participate in floodplain and coastal risk management initiatives organised by the Tweed Shire Council.

e. Coordinate, with Tweed Shire Council a public education program.

f. Identify and monitor people and/or communities at risk of flooding and coastal erosion.

g. Ensure that the currency of this plan is maintained.

Response

h. Appoint an appropriate Local Incident Controller to undertake response roles. The Incident Controller will:

i. Control flood and storm response operations. This includes:

- Directing the activities of the NSW SES units operating within the council area.
- Coordinating the activities of supporting agencies and organisations and ensuring that liaison is established with them.
- Contribute to preparation of Region IAP.

j. Provide an information service in relation to:

- Flood heights and flood behaviour.
- Coastal erosion / inundation.
- Advice on methods of limiting property damage.
- Confirmation of evacuation warnings and evacuation orders.
- Provide road conditions and closure information to Council for the update of the MyRoadInfo website.

k. Direct the conduct of flood rescue operations.

l. Direct the evacuation of people and/or communities.

m. Provide immediate welfare support for evacuated people.

n. Coordinate the provision of emergency food and medical supplies to isolated people and/or communities.

o. Coordinate operations to protect property (where resources permit), for example by:

- Arranging resources for sandbagging operations.
- Lifting or moving household furniture.
- Lifting or moving commercial stock and equipment.

p. Assist the Tweed Shire Council to organise temporary repairs or improvements to levees, where resources permit.

q. Arrange for support (for example, accommodation and meals) for emergency service organisation members and volunteers assisting them.

r. Ensure that the managers of caravan parks are advised of flood warnings and the details of any evacuation order.

s. If NSW SES resources are available, assist with emergency fodder supply operations conducted by Agriculture and Animal Services.

t. If NSW SES resources are available, assist the NSW Police Force, RMS and Council with road closure and traffic control operations.

u. Exercise financial delegations relating to the use of emergency orders as laid down in the NSW SES Controllers' Guide.

v. Coordinate the collection of flood and coastal erosion/inundation information for development of intelligence.

w. Submit Situation Reports to the NSW SES Richmond Tweed Region Headquarters, Tweed Shire Council, Tweed Shire Local Emergency Management Officer and agencies assisting within the council area. These will contain information on:

- Current flood behaviour.
- Current operational activities.
- Likely future flood behaviour.
- Likely future operational activities.
- Probable resource needs.
- Road conditions and closures as provided by RMS, Council or the NSW Police Force.

x. Keep the Local Emergency Operations Controller advised of the flood situation and the operational response.

y. Issue the 'All Clear' when flood operations have been completed.

Recovery

z. Ensure that appropriate After Action Reviews are held after floods.

aa. Provide appropriate representation to the recovery committee for the duration of the response phase of an event and as agreed during the recovery phase.

1.5.3 **NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit Controllers:**

a. Assist the NSW SES Tweed Shire Local Controller with flood preparedness activities, including:

- Flood planning.
- Training of unit members.
- The development of flood and coastal erosion/inundation intelligence.
- The development of warning services.
- Floodplain and coastal risk management initiatives.
- Public education.

b. Conduct flood and coastal erosion operations within the Tweed Shire Council area as directed by the NSW SES Tweed Shire Local Incident Controller.

c. Submit Situation Reports to the NSW SES Tweed Shire Local Headquarters, the NSW SES Richmond Tweed Region Headquarters, Tweed Shire Council, Tweed Shire Local Emergency Management Officer and agencies assisting within the local area.

1.5.4 **NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit Members:**

a. Carry out flood and coastal erosion response tasks. These may include:

- The management of the NSW SES Tweed Shire Local and Unit Headquarters Operations Centres.
- Assist in the collection of flood and coastal erosion/inundation information for the development of intelligence.
- Flood rescue.
- Evacuation.
- Providing immediate welfare for evacuated people.
- Delivery of warnings and information.
- Resupply.
- Levee monitoring.
- Sandbagging.
- Lifting and/or moving household furniture and commercial stock (where resources permit).
- Animal rescue.
- Assisting in repairing or improving levees.
- Assisting with road closure and traffic control operations.
- Assisting with emergency fodder supply operations.

b. Assist with preparedness activities.

c. Undertake training in flood and storm response operations.

1.5.5 **Agriculture and Animal Services Functional Area:**

a. When requested by NSW SES:

- Activate the Agriculture and Animal Services Supporting Plan as required and coordinate the provision of required services which may include:
  - Supply and delivery of emergency fodder.
  - Coordinate the management of livestock and farm animals.
  - Advice on dealing with dead and injured farm animals.

- Financial, welfare and damage assessment assistance to flood affected farmers.
- Operation of animal shelter compound facilities for the domestic pets and companion animals of evacuees.

1.5.6 The **Ambulance Service of NSW**:

a. Assist with the evacuation of at risk communities (in particular infirm/elderly bed-bound or non-ambulant persons).

b. Where resources permit, deploy ambulance resources to appropriate locations if access is expected to be lost.

c. Where resources permit, provide appropriately trained resources to assist the NSW SES with flood rescue operations.

1.5.7 **Australian Government Bureau of Meteorology (The Bureau):**

a. Provide Flood Watches for the Tweed River Basin.

b. Provide Flood Warnings, incorporating height-time predictions, for the following gauges:

- Murwillumbah - 201902;
- Chinderah (Barney's Point Gauge) – 201426.

c. Provide severe weather warnings when large waves and/or storm surge conditions are forecast to result in coastal erosion/inundation.

d. Provide severe weather warnings when flash flooding is likely to occur.

1.5.8 **Australian Volunteer Coast Guard – Kingscliff:**

a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.

b. Assist the NSW SES with the conduct of evacuations.

c. On request provide a liaison officer to the Tweed Shire Local Controller or NSW SES Richmond Tweed Region Headquarters.

1.5.9 **Caravan Park Proprietor(s)**:

a. Prepare a Flood Management Plan for flood affected Caravan Parks.

b. Install flood depth indicators and road alignment markers within their caravan parks.

c. Ensure that owners and occupiers of caravans are aware that the caravan park is flood liable by:

- Handing a printed notice to occupiers taking up residence. The notice will indicate that the caravan park is liable to flooding and outline the evacuation and van relocation arrangements.
- Displaying this notice prominently in each van.

d. Ensure that owners and occupiers of caravans are aware that if they are expecting to be absent from their vans for extended periods, they must:

- Provide the manager with a key; in a sealed envelope; to the van.
- Provide a contact address and telephone number.
- Inform the manager if a vehicle will be required to relocate the van during flood time.
- Leave any mobile van in a condition allowing it to be towed in an emergency (ie: tyres inflated, jacks wound up, personal effects secured and annexes and lines for water, sewer, electricity and gas readily detachable).

e. Ensure that occupiers are informed of Flood Warnings and Flood Watches. At this time, occupiers should be advised to:

- Ensure that they have spare batteries for their radios.
- Listen to a local radio station for updated flood information.
- Prepare for evacuation and van relocation.

f. Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and van relocation when flooding occurs. Owners of Vans which are incapable of being relocated, should ensure they are securely anchored to their site to avoid being swept away.

g. Coordinate the evacuation of people and the relocation of moveable vans when floods are rising and their return when flood waters have subsided. Vans will be towed back to the caravan park(s) by van owners or by vehicles and drivers arranged by the park managers.

h. Inform the NSW SES of the progress of evacuation and/or van relocation operations and of any need for assistance in the conduct of these tasks.

1.5.10 **Child Care Centres and Preschools**:

a. Childcare Centres are to be contacted by the NSW SES in the event of possible flooding or isolation.

b. When notified the child care centres and preschools should:

- Liaise with the NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures.
- Assist with coordinating the evacuation of preschools and child care centres.

1.5.11 **Energy and Utility Services Functional Area:**

a. When requested by NSW SES:

- Implement the Energy and Utilities Services Functional Area Supporting Plan.
- Where required, coordinate energy and utility services emergency management planning, preparation, response and recovery, including the restoration of services following a flood event.
- Coordinate advice to the NSW SES of any need to disconnect electricity, gas, water or wastewater services.
- Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.
- Identify interdependencies between flooding and utility services due to secondary impacts of flooding and advise the NSW SES.
- Assist the NSW SES with advisory notices relating to hazards from utility services during flooding.
- Coordinate with utilities on restoration of services, including advisory notices relating to estimated time for restoration and mandatory safety checks prior to reconnection. Advise the NSW SES and the relevant recovery committee and coordinator of the timetable for restoration.

b. Local Providers (electricity, gas, water, waste water) Essential Energy:

- Provide advice to the NSW SES Tweed Shire Local Controller of any need to disconnect power/gas/water/waste water supplies or of any timetable for reconnection.
- Advise the NSW SES of any hazards from utility services during flooding and coastal erosion/inundation.
- Advise the public with regard to electrical hazards during flooding and coastal erosion/inundation, and to the availability or otherwise of the electricity supply.
- Clear or make safe any hazard caused by power lines or electrical reticulation equipment.
- Inspect, test and reconnect customers' electrical/ gas/ water/waste water installations as conditions allow.
- Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.

1.5.12 **Engineering Services Functional Area**:

a. When requested by NSW SES:

- Provide engineering advice regarding the integrity of damaged structures.
- Assist the NSW SES with damage assessment.

- Acquire and/or provide specialist technical engineering expertise.
- Assist the NSW SES and councils with the assessment and operation of flood protection levees when requested.
- Assist with property protection, including the construction or repair of levees.
- Coordinate the restoration of critical public facilities.
- Establish recovery centre facilities.

1.5.13 **Environmental Services Functional Area**:

a. When requested by NSW SES:

- Implement the Environmental Services Functional Area (Enviroplan) Supporting Plan if required.

1.5.14 **Flood Warning Networks, (Tumbulgum Floodsafe Committee, Uki Floodsafe Committee):**

a. Provide flood information to the NSW SES Tweed Shire Local Controller.

b. Distribute flood warnings and flood information provided by the NSW SES Tweed Shire Local Controller.

1.5.15 **Fire and Rescue NSW:**

a. FRNSW responsibilities are primarily confined to the FRNSW Fire District. Any deployment of FRNSW resources to assist SES in Flood events rests with the respective FRNSW Zone Commander.

b. The FRNSW Zone Commander will assess the capability of FRNSW to assist SES in the following tasks:

- Assist with the delivery of evacuation warnings and evacuation orders.
- Assist with the conduct of evacuations.
- Assist with the provision of equipment for pumping flood water out of buildings and from low-lying areas.
- Assist with clean-up operations, including the hosing out of flood affected properties.

c. FRNSW will use its best endeavours to deploy appliances and or resources into locations where access is expected to be lost.

1.5.16 **Health Services Functional Area, NNSW LHD (Northern NSW Local Health District)**:

a. When requested by NSW SES:

- Activate Healthplan if required.
- Ensure that appropriate business continuity plans are developed for essential health infrastructure and are activated during floods.

- Provide medical support to the NSW SES.
- Establish health surveillance in affected areas.
- Assess potential public health risks that either acutely endanger the health of human populations or are thought to have longer term consequences.
- Provide environmental health advice.
- Provide public health warnings and advice to affected communities.
- Assist the NSW SES with the warning and evacuation of hospitals.

1.5.17 **Marine Rescue NSW, Point Danger:**

a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.

b. Assist the NSW SES with the conduct of evacuations.

c. On request provide a liaison officer to the Tweed Shire Local Controller or NSW SES Richmond Tweed Region Headquarters.

1.5.18 **NSW Office of Water:**

a. Collect and maintain flood data including data relating to flood heights, velocities and discharges.

b. Provide the Bureau of Meteorology and NSW SES real-time or near real-time access to river height gauges and height data for the development of official flood warnings.

c. Provide flow rating charts for river height gauges.

d. Manage (with technical support from OEH) the approval process under the Water Act 1912 and Water Management Act 2000 for flood control works (earthworks, embankments and levees which can affect the distribution of floodwaters) including:

- Assessment and approval of flood control works (including flood mitigation works) in rural areas designated under the Acts.
- Use of floodplain management plans prepared by OEH in rural areas designated under the Acts to assess flood control work approvals.
- Giving the NSW SES access to relevant studies regarding flooding and studies supporting floodplain management plans prepared by OEH including flood studies, floodplain risk management studies and flood behaviour investigations.

1.5.19 **NSW Police Force, Tweed/Byron Local Area Command (LAC):**

a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.

b. Assist the NSW SES with the conduct of evacuation operations.

c. Conduct road and traffic control operations in conjunction with council and/or RMS.

d. Coordinate the registration of evacuees.

e. Secure evacuated areas.

1.5.20 **NSW Rural Fire Service (Far North Coast Zone):**

a. Provide personnel in rural areas and villages to:

- inform the NSW SES Tweed Shire Local Controller about flood conditions and response needs in their own communities, and
- disseminate flood information.

b. Provide personnel and high-clearance vehicles for flood related activities.

c. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.

d. Assist the NSW SES with the conduct of evacuations.

e. Assist with traffic control.

f. Provide equipment for pumping flood water out of buildings and from low-lying areas.

g. Assist with the removal of caravans.

h. Provide back-up radio communications.

i. Assist with clean-up operations, including the hosing of flood affected properties.

j. Deploy fire resources to appropriate locations if access is expected to be lost.

1.5.21 **Office of Environment and Heritage**:

a. Provide specialist policy, engineering and scientific advice to councils and the NSW SES on flood related matters including assistance with:

- The identification of flood problems.
- The preparation of Floodplain Risk Management Plans and associated studies.
- The implementation of floodplain risk management plans. This involves floodplain management projects which include flood mitigation works, flood warning, strategic land use planning and upgrade of evacuation routes.
- The exercising of Local Flood Plans.

b. Provide specialist advice flood related matters as follows:

- Provide the NSW SES with access to relevant studies regarding flooding, including Flood Studies and Floodplain Risk Management Studies.
- Coordinate the collection of post event flood data, in consultation with the NSW SES.
- Provide advice to the NSW SES about conditions which may lead to coastal flooding or retarded river drainage near the coast.
- Collect and maintain flood data relating to flood heights, velocities and discharges in coastal areas of NSW (through a contract with MHL as discussed separately).
- Provide data to the Bureau of Meteorology and NSW SES real-time or near real-time access to river height gauges and height data for the development of official flood warnings (through a contract with MHL as described in the Response section of this plan).

c. **National Parks and Wildlife Service**

- Close and evacuate at risk camping grounds in National Parks managed areas.

1.5.22 **Owners of Prescribed Dams within or upstream of Tweed Shire:**

Dam	Owner
Clarrie Hall Dam	Tweed Shire Council

a. Maintain and operate the Dam Failure Warning System for their Dam.

b. Contribute to the development and implementation of a public education program on flooding within the council area.

c. Consult with NSW SES on the determination of dam failure alert levels and notification arrangements when developing Dam Safety Emergency Plans.

d. Maintain a Dam Safety Emergency Plan and provide copies to the NSW SES.

e. Provide information on the consequences of dam failure to the NSW SES for incorporation into planning and flood intelligence.

f. Provide personnel and vehicles to undertake warning and evacuation downstream of the dam if directed by the NSW SES.

g. Close and evacuate at risk camping grounds/recreational areas within their managed areas.

1.5.23 **Public Information Services Functional Area:**

a. When requested by NSW SES:

- Assist the NSW SES in the establishment and operation of a Joint Media Information Centre.

1.5.24 **Roads and Maritime Services** will:

a. Close and reopen the Pacific Highway when affected by flood waters and advise the NSW SES of their status.

b. Facilitate the safe reliable access of emergency resources on RMS managed roads.

c. Assist the NSW SES with identification of road infrastructure at risk of flooding.

d. Manage traffic.

e. Assist the NSW SES with the communication of warnings and information provision to the public through variable message signs.

f. Provide information on the status of RMS owned roads via m.livetraffic.rta.nsw.gov.au.

1.5.25 **School Administration Offices (including Catholic Education Office Lismore, Department of Education & Communities Murwillumbah and Lismore and The Association of Independent Schools):**

a. Liaise with the NSW SES and arrange for the early release of students whose travel arrangements are likely to be disrupted by flooding and/or road closures (or where required, for students to be moved to a suitable location until normal school closing time).

b. Pass information to school bus drivers/companies and/or other schools on expected or actual impacts of flooding.

c. Assist with coordinating the evacuation of schools when flooding or isolation is expected to occur.

d. Provide space in schools for evacuation centres where necessary.

1.5.26 **Surf Life Saving NSW:**

a. Assist the NSW SES with the warning and/or evacuation of at risk communities;

b. Provide boats and crews for flood operations as tasked by the NSW SES Tweed Shire Local Controller.

c. Provide space in Surf Life Saving facilities for evacuation centres where required; and

d. Assist the NSW SES with flood rescue operations.

1.5.27 **Telecommunication Services Functional Area**:

a. When requested by NSW SES:

- Coordinate the restoration of telephone facilities damaged by flooding.

- Coordinate additional telecommunications support for the NSW SES Headquarters as required.
- Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.

1.5.28 **Transport Services Functional Area:**

a. When requested by NSW SES:

- Assist with the coordination of transport for evacuation purposes.
- Assist with the resupply of isolated communities and/or properties.

1.5.29 **Tweed Byron Aboriginal Land Council – Fingal, Cudgen and Tweed Heads (Kirkwood Road):**

a. Act as the point of contact between the NSW SES and the local community.

b. Inform the NSW SES Tweed Shire Local Controller about flood conditions and response needs at Fingal, Cudgen and Tweed Heads.

c. Disseminate flood information, including flood and evacuation warnings, to the local community.

1.5.30 **Tweed Shire Council:**

Preparedness

a. Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented on such committees.

b. Provide levee studies, flood studies, floodplain management studies and coastal management studies to the NSW SES.

c. Maintain in conjunction with the BoM an Enviromon System.

d. Maintain Dam Safety Emergency Plans for the Clarrie Hall Dam and provide copies to the NSW SES.

e. Provide information on the consequences of dam failure to the NSW SES for incorporation into planning and flood intelligence.

f. Advise of available plant and equipment resources within the council area upon request.

g. Contribute to the development and implementation of a public education program.

Response

h. Operate and maintain in conjunction with the BoM and Manly Hydraulics Laboratory the Tweed Shire flood mitigation system including flood gates and the Murwillumbah and Tweed levees.

i. At the request of the NSW SES Local Controller, deploy personnel and resources for flood and coastal erosion related activities.

j. Close and reopen council roads (and other roads nominated by agreement with the RMS) and advise the NSW SES Tweed Shire Local Controller and the Police.

k. Provide information on the status of roads via www.myroadinfo.com.au.

l. During periods of coastal erosion from ocean storms:

- Assist the NSW SES with reconnaissance of coastal erosion risk areas.
- Liaise with the NSW SES Local Controller to provide advice regarding the need for response actions by the NSW SES such as evacuations.

Recovery

m. Provide for the management of health hazards associated with flooding. This includes removing debris and waste.

n. Ensure premises are fit and safe for reoccupation and assess any need for demolition.

1.5.31 **Tweed Shire Local Emergency Management Officer:**

a. Provide executive support to the LEMC and LEOCON in accordance with the Tweed Shire Local Emergency Management Plan.

b. At the request of the NSW SES Tweed Shire Local Controller, advise appropriate agencies and officers of the start of response operations.

1.5.32 **Tweed Local Emergency Operations Controller (LEOCON):**

a. Monitor flood operations.

b. Coordinate support to the NSW SES Tweed Shire Local Controller if requested to do so.

1.5.33 **Welfare Services Functional Area:**

a. When requested by NSW SES:

- Establish and manage evacuation centres, and provide disaster welfare services from recovery centres.
- Administer the Personal Hardship and Distress component of the NSW Disaster Relief Scheme established to provide financial assistance to people affected by emergencies.

1.5.34 **Volunteer Rescue Association (VRA), Tweed District:**

a. Assist the NSW SES Tweed Shire Local Controller with flood operations, including flood rescue, where equipment and training are suitable.

1.6 CROSS-BORDER ASSISTANCE ARRANGEMENTS

1.6.1 An informal cross-border mutual assistance arrangement exists in which the Tweed Shire NSW SES Controller and the Gold Coast SES Controller will deploy resources to support each other. This is limited to a 24 hour period without further approval from the NSW SES State Headquarters.

PART 2 - PREPAREDNESS

2.1 MAINTENANCE OF THIS PLAN

2.1.1 The NSW SES Tweed Shire Local Controller will maintain the currency of this plan by:

a. Ensuring that all agencies, organisations and officers mentioned in it are aware of their roles and responsibilities.

b. Conducting exercises to test arrangements.

c. Reviewing the contents of the plan:

- After each flood operation.
- When significant changes in land-use or community characteristics occur.
- When new information from flood studies become available.
- When flood control or mitigation works are implemented or altered.
- When there are changes that alter agreed plan arrangements.

2.1.2 The plan is to be reviewed no less frequently than every five years.

2.2 FLOODPLAIN AND COASTAL RISK MANAGEMENT

2.2.1 The NSW SES Tweed Shire Local Controller will ensure that:

a. NSW SES participates in local floodplain and coastal risk management committee activities when those committees are formed, in accordance with the protocols outlined in the NSW SES Controllers' Guide.

b. The NSW SES Richmond Tweed Region Headquarters is informed of involvement in floodplain and coastal risk management activities.

c. Flood prone communities are consulted about the nature of the flooding and coastal erosion/inundation problem and its management.

2.3 DEVELOPMENT OF FLOOD INTELLIGENCE

2.3.1 Flood intelligence describes flood behaviour and its effects on the community.

2.3.2 The NSW SES maintains a centralised flood intelligence system.

2.4 DEVELOPMENT OF WARNING SYSTEMS

2.4.1 The NSW SES may establish a total flood warning system for areas affected by flooding. This requires:

a. An identification of the potential clients of flood warning information at different levels of flooding (ie. who would be affected in floods of differing severities).

b. Available information about the estimated impacts of flooding at different heights.

c. Identification of required actions and the amounts of time needed to carry them out.

d. Appropriate means of disseminating warnings to different clients and at different flood levels.

2.5 PUBLIC EDUCATION

2.5.1 The NSW SES Tweed Shire Local Controller, with the assistance of the Tweed Shire Council, the NSW SES Richmond Tweed Region Headquarters and NSW SES State Headquarters, is responsible for ensuring that the residents of the council area are aware of the flood threat in their vicinity and how to protect themselves from it.

2.5.2 Specific strategies to be employed include:

a. Dissemination of flood-related brochures and booklets in flood liable areas.

b. Dissemination of coastal erosion related brochures in coastal erosion liable areas.

c. Talks and displays orientated to community organisations, businesses and schools.

d. Publicity given to this plan and to flood-orientated NSW SES activities through local media outlets, including articles in local newspapers about the flood threat and appropriate responses.

e. Participating with Council on community education programs.

f. Managing the development and dissemination of awareness information (brochures, lectures etc.) to residential, business, rural and visitor communities within the Tweed Shire area.

g. Informing special interest groups as to their responsibilities during events.

2.6 TRAINING

2.6.1 Throughout this document there are references to functions that must be carried out by the members of the NSW SES Tweed Heads, Murwillumbah and Tweed Coast Units. The NSW SES Tweed Shire Local Controller is responsible for ensuring that the members are:

a. Familiar with the contents of this plan.

b. Trained in the skills necessary to carry out the tasks allocated to the NSW SES.

2.7 RESOURCES

2.7.1 The NSW SES Tweed Shire Local Controller is responsible for maintaining the condition and state of readiness of NSW SES equipment and the NSW SES Tweed Shire Local Headquarters.

2.7.2 The NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit Controllers have similar responsibilities in relation to the Tweed Heads, Murwillumbah and Tweed Coast Unit Headquarters and equipment.

PART 3 - RESPONSE

CONTROL

3.1 CONTROL ARRANGEMENTS

3.1.1 The NSW SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. This includes the coordination of other agencies and organisations for flood management tasks.

3.1.2 The NSW SES is the designated Combat Agency for damage control for storms. This includes damage control for coastal erosion and inundation from storm activity, specifically the protection of life and the coordination of the protection of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works.

3.1.3 The Local EMPLAN will operate to provide support as requested by the NSW SES Local Incident Controller.

3.2 OPERATIONAL MANAGEMENT

3.2.1 NSW SES utilises the Australasian Inter-service Incident Management System (AIIMS), which is based on three principles:

a. functional management;

b. management by objectives; and

c. span of control.

3.2.2 AIIMS provides for different incident levels based on the complexity of management.

3.2.3 The Local Government Area may be divided into sectors and divisions to manage the flood and/or coastal erosion event (divisions are usually a group of sectors).

3.2.4 Sectors and divisions may be based on floodplain classifications, geographical, physical or functional boundaries. A town, city or suburb may be one sector or split into several sectors and divisions.

3.3 START OF RESPONSE OPERATIONS

3.3.1 This plan is always active to ensure that preparedness actions detailed in this plan are completed.

3.3.2 Response operations will begin:

a. On receipt of a Bureau of Meteorology Preliminary Flood Warning, Flood Warning, Flood Watch, Severe Thunderstorm Warning or a Severe Weather Warning for flash flooding or severe ocean conditions and/or;

b. The Bureau of Meteorology issues a Flood warning for the Murwillumbah or Chinderah (Barney's Point) gauges and/or;

c. Flood indictators, including the Tweed Shire Council ENVIROMON System indicate that flooding is likely and/or;

d. On receipt of a dam failure alert for Clarrie Hall Dam and/or;.

e. When other evidence leads to an expectation of flooding or coastal erosion within the council area.

3.3.3 Contact with the Bureau of Meteorology to discuss the development of flood warnings will normally be through the NSW SES Richmond Tweed Region Headquarters and/or NSW SES State Headquarters.

3.3.4 The following persons and organisations will be advised of the start of response operations regardless of the location and severity of the flooding anticipated:

a. NSW SES Richmond Tweed Region Headquarters.

b. NSW SES Tweed Shire Tweed Heads, Murwillumbah and Tweed Coast Controllers.

c. NSW SES Tweed Shire Tweed Heads, Murwillumbah and Tweed Coast Units.

d. Tweed Shire Local Emergency Operations Controller (for transmission to the NSW Police Force Local Area Command Headquarters).

e. Regional Emergency Management Officer

f. Tweed Shire Local Emergency Management Officer (for transmission to appropriate council officers and departments).

g. Tweed Shire Council Mayor.

h. Other agencies listed in this plan will be advised by the Local Emergency Management Officer on the request of the NSW SES Tweed Shire Local Incident Controller and as appropriate to the location and nature of the threat.

3.4 RESPONSE STRATEGIES

3.4.1 The main response strategies for NSW SES flood operations include:

a. Information provision and warning

- Provision of warnings, information and advice to communities.
- Inform the community regarding the potential impacts of a flood and what actions to undertake in preparation for flooding.

- Inform the community regarding the potential impacts of coastal erosion and what preparatory actions to undertake.
- Provide timely and accurate information to the community.

b. Property protection (where resources permit)

- Protect the property of residents and businesses at risk of flood damage.
- Assistance with property protection by way of sandbagging and the lifting or transporting of furniture, personal effects, commercial stock and caravans.
- Assistance with the relocation of readily moveable household goods and commercial stock and equipment from properties threatened by coastal erosion.
- Assistance with the protection of essential infrastructure.

c. Evacuation

- The temporary movement of people from a dangerous or potentially dangerous place to a safe location, and their eventual return. It is a safety strategy which uses distance to separate people from the danger created by the hazard.

d. Rescue

- The rescue or retrieval of persons trapped by floodwaters.

e. Resupply

- Minimise disruption upon the community by resupplying towns and villages which have become isolated as a consequence of flooding.
- Ensure supplies are maintained to property owners by coordinating the resupply of properties which have become isolated as a consequence of flooding.

3.4.2 The NSW SES Local Incident Controller will select the appropriate response strategy to deal with the expected impact of the flood in each sector and/or community. The impact may vary so a number of different strategies may need to be selected and implemented across the whole operational area. The available strategies for each sector and/or community are maintained by the NSW SES.

3.4.3 Supporting strategies may include:

a. Protect the community from incidents involving fire and hazardous materials.

b. Maintain the welfare of communities and individuals affected by the impact of a flood.

c. Minimise disruption to the community by ensuring supply of essential energy and utility services.

d. Ensure coordinated health services are available to and accessible by the flood affected communities.

e. Maintain the welfare of animals affected by the impact of a flood.

3.5 OPERATIONS CENTRES

3.5.1 The NSW SES Tweed Shire Operations Centre is located at Pioneer Parade, BANORA POINT NSW 2486.

3.5.2 NSW SES Unit Operations Centres are located at:

a. Tweed Heads, Pioneer Parade, BANORA POINT NSW 2486.

b. Murwillumbah, 81-83 Riverview Street, MURWILLUMBAH NSW 2484.

c. Pottsville, Centennial Drive, POTTSVILLE NSW 2489.

3.5.3 Supporting EOCs are located at:

a. The Tweed Shire Emergency Operations Centre is located at Tweed Heads Civic Centre, Southsea Islander Room, Brett Street, TWEED HEADS NSW 2485.

3.6 LIAISON

3.6.1 Any agency with responsibilities identified in this plan may be requested by the NSW SES to provide liaison (including a liaison officer where necessary) to either the NSW SES Tweed Heads or Murwillumbah Operations Centres.

3.6.2 Liaisons with some agencies will be managed at the local level, while liaisons with other agencies will be at the Region level. Liaisons managed at Region level will be provided to the NSW SES Richmond Tweed Region Headquarters, 7 Lancaster Drive, GOONELLABAH NSW 2480.

3.6.3 Liaison officers are to:

a. have the authority to deploy the resources of their parent organisations at the request of the NSW SES Tweed Shire Local Incident Controller,

b. advise the NSW SES Tweed Shire Local Incident Controller on resource availability for their service, and

c. be able to provide communications to their own organisations.

3.7 END OF RESPONSE OPERATIONS

3.7.1 When the immediate danger to life and property has passed the NSW SES Region Incident Controller or the NSW SES Local Incident Controller will issue an 'All Clear' message signifying that response operations have been completed. The message will be distributed through the same media outlets

as earlier evacuation messages. The relevant Controller will also advise details of recovery coordination arrangements, arrangements made for clean-up operations prior to evacuees being allowed to return to their homes, and stand-down instructions for agencies not required for recovery operations.

PLANNING

3.8 COLLATING SITUATIONAL INFORMATION

Strategy

3.8.1 The NSW SES maintains and records situational awareness of current impacts and response activities.

Actions

3.8.2 The NSW SES Tweed Shire Local Headquarters collates information on the current situation in the Tweed Shire Council LGA and incorporates in Situation Reports.

3.8.3 The NSW SES Richmond Tweed Region Headquarters collates Region-wide information for inclusion in Region NSW SES Situation Reports.

3.8.4 Sources of situational information during times of flooding are:

a. **Agency Situation Reports**. Agencies and functional areas provide regular situation reports (SITREPs) to the NSW SES.

b. **Active Reconnaissance**. The NSW SES Tweed Shire Local Incident Controller is responsible for coordinating the reconnaissance of impact areas, recording and communicating observations. Reconnaissance can be performed on the ground and using remote sensing (more commonly aerial). The NSW SES monitors the following problem areas:

- Fingal Head – Wommin Lake Crescent.
- Chinderah – 'Jenners' Corner and Chinderah Bay Drive.
- West Kingscliff - North of Beach Street.
- South Kingscliff – Casuarina Estate, Cudgen Creek.
- Tweed Heads;
  - Seagulls Estate,
  - Tweed Hospital,
  - Kennedy Drive and Rose Lane, and
  - Ducat Street and Meridian Way.
- South Tweed Heads;
  - Dry Dock Road,
  - Lloyd Street,

  - Minjungbal Drive,
  - Greenway Drive, and
  - Fraser Dive.
- Banora;
  - Golf Course, and
  - Western Drainage Scheme (Vintage Lakes Weir).
- Bilambil – Bilambil Retirement Village, Sporting Fields.
- Cabarita/Bogangar – Tamarind Ave and North of Banksia Ave.
- Murwillumbah (East): George Street, East Murwillumbah Primary School. Mayal Creek in the vicinity of the old Rowing Club.
- Murwillumbah (West): Mooball Street & Queensland Road.
- Murwillumbah (Central) – Inside the levee at Commercial Road and Wollumbin Street. The levee overtops at the Bridge opposite the Services Club and the Sports fields at Queensland Road.
- Murwillumbah (South) – Wardrop Street, Holland Street, Blacks Creek and Budd Park, Alma Street.
- Murwillumbah (North) – Tumbulgum Road, Cane Road.
- Tumbulgum
- Tyalgum – Sewerage Treatment Plant and the bridge at Springfield Dip.
- Crabbes Creek
- Pottsville;
  - Elanora Avenue and Coronation Drive,
  - Pottsville Waters,
  - Black Rocks,
  - Western end of Koala Beach,
  - Wooyung, and
  - Seabreeze Estate (low northern areas adjacent to creek).

c. The **Bureau of Meteorology's Flood Warning Centre** provides river height and rainfall information, data is available on the website http://www.bom.gov.au/nsw/flood/

d. **Manly Hydraulics Laboratory (a business unit within NSW Public Works)** automated river watch system funded by the Office of Environment and Heritage. This system provides river height and rainfall readings for a number of gauges in the Tweed Shire Council area. Recent data from this system is available on the Manly Hydraulic Laboratory website: http://www.mhl.nsw.gov.au. A history of area floods is also available upon request via the website.

e. **NSW Office of Water**. This office advises flow rates and rates of rise for the Tweed River. Daily river reports containing information on gauge heights and river flows are available from the website: http://waterinfo.nsw.gov.au/.

f. **Clarrie Hall Dam Storage Monitoring System.** This system provides information on Clarrie Hall Dam.

g. **NSW SES Richmond Tweed Region Headquarters**. The Region Headquarters provides information on flooding and its consequences, including those in nearby council areas (this information is documented in Bulletins and Situation Reports).

h. **Tweed Shire Council.** Tweed Shire Council operates an ENVIROMON System. Master consoles of the ENVIROMON System are located in the office of the Tweed Shire Water Manager, the Tweed Heads and Murwillumbah NSW SES Unit Headquarters and NSW SES Richmond-Tweed Region Headquarters. The system monitors rainfall gauges across the catchment area and river height gauges at the following locations;

- Eungella, on the Oxley River (the Middle Arm),
- Uki, on the Tweed River (the South Arm),
- Bray Park Weir, on the Tweed River,
- Murwillumbah, on Tweed River,
- Murwillumbah Bridge, on the Tweed River,
- Boat Harbour on the Rous River,
- Kyunnboon on the Rous River,
- Tumbulgum, on the Tweed River,
- Barney's Point, on the Tweed River,
- Point Danger, Tweed River, and
- Dry Dock, on Terranora Inlet.

i. **OEH, Alstonville Office.** Provides specialist flood management advice.

3.8.5 During flood operations sources of information on roads closed by flooding include:

a. Tweed Shire Council (www.myroadinfo.com.au)

b. Tweed/Byron Police Local Area Command.

c. Roads and Maritime Services (livetraffic.rta.nsw.gov.au Ph 132 701).

d. NSW SES Richmond Tweed Region Headquarters.

e. NSW SES Tweed Shire Local Headquarters.

3.8.6 Situational information relating to consequences of flooding and/or coastal erosion should be used to verify and validate NSW SES Flood Intelligence records.

3.9 PROVISION OF FLOOD INFORMATION AND WARNINGS

Strategy

3.9.1 The NSW SES Tweed Shire Local Headquarters provides advice to the NSW SES Richmond Tweed Region Headquarters on current and expected impacts of flooding in the Tweed Shire Council LGA.

3.9.2 The NSW SES Richmond Tweed Region Headquarters issues NSW SES Flood Bulletins, NSW SES Livestock and Equipment Warnings, Evacuation Warnings and Evacuation Orders to media outlets and agencies on behalf of all NSW SES units in the Region.

Actions

3.9.3 The NSW SES Tweed Shire Local Incident Controller will ensure that the NSW SES Richmond Tweed Region Incident Controller is regularly briefed on the progress of operations, current flood conditions and expected impacts.

3.9.4 NSW SES Tweed Shire Local Headquarters operations staff will be briefed regularly so that they can provide information in response to inquiries received in person or by other means such as phone or fax.

3.9.5 **Bureau of Meteorology Severe Thunderstorm Warning**. These are issued direct to the media by the Bureau when severe thunderstorms are expected to produce dangerous or damaging conditions, including flash flooding. Severe thunderstorms are usually smaller in scale than events covered by Flood Watches and Severe Weather Warnings.

3.9.6 **Bureau of Meteorology Severe Weather Warnings for Flash Flooding**. These are issued direct to the media by the Bureau and provide a warning of the possibility for flash flooding as a result of intense rainfall. These warnings are issued when severe weather is expected to affect land based communities with 6 to 24 hours. Severe Weather Warnings may also include other conditions such as Damaging Surf, Dangerous Surf or tides, or Damaging Winds.

3.9.7 **Bureau of Meteorology Flood Watches**. Flood Watches are issued by the Bureau to advise people of the potential for flooding in a catchment area based on predicted or actual rainfall. Flood Watches will be included in NSW SES Flood Bulletins issued by the NSW SES Richmond Tweed Region Headquarters.

3.9.8 **Bureau of Meteorology Flood Warnings.** The NSW SES Richmond Tweed Region Headquarters will send a copy of Bureau Flood Warnings to the NSW SES Tweed Heads, Murwillumbah and Tweed Coast Units. On receipt the NSW SES Local Incident Controller will provide the NSW SES Richmond Tweed

Region Headquarters with information on the estimated impacts of flooding at the predicted heights for inclusion in NSW SES Region Flood Bulletins.

3.9.9 **NSW SES Livestock and Equipment Warnings**. Following heavy rain or when there are indications of significant creek or river rises (even to levels below Minor Flood heights), the NSW SES Tweed Local Incident Controller will advise the NSW SES Richmond Tweed Region Headquarters which will issue NSW SES Livestock and Equipment Warnings.

3.9.10 **NSW SES Local Flood Advices**. The NSW SES Local Incident Controller may issue Local Flood Advices for locations not covered by Bureau Flood Warnings. They may be provided verbally in response to phone inquiries but will normally be incorporated into NSW SES Region Flood Bulletins.

3.9.11 **NSW SES Flood Bulletins**. The NSW SES Richmond Tweed Region Headquarters will regularly issue NSW SES Flood Bulletins which describe information on the estimated impacts of flooding at the predicted heights (using information from Bureau Flood Warnings and NSW SES Local Flood Advices) to NSW SES units, media outlets and agencies on behalf of all NSW SES units in the Region. When operations relating to coastal erosion/inundation are being undertaken, NSW SES Region Bulletins will contain information and advice about property damage mitigation measures and evacuation in affected areas.

3.9.12 **NSW SES Evacuation Warnings and Evacuation Orders**. These are usually issued to the media by the NSW SES Region Incident Controller on behalf of the NSW SES Local Incident Controller.

3.9.13 **Dam Failure Alerts**. Dam failure alerts are issued to NSW SES by the dam owner, in accordance with arrangements in the Dam Safety Emergency Plan (DSEP), the system involves the Dam Owner notifying NSW SES State Headquarters Operations Communications Centre, who in turn distribute the warning to the NSW SES Region Headquarters and NSW SES Unit Headquarters.

3.9.14 A flow chart illustrating the notification arrangements for potential dam failure is shown in Attachment 2.

3.9.15 Dam failure alert levels are set in consultation with the NSW SES and are used to trigger appropriate response actions. The conditions that define each of the alert levels are listed in the relevant DSEP. Responses escalate as the alert level migrates from white to amber to red. Table 1 briefly outlines example defining conditions and appropriate NSW SES responses associated with each alert.

Alert Level	Example Defining Condition	NSW SES Response	NSW SES Warning Product
White	May be a structural anomaly. May be increased monitoring in response to a heavy rainfall event	Implements notification flowchart. Check operational readiness.	This is a preliminary alert to assist the NSW SES in its preparation. This is not a public alert.
Amber	Failure possible if storage level continues to rise or structural anomaly not fixed	Implements notification flowchart. Warn downstream population at risk to prepare to evacuate	NSW SES Evacuation Warning
Red	Failure imminent or occurred	Implements notification flowchart. Evacuation of downstream populations	NSW SES Evacuation Order

Table 1: Dam Failure Alert Levels

Note: Some DSEPs will have alert levels that proceed directly from White to Red. This is the case if adequate time does not exist between the three alert levels to evacuate the downstream population at risk. The decision to omit the Amber Alert level, and the general setting of Alert levels should be undertaken in consultation with the NSW SES.

3.9.16 The NSW SES / Dam Owner will disseminate warnings to the population at risk of dam failure (these arrangements are specific to each dam, are negotiated between the Dam Owner and NSW SES, and are documented in the DSEP).

3.9.17 **Standard Emergency Warning Signal (SEWS).** This signal may be played over radio and television stations to alert communities to Evacuation Warnings, Evacuation Orders, Special Warnings or Dam-Failure Warnings. Approval to use the signal is associated with who approves the warning/order message.

3.9.18 **The Public Information and Inquiry Centre (PIIC)** (operated by the NSW Police Force) will answer calls from the public regarding registered evacuees.

3.9.19 **The Disaster Welfare Assistance line** is a central support and contact point for disaster affected people inquiring about welfare services advice and assistance.

3.9.20 **The RMS Transport Information Line** will provide advice to callers on the status of roads. The RMS website also lists road closure information.

3.9.21 **Tweed Shire Council** will provide information on the status of roads.

3.9.22 Collation and dissemination of road information is actioned as follows:

a. As part of Situation Reports, the NSW SES Tweed Shire Local Incident Controller provides road status reports for main roads in the council area to the NSW SES Richmond Tweed Region Headquarters.

b. The NSW SES Richmond Tweed Region Headquarters distributes information on main roads to NSW SES units, media outlets and agencies as part of NSW SES Flood Bulletins.

OPERATIONS

3.10 AIRCRAFT MANAGEMENT

3.10.1 Aircraft can be used for a variety of purposes during flood operations including evacuation, rescue, resupply, reconnaissance and emergency travel.

3.10.2 Air support operations will be conducted under the control of the NSW SES Region Headquarters, which may allocate aircraft to units if applicable.

3.10.3 NSW SES maintains the following information for the Tweed Shire Council area:

a. Locations of suitable helicopter landing points.

b. Locations of suitable airports and records detailing aircraft size and type that can land at airports.

c. Intelligence on when access to these locations is expected to be lost.

3.11 ASSISTANCE FOR ANIMALS

3.11.1 Matters relating to the welfare of livestock, companion animals and wildlife are to be referred to Agriculture and Animal Services.

3.11.2 Requests for emergency supply and/or delivery of fodder to stranded livestock, or for livestock rescue, are to be referred to Agriculture and Animal Services.

3.11.3 Requests for animal rescue should be referred to the NSW SES.

3.12 COMMUNICATION SYSTEMS

3.12.1 The primary means of communications between fixed locations is by telephone, email and facsimile.

3.12.2 The primary means of communication to and between deployed NSW SES resources is by GRN compatible radio and mobile phone.

3.12.3 All liaison officers will provide their own communication links back to their parent agencies.

3.12.4 All other organisations will provide communications as necessary to their deployed field teams.

3.12.5 Back-up communications are provided as follows:

a. NSW Rural Fire Service (RFS) radio network.

3.13 PRELIMINARY DEPLOYMENTS

3.13.1 When flooding is expected to be severe enough to cut road access to towns, within towns and/or rural communities, the NSW SES Tweed Shire Local Incident Controller will ensure that resources are in place for the distribution of foodstuffs and medical supplies to the areas that could become isolated.

3.13.2 When access between locations is expected to be cut, the NSW SES Tweed Shire Local Incident Controller will advise appropriate agencies so that resources (including sandbags, fire fighting appliances, ambulances, etc.) are deployed to ensure that operational capability is maintained.

3.14 ROAD AND TRAFFIC CONTROL.

3.14.1 A number of roads within the council area are affected by flooding. NSW SES maintains details of these roads.

3.14.2 The council closes and re-opens its own roads.

3.14.3 The NSW Police Force has the authority to close and re-open roads but will normally only do so (if the Council or the RMS have not already acted) if public safety requires such action.

3.14.4 When resources permit, the NSW SES assists Council, RMS or the Police by erecting road closure signs and barriers.

3.14.5 In flood events, the NSW SES Tweed Shire Local Incident Controller may direct the imposition of traffic control measures. The entry into flood affected areas will be controlled in accordance with the provisions of the State Emergency Service Act, 1989 (Part 5, Sections 19, 20, 21 and 22) and the State Emergency Rescue Management Act, 1989 (Part 4, Sections 60KA, 60L and 61).

3.14.6 Information on roads affected by flooding (including closures) are to be managed by Tweed Shire Council (www.myroadinfo.com.au) and RMS (m.livetraffic.rta.nsw.gov.au). All agencies are to provide road closure information to the Tweed Shire Council and RMS as appropriate.

3.15 STRANDED TRAVELLERS

3.15.1 Flood waters can strand travellers. Travellers seeking assistance will be referred to the Welfare Services Functional Area for the arrangement of emergency accommodation.

3.16 MANAGING PROPERTY PROTECTION OPERATIONS

Strategy

3.16.1 Protect the property of residents and businesses at risk of flood damage.

Actions

3.16.2 The NSW SES is the responsible agency for the coordination of operations to protect property.

3.16.3 Property may be protected from floods by:

a. Lifting or moving of household furniture.

b. Lifting or moving commercial stock and equipment.

c. Sandbagging to minimise entry of water into buildings.

3.16.4 The NSW SES Tweed Heads, Murwillumbah and Tweed Coast Units maintain a small stock of sandbags, and back-up supplies are available through the NSW SES Richmond Tweed Region Headquarters. Motorised sandbagging machines are located at NSW SES Tweed Heads Unit (single) and NSW SES Murwillumbah Unit (Double Hopper).

3.16.5 On activation of this plan the NSW SES Tweed Local Controller will liaise with the Tweed Shire Council and arrange for the establishment of sand dumps in each of the towns and villages that require sand bags within the council area.

3.16.6 Property protection options are however very limited in the Tweed Shire Council Area due to the large number of properties that can be affected and the depth of floodwaters arising from severe flooding on the Tweed River.

3.16.7 Property protection measures for the threat of coastal erosion involves the relocation of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works.

3.17 MANAGING FLOOD RESCUE OPERATIONS

Strategy

3.17.1 Rescue of people from floods.

Actions

3.17.2 The NSW SES Tweed Shire Local Incident Controller controls flood rescue in Tweed Shire Council local government area.

3.17.3 Flood rescues, may be carried out by accredited units in accordance with appropriate standards.

3.17.4 Additional flood boats and crews can be requested through the NSW SES Richmond Tweed Region Headquarters.

3.17.5 There may be some residual population which did not evacuate during the early stages of flooding and which require rescue.

3.18 MANAGING EVACUATION OPERATIONS

Strategy

3.18.1 When there is a risk to public safety, evacuation is the primary strategy. Circumstances may include:

a. Evacuation of people when their homes or businesses are likely to flood.

b. Evacuation of people who are unsuited to living in isolated circumstances, due to flood water closing access.

c. Evacuation of people where essential energy and utility services are likely to fail, have failed or where buildings have been made uninhabitable.

d. Evacuation of people when their homes or business are at threat of collapse from coastal erosion.

Actions

3.18.2 The evacuation operation will have the following stages:

a. Decision to evacuate.

b. Mobilisation (mobilisation may begin prior to the decision to evacuate).

c. Evacuation Warning delivery.

d. Evacuation Order delivery.

e. Withdrawal.

f. Shelter.

g. Return.

3.18.3 During floods evacuations will be controlled by the NSW SES. Small-scale evacuations will be controlled by the NSW SES Tweed Shire Local Incident Controller. Should the scale of evacuation operations be beyond the capabilities of local resources control may be escalated to the NSW SES Richmond Tweed Region Incident Controller.

Decision to evacuate

3.18.4 In most cases the decision to evacuate rests with the NSW SES Tweed Shire Local Incident Controller who exercises his/her authority in accordance with

Section 22(1) of The State Emergency Service Act 1989. However, the decision to evacuate will usually be made after consultation with the NSW SES Richmond Tweed Region Incident Controller and the Local Emergency Operations Controller.

3.18.5 In events that require large scale evacuations, the decision to evacuate may be escalated to the Region or the State Incident Controller.

3.18.6 Some people will make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. This is referred to as self-motivated evacuation.

Mobilisation

3.18.7 The NSW SES Local Incident Controller will mobilise the following to provide personnel for doorknock teams for designated Sectors/locations:

a. NSW SES Tweed Heads, Murwillumbah and Tweed Coast Unit members.

b. RFS Far North Coast Zone members via the RFS Fire Control Officer.

c. Local Police Force officers.

3.18.8 The NSW SES Richmond Tweed Region Incident Controller will mobilise any additional personnel required to assist with doorknock teams using:

a. NSW SES members from the NSW SES Richmond Tweed Region and surrounding NSW SES Regions.

b. FRNSW personnel arranged via the FRNSW Liaison Officer located at NSW SES Richmond Tweed Region Headquarters.

c. RFS personnel arranged via the RFS Liaison Officer located at NSW SES Richmond Tweed Region Headquarters.

3.18.9 The NSW SES Local Incident Controller will request the Tweed Shire Council / Local Emergency Management Officer to provide Council personnel to assist with traffic coordination within Sector(s)/Community.

3.18.10 The NSW SES Local Incident Controller will arrange liaison officers for Sector Command Centres.

Delivery of Evacuation Warnings and Evacuation Orders

3.18.11 The NSW SES will advise the community of the requirements to evacuate. The NSW SES will issue an **Evacuation Warning** when the intent of an NSW SES Incident Controller is to warn the community of the need to prepare for a possible evacuation.

3.18.12 The NSW SES will issue an **Evacuation Order** when the intent of the NSW SES Incident Controller is to instruct a community to immediately evacuate in response to an imminent threat.

3.18.13 The NSW SES Local Incident Controller will distribute Evacuation Warnings and Evacuation Orders to:

a. Sector/Division Command Centres (where established).

b. Tweed Shire Local Emergency Operations Centre.

c. Tweed Shire Local Emergency Management Officer.

d. Tweed/Byron Police Local Area Command.

e. Far North Coast Rural Fire Service Control Centre.

f. Radio Stations.

g. Other local agencies and specified individuals.

3.18.14 The NSW SES Richmond Tweed Region Incident Controller will distribute Evacuation Warnings and Evacuation Orders to:

a. The NSW SES State Operations Centre.

b. The NSW SES Tweed Shire Local Incident Controller.

c. Affected communities via dial-out warning systems where installed or applicable.

d. Relevant media outlets and agencies.

3.18.15 Evacuation Warnings and Evacuation Orders may be delivered through:

a. Radio and television stations.

b. Doorknocking by emergency service personnel.

c. Public address systems (fixed or mobile).

d. Telephony-based systems (including Emergency Alert).

e. Two-way Radio.

3.18.16 The Standard Emergency Warning Signal (SEWS) may be used to precede all Evacuation Orders broadcast on Radio Stations.

3.18.17 Sector Command Centres, where established, will distribute Evacuation Orders via Emergency Service personnel in doorknock teams to areas under threat of inundation.

3.18.18 Doorknock teams will work at the direction of:

a. The Sector Commander if a Sector Command Centre is established.

b. The relevant Division Commander where a Sector Command Centre has not been established.

c. The Local Incident Controller.

3.18.19 Field teams conducting doorknocks will record and report back the following information to their Sector Commander/Division Commander/Local Incident Controller:

a. Addresses and locations of houses doorknocked and/or evacuated.

b. The number of occupants.

c. Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).

d. Details of residents who refuse to comply with the Evacuation Order.

3.18.20 Refusal to evacuate. Field teams cannot afford to waste time dealing with people who are reluctant or refuse to comply with any Evacuation Order. These cases are to be referred to the NSW Police Force.

Withdrawal

3.18.21 Evacuations will generally be carried out in stages starting from the lowest areas, low flood islands and low trapped perimeters; and progressively from higher areas.

3.18.22 The most desirable method of evacuation is via road using private transport. This may be supplemented by buses for car-less people. However, other means of evacuation may also be used if available and as necessary (eg by foot, rail, air).

3.18.23 Evacuees who require emergency accommodation or disaster welfare assistance will be directed to designated evacuation centres. Evacuees who have made their own accommodation arrangements will not be directed to evacuation centres. It is not possible to determine in advance how many will fall into this category.

3.18.24 Evacuees will:

a. Move under local traffic arrangements from the relevant Sectors/Community via managed evacuation routes;

b. Continue along the suburban/regional/rural road network to allocated Evacuation Centres.

3.18.25 **Health Services**. The Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes).

3.18.26 **Schools.** School administration offices (Department of Education and Communities, Catholic Education Office and Private Schools) will coordinate the evacuation of schools if not already closed.

3.18.27 If there is sufficient time between the start of response operations and the evacuation of communities, the NSW SES Richmond Tweed Region Incident Controller will discuss the temporary closure of appropriate schools with the Regional Director, Department of Education and Communities. This will enable pupils to stay at home or be returned home so they can be evacuated (if required) with their families.

3.18.28 Note that in the Tweed Shire Council LGA, school principals may close some schools affected by flooding in the early stages of flooding.

3.18.29 **Caravan parks**. When an evacuation order is given occupiers of non-movable vans should:

a. Secure their vans by tying them down to prevent flotation.

b. Isolate power to their vans.

c. Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.

d. Lift the other contents of their vans as high as possible within the van.

e. Move to a designated evacuation centre if they have their own transport, or move to the caravan office to await transport.

3.18.30 Where possible, vans that can be moved will be relocated by their owners. Park managers will arrange for the relocation of mobile vans whose owners do not have a vehicle. NSW SES personnel will assist if required and may be able to provide additional vehicles where resources permit.

3.18.31 Caravan park managers will ensure that their caravan park is capable of being evacuated within the allocated time.

3.18.32 Advise the NSW SES Tweed Shire Local Controller of:

a. The number of people requiring transport.

b. Details of any medical evacuations required.

c. Whether additional assistance is required to effect the evacuation.

3.18.33 Check that no people remain in non-removable vans that are likely to be inundated.

3.18.34 Inform the NSW SES Tweed Shire Local Controller when the evacuation of the caravan park has been completed.

3.18.35 Provide the NSW SES Tweed Shire Local Controller with a register of people that have been evacuated.

3.18.36 **Assistance Animals, Pets and Companion Animals of Evacuees:** Assistance animals (guide dogs, hearing assistance animals, etc) will remain in the care of their owners throughout the evacuation. This includes transport and access into evacuation centres etc. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners when being transported via aircraft or flood rescue boats. Agriculture and Animal Services will make separate arrangements for the evacuation and care of companion animals.

3.18.37 **Transport and storage:** Transport and storage of furniture from flood and/or coastal erosion threatened properties will be arranged as time and resources permit.

3.18.38 **Security:** The NSW Police Force will provide security for evacuated areas.

3.18.39 The NSW SES Local Incident Controller is to provide the following reports to the NSW SES Richmond Tweed Region Headquarters:

a. Advice of commencement of the evacuation of each Sector;

b. Progress reports (by Sectors) during evacuations;

c. Advice of completion of the evacuation of each Sector.

Shelter

3.18.40 **Evacuation centres / assembly areas.** The usual purpose of evacuation centres or assembly areas is to meet the immediate needs of disaster affected people following evacuation from an emergency situation, not to provide them with accommodation. Evacuees will be advised to go to or be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the NSW SES Tweed Shire Local Incident Controller, but managed as soon as possible by Welfare Services.

3.18.41 Tweed Shire Council / Local Emergency Management Officer will maintain an Evacuation Centre Register and distribute to LEMC members annually.

3.18.42 **Registration:** The NSW Police Force will ensure that evacuees are registered on arrival at the designated evacuation centres.

3.18.43 **Animal shelter compounds:** Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees if required. Facilities will be managed by Agriculture and Animal Services.

Return

3.18.44 The NSW SES Local Incident Controller will advise when return to evacuated areas is safe after flood waters have receded and reliable access is available.

3.18.45 The NSW SES Local Incident Controller will determine when it is safe for evacuees to return to their homes in consultation with:

a. the Recovery Committee (if established),

b. Welfare Services Functional Area Coordinator (welfare of evacuees),

c. Engineering Services Functional Area Co-coordinator (electrical safety of buildings, structural integrity of levees/dams),

d. Health Service Functional Area Coordinator (public health),

e. Transport Services Functional Areas Coordinator (arrangement of transport),

f. the Tweed Shire LEOCON,

g. the Tweed Shire Council,

h. NSW SES Region Incident Controller,

i. Other appropriate agencies/functional areas as required (mitigation and advice regarding identified risks resulting from the flood and/or coastal erosion event).

3.18.46 Once it is considered safe to do so, the NSW SES Incident Controller will authorise the return of evacuees.

3.18.47 The return will be controlled by the NSW SES Local Incident Controller and may be conducted, at their request, by the Recovery Coordinator.

3.19 MANAGING RESUPPLY OPERATIONS

3.19.1 The NSW SES is responsible for the coordination of the resupply of isolated communities and properties.

3.19.2 If isolation is expected to occur, residents should be encouraged to consider their needs and suitability for an unknown period of isolation.

3.19.3 If properties/communities are going to remain in locations expected to become isolated, households/retailers should be encouraged to stock up on essential supplies.

3.19.4 Where practicable, once supplies are delivered to the NSW SES designated loading point, the NSW SES Local Incident Controller will arrange for the delivery of essential foodstuffs, fuels or urgent medical supplies required by an isolated property or community.

3.19.5 All reasonable effects will be made to deliver supplies, however where necessary the NSW SES will prioritise the delivery of items.

Resupply of Isolated Towns and Villages

Strategy

3.19.6 Minimise disruption upon the community by resupplying towns and villages which have become isolated as a consequence of flooding.

Actions

3.19.7 The NSW SES is responsible for the coordination of the resupply of isolated communities.

3.19.8 If flood predictions indicate that areas are likely to become isolated, the NSW SES Local Incident Controller should advise retailers that they should stock up.

3.19.9 When isolation occurs, retailers will be expected to place orders with suppliers where they have a line of credit and to instruct those suppliers to package their goods and deliver them to loading points designated by the NSW SES.

3.19.10 The NSW SES is prepared to deliver mail to isolated communities but may not be able to do so according to normal Australia Post timetables.

3.19.11 The NSW SES will assist hospitals with resupply of linen and other consumables where able.

Resupply of Isolated Properties

Strategy

3.19.12 Ensure supplies are maintained to properties by coordinating the resupply of properties which have become isolated as a consequence of flooding.

Actions

3.19.13 The resupply of isolated properties is a common requirement during floods and coordination can be difficult because requests can emanate from a variety of sources. Isolated properties may call their suppliers direct, place their orders through their own social networks or contact the NSW SES.

3.19.14 The principles to be applied when planning for the resupply of isolated properties are:

a. The NSW SES will coordinate resupply and establish a schedule.

b. Some isolated households will not have the ability to purchase essential grocery items due to financial hardship. If an isolated household seeks resupply from the NSW SES and claims to be, or is considered to be, in dire circumstances, he/she is to be referred to Welfare Services for assessment of eligibility. Where financial eligibility criteria are met, Welfare Services will assist with the purchase of essential grocery items. Welfare Services will deliver the essential grocery items to the NSW SES designated loading point for transport.

c. Local suppliers will liaise with the NSW SES regarding delivery of resupply items to the designated loading point.

d. Local suppliers are responsible for packaging resupply items for delivery.

3.19.15 A flowchart illustrating the Resupply process is shown in Attachment 1. Please note that the flowchart outlines the resupply process but does not encompass all potential situations and/or outcomes.

PART 4 - RECOVERY

4.1 RECOVERY COORDINATION AT THE LOCAL LEVEL

4.1.1 The NSW SES Tweed Shire Local Controller will ensure that planning for long-term recovery operations begins at the earliest opportunity, initially through briefing the Local Emergency Management Committee (LEMC).

4.1.2 Arrangements for recovery at the local, District and State level are detailed in EMPLAN and the NSW Recovery Plan.

4.1.3 The NSW SES Tweed Shire Local Controller may be required to attend recovery meetings to provide an overview of the emergency response operation.

4.1.4 The NSW SES Region Incident Controller may be invited to the initial local Recovery Committee meeting and to subsequent meetings as required.

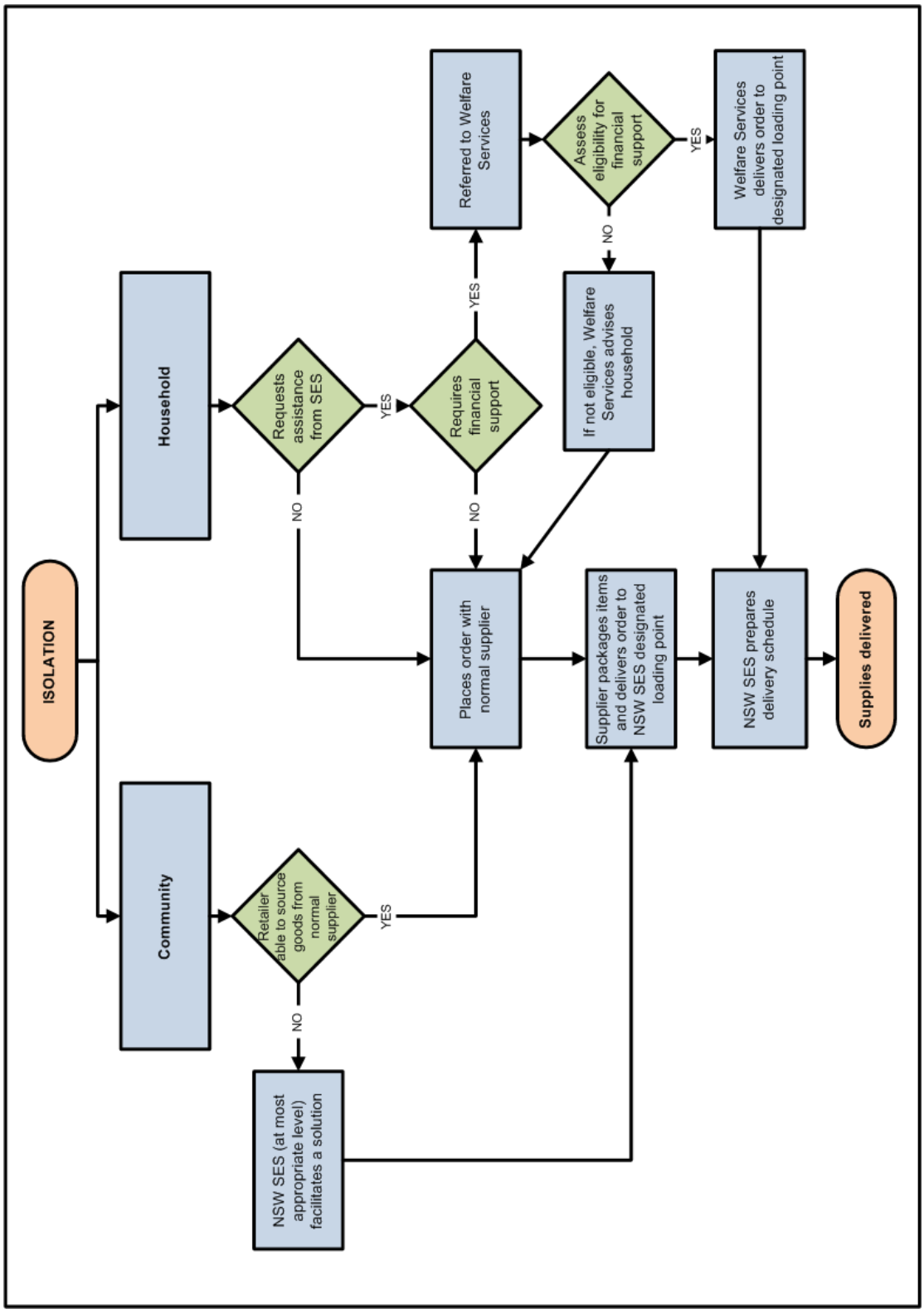
4.2 ARRANGEMENTS FOR DEBRIEFS / AFTER ACTION REVIEWS

4.2.1 As soon as possible after flooding has abated, the NSW SES Tweed Shire Local Controller will advise participating organisations of details of response operation after action review arrangements.

4.2.2 The NSW SES Tweed Shire Local Controller will ensure that adequate arrangements are in place to record details of the after action review and each item requiring further action is delegated to an organisation or individual to implement.

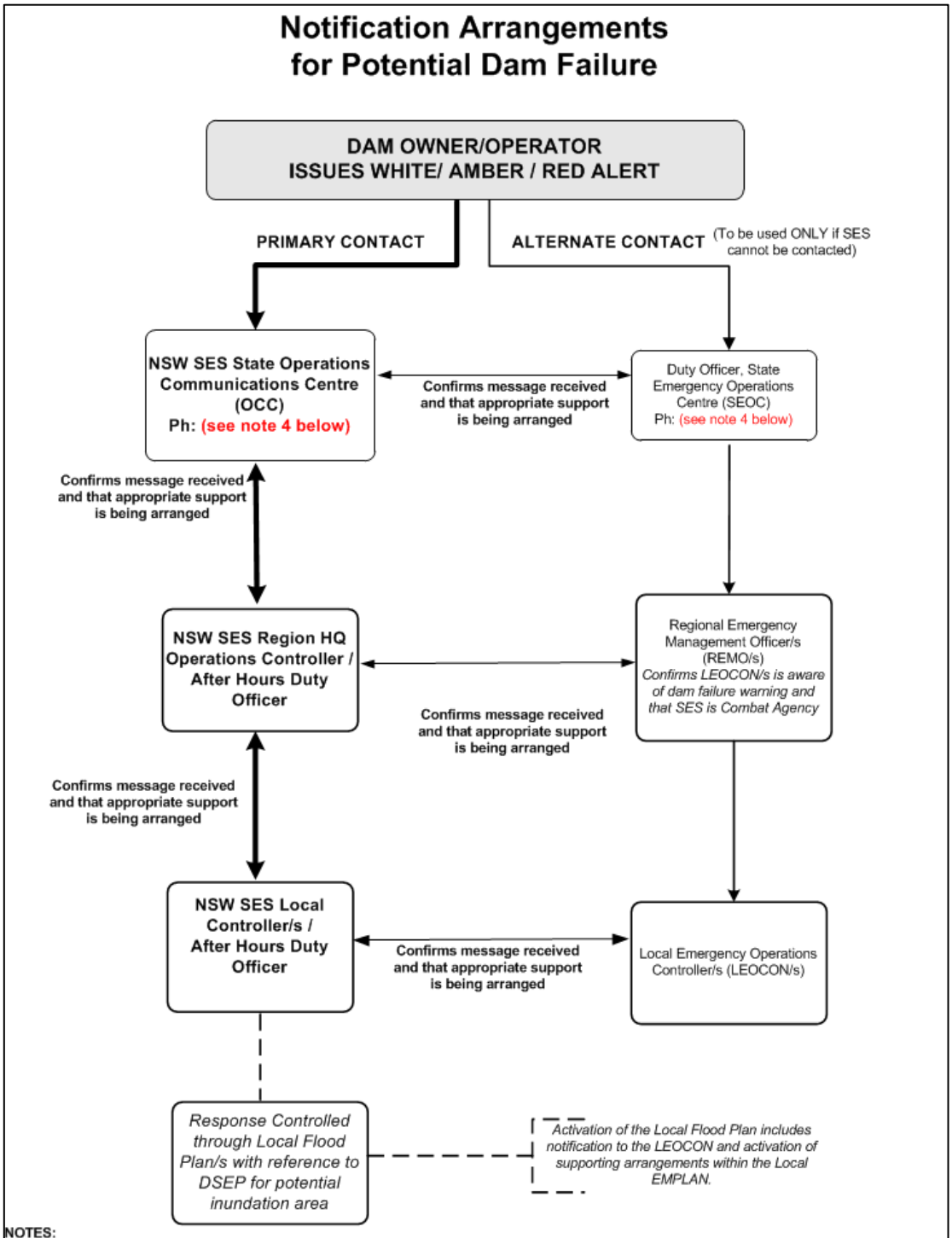
4.2.3 Follow-up to ensure the satisfactory completion of these actions will be undertaken by the Tweed Shire Local Emergency Management Committee.

ATTACHMENT 1 - RESUPPLY FLOWCHART



Please Note: **The chart outlines the resupply process, but does not encompass all potential situations and outcomes.**

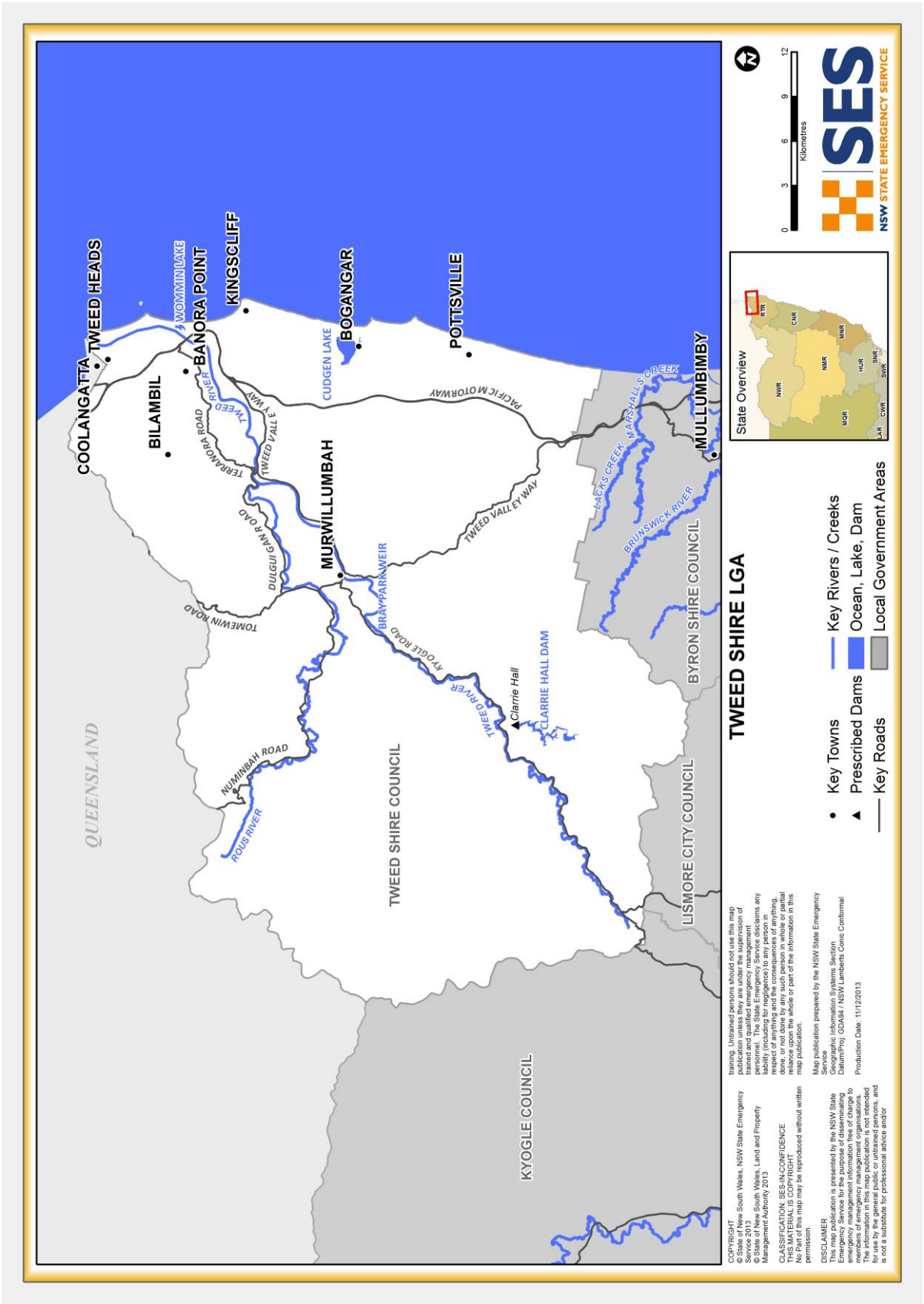
ATTACHMENT 2 - DAM FAILURE ALERT NOTIFICATION ARRANGEMENTS FLOWCHART



NOTES:

1. Dam owners should only contact the SEOC if the SES State Operations Communications Centre (OCC) cannot be contacted.
2. The first priority for notification is to contact the next SES HQ or the next level of EOC down the flowchart. The second notification should always be across the flow chart to confirm the message is received. If the first priority notification fails or is not picked up for any reason, the second priority notification should be made before any further attempts to contact the first priority (this is why an alternate or backup system of contacts is in place).
3. The triple zero (000) number for emergency services should not be used unless contact cannot be made with SES or the SEOC, as it is likely the triple zero (000) operators will have difficulty dealing with the very unusual case of potential or actual dam failure.
4. Dam owners must contact the SES State Headquarters during the preparation of the DSEP to obtain the appropriate emergency contact numbers.

ATTACHMENT 3 - TWEED SHIRE LGA MAP



NSW STATE EMERGENCY SERVICE

HAZARD AND RISK IN TWEED SHIRE

Volume 2 of the Tweed Shire Local Flood Plan

Last Update: November 2008

FloodSafe

ANNEX A - THE FLOOD THREAT

Landforms and River System(s)

Background

1. **Tweed River Catchment.** The Tweed River Catchment (Basin No. 201) is located in the Tweed Shire and the most northerly coastal region of NSW. The Tweed Valley consists of flat floodplain land of alluvial sediments, surrounded by higher ground of bedrock. The extensive floodplains form an important cane-growing area. The Tweed River has a length of approximately 50 km and a catchment area of about 1303 km^2. The Tweed Valley has suffered frequent and extensive flooding and in major floods, such as occurred in 1954 some 120 to 130 square kilometres were inundated and about 400 houses and farms were isolated by floodwaters.

2. The basin comprises the catchment areas of the North, Middle and South Arms of the Tweed River – referred to as the Rous, Oxley and Tweed Rivers respectively. Several minor local catchment areas occur between the Tweed River and the Qld/NSW border. The catchment includes the smaller coastal creeks (Cudgen, Cudgera and Mooball creeks) immediately south of the Tweed as far as Billinudgel. The river flows generally in a north-easterly direction and reaches the sea at Point Danger, Tweed Heads As stated above the Tweed River (Main Arm) is joined by several tributary systems:

   a. Oxley River, which joins at Byangum, about 5 km upstream of Murwillumbah.

   b. Dunbible Creek, which joins upstream of Murwillumbah.

   c. Rous River, which joins at Tumbulgum.

   d. Terranora and Cobaki Broadwaters which join 2 km upstream of the mouth at Tweed Head via Terranora Inlet along with Duroby, Tomewin Catchments and Ukerebagh Passage.

3. **The Tweed River** floodplain commences near Murwillumbah and includes South Murwillumbah (Blacks Drain) to the east of the river. On the northern side of the river a large area of floodplain occurs between the Tweed and Rous Rivers (including Dulgigan and Dungay areas) to Stotts Island and south east to the Condong Range. Other floodplain areas are located between Stotts Island and Chinderah on the southern bank of the Tweed River. Flood storage areas include Bray Park, Dunbible Creek, South Murwillumbah/Wardrop Valley, Terranora and Cobaki Broadwaters.

4. Near Murwillumbah the river is 120-140m wide and the depth is generally less than 2-3m except in local areas of the town where flow and associated scour patterns cause deeper water. Within the Murwillumbah townships a series of levees exist which offer a degree of protection. Tidal influence is experienced

upstream of Murwillumbah at Bray Park Weir on the Tweed River and at Boat Harbour on the Rous River. Approximately 30km's of the Tweed River is tidal upstream from Point Danger.

5. Revetments near the mouth of the river control the width of the river to about 200-250m and up to 8m deep. The river is wider at Fingal and Chinderah, becoming progressively narrower with the distance upstream. Breakwaters were constructed at the mouth of the river from 1962-1964 to control the entrance. In this region a strong longshore movement of beach sand influences the river characteristics and associated hydraulic behaviour. The coastal creeks occupy part of a 5km wide coastal strip from Wooyung to Leticia Spit.

6. Downstream of Murwillumbah, flood peaks tend to spread out into the floodplain. When river heights at Tumbulgum are greater than 2m AHD Riverside Drive Tumbulgum will be flooded. Chinderah begins to flood when river levels reach between 1.5m and 2.0m AHD and is inundated for between 1 and 2 days during a major flood.

7. Arterial roads can be cut by floodwater which can isolate the villages of Nobby's Creek, Chillingham, Crystal Creek, Dungay (access to Qld via Tomewin), Stokers Siding (access Smiths Creek Road), Uki, Richard's deviation, Stokers Siding Road, Byangum Road, North Arm Road, Kyogle Road, Dallas Park, Bakers Road at Anthony's Flats and movement out of and into the council area from the south and west can become difficult.

8. The areas downstream of Byangum and Boat Harbour are generally protected by rural levees. Although, the Rous River does not join the Tweed River until near Tumbulgum, flooding in this tributary can affect Murwillumbah from Mayal Creek (Murdering Creek), which connects the two rivers immediately downstream of Murwillumbah.

9. Ponding can occur in the following locations:

    a. Bray Park Basin east of Kyogle Road;

    b. Football fields Queensland Road;

    c. Knox Park Nullum Street;

    d. Football fields Willward Park;

    e. South Murwillumbah Black's Creek Drain;

    f. South Murwillumbah adjacent to Holland Road and Wardrop Street; and

    g. Condong Creek Wardrop Valley

Coastal Catchments

10. Coastal creeks which are contained within the Tweed Catchment area are outlined in Table 1 along with the creek outlets to the sea The upper

catchments of the creeks are steep and travel times of flood peaks are short. In this area floods rise and fall rapidly. Coastal creek floodplains occupy part of a five (5) kilometre wide coastal strip from Billinudgel to Kingscliff. Anecdotal intelligence suggests that there is very little chance of riverine flooding of these creeks, except in a Major or PMF flood event. However, the creeks outlined below are subject to localised flash flooding

11. Crabbes Creek may also drain into Crabbes Swamp where it is affected by the Ocean Shores bund. Water backs up in the Billinudgel Creek system, which then flows south, into Yelgun Creek where it is blocked by the bund wall at Kallaroo Circuit in north Ocean Shores.

12. The tributaries of these creeks, upstream of the floodplain have a total contributing catchment of about 240sqkm. The area contains the urban communities of Tanglewood, Casuarina, Salt, Cabarita (Bogangar), Hastings Point, Pottsville, Koala Beach and Wooyung (Approximately 70sqkm coastal area) and the new developments of Seabreeze and Kings Forest.

SYSTEM	OUTLET LOCATION
Tweed River	Letitia Spit (Fingal Head)
Cudgen Creek	Kingscliff (Cudgen Headland)
Reserve Creek	Kingscliff (Cudgen Headland)
Cudgera Creek	Hastings Point
Christies Creek	Hastings Point
Mooball Creek	Pottsville
Crabbes Creek	Pottsville

Table 1

Storage Dams

13. Clarrie Hall Dam is a water supply dam built to augment the water supply to towns in the Tweed Shire Water Supply District. The dam site is located on Doon Doon Creek, a tributary of the Tweed River and is 1.6km upstream of the confluence with the Tweed River. This is approximately 15km south west of Murwillumbah and was completed in 1983.

14. The dam is a 43m high concrete-faced rockfill dam with a crest length of 180m and a capacity of 1600ML at full level. The spillway is a concrete lined chute with an ogee crest and is 23m wide. The spillway is topped at 61.5m and the maximum flood level is 67.1m AHD.

15. Refer to the Dam Safety Emergency Plan (DSEP) Clarrie Hall Dam 1999 for procedures for dam failure. Dam Failure arrangements are detailed in Annex I.

Weather Systems and Flooding

16. Tropical cyclones originating near the equator (Pacific Basin) can move south and effect the TSC area. While it is rare for a cyclone to enter north eastern NSW, those that approach southern QLD (Gladstone to Maroochydore) or which travel southwards past the coast of northern NSW may bring rain of sufficient intensity and duration as to cause flooding. There are also occasions when a heavy rain system advances well ahead of the cyclone.

17. Cyclones occur in the southern hemisphere in latitudes 10° south to 25° south. An air pressure of 960hPa equates to 200km winds and sea levels rise by several metres. Latitudes between 20° - 35° south will experience extreme rainfall.

18. In 1954 a tropical cyclone passed over Northern NSW with winds over 100 km/h, and air pressures as low as 973 hPa. Around Cudgen houses were blown apart, and trees of more than one metre in diameter were twisted out of the ground. In the hinterland of the Gold Coast (South East Queensland), some areas recorded 900mm of precipitation in a 24 hour period. Gales whipped up large waves on the Richmond River as a large wall of water moved from the upper catchment through Lismore trapping many people. In all 26 people died (BoM, 2007).

19. The most frequent origin of flooding rain events is caused by the development of easterly lows close to the coast. Pressure systems fall below 980 hPa causing rain, increases in the wind strength, increases in the wave height and increases in the storm surge (above 1.5m).

20. These depressions may develop at any time but the flood rain events are most likely during that part of the year when sea surface temperatures are high and the air is humid. As tropical cyclones can also be expected at this time, most flood events in the Tweed Valley occur in the first half of the year with a peak period of around February and March.

21. The seasonal distribution of flooding is during the period November to July with the highest incidence during February, March and June. The predominance of flooding in late summer reflects the fact that the Tweed Valley is more affected by tropical cyclones than by winter depressions. (See Figure 1)

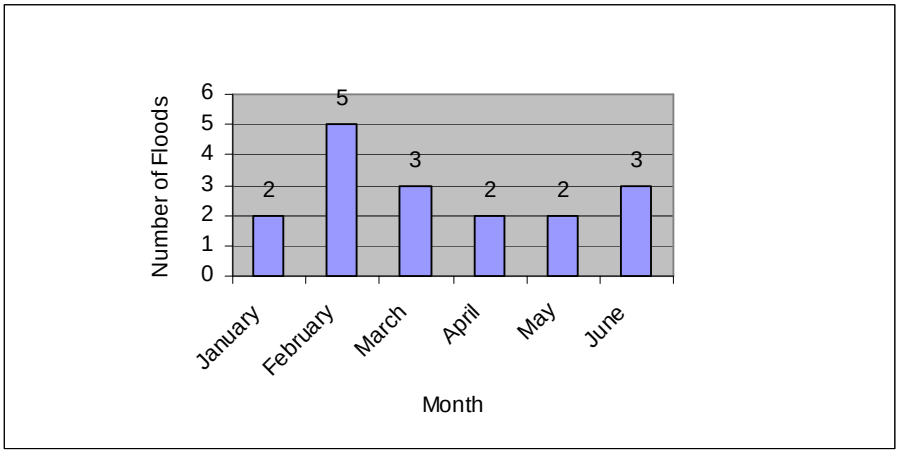


Figure 1

22. When considering rainfall and its effects it should be remembered that isolated heavy falls on the catchment of one of the arms is unlikely to cause a major flood, whereas a similar rainfall on two arms may cause significant riverine flooding. Indicative flood producing rainfall levels are as follows:

    a. 50-150mm over a period of 1-3 days usually results in river rises with nuisance to minor flooding;

    b. 175-300mm over a period of 1-3 days usually results in moderate flooding

    c. 300-450mm over a period of 1-5 days usually results in major flooding

    d. 500-700mm on the Condong Range and coastal fringe over a period of 1-3 days will result in major storm water flooding around Cudgen Lake, Tanglewood, Cabarita, Bogangar, Hastings Point and Pottsville.

23. **Flash Flooding** can result from heavy rainfall in steep, narrow catchments that require little time to flood. The coastal catchments in the Tweed Shire Council area are subject to flash flooding. Choke points and the influence of tidal fluctuations can prohibit the expedient outflow of water from creeks and waterways to the ocean.

Characteristics of Flooding

24. Outlined below in Table 3 are the peak design flood levels for the selected locations for the Tweed River:

Height (AHD)	Gauge Location	Classification
1.5m	Barneys Point	20% AEP or 1 in 5 yr ARI
2.2m	Barneys Point	5% AEP or 1 in 20 yr ARI
3.0m	Barneys Point	1% AEP or 1 in 100yr ARI
5.8m	Barneys Point	PMF
5.01m	Murwillumbah	20% AEP or 1 in 5 yr ARI
5.79m	Murwillumbah	5% AEP or 1 in 20 yr ARI
6.52m	Murwillumbah	1% AEP or 1 in 100yr ARI
9.98	Murwillumbah	PMF

Table 2

25. The State Flood Plan (June 2008) contains the Flood Classification levels for both the Murwillumbah and Barney's Point gauge, which have been tabled below. (Table 3)

FLOOD CLASSIFICATION LEVELS (in metres)			
REFERENCE AREA	Minor	Moderate	Major
Murwillumbah (201902)	3.0	4.0	4.8
Barney's Point (201426)	1.3	1.7	2.0

Table 3 - Peak Height Flow Times

26. Indicative flow times are as detailed in the following table (NB: Two to three hours can generally be added to these times from the onset of rain.)

Table 4 - Indicative Flow Times within Tweed Shire.

River	From	To	Time
Rous (North Arm)	Chillingham	Kynnumboon Bridge	3.5 hours
Oxley (Middle Arm)	Tyalgum	Murwillumbah	3 to 6 hours
Tweed River (South Arm)	Uki	Murwillumbah	2 to 3.5 hours

Table 5 - Recorded peak heights for Tweed Valley Gauges

DATE	TYALGUM	CHILLINGHAM	EUNGELLA	UKI	MURWILLUMBAH	BRAESIDE	TUMBULGUM	BARNEY'S POINT
Datum	ASS	ASS	ASS	ASS	AHD	ASS	TRHD	AHD
Feb 1921					5.8			
Feb 1931					5.7			
19.1.1938					4.86			
11.6.1945					5.5		4.04	2.6
15.6.1948				7.62	4.8			
20.2.1954	7.92			12.26	6.07	8.81	4.82	3.1
28.3.1955	5.79				5.11	7.62		
18.2.1956	7.47	5.11		12.19	5.82	11.73		
8.5.1963	8.23	4.57		10.05	5.21	4.01		
12.6.1967	6.32			8.51	5.01	5.33		
12.2.1972	6.25	5.74	8.31	9.14	4.91			
26.1.1974			6.22	9.27	5.42			2.4
10.3.1974	8.46		8.91	11.4	5.9			2.2
11.2.1976	5.8		6.1	7.81	5.01			
18.3.1978	5.7		6.09	9.85	5.2			1.53
10.5.1987		7.3	8.72	10.23	5.26			
1.4.1989	10.95		10.31	10.9	5.6		4.00	1.42
26.4.1996			6.81	8.94	3.78		2.0	1.97
6.5.1996			7.31	8.35	3.9		2.9	
2.2.2001			6.16	7.28	4.85			1.6
6.3.2004					4.04		3.34	1.6
5.1.2008			9.97	8.51	4.87		3.31	1.56

Flood History

27. **Flood of February 1954**. The 1954 flood is the largest flood on record. Recorded rainfall was approximately to be between 400mm and 900mm over a 72hr period in the upper catchment area. Peak flows varied between 2,600 – 4,600m3/s. The entire floodplain was inundated with high velocity flood water across the floodplain causing significant damage to homes in South Murwillumbah. This flooding was related to the cyclone as described in point 18, Weather Systems and Flooding.

28. **Floods of December 1972**. A unique weather pattern, which developed over the North Coast in late December 1972, led to flood emergencies on all coastal river systems from the Manning north to the Tweed. Torrential rain was experienced on all catchments. Extensive inundation of property occurred along the floodplain of the river at Murwillumbah. Floodwater, which entered the caravan park in Murwillumbah, necessitated the removal of caravans and

equipment to higher ground. Some people needed to be evacuated and Tweed Shire flood boats carried this out. Cane growers in the valley suffered substantial losses, as this was the third major flood during the year.

29. The Tweed River peaked in Murwillumbah at 10.30am with a gauge height of 4.6m on 28 December 1972.

30. **Floods of January, February and March 1974**. The year of 1974 was devastating for the residents of the Tweed Valley. The area was subjected to the forces of Cyclones "Wanda and Pam" who wreaked havoc along the coastal strip causing unusually high tides and huge wave actions. The accompanying heavy rain caused major flooding.

31. On January 25 to 26, 1974 the remains of tropical cyclone "Wanda" and a moist north-easterly low pressure system combined to cause major flooding in the Tweed Valley. By the time the river had peaked at 5.42m at Murwillumbah a total of 100 people had been evacuated from South Murwillumbah. Fortunately the main residential and business areas escaped serious flooding. The school holidays had not ended and thousands of visitors crammed the various holiday resorts along the coast. Stranded visitors were desperately trying to return to Queensland to salvage their belongings from the unprecedented flooding, which was occurring. All roads north were cut, either by major flooding on the Tweed River, or by swollen streams beyond the Gold Coast. The coastal town of Kingscliff became completely isolated and was threatened with serious food shortages. At this time the gauge at Chinderah was 2.4m AHD

32. Although well out to sea, the effects of tropical cyclone "Pam", which moved along the coast from February 5 to 7, 1974, together with the unusually high tides, caused havoc along the north coast from Evans Head to Tweed Heads. Extreme erosion of the foreshores, as well as inundation of low lying areas by seawater resulted in damage to many buildings and properties on two successive days. The storm surge associated with tropical cyclone "Pam" was estimated at 0.61m and combined with very rough seas caused anxiety to coastal residents. Detailed information on the location of the cyclone was not available until about 12 hours after the first effects were felt. Consequently preparatory work was very limited.

33. North Coast towns were subjected to serious inundation in March 1974. On March 10, 1974 the second largest flood that has been recorded at Murwillumbah was experienced. The flooding resulted from a complicated weather system - heavy rainfall over much of the North Coast and adjacent ranges. A series of small intense depressions stretched from the Manning River to the Queensland border. During the 48hr period to March 11, 1974 recorded rainfall in the catchment area ranged between 400 – 600mm. The Tweed Valley experienced very serious and prolonged inundation with high commercial, domestic and rural losses.

34. The Tweed River at Murwillumbah reached a height of **5.9m (Murwillumbah gauge, AWRC No. 201902)** at 6pm on March 10, 1974. The commercial centre was inundated when water topped the levee with some shops being flooded to a depth of 1.5 – 2m. Water up to 2.5m entered parts of the

Tumbulgum and Chinderah (2.1m) areas. Approximately 1,000 persons from Murwillumbah and South Murwillumbah were evacuated. Murwillumbah was completely isolated with roads in the area badly scoured and potholed. Damage to homes and personal effects were estimated at over $A1 million. The levee has since been upgraded in the early to mid 1990's.

35. In 1974 levees were overtopped at Condong Creek Weir before inundating Bray Park.

36. **Flood of March 1978**. The 1978 flood resulted from heavy rainfall occurring between March 17 and 19, 1978. Rainfall for the 48hrs to March 19, 1974 in the catchment area averaged 300 – 500mm.

37. At Murwillumbah the Tweed River went within a few centimetres of breaking the levee bank at the western side of the river. If it had been overtopped the floodwater would have entered the CBD. The river peaked at **5.2m (Murwillumbah gauge, AWRC No. 201902)** with the worst affected areas being east and south Murwillumbah.

38. **Autumn Flood of April 1989**. The flooding on the North Coast was prolonged with two separate systems bringing flood rain over a period of 11 days. Warnings were issued for the Tweed River on April 4, 1989. Rainfall in the area for the 48hrs to March 3, 1989 averaged 100 – 400mm. The intensity of the rain and sudden river rise caused extensive flooding of local areas with the Tweed River peaking at 5.6m (AHD Murwillumbah gauge).

39. Several medical evacuations were carried out in the Murwillumbah area over the weekend and road closures resulted in the necessity of conducting food drops to isolated communities. Emergency accommodation was required for 368 people in Murwillumbah.

40. A new weather system brought further heavy rain to the catchment with new flood warnings issued on April 11, 1989. Levels for the Tweed River did not go as high and the river peaked at 3.76m.

41. A history of recorded peak heights for Tweed Valley gauges is recorded in Table 6.

Flood Mitigation Systems

Murwillumbah Levees

42. A system of levees exists to protect Murwillumbah from flooding up to certain heights. These include:

43. Murwillumbah Levee, with crests heights related to the Murwillumbah gauge (AWRC No. 201902) and which vary along the levee (see Figure 2), was originally designed to protect to the 100 YR ARI flood event of 6.5 metres AHD at the gauge, but has been evaluated to protect to the 65-80 YR ARI. The Murwillumbah Levee was implemented to its current height in the early 1990's. In modelling completed by Tweed Shire Council the Murwillumbah Levee will

overtop around the Tweed River Bridge by 200-300mm when the gauge reaches 6.5m AHD, which indicates that the overtopping height would be 200-300mm less than 6.5m AHD, and therefore at 6.3m (refer to Overtopping Analysis later in this section). There are three public access gates along the Murwillumbah levee which require closure by Tweed Shire council.

44. South Murwillumbah Levee, with crests heights related to the Murwillumbah gauge (AWRC No. 201902) also vary along the levee (see Figure 3), but is designed to protect to approximately the 20% AEP flood level of 5.00 metres at the gauge. Prior to the levee overtopping water will come across Budd Park and Alma Street into the industrial and then the urban area at approximately 3.2 metres on the gauge. In January 2008 a peak height of 4.87m AHD was reached and the South Murwillumbah levee did not overtop at this height.

45. East Murwillumbah Levee (raised in 2006 to provide 1% flood protection) with crests heights related to the Murwillumbah gauge (AWRC No. 201902) also vary along the levee (see Figure 4), but is designed to protect to approximately the 1% AEP flood, which corresponds with a levee crest height of approximately 6.5 metres AHD on the Murwillumbah gauge.

46. Dorothy Street Levee (raised in 2006 to provide 1% flood protection) to the west of the Murwillumbah town protecting from Rous River, with design height of 4.9 metres related to the Murwillumbah gauge (AWRC No. 201902), protecting up to a 1% AEP flood.

47. Bray Park Levee, to the south west of Murwillumbah on the banks of the Tweed River is an agricultural levee at the southern end of the Murwillumbah levee that was constructed to 0.5metres above natural ground level to compensate for increased upstream levels caused by the increase of wall levees in the main part of the Murwillumbah levee.

Tweed Heads South Levees

48. In South Tweed Heads a system of levees with varying crest heights of 2 metres AHD and greater (see Figure) , related to the South Tweed Heads (Dry Dock Rd) gauge (AWRC No. 201000) exists which represents approximately 5% AEP flood levels. These levels equate to around 2.18 metres at Barneys Point gauge.

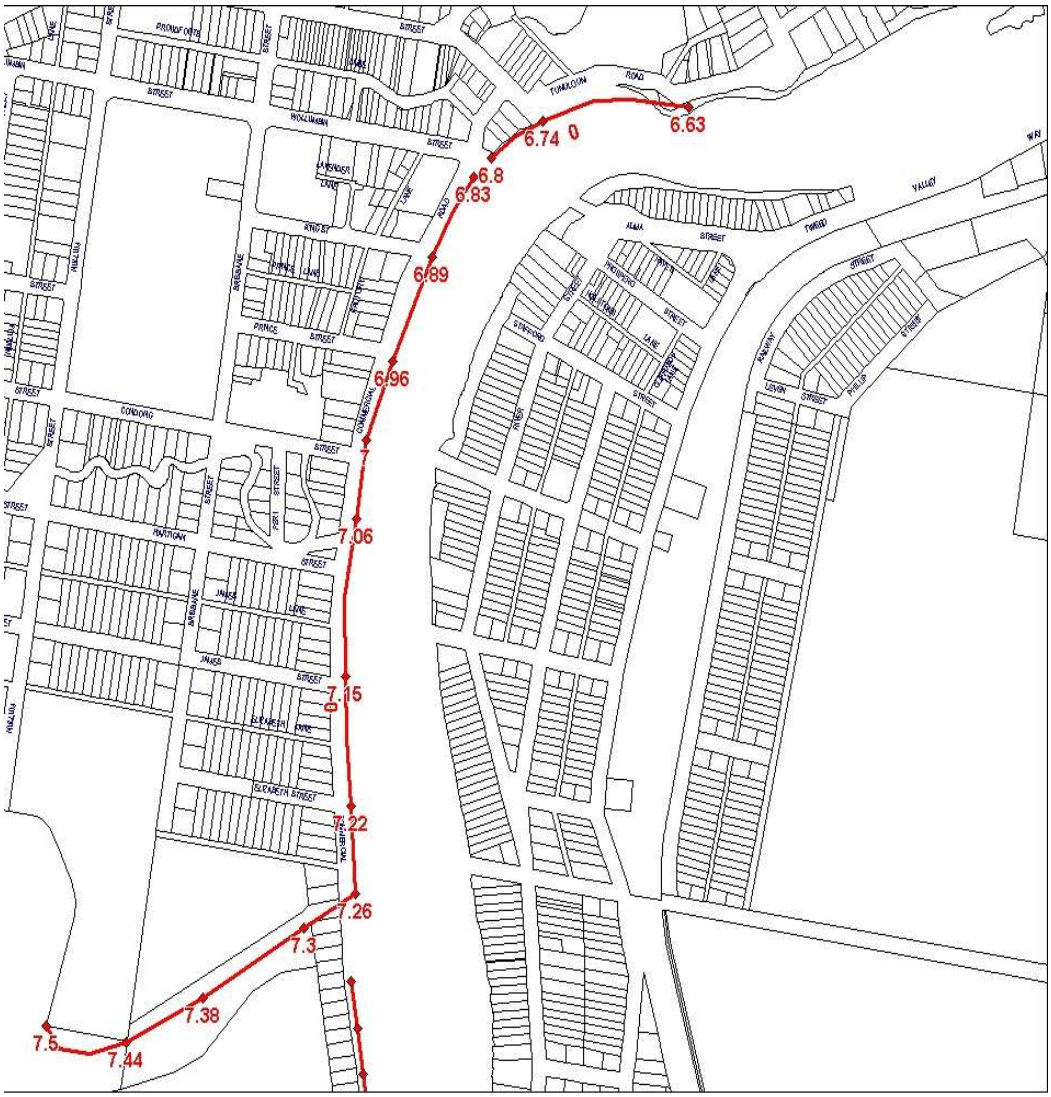


Figure 2, Murwillumbah Levee Crest Height (mAHD) Note: heights depicted are spot heights and do not directly relate to the Murwillumbah gauge.

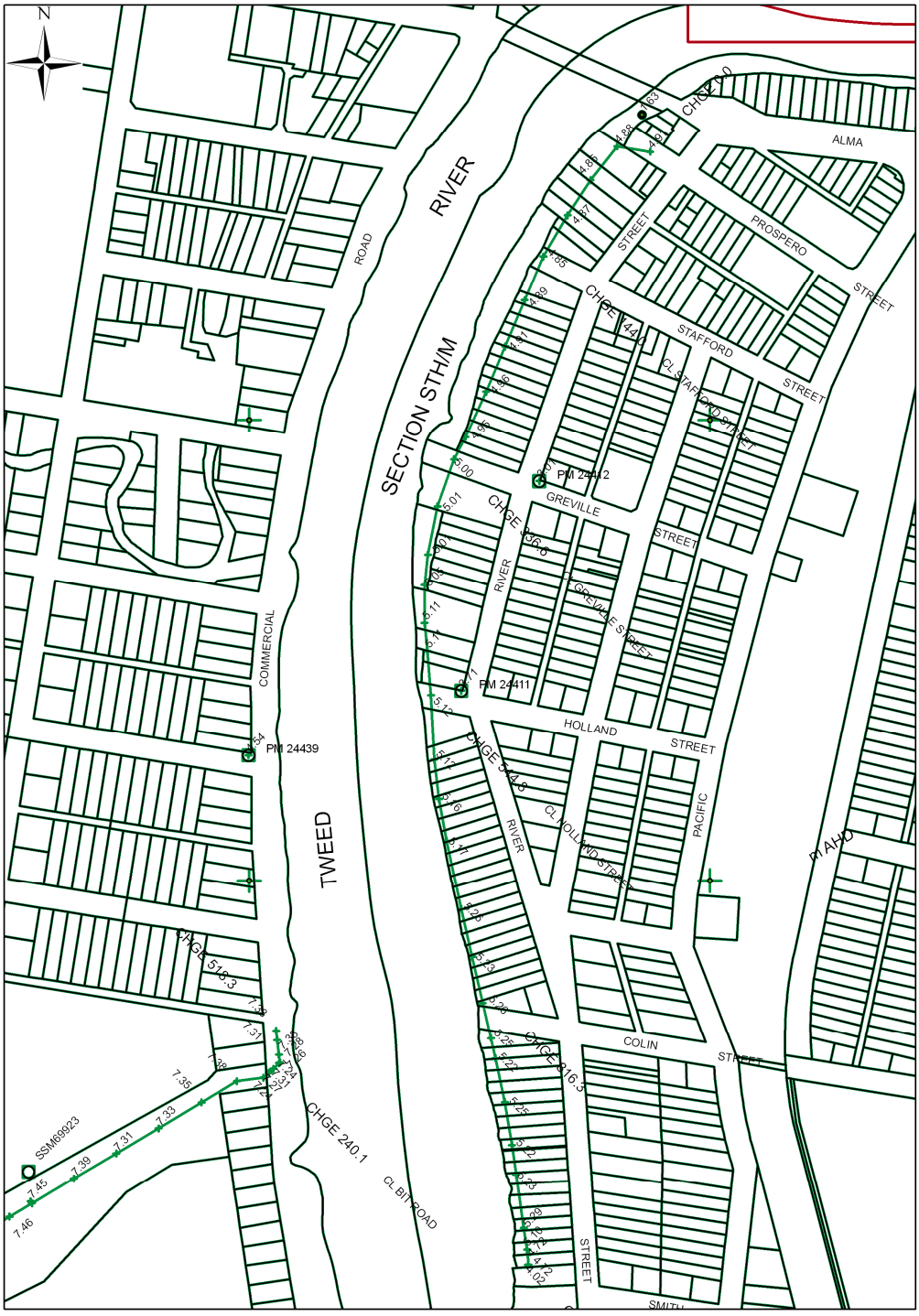


Figure 3, South Murwillumbah Levee Crest Heights (mAHD) Note: heights depicted are spot heights and do not directly relate to the Murwillumbah gauge

Figure 4, East Murwillumbah Levee Crest Heights (mAHD) Note: heights depicted are spot heights and do not directly relate to the Murwillumbah gauge

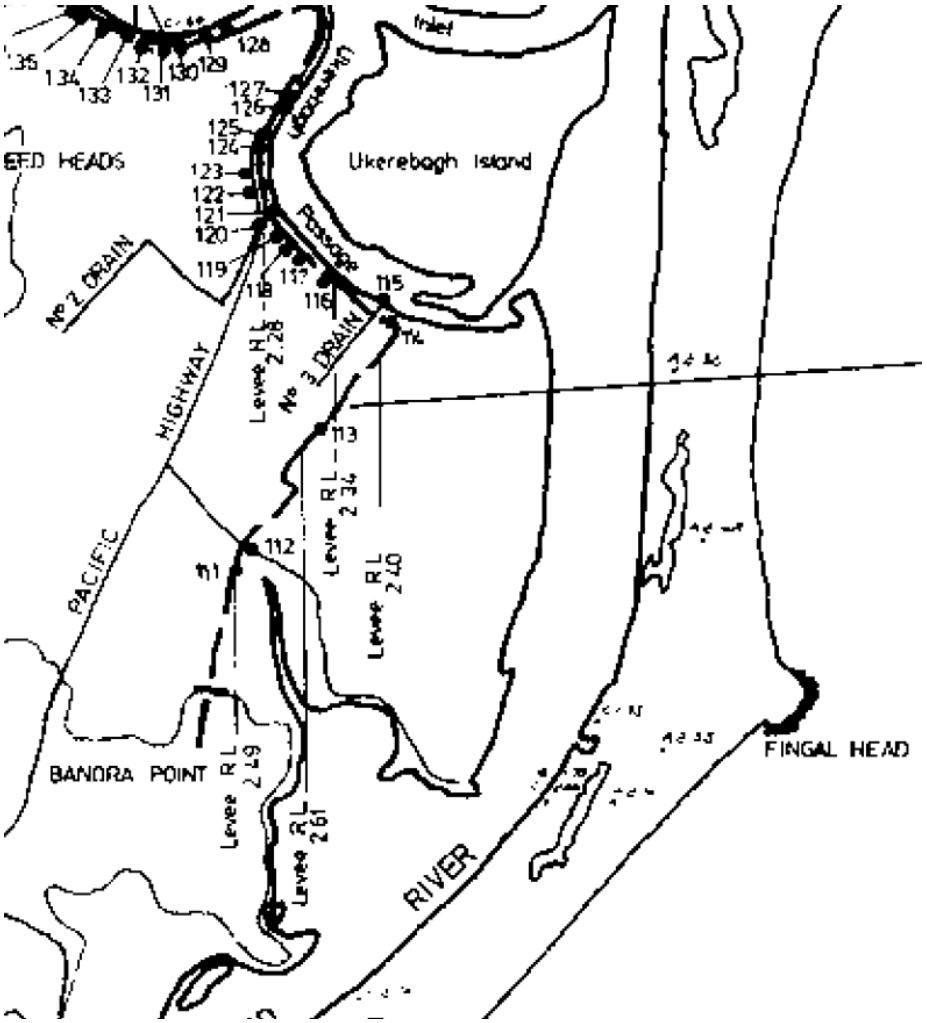


Figure 5. South Tweed Heads Levee Crest Heights

Overtopping Analysis of Murwillumbah Levee – Tweed Flood Study 2005

49. 100 YR ARI Flood Event:

a. In a 100 YR ARI Event the Murwillumbah Levee is overtopped 33.5 hours into the event, at 6.3m AHD on the Murwillumbah gauge (201902) and at the peak it is predicted the entire levee will be overtopped in a 1:100 YR ARI flood event by 200mm.

b. When the gauge reaches 6.4m AHD on the Murwillumbah gauge (201902), which occurs around 33.75 hours into the event, the levee overtops between Condong St and the Murwillumbah Bridge, starting first between King and Prince Street.

c. The Bray Park end of the levee is overtopped at 6.5m AHD

d. Modelling indicates that it will take between 3 and 4 hours to fill the basin behind the levee once overtopping has begun.

e. Prior to overtopping backwater flooding within the levee may occur as a consequence of flooding along Lavender Creek. Tweed Shire Council operates two pumping stations in this area and also at an unnamed creek in the east Murwillumbah area.

Storm Surge

50. A storm surge is a rise in sea level under a cyclone or severe sub-tropical depression. A storm tide is the combination of storm surge and lunar tide and would not normally coincide with a flood peak from the upper river catchment.

51. A storm surge could affect the Tweed River downstream of Chinderah (including South Tweed Heads) and the lower lying coastal areas of:

a. Fingal to Kingscliff

b. Cabarita - Bogangar

c. Hastings Point

d. Pottsville

e. Wooyung

52. Coastal erosion and inundation can result from storm surge. Annex I details the areas at risk and the arrangements for emergency response to coastal erosion

ANNEX B - EFFECTS OF FLOODING ON THE COMMUNITY

Community Profile

Census Description	LGA	Tweed Heads	Murwillumbah	Pottsville
Total Persons	79322	51789	7952	3297
Total Dwellings	31121	20977	3088	1277
Total persons aged 65 years and over	17601	13265	1643	580
Total persons aged below 15 years	14614	8925	1542	745
Total persons with a need for assistance (profound / severe disability)	4685	3381	527	157
Total persons of indigenous origin	2333	1795	150	85
Total persons using Internet	16730	10847	1523	723
Single parent families	3968	2594	471	187
Persons living alone	8633	6167	950	281
Total persons who do not speak English well	193	129	25	3
Total persons who lived at a different address 5 years ago	31241	21303	2965	1637
Households without vehicles	2838	2136	420	71
Total persons residing in caravans, cabins or houseboats	1711	1225	16	48
Mean household size	2	2	2	2

Table 6: Census of Housing and Population data (2006)

1. Tweed Shire covers 1,303 square kilometres and adjoins the NSW shires of Byron, Lismore and Kyogle, with the NSW/QLD border to its north where it divides the twin towns of Tweed Heads and Coolangatta.

2. The Tweed Shire local government area contains 37km of natural coastline, wetlands and estuarine forests, lush pastoral and farmland, the entire basin of

the Tweed River and mountainous regions containing three world-heritage listed national parks.

3. Approximately 79,322 people live in Tweed Shire (2006 Census data, ABS), scattered through 17 villages, two towns, and the major urban areas of Tweed Heads and South Tweed. This is an increase of 6% or 4822 persons over the previous 5 years.

4. The Tweed Shire has a high percentage of aged persons in its population. More than 22 % of the total population are over 64 years of age. People over 65 years of age are more likely to need assistance during evacuations. Some elderly people may also be socially isolated, resulting in them being unaware of evacuation warnings or unable to decide on a course of action. Areas with particularly high proportions of elderly residents should be targeted for doorknocking and the provision of transport.

5. Tweed has 23 caravan parks, 16 aged care facilities and at least 8 retirement villages, most of which are flood prone. Access roads to some of these facilities close early in flood events. During peak holiday season the Tweed shire would contain a large number of tourists and travellers. Potential problems can occur during emergency arrangements if travellers are unaware of the risks of an area and the strategies developed to deal with these emergencies. Caravan Park and Aged Care facility managers will require early warning during an event if evacuations are imminent.

6. The number of persons living in Caravan parks is significantly high. According to 2006 ABS Census figures this equates to 2% of the shire population or slightly over 1700 people.

7. The residents and communities of the upper Tweed River tend to be more experienced with flooding, particularly residents in Murwillumbah, Chillingham, Uki and Tumbulgum. However, in contrast the residents of the Lower Tweed have little experience with flooding and its effects. Community education is of paramount importance in the Lower Tweed area.

8. Research by the Tweed Shire Council SES Local Controller (2006) identified that Aged Care Facility (ACF) patient numbers total in excess of 1200, of which more than 50% are “high risk”, (i.e. they require an ambulance for transfer and one-on-one attention). The majority of ACFs have their meals, medication and linen delivered every 2 - 3 days. Only a small number of these facilities have back up generator power.

Overview of the Flood Threat

9. Flood affected urban or residential areas in the flood plains are Tweed Heads, Fingal, Chinderah, Tumbulgum, Condong, Murwillumbah and Cabarita - Bogangar. Several other centres border on the floodplains and can suffer access problems during major flooding. These include: Banora Point, Kingscliff, Uki, Cudgen, Hastings Point, Tanglewood and Pottsville.

10. South Murwillumbah, Chinderah, Fingal, Tumbulgum, Condong and Cabarita - Bogangar are particularly prone to flooding, being inundated by floodwater averaging once in three (3) to five (5) years.

11. A system of levees protects Murwillumbah and South Tweed Heads up to certain design heights (refer to Annex A, Flood Mitigation Systems). If these levees are breached, overtopped or fail, the communities behind them would be at risk of being inundated by flood water. Upstream of Murwillumbah, local pooling occurs behind rural levees in areas of the floodplain between Murwillumbah, Byangum and Boat Harbour, which occurs about once a year. Overtopping of these rural levees from the Tweed River occurs once every two (2) years on average.

12. Only major floods seriously affect the rural areas upstream of Byangum and Boat Harbour in the Tweed Valley. Local runoff may cause minor problems in some lower lands, but backwater from the main channels is very localised and would affect farmland only once in ten to twenty years. A disruption of access to areas however, is fairly frequent.

13. The rural areas of the Coastal Creeks floodplains have no structural protection against inundation. Flooding of some of the lower areas occurs as often as once a year and some areas, particularly those upstream of Cudgen Lake, suffer from particularly slow drainage.

Sector Profiles

14. For emergency management purposes, Tweed Shire Council area has been broken up into 16 sectors which have been numerically ordered in the general direction of river flow. Each sector can experience significant flood threats and emergency response should not be considered in isolation of the other sectors.

15. The demographic community profile of each sector are contained in **Annex F – Evacuation Arrangements for the Tweed Shire Council Area**. Within the community profile there are several categories including, Total persons, Dwellings without vehicles and total number of dwellings. These categories are extremely significant in relation to evacuation and/or isolation of the relevant sector.

16. Table 8 details these sectors as well as outlining the Flood warning gauge relevant to the village or township.

Sector Number	Name of Sector	Related Flood Warning Gauge (AWRC No.) & Relevant SES Flood Intelligence Gauges
1	Uki	Murwillumbah (201902) & Uki (201900)
2	Tyalgum	Murwillumbah (201902) Tyalgum (Oxley River) - (201006) Eungella (201000) NB: Tyalgum (210901) not currently used for intelligence.
3	Chillingham	Murwillumbah (201902) & Chillingham (201008)
4	Murwillumbah	Murwillumbah (201902)
5	Tumbulgum	Murwillumbah (201902) & Tumbulgum (201432)
6	Chinderah/Kingscliff	Barneys Point (201426)
7	Banora	Barneys Point (201426)
8	Terranora and North Tumbulgum	Terranora (201447) no current intelligence.
9	Bilambil and Duroby	None Available (Effects from Tomewin Catchment)
10	Tweed South	Barneys Point (201426), Dry Dock (201428)
11	Seagulls	Barneys Point (201426), Dry Dock (201428)
12	Tweed West	Barneys Point (201426), Dry Dock (201428)
13	Tweed Heads	Barneys Point (201426), Dry Dock (201428)
14	Fingal Head	Barneys Point (210426), Dry Dock (201428)
15	Bogangar	None Available
16	Pottsville/Wooyung	None Available

Table 7: Tweed Sectors

Specific Risk Areas

Sector 1 – Uki

17. The rural village of Uki is located on the southern bank of the Tweed River approximately 20kms southwest of Murwillumbah along the Kyogle Road, upstream of the confluence with Smiths Creek. The village community extends west along Kyogle Road to the sports ground and east along Smiths Creek Road including the small rural land parcels along Smiths Creek Road and Clareville Road. The central village area is relatively steep, sloping towards the Tweed River.

18. The main access in and out of Uki is along Kyogle road. The village may be accessed to the south from Rowlands Creek Road, via Billinudgel and east along Smiths Creek Road via Stokers Siding.

19. The river has extremely high banks and there are no local effects before 6.1 metres on the Uki gauge (201900). The Flood of Record occurred in February 1954 12.26m AHD (Uki gauge 201900) with the second largest flood occurring in March 1974 (11.40m on the Uki Gauge, 201900)

20. River levels at Uki provide early warning of possible effects at Murwillumbah. A reading of 5 metres at Uki may indicate significant flooding at Murwillumbah.

21. Kyogle Road and Bakers Road will be closed at Anthony's Flat at a height of less than 6.9m (Uki gauge)

Sector 2 - Tyalgum

22. The rural village of Tyalgum is located on the western bank of Tyalgum Creek where it joins the Oxley River and is approximately 24kms west of Murwillumbah along Tyalgum Road.

23. Access in and out of Tyalgum is along Tyalgum Road from Murwillumbah and Brays Creek Road via Byrill Creek and Limpinwood Road to Chillingham.

24. The Flood of Record occurred in April 1989 (10.95m Tyalgum (Oxley River) gauge, 201006). The Eungella gauge (201001) provides warning for the town of Tyalgum. Historical evidence suggests water was over the front bar of the hotel on 1st April 1989.

25. The township could be isolated for up to 48 hours due to flooding, with the flood waters having a large velocity and would likely to be destructive.

Sector 3 – Chillingham

26. The Chillingham sector covers from Hopkins Creek in the west to slightly west of Tumbulgum in the east. The main towns included in this rural sector within reach of the Tweed River include: Chillingham, Crystal Creek, North Arm, Dungay, Kynnumboon, Tyalgah, Nobby's Creek and Dulguigan.

27. This area can become isolated by road within 2-3 hours and can remain so for 2-3 days. On 10 May 1987 the Rous River peaked at Chillingham (201008) at a height of 7.3m which represented a 1% AEP flood (6.6m Murwillumbah gauge, 201902).

28. In January 2008 the village of Chillingham experienced severe flooding. Recorded heights for locations within the village include; Bindaree Street 30.33m (AHD), Chillingham Fire Station 30.71m (AHD) and Beantree 31.63m (AHD).

29. Minor flooding closes most access roads with the North Arm Road and Numinbah Road cutting early in minor and flash flooding events. Aerial movement in area is usually restricted in the early stages of a flood due to poor visibility and low cloud cover.

Sector 4 – Murwillumbah

30. Murwillumbah is situated on the Tweed River approximately 8 kilometres east of the junction of the Tweed and Oxley Rivers. The Murwillumbah area extends from Condong in the north to Bray Park in the south west. The Tweed River divides South Murwillumbah from the Murwillumbah township.

31. The town has a population of 7,696 and some 130 commercial premises. There is a local knowledge and experience with flood within the community. The March 1974 flood (5% AEP), prior to construction of levees, had a peak height of 5.9m (Murwillumbah gauge, 201902) affecting much of the town and flooding the CBD to between 1 and 2.5 metres. About 490 houses are flood prone.

32. The main access in and out of Murwillumbah is along the Tweed Valley Way. Other accesses include Kyogle Road from the south west, North Arm Road from the west and Tomewin/Queensland Road from the northwest.

33. The area has its own reticulated sewer and water supply. The water treatment plant for the reticulated supply to Tumbulgum, Tweed Heads and Coastal Villages is located in Murwillumbah at Bray Park, and draws raw water from the Tweed River from a weir pool at Bray Park.

34. Most of the houses in Murwillumbah which are protected by the main town levee have floor levels above the maximum recorded flood height of 6.1m (Murwillumbah gauge, 201902). The South Murwillumbah levee protects about 150 houses and a population of about 400. The town has three levees, which offer some protection to the residents. (See Annex A, Flood Mitigation Systems)

35. According to the Tweed Flood Study (2005) relevant to the Murwillumbah gauge, the CBD levee will overtop at 6.3m AHD at the vicinity of the bridge on the western side of the river. The south Murwillumbah levee overtops at height greater than 4.87m AHD effecting approximately 176 houses, with the East Murwillumbah levee overtopping at a height of 6.5m AHD.

36. The entire township of Murwillumbah will become isolated by a moderate flood event. The Tweed Valley Way will be impassable at several locations including between Tumbulgum and Murwillumbah when flood levels exceed 3.5m -4.0m on the Murwillumbah gauge. The CBD of Murwillumbah is a high flood island with individual property owners becoming trapped in raised houses in a flood event of 1% AEP.

37. Murwillumbah township has one (1) hospital, four (4) Aged Care Facilities, one (1) Retirement village, five (5) early childhood centres, ten (10) schools and 1 caravan park. At a height of 4.0m AHD (Murwillumbah gauge) water begins to approach the Greenhills Caravan Park. The park requires monitoring to ascertain the need for evacuations.

38. Between 3.0m and 4.0m (Murwillumbah gauge) water enters Budd Park, Alma Street and begins to flow across the road and along the floodway in South Murwillumbah. At this height the Roundhouse hotel will have water entering the ground floor of the premises.

39. Knox Park is subject to flash flooding with Hartigan Street being the lowest area within the Murwillumbah CBD precinct. The intersection of Nullum and Wollumbin St will become impassable with alternate routes being available along Byangum Rd and Brisbane Street.

40. According to the Murwillumbah Overtopping Analysis during the 100 year ARI Flood event in the Tweed River, (Tweed Valley Flood Study, 2005) the following events will occur in the Murwillumbah area, referenced to the Murwillumbah gauge

Murwillumbah Gauge Level (201902)	**Description**
5.1	Kyogle Road inundated
5.7	Tumbulgum Road inundated
5.8	Old Lismore Road inundated
6.3	CBD Levee reaches overtopping point
6.3 – 6.4	Access to Murwillumbah Bridge Inundated Wollumbin Street
6.3 – 6.4	Levee overtopped between Condong Street and Murwillumbah Bridge
6.5	Bray Park levee overtopped

Table 8

Sector 5 – Tumbulgum and Condong

41. The village of Tumbulgum is located 10km downstream of Murwillumbah on the eastern bank of the Tweed River. The village is opposite the confluence of the Rous River and has no levee protection and is flood liable. The Tweed Valley Way runs along the eastern border of the village, generally separating the village from agricultural activities.

42. The village of Tumbulgum consists of 94 houses with a population of 330 and six commercial premises. Residents possess a local knowledge and experience with flood within the community. Ground level flooding in the village occurs about once in 3 years and a 1% AEP flood would necessitate all residents being evacuated. (6.6m Murwillumbah gauge)

43. The village of Condong is located 4km downstream of Murwillumbah. The village has 153 houses with a population of 250. Low riverside levees protect the sugar mill from low level flooding and all houses have floor levels above the major flood level. A 1% AEP flood would affect all residential and commercial premises, including the sugar mill.

44. The speed of onset is approximately 3 hours from Murwillumbah to Condong and approximately 4 hours from Murwillumbah to Tumbulgum.

45. At a height > 3.5m (Murwillumbah gauge) Tweed Valley Way will close within four (4) hours at Tumbulgum and at a height > 3.9m Tweed Valley Way will be closed at Condong within four (4) hours of reaching this height at Murwillumbah gauge. It is possible that the Tweed Valley Way north of Tumbulgum in the vicinity of Meleluca Station may be cut prior to the road being cut in the Tumbuglum and Condong areas.

46. Due to closure of access and egress routes surrounding the village of Tumbulgum, if a decision is made to evacuate the village of Tumbulgum, the evacuation will be required to be commenced prior to the evacuation of the village of Condong.

Sector 6 – Chinderah/Kingscliff

47. This sector is bounded by Tweed River and west of the freeway from Dodd's Island to Barneys Point Bridge. The lower parts of the village of Chinderah will begin to experience low-level flooding at river heights as low as 1.5m AHD (Barneys Point gauge) and significant flooding by 2.0m AHD. Flooding could result in inundation depths varying from 0.2m to a maximum of approximately 2.5m and would affect about 135 houses and 22 commercial premises. Flood extent in this sector is influenced by tidal anomalies, storm surge and storm water flooding.

48. The main coastal erosion and inundation problems within the Tweed Shire occur at the Kingscliff village. Dreamtime Beach and Duranbah Beach suffer undercutting of dunes on the seaward side, threatening the collapse of dwellings and other buildings and secondly the potential breaking through of the dunes by

sea water, causing flooding and isolation of property on the landward side of the dunes.

49. The village of Chinderah is a low flood island whilst the Kingscliff community is a high flood island which will become isolated in a PMF event. The flood of record occurred in 1954 when 3.16m was reached at the Barneys Point gauge.

50. The intersection locally known as "Jenners Corner" situated at the intersection of Wommin Bay Road and Chinderah Bay Road will experience water over the road at 1.6m (Barneys Point gauge) whilst the Pacific Highway will be inundated at a height above 2.2m (Barneys Point gauge)

51. Of particular concern are the 8 caravan parks in the area. Five would have ground level flooding during a 20% AEP flood (1.5m), another two during a 5% AEP flood (2.2m), and the last becomes an island during anything greater than a 20% AEP flood (1.5m). Approximately 90% of residents in the Chinderah caravan parks are permanent residents occupying permanent van sites.

52. The caravan parks are predominantly located on the southern side of the Tweed River and include:

    a. On Tweed Caravan Park, 1/3 Chinderah Rd Chinderah

    b. Chinderah Village Caravan Park 94 Chinderah Bay Drive Chinderah

    c. Tweed River Hacienda Holiday Park 37-63 Chinderah Bay Drive, Chinderah

    d. Homestead Caravan Park Chinderah Bay Drive Chinderah

    e. Tweed Heritage Caravan Park 92 Chinderah Bay Drive, Chinderah

    f. Chinderah Lake Caravan Park 101 Anne Street Chinderah

    g. Royal Pacific Caravan Park 109 Chinderah Rd Chinderah

    h. Drifters Caravan Park, Wommin Bay Rd Kingscliff

53. This sector also contains the Wommin Bay Village Aged Care Facility situated at McKissock Drive Kingscliff. There are seventy (70) residents, predominantly of low care who are relatively free of the need for outside medical help. The facility has no alternative power source although it does possess two vehicles available to move residents. In June/July 2005 the facility was isolated for at least seven (7) days. Access to the facility is via McKissock Street which crosses the Walter Peate Reserve floodway on the eastern side of the premises.

54. The Kingshaven Aged Care Facility is situated at 24a Kingscliff Street, Kingscliff. The premises incorporate the Elourea Nursing Home which has 72 high care patients with the majority of high care patients requiring a 2:1 nursing care. The majority of the Kingshaven Aged Care Facility appears to have a floor level below the recent new developments located in Beach Street and Lorien Way.

55. Located within this sector is the Noble Lakeside Park, situated in Les Noble Parade, Chinderah. The park, although not a designated caravan park, is a retirement complex consisting of mobile homes for persons over the age of 55 years of age.

Sector 7 – Banora Point

56. Generally the residents of the lower Tweed Shire, which includes the sector of Banora Point, have a limited local knowledge and experience with flooding. According to the 2006 Census statistics 39% of the current population of the Tweed Shire, resided at a different address five years previously.

57. Banora Point is bordered by the Tweed River to the east, and the sectors of Bilambil & Terranora to the west and Tweed Heads South to the north.

58. Very little historical flood data exists for the Banora Point sector. Anecdotal evidence suggests the flood of record was 3.148m however due to the lack of location, date and datum this height is unable to be relied upon.

59. Within this sector an evacuation centre has been recognised, being the Banora Point Public School, situated in Pioneer Parade Banora Point.

60. There are five aged care facilities within the Banora Sector. It is highly likely that access roads to all these facilities will be affected in a 5% AEP event (2.2m Barney's Point). The facilities include;

    a. Amity Nursing Home, 18 Ballymore CRT Vintage Lakes

    b. St Martha's Hostel Leisure Drive Banora Point

    c. Winder's Lodge and Cottages Winders Place Banora Point

    d. Banora Point Retirement Village, 57 Leisure Drive

    e. RSL Darlington, Leisure Drive Banora Point

61. The Amity Nursing home is located within this sector at 18 Ballymore Court. This aged care facility has 56 high care patients who would need special assistance during evacuation, including an appropriate vehicle and carer. This facility suffered minor inundation during June/July 2005 and has no alternative power source. There is only one access/egress route into the facility and is located within 'Vintage Lakes" which is a newer development within the Banora Sector.

62. St Martha's Hostel and Winder's Lodge and Cottages are facilities which are situated adjacent to each other. It is estimated that inundation would commence during an event which is greater than 2.2m AHD (Barneys Point gauge) and possible isolation during a lesser event. Facilities are to be notified at the earliest possible time to assist with emergency management of these facilities.

Sector 8 – Terranora & North Tumbulgum

63. Terranora is bordered by Duroby Creek in the north and by the Tweed River in the south. Terranora will become isolated in a PMF, however will remain out of the flood extent and will require re-supply for up to 2000 people. The main population of Terranora is above the PMF level (5.8m Barneys Point gauge, 201426). The Sector will become isolated in a large flood event, when access/egress roads close.

64. North Tumbulgum is on the north bank opposite Tumbulgum. It consists of 20-30 houses and a population of approximately 75. Evacuation of rural dwellings in North Tumbulgum and outside of Terranora Village should be initiated before access roads are cut. This community is isolated by flooding, requiring re-supply only.

65. Located within this sector is the Lindisfarne Anglican School, Mahers Lane Terranora. The establishment is an ideal evacuation centre located in a flood free site with ample facilities contained on site. A large oval to the south east of the buildings allows for helicopter access. Terranora Road is liable to landslips which may impact on the access to this evacuation centre, therefore necessary earthmoving equipment may be required for deployment to this area.

Sector 9 – Bilambil & Bilambil Heights

66. Situated predominantly to the west of the Terranora Broadwater this sector has a population of approximately 3691 (2006 Census). Historically this sector has been a rural area regularly subjected to flooding from the Tomewin catchment. There are no detailed records available; however, the highest recorded flood level 3.48m at the bridge over Bilambil Creek on Bilambil Rd. Due to the lack of further information including, date and datum for this height, it is unsuitable to use this for risk assessment.

67. If major rain falls within the Tomewin Catchment area then the effects of flooding could be less than 3 hours. If major rain falls within the Duroby Creek Catchment area then flooding effects could be less than 3 hours.

68. Up to 200 residents could be inundated from flooding with adjacent sports fields and retirement village complex being affected by inundation. Rural properties will be isolated with the potential for landslips cutting major roads. The Bilambil Creek Residential Village, situated at 382 Bilambil Rd Bilambil is located on the western bank of the Bilambil Creek and consists of residents over the age of 55 years housed in mobile homes. During the January 2008 event up to 0.5m of flood water entered the retirement complex with the south eastern residents being worst effected.

69. Roads affected by flooding include Bilambil Road north of the Duroby Creek Bridge, Kennedy Drive leading into Scenic Drive. Within the Duroby area, Naponyah Road, Benevis Place and Ribbonwood Place will be affected by inundation which may cause isolation.

Sector 10 – Tweed Heads South

70. Sector includes areas of Shallow Bay Drive, Tweed City and Homemart Shopping Centre. Some of the flood prone areas in Tweed Heads South are protected by levees to 2.0 metres which represents somewhere between the 5% and 2% AEP flood levels (see Annex A). 1% AEP flood could affect about 250 houses, schools and numerous commercial/industrial/recreational premises to levels varying between 1.0 and 1.5 metres. Houses and premises built since 1984 are above the 1% AEP flood level (3.0m Barney's Point gauge)

71. Physical inspection of the south Tweed levee casts doubt about the level of protection the levee offers to nearby residents. Lack of maintenance and erosion may have reduced the original level of protection. Areas of particular concern are in the vicinity of the Tweed Heads South Bowling club.

72. During the 1954 and 1974 floods this area was predominantly pastoral, however since these dates a large amount of development has occurred within this sector. Since 1980 all development has been filled to the 1:100 year flood level, while residential floor slabs have generally been constructed to 300mm above this level. The road system has been designed as an overland flow for storm water.

73. The speed of onset from the upper catchment is believed to be approximately nine (9) hours for riverine flooding, although storm surge and tidal anomalies can impact on this time frame.

74. The Pacific Highway traverses the sector in a predominantly north south direction. Minjungbal Drive allows traffic access into the township proper of Tweed Heads. Dry Dock Road which generally traverses the sector in an east/west direction is one of only two evacuation routes from the sector and is inundated at approximately 1.5m with the road being completely impassable at a height of 1.7m (Dry Dock gauge).

75. Within this sector approximately 3000 to 4000 residents will be inundated in a 100yr flood event. In the same event approximately 9000 residents will be isolated. With evacuation routes closing early it is therefore imperative that the decision to evacuate is finalised prior to access/egress roads being affected.

76. There are six (6) caravan parks within the sector and it is recommended that at a height of 1.25m (Dry Dock Gauge) with further rises expected, the mobile caravans and cars are relocated from the caravan parks to the Tweed Heads Recreational area adjacent to the Police and Community Youth Club (PCYC). The caravan parks include:

    a. River Retreat Caravan Park, 8 Philip Parade Tweed Heads

    b. Tweed Broadwater Village, Kirkwood Rd Tweed Heads South

    c. Palms Village Caravan Park, 112 Dry Dock Rd Tweed Heads

    d. Tweed Billabong Holiday Park, Holden Street Tweed Heads

    e. Colonial Tweed Caravan Park 158 Dry Dock Rd Tweed Heads

    f. Boyds Bay Holiday Park, Dry Dock Rd Tweed Heads

77. There are six (6) schools within the sector which are vulnerable to a flood event equal to or greater than a 20 yr ARI event. (2.1m Dry Dock gauge) In a 20yr ARI event it is estimated that the flood depth within the schools will be between 0.0m – 0.5m. The six schools are:

    a. Tweed Heads South Public School, 277 Heffron Street, Tweed Heads

    b. Tweed River High School, Heffron Street, Tweed Heads

    c. Caldera School 37 Corporation Circuit Tweed Heads

    d. Lakeside Christian High School 3a Acacia Street Tweed Heads

    e. St James Primary School, Doyle Drive Banora Point

    f. St Joseph's College, Doyle Drive Banora Point

78. There are two aged care facilities (ACF) located within this sector. St Joseph's Apartments, situated at 1-9 Blundell Boulevarde, Tweed Heads South, is considered vulnerable in an event equal to or greater than a 20 yr ARI event. The ACF has 44 residents with nine (9) high care patients. The facility has no transport facilities and would require assistance if required to evacuate.

79. The second ACF is Raffles Assisted Aged care facility located at Peregrine Drive Tweed Heads South. Of the 98 residents 60% are high care which would also require special needs transport during evacuation. The facility would become isolated in a 20yr ARI event and according to modelling (Tweed Flood Study 2005) inundation would only occur in a PMF event.

80. There are two child care centres within this sector. ABC Child care is situated at 53-55 Greenway Drive whilst Teddy Bears Educational Child Care centre is location at 27 Corporation Circuit.

Sector 11 – Seagulls Estate

81. The Seagulls Estate is located south west of Tweed Heads and borders the Tweed River at the Terranora Broadwater. The estate is bound by Scenic Drive to the west and Jacaranda Avenue to the north east. Typical ground levels in this area are about 1.5m AHD and typical floor levels of houses built prior to 1984 vary between 2m and 2.4m AHD.

82. Houses built since 1984 should all have floor levels about 3.0m AHD. The major problem with this sector is that the only access route in and out of the estate, (Lakes Drive) may flood to a depth of 0.6 m in the 1 in 20 year flood. (2.2m on Barneys Point gauge). Anecdotal information from residents within this estate suggests that the majority of inundation is caused by the back-up of storm water and run-off.

83. The warning time from the upper catchment to this sector, for only riverine flooding is approximately 9 hours. However storm surge and tidal anomalies would have a significant impact on this timing as well as any events of intensive localised flash flooding from the Cobaki. Piggabeen and Bilambil Creek areas.

84. The sector is a low flood island which would be completely inundated in a PMF event. Between 1200 and 1500 residents would be affected by inundation. The main evacuation route is Kennedy Drive to the north which becomes impassable at a height > 1.8m (Dry Dock gauge)

Sector 12 – Tweed Heads West

85. Situated predominantly northwest of Terranora Creek and incorporating the Cobaki lakes area and bordering on the Queensland border, this sector has a population of approximately 6097. In 1954 and 1974 this sector had little or no development and according to records the flood level in 1954 reached 2.09m AHD in the vicinity of Ducat Street and in 1974 the flood level reached 1.6m AHD in March and 1.81m AHD in January.

86. The Pacific Highway traverses the sector in a north/south direction. In 2008 construction of the Tugun by-pass was completed, with the interchange located in the southern end of the sector.

87. Kennedy Drive and Scenic Drive are the main evacuation routes from within this sector. Scenic Drive heads south west of the sector to Bilambil Heights whilst Kennedy Drive provides access to the east and in particularly Tweed Heads CBD. At 1.8m (Barneys Point Gauge) it is highly likely that Kennedy Drive will be covered by almost 0.3m of water and impassable to normal traffic near the vicinity of Rose Street.

88. There are three vulnerable institutions/facilities situated within this sector. They are;

    a. Tweed Heads Nursing Centre, Carramar Drive Tweed Heads West

    b. Cobaki Broadwater Retirement Village, 192 Piggabeen Rd Cobaki

    c. Pyramid Caravan Park, 145 Kennedy Drive Tweed Heads West

89. The Tweed Heads Nursing Centre is considered flood free however the facility would be isolated by road closures which could affect staffing levels of the facility. In 2005 this facility required assistance to convey staff and medical supplies to the facility.

90. The Cobaki Broadwater Retirement Village consists of residents over 55 years of age, housed in mobile homes. There are approximately 280 mobile homes situated on the eastern bank of the Cobaki Creek.

91. The caravan park is situated in the vicinity of Rose Street which is inundated forcing the closure of Kennedy Drive at a height of 1.6m (Barney's Point gauge). The caravan park will become isolated and evacuation routes will be minimised.

Sector 13 – Tweed Heads

92. This sector encompasses areas East of Cobaki Bridge and North of Terranora Inlet. The sector has a population of 7125 (2006 Census). The Tweed Heads

sector extends to the north eastern corner of NSW and borders the state border with Queensland and the local government area of Gold Coast City Council. The sector is located at the mouth of the Tweed River. Terranora Creek branches off from the Tweed River just inside the estuary dividing Tweed Heads from Tweed Heads south.

93. The main access to the Tweed Heads sector is along the Pacific Highway that runs north and south through the township. Access from the north from the Gold Coast City council boundary is along Griffith Street Coolangatta through to Wharf Street. Southern access into the sector is along Minjungbal Drive with western access is along Scenic and Kennedy Drive.

94. There is limited local knowledge and experience with flood within the community with 23% of the population being a resident of the area for less than 5 years. Prior to the mid 1980's, the fill level for housing blocks was approximately 2.2m. Public works revised ocean level predictions at this time and Council adopted the higher 2.65m design flood level. All developments since have been required to be filled to 2.65m with floor levels 2.95m.

95. In a PMF event (5.8m on Barneys Point gauge), it is highly likely that all areas of this sector will be inundated, except for high land between Razorback and Flagstaff Hill, which becomes a high flood island. In a 1:100 year flood (3.0m Barneys Point gauge); older developed areas along Kennedy Drive west of the motorway, along the canal development near Ducat Street and Wyuna Road, and older developments around Tweed Hospital will be inundated.

96. Warning time for this sector would be 9 hours in the case of a riverine flood; however storm surges and high tides could reduce this time significantly. In the event of intensive localised flash flooding, evacuation time could be less than 4 to 5 hours.

97. Conservatively, in a PMF event, approximately 6,500 residents will be inundated with a further 6,000 residents becoming isolated. In a 100yr ARI event the amount of residents becoming inundated and isolated will be 3,000 and 2,500 respectively.

98. The Tweed Hospital is located within this sector at Powell Street Tweed Heads. The hospital has a bed capacity of 214 beds and is affected by floodwaters in a 100yr ARI event or greater. In a PMF event the extent of flooding would be between 1.0m and 2.0m of floodwaters throughout the ground level. The provision of medical supplies including linen/laundry and prescribed medications has been de-centralised and the hospital would require re-supply during an event of more than 3 days of isolation.

99. Also within this sector is the Amaroo Nursing Home located at Keith Compton Drive. This aged care facility has 101 residents with approximately 26 % of patients being of high care. The facility is a single level building which barely avoided inundation in June/July 2005. It is highly likely that the facility would be impacted upon in an event of 5% AEP or greater. The facility has a vehicle which it shares and consequently the high care patients would require specialised transportation in times of evacuation.

100. Other factors for consideration within this sector include four service stations, Police station, council depot and sewerage works, Ourimbah Road industrial area, impact of tourism and associated accommodation and a Housing Commission development which previously required evacuation in a large storm event.

101. It is highly likely that during an event greater than a 20 yr ARI a significant proportion of residents will be isolated due to localised flooding and commercial businesses will be unable to function. It is envisaged that the majority of people will shelter in place due to housing being built above the 100yr ARI flood level; however in an event greater than a 100yr ARI the same residents may require evacuation.

102. Several evacuation centres have been recognised both within this sector and within the adjacent sectors. (See Annex F) However it is probable that the evacuation centres will not be able to cope with evacuees if the majority of residents decide to evacuate to a nominated evacuation centre. The current recognised evacuation centres would be able to adequately support approximately 500 - 1000 evacuees.

Sector 14 – Fingal Head

103. This sector encompasses the coastal strip bounded by the Tweed River to the north and west, the Pacific Ocean to the east and Wommin Bay Rd to the south. This sector can be affected by oceanic inundation and flooding from the Tweed River in the Chinderah floodplain during a PMF event. According to the 2006 Census 575 people reside within the Fingal Head sector which consists of 318 dwellings.

104. Fingal Head Village which consists of the surf club, general store and caravan park reception is a high flood island with the remaining houses within Fingal Head being a low flood island. Fingal Head becomes isolated as the magnitude of flooding increases.

105. Wommin Lake Crescent is affected at 1.5m on Barneys Point Gauge (201426). The Fingal Rd/Wommin Lake Crescent intersection cuts early during an event that is less than the 20% AEP (1.5m on gauge). Early unassisted evacuation will be necessary before the Fingal Rd/Wommin Lake Crescent intersection is cut; otherwise high clearance vehicles will be necessary. Conventional passenger vehicle access will be restricted once the water level on the roads reaches 0.3m.

106. Lettia Rd which heads directly north from the Fingal Head village contains approximately ten (10) houses which will suffer the affects of flooding. The residents of these houses will require sufficient warning to prepare and evacuate their premises. This will need to occur prior to the Fingal Rd being cut.

107. The sector contains one caravan park, being the;

    a. Fingal Holiday Park, Prince Street, Fingal Head.

108. Flood waters begin to enter the lower parts of the caravan park at approximately 2.1m (Barneys Point gauge) necessitating the re-location of the caravans and residents

Sector 15 – Bogangar/Cabarita

109. The sector covers an area approximately 14km long by 5.5km wide along the coast from just south of Kingscliff to slightly below Hasting Point. The sector is bordered by the Pacific Highway in the west. It includes the villages of Cudgen, Duranbah, Bogangar, Round Mountain, Cabarita and Hasting Point.

110. This sector attracts people for regular daily visits as well as short term holidays and scheduled school holidays. The sector is part of a 37kilometre coastline and contains areas of wetlands, remnant coastal rainforest and estuarine forests.

111. It is a flash flood environment (less than 6 hours prior warning) with the main area becoming inundated from flooding being north of Banksia Avenue. Over one hundred properties were inundated in 2005 and the entire population can become isolated. Within the sector there is a school, reticulated sewer and caravan park under threat. Tamarind Avenue in Cabarita-Bogangar is a low lying area that is frequently flooded.

112. A coastal floodplain exists between Kingscliff and Pottsville. This area is flooded independent of the Tweed River, being affected by Cudgen Creek, Cudgen Lake, Cudgera Creek and Mooball Creeks. The following communities may be affected:

    a. Cabarita-Bogangar (total population 1,500) has between 74 and100 houses may require evacuation. There is one caravan park in the area

    b. Hastings Point (total population 760) may be isolated for short periods however residents tend to move to the high ground if short term evacuations are necessary. This area has 3 caravan parks with a capacity for 436 caravans.

    c. Pottsville (total population in excess of 1200) 10-20 houses can be affected by flooding however evacuations should not be necessary. This area has 2 caravan parks with a capacity of 256 caravans.

113. Access from the south can be cut by local heavy rainfalls, but usually for periods of less than 12 hours. Access from the north depends on the flood situation at Chinderah. Roads surround this sector can be inundated for up to 3 days.

114. As stated above there are several caravan parks within this sector. They are:

    a. North Star Holiday Resort, 1 Coast Rd, Hastings Point.

    b. Hastings Point Caravan Park, Tweed Coast Rd, Hastings Point.

    c. Hasting Point Holiday Village, 87-89 Tweed Coast Rd, Hastings Point.

    d. Cabarita Beach Caravan Park, 1 Coast Road Bogangar.

Sector 16 – Pottsville/ Wooyung

115. This sector is also part of the 45 kilometre coastline within the Tweed Shire. Again there is a diminishing local knowledge and experience with flood within the community. The northern part of Pottsville Village, Seabreeze and Koala Beach are in the Cudgera Creek Catchment. The southern part of Pottsville Village, Pottsville Waters and Black Rocks are in the Mooball Creek Catchment. Each catchment may have different flooding characteristics.

116. The Pottsville village has a population of 3298 (2006 Census) and is a typical coastal village which attracts holidaying tourists and day visitors throughout the year. Tourism is the biggest industry along the coastal strip particularly within the village of Pottsville.

117. Pottsville village consists of single and double storey residential housing, up to three-storey unit development, apartment and resort living and housing. A large percentage of people live in townhouses, flats, units, apartments, manufactured home estates and caravan parks.

118. Historical data suggests that approximately 100 homes were inundated in 2005. It is believed the inundation occurred due to the inability of the drainage system to remove storm water. Flood levels at Cudgen Lake, Hastings Rd and Friday Island areas, rose 3.2 metres during the 2005 flood. The outlet of Cudgen Lake was restricted and prevented outflow of built-up water in that catchment (Daily News July 16 2005). 2.29m was the maximum recorded height at Pottsville Village. Areas which suffered significant flood effects included the premises in Elanora Avenue and Coronation Drive.

119. Within this sector there are two caravan parks:

    a. Wooyung Beach Motel & Caravan Park, 515 Wooyung Road, Wooyung

    b. Pottsville North Holiday Park, 27 Tweed Coast Rd, Pottsville Beach

Camping Reserves

120. The Mount Warning Caravan Park situated on the Mount Warning Road via Murwillumbah has 150 powered and un-powered sites. The caravan park can become isolated during a flood event. This is the only significant camping ground identified in this area

Road Closures

121. Important access links in the valleys that are affected by flooding are as follows:

    a. Tweed Valley Way between South Murwillumbah and Chinderah (once a year, at the river crossing).

    b. Tweed Valley Way between Melaleuca Station and Banora Point approximately every 5 years

c. Main Roads 142 (Kyogle Rd), 143 (Queensland Rd), 399 (Numinbah Rd) & 541 (Dulguigan Rd) (once in five (5) years); and

d. Various roads which cross the Coastal Creeks floodplains (once in one (1) or two (2) years).

e. Kennedy Drive and Dry Dock road at various points - every 1 - 2 years

f. Mooball to Pottsville

g. Clothiers Creek Rd from Condong to Cabarita

122. The following roads are disrupted by flooding:

Murwillumbah Flood Sector	**Tweed Heads Flood Sector**
Murwillumbah to Tweed Heads (Tweed Valley Way)	Tourist Road No 4028, Kingscliff to Chinderah
Main Road No 142, Bray Park to Uki (Kyogle Rd)	Fraser Drive, Terranora to Tweed Heads South
Main Road No 143, Murwillumbah to Dungay (Queensland Rd)	Kennedy Drive, Bilambil to Tweeds Heads
Main Road No 399 (Numinbah Rd), Boat Harbour to Main Road No 143	Round Mountain Road, Palmvale to Hastings Point
Main Road No 541, Dungay to North Tumbulgum (Dulguigan Rd)	Cudgera Creek Road, Burringbar to Pottsville
Bray Park to Eungella, Tyalgum Road	Pottsville Road, Mooball to Pottsville
Wooyung Road, Pottsville	Clothiers Creek Road, Clothiers Creek to Tanglewood
Mooball to Pottsville	
Mooball to Murwillumbah Road	

Table 9

Effects on Utilities and Infrastructure

123. Dependant upon the flood severity, the impact upon infrastructure and utilities within the Tweed Shire could be significant. Utilities and infrastructure would be affected in the following sectors;

a. Fingal Head

b. Chinderah/Kingscliff

c. Tweed South

d. Murwillumbah

e. Tumbulgum

f. Uki

g. Tyalgum

124. The scope of the problem is varied however the potential for serious disruption to the community is possible. Problems such as failure of sewerage and water treatment plants, pump stations, pipelines, roads, utilities and telecommunications is most likely in a significant event.

NSW STATE EMERGENCY SERVICE

SES RESPONSE ARRANGEMENTS FOR TWEED SHIRE

Volume 3 of the Tweed Shire Local Flood Plan

Last Update: November 2008

FloodSafe

ANNEX C - GAUGES MONITORED BY THE TWEED SHIRE SES LOCAL HEADQUARTERS

Gauge Name	River	AWRC No	Easting	Northing	Projection	Datum	Zero Gauge	Conversion to AHD	Type	Owner
Boat Harbour No.3	Rous River	201005	532938.255	6868452.004	MGA 94	ASS	3.738	N/A		DWE
Kynnumboon	Rous River		538179	6867895	MGA 94	TRHD		-0.926	Telemeter	MHL
Eungella‡	Oxley River	201001	528723.666	6863585.036	MGA 94	ASS		+13.285	Telemeter	DWE
Uki‡	Tweed River	201900	532742.434	6856977.060	MGA 94	ASS		+9.04	Telemeter	DWE
Tyalgum (Oxley River)‡	Oxley River	201006							Manual	
Bray Park Weir	Tweed River		536209	6864484	MGA 94	TRHD		-0.934	Telemeter	MHL
Chillingham‡	Rous River	201008							Manual	
Tyalgum‡	Pumpenbil Ck	201901							Manual	
Murwillumbah Bridge	Tweed River	201420	539219	6866353	MGA 94	TRHD		-0.909	Telemeter	MHL
Murwillumbah*‡	Tweed River	201902	539295	6866485	MGA 94	AHD		0	Telemeter	TSC/BoM
Tumbulgum‡	Tweed River	201432	545172	6871996	MGA 94	TRHD		-0.893	Telemeter	MHL
Tumbulgum			545212	6872325	MGA 94					TSC
Barneys Point (Chinderah) *^	Tweed River	201426	554110	6877724	MGA 94	TRHD		-0.883	Telemeter	MHL
Barneys Point	Tweed River		554505	6877666	MGA 94	AHD		0	Telemeter	MHL
Dry Dock	Tweed River	201428							Telemeter	TSC
Letitia 2A	Tweed River	201429	554314	6882414	MGA 94	TRHD		-0.886	Telemeter	MHL
Terranora	Broadwater	201447	548941	6880375	MGA 94	TRHD		-0.853	Telemeter	MHL
Cobaki	Broadwater	201448	549348	6883136	MGA 94	TRHD		-0.863	Telemeter	MHL
Point Danger‡	Tweed River	201904							Manual	

Notes:

1. The Bureau of Meteorology provides flood warnings for the gauges marked with an asterisk (*).
2. SES Local Flood Advices are provided for the gauges marked with a single cross (†).
3. The SES holds a Flood Intelligence Card for the gauges marked with a double cross (‡).
4. Murwillumbah and Banora SES monitor Enviromon from their HQ locations.
5. Barneys Point Gauge has replaced Chinderah (Oxley Cove) as the BoM warning gauge (see ^)

ANNEX D - DISSEMINATION OF SES FLOOD BULLETINS

The Richmond Tweed SES Region Headquarters distributes SES Flood Bulletins and other flood related information (including Flood Warnings) to the following regional media outlets:

Television Stations:

Station	Location
Prime	Lismore
Prime	Gold Coast
NBN	Lismore
NBN	Gold Coast
SC Ten	Goonellabah

Radio Stations:

Station	Location	Frequency	Modulation
2MW Radio 97	Tweed Heads	972 100.4	AM FM
ABC North Coast	Lismore	720 & 94.5	AM/FM
ABC Gold Coast	Gold Coast	91.7	FM
Gold Coast FM	Gold Coast	92.5	FM
Sea FM	Gold and Tweed Coast	90.9	FM
2 LM/ 2ZZZ FM	Lismore	100.9	FM
2 NCR	Lismore	92.9	FM
2 SM	Sydney	1269	AM
Bay FM	Byron Bay	99.9	FM
Coraki FM	Coraki	88.9	FM
Cow FM	Casino	107.9	FM
Gold FM	Gold Coast	1043	FM
Hot Tomato FM	Gold Coast	102.9	FM
Nimbin FM	Nimbin	102.3	FM
Paradise FM	Ballina	101.9	FM
Sea FM	Gold Coast	90.9	FM

Newspapers:

Name	Location
Daily News	Tweed Heads
Gold Coast Bulletin	Gold Coast
Lismore Echo	Lismore
Northern Star	Lismore

Other Agencies:

Name	Location
NSW Department of Primary Industries	Lismore
Ambulance Control Centre	Lismore
ARMY 41 Bn	Lismore
Ballina LEMC	Ballina
Byron Bay LEMC	Mullumbimby
Dept Community Services	Ballina
Country Energy	Lismore
DEMO	Lismore
Dept of Commerce	Lismore
Dept Environ & Climate Change	Alstonville
Gold Coast City Council	Gold Coast
Health Services	Lismore
HeliBase- Admin	Lismore
Kyogle LEMC	Kyogle
Lismore LEMC 1	Lismore
Lismore LEMC 2	Lismore
Lismore LEMC 3	Lismore
NSWFB	Lismore
Police Command- Northern Region	Newcastle
Ports Authority	Newcastle
Qld CDRS	Brisbane
NSW Police/Tweed/Byron LAC	Tweed Heads
RFS - North	Newcastle
Rich Valley LEMC	Casino
RTA	Ballina
Telstra Country Wide	
Ministry of Transport	Lismore
Tweed LEMC	Tweed Heads
Workcover Authority	Ballina

ANNEX E - TEMPLATE EVACUATION WARNING MESSAGE FOR [ENTER NAME OF AREA]

Evacuation Warning for [ ]

Date/Time of Issue: [ ]

Authorised By: [ ]

The Bureau of Meteorology has predicted a flood level of [ ] metres at [ ] ***(place)*** at [ ] ***(time).*** This means that the following area(s) may be inundated **[ ]**.

It is recommended that you prepare to evacuate/for evacuation within the next [ ] hours. If you leave it later, the roads may be congested or closed.

To prepare for evacuation, you should:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. Some items may be able to be placed in ceilings.
- Gather medicines, personal and financial documents and mementos together to take with you.
- Listen to radio stations [enter station] for further information and to confirm this warning.
- If possible, check to see whether your neighbours need help.
- Make arrangements for care of pets or companion animals.

If evacuation is necessary:

- Turn off the electricity, gas and water.
- Take three days' supply of clothes with you.
- If you have a car, drive to the evacuation centre at [ ] ***(specify route if appropriate)***.
- If you don't have a car, buses will operate on normal routes. Special transport can also be provided on request if necessary, telephone [ ].
- So that you can be accounted for, it is important that you register at the evacuation centre.
- After registering, you may go to the house of a friend or relative. Alternatively, accommodation will be arranged for you.
- The Police will provide security for your property while you are away.

ANNEX F - EVACUATION ARRANGEMENTS FOR THE TWEED SHIRE COUNCIL AREA

Background

1. Flooding affecting the Tweed Shire may require the evacuation of small isolated communities (e.g. Fingal Head Sector) or larger communities (e.g. Tweed Heads Sector). Flood evacuation warning time could be less than six hours and, given the diversity and variation in community demographics, significant resources may be required to effect an evacuation of priority.

2. Evacuations are made difficult by flash flooding affecting evacuation routes.

3. Approximately 12,000 people in Tweed Shire Council area will require evacuation in an event equal to or greater than 1 in 100yr ARI flood event.

Arrangements

4. **Control.** During floods evacuations will be controlled by the NSW SES. Small-scale evacuations will be controlled by the Tweed Shire SES Local Controller. Should the evacuations operations escalate beyond the capabilities of local resources control may be handed over to the Richmond Tweed SES Region Controller.

5. **Conduct.** Evacuations will be controlled by the SES and conducted in four phases:

    a. Phase 1 - Warning.

    b. Phase 2 – Withdrawal.

    c. Phase 3 – Shelter.

    d. Phase 4 – Return.

Decision to Evacuate

6. Responsibility for issuing any general evacuation order during flooding rests with the Tweed Shire SES Local Controller who exercises authority in accordance with Section 22(1) of the State Emergency Service Act 1989. However, the decision to evacuate may be taken after consultation with the Local Emergency Operations Controller and the Richmond-Tweed SES Region Controller.

7. When deciding to evacuate the following should be considered:

    a. Predicted flood level and rate of rise.

    b. Rainfall situation and rainfall predictions.

c. Condition of levee banks.

d. Condition of evacuation routes.

e. Characteristics of the at risk population.

f. Time of day.

g. Likely duration of evacuation operations and time available to conduct evacuations.

h. Likely duration of any isolation and preparedness of the community to cope with isolation.

i. Condition of essential services.

j. Environmental risks posed to evacuees in evacuating

8. As far as possible, evacuations will be carried out before inundation occurs.

9. Self-motivated evacuation. Some people will make their own decision to evacuate earlier and move to alternative accommodation using their own transport. These evacuees will be advised, via the media, to inform the Police or SES of their evacuation and their temporary address.

10. Operational Sectors For the purpose of managing evacuations during severe floods and instances of coastal erosion/inundation, Tweed Shire Council has been divided into sectors as listed in Annex B Table 8. Evacuation procedures and information for each sector has been outlined below.

11. **Evacuation triggers**. The following conditions are triggers for evacuation:

a. **Failure of Essential Services**. The failure of public utilities such as sewerage, power, telephones and water pose a significant health risk to residents on the floodplain or in flood affected areas. In the event of any or all of these systems failing or potentially failing, the need for evacuations will be discussed with the members of the LEMC.

b. **Flooding affecting properties**. Evacuations are to occur, if it is likely properties will be flooded.

c. **Isolation of properties**. Persons who are not prepared for isolation or unsuited due to medical conditions etc should be encouraged to evacuate.

d. **Sector Evacuation Triggers**. Evacuation triggers relative to specific sectors are detailed as part of this Annex.

Phase 1 – Warning

12. **Evacuation warnings.** On the receipt of flood warnings predicting peak heights at relative gauges as detailed in Annex C, the Tweed Shire SES Local Controller will consult as necessary to determine the level of the threat and the

need to consider evacuations. As soon as possible after the decision to evacuate is made, the Richmond Tweed Region Headquarters will issue evacuation warnings to the 'at risk' residents, via media outlets, indicating what people should do before evacuating and when actually doing so. The Tweed Shire SES Local Controller will ensure that the evacuation warnings will be disseminated at a local level.

13. **Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at Annex E. These are disseminated via:

- The radio and TV stations listed in Annex D. Bulletins may be preceded by the Standard Emergency Warning Signal (Authorisation required by Richmond Tweed SES Region Headquarters).
- Door-knocks by emergency service personnel.
- Public address systems from emergency service vehicles.
- Telephone.
- Two-way radio.
- Direct access to Radio Stations as listed in Annex D.
- SES Flood Bulletins.
- Variable Message Signs.

Phase 2 – Withdrawal

14. **Introduction.** Withdrawal involves the actual removal of the community/individuals from dangerous or potentially dangerous areas to safer areas.

15. **Movement.** Evacuees should initially be encouraged to move by foot if practical or use their own transport where distance and circumstances prevent movement by foot to a safe area. The Tweed Shire SES Local Controller is responsible for the arrangement of transport for those people without their own vehicles.

16. **Phasing**. Evacuation and warning priorities will vary depending on the trigger as described below:

Triggers	Priority 1	Priority 2	Priority 3	Priority 4
Severe Weather Warning	Schools and Child Care Centres, Special needs/home care patients	Elderly and infirm		

Triggers	Priority 1	Priority 2	Priority 3	Priority 4
Failure of Essential Services	Hospitals* Special* needs/home care patients	Aged Care Facilities	Identified at risk home residents	Other residents and pets as possible.
Flooding affecting properties	Special needs/home care patients	Ground Level residents/Caravan Parks	Other residents and pets when possible	
Tsunami Warning	Beaches	Residences within 1 kilometre from high tide mark and less than 10 metres above mean high tide levels	Schools	Other
Isolation of properties	Elderly and infirm	Single Parent families	Re-supply	

Table 10

17. **Large-scale evacuations.** When large scale evacuations are likely, the Tweed Shire SES Local Controller will liaise with the Richmond-Tweed SES Region Headquarters and request the deployment of helicopters and additional flood boats/resources if required.

18. **Health Demographics**. There are a number of persons within the community who have special needs and support in the event of an evacuation and these may include:

    a. Persons with pre-existing medical conditions, in particular asthma, diabetes and epilepsy, and communicable diseases.

    b. Pregnant women.

    c. Home care patients (location data maintained by NSW Health via NCAHS Community Health Facilities); and

    d. Aged care facilities.

19. **Animals.** Assistance animals (guide dogs, hearing assistance animals, etc) will remain in the care of their owners throughout the evacuation. This includes transport and access into evacuation centres etc. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners when being transported via aircraft or flood rescue boats. DPI will make separate arrangements for the evacuation and care of companion animals.

20. **Doorknocking.** Field teams conducting doorknocks will record and report back the following information to the Operations Centre:

    - Addresses and locations of houses doorknocked and/or evacuated.
    - The number of occupants.
    - Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).
    - Details of residents who refuse to comply with the evacuation order.

21. **Refusal to evacuate.** Field teams cannot afford to waste time dealing with people who are reluctant or refuse to comply with any evacuation order. These cases should be referred to the Local Emergency Management Operations Controller who will arrange for Police to ensure their evacuation.

22. **Security.** The NSW Police Force will provide security for evacuated areas.

23. **Transport and storage**. Transport and storage of furniture from flood threatened properties will be arranged as time and resources permit.

Phase 3 – Shelter

24. **Evacuation centres/areas**. The usual purpose of evacuation centres is to meet the immediate needs of victims, not to provide them with accommodation. Evacuees will be advised to go to or be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the Tweed Shire SES Local Controller, but managed as soon as possible by the DoCS. Identified Evacuation Centres/Areas specific to sectors are listed in their respective Sector Evacuation Strategies below.

25. **Action on arrival.** On arrival, evacuees will be:

    a. registered;

    b. medically checked, if necessary; and

    c. provided with their immediate welfare needs.

26. **Registration.** The NSW Police Force will ensure that all evacuees are registered on arrival at the designated evacuation centres.

27. **Animal shelter compounds**. Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees if required. Facilities will be managed by DPI.

Phase 4 – Return

28. Once it is considered safe to do so, the Tweed Shire SES Local Controller will authorise the return of evacuees to their normal or alternative place of residence. This decision will be made in consultation with Engineering Services Functional Area Co-coordinator in regards to matters such as the electrical safety of buildings.

29. The return will be controlled by the Tweed Shire SES Local Controller and may be conducted, at his/her request, by DoCS.

Sector 1 - Uki

General

30. This sector is dominated by single dwelling residential development. The village is serviced by a small commercial precinct and there is no designated industrial area within the village, however it is surrounded by agricultural activities. Uki sector is within a flash flood environment.

Community Profile

Census Description – Uki	Result (2006 Census)
Total persons	2590
Total persons aged 5 years and younger	136
Aged 65 Over	248
Total persons where English is 2nd language	94
Single parent families	144
Resident of 5yrs or less	506
Dwellings without vehicles	38
Total number of dwellings	1113
Total persons of indigenous origin	58

Sector Control

31. **Control.** The Tweed Shire SES Local Controller will co-ordinate evacuations in this sector with the assistance of the NSW Rural Fire Service.

32. **Conduct.** The NSW Rural fire Service and NSW SES will assist in the conduct of evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

33. Evacuation occurs when the Uki gauge (201900) is expected to exceed 6.0m. 10-12 houses in Smith Street will be affected at this height.

Method of Evacuation

34. Historically, telephone contact and door knocking by local residents and NSW RFS volunteers have effected the previous evacuations.

Evacuation Centres

35. Uki Public School, Main Street Uki is most suitable location

36. Uki Public Hall & Recreation Reserve, Main Street Uki

Evacuation Routes

37. Residents should be encouraged to take local roads/streets to Main Street Uki.

Evacuation Route Closure

38. Evacuation routes to Murwillumbah will be closed at Anthony's Flat on Bakers Road at a height of 6.9m on the Uki gauge. The Kyogle Road will be cut at Perch Creek Kunghur.

Vulnerable Institutions and Facilities Affected

39. Nil identified.

Time

40. The available time to warn the community is variable as the sector is a flash flood environment and it could be as short as 2 hours.

Sector 2 - Tyalgum

General

41. Located 24kms west of Murwillumbah on the Tyalgum Road. The area is dominated by single dwelling residential development. The village is serviced by a small commercial precinct with no designated industrial area. The area is surround be agricultural activities. The entire area is subject to flash flooding.

Community Profile

Census Description - Tyalgum	Result (2006 Census)
Total persons	1150
Total persons aged 5 years and younger	77
Aged 65 Over	108
Total persons where English is 2nd language	27
Single parent families	64
Resident of 5yrs or less	206
Dwellings without vehicles	23
Total number of dwellings	502
Total persons of indigenous origin	34

Sector Control

42. Control. The Tweed shire SES Local Controller will control evacuations in this sector

43. Conduct The NSW Rural Fire Service and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

44. Evacuation is to proceed when the Tyalgum gauge (201006) reaches 9.2m with further rises expected.

Evacuation Centres

45. Tyalgum Public School, Coolman Street Tyalgum

46. Tyalgum Hall, 1 Cudriga Street Tyalgum

Evacuation Routes

47. Local roads and streets to above locations

Evacuation Route Closure

48. Tyalgum village can become isolated by floodwaters. Time of isolation is expected to be less than 48 hours.

Time

49. The available time to warn the community is variable as the area is a flash flood environment.

Sector 3- Chillingham

General

50. Located west of Murwillumbah on the Rous River this sector is located in a flash flood environment. Rainfall in the catchment area, particularly the Bald Mountain area can significantly impact upon the Chillingham village

Community Profile

Census Description - Chillingham	Result (2006 Census)
Total persons	2685
Total persons aged 5 years and younger	154
Aged 65 Over	325
Total persons where English is 2nd language	69
Single parent families	116
Resident of 5yrs or less	523
Dwellings without vehicles	31
Total number of dwellings	1119

Sector Control

51. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

52. Conduct The NSW Rural Fire Service and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

53. Rainfall in the Bald Mountain area should be monitored. Over 350mm of rain fell in Bald Mountain area over a 24hr period in January 2008 which caused significant flash flooding at Chillingham

Evacuation Centres

54. Chillingham Village Hall

Time

55. Flash flood environment with rapid onset of localised flash flooding.

Sector 4 - Murwillumbah

General

56. The township of Murwillumbah has a population of 7696, with approximately 400 residents living in the south Murwillumbah area. The majority of people live in separate houses, with a small percentage living in flats, units and apartments. The main commercial /retail area is located in central Murwillumbah and is protected by a levee system. An industrial/commercial area is located at South Murwillumbah with protection from a 1 in 10yr (ARI) event.

57. Murwillumbah also has a 102 bed hospital located in Ewing Street.

Community Profile

Census Description –Murwillumbah	Result (2006 Census)
Total persons	7696
Total persons aged 5 years and younger	446
Aged 65 Over	1614
Total persons where English is 2nd language	161
Single parent families	462
Resident of 5yrs or less	1684
Dwellings without vehicles	415
Total number of dwellings	3334
Total persons of indigenous origin	145

Sector Control

58. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

59. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

60. Evacuation from South Murwillumbah will occur when the Murwillumbah gauge (201902) is predicted to exceed 4.85m. In January 2008 evacuations commenced when the Murwillumbah gauge height reached 2.68m at midnight 5th January. Evacuations were successfully competed by 3.00am where the gauge height was 3.95m.

61. The CBD of Murwillumbah should be evacuated when the height is predicted to reach and exceed 6.3m (Murwillumbah gauge). The Tweed Flood Study 2005 suggests that the levee system will overtop near the road bridge at a height of 6.3m AHD which is equivalent to a 1 in 60-80 yr ARI flood.

Method of Evacuation

62. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged with the assistance of the Regional Transport Co-ordinator. Once road access is cut SES Flood Rescue boats will be utilised.

Evacuation Centres

63. Murwillumbah TAFE, Main Street Murwillumbah

64. Sacred Heart (Catholic Hall) Murwillumbah Street Murwillumbah

65. Wollumbin High School, North Arm Rd Murwillumbah

Evacuation Routes

66. South Murwillumbah/Condong Residents:

    a. Local streets to Tweed Valley Way - Alma Street – Wollumbin St – Brisbane St – Murwillumbah St towards TAFE/Hall

67. Murwillumbah residents:

    a. Local Streets to Wollumbin St – Brisbane St – Murwillumbah St to TAFE/Hall OR

    b. Local Streets to Byangum Rd/Nullum St towards TAFE/Hall

68. Wollumbin High/North Arm Rd residents:

    a. Local streets to North Arm Rd – East/West to Wollumbin High

Evacuation Route Closure

69. The Tweed Valley Way is cut at a height of between 3.5m – 4.0m (Murwillumbah gauge) which prevents evacuation to the Lower Tweed.

70. Water will be over Alma Street at Budd Park at a height of 4.0m on the Murwillumbah gauge. This will need to be considered when evacuations of South Murwillumbah are commenced.

Vulnerable Institutions and Facilities Affected

71. The following institutions and facilities may require evacuation;

    a. Greenhill's Caravan Park will have water approaching when flood height reaches 4.0m (Murwillumbah gauge)

b. East Murwillumbah School which is located outside the levee wall

Time

72. The available time to warn the community is between 3-4 hours.

Sector 5 – Tumbulgum And Condong

General

73. This sector consists of 94 houses and a population of 330 people in the Tumbulgum area and 153 houses and 250 residents in the Condong area.

74. If evacuation is necessary the village of Tumbulgum is to be evacuated prior to Condong.

Community Profile

Census Description - Tumbulgum	Result (2006 Census)
Total persons	2536
Total persons aged 5 years and younger	145
Aged 65 Over	297
Total persons where English is 2nd language	72
Single parent families	97
Resident of 5yrs or less	569
Dwellings without vehicles	24
Total number of dwellings	983
Total persons of indigenous origin	46

Sector Control

75. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

76. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

77. In January 2008 a flood height of 2.42m (AHD) was reached which caused ground surface flooding in Bawden Street, Irving Street, Fawcett Street and Gray Street. At this height properties in Riverside Drive were above the flood level, except for houses in the vicinity of Tumbulgum Bridge. Evacuation did not occur at this height with residents remaining inside their premises. Further to this, at this height access routes to Lower Tweed and Upper Tweed via Tweed Valley Way were closed.

Method of Evacuation

78. There are no suitable evacuation centres in the Sector but the following evacuation centres from Sector 4 (Murwillumbah) and 8 (Terranora) can be used for Evacuation Centres as long as the Tweed Valley Way remains open (closes at 3.5m AHD at the Murwillumbah gauge) and the Terranora Road remains open.

Evacuation Centres

79. Murwillumbah Sector

    a. Murwillumbah TAFE, Main Street Murwillumbah

    b. Sacred Heart (Catholic Hall) Murwillumbah Street Murwillumbah

80. Terranora Sector

    a. Lindisfarne Anglican School, Mahers Lane Terranora

Evacuation Routes

81. To Murwillumbah:

    a. Tweed Valley Way to Murwillumbah - Alma Street – Wollumbin St – Brisbane St – Murwillumbah St towards TAFE/Hall

82. To Terranora:

    a. Cross Tumbulgum Bridge to Terranora Rd – Mahers Lane – Lindisfarne Anglican School

Evacuation Route Closure

83. The Tweed Valley Way will close at a height of 3.5m (Murwillumbah gauge) at Tumbulgum and 3.9m (Murwillumbah gauge) at Condong. Closure of this evacuation route will prevent access to Murwillumbah evacuation centres. The Flood Intelligence Collection and Review Draft Report July 2008 suggests that Terranora Road had been cut by floodwaters between Tumbulgum Bridge and high ground to the north.

Vulnerable Institutions and Facilities Affected

84. The following institutions may require evacuation (at risk)

    a. Tumbulgum Public School

Time

85. The speed of onset between Murwillumbah and Tumbulgum/Condong is between 3-4 hours.

Sector 6 – Chinderah/Kingscliff

General

86. This sector is located on the Chinderah Floodplain and will become isolated when road access is lost and can remain isolated for up to 5 days. The average ground level of the Chinderah and Barney's Point area is about 2.0metres.

Community Profile

Census Description – Chinderah/Kingscliff	Result (2006 Census)
Total persons	7357
Total persons aged 5 years and younger	343
Aged 65 Over	1881
Total persons where English is 2nd language	79
Single parent families	389
Resident of 5yrs or less	2173
Dwellings without vehicles	356
Total number of dwellings	3982
Total persons of indigenous origin	306

Sector Control

87. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

88. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

89. Evacuation is to proceed when it is predicted to reach and/or exceed 2.0m (Barney's Point gauge). The removal of caravans from caravan parks, particularly the Chinderah Village Caravan Park should commence when it is predicted to reach and/or exceed 1.5m (Barney's Point gauge). Staged evacuations of lowest lying caravans and residents should commence at this height. Caravans should be re-located to Marine Parade Kingscliff unless cyclonic weather is predicted.

90. Complete road access will be lost at a height of 2.1m (Barney's Point gauge) when the Pacific Highway is cut.

Method of Evacuation

91. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

92. The most suitable evacuation centres are located within the Kingscliff and Cudgen villages. A secondary evacuation centre can be located in the Banora Point sector.

    a. Kingscliff Public School Orient Street Kingscliff

    b. Kingscliff TAFE Campus Cudgen Rd Kingscliff

    c. Cudgen Public School Collier Street Cudgen

    d. Banora Pt Public School Pioneer Drive Banora Pt

Evacuation Routes

93. Kingscliff Evacuation Centre:

    a. Chinderah Road - Tweed Coast Rd – Cudgen Rd – McPails St/Orient St

94. Cudgen Evacuation Centre:

    a. Local streets to Tweed Coast Rd – Crescent St - Cudgen Rd – Collier St.

95. Banora Evacuation Centre:

    a. Wommin Bay Rd – Pacific Highway – Short Street – Pioneer Parade

Evacuation Route Closure

96. Closure of evacuation routes will occur systematically as the predicted height rises.

97. Chinderah Bay Road will have water across the road west of River Street at a height of 1.5m (Barneys Point gauge) requiring closure.

98. Jenners Corner (Chinderah Bay Rd & Wommin Bay Road) will have water across the road at a height of 1.6m (Barney's Point gauge)

99. Chinderah Rd which will be used for an evacuation route for the residents in the south western area of the sector will have water across the Pacific Highway at the roundabout/interchange at a height of 2.0m (Barney's Point gauge)

Vulnerable Institutions and Facilities Affected

100. The following vulnerable institutions will require evacuation when it is predicted to reach and/or exceed the heights specified, relevant to the Barneys Point gauge, with the suggested evacuation route.

a. On Tweed Caravan Park

- Water enters park at 1.51m

b. Homestead Caravan Park

- Water enters park at 1.6m

c. Hacienda Caravan Park

- Water enters park at 1.6m

d. The suggested evacuation route for the above three caravan parks is Wommin Bay Road to Kingscliff with the secondary evacuation route being Waugh Street to Banora Point Public School

e. Chinderah Village Caravan Park

- Water enters park at 1.6m

f. Drifter's Caravan Park

- Water enters park at 2.0m

g. The suggested evacuation route for the above two caravan parks is Wommin Bay Road to Kingscliff

h. Heritage Caravan Park

- Water enters park at 1.5m

i. Chinderah Lake Caravan Park

- Water enters park at 1.6m

j. Royal Pacific Caravan Park

- Water enters park at 1.55m

k. The suggested evacuation route for the above three caravan parks is Chinderah Rd to Tweed Coast Road to Kingscliff.

Time

101. The approximate speed of onset for flooding in this sector is nine (9) hours from Murwillumbah to Chinderah.

Sector 7 – Banora

General

102. This sector covers the area north of the Tweed River known as Banora Point, which includes the commercial and residential areas centred around Darlington Drive and Leisure Drive as well as the new development Vintage Lakes.

Community Profile

Census Description Banora	Result (2006 Census)
Total persons	14682
Total persons aged 5 years and younger	777
Aged 65 Over	3569
Total persons where English is 2nd language	179
Single parent families	742
Resident of 5yrs or less	3672
Dwellings without vehicles	32
Total number of dwellings	6191
Caravan Park residents	333
Total persons of indigenous Origin	468

Sector Control

103. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

104. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police Force.

Evacuation Trigger

105. Evacuation of vulnerable areas is to proceed at the following locations when the Barney's Point gauge is predicted to reach and/or exceed 2.2m.

Method of Evacuation

106. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

107. The Banora Point Public School located at Pioneer Parade Banora Point is suitable for use as an evacuation centre.

Evacuation Routes

108. Local Streets to Fraser Drive to Leisure Drive to Woodlands Drive to Darlington Drive to Banora Hills Drive

109. Local Streets to Vintage Lakes Drive to Leisure Drive to Woodlands Drive to Darlington Drive to Banora Hills Drive

110. Local Streets to Pacific Drive to Terranora Drive to Johnson Drive to Pioneer Drive

Evacuation Route Closure

111. If the above three evacuation routes prevent access to the Banora Point evacuation centre an alternate Evacuation Centre can be located at the Lindisfarne Anglican School, Mahers Lane Terranora which can be accessed by Frazer Drive to Terranora Road.

Vulnerable Institutions and Facilities Affected

112. The following institutions may require evacuation and/or re-supply;

a. Amity Nursing Home, 18 Ballymore CRT Vintage Lakes

- Approximate property level of 2.76m. Would suggest that facility is un-effected by 20% or 5% flood event but would commence to suffer flood effects in a 1% event (3.0m Barney's Point gauge). It may suffer isolation in a lesser event.

b. St Martha's Hostel Leisure Drive Banora Point

- Inundation would occur during a 5% event (2.2m Barneys Point gauge) and isolation may occur during lesser events. In a 5% event flood depth is modelled to exceed .22m.

c. Winder's Lodge and Cottages Winders Place Banora Point

- Similar effects as St Martha's as facilities are neighbouring properties. In a 5% event (2.2m Barneys Point gauge) flood depth is predicted to exceed 0.17m and up to 0.61m in a 1% event.

d. Banora Point Retirement Village, 57 Leisure Drive

e. RSL Darlington, Leisure Drive Banora Point

Time

113. The available time to warn the community is variable but may be as short as three hours dependant upon rainfall in the Tomewin Catchment.

Sector 8 – Terranora & North Tumbulgum

General

114. Majority of sector is flood free and will remain out of the flood extent. However may require re-supply for up to 2000 people.

115. This sector also encompasses the North Tumbulgum area which is isolated during flooding.

Community Profile

Census Description Terranora	Result (2006 Census)
Total persons	3137
Total persons aged 5 years and younger	184
Aged 65 Over	337
Total persons where English is 2nd language	39
Single parent families	109
Resident of 5yrs or less	617
Dwellings without vehicles	14
Total number of dwellings	1069
Caravan Park residents	643
Total persons of indigenous Origin	47

Sector Control

116. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

117. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

118. If evacuation of rural dwellings in North Tumbulgum and outside of Terranora Village is required evacuation should be initiated before access roads are cut. However, in previous events this area has been successfully re-supplied with minimal evacuation required.

Method of Evacuation

119. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged. A majority of residents from both Tumbulgum and North Tumbulgum park their private motor vehicles on the Tumbulgum Bridge and Terranora Road during times of flood. The parked motor vehicles may have an impact upon the evacuation route and should be monitored.

Evacuation Centres

120. The Lindisfarne Anglican School, Mahers Lane Terranora is the most suitable evacuation centre. The secondary evacuation centre is the Terranora Public School located on the corner of Terranora Road and Mahers Lane.

Evacuation Routes

121. Evacuees should be encouraged to take the following route;

    a. Local roads to Terranora Rd – Mahers Lane – Lindisfarne Anglican School

Evacuation Route Closure

122. Terranora Road is susceptible to land slips during times of heavy rain. An alternate evacuation centre is the Bilambil Public School, Bilambil Road Bilambil however access may be limited due to flooding of the Duroby and Bilambil Creeks

Time

123. The available time to warn the community is variable but may be as short as three hours dependant upon rainfall in the Tomewin Catchment.

Sector 9 – Bilambil

General

124. This sector encompasses the areas of Bilambil and Bilambil Heights and frequently suffers the effects of flash flooding from the Bilambil and Duroby Creeks. Some rural properties are isolated in floods for up to five (5) days and will need either early evacuation or re-supply.

Community Profile

Census Description Bilambil	Result (2006 Census)
Total persons	3691
Total persons aged 5 years and younger	224
Aged 65 Over	511
Total persons where English is 2nd language	76
Single parent families	129
Resident of 5yrs or less	759
Dwellings without vehicles	36
Total number of dwellings	1365
Caravan Park residents	643
Total persons of indigenous Origin	84

Sector Control

125. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

126. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

127. A predicted height of 1.5m (Barney's Point gauge), which is equivalent to a 20 yr ARI event, will isolate the village of Bilambil. At this height the intersection of Duroby Creek Road and Bilambil Rd will close.

Method of Evacuation

128. Early evacuation is necessary or after evacuation routes close the strategy becomes shelter in place and area will require re-supply.

Evacuation Centres

129. The preferred evacuation centres are;

    a. Lindisfarne Anglican School, Mahers Lane Terranora

    b. Terranora Public School, Cnr Terranora Rd & Mahers Lane Terranora

    c. Bilambil Primary School, Bilambil Rd Bilambil

Evacuation Routes

130. Local Roads to Bilambil Rd to Terranora Rd to Mahers Lane

Evacuation Route Closure

131. In the event of the preferred evacuation route closing as a result of reaching the predicted height of 1.5m (Barney's Point gauge) the Bilambil Primary School can be accessed by local roads to Bilambil Road (cooking facilities at the Jets Junior Football Club).

Vulnerable Institutions and Facilities Affected

132. Within this sector an over 55 years mobile home, retirement village complex is located at the intersection of Bilambil Rd and Carool Rd. In the January 2008 event the complex was inundated with floodwater from the nearby Bilambil Creek to a height of between 0.1m – 0.5m

Time

133. If major rain falls within Tomewin Catchment area warning time could be less than 3 hours. If rain falls within Duroby Creek catchment area warning time could be less than 3 hours. Tidal anomalies can also impact upon this sector.

Sector 10 – Tweed Heads South

General

134. This sector covers the area of South Tweed Heads. Many residences and businesses are affected by floods as small as a 20 YR ARI event.

135. Some of the flood prone areas in this sector are protected by levees to 2.18m (crest height) (Barneys Point gauge)

Community Profile

Census Description – Tweed Heads South	Result (2006 Census)
Total persons	7321
Total persons aged 5 years and younger	321
Aged 65 Over	2681
Total persons where English is 2nd language	108
Single parent families	381
Resident of 5yrs or less	1890
Dwellings without vehicles	453
Total number of dwellings	3939
Caravan Park residents	489
Total persons of indigenous Origin	324

Sector Control

136. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

137. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

138. Evacuation needs to begin when there is a prediction at Barney's Point gauge to reach and/or exceed 2.2m.

139. Some roads (Floral Ave to Minjungbal Drive) within the Sector close early in the flood due to inundation from flood water, evacuations need to begin early otherwise residents will become isolated and some areas will require rescue.

140. Many vulnerable facilities are affected, as detailed in Annex B. Of note are the two (2) Aged Care facilities, six (6) Caravan Parks and six (6) schools which are vulnerable to a flood event equal to or exceeding a 20 YR ARI event (2.2m Barney's Point gauge).

141. A height of 1.1m on the Dry Dock gauge is the first trigger for removal of caravans (River Retreat CP) from the area; however the evacuation process should begin when there is a prediction at Barneys Point gauge to reach/exceed 1.5m (TBC). This will begin a staged evacuation of lowest lying caravans to the Tweed Heads Recreation Ground.

Method of Evacuation

142. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

143. There are no evacuation centres within this sector that are above the PMF, however neighbouring sectors have evacuation centres and are listed below in the preferred order;

a. Police & Citizens Youth Club (PCYC) Cnr Florence & Adelaide Street Tweed Heads

b. Banora Point Public School Pioneer Drive Banora Point

Evacuation Routes

144. Local streets to Dry Dock Rd – north in Minjungbal Drive – continue north in Wharf Street – turn left into Florence Street heading west.

145. Local streets to Minjungbal Drive to Pacific Highway then south and right turn into Terranora Road, right at Kittawaki St and left onto Pioneer Parade

Evacuation Route Closure

146. Parts of Dry Dock Rd, Fraser Drive and Philip Parade can be inundated early in floods. Dry Dock Road will be cut at a height of 1.7m on the Dry Dock gauge. Early warning and evacuation is required for this sector

Vulnerable Institutions and Facilities Affected

147. Many vulnerable facilities are affected, as detailed in Annex B. Of note are the two (2) Aged Care facilities, six (6) Caravan Parks and six (6) schools which are vulnerable to a flood event equal to or exceeding a 20 YR ARI event (2.2m Barney's Point gauge).

Time

148. Nine (9) hours in a riverine flood however storm surge and tide anomalies could reduce this time significantly.

Sector 11 – Seagulls Estate

General

149. The Seagulls Estate is a low flood island that will be completely inundated in a PMF flood event.

150. Approximately 1200 to 1500 people will need to be evacuated prior to the access roads closing. Inundation can last up to 4 days within this Sector, but evacuees may need to be accommodated longer if residential areas are considered not suitable to re-inhabit immediately after the flood.

Community Profile

Census Description – Seagulls Estate	Result (2006 Census)
Total persons	1179
Total persons aged 5 years and younger	62
Aged 65 Over	354
Aged 75 Over	145
Total persons where English is 2nd language	No data available
Single parent families	25
Resident of 5yrs or less	503
Dwellings without vehicles	48
Total number of dwellings	570

Sector Control

151. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

152. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

153. When the predicted height for Barney's Point gauge is to reach and/or exceed 2.2m.

Method of Evacuation

154. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

155. There is no suitable evacuation centre in this sector. The preferred list of evacuation centres are listed below in order of preferred options;

a. Police & Citizens Youth Club (PCYC) Cnr Florence & Adelaide Street Tweed Heads

b. Tweed Shire Civic Centre, Brett Street Tweed Heads

c. Bilambil Public School, Bilambil Rd, Bilambil

Evacuation Routes

156. Evacuees should be encouraged to take the following routes as listed below;

a. Local Streets to Lakes Drive right into Gollan Drive – onto Kennedy Drive - left into Ducat Street – Mugga Way – Kent St – Dutton St – Florence St

b. Local Streets to Lakes Drive right into Gollan Drive – onto Kennedy Drive - left into Ducat Street – Mugga Way – Kent St – Dutton St – Florence St – left into Brett St

c. Local Roads to Lakes Drive, Gollan Drive, Bilambil Heights Scenic Drive, Bilambil Rd to the School

Evacuation Route Closure

157. There is no alternate evacuation route. This sector has only one access/egress route in and out of the estate. (The Lakes Drive) According to Tweed Flood Study (2005) The Lakes Drive in the vicinity of Jacaranda Ave, will flood to a depth of 0.6m in a 20 yr ARI event ((2.2m Barney's Point gauge).

Time

158. Nine (9) hours in a riverine flood however storm surge and high tide could reduce this time significantly.

159. In the event of intensive localized flash flooding influenced by Cobaki, Piggabeen and Bilambil Creek, evacuation time is 3 to 4 hours.

Sector 12 – Tweed Heads West

General

160. This sector includes the area surrounding Cobaki Broadwater including Cobaki Creek and the residential and commercial area's west of the Pacific Highway.

161. Areas within this sector can be isolated up to four (4) days.

Community Profile

Demographic Data	(2006 Census)
Total persons	6097
Total persons aged 5 years and younger	282
Aged 65 Over	1707
Total persons where English is 2nd language	70
Single parent families	349
Resident of 5yrs or less	1343
Dwellings without vehicles	326
Total number of dwellings	2988
Total persons of indigenous Origin	219

Sector Control

162. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

163. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

164. Consideration of evacuation of this sector should begin when the Barneys Point gauge is predicted to exceed 2.0m AHD.

165. The Retirement Village on Piggabeen Rd needs to be evacuated when the Barneys Point gauge is predicted to reach/exceed 1.2m (0.9m on the Dry Dock gauge), at which point the access road closes (Kennedy Drive)). This will begin a staged evacuation of lowest lying residents, in particularly caravans from the Pyramid Caravan Park, to the Tweed Heads Recreation Ground

Method of Evacuation

166. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

167. There is no suitable evacuation centre in this sector. The preferred list of evacuation centres are listed below in order of preferred options;

a. Police & Citizens Youth Club (PCYC) Cnr Florence & Adelaide Street Tweed Heads

b. Tweed Shire Civic Centre, Brett Street Tweed Heads

c. Bilambil Public School, Bilambil Rd, Bilambil

Evacuation Routes

168. Local Streets to Gollan Drive – onto Kennedy Drive - left into Ducat Street – Mugga Way – Kent St – Dutton St – Florence St

169. Local Streets to Gollan Drive – onto Kennedy Drive - left into Ducat Street – Mugga Way – Kent St – Dutton St – Florence St – left into Brett St

170. Local Roads to Gollan Drive, - Scenic Drive, Bilambil Rd to the School

Evacuation Route Closure

171. Kennedy Drive near intersection of Rose Street will be cut at a height of 1.6m (Barney's Point gauge), which will prevent access to Kennedy Drive in the east which will prevent evacuation centres 1 & 2 from being utilised.

172. Access to the evacuation centre located at Bilambil will be prevented in a flood event greater than a 20yr ARI (2.2m Barney's Point gauge)

Vulnerable Institutions and Facilities Affected

173. There is one (1) caravan park, one (1) Aged Care Facility and one (1) Retirement Complex within this sector which are outlined in Annex B.

Time

174. Nine (9) hours in a riverine flood however storm surge and high tide could reduce this time significantly.

175. In the event of intensive localized flash flooding influenced by Cobaki, Piggabeen and Bilambil Creek, evacuation time is 3 to 4 hours.

Sector 13 – Tweed Heads

General

176. This sector encompasses the main Central Business District of the Tweed Local Government Area.

177. Many residential properties will be affected in a flood as frequent as a 1:20 YR ARI, and this will increase with the magnitude of the flood. In the Probable Maximum Flood, Tweed Heads becomes a high flood island with land between Razorback and Flagstaff Hill the only land free from flood water.

Community Profile

Demographic Data	(2006Census)
Total persons	7125
Total persons aged 5 years and younger	256
Aged 65 Over	2567
Total persons where English is 2nd language	127
Single parent families	284
Resident of 5yrs or less	1647
Dwellings without vehicles	552
Total number of dwellings	4042
Total persons of indigenous Origin	137

Sector Control

178. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

179. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

180. Consideration for the evacuation of this sector should begin when there is a prediction at Barneys Point gauge to exceed 2.0m.

Method of Evacuation

181. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

182. Police & Citizens Youth Club (PCYC) Cnr Florence & Adelaide Street Tweed Heads

183. Tweed Shire Civic Centre, Brett Street Tweed Heads

Evacuation Routes

184. Local streets to Florence Street

185. Local Streets to Brett Street

Vulnerable Institutions and Facilities Affected

186. Several identified institutions and facilities have been identified which are located within this sector. See Annex B. Many residential properties will be affected by a flood as frequent as a 20 yr ARI event.

187. Of note is the Amaroo Nursing Home and the Hospital which are affected in a 1:100 YR ARI flood event, and evacuation may need to be considered if this height is predicted on the Barneys Point gauge (3.0m).

Time

188. Approximate available time will be Nine (9) hours riverine flood. (Storm surge and Tidal influence could reduce this significantly)Intensive localised flash flooding will reduce evacuation time to 4 to 5 hours.

Sector 14 – Fingal Head

General

189. Unless evacuation is completed early residents will become isolated and if the flood increases in size some residents will need to be rescued.

190. Fingal Village becomes a flood island and can act as an area of last resort, but can not offer any suitable shelter for flood refugees. Fingal Rovers Surf Club is above the flood PMF but may not be above the storm surge PMF.

Community Profile

Demographic Data	(2006 ABS Census)
Total persons	575
Total persons aged 5 years and younger	37
Aged 65 Over	114
Single parent families	32
Resident of 5yrs or less	122
Dwellings without vehicles	4
Total number of dwellings	318
Total persons of indigenous Origin	70

Sector Control

191. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

192. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

193. Evacuation Triggers for Fingal head include;

a. Fingal Head Road begins to be inundated at 0.8m (Barneys Point gauge), at a height greater than 1.1m Fingal Head Rd would become impassable to normal vehicles, which would isolate Fingal Head village.

b. When there is a prediction for Barneys Point gauge (201426) to reach and/or exceed 1.5m, evacuation should begin.

Method of Evacuation

194. Early unassisted evacuation will be necessary before the Fingal Rd/Wommin Lake Crescent intersection is cut, otherwise high clearance vehicles will be necessary.

Evacuation Centres

195. There is no suitable evacuation centre in this sector. The preferred list of evacuation centres are listed below in order of preferred options;

a. Kingscliff TAFE Campus, Cudgen Road Kingscliff

b. Kingscliff Public School, Orient Street Kingscliff

c. Cudgen Public School, Collier Street Cudgen

d. Banora Point Public School, Pioneer Pde Banora Pt

Evacuation Routes

196. Evacuees should be encouraged to take the following routes as listed below;

a. Fingal Head Rd – Pacific Highway - Tweed Coast Rd – Cudgen Rd

b. Fingal Head Rd – Pacific Highway - Tweed Coast Rd – Cudgen Rd – McPails St -Orient St

c. Fingal Head Rd – Pacific Highway - Tweed Coast Rd – Crescent St - Cudgen Rd – Collier St

d. Fingal Head Rd – Pacific Highway – Short Street – Pioneer Parade

Evacuation Route Closure

197. Early evacuation is necessary as the Fingal Head Road in the vicinity of Wommin Lake Crescent will become impassable at a height of 1.1m (Barney's Point gauge) and completely isolate the village of Fingal Head.

198. Temporary accommodation is available in the following location when there is no longer road access, but the first priority should be evacuation to the centres listed above.

199. Fingal Rovers Surf Club, Marine Parade: Local Streets to Fingal Rd, Lighthouse Parade, Main Rd, Marine Parade

Vulnerable Institutions and Facilities Affected

200. The Fingal Holiday Park is located in Prince Street Fingal Head.

Time

201. Approximately 9 hours warning is available before the onset of flooding.

Sector 15 – Cabarita - Bogangar

General

202. In the Bogangar/Cabarita Sector evacuation will focus on areas most at risk close to Cudgen Creek, Cudgen Lake, Cudgera Creek, and Mooball Creek. Other residents should shelter in place for the duration of the event

203. There are up to 100 properties in Bogangar that require evacuation and up to 10-20 houses in Pottsville.

204. Roads surrounding Bogangar/Cabarita can be inundated for up to 3 days and the area will become isolated. Hastings point can also become isolated. Hastings Point has up to 440 caravans and can have a significant population during holiday periods.

Community Profile

Census Description – Bogangar/Cabarita	Result (2006 Census)
Total persons	5226
Total persons aged 5 years and younger	320
Aged 65 Over	695
Total persons where English is 2nd language	83
Single parent families	278
Resident of 5yrs or less	1809
Dwellings without vehicles	128
Total number of dwellings	2382
Total persons of indigenous Origin	195

Sector Control

205. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

206. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

207. Evacuation of areas should be considered when a flood watch for the area is issued by the BoM, as no flood warning products are issued for gauges in the Cabarita-Bogangar areas.

208. Evacuation of most ‘at risk’ properties north of Banksia Ave will be required.

Method of Evacuation

209. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

210. The following places can be used for Evacuation Centres in this Sector:

a. Bogangar (Cabarita) Public School:

b. Cabarita Surf Club, Pandanus Parade, Cabarita Beach

c. Duranbah Public School, Duranbah Rd, Duranbah: Local Streets to Duranbah Rd

Evacuation Routes

211. Local streets to Tweed Coast Road

212. Local streets to Tweed Coast Road, Pandanus Parade

213. Local streets to Tweed Coast road – north to Cudgen Rd – Duranbah Rd

Vulnerable Institutions and Facilities Affected

214. There are several vulnerable institutions and facilities within this sector. These establishments are outlined in Annex B

Time

215. Flooding within Cabarita -Bogangar is characteristically of a flash flood nature and warning time is less than 6 hours

Sector 16 – Pottsville/Wooyung

General

216. This sector is characteristically a flash flood environment with Pottsville Waters, Black Rocks, the western end of Koala Beach, and Elanora Avenue areas subject to inundated by local stormwater and flooding from either Cudgera or Mooball Creeks.

Community Profile

Census Description - Wooyung (Pottsville)	Result (2006 Census)
Total persons	5454
Total persons aged 5 years and younger	404
Aged 65 Over	746
Total persons where English is 2nd language	104
Single parent families	279
Resident of 5yrs or less	1813
Dwellings without vehicles	92
Total number of dwellings	2436
Total persons of indigenous Origin	132

Sector Control

217. Control. The Tweed Shire SES Local Controller will control evacuations in this sector

218. Conduct The NSW Rural Fire Service, NSW Fire Brigade and NSW SES will conduct evacuations in this sector with assistance from the NSW Police.

Evacuation Trigger

219. Evacuation of areas should be considered when a flood watch for the area is issued by the BoM, as no flood warning products are issued for gauges in the Pottsville/Wooyung area.

Method of Evacuation

220. Initial evacuations will be by road using private transport. For those without transport, transport will be arranged.

Evacuation Centres

221. The following places can be used for Evacuation Centres in this Sector:

    a. Burringbah School of Arts, Old Pacific Hwy Burringbah

    b. Pottsville Beach Public School, Tweed Coast Rd, Pottsville

    c. Crabbes Creek Public School, Crabbes Creek Road Crabbes Creek (Wooyung)

Evacuation Routes

222. Local roads to Old Pacific Highway.

223. Upper Burringbah Rd to corner of Upper Burringbah Rd and Old Pacific Highway/Tweed Valley Way

224. Tweed Valley Way (South/North) to corner of Upper Burringbah Rd and Tweed Valley Way

225. Local roads to Tweed Coast Road (South/North)

226. Local Roads to Cudgera Avenue, South on Tweed Coast Rd

227. Local streets to Crabbes Creek Rd, East to School

228. Local streets to Wooyung Rd, West to Tweed Valley Way, North to Crabbes Creek Road, West to School

229. Local streets to Tweed Valley Way, South to Crabbes Creek Rd, West to School

Vulnerable Institutions and Facilities Affected

230. Wooyung Beach Motel & Caravan Park, 515 Wooyung Road Wooyung

231. Pottsville North Holiday Park, 27 Tweed Coast Rd, Pottsville Beach

Time

232. Riverine Flood – 1 -2 days

233. Storm Water flooding – 1-2 hours, possibly longer

ANNEX G - ARRANGEMENTS FOR THE EVACUATION OF CARAVAN PARKS AND THE RELOCATION OF CARAVANS

General

1. The following caravan parks are flood liable:

a. Chinderah/Kingscliff Sector

- On Tweed Caravan Park, 1/3 Chinderah Rd Chinderah
- Chinderah Village Caravan Park 94 Chinderah Bay Drive Chinderah
- Tweed River Hacienda Holiday Park 37-63 Chinderah Bay Drive, Chinderah
- Homestead Caravan Park Chinderah Bay Drive Chinderah
- Tweed Heritage Caravan Park 92 Chinderah Bay Drive, Chinderah
- Chinderah Lake Caravan Park 101 Anne Street Chinderah
- Royal Pacific Caravan Park 109 Chinderah Rd Chinderah
- Drifters Caravan Park, Wommin Bay Rd Kingscliff

b. Tweed Head South Sector

- River Retreat Caravan Park, 8 Philip Parade Tweed Heads
- Tweed Broadwater Village, Kirkwood Rd Tweed heads South
- Palms Village Caravan Park, 112 Dry Dock Rd Tweed Heads
- Tweed Billabong Holiday Park, Holden Street Tweed Heads
- Colonial Tweed Caravan Park 158 Dry Dock Rd Tweed Heads
- Boyds Bay Holiday Park, Dry Dock Rd Tweed Heads

c. Tweed Head West Sector

- Pyramid Caravan Park, 145 Kennedy Drive Tweed Heads West

d. Fingal Head Sector

- Fingal Holiday Park, Prince Street Fingal Head

Advising Procedures

2. Caravan Park proprietors will ensure that the owners and occupiers of caravans are:

   a. Made aware that the caravan park is flood liable by:

   - Handing a printed notice to occupiers taking up residence. The notice will indicate that the caravan park is liable to flooding and outline the evacuation and van relocation arrangements as detailed in this Annex.
   - Displaying this notice prominently in each van.

   b. Made aware that if they are expecting to be absent from their vans for extended periods, they must:

   - Provide the manager with a key; in a sealed envelope; to the van.
   - Provide a contact address and telephone number.
   - Inform the manager if a vehicle will be required to relocate the van during flood time.
   - Leave any mobile van in a condition allowing it to be towed in an emergency (i.e.: tyres inflated, jacks wound up, personal effects secured and annexes and lines for water, sewer, electricity and gas readily detachable).

   c. Informed when a flood is rising. At this time, occupiers will be advised to:

   - Ensure that they have spare batteries for their radios.
   - Listen to a local radio station for updated flood information.
   - Prepare for evacuation and van relocation.

3. The Tweed Shire SES Local Controller will ensure that the managers of caravan parks are advised of flood warnings and the details of any evacuation order.

Evacuation of Occupants and Relocation of Vans

4. Caravan park proprietors will install flood depth indicators and road alignment markers within their caravan parks.

5. When an evacuation order is given:

   a. Occupiers of non-movable vans should:

   - Secure their vans by tying them down to prevent flotation.
   - Isolate power to their vans.

- Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.

- Lift the other contents of their vans as high as possible within the van.

- Move to a designated evacuation centre in [enter location] if they have their own transport, or move to the caravan office to await transport.

- Where possible, vans that can be moved will be relocated by their owners. Park managers will arrange for the relocation of mobile vans whose owners do not have a vehicle. Council and SES personnel will assist if required and may be able to provide additional vehicles. Vans are to be moved to either Kingscliff Amenities Centre or the Recreation Street sports field.

6. Occupants of vans that are being relocated should go to a designated evacuation centre if they have their own transport. Those without their own transport are to report to the caravan park office.

7. Caravan park managers will:

   a. Ensure that their caravan park is capable of being evacuated within three (3) hours.

   b. Advise the Tweed Shire SES Local Controller of:

   - The number of people requiring transport.

   - Details of any medical evacuations required.

   - Whether additional assistance is required to effect the evacuation.

   c. Check that no people remain in non-removable vans that are likely to be inundated.

   d. Inform the Tweed Shire SES Local Controller when the evacuation of the caravan park has been completed.

   e. Provide the Tweed Shire SES Local Controller with a register of people that have been evacuated.

Return of Occupants and Vans

8. The Tweed Shire SES Local Controller, using council resources as necessary, will advise when it is safe for the caravan parks to be re-occupied.

9. Vans will be towed back to the caravan park(s) by van owners or by vehicles and drivers arranged by the park managers. Again, Council and SES personnel will assist if available.

ANNEX H - RESUPPLY REQUIREMENTS AND OPERATIONS

1. During periods of severe flooding the following sectors of Tweed Shire Council may become isolated. This may involve up to 63,000 people requiring re-supply in a significant event. (refer to Annex B):

    a. Sector 1 - Fingal

    b. Sector 2 – Kingscliff;

    c. Sector 4 – Tweed Heads (approx 6000 in a 1:100 flood event);

    d. Sector 6 – Banora

    e. Sector 7 – Terranora and North Tumbulgum

    f. Sector 8 – Bilambil and Duroby

    g. Sector 10 – Bogangar/Cabarita and Hastings Point;

    h. Sector 11 – Chillingham;

    i. Sector 12 – Murwillumbah;

    j. Sector 14 – Tyalgum;

    k. Sector 15 – Uki; and

    l. Sector 16 – Wooyung, Pottsville, Burringbar and Mooball.

2. Areas are detailed within Annex B and in the relevant Sector Maps.

3. Individual urban and rural properties in the Tweed Shire Council area can also become isolated and may require re-supply.

4. Likely durations of isolation are described in Annex B. These are assumed average durations and will vary depending upon infrastructure damage and flood magnitude.

Arrangements

Control

5. During floods re-supply of isolated communities and properties will be controlled and coordinated by the NSW State Emergency Service (SES). Small-scale re-supply operations will be controlled by the Tweed Shire SES Local Controller. Should re-supply operations escalate beyond the capabilities of local resources control may be handed over to the Richmond Tweed SES Region Controller.

Conduct

6. The SES will conduct re-supply operations with assistance from the Rural Fire Service and Department of Community Services.

Responsibilities

7. **Tweed Shire SES Local Controller**. Control and coordinate the re-supply of isolated communities and properties.

8. **Department of Community Services**. Provide welfare services for flood affected people.

9. **NSW Rural Fire Service**. Assist the SES with the re-supply of isolated properties and communities

10. Assistance from other emergency services and functional areas may be required as per DISPLAN arrangements.

Concept of Operations

11. Normal supply arrangements will be maintained for as long as practicable. The main supply routes will be kept open to essential and emergency vehicles for as long as it is safe to do so. Given the variable nature of flood events, detailed re-supply arrangements for isolated towns and villages will be prepared relative to priority, time and resources available.

Re-supply Procedures

12. **Pre-Stocking**. As part of flood warning procedures residents and storekeepers likely to become isolated will be warned to pre-stock. Residents in particular should ensure they have an adequate supply of high usage non-perishable items, pet food, fuel, water and essential medications.

13. **Re-supply of Isolated Towns and Villages**. When isolation occurs, storekeepers will be expected to place orders on suppliers where they have a line of credit or make temporary payment arrangements and to instruct those suppliers to package their goods and deliver them to loading points designated by the SES. Similarly, essential services (eg. hospitals) will make arrangements to acquire their re-supply needs from normal sources and have the supplies delivered to loading points designated by the SES.

14. The SES may establish a vetting committee to ensure that only essential goods are ordered. The committee will consist of representatives from the SES, Tweed Shire Council, Police, DoCS and the Chamber of Commerce. The committee will ensure that businesses requesting supplies are not using the flood as a means of restocking free of charge and also that load space in re-supply vehicles and aircraft is optimally used.

15. Where supplies are not available within the council area, the Tweed Shire SES Local Controller may request them through the Richmond Tweed SES Region Headquarters.

16. The outline of the re-supply system for isolated properties is represented in Figure 4.

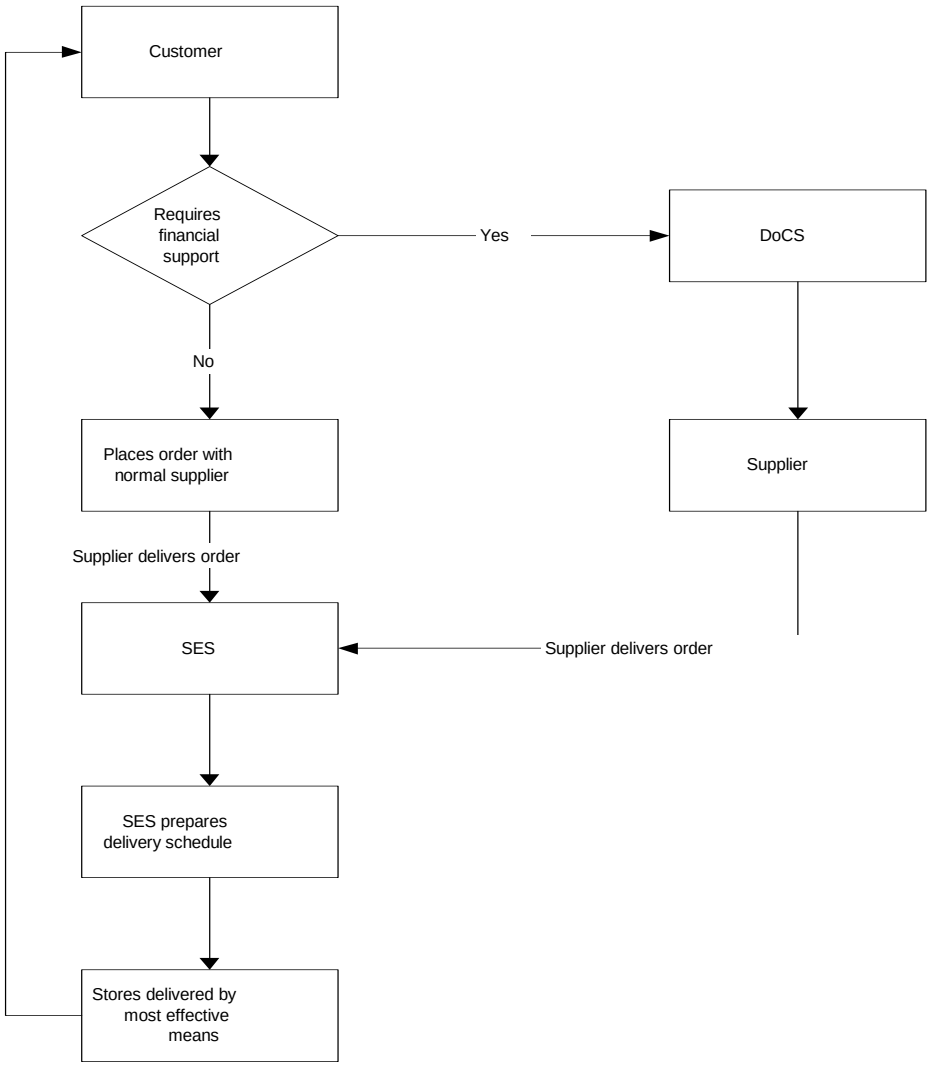


Figure 5 Outline of re-supply system for isolated properties.

17. **Pharmaceutical Supplies and Prescription Medicine.** The SES can deliver completed prescriptions to isolated properties or communities. It is the responsibility of the individual to ensure that the prescription is completed.

18. **Mail Delivery**. The SES is prepared to deliver mail to isolated communities and properties but may not be able to do so according to Australia Post timetables.

19. **Personnel Movement**. Where possible, the SES will assist isolated communities and properties with the movement of people to and from isolated areas.

20. **Transport Methods**. Re-supply will be conducted using high clearance vehicle, SES flood rescue boat, fixed wing or rotary wing aircraft.

21. If air re-supply is necessary the Tweed Shire SES Local Controller will liaise with the Richmond Tweed SES Region Controller who will make arrangements for air re-supply. Loading points for air re-supply can be established at Casino airport.

22. The Tweed Shire SES Local Controller may task aircraft within the council area. However, during floods affecting more than one council area, aircraft will normally be tasked by the Richmond Tweed SES Region Controller.

23. Landing zones for air-re-supply should be selected and used in accordance with Civil Aviation Safety Authority "Guidelines for Establishing and Using Helicopter Landing Sites (HLS) Jan 96. Other landing sites will be identified and used as required for re-supply operations within specific sectors

Table 11 - Sector Re-supply Data

COMMUNITY RESUPPLY DATA

Community	Isolation Duration (approx)	Re-supply Means		Location for Delivery/Distribution		Vulnerable /Sensitive Communities	Re-supply Assets Required	Notes
		Primary	Alternate	Primary	Alternate			
Fingal	Up to 4 Days	Helicopter	Boat	South End of Marine Parade,	Car Park near Fingal Heads SLSC		Sewerage, Power, Water at risk of failure.	Up to 700 persons isolated
Kingscliff	Up to 5 Days	Helicopter	Boat	North Coast Institute (NSW TAFE), Kingscliff Campus	Kingscliff High School	2 Nursing Homes	Hazmat, Water, Power, Sewerage	Up to 7,000 will require re-supply
Tweed	Up to 4 Days	Helicopter	Boat	Oval at Crn Florence St and Adelaide St, Tweed Heads	Razorback Lookout, Razorback Rd, Tweed Heads	Hospital, Nursing Home (Greenback Island), 2 Schools,	Water, Power, Sewerage	Up to 8,000 will require re-supply
Banora	Up to 4 Days	Helicopter	High Clearance Vehicle up to when roads close to these vehicles	Banora Point Primary School, Pioneer Parade, Banora				Up to 15,500 will require re-supply
Terranora	Up to 4 Days	Vehicle from Banora	Helicopter	Lindisfarne Anglican School	Terranora Public School			Up to 2000 will require re-supply
North Tumbulgum	Up to 4 Days	Vehicle from Banora	Helicopter	Lindisfarne Anglican School				Up to 75 will require re-supply
Bilambil (Bilambil Creek)	Up to 3 Days	Helicopter	High Clearance Vehicle up to when roads close to these vehicles	Bilambil Rugby League Oval	Bilambil RFS Headquarters	School Children, Mobile Home Park		Up to 2500 people isolated

Community	Isolation Duration (approx)	Re-supply Means		Location for Delivery/Distribution		Vulnerable /Sensitive Communities	Re-supply Assets Required	Notes
		Primary	Alternate	Primary	Alternate			
Duroby (Duroby Creek)	Up to 3 Days	Helicopter	High Clearance Vehicle up to when roads close to these vehicles	North End Crofters Way. Crn Beltana Drive and Aroona Cres.				2 areas isolated after Beltana Drive is cut, Up to 250 people isolated
Bogangar/ Cabarita/	Up to 4 Days	Helicopter	Boat	Bogangar Sports Field (South of Bogangar)	Cabarita Beach Surf Club Car Park.	School, Caravan Park	Sewerage under threat	Up to 6000 will require re-supply
Hastings Point	Up to 4 Days	Helicopter	Boat/High Clearance Vehicle	Camping Area on South Side of Yugari Drive	Cul-de-sac at end of Yugari Drive			Up to 1000 will require re-supply
Chillingham	Up to 3 Days	Helicopter		Chillingham RFS Headquarters		4 Schools		Up to 3000 will require re-supply. Aerial movement usually restricted in the early stages of a flood by low cloud and poor visibility.

Community	Isolation Duration (approx)	Re-supply Means		Location for Delivery/Distribution		Vulnerable /Sensitive Communities	Re-supply Assets Required	Notes
		Primary	Alternate	Primary	Alternate			
Murwillumbah	Up to 4 Days	Helicopter	Boat, High Clearance Vehicles	Mount St Patrick Public School	Wollumbin High School, North Arm Road	Hospital, Schools	Hazmat, Water, Power, Sewerage	Up to 8,000 will require re-supply
Tyalgum	Up to 2 Days	Helicopter		Tyalgum Public School Oval	Tyalgum RFS Headquarters		Hazmat, Water, Power, Sewerage	Up to 1500 will require re-supply
Uki	Up to 3 Days	Helicopter	High Clearance Vehicles	Uki Sports Oval, Kyogle Rd	Uki Public School, Crn Kyogle Rd & Rowlands Creek Rd			Up to 3000 will require re-supply
Wooyung	Up to 3 Days	Helicopter		Crabbes Creek Public School, Crabbes Creek Road				Up to 700 people will require re-supply
Pottsville	Up to 3 Days	Helicopter		Pottsville Beach Public School				Up to 2500 will require re-supply
Burringbar	Up to 3 Days	Helicopter		Burringbar School of Arts, Old Pacific Highway	Burringbar Public School, Upper Burringbar Road; Burringbar RFS Headquarters			Up to 1200 will require re-supply

ANNEX I - DETAILS OF THE DAM-FAILURE WARNING AND EVACUATION SYSTEM FOR CLARRIE HALL DAM

Introduction

1. Clarrie Hall Dam is a water supply dam located on the Doon Doon Creek, about 1.5km upstream from the confluence with the Tweed River. Uki is located 5km and Murwillumbah is located about 20.5km downstream of the Dam.

2. Clarrie Hall Dam consists of a 42m high concrete face rockfill dam with a crest length of 185m. The capacity of the dam is 15,600 ML at full supply (61.5m AHD). The maximum flood level is at 67.1m AHD. The spillway is 23m wide and consists of a concrete lined chute with an ogee crest.

3. There are three major possible causes of Clarrie Hall Dam failure:

   a. Failure due to extreme flood levels overtopping the embankments.

   b. Failure due to a rapidly deteriorating structural deficiency such as may be induced by internal erosion or by an extreme earthquake. (This is the so-called “Sunny Day” failure, i.e. not induced by an inflow flood).

   c. Failure combining a) and b).

4. Although the dam is currently in good condition, it is recognised that an unsafe or emergency condition could occur at any time due to extreme natural events.

5. Clarrie Hall Dam spillway is capable of passing as little as 70% of the PMF.

6. The NSW Public Works Clarrie Hall Dam break Study dated May 1995 indicates that the dam would not be capable of safely passing the Probable Maximum Flood (PMF).

7. The report on the Study indicates that during an extreme storm event the water level could rise from the full supply level (FSL) of 61.5m AHD by about 7 m over a period of some 6 hours. At this height of 68.5 m AHD the water would start to flow over the top of the wave wall. This is classed as the Imminent Failure Level (IFL) and equates to a flood, which is about 72% of the Probable Maximum Flood.

8. Sometime after the IFL is reached, this water will start to erode away the rock fill on the downstream face of the wall and this could lead to the failure of the dam. It is estimated that this process could take about 1 ¾ hours and the peak of the Dam break flood wave could reach Uki about 15 minutes after the failure and Murwillumbah a further 1 hour later.

9. Flood conditions that might precede this event would be extreme. For example, the flood height at Uki could be up to 1m above the 1974 flood level of 22.4m

AHD. Below the dam, the valley along the Doon Doon Creek and Tweed River is generally narrow and rugged. Downstream of Byangum Bridge the valley starts to widen out onto extensive river flats and any Dam break flood wave would spread out on top of existing floodwaters. Any increased flood levels at Murwillumbah can be managed within the general arrangements documented within this plan.

Aim

10. This Annex describes the arrangements for the failure of Clarrie Hall Dam and should be referred to in conjunction with Section 1 through 4 of the plan as well as Annexes B and F.

Consequences of Failure

11. Number of people at risk is in excess of approximately 200. The major population areas effected by dam failure will include the areas above Uki, Uki Village and below Uki from Smith Creek Rd and downstream to the Byangum Bridge.

12. Severe flooding would also likely damage power supply facilities in the area resulting in loss of power, put telephone facilities out of action, and cut off evacuation routes.

13. In all failure scenarios, extreme velocities and depths are likely to be experienced resulting in the destruction of private property and public infrastructure.

14. Travel times for a dambreak:

Table 12- Clarrie Hall Dambreak Travel Times

Dambreak Scenario/Type	Travel Time to Uki (5km)	Travel time to Byangum (12km)	Travel time to Murwillumbah (20.5km)
Failure due to deteriorating structure (‘Sunny Day’ Failure)			
Imminent Failure Flood (with no Dambreak)			
Imminent Failure Flood (with Dambreak)	2 hours		3 hours

Dam Break Flood Levels

15. Levels and extent of inundation, rates of rise and flood wave travel times will depend on a number of factors including:

    a. Pre-existing flood conditions.

b. Dam storage levels.

c. The cause of failure (eg. flood or earthquake).

d. The actual mode of failure.

e. Actions taken at the dam to control releases and to contain damage

Operation and Procedures

16. **Monitoring procedures** – Dam levels are monitored by Tweed Shire Council by:

    a. Rainfall gauges upstream

    b. The principal storage level indicator is a recorder and data logger located on?

17. Manual readings of the gauge boards at the dam will be taken for dam levels above FSL?

18. **Notification Procedures** - The primary contact for dam failure warning notification is the NSW SES State Headquarters Communications Centre. This centre will subsequently notify the Richmond Tweed Region Headquarters duty officer who will contact the Tweed Shire SES Local Controller. An alternate NSW Police Force contact is available if this notification procedure was to fail.

Monitoring

19. Clarrie Hall Dam owner (Tweed Shire Council) will undertake monitoring and inspections of their respective dams to ensure any situations, which may lead to potential dam failure, are identified.

20. If a situation is identified which may lead to potential dam failure, the dam owner will notify the SES.

21. Tweed Shire Council must ensure that appropriate agencies are made aware of any threat to the dam to maximise the time available for mobilising necessary resources

Warning

22. Once an amber alert level is reached dam failure warnings will be disseminated.

23. The SES will disseminate dam failure warnings with assistance from NSW Police Force, NSW Fire Brigades, NSW Rural Fire Service, VRA, Service Clubs and Tweed Shire Council.

24. Dam Failure Warnings will be disseminated by the following means:

    a. Doorknocking of at-risk dwellings.

b. Telephone calls being made to at-risk dwellings.

c. Mobile public address systems fitted to emergency service vehicles.

d. Sirens fitted to emergency service vehicles.

e. Broadcasts over radio and television stations.

f. By two-way radio.

25. Broadcast dam failure warning messages will describe the situation; say what is happening currently: what is expected to happen: when it will occur and indicate how people should act. If evacuation is required the message will be preceded by the playing of the Standard Emergency Warning Signal (SEWS) and will detail:

a. Instructions to evacuate.

b. The location of assembly areas for transport to evacuation centres.

c. The location of evacuation centres for those using private transport

d. Authorised or recommended evacuation routes.

e. Arrangements for children in schools and pre-schools.

f. Arrangements for elderly or infirm residents unable to self-evacuate.

Evacuation

26. If necessary, evacuations will be undertaken. Refer to Annex B and F of this plan for detailed evacuation arrangements.

ANNEX J - THE MANAGEMENT OF COASTAL EROSION/OCEANIC INUNDATION

Background

1. Tweed Shire's coastline extends some 37 kilometres from Wooyung in the south to Point Danger on the NSW – Queensland border. The most severe problems of coastal erosion occur as a result of oceanic storm conditions associated with the passage of ex-tropical cyclones and temperate-zone low-pressure systems. These storms may cause temporary sea level rises with large associated waves. The worst erosion is likely when severe weather conditions occur in conjunction with high tides.

2. Coastal storms in the 1960's and 1970's highlighted the threat to coastal developments at Kingscliff, the Kingscliff Bowling Club Kingscliff Holiday Park and Cudgen Surf Life Saving Club.

3. The main coastal erosion and inundation problem in the Tweed Shire is at Kingscliff foreshore, and to a lesser extent at Duranbah Beach. It takes two forms:

   a. Undercutting of dunes on their seaward sides, threatening the collapse of buildings and other infrastructure.

   b. The potential breaking through of the dunes by sea water, causing flooding and isolation of property on the landward side of the dunes.

4. The Coastline in the Tweed Shire is broken up into five units which include:

   a. Wooyung to Hastings Point

   b. Hastings Point to Norries Head

   c. Norries Head to Sutherland Point (Cabarita, Bogangar and Casurina Beaches)

   d. Sutherland Point to Fingal Head (Dreamtime Beach)

   e. Fingal Head to Point Danger

Areas at Risk

Wooyung to Hastings Point

5. There is no development within the immediate hazard zone that is under threat from coastal erosion or oceanic inundation.

Hastings Point to Norries Head

6. All development is landward of the 50 year erosion hazard zone however at Hastings Point the 100 year erosion hazard zone extends into existing properties to varying degrees.

Norries Head to Sutherland Point

Cabarita, Bogangar and Casuarina Beaches

7. The immediate hazard zone does not impinge on any developed areas within this beach unit.

8. At Cabarita (at the southern end of Bogangar Beach) all existing structures are landward of the best estimate 50 year line except for the surf pavilion building.

9. The dune system is generally sufficiently high to accommodate elevated water levels during storm events without direct inundation from the sea. However, there are some areas at the southern end of the Cabarita township where the dunes are only around 5m AHD and under extreme conditions it is possible that some oceanic inundation may occur. .

Sutherland Point to Fingal Head

10. Dreamtime Beach extends northward from Sutherland Point some 7 km to Fingal Point. The township of Kingscliff fronts the southern-most 3 km of the beach. At Fingal, a small settlement (about 26 allotments) is located on the seaward side of Wommin Lagoon, extending about 700 metres south of Fingal Point.

11. Development is set back from the beach along this beach unit except at Kingscliff where the Kingscliff Bowls Club is located on the dune system and has been protected from erosion by a rock revetment seawall.

Kingscliff / Dreamtime Beach

12. The immediate hazard line is typically 30 to 40m landward from the 1999 erosion scarp along this beach unit with some areas of southern Kingscliff extending to 50m where the dunes are lower. This immediate hazard zone extends into the Kingscliff Holiday Park and the Cudgen Headland Surf Life Saving Club building is also under immediate threat from severe storm erosion.

13. The Kingscliff Bowls Club is protected by a rock revetment seawall constructed in the late 1960s and upgraded in 1995. Tweed Shire Council is progressing with a foreshore protection strategy south of the Bowls Club to encompass the Kingscliff Holiday Park and Cudgen Surf Life Saving Club. Coastal erosion at Kingscliff will depend on the implementation of the protection strategy and ongoing maintenance requirements to withstand coastal storm attack. The hazard line has been drawn landward of the Bowls Club building on the basis of no seawall being in place. The realisation of the erosion threat at this location will be dependent on future management decisions on whether the seawall is to be maintained to a suitable standard to withstand cyclonic erosion.

14. To the north of the Bowls Club the immediate hazard zone extends into the parkland but no structures are threatened. However some public structures may be threatened within the 50 year planning period.

15. The entrance to Cudgen Creek was stabilised in 1967 and is no longer subject to significant migration and impact on the adjacent foreshore. A seawall was built to protect the Bowls Club following the 1967 cyclone erosion. Interference with the dune system has ceased and dune management practices are in place to ensure no losses of sand by wind drift.

16. Some of the lower sections of dune at the southern end of Kingscliff are prone to being over-topped during extreme storm events. Elsewhere direct oceanic inundation of hind dune areas is unlikely.

Fingal Head to Point Danger

17. Letitia Spit extends some 3.6 km in a north-northwest direction from Fingal Head towards Point Danger, controlled at its northern end by the Tweed River breakwalls. It is bounded on its western side by the training walls of the Tweed River.

18. The village of Fingal extends a short distance north from the headland, generally set back from the main dune escarpment except for the Surf Club and caravan park.

Fingal / Letitia Spit

19. No development is located within the immediate hazard zone. The 50 and 100 year hazard zones extend into the caravan park area but are well seaward of the development further to the north. The remainder of Letitia Spit is undeveloped.

Duranbah Beach

20. The alignment and sand supply to Duranbah Beach is primarily governed by the operation of the Tweed River Entrance Sand Bypassing Project. Under the project Duranbah Beach is receding to a position some 50 to 80 metres landward of its 2002 position.

21. Coastal erosion and oceanic inundation may impact on Flagstaff Beach Road.

Concept Of Operations

22. **Control**. The SES is the designated combat agency for damage control from storms, including coastal erosion from storm activity.

23. The Coastal Erosion Annex details **all** of the arrangements for the emergency management of coastal erosion.

24. Evacuation arrangements for Tweed Shire are contained in Annex F.

25. Within this role and as specified under the State Storm Plan the SES is responsible for the following during and in the period immediately prior to a storm event occurring out at sea:

    a. Advising the community at risk of the likely problem and actions they should take;

    b. The protection of life through the warning and evacuation of residents at risk; and

    c. The coordination of the lifting and/or relocation of readily movable household items and commercial stock and equipment.

26. The role of the SES as the combat agency for storms does not include coastal erosion and inundation caused by astronomical high tides when severe weather is not actually developing or occurring.

27. **DECC** will provide ongoing advice to local councils and coastal zone management committees on the formulation and implementation of coastal zone management plans including procedures for addressing coastal processes, coastline hazards and risks, management options and coastal policies.

28. **BoM** will provide Severe Weather Warnings.

Responsibilities

Before the Storm

29. The SES will:

    a. Conduct educational activities to ensure that people in locations potentially threatened by coastal erosion and associated flooding can understand the threat and its management.

    b. Consult with councils, coastal zone management committees, DECC, and other agencies during the development of emergency management arrangements for the management of coastal erosion.

30. BoM will:

    a. Formulate and issue official forecasts and Severe Weather Warnings and provide them to the SES, radio stations and other organisations prior to and during potential and actual coastal erosion events. (Note: Severe Weather Warnings for dangerous surf are issued when onshore waves in the surf zone are expected to reach at least 5 metres within the following 24 hours or when a storm surge of 0.5 metres or greater is anticipated).

31. DECC will:

    a. Develop and advise on state wide coastal policy, planning and management.

b. Provide ongoing advice to local councils and Coastal Zone Management Committees on coast and estuary management including procedures for addressing coastal hazards, coastal processes and risks, management options and coastal policies.

c. Provide the SES and councils with advice on likely erosion 'hotspots' along the New South Wales coastline.

32. Tweed Shire Council will:

a. Carry out ecologically sustainable planning and management of the coastal zone.

b. Prepare Coastal Zone Management Plans in accordance with the Coastal Protection Act, 1979 including arrangements for the emergency management of coastal erosion.

c. Consult with the communities at risk, Coastal Zone Management Committees, DECC and other agencies during the development of emergency management arrangements for the management of coastal erosion for inclusion in council Coastal Zone Management Plans and SES Local Flood Plans.

d. Participate in education campaigns and assist the SES in the development and delivery of educational material to ensure that people in areas potentially threatened by coastal erosion understand the threat and its management.

e. Other supporting agencies responsibilities are listed in section 1.5, and in Tweed Shire DISPLAN.

During the Storm

33. Response operations will be initiated when:

a. The BoM issues a severe weather warning for dangerous waves or storm surge (forecast on-shore waves of 5 metres or more, or storm surge of 0.5 metres or more) for the NSW north coast.

b. Response operations may also be initiated by the SES when large storm induced waves are observed locally and no BoM warning has been issued.

34. The SES will:

a. Advise local council and other emergency agencies of the likelihood of coastal erosion in the council area.

b. Coordinate the conduct of regular reconnaissance at locations identified as being susceptible to coastal erosion.

c. Coordinate the provision of advice to the community at risk regarding the likely problem and the actions they should take. These actions may include evacuation and/or removal of portable property from households and businesses.

d. Coordinate the evacuation of people at risk.

e. Coordinate transport of removal household possessions and stock, records and equipment from business premises (if time and resources permit).

f. Provide a phone in service for the local community to take requests for assistance and give advice as necessary.

g. The SES is not responsible for controlling or conducting any physical mitigation works to protect properties or structures at risk from coastal erosion/inundation, either during or outside the period of storm activity. This includes, but is not limited to:

h. The placement of rocks or other materials on beaches or foreshore areas

i. The construction of temporary walls made of sandbags, geotechnical tubes, or other material.

35. Tweed Shire Council will:

a. Conduct reconnaissance at coastal erosion trouble spots in consultation with the SES.

b. Undertake relevant emergency coastal zone management actions as detailed in the Coastal Zone Management Plan.

c. DECC will provide advice and approval to councils regarding the most appropriate methods of dealing with coastal erosion and placement of temporary mitigation measures during storm events, via the Engineering Services Functional Area Coordinator (ESFAC).

d. BoM will formulate and issue official forecasts and Severe Weather Warnings and provide them to the SES, radio stations and other organisations prior to and during potential and actual coastal erosion events.

e. Other supporting agencies responsibilities are listed in section 1.5, and in Tweed Shire DISPLAN.

After the Storm

36. The SES will:

a. Assign personnel to gather intelligence in areas susceptible to coastal erosion/inundation.

b. Review and update the arrangements for managing coastal erosion/inundation.

c. Liaise with DECC to obtain information on the impact of storm events on coastal properties, once the storm has abated.

d. Liaise with DoCs regarding the return of evacuees.

37. Tweed Shire Council will:

a. Liaise with DECC to determine any changes to the coastal zone and any new areas at risk following storms at sea.

b. Maintain and review council Coastal Zone Management Plans in consultation with other stakeholders.

c. Remove and/or mitigate the impact of temporary physical protection measures on the beach.

d. Review and update changes to the emergency action plan for coastal erosion in the Coastal Zone Management Plan.

38. DECC will provide the SES and council with updates on the current state of the coastal zone and any new areas at risk following a storm event.

39. A summary of agency responsibilities and support agencies for coastal erosion is listed in Table 12.

Action	Agency Responsible	Support
1. Before the Storm		
(TSC does not have any interim measures in place. Council is in the process of preparing an EAP)	Tweed Shire Council (TSC)	DECC
1.2 Monitor potential coastal storms	Bureau of Meteorology	SES, DECC, TSC
2. During the Storm		
2.1 Issue Severe Weather Warnings	BoM	
2.2 Conduct reconnaissance of at risk areas	SES	Other Emergency Services, TSC
2.3 Control Evacuations	SES	
2.4 Conduct Evacuations	SES	Other Emergency Services
2.5 Coordinate removal of evacuated peoples belongings to safety	SES	Other Emergency Services
2.6 Coordinate welfare for domestic pets and companion animals from evacuated areas.	DPI	
2.7 Register Evacuated People	Police	
2.8 Provide welfare support to evacuated people	DoCS	
2.9 Manage traffic and control evacuation routes	Police	
2.10 Provide security to evacuated areas	Police	
2.11 Resupply Area isolated by coastal storms/floods	SES	RFS
3. Recovery After the Storm		
3.1 Assess damage to property, roads, coastal protection works	TSC	
3.2 Establish Recovery Committees as required	LEOCON	
3.3 Co-ordinate return of evacuated people	Recovery Coordination Committee	
3.4 Assess any development in imminent danger of collapse because of proximity to eroded dune escarpment	TSC, SES	
3.5 Erect relevant safety warning signs where unstable dune escarpments present a public safety hazard. In high use areas the erosion escarpment may be collapsed to a more stable slope by machinery	TSC	
3.6 Re-instate damaged beach access	TSC	

Table 13 - Responsibilities Emergency Mitigation of Coastal Erosion

ANNEX K - AIRCRAFT MANAGEMENT

Purpose

1. During floods aviation assets can be used to perform numerous tasks including resupply, evacuation, personnel movement and reconnaissance.

2. This Annex should be read in conjunction with the SES Air Management Policy

Coordination of Aviation Assets

3. The Tweed Shire SES Local Controller may task aircraft for flood operations within the council area if other transport means are not available or not suitable. During floods affecting more than one council area, aircraft will normally be tasked centrally by the Richmond Tweed SES Region Controller; however this does not prevent tasking by the Tweed Shire SES Local Controller.

Refuelling facilities

4. Refuelling facilities within the Richmond Tweed Region are only available at Lismore and Ballina.

Refuelling facility	Aircraft Suitability	Features
Casino S28 53.0 E153 04.0 (1100m runway available)	C-130, Caribou, All Rotary	No permanent arrangements
Lismore S28 49.8 E153 15.6	Dash 8, C130, Caribou, SAAB 340	Refuelling from Mobil, Lismore or Air BP, Lismore.
Ballina S28 50.0 E153 33.7	Boeing 737, C130, Dash 8, SAAB 340, Caribou	Refuelling from Shell – Skyhigh Ground Services Pty Ltd.
Coolangatta S28 09.9 E153 30.3	Boeing 747,737, C130, Dash 8, SAAB 340, Caribou	Refuelling BP, Shell and MOBIL/Caltex
Ballina S28.50.0 E153.33.7	All Rotary, 737, A320. SAAB 340, DASH 8, C130,Caribou	Shell AVGAS & Jet A1

Table 14 - Aircraft Refuelling Details

Landing Zones

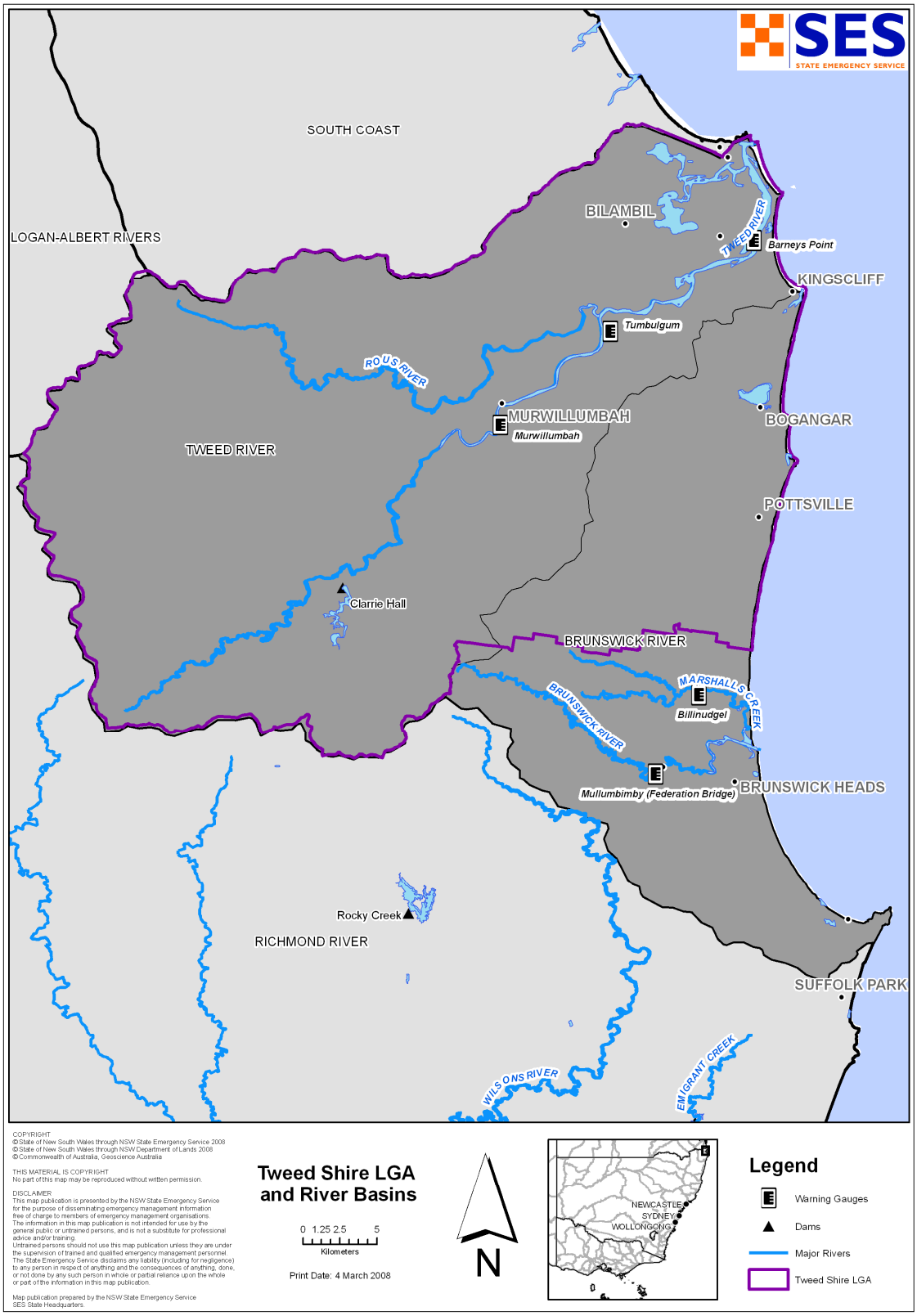
5. The following sites can be used for the landing of aircraft:

Sector	Location	Latitude / Longitude	Known Hazards	Comments
Uki	Uki Sports Oval, Kyogle Rd	Helicopter		
Tyalgum	Tyalgum Oval	S 28 21 17.5 E 153 12 20.4	Goal posts at NE & SW end of LZ	Suitable for multiple Light and medium Helo's
Chillingham	Chillingham RFS Station	S 28 18 48.5 E 153 16 32.8		No Suitable Landing Site
Murwillumbah	Sth Murwillumbah Infant School	S 28 20 24.7 E 153 23 58.3	Power lines at Sth end, Trees W and E side of LS	Suitable for Light helicopters or BK 117 only
	Murwillumbah Airfield	S 28 19 52.8 E 153 24 50.4		Grass strip 800m long suitable for Light and Medium helicopters
	Mt Saint Patricks High School Murwillumbah	S 28 19 27.2 E 153 23 37.3	Light towers & powerlines on Nth end of LZ	Shelter on W side, suitable for multiple Light and medium Helo's
	Wollumbin High School Murwillumbah	S 28 19 59.6 E 153 21 47.3	Goal posts at NE & SW end of LZ	Suitable for multiple Light and medium Helo's
Tumbulgum	Tumbulgum / Terranora Rd	S 28 16 05.6 E 153 28 12.5	Power lines in Sthn Paddock on western side of road	LZ located on Nthn side of bridge on both sides of road
Chinderah/ Kingscliff	Kingscliff TAFE Evac centre	S 28 16 02.5 E 153 34 06.9	Slopes from west to east	Area over 200m long suitable for multiple light and mediums
Banora	Banora Public School	S 28 13 20.1 E 153 32 37.8	Slopes from Nth to Sth	Suitable for multiple Light and medium Helo's.
	Banora Headquarters	S 28 13 42.1 E 153 32 32.3		Not suitable for Helo unless car park empty
Terranora/North	Lindisfarne School	S 28 14 07.4 E 153 30 23.7	No wires Goal posts at each end of field	Suitable for multiple Light and medium Helo's
Bilambil	Bilambil Sports field Evac centre	S 28 13 19.2 E 153 28 07.7	Goal posts at East & West end, powerlines Parallel to road & light towers on boundary of LZ	Suitable for multiple Light and medium Helo's.

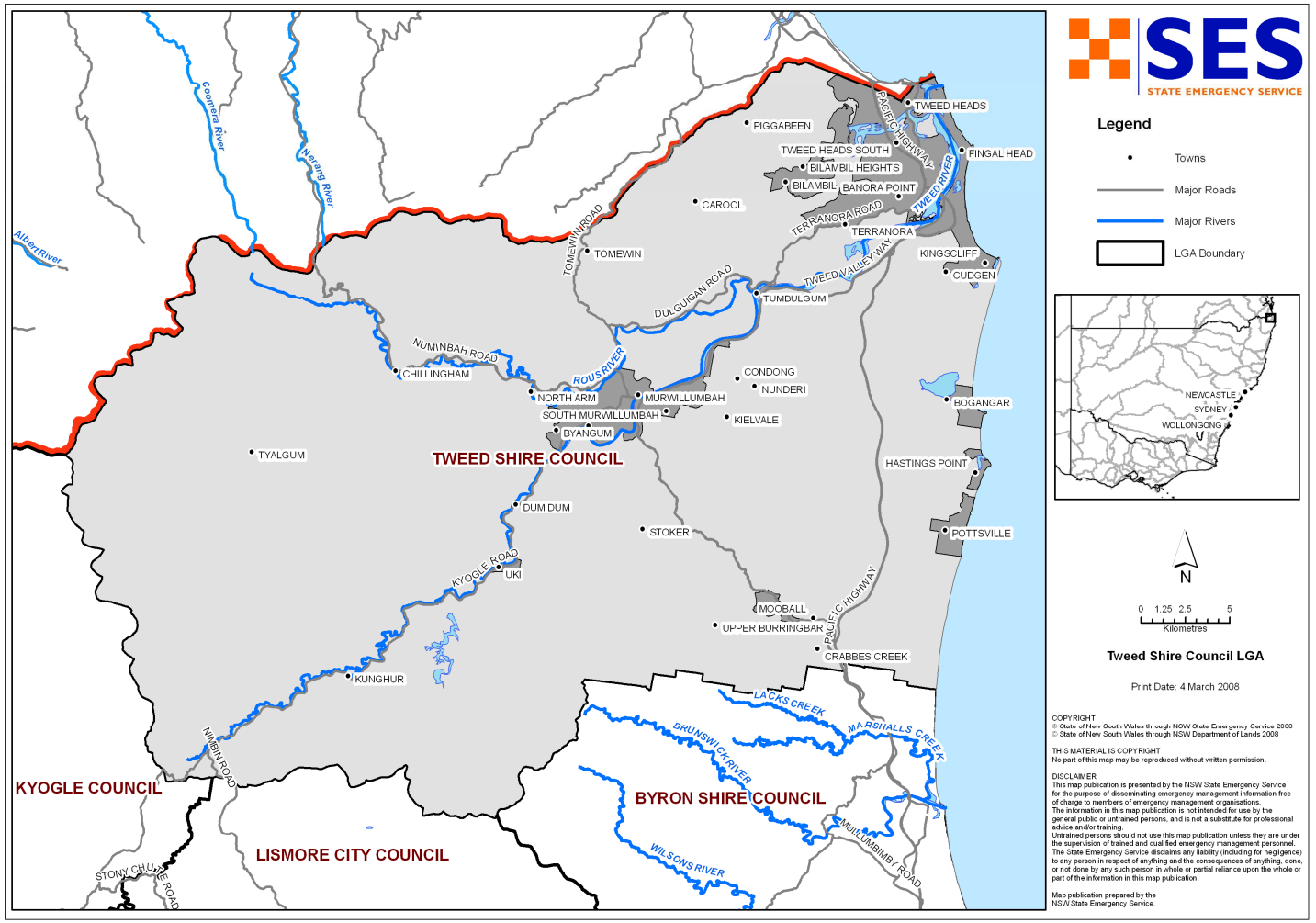
Tweed Heads	Tweed Heads PCYC Evac Centre	S 28 10 34.2 E 153 32 16.4	Trees on all boundaries of LZ	Suitable for multiple Light and medium Helo's.
Fingal	Fingal Head School	S 28 11 50.5 E 153 33 54.7	Small trees on boundaries	Suitable for 2-3 Light or 2 Mediums
Bogangar/Cabarita	Cabarita Beach village	S 28 19 41.9 E 153 34 09.4		
Hastings Point	Hastings Point Village	S 28 21 41.4 E 153 34 37.9		
Wooyung	Crabbes Creek Public School, Crabbes Creek Road	Helicopter		
Pottsville	Pottsville Village	S 28 23 04.6 E 153 34 00.0		
Burringbar	Burringbar School of Arts, Old Pacific Highway	Helicopter		

Table 15 - Aircraft Landing Zone

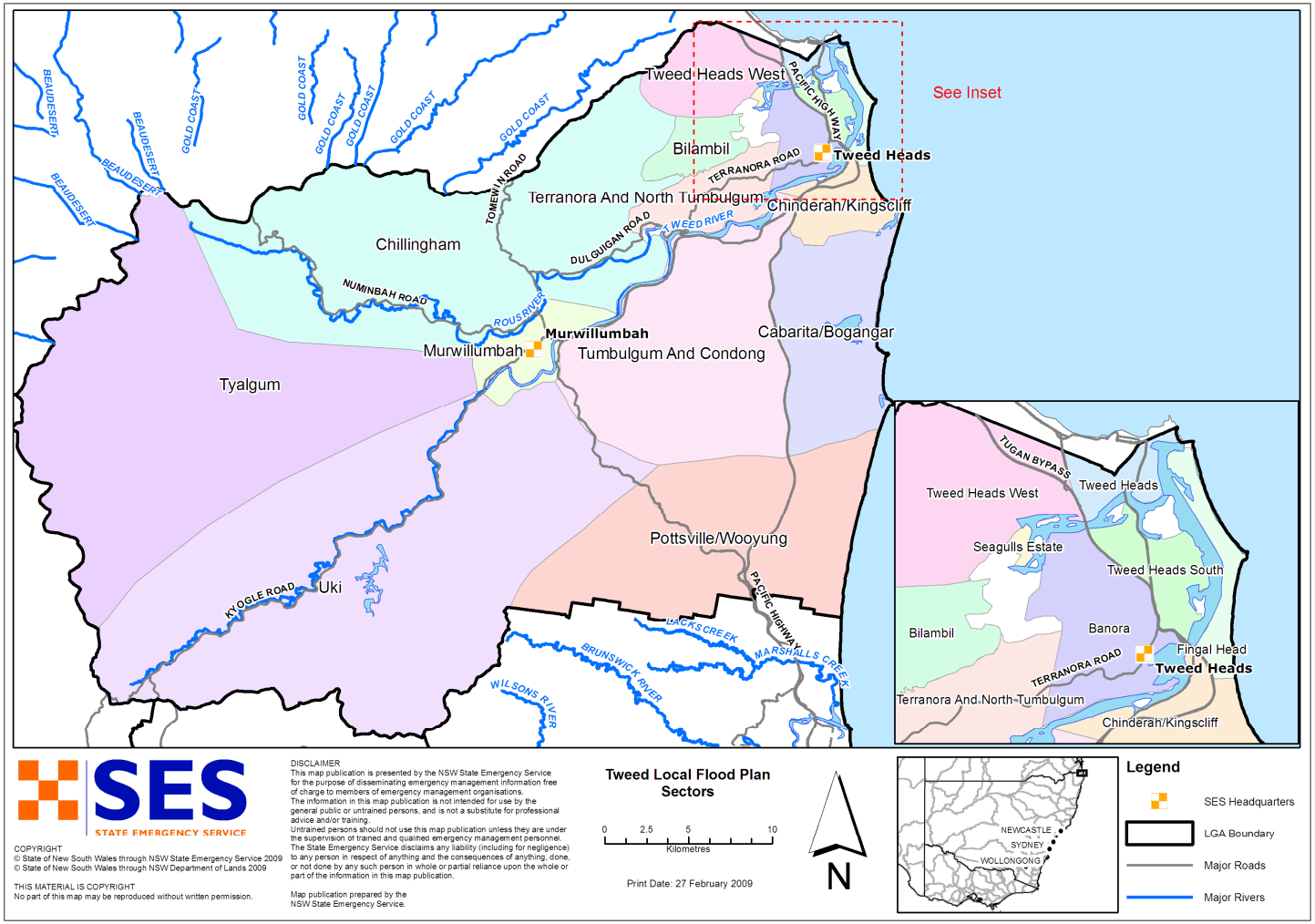
MAP 1 - TWEED AND BRUNSWICK RIVER BASINS



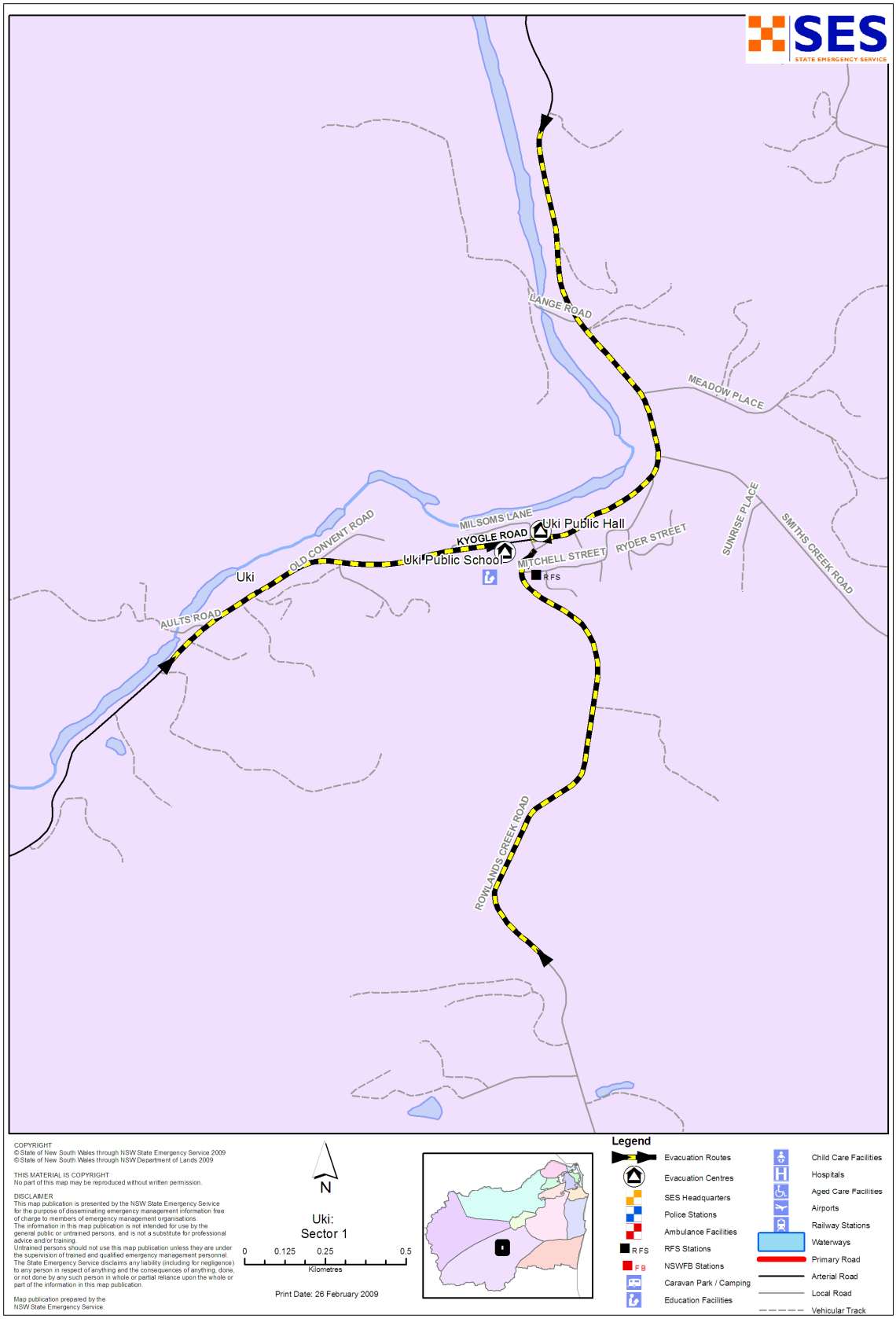
MAP 2 - TWEED SHIRE COUNCIL AREA



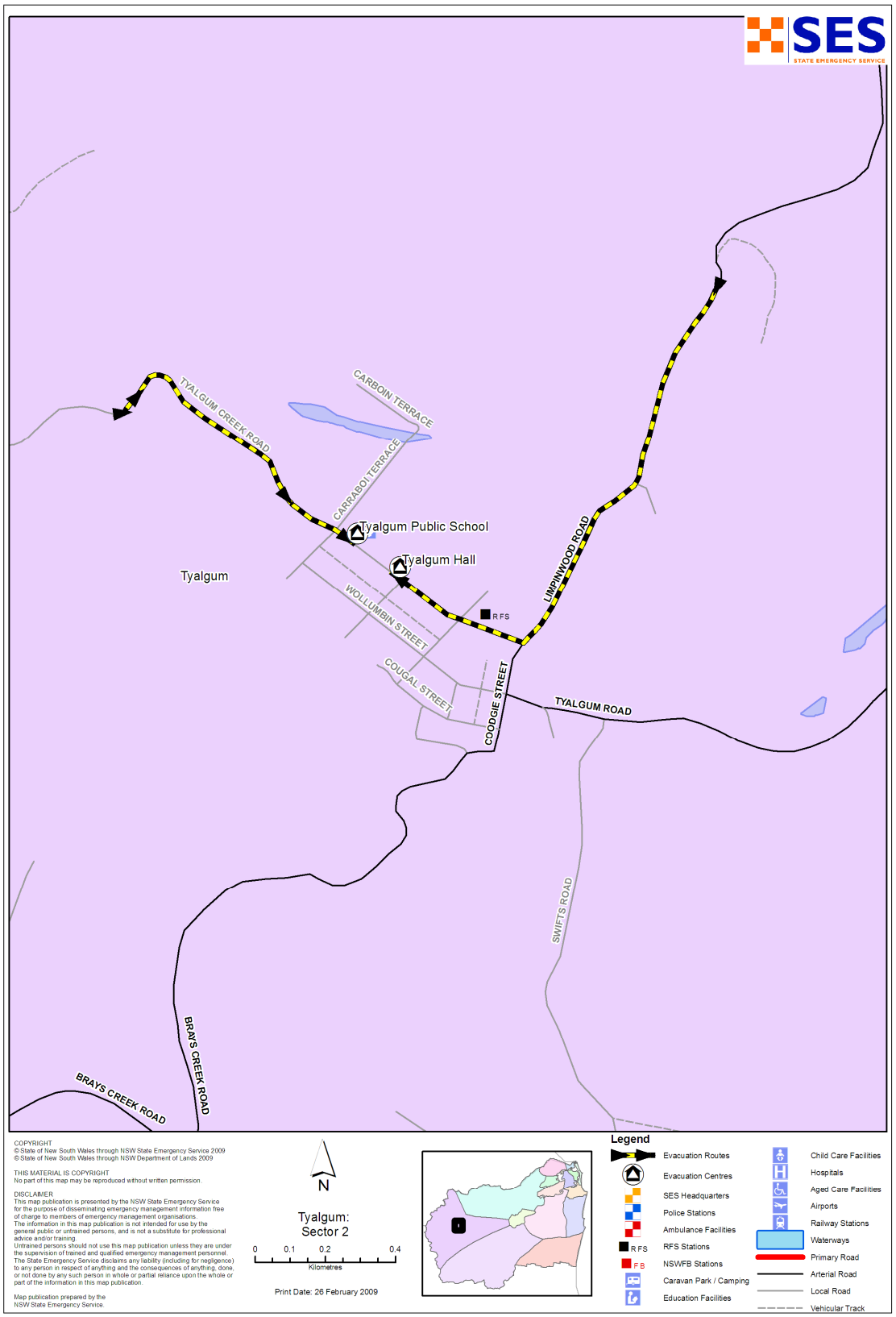
MAP 3 - TWEED SHIRE SECTORS



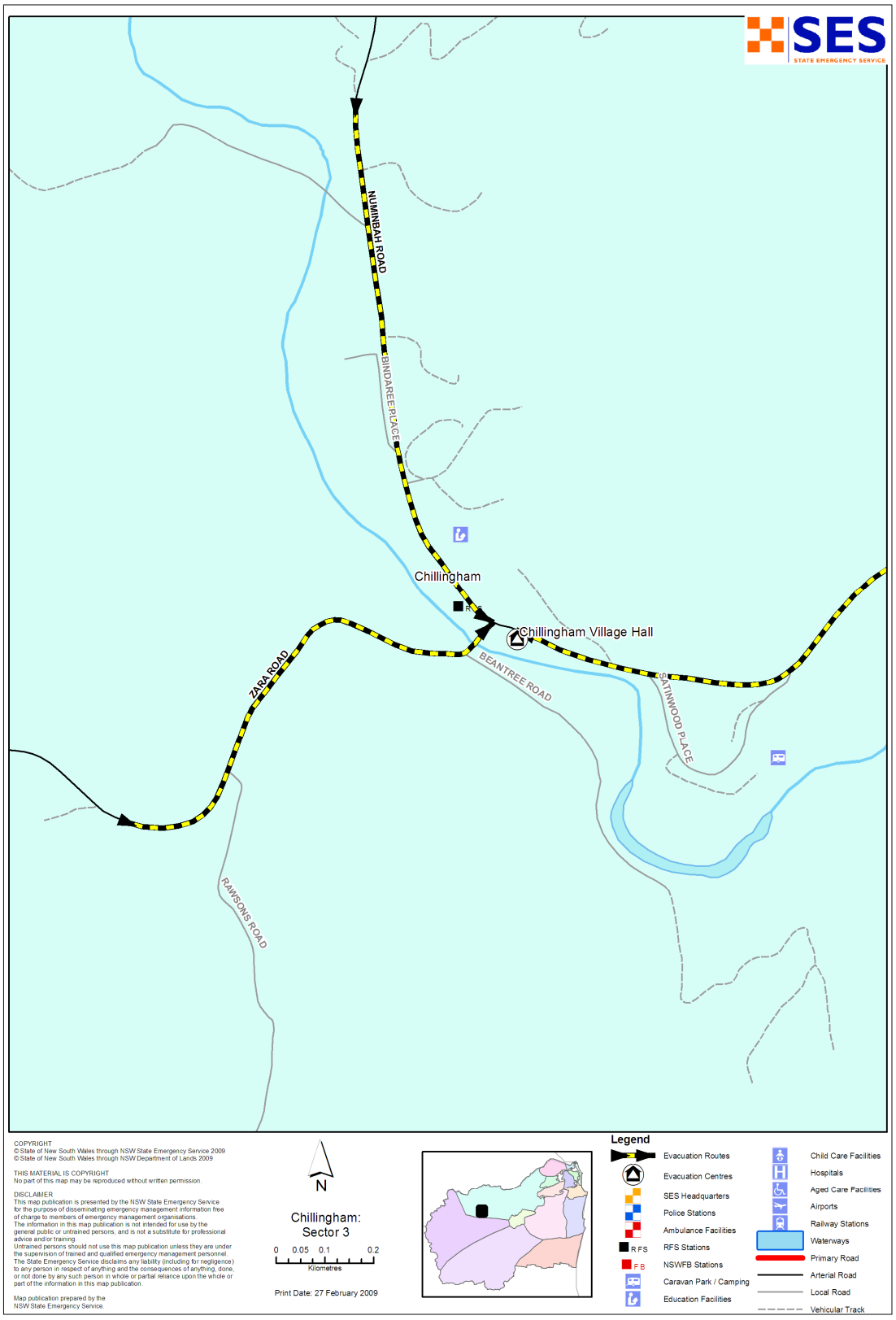
MAP 4 - UKI SECTOR EVACUATION MAP



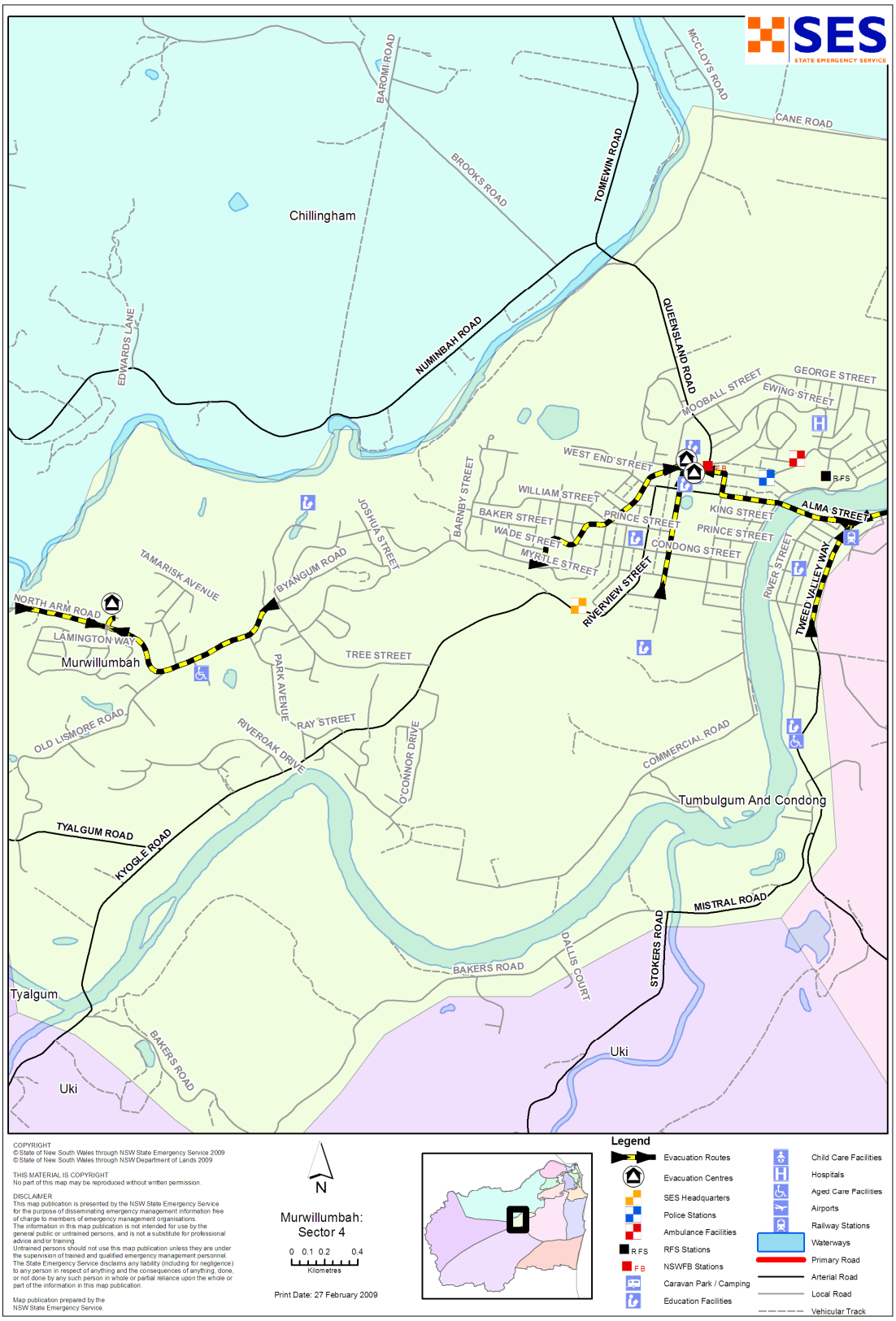
MAP 5 - TYALGUM SECTOR EVACUATION MAP



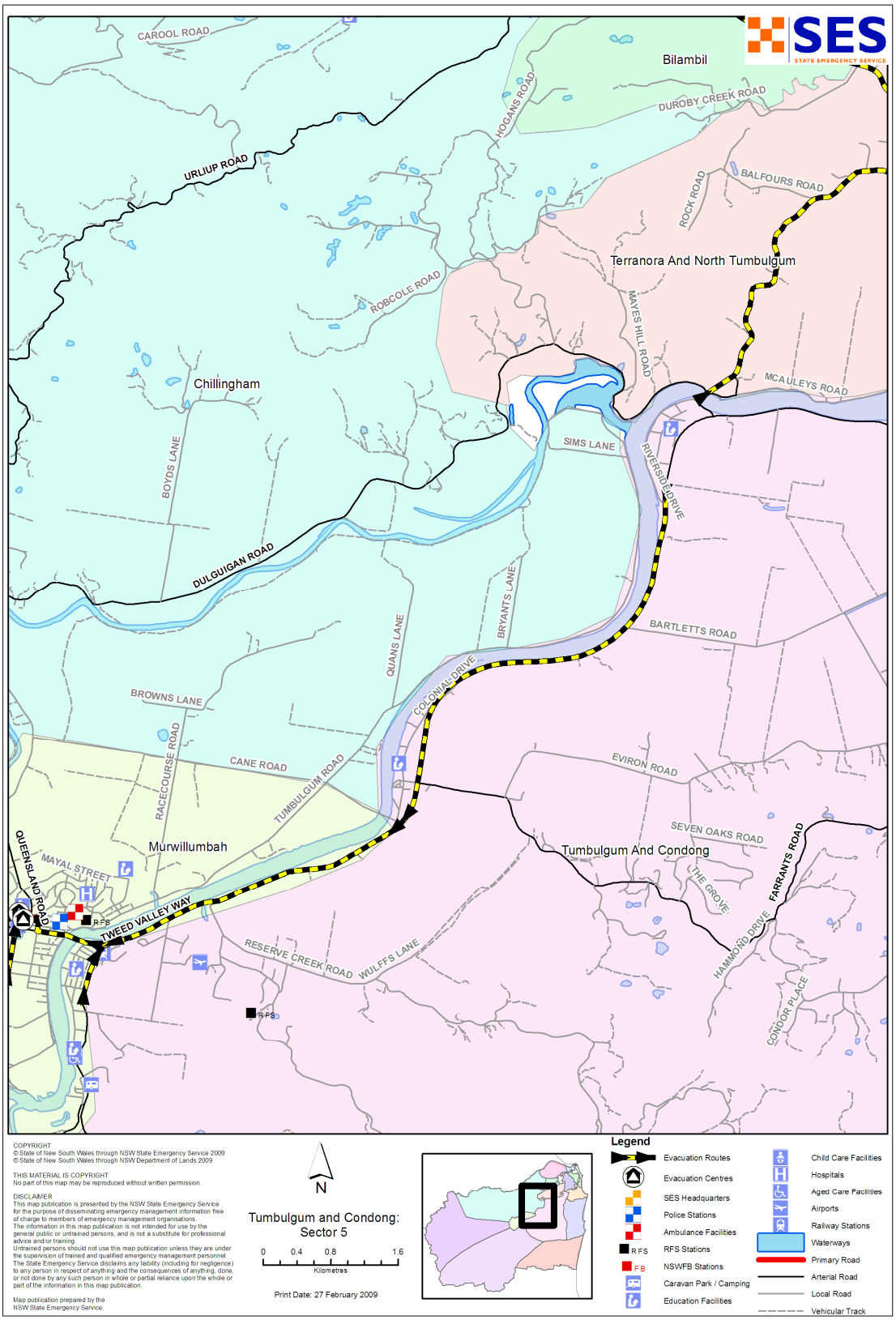
MAP 6 - CHILLINGHAM SECTOR EVACUATION MAP



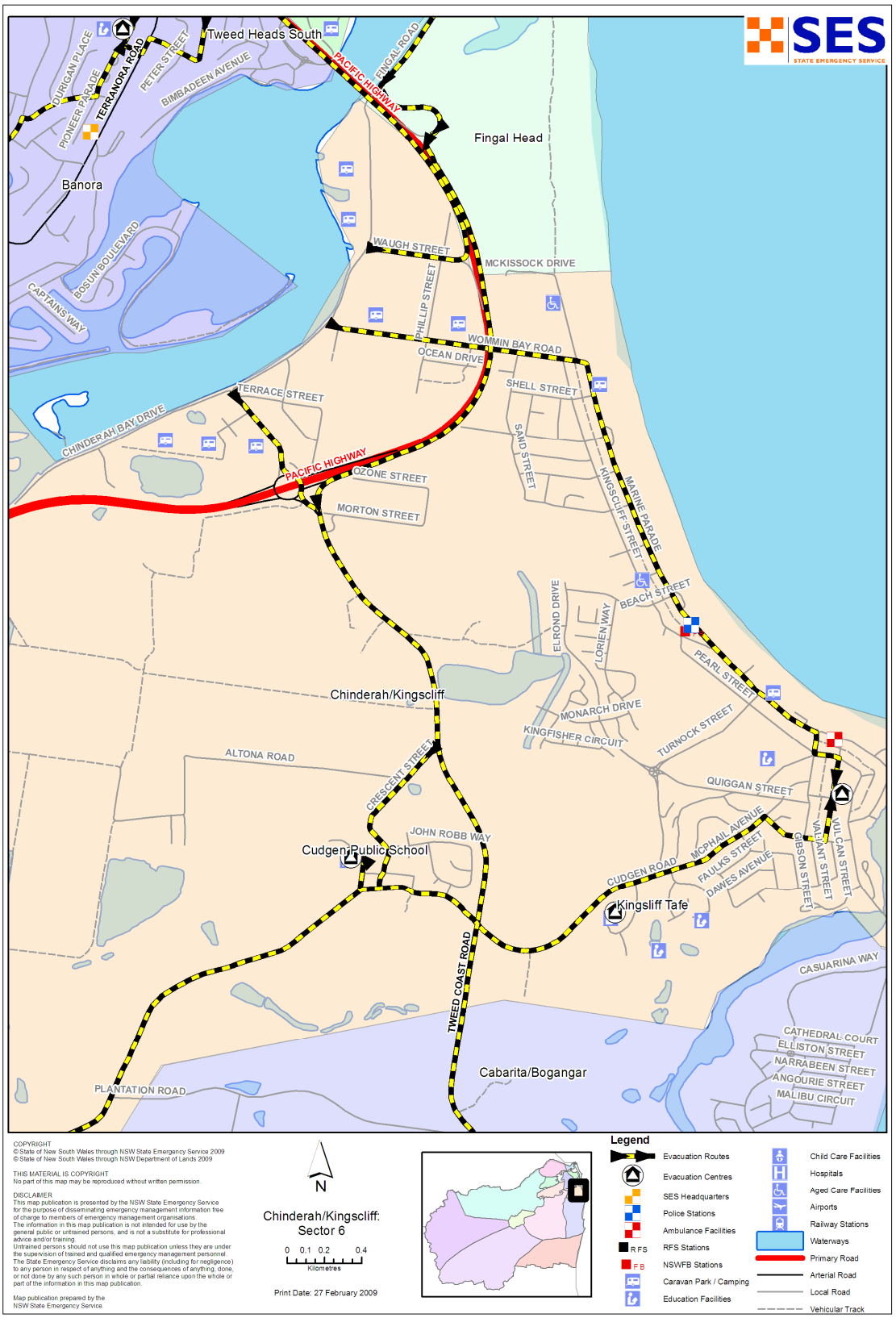
MAP 7 - MURWILLUMBAH SECTOR EVACUATION MAP



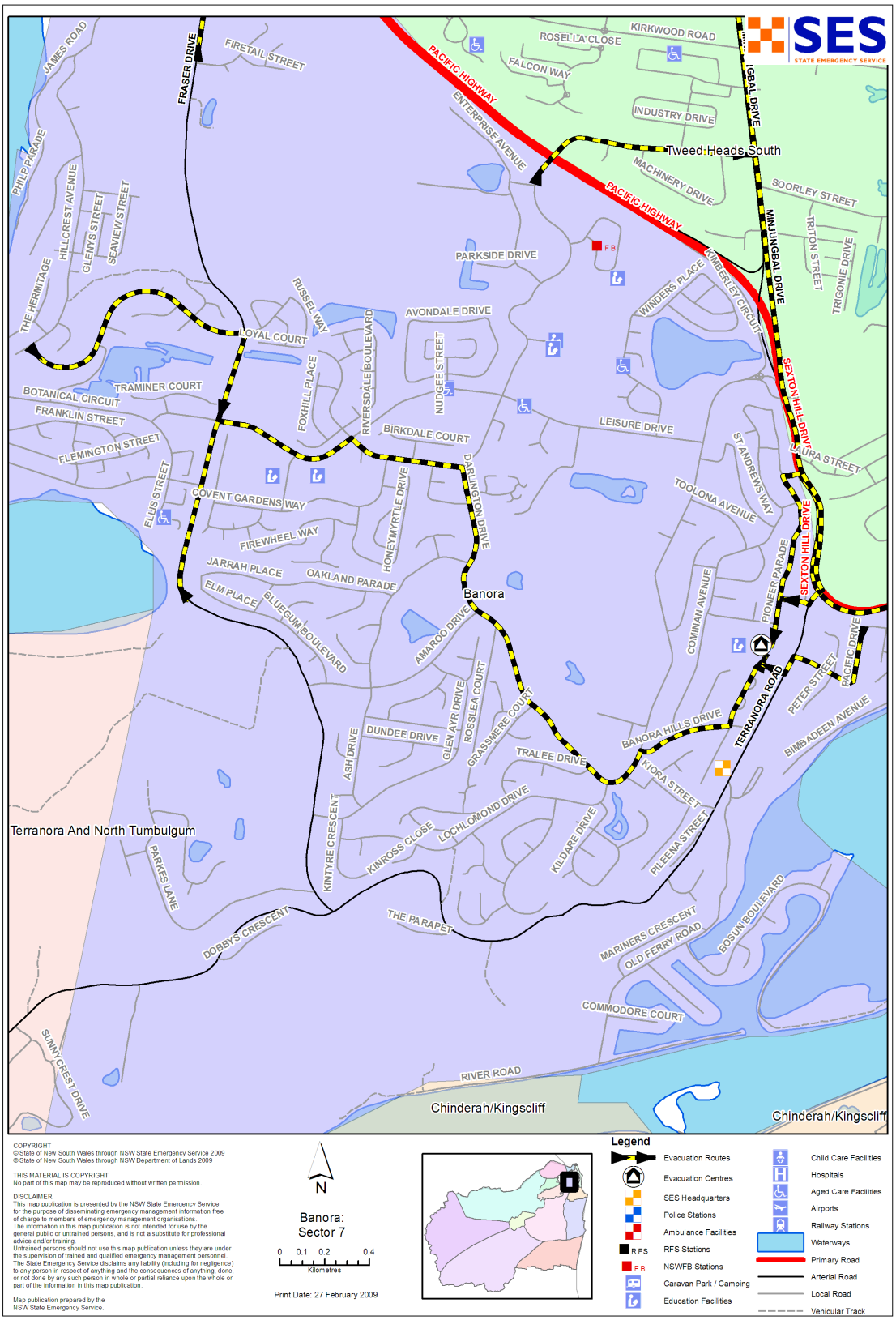
MAP 8 - TUMBULGUM AND CONDONG SECTOR EVACUATION MAP



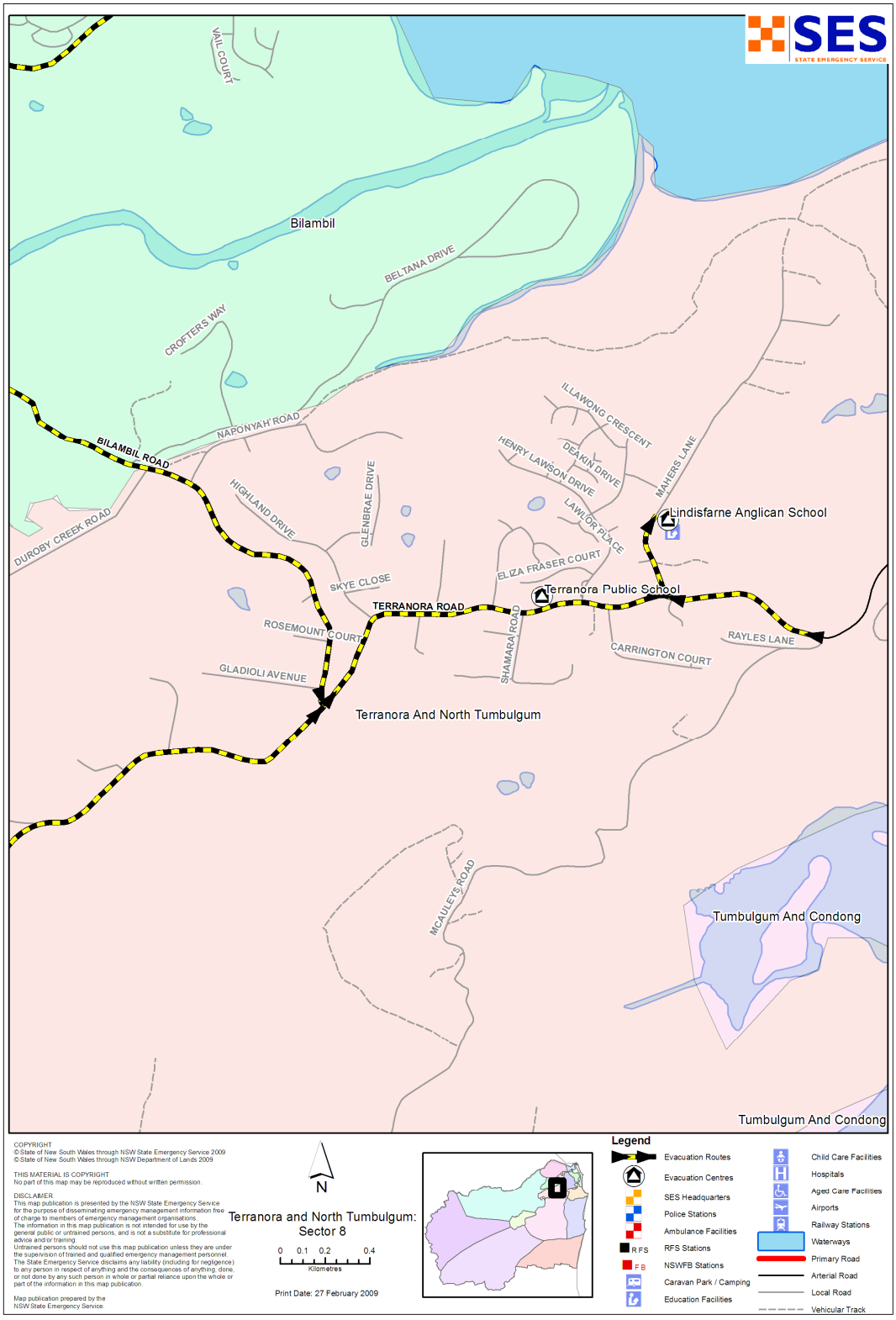
MAP 9 - CHINDERAH/KINGSCLIFF SECTOR EVACUATION MAP



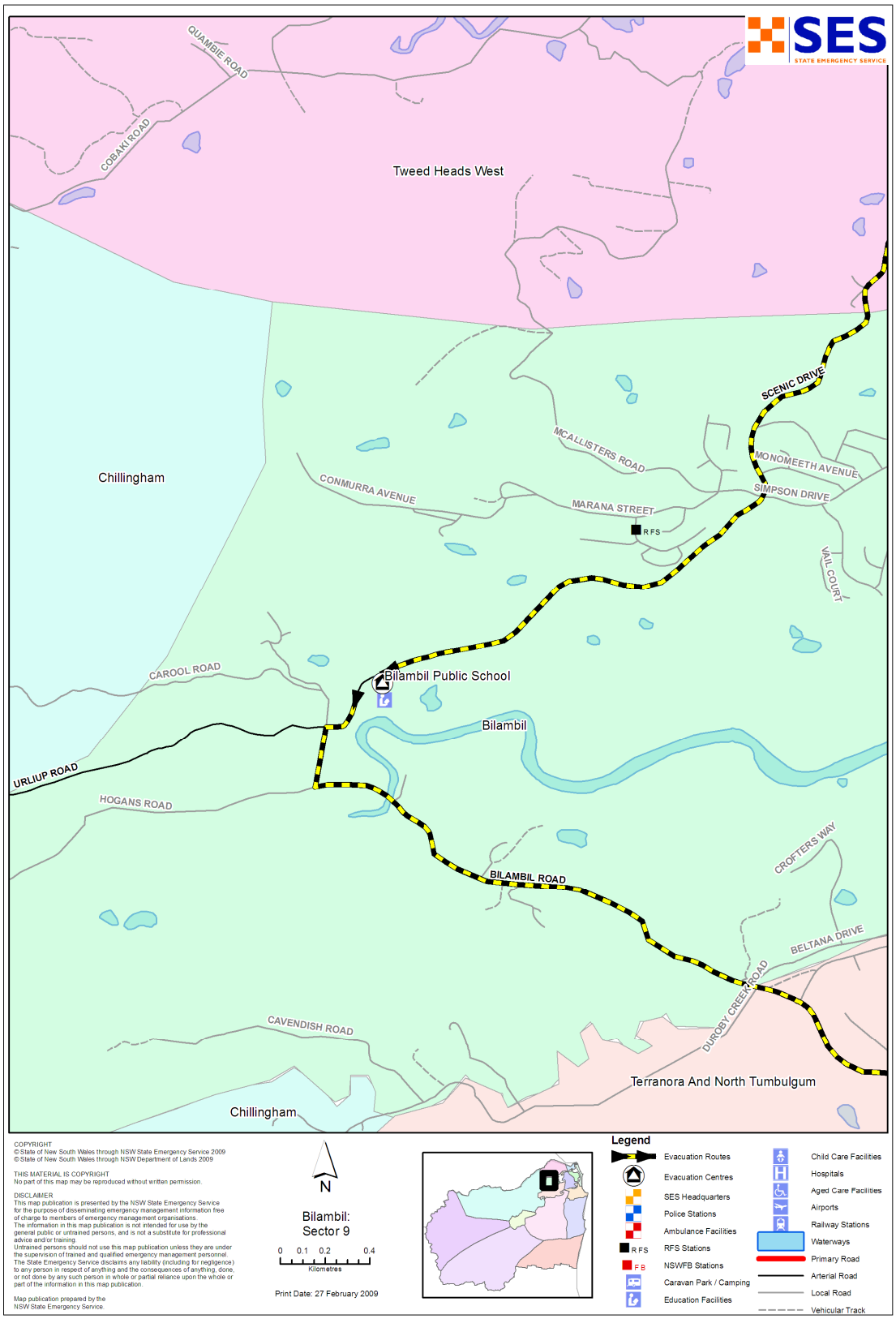
MAP 10 - BANORA SECTOR EVACUATION MAP



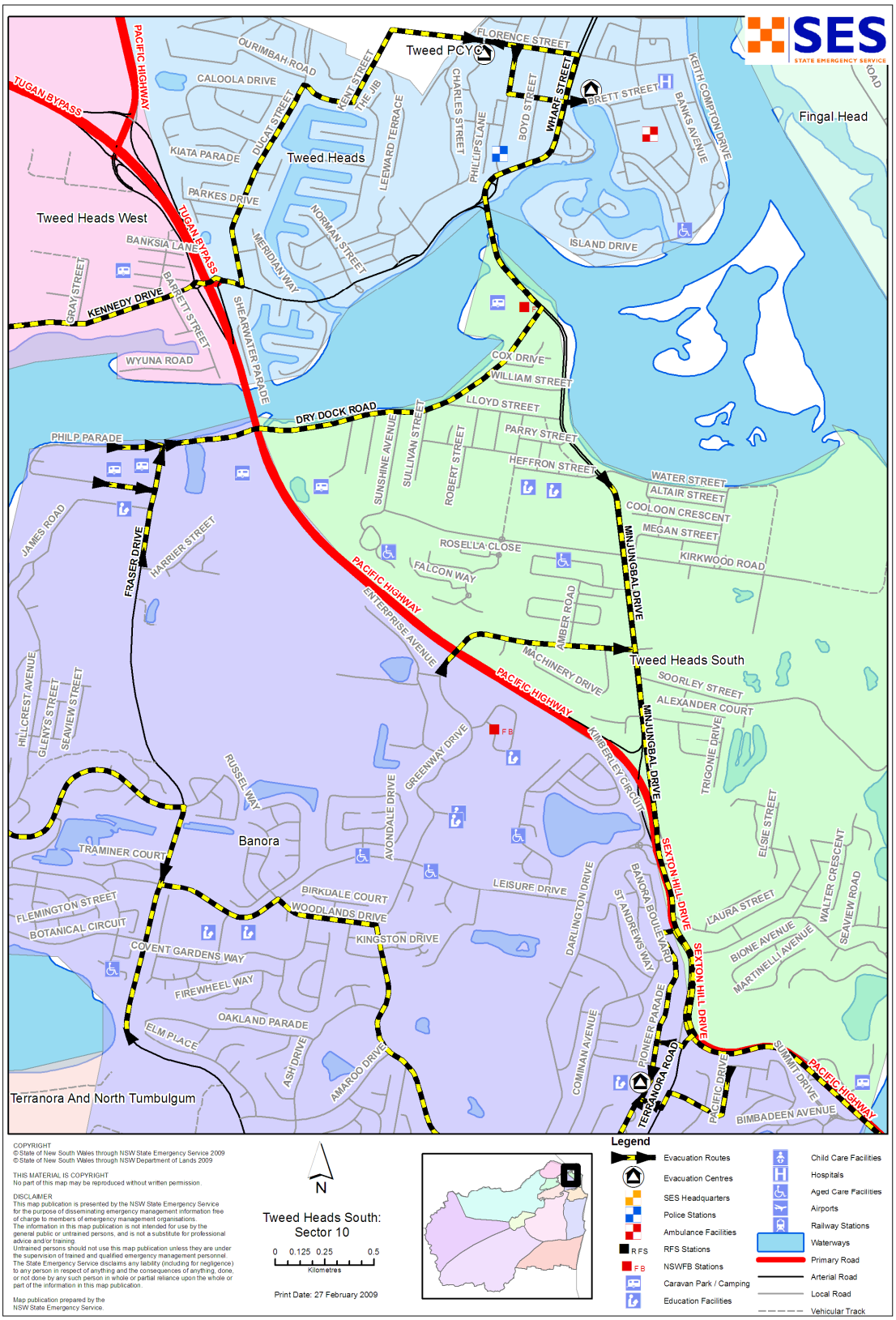
MAP 11 - TERRANORA AND NOTH TUMBULGUM SECTOR EVACUATION MAP



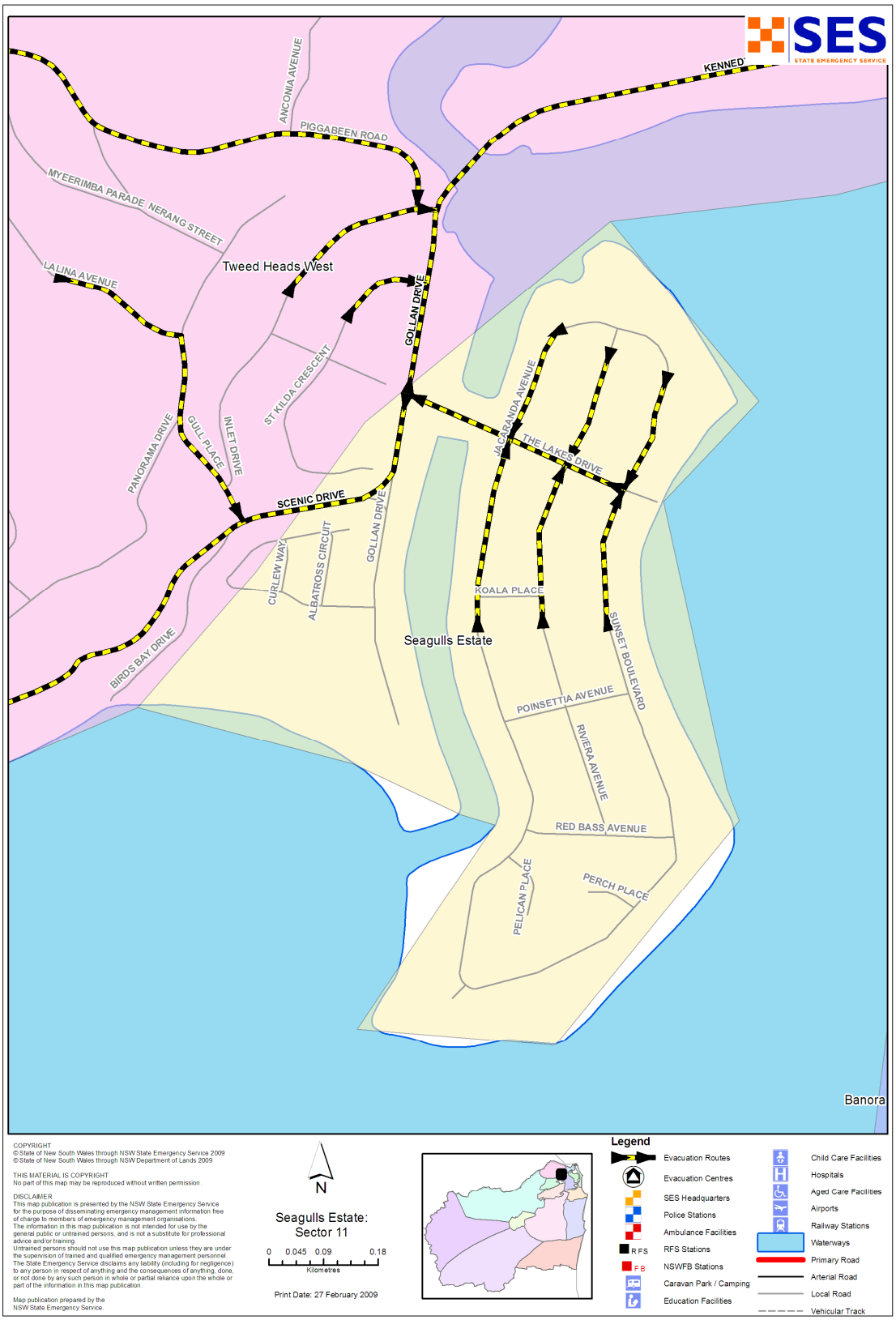
MAP 12 - BILAMBIL SECTOR EVACUATION MAP



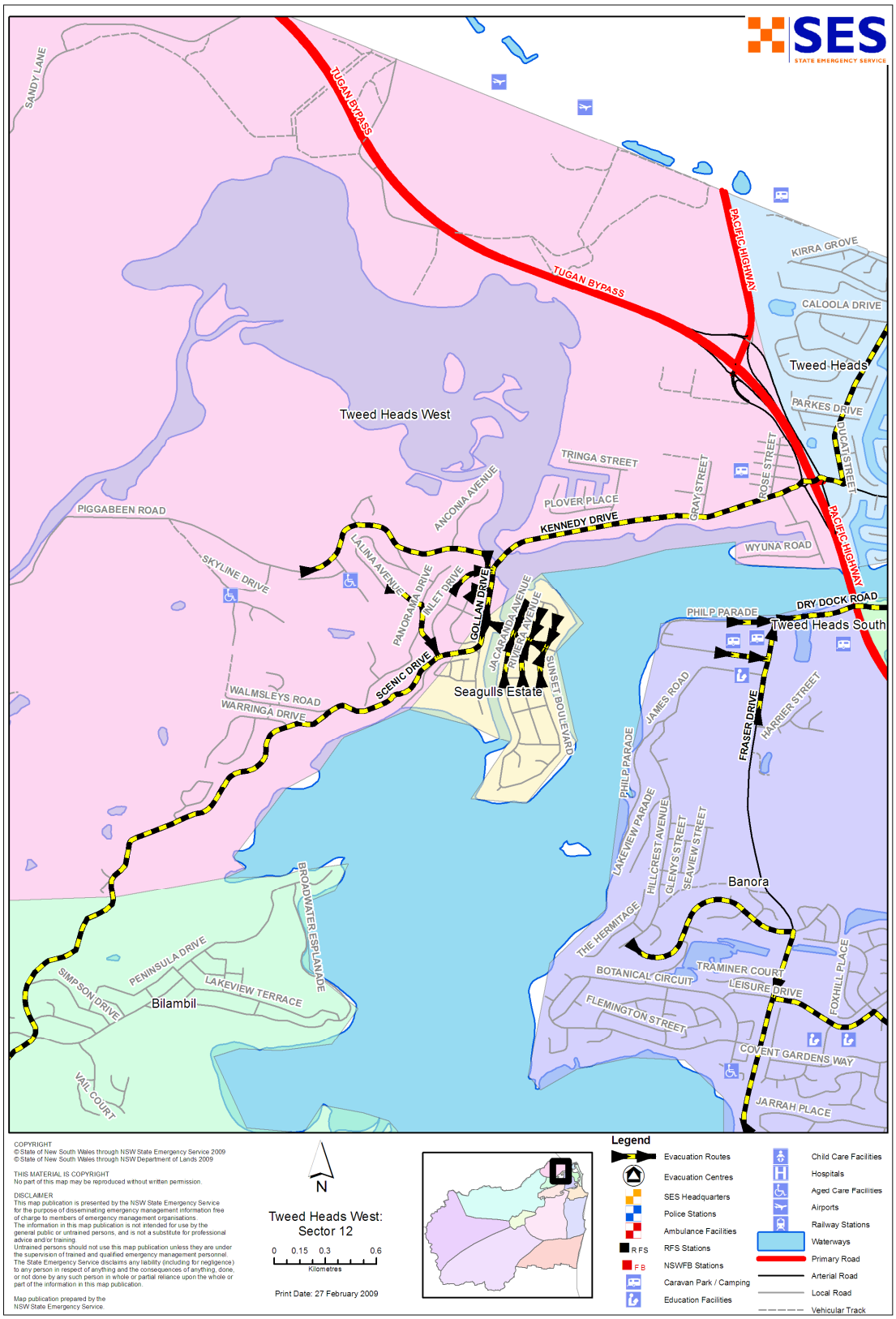
MAP 13 - TWEED HEADS SOUTH SECTOR EVACUATION MAP



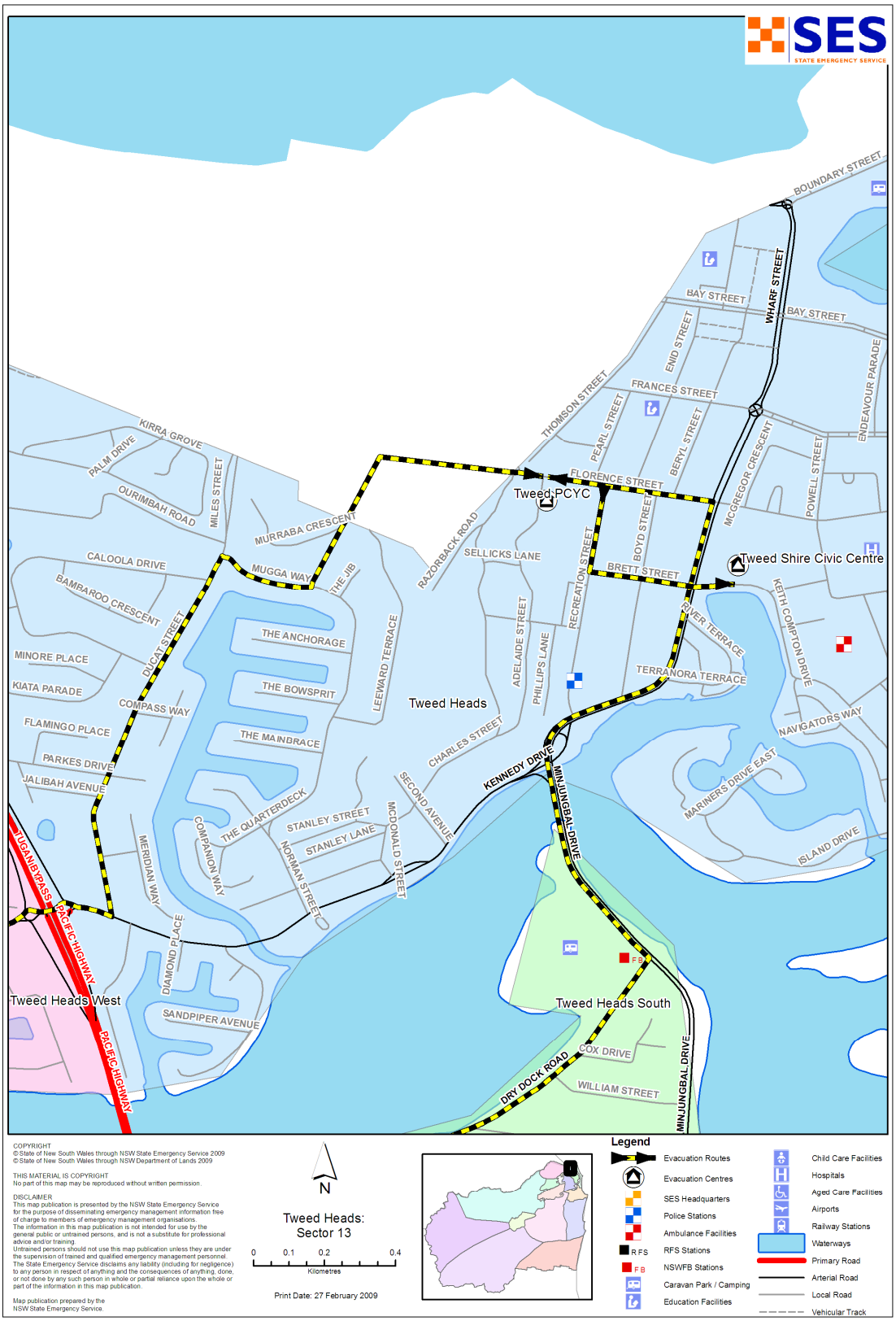
MAP 14 - SEAGULLS ESTATE SECTOR EVACUATION MAP



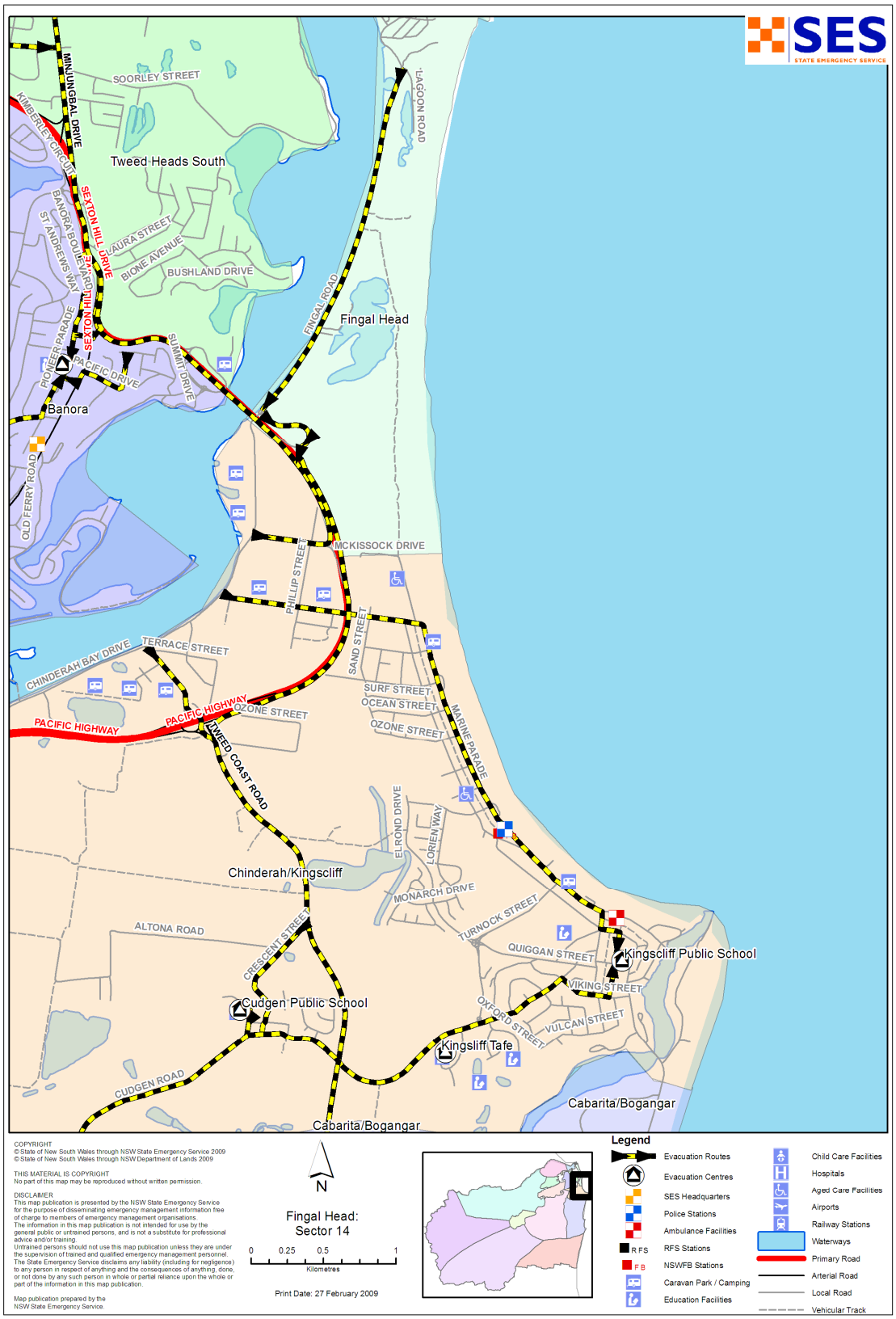
MAP 15 - TWEED HEADS WEST SECTOR EVACUATION MAP



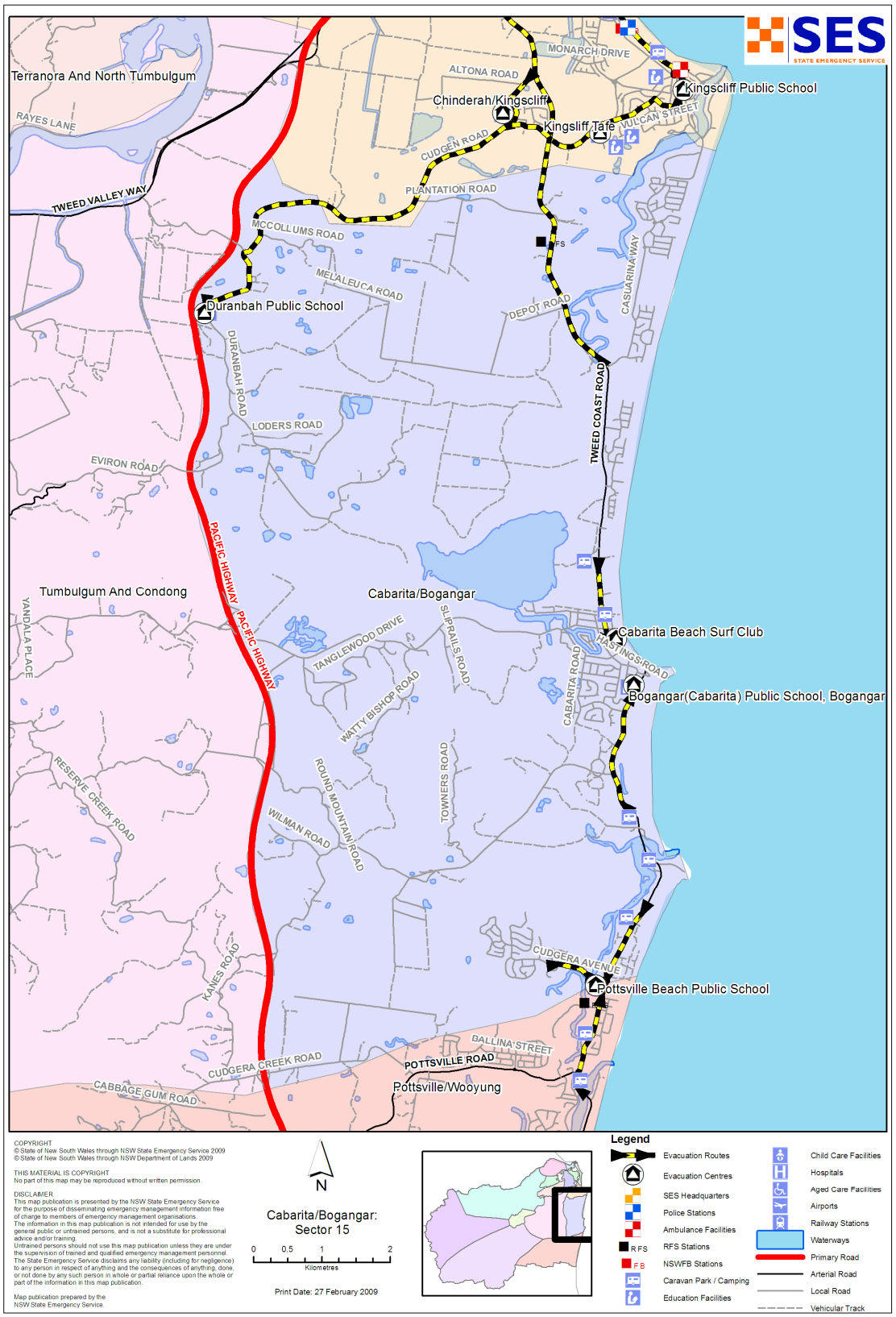
MAP 16 - TWEED HEADS SECTOR EVACUATION MAP



MAP 17 - FINGAL HEAD SECTOR EVACUATION MAP



MAP 18 - CABARITA/BOGANGAR SECTOR EVACUATION MAP



MAP 19 - POTTSVILLE/WOOYUNG SECTOR EVACUATION MAP