Chapter 1: Part K

Flood Liable Lands

Document History

Doc No.	Date Amended	Details Comments eg Resolution No.
#312313	14 November 2002	Res 02-946 Part K – Flood Evacuation Plan Amendment: No. 3
#312313	14 October 2010	Res 10-696 - to create Draft DCP 2010 for public exhibition
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#1068736	14 March 2011	Adopted Res 11-169 - Format changes applied

PART K – FLOOD LIABLE LANDS

Note: (D) = definition included in Chapter 1 Part A7 of this DCP

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K1. INTRODUCTION

What is the purpose of this Part?

Clause 24 of Byron Local Environmental Plan 1988 provides that the consent of Council is required for the erection of a building or carrying out of a work on flood liable land. Clause 24 specifies matters that Council must take into account when considering such an application. Copies of Clause 24 are available from Council's Division of Local Approvals and Compliance Services.

The NSW State Government's Flood Prone Land Policy is contained in the *Floodplain Management Manual: the management of flood liable land* published in January 2001. A copy of the Floodplain Management Manual is available for inspection at Council's Administrative Centre. The primary objective of the Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers and to reduce private and public losses resulting from flooding.

The Manual requires that all development and building proposals are considered by Council, taking into account social, economic and ecological issues, as well as flooding considerations. In this way, floodplains should not be unnecessarily sterilised and development should not be unreasonably restricted by virtue of the land being liable to flooding.

The purpose of this Part is to;

- set out the adopted flood levels as referred to in the definition of *flood liable land* Byron Local Environmental Plan 1988,
- provide details provisions in regard to clause 24 of Byron Local Environmental Plan 1988 and
- set out Council's interim flood policy in terms of the *Floodplain Management Manual*

What are the Objectives of this part?

The Objectives of this Part of the DCP are:

- to reduce the impact of flooding and flood liability on individual owners and occupiers,
- to reduce private and public losses resulting from flooding,
- to ensure that all development and building proposals on flood liable lands are considered by Council, taking into account social, economic and ecological issues, as well as flooding considerations to ensure floodplains are not unnecessarily sterilised and development not unreasonably restricted by virtue of the land being liable to flooding, and
- to provide guidelines for determination of the merits of development on flood liable lands as required by section 79C(a)(iv) of the Environmental Planning and Assessment Act 1979.

Responsibilities for Floodplain Management

Individual members of the community, private business and developers should exercise some responsibility for exposing themselves and others to flood risks.

In addition all three levels of government share in responsibility for flood related issues in NSW.

The primary responsibility rests with Local Government which:

- develops land use planning instruments (Local Environmental Plans), and
- determines applications for development consent for those instruments.

The State Government role is to set policy and provide technical and financial assistance to local government. It also provides the framework for emergency management, response and recovery.

The Federal Government role is primarily to provide financial assistance, both to provide emergency relief during and after natural diasters and to implement floodplain management measures.
Council can be held liable under Section 733 of the Local Government Act for personal and property damages as a result of approving development on flood liable land or giving advice with regard to flooding matters unless it does so in accordance with the Floodplain Management Manual. The Manual requires Council to prepare:

1. **Flood Study** – The following studies have been prepared;

Study	Date
Marshalls Creek Floodplain Management Plan	Adopted Nov 25, 1997
Marshalls Creek Floodplain Management Plan	Dated Nov 25, 1997 (Report)
Marshalls Creek Flood Study	Dated Nov 1986
Brunswick River Floodplain Management	Dated Nov 1989 Investigation
Brunswick River - Mullumbimby	*Draft* Dated Nov 1993 Floodplain Management Plan
Brunswick River Tidal Dynamics	Dated April 1990
Brunswick Valley Floodplain Management Study	Dated April 1987
Brunswick River Flood Study	Dated Nov 1986
Belongil Creek Floodplain Management Investigations	Dated Feb 1987
Belongil Creek Flood Study	Dated Feb 1986
Mullumbimby Floodplain Management Study	Dated Dec 1989
Proposed Levees Around South Golden Beach	Dated Dec 1989

2. **Floodplain Risk Management Study**

3. **Floodplain Risk Management Plan** – Below is an Interim Floodplain Risk Management Plan. This Interim plan applies to the whole Shire other than to that area cover by the Marshalls Creek Floodplain Management Plan.

What information will I need with my application on Flood Liable Lands?

As a minimum, you will need to establish in relation to the land on which you are proposing development:

- the level of the 1% AEP flood
- the velocity of the flood waters at the 1% AEP flood level
- the level of the land
- the floor level of any existing buildings
- impact on the floodplain and surrounding development

Council has information on the levels of the 1% AEP flood contained in the above Flood Studies. Council also has a survey of the floor level of many of the existing residential and commercial buildings liable to flooding and corresponding ground levels for the lower reaches of the Brunswick River and Marshalls Creek. In other cases, it will be necessary for you to employ a surveyor and/or consulting engineer to determine the details specified above.

Once these levels have been established and the flood hazard category determined, the following details need to be prepared and submitted with your application:

A detailed report, satisfactorily demonstrating that the development will not increase the flood hazard or flood damage to other properties or adversely affect flood behaviour (generally not required for low hazard flood fringe).

A detailed report to demonstrate that the proposed development will not unnecessarily reduce flood storage in the flood plain (not required for low hazard flood fringe).

A detailed engineer's report on the structural characteristics of the proposed building or work and its ability to withstand the force of flowing flood waters, including buoyancy forces and impact by debris (not required for low hazard flood fringe and low hazard flood storage).

An adequate flood evacuation/contingency plan to show that the proposed development does not involve any risk to life, human safety, property or the environment in time of flood. Measures must be permanent, fail-safe and maintenance free to ensure timely, orderly and safe evacuation in time of flood. The SES may be able to provide some assistance in this area. A typical flood contingency / evacuation plan and advisory notes are attached for reference

In most cases you will need to employ an appropriately qualified, competent and experienced consultant to prepare the information to submit with your application.

K2. DEVELOPMENT STANDARDS

K2.1 Element - Flood Standard

Element Objective

To provide a consist level of risk, for development on flood liable lands, throughout the Shire

Performance Criteria

Any development must not be unduly effected by the 1% Annual Exceedance Probability (AEP) flood.

Prescriptive measures

The flood standard is the size of flood selected for planning purposes (this standard applies throughout the Shire). For the purposes of this policy, Council's flood standard is the 1% Annual Exceedance Probability (AEP) flood. This flood event is commonly described as a 1 in 100 year flood. It is more properly described as a percentage since there is a one percent chance that a flood of that magnitude may occur in any particular year.

The 1% AEP flood is not the largest flood which is likely to occur. Development which is above the 1% AEP level may be affected by larger floods up to the Probable Maximum Flood (PMF)[(D)]. Council does not have any flood related development controls in regard to flooding for development, which would be affected by flood events larger than the 1% AEP flood.

K2.2 Element – Development Criteria

Element Objective

To ensure that all development and building proposals on flood liable lands are considered by Council, taking into account social, economic and ecological issues, as well as flooding considerations to ensure floodplains are not unnecessarily sterilised and development not unreasonably restricted by virtue of the land being liable to flooding.

Performance Criteria

- Development must not restrict the flow characteristics of flood waters;
- Development must not increase the level of flooding on other land in the vicinity;
- The structural characteristics of any proposed building or work must be capable of withstanding flooding.
- Any building must be adequately flood proofed.
- Satisfactory arrangements must be made for access to any building or work during a flood.

Prescriptive measures

For the purposes of assessing proposed development under this policy, Council has adopted the six flood hazard categories contained in the Floodplain Management Manual. Figures from the Manual assist in determining the hazard categories and are reproduced below.

General Requirements

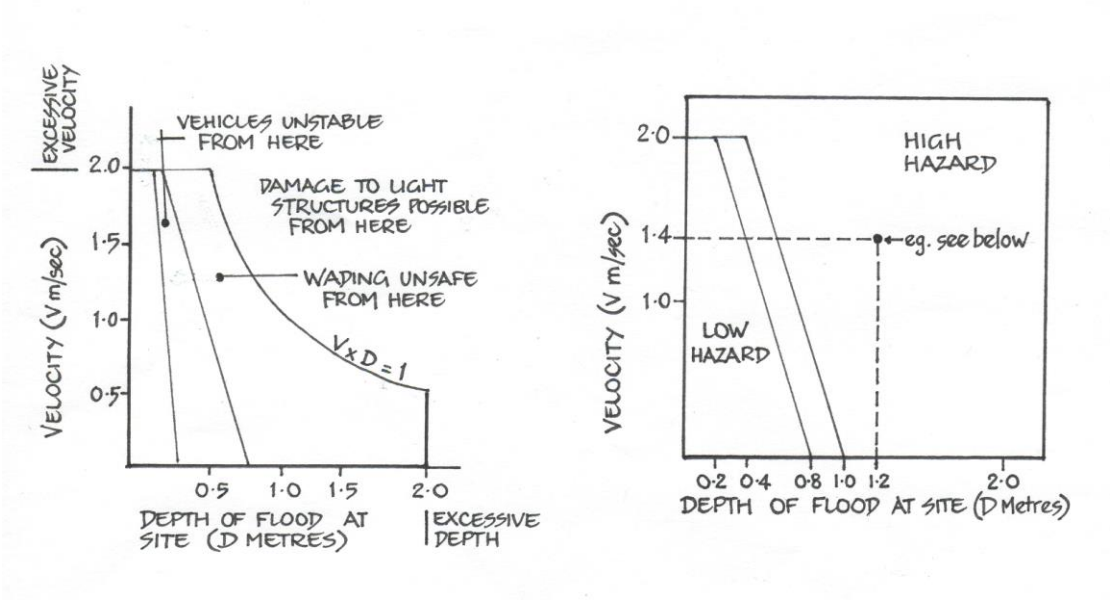
The use or storage of toxic or potentially polluting goods, materials or other products which, in the opinion of Council, may be hazardous or pollute flood waters will not be permitted on flood liable land below the flood planning level[(D)]. Any proposal, which involves the use or storage of such material, must be accompanied by an Emergency Management Plan that provides for the 1% AEP flood. Depending on the nature of the materials and the details of the proposal, the plan may also need to address contingencies for the Probable Maximum Flood[(D)].

Note: [(D)] = definition included in Chapter 1 Part A7 of this DCP

Materials to be used for construction below the flood planning level[(D)] must be flood compatible materials in accordance with Appendix F of the previous Floodplain Development Manual published in December 1981.

Council will not consent to any development on flood liable land if there is sufficient area on that land above the 1% AEP flood level on which to carry out the development. Where the land is below the flood standard any buildings must be proposed to be constructed at or the above the flood planning level[(D)]. Council will not support filling beneath the building footprint of the proposed development unless it can be demonstrated it will not impact on the floodplain. Filling outside this area will not be permitted.

Where extensive additions are proposed to light weight buildings (eg timber, fibro) Council may require the whole building to be raised to the flood planning level[(D)].



Notes

1. At velocities in excess of 2.0 m/s, the stability of foundations and poles can be affected by scour. Also, grass and earth surfaces begin to scour and can become rough and unstable.
2. The velocity of floodwaters passing between buildings can produce a hazard, which may not be apparent if only the average velocity is considered. For instance, the velocity of floodwaters in a model test has risen from an average of 1 m/sec to 3 m/sec between houses.
3. Vehicle instability is initially by buoyancy.
4. At floodwater depths in excess of 2.0 metres and even at lower velocities, there can be damage to light-framed buildings from water pressure, flotation and debris impact.
5. Derived from laboratory testing and flood conditions which caused damage.

Note

The degree of hazard may be either –

- Reduced by establishment of an effective flood evacuation procedure.
- Increased if evacuation difficulties exist.

In the transitions zone between Low Hazard and High Hazard, the degree of hazard is dependent on site[(D)] conditions and the nature of the proposed development.

EXAMPLE
If the depth of floodwater is 1.2m

And the velocity of floodwater is 1.4m

Then the provisional flood hazard is high.

Note: [(D)] = definition included in Chapter 1 Part A7 of this DCP

Flood Assessment of Development

TYPE OF DEVELOPMENT	FLOOD HAZARD CATEGORIES					
	LOW HAZARD FLOOD FRINGE	LOW HAZARD FLOOD STORAGE	LOW HAZARD FLOOD WAY	HIGH HAZARD FLOOD FRINGE	HIGH HAZARD FLOOD STORAGE	HIGH HAZARD FLOOD WAY
New dwellings[(D)]: Zone No. 2(a) (Residential Zone) Zone No. 2(t) (Tourist Area Zone) Zone No. 2(v) (Village Area Zone) Zone No. 7(f2)-(Urban Coastal Lands (f2) Zone)	***Consider on its merits*** – special requirements: Floor level of all buildings to be at or above the flood planning level[(D)]					
New dwellings[(D)]: All other zones	***Consider on its merits*** – special requirements: Floor level of all buildings to be at or above the flood planning level[(D)]				Inappropriate Development (D)	
Dwelling additions: Zone No. 2(a) (Residential Zone) Zone No. 2(t) (Tourist Area Zone) Zone No. 2(v) (Village Area Zone) Zone No. 7(f2)-(Urban Coastal Lands (f2) Zone)	***Consider on its merits*** – special requirements: Additional habitable rooms[(D)] to be at or above the flood planning level[(D)] Minor additions to existing rooms at existing floor level					
Dwelling additions: All other zones	***Consider on its merits*** – special requirements: Additional habitable rooms[(D)] to be at or above the flood planning level[(D)] Minor additions to existing rooms at existing floor level				Inappropriate Development (D)	
Multiple residential development including dual occupancy[(D)], residential flats, tourist accommodation, caravan parks[(D)]	Inappropriate Development[(D)]					
New commercial development	***Consider on its merits*** - special requirements: Floor level of all buildings to be at or above the flood planning level[(D)]		Inappropriate Development[(D)]			
Additions to commercial buildings	***Consider on its merits*** – special requirements: Floor level of all buildings to be at or above the flood planning level[(D)]				Inappropriate Development (D)	
Industrial development and rural sheds	***Consider on its merits*** – special requirements: Floor level of offices to be at or above the flood planning level[(D)] Adequate storage space to be at or above flood planning level[(D)]					
Other development not involving buildings	Consider on its merits					

Note: [(D)] = definition included in Chapter 1 Part A7 of this DCP

Flood Evacuation Plan

(to be laminated in clear plastic and displayed in a prominent location within the development)

Date - .....

Address of Development - .....

.....

1 Flood Characteristics
(refer to note 1)

2 Flood Warnings
(refer to note 2)

3 Preparations
(refer to note 3)

4 Evacuation
(refer to note 4)

5 Contacts
(refer to note 5)

Typical details

• **SES** Location	Phone:
• **Police** Location	Phone:
• **Closest Emergency Shelter** Location	Phone:
• **Alternative Emergency Shelter** Location	Phone:
• **Northpower**	Phone:
• **Telstra**	Phone:
• **Local Radio Stations** 1. Freq. 2. Freq	 Phone: Phone:

6 Additional Detail
(refer to note 6)

Note: (D) = definition included in Chapter 1 Part A7 of this DCP

SAMPLE DIAGRAMS

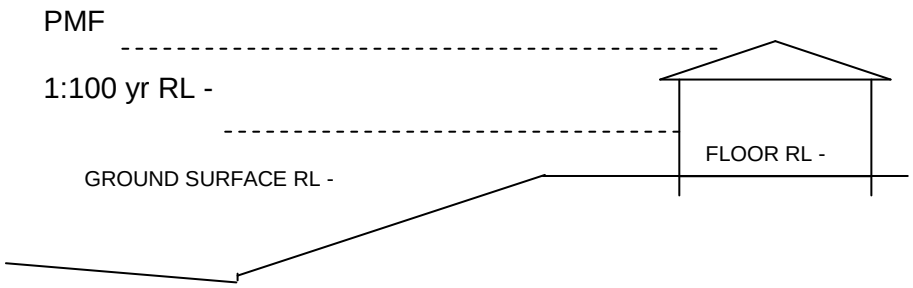


Figure 1 IMPACT OF FLOODING ON DWELLING

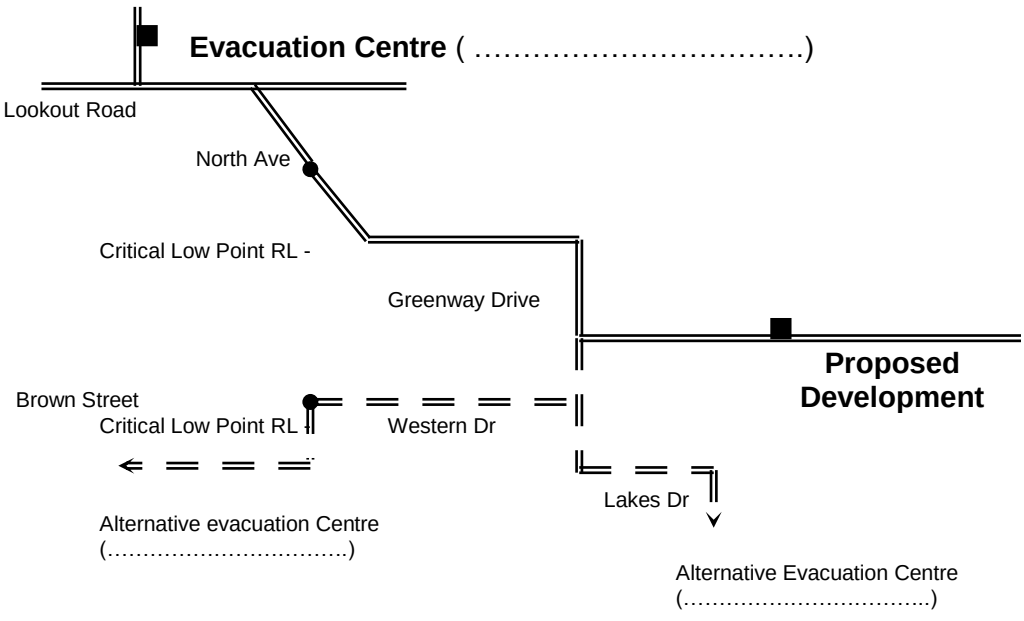


Figure 2 FLOOD EVACUATION MAP

Note: (D) = definition included in Chapter 1 Part A7 of this DCP

ADVICE ON COMPILING A FLOOD EVACUATION / CONTINGENCY PLAN.

(a flood contingency / evacuation plan is required for any development located in an area designated above the Low Hazard Flood Fringe or Flood Storage Areas)

Flood evacuation / contingency plans should be compiled by a suitably qualified person experienced in hydraulics.

To assist in completing the plan it is recommended discussions with long term residents whom have witnessed flood events such as those experienced in 1954, 1978 and 1987 may provide historical detail. The Local SES controller will also be able to provide valuable information concerning evacuation centres, warnings and emergency shelters. Byron Shire Council may in many instances provide flood heights relative to individual parcels of land.

Note 1 Flood Characteristics
This detail should give any future resident /occupier an understanding of what to expect during a flood event.

A brief description of how a flood event occurs in the area and its impact on the proposed development. Any historical knowledge detailing where previous waters have reached, damage to building, impact on services, etc.

The inclusion of a sketch as shown in Figure 1 provides residents / occupants with a clear visual impact of flooding on a development.
Residents / occupiers should understand that flood heights are given in metres in accordance with Australian Height Datum (AHD) and its relevance to their particular location.

Detail should include the level of the floor within the development, the level of the outside natural surface and the level of the 1% flood event (1 in 100yr). Levels of the PMF and any lesser events should also be included where known. Where possible advise on the range of flood heights for minor, moderate and major flooding.

Example
Following extensive wet weather, water flow from the Billinudgel area travelling down Marshall's Creek can cause overtopping of the natural banks of the creek. Low lying areas are then inundated with the potential of entering dwellings. Flow velocity at the residence is not considered to create a major risk to life however should the site need to be evacuated the critical point on the evacuation route should be traversed prior to inundation as depths and velocities shall create a danger to evacuees.

Note 2 Flood Warnings
Provide detail as to the warnings occupants can expect in relation to flooding and how they are received. At present the SES provide flood updates on the hour over local radio and TV stations.

These warnings include:
- Expected flood peak
- Road closures
- Long term weather forecasts
- Emergency Advice

Detail of Radio Station frequency, TV channels, contact phone numbers etc should be identified. Other flood warnings devices / notices specific to the development should also be identified in the Flood Evacuation Plan.

Note 3 Preparations
Occupants of the development should have clear direction on the various activities that need to be undertaken when preparing for an expected flood event.

Emergency equipment and clothing including
- Wet weather clothing
- Torch
- Radio (battery)
- Spare batteries
- Prescription medicines
- Basic food stuffs,

In addition residents / occupants need to ensure all goods, pets, livestock, motor vehicles, plant etc are stored / moved above flood level. Other activities including switching off electrical equipment, storing water and the like should be identified. A brief description of programmed activities may assist in reducing any loses due to flooding.

Note 4 Evacuation
Programming the evacuation process must ensure all activities are undertaken in a safe timely manner providing safe unassisted evacuation from the development. The inclusion of a sketch as detailed in Figure 2 provides occupants / residents with clear direction to Emergency Shelters including alternative routes.

4.1 Flood warnings

Following the reporting of flood warnings residents / occupants are encouraged to monitor flood advice taking notice of the impact on their locality. It is important to note the estimated flood peak and expected time.

4.2 Preparations
Upon flood warning advise indicating a flood event may impact on the development, all activities identified in the contingency plan should be undertaken ensuring sufficient time is available to evacuate if needed.

4.3 Evacuation
Flood Warnings indicate severe flooding in the locality. It is important that residents / occupants evacuate at a time to ensure any other location on the route has not been inundated by flood waters. The objective of timely evacuation ensures emergency personnel are not required to take undue risks providing assistance.

4.4 Notification
Should Residents / occupants seek alternative accommodation, contact should be made to the local shelter to avoid confusion as to people's safety and potential costly searches being undertaken.

Note 5 Contacts
Useful contact numbers for flood advice should be included in any flood contingency plan. The following authorities / services should be included.

- State Emergency Services
- Police
- Northpower
- Telstra
- Emergency Shelters

It is natural to be apprehensive during flood events however contact to the above should only be undertaken where there is a clear threat to safety so as not to congest control centres.

Note 6 Additional Detail

Any additional detail that may assist occupants in preparing for and understanding the impact of flood events

Draft Flood Proofing Code

Adequate flood proofing of buildings in flood liable areas is an effective and equitable means of reducing flood damage to the structure or building. It is essential that flood proofing be a condition of both compatible and conditional developments in flood liable areas.

A draft flood proofing code is incorporated in Table 10. This code is based on the Australian Department of Housing and Construction "Housing in Flood Prone Areas 1975". It is included as an example of the type of information and conditions that is required for buildings on flood liable land. Action is currently being taken by the Australian Standards Association to produce an official proofing code.

Construction Methods and Materials
Construction methods and materials are graded into four classes according to their resistance to floodwaters.

Suitable - the materials or products which are relatively unaffected by submersion and unmitigated flood exposure and are the best available for the particular application.

Mild effects - where the most suitable materials or products are unavailable or economic considerations prohibit their use, these materials or products are considered the next best choice to minimise the damage caused by flooding.

Marked effects - as for "2nd preference" but considered to be more liable to damage under flood conditions.

Sever effects - the materials or products listed here are seriously affected by floodwaters and in general have to be replaced if submerged.

Electrical and Mechanical Equipment
For dwellings(D) constructed on flood liable land, the electrical and mechanical materials, equipment and installation must conform to the following requirements.

Main power supply - Subject to the approval of the relevant power authority, the incoming main commercial power service equipment, including all metering equipment, is to be located above the DFL. Means are to be available to easily disconnect the dwelling(D) from the main power supply.

Wiring - all wiring, power outlets, switches, etc., must, to the maximum extent possible, be located above the DFL. All electrical wiring installed below the DFL must be suitable for continuous submergence in water and must contain no fibrous components. Only submersible-type splices are to be used below the DFL. All conduits located below the DFL are to be so installed that they will be self-draining if subjected to flooding.

Equipment - All equipment installed below or partially below the DFL must be capable of disconnection by a single plug and socket assembly.

Reconnection - Must any electrical device and/or part of the wiring be flooded it must be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.

Heating and Air Conditioning Systems
Heating and air conditioning systems must, to the maximum extent possible, be installed in areas and space of the house above the DFL. When this is not feasible every precaution must be taken to minimise the damage caused by submersion according to the following guidelines.

Note: (D) = definition included in Chapter 1 Part A7 of this DCP

Fuel - Heating systems using gas or oil as a fuel must have a manually operated valve located in the fuel supply line to enable fuel cut-off.

Installation - The heating equipment and fuel storage tanks must be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks must be vented to an elevation of 600 millimetres above the DFL.

Ducting - All ductwork located below the DFL must be provided with openings for drainage and cleaning. Self draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the DFL, the ductwork must be protected by a closure assembly operated from above DFL.

Table 10 - Flood Proofing Code

component	Order of preference suitable	mild effects	marked effects	severe effects
floor and sub-floor structure	- concrete slab-on-ground monolith construction note: clay filling is not permitted beneath slab-on-ground construction, which could be inundated - suspension reinforced concrete slab	- timber floor (T&G boarding, marine plywood) full epoxy sealed joints	- timber floor (T&G boarding, marine plywood) with ends only epoxy sealed on joints and provision of side clearance for board swelling	- timber close to ground surrounding base - timber flooring with ceilings or soffit linings - timber flooring with seal on top only
floor covering	- clay tiles - concrete, precast or in situ - concrete tiles - epoxy, formed-in-place - mastic flooring, formed-in-place - rubber sheets or tiles with chemical-set adhesives - silicone floors formed-in-place - vinyl sheets or tiles with chemical-set adhesives - ceramic tiles, fixed with mortar or chemical set adhesive - asphalt tiles, fixed with water resistant adhesive	- cement/bitumenous formed-in-place - cement/latex formed-in-place - rubber tiles, with chemical-set adhesive - terrazzo - vinyl tile with chemical-set adhesive - vinyl-asbestos tiles asphaltic adhesives - loose rugs - ceramic tiles with acid and alkali-resistant grout	- asphalt tiles with asphaltic adhesives - loose fit nylon or acrylic carpet with closed cell rubber underlay	- carpeting, glue-down type or fixed with smooth edge on jute felts - chipboard (particle board) - cork - linoleum - PVA emulsion cements - vinyl sheets or tiles coated on cork or wood backings - fibre matting (sea- grass matting)
wall structure (up to the DFL)	- solid brickwork, blockwork, reinforced, concrete or mass concrete	- two skins of brickwork or blockwork with inspection openings	- brick or blockwork veneer construction with inspection openings	- inaccessible cavities - large window openings
roof structure (for situations where DFL is above the ceiling)	- reinforced concrete construction - galvanised metal construction	- timber trusses with galvanised fittings	- traditional timber roof construction	- inaccessible flat roof construction - ungalvanised steelwork eg. lintels, arch bars, tie rods, beams, etc. - unsecured roof tiles

Note: (D) = definition included in Chapter 1 Part A7 of this DCP

Flood Proofing Code Continued…

component	Order of preference suitable	mild effects	marked effects	severe effects
doors	- solid panel with water proof adhesives - flush door with marine ply filled with closed cell foam - painted metal construction - aluminium or galvanised steel frame	- flush panel or single panel with marine plywood and water proof adhesive - T&G lines door, framed ledged and braced - painted steel - timber frame fully epoxy sealed before assembly	- fly-wire doors - standard timber frame	- hollow core ply with PVA adhesives and honeycomb paper core
wall and ceiling linings	- asbestos-cement board - brick, face or glazed - clay tile glazed in waterproof mortar - concrete - concrete block - steel and waterproof applications - stone, natural solid or veneer, waterproof ground - glass blocks - glass - plastic sheeting or wall with waterproof adhesive	- brick, common - plastic wall tiles - metals, non ferrous - rubber mouldings and trim - wood, solid or exterior grade plywood fully sealed	- chipboard exterior grade - hardboard exterior grade - wood, solid (boards or timber) with allowance for swelling - wood, plywood exterior grade - fibrous plaster board	- chipboard - fibreboard panels - mineral fibreboard - paperboard - plaster-board, gypsum plaster - wall coverings (paper, burlap cloth types) - wood, standard plywood strawboard
insulation	- foam or closed cell types	- reflective insulation	- bat or blanket types	- open cell fibre types
windows	- aluminium frame with stainless steel or brass rollers	- epoxy sealed timber waterproof glues with stainless steel or brass fittings - galvanised or painted steel		- timber with PVA glues mild steel fittings
nails, bolts, hinges and fittings	- brass, nylon or stainless steel - removable pin hinges	- galvanised steel - aluminium		- mild steel

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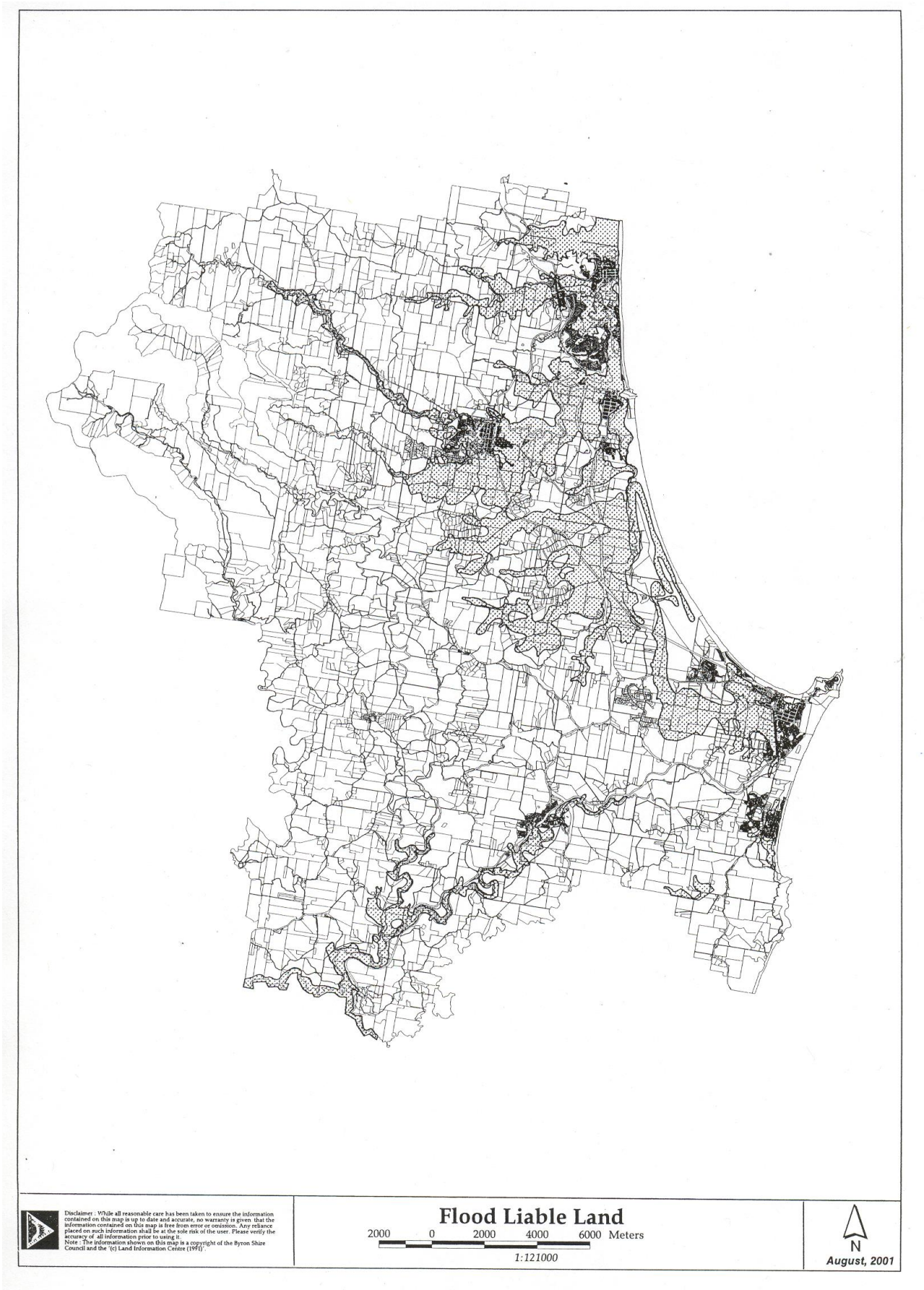
Map - Byron Shire Flood Liable Land



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