

PLANNING POLICY NO. 14

Flood Plain Management

1.0 Purpose

The purpose of this Planning Scheme Policy is to:

- facilitate assessment of development on flood prone land (defined as land below the 1 in 100 year ARI flood level)
- provide guidelines on establishing levels of flood hazard and hydraulic categories of a site; and
- identify elements to be considered in the development of a flood study.

1.1 Application of the Policy

The provisions of this policy apply to any assessable development, which is required to be supported by additional information on flooding, such as the level of flood hazard, or the provision of a flood study. The content in this policy is sourced from the *Draft Flood Plain Management Policy*, June 1999 prepared for Rockhampton City Council by ERM Mitchell McCotter, Geo-Eng Australia Pty Ltd and Willing & Partners Pty Ltd.

This policy relates to Regional Flooding from the Fitzroy River and is not intended to address stormwater, local or creek flooding issues, which need to be separately assessed.

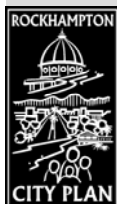
2.0 Background Information

The Fitzroy River at Rockhampton has a long history of flooding. The worst recorded flood at Rockhampton occurred in 1918. Consistent record keeping of peak flood heights commenced in 1859. Notable major floods occurred in Rockhampton in 1918, 1954, 1988 and 1991.

In the March 1988 flood the Fitzroy River peaked at 8.4 metres. A total of 264 residential properties were flooded with a maximum depth of 1.3 metres. Two dwellings experienced over floor flooding and five commercial premises had water at or above floor level.

In the days following the coastal crossing of Tropical Cyclone Joy near Ayr on 26 December 1990, Rockhampton experienced a major flood event with the Fitzroy River peaking at 9.15 metres on 7 January 1991 and a second peak of 9.3 metres on 12 January 1991. All road and rail links to Rockhampton were cut and several hundred people were evacuated.

In response to the 1991 Fitzroy River Flood, a number of flood studies have been undertaken by Rockhampton City Council. One of the recommendations to arise was that non-structural measures were to include the formulation and adoption of a flood plain management policy as part of the Planning Scheme. This policy in conjunction with the Flood Prone Land Code responds to and satisfies that recommendation.



3.0 The Need for Flood Plain Management

3.1 Why have a Council Policy ?

Rockhampton City Council recognises the significant impact that flooding has on its residents and ratepayers and considers that a policy is needed to assist Council in developing assessment criteria and standards for decision making of development on flood prone land.

As part of Rockhampton City Council's Flood Plain Management Strategy, this Policy represents a significant component of an overall strategy to help identify measures to mitigate the impacts of flooding. The impacts of large flood events are significant both in financial and in human terms. These costs are briefly discussed below.

3.2 Injury and Loss of Life

Potentially, the greatest loss from permitting inappropriate development in floodways is the loss of life and injury to persons. Extended periods of time between major flood events and the perception that "it will never happen again", reduces public awareness of the dangers associated with major flood events. As memories fade of previous major floods, pressure increases to allow development, particularly residential development in flood prone areas.

3.3 Damage to Property

Damage to property not only occurs in the floodways, but also in flood storage and flood fringe areas if adequate design criteria are not used. Structural and internal damage to dwellings can occur, for example, shifting and undermining of foundations, silt and water damage to internal fittings, carpets and walls. There is also potential for damage to roads, sewerage and water infrastructure, extreme soil erosion and large silt deposits.

Residents and property owners are further disadvantaged by being unable to access appropriate insurance cover for buildings and contents in flood prone areas.

3.4 Cost to the Community

The cost to the wider community of continued development within flood affected areas includes increased rescue and evacuation needs, post flood clean up costs, rebuilding costs and significant disruption to lives, jobs and businesses.

Property damage, as well as affecting individuals, places significant repair costs on service providers such as Council and consequently ratepayers. In addition to this, State level resources are called upon to assist with clean up operations, welfare, counselling and accommodation services. Increasing these costs can be avoided through application of sound performance criteria and consistent decision making.

4.0 Flood Hazard and Hydraulic Categories of a Site

Primary flow paths during a defined flood event have been modelled and are characterised by major flows along the Fitzroy River (including Splitters Creek and Lakes Creek) and to the south of Rockhampton City as a result of the Fitzroy River breaking out across Lotus Lagoon, Lion Creek, the Airport, Capricorn Highway and through to Gavial Creek.



In addition there are a number of secondary flow paths that permit flow between two primary flow paths and between parts of the individual primary flow paths.

To determine the hazard and hydraulic category most applicable to a site, applicants should contact Rockhampton City Council with details of the subject land, including its real property description (eg. Lot and RP) and the street address, and ask Council to search their records for information relating to the site. Such a search attracts a fee to recover costs.

If Council has insufficient site information to determine the hazard or hydraulic category, then the applicant will need to provide a qualified Surveyor's report detailing surface levels for the subject land, including details of the highest and lowest points, levels at each property corner and details of adjacent road surface levels. All levels are to be determined to AHD and the report/survey plan shall identify the survey reference point (s) used to determine those levels.

This information may be supported by anecdotal information relating to the site or the immediate locality, such as extracts from newspapers of the time of previous major floods, statutory declarations from persons who were present at the time of such floods, photographs, records of water marks or debris deposits at peak heights in the locality.

5.0 Determining Hazard and Hydraulic Categories

A hydraulic category is a reference to the nature of flooding in a particular area and is used in the Flood Prone Land Code to determine what level of control to apply to any particular parcel of land. Hydraulic categories are expressed as:

- Flood Fringe;
- Flood Storage; and
- Floodway.

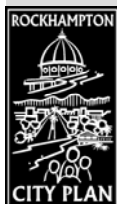
Definitions on these terms are contained within Chapter 3, section 3.7 of the Planning Scheme.

Flood Hazard is a measure of the overall adverse effects of flooding and is described in terms of Low Hazard and High Hazard. In general terms Low Hazard flooding refers to flooding where it is possible for people and their possessions to be evacuated by truck, and where pedestrians could easily wade to flood free ground. Potential damage to property and risk of personal injury would normally be expected to be low.

A High Hazard flood is one where evacuation by heavy trucks is difficult and pedestrian wading is dangerous. Structural damage to buildings occurs and some houses could be washed away. The potential for loss of life or injury together with social disruption and financial losses is high.

Factors which determine flood hazard include:

- size of flood;
- depth and velocity of flood waters as determined by the size of the flood and the hydraulic characteristics of the river and its flood plain;
- effective warning time and rate of rise of floodwaters, which is influenced by the catchment characteristics and the rainfall event(s) which caused the flood;



- duration of flooding, being how long people and property are cut off by floodwaters;
- obstructions to the flow of floodwater, which may be caused by buildings, embankments, bridges, built-up lands and fences blocked with debris;
- flood awareness, as a high degree of community awareness leads to quicker response times by members of the community when flood warnings are issued;
- access, being the availability of trafficable roads to facilitate evacuation or provision of supplies;
- evacuation problems, which may be affected by depth and velocity of floodwaters, ability to leave the flood affected land on foot (wading) or by vehicle, distance from flood free ground and degree of isolation; and
- potential for damage, which is influenced by the amount and type of development in a flood prone area.

In determining the characteristics of high flood hazard and low flood hazard land (refer to the Flood Prone Land Code), Council has given consideration to available research and data on depth, velocity and depth x velocity criteria, which determine the limits on the ability of pedestrians (especially children and older people) to wade through the floodwaters in order to evacuate. Reference to Appendix I within the Flood Prone Land Code will also assist in the determination of whether a site is a Low or High Hazard.

6.0 Development Assessment Requirements / Considerations

6.1 Flood Statement

In a high hazard area or where the nature of flooding at a specific site is uncertain, an applicant is required to submit a written assessment, as stated in the Flood Prone Land Code, of the nature of flooding at the site of a proposed development. This assessment, called a Flood Statement, will contain details of the assessed flood characteristics at the site and how the proposed development will impact upon and be impacted upon by a Defined Flood Event¹ with recommendations included outlining how these impacts will be reduced or mitigated.

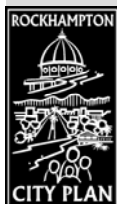
The minimum information to be included in a Flood Statement to Council is:

- current natural surface levels;
- any proposed adjustment to natural surface levels;
- relevant low hazard access route (if required by the Flood Prone Land Code);
- estimated flood depths and velocity;
- hydraulic classification (eg. flood fringe, flood storage or floodway);
- potential impact of development on flood depth and velocity;
- evacuation options;
- effective warning time;
- any other matters which are considered relevant by the Assessment Manager on behalf of Rockhampton City Council;
- source(s) of information; and
- qualifications and experience of the author of the Flood Statement.

A person with acceptable qualifications and experience would be a Registered Professional Engineer with relevant experience in the field of hydraulic engineering and flood plain management.

¹ Defined in the Flood Prone Land Code.





6.2 Environmental Harm

In assessing an application to develop on flood prone land, Council will take into consideration whether any adverse environmental impacts may occur as a result of flooding of the development. For example, inundation of certain developments might release and/or disperse contaminants, chemicals, wastes or other pollutants into flood waters. This is especially particular to hazardous materials². In addition to this the release of significant amounts or types of debris into flood waters has the potential to cause adverse environmental impacts down stream and may effect changes to the dispersal of flood waters.

In the case of an application for development which may produce adverse environmental impacts as a result of flooding, Council may refuse the application, based on the requirements of the Flood Prone Land Code, if the applicant cannot demonstrate that this risk will be sufficiently mitigated.

6.3 Filling or Excavation

In assessing an application involving the filling of land in the flood plain, the applicant is required to demonstrate that it will not adversely affect flood behaviour, including depth and velocity, and is recommended not to:

- a) cause an afflux greater than 0.1 metres; or
- b) if a similar relaxation in filling policy was to be permitted on all allotments in the vicinity of the proposed development, cause an overall afflux greater than 0.15 metres during the defined flood event; or
- c) interrupt or materially change the surface water drainage from or onto adjoining land; or
- d) create, in the event of a major flood event, a sudden change in flow distributions, flood level or velocity that could result in:
 - breaking of a levee; or
 - establishment or blockage of a breakout; or
 - excessive scour; or
 - possible channel realignment; or
 - sedimentation; or
 - worsening of emergency access; or
 - increased flood hazard; or
 - any adverse effect on existing structures or buildings in the locality

In respect to excavation, the applicant is required to demonstrate that it will not have an adverse impact on flow paths, velocity or flood behaviour.

6.4 Flood Study

In deciding an application, where determined to be necessary, the Rockhampton City Council may require as a part of an information request under the Integrated Development Assessment System (IDAS) a detailed flood study, prepared by a suitably qualified engineer to assess the flood hazard of a site or the flood damage caused by the proposal and the impact of the proposal on flood flows and flood levels.

Any Operational Works application for filling or excavation is likely to require the carrying out of a flood study.

² As defined in the *Dangerous Goods Safety Management Act 2001*.



The minimum information to be included in a Flood Study includes, but is not limited to, the following:

- (a) details of the existing (pre-development) and modified (post development) ground levels over the subject land and all adjoining properties and any other properties that may be affected by any change in behaviour of floodwaters as a result of the proposed development;
- (b) details of the existing (pre-development) and modified (post development) flood extent levels and velocity of floodwaters over the subject site and all adjoining properties and any other properties that may be affected by any change in the behaviour of floodwaters as a result of the proposed development;
- (c) the potential impact of the proposed development on;
 - peak flow rates; and
 - flood levels; and
 - frequency of flooding; and
 - velocity of floodwaters; and
 - sedimentation or scour effects; and
 - duration of inundation; and
 - trafficable access routes; and
 - freeboard levels.
- (d) all information used in the preparation of the study, including, but not limited to;
 - source/s of information; and
 - methodology; and
 - hydrologic and hydraulic models; and
 - calibration techniques for mathematical models; and
 - model accuracy; and
 - qualifications and experience of the author of the flood study.

7.0 Structural Engineers Certification

Where it is proposed to construct a building on a flood-prone site and the anticipated depth of inundation is greater than 1.0 metre or the product of depth and velocity during the defined flood is greater than 1.0 m²/s, Council will require a certificate from a Registered Professional Engineer, with relevant experience in Structural Engineering.

The Structural Engineer's report shall confirm that the building has been designed to withstand the forces created by floodwaters and debris loading anticipated for that location. Matters to be addressed in the report include, but are not limited to:

- (i) the attachment of the building to its foundations in order to prevent flotation;
- (ii) the provision of flood resistant materials for those parts of the building constructed below flood level;
- (iii) the requirement that where possible walls below flood level be aligned parallel to the direction of flood flow;
- (iv) structural design to withstand the following concurrent forces:
 - serviceability wind load; and
 - stream flow forces (based upon the flood flow velocity); and
 - debris loading (1m of debris mat at flood level).

In addition, the material type shall be chosen such that, in combination with appropriate bracing and connectivity, the structure whilst suffering some damage, would not disintegrate in the event of a log impact;

- (v) adequate protection of the building foundations from the effects of scour during flood.



8.0 Flood Proofing Measures

Development Applications in flood prone areas are to include details of flood proofing measures proposed to be used, as determined to be necessary in the Flood Prone Land Code. Flood proofing means a combination of measures incorporated in the design, construction and alteration of individual flood-labile buildings or structures to reduce or eliminate flood damage and may include the filling or building up of flood prone land. Details that are to be provided include structural specifications, the location of electrical installations and types of flood resilient materials³ to be used.

Wherever possible, specific design and construction measures are to be incorporated into a development for building works to minimise the potential impacts of flooding on the building or structure. Design and construction measures are required to address potential impacts on flood flows, velocity and depth.

Methods of flood proofing that will also be considered by Rockhampton City Council in Rural or Special Use Areas are:

- Earth mounds; and
- Elevated buildings.

Both are subject to the other requirements of this policy and the Flood Prone Land Code.



³ As defined in the Flood Prone Land Code.

