Griffith Flood Liable Lands CS-CP-403

(LOCAL POLICY)

Policy History

Revision No.	Council Meeting Date	Minute No.	Adoption Date
1	11 Oct 2011	0353	11 Oct 2011
2	13 Aug 2013	0255	13 Aug 2013
3	22 Aug 2017	17/205	22 Aug 2017

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Glossary

AEP	Annual Exceedance Probability. Refers to the probability of a flood event of a certain magnitude occurring in a year. E.g. a 1% AEP flood event is the 100 year ARI flood event.
AHD	Australian Height Datum
ARI	Average Recurrence Interval
Council	Refers to Griffith City Council, who is the consent authority for the approval of developments
DCP	Development Control Plan
DECC	former Department of Environment and Climate Change (*now OEH*)
DECCW	Department of Environment, Climate Change and Water (*now* OEH)
EP&A Act	Environmental Planning and Assessment Act, 1979
EPAR	Environmental Planning and Assessment Regulation, 2000
FPA	Flood Planning Area
FPL	Flood Planning Level
LEP	Local Environment Plan
LG Act	Local Government Act, 1993
LGA	Local Government Area
Management Plan	Floodplain Risk Management Plan
Management Study	Floodplain Risk Management Study
Manual	Floodplain Development Manual (2005)

OEH	Office of Environment & Heritage (*formerly DECCW*)
PMF	Probable Maximum Flood
SEPP	State Environmental Planning Policy
SES	State Emergency Service

1 About This Policy

1.1 Background

This policy seeks to guide proposed development in the management of flood risks for the Griffith City Council Local Government Area. It shall be applied in conjunction with other development control plans adopted by Griffith City Council.

The policy presents a set of flood related assessment criteria which are to be met by all new development. For example, the minimum floor level for new residential development has been based on the 100 year ARI flood event with a 500 millimetre freeboard.

The policy also requires that new development address potential life threatening situations arising from flooding, up to the probable maximum flood. The aim is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods, wherever possible.

The policy also identifies areas where development may be restricted as a result of flood related risks. The restriction of incompatible development in these areas is essential to achieving the objectives of floodplain risk management set out in the Floodplain Development Manual.

This policy has been developed in the context of specific information available on flooding for the area of the Griffith LGA covered by the *'Griffith Floodplain Risk Management Study & draft Floodplain Risk Management Plan'* (*September 2011*). In addition, it is intended to be used as an interim set of guidelines for all flood prone land within the LGA until incorporated into a comprehensive development control plan (DCP).

1.2 Purpose

The purpose of this policy is to provide matters to be taken into consideration by Griffith City Council when exercising its environmental assessment and planning functions in relation to development in the City of Griffith. The policy addresses the new directions in flood risk management that are embodied in the NSW Government's Flood Prone Land Policy and which are emphasised in the government's Floodplain Development Manual.

1.3 Where Does This Policy Apply?

The policy applies to flood prone land within the whole of the Griffith City Council LGA. There are a number of floodplains within the LGA. The policy includes general provisions relating to all flood prone land. However, it has been developed in the context of work undertaken as part of the Griffith Floodplain Risk Management Study.

1.4 How Does the Policy Relate To Other Legislation and Regulations

This policy should be read in conjunction with the relevant provisions of the following:

- NSW Government's *Flood Prone Lands Policy* and *Floodplain Development Manual* (*2005*);
- The *Environmental Planning & Assessment Act 1979*, and regulations thereto,
- Applicable environmental planning instruments, including but not limited to *Griffith Local Environmental Plan 2002*; and,
- other relevant Development Control Plans (*DCPs*) and Policies adopted by Council including '*Floor Heights - Policy No. 105' (CS-CP-318).*

1.5 Objectives

The objectives of this policy are:

- to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property;
- to reduce private & public losses resulting from floods, utilizing ecologically positive methods wherever possible;
- to alert the community to the hazard and extent of land affected by potential floods;
- to inform the community of Council's policy in relation to the use and development of land affected by potential floods;
- to deal equitably and consistently with all matters requiring Council's approval on land affected by potential floods, in accordance with the principles contained in the Floodplain Development Manual issued by the NSW Government;
- to increase public awareness of the potential for flooding across the range of flood events up to the probable maximum flood level; and,
- to ensure that planning and development of essential services and land use generally makes appropriate provision for flood related risk.

2 Definitions

For the purposes of this policy, the definitions as prescribed in the NSW Government's *Floodplain Development Manual* (*2005*); the Griffith Local Environmental Plan (*2002*) and the Standard Instrument (2006) shall be adopted[1].

Concessional Allotment Concessional allotments are as defined in Clause 21A and 22 of the Griffith Local Environmental Plan (2002),.

Commercial Development Has the same meaning ascribed to *commercial premises* set down in the Standard Instrument, and also includes *pubs* and *registered clubs* also defined in the Standard Instrument.

[1] Where a development or land use category is not set out in the definitions of the Flood Liable Lands Policy, the definitions set down in Griffith Local Environmental Plan 2002 or the Standard Instrument shall be used.

Critical Infrastructure	Critical infrastructure refers to essential services and other infrastructure where loss of these services during flooding represents an unacceptable risk. This includes services such as *water supply system*, *sewerage system*, *telecommunication facilities*, *electricity generating works*. It includes structures associated with an *emergency services facilities*, and *hospitals*, and designated flood evacuation centres.
Development	is defined in Part 4 of the EP and A Act. In addition, the Manual adopts the following definitions for particular development types. ***Infill Development*** refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. ***New Development*** refers to development of a different nature to that associated with the former land use. Eg, the urban sub-division of land previously used for rural purposes. ***Redevelopment*** refers to rebuilding a similar type of development to that housed previously. Eg, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. In general, redevelopment does not require re-zoning.
Extension	Refers to a modification to an existing structure where a secure enclosure is provided.
Floodway	A floodway is defined as an area of the floodplain where significant discharge of water occurs during floods. Floodways are areas that, even if partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
Flood Immunity Level	The level at which a road is cut by floodwaters. For example, a road which first becomes inundated by the 20 year ARI flood event has a 20 year flood immunity level.
Flood Planning Area	The area of land below the FPL and thus subject to flood related development controls.
Flood Planning Levels (FPL)	Is the combination of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans.

Flood Prone Land	Land susceptible to flooding by the PMF event. Flood prone land is synonymous with flood liable land.
Flood Storage	A flood storage is an area of the floodplain that is important for the temporary storage of floodwaters during the passage of a flood. A substantial reduction in the capacity of flood storage areas may cause flood levels to rise and the peak discharge downstream may increase.
Freeboard	refers to a designated height above the design flood which is stipulated to incorporate a suitable factor of safety into development. Freeboard may vary depending upon the proposed type of development.
Industrial Development	Has the same meaning ascribed to *industry* as set down in the Standard Instrument.
Residential Development	Has the same meaning ascribed to *residential accommodation* as set down in the Standard Instrument.
Tourist Accommodation	Has the same meaning ascribed to *tourist and visitor accommodation* as set down in the Standard Instrument.

3 Statutory Context

3.1 Title

This document is called *Griffith Flood Liable Lands Policy* ('the policy').

3.2 Status

The policy is:

- a policy that is required to be listed in the Council's *Summary of Affairs* published under the *Freedom of Information Act 1989*.
- a policy that is a matter for consideration under Section 79C of the *Environmental Planning and Assessment Act, 1979* as it is relevant to provisions contained in *Griffith Local Environmental Plan 2002* in respect to flood liable land.

3.3 Commencement

The policy commences operation on 11/10/2011.

3.4 Where the Policy Applies

The policy applies to all flood prone land within the Griffith LGA.

3.5 Development to Which the Policy Applies

The policy applies to all development except minor alterations to existing buildings listed as exempt development in *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

3.6 Council Functions to Which the Policy Applies

The contents of the policy are to be considered by the Council when determining development applications under Part 4 of the *Environmental Planning & Assessment Act 1979.*

3.7 Relevant LEPS/DCPS

The policy supplements the provisions of the *Griffith Local Environmental Plan, 2002* and relevant development control plans for particular land uses or zones.

3.8 Related Documents

The policy has been developed considering the following Council flood related policies that were current as at May 2013:

- Buildings –Floor Heights, Policy No. 105;
- Onsite Stormwater Detention Policy, CS-CP-404

It also considers the findings of a range of flood and floodplain management studies that have been prepared for specific creek and river systems within the LGA. These include:

- Aerodrome Overland Flow Flood Study (2010)
- Aerodrome Overland Flow Floodplain Risk Management Study and Plan (2011)
- CBD Overland Flow Flood Study (2012)
- CDB Overland Flow Floodplain Risk Management Study and Plan (2013)
- Lake Wyangan Flood Study (2012)
- Lake Wyangan Floodplain Risk Management Study and Plan (2013)
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 1
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 1
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 2
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 3
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 4
- Griffith Main Drain J and Mirrool Creek Floodplain Risk Management Study and Plan (2015)

4 Flood Risk Management Policy

4.1 Objectives

The primary objectives of this policy in terms of achieving sound floodplain management are to:

- guide the development of flood prone land, applying balanced strategies to economically, socially and environmentally manage the potential risk to life and property;
- set aside appropriate areas to convey and/or store floodwaters and to protect and restore the riparian zone; and
- ensure development, when considered both individually and in the context of cumulative development trends, will not cause unreasonable adverse flooding impacts in other locations.

4.2 Applicability

This policy applies to all Flood Prone Land within the Griffith LGA. As defined by the Floodplain Development Manual, this includes all land inundated by flooding up to the PMF. However, different types of control will apply subject to the severity, frequency and magnitude of flooding at any one location. In this regard, development controls typically apply to the area of land that falls within the flood planning area.

4.3 How to Use the Policy

The following is a summary of the steps that should be followed in the assessment of development proposals on or adjacent to flood prone land.

Step 1 - Check that the proposal is permissible relative to the zoning of the land by reference to the *Griffith City Council Local Environmental Plan 2002* or any other applicable environmental planning instrument.

Step 2 - Consider any other relevant planning controls of Council *(e.g. controls in any other applicable development control plans which govern for instance the size and setback of development).*

Step 3 - Where available, determine the relevant floodplain and obtain flood data (*e.g. flood levels and velocities*) from Council's existing flood studies (*refer* **Section 3.8**). This information can be obtained from Council. Where no flood study has been undertaken, the applicant will need to liaise with Council to determine whether flood restrictions may apply.

Step 4 - Determine the "provisional" hydraulic and hazard categorisation of the site. This may be determined from existing Flood Studies and Floodplain Risk Management Studies. Otherwise, this may be determined in accordance with the procedures outlined in Appendix L of the *Floodplain Development Manual 2005* and the DECC Floodplain Risk Management Guideline titled '*Floodway Definition'*.
At this stage applicants are encouraged to consider whether or not the advice of a Consultant and/or Engineer specialising in flood hydrology is required.

Step 5 - In consideration of the provisional hydraulic and hazard categorisation at the site, demonstrate that the development will adhere to the relevant matters for consideration discussed in **Chapter 5**.

Step 6 - Check with Council planning staff to establish any other requirements for a development application. Submit flood assessment with development application once satisfied all requirements have been met.

4.4 Provisional Site Classification

Definition of the provisional hydraulic and hazard categories which exist at the site of a development proposal is required to assess developments within flood prone land. This Policy has adopted the combination of hydraulic and hazard categories defined in the Manual. These are as follows:

- Low Hazard - Flood Fringe
- Low Hazard - Flood Storage
- Low Hazard - Floodway
- High Hazard - Flood Fringe
- High Hazard - Flood Storage
- High Hazard – Floodway

These categories are to be employed when considering development in flood prone land during the term of this policy. Pre-existing information pertaining to areas where classifications have already been developed for particular creeks, rivers or drainage channels can be obtained from the documentation listed in **Section 3.8**.

Where unavailable, the hydraulic and hazard categorisation is to be based on the judgment of an experienced flood hydraulics engineer. Council will not provide provisional site classifications, other than for areas classified as part of a flood study or floodplain risk management plan. Notwithstanding, Council may elect to nominate a provisional site classification in instances where an applicant is not prepared to provide this assessment on request and also reserves the right to review site classifications provided by an applicant.
The following provides additional details for the three hydraulic categories and two hazard categories identified above.

4.4.1 Description of Hydraulic Categories

Floodways

Floodways are shown on mapping that accompanies flood studies and floodplain risk management studies prepared by Council and are generally obtainable on application from Council.

Floodways are required for the conveyance of essential flood flow and are to be retained in a condition capable of doing so. Development in floodway areas is subject to a range of additional controls. It needs to be recognised that floodways are not necessarily indicative of high hazard areas. It is necessary to separately consider the range of factors that contribute to hazard categorisation.

For the purposes of this policy, floodways are defined as those sections of the floodplain:

Where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels.

Which even if partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.

Where most conveyance of floodwater along a particular flowpath occurs.

Where flow velocities may be relatively high compared to other areas of the floodplain.

Where blockage will either raise flood levels or redirect flood flows. In all cases blockage is to be considered at an "overall" scale in order to identify both broad scale and local impacts and is to consider the cumulative impacts of any other future development.

Flood Storage Areas

Flood storage areas are defined in the Manual as *"those parts of the floodplain that are important for the temporary storage of floodwater during the passage of a flood."* The manual goes on to indicate that that filling or obstruction of these areas may cause an increase in flood levels and the peak discharge downstream of these areas.

The Development restrictions which apply to "HIGH" hazard flood storage areas and "LOW" hazard flood storage areas are discussed following in **Section 5.1**.

Flood Fringe Areas

Flood Fringe refers to those areas not classified as Floodway or Flood Storage that are located within the extent of the 100 year flood event.

4.4.2 Description of Hazard Categories

Appendix L of the Floodplain Development Manual details the process by which hazard categories are defined. In general, it involves firstly consideration of the peak depths and velocities present at a site and relates this to low and high hazard categories. It then outlines a range of additional factors, such as available warning times, flood risk along evacuation routes and vulnerable populations which also contribute to hazard. Consideration of these combined factors will result in definition of the final hazard categorization.

4.4.3 Existing Provisional Hydraulic and Hazard Category Mapping

At the time of the current revision, provisional hydraulic and hazard categories had been documented in the following reports for parts of the Griffith Local Government Area:

Griffith Floodplain Risk Management Study

The Griffith Floodplain Risk Management Study documented provisional hydraulic and hazard classifications for the area throughout the Main Drain 'J' floodplain. Specifically, this covers the area of the Griffith Local Government Area bounded by the Main Branch Canal to the north/east and the Mirrool Branch Canal to the south. The Study also provides hydraulic and hazard categories at Yenda and within the Griffith CBD area.

Other Studies

A range of other studies have been undertaken, or are in the process of being completed where hydraulic and hazard categorisation may be available or may become available in the future. These include:

- Aerodrome Overland Flow Flood Study (2010)
- Aerodrome Overland Flow Floodplain Risk Management Study and Plan (2011)
- CBD Overland Flow Flood Study (2012)
- CDB Overland Flow Floodplain Risk Management Study and Plan (2013)
- Lake Wyangan Flood Study (2012)
- Lake Wyangan Floodplain Risk Management Study and Plan (2013)
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 1
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 1
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 2
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 3
- Griffith Main Drain J and Mirrool Creek Flood Study 2015 Vol 2 - Part 4

- Griffith Main Drain J and Mirrool Creek Floodplain Risk Management Study and Plan (2015)

4.5 Flood Planning Level

For the Griffith LGA, the 100 year ARI flood level plus a freeboard of 500 mm has been adopted as the Flood Planning Level (*FPL*). Mapping has been prepared which shows the Flood Planning Area's extent across the Main Drain 'J' floodplain and Lake Wyangan. Council is able to supply the FPL for properties located within the Main Drain 'J' floodplain.

Alternate flood planning levels may apply to particular land uses. A summary of the FPL's adopted for this policy is identified below.

- The finished floor levels of habitable rooms shall be at least equal to the FPL where known, or where not known, 500mm above the 100 year ARI flood level as advised at the time by Council.

- Flood Planning Levels shall be as follows for the following land uses:

  Commercial & Industrial = 100 year flood level with 25% of the floor area to be 500 mm above the 100 year flood level. Council will give consideration to a lower floor level (*absolute minimum 1:20 year flood level)* only in circumstances to achieve mobility access standards and compatibility with existing street frontages.

  Critical Utilities = If at all avoidable, critical utilities should be constructed outside of flood prone land. Where construction of critical facilities within flood prone land is unavoidable, they shall be flood free during the PMF event.

  Subdivision = 100 year + 500 mm freeboard

  Garages and Storage sheds = 20 year ARI flood level

4.6 Land Use Categories

The following land use categories have been identified for the purpose of considering flood related controls on potential development.

- Residential accommodation (as defined in the Standard Instrument)
- Commercial premises and industry (as defined in the Standard Instrument)
- Critical infrastructure (including *water supply system*, *sewerage system*, *telecommunication facilities*, *electricity generating works ,emergency services facilities*, and *hospitals as defined in the Standard Instrument* and designated flood evacuation centres)
- Subdivisions (as defined in the Environmental Planning and Assessment Act, 1979) and boundary adjustments (as defined in Griffith Local Environmental Plan 2002).

- Caravan parks, tourist and visitor accommodation (as defined in the Standard Instrument)
- Fencing
- Car parks

4.7 Matters for Consideration

Development of any of the above land use categories may proceed subject to determination of a site's provisional hydraulic and hazard categories. The matters for consideration which apply to each land use type for hydraulic and hazard categories has been addressed in **Section 5**.

5 Matters for Consideration

The following section identifies the matters for consideration which are relevant to specific land uses that fall within flood prone land. The matters for consideration have been developed in the context of the hydraulic categories adopted by the Manual.

5.1 Flood Storage and Flood Fringe

The following section outlines the matters for consideration which apply to flood prone land categorised as flood storage or flood fringe. In general:

- Development in flood storage areas has the potential to adversely impact on flooding at adjacent properties. Accordingly, development in these areas is subject to certain controls on filling, and blockage of this land.

- Flood Fringe areas are generally locations which will have little effect on the downstream conveyance of floodwaters.

In addition, consideration is given to the flood hazard posed to users of the proposed development.

5.1.1 Residential Development

New Development, Infill Development and Redevelopment

(a) Floor Levels

The elevation of all habitable floor levels shall be equal to or above the FPL. The minimum elevation for garages, sheds and other structures ancillary to residential development is the peak 100 year ARI flood level.

(b) Flood Proofing

Flood proofing shall be provided to all aspects of the proposed development up to the FPL. Flood proofing for the building are required

and flood proofing measures may be considered on a case by case basis.

(c) Flood Impact on Other Properties

Where development will take place in a designated flood storage area, the applicant is required to demonstrate that the net loss in flood storage is negligible. Where practical, excavation and other works may be proposed to address this requirement
Any development must also ensure that existing overland flow paths are not impeded. Additional drainage infrastructure may be required to achieve this objective.

Council will review each development on a case by case basis to establish the level of investigation required to assess the impact of flooding on other properties. It is recommended that the applicant liaise with Council to establish whether a Flood Impact Assessment Report is required for the proposed development.

(d) Site Access and Flood Evacuation Requirements

The internal access road shall be equivalent to the flood immunity level of the adjoining public road. However, Council may also consider access roads as low as the 20 year ARI flood event in certain circumstances.

Where there is greater than dual occupancy proposed, a flood risk assessment will be undertaken to demonstrate that evacuation of the residents during flooding can proceed safely without increasing demand on emergency service resources. Consideration should be given to the site's emergency response requirements.

Developments reliant upon evacuation through high hazard floodway or high hazard flood storage conditions will not be supported by Council.

The applicant is encouraged to liaise with Council to establish the level of investigation required to assess the flood risk at a particular property.

Extensions

In general, extensions shall proceed in accordance with the guidelines outlined above. Notwithstanding, extensions undertaken on single dwelling and dual occupancy may be exempt from item (d) above.

In addition, consideration will be given to floor levels for minor extension or modifications below the FPL provided:

- the area of the extension's floor level covers no more than 20% of the existing floor level, or 40 m^2, whichever is greater,
- the extension is above the level of the 20 year ARI flood event.

- the extension is as high as practical without modification to the existing roofline.

5.1.2 Commercial and Industrial Development

New Development & Redevelopment

(a) Floor Levels

At least 25 % of the floor level provided for this type of development shall be at an elevation equal to the 100 year ARI flood level plus a minimum of 500 mm. The remaining 75% of the floor level shall be sited at a level equivalent to the peak 100 year ARI flood level.

Where multiple units will be provided at an industrial or commercial subdivision, at least 25 % of the floor level of each unit must be at an elevation equivalent to or above the FPL.

The application shall demonstrate the feasibility of moving bulky or heavy items to the raised area.

Consideration may be given to floor levels below this for non-habitable parts of the development (including garages, sheds). However, all floor levels will be required to be a minimum of the 20 year ARI flood level.

(b) Flood Proofing

Flood proofing shall be undertaken in accordance with that described for residential properties in **Section 5.1.1**.

(c) Flood Impact on Other Properties

The flood impact on other properties shall be assessed in accordance with that described in **Section 5.1.1**.

(d) Site Access and Flood Evacuation Requirements

For all industrial and commercial developments, the internal access road shall be equivalent to the flood immunity level of the adjoining public road.
Furthermore, where flood free access up to and including the 100 year ARI flood event is not available, a flood risk assessment shall be undertaken to demonstrate that evacuation can proceed safely without increasing demand on emergency services.

Extensions

In general, extensions shall proceed in accordance with the guidelines outlined above.

In addition, consideration will be given to floor levels for minor extension or modifications below the FPL provided:

- the area of the extension's floor level covers no more than 20% of the existing floor level, or 60 m^2, whichever is greater,
- the extension is above the level of the 20 year ARI flood event.
- the extension is as high as practical without modification to the existing roofline.

5.1.3 Critical Infrastructure

Where possible, critical infrastructure should be located outside the Flood Planning Level. However, the policy recognises that this is not possible in all circumstances, in which merit assessment will apply.

New Development & Redevelopment

Critical infrastructure is defined in accordance with the definition provided in **Section 2**. However, this is not intended to be an exhaustive list of critical infrastructure and Council may elect to define additional development types as critical.

(a) Floor Levels

The floor level of all critical infrastructures shall be at or above the level of the Probable Maximum Flood (PMF).

(b) Flood Proofing

Flood proofing shall be provided for all parts of the building up to and including the level of the PMF. Preferably, this is to be achieved by filling the portion of the site containing the critical infrastructure, however alternative methods may also be considered.

A certified structural engineer's report will be required to verify that the structure can withstand forces generated by flooding for all floods up to and including the PMF event.

(c) Flood Impact on Other Properties

The flood impact on other properties shall be assessed in accordance with the procedures described in **Section 5.1.1**.

(d) Site Access and Flood Evacuation Requirements

Appropriate access shall be provided to the site up to and including the PMF.

Extensions

Extensions to critical infrastructure shall be undertaken in accordance with the guidelines described above.

5.1.4 Subdivisions

The sub-division of land will be subject to the matters for consideration identified above for the relevant land use type (i.e. residential or commercial/industrial). In addition, the following flood related controls will apply to the sub-division of flood liable land.

(a) Floor Levels

The minimum floor level shall be in accordance with the guidelines adopted for residential and industrial/commercial development in **Sections 5.1.1** and **5.1.2.**

(b) Flood Proofing

Flood proofing shall be provided for all the proposed lots up to FPL.

(c) Flood Impact on Other Properties

A flood impact assessment is required to verify that the subdivision does not result in adverse flood impacts to properties located off-site.

Council will only support subdivisions in flood prone land, provided the applicant can demonstrate to Council's satisfaction the requirements of Appendix L of the Manual 2005 have been met. Such applications are to be prepared by a suitably qualified civil engineer/surveyor/hydrologist with a demonstrated experience in flood assessment of land development proposals.

Furthermore, assessment of several different ARI flood events may be required to verify that the impact of flooding is not increased for floods other than the 100 year ARI flood event.

Where required, appropriate compensatory works shall be incorporated into the sub-division.

(d) Site Access and Flood Evacuation Requirements

Safe vehicular access shall be provided at the level of the 100 year ARI flood event to each individual allotment within a residential sub-division. Modification of this criteria may be considered where the adjoining public road is below the 100 year ARI flood and it is demonstrated through a flood risk assessment that residents of the sub-division can be evacuated

to ground situated above the PMF without increasing the demand on emergency services.

For a commercial and industrial sub-division, the access road shall be sited at flood immunity level of the adjacent public road.

5.1.5 Existing Entitlements

- Council may support the replacement of an existing dwelling within flood prone areas provided the new dwelling is permissible according to the zoning and evidence is submitted with applications to demonstrate the existence of the dwelling. The applicants must demonstrate the existence of the former dwelling by photographs and/or records of building approvals.
- Approvals should be submitted for any dwelling erected after 1 January 1996 (*being the gazettal date of Interim Development Order No. 1*)
- Levels of habitable floors of the former dwelling based on AHD and certified by a Registered Surveyor must be submitted with the application.
- Council will not support replacement of an existing dwelling to be located within a High Hazard – Floodway.

5.1.6 Caravan Parks & Manufactured Housing

- Caravan Parks & Manufactured Housing permissible under Council's zoning shall be restricted to Low Hazard flood areas.
- Applicants are to assess proposals for Caravan Parks and Manufactured Housing in accordance with the building development controls outlined above.
- Evacuation plans shall be prepared as part of the on-site management plans required for the site.

5.1.7 Carparks

- Carparks are permitted within flood prone areas provided the applicant can demonstrate the potential damage to motor vehicles from flooding is minimised.
- Proposals for carparks shall also ensure that motor vehicles do not become moving debris during floods, which threaten the integrity of structures, safety of people or damage other property.
- Proposals for basement carparks shall ensure risk to human life from the inundation of basement and other car park or driveway areas is minimised.

5.1.8 Fences

- Fences of a continuous design, such as paling fences, and continuous brick fences, shall be permissible in flood fringe areas, subject to Council approval. In some cases, Council may require the applicant to demonstrate that fencing will not result in any significant increase in flood levels and flow velocities off site. In this regard, each case will be assessed on its merits.

- Some limitations may apply to fences which create a continuous impermeable design within flood storage areas.
- Post and rail fences may be permitted and shall be designed so as to permit the unimpeded flow of flood waters.
- Fencing of a continuous design may be permitted in flood prone areas (other than floodways) provided that the applicants can demonstrate that the proposed fencing does not generate an adverse impacts on flooding.

5.1.9 Rezoning of Land

The following will apply to rezoning applications of flood prone land:

- Any ministerial direction given pursuant to Section 117(2) of the Environmental Planning and Assessment Act, 1979 in respect to flood prone land.
- Rezoning applications in flood prone land will not be considered unless a Floodplain Risk Management Study has been undertaken or investigations are completed to confirm potential impacts of the full range of floods (including the PMF) on the future development of the rezoned land are minimal (ie development is of minor significance).
- The applicant will also be required to prepare hydraulic and hazard category mapping for the proposed rezoning site, where this is not available from existing studies.
- Council will not support the rezoning of flood prone land for all sites provisionally classified as High Hazard and/or floodway in accordance with the Floodplain Development Manual (2005), unless it can be shown that works proposed as part of the rezoning will reduce the hazard categorization of the land, while at the same time not adversely impacting flood characteristics for adjacent or nearby properties. Such applications are to be prepared by a suitably qualified civil engineer / surveyor / hydrologist with a demonstrated experience in flood assessment of land development proposals.

5.2 Floodways

A definition of floodway areas is provided in **Section 4.4.1**. In general, development within a floodway is discouraged for the following reasons:

- the potential to redirect flows;
- the level of potential danger to personal safety; and,
- significant financial losses due to the damage potential.

Notwithstanding, there may be circumstances in which certain types of development could proceed, subject to a range of considerations. These considerations are in addition to the relevant requirements outlined in **Section 5.1**.

The types of development that may be appropriate within low hazard floodways include:

- infill development;
- existing entitlements/ concessional allotments, where provision is made in accordance with the guidelines of the Griffith LEP; and
- replacement and extensions to existing structures.

In general, the following types of activities in area provisionally categorised as "floodway" will not be permitted:

- sub-division;
- rezoning; and,
- new development.

For development in the floodway, landowners / developers will be given opportunity to further refine the floodway, but at their own cost. Applications are to be prepared by a suitably qualified civil engineer/surveyor/hydrologist with a demonstrated experience in flood assessment of land development proposals. It is expected that any changes to the floodway development would be difficult to justify.

The relevant controls that apply to development within floodway areas are identified in the following.

5.2.1 Low Hazard Floodways

General

The following provides a summary of development which is permissible in low hazard floodways. Each proposal to develop in low hazard floodways will be considered on the basis of its merits. In general, development of floodways may proceed where either one of two conditions can be met:

- The proposal is located in an area of the floodway where a substantial amount of development already exists and existing development can be utilised to construct new buildings and structures without measurably increasing the lateral blockage of a floodway (*e.g. infill development*); or,

- The proposal is located on a large enough lot such that the proposal and associated filling is minor relative to the overall conveyance of floodwater and any localised impacts can be maintained wholly on site (e.g. concessional allotments on rural land).

Where permissible, development shall proceed in accordance with the following principles:

Infill Development

Infill development generally occurs where undeveloped lots exist within urbanised areas or subdivisions. A definition of infill development is provided in **Section 2**.

The following controls shall apply to infill development in floodway areas.

- The building is located to avoid any additional blockage of the lateral extent of the floodway. In this regard, the "shadow" of upstream development must be utilised when siting the proposed dwelling (refer Figure 1).
- The maximum permissible floor area shall be in accordance with the provisions of other DCP's. However, the footprint development will need to consider the shadow requirements outlined immediately above.
- Any other structures (e.g. garages) must be sited to also observe shadow requirements.
- Habitable rooms will be sited above the flood planning level.

An example of infill development that incorporates the principles of shadow development is shown in **Figure 1**. Please note, **Figure 1** is solely intended as an example of what might constitute development within the shadow of a pre-existing building.



Figure 1 Example of a "Shadow" created by an existing development

Concessional Allotments / Existing Entitlements

Concessional allotments are recognised in the Griffith LEP 2002. The following outlines the assessment criteria for construction of an additional dwelling on an area where concessional allotments are permitted. In general, the following will also apply to existing entitlements.

- Where a property is only partially affected by the floodway extent, the proposed dwelling shall be located outside the floodway, unless reasons can be given why locating the building within the floodway generates more optimal flood risk management outcomes (for example, the combined consideration of hazard and blockage suggests the property is best located in a floodway where it can also utilise an existing road and avoid any requirement for fill).

- Where the property boundary falls wholly within the floodway extent the property should be sited to minimise the impact on flooding. This should include consideration of the following aims:

    - Develop in the shadow of an existing structure, where applicable;
    - Minimise the volume of fill required to develop the property. This may be achieved by positioning the house on locally raised terrain. Notwithstanding, hazard categorisation and evacuation requirements will still need to be considered.
    - Locate the property to avoid any off-site flood impacts. In this regard, Council may require the proponent engage a suitably qualified flood engineer to assess the proposal.

- Adequate evacuation from the site must be provided in accordance with the principles outlined in Section 5.1.

Redevelopment

Re-development is defined in **Section 2**. Re-development of a lot located within the floodway on land zoned 1 (a) rural or 1(c) rural residential by the Griffith LEP 2002 should observe the principles outlined above for concessional allotments.

Where redevelopment in the floodway occurs on existing land under the Griffith LEP, redevelopment should generally occur in accordance with the principals outlined above for infill development.

Extensions

Extensions to existing dwellings are permissible. However, where they are located within a floodway zone, they must observe the following:

- No greater than 60 m2 in area for residential developments. Variations to this for industrial, commercial and rural residential will be considered on a case by case basis.
- They are to observe the principles of shadow development outlined for infill development. That is, any extensions must avoid increasing the blocked area of the floodway.
- Habitable rooms must be constructed with a minimum floor level not less than the Flood Planning Level.

Fences

Where dividing fences across floodways are unavoidable, they are to be constructed only of open type fencing that will not restrict the flow of flood waters and be resistant to blockage.

5.2.2 High Hazard Floodways

Development within highway hazard floodways is generally discouraged. Council may consider granting permission to minor developments including extensions provided the requirements outlined in **Section 5.2.1** can be met. It is noted that only very minor sections of the Main Drain 'J' floodplain have been categorised as "High" hazard.

5.3 Additional Flood Proofing Matters for Consideration

The following provides additional guidance in relation to flood proofing measures which have been described above. These flood proofing measures shall apply to all development which will has the potential to be flood affected.

Electrical installations

Electrical fixtures such as power points, light fittings and switches are to be sited above the FPL unless they are on a separate circuit (with earth leakage protection) to the rest of the building.

Building Materials

Where parts of the building are proposed to be below the FPL, they are to be constructed of water-resistant materials.

Large buoyant objects

Areas where cars, vans and trailers etc are parked, displayed or stored are not to be located in areas subject to property hazard. Containers, bins, hoppers and other large floatable objects also are not to be stored in these areas. Heavy vehicle parking areas are not to be located in areas subject to property hazard.

Method of construction

Timber framed, light steel construction, cavity brickwork and other conventional domestic building materials are generally not suitable forms of construction where the property hazard is high. Where property hazard is high, the structure shall be certified by a practicing structural engineer to withstand the hydraulic loads (*including debris*) induced by the flood waters.

Structural Design

All buildings shall prior to occupation be certified by a civil or structural engineer that the structures can withstand the forces of floodwaters, buoyancy and debris loadings up to the 100 year ARI flood event plus freeboard.

Car Parks

- Where possible basement car parks are to be protected from inundation from the 100 year ARI flood event.
- The minimum surface level of open space car parking subject to inundation within high hazard areas shall be designed giving regard to vehicle stability in terms of depths and velocity during inundation by flood waters.

6 Supporting Documentation to be Submitted with an Application

6.1 Survey Plans

Development applications affected by this policy shall be accompanied by a survey plan showing:

- the position of the existing building/s or proposed building/s;
- the existing ground levels to Australian Height Datum around the perimeter of the building and contours of the site, and,
- the existing and proposed floor levels relative to Australian Height Datum.

Applications for earthworks, filling of land and subdivision shall be accompanied by a survey plan (with a contour interval of 0.1m) showing relative levels to Australian Height Datum.

6.2 Flood Impact Assessment and Flood Risk Assessment

Where required by the matters for consideration outlined in **Section 5**, a Flood Impact Assessment is to be supplied addressing the issues outlined in Appendix L of the New South Wales Government (2005) Floodplain Development Manual.

For large scale developments, or developments in critical locations, particularly where an existing catchment based flood study is not available, it may be necessary to prepare a flood study based on the results of a fully dynamic one or two dimensional computer model. Alternatively, where a flood study already exists, it will be necessary to use the hydraulic model developed for that flood study to assess the development proposal. In either case, the assessment should:

- quantify the potential impact of the development proposal on flood behaviour elsewhere in the floodplain and particularly across adjoining land/properties; and,
- determine the potential impact of flooding on the development proposal and the future users of the development plus the cumulative impacts resulting from the development.

The following information shall be submitted in plan form for the pre-developed and post-developed scenarios:

- flood profiles for the full range of events for total development including all structures and works;
- water surface contours;
- velocity vectors;
- velocity depth product contours; and,
- delineation of flood risk precincts relevant to individual floodplains.

Alternatively, the flood impact assessment can include flood level, velocity and hazard difference mapping that shows the increase in each of these flood characteristics due to the proposed development. These increases are to be considered and commented on in the context of the NSW Government's Flood Prone Land Policy.

Applicants should check with Council Officers to confirm the need for a specialist flood study. For smaller developments consideration may be given to the use of an existing flood study if available and suitable (*e.g. it contains sufficient local detail*), or otherwise a flood study is to be prepared. Where the controls for a particular development proposal require an assessment of structural soundness during potential floods, the following impacts must be addressed:

- hydrostatic pressure,
- hydrodynamic pressure,
- impact of debris, and
- buoyancy forces.

Alternatively, or together with a flood impact assessment, the applicant may be required to prepare a flood risk assessment for the proposed development. The assessment will be required to demonstrate that the full range of risks associated with flooding at the site have been considered and suitable measures proposed to adequately mitigate the risk.

7 References

1. Department of Environment and Climate Change (2007), '*Floodway definition – Floodplain Risk Management Guideline*'.
2. Griffith City Council (2010), '*Griffith Aerodrome Overland Flow Flood Study'* prepared by WMAwater.
3. Griffith City Council (2011), '*Griffith Aerodrome Overland Flow Floodplain Risk Management Study'* prepared by WMAwater.
4. Griffith City Council (*2006*), *'Griffith Flood Study (Issue No. 3)',* prepared by Patterson Britton & Partners.
5. Griffith Floodplain Risk Management Study and Draft Floodplain Risk Management Plan 2011, prepared by WorleyParsons Pty Ltd.
6. Griffith City Council (2002), *'Griffith Local Environmental Plan 2002'*.
7. Griffith City Council (1996), *'Interim Development Order No. 1'*.
8. Griffith City Council, Floor Levels Policy, CS-CP-318.

9. New South Wales Government (*2005*), *'Floodplain Development Manual: the management of flood liable land'*; ISBN 0 7347 5476 0.
10. Griffith CBD Catchment Overland Flow Flood Study (2012), prepared by WMAwater
11. Griffith Major Overland Flow Floodplain Risk Management Study and Plan for CBD Catchments (2013), prepared by WMA
12. Lake Wyangan Flood Study (2012), prepared by BMT WBM.
13. Land Wyangan (Draft) Floodplain Risk Management Study & Plan (2013), prepared by BMT WBM