

Figure 2: Brisbane River Flood Planning Area



Figure 3: Overland Flow Flood Planning Area

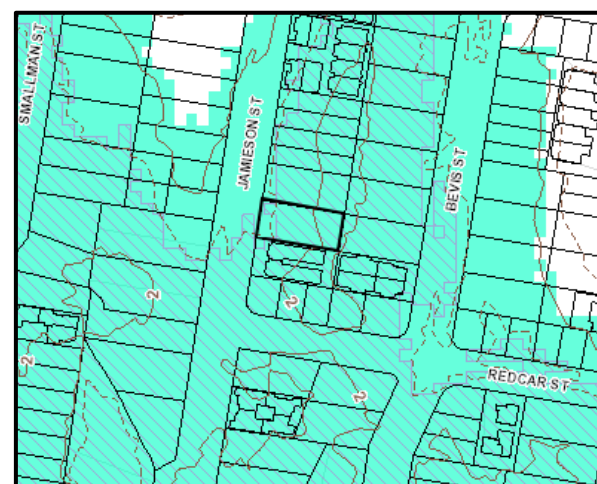


Figure 4: Storm-Tide Inundation Area

In order to undertake the flooding assessment, flood hazard for the various sources will firstly be explored in terms of flooding depths and levels. Minimum lot levels, habitable flood levels, and non-habitable floor levels will then be estimated based on these hazard levels along with trafficable access and undercroft heights to satisfy Brisbane City Council's (BCC's) Flood Overlay Code and Flood Planning Scheme Policy.

EXISTING FLOODING CONDITIONS

This section will outline existing flood levels applicable for the development using levels specified in Brisbane City Council's (BCC's) FloodWise Property Report and Citywide Creek & Overland Flow Path Mapping.

Brisbane River Flooding & Storm-Tide Inundation

In relation to the Brisbane River flood planning area and the Medium Storm-Tide inundation area, flood levels for the site have been specified in the BCC's FloodWise Property Report as per the following table.

Table 1: Flood Levels

Storm Event	Flood Level (AHD)
BRCFS 1%	2.6
Jan 2011	2.6
1%	2.5
2%	2.2
5%	2.1
20%	1.9

The report further outlines that the Residential Flood Level (RFL) source is from Jan 2011 River flooding and the Defined Flood Level is from Storm tide

Overland Flow Flooding

In relation to the Overland Flow flooding planning area, the Citywide Creek & Overland Flow Path Mapping indicate that a majority of the site is inundated per the below figures.

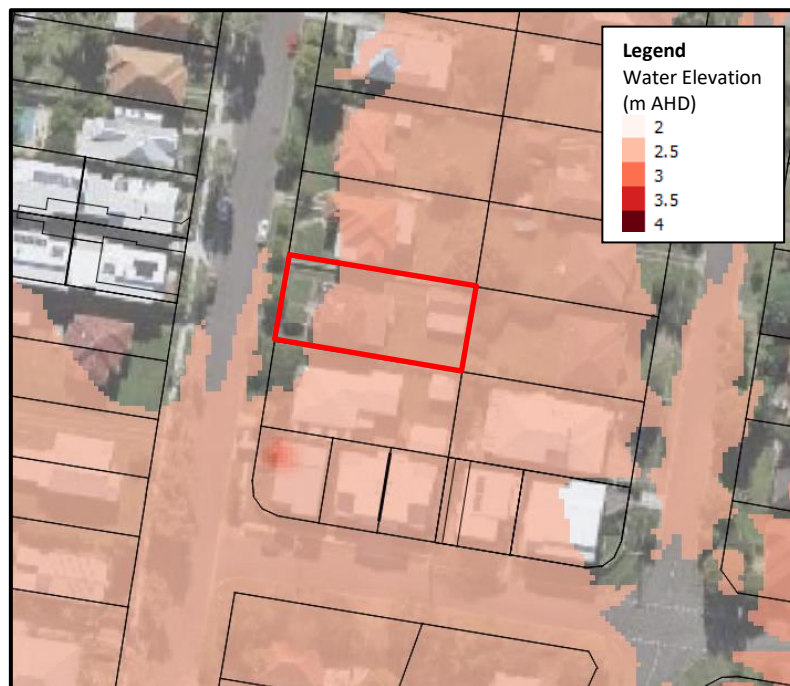


Figure 5: Citywide 2% AEP Water Elevation

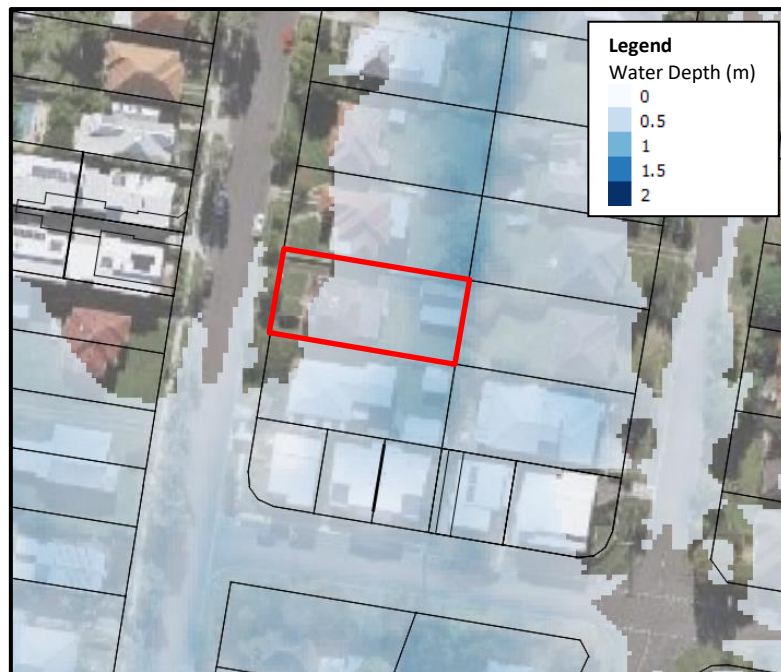


Figure 6: Citywide 2% AEP Water Depth

The site is inundated to a level of 2.57m AHD from the 2% AEP storm event. It is noted that carriageway fronting the site is inundated to a maximum flooding depth of approximately 0.23m and the site is inundated to a maximum flooding depth of approximately 0.91m. A maximum flooding depth of approximately 0.8m however occurs in the vicinity of the proposed building.

PLANNING SCHEME REQUIREMENTS

This section will outline minimum undercroft heights, flood planning levels and site access requirements for the proposed development based on the flow parameters outlined above.

Flood Planning Levels

This section will outline minimum flood immunity levels applicable for the development to satisfy Council's Flood Immunity Requirements as outlined BCC's Flood Overlay Code and Coastal Hazard Overlay Code.

As the RFL from Brisbane River flooding is 2.6m AHD and the 2% AEP flood level from Overland flow flooding is 2.57m, Brisbane River flooding is the dominant source and will be used to outline flood overlay code immunity levels applicable for the development.

The table below provides a summary of the required lot levels and flood immunity levels for habitable/non-habitable spaces associated with multiple dwelling residence with a BCA Classification of 1-4 to demonstrate compliance with Council's Flood Overlay Code and Council's Coastal Hazard Overlay Code.

Table 2: Flood Immunity Levels

Category	Requirement	Minimum Flood Immunity Level (AHD)
Habitable Floor Level	RFL + 0.5m	3.1m (2.6m + 0.5m)
Non-Habitable Floor Level	RFL + 0.3m	2.9m (2.6m + 0.3m)
Min. 300m ² Lot Level	2% AEP + 0.3m	2.87m (2.57m + 0.3m)

Table 3: Coastal Immunity Levels

Category	Requirement	Minimum Flood Immunity Level (AHD)
Habitable Floor Level	3.1 + 0.5m	3.6m
Non-Habitable Floor Level	3.1 + 0.3m	3.4m
Min. 80% Lot Level	3.1 + 0.3m	3.4m

Upon review of architect plans by Elevate Design Studio, job number 19044, revision F, minimum floor levels have been achieved. It is noted that lots will not be filled for flood immunity however, as filling the entire lot is envisaged to create adverse impacts on neighbouring properties. In light of this, it is requested that Council relax the requirement for fill for lot immunity as flood immunity will be implemented through the construction of flood immune habitable and non-habitable floor levels.

Undercroft

This section will outline minimum undercroft requirements applicable for the development to satisfy Council's Flood Immunity Requirements as outlined in BCC's Flood Overlay Code.

Any future building works which occur within creek/waterway and overland flow extents must allow for conveyance of flood waters through the site in order that no adverse impact on surrounding properties occurs. This could be achieved through the elevation of structures with a clear undercroft to allow for free conveyance of overland flow.

As the Creek/Waterway flood planning area covers the entire site, any proposed works are required to be elevated. Council's Flood Overlay Code sets the following minimum requirements for an undercroft:

Table 4: Undercroft Clearances

Flooding Source	Flooding Conditions	Minimum Clearance
Overland Flow (2% AEP)	DV < 0.6m ² /s and Depth < 600mm	1.5m
Overland Flow (2% AEP)	DV > 0.6m ² /s or Depth > 600mm	2.5m
Creek/Waterway (1% AEP)	FPA 1, 2, or 3	2.5m
Creek/Waterway (1% AEP)	FPA 4	1.5m

As the site is affected by the Overland Flow flood planning area where the depth of flow under the building is approximately 0.8m (based on a water surface level of 2.60m AHD and a natural surface level under the building of 1.80m AHD), a 2.5m undercroft from lowest floor level to highest ground elevation is required.

Based on Minimum Undercroft Heights specified, a natural surface level of 2.25m (achievable with 100mm of excavation allowable per A08 of the flood overlay code) located under the building, revised floor levels are provided in the following table (garages are to be constructed on fill and hence aforementioned flood immunity requirements apply):

Table 5: Minimum Floor Levels

Category	Minimum Floor Level (AHD)
Habitable Floor Level	4.75m (2.25m + 2.5m)
Non-Habitable Floor Level	4.75m (2.25m + 2.5m)
Garage	3.4m (3.1m + 0.3m)

It is noted however that undercroft heights can be reduced to 1.5m (and floor levels reduced to 3.75m AHD) where depth of flow are less than 0.6m, refer below figure.



Figure 6: Citywide 2% AEP Water Depth

Upon review of architect plans by Elevate Design Studio, job number 19044, revision F, minimum floor levels have been achieved, however minimum undercroft heights have not.

The undercroft height ranges from approximately 1.500m to 1.950m (based on a finished floor level of 3.75m AHD and an existing surface level of 1.8m AHD to 2.25m AHD). The building design is expected to have a floor thickness of approximately 0.500m, therefore the clearance from the undercroft to the natural ground line ranges from 1.000m to 1.450m. As a result, the proposed undercroft fulfils the minimum hydraulic clearance specified in Chapter 7 of the Flood Planning Scheme Policy.

It is noted multiple developments in the vicinity of the site have been approved with similar undercroft heights over the same Overland Flow path, Brisbane River flood area, and Storm-Tide inundation area, with a recent approval being right next door at 62 Jamieson Street, Bulimba, refer Development Application Approval A004589923.

Other examples are as follows:

- 64 Jamieson Street (A003069251)
- 50 Jamieson Street (A004171028)
- 44-46 Jamieson Street (A003892216) with less than a 1.5m underdrift
- 42 Jamieson Street (A002970986) with less than a 1.5m underdrift

In light of these considerations, it is requested that Council consider the undercroft of approximately 1.5m for this building to be a sufficient performance-based solution to the flood overlay code.

Adverse Impacts

This section will comment on the increase in flood level or flood hazard on up slope, down slope or adjacent premises as outlined in BCC's Flood Overlay Code.

An undercroft is proposed to all areas to allow for conveyance of flood waters through the site in order that no adverse impact on surrounding properties occurs, with the exception of the proposed garage and driveway, which will be on fill.



Proposed filling under the garage and driveway is generally located within flood free areas or at the edge of the overland flow extent per the Citywide Creek & Overland Flow Path Mapping indicated in Figure 5 and 6 above. Flow conditions at the edge of the overland flow extent is envisaged to have low flow velocities and shallow depths and hence filling of these areas are expected to have a negligible impact on flood conditions. Brisbane River flooding and Storm tide inundation affecting the site is envisaged to involve flood plain storage and not flow conveyance. Fill of the garage and driveway is expected to negligibly reduce flood storage when compared to the entire flood plain.

It is noted multiple developments in the vicinity of the site have been approved with similar fill extents over the same Overland Flow path, Brisbane River flood area, and Storm-Tide inundation area, with a recent approval being right next door at 62 Jamieson Street, Bulimba, refer Development Application Approval A004589923.

Site Access

This section will outline acceptable solutions for site access that satisfy requirements as outlined in BCC's Flood Overlay Code applicable for the development.

The requirements are listed as being:

- Trafficable during the defined flood event;
- Not located in the Creek/waterway flood planning area 1 sub-category;
- Not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event;
- The access or driveway is not inundated by a 10% AEP flood.

Table 7.4.3 of the Queensland Urban Drainage Manual QUDM provides limitations on 'longitudinal' roadway flow conditions during major storm events. A maximum flow depth of 250mm and a depth velocity of $0.400\text{m}^2/\text{s}$ at the kerb is set for vehicle safety with low risk to life. As the flow depth is less than this within the road reserve fronting the site, the access complies.

Certification Requirements

The following section will provide comment on land use compatibility within the flood hazard area to comply with BCC's Flood Overlay Code.

Development located in Brisbane River flood planning area 1-2, Creek/Waterway flood planning area 1-2 or Overland Flow flood planning area is required to be structurally designed and certified by a Registered Professional Engineer Queensland (RPEQ) (by others) to resist hydrostatic and hydrodynamic loads associated with flooding up to and including the defined flood level event (DFL). As the site is affected by overland flow flooding, the development requires this additional certification.



CONCLUSION

This letter has been prepared to provide an assessment regarding potential flood limitations on a development proposal involving a 1 into 2 lot subdivision and dual occupancy on the property at 60 Jamieson Street, Bulimba imposed by Brisbane River, Overland Flow, and Storm-Tide flooding.

Brisbane City Council flood hazard maps indicate that the site is affected by the Brisbane River flood planning area, Overland Flow flood planning area, and Storm-Tide inundation area. During the RFL Brisbane River flood event, being the defined flooding source, the site is affected by an inundation level of 2.6m AHD

Minimum required lot levels, habitable floor levels, non-habitable floor levels, and garage floor levels, for the proposed development were found to be 3.4m AHD, 4.75m AHD, 4.75m AHD, and 3.4m AHD respectively. Upon review of architect plans minimum floor levels have been achieved. It is requested that Council however to relax the requirement for fill over the entire lot as it is envisaged to create adverse impacts on neighbouring properties and flood immunity will be implemented through the construction of flood immune habitable and non-habitable floor levels.

The building is to be raised on a 2.5m undercroft, but this can be reduced to 1.5m (and floor levels reduced to 3.75m AHD) where flood depths under the building are less than 0.6m. Upon review of architect plans minimum undercroft heights have not been achieved. It is requested that Council consider the undercroft of approximately 1.5m for this building to be a sufficient performance-based solution to the flood overlay code as it is envisaged to fulfil the minimum hydraulic clearance specified in Chapter 7 of the Flood Planning Scheme Policy and multiple developments in the vicinity of the site have been approved with similar undercroft heights over the same Overland Flow path, Brisbane River flood area, and Storm-Tide inundation area.

Finally, the garage is to be constructed on fill which is envisaged to have a negligible impact on flow conveyance or storage. It is noted that multiple developments in the vicinity of the site have been approved with similar fill extents over the same Overland Flow path, Brisbane River flood area, and Storm-Tide inundation area, with a recent approval being right next door at 62 Jamieson Street, Bulimba.

Should you have any queries please do not hesitate to contact our office.

Yours faithfully,

Milanovic Neale Consulting Engineers

Richard Dugdell

Civil Engineer

Attached:

BCC FloodWise Property Report – Report Reference 1567733757209 Dated 06/09/19



Brisbane City Council FloodWise Property Report

Report Reference

1567733757209

06/09/2019 11:35:57

Dedicated to a better Brisbane

THIS REPORT IS FOR BUILDING AND DEVELOPMENT PURPOSES ONLY

The FloodWise Property Report provides property or lot-based flood information for building and development requirements. This report provides information on estimated flood levels, habitable floor level requirements and more technical information on the four sources of flooding: river, creek / waterway, storm tide and overland flow. Refer to the Useful Definitions section for a glossary of terms.

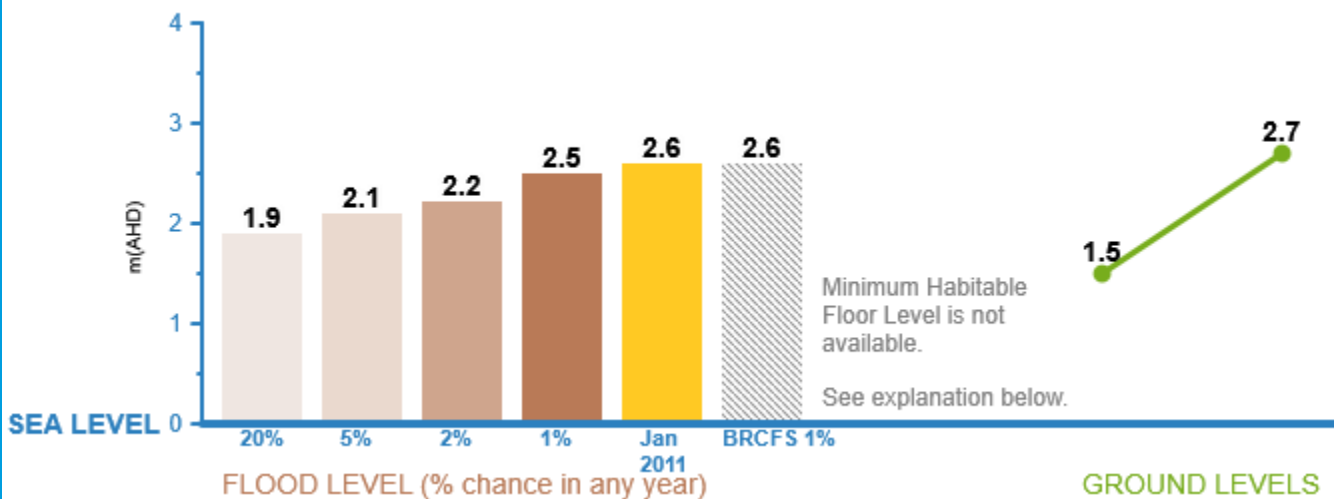
To find out more about how the contents of this report may affect building or development on this property, please visit www.brisbane.qld.gov.au/planning-building. For more general information about understanding your flood risk and how to prepare your property, family or business for potential flooding visit www.brisbane.qld.gov.au/beprepared

THIS IS A REPORT FOR:

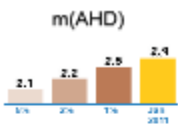
Rateable Address: 60 JAMIESON ST, BULIMBA QLD 4171

Lot Details: L.18 RP.54421

FLOOD LEVEL INFORMATION



EXPLANATION



m(AHD) - Metres Australia Height Datum. The level of 0.0m AHD is approximately mean sea level.

Flood Levels - The Flood level bar chart above shows the possible flooding level and percentage chance of that level being reached or exceeded in any year. If an orange bar shows, it is the calculated January 2011 flood level at this address or lot. If a hatched bar shows, it is the 1% AEP flood level from the 2017 Brisbane River Catchment Flood Study (BRCFS). Refer to 'Useful Definitions' for further information.

Minimum Habitable Floor Level - Applies to residential development only. Please refer to Council's planning scheme to learn how this may affect you. If a property is in an overland flow path, or a large allotment, a minimum habitable floor level cannot be provided. Refer flood and planning development flags below.

Ground Levels - The green line above shows this property's approximate lowest and highest ground levels based on latest available information (2014 airborne laser survey) to Council. If you are building, please confirm with a surveyor.

For further information and definitions please refer to the Useful Definitions page

FLOOD AND PLANNING DEVELOPMENT FLAGS

DEVELOPMENT FLAG(S)

This property may also be affected by one or more flood or property development overlays or flags. These include: OVERLAND FLOW PATH

Please review the technical summary over page and refer to Council's planning scheme for further information.



Brisbane City Council FloodWise Property Report

Report Reference

1567733757209

06/09/2019 11:35:57

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TECHNICAL SUMMARY

This section of the FloodWise Property Report contains more detailed flood information for this property so surveyors, builders, certifiers, architects and engineers can plan and build in accordance with Council's planning scheme. For more information about building and development in Brisbane please visit www.brisbane.qld.gov.au/planning-building or talk to a Development Assessment Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

THIS IS A REPORT FOR:

Rateable Address: 60 JAMIESON ST, BULIMBA QLD 4171

Lot Details: L.18 RP.54421

PROPERTY INFORMATION (Summary)

The following table provides a summary of flood information for this property. More detailed flood level information is provided in the following sections of this report.

PROPERTY SUMMARY	LEVEL (mAHD)
Minimum Ground Level	1.5
Maximum Ground Level	2.7
Min Habitable Floor Level	Contact Council
Residential Flood Level (RFL)	2.6
Residential Flood Level Source	RIVER
Flooding may also occur from	STORMTIDE,RIVER,OVERLAND FLOW

ESTIMATED PEAK FLOODING LEVELS

The table below displays the peak estimated flood levels by probability for this property. Estimated flood level data should be used in conjunction with applicable planning scheme requirements - Refer to Flood Planning Development Information.

Note that the overland flow flooding level maybe higher than the levels below from other sources.

DESCRIPTION	LEVEL (mAHD)	SOURCE
20% AEP	1.9	STORMTIDE
5% AEP	2.1	STORMTIDE
2% AEP	2.2	STORMTIDE
1% AEP	2.5	STORMTIDE
January 2011	2.6	RIVER
DFL	2.5	STORMTIDE
RFL	2.6	RIVER
2017 BRCFS 1% AEP**	2.6	RIVER

** This is the 1% AEP flood level from the 2017 Brisbane River Catchment Flood Study (BRCFS). The new flood study data is yet to be adopted for application in planning schemes and is for information purposes only.

FLOOD PLANNING DEVELOPMENT INFORMATION

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

FLOOD OVERLAY CODE

The Flood overlay code of Council's planning scheme uses the following information to provide guidelines when developing properties. The table below summarises the Flood Planning Areas (FPAs) that apply to this property. Development guidelines for the FPAs are explained in Council's planning scheme, which is available from www.brisbane.qld.gov.au/planning-building.

FLOOD PLANNING AREAS (FPA)		
RIVER	CREEK/WATERWAY	OVERLAND FLOW
FPA3		Applicable
FPA4		

COASTAL HAZARD OVERLAY CODE

The coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new development. The table below summarises the coastal hazard categories that apply to this property. Development guidelines for the following coastal hazard overlay sub-categories are explained in the planning scheme, which is available from www.brisbane.qld.gov.au/planning-building.

COASTAL HAZARD OVERLAY SUB-CATEGORIES
Medium Storm Tide Inundation Area
Erosion Prone Area - permanent inundation by 2100

NOTE: Where land is identified within one or more flood planning area on the Flood Overlay, or is identified within a Storm Tide Inundation area on the Coastal Hazard Overlay, the assessment criteria that provide the highest level of protection from any source of flooding applies.

PROPERTY DEVELOPMENT FLAGS

Overland Flow Path - Mapping indicates this property may be located within an overland flow path. Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded and/or when the overland flow path is blocked. It is recommended you consult a Registered Professional Engineer of Queensland to determine this property's habitable floor level and flooding depth. Please refer to Council's planning scheme for further information.



Brisbane City Council FloodWise Property Report

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Useful Definitions

Australian Height Datum (AHD) - The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

Defined Flood Level (DFL) - The DFL for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m³/s.

Maximum and Minimum Ground Level - Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum Habitable Floor Level - The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family and rumpus rooms) must be constructed.

Council's Planning Scheme - The City Plan (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Residential Flood Level (RFL) - Residential flood level (RFL) for Brisbane River flooding equates to the flood level applicable to the extent of January 2011 floods as depicted by mapping on the Queensland Reconstruction Authority website or the Council's defined flood level (DFL) for the Brisbane River, whichever is higher.

Rateable Address - A Lot or Property may have more than one street address. The address shown on this report is the address used by Council for the Lot or property selected.

Property - A property will contain 1 or more lots. The *Multiple Lot Warning* is shown if you have selected a property that contains multiple lots.

2017 Brisbane River Catchment Flood Study (BRCFS) - The BRCFS is a project led by the Queensland Government. The flood study was released in 2017. The 1% AEP flood levels from the flood study is yet to be adopted for application in planning schemes and is for information only. Other % AEPs will be updated with new information from the flood study as part of any relevant changes to City Plan 2014 as soon as is practicable.

Brisbane City Council's Online Flood Tools

Council provides a number of online flood tools:

- to guide planning and development
- to help residents and businesses understand their flood risk and prepare for flooding.

Planning and Development Online Flood Tools

Council's online flood tools for planning and development purposes include:

- FloodWise Property Report
- Flood Overlay Code

For more information on Council's planning scheme and online flood tools for planning and development:

- phone 07 3403 8888 to talk to a Development Assessment Customer Liaison Officer
- visit www.brisbane.qld.gov.au/planning-building
- visit a Regional Business Centre.

Helping residents and businesses be prepared for flooding

Council has a range of free tools and information to help residents and businesses understand potential flood risks and how to be prepared. This includes:

- Flood Awareness Map
- Flooding in Brisbane - A Guide for Residents
- Flooding in Brisbane - A Guide for Businesses
- Early Warning Alert Service. Visit www.brisbane.qld.gov.au/earlywarning to register for email, home phone or SMS severe weather alert updates.

Note: The Flood Awareness Map shows four levels of flood likelihood from high likelihood (flooding is very likely to occur) through to very low likelihood (very rare and extreme flood events).

For more information on Council's online flood tools for residents and business:

- Visit www.brisbane.qld.gov.au/beprepared
- Phone (07) 3403 8888.



Brisbane City Council FloodWise Property Report

Report Reference

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06/09/2019 11:35:57

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Disclaimer

1. Defined Flood Levels and Residential Flood Levels, and the Minimum Habitable Floor Levels are determined from the best available information to Council at the date of issue. These flood levels, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating flood levels.
2. Council makes no warranty or representation regarding the accuracy or completeness of a FloodWise Property report. Council disclaims any responsibility or liability in relation to the use or reliance by any person on a FloodWise Property Report.



Planning to build or renovate?

For information, guidelines, tools and resources to help you track, plan or apply for your development visit www.brisbane.qld.gov.au/planning-building

You can also find the Brisbane City Plan 2014 and Neighbourhood Plans as well as other information and training videos to help with your building and development plans.