

SITE BASED STORMWATER MANAGEMENT PLAN

FOR THE PROPOSED MIXED-USE DEVELOPMENT

LOCATED AT
17 HAMILTON PLACE, 26 & 28 CAMPBELL STREET,
BOWEN HILLS QLD 4006

PREPARED FOR
LANDITUDE

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV-2026-BNH-4372

Date: 19th May 2026



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Bornhorst and Ward Project No: **25160**

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Revision	Date	Description	Author	Rev.	App.
A	January 2026	Issue for DA	DGT	NR	NR

Nicholas Rozis: RPEQ 7729

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1. INTRODUCTION

Bornhorst and Ward has been commissioned to investigate and report on the stormwater requirements pertaining to the proposed mixed-use development located at 17 Hamilton Place, 26 and 28 Campbell Street, Bowen Hills, Easement A on SP145847, and part of the Common Property of Code Bowen Hills Community Titles Scheme 43095 (formally described as Lot 2 on RP83400, Lots 30 & 31 on RP9982, Easement A on SP145847 and Lot 0 on SP247766). The proposal consists of constructing a 2-level basement carpark along with associated infrastructure connections required to service the development, a 4-level podium and a 24-level mixed use tower. Plans of the proposed development can be seen in Appendix A.

This document reports on the existing and proposed stormwater infrastructure required as part of the proposed development as well as the stormwater quantity and quality management required for the site. The engineering requirements for this proposal shall be in accordance with Engineering Best Management Practices, Brisbane City Council Planning Scheme, the Queensland Urban Drainage Manual (QUDM 2017) and the State Planning Policy (2017).

This report outlines the preliminary design methodology and calculations in support of a Development Application and should be read in conjunction with other documents issued by the consultant team.

2. EXISTING AND PROPOSED SITE CHARACTERISTICS

2.1 LOCATION AND EXISTING FEATURES

The development site, located at 17 Hamilton Place, 26 & 28 Campbell Street, Bowen Hills (formally described as Lot 2 on RP83400, Lots 30 & 31 on RP9982, Easement A on SP145847 and Lot 0 on SP247766) has the following existing characteristics:

- The site is bound by, Campbell Street to the north, commercial lots to the east and south and Hamilton Place to the west;
- The development site is comprised of three commercial lots with two existing 2-storey buildings on Lots 30 and 31 on RP9982 and a 1-storey building on Lot 2 on RP83400 with associated driveways, footpaths and carparking;
- The total area of the site is approximately 0.151 ha;
- Vehicle access to the site is via Campbell Street and Jeays Street;
- There is an existing access easement directly south of the development site on Lot 0 on SP247766;
- The nearest downstream waterway to the site is Enoggera Creek which is approximately 425m north-west of the site.

Refer to Figure 1 for locality details.



Figure 1: Locality Plan

2.2 PROPOSED DEVELOPMENT

The following points outline the proposed development:

- Material Change of Use from commercial use to residential mixed use;
- The existing commercial buildings is to be demolished and a residential tower including a podium level and basement level is to be constructed in its place;
- The site will be accessed via a driveway onto Campbell Street and the existing access easement from Jeays Street, a lower-order road consistent with EDQ's preferred access hierarchy.

Refer to the development drawings in Appendix A for further information.

2.3 TOPOGRAPHY AND CATCHMENT CHARACTERISTICS

The topography and catchment characteristics are as follows:

- The high point of the existing site is RL 20m AHD located in the south-western corner of the site. The low point of the site is approximately RL 19m AHD located in the north-western corner of the site;
- The development falls at an average approximate grade of 2.8% from the high to low point;
- Roof water is currently discharged to the kerb and channel within Jeays Street and Hamilton Place via kerb adaptors;

- During storm events, runoff from the site discharges as overland flow over the north-western corner of the development site to an existing stormwater gully pit;
- The site's external catchment is fully developed and considered to be serviced by existing systems and road flow.

See the survey plan in Appendix C for more information.

2.4 EXISTING FLOODING CONDITIONS

A BCC Floodwise Report has been obtained for the site and can be provided upon request. This report indicated that no flood levels or flags for building or development purposes exist for the development site. The interactive mapping system within BCC's (2014) City Plan confirms that the development site is not affected by Brisbane River, creek/waterway or overland flow flooding. As a result of this, it is expected that the site is at a low risk of flood inundation.

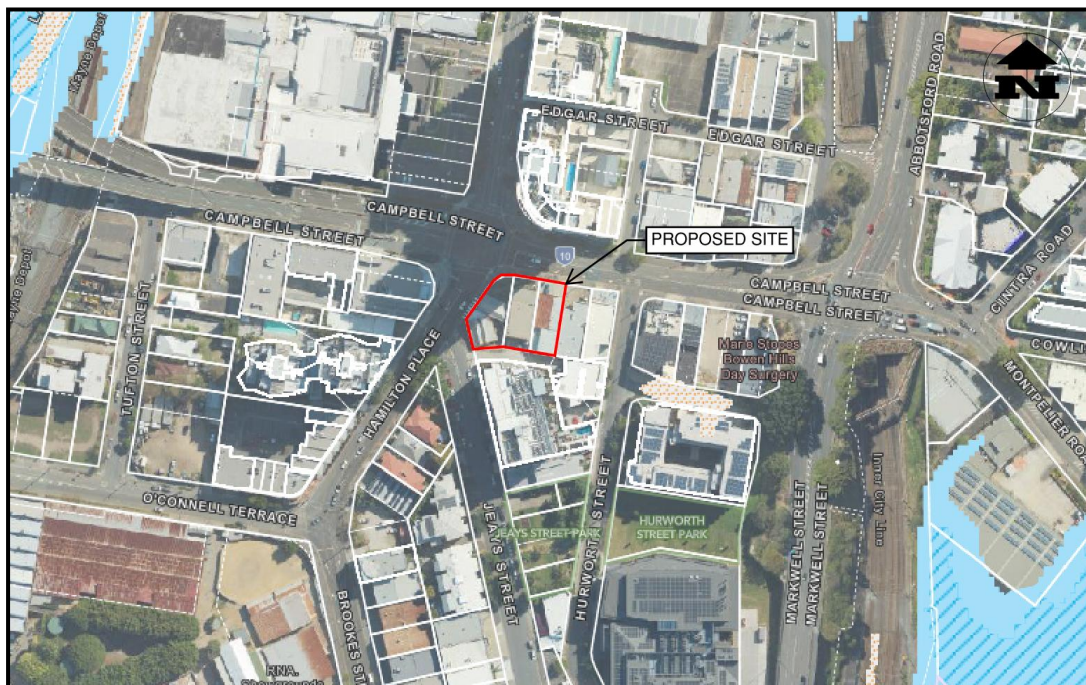


Figure 2: Brisbane City Council Interactive Flood Map

3. EXISTING AND PROPOSED STORMWATER INFRASTRUCTURE

3.1 EXISTING INFRASTRUCTURE

A Before You Dig Investigation has been completed of the site and its surrounding area. The following stormwater infrastructure was noted:

- An existing 100mm diameter stormwater pipe is located within Hamilton Place road reserve. This stormwater line ultimately drains north towards an existing unknown diameter stormwater pipe within Hamilton Place road reserve. Runoff from the existing site is not conveyed to this stormwater pipe;
- An existing unknown diameter stormwater pipe is located within the Hamilton Place road reserve. This stormwater line ultimately drains north towards the existing stormwater infrastructure within Campbell Street road reserve. Runoff from the existing site is conveyed to this stormwater pipe via an existing stormwater gully pit;

- An existing stormwater gully pit is located west of the development site within the eastern verge of Hamilton Place. Runoff from the existing site is conveyed to this gully pit and ultimately drains to the unknown diameter stormwater pipe;
- An existing stormwater gully pit is located at the north-western corner of the development site within the corner between Hamilton Place and Campbell Street. Runoff from the existing site is conveyed to this stormwater pipe and ultimately drains north towards a 300mm diameter stormwater pipe;
- An existing 300mm diameter stormwater pipe is located within the Campbell Street road reserve. This stormwater line connects to the existing stormwater gully pit and drains north towards a 375mm diameter stormwater pipe;
- An existing 375mm diameter stormwater pipe is located within the Campbell Street road reserve. This stormwater line connects to an existing field inlet located within the Campbell Street road reserve and ultimately drains west towards the existing stormwater network within Airport Link;
- There are three existing manholes between the existing gully pit north-western corner of the site and the existing filed inlet within Campbell Street;
- The stormwater infrastructure has been built for a fully developed catchment.

Refer to the Before You Dig plans of the existing stormwater infrastructure can be found in Appendix C of this report.

3.2 PROPOSED STORMWATER DRAINAGE

The proposed stormwater infrastructure for the development site will consist of:

- It is proposed to maintain the existing stormwater catchments and flow direction for the discharge of the stormwater from the development site while it is used for a residential tower;
- Minor storm events will be captured by the proposed internal stormwater network and discharge to the existing gully pit located at the north-western corner of the development site;
- Major storm events will be conveyed via overland flow to the existing gully pit at the north-western corner of the site;
- Existing roof water kerb adaptors to be demolishes for excavation;
- As there will be no increase to the impervious area as a result of the development, there will be no expected increase to peak stormwater discharge rates from the site. Based on this, no stormwater detention measures are required;
- Considering the development works area is less than 2,500m², stormwater quality improvement is required under the State Planning Policy.

Refer to the Engineering drawings located in Appendix B.

4. STORMWATER QUANTITY ANALYSIS

Under the Brisbane City Council Guidelines, several design elements were identified in relation to stormwater management issues. Brisbane City Council must be satisfied that:

- The proposed development can be drained;
- The stormwater management system can follow the features and functions of the natural drainage system;

- The volume, timing, velocity and pollutant load of stormwater has no adverse effect on any surrounding properties or receiving waters; and
- Suitable provision is made in the design layout to accommodate for major drainage.

All stormwater discharge will comply with Brisbane City Council's Stormwater Management Code with quantity calculations completed in accordance with the requirements and methods outlined in the Queensland Urban Drainage Manual (QUDM).

4.1 PEAK FLOW CALCULATIONS

Modelling of stormwater runoff quantity has been considered for the existing site conditions and operational phase of the development. The Rational Method as outlined in QUDM was used to determine the peak flow rate corresponding to the minor and major storm events for this development.

Brisbane City Council City Plan Infrastructure Design Planning Scheme Policy Table 7.2.2.3.B "Design Standards for Drainage Systems" was used to identify the design storm events for this development as:

Minor (piped flow)	-	10% AEP (1 in 10 year ARI)
Major (overland flow)	-	1.0% AEP (1 in 100 year ARI)

Flow rates for the developed site have been evaluated as a total discharge from the site.

4.1.1 Rainfall Data

The IFD data used in the Rational Method calculations was obtained from the Australian Bureau of Meteorology website based on the approximate latitude and longitude of the development site (LAT: -27.448°S, LONG: 153.036°E). This data indicated the 60 minute, 10 year ARI rainfall intensity applicable to the development site is 64.5mm/hr. This rainfall intensity was used in conjunction with the fraction impervious values to determine the coefficients of runoff for the existing and developed phases of the development in accordance with QUDM.

4.1.2 Peak Flow Discharge

The coefficient of runoff was taken to be 0.90 and 0.90 for the existing and proposed scenarios respectively. For the existing and proposed site, this was determined from existing and proposed impervious areas.

The time of concentration for both cases was determined in accordance with QUDM. The existing and proposed time of concentration was calculated at 5 minutes based on the minimum standard inlet time as the site consists of paved areas according to Table 4.6.2 in QUDM. This time of concentration was evaluated from the south-western corner of the catchment to the north-western corner of the development site. In both the existing and developed scenarios, the catchment has been taken as the whole of Lots 2 on RP83400, Lot 30 and 31 on RP9982, with no additional external catchment as the surround area is fully developed.

The following table is a summary of the peak site stormwater discharges for varying storm events, calculated in accordance with the Rational Method as outlined in QUDM, to the lawful point of discharge on Campbell Street for the existing and developed conditions. Detailed calculations are attached in Appendix D for reference and review.

Table 1: Pre and Post Development Peak Stormwater Discharge

	Parameter	Existing	Developed	Difference
Catchment Details	Area (ha)	0.151	0.151	-
	Fraction Impervious (fi)	98%	98%	-
	Coefficient of Runoff (C_{10})	0.90	0.90	-
	Time of Concentration (min)	5.0	5.0	-
	63% AEP (Q1 ARI) Rainfall Intensity (mm/hr)	113	113	-
	39% AEP (Q2 ARI) Rainfall Intensity (mm/hr)	128	128	-
	18% AEP (Q5 ARI) Rainfall Intensity (mm/hr)	174	174	-
	10% AEP (Q10 ARI) Rainfall Intensity (mm/hr)	205	205	-
	5% AEP (Q20 ARI) Rainfall Intensity (mm/hr)	236	236	-
	2% AEP (Q50 ARI) Rainfall Intensity (mm/hr)	276	276	-
	1% AEP (Q100 ARI) Rainfall Intensity (mm/hr)	306	306	-
Discharge	63% AEP (Q1 ARI) (m^3/s)	0.034	0.034	-
	39% AEP (Q2 ARI) (m^3/s)	0.041	0.041	-
	18% AEP (Q5 ARI) (m^3/s)	0.062	0.062	-
	10% AEP (Q10 ARI) (m^3/s)	0.077	0.077	-
	5% AEP (Q20 ARI) (m^3/s)	0.093	0.093	-
	2% AEP (Q50 ARI) (m^3/s)	0.116	0.116	-
	1% AEP (Q100 ARI) (m^3/s)	0.128	0.128	-

As there is no change in area, fraction impervious or time of concentration, no change in storm flows from the development site to the lawful point of discharge will occur. Therefore, no stormwater quantity detention measures are required for the discharge of stormwater runoff, as the development will not cause adverse impacts or actionable nuisance to surrounding properties and discharges north-west to Campbell Street to an existing gully pit discharging towards the existing stormwater network within Campbell Street.

5. STORMWATER QUALITY

5.1 CONSTRUCTION PHASE

The development works are considered medium risk with respect to the contaminants generated during the construction phase. A comprehensive Erosion and Sediment control plan including the construction process will be prepared during the detailed design. This is to be kept on site during the construction phase and will be in accordance with the State Planning Policy (2017) and Brisbane City Plan (2014).

Refer to the Erosion Hazard Assessment form in Appendix E for further information.

5.2 OPERATIONAL PHASE

The following extract from the document describes when a development is considered high risk, under Table 9.4.9.3.A of the Brisbane City Plan (2014):

- a) A material change of use for an urban purpose which involves greater than 2500m² of land that:
 - i. Will result in an impervious area greater than 25% of the net developable area, or*
 - ii. Will result in 6 or more dwellings.**
- b) Reconfiguring a lot for urban purposes that involves greater than 2500m² of land and will result in 6 or more lots;*
- c) Operational works for an urban purpose which involves disturbing greater than 2500m² of land.*

As the proposed development is for a material change of use that involves less than 2500m² of land, the Brisbane City Plan (2014) requirements for water quality is not applicable to the proposed development.

6. BRISBANE CITY COUNCIL CODES

The relevant Brisbane City Council Codes with respect to engineering aspects for assessment of the Development Application have been addressed. The codes will assist in assessing operational works requirements. The codes addressed in this report include:

- Stormwater code;
- Filling and excavation code.

The completed codes can be found attached in Appendix F of this Report.

7. SUMMARY

This Engineering Report has demonstrated that the proposed development located at 17 Hamilton Place and 26-28 Campbell Street, Bowen Hills (formally described as Lot 2 on RP83400, Lots 30 & 31 on RP9982, Easement A on SP145847 and Lot 0 on SP247766), can be developed in accordance with Engineering Best Management Practice, Brisbane City Council guidelines, QUDM (2017) and the State Planning Policy (2017). The following points summarise the findings and recommendations:

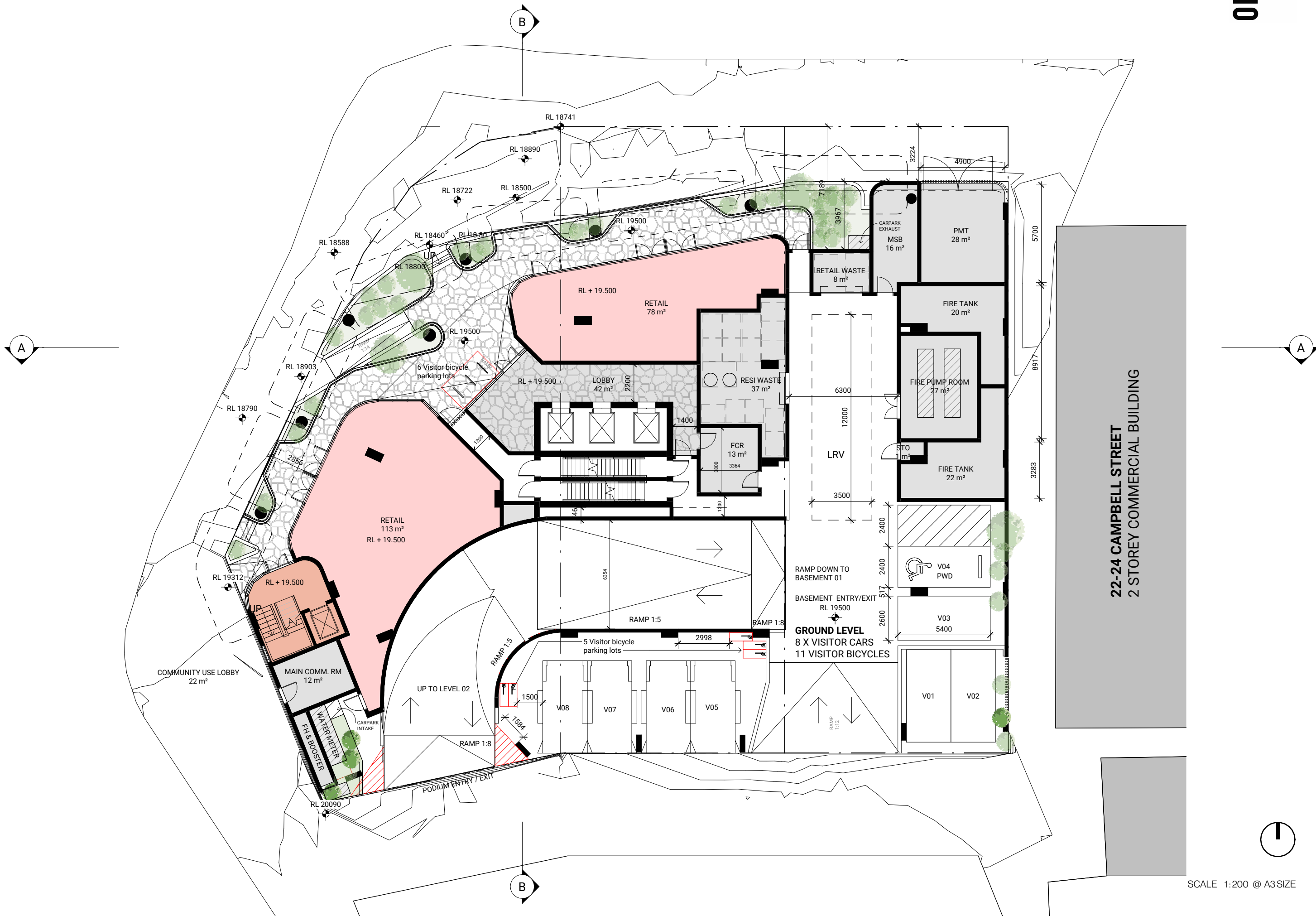
- The proposed development site has no flood levels or flags for building or development purposes and is expected to be very low risk of flood inundation;
- Minor storm events will be captured by the proposed internal stormwater network and discharge to the existing gully pit located at the north-western corner of the development site;
- Major storm events will be conveyed via overland flow to the existing gully pit at the north-western corner of the site;
- There will be no increase in peak stormwater runoff as a result of the development for 17 Hamilton Place and 26-28 Campbell Street, Bowen Hills and is considered negligible. Therefore, no detention is proposed;
- In accordance with the State Planning Policy and the Brisbane City Council Planning Scheme, stormwater quality treatment measures are not applicable to the proposed development on 17 Hamilton Place, 26 & 28 Campbell Street as the site is less than 2500m². Therefore, stormwater quality improvement treatment will not be required for the proposed development.

APPENDIX A
DEVELOPMENT DRAWINGS



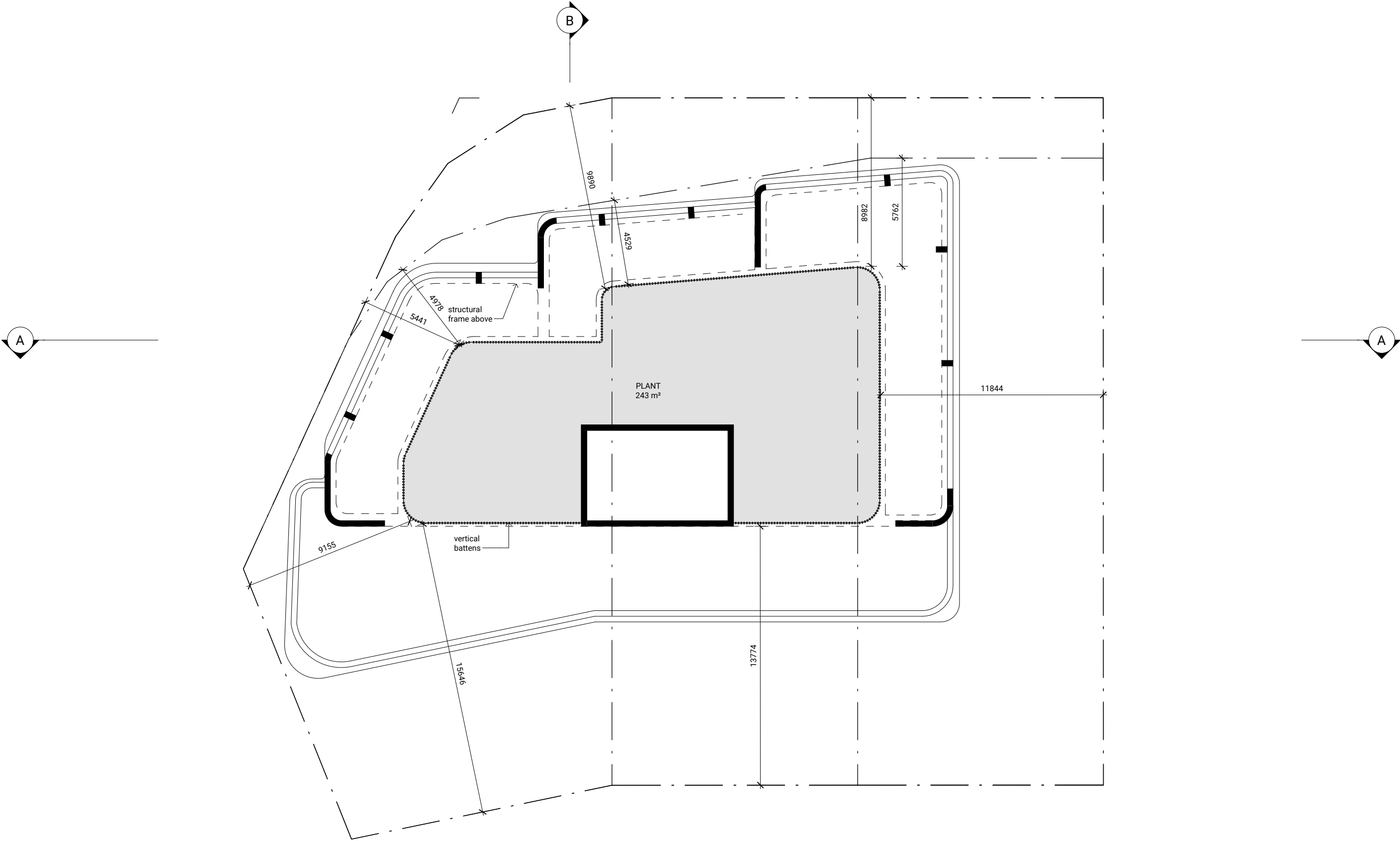
Our Solution

FLOOR PLAN - GROUND LEVEL



Our Solution

ROOF PLAN



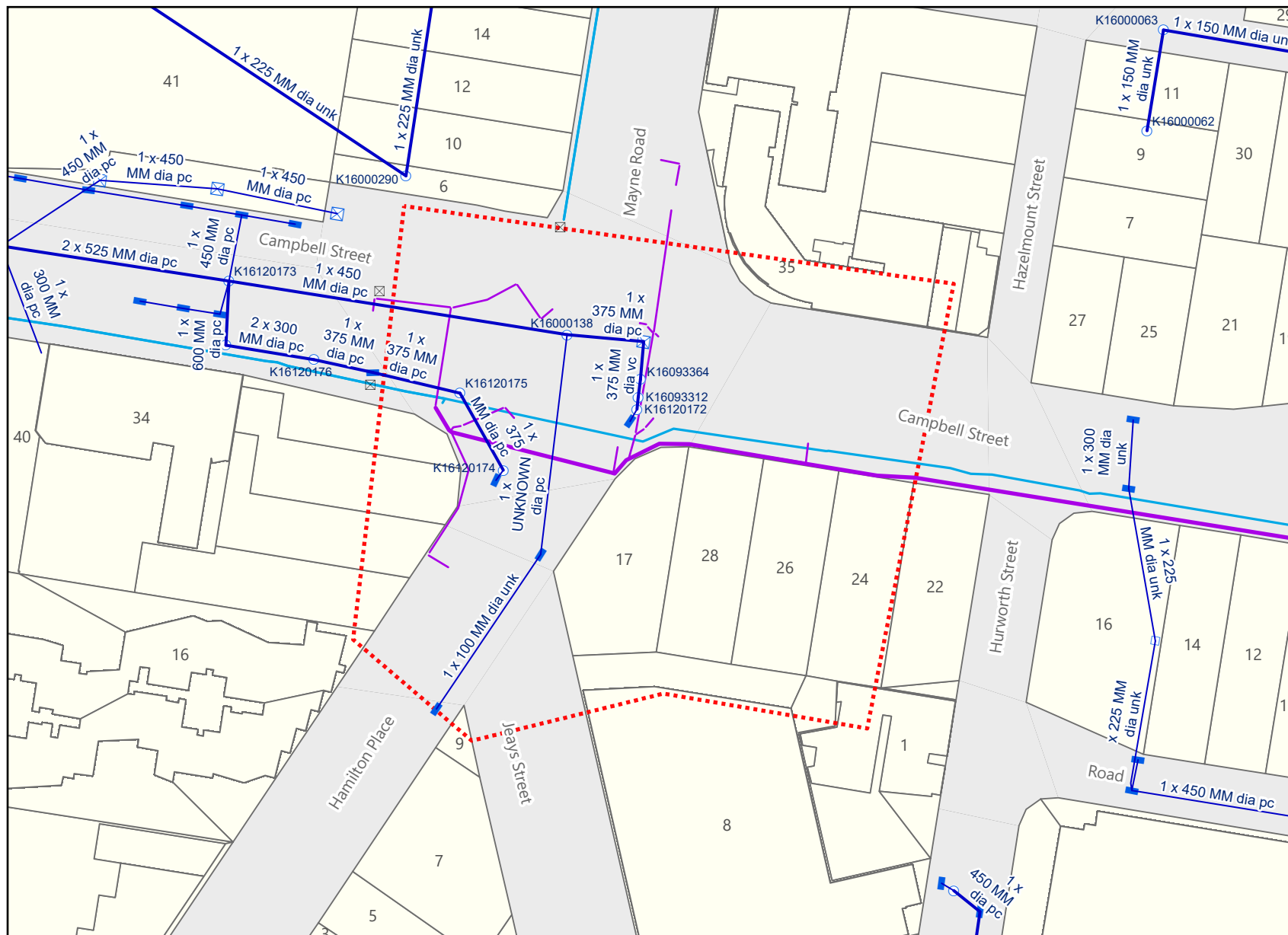
APPENDIX B
ENGINEERING DRAWINGS

APPENDIX C

EXISTING SITE INFORMATION



Job # 52043634
Seq # 266284238
Provider: Brisbane City Council
Telephone: (07) 3403 8888



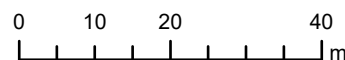
- Legend**
- BYDA Enquiry
- Stormwater Network**
- Stormwater Drain
 - Stormwater Gully / Roofwater Connection
 - Stormwater Maintenance Hole
 - Stormwater Roofwater Pit
 - Stormwater Gully Pit
 - Stormwater Field Inlet
- BCC Cable Network**
- Fibre Optic Pit Location
 - Traffic System Cable
 - Traffic Signal Ducting
 - Fibre Optic Cable Location

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Caution: This map may contain the locations of abandoned underground asbestos pipes. Council gives no warranty to the completeness or accuracy of these records. Appropriate care needs to be taken in all cases.

In an emergency contact Brisbane City Council on 07 3403 8888
06/01/26 (valid for 30 days)



Scale 1:1,000



Plans generated by
SmarterWX™ Automate

FloodWise Property Report

17 HAMILTON PL, BOWEN HILLS 4006
Lot 2 on RP83400



Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report provides technical flood planning information including estimated flood levels, habitable floor level requirements and more. This report uses the adopted flood planning information in Brisbane City Plan 2014, that guides how land in Brisbane is used and developed for the future. Find out more about [planning and building](#). To understand how to be resilient and prepare for floods, visit Council's [Be Prepared](#) web page. Find more information about [how to read a FloodWise Property Report](#).

This property has no flood levels

Brisbane City Council has not assigned flood level information for this property however it may be affected by one or more flood or property development flags. Please refer to the Flood Planning and Development Information below for details. The property may have 0.2% AEP flood level which will appear on the Flood Planning Information table if applicable. For professional advice or detailed assessment of a property contact a Registered Professional Engineer of Queensland.

Visit the [Be Prepared](#) page to find more information on how to prepare your home or business for potential flooding.

 **Combined** 1% AEP for river, creek and storm tide flood extent (if applicable) from the adopted Brisbane City Plan 2014. Read more about [Brisbane City Plan 2014](#).



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Are you resilient and ready for flood?

- Sign up to the Brisbane Severe Weather Alert at brisbane.qld.gov.au/beprepared
- Visit bom.gov.au for the latest weather updates.
- Have an evacuation plan, emergency kit and important phone numbers ready.
- Observe where water flows from and to during heavy rain.
- Consider how flood-resilient building techniques will have you home faster and with less damage.

Life threatening emergencies
000 Police/fire/ambulance
(mobiles **000** and **112**)

State Emergency Service (SES) **132 500**
Energex **13 19 62**
Brisbane City Council **3403 8888**

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.

Find more information about [planning and building](#) in Brisbane or talk to a Development Services Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

Flood Planning and 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](#).

Flood planning areas (FPA)		
River	Creek / waterway	Overland flow
		Not Applicable

To find more information about Council's flood planning areas (FPAs) for Brisbane River and Creek/waterway flooding to guide future building and development in flood prone areas, please review [Council's Flood Planning Provisions](#).

Coastal hazard overlay code

The Coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new developments. 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 Council's [planning scheme](#).

Coastal hazard overlay sub-categories
There are currently no Coastal hazard overlay sub-categories that apply to this property.

Note: Where land is identified within one for more flood planning areas on the Flood overlay or is identified within one of the Storm tide inundation area sub-categories on the Coastal hazard overlay, the assessment criteria that provides the highest level of protection from any source of flooding applies.

Useful Flood Information 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.

- **0.2% AEP** - A flood event of this size is considered rare but may still occur. A flood of size or larger has a 1 in 500 chance or a 0.2% probability of occurring in any year.
- **1% AEP** - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
- **2% AEP** - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
- **5% AEP** - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
- **20% AEP** - A flood of this size or larger has a 1 in 5 chance or a 20% probability of occurring in any year.

Data quality

- **Data Quality Code A** - Level data based on recent surveyor report or approved as-constructed drawings.
- **Data Quality Code B** - Level data based on ground-based mobile survey or similar.
- **Data Quality Code C** - Level data derived from Airborne Laser Scanning or LiDAR information.

Defined Flood Level (DFL) - The DFL is used for commercial and industrial development. The Defined flood level (DFL) for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m/s. DFL is only applicable for non-residential uses affected by Brisbane River flooding.

Flood planning area (FPA) - Council has developed five Flood planning areas (FPAs) as part of Brisbane City Plan 2014 Flood overlay mapping for Brisbane River, Creek/waterway flooding and Overland flow to guide future building and development in flood prone areas. Storm tide flooding is mapped separately. The FPAs are designed to recognise the flood hazard for different flooding types. Flood hazard is a combination of frequency of flooding, the flood depth, and the speed at which the water is travelling. [Find more information here.](#)

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 (dwelling house) - 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 as required by the Brisbane City Plan 2014.

Indicative existing floor level - The approximate level in metres AHD of the lowest habitable floor in the existing building (excluding apartments). The data is sourced from a range of sources with varying accuracy levels.

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.

Residential flood level (RFL) - This flood level for the Brisbane River equates to the 1% annual exceedance probability (AEP) flood level.

To learn more, visit [Brisbane City Council's Flood Information Hub](#)

Brisbane City Council's Online Flood Tools

Council provides several online flood tools:

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

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 and ask to talk to a Development Services Planning Information Officer

- visit brisbane.qld.gov.au/planning-building

Council's Planning Scheme - The Brisbane City Plan 2014 (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.

Disclaimer

1. Defined flood levels and residential flood levels, minimum habitable floor levels and indicative existing floor levels are determined from the best available information to Council at the date of issue. These levels, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating levels.
2. Council makes no warranty or representation regarding the accuracy or completeness of a FloodWise Property Report. Council disdains 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 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.

APPENDIX D

RATIONAL METHOD CALCULATIONS

INITIAL PEAK FLOW ESTIMATE

Written by BB 31/10/08
Updated by DJK 25/05/20



Job Number: **proj_id** 25160
Job Name: **proj_name** 17 Hamilton Place, Bowen Hills
Calc_zone

Designed: **DGT**
Checked: **NR** IFD Location: **-27.448, 153.036**

TOTAL RUNOFF COEFF.								
Sub Catchment Area (Ha)			Fraction Impervious		Runoff Coefficients		Calculated C10	
No.	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1	0.151	0.151	98%	98%	0.90	0.90		
2	0.000	0.000	0%	0%	0.00	0.00		
3	0.000	0.000	0%	0%	0.00	0.00		
4	0.000	0.000	0%	0%	0.00	0.00		
5	0.000	0.000	0%	0%	0.00	0.00		
	0.151	0.151					0.90	0.90

Raw IFD data has been obtained from the Bureau of Meteorology (BOM) website.

EXISTING TIME OF CONCENTRATION		
SHEET FLOW	Std Inlet Time	5
	Site Slope (%)	
	Flow Length (m)	
	Horton's "n"	
	Travel Time (min)	
CHANNEL/PIPE FLOW	Travel Length (m)	0
	Fall (m)	0
	Travel Time (min)	0
	Multiplier	0
	Travel Time (min)	0
	Total Time (Tc)	5.0

DEVELOPED TIME OF CONCENTRATION		
SHEET FLOW	Std Inlet Time	13
	Site Slope (%)	0
	Flow Length (m)	0
	Horton's "n"	0
	Travel Time (min)	0.00
CHANNEL/PIPE FLOW	Travel Length (m)	0
	Fall (m)	0
	Travel Time (min)	0
	Multiplier	0
	Travel Time (min)	0
	Total Time (Tc)	5.0

PEAK RUNOFF CALCULATIONS							
AEP Event %	ARI Event yr	Rainfall Intensity (mm/hr)		Coefficient of Runoff		Peak Runoff Rates (m^3/s)	
		Existing	Proposed	Existing	Proposed	Existing	Proposed
63%	1	113	113	0.72	0.72	0.034	0.034
39%	2	128	128	0.76	0.76	0.041	0.041
18%	5	174	174	0.85	0.85	0.062	0.062
10%	10	205	205	0.90	0.90	0.077	0.077
5%	20	236	236	0.94	0.94	0.093	0.093
2%	50	276	276	1.00	1.00	0.116	0.116
1%	100	306	306	1.00	1.00	0.128	0.128

PEAK FLOWS FOR FREQUENT EVENTS			
ARI Event yr	% of Q1	Peak discharge (m^3/s)	
		Existing	Proposed
1mth	25%	0.008	0.008
2mth	40%	0.014	0.014
3mth	50%	0.017	0.017
4mth	60%	0.020	0.020
6mth	75%	0.025	0.025
9mth	90%	0.031	0.031
12mth	100%	0.034	0.034

INITIAL DETENTION SIZING ESTIMATE

Written by SC 31/10/94
updated by BB 31/10/08



Job Number: **proj_id**
Job Name: **proj_name**
Flow into Development site

#REF!

Designed: DGT
Checked: NR

	Critical Time of Concentration tc min	10 yr ARI Runoff C'eff p307 ARR Cv	Total Catchment Area A ha
Existing	5.00	0.90	0.151
Post- Develop	5.00	0.90	0.151

Flood Event ARI yr	Volumetric Coeff. of Runoff		Rainfall Intensity		Inflow Volume	Peak outflow capacity or desired peak outflow	Peak Inflow rate by rational method	Reduction ratio	Storage Volume					
	Existing Cv	Post-D'ment Cv	Existing I	Post- Devel I	Vi	Qo	Qi	r	Vs					Time ratio factor 1.25
			mm/hr	mm/hr	m^3	m^3/s	m^3/s		CULP m^3	BOYD m^3	CARROL m^3	BASHA m^3	Small Basins m^3	Required Volume m^3
3mth	0.72	0.72	56	56	7	0.017	0.017							7
1	0.72	0.72	113	113	14	0.034	0.034	0.00	0	0	0	0	7	0
2	0.76	0.76	128	128	16	0.041	0.041	0.00	0	0	0	0	8	0
5	0.85	0.85	174	174	25	0.062	0.062	0.00	0	0	0	0	12	0
10	0.90	0.90	205	205	31	0.077	0.077	0.00	0	0	0	0	15	0
20	0.94	0.94	236	236	37	0.093	0.093	0.00	0	0	0	0	19	0
50	1.00	1.00	276	276	46	0.116	0.116	0.00	0	0	0	0	23	0
100	1.00	1.00	306	306	51	0.128	0.128	0.00	0	0	0	0	26	0

assumes $V_i = 4 \cdot Q_i \cdot T_c / 3$ where Q_i is flow from rational method (QUDM 5.05.1)
and T_c is in seconds for this equation only.
ie $C_v = 1.33 \cdot C_r$ which is conservative for SE QLD.
Required Volume is a the maximum volume estimated by the 4 different methods, with a Time Ratio factor applied.
Time Ratio Factor is a allowance for additional volume based upon detail sizing calculations for previous projects.

APPENDIX E

EROSION HAZARD ASSESSMENT FORM



Erosion Hazard Assessment

Brisbane City Council (BCC), *Erosion Hazard Assessment* form must be read in conjunction with the *Erosion Hazard Assessment- Supporting Technical Notes* (June 2014 or later version) for explanatory terms and Certification information.

What is an Erosion Hazard Assessment?

Soil erosion and sediment from urban development, particularly during construction activities, is a significant source of sediment pollution in Brisbane's waterways. The Erosion Hazard Assessment determines whether the risk of soil erosion and sediment pollution to the environment is 'low', 'medium' or 'high'.

When is the EHA required?

An Erosion Hazard Assessment form must be completed and lodged with BCC for any Development Application (ie MCU or ROL) that will result in soil disturbance OR Operational Works or Compliance Assessment Application for 'Filling' or Excavation.

Failure to submit this form during lodgement of an application may result in assessment delays or refusal of the application.

Privacy Statement

The personal information collected on this form will be used by Brisbane City Council for the purposes of fulfilling your request and undertaking associated Council functions and services. Your personal information will not be disclosed to any third party without your consent, unless this is required or permitted by law.

Assessment Details

1 Please turn over and complete the erosion hazard assessment.

2 Based on the erosion hazard assessment overleaf, is the site:

☐ A 'low' risk site

Best practice erosion and sediment control (ESC) must be implemented but no erosion and sediment control plans need to be submitted with the development application. Factsheets outlining best practice ESC can be found at <https://waterbydesign.com.au/download/erosion-sediment-control-for-small-construction-sites>

☒ A 'medium' risk site

If the development is approved, the applicant will need to engage a Registered Professional Engineer (RPEQ) or Certified Professional in Erosion and Sediment Control (CPESC) to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy.

☐ A 'high' risk site

If the development is approved, the applicant will need to engage a RPEQ and CPESC to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy. The plans and program will need to be certified by a CPESC.

3 Site Information and Certification

Application number (if known)

Site address

17 Hamilton Place, 26 & 28 Campbell Street, Bowen Hills

Postcode 4006

I certify that:

- ☒ I have made all relevant enquiries and am satisfied no matters of significance have been withheld from the assessment manager.
- ☒ I am a person with suitable qualifications and/or experience in erosion and sediment control.
- ☒ The Erosion Hazard Assessment was completed in accordance with the Erosion Hazard Assessment Supporting Technical Notes and the BCC Infrastructure Design Planning Scheme Policy.
- ☒ The Erosion Hazard Assessment accurately reflects the site's overall risk of soil erosion and sediment pollution to the environment.
- ☒ I acknowledge and accept that the BCC, as assessment manager, relies, in good faith, on this certification as part of its development assessment process and the provision of false or misleading information to the BCC constitutes an offence for which BCC may take punitive steps/ action against me/ enforcement action against me.

Certified by (Print name)

DEAN TRAN

Certifier's signature

Date

14 / 01 / 2026

Assessment Table

Table 1: Low Risk Test

		Yes	No
1.1	is the area of land disturbance > 1000 m2?	☒	☐
1.2	does any land disturbance occur in a BCC mapped waterway corridor?	☐	☒
1.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 5%?	☐	☒
1.4	does any land disturbance occur below 5 m AHD?	☐	☒
1.5	does development involve endorsement of a staging plan?	☐	☒
1.6	is there an upstream catchment passing through the site > 1 hectare?	☐	☒

If you answered '**No**' to **ALL** of these questions, then the site is **low risk** with respect to erosion and sediment control.
(Do not continue to Table 2)

If you answered '**Yes**' to **ANY** of these questions, then proceed to **Table 2**

Table 2: Medium Risk Test

		Yes	No
2.1	is the area of land disturbance > 1 hectare?	☐	☒

If '**No**' then the site is **medium risk** with respect to erosion and sediment control.
(Do not continue to Table 3)

If '**Yes**' then proceed to **Table 3**

Table 3: High Risk Test

		Yes	No
3.1	is there an upstream catchment passing through the site > 1 hectare?	☐	☐
3.2	does any land disturbance occurs in a BCC mapped waterway corridor?	☐	☐
3.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 15%?	☐	☐

If you answered '**No**' to **ALL** of these questions, then the site is also **medium risk** with respect to erosion and sediment control.

If you answered '**Yes**' to **ANY** of these questions, then the site is **high risk** with respect to erosion and sediment control.

APPENDIX F

BRISBANE CITY COUNCIL CODES

9.4.9 Stormwater code

9.4.9.1 Application

1. This code applies to assessing a material change of use, reconfiguring a lot or operational work if:
 - a. assessable development where this code is identified as a prescribed secondary code in the assessment benchmarks column of a table of assessment for a material change of use (section 5.5), reconfiguring a lot (section 5.6) operational work (section 5.8) or an overlay (section 5.10); or
 - b. impact assessable development, to the extent relevant.
2. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to infrastructure design and construction works, guidance is provided in the Infrastructure design planning scheme policy.

9.4.9.2 Purpose

1. The purpose of the Stormwater code is to assess the suitability of the stormwater aspects of development.
2. The purpose of the code will be achieved through the following overall outcomes:
 - a. Development achieves acceptable levels of stormwater run-off quality and quantity by applying water sensitive urban design principles as part of an integrated stormwater management framework.
 - b. Development protects public health and safety and protects against damage or nuisance caused by stormwater flows.
 - c. Development has a stormwater management system which maintains, recreates or minimises impact to natural catchment hydrological processes.
 - d. Development ensures that the environmental values of the city's waterways are protected or enhanced.
 - e. Development minimises run-off, including peak flows.
 - f. Development maintains or enhances the efficiency and integrity of the stormwater infrastructure network.
 - g. Development minimises the whole of life cycle cost of stormwater infrastructure.

9.4.9.3 Performance outcomes and acceptable outcomes

Table 9.4.9.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
Section A—If for a material change of use, reconfiguring a lot, operational work or building work Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only.		
PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: a. minimise flooding; b. protect environmental values of receiving waters; c. maximise the use of water sensitive urban design; d. minimise safety risk to all persons; e. maximise the use of natural waterway corridors and natural channel design principles. Editor's note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.	AO1 Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	Acceptable Solution The development will provide a stormwater system designed in compliance with the Infrastructure Design Planning Scheme Policy.
PO2 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.	AO2.1 Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises. AO2.2 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	Acceptable Solution The development meets the requirements of Council's Infrastructure design planning scheme policy and does not result in an increase in flood level or flood duration on upstream, downstream or adjacent properties.
PO3 Development ensures that the stormwater management system does not direct stormwater run-off through	AO3.1 Development ensures that the location of the stormwater drainage system is contained within a road reserve,	Acceptable Solution The design demonstrates that a drainage network will

existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.	drainage reserve, public pathway, park or waterway corridor. A03.2 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	be provided that will comply with Council's Infrastructure design planning scheme policy. Conceptual drainage requirements for the proposal are identified in the SBSMP.
	A03.3 Development obtains a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy.	Acceptable Solution The development has a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy.
	A03.4 Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	N/A No drainage easement proposed for development.
PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.	A04.1 Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy. A04.2 Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.	Acceptable Solution The design demonstrates that a drainage network will be provided that will comply with Council's Infrastructure design planning scheme policy which safely conveys runoff considering increased runoff and flooding in local catchments.
PO5 Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.	A05 Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.	N/A The proposed development does not have any channel, creek modification, bridge, culvert or major drain works.
PO6 Development ensures that location and design of	A06.1 Development locates stormwater detention and water	N/A The proposed development does not require

stormwater detention and water quality treatment: a. minimises risk to people and property; b. provides for safe access and maintenance; c. minimises ecological impacts to creeks and waterways.	quality treatment: a. outside of a waterway corridor; b. offline to any catchment not contained within the development. AO6.2 Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.	stormwater detention or water quality treatment in accordance with the Infrastructure design planning scheme policy.
PO7 Development is designed, including any car parking areas and channel works to: a. reduce property damage; b. provide safe access to the site during the defined flood event.	AO7.1 Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F. Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan). AO7.2 Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.	N/A The proposed development design provides flood immunity levels in accordance with the Infrastructure design planning scheme policy. A SBSMP has been prepared and demonstrates this. Acceptable Solution The proposed development design provides a stormwater management system that ensures safe pedestrian and vehicle access in accordance with the Infrastructure design planning scheme policy.
PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.	AO8.1 Development ensures natural waterway corridors and drainage paths are retained. AO8.2 Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	Acceptable Solution The proposed development stormwater designs are in accordance with the Infrastructure design planning scheme policy. N/A The proposed development does not include any channel or creek modification works.

	AO8.3 Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the Infrastructure design planning scheme policy.	N/A The proposed development does not include any channel or creek modification works.
	AO8.4 Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the Infrastructure design planning scheme policy.	N/A The proposed development does not include any channel or creek modification works.
PO9 Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.	AO9 No acceptable outcome is prescribed.	N/A
PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	AO10 No acceptable outcome is prescribed.	Acceptable Solution The proposed development ensures there is sufficient site area to accommodate an effective stormwater management system. This is demonstrated in the SBSMP.
PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the: a. existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades; b. safe management of stormwater discharge from existing and future up-slope development; c. implication for adjacent and down-slope development.	AO11.1 Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge. AO11.2 Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Infrastructure design planning scheme policy.	Acceptable Solution Up-slope external catchments have been diverted to appropriate lawful points of discharge by the surrounding network. Acceptable Solution Additional flows not initially accounted for within the stormwater infrastructure have been used to determine any required pipe upgrades in compliance with the Infrastructure design planning scheme policy.

PO12 Development provides stormwater infrastructure which: a. remains fit for purpose for the life of the development and maintains full functionality in the design flood event; b. can be safely accessed and maintained cost effectively; c. ensures no structural damage to existing stormwater infrastructure.	AO12.1 The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy. AO12.2 Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	Acceptable Solution The proposed development stormwater designs are in accordance with the Infrastructure design planning scheme policy. N/A
PO13 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: a. the environmental values and water quality objectives of waters; b. waterway hydrology; c. the maintenance and serviceability of stormwater infrastructure. Note—The Infrastructure design planning scheme policy outlines the appropriate measures to be taken into account to achieve the performance outcome.	AO13 No acceptable outcome is prescribed.	Acceptable Solution Appropriate erosion sediment control plans will be prepared at the operational works stage in accordance with the infrastructure design planning scheme policy.
PO14 Development ensures that: a. unnecessary disturbance to soil, waterways or drainage channels is avoided; b. all soil surfaces remain effectively stabilised against erosion in the short and long term.	AO14 No acceptable outcome is prescribed.	Acceptable Solution A detailed Erosion Sediment Control Plan will be prepared in accordance with Brisbane City Council Guidelines. The ESCP shall be prepared during the Operational Works phase of the development.
PO15 Development does not increase:	AO15 No acceptable outcome is prescribed.	Acceptable Solution

a. the concentration of total suspended solids or other contaminants in stormwater flows during site construction; b. run-off which causes erosion either on site or off site.		A detailed Erosion Sediment Control Plan will be prepared in accordance with Brisbane City Council Guidelines. The ESCP shall be prepared during the Operational Works phase of the development.
Section B—Additional performance outcomes and acceptable outcomes which apply to high-risk development, being one or more of the following: a. a material change of use for an urban purpose which involves greater than 2,500m² of land that: i. will result in an impervious area greater than 25% of the net developable area; or ii. will result in 6 or more dwellings. b. reconfiguring a lot for an urban purpose that involves greater than 2,500m² of land and will result in 6 or more lots; c. operational work for an urban purpose which involves disturbing greater than 2,500m² of land.		
PO16 Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values. Note—Prescribed water contaminants are defined in the <i>Environmental Protection Act 1994</i>. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.	AO16 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.	N/A The proposed development does not require water quality
PO17 Development ensures that: a. the discharge of wastewater to a waterway or external to the site is avoided; or b. if the discharge cannot practicably be avoided, the development minimises wastewater discharge through re-use, recycling, recovery and treatment. Note—The preparation of a wastewater management plan can assist in demonstrating achievement of this performance outcome. Editor's note—This code does not deal with sewerage which is the subject of the Wastewater code.	AO17 No acceptable outcome is prescribed.	Acceptable Solution Due to the proximity to the Brisbane River discharge to waterway is most likely unavoidable, however, re-use, recycling, and treatment will be used where possible to reduce impacts on said waterway.

Section C—Additional performance outcomes and acceptable outcomes for assessable development for a material change of use or reconfiguring a lot		
PO18 Development protects stormwater infrastructure to ensure the following are not compromised: a. the long term infrastructure for the stormwater network in the Long term infrastructure plans; b. the existing and planned infrastructure for the stormwater network in the Local government infrastructure plan; c. the provision of long term, existing and planned infrastructure for the stormwater network which: i. is required to service the development or an existing and future urban development in the planning scheme area; or ii. is in the interests of rational development or the efficient and orderly planning of the general area in which the site is situated. Editor's note—A condition which requires a proposed development to keep permanent improvements and structures associated with the approved development clear of the area of long term infrastructure, may be imposed.	AO18 Development protects stormwater infrastructure in compliance with the following: a. for long term infrastructure for the stormwater network, the Long term infrastructure plans; b. for existing and planned infrastructure for the stormwater network, the Local government infrastructure plan; c. the standards for stormwater drainage in the Infrastructure design planning scheme policy.	Acceptable solution. The proposed development protects stormwater infrastructure in compliance with the Long term infrastructure plans, Local government infrastructure plan and the standards for stormwater drainage in the Infrastructure design planning scheme policy.
PO19 Development provides for the payment of extra trunk infrastructure costs for the following: a. for development completely or partly outside the priority infrastructure area in the Local government infrastructure plan; b. for development completely inside the priority infrastructure area in the Local government infrastructure plan involving: i. trunk infrastructure that is to be provided earlier than planned in the Local	AO19 No acceptable outcome is prescribed.	N/A

government infrastructure plan; ii. long term infrastructure for the stormwater network which is made necessary by development that is not assumed future urban development; iii. other infrastructure for the stormwater network associated with development that is not assumed future urban development which is made necessary by the development. Editor's note—The payment of extra trunk infrastructure costs for development completely inside the priority infrastructure area in the Local government infrastructure plan is to be worked out in accordance with the Charges Resolution. Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the <i>Planning Act 2016</i>.		
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Table 9.4.9.3.B—Categories of flood planning levels

Flooding type ⁽¹⁾	Minimum design floor or pavement levels (m AHD) ⁽²⁾ (refer to Table 9.4.9.3.C for assignment of these categories)				
	Category A	Category B	Category C	Category D	Category E
Waterway ^(A) or open channel	1% AEP flood level + 500mm	1% AEP flood level + 300mm	1% AEP flood level	1% AEP flood level	5% AEP flood level
Overland flow flooding ^(B)	2% AEP flood level +500mm	2% AEP flood level +300mm	2% AEP flood level	2% AEP flood level	5% AEP flood level

Notes—

⁽¹⁾ Where the site is subject to more than one type of flooding that is overland flow flooding, creek or waterway flooding or river flooding, the minimum flood immunity level is the highest level determined from these sources.

⁽²⁾ Where flood levels are not available from Council's Floodwise Property Report such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note ^(A) A waterway, including any indicated on the planning scheme maps, is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks, typically with a catchment area

greater than 30ha.

Note ^(B) 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. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 5% is the equivalent of a 20 year ARI flood event.

Note—The flood immunity level in some older inner-city areas is often controlled by local ponding.

Table 9.4.9.3.C—Flood planning level categories for development types

BCA building classification ⁽¹⁾	Development types and design levels, assigned design floor or pavement levels	Category Refer to Table 8.2.11.3.L
Class 1—4	Habitable room	Category A
	Non-habitable room including patio and courtyard	Category B
	Non-habitable part of a Class 2 or Class 3 building excluding the essential services ⁽²⁾ control room	Category B
	Parking located in the building undercroft of a multiple dwelling	Category C
	Carport ⁽⁴⁾ , unroofed car park; vehicular manoeuvring area	Category D
	Essential electrical services ⁽²⁾ of a Class 2 or Class 3 building only	Category A ⁽⁶⁾
	Basement parking entry ⁽³⁾	Category C + 300mm
Class 5, Class 6, or Class 8	Building floor level	Category C
	Garage or car park located in the building undercroft ⁽³⁾	Category C
	Carport ⁽⁴⁾ or unroofed car park	Category D

	Vehicular access and manoeuvring areas	Category D
	Basement parking entry ⁽³⁾	Category C
	Essential electrical services ⁽²⁾	Class 8 — Category C ⁽⁶⁾ Class 5 & 6 — Category A ⁽⁶⁾
Class 7a	Refer to the relevant building class specified in this table	
Class 7b	Building floor level	Category C
	Vehicular access and manoeuvring area	Category D
	Essential electrical services ⁽²⁾	Category C
Class 9	Building floor level	Category A
	Building floor level for habitable rooms in Class 9a or 9c where for a residential care facility	0.2% AEP flood
	Garage or car park located in the building undercroft ⁽³⁾	Category C
	Carport ⁽⁴⁾ or unroofed car park	Category D
	Vehicular access and manoeuvring areas	Category D
	Essential electrical services ⁽²⁾	Category A
Class 10a	Car parking facility	Refer to the relevant building class specified in this table
	Shed ⁽⁵⁾ or the like	Category D
Class 10b	Swimming pool	Category E
	Associated mechanical and electrical pool equipment	Category C
	Other structures	Flood immunity standard does not apply

Notes—

⁽¹⁾ Refer to the Building Code of Australia for definitions of building classifications.

(2) Essential services include any room used for fire control panel, telephone PABX, sensitive substation equipment including transformers, low voltage switch gear, high-voltage switch gear, battery chargers, protection control and communication equipment, low voltage cables, high-voltage cables and lift controls.

(3) Basement car parks must be suitably waterproofed and all air vents, air-conditioning ducts, pedestrian access and entry and exit ramps at the car park entrance have flood immunity in accordance with this table.

(4) A shelter for a motor vehicle, which has a roof and one or more open sides, and which can be built against the side of a building.

(5) A slight or rough structure built for shelter and storage; or a large strongly built structure, often open at the sides or end.

(6) Where essential services are proposed in a basement below the specified flood planning level, the flood immunity of all air vents, air-conditioning ducts, pedestrian access, lift shafts and entry/exit ramps at the basement entrance and any other openings into that basement must conform to Category A for Residential development, and the relevant basement entry level of all other uses. This will require a waterproof basement design to prevent floodwaters entering the basement to ensure flood immunity.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.

Note—Where a building has a combination of uses that includes a component of class 2, 3 or 9, the essential services for that building shall comply with the requirements of the building class with the greatest flood immunity requirement.

Note—Use classes for residential development also include basement storage.

Table 9.4.9.3.D—Flood planning levels for a new road

Flooding type ⁽¹⁾	Minimum design levels at the crown of the road (m AHD) ⁽²⁾	
	Residential development	Industrial or commercial development
Waterway ^(A) or open channel	1% AEP flood level	2% AEP flood level
Overland flow flooding ^(B)	2% AEP flood level	2% AEP flood level

Notes—

(1) Where the site is subject to more than 1 type of flooding, the minimum flood planning level is the highest level determined from these sources. It should be noted that the flooding planning level in some older areas is often controlled by local ponding.

(2) Where flood levels are not available from Council's Floodwise Property Report, such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note ^(A) A waterway including any indicated on the planning scheme maps is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks typically with a catchment area greater than 30ha.

Note ^(B) 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. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

Note—A flood event with an AEP of 5% is the equivalent of a 20 year ARI flood event.

Table 9.4.9.3.E—Flood planning levels for essential community infrastructure

Type of essential community infrastructure	Minimum design levels
Emergency services	0.2% AEP flood
Emergency services, where for an emergency shelter	0.5% AEP flood
Emergency services, where for police facilities	0.5% AEP flood
Hospital and health care service, where associated with a hospital	0.2% AEP flood
Community facility where involving storage of valuable records or items of historic or cultural significance (e.g. galleries and libraries)	0.5% AEP flood
State-controlled roads Major or minor electricity infrastructure not otherwise listed in this table Utility installation where for rail transport services Air service Telecommunications facility	No specific recommended level but development proponents should ensure that the infrastructure is optimally located and designed to achieve suitable levels of service, having regard to the processes and policies of the administering government agency.
Power stations (as defined in the <i>Electricity Act 1994</i>) or renewable energy facility.	0.2% AEP flood
Major electricity infrastructure where a major switch yard	0.2% AEP flood
Substations	0.5% AEP flood
Utility installation where for a sewage treatment plant	DFE
Utility installation where for a water treatment plant	0.5% AEP flood

Note—A flood event with an AEP of 0.2% is the equivalent of a 500 year ARI flood event.

Note—A flood event with an AEP of 0.5% is the equivalent of a 200 year ARI flood event.

Table 9.4.9.3.F—Flood planning levels for reconfiguring a lot

Flooding type ⁽¹⁾	Minimum lot levels (m AHD) ⁽²⁾	
	Residential	Other than residential
Waterway ^(A) or open channel	1% AEP flood level + 300mm	1% AEP flood level
Overland flow flooding ^(B)	1% AEP flood level + 300mm	2% AEP flood level

Notes—

⁽¹⁾ Where the site is subject to more than one type of flooding, the minimum flood immunity level is the highest level determined from these sources.

⁽²⁾ Where flood levels are not available from Council's Floodwise Property Report such as overland flow flooding, the applicant will need to engage a suitably qualified Registered Professional Engineer Queensland with expertise in undertaking flood studies to estimate the relevant flood level.

Note ^(A) A waterway including any indicated on the planning scheme maps is defined as any element of a river, creek, stream, gully or drainage channel, including the bed and banks typically with a catchment area greater than 30ha.

Note ^(B) Overland flow flooding usually occurs when the capacity of the underground piped drainage system is exceeded or when the overland flow path is blocked. Localised overland flow paths generally traverse along roadways, and in the older established areas, through private properties within existing low points and gullies. A localised overland flow path is not characterised by well-defined bed and banks and the contributing catchment is generally less than 30ha.

Note—A flood event with an AEP of 1% is the equivalent of a 100 year ARI flood event.

Note—A flood event with an AEP of 2% is the equivalent of a 50 year ARI flood event.

9.4.3 Filling and excavation code

9.4.3.1 Application

1. This code applies to assessing:
 - a. accepted development subject to compliance with identified requirements, where acceptable outcomes of this code are identified requirements in a table of assessment for an overlay (section 5.10); or
 - b. operational work for filling or excavation which is assessable development if this code is an applicable code identified in the assessment benchmarks column of a table of assessment for operational work (section 5.8) or an overlay (section 5.10); or
 - c. a material change of use or reconfiguring a lot if:
 - i. assessable development where this code is identified as a prescribed secondary code in the assessment benchmarks column of a table of assessment for material change of use (section 5.5) or reconfiguring a lot (section 5.6); or
 - ii. impact assessable development, to the extent relevant.

Note—The following purpose, overall outcomes, performance outcomes and acceptable outcomes comprise the assessment benchmarks of this code.

Note—This code does not apply to building work as defined in the Act.

Note—A development application involving a rock anchor within an adjoining site is submitted with proof of consent from an adjoining land and building owner.

Editor's note—Guidance on managing the spread of invasive species in filling or excavation activities is provided in Minimising Pest Spread Advisory Guidelines prepared for the Petroleum industry.

Editor's note—Where filling or excavation is conducted on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register, the relevant Queensland Government department should be contacted for advice and guidelines.

2. When using this code, reference should be made to section 1.5 and section 5.3.3.

Note—Where this code includes performance outcomes or acceptable outcomes that relate to:

- air quality assessment, guidance is provided in the Air quality planning scheme policy;
- ecological assessment, koala habitat or development design, guidance is provided in the Biodiversity areas planning scheme policy;
- retaining wall construction, guidance is provided in the Infrastructure design planning scheme policy;
- landscape design, guidance is provided in the Landscape design planning scheme policy;
- noise and dust impacts during construction and/or demolition, guidance is provided in the Management plans planning scheme policy;
- noise impact assessment, guidance is provided in the Noise impact assessment planning scheme policy;
- the selection of planting species, guidance is provided in the Planting species planning scheme policy;
- significant vegetation, guidance is provided in the Vegetation planning scheme policy.

Editor's note—For a proposal to be accepted development, subject to compliance with identified requirements, it must meet all the identified acceptable outcomes of this code and any other applicable code. Where it does not meet all identified acceptable outcomes, the proposal becomes assessable development and a development application is required. Where a development application is triggered, only the specific acceptable outcome that the proposal fails to meet needs to be assessed against the corresponding acceptable outcome or performance outcome and relevant overall outcomes. Other identified acceptable outcomes that are met are not assessed as part of the development application.

9.4.3.2 Purpose

1. The purpose of the Filling and excavation code is to assess the suitability of development for filling or excavation.
2. The purpose of the code will be achieved through the following overall outcomes:
 - a. filling or excavation does not adversely affect the visual character and amenity of the site or the surrounding area and provides access for maintenance to any structure as a result of filling or excavation.
 - b. filling or excavation does not adversely impact significant vegetation, water quality or drainage of upstream, downstream and adjoining land.
 - c. filling or excavation effectively manages the impacts associated with the activity.
 - d. filling or excavation and any retaining structure is designed and constructed to be fit for purpose and to protect services and utilities.

9.4.3.3 Performance outcomes and acceptable outcomes

Table 9.4.3.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	AO1 Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: a. 2.5m in a zone in the Industry zones category; b. 1m in all other zones, or if adjoining a sensitive zone.	Acceptable Solution Cut/fill required exceeds 1m, however will not visually impact the character of the development site or surrounds
PO2 Development of a retaining wall proposed as a result of filling or excavation: a. is designed and constructed to be fit for purpose; b. does not impact adversely on significant vegetation; c. is capable of easy maintenance. Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with the Building Regulation.	AO2.1 Development of a retaining structure, including footings, surface drainage and subsoil drainage: a. is wholly contained within the site; b. if the total height to be retained is greater than 1m, then: i. the retaining wall at the property boundary is no greater than 1m above the ground level; ii. all further terracing from the 1m high	Acceptable Solution Proposed development includes retaining walls/structures.

Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	boundary retaining wall is 1 vertical unit:1 horizontal unit; iii. the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas. AO2.2 Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland. AO2.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary. AO2.4 Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.	Acceptable Solution. Fill required will be clean – free of construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	AO3 Development ensures that a rock anchor: - is constructed in accordance with the standards in the Infrastructure design planning scheme policy; - where it extends beyond the property boundary, is supported by a letter of consent from the	Acceptable Solution Rock anchors, where used, will be constructed in accordance with the Infrastructure design planning scheme policy, and where extending beyond the property boundary, will be supported by a letter of consent from the adjoining land and building owners.

	adjoining land and building owners.	
PO4 Development protects all services and public utilities.	AO4 Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	Acceptable Solution Design of service connections and crossings are designed with the protection of existing services and public utilities. No service relocation is proposed.
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	AO5 Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	Acceptable Solution Captured flow to be drained to underground council infrastructure – legal point of discharge.
PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.	AO6 Filling or excavation does not involve the construction of open drainage.	Acceptable Solution Proposed development does not include any open drainage.
PO7 Development for filling or excavation: a. does not degrade water quality or adversely affect environmental values in receiving waters; b. ensures site sediment and erosion control standards are best practice.	AO7.1 Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy. AO7.2 Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning	Acceptable Solution A comprehensive erosion and sediment control plan will be provided as part of the detailed design phase, complying with the stormwater drainage section of the Infrastructure design planning scheme policy.

	scheme policy.	
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	AO8.1 Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site. AO8.2 Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	Acceptable Solution Dust emissions will not extend past the site boundaries and will be ensured using dust suppression methods. Filling or excavation will only occur during the prescribed hours and days.
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	AO9 Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	Acceptable Solution Vibration levels are to be kept within the allowable levels of Table 9.4.4.3.B, Table 9.4.4.3.C, Table 9.4.4.3.D and Table 9.4.4.3.E.
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	AO10 Development ensures that heavy trucks hauling material to and from the site: a. occur for a maximum of 3 weeks; b. use a major road to access the site; c. only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	N/A Outside of design scope
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	AO11 Development does not involve: a. excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; b. filling with material containing a contaminant.	Acceptable Solution Development site has not been previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register.

PO12 Development provides for: a. landscaping for water conservation purposes; b. water sensitive urban design measures which are employed within the landscape design to maximise stormwater use; c. drainage and stormwater measures to reduce any adverse impacts on the landscape; d. stormwater harvesting to be maximised and any adverse impacts of stormwater minimised; e. reticulated irrigation to all artificial growing environments. Note—The Landscape design planning scheme policy provides guidance on information to be provided to demonstrate compliance with the performance outcome and acceptable outcomes.	AO12.1 Development provides drainage for artificial growing environments which is connected to the stormwater drain. AO12.2 Development ensures that the maximum site stormwater harvest capacity is utilised to meet the irrigation demand of the development before alternative irrigation sources are utilised and is in compliance with the standards in the Landscape design planning scheme policy. AO12.3 Development provides areas of pavement, turf, landscaping and mulched garden beds which are drained. Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections. AO12.4 Development provides a reticulated irrigation system to all landscaping areas in accordance with the Landscape design planning scheme policy.	Acceptable Solution. Development site landscaping and irrigation designed in accordance with the Landscape design planning scheme policy.
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	AO13 Development does not involve the creation of canals or artificial waterways.	Acceptable Solution Development does not include canals or artificial waterways.

Table 9.4.3.3.B— Recommended intermittent vibration levels for cosmetic damage

Type of building	Peak particle velocity (mm/s)
Reinforced or framed structures; industrial and heavy commercial buildings	50mm/s at 4Hz and above

Unreinforced or light-framed structures; residential or light-commercial type buildings	Below 4Hz	4Hz to 15Hz	15Hz and above
	0.6mm/s	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

Table 9.4.3.3.C— Recommended blasting vibration levels for human comfort

Type of building	Type of blasting operations	Peak component particle velocity (mm/s)
Residences, educational establishments and places of worship	Operation blasting longer than 12 months or more than 20 blasts	5mm/s for 95% blasts per year 10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Residences, educational establishments and places of worship	Operations lasting for less than 12 months or less than 20 blasts	10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Industry or commercial premises	All blasting	25 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that do not adversely affect the equipment operation.

Table 9.4.3.3.D— Recommended levels for continuous and impulsive vibration acceleration (m/s²) 1—80Hz for human comfort

Location	Assessment period ⁽¹⁾	Preferred values ⁽³⁾		Maximum values ⁽³⁾	
Continuous vibration		z-axis	x and y axes	z-axis	x and y axes

Critical areas ⁽²⁾	Day or night	0.005 m/s ²	0.0036 m/s ²	0.01 m/s ²	0.0072 m/s ²
Residences	Day	0.01 m/s ²	0.0071 m/s ²	0.02 m/s ²	0.014 m/s ²
-	Night	0.007 m/s ²	0.005 m/s ²	0.014 m/s ²	0.01 m/s ²
Offices, educational establishments and places of worship	Day or night	0.02 m/s ²	0.014 m/s ²	0.04 m/s ²	0.028 m/s ²
Workshops	Day or night	0.04 m/s ²	0.029 m/s ²	0.08 m/s ²	0.058 m/s ²
Impulsive vibration					
Critical areas	Day or night	0.005 m/s ²	0.0036 m/s ²	0.01 m/s ²	0.0072 m/s ²
Residences	Day	0.3 m/s ²	0.21 m/s ²	0.6 m/s ²	0.42 m/s ²
-	Night	0.1 m/s ²	0.071 m/s ²	0.2 m/s ²	0.14 m/s ²
Offices, educational establishments and places of worship	Day or night	0.64 m/s ²	0.46 m/s ²	1.28 m/s ²	0.92 m/s ²
Workshops	Day or night	0.64 m/s ²	0.46 m/s ²	1.28 m/s ²	0.92 m/s ²

Note—

(1) Day is 7am to 10pm and night is 10pm to 7am.

(2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(3) Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.

Table 9.4.3.3.E— Recommended vibration dose values for intermittent vibration (m/s^{1.75}) for human comfort

Location	Daytime ⁽¹⁾		Night time ⁽¹⁾	
	Preferred value	Maximum value	Preferred value ⁽³⁾	Maximum value ⁽³⁾

Critical areas ⁽²⁾	0.1 m/s ^{1.75}	0.2 m/s ^{1.75}	0.1 m/s ^{1.75}	0.2 m/s ^{1.75}
Residences	0.2 m/s ^{1.75}	0.4 m/s ^{1.75}	0.13 m/s ^{1.75}	0.26 m/s ^{1.75}
Offices, educational establishments and places of worship	0.4 m/s ^{1.75}	0.8 m/s ^{1.75}	0.4 m/s ^{1.75}	0.8 m/s ^{1.75}
Workshops	0.8 m/s ^{1.75}	1.6 m/s ^{1.75}	0.8 m/s ^{1.75}	1.6 m/s ^{1.75}

Note—

⁽¹⁾ Day is 7am to 10pm and night is 10pm to 7am.

⁽²⁾ Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

⁽³⁾ Situations exist where vibration above the preferred values can be acceptable, particularly for temporary or short-term events. Further guidance is given in the Noise impact assessment planning scheme policy.