BORNHORST + WARD
CONSULTING ENGINEERS
CIVIL AND STRUCTURAL

SITE BASED STORMWATER MANAGEMENT PLAN

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2020/1103

Date: 12 August 2021

Queensland
Government

FOR THE PROPOSED RESIDENTIAL DEVELOPMENT

LOCATED AT
490 BEAMS ROAD
FITZGIBBON QLD 4018

PREPARED FOR
BOB KELLY & CO PTY LTD ATF RJ & KO KELLY FAMILY TRUST

FEBRUARY 2020

Bornhorst & Ward Project No. **19045**

If you have any queries regarding this report please contact Jason Dang.

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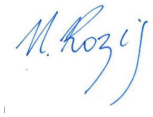
Nicholas Rozis (REPQ 7729): 

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1. INTRODUCTION

Bornhorst and Ward has been commissioned to investigate and report on the stormwater requirements pertaining to the proposed residential development located at 490 Beams Road, Fitzgibbon (Lot 4 on RP80282). The proposal consists of constructing 7 apartment blocks with associated basements and car parking. A small commercial area is also proposed near the north eastern corner of the site. 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. The engineering requirements for this proposal shall be in accordance with Engineering Best Management Practices, Brisbane City Council City Plan 2014, EDQ guidelines, 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. SITE CHARACTERISTICS

2.1 LOCATION AND EXISTING FEATURES

The development site, located at 490 Beams Road, Fitzgibbon has the following existing characteristics:

- The site is bound by Beams Road to the north, Golden Place and Golden Downs Relocatable Home Park to the east, and the Caboolture railway line to the south and west.
- The development site comprises of one lot with an area of approximately 3.557ha.
- The site is currently being used as a vehicle wrecking yard. Ancillary sheds are located near the north eastern corner of the site.
- Access to the site is currently achieved from Beams Road.
- No easements are currently located within the site.
- The closest downstream waterway is Cabbage Tree Creek, approximately 400m to the east of the site.

Refer to Figure 1 for locality details.

Figure 1: Site Locality Plan

2.2 PROPOSED DEVELOPMENT

The following points outline the extent of works for the proposed development:

- 7 separate residential apartment buildings are proposed within the site.
- Ground level and basement car parking will be provided.
- Site access will be achieved from Golden Place.
- A commercial use is proposed on ground level of Building A at the north eastern corner of the site.
- An 8202m^2 land resumption for the future Northern Busway Corridor has been allowed for in the design, along the western boundary.

Refer to the development drawings in Appendix A for further details of the proposed development.

2.3 TOPOGRAPHY AND CATCHMENT CHARACTERISTICS

The topography and catchment characteristics are as follows:

- The high point of the existing site is approximately RL 13.45m AHD located near the centre of the site.
- The site falls from the high point in all directions, towards Beams Road, Golden Place, the Golden Downs site, and the Caboolture railway line.
- The majority of the site is relatively flat, ranging from 0.5% to 1.2% grade.
- During minor and major storm events, runoff from the site discharges as overland flow over all property boundaries.
- An existing concrete swale drain and batter is located adjacent to the eastern property boundary, within the Golden Downs site and Golden Place road reserve. This swale drain conveys all runoff from a portion of the site to the intersection of Beams Road and Golden Place. Refer to images of this concrete swale drain within Appendix C.
- The road reserve of Beams Road conveys all runoff from a portion of the site also to the intersection of Beams Road and Golden Place.
- As the local crest is within the site, there are no external catchment flows which enter the site.
- Two existing internal catchments have been identified for the site, which will be relevant for the development. (Refer to drawing DA-C035 in Appendix B for the Existing Catchment Plan).
    - **Ex Catchment A (2.846ha)** – Runoff from this catchment currently either flows across the northern property boundary to Beams Road, across the eastern property boundary into Golden Place, or across the eastern property boundary into the Golden Downs site. All runoff from Ex Catchment A ultimately flows to the intersection of Beams Road and Golden Place, where it then continues down Beams Road to Cabbage Tree Creek approximately 400m to the east of the site.
    - **Ex Catchment B (0.711ha)** – Runoff from this catchment currently flows across the western property boundary, into the existing Caboolture Railway corridor. Ultimately, the railway corridor conveys this flow east to Cabbage Tree Creek.

The existing catchments will be modified to represent the developed scenario as follows. (Refer to drawing DA-C036 in Appendix B for the Developed Catchment Plan).

- **Dev Catchment A (2.737ha)** – It is proposed that runoff from this catchment is discharged to existing drainage infrastructure within Beams Road (via new infrastructure within Golden Place) as per existing conditions. A detention tank will be provided within the site to mitigate the increase in peak flows due to the increased impervious area of the development. Peak flow discharge from Dev Catchment A shall be less than Ex Catchment A.

  No runoff is proposed to discharge across the eastern property boundary into the Golden Downs site from Dev Catchment A. All runoff from Dev Catchment A will be conveyed to the intersection of Beams Road and Golden Place with no adverse effects to surrounding catchments.

- **Dev Catchment B (0.820ha)** – The area of this catchment has been determined from the Northern Busway resumption line. It is noted that the area of Catchment B will increase in the developed case by approximately 15%, which is expected to slightly increase peak flow runoff towards the existing railway. However, as this land is part of a resumption for the Northern Busway, it is expected that the future development will manage the additional catchment area and flows. The runoff from this catchment will generally remain as per existing conditions as overland sheet flow to the railway. Discharge will not be concentrated. The 15% increase in catchment area is not expected to cause adverse impacts to the operations of the railway. Refer to Section 4.1.7 below for further discussion.

Overall, the peak flow discharge from Dev Catchment A will be reduced to compensate for the minor increase in peak flow discharge from Dev Catchment B, as to not create an overall worsening to Cabbage Tree Creek.

See the survey plan in Appendix C for more information.

2.4 EXISTING FLOODING CONDITIONS AND FREEBOARD REQUIREMENTS

A BCC Floodwise Report has been obtained for the site and states the following:

- The report indicates that the site is subject to flooding from the creek/waterway. This derives from Cabbage Tree Creek to the east of the site.
- The site is within the BCC creek/waterway flood planning area 4 and 5.
- Upon review of the BCC Flood Awareness Mapping, an overland flow path has been identified along the eastern property boundary of the site.

Please refer to the Brisbane City Council's Floodwise Property Report in Appendix C and Figure 2 below for more details.

Figure 2: Brisbane City Council Interactive Flood Map

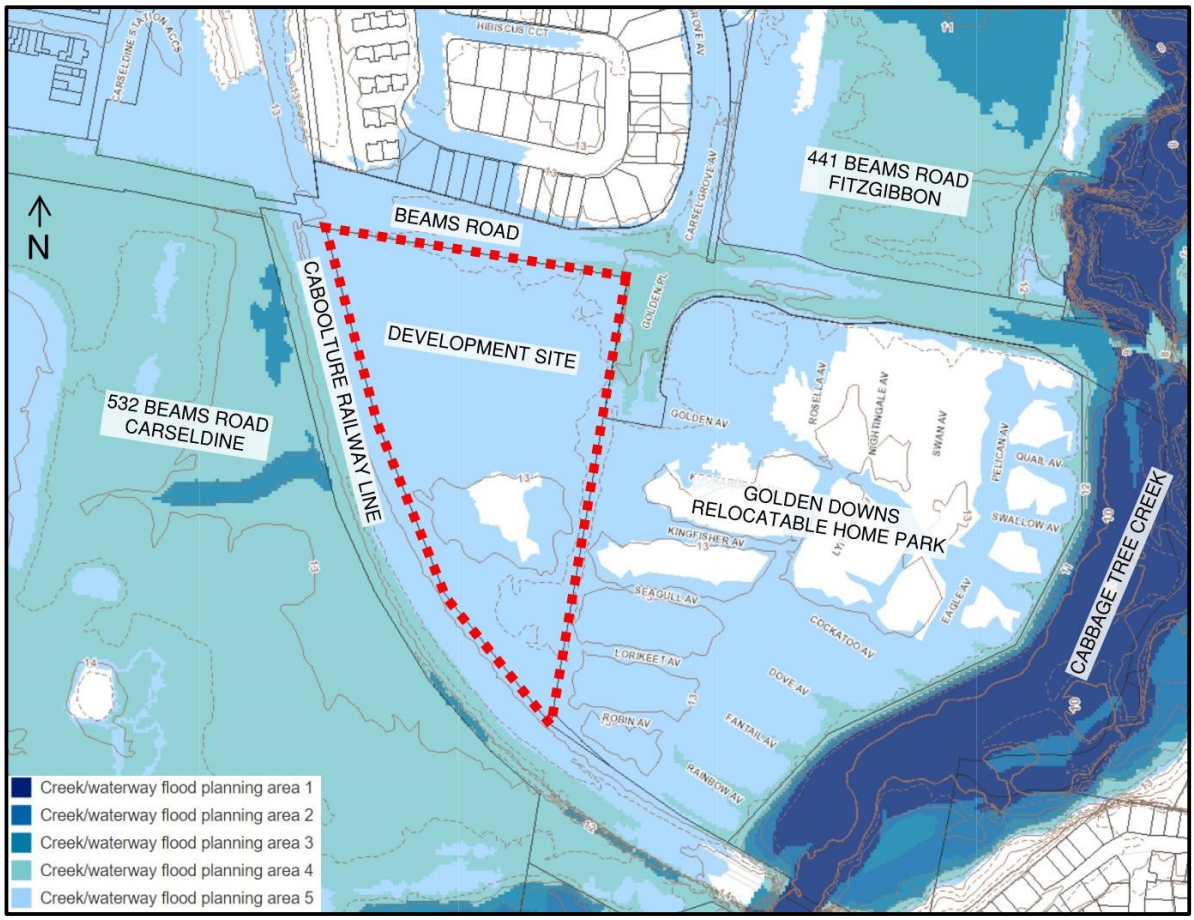

Figure 3: Brisbane City Council Flood Overlay Map

Design levels for the buildings must comply with the flood immunity standards specified by Brisbane City Council's City Plan 2014. The development will be assessed against the flood levels determined from our investigations. In accordance with the BCC City Plan 2014, the minimum flood freeboard requirements would therefore be in order of:

Table 1: Flood Freeboard Requirements (Multiple Dwelling Residential)

Development Area	Council Flood Freeboard Requirements (AHD)	Required Development Level (AHD)
Habitable Room	1% AEP (RL 12.8m) + 0.5m	13.3m
Non-habitable Room	1% AEP (RL 12.8m) + 0.3m	13.1m
Basement Entry	1% AEP (RL 12.8m) + 0.3m	13.1m
Unroofed car park & Vehicular manoeuvring area	1% AEP	12.8m
Essential Electrical Services	1% AEP (RL 12.8m) + 0.5m	13.3m

Table 2: Flood Freeboard Requirements (Commercial/Retail, Medical)

Development Area	Council Flood Freeboard Requirements (AHD)	Required Development Level (AHD)
Building Floor Level	1% AEP	12.8m
Essential Electrical Services	1% AEP (RL 12.8m) + 0.5m	13.3m

Table 8.2.11.3.C, Table 8.2.11.3.D and Table 8.2.11.3.L of the Brisbane City Council's Flood Overlay Code were used to determine recommended development levels. The flood immunity levels have been based on a BCA building classification of "2, 5 or 6" within Table 8.2.11.3D.

To achieve flood immunity for the development, all building floor levels shall comply with the levels stated in the tables above. All basements shall be adequately waterproofed and all air vents, air-conditioning ducts, pedestrian access and entry exit ramps, and basement entries shall comply with the levels in the tables stated above.

As the site is within the creek/waterway Flood Planning Area 4 and 5, no compensatory earthworks are triggered under the BCC Flood Overlay Code and Compensatory earthworks planning scheme policy. It is noted that no fill is proposed within the 1% AEP flood extent area of the BCC mapping.

Based on site inspection, the overland flow path identified along the eastern property boundary comprises of an existing concrete swale drain and batter. Refer to site images within Appendix C. This swale drain is located completely within the neighbouring Golden Downs site, and conveys runoff from a portion of Ex Catchment A of the subject development site to the intersection of Golden Place and Beams Road. As all stormwater runoff from Catchment A in the developed case will be conveyed to a detention tank, then to new stormwater infrastructure along Golden Place, there will be no catchment discharging to this overland flow path/concrete swale drain. Therefore, any risks associated with overland flows paths will be removed.

2.4.1 Beams Road Golf Driving Range Flood Impact Study

In addition to the findings of the BCC Flood Mapping and data, a review of the Beams Road Golf Driving Range Flood Impact Study completed by Cardno (11 March 2016) was also undertaken. The flood study was submitted to BCC under application A004447263. The flood study was completed to facilitate bulk earthworks within the site of 441 Beams Road Fitzgibbon, which is to the north east of the subject development site. The intent of the Flood Impact Study was to determine the extent of land that could be filled to above the Q100 year flood level, without causing unacceptable flood impacts elsewhere in the catchment. The works were within the BCC Flood Planning Areas 3, 4 and 5.

Figures 2, 8 and 16 within the Cardno Flood Impact Study report on the Q100 flood impacts for the area. These figures are attached in Appendix C of this report. It was found that:

- Figure 2 shows that the Q100 flood level at the intersection of Beams Road and Golden Place is between RL 12.00 to 12.20 mAHD.
- Figure 8 shows that the Q100 flood depth at the intersection of Beams Road and Golden Place is less than 0.25m.
- Figure 16 shows that the proposed works within the 441 Beams Road site will not cause any changes to the Q100 flood levels at the intersection of Beams Road and Golden Place.

Based on the detailed site survey, the levels within the development site are above RL12.20 mAHD, and therefore the site is not affected by the Q100 flood event modelled within the Cardno Flood Impact Study. Therefore, any fill placed within the site will not adversely affect the floodplain storage of the broader catchment. The site is proposed to be filled to greater than RL 12.80m AHD to achieve immunity as per the BCC requirements, therefore, will not be impacted by the Q100 flood event in the developed case.

Figure 4: Q100 Flood Levels (Beams Road Golf Driving Range Flood Impact Study, Cardno 2016)

2.4.2 Carseldine Urban Village Stormwater Management Plan

In addition to the findings above, a review of the Carseldine Urban Village Updated Stormwater Management Plan (SWMP) completed by DesignFlow (July 2019) was also undertaken. The SWMP was submitted to EDQ under application DEV2018/932. The SWMP was prepared for the proposed development at 532 Beams Road Carseldine, which is to the west of the subject development site and includes the creation of mixed lots for commercial and retail, residential, retirement living and sporting complex uses. The works were within the BCC Flood Planning Areas 3, 4 and 5.

Figures A3, A6 & A12 within the DesignFlow SWMP report on the Q100 flood impacts for the area. These figures are attached in Appendix C of this report. It was found that:

- Figure A3 shows the Q100 flood depths and contour levels for the surrounding area in the existing case. There are modelled flood depths of less than 0.25m within the subject development site, with flood levels ranging from RL 12.5 mAHD to RL 13.0 mAHD.
- Figure A6 shows the Q100 flood depths and contour levels for the surrounding area in the developed case. The flood depths and levels within the subject development site are reduced compared to the existing case, as a portion of the flows from the Carseldine Urban Village site is directed away from Beams Road, and discharge directly to Cabbage Tree Creek.
- Figure A12 shows the flood impacts to the surrounding area as a result of the Carseldine Urban Village development. It is seen that flood levels within the subject development site are reduced by up to 0.10m due to the Carseldine Urban Village development.

To address the flooding of the development, it is proposed to fill the site, with finished surface levels ranging between RL 12.80 mAHD and RL 14.0 mAHD. The development levels comply with the BCC Flood Overlay Code requirements, and are above the flood levels adjacent to the development site shown within the DesignFlow SWMP.

The proposed fill within the site is not expected to cause any notable adverse impacts, especially when compared to the overall floodplain storage of the regional catchment. The modelled flooding within the development site is very shallow (approx. 100mm in limited areas) when compared with the detailed site survey, and therefore very minimal flood storage will be lost.

As noted in the DesignFlow SWMP, the flooding indicated within the site serves as a flood conveyance (or overland flow) function as opposed to a flood storage function for the Cabbage Tree Creek floodwaters. The minimal loss in flood storage will therefore result in negligible adverse effects to surrounding areas within the flood model.

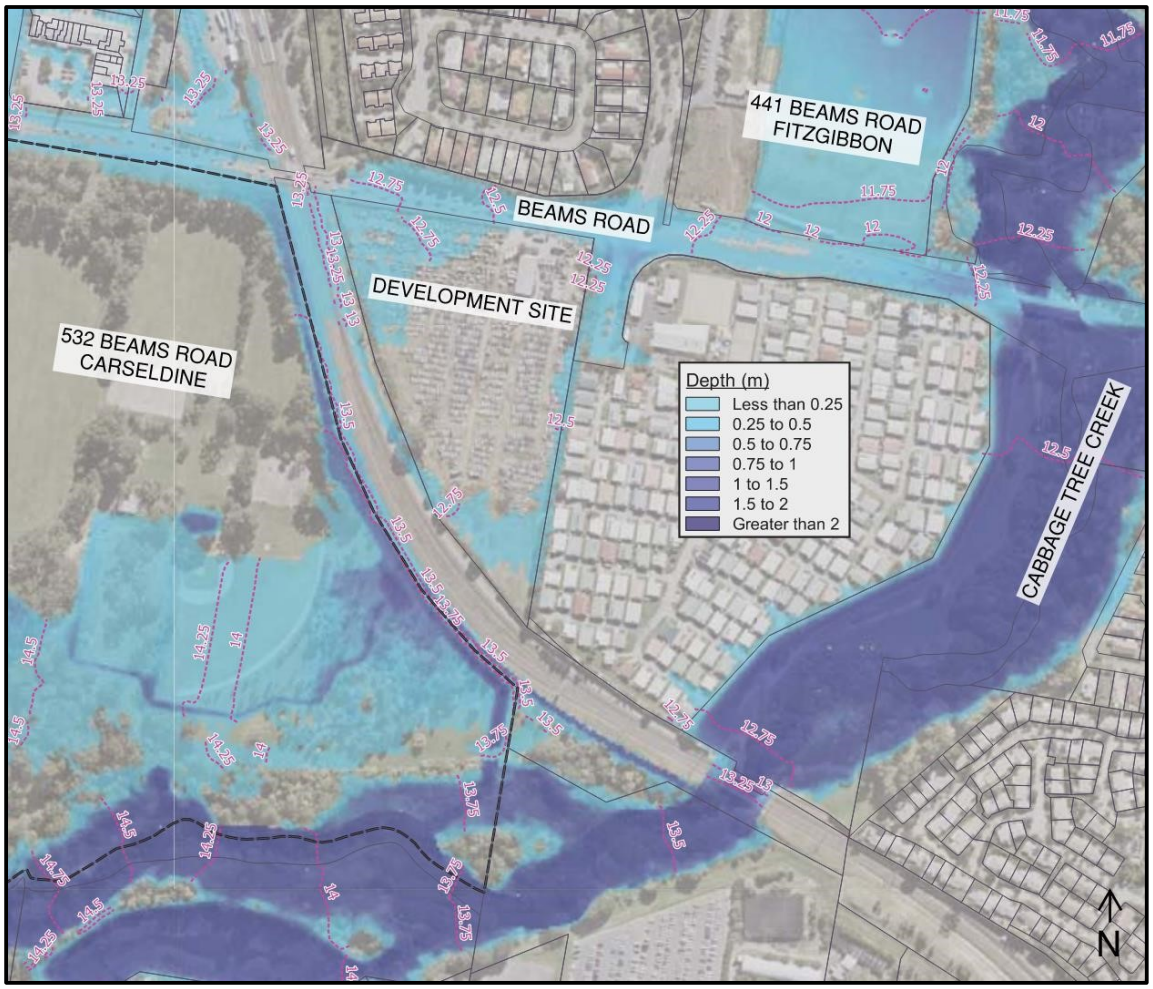

Figure 5: Q100 Proposed Flood Levels (Carseldine Urban Village SWMP, DesignFlow 2019)

3. EXISTING AND PROPOSED STORMWATER INFRASTRUCTURE

3.1 EXISTING INFRASTRUCTURE

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

- A gully pit is located near the north eastern corner of the site along Beams Road. This gully pit collects and conveys runoff via a 375mm dia. pipe to a manhole within the verge at the intersection of Beams Road and Golden Place.
- An approx. 1.0m wide concrete swale drain is located within the Golden Downs site and the Golden Place road reserve, against the eastern property boundary of the site. This concrete swale drain conveys runoff from Ex Catchment A of the site, to a headwall within the verge at the intersection of Beams Road and Golden Place. This headwall collects and conveys flows to the manhole within the verge mentioned above.
- From the manhole mentioned above, flows are conveyed east down Beams Road by a 900mm dia. pipe, which enlarges to 1050mm dia., then 1220mm dia., and ultimately discharges into Cabbage Tree Creek.
- A gully pit is located along Golden Place, near the intersection with Beams Road. This gully pit collects and conveys runoff via a 300mm dia. pipe, to the 1050mm dia. pipe along Beams Road.
- Runoff from the existing sheds on the site discharges to ground, and continues with the surrounding surface runoff within Ex Catchment A to Beams Road.

Council Asset Plans of the existing stormwater infrastructure can be found in Appendix C of this report.

3.2 PROPOSED STORMWATER DRAINAGE

The following points outline the proposed stormwater infrastructure for the development site:

- All runoff from Dev Catchment A of development site in minor and major storm events will be collected and conveyed to the underground stormwater detention tank, located beneath the entrance driveway of the site off Golden Place.
- The 920m^3 underground detention tank will mitigate the increases in peak flow due to the development, to the existing peak discharge rate from Ex Catchment A.
- A 750mm dia. pipe is proposed to be constructed from the detention tank outlet, to the existing 900mm dia. pipe near the intersection of Beams Road and Golden Place. A backflow prevention device is proposed within the 750mm dia. pipe within the site to prevent flood waters backing up into the drainage system of the site.
- The existing concrete swale drain within the Golden Place road reserve, along the eastern property boundary of the site is proposed to be demolished, and the verge regraded to BCC standards.
- A field inlet is proposed along the existing concrete swale drain (within the Golden Place Road reserve), to collect any flows from the section of swale drain that will remain within the Golden Downs site. Flows are expected to be minimal as the catchment of the remaining swale drain will only be itself. This field inlet will connect to new drainage infrastructure within Golden Place.
- Considering the development works area is greater than 2500m^2 stormwater quality treatment measures will be required for the site.

Refer to the Siteworks and Drainage Layout DA-C030 in Appendix B for further information.

4. STORMWATER QUANTITY ANALYSIS

4.1 DETAILED HYDRAULIC MODELLING – XP STORM

A detailed hydrologic and hydraulic analysis using XP Storm software has been undertaken to more accurately model the stormwater flow characteristics of the site.

XP Storm is a hydraulic modelling software tool that utilises detailed hydrograph flow analysis to provide an effective representation of urban stormwater systems. Hydrographs are calculated using the Laurenson Method for runoff routing in conjunction with the Uniform Loss model for determining catchment losses. XP Storm has been used to demonstrate acceptable detention sizing, and a non-worsening discharge to the downstream stormwater network of through comparison of the results obtained for existing and developed mitigated scenarios.

The modelling strategy will be as follows:

- Catchment A
  - In the Existing Scenario, the peak flow discharge from Ex Catchment A will be determined.
  - In the Developed Scenario, a detention tank will be included in the model to reduce peak flow discharge from Dev Catchment A, back to the peak flow discharge rate from Ex Catchment A.
  - The detention tank will be designed to over detain flows from Dev Catchment A, to offset the minor increase in flows from Catchment B. This is to ensure total discharge downstream to Cabbage Tree Creek remains non-worsening.
- Catchment B
  - In the Existing Scenario, the peak flow discharge from Ex Catchment B will be determined.
  - In the Developed Scenario, the peak flow discharge from Dev Catchment B will be determined. It is noted that there will be an increase in peak discharge to the railway corridor. However, it is not proposed to mitigate this increase within Catchment B as future works for the Northern Busway will accommodate for this catchment.
  - As mentioned above, runoff from Catchment A will be over detained to offset this minor increase in peak discharge from Catchment B.

4.1.1 Existing Scenario Model

Initially the existing XP Storm model was built using the catchment parameters outlined in Table 3. The initial and continuing loss properties were taken from the ARR Data Hub, and accepted based on recent experience with stormwater modelling in the subject area.

Ex Catchment A outlined below was modelled to the existing 900mm dia. pipe within Beams Road near the north eastern corner of the site. Ex Catchment B outlined below was modelled to the western property boundary.

Table 3: XP Storm Existing Model Parameters

Parameter	Ex Catchment A		Ex Catchment B	
	Pervious Data	Impervious Data	Pervious Data	Impervious Data
Area (ha)	2.188	0.658	0.711	0
Slope (%)	0.8%	0.8%	1%	-
Mannings 'n'	0.035	0.013	0.035	-
Initial Loss (mm)	13	0	13	0
Continuing Loss (mm/hr)	2.2	0	2.2	0
Laurenson 'n'	-0.285	-0.285	-0.285	-0.285

4.1.2 Results for Existing Scenario

Tables 4 and 5 indicate the existing total peak discharge rate as outputted by XP storm for Ex Catchment A and B respectively. The critical storm duration for the existing catchment was determined by simulating all storm events from the 1 to 100 year ARI storm events for 20, 25, 30, 45, 60, 90, 120 and 180 minute durations. The critical storm events can be seen within the tables below.

Table 4: XP Storm Existing Peak Flow Results – Ex Catchment A (m^3/sec)

Storm Duration (min)	ARI (Years)						
	1	2	5	10	20	50	100
20	0.248	0.280	0.397	0.452	0.559	0.658	0.751
25	0.248	0.337	0.480	0.575	0.679	0.764	0.870
30	0.218	0.311	0.444	0.533	0.630	0.726	0.828
45	0.180	0.245	0.385	0.454	0.571	0.722	0.866
60	0.228	0.338	0.492	0.573	0.712	0.850	0.977
90	0.209	0.306	0.463	0.556	0.686	0.790	0.931
120	0.178	0.264	0.411	0.479	0.599	0.709	0.836
180	0.175	0.275	0.452	0.504	0.629	0.710	0.825
Critical Flow	**0.248**	**0.338**	**0.492**	**0.575**	**0.712**	**0.850**	**0.977**
Critical Storm Duration	**20**	**60**	**60**	**25**	**60**	**60**	**60**

Table 5: XP Storm Existing Peak Flow Results – Ex Catchment B (m^3/sec)

Storm Duration (min)	ARI (Years)						
	1	2	5	10	20	50	100
20	0.036	0.045	0.094	0.111	0.157	0.194	0.225
25	0.036	0.059	0.104	0.135	0.163	0.215	0.247
30	0.037	0.069	0.113	0.143	0.173	0.222	0.254
45	0.052	0.084	0.132	0.155	0.193	0.239	0.281
60	0.059	0.098	0.151	0.178	0.222	0.270	0.310
90	0.061	0.094	0.146	0.175	0.215	0.247	0.285
120	0.056	0.088	0.141	0.163	0.199	0.226	0.260
180	0.052	0.082	0.133	0.147	0.177	0.195	0.223
Critical Flow	**0.061**	**0.098**	**0.151**	**0.178**	**0.222**	**0.270**	**0.310**
Critical Storm Duration	**90**	**60**	**60**	**60**	**60**	**60**	**60**

Discharge hydrographs for the existing model have been included in Appendix D.

4.1.3 Developed Scenario Model

A developed scenario model was then created with internal catchments and parameters modified from the existing model to suit the proposed development as outlined in Table 6.

Table 6: XP Storm Developed Model Parameters

Parameter	Dev Catchment A		Dev Catchment B	
	Pervious Data	Impervious Data	Pervious Data	Impervious Data
Area (ha)	0.741	1.996	0.820	0
Slope (%)	0.5%	0.5%	1%	-
Mannings 'n'	0.035	0.013	0.035	-
Initial Loss (mm)	13	0	13	0
Continuing Loss (mm/hr)	2.2	0	2.2	0
Laurenson 'n'	-0.285	-0.285	-0.285	-0.285

4.1.4 Detention Basin Design (Catchment A)

For the developed mitigated scenario, a storage node representing the proposed detention tank was included in the model. A detention tank is proposed beneath the main entry driveway from Golden Place. Flows Dev Catchment A were routed to the detention tank.

The detention tank was modelled as outlined in Table 7 below.

Table 7: XP Storm Detention Tank Parameters

Elevation (RL)	Depth(m)	Area (m^2)	Approximate Volume (m^3)
10.5m	0	460	0
12.5m	2.0	460	920

Outlets to the detention basin were modelled as below:

- Low-flow outlet: 0.25m x 0.52m rectangular orifice with invert at the base of the tank.
- High-flow outlet: 0.30m x 0.65m rectangular orifice with invert 0.95m above base of tank.
- Weir outlet: 3.0m long weir with crest 1.85m above base of tank.
- Tank outlet: 750mm dia. pipe.
- Emergency overflow: 3 x 900x600 field inlets within driveway.

See drawing DA-C031 in Appendix B for more information.

4.1.5 Results for Developed Scenario

Tables 8 and 9 indicate the developed total peak discharge rate as outputted by XP storm for Dev Catchment A and B respectively. To determine the critical storm event for the developed mitigated case, the 1 to 100 year ARI storm events for 20, 25, 30, 45, 60, 90, 120 and 180 minute durations were simulated in the model. The critical storm events can be seen within the tables below.

Table 8: XP Storm Developed Mitigated Peak Flow Results – Dev Catchment A (m^3/sec)

Storm Duration (min)	ARI (Years)						
	1	2	5	10	20	50	100
20	0.207	0.263	0.350	0.430	0.539	0.674	0.766
25	0.219	0.276	0.376	0.471	0.585	0.691	0.787
30	0.211	0.268	0.362	0.446	0.546	0.668	0.762
45	0.217	0.282	0.403	0.488	0.595	0.714	0.821
60	0.234	0.306	0.458	0.546	0.674	0.794	0.920
90	0.224	0.292	0.454	0.542	0.673	0.761	0.880
120	0.212	0.277	0.426	0.497	0.612	0.697	0.796
180	0.193	0.256	0.397	0.456	0.579	0.657	0.745
Critical Flow	**0.234**	**0.306**	**0.458**	**0.546**	**0.674**	**0.794**	**0.920**
Critical Storm Duration	**60**	**60**	**60**	**60**	**60**	**60**	**60**

Table 9: XP Storm Developed Mitigated Peak Flow Results – Dev Catchment B (m^3/sec)

Storm Duration (min)	ARI (Years)						
	1	2	5	10	20	50	100
20	0.040	0.050	0.103	0.123	0.174	0.215	0.250
25	0.040	0.066	0.116	0.150	0.182	0.242	0.278
30	0.041	0.076	0.126	0.160	0.193	0.250	0.287
45	0.058	0.095	0.149	0.175	0.218	0.271	0.319
60	0.066	0.110	0.169	0.200	0.251	0.306	0.350
90	0.069	0.106	0.164	0.197	0.243	0.280	0.324
120	0.063	0.099	0.158	0.183	0.225	0.256	0.296
180	0.059	0.092	0.150	0.166	0.202	0.222	0.255
Critical Flow	**0.069**	**0.110**	**0.169**	**0.200**	**0.251**	**0.306**	**0.350**
Critical Storm Duration	**90**	**60**	**60**	**60**	**60**	**60**	**60**

Table 10 indicates the maximum depth of stormwater within the detention tank for each respective storm event.

Table 10: Detention Tank Staging – Catchment A

ARI (Years)	Elevation (RL)	Depth (m)	Approximate Volume (m^3)
1	11.205	0.705	324
2	11.469	0.969	446
5	11.679	1.179	542
10	11.796	1.296	596
20	11.996	1.496	688
50	12.237	1.737	799
100	12.424	1.924	885

Further details of the outputs for the critical events have been located within Appendix D.

4.1.6 Hydraulic Impacts on Downstream Waterway Corridor

A comparison of critical peak flows for the existing and developed mitigated scenarios has been included in Tables 11 and 12.

Discharge hydrographs, stage/water elevations for the detention basin and associated XP Storm outputs have been included in Appendix D of this report to demonstrate the performance of the proposed detention system.

Table 11: XP Storm Existing and Developed Mitigated Peak Discharge Comparison – Catchment A (m^3/sec)

ARI (Years)	Existing Critical Discharge	Developed Critical Discharge	Discharge Difference
1	0.248	0.234	**-0.014**
2	0.338	0.306	**-0.032**
5	0.492	0.458	**-0.034**
10	0.575	0.546	**-0.029**
20	0.712	0.674	**-0.038**
50	0.850	0.794	**-0.056**
100	0.977	0.920	**-0.057**

Table 12: XP Storm Existing and Developed Mitigated Peak Discharge Comparison – Catchment B (m^3/sec)

ARI (Years)	Existing Critical Discharge	Developed Critical Discharge	Discharge Difference
1	0.061	0.069	**+0.008**
2	0.098	0.110	**+0.012**
5	0.151	0.169	**+0.018**
10	0.178	0.200	**+0.022**
20	0.222	0.251	**+0.029**
50	0.270	0.306	**+0.036**
100	0.310	0.350	**+0.040**

4.1.7 Discussion of Results

Catchment A

The hydraulic modelling undertaken has demonstrated that the proposed development will not cause a worsening impact downstream of the site in the Q1-Q100 storm events.

Adequate detention volume (920m^3) has been provided for Dev Catchment A to reduce the developed peak discharge rate back to that of Ex Catchment A. Therefore, the peak flow discharge from the site to Beams Road is non-worsening. The existing underground drainage network, and overland flow within Beams road reserve will continue to function as per existing conditions.

It is noted that a 750mm dia. outlet pipe is proposed from the detention tank to the 900mm dia. pipe within Beams Road. The only other pipe that feeds into this 900mm dia. pipe is a 375mm dia. pipe from a gully pit near the intersection of Beams Road and Golden Place. Combined, the proposed 750mm dia. and 375mm dia. pipe capacities are less than the downstream 900mm dia. pipe capacity. Therefore, is reasonably be expected that the 900mm dia. pipe was constructed to cater for the site and surrounding catchments.

Catchment B

The hydraulic modelling has demonstrated that there will be an increase in the peak flow discharge from Catchment B of the site to the Caboolture Railway corridor of approximately 13%. This is due to the land resumption for the future Northern Busway being larger than the existing catchment that discharges to the Caboolture Railway corridor. It is expected that the future Northern Busway works will account for this minor increase in the peak flow, and provide mitigation with future development works. In the interim, runoff from this catchment will continue to discharge into the railway corridor as sheet flow, which is as per existing conditions. Therefore, there will not be a concentration of flows or any perceivable nuisance flow created.

It is considered a poor outcome if a detention basin is constructed within this land resumption to mitigate this minor increase in peak flows. It would be a burden on Queensland Rail to maintain the detention basin. It is also considered a poor outcome if runoff from this land resumption needs to be collected and brought back into the development site for quantity mitigation, as there would be considerable easements passing through the development site. Therefore, it is proposed that the minor increase in peak discharge to the railway corridor is accepted. It is not expected that there will be adverse impacts due to this increase.

Overall

As discussed within section 4.1 of this report, the detention tank within the site has over detained flows from Dev Catchment A to account for the minor increase in flows from Catchment B. This is to ensure that flows which ultimately end up at Cabbage Tree Creek, are non-worsening compared to existing conditions. As seen by comparing Tables 11 and 12 in Section 4.1.6 above, there is a net decrease in peak flow discharge from the site to surrounding infrastructure for all storm events. Therefore, there will be a non-worsening impact to Cabbage Tree Creek and the broader catchment.

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 Council Planning Scheme. Refer to the Erosion Hazard Assessment form in Appendix F 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 BCC City Plan 2014:

a) *A material change of use for an urban purposes which involves greater than 2,500m^2 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 2,500m^2 of land and will result in 6 or more lots;*
c) *Operational works for an urban purpose which involves disturbing greater than 2,500m^2 of land.*

As the proposed development is for a material change of use that involves greater than 2,500m^2 of land, the State Planning Policy 2017 and BCC City Plan 2014 requirements for water quality are applicable to the proposed development.

5.2.1 Pollutants of Concern

The key pollutants to be targeted and the minimum reductions in mean annual loads described in the State Planning Policy for the South East Queensland Region area outlined in Table 13.

Table 13: South East Queensland Water Quality Objectives

Pollutant	Reduction in Mean Annual Load
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (GP)	90%

5.2.2 Modelling/Assessment Approach

A quantitative assessment of stormwater runoff quality was considered for the catchments ultimate developed scenario.

The predicted reductions in mean annual loads of key pollutants have been identified using the “Model for Urban Stormwater Improvement Conceptualisation” (MUSIC), Version 6 (6.3.0). MUSIC is a stormwater quality modelling program that provides estimates of stormwater pollution generation and the performance of stormwater management measures used in series or parallel to form a ‘treatment train’.

5.2.3 Meteorological Data

The first step in creating the MUSIC model was to select the appropriate meteorological data set (period and time step) to be used as the basis for the runoff algorithms. Section 3.1 – Meteorological Data and Section 3.2 – Modelling Period and time-step, of the MUSIC Modelling Guidelines details the Rainfall Data and Time Step process requirements of the model, respectively. The time step used for the MUSIC modelling process was: Brisbane East 6 Minutes.

5.2.4 Source Nodes

The second step taken in creating the MUSIC models was to define 'Source Nodes' or Sub-Catchments. Source nodes for modelling these catchments were based on the Water by Design reference material: Music Modelling Guidelines. The MUSIC model uses the split catchment approach and consists of residential source nodes. Catchment areas are outlined below.

It is noted that stormwater quality treatment is only provided for Dev Catchment A of the development. Dev Catchment B is proposed to discharge unmitigated to the Caboolture Railway corridor, as there is no proposed development within this catchment. Future works for the Northern Busway will provide stormwater quality treatment for this catchment. Dev Catchment B will be returned to a grassed surface, which is an improvement compared to existing conditions in the interim.

Table 14: Source Node Information

Node type	Area (ha)	Fraction Impervious
Residential Road	0.561	100%
Residential Roof	1.016	100%
Residential Ground	1.160	36%

The input parameters used are listed in Appendix E.

5.2.5 Treatment Nodes

The MUSIC model consisted of 2 treatment nodes as detailed in Table 15. Treatment node input parameters were sourced from the product supplier. Refer to DA-C030 in Appendix B for further information.

Table 15: Selected Stormwater Quality Treatment Devices

Treatment Device	Discussion
Gross Pollutant Traps **Ocean Protect** **OceanGuard**	A gross pollutant trap is a treatment device designed to capture coarse sediment, trash and vegetation matter in stormwater runoff. Ocean Protect OceanGuards are proposed within all major field inlets within the site. A minimum of **22 OceanGuards** are required.
Tertiary Treatment Device **Ocean Protect PSorb StormFilter**	The Ocean Protect PSorb Stormfilter is an underground treatment device comprised of media-filled cartridges designed to remove nutrients and sediments from stormwater runoff. **26 x 690mm PSorb Stormfilter cartridges** are proposed within an offline tank near the end of line.

Refer to the MUSIC information attached in Appendix E for further details.

5.2.6 Proposed Treatment Train

A 'Treatment Train' was developed to target each of the pollutants of concern to be incorporated into the development site layout. This treatment train is illustrated in Figure 6.

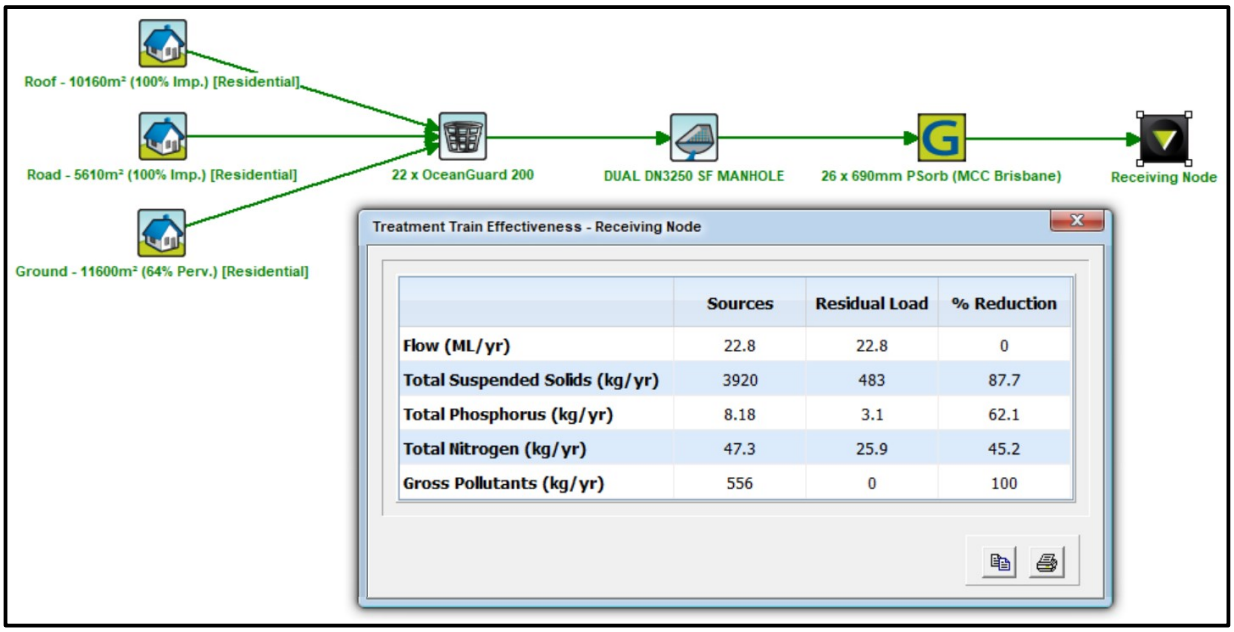

Figure 6: Proposed Treatment Train

5.2.7 Results

The pollutant reductions for the ultimate developed phase of the site, with the inclusion of the detailed treatment train, as obtained from the MUSIC model and analysis are summarised in Table 16.

Table 16: Pollutant Removal Rates Discharge

Pollutant	TSS (%)	TP (%)	TN (%)	GP (%)
Treatment Train Effectiveness	87.7	62.1	45.2	100
WQOs	80.0	60.0	45.0	90.0

As indicated in the table above, the removal rates for the target pollutants; total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN) and gross pollutants (GP) are all above the water quality objectives stipulated in the State Planning Policy. Therefore, the proposed treatment train for these areas will yield satisfactory pollutant removal.

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: -

- Flood overlay code
- Infrastructure design code
- Stormwater code

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

7. SUMMARY

This Engineering Report has demonstrated that the proposed development located at 490 Beams Road Fitzgibbon, 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 development site has flood flags in the form of creek/waterway flooding and an overland flow path. The development levels meet the required flood planning levels to achieve flood immunity.
- It is proposed that stormwater is discharged to the existing 900mm dia. pipe at the intersection of Beams Road and Golden Place.
- There will be an increase in peak stormwater runoff as a result of the development, therefore a detention tank is proposed beneath the entrance driveway near Golden Place.
- During construction the development is considered as medium risk with regards to the pollutants generated onsite. A detailed Erosion Sediment Plan will be submitted during the detailed design phase.
- Stormwater runoff is to be treated via a proprietary stormwater system before being discharged from the site.

APPENDIX A

DEVELOPMENT DRAWINGS

Bornhorst + Ward Pty Ltd
Level 4, 67 Astor Terrace, Spring Hill, Qld 4000
Ph. (07) 3013 4699 / mail@bornhorstward.com.au
A.B.N. 78 010 151 354

SITE STATISTICS

ORIGINAL TITLE AREA	35572m²
LESS BUSWAY RESUMPTION	8202m²
EQUALS USABLE SITE AREA	27370m²
SITE COVER	37.7% (10333m²)
LANDSCAPING (20% minimum) (WITH A MINIMUM OF 5% (1368m²) DEDICATED TO DEEP PLANTING)	6698m² (24.4%)
COMMUNAL RECREATION	1956m² (7.1%)
PRIVATE OPEN SPACE	31.5% (8646m²)
GFA	132% (47174m²)

APARTMENT SCHEDULE

STAGE	BUILDING	1 BED	2 BED	3 BED	TOTAL
1	A	16	20	12	48
2	B	28	35	21	84
3	C	28	35	21	84
4	D	28	35	21	84
5	E	28	35	21	84
6	F	28	35	21	84
7	G	28	35	21	84
TOTAL		184	230	138	552
		33%	42%	25%	

CARPARKING

STAGE	BUILDING	TOTAL APARTMENTS	RESIDENT PARKS	VISITOR PARKS	COMMERCIAL PARKS	BICYCLE SPACES
1	A	48	96	59	26	65
2	B	84	128	15		105
3	C	84	128	4		105
4	D	84	127	7		105
5	E	84	128	9		105
6	F	84	128	4		105
7	G	84	128	2		105
TOTAL	7 BUILDINGS	552	864	100	26	695

STAGE STATISTICS

STAGE	STAGE AREA	SITE COVER	GFA	PRIVATE OPEN SPACE
1	9441m²	14.8% (1399m²)	57.4% (5426m²)	9.2% (876m²)
2	2858m²	58.1% (1489m²)	243% (6958m²)	45.3% (1295m²)
3	3092m²	48.1% (1489m²)	225% (6958m²)	41.8% (1295m²)
4	3091m²	48.1% (1489m²)	225% (6958m²)	41.8% (1295m²)
5	2191m²	67.9% (1489m²)	317% (6958m²)	59.1% (1295m²)
6	4021m²	37.0% (1489m²)	173% (6958m²)	32.2% (1295m²)
7	2662m²	55.9% (1489m²)	261% (6958m²)	48.6% (1295m²)
TOTAL				

ISSUE	DATE	DESCRIPTION	INITIAL
H		DRAFT REVISION	MP
G	28.01.2020	REVISION	MP
F	29.11.2019	REVISION	MP
E	22.11.2019	REVISION	MP
D	09.09.2019	REVISION	CM
C	10.04.2018	REVISION	CM
B	03.08.2018	REVISION HEIGHTS	MW
A	23.10.2017	PRELIMINARY ISSUE	MW

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A.B.N. 97 093 389 658
wiltshirestevens.com.au

CLIENT

BOB KELLY & CO PTY LTD ATF RJ & KO KELLY FAMILY TRUST

PROJECT

PROPOSED RESIDENTIAL DEVELOPMENT

490 BEAMS ROAD FITZGIBBON

TITLE

SITE PLAN

DATE OCTOBER 2017

SCALE 1:500@ A1 1:1000 @ A3

JOB NO - DRAWN MW

DRAWING NO SK-02 H

WILTSHIRE STEVENS ARCHITECTS PTY LTD
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APPENDIX B

ENGINEERING DRAWINGS

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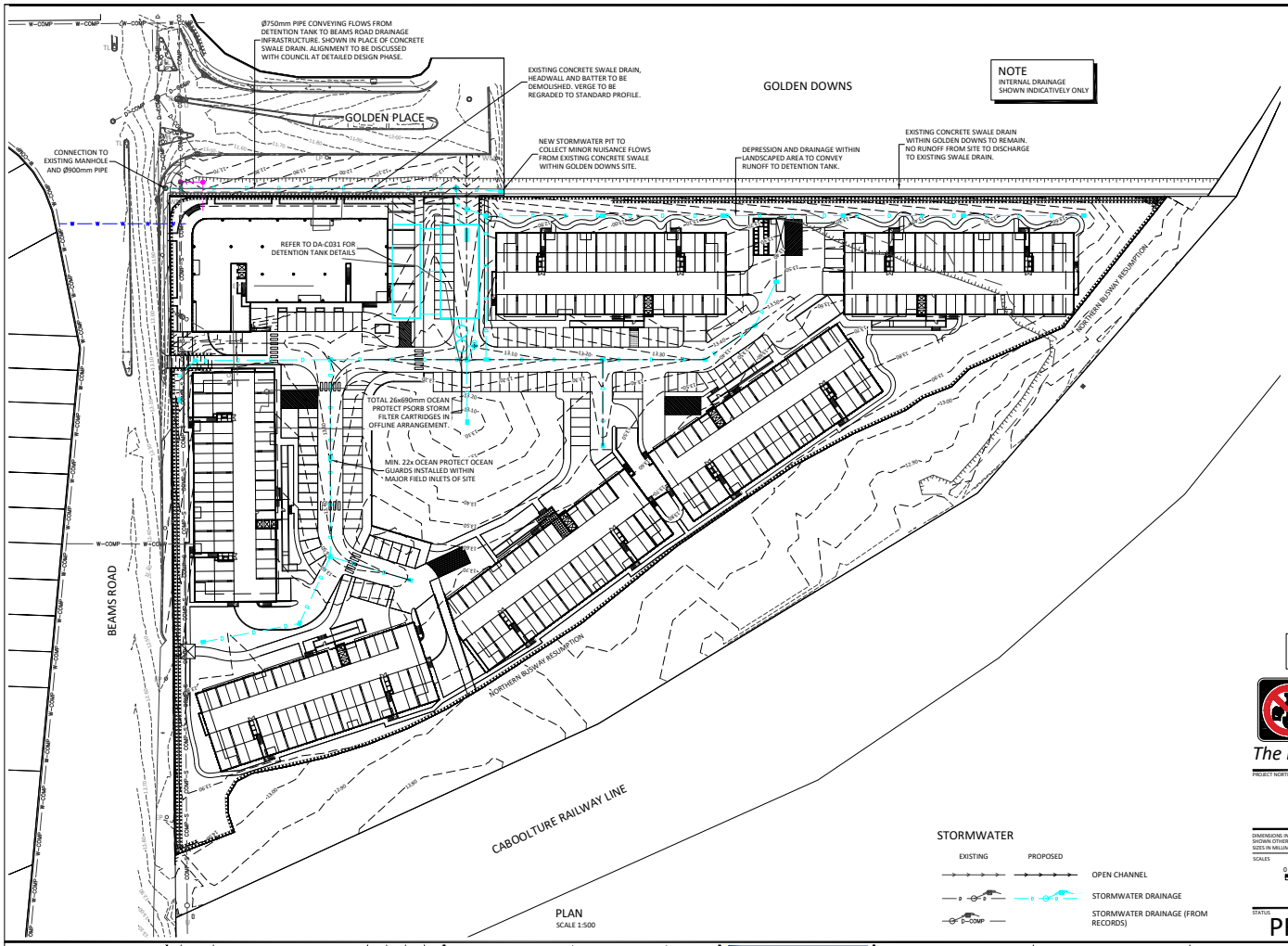

PLAN
SCALE 1:500

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PROJECT NORTH

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A3 REDUCED
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PROJECT
490 BEAMS ROAD FITZGIBBON

SUBJECT
SITEWORKS AND DRAINAGE LAYOUT

PROJECT No.
19045

DRAWING No.
DA-C030

REVISION
B

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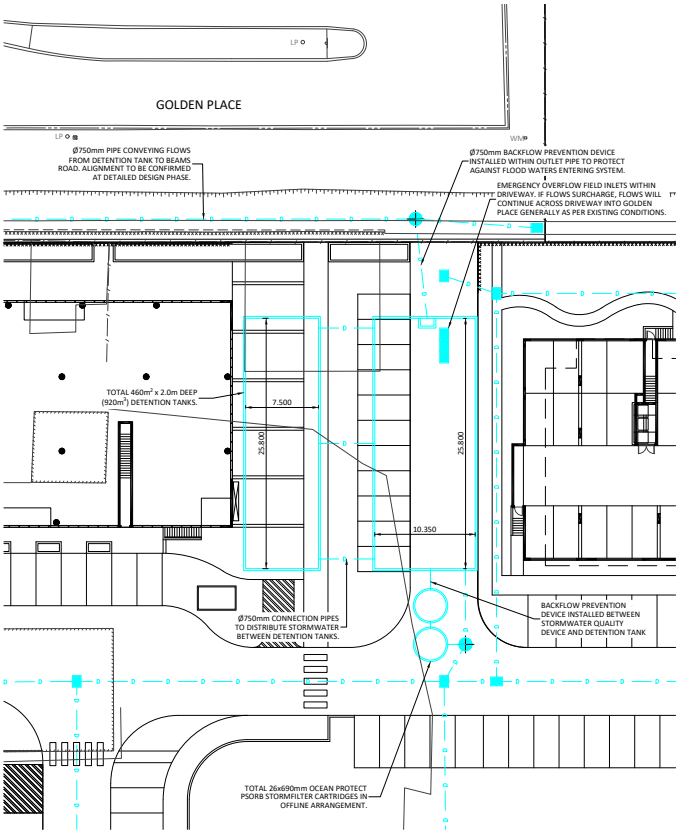

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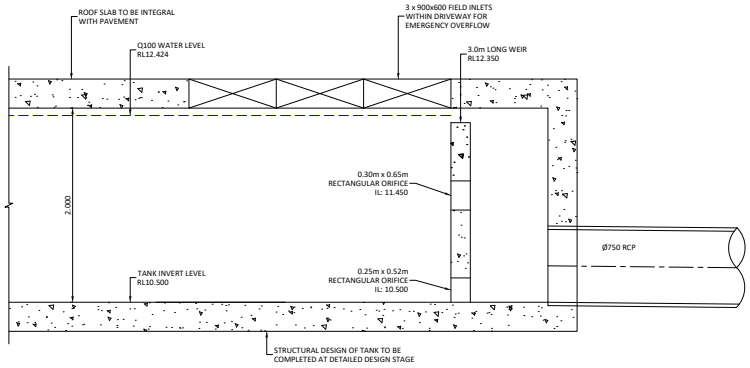
NOTE
INTERNAL DRAINAGE SHOWN INDICATIVELY ONLY



DETENTION TANK OUTLET DETAILS
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SCALES — UNREDUCED / REDUCED

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0 0.2 0.4 0.6 0.8 1 m — 1 : 20 / 1 : 40

STATUS

PRELIMINARY

STORMWATER

EXISTING PROPOSED

OPEN CHANNEL

STORMWATER DRAINAGE

STORMWATER DRAINAGE (FROM RECORDS)

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SUBJECT: DETENTION TANK PLAN

PROJECT No. 19045

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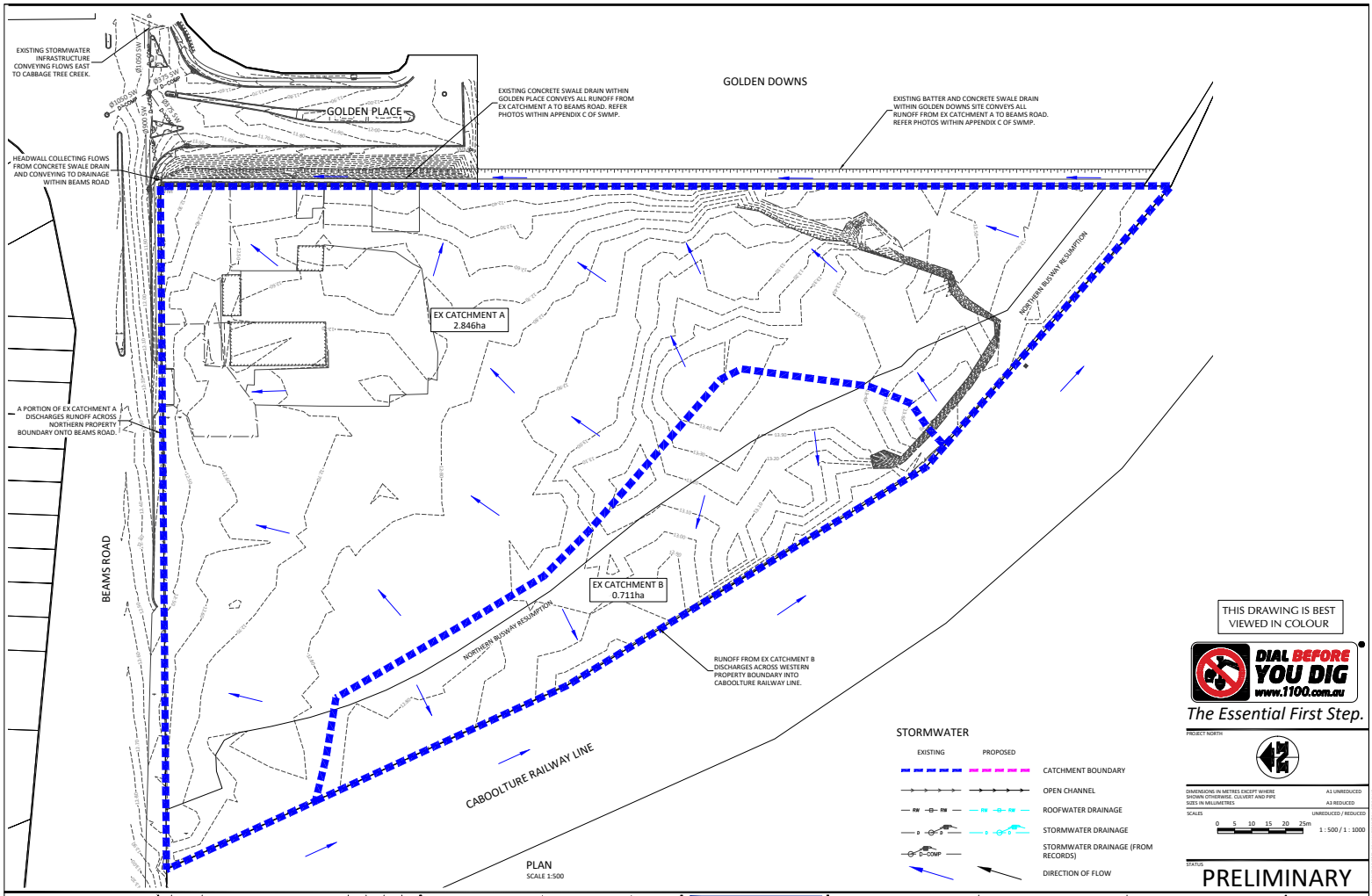

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PROJECT
490 BEAMS ROAD FITZGIBBON

SUBJECT
EXISTING CATCHMENT PLAN

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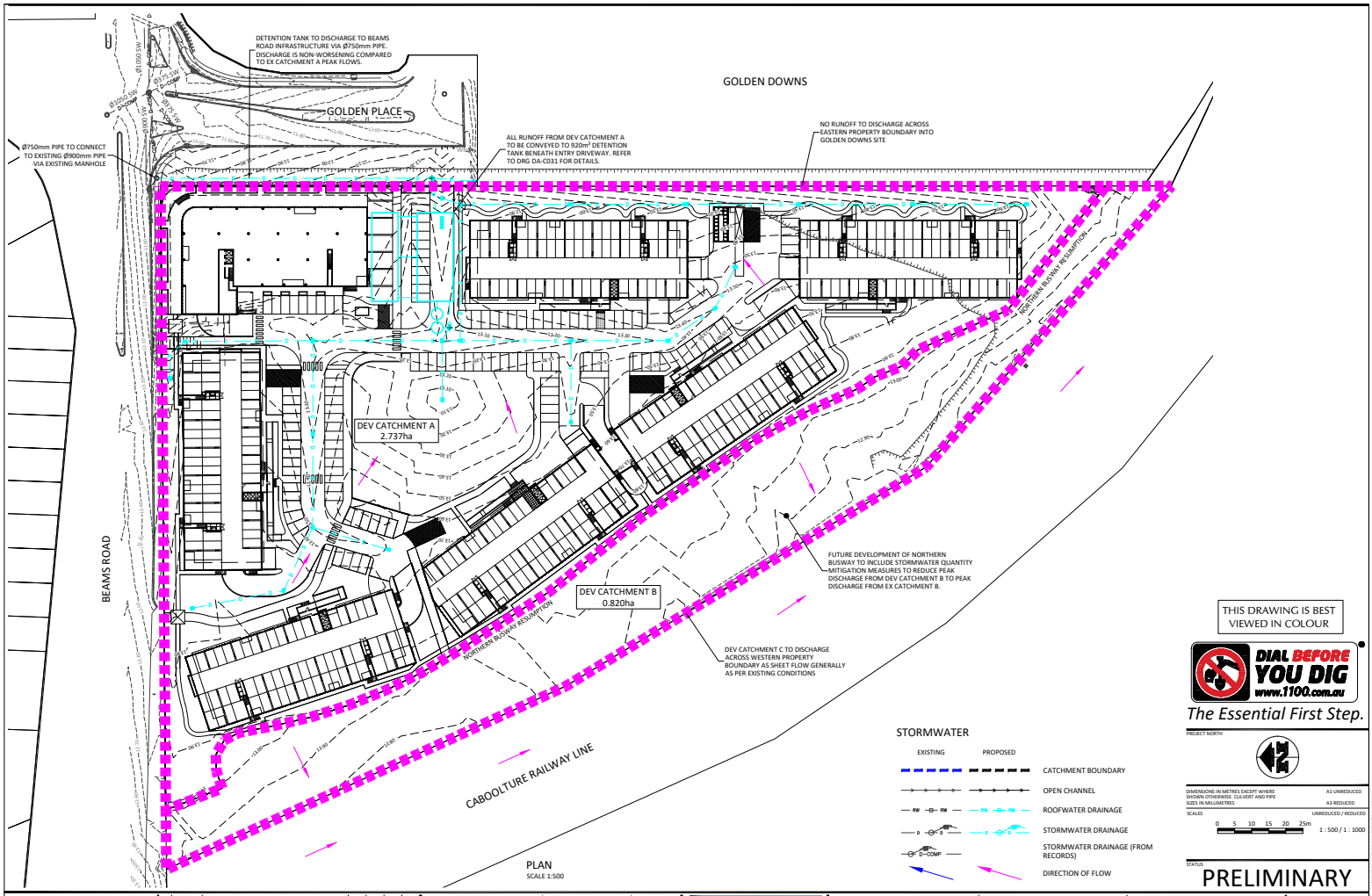

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SUBJECT: DEVELOPED CATCHMENT PLAN

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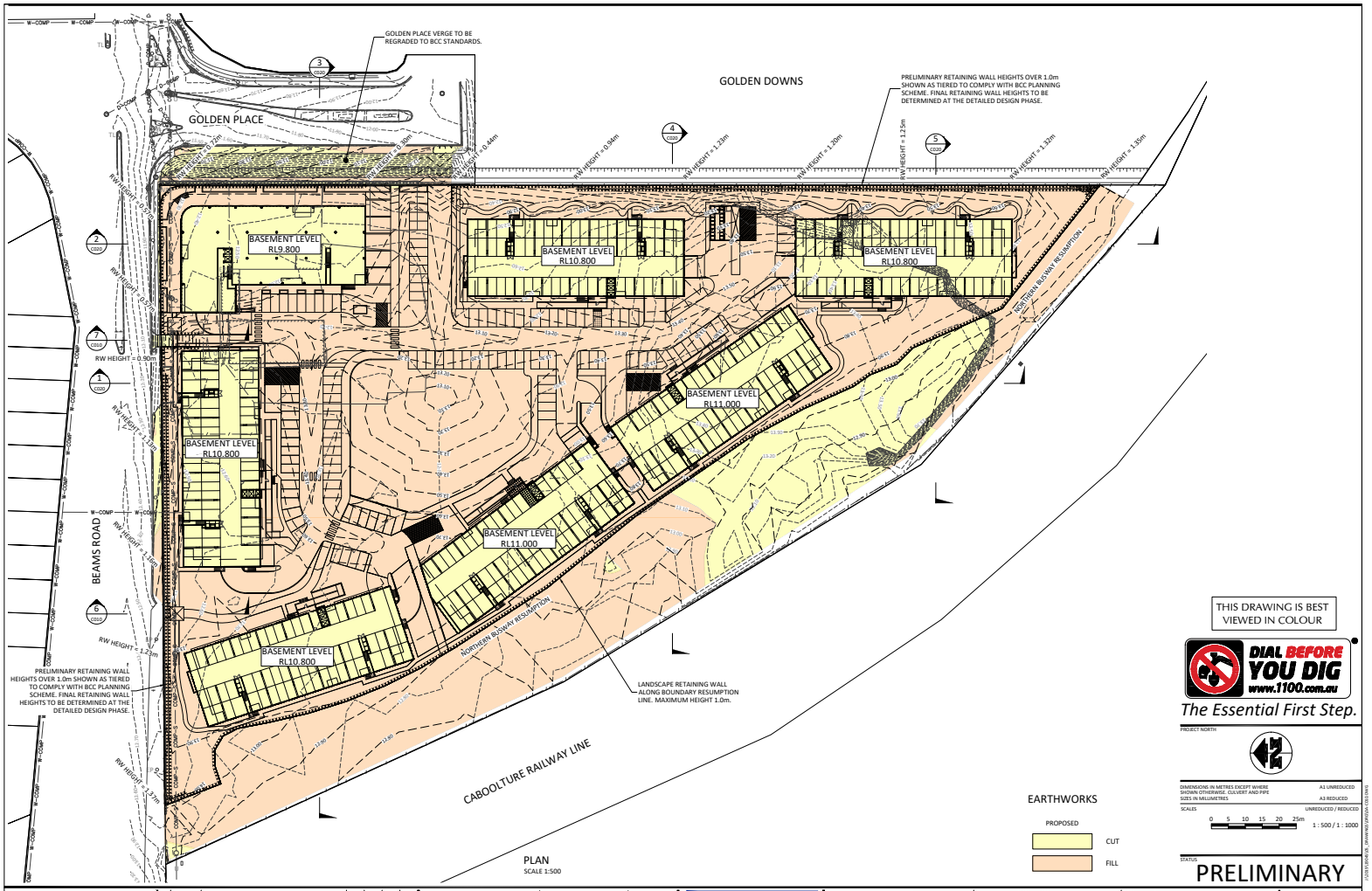

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PROJECT: 490 BEAMS ROAD FITZGIBBON

SUBJECT: EARTHWORKS LAYOUT

PROJECT No. 19045

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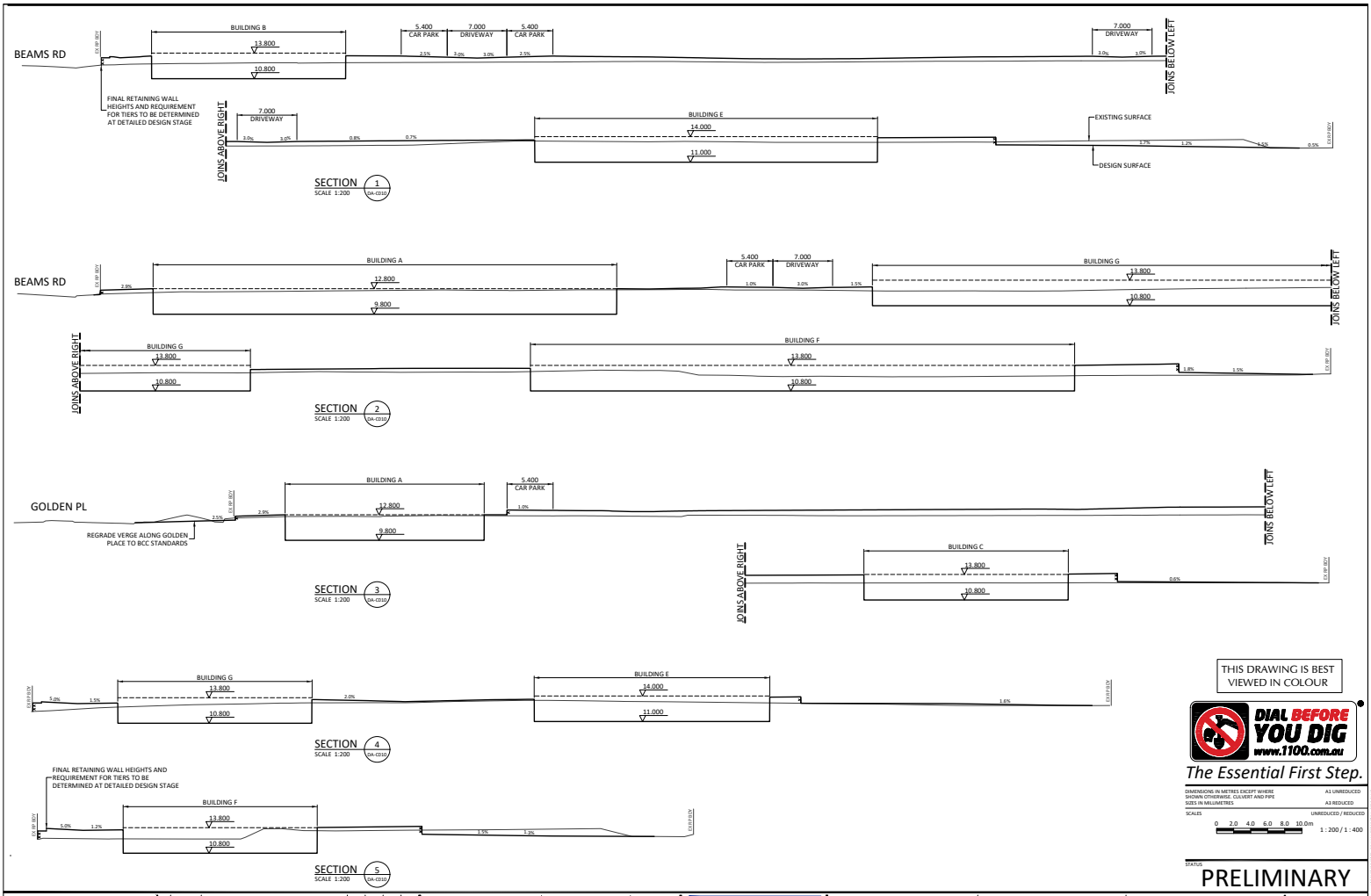

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A1 UNREDUCED
A3 REDUCED

SCALES — UNREDUCED / REDUCED

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1 : 200 / 1 : 400

STATUS

PRELIMINARY

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CLIENT
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PROJECT
490 BEAMS ROAD
FITZGIBBON

SUBJECT
EARTHWORKS SECTIONS
SHEET 1

PROJECT No. 19045

DRAWING No. DA-C020

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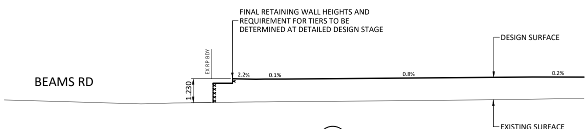
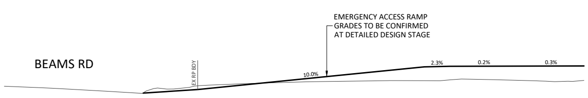


SECTION 6 (DA-C010)
SCALE 1:100



SECTION 7 (DA-C010)
SCALE 1:100

THIS DRAWING IS BEST VIEWED IN COLOUR

DIAL BEFORE YOU DIG
www.1100.com.au
The Essential First Step.

DIMENSIONS IN METRES EXCEPT WHERE SHOWN OTHERWISE. CULVERT AND PIPE SIZES IN MILLIMETRES — A1 UNREDUCED / A3 REDUCED

SCALES — UNREDUCED / REDUCED
0 1.0 2.0 3.0 4.0 5.0m — 1 : 100 / 1 : 200

STATUS
PRELIMINARY

SCAN QR CODE TO CONFIRM CURRENT DRAWING REVISION
http://docs.bornhorstward.com.au/revision/

REV	DATE	DESCRIPTION	DWN	DES	CHK	APP
A	19.02.20	ISSUE FOR DA APPROVAL	JD	JD	AL	

ASSOCIATED CONSULTANTS

APPROVED — DATE
CHECKED — DATE

BORNHORST + WARD
CONSULTING ENGINEERS
CIVIL AND STRUCTURAL
P. +61 (7) 3013 4699 | www.bornhorstward.com.au

CLIENT
BOB KELLY & CO PTY LTD ATF RJ & KO KELLY FAMILY TRUST

PROJECT
490 BEAMS ROAD FITZGIBBON

SUBJECT
EARTHWORKS SECTIONS SHEET 2

PROJECT No. 19045
DRAWING No. DA-C021
REVISION A

ORIGINAL SIZE A1

J:\2019\19045\05_DRAWINGS\DRG\DA-C020.DWG
21/02/2020 9:59:50 AM

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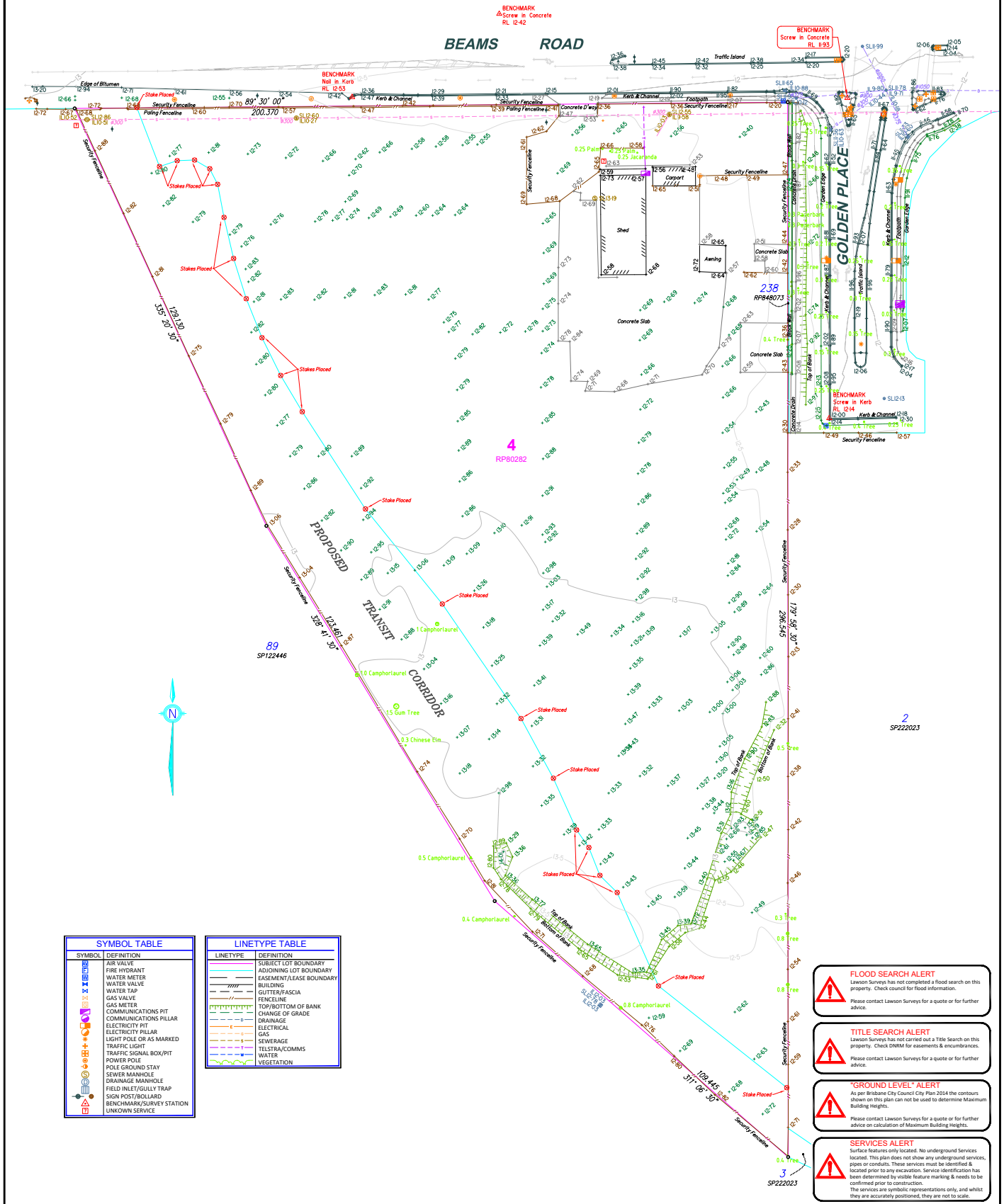
APPENDIX C

EXISTING STORMWATER INFORMATION



SYMBOL TABLE	
SYMBOL	DEFINITION
	AIR VALVE
	FIRE HYDRANT
	WATER METER
	WATER VALVE
	WATER TAP
	GAS VALVE
	GAS METER
	COMMUNICATIONS PIT
	COMMUNICATIONS PILLAR
	ELECTRICITY PIT
	ELECTRICITY PILLAR
	LIGHT POLE OR AS MARKED
	TRAFFIC LIGHT
	TRAFFIC SIGNAL BOX/PIT
	POWER POLE
	POLE GROUND STAY
	SEWER MANHOLE
	DRAINAGE MANHOLE
	FIELD INLET/GULLY TRAP
	SIGN POST/BOLLARD
	BENCHMARK/SURVEY STATION
	UNKOWN SERVICE

LINETYPE TABLE	
LINETYPE	DEFINITION
	SUBJECT LOT BOUNDARY
	ADJOINING LOT BOUNDARY
	EASEMENT/LEASE BOUNDARY
	BUILDING
	GUTTER/FASCIA
	FENCELINE
	TOP/BOTTOM OF BANK
	CHANGE OF GRADE
	DRAINAGE
	ELECTRICAL
	GAS
	SEWERAGE
	TELSTRA/COMMS
	WATER
	VEGETATION

FLOOD SEARCH ALERT
Lawson Surveys has not completed a flood search on this property. Check council for flood information.

Please contact Lawson Surveys for a quote or for further advice.

TITLE SEARCH ALERT
Lawson Surveys has not carried out a Title Search on this property. Check DNRM for easements & encumbrances.

Please contact Lawson Surveys for a quote or for further advice.

"GROUND LEVEL" ALERT
As per Brisbane City Council City Plan 2014 the contours shown on this plan can not be used to determine Maximum Building Heights.

Please contact Lawson Surveys for a quote or for further advice on calculation of Maximum Building Heights.

SERVICES ALERT
Surface features only located. No underground Services located. This plan does not show any underground services, pipes or conduits. These services must be identified & located prior to any excavation. Service identification has been determined by visible feature marking & needs to be confirmed prior to construction.
The services are symbolic representations only, and whilst they are accurately positioned, they are not to scale.

IDENTIFICATION SURVEY ALERT
The Surface Detail & Contour Survey, as prepared by Lawson Surveys, does not guarantee the location of boundary pegs.

Please contact Lawson Surveys for a quote or for further advice.

GENERAL NOTES
Contour Interval 0.5m

Boundaries have been approximately positioned & remain subject to an Identification Survey.
Tree Species may not be accurate - it is an indication of tree type only.

North Point is indicative only & may not be an accurate representation of True North.
If in doubt contact Lawson Surveys.

SCALE 1:500 at A1 - Lengths are in metres

0 10 20 30 40 50 60 70 80 90 100
0 100 mm 200 mm

PLAN SHOWING SURFACE DETAIL & CONTOURS

LEVEL DATUM	AHD - VIDE PSM 138042 RL 14.315
LOCAL AUTHORITY	BRISBANE CITY COUNCIL
MERIDIAN	DP222022
DWG NAME	ACAD-19646 DT
SCALE	1:500 @ A1
DATE	20/06/19
SURVEYED BY	BG
DRAWN BY	BG
CLIENT	BOB KELLY & CO PTY LTD ATF RJ & KO KELLY FAMILY TRUST
LOCATION	490 BEAMS ROAD FITZGIBBON
RPD	LOT 4 ON RP80282

LAWSON SURVEYS
A.B.N 46 272 949 047
CONSULTING LAND SURVEYORS
9B / 62 BISHOP STREET
KELVIN GROVE QLD 4059
Ph 07 3352 3326 Fax 07 3352 6991
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REFERENCE **19646**

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www.bornhorstward.com.au

PROJECT
490 BEAMS ROAD
FITZGIBBON

SUBJECT
CONCRETE SWALE DRAIN
PHOTOS

PROJECT No.
19045

DRAWING No. REVISION

0 10 20 30 40 50

ORIGINAL SIZE A3

Brisbane City Council

FloodWise Property Report

Report Reference
1564699608923
02/08/2019 08:46:48

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.

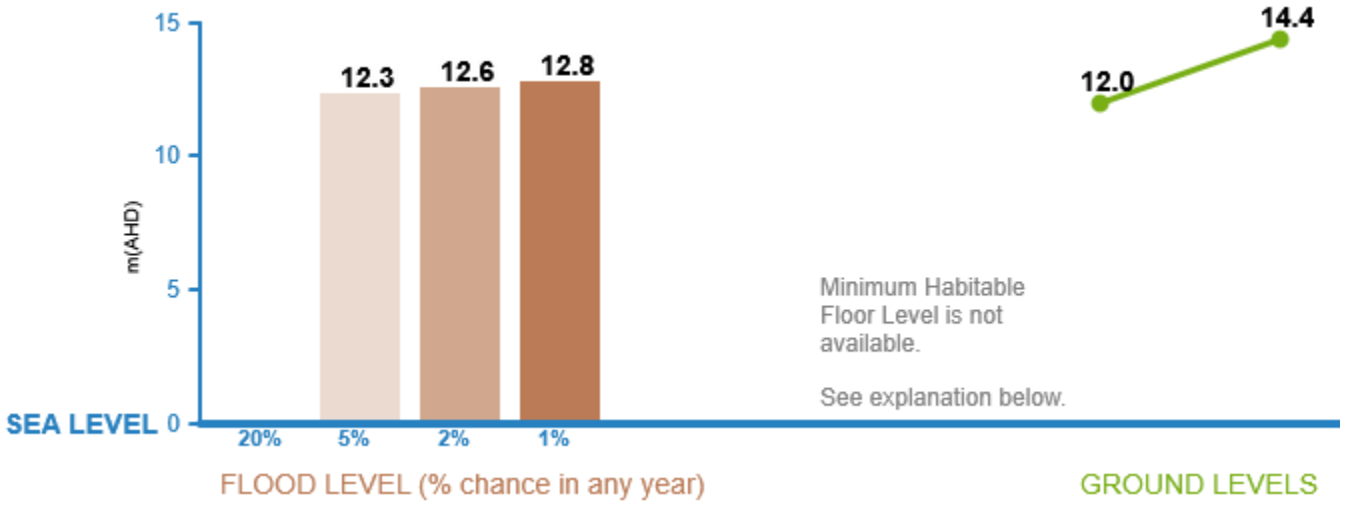
To find out more about how the contents of this report may affect building or development on this property, please visit www.brisbane.qld.gov.au/planning-building.For more general information about understanding your flood risk and how to prepare your property, family or business for potential flooding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

THIS IS A REPORT FOR:

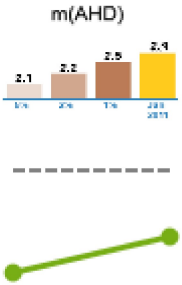
Rateable Address: 490 BEAMS RD, FITZGIBBON QLD 4018

Lot Details: L.4 RP.80282

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: LARGE ALLOTMENT

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

Brisbane City Council

FloodWise Property Report

Dedicated to a better Brisbane

Report Reference
1564699608923
02/08/2019 08:46:48

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: 490 BEAMS RD, FITZGIBBON QLD 4018
Lot Details: L.4 RP.80282

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	12.0
Maximum Ground Level	14.4
Min Habitable Floor Level	Contact Council
Defined Flood Level (DFL)	12.8
Defined Flood Level Source	CREEK/WATERWAY
Source of Highest Flooding	CREEK/WATERWAY
Flooding may also occur from	CREEK/WATERWAY

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	N/A*	
5% AEP	12.3	CREEK/WATERWAY
2% AEP	12.6	CREEK/WATERWAY
1% AEP	12.8	CREEK/WATERWAY
DFL	12.8	CREEK/WATERWAY

* Council does not hold flood levels for this probability event, or it is not applicable for your property. If the source for the 1% AEP is River, refer to the DFL. Otherwise, refer to the BRCFS 1% AEP 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
	FPA4	Not Applicable
	FPA5	

COASTAL HAZARD OVERLAY CODE

There are currently no Coastal Hazard Overlays that apply to this property.

PROPERTY DEVELOPMENT FLAGS

Large Allotment - This property is either a Large Allotment of over 1000 square metres or is located within a Large Allotment. Flood levels may vary significantly across allotments of this size. Further investigations may be warranted in determining the variation in flood levels and the minimum habitable floor level across the site. For more information or advice, it is recommended you engage a Registered Professional Engineer of Queensland.

Brisbane City Council

FloodWise Property Report

Report Reference
1564699608923

02/08/2019 08:46:48

Dedicated to a better Brisbane

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 m^3/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
1564699608923

02/08/2019 08:46:48

Dedicated to a better Brisbane

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.

FIGURE 2

Beams Road Golf Driving Range

100 year ARI event Flood Extent

LEGEND

Site Boundary

Flood Level (mAHD)

- < 10.80
- 10.80 to 11.00
- 11.00 to 11.20
- 11.20 to 11.40
- 11.40 to 11.60
- 11.60 to 11.80
- 11.80 to 12.00
- 12.00 to 12.20
- 12.20 to 12.40
- 12.40 to 12.60

Scale: 1:25,000

25 0 25 50 75

Metres

N W E S

SHEET	A3
Project No:	7195/71
Date:	26 June 2015
Revision Number:	1
Designed by:	HD
Client Name:	Michael Pelling

File Path: O:\7195-71\Mapinfo\Figures\FloodStudy

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006 Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722

Cardno Shaping the Future

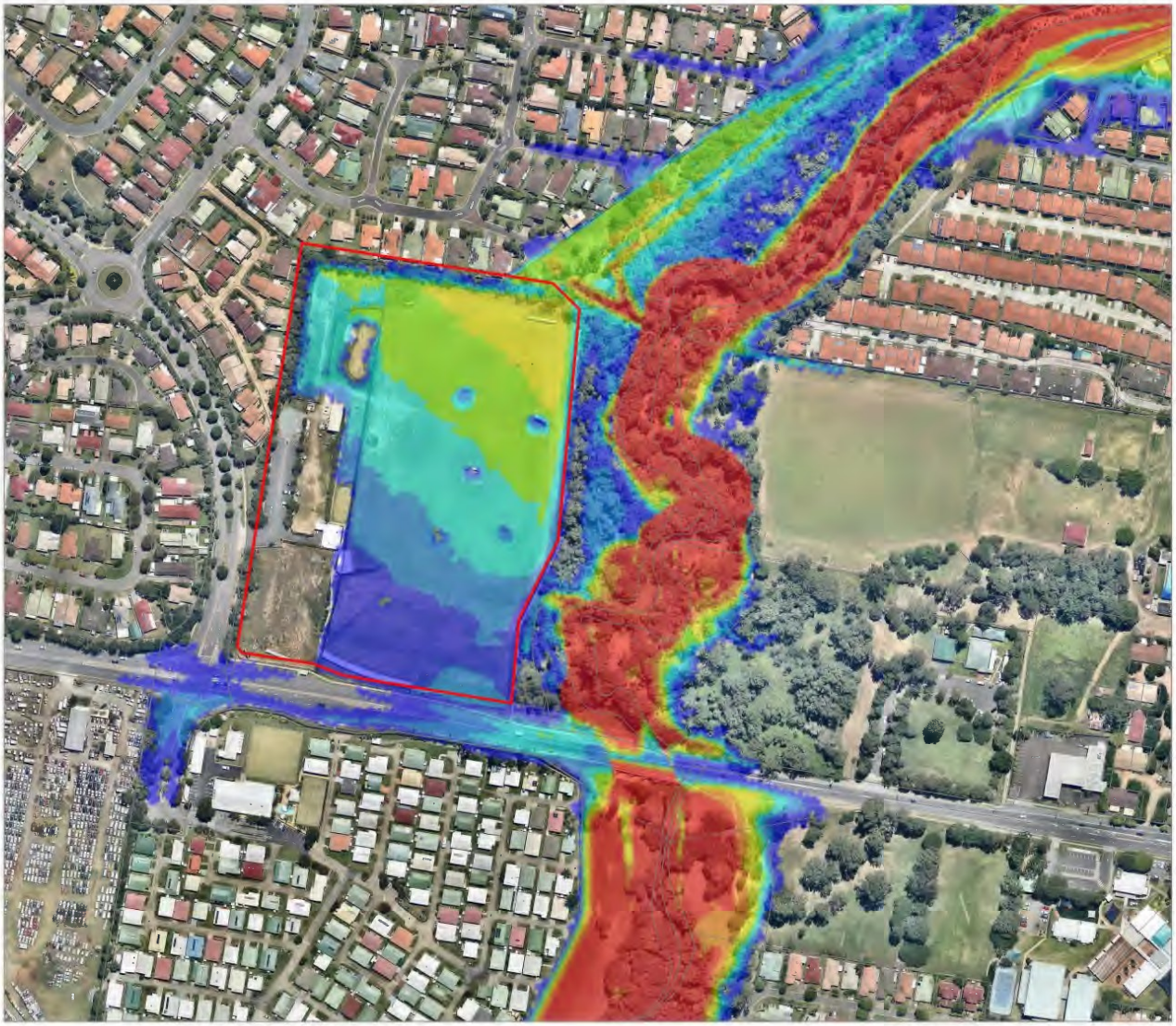


FIGURE 8

Beams Road Golf Driving Range

100 year ARI event Flood Depth

LEGEND

Site Boundary

Depth (m)

- < 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- > 2.00

Scale: 1:2,500

25 0 25 50 75

Metres

N W E S

SHEET	A3
Project No:	7195/71
Date:	11 March 2016
Revision Number:	1
Designed by:	HD
Client Name:	Michael Pelling

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006 Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722

Cardno Shaping the Future

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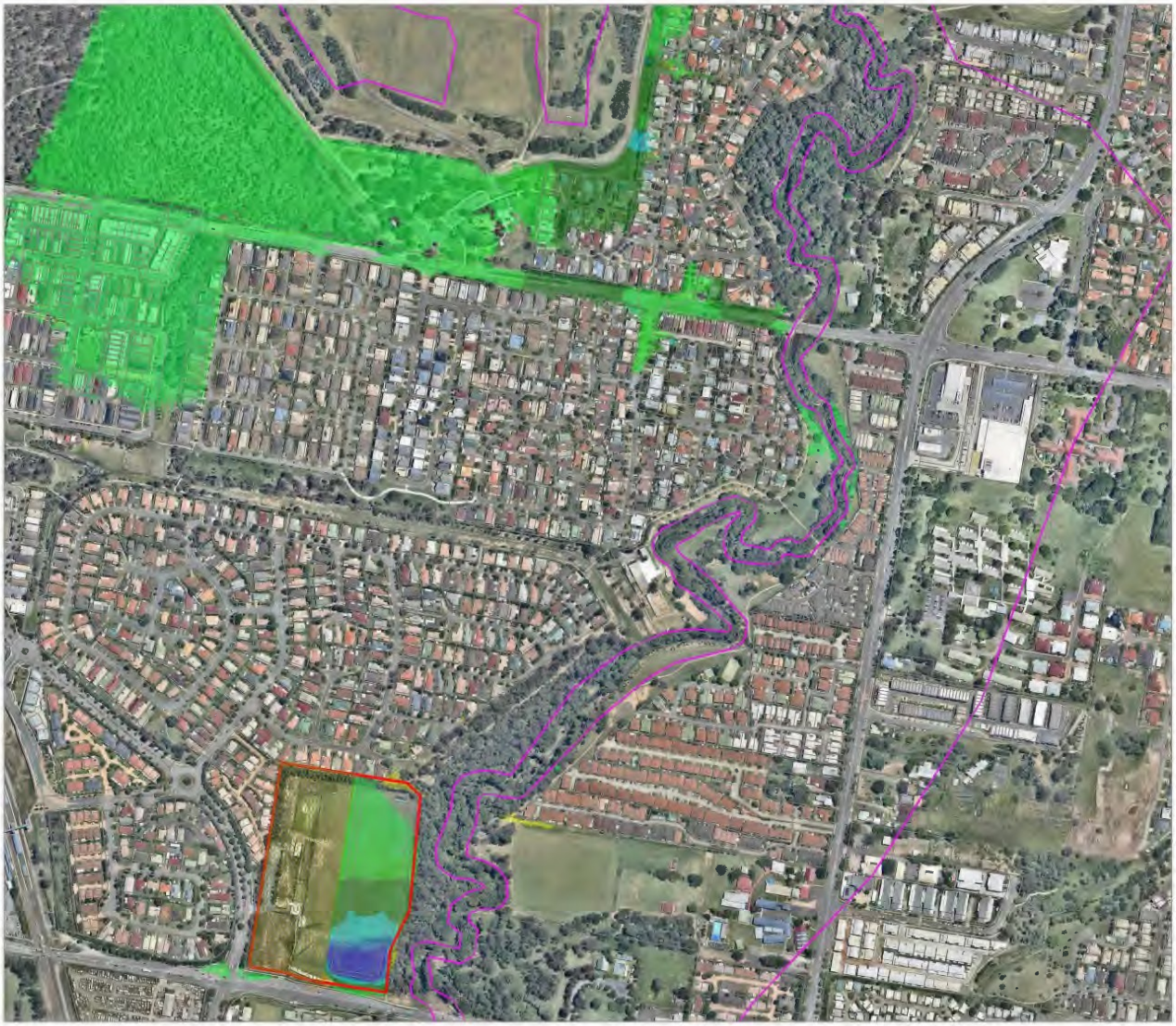


FIGURE 16

Beams Road Golf Driving Range

100 year ARI event Flood Impact

LEGEND

- Site Boundary
- 2D Model Extent
- Area of cut
- Fill area

Flood Impact (m)

- < -0.10
- -0.100 to -0.050
- -0.050 to -0.025
- -0.025 to -0.010
- -0.010 to -0.002
- -0.002 to 0.002
- 0.002 to 0.010
- 0.010 to 0.025
- 0.025 to 0.050
- 0.050 to 0.100
- 0.100 to 0.250
- > 0.250

Received
06/07/2016
BCC DA

Scale: 1:5,000

50 0 50 100 150
Metres

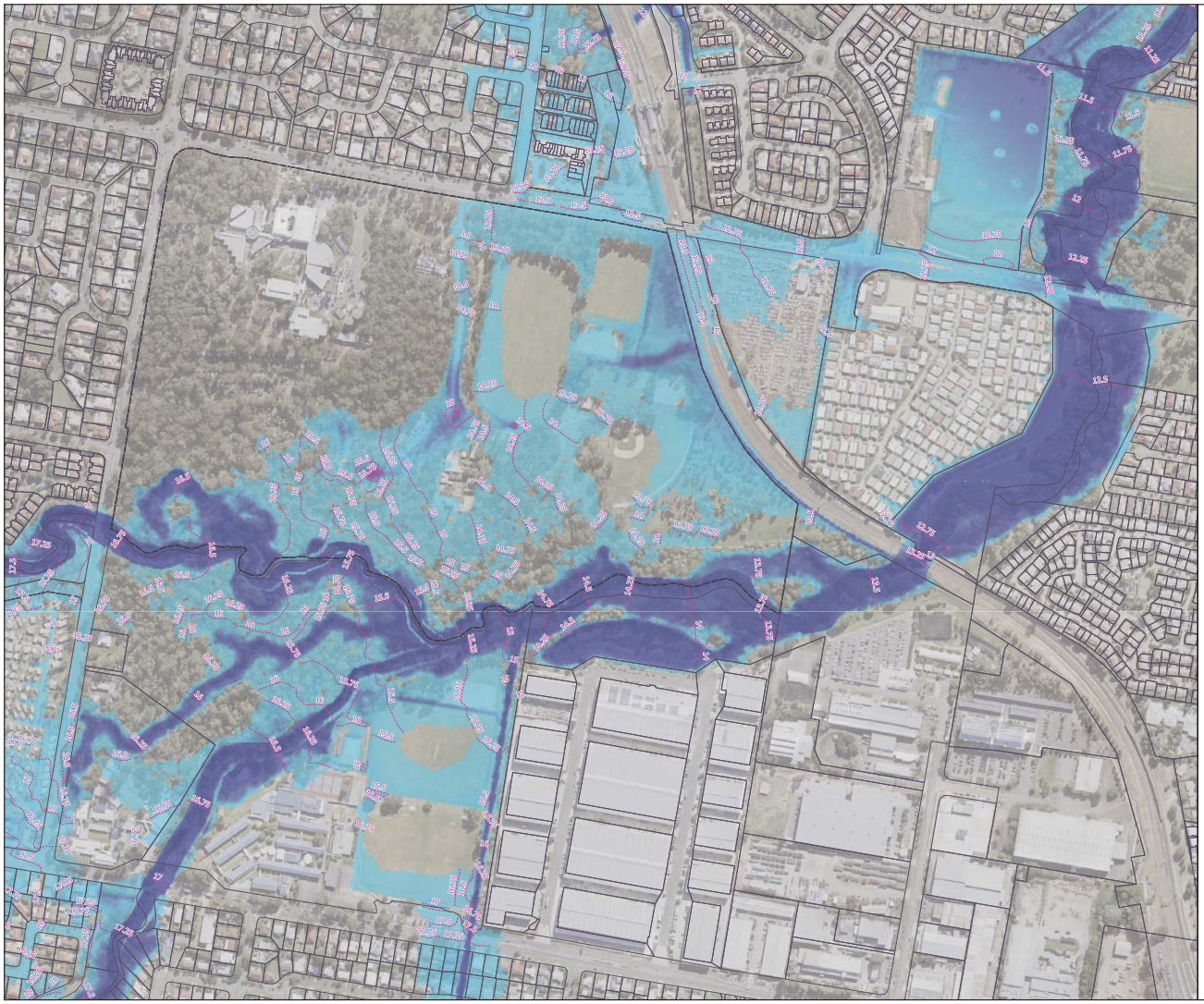
N W E S

SHEET	A3
Project No:	7195/71
Date:	10 March 2016
Revision Number:	1
Designed by:	HD
Client Name:	Michael Pelling

File Path: G:\7195-71\Mapinfo\Figures\R2_FloodStudyV2

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006 Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722

Cardno Shaping the Future



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A3

N

50 0 50 100 m

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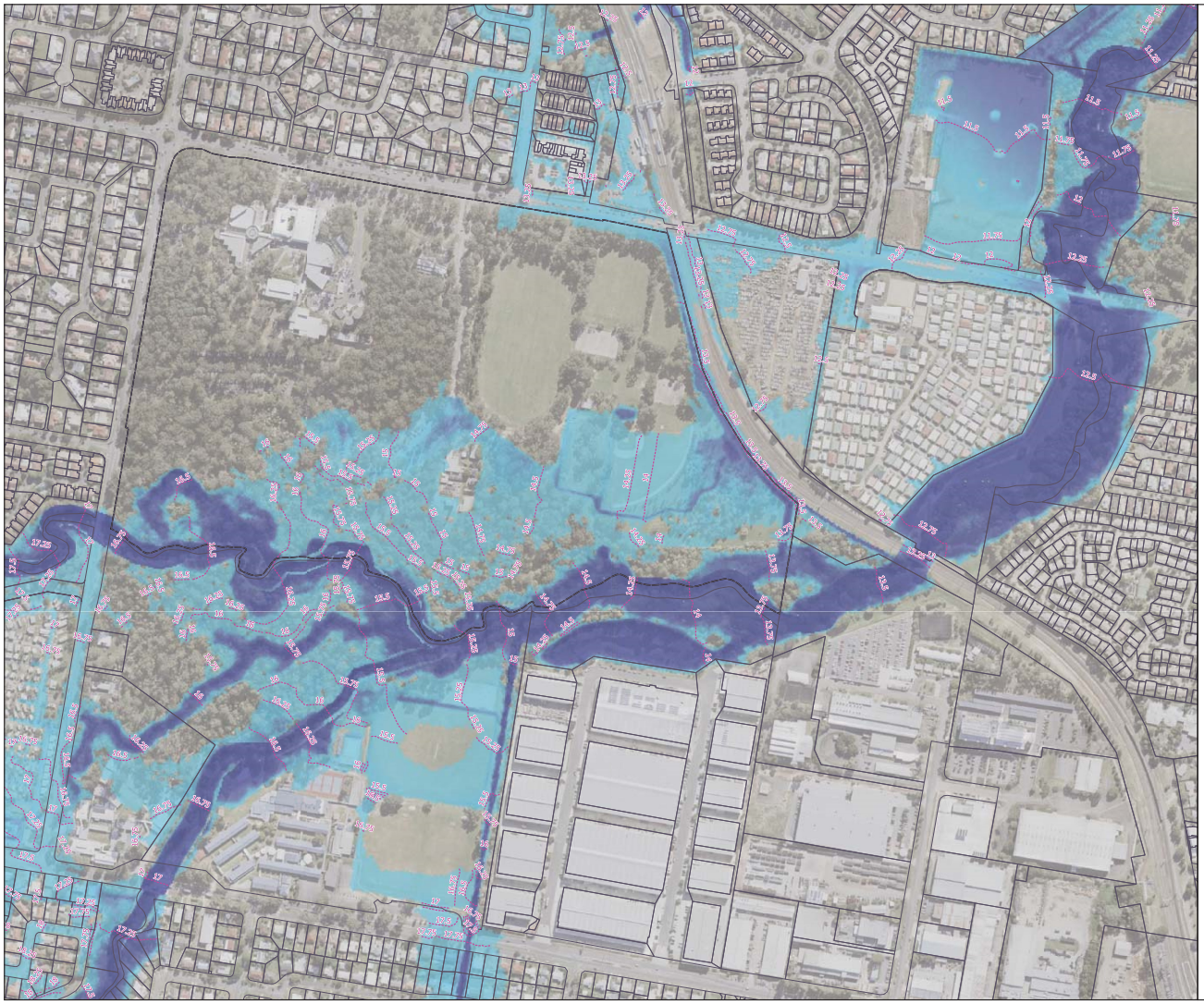
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Existing Case (TUFLOW ID B01d)

1%AEP Event (Q100)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- Peak Flood Height Contours (m AHD)

Depth (m)

- Less than 0.25
- 0.25 to 0.5
- 0.5 to 0.75
- 0.75 to 1
- 1 to 1.5
- 1.5 to 2
- Greater than 2

FIGURE A6

N

50 0 50 100 m

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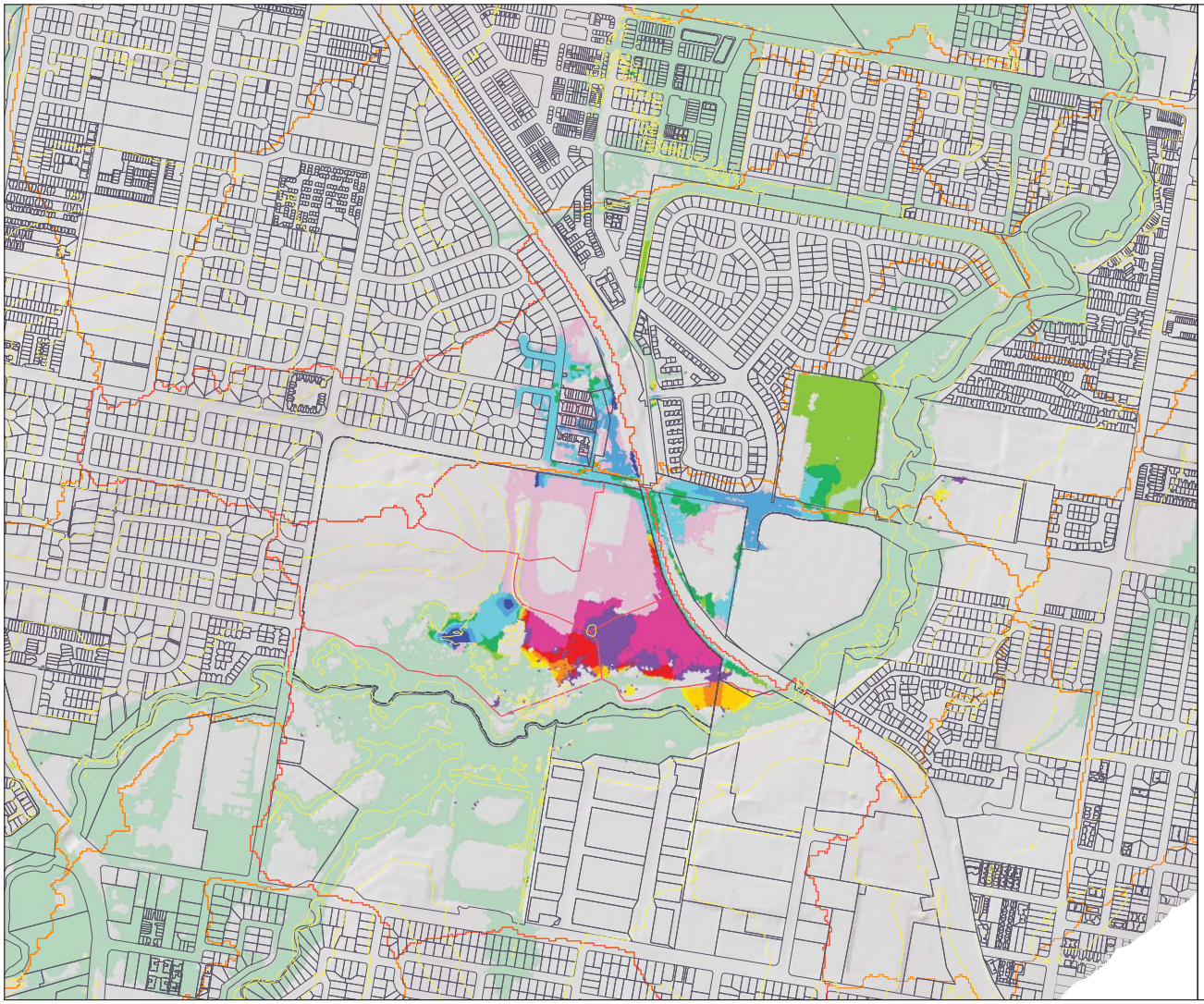
Carseldine Urban Village

Peak Flood Depth & Peak Flood Level Contours

Proposed Case (TUFLOW ID P02j)

1%AEP Event (Q100)

Client: Economic Development Queensland



Hydrology & Water Management Consulting

DesignFlow

LEGEND

- Site
- Cadastral Data
- LiDAR Contours (5m)
- URBS Sub-Catchments (BCC)
- Updated Sub-Catchments

Impact (m)

- Less than -0.2
- -0.1 to -0.2
- -0.05 to -0.1
- -0.02 to -0.05
- -0.01 to -0.02
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- Greater than 0.2
- Was Wet - Now Dry
- Was Dry - Now Wet

FIGURE A12

80 0 80 160 m

© Hydrology and Water Management Consulting Pty Ltd (HWMC) 2019. HWMC endeavours to ensure that the information contained in this figure is correct at the time of publication. Furthermore, HWMC makes no representations, warranties or guarantees about its accuracy.

Carseldine Urban Village

Peak Flood Level Impacts
Proposed Vs Existing Case

(TUFLOW Case P02j Vs B01d)

1%AEP Event (Q100)

Client: Economic Development Queensland

APPENDIX D

XP STORM OUTPUTS

Bornhorst + Ward Pty Ltd
Level 4, 67 Astor Terrace, Spring Hill, Qld 4000
Ph. (07) 3013 4699 / mail@bornhorstward.com.au
A.B.N. 78 010 151 354

FIGURE 1 – EX CATCHMENT A – CRITICAL RUNOFF HYDROGRAPHS (m^3/s)

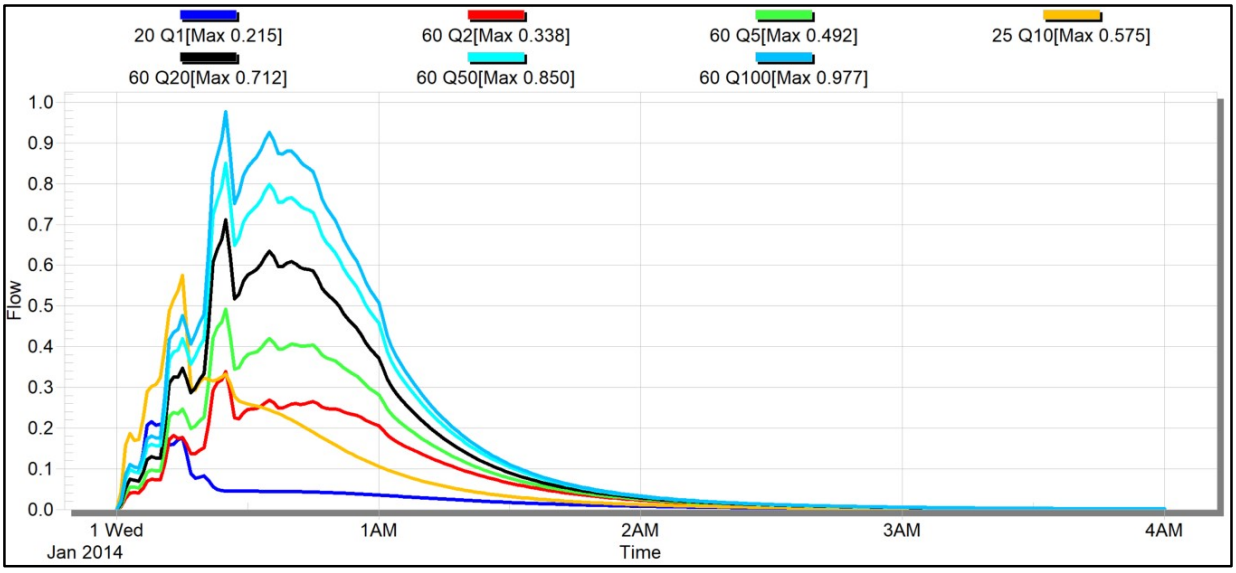


FIGURE 2 – EX CATCHMENT B – CRITICAL RUNOFF HYDROGRAPHS (m^3/s)

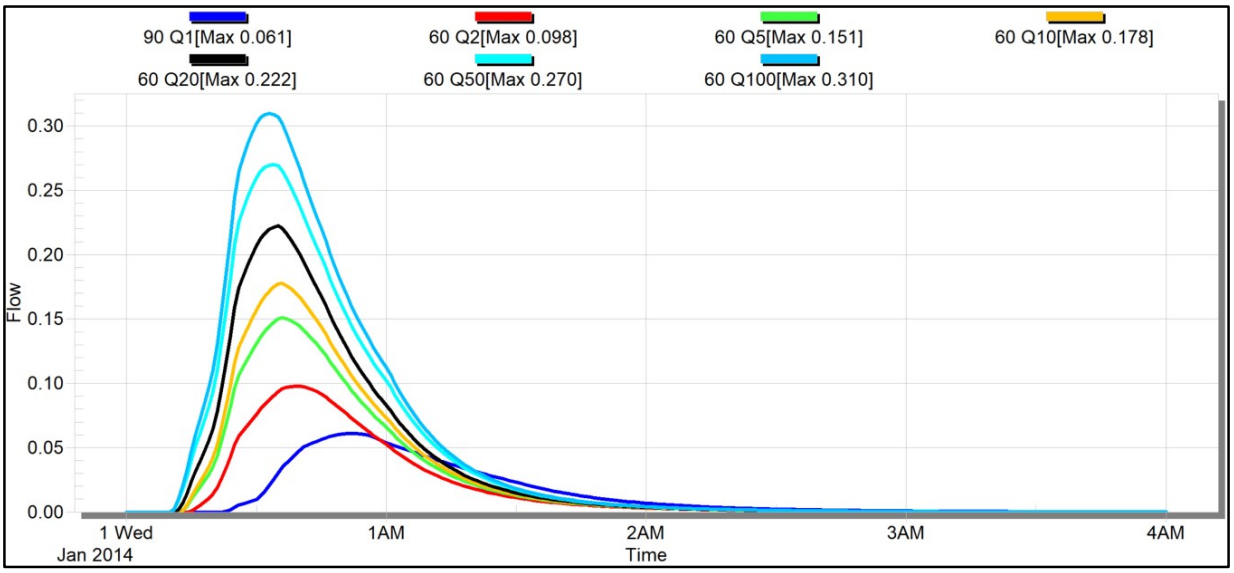


FIGURE 3 – DEV CATCHMENT A – CRITICAL RUNOFF HYDROGRAPHS (m^3/s)

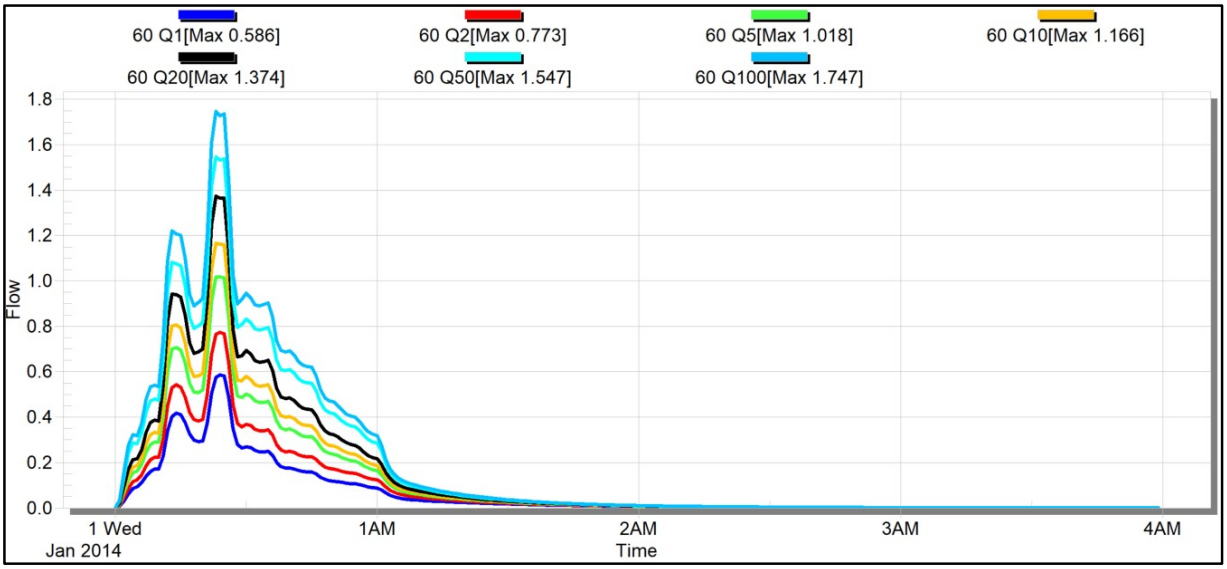


FIGURE 4 – DEV CATCHMENT B – CRITICAL RUNOFF HYDROGRAPHS (m^3/s)

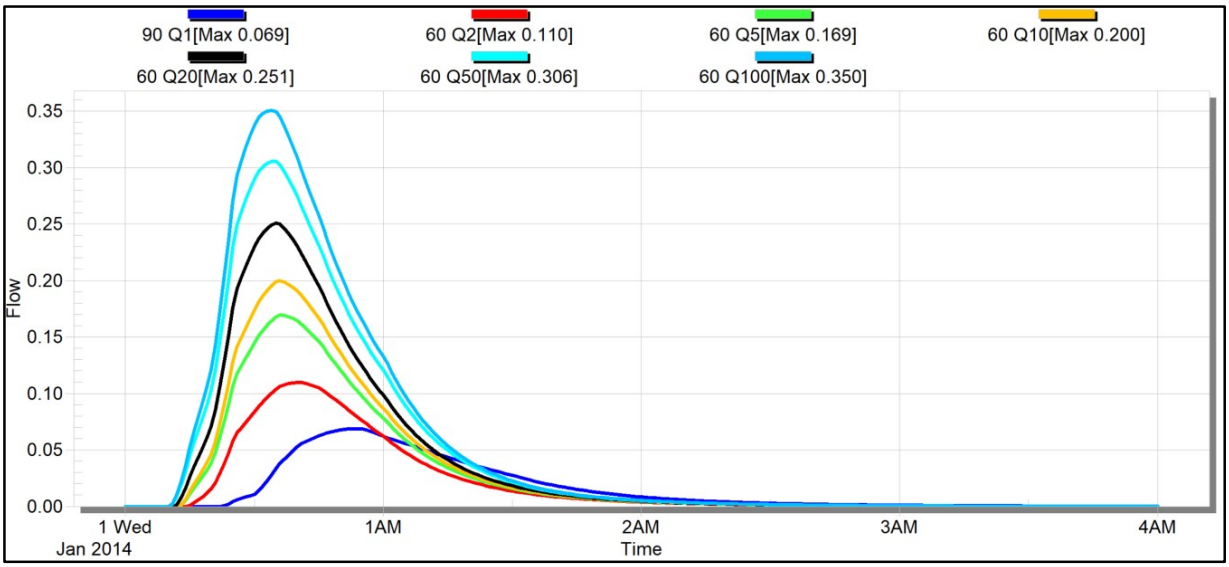


FIGURE 5 – DEV CATCHMENT A – DETENTION TANK STAGING (m)

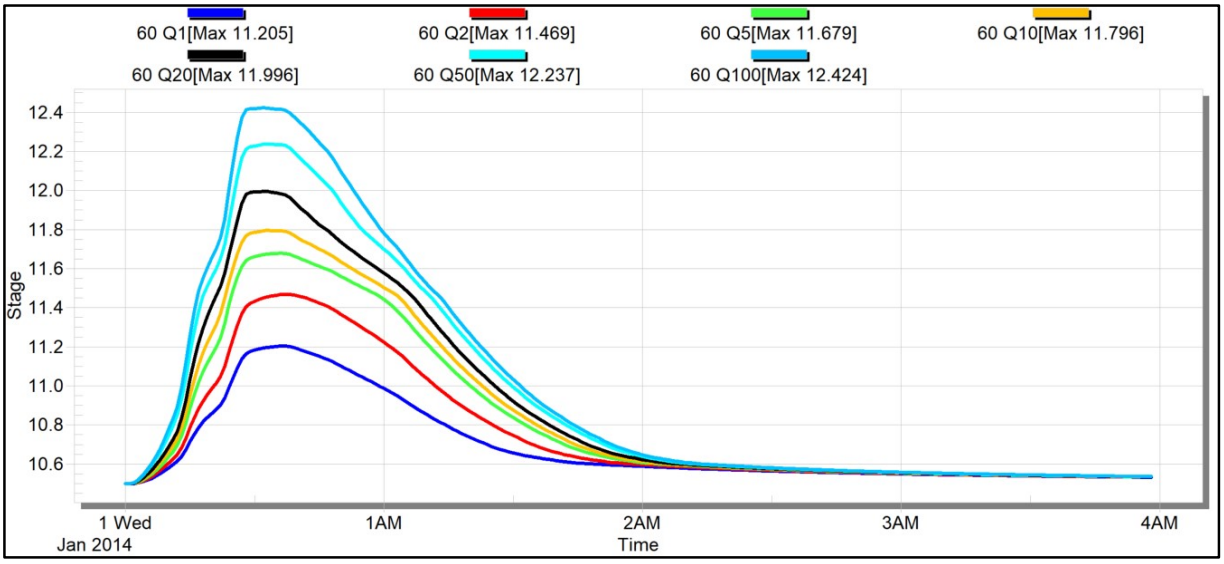


FIGURE 6 – DEV CATCHMENT A – CRITICAL PEAK DISCHARGE HYDROGRAPHS (m^3/s)

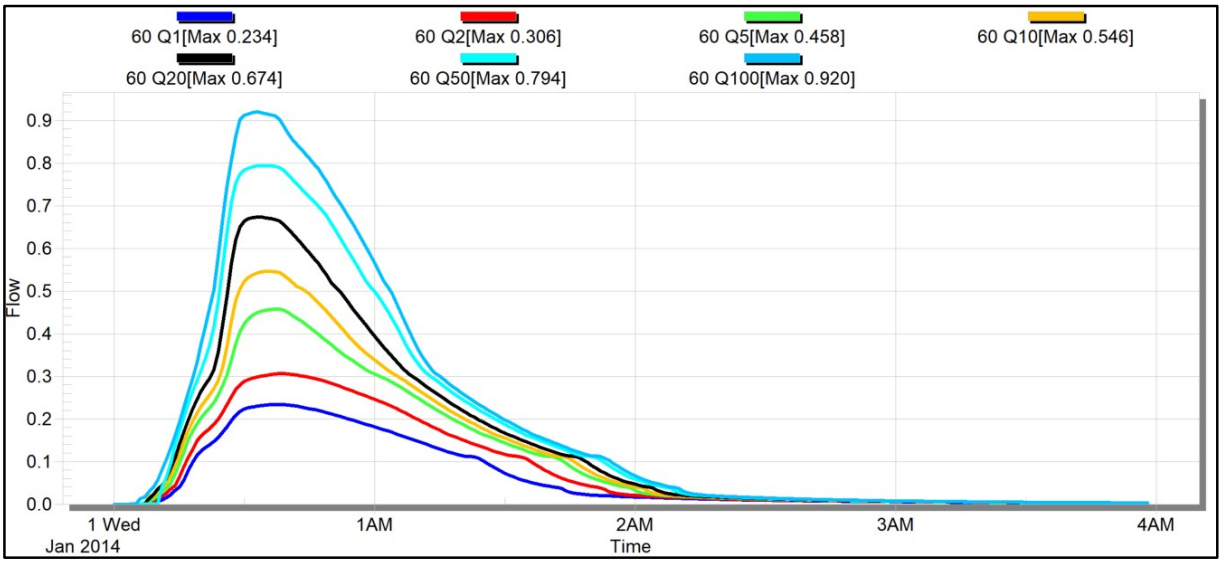
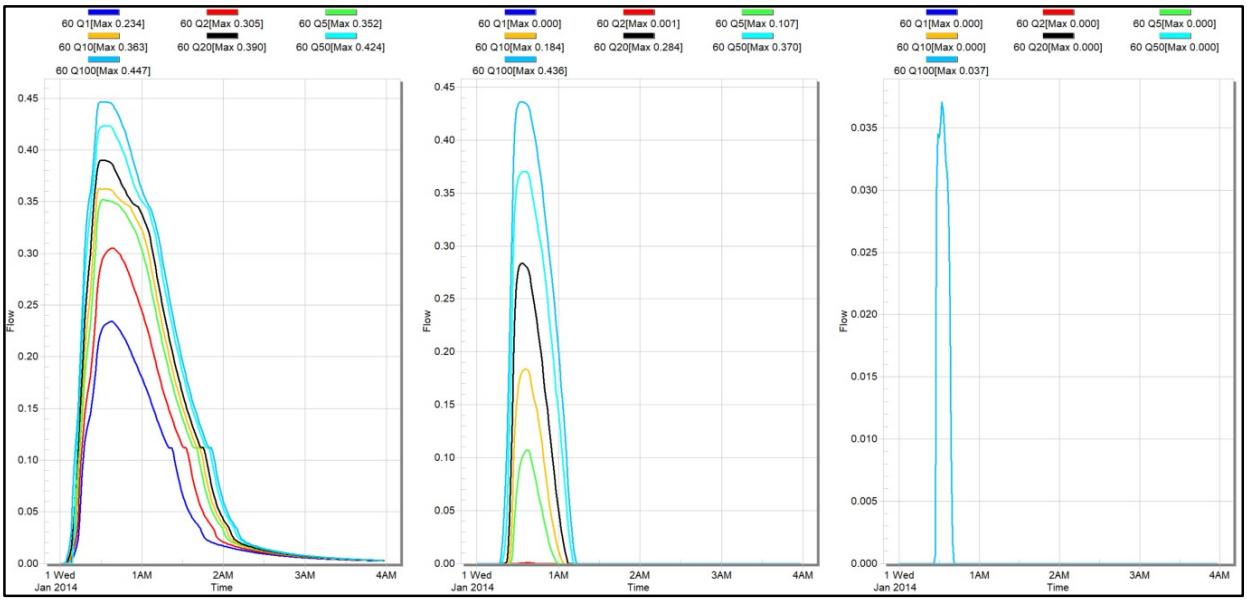


FIGURE 7 – DEV CATCHMENT A – INDIVIDUAL OUTLET CONTROL HYDROGRAPHS (m^3/s)

LOW FLOW OUTLET **HIGH FLOW OUTLET** **WEIR OUTLET**



APPENDIX E

MUSIC DATA

Bornhorst + Ward Pty Ltd
Level 4, 67 Astor Terrace, Spring Hill, Qld 4000
Ph. (07) 3013 4699 / mail@bornhorstward.com.au
A.B.N. 78 010 151 354

Table 1: Pollutants Typically Generated During the Construction Phase

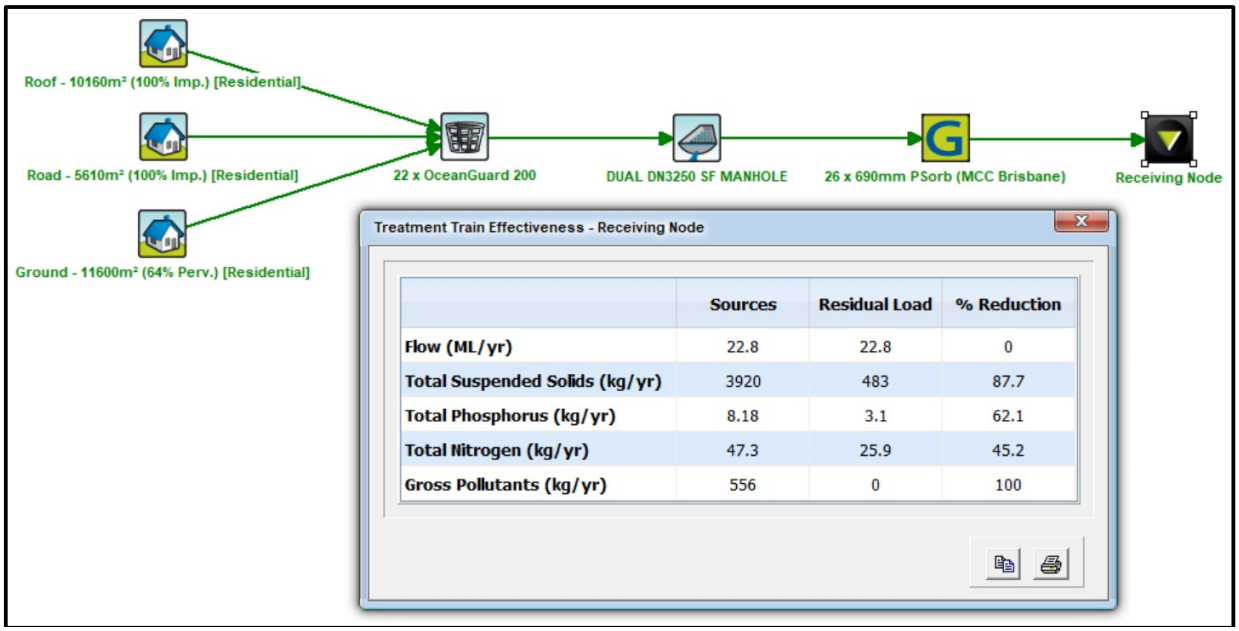
Pollutant	Source
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, washwaters (e.g. from tile works)
pH altering substances	Acid sulphate soils, cement slurry and washwaters

Table 2: Recommended MUSIC Rainfall-Runoff Generation Parameters

Parameter	Urban Residential
Rainfall Threshold (mm)	1
Soil Storage Capacity (mm)	500
Initial Storage (% capacity)	10
Field Capacity (mm)	200
Infiltration Capacity Coefficient a	211
Infiltration Capacity Exponent b	5
Initial Depth (mm)	50
Daily Recharge Rate (%)	28
Daily Baseflow Rate (%)	27
Daily Deep Seepage Rate (%)	0

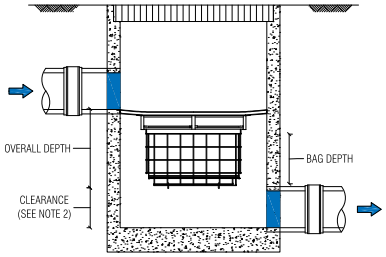
Table 3: Music Base and Storm flow Concentration Parameters for Residential Catchments

Land Use Type	Parameter	TSS (Log_{10}mg/L)		TP (Log_{10}mg/L)		TN (Log_{10}mg/L)	
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Residential Roof	Mean	N/A	1.30	N/A	-0.89	N/A	0.26
	Std Dev	N/A	0.39	N/A	0.31	N/A	0.23
Residential Roads	Mean	1	2.43	-0.97	-0.30	0.20	0.26
	Std Dev	0.34	0.39	0.31	0.31	0.20	0.23
Residential Ground	Mean	1	2.18	-0.97	-0.47	0.20	0.26
	Std Dev	0.34	0.39	0.31	0.31	0.20	0.23

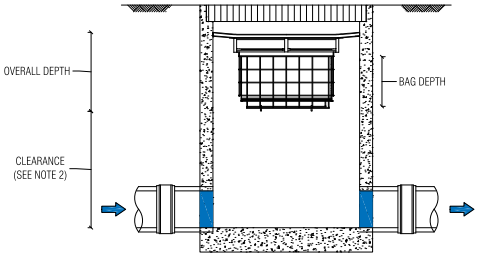


	Sources	Residual Load	% Reduction
Flow (ML/yr)	22.8	22.8	0
Total Suspended Solids (kg/yr)	3920	483	87.7
Total Phosphorus (kg/yr)	8.18	3.1	62.1
Total Nitrogen (kg/yr)	47.3	25.9	45.2
Gross Pollutants (kg/yr)	556	0	100

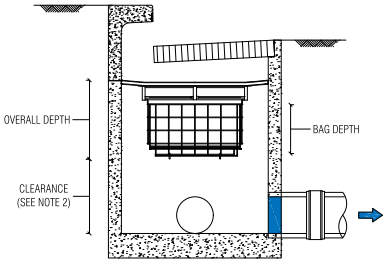
Figure 1: MUSIC Results



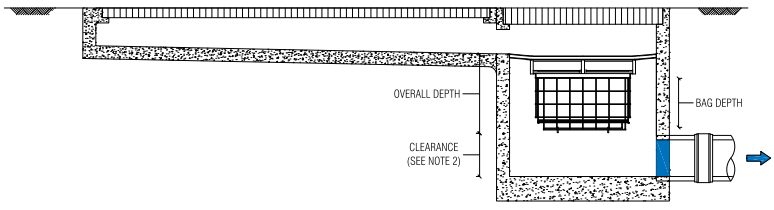
PIPE FLOW CONFIGURATION



SURFACE FLOW CONFIGURATION



SURFACE FLOW CONFIGURATION

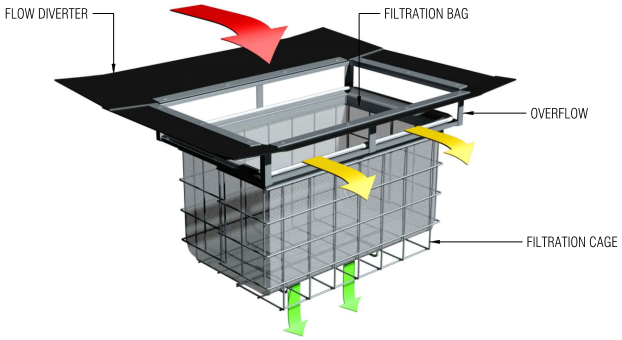


GRATED STRIP DRAIN CONFIGURATION

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

PLAN ID	DEPTH ID 1	DEPTH ID 2	DEPTH ID 3
S	■		
M	■	■	
L	■	■	■
XL	■	■	■



GENERAL NOTES

1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.
2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.
4. DRAWINGS NOT TO SCALE.

OCEAN PROTECT
PHONE: 1300 354 722
www.oceanprotect.com.au

OCEAN PROTECT
OCEANGUARD
TYPCIAL ARRANGEMENTS
SPECIFICATION DRAWING

LAST MODIFIED: 15-10-19

APPENDIX F

EROSION HAZARD FORM

Bornhorst + Ward Pty Ltd
Level 4, 67 Astor Terrace, Spring Hill, Qld 4000
Ph. (07) 3013 4699 / mail@bornhorstward.com.au
A.B.N. 78 010 151 354

BRISBANE CITY COUNCIL ABN 72 002 765 795

Erosion Hazard Assessment - June 2014

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 http://www.waterbydesign.com.au/factsheets

☒ ***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

490 BEAMS ROAD FITZGIBBON

Postcode 4018

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*

ANGUS LIVINGSTONE

Certifier's signature

A. Livingstone

Date

25 / 02 / 2020

ANGUS LIVINGSTONE

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Assessment Table

Table 1: Low Risk Test

		Yes	*No*
1.1	is the area of land disturbance > 1000 m^2	☒	☐
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	☐	☒

Have you answered 'yes' to any of the questions in Table 1?	*Yes*	*No*	**If '*No*' then site is <u>low risk</u> with respect to erosion and sediment control**
	☒	☐	

If '*Yes*' then proceed to Table 2

Table 2: Medium Risk Test

		Yes	*No*	**If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control**
2.1	is the area of land disturbance > 1 hectare	☒	☐	

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%	☐	☒

Have you answered 'yes' to any of the questions in Table 3?	*Yes*	*No*	**If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control**
	☐	☒	

If '*Yes*' then site is <u>high risk</u> with respect to erosion and sediment control

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APPENDIX G

BRISBANE CITY COUNCIL CODES

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Section A—If for self-assessable or assessable development for a dwelling house including any secondary dwelling Note—Development for a dwelling house does not require assessment against any other sections of this code.				
PO1 Development involving any habitable or non-habitable part of a dwelling house, including any secondary dwelling, is located and designed to: (a) minimise the risk to people from flood hazard; (b) achieve acceptable flood immunity; (c) minimise property impacts from a flood event up to and including the defined flood event; (d) minimise disruption to residents, recovery time and rebuilding or restoration costs after a flood event up to and including the defined flood event.	**AO1.1** Development for a dwelling house including anysecondary dwelling: (a) s not located in the Brisbane River flood planning area 1, 2a or 2b sub-categories or the Creek/waterway flood planning area 1 or 2 sub-categories; or (b) is only located in these sub-categories, if a Registered Professional Engineer Queensland certifies that thedwelling house and any secondary dwelling are structurally designed to be able to resist hydrostatic and hydrodynamic loads associated with flooding up to and including thedefined flood event. **AO1.2** Development for a dwelling house and any secondary dwelling complies with the minimum flood planning levels inTable 8.2.11.3.B. Note—If located in an area that has no flood level information available from the Council such as an overland flow path, a Registered Professional Engineer of Queensland with expertise in undertaking flood studies is to certify that the flood level and development	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	levels for the dwelling house and any secondary dwelling achieve the required flood planning levels in Table 8.2.11.3.B. **AO1.2** Development involving a building undercroft complies with the minimum clearance requirements in Table 8.2.11.3.E. Editor's note—For creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council's FloodWise Property Report. Note—The Flood planning scheme policy provides guidance on undercroft design.			
PO2 Development within the Creek/waterway flood planning area sub-categories or Overland flow flood planning area sub-category: (a) maintains the conveyance of flood waters to allow them to pass predominantly unimpeded through the site; (b) does not concentrate, intensify or divert floodwater onto upstream, downstream or adjacent properties; (c) will not result in a material increase in	**AO2** Development: (a) is not located within the Creek/waterway flood planning area 1, 2 or 3 sub-categories or the Overland flow flood planning area sub-category; or (b) provides an open undercroft area from natural ground level to habitable floor level for any area inundated by the defined flood event; or ote—This undercroft area is not suitable for providing non-habitable rooms,	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
flood levels or flood hazard on upstream, downstream or adjacent properties.	secure storage of valuables, or future enclosing for storage or car parking. The clear area may include structural elements such as columns and floor substructure. The Flood planning scheme policyprovides guidance on undercroft design. Editor's note—An open undercroft design may be achieved through a 'valance' treatment around the perimeter of an otherwise internally clear undercroft. Editor's note—For Creek/waterway, storm-tide and river flooding, applicable flood planning information is available from Council'sFloodWise Property Report. (c) report from a Registered Professional Engineer Queensland certifies that the development in the Creek/waterway flood planning area or Overland flow flood planning area sub-categories will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties. Note—Flood studies demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure			

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	design planning scheme policy.			
Section B—If self-assessable or assessable development other than for a dwelling house or reconfiguring a lot Note—If self-assessable development complies with the acceptable outcomes of this part, no further assessment against this code is required.				
PO3 Development: (a) is compatible with flood hazard in a defined flood event; (b) minimises the risk to people from flood hazard; (c) does not reduce the ability of evacuation resources including emergency services to access and evacuate the site in a flood emergency, with consideration to the scale of the development; (d) minimises impacts on property from flooding; (e) minimises disruption to residents, business or site operations and recovery time due to flooding; (f) minimises the need to rebuild structures after a flood event greater than the defined flood event. Note—Where Table 8.2.11.3.C identifies that a flood risk assessment is required, compliance with this performance outcome can be achieved by submitting a flood risk assessment, which may be included within a flood study, addressing the criteria within this performance	**AO3** Development for a material change of use complies with Table 8.2.11.3.C.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
solution. Preparing flood risk assessments and flood studies is required to be in accordance with the Flood planning scheme policy. Note—An emergency management plan prepared in accordance with the Flood planning scheme policy, which sets out procedures for evacuation due to flooding may be used to demonstrate compliance with this performance outcome.				
PO4 Development for a park ensures that the design of a park and location of structures and facilities responds to the flood hazard and balances the safety of intended users with: (a) maintaining continuity of operations; (b) impacts of flooding on asset life and ongoing maintenance costs; (c) efficient recovery after flood events; (d) recreational benefits to the city; (e) availability of suitable land within the park.	**AO4.1** Development involving a building or structure in a park complies with the flood planning levels specified in Table 8.2.11.3.D. **AO4.2** Development involving a building or structure where Table 8.2.11.3.D does not apply: (a) is not located within the 20% AEP flood extent of any creek/waterway or overland flow path; or (b) is located above the 20% AEP flood level of any creek/waterway or overland flow path.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Section C—If for assessable development other than for a dwelling house				
PO5 Development is located and designed to: (a) minimise the risk to people from flood hazard on the site; (b) minimise flood damage to the development and contents of buildings up to the defined flood event; (c) provide suitable amenity; (d) minimise disruption to residents, recovery time and the need to rebuild structures after a flood event up to and including the defined flood event.	**AO5.1** Development complies with the flood planning levels specified in Table 8.2.11.3.D. Note—If located in an area with no Council-derived flood levels such as an overland flow path, a Registered Professional Engineer Queensland with expertise in undertaking flood studies is to derive the applicable flood level and certify that the development meets the required flood planning levels in Table 8.2.11.3.D. The study is to demonstrate that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy. **AO5.2** Development is: (a) not located in the: i. Brisbane River flood planning area 1, 2a, or 2b sub-categories; ii. Creek/waterway flood planning area 1 or 2 sub-categories; iii. Overland flow flood planning area sub-category; or (b) only located in these sub-categories if a Registered Professional Engineer Queensland with expertise in	✓	Development complies with the requirements of the Flood Overlay Code. Refer to the Bornhorst + Ward SWMP for further information.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	undertaking flood studies certifies that: i. the development design, siting and any mitigation measures will ensure the development is structurally adequate to resist hydrostatic, hydrodynamic and debris impact loads associated with flooding up to the defined flood event; and ii. the risk to people is managed to an acceptable level.			
PO6 Development involving essential electrical services or a basement storage area is suitably located and designed to ensure public safety and minimise flood recovery and economic consequences of damage during a flood.	**AO6.1** Development ensures that: (a) all areas containing essential electrical services comply with the flood planning levels in Table 8.2.11.3.D; or (b) if a basement contains essential electrical services or a private basement storage area, the basement is a waterproof structure with walls and floors impermeable to the passage of water with all entry points and services located at or above the relevant flood planning level in Table 8.2.11.3.D. Note—A basement storage area does not include a bike storage room, change room, building maintenance storage and non-critical electrical services.	✓	Development complies with the requirements of the Flood Overlay Code. Refer to the Bornhorst + Ward SWMP for further information.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	AO6.2 Development involving a basement that relies on a pumping solution to manage floodwater ingress or for dewatering after a flood provides a redundant pump system with a backup power source for those pumps.	**N/A**		
PO7 Development does not directly or indirectly create a material adverse impact on flood behaviour or drainage on properties that are upstream, downstream or adjacent to the development.	**AO7.1** Development: (a) does not block, or divert floodwaters for any area affected by creek/waterway or overland flow flooding, excluding storm-tide flooding and Brisbane River flooding sources; or (b) does not result in a material increase in flood level or hydraulic hazard on upstream, downstream or adjacent properties. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	**A/S**	Development removes a catchment flowing to an overland flow path within the site, and redirects it to an internal formal underground drainage system. There are no adverse impacts to this overland flow path. Development complies with the requirements of the Flood Overlay Code. Refer to the Bornhorst + Ward SWMP for further information.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
	AO7.2 Development retains existing overland flow paths and does not rely wholly on piped solutions to manage major flows. **AO7.3** Development which creates a new overland flow path or significantly modifies an existing overland flow path via earthworks does not materially worsen hydraulic hazard on the site from existing conditions. Note—Compliance with this acceptable solution can be demonstrated by the submission of a flood study by a Registered Professional Engineer of Queensland with expertise in undertaking flood studies demonstrating that the development and engineering design methods conform to the principles within the Flood planning scheme policy and the Infrastructure design planning scheme policy.	**A/S** **N/A**		
PO8 Development for filling or excavation in an area affected by creek/waterway flooding does not directly, indirectly or cumulatively cause any material increase in flooding or hydraulic hazard or involve significant redistribution of flood storage from high to lower areas in the	**AO8** Development ensures that no filling or excavation greater than 100mm is located in the Creek/waterway flood planning area 1, 2 or 3 sub-categories if contained in the 5% AEP flood extent of any Creek/waterway flood planning area sub-category for which no waterway	✓	No filling is proposed within Creek/waterway flood planning area 1,2 or 3 sub-categories.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
floodplain. Note—This can be demonstrated by undertaking earthworks in compliance with the Compensatory earthworks planning scheme policy. Note—This part of the code applies to all development other than a dwelling house and any secondary dwelling which involves filling or excavation, whether or not the development application comprises a separate development application for operational work involving filling or excavation.	corridor has been mapped in the Waterway corridors overlay.			
PO9 Development ensures that the building and site design: (a) maintains the conveyance capacity of existing overland flow paths and creek/waterways; (b) ensures floodwaters and flood debris can pass predominantly unimpeded under a structure or building to minimise property or building damage, including for a flood larger than the defined flood event; (c) mitigates flood impacts by ensuring that filling, excavation and location of services are designed to allow for the conveyance of floodwater across the site.	**AO9.1** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the Overland flow flood planning area sub-category: (a) complies with the minimum building undercroft clearance requirements in Table 8.2.11.3.E; (b) not located directly above any part of a waterway corridor as mapped in the Waterway corridors overlay. **AO9.2** Development involving a building undercroft in the Creek/waterway flood planning area sub-categories or the	**N/A**	No building undercrofts are proposed.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Note—The Flood planning scheme policy provides guidance on relevant considerations in determining minimum undercroft clearances and treatment of ground level in undercroft areas where floodwater conveyance is required underneath development.	Overland flow flood planning area sub category: (a) has a ground level within the undercroft area is free draining; (b) does not involve excavation below ground level of more than 300mm within the undercroft area.			
PO10 Development for vulnerable uses, difficult to evacuate uses or assembly uses optimises vehicular access and efficient evacuation from the development to parts of the road network unaffected by flood hazard, in order to: (a) protect safety of users and emergency services personnel; (b) upport efficient emergency services access and site evacuation with consideration to the scale of development. Note—A flood risk assessment may be required to address the performance outcomes or acceptable solutions which deal with evacuation and isolation arrangements, and the ability to take refuge. The Flood planning scheme policy provides information for undertaking flood risk assessments.	**AO10.1** Development for vulnerable uses, difficult to evacuate uses or assembly uses: (a) is not isolated in any event up to the relevant flood planning level specified in Table 8.2.11.3.L; or (b) has direct vehicle access to a critical route or interim critical route in the Critical infrastructure and movement network overlay for evacuation in a flood; or (c) can achieve vehicular evacuation to a suitable flood-free location. Note—A suitable flood-free location is of a size and nature sufficient to provide for the size and characteristics of the population likely to need evacuation to that area.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO11 Development has access which, having regard to hydraulic hazard, provides for safe vehicular and pedestrian movement and emergency services access to adjoining roads.	**AO11.1** Development provides an access or driveway into the site which is: (a) trafficable during the defined flood event; (b) not located in the Creek/waterway flood planning area 1 sub-category; (c) not located in the Overland flow flood planning area sub-category if the hydraulic hazard is unsafe in the defined flood event; (d) the access or driveway is not inundated by a 10% AEP flood. **AO11.2** Development located in the Creek/waterway flood planning area 1, 2, 3 or 4 sub-categories locates any disabled access in the highest part of the site. Note—explanation of hydraulic hazard provided in the Flood planning scheme policy.	**A/S**	Development will provide adequate area for the population on site to remain on site until flood waters recede. It is noted that the flooding along Beams Road is flood conveyance (or overland flow) as opposed to flood storage, therefore flood waters will recede in a short time frame.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO12 Development involving a new road, a bridge or culvert is designed to minimise impacts to flood behaviour, minimise disruption to traffic during a flood and allow for emergency access.	**AO12** Development involving a new road complies with the flood planning levels in Table 8.2.11.3.F.	**N/A**		
PO13 Development for pedestrian and cyclist paths: (a) provides a suitable level of trafficability; (b) manages the impacts of flooding on asset life and ongoing maintenance costs; (c) balances route availability with recreational and transport connectivity benefits to the city.	**AO13.1** Development for cyclist and pedestrian facilities other than on public roads, including those traversing through a park and adjacent to a watercourse and overland flow path, are located above the 39% AEP (2 year ARI) flood immunity from all flooding sources. Note—If the site is subject to more than one type of flooding, the requirement that affords the greatest level of protection will apply. **AO13.1** All new on-road cyclist and pedestrian facilities comply with the flood planning levels and trafficability standards for the applicable category of road in Table 8.2.11.3.F or Table 8.2.11.3.K.	✓	Development will provide a pedestrian facility that is above the 39% AEP.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO14 Development which increases the residential population within the Brisbane River flood planning area sub-categories minimises the risk to people in all flood events with consideration to flood hazard, including warning time.	**AO14** Development in the Brisbane River flood planning area sub-categories in areas where the residential flood level is greater than 12.8m AHD involving: (a) an increase in the number of residential dwellings; or (b) additional residential lots; or (c) is not subject to an unsafe hydraulic hazard in the 0.2% AEP flood event. Note—Explanation of a hydraulic hazard is provided in the Flood planning scheme policy.	**N/A**		
Additional criteria for essential community infrastructure				
PO15 Development involving essential community infrastructure: (a) remains functional to serve community need during and immediately after a flood event, or is part of a network that is able to maintain the function of the essential community infrastructure when parts of the development are unable to function during or after a flood; (b) is designed, sited and operated to avoid adverse impacts on the community or the environment due to the impacts of flooding on infrastructure, facilities or access and egress routes; (c) is able to remain functional or is part	**AO15** Development involving essential community infrastructure: (a) is ancillary to and not relied upon for the provision of the essential service during a flood; or (b) is located above the flood planning levels in Table 8.2.11.3.G; (c) has access to or provides the necessary back-up emergency electricity and communications supply in times of flood; (d) is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the flood event listed for the development type in Table	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
of a network which is able to remain functional even when other infrastructure or services (such as electricity supply) may be compromised in a flood event; (d) contains mitigation measures which are not entirely dependent on human activation to respond to a flood event. Note—Protection of function is required up to and including the flood event in Table 8.2.11.3.G.	8.2.11.3.G; (e) that services a local area: i. is able to be accessed in times of flood to service local community needs up to the event listed for that development type in Table 8.2.11.3.G; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood prone areas planning scheme policy and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood prone areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.			

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Additional criteria if development involves the processes in Table 8.2.11.3.H				
PO16 Development involving the storage and handling of hazardous materials avoids or minimises risks to public health and safety and the environment, by: (a) protecting underground tanks for hazardous materials against the forces of buoyancy, velocity flow and debris impacts; (b) securing above-ground tanks for hazardous materials against flotation and lateral movement; (c) preventing damage to hazardous materials pipework or entry of floodwater into hazardous materials pipework; (d) preventing damage to or off-site release of packages, drums or containers storing hazardous materials. Note—A chemical hazards flood risk report prepared in accordance with the Management of hazardous chemicals in flood prone areas planning scheme policy can assist in demonstrating achievement of this performance outcome. Note—A pump drainage system is not an acceptable measure to meet the performance outcome.	**AO16** (a) Development does not include the storage or handling of hazardous chemicals that are equivalent to or exceed the threshold quantities in Table 8.2.11.3.M. (b) Development involving the processes listed in Table 8.2.11.3.H: i. where located in the Flood overlay area, occurs only in the Creek/waterway flood planning area 5 sub-category or the Brisbane River flood planning area 5 sub-category; or ii. is consistent with the standards contained in the Management of hazardous chemicals in flood prone areas planning scheme policy and can operate without risk of environmental harm during a flood event. Note—The Management of hazardous chemicals in flood prone areas planning scheme policy sets out further information and processes including risk assessment for the management of hazardous chemicals in flood planning areas.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
Additional criteria for reconfiguring a lot				
PO17 Development locates and designs all lots resulting from reconfiguring a lot to: (a) minimise the risk to people from flood hazard; (b) minimise damage to property from flood hazard; (c) facilitate safe and efficient evacuation. Note— • Consideration of all floods up to the probably maximum flood is relevant to minimising the risk to people. • Flood warning time is not considered sufficient in the Creek/waterway planning area sub-categories or the Overland flow flood planning area sub-category. • Filling above the flood planning level for a flood event greater than the defined flood event cannot be assumed to mitigate the flood hazard.	**AO17.1** Development creating new lots is to comply with Table 8.2.11.3.I. **AO17.2** Development provides for reconfiguring a lot design that achieves a road and lot layout which: (a) provides trafficable vehicular egress for evacuation during a defined flood event; (b) optimises hazard-free movement away from sources of flood hazard within the development. Note—Further advice on road and lot layout is contained in the Flood planning scheme policy. **AO17.3** Development which creates a new residential lot in an area subject to Brisbane River flooding, if the residential flood level is greater than 12.8m AHD is not subject to a hydraulic hazard greater than 0.6m^2/s DV or 0.6m deep in a 0.2% AEP flood. Note—Refer to the Flood planning scheme policy for further explanation on the 0.2% AEP flood.	**N/A** **N/A** **N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

FLOOD OVERLAY CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO18 Development involving reconfiguring a lot: (a) minimises the risk to people from flood hazard; (b) creates safe evacuation routes or avoids isolation of the development during a flood greater than the defined flood event; (c) minimises damage to property and services; (d) provides lots and roads that are not frequently flooded or subject to nuisance ponding or seepage; (e) ensures lots created for park or private open space minimise the risk to people from flood hazard and are fit for purpose; (f) provides a lot that is not substantially burdened by flood mitigation infrastructure.	**AO18.1** Development involving reconfiguring a lot ensures: (a) all lots comply with the flood planning levels in Table 8.2.11.3.J; (b) a new road complies with the flood planning levels in Table 8.2.11.3.F.	**N/A**		
	AO18.2 Development involving reconfiguring a lot creating more than 6 residential lots or a lot for industry ensures the flood planning levels of a dedicated road fronting the development or providing primary access within 200m of the development: (a) complies with Table 8.2.11.3.K; or (b) has acceptable trafficability in accordance with the requirements in the Flood planning scheme policy and the Queensland Urban Drainage Manual. Note—The Flood planning scheme policy contains supporting information about trafficability on existing roads and serviceability during floods.	**N/A**		
	AO18.3 Development protects the conveyance of flood hazard area by providing an easement over the: (a) 2% AEP flood extent for overland flow flooding; (b) 1% AEP flood extent for creek/waterway flooding.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO1 Development provides roads, pavement, edging and landscaping which: (a) are designed and constructed in accordance with the road hierarchy; (b) provide for safe travel for pedestrians, cyclists and vehicles; (c) provide access to properties for all modes; (d) provide utilities; (e) provide high levels of aesthetics and amenity, improved liveability and future growth; (f) provide for the amelioration of noise and other pollution; (g) provide a high-quality streetscape; (h) provide a low-maintenance asset with a minimal whole-of-life cost. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**AO1** Development provides roads and associated pavement, edging and landscaping which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	✓	Driveways, pavement and landscaping will be designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy. Services exist within the surrounding road reserves and will be connected to the proposed development.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO2 Development provides road pavement surfaces which: (a) are well designed and constructed; (b) durable enough to carry the wheel loads of the intended types and numbers of travelling and parked vehicles; (c) ensures the safe passage of vehicles, pedestrians and cyclists, the discharge of stormwater run-off and the preservation of all-weather access; (d) allows for reasonable travel comfort.	**AO2** Development provides road pavement surfaces which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	✓	Development will provide road pavement surfaces which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	
PO3 Development provides a pavement edge which is designed and constructed to: (a) control vehicle movements by delineating the carriageway for all users; (b) provide for people with disabilities by allowing safe passage of wheelchairs and other mobility aids.	**AO3** Development provides pavement edges which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	✓	Development will provide pavement edges which are designed and constructed in compliance with the road corridor design standards in the Infrastructure design planning scheme policy.	
PO4 Development provides verges which are designed and constructed to: (a) provide safe access for pedestrians clear of obstructions and access areas for vehicles onto properties; (b) provide a sufficient area for public utility services; (c) be maintainable by the Council.	**AO4** Development provides verges which are designed and constructed in compliance with the road corridor design and streetscape locality advice standards in the Infrastructure design planning scheme policy.	✓	Development will provide verges which are designed and constructed in compliance with the road corridor design and streetscape locality advice standards in the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO5 Development provides a lane or laneway identified in a neighbourhood plan which: (a) allows equitable access for all modes; (b) is safe and secure; (c) has 24-hour access; (d) is a low-speed shared zone environment; (e) has a high-quality streetscape.	**AO5** Development provides a lane or laneway identified in a neighbourhood plan which is embellished in compliance with the streetscape locality advice standards in the Infrastructure design planning scheme policy.	**N/A**		
PO6 Development of an existing premises provides at the frontage to the site, if not already provided, the following infrastructure to an appropriate urban standard: (a) an effective, high-quality paved roadway; (b) an effective, high-quality roadway kerb and channel; (c) safe, high-quality vehicle crossings over channels and verges; (d) safe, accessible, high-quality verges compatible and integrated with the surrounding environment; (e) safe vehicle access to the site that enables ingress and egress in a forward gear; (f) provision of and required alterations to public utilities; (g) effective drainage; (h) appropriate conduits to facilitate the provision of required street-lighting systems and traffic signals.	**AO6** Development of an existing premises provides at the frontage of the site, if not already existing, the following infrastructure to the standard that would have applied if the development involved new premises as stated in the road corridor design standards in the Infrastructure design planning scheme policy: (a) concrete kerb and channel; (b) forming and grading to verges; (c) crossings over channels and verges; (d) a constructed bikeway; (e) a constructed verge or reconstruction of any damaged verge; (f) construction of the carriageway; (g) payment of costs for required alterations to public utility mains, services or installations; (h) construction of and required alterations to public utility mains, services or installations; (i) drainage works; (j) installation of electrical conduits.	✓	Any works required within the adjacent road corridors will be to the standards stated in the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO7 Development provides both cycle and walking routes which: (a) are located, designed and constructed to their network classification (where applicable); (b) provide safe and attractive travel routes for pedestrians and cyclists for commuter and recreational purposes; (c) provide safe and comfortable access to properties for pedestrians and cyclists; (d) incorporate water sensitive urban design into stormwater drainage; (e) provide for utilities; (f) provide for a high level of aesthetics and amenity, improved liveability and future growth; (g) are a low-maintenance asset with a minimal whole-of-life cost; (h) minimise the clearing of significant native vegetation. Note—This can be demonstrated in an engineering report prepared and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.	**AO7** Development provides cycle and walking routes which are located, designed and constructed in compliance with the road corridor design and off-road pathway design standards in the Infrastructure design planning scheme policy.	✓	Development will provide walking routes which are designed and constructed in compliance with the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO8 Development provides refuse and recycling collection, separation and storage facilities that are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised.	**AO8.1** Development provides refuse and recycling collection and storage facilities in accordance with the Refuse planning scheme policy. **AO8.2** Development ensures that refuse and recycling collection and storage location and design do not have any adverse impact including odour, noise or visual impacts on the amenity of land uses within or adjoining the development. Note—Refer to the Refuse planning scheme policy for further guidance.	✓	Development will provide refuse and recycling collection and storage facilities in accordance with the Refuse planning scheme policy and they will have no adverse impacts.	
PO9 Development ensures that: (a) land used for an urban purpose is serviced adequately with regard to water supply and waste disposal; (b) the water supply meets the stated standard of service for the intended use and fire-fighting purposes.	**AO9.1** Development ensures that the reticulated water and sewerage distribution system for all services is in place before the first use is commenced. **AO9.2** Development provides the lot with reticulated water supply and sewerage to a standard acceptable to the distributor–retailer.	✓	Development ensures that the reticulated water and sewerage distribution system for all services is in place before the first use is commenced. Connections will be provided as outline in Bornhorst and Ward's Engineering Serviceability Report and Site Based Stormwater Management Plan.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO10 Development provides public utilities and street lighting which are the best current or alternative technology and facilitate accessibility, easy maintenance, minimal whole-of-life costs, and minimal adverse environmental impacts.	**AO10.1** Development provides public utilities and street lighting which are located and aligned to: (a) avoid significant native vegetation and areas identified within the Biodiversity areas overlay map; (b) minimise earthworks; (c) avoid crossing waterways, waterway corridors and wetlands or if a crossing is unavoidable, tunnel-boring techniques are used to minimise disturbance, and a disturbed area is reinstated and restored on completion of the work. Note—Guidance on the restoration of habitat is included in the Biodiversity areas planning scheme policy. **AO10.2** Development provides compatible public utility services and street-lighting services which are co-located in common trenching for underground services. **AO10.3** Development provides public utilities and street lighting which are designed and constructed in compliance with the public utilities standards in the Infrastructure design planning scheme policy.	✓	Development will provide lighting which is designed and constructed in compliance with the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO11 Development ensures that land used for urban purposes is serviced adequately with telecommunications and energy supply.	**AO11** Development provides land with the following services to the standards of the approved supplier: (a) electricity; (b) telecommunications services; (c) gas service where practicable.	✓	The development has telecommunications and energy infrastructure located around it and will be serviced adequately to ensure supply of these services. This will be achieved with Energex and Telstra's coordination and approval. See Bornhorst and Wards Engineering Serviceability Report for more information.	
PO12 Development ensures that major public projects promote the provision of affordable, high-bandwidth telecommunications services throughout the city.	**AO12** Development provides conduits which are provided in all major Council and government works projects to enable the future provision of fibre optic cabling, if: (a) the additional expense is unlikely to be prohibitive; or (b) further major work is unlikely or disruption would be a major concern, such as where there is a limited capacity road; or (c) there is a clear gap in the telecommunications network; or (d) there is a clear gap in the bandwidth available to the area. Editor's note—An accurate, digital 'as built' three-dimensional location plan is to be supplied for all infrastructure provided in a road.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO13 Development provides public art identified in a neighbourhood plan or park concept plan which: (a) is provided commensurate with the status and scale of the proposed development; (b) is sited and designed: (i) as an integrated part of the project design; (ii) as conceptually relevant to the context of the location; (iii) to reflect and respond to the cultural values of the community; (iv) to promote local character in a planned and informed manner.	**AO13** Development provides public art identified in a neighbourhood plan or park concept plan which is sited and designed in compliance with the public art standards in the Infrastructure design planning scheme policy.	**N/A**		
PO14 Development provides signage of buildings and spaces which promote legibility to help users find their way.	**AO14** Development provides public signage: (a) at public transport interchanges and stops, key destinations, public spaces, pedestrian linkages and at entries to centre developments; (b) which details the location of the key destinations, public spaces and pedestrian linkages in the vicinity, the services available within the development and where they are located. Editor's note—Signage is to be in accordance with Local Law Number 1 (Control of Advertisements Local Law).	**N/A**		

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO15 Development that provides community facilities which form part of the development is functional, safe, low maintenance, and fit for purpose.	**AO15** Development that provides community facilities which form part of the development is designed in compliance with the community facilities standards in the Infrastructure design planning scheme policy.	**N/A**		
PO16 Development provides public toilets which: (a) are required as part of a community facility or park; (b) are located, designed and constructed to be: (i) safe; (ii) durable; (iii) resistant to vandalism; (iv) able to service expected demand; (v) fit for purpose.	**AO16** Development that provides public toilets is designed and constructed in compliance with the public toilets standards in the Infrastructure design planning scheme policy.	**N/A**		
PO17 Development provides bridges, tunnels, elevated structures and water access structures that are designed and constructed using proven methods, materials and technology to provide for: (a) safe movement of intended users; (b) an attractive appearance appropriate to the general surroundings and any adjacent structures;	**AO17** Development that provides bridges, tunnels, elevated structures and water access structures is designed and constructed in compliance with the standards in the Infrastructure design planning scheme policy.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
(c) functionality and easy maintenance; (d) minimal whole-of-life cost; (e) longevity; (f) current and future services. Note—All bridges and elevated and associated elements must be designed and certified by a Registered Professional Engineer Queensland in accordance with the Infrastructure design planning scheme policy.				
PO18 Development provides culverts which are designed and constructed using proven methods, materials and technology to provide for: (a) safety; (b) an attractive appearance appropriate to the general surroundings; (c) functionality and easy maintenance; (d) minimal whole-of-life cost; (e) longevity; (f) future widening; (g) current and future services; (h) minimal adverse impacts, such as increase in water levels or flow velocities, and significant change of flood patterns. Note—All culverts and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards.	**AO18** Development that provides culverts is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
PO19 Development provides batters, retaining walls, and seawalls and river walls which are designed and constructed using proven methods, materials and technology to provide for: (a) safety; (b) an attractive appearance appropriate to the surrounding area; (c) easy maintenance; (d) minimal whole-of-life cost; (e) longevity; (f) minimal water seepage. Note—All retaining walls and associated elements are to be designed and certified by a Registered Professional Engineer Queensland in accordance with the applicable design standards.	**AO19** Development that provides batters, retaining walls, seawalls and river walls is designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	✓	Retaining walls and batters required for the development will be designed and constructed in compliance with the structures standards in the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
If for development with a gross floor area greater than 1,000m^2				
PO20 Development ensures that construction is managed so that use of public spaces and movement on pedestrian, cyclist and other traffic routes is not unreasonably disrupted and existing landscaping is adequately protected from short- and long-term impacts. Note—The preparation of a construction management plan can assist in demonstrating achievement of this performance outcome. Note—The Transport, access, parking and servicing planning scheme policy provides advice on the management of vehicle parking and deliveries during construction.	**AO20** Development ensures that during construction: (a) the ongoing use of adjoining and surrounding parks and public spaces, such as malls and outdoor dining, is not compromised; (b) adjoining and surrounding landscaping is protected from damage; (c) safe, legible, efficient and sufficient pedestrian, cyclist and vehicular accessibility and connectivity to the wider network are maintained.	✓	Construction will be managed so that use of public spaces and movement on pedestrian, cyclist and other traffic routes is not unreasonably disrupted and existing landscaping is adequately protected from short- and long-term impacts.	
PO21 Development ensures that construction and demolition activities are guided by measures that prevent or minimise adverse impacts including sleep disturbance at a sensitive use, due to noise and dust, including dust from construction vehicles entering and leaving the site. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in	**AO21.1** Development ensures that demolition and construction: (a) only occur between 6:30am and 6:30pm Monday to Saturday, excluding public holidays; (b) do not occur over periods greater than 6 months. **AO21.2** Development including construction and demolition does not release dust emissions beyond the boundary of the	✓	Release of dust emissions beyond the boundary of the site will not occur during demolition and construction. These activities will only take place between 6:30am and 6:30pm Monday to Saturday, excluding public holidays and will not occur over periods greater than 6 months.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

INFRASTRUCTURE DESIGN CODE
Performance Criteria and Acceptable Solutions

PERFORMANCE OUTCOME	ACCEPTABLE OUTCOME	SOLUTION[1]	COMMENTS	COUNCIL USE ONLY
demonstrating achievement of this performance outcome.	site. **AO21.3** Development construction and demolition does not involve asbestos-containing materials.			
PO22 Development ensures that: (a) construction and demolition do not result in damage to surrounding property as a result of vibration; (b) vibration levels achieve the vibration criteria in 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. Note—A vibration impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO22** Development ensures that the nature and scale of construction and demolition do not generate noticeable levels of vibration.	✓	Development ensures that the nature and scale of construction and demolition do not generate noticeable levels of vibration in accordance to the Brisbane City Councils vibration criteria.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this Proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
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.*	**A01** Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.	✓	The proposal complies with the Infrastructure Design Planning Scheme Policy.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
P02 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.**	✓ ✓	The proposal 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 existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.	**AO3.1** Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage reserve, public pathway, park or waterway corridor. **AO3.2** Development provides a stormwater management system which is designed in compliance with the standards in the **Infrastructure design planning scheme policy.** **AO3.3** Development obtains a lawful point of discharge in compliance with the standards in the **Infrastructure design**	✓ ✓ ✓	The design demonstrates that a drainage network will be provided that will comply with Council's Infrastructure design planning scheme policy. Conceptual drainage requirements for the proposal are identified in the SBSMP.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
	planning scheme policy. **AO3.4** Where on private land, all underground stormwater infrastructure is secured by a drainage easement.	✓		
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.	**AO4.1** 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.** **AO4.2** Development provides sufficient area to convey run-off which will comply with the standards in the **Infrastructure design planning scheme policy.**	✓ ✓	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 taking into account increased runoff and flooding in local catchments.	
P05 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.	**AO5** 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.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
PO6 Development ensures that location and design of 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.	**AO6.1** Development locates stormwater detention and water quality treatment: (a) outside of a waterway corridor; (b) offline to any catchment not contained within the development.	✓		
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 The proposed development design provides a stormwater management system that ensures the safe pedestrian and vehicle access in accordance with the Infrastructure design planning scheme policy.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
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.** **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.** **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.**	✓	The proposed development stormwater designs are in accordance with the Infrastructure design planning scheme policy. The proposed development does not include any channel or creek modification works.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
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.	**A/S**	The development manages peak flows through a detention tank and is in accordance with the Infrastructure design planning scheme policy.	
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.	✓	The proposed development ensures there is sufficient site area to accommodate an effective stormwater management system. This is demonstrated in the SBSMP. Works will comply with Council's Erosion and Sediment Control Standard. An Erosion and Sediment Control Plan will be submitted in the detailed design phase of the development. Strategies that will be implemented have been outlined in the SBSMP. A Detailed Erosion and Sediment Control Program will be prepared and submitted during the Operation Works phase of the development.	
PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the:	**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.	**N/A**		

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
(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.	**AO11.2** Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the **Priority infrastructure plan** and the standards in 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.	✓	The proposed development stormwater designs are in accordance with the Infrastructure design planning scheme policy.	
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,	**AO13** No acceptable outcome is prescribed.	**A/S**	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.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
Performance Outcomes and Acceptable Solution

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	SOLUTIONS[1]	COMMENTS	COUNCIL USE ONLY
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*.				
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	**A/S**	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: (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.	**AO15** No acceptable outcome is prescribed	**A/S**	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.	

1. Solution: ✓ = Acceptable Outcome
A/S = Performance Outcome
N/A = Not applicable to this proposal

STORMWATER CODE
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Section B—Additional criteria 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 2,500m^2 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 2,500m^2 of land and will result in 6 or more lots; (c) operational work for an urban purpose which involves disturbing greater than 2,500m^2 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 **Environmental Protection Act 1994.*** *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.	✓	The proposed development stormwater designs are in accordance with the Infrastructure design planning scheme policy.	
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	**AO17** No acceptable outcome is prescribed.	**A/S**	The development discharges all wastewater into existing infrastructure surrounding the site.	

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this proposal

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.*				

1. Solution: ✓ = Acceptable Outcome
   A/S = Performance Outcome
   N/A = Not applicable to this proposal