

Parkside Yeronga

Site Based Stormwater Management Plan (SBSMP)

Development Application

Prepared for: Economic Development Queensland

Date: 14/02/2022

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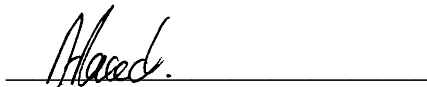
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Revision

Revision	Date	Comment	Prepared By	Approved By
A	8/9/21	Draft Issue for comment	BM/ AR	AR
B	15/9/21	Issued for Approval	BM/ AR	AR
C	14/02/22	Further Issues Response	AR	AR

Site Address: 70 Park Road, Yeronga, QLD, 4104
Real Property Description: Lot 3 on SP300888
Proposed Development: PDA Preliminary Approval for a material change of use and a PDA Development Permit for a reconfiguring a lot (1 into 11 lot subdivision, easements and road)

Client: Economic Development Queensland
Local Authority: Minister for Economic Development Queensland
Authority Reference #: DEV2021/1221
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 For and on behalf of
Stantec Australia Pty Ltd

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1. Introduction

Stantec have been commissioned by Economic Development Queensland (EDQ) to prepare this Stormwater Management Plan to accompany a development application for the proposed Parkside Yeronga Masterplan ('the masterplan'). The development application will focus on a Preliminary Approval to give effect to the masterplan to act as a framework for subsequent development applications made in respect of the individual sites within the master plan area. The application will also include a Reconfiguring a Lot (RoL) to establish the master lots for the project.

This report outlines the concept stormwater servicing strategy to support the Development Application for the proposed subdivision being lodged with EDQ. It will outline the stormwater management strategy proposed to meet the runoff quantity and quality objectives outlined in the Development Scheme for the Yeronga PDA, and the EDQ Technical Guideline No. 13.

1.1 Purpose

The purpose of this Report is to evaluate the quantity and quality of stormwater associated with the proposed development so as to demonstrate to MEDQ that an appropriate stormwater management strategy can be accommodated.

This report specifically addresses the following items for both the construction and operational phases of the development:

- An appropriate stormwater quality management strategy can be implemented that meets Water Sensitive Urban Design (WSUD) best management practices, state and local government planning and guideline requirements,
- An appropriate stormwater quantity management strategy can be implemented to ensure that the developed site's stormwater runoff meets Council requirements, and
- Maintenance of water quality treatment devices.

1.2 Further Issues Response

The Applicant received a Further Issues Letter from Economic Development Queensland Development Assessment dated 28 October 2021 and the Department of Transport and Main Roads (TMR) dated 5 October 2021. This report has been revised to reflect the items raised. For specific responsive comments, please refer to the covering Further Issues Response Letter dated 11 February 2022.

We note that Revision C of this report, has had the stormwater Quantity Management Section (Section 4) substantially replaced by the Flood Assessment Report prepared by Watertech on behalf of Stantec, dated 11 February 2022.

2. Existing Site Characteristics

2.1 Property Detail

Address: 70 Park Road, Yeronga

Real Property Description: Lot 3 on SP300888

For the purpose of the development application, the Parkside Yeronga site relates to all land within the Yeronga Priority Development Area. In broad terms, the site can be described as the land bounded by Villa Street, Park Street, the railway line and Yeronga State School. This is pictured in Figure 2-1 and Figure 2-2 below.

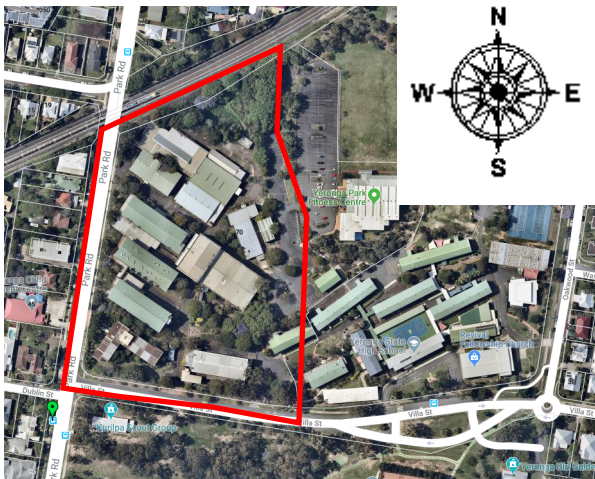


Figure 2-1: PDA Boundary (Source: DSDMIP, 2018)

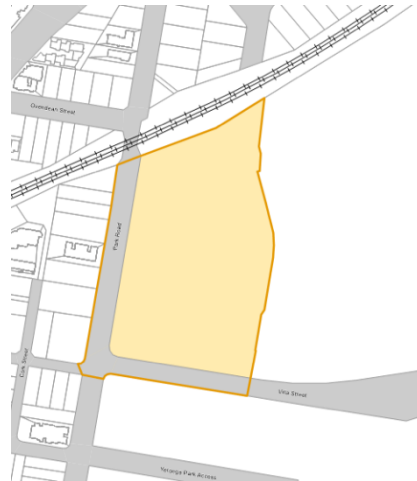


Figure 2-2: Site Location Plan (Source: Nearmap Australia 2018)

2.2 Existing Site Conditions

The site was formerly occupied by the Yeronga TAFE until it closed in 2010. All buildings on the site have been demolished and the site cleared. However, for the purposes of assessing development impacts, the site's former use should be considered as the baseline position.

2.3 Proposed Development

The proposal seeks a PDA Preliminary Approval for a material change of use and a PDA Development Permit for a reconfiguring a lot (1 into 11 lots, easements and road). The proposed Plan of Subdivision is included in Appendix 2.

The proposal seeks a PDA preliminary approval for a material change of use in accordance with a masterplan for the development of 4 precincts as follows:

1. Residential Precinct
2. Community Precinct
3. Commercial Precinct
4. Open Space Precinct

The land uses sought in each precinct are outlined within Table 2-1 below.



Residential Precinct	Community Precinct	Commercial Precinct	Open Space Precinct
Care co-located uses	Childcare centre	Childcare centre	Park
Dwelling house	Club	Community care centre	
Dual occupancy	Community care centre	Food and drink outlet	
Multiple dwelling	Community use	Health care service	
Park	Food and drink outlet	Office	
Residential care facility	Shop	Shop	
Retirement facility			

Table 2-1: Precinct land uses

The PDA Development Permit for reconfiguring a lot (1 into 11 lots, easements and road) will be undertaken in the following stages:

- **Stage 1:** 3 lot subdivision to establish lots 1, 11 easements and balance lot (lot 500).
- **Stage 2a:** 8 lot subdivision of balance lot (lot 500) to establish lots 3, 4, 5, 6, 7, 8, 10, 21, 22 and easements.
- **Stage 2b:** volumetric easements (Public Plaza).

There will be subsequent stages for separate applications associated with Material Change of Use applications for each of the newly created lots (not part of this application).

The proposed Masterplan in Appendix 2 has been used to develop a potential composition. This will demonstrate the proposed servicing has adequate capacity to support the proposed development.

It is noted that the Masterplan layout is illustrative of the intended development but is subject to design development and associated approvals. Therefore, depicted civil works, should be interpreted as pictorial only, and not necessarily an engineering requirement.

2.4 Topography

As shown in the combined detail feature survey completed by Wolter Consulting Group on 31/03/2021 (Appendix 1). The sites ground level ranges from a minimum of 5.5m AHD adjacent to the rail line embankment, to a maximum ground level of 22.3m AHD on Villa St. The site generally grades from the southern boundary to the northern boundary. The topography is characterised as steep or retained towards Villa St, with general grade on average of 6% towards the railway line. Batters are located adjacent to the railway line adjacent to the stormwater inlet pit.

3. Flooding/ Overland Flow Impacts

3.1 General Site Characteristics

3.1.1 Flooding

The Brisbane City Council (BCC) Interactive Mapping 2014 and the BCC FloodWise Property Report (Appendix 3) indicates that the northern section of the development site is located within the Brisbane River Flood Planning Area overlay. The northern end of the site, including the park/open space area, is located within the Brisbane River Flood Planning Area 5.

In addition, the site is impacted by overland flow which traverses through the centre of the site during major storm events and is directed to the existing Lawful Point of Discharge (LPD) at the railway line. These flows originated from the now demolished internal roads of the TAFE site. An analysis of the existing flooding and hydrology characteristics pertinent to the site, and the proposed stormwater management requirements are addressed below.

3.1.2 Waterways

Reviewing BCC Interactive Mapping 2014 identifies that the subject site does not have a defined waterway within the site, neither is the site located adjacent to a defined waterway where stormwater flow would discharge directly to. The Brisbane City Plan Interactive Mapping 2014 identifies that the closest defined waterway ends at Fairfield Road and consequently has no impact on the development site.

3.1.3 Referable Dams

A 'referable dam' is defined within the Water Supply (safety and Reliability) Act 2008 and is referred to under the State Development Assessment Provisions No.20. Essentially a dam is referable if a failure impact assessment was required for the dam, an assessment found the dam has a failure impact rating, and the assessment has been accepted by the chief executive administering the Act.

A dam is required to be failure impact assessed if after its construction, or as a result of modification works, the dam will be:

- More than 10m in height and have a storage of more than 1500ML, or
- More than 10m in height and a storage of more than 750ML and a catchment area more than 3 times its maximum surface area at full supply level.

No existing or proposed water bodies meet the above criteria; thus a failure impact assessment is not required, and therefore the SDAP No.20 is not applicable to this development.

3.2 Riverine Flooding

3.2.1 Background Data

Information retrieved from BCC Interactive Mapping 2014 and BCC Flood awareness mapping identifies that the site is affected by riverine flooding. The following information was established:

- The development is affected by the Brisbane River Flood Planning Area 5. Refer to Figure 3 below, with the ROL plan from Wolter Consulting Group dated 07/09/2021 overlaid.
- BCC's flood awareness mapping identifies that the site is affected by low likelihood and very low likelihood flood events. Refer to Figure 4 below.
- The FloodWise Property Report (contained within Appendix 3) for the property prepared by BCC outlines that the site is impacted by the 1% Annual Exceedance Probability (AEP) event to a flood level of 8.3m AHD.
- The FloodWise report also identifies that during the January 2011 flood event, the site was impacted to a flood level of 7.8m AHD.

- The Brisbane River Catchment Flood Study (BRCFS) (Version 803) identified a flood level of RL11.80m AHD for a 0.2% AEP (1 in 500yr ARI) event.

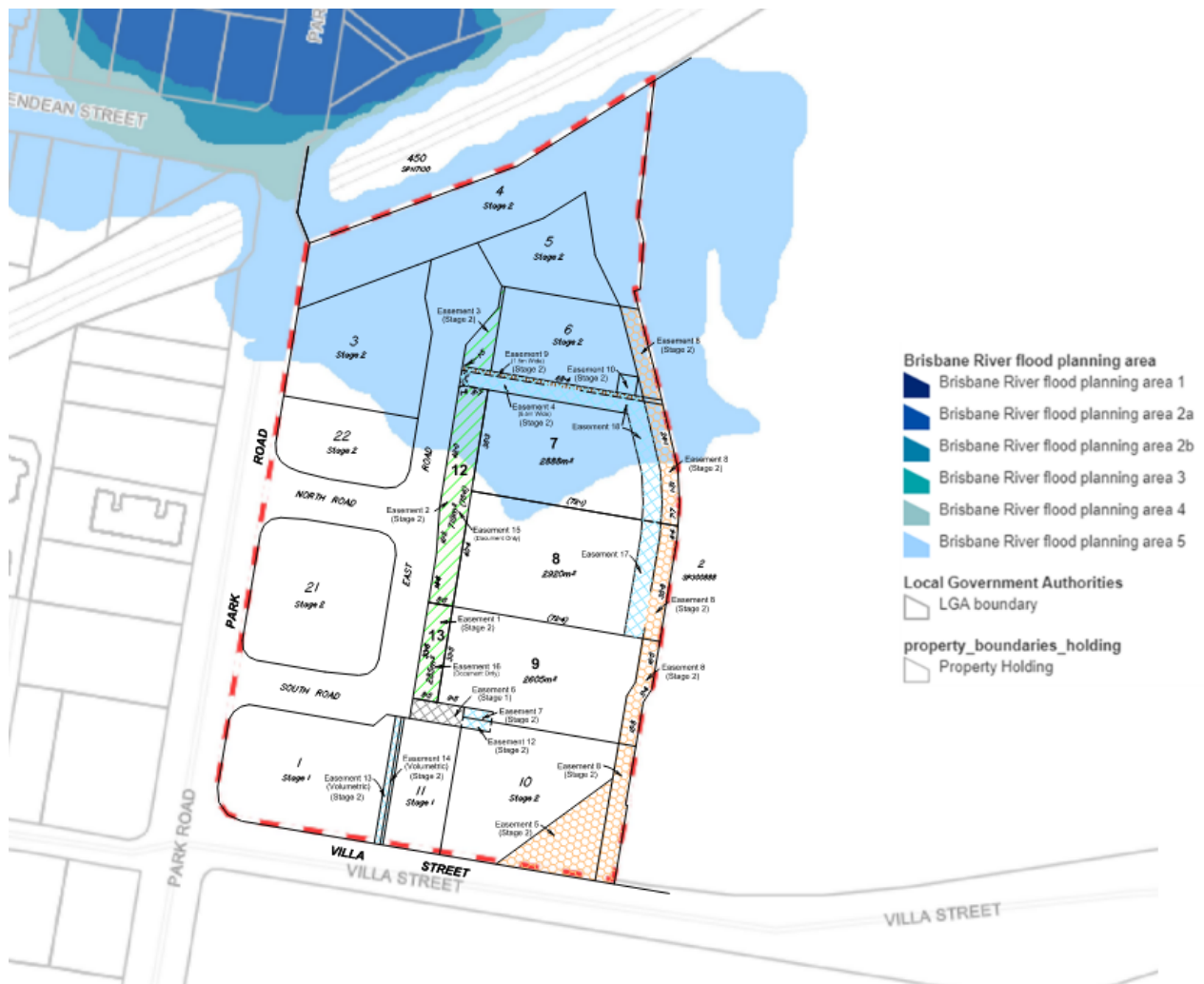


Figure 3: Riverine Flooding to Parkside Yeronga Overlay with ROL Plan (Source: Brisbane City Council Interactive Mapping 2014)

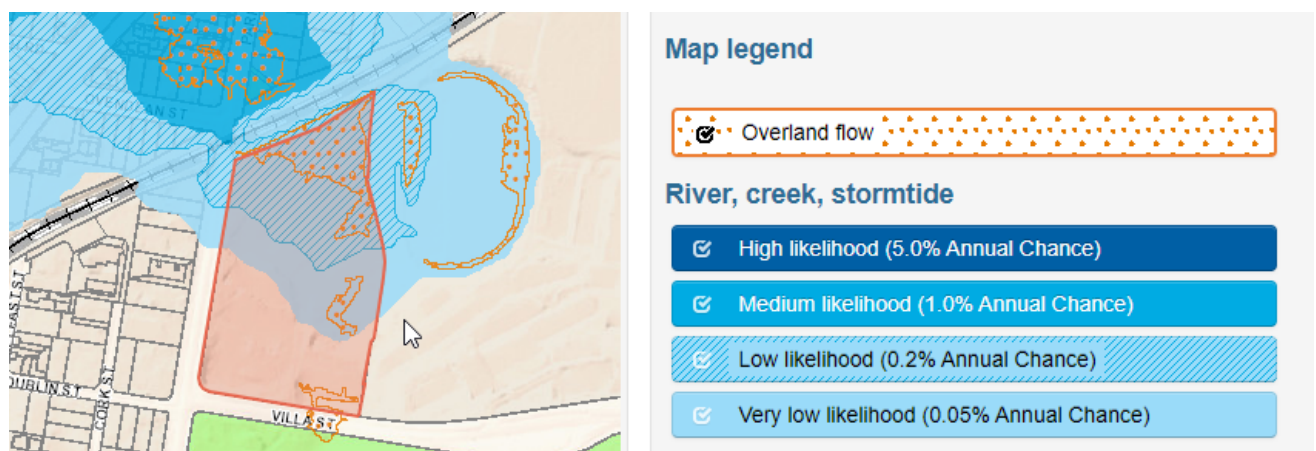


Figure 4: Riverine Flooding to Parkside Yeronga (Source: Brisbane Flood Awareness Mapping 2014)

3.2.2 Brisbane River Catchment Flood Study Use Note

In accordance with the use license with the State of Queensland as represented by the Department of Environment and Science (DES), it is noted that the flood levels associated with Riverine Flooding are *based on or contains data provided by the State of Queensland (Department of Environment and Science) 2021. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.*

3.2.3 Riverine Flood inundation assessment

As identified in Section 3.1.1, the subject site is impacted by inundation from the Brisbane River. As the Brisbane River flood levels rise, water backs up through existing stormwater infrastructure along Hyde Park and across Fairfield Road. Eventually, this back flow of stormwater enters the site via existing stormwater infrastructure located at the lawful point of discharge (LPD) in the northern extents of the site near the railway overpass.

Flood Storage

The flood storage available on-site under inundation from the backwatering from the Brisbane River is:

- Base case: 2,830m³
- Post Development: 2,835m³

However, it should be noted that the flood storage on the site will have a negligible impact on Brisbane River Flood. Further, it appears that the Brisbane River Catchment Flood Study hasn't contemplated the available flood storage on the subject site, so it will not impact on their derived flood planning levels downstream. As such, while this has been achieved, we believe any changes will not impact on Riverine Flood inundation in the site, or external to the site.

Flood Planning Area 5

As presented in Figure 3, portions of the site are impacted by the Brisbane River Flood Planning Area (FPA) 5. BCC identifies that FPA 5 is regarded as areas where there is no recent flooding history but there is potential for flooding within very rare events. As per the BCC Flood Overlay Code, the following land uses are incompatible with FPA 5:

- Residential care facility
- Hospital
- Detention facility
- Emergency services
- Major electricity infrastructure

The Masterplan is proposing the following uses, which are considering compatible with the FPA5 overlay:

- Childcare centre
- Club
- Community care centre
- Community use
- Dwelling houses
- Food and drink outlet
- Health care service
- Multiple dwelling
- Office
- Park
- Retirement facility; and

- Shop

The Masterplan includes a proposed Residential care facility use, which is not considered compatible with the FPA5 overlay. It is noted that only the lower portion of the site is affected by the FPA5 overlay, specifically Lots 3, 4, 5, 6 and 7. Further, the FPA5 is based on the baseline site levels current when the TAFE was in operation. The FPA5 overlay is the result of the backflow from the Brisbane River Flooding in a 0.2% AEP event and is estimated to be RL 11.8m AHD based on the BRCFS. There is filling proposed within the FPA5 overlay, which will change the area expected to be impacted by the relevant very rare flood event. The Yeronga PDA Development Scheme references the BCC Flood Overlay Code, which recommends a flood risk assessment in accordance with the requirements of the BCC Flood Planning Scheme Policy to assess the appropriate risk and mitigation measures to demonstrate that vulnerable uses are not located in areas where the risk from flooding is unacceptable or intolerable and cannot be mitigated. Section 3.2.4 undertakes a high-level risk assessment for the Residential Care facility use.

3.2.4 Flood Risk Assessment – Residential Care Facility

Stantec have undertaken a high-level flood risk assessment in reference to the Residential Care Facility use that that could be applied for on Proposed Lot 7. As per the previous section, this proposed lot is impacted by FPA5 for which a Residential Care Facility use is not deemed to be compatible without an appropriate Flood Risk Assessment as per the BCC Flood Overlay Code and the BCC Flood planning scheme policy.

Stantec have made the following considerations in reference to the potential for a Residential Care Facility use on proposed Lot 7:

- The FPA5 overlay corresponds to a 0.2% AEP flood event, which is a very rare flood event, which correlates with ~RL11.8m AHD.
- Only the northern portion of Lot 7 is impacted by the FPA5 overlay
- There is filling proposed in the impacted area of Lot 7, which will lift the minimum podium level of any potential development (assumed to be higher than the proposed minimum adjacent road level of RL12.5m AHD), which is above associated estimated flood level
- The flood planning area is associated with the impacts of backflow from the Brisbane River Flooding event. Brisbane River is a long river which has long time to peak flood levels and is monitored, and has an established warning system throughout the relevant Local Government Authorities. As such, there is a low risk associated with inadequate warning times or notifications with existing notification processes in place by the relevant authorities.
- Safe access and egress from Lot 7 will be available via the shared access easement in Lot 10, which is unimpacted by flooding.

Based on the above, the following recommendations are proposed where a Residential Care Facility Use is proposed on Lot 7:

1. The Residential Care facility uses are located outside the FPA5 impacted areas of the site where possible
2. Critical infrastructure that supports the Residential Care Facility use such as transformers, main switchboards, etc, should be located above the 0.2% AEP flood level, or where in a basement below the 0.2% AEP flood level, the lowest opening or basement entry should be located above this flood level.
3. The proposed development should prepare flood emergency management plans and flood warning systems will be put in place as a part of the facilities operations plans.
4. An emergency access/ egress should be incorporated above the FPA5 overlay
5. A development specific Flood Risk Assessment should be undertaken in conjunction with the relevant development application to EDQ for the respective use.

3.3 Local/Overland Flow Flooding

3.3.1 Background data

Information retrieved from BCC Interactive Mapping 2014 and BCC Flood awareness mapping identifies that the site is also affected by overland flow. The information identified in Figure 5 and Figure 6 below (retrieved from BCC Interactive Mapping



and Flood awareness mapping respectively), indicates the site experiences overland flow generated from major storm events that traverses the now demolished internal road network within the site and is discharged via existing stormwater infrastructure to the LPD.



Figure 5: Overland Flooding to Parkside Yeronga (Source: BCC Interactive Mapping 2014)

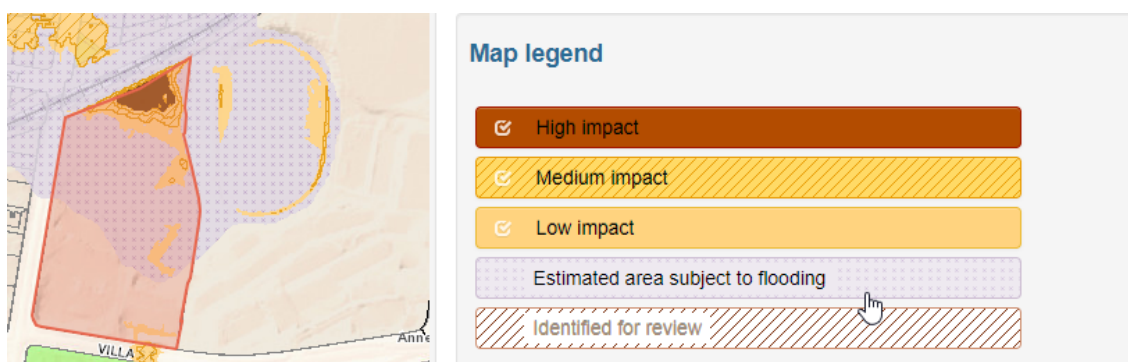


Figure 6: Overland Flooding to Parkside Yeronga (Source: BCC Flood Awareness Mapping)

3.3.2 Overland flow Flood inundation assessment

The Parkside Yeronga development is influenced by local/overland flooding from three separate catchments. As identified in drawing 520-P02 in Appendix 4, Catchment 1 represents stormwater overland flow generated from the east of the Parkside Yeronga development, Catchment 2 represents stormwater overland flow generated within the site and Catchment 3 represents stormwater overland flow generated from the south. Table 3-1, below presents a summary of the catchments currently influencing the subject site.

Catchment	Area (Ha)	Location
Catchment No.1	12.97	East of the Parkside Yeronga
Catchment No.2	3.43	Internal to the Parkside Yeronga
Catchment No.3	5.22	South of the Parkside Yeronga

Table 3-1: External Catchments Summary

Catchment 1 largely contains the Yeronga State High School and a portion of Oakwood St, Waverly St and Villa St and private dwellings on these streets to the east of the subject site. A majority of the runoff from this catchment is intercepted by the rail line, and the access road/car park along the common boundary with the Parkside Yeronga site, and is directed to the north west of the high school site. The runoff is conveyed to the field inlet located within the subject site, adjacent to the rail line. Therefore, a significant portion of this catchment has limited impact on the proposed layout. Stormwater flows that overtop the kerb along the School's carpark, and localised areas of sheet flow, enter the site over the eastern boundary.

Catchment 2 is the proportion of runoff that is contributed to by the subject site. This stormwater and its management are assessed within Section 4.

Catchment 3 is primarily the existing park facilities on the southern side of Villa St with minor contributions from the Yeronga Primary School and the area of Villa St to the south of the site. They are collected at the existing sag in Villa St located directly to the south of the subject site. There is currently an existing field inlet in the adjacent park which intercepts surface runoff within the park, and road gullies in Villa St intercept existing road flows. These captured flows are conveyed via an existing 525/600 dia. stormwater pipe that runs through the subject site. When the pipe's capacity is exceeded and/or the inlets become blocked, stormwater would surcharge and flow through the subject site. During site visual inspections, there was evidence of regular debris blockage occurring at these inlets in the park and in the sag in Villa St.

3.3.3 Proposed mitigation measures

The following mitigation measures are proposed to address the existing overland flow constraints:

- Overland flow path located along the eastern boundary of the subject site, along the common boundary with the Yeronga State High School, within the proposed development site to intercept surface flows from Catchment 1 and convey surcharge flows from Catchment 3.
- Upgrade of the existing pipe network draining the trapped sag in Villa St to a DN1200 and realigning it under the proposed overland flow path
- Upgrade inlet capacities in Villa St to achieve the minimum levels of serviceability and trafficability criteria for a minor road.
- Direct surface flows not captured by the proposed pipe network in Villa St, across Lot 10 to the eastern landscaped overland flow path.
- The internal pit and pipe network, and roadways will capture and convey stormwater associated with Catchment 2.

The overland flow path proposed along the eastern boundary is proposed to have the following characteristics:

- 5.5m minimum width contained in a 6m drainage easement
- 1.2m wide Concrete lined invert channel
- Landscaped batters

The overland flow path is proposed to be a staged construction:

- Reconfiguration of a Lot (RoL) development permit will deliver:
 - Establishment of the drainage easement
 - DN1200 pipe and pit system
 - retaining walls (if required) along the common boundary with the Yeronga State High School

- finished surface profile of the drain section within the proposed drainage easement
 - Concrete lined invert
 - batters as required from the edge of the easement to the surface levels within the proposed lots
- Future developments on the respective lots (Material Change of Use) will deliver:
 - Landscaped batters, in accordance with the approved Site-based Stormwater Management Plan and Illustrative Landscaping Masterplan
 - Edge treatment adjacent to but located outside the easement boundary with the respective lots, which may (or may not) involve a wall (for example a basement wall, retaining wall or other built-form).
 - Preclusion fencing to ensure access is only available authorised individuals
 - Access provisions for maintenance

The proposed details of overland flow path are depicted in the Engineering drawings contained in Appendix 4. However, generally, the ultimate form of the overland flow path is shown in Figure 7.

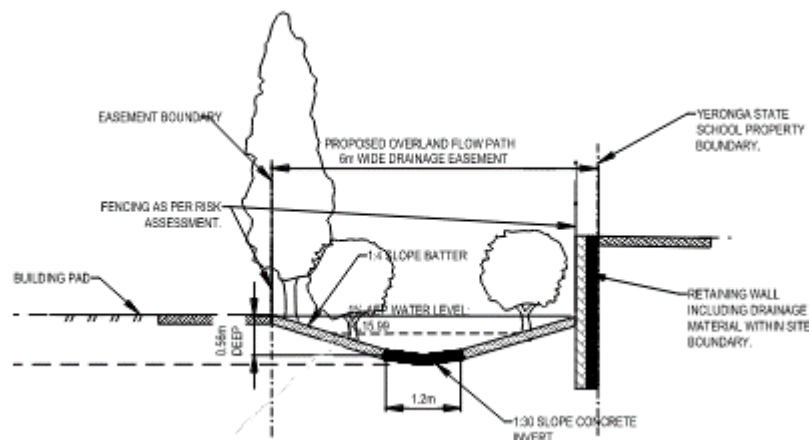


Figure 7: Overland Flow Path Section

The design has allowed for the landscaping of the batters to include trees (dia <200mm) and shrubs at max 1m spacing, some vines, low branches, difficult and slow to walk through. No grasses. This correlates with a manning's roughness of $n=0.1$ in accordance with the Infrastructure Design Planning Scheme Policy in the Cityplan 2014.

It is further proposed to reduce the frequency of overland flow entering the site, by upgrading and realigning the existing BCC stormwater trunk infrastructure that traverses the site to a 1200mm diameter stormwater pipe that runs along the alignment of the proposed overland flow path, with field inlets located along the stormwater pipe in the invert of the cut-off drain. Necessary upgrades to the inlet pits in Villa St and the existing field inlet located in the park adjacent to the Villa St have also been proposed to accommodate additional inlet capacity.

3.3.4 Local/ Overland flow Flood Assessment

Watertech have prepared a separate Flood Assessment Report on behalf of Stantec, which incorporates a 1d/2d Hydraulic assessment.

These proposed works described in Section 3.3.3 have been modelled in the Flood Assessment in the Post Development Case. The proposed works are shown conceptually in drawing 520-P02 in Appendix 4.

The Flood Assessment report demonstrates that:

1. No actionable nuisance is achieved in respect of the stormwater condition is achieved at the rail corridor (the lawful point of discharge) and downstream of the site, and

- the future development of Lot 10 can occur, which would incorporate a re-direction of the overland flow east along the southern boundary and achieve acceptable outcomes for vehicles and pedestrians (in reference to trafficability and pedestrian safety criteria outlined in QUDM).

The Flood Assessment has estimated a flood level of RL8.56m AHD for the 1% AEP event associated with overland flow/ local catchments.

This report is provided under separate cover and should be referred to for further details and recommendations in relation to the assessment.

3.4 Flood Risk Recommendations

In reference to the critical flood levels noted in the previous sections, the following Flood mitigation strategies are proposed to be adopted as part of the development:

- Minimum floor levels shall be adopted in line with the BCC Flood Planning Scheme Policy, including minimum 500mm freeboard to the relevant flood levels. This will be achieved by filling. Minimum proposed development levels are as per in reference to the estimated flood levels in the Watertech Flood Assessment report dated 11 February 2022.

Table 3-2: Minimum Development Levels

LOT	USE	MIN LEVEL (mAHD) (FREEBOARD)
1	All uses	N/A
3	NCC Class 1-4 building - habitable room NCC Class 1-4 building - basement entry Other NCC Classes	9.06m (500mm) 8.56m (0mm) NOT COMPATIBLE
6	NCC Class 1-4 building - habitable room NCC Class 1-4 building - habitable room NCC Class 1-4 building - basement entry NCC Class 9a/c building - building floor level NCC Class 9 building - basement entry NCC Class 9 building – Substation (fully servicing and located within lot 6)	9.06m (500mm) 9.06m (500mm) 8.56m (0mm) 11.8 (0mm) 8.56m (0mm) 11.8m (0mm)*
8	Open space	8.56m (0mm)
10	All uses (min RL along Villa St frontage)	19.0m (500mm)
11	All uses	N/A
21	All uses	N/A
22	All uses	N/A
Road	Substation	9.85m (0mm) (0.5% AEP)

* Note: Where located in a basement, to ensure flood immunity, basements require a waterproof basement design to prevent flood waters entering basement to the relevant event. Subject to specific Utility Authority Approval.

- The future developments of the respective lots as part of separate applications will need to ensure their built form provides adequate height of an impermeable barrier above the overland flow path along the western boundary. The minimum height above the top of drain at any point is recommended to be 0.3m or 0.7m above the invert unless noted otherwise. This allows for includes 500mm freeboard to the 2% AEP, and contains the severe storm assessment which assumes blockage of the pipe system in Villa St.
- The Conceptual Earthworks shown in Appendix 4 have demonstrated no actionable nuisance to downstream and upstream properties and infrastructure.
- Public Open Space and Drainage Reserve (Bioretention Basin) will occupy the area inundated by the 1% AEP



5. Warning signage will be erected to warn the public of areas that may be impacted by a 1% AEP.
6. Residential Care Facility uses shall not occur on Lots 22, 3, 4, 5, 6 and 8.
7. Other recommendations as per the Flood Assessment dated 11 February 2022 by Watertech.



4. Stormwater Quantity

4.1 Stormwater Discharge/Lawful Point of Discharge

The lawful point of discharge (LPD) for the Parkside Yeronga development is currently located near the northern boundary of the site and given the natural topography of the site and the proposed development layout, the LPD for the proposed development will be maintain in the same position. The LPD is an existing field inlet and piped drainage (ex 1200mm dia. pipe) discharging under the rail line. This is also proposed to be retained for the purposes of discharging stormwater flow generated within the subject site.

4.2 Proposed Stormwater Network

It is proposed to construct new traditional pit and pipe infrastructure within the site to convey the stormwater runoff to the LPD in accordance with the requirements of the Queensland Urban Drainage Manual (2017). Major storm overland flow paths are expected to generally be the internal roadways but may incorporate some dedicated overland flow paths as appropriate. An indicative stormwater management strategy is included in drawing 520-P02 in Appendix 4.

In reference to the overland flow discussed in Section 3.3.3, it is further proposed to reduce the frequency of overland flow entering the site, by upgrading and realigning the existing BCC stormwater pipe that traverses the site to a nominally 1200mm stormwater pipe (it is currently an existing 525 / 600mm pipe). Necessary upgrades to the inlet pits in Villa St and the existing field inlet located in the park adjacent to the Villa St are also proposed to accommodate additional inlet capacity. These proposed upgrades and alterations have been modelled and the indicative stormwater management strategy is included in drawing 520-P02 in Appendix 4.

4.3 Stormwater Quantity

The former Yeronga TAFE site is characterised by substantially paved surfaces and buildings. An assessment based on the provided survey and available aerial imagery was undertaken to estimate the existing impervious surfaces.

Based on the indicative Masterplan included in Appendix 2, the proposed impervious surfaces were estimated, with notional allowances for hard landscaping. Further, planted areas above constructed basement slabs have been assumed to be impervious.

A comparison of the above assessment is summarised in Table 4-1.

	Impervious (m ²)	Percent Impervious
Pre-Development	23,000	74%
Indicative Masterplan	22,850	74%

Table 4-1: Estimate of impervious areas

The above assessment confirms that proposed Parkside Yeronga development will have less impervious area than its former use.

As per Section 3.3, Watertech have undertaken a Flood Assessment on behalf of Stantec to assess the impacts of the proposed development on the stormwater quantity condition of the site based on the proposed stormwater management measures. It demonstrated that the proposed development will not result in actionable nuisance associated with adverse flooding conditions external to the site. Reference should be made to the report for its full findings and recommendations.

5. Stormwater Quality

5.1 Stormwater Management Strategy – Operational Phase

It is a requirement that the proposed development manages stormwater in such a way that in the long term, the development achieves industry standard Water Quality Objectives thus reducing the impact the development has on receiving waters.

It will be demonstrated that the Water Quality Objectives (WQO's) in accordance with the Brisbane City Council City Plan 2014 can be met by implementing appropriate Stormwater Quality Improvement Devices (SQID's). The proposed system will be assessed by undertaking Pollutant Export Modelling to demonstrate the effectiveness of the treatment train in achieving the WQO's.

It is proposed to construct an end-of-line stormwater quality treatment device to accommodate stormwater quality treatment for the ultimate Masterplan. For the purposes of sizing the device, the indicative masterplan in Appendix 2 has been assumed.

Operational Phase Water Quality Objectives

The WQO's selected for the site are listed in Table 5-1. These are based on Table B in Appendix 2 of the State Planning Policy in accordance with BCC City Plan.

Table 5-1: Site Water Quality Objectives

Minimum Reductions in Mean Annual Loads from Unmitigated Development	
Indicator	South East QLD
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Total Gross Pollutants >5mm (GP)	90%

It should be noted that these WQO's are long term objectives for a fully stabilised catchment with fully established water quality improvement devices throughout.

Water Quality Treatment – Proposed Bio-Retention Basin

It is proposed to provide an end-of-line bio-retention basin located within Lot 5 in the north of the site. This centralised system has been designed to accommodate the stormwater runoff from:

- internal roads
- verges
- green spine
- future development on the proposed lots in line with the Preliminary Approval

The device is designed such that it collects only treatable flows, with larger flows bypassing it to minimise maintenance activities following larger events.

As the basin benefits both public assets and private freehold lots, the basin is proposed to become a donated asset to the Local Government Authority, designed and constructed generally in accordance with the Infrastructure Design Planning Scheme Policy within the BCC City plan 2014.

The device has been designed to the Infrastructure Design PSP for BCC and shall be dedicated to BCC. It should be noted that in a 1% AEP flood event the basin will flood in order to accommodate the developments flood storage requirements.

Water Quality Treatment Train – Operational Phase

Consideration of the requirement for safety, maintenance and visual amenity has been incorporated when establishing the proposed WSUD principles and devices to be utilised within the treatment system for this development.

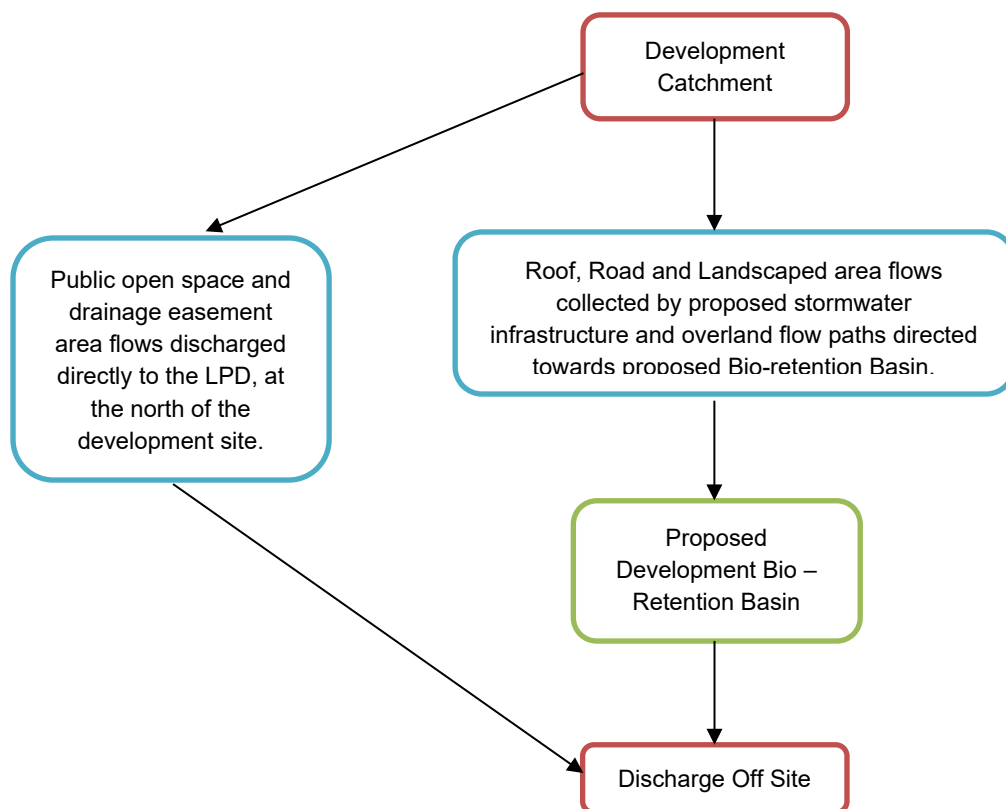


Figure 5-1: Schematic Treatment Train Proposed

5.2 Pollutant Export Modelling

To demonstrate that the proposed treatment train meets the required WQO's, pollutant export modelling has been undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Software program Version 6.3 by eWater CRC. As such, Total Suspended Solids (TSS), Total Nitrogen (TN), Total Phosphorous (TP) and Gross Pollutants (GP) have been quantitatively modelled for pollutant exports using MUSIC.

Modelling has only been undertaken on the post-development proposal with SQID's installed to demonstrate the long-term load reductions from a fully established catchment.

The bio-retention basin is proposed to treat the stormwater flows from the subject site. The site and proposed basin have been reviewed to achieve the required treatment train efficiencies; however, it was necessary for the site to allow some site discharge to discharge directly to the LPD at the north of the site, including the public open space area located at the north of the development and the proposed 6m wide drainage easement adjacent to the eastern boundary of the site. For a detailed description of the sites quantities, refer to Table 5-3.

MUSIC Program Setup

This section explains the setup of the MUSIC model with the detailed pollutant export calculations being included in the MUSIC results in Appendix 5.

For MUSIC modelling (using MUSIC 6.3) the following parameters, in accordance with MUSIC Modelling Guidelines (2010), have been used:

Table 5-2: MUSIC Modelling Parameters

Meteorological Data	
MUSIC Link	Brisbane – Central
Rainfall Station	40214 Brisbane QLD
Period	1/1/1980 – 31/12/1989
Time Step	6 Minutes
Evaporation Data	Brisbane Monthly PET

Table 5-3: Catchment Modelling Parameters

Node Description	Area (Ha)	Percentage Impervious (%) / Area Impervious (Ha)		Land Use Rainfall and Pollutant Parameters
Sub-Catchments Directed to Basin for Treatment				
Site Development Catchment				
Lot 10 Ground	0.091	0.70	0.064	Urban Residential
Road (Pavement)	0.197	1.00	0.197	Urban Residential
Lot 10 Roof Area	0.185	1.00	0.185	Urban Residential
Lot 11 Roof Area	0.039	1.00	0.039	Commercial
Lot 1 Roof Area	0.111	1.00	0.111	Commercial
Lot 21 Roof Area	0.152	1.00	0.152	Urban Residential
Lot 7 Roof Area	0.369	1.00	0.369	Commercial
Lot 6 Roof Area	0.06	1.00	0.06	Urban Residential
Lot 3 Roof Area	0.116	1.00	0.116	Urban Residential
Lot 11 Ground	0.054	0.83	0.045	Commercial
Lot 1 Ground	0.123	0.81	0.099	Commercial
Lot 21 Ground	0.083	0.72	0.060	Urban Residential
Lot 3 Ground	0.08	0.75	0.060	Urban Residential
Lot 6 Ground	0.099	0.82	0.081	Urban Residential
Lot 7 Ground	0.406	0.81	0.328	Commercial
Lot 8 Green spine Ground	0.1	0.3	0.030	Urban Residential
Road Verge (Ground)	0.056	0.50	0.100	Urban Residential
Lot 22 Ground	0.056	0.80	0.045	Urban Residential
Lot 22 Roof Area	0.06	1.00	0.060	Urban Residential
Lot 5 Ground	0.055	0.0	0.0	Urban Residential
Sub-Catchment Directed as Bypass without treatment				
Bypass to LPD				
Drainage Easement Ground	0.122	0.25	0.030	Urban Residential
Lot 4 Ground	0.334	0.13	0.044	Urban Residential

The parameters of each Land Use category are based on MUSIC Modelling Guidelines (2010). Copies of the parameters are included Appendix 5.

5.3 Stormwater Quality Improvement Devices

Bio-retention System

Bio-retention systems are vegetated areas where stormwater is passed through densely planted filter media (loamy sand) allowing the plants to absorb the collected and stored nutrients. Bio-retention basins utilise temporary ponding above the vegetated surface to increase the volume of stored water for treatment. Bio-retention systems can take a number of forms, but all have common features including the extended detention depth above the media surface, the filter media and a low level drainage media and subsoil system. These are shown in the figure below.

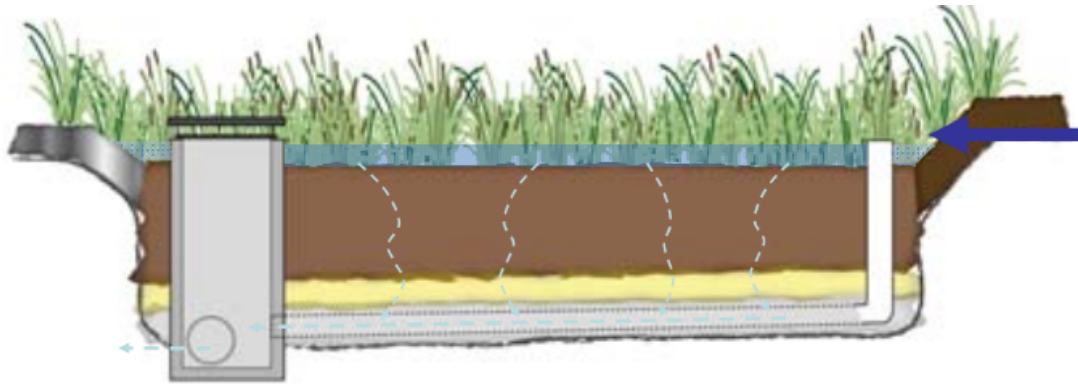


Figure 5-2: Typical Section of a generic Bio-retention system (Source: Water by Design)

For this development it is proposed to utilise a bio-retention basin to achieve the Water Quality Objectives (WQO's). The proposed basin and associated details are presented in Appendix 4 and has been modelled with the properties summarised in Table 5-4.

Table 5-4: Proposed Bio Basin Parameters

Node Description	Surface Area (m ²)	Filter Area (m ²)	Extended Detention Depth (m)	Filter Media Depth (m)	CSTR
Bioretention Basin	613	555	0.25	0.5	3

The proposed bio-retention system is comprised of three layers as outlined below:

- Filter Media – 0.5m depth, Loamy sand with Saturated Hydraulic Conductivity of 200mm/hr.
- Transitional Layer – 0.1m depth, Sand/Course sand material.
- Drainage Layer – min 0.2m depth, coarse material (e.g. fine gravel)
- Saturated Zone = 0.35m depth min

The basin is proposed to be densely vegetated in accordance with Healthy Waterways guidance. Further, the ponded depth is designed not to exceed 300mm in a 10% AEP. Therefore, no fencing is proposed so it is incorporated into the landscape.

It is noted that the basin is expected to be inundated by flooding from the Brisbane River, for only events greater than 10% AEP.

5.4 Post-development Water Quality Results.

Operational Phase

The WSUD principals proposed for stormwater treatment includes the proposed bioretention basin, to achieve the long-term Water Quality Objectives identified in Section 5.1.

The effectiveness of the treatment devices in the above section has been modelled using MUSIC with the overall treatment train efficiency results shown in Table 5-6. It has therefore been confirmed that the use of a bio-retention basin for the primary site catchments achieve the required water quality objectives.

Table 5-5: Catchment Modelling Parameters

Indicator	Total Site Reduction	Load Based Target WQOs	Target Achieved
Total Suspended Solids (TSS)	81.9%	80%	Yes
Total Phosphorus (TP)	60.3%	60%	Yes
Total Nitrogen (TN)	57.3%	45%	Yes
Total Gross Pollutants (GP)	91.8%	90%	Yes

5.5 Maintenance Tasks & Responsibilities

To ensure that the proposed stormwater quality treatment train maintains its treatment effectiveness, maintenance is imperative to be undertaken including monitoring and rectification as required. The maintenance requirements are included in Appendix 6.

The following maintenance responsibilities are proposed for the various Stormwater Quality Improvement Devices to ensure they continue to operate as planned.

Table 5-6: Summary of SQID Maintenance Responsibility

Stormwater Quality Improvement Devices	Maintains Responsibility	
	Defects Period	Ongoing
Proposed Bio-Retention Basin	Developer	Brisbane City Council
Overland Flow Path	Developer of the relevant lot	Landowner

5.6 Acid Sulphate Soils

The subject site is located within the Potential and Actual Acid Sulfate Soils (ASS) Overlay within the Brisbane City Plan 2014. Refer to Figure 5-3 for the respective overlay extents.



Figure 5-3: Potential and Actual Acid Sulfate Soils shown Brown (Source: Brisbane City Plan 2014)

Butler Partners have undertaken an Acid Sulfate Soils Assessment for the site. They concluded that soils encountered in their 26 test locations include zones that are acidic, but are considered to mainly comprise residual soils that be been derived from deep in place weathered rock. Based on their visual assessment, site geology, and the surface elevation, the soils are not considering to be ASS. Further, there was no potential for generation of additional acidity dur to oxidisation of pyrite. As such, an Acid Sulfate Soils Management Plan is not required.

It was noted that due to the presence of some acidic soils, it is recommended that any stormwater discharge leaving the site should be checked prior to discharge to ensure the pH is within the range of 6.5pH to 8.5pH units, or treated to achieve this range prior to discharge.

5.7 Erosion and Sediment Control (ESC) – Construction

Stantec have undertaken an Erosion Hazard Assessment utilised the Brisbane City Council form. The proposed works for Stage 2 has been identified as a High Erosion Hazard Risk.

Therefore, an Erosion and Sediment Control programme will be developed in accordance with International Erosion Control Association Australiasia (IECA) guidelines and EDQ PDA Guideline 13. The design shall be prepared by a suitably qualified consultant, and shall address in particular:

- Upstream catchment conveyance from the existing Regional Park, Villa St and Yeronga State School
- Large areas of disturbance
- Protection of the rail corridor

6. Conclusion

This Site Based Stormwater Management Plan has been prepared for the proposed Parkside Yeronga development on the property situated at 70 Park Rd, Yeronga.

This report has confirmed that the Stormwater Water Quality Objectives (WQO's) will be met by the treatment train, incorporating the proposed Bio-retention system.

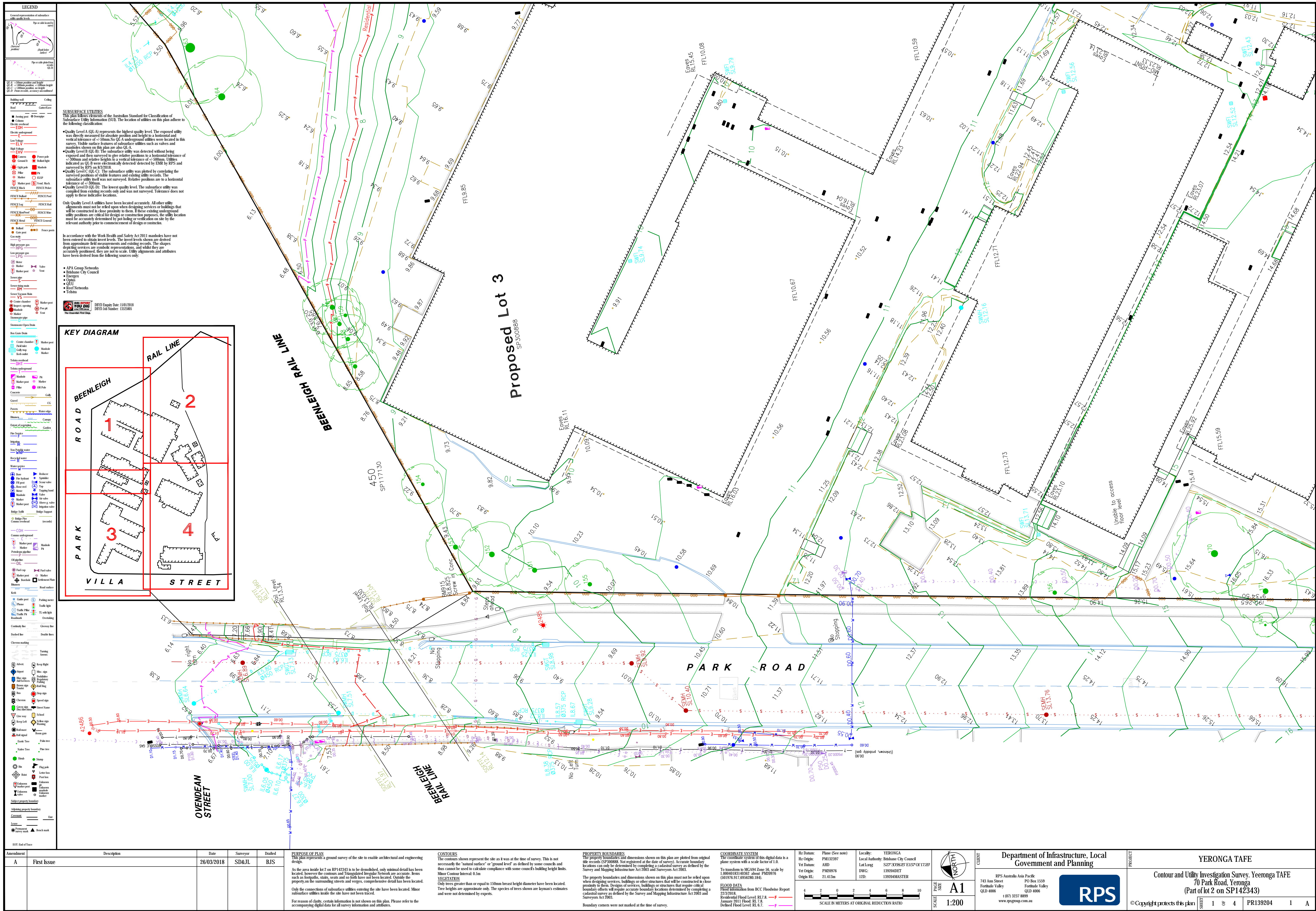
The report has also demonstrated that the proposed development can implement an appropriate stormwater management strategy for both internal flows and the effects of overland flow flood inundation from external catchments. It is anticipated that stormwater flow arriving at the LPD and rail line will not cause an actionable nuisance as part of the proposed development with the proposed stormwater management measures outlined in this report.

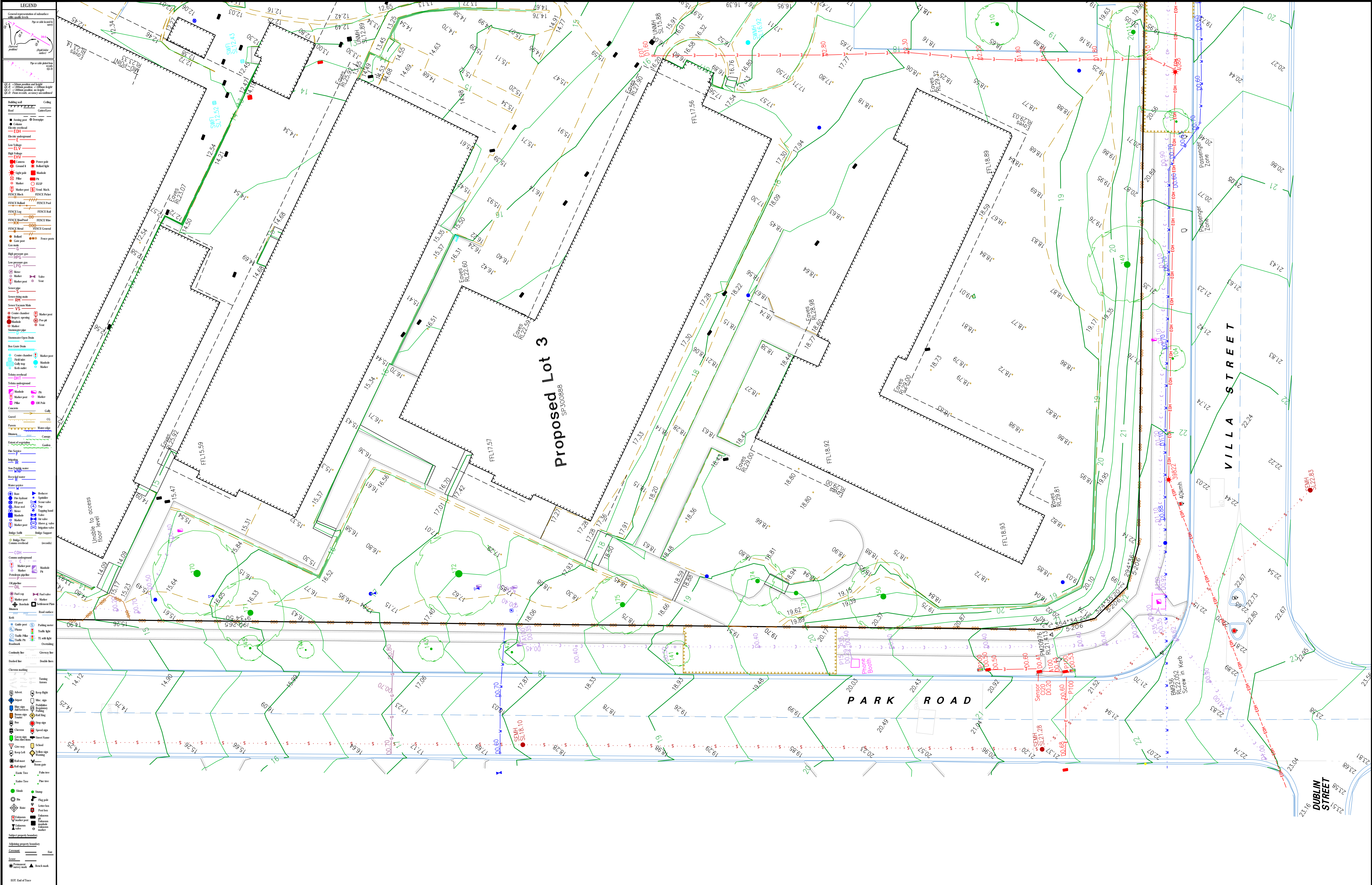
We therefore recommend that EDQ support the Development Application for this site.



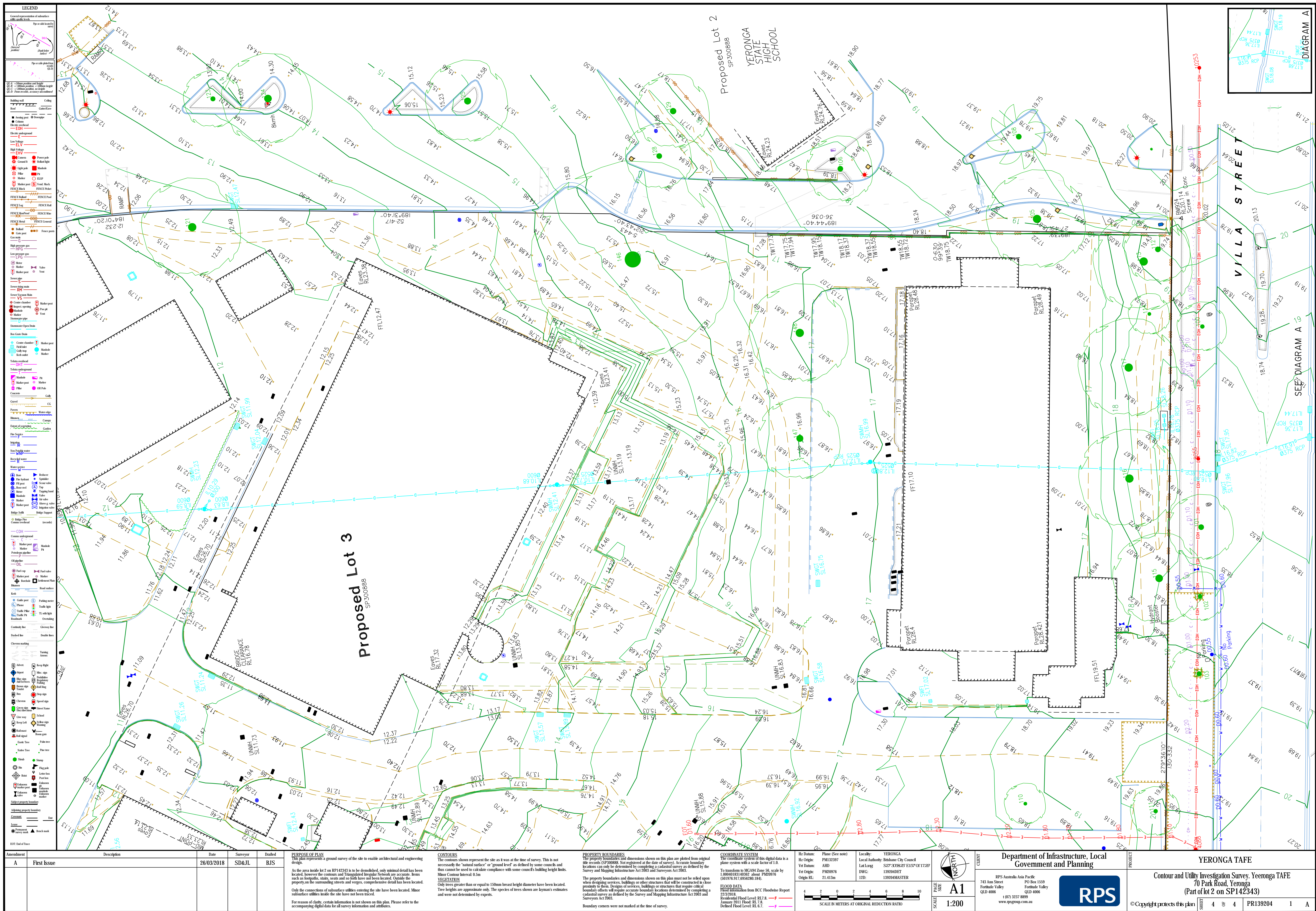
APPENDIX 1 – Existing Detailed Site Survey







Amendment		Description		Date	Surveyor	Drafted	PROJECT																											
A		First Issue		26/03/2018	SD&JL	BJS	YERONGA TAFE																											
<p>PURPOSE OF PLAN This plan represents a ground survey of the site to enable architectural and engineering design.</p> <p>As the area inside lot 2 on RP142343 is to be demolished, only minimal detail has been located, however the contours and triangulated irregular network are accurate. Items such as topographic, state, water and so forth have not been located. Outside the property on the surrounding streets and verges, comprehensive detail has been located.</p> <p>Only the connections of subsurface utilities entering the site have been located. Minor subsurface utilities inside the site have not been traced.</p> <p>For reason of clarity, certain information is not shown on this plan. Please refer to the accompanying digital data for all survey information and attributes.</p>							<p>CONTOURS The contours shown represent the site as it was at the time of survey. This is not necessarily the "natural surface" or "ground level" as defined by some councils and thus cannot be used to calculate compliance with some council's building height limits.</p> <p>Minor Contour Interval 0.5m</p> <p>VEGETATION Only trees greater than or equal to 150mm breast height diameter have been located. Tree heights are approximate only. The species of trees shown are layman's estimates and were not determined by experts.</p>							<p>PROPERTY BOUNDARIES The property boundaries and dimensions shown on this plan are plotted from original title records SP300888, not registered at the date of survey. Accurate boundary locations can only be determined by completing a cadastral survey as defined by the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2005.</p> <p>The property boundaries and dimensions shown on this plan must not be relied upon when designing services, buildings or other structures that will be constructed in close proximity to them. Designs of services, buildings or structures that require critical boundary offsets will require accurate boundary locations determined by completing a cadastral survey as defined by the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2005.</p> <p>Boundary corners were not marked at the time of survey.</p>							<p>COORDINATE SYSTEM The coordinate system of this digital data is a plane system with a scale factor of 1.0.</p> <p>To transform to MC44 Zone 56, scale by 1.00040183140382 about PM20976 (601976.917, 8958280.184).</p> <p>FLOOD DATA Flood information from BCC Floodwise Report 22/57018. Residential Flood Level RL7.8 — F January 2011 Flood RL 7.8 Delineated Flood Level RL 6.7. — F</p>							<p>Hz Datum: PM132387 Locality: YERONGA Local Authority: Brisbane City Council Lot Lxg: S27°30'38.25" E155°0'17.23" DWG: 13899401ET 12D: 138994MASTER</p> <p>Hz Datum: AHD Vrt Datum: PM20976 Origin RL: 21.413m</p> <p>SCALE 1:200</p> <p>SCALE IN METERS AT ORIGINAL REDUCTION RATIO</p> <p>SCALE BAR</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> <p>SCALE</p> 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APPENDIX 2 – Proposed Development Layout



2.3

ILLUSTRATIVE MASTER PLAN

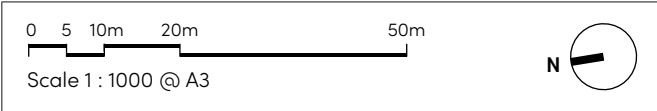
The master plan framework will be realised as an integrated precinct with a variety of housing choice, diverse demographics and supporting community infrastructure

*This master plan and the underlying building forms are used for reference and for illustration purposes only.



Legend

- 1 Informal pedestrian crossing
- 2 Green spine community garden
- 3 Community plaza
- 4 Neighbourhood park
- 5 Bio-retention basin
- 6 Access paths
- 7 Existing trees to remain
- 8 Shade trees
- 9 Street trees
- 10 Swale



APPENDIX 3 – Authority Flood Report





Brisbane City Council FloodWise Property Report

Report Reference

1630896727760

06/09/2021 12:52:07

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.

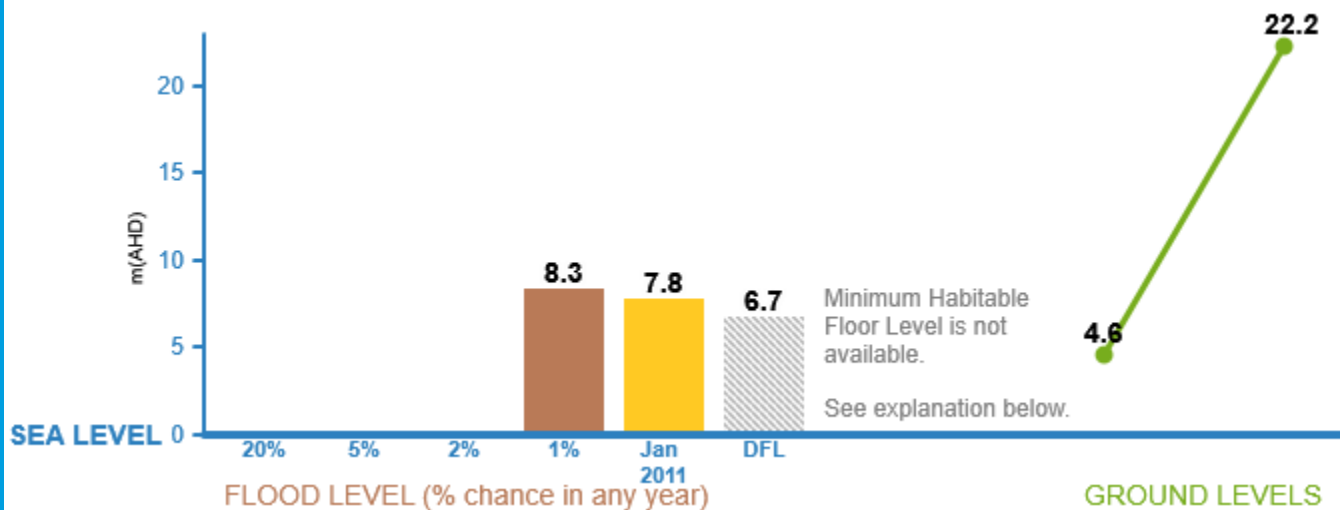
To find out more about how the contents of this report may affect building or development on this property, please visit www.brisbane.qld.gov.au/planning-building. For more general information about understanding your flood risk and how to prepare your property, family or business for potential flooding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

THIS IS A REPORT FOR:

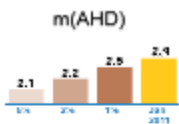
Rateable Address: 70 PARK RD, YERONGA QLD 4104

Lot Details: L.3 SP.300888

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. 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 (2019 airborne laser survey) to Council. If you are building, please confirm with a surveyor.

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

FLOOD AND PLANNING DEVELOPMENT FLAGS

DEVELOPMENT FLAG(S)

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

Report Reference

1630896727760

06/09/2021 12:52:07

Dedicated to a better Brisbane

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: 70 PARK RD, YERONGA QLD 4104

Lot Details: L.3 SP.300888

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	4.6
Maximum Ground Level	22.2
Min Habitable Floor Level	Contact Council
Residential Flood Level (RFL)	8.3
Residential Flood Level Source	RIVER
Flooding may also occur from	RIVER,OVERLAND FLOW

ESTIMATED PEAK FLOODING LEVELS

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

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

DESCRIPTION	LEVEL (mAHD)	SOURCE
20% AEP	N/A*	
5% AEP	N/A*	
2% AEP	N/A*	
1% AEP	8.3	RIVER
January 2011	7.8	RIVER
DFL	6.7	RIVER
RFL	8.3	RIVER

* Council does not hold flood levels for this probability event.

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
FPA5		Applicable

COASTAL HAZARD OVERLAY CODE

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

PROPERTY DEVELOPMENT FLAGS

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

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

1630896727760

06/09/2021 12:52:07

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 m³/s.

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

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

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

Residential Flood Level (RFL) - Residential flood level (RFL) for the Brisbane River flooding equates to the 1% Annual Exceedance Probability flood level.

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.

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

1630896727760

06/09/2021 12:52:07

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?

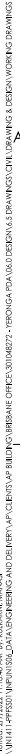
For information, guidelines, tools and resources to help you track, plan or apply for your development visit www.brisbane.qld.gov.au/planning-building

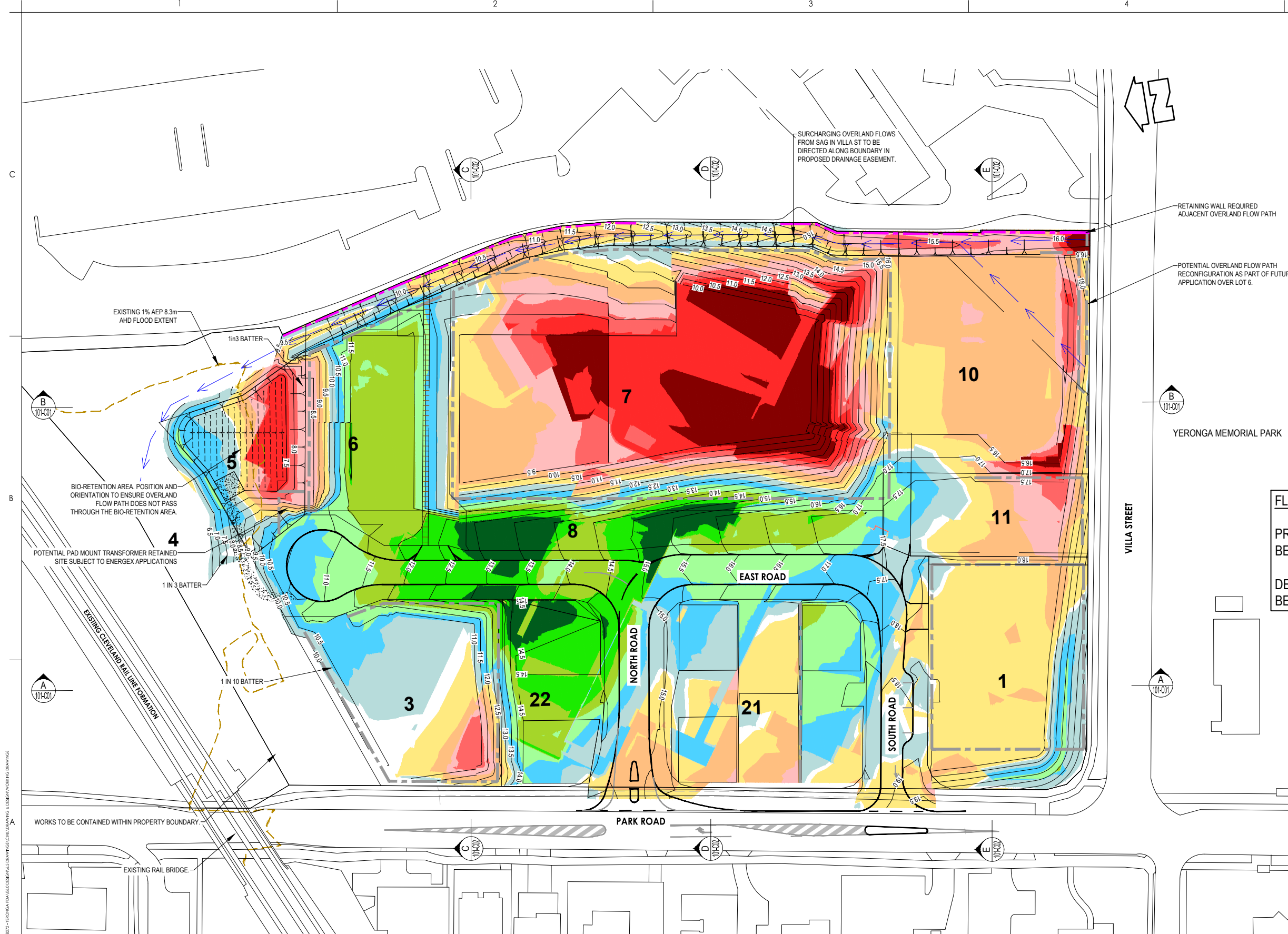
You can also find the Brisbane City Plan 2014 and Neighbourhood Plans as well as other information and training videos to help with your building and development plans.

APPENDIX 4 – Engineering Drawings



B

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- SERVICES NOTES**
- DRAWINGS ARE CONCEPTUAL ONLY AND HAVE BEEN PREPARED AS AN ILLUSTRATION OF THE CONCEPTS DISCUSSED WITHIN THIS REPORT AND ARE INTENDED TO ASSIST RESPONSE TO A REQUEST FOR PROPOSAL.
 - ALL ITEMS ON THIS DRAWING ARE SUBJECT TO CONFIRMATION FROM RELEVANT SUPPLY AUTHORITY.
 - WHERE LEVELS OR SIZES OF ANY WORKS ARE SHOWN, THESE ARE INDICATIVE ONLY TO DEMONSTRATE THE CAPABILITY OF THE SERVING OPTION PROPOSED AND ARE SUBJECT TO DETAILED DESIGN (OPERATIONAL WORKS DESIGN). THIS IS TO BE UNDERTAKEN IN ACCORDANCE WITH THE LATEST VERSIONS OF THE AUTHORITY STANDARDS, AUSTRALIAN STANDARDS AND OTHER INDUSTRY REFERENCE DOCUMENTS AT TIME OF DESIGN.
 - DRAWINGS ARE NOT INTENDED TO BE USED FOR TENDER, ESTIMATING OR CONSTRUCTION.
 - ALL LOTS SHALL BE PROVIDED WITH CONNECTION TO SEWER, WATER, ELECTRICITY, TELECOMMUNICATIONS AND A LAWFUL POINT OF STORMWATER DISCHARGE.
 - IN GENERAL, ALL CONTOURS SHOWN ARE BULK EARTHWORKS CONTOURS ONLY AND DO NOT REPRESENT FINAL FINISHED SURFACE LEVELS. TEMPORARY BATTERS WILL BE CONSTRUCTED TO ALLOW BUILT FORM AND LOT DEVELOPMENTS TO BE ESTABLISHED.

- LEGEND**
- 10.5 INDICATIVE PROPOSED BULK EW DESIGN CONTOURS 0.5m
 - 20.00 EXISTING CONTOURS
 - PROPOSED RETAINING WALL
 - POTENTIAL FUTURE RETAINING WALL

- CUT/FILL LEGEND**
- AREA OF CUT DEPTH >2.5m
 - AREA OF CUT DEPTH 2.5m - 2.0m
 - AREA OF CUT DEPTH 2.0m - 1.5m
 - AREA OF CUT DEPTH 1.5m - 1.0m
 - AREA OF CUT DEPTH 1.0m - 0.5m
 - AREA OF CUT DEPTH 0.5m - 0.05m
 - AREA OF FILL DEPTH 0.05m - 0.5m
 - AREA OF FILL DEPTH 0.5m - 1.0m
 - AREA OF FILL DEPTH 1.0m - 1.5m
 - AREA OF FILL DEPTH 1.5m - 2.0m
 - AREA OF FILL DEPTH 2.0m - 2.5m
 - AREA OF FILL DEPTH >2.5m

FLOOD STORAGE COMPARASION (1% AEP SCENARIO):

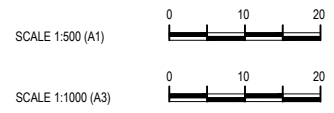
PRE-DEMO (RPS SURFACE) FLOOD STORAGE
BELOW RL8.30m AHD: 2830m³

DESIGN SURFACE FLOOD STORAGE
BELOW RL8.30m AHD: 2835m³

BUILDING PADS SHOWN ARE INDICATIVE IN FORM AND LEVEL. THEY ARE SUBJECT TO FUTURE DEVELOPMENT AS PART OF THE RESPECTIVE LOT'S FUTURE APPLICATIONS.

BULK EARTHWORKS VOLUMES (DESIGN SURFACE TO PRE-DEMO SURFACE):

CUT = -17048m³
FILL = +12942m³
BALANCE = -4106m³



Notes

C	FURTHER ISSUES RESPONSE	MK	AR	2022.02.10
B	FURTHER ISSUES LETTER	TJ	AR	2021.11.10
A	ISSUED FOR APPROVAL	BM/VI	AR	2021.09.15

Issued/Revision

By Appd

XXXX.MM.DD

Issue Status

PRELIMINARY

NOT FOR CONSTRUCTION

This document is suitable only for the purpose noted above. Use of this document for any other purpose is not permitted.

Colour Disclaimer

This drawing has been documented in colour. This drawing is required to be printed in colour. Failure to do so may result in loss of information. Black and white printing may be used if specific black and white documents have been obtained from Stantec.

AUTHORISED:

Maced

A RAADSCHELDERS (RPEQ 19881)

Client/Project Logo

Client/Project

ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name: CH-100-P01.DWG

DDJ TJ AR 2021.11.10

Dwn. Dign. Chkd. YYYY.MM.DD

Client/Project

ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name: CH-100-P01.DWG

DDJ TJ AR 2021.11.10

Dwn. Dign. Chkd. YYYY.MM.DD

Title

BULK EARTHWORKS PLAN

CONCEPTUAL MASTER PLAN

Project No. 301048272

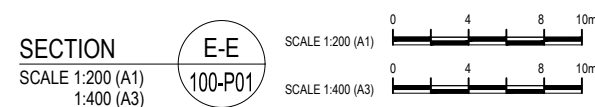
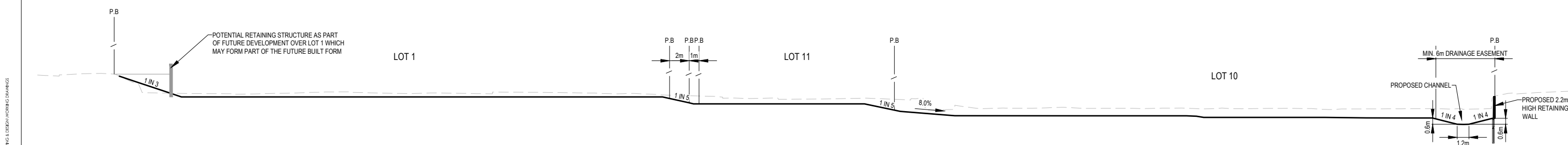
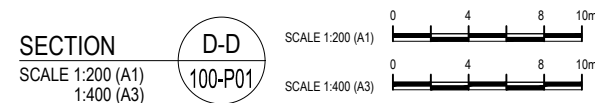
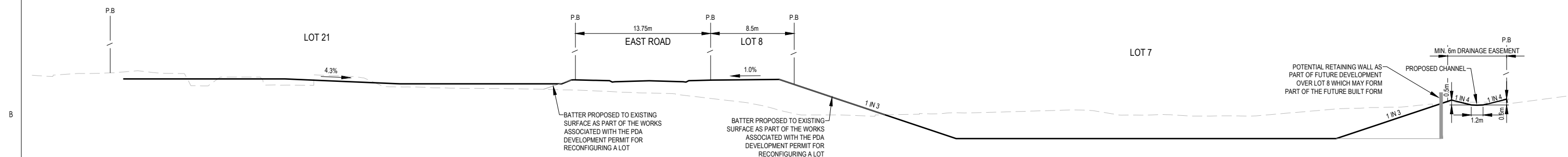
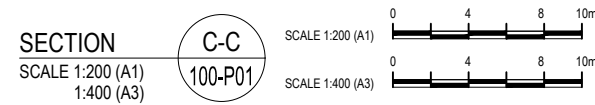
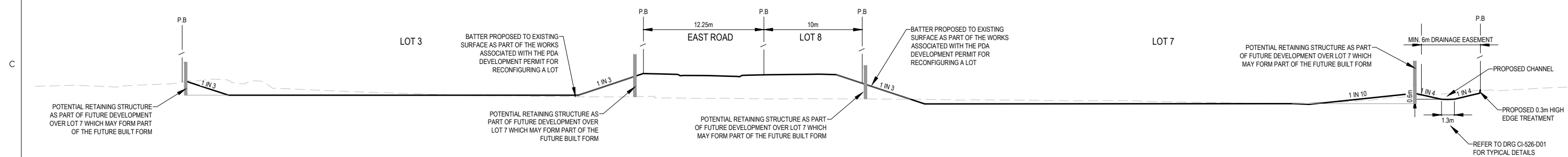
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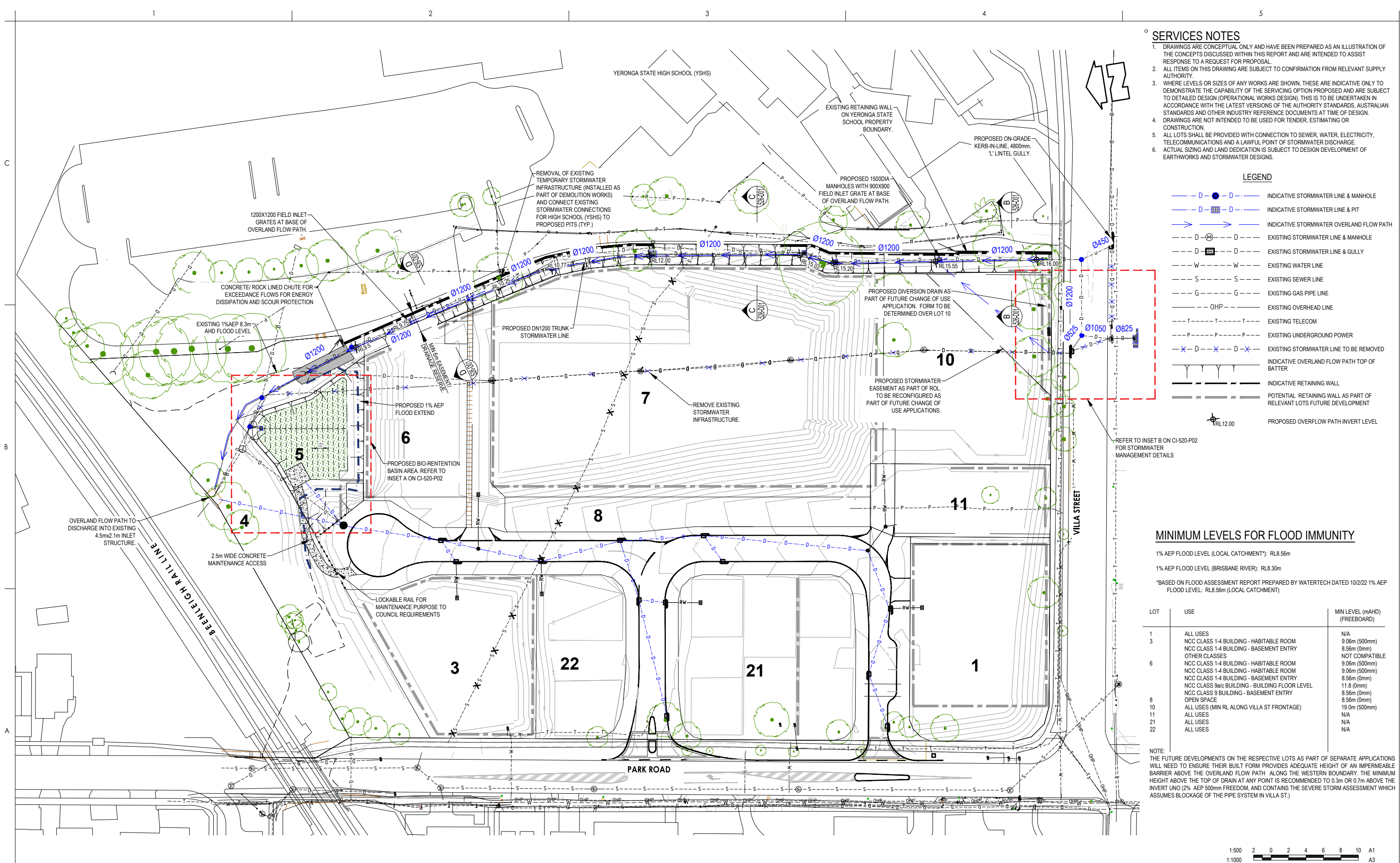
Revision c

Drawing No. CI-100-P01

Revised: 2/10/2022 13:53 PM By: KILIANI, MAHDI
\\BHL4P0001\BHL4P0001\DATA\ENGINEERING AND DELIVERY\AP\CLIENTS\BULK EARTHWORKS\DRAWINGS\CH-100-P01.DWG

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 - ACTUAL SIZING AND LAND DEDICATION IS SUBJECT TO DESIGN DEVELOPMENT OF EARTHWORKS AND STORMWATER DESIGNS.

- LEGEND**
- INDICATIVE STORMWATER LINE & MANHOLE
 - INDICATIVE STORMWATER LINE & PIT
 - INDICATIVE STORMWATER OVERLAND FLOW PATH
 - EXISTING STORMWATER LINE & MANHOLE
 - EXISTING STORMWATER LINE & GULLY
 - EXISTING WATER LINE
 - EXISTING SEWER LINE
 - EXISTING GAS PIPE LINE
 - EXISTING OVERHEAD LINE
 - EXISTING TELECOM
 - EXISTING UNDERGROUND POWER
 - EXISTING STORMWATER LINE TO BE REMOVED
 - INDICATIVE OVERLAND FLOW PATH TOP OF BATTER
 - INDICATIVE RETAINING WALL
 - POTENTIAL RETAINING WALL AS PART OF RELEVANT LOTS FUTURE DEVELOPMENT
 - PROPOSED OVERFLOW PATH INVERT LEVEL

MINIMUM LEVELS FOR FLOOD IMMUNITY

1% AEP FLOOD LEVEL (LOCAL CATCHMENT): RL8.56m

1% AEP FLOOD LEVEL (BRISBANE RIVER): RL8.30m

*BASED ON FLOOD ASSESSMENT REPORT PREPARED BY WATERTECH DATED 10/2/22 1% AEP FLOOD LEVEL: RL8.56m (LOCAL CATCHMENT)

LOT	USE	MIN LEVEL (mAHD) (FREEBOARD)
1	ALL USES	N/A
3	NCC CLASS 1-4 BUILDING - HABITABLE ROOM	9.06m (500mm)
	NCC CLASS 1-4 BUILDING - BASEMENT ENTRY	8.56m (0mm)
	OTHER CLASSES	NOT COMPATIBLE
6	NCC CLASS 1-4 BUILDING - HABITABLE ROOM	9.06m (500mm)
	NCC CLASS 1-4 BUILDING - HABITABLE ROOM	9.06m (500mm)
	NCC CLASS 1-4 BUILDING - BASEMENT ENTRY	8.56m (0mm)
	NCC CLASS 9a/c BUILDING - BUILDING FLOOR LEVEL	11.8 (0mm)
	NCC CLASS 9 BUILDING - BASEMENT ENTRY	8.56m (0mm)
8	OPEN SPACE	8.56m (0mm)
10	ALL USES (MIN RL ALONG VILLA ST FRONTAGE)	19.0m (500mm)
11	ALL USES	N/A
21	ALL USES	N/A
22	ALL USES	N/A

NOTE: THE FUTURE DEVELOPMENTS ON THE RESPECTIVE LOTS AS PART OF SEPARATE APPLICATIONS WILL NEED TO ENSURE THEIR BUILT FORM PROVIDES ADEQUATE HEIGHT OF AN IMPERMEABLE BARRIER ABOVE THE OVERLAND FLOW PATH ALONG THE WESTERN BOUNDARY. THE MINIMUM HEIGHT ABOVE THE TOP OF DRAIN AT ANY POINT IS RECOMMENDED TO 0.3m OR 0.7m ABOVE THE INVERT UNO (2% AEP 500mm FREEDOM, AND CONTAINS THE SEVERE STORM ASSESSMENT WHICH ASSUMES BLOCKAGE OF THE PIPE SYSTEM IN VILLA ST.)

Notes

C	FURTHER ISSUES RESPONSE	MK	AR	2022.02.10
B	FURTHER ISSUES LETTER	TJ	AR	2021.11.10
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Title

CONCEPTUAL STORMWATER DRAINAGE PLAN

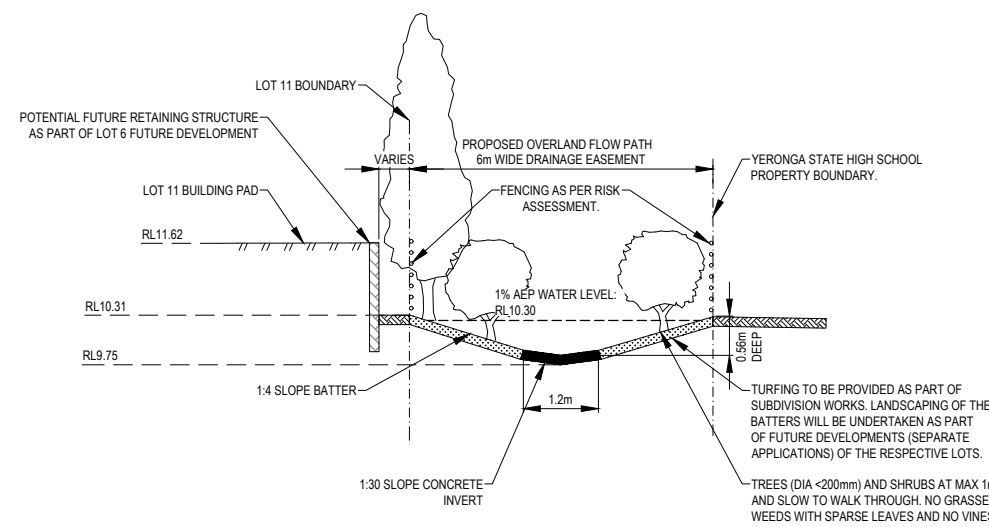
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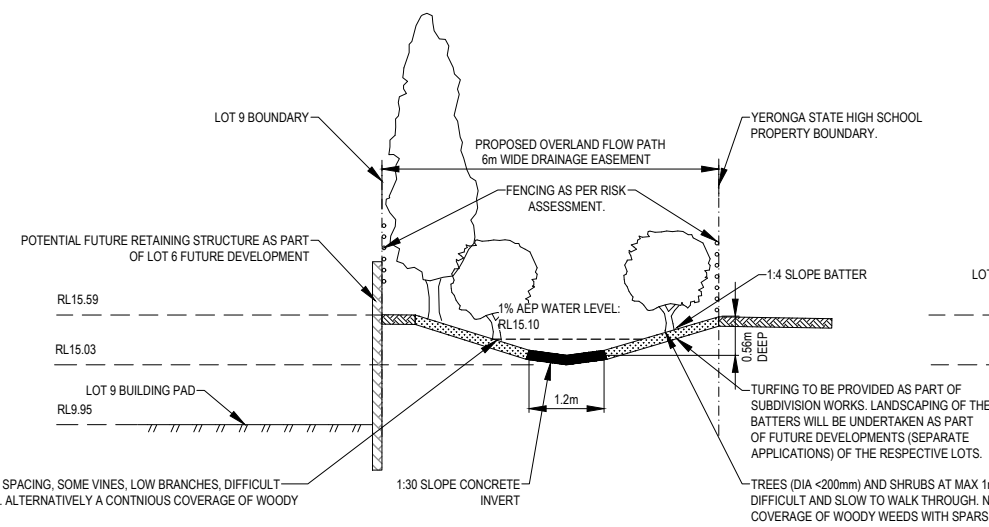
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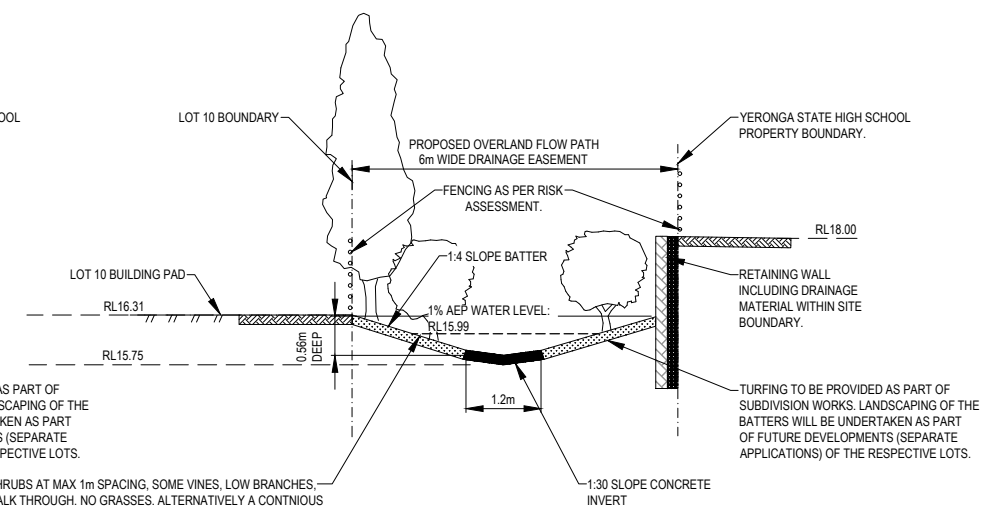
CI-520-P01



TYPICAL OVERLAND FLOW PATH
SECTION D-D
N.T.S.



TYPICAL OVERLAND FLOW PATH
SECTION C-C
N.T.S.



TYPICAL OVERLAND FLOW PATH
SECTION B-B
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STORMWATER DRAINAGE DETAILS

Project No.
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CI-526-D01

APPENDIX 5 – MUSIC Model Parameters & Output

- MUSIC Model
- MUSIC Output
- MUSIC Runoff Generation Parameters
- MUSIC Concentration Parameters



MUSIC Model

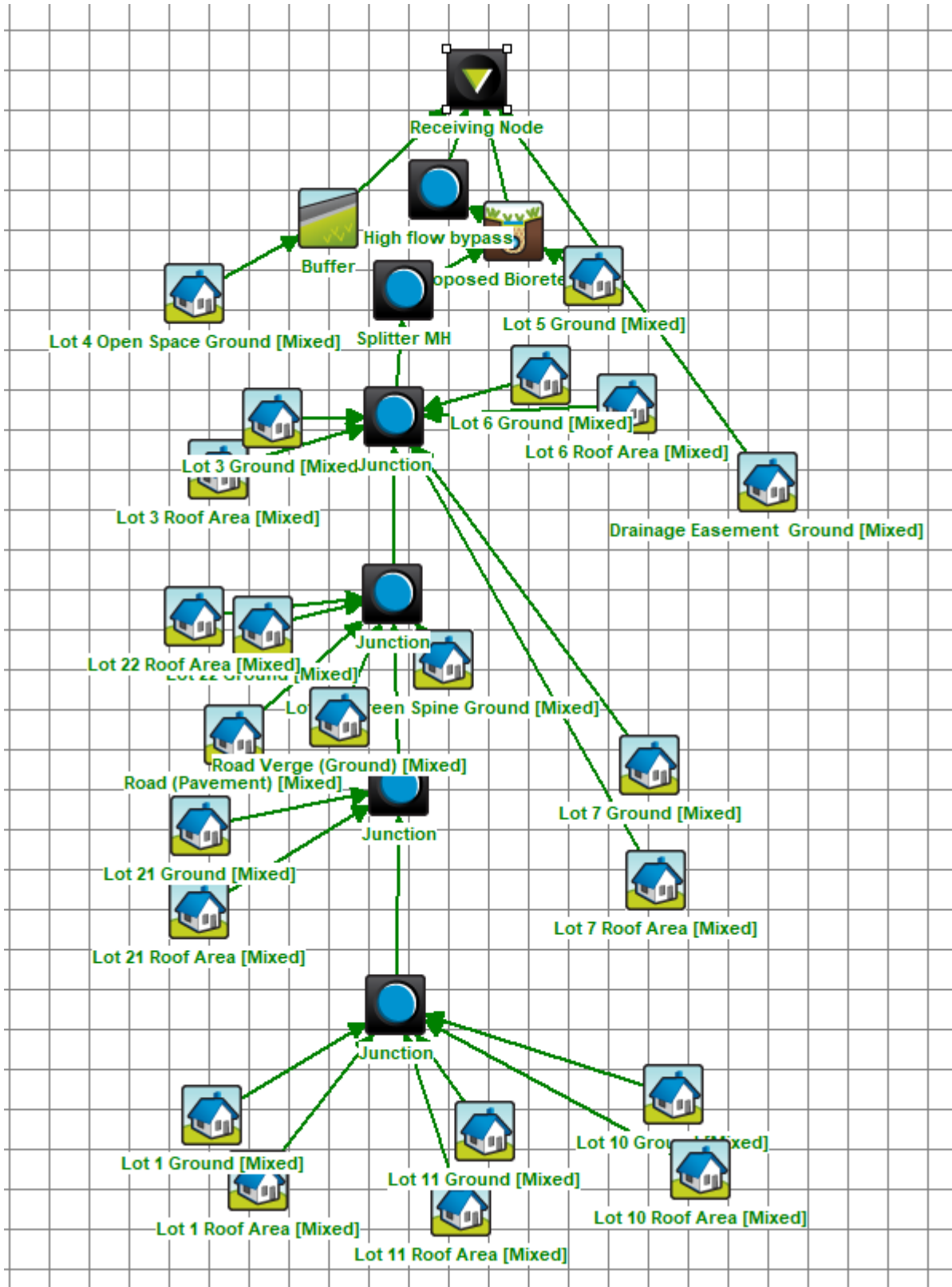


Figure 6-1: MUSIC Model



MUSIC Model Treatment Train Effectiveness

	Sources	Residual Load	% Reduction
Flow (ML/yr)	27.2	25.8	5.2
Total Suspended Solids (kg/yr)	3890	611	84.3
Total Phosphorus (kg/yr)	8.92	3.56	60
Total Nitrogen (kg/yr)	59.5	25.6	57
Gross Pollutants (kg/yr)	535	43.7	91.8

Figure 6-2: Treatment Train Effectiveness

MUSIC Runoff Generation Parameters

The following properties have been used in the MUSIC Modelling based on the Land Use Rainfall and Pollutant Parameters.

Table 6-1: Recommended MUSIC Runoff Generation Parameters (MUSIC Modelling Guidelines, 2018)

Parameter	Urban Residential	Commercial and Industrial
Rainfall Threshold (mm)	1	1
Soil Capacity (mm)	500	18
Initial Storage (%)	10	10
Field Capacity	200	80
Infiltration Capacity Coefficient a	211	243
Infiltration Capacity Coefficient b	5.0	0.6
Initial Depth (mm)	50	50
Daily Recharge Rate (%)	28	0
Daily Drainage Rate (%)	27	31
Daily Deep Seepage Rate (%)	0	0

MUSIC Concentration Parameters

LANDUSE	FLOW TYPE	TSS log ¹⁰ values		TP log ¹⁰ values		TN log ¹⁰ values	
		Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Urban residential	Baseflow	1.00	0.34	-0.97	0.31	0.20	0.20
	Stormflow	2.18	0.39	-0.47	0.32	0.26	0.23
Industrial	Baseflow	0.78	0.45	-1.11	0.48	0.14	0.20
	Stormflow	1.92	0.44	-0.59	0.36	0.25	0.32
Commercial	Baseflow	0.78	0.39	-0.60	0.50	0.32	0.30
	Stormflow	2.16	0.38	-0.39	0.34	0.37	0.34

Table 6-2: MUSIC Concentration Parameters (MUSIC Modelling Guidelines, 2018)



APPENDIX 6 – Stormwater Quality Maintenance Requirements

This Appendix is intended to be representative of a manual to assist with the handover of proposed stormwater quality treatment devices in respect to maintenance requirements.

- Bioretention Systems Information Sheet



Bio-Retention Systems

Minimising Long Term Maintenance

The Facility for Advancing Water Bio-filtration (FAWB) describes three key elements in the design and construction of bio-retention systems which strongly influence the amount of long term maintenance that is required. Adequately addressing these three key elements ensures that the long term maintenance of these systems is predictable, and therefore minimal. The elements are:

- Correct filter media specification and installation
- Correct vegetation specification and cover
- Protection during construction phases

The filter media for the bio-retention system must meet certain specifications. It is crucial that the filter media installed maintains its hydraulic conductivity (i.e. its ability to pass water through the media) in the long term. When an inappropriate filter media is installed (e.g. when it contains high levels of fine silt and clay materials) it may result in compaction or even structural collapse of the media. This leads to a substantial reduction in the treatment capacity of the system because water will not filter through the media but will pond on the surface instead and spill out through the overflow. A symptom of this compaction is often the loss of vegetation within the system. Similarly, the filter media must be correctly installed with an appropriate level of compaction during installation. Guidelines currently recommend that filter media be lightly compacted during installation to prevent migration of fine particles. In small systems, a single pass with a vibrating plate should be used to compact the filter media (FAWB 2009).

Nutrients have been identified as a key pollutant in stormwater, particularly nitrogen and phosphorus. The nutrient removal efficiency of bio-retention systems is related to the root structure and density of the plants within the system. Early analysis carried out by FAWB suggests that dense fibrous roots provide the most efficient pollutant removal. Furthermore, as plants mature and their roots penetrate the filter media, they play a role in maintaining the hydraulic conductivity of the media. Root growth helps to maintain the surface porosity and the infiltration capacity of the filter media. As a result, it is important that dense vegetation cover is established at an early stage to prevent compaction or surface sealing by promoting extensive root penetration. Some bio-retention systems are designed without understorey vegetation. In these instances, it is likely that additional maintenance will be required to maintain the porosity of the surface of the filter media (e.g. physical removal of any fine sediments accumulating on the surface).

Long Term Maintenance Tasks

The following long term maintenance plan is taken from the FAWB Raingarden and Bio-retention Tree Pit Maintenance Plan example.

Schedule of Bio-Retention Maintenance Visits

Schedule of Site Visits	
Purpose of Visit	Frequency
Inspection	Regular inspection and maintenance should be carried out to ensure the system functions as designed. It is recommended that these checks be undertaken on a three monthly basis during the initial period of operating the system. A less frequent schedule might be possible after the system has established.
Maintenance	

Bio-Retention Maintenance Tasks

Filter Media Tasks	
Sediment deposition	Remove sediment build up from the Bio-Retention System Frequency - 3 MONTHLY AFTER RAIN
Holes or Scour	Infill any holes in the filter media. Check for erosion or scour and repair, provide energy dissipation (e.g. rocks and pebbles at inlet) if necessary. Frequency - 3 MONTHLY AFTER RAIN
Filter media surface porosity	Inspect for the accumulation of an impermeable layer (such as oily or clayey sediment) that may have formed on the surface of the filter media. A symptom may be that water remains ponded in the system for more than a few hours after a rain event. Repair minor accumulations by raking away any mulch on the surface and scarifying the surface of the filter media between plants. For bio-retention systems without understorey vegetation, any accumulation of leaf litter should be removed to help maintain the surface porosity of the filter media. Frequency - 3 MONTHLY AFTER RAIN
Litter Control	Check for litter (including organic litter) in and around treatment areas. Remove both organic and anthropogenic litter to ensure flow paths and infiltration through the filter media are not hindered. Frequency - 3 MONTHLY OR AS DESIRED FOR AESTHETICS
Horticultural Tasks	
Pests and Diseases	Assess plants for disease, pest infection, stunted growth or senescent plants. Treat or replace as necessary. Reduced plant density reduces pollutant removal and infiltration performance. Frequency - 3 MONTHLY OR AS DESIRED FOR AESTHETICS
Maintain original plant densities	Infill planting: Between 6 and 10 plants per square metre should (depending on species) be adequate to maintain a density where the plant's roots touch each other. Planting should be evenly spaced to help prevent scouring due to a concentration of flow. Frequency - 3 MONTHLY OR AS DESIRED FOR AESTHETICS
Weeds	It is important to identify the presence of any rapidly spreading weeds as they occur. The presence of such weeds can reduce dominant species distributions and diminish aesthetics. Weed species can also compromise the systems long term performance. Inspect for and manually remove weed species. Application of herbicide should be limited to a wand or restrictive spot spraying due to the fact that bio-retention systems are directly connected to the stormwater system. Frequency - 3 MONTHLY OR AS DESIRED FOR AESTHETICS



Drainage Tasks	
Slotted subsoil drains	<p>Ensure that perforated pipes are not blocked to prevent filter media and plants from becoming waterlogged.</p> <p>A small steady clear flow of water may be observed discharging from the perforated pipe at its connection into the downstream pit some hours after rainfall. Note that smaller rainfall events after dry weather may be completely absorbed by the filter media and not result in flow. Remote camera (e.g. CCTV) inspection of pipelines for blockage and structural integrity could be useful.</p> <p>Frequency - 6 MONTHLY AFTER RAIN</p>
High flow inlet pits, overflow pits and other stormwater junction pits	<p>Ensure inflow areas and grates over pits are clear of litter and debris and in good and safe condition. A blocked grate would cause nuisance flooding of streets. Inspect for dislodged or damaged pit covers and ensure general structural integrity. Remove sediment from pits and entry sites etc. (likely to be an irregular occurrence in mature catchment).</p> <p>Frequency - MONTHLY AND OCCASIONALLY AFTER RAIN</p>
Other Routine Tasks	
Inspection after rainfall	<p>Occasionally observe the bio-retention system after a rainfall event to check infiltration. Identify signs of poor drainage (extended ponding on the filter media surface). If poor drainage is identified, check landuse and assess whether it has altered from design capacity (e.g. unusually high sediment loads may require installation of a sediment forebay).</p> <p>Frequency - TWICE A YEAR AFTER RAIN</p>

Included are the Healthy Waterways Bio-retention Basin Construction and Establishment Guidelines and Sign Off Forms. These are included to assist the contractor and the developer to understand their obligations and responsibilities in regards to both the Construction and Operational Phases of the device

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