Parkside Yeronga

Site Based Stormwater Management Plan (SBSMP)

Development Application

Prepared for: Economic Development Queensland

Date: 16/09/2022

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Ref: 301048272_E

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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	14/2/22	Further Issues Response	AR	AR
D	7/7/22	Flood Modelling Updates	BM	AR
E	16/9/22	TMR Information Request Updates	KJL/ 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
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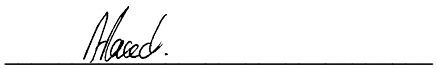

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For and on behalf of
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1. Introduction

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 Revision Update

This Conceptual Site Based Stormwater Management Plan has been updated to reflect changes required by conditions of the EDQ Development Approval Ref DEV2021/1221. Specifically, Condition 10 required an update to the Flood Impact Assessment to reflect changed flood criteria. Consequently, Condition 11a, required that an updated Stormwater Quality Management plan was provided that reflected the outcomes specified in the updated Flood Impact Assessment.

We note that Revision D of this report, incorporated updates to the Stormwater Quantity Management Section (Section 4) and minor updates to Stormwater Quality (Section 5), each to align with the Flood Assessment Report prepared by Watertech on behalf of Stantec, dated 8 July 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)

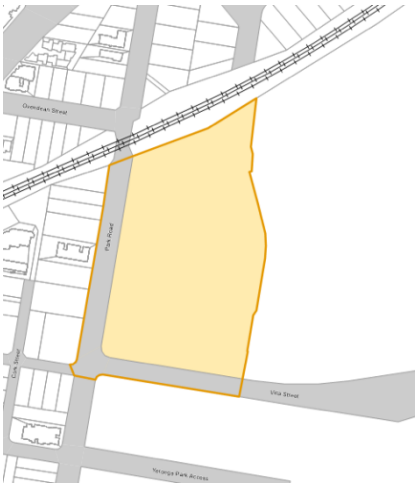

Figure 2-2: Site Location Plan (Source: Nearmap Australia 2018)

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 2**: 8 lot subdivision of balance lot (lot 500) to establish lots 3, 4, 5, 6, 7, 8, 10, 21, 22 and easements.

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. It is noted that a earlier ROL plan (dated 07/09/2021) has been overlaid, but the findings are not impacted.
- 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)

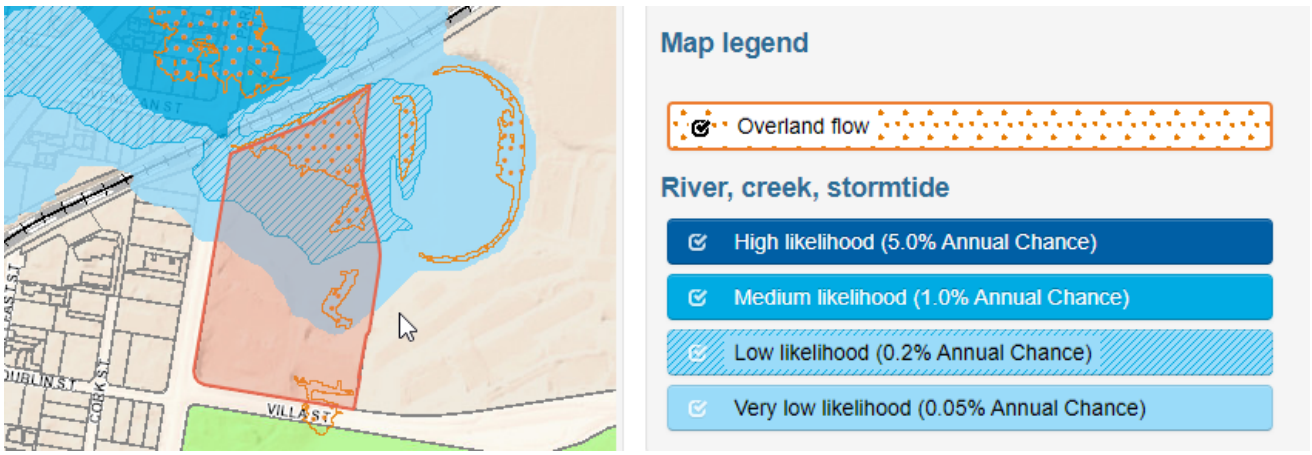

Figure 4: Riverine Flooding to Parkside Yeronga (Source: Brisbane Flood Awareness Mapping 2014)

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: 2,973m³
- Post Development: 3,974m³

However, it should be noted that the flood storage on the site will have a negligible impact on Brisbane River Flood and as such this storage is not considered critical except as required to achieve the non-worsening criteria outlined in the Flood Impact Assessment prepared by Watertech. 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)

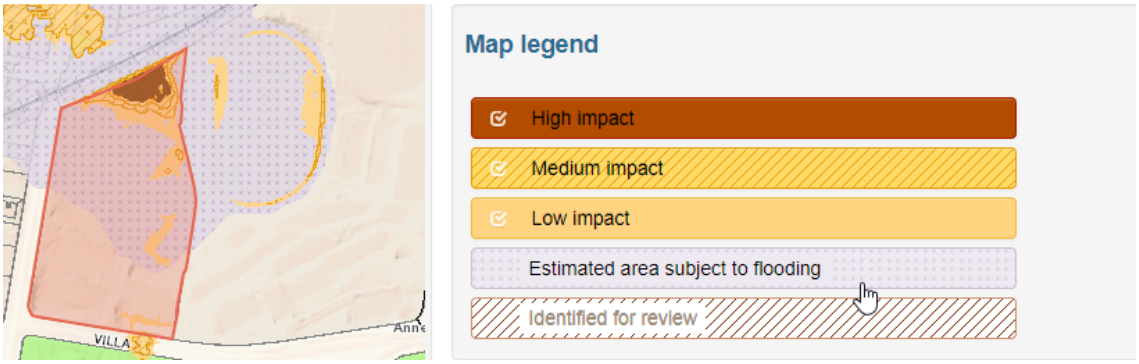

Figure 6: Overland Flooding to Parkside Yeronga (Source: BCC Flood Awareness Mapping)

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 DN1050 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.
- Increase flood storage within Lot 4 to ensure that the flood storage removed from Villa St does not increase water surface levels against the railway line, or in upstream or downstream properties.

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

- DN1050 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.

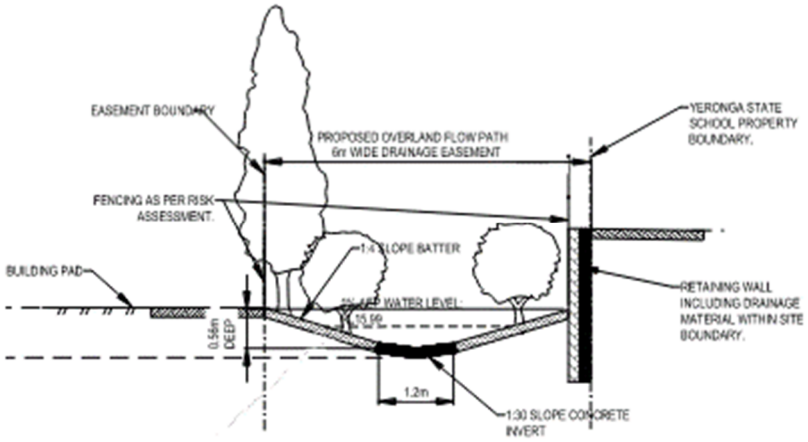

Figure 7: Overland Flow Path Section

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 1050mm 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. Non-worsening on peak flood levels for all downstream and upstream private properties and within the rail corridor (using a modelling tolerance of +/-10mm) for the critical duration for the following storm events 63.2%, 50%, 20%, 10%, 5%, 2% and 1% AEP; and
2. Non-worsening of velocities downstream and upstream properties or within the railway corridor (using a modelling tolerance of +/-10mm) for critical durations for each storm event between the 63.2%, 50%, 20%, 10%, 5%, 2% and 1% AEP
3. The modelling must consider Lot 10 to be fully developed without Easement 5 as an overland flow
4. QUDM safety criteria and requirements for fencing and warning signage
5. Trafficability and acceptable pedestrian safety within Villa Street for 1% AEP storm event in accordance

with QUDM. The Flood Assessment has estimated a flood level of RL8.41m 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:

1. 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 Table 3-2 in reference to the estimated flood levels in the Watertech Flood Assessment report dated 8 July 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	8.91m (500mm)
	NCC Class 1-4 building - basement entry	8.41m (0mm)
	Other NCC Classes	NOT COMPATIBLE
6	NCC Class 1-4 building - habitable room	8.91m (500mm)
	NCC Class 1-4 building - habitable room	8.91m (500mm)
	NCC Class 1-4 building - basement entry	8.41m (0mm)
	NCC Class 9a/c building - building floor level	11.8 (0mm)
	NCC Class 9 building - basement entry	8.41m (0mm)
	NCC Class 9 building – Substation (fully servicing and located within lot 6)	11.8m (0mm)*
8	Open space	8.41m (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.

2. 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.
3. The Conceptual Earthworks shown in Appendix 4 have demonstrated the criteria noted in Section 3.3.43.2.4.
4. 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 8 July 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 typography 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 1050mm 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.

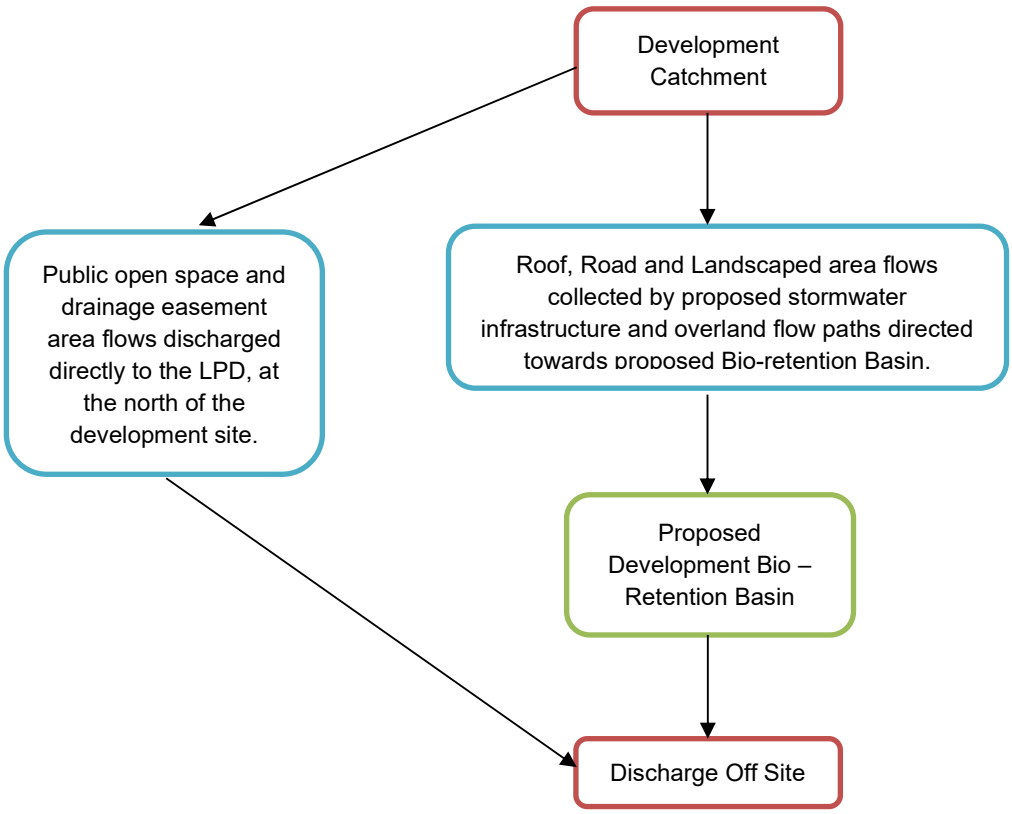

Figure 5-1: Schematic Treatment Train Proposed

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 site's catchments, 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 (2018), 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)	0.174	1.00	0.174	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	0.363	1.00	0.363	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	0.083	0.75	0.062	Urban Residential
Lot 6 Ground	0.063	0.82	0.052	Urban Residential
Lot 7 Ground	0.404	0.81	0.326	Commercial
Lot 8 Green spine Ground	0.087	0.3	0.026	Urban Residential
Road Verge (Ground)	0.214	0.50	0.108	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	0.132	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	0.35	0.05	0.018	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.

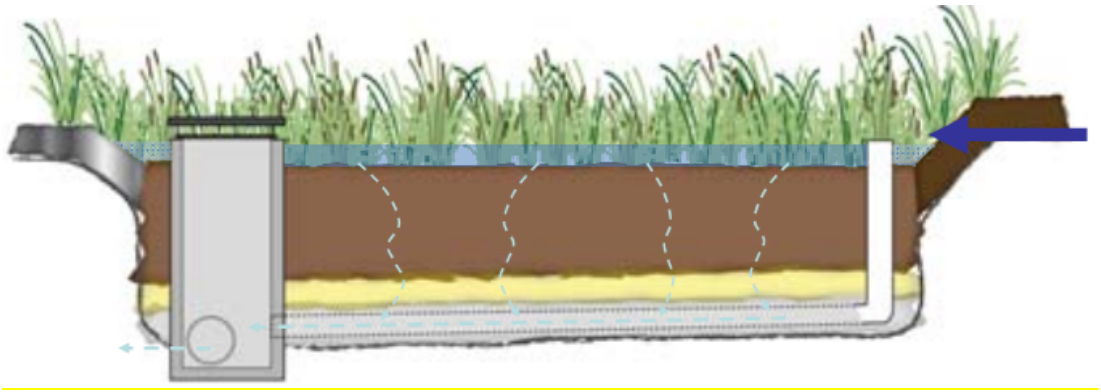

Figure 5-2: Typical Section of a generic Bio-retention system (Source: Water by Design)

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	569	500	0.25	0.6	3

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

- Filter Media – 0.6m 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 and local flows contained in Lot 4, 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)	82.2%	80%	Yes
Total Phosphorus (TP)	61.2%	60%	Yes
Total Nitrogen (TN)	55.7%	45%	Yes
Total Gross Pollutants (GP)	93.9%	90%	Yes

5.5 Maintenance Tasks & Responsibilities

To ensure that the proposed stormwater quality treatment train maintains it 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 oxidsation 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 Compliance Assessment against Condition 11a.

APPENDIX 1 – Existing Detailed Site Survey

SUBSURFACE UTILITIES

This plan follows elements of the Australian Standard for Classification of Subsurface Utility Information (SUI). The location of utilities on this plan adhere to the following classification:

- Quality Level A (QL-A) represents the highest quality level. The exposed utility was directly measured for absolute position and height to a horizontal and vertical tolerance of +/-50mm.No QL-A underground utilities were located in this survey. Visible surface features of subsurface utilities such as valves and manholes shown on this plan are also QL-A.
- Quality Level B (QL-B): The subsurface utility was detected without being exposed and then surveyed to give relative positions to a horizontal tolerance of +/-300mm and relative heights to a vertical tolerance of +/-500mm. Utilities indicated as QL-B were electronically detected/ detected by EMR by RPS and surveyed by RPS on 8/3/2018.
- Quality Level C (QL-C): The subsurface utility was plotted by correlating the surveyed positions of visible features and existing utility records. The subsurface utility itself was not surveyed. Relative positions are to a horizontal tolerance of +/-300mm.
- Quality Level D (QL-D): The lowest quality level. The subsurface utility was compiled from existing records only and was not surveyed. Tolerance does not apply to these indicative locations.

Only Quality Level A utilities have been located accurately. All other utility alignments must not be relied upon when designing services or buildings that will be constructed in close proximity to them. If these existing underground utility positions are critical for design or construction purposes, the utility location must be accurately determined by pot-holing or verification on site by the relevant authority prior to commencement of design or construction.

In accordance with the Work Health and Safety Act 2011 manholes have not been entered to obtain invert levels. The invert levels shown are derived from approximate field measurements and existing records. The shapes depicting services are symbolic representations, and whilst they are accurately positioned, they are not to scale. Utility alignments and attributes have been derived from the following sources only:

- APA Group Networks
- Brisbane City Council
- Energex
- Optus
- QUU
- Reef Networks
- Telstra

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DBYD Enquiry Date: 15/01/2018
DBYD Job Number: 13525805

Amendment	Description	Date	Surveyor	Drafted
A	First Issue	26/03/2018	SD&JL	BJS

PURPOSE OF PLAN

This plan represents a ground survey of the site to enable architectural and engineering design.

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 footpaths, stairs, seats and so forth have not been located. Outside the property,on the surrounding streets and verges, comprehensive detail has been located.

Only the connections of subsurface utilities entering the site have been located. Minor subsurface utilities inside the site have not been traced.

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.

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.
Minor Contour Interval: 0.5m

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.

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 2003.

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 2003.

Boundary corners were not marked at the time of survey.

COORDINATE SYSTEM

The coordinate system of this digital data is a plane system with a scale factor of 1.0.

To transform to MGA94 Zone 56, scale by 1.00040183140362 about PM20976 (501976.917,6956280.184).

FLOOD DATA

Flood information from BCC Floodwise Report 22/3/2018.
Residential Flood Level: RL7.8.
January 2011 Flood: RL 7.8.
Defined Flood Level: RL 6.7.

Hz Datum:	Plane (See note)	Locality:	YERONGA
Hz Origin:	PM132397	Local Authority:	Brisbane City Council
Vrt Datum:	AHD	Lat Long:	S27°30'58.25" E157°01'17.29"
Vrt Origin:	PM20976	DWG:	139204DET
Origin RL:	21.413m	12D:	139204MASTER

SCALE IN METERS AT ORIGINAL REDUCTION RATIO

NORTH

PAGE SIZE: A1
SCALE: 1:200

CLIENT: Department of Infrastructure, Local Government and Planning

RPS Australia Asia Pacific
743 Ann Street, Fortitude Valley QLD 4006
PO Box 1559, Fortitude Valley QLD 4006
t (07) 3237 8899
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RPS

PROJECT: YERONGA TAFE

Contour and Utility Investigation Survey. Yeeronga TAFE
70 Park Road, Yeronga
(Part of lot 2 on SP142343)

SHEET 1 OF 4 | PR139204 | 1 | A

LEGEND

General representation of subsurface utility (public) levels

Pipe or cable located by survey

(Surveyed position) (Depth below surface)

Pipe or cable plotted from records (QL-D)

QL-A: +/-300mm position and height
QL-B: +/-300mm position, +/-300mm height
QL-C: +/-300mm position, no height
QL-D: From records, accuracy unconfirmed

Building wall
Ceiling
Roof
Gutter/Eave
Awning post
Downpipe
Column
Electric overhead EOH
Electric underground E
Low Voltage ELV
High Voltage EHV
Camera
Power pole
Ground fi
Bollard light
Light pole
Manhole
Pillar
Pit
Marker
IE/UP
Marker post
Vend. Mach.
FENCE Block
FENCE Picket
FENCE Bollard
FENCE Pool
FENCE Log
FENCE Rail
FENCE Mainfroot
FENCE Wire
FENCE Metal
FENCE General
Bollard
Gate post
Fence posts
Gas main G
High pressure gas HPG
Low pressure gas LPG
Meter
Valve
Marker
Vent
Marker post
Sewer pipe S
Sewer rising main RM
Sewer Vacuum Main VS
Centre chamber
Marker post
Inspect. opening
Pop pit
Manhole
Vent
Marker
Stormwater pipe
Stormwater Open Drain
Box Grate Drain
Centre chamber
Marker post
Field inlet
Gully trap
Manhole
Kerb outlet
Marker
Telstra overhead OHT
Telstra underground T
Manhole
Pit
Marker post
Marker
Pillar
Ort Pole
Concrete
Gully
Gravel
CG
Pavers
Water edge
Bitumen
Canopy
Extent of vegetation
Garden
Fire Service
Irrigation IR
Non Potable water NPW
Recycled water R
Water service W
Bore
Reducer
Fire hydrant
Sprinkler
FH post
Scour valve
Hose reel
Tap
Meter
Tapping band
Manhole
Valve
Marker
Air valve
Marker post
Above g. valve
Irrigation valve
Bridge Soffit
Bridge Support
Bridge Pier
Comms overhead
(records)
COH
Comms underground C
Marker post
Manhole
Marker
Pit
Petroleum pipeline P
Oil pipeline OIL
Fuel cap
Fuel valve
Marker post
Marker
Borehole
Settlement Plate
Bitumen
Road surface
Kerb
Guide post
Parking meter
Phone
Traffic light
Traffic Pillar
TL with light
Traffic Pit
Roadmark
Overtaking
Continuity line
Giveway line
Dashed line
Double lines
Chevron marking
Turning Arrows
Advert.
Keep Right
Airport
Misc. sign
Blue sign AdServices
Roadside Delivery Parking
Brown sign Tourist
Rail Xing
Bus
Stop sign
Chevron
Speed sign
Green sign Dist./direction
Street Name
Give way
School
Keep Left
Yellow sign Planning
Rail mast
Room gate
Rail signal
Exotic Tree
Palm tree
Native Tree
Pine tree
Shrub
Stump
Bin
Flag pole
Hoist
Letter box
Post box
Unknown marker post
Unknown
Unknown valve
Unknown manhole
Unknown marker
Subject property boundary
Adjoining property boundary
Covenant
Emt
Lease
Permanent Survey mark
Bench mark

EOT: End of Trace

TREE TABLE

ID	Species	Dia	Spread	Height
100	Native	0.25	6	6
101	Native	0.30	8	9
102	Native	0.25	6	8
103	Native	0.30	7	8
104	Native	0.35	3	4
105	Native	1.00	12	14
106	Native	0.20	8	10
108	Native	0.30	8	9
109	Native	0.30	3	4
110	Native	0.35	5	4
111	Gum	0.60	6	13
112	Native	0.30	8	9
113	Native	0.60	12	16
114	Native	0.20	5	12
115	Native	0.50	11	12
116	Native	0.30	12	14
117	Native	0.35	12	14
118	Native	0.20	7	8
119	Native	0.20	4	8
120	Native	0.30	5	8
121	Native	0.50	12	10
122	Native	0.60	14	10
123	Native	0.20	7	8
124	Native	0.40	11	10
125	Native	0.25	10	10
126	Native	0.30	8	10
127	Native	0.50	12	9
128	Native	0.45	8	12
129	Native	0.20	9	11
130	Native	0.80	12	10
131	Native	0.30	7	8
132	Native	0.40	8	10
133	Native	0.25	6	8
134	Native	1.00	10	14
135	Native	0.40	12	12
136	Native	0.50	20	18
137	Native	0.40	20	18
138	Native	0.40	20	18
139	Native	0.50	20	18

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140	Native	0.50	20	18
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142	Native	0.30	3	4
143	Native	0.25	3	4
144	Native	0.20	2	4
145	Native	0.20	3	4
146	Native	1.00	24	18
147	Native	0.40	10	12
148	Native	0.50	12	15
149	Gum	0.50	9	15
150	Pine	0.40	8	16
151	Gum	0.50	7	16
152	Gum	0.60	8	16
153	Gum	0.50	7	14
154	Gum	0.40	5	13
155	Gum	0.50	6	15
156	Native	0.45	6	12
157	Native	0.40	6	12
158	Native	0.40	6	12
159	Native	0.25	5	10
160	Native	0.30	6	10
161	Native	0.40	7	11
162	Palm	0.50	10	16
163	Native	0.50	14	14
164	Native	0.28	10	12
165	Native	0.40	6	8
166	Native	0.40	8	12
167	Native	0.30	10	12
168	Native	0.45	18	14
169	Native	0.50	14	12
170	Native	0.60	10	6
171	Gum	0.40	8	13
172	Native	0.50	10	7
173	Pine	0.40	6	16
174	Pine	0.40	6	16
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Amendment	Description	Date	Surveyor	Drafted
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SCALE IN METERS AT ORIGINAL REDUCTION RATIO

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Origin RL:	21.413m	12D:	139204MASTER

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PROJECT
YERONGA TAFE

Contour and Utility Investigation Survey. Yeeronga TAFE
70 Park Road, Yeronga
(Part of lot 2 on SP142343)

SHEET 2 of 4 PR139204 1 A

LEGEND

General representation of subsurface utility (public) levels

Pipe or cable located by survey

Pipe or cable plotted from records (QL-C)

QL-A: +/-20mm position and height
QL-B: +/-20mm position, +/-300mm height
QL-C: +/-300mm position, no height
QL-D: From records, accuracy unconfirmed

Building wall
Ceiling
Roof
Gutter/Eave
Awning post
Downpipe
Column
Electric overhead EOH
Electric underground E
Low Voltage ELV
High Voltage EHV
Camera
Power pole
Ground fi
Bollard light
Light pole
Manhole
Pillar
Pit
Marker
KLUP
Marker post
Vend. Mach.
FENCE Block
FENCE Picket
FENCE Bollard
FENCE Pool
FENCE Log
FENCE Rail
FENCE MainRoof
FENCE Wire
FENCE Metal
FENCE General
Bollard
Fence posts
Gate post
Gas main G
High pressure gas HPG
Low pressure gas LPG
Meter
Valve
Marker
Vent
Marker post
Sewer pipe S
Sewer rising main RM
Sewer Vacuum Main VS
Centre chamber
Marker post
Hinged. opening
Pop pit
Manhole
Vent
Marker
Stormwater pipe SW
Stormwater Open Drain
Box Grate Drain
Centre chamber
Marker post
Field inlet
Gully trap
Manhole
Kerb outlet
Marker
Telstra overhead OHT
Telstra underground T
Manhole
Pit
Marker post
Marker
Pillar
Grt Pole
Concrete
Gully
Gravel CG
Pavers
Water edge
Bitumen
Canopy
Extent of vegetation
Garden
Fire Service FW
Irrigation IR
Non Potable water NPW
Recycled water R
Water service W
Bore
Reducer
Fire hydrant
Sprinkler
FH post
Scour valve
Hose reel
Tap
Meter
Tapping band
Manhole
Valve
Marker
Air valve
Marker post
Above g. valve
Irrigation valve
Bridge Soffit
Bridge Support
Bridge Pier
(records)
Comms overhead COH
Comms underground
Marker post
Manhole
Marker
Pit
Petroleum pipeline P
Oil pipeline OIL
Fuel cap
Fuel valve
Marker post
Marker
Manhole
Settlement Plate
Bitumen
Road surface
Kerb
Guide post
Parking meter
Phone
Traffic light
Traffic Pillar
Tc veh light
Traffic Pit
Roadmark
Overlaying
Continuity line
Giveway line
Dashed line
Double lines
Chevron marking
Turning Arrows
Advert
Keep Right
Airport
Misc. sign
Blue sign Aid/Services
Prohibitive Regulatory Parking
Brown sign Tourist
Rail /ung
Bus
Stop sign
Chevron
Speed sign
Green sign Dist./directions
Street Name
Give way
School
Keep Left
Yellow sign Warning
Rail mast
Boom gate
Rail signal
Exotic Tree
Palm tree
Native Tree
Pine tree
Shrub
Stump
Bin
Flag pole
Hoist
Letter box
Post box
Unknown marker post
Unknown pit
Unknown manhole
Unknown valve
Unknown marker
Subject property boundary
Adjoining property boundary
Covenant
Easement
Lease
Permanent survey mark
Bench mark

EOT: End of Trace

Proposed Lot 3
SP300888

PARK ROAD

VILLA STREET

DUBLIN STREET

Possenger Zone

Phone Booth

Unable to access floor level

Amendment	Description	Date	Surveyor	Drafted
A	First Issue	26/03/2018	SD&JL	BJS

PURPOSE OF PLAN
This plan represents a ground survey of the site to enable architectural and engineering design.

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 footpaths, stairs, seats and so forth have not been located. Outside the property,on the surrounding streets and verges, comprehensive detail has been located.

Only the connections of subsurface utilities entering the site have been located. Minor subsurface utilities inside the site have not been traced.

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.

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.
Minor Contour Interval: 0.5m

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.

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 2003.

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 2003.

Boundary corners were not marked at the time of survey.

COORDINATE SYSTEM
The coordinate system of this digital data is a plane system with a scale factor of 1.0.

To transform to MGA94 Zone 56, scale by 1.000401831403362 about PM20976 (501976.917,6956280.184).

FLOOD DATA
Flood information from BCC Floodwise Report 22/3/2018
Residential Flood Level: RL7.8. — F
January 2011 Flood: RL 7.8. — F
Defined Flood Level: RL 6.7. — F

Hz Datum:	Plane (See note)	Locality:	YERONGA
Hz Origin:	PM132397	Local Authority:	Brisbane City Council
Vrt Datum:	AHD	Lat Long:	S27°30'58.25" E157°01'17.29"
Vrt Origin:	PM20976	DWG:	139204DET
Origin RL:	21.413m	12D:	139204MASTER

SCALE IN METERS AT ORIGINAL REDUCTION RATIO

PAGE SIZE: A1
SCALE: 1:200

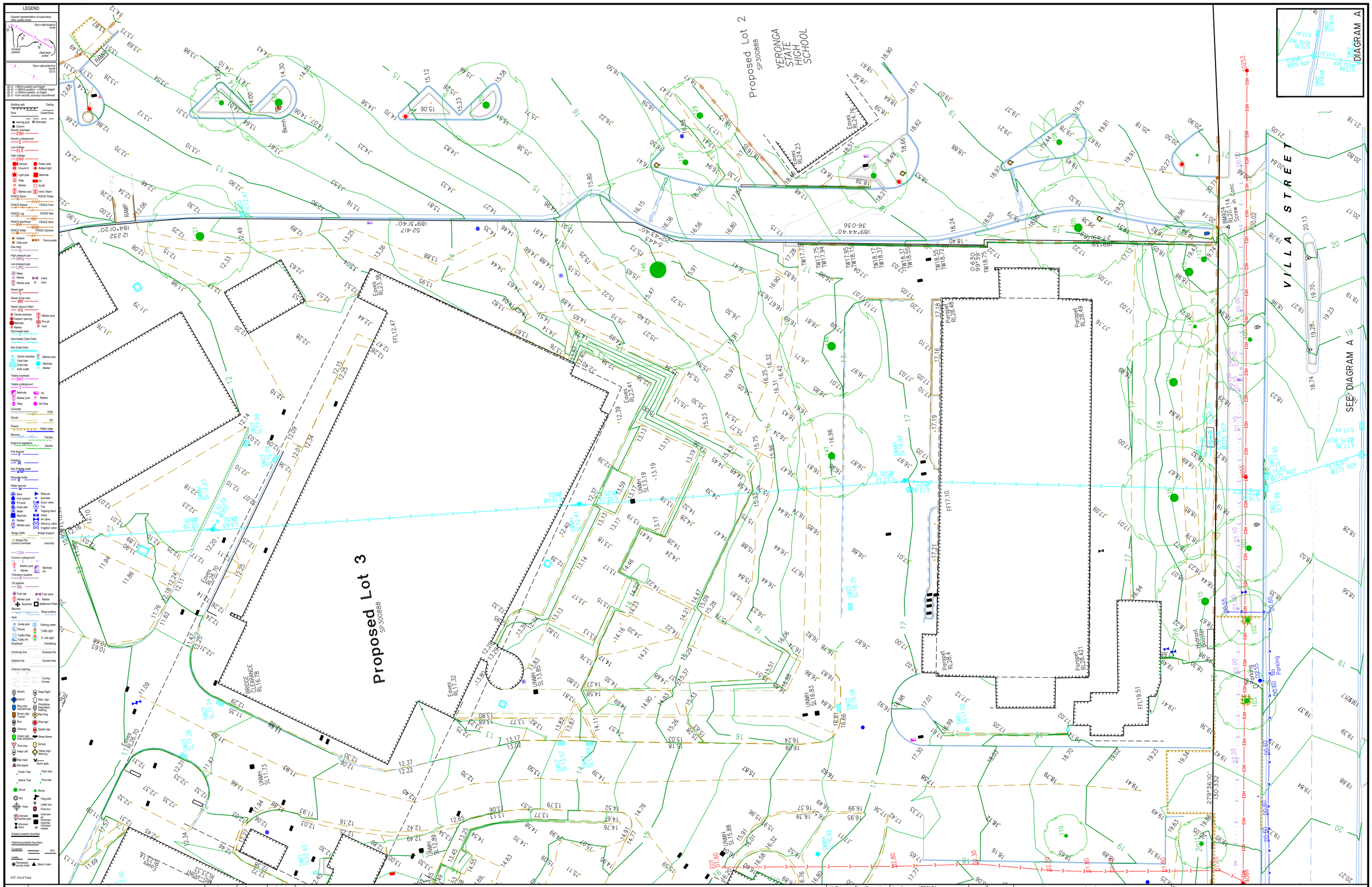
CLIENT: Department of Infrastructure, Local Government and Planning

PROJECT: YERONGA TAFE

Contour and Utility Investigation Survey. Yeeronga TAFE
70 Park Road, Yeronga
(Part of lot 2 on SP142343)

RPS Australia Asia Pacific
743 Ann Street, Fortitude Valley QLD 4006
PO Box 1559, Fortitude Valley QLD 4006
t (07) 3237 8899
www.rpsgroup.com.au

SHEET: 3 & 4 | PR139204 | 1 | A



Amendment	Description	Date	Surveyor	Drafted
A	First Issue	26/03/2018	SD&JL	BJS

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

0 5 10m 20m 50m
Scale 1 : 1000 @ A3

N

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

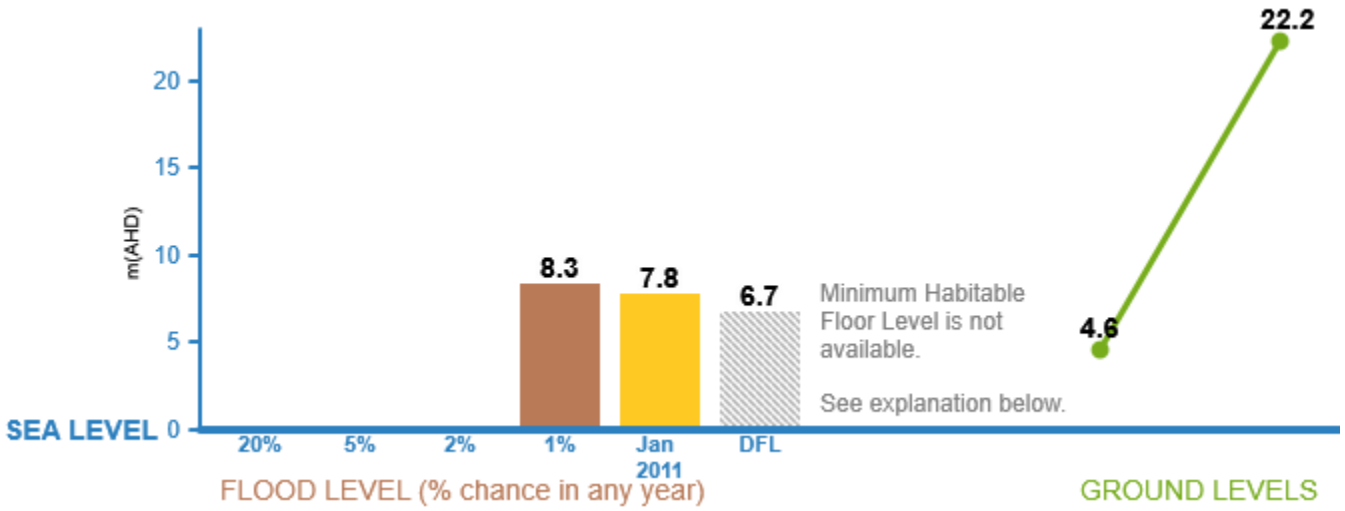
The FloodWise Property Report provides property or lot-based flood information for building and development requirements. This report provides information on estimated flood levels, habitable floor level requirements and more technical information on the four sources of flooding: river, creek / waterway, 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

Dedicated to a better Brisbane

Report Reference
1630896727760

06/09/2021 12:52:07

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 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 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

Dedicated to a better Brisbane

Report Reference
1630896727760

06/09/2021 12:52:07

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

ECONOMIC DEVELOPMENT QUEENSLAND
PARKSIDE YERONGA - SUBDIVISION
70 PARK ROAD, YERONGA, BRISBANE

DEVELOPMENT LAYOUT PLAN

1:1000 10 0 10 20 30 40 50 A1
1:2000 A3

DRAWING REGISTRY	
DRAWING NUMBER	DRAWING DESCRIPTION
CI-001-P01	COVER SHEET, DRAWING REGISTRY AND LOCALITY PLAN
CI-100-P01	BULK EARTHWORKS PLANCONCEPTUAL MASTER PLAN
CI-500-P01	CONCEPTUAL STORMWATER EXTERNAL CATCHMENT PLAN
CI-500-P02	CONCEPTUAL STORMWATER QUALITY CATCHMENT PLAN
CI-520-P01	CONCEPTUAL STORMWATER DRAINAGE PLAN
CI-520-P02	CONCEPTUAL STORMWATERMANAGEMENT PLAN
CI-526-D01	STORMWATER DRAINAGE DETAILS SHEET 1 OF 3
CI-526-D02	STORMWATER DRAINAGE DETAILS SHEET 2 OF 3
CI-526-D03	STORMWATER DRAINAGE DETAILS SHEET 3 OF 3
CI-700-P01	COMBINED SERVICES PLAN CONCEPTUAL MASTER PLAN

Notes

D	UPDATED FOR FLOOD IMPACT ASSESSMENT	MK	AR	2022.07.08
C	FURTHER ISSUE RESPONSE	MK	AR	2022.02.10
B	FURTHER ISSUE LETTER	TJ	AR	2021.11.10
A	ISSUED FOR APPROVAL	BM/VI	AR	2021.09.15
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

PRELIMINARY

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Tel: +61 7 3811 4500

Client/Project Logo

Client/Project
ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name: CI-001-P01.DWG | MK Dwn. | JW/SBJ Dsgn. | AR Chkd. | 2022.07.07 YYYY.MM.DD

Title
COVER SHEET AND DRAWING REGISTRY

Project No. 301048272
Scale 1:1000 @A1
Revision D
Drawing No. **CI-001-P01**

Plotted: 8/07/2022 11:09:38 AM By: AMES, BEN
\\VWGE-BRIFS-01\VWG_JOBS\301048272\PROJECT DOCUMENTATION\CIVIL\VWG TRANSFER\220708 UPDATED DA SET\CI-TBA.DWG\220707
ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD

SERVICES NOTES

1. 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.
2. ALL ITEMS ON THIS DRAWING ARE SUBJECT TO CONFIRMATION FROM RELEVANT SUPPLY AUTHORITY.
3. WHERE LEVELS OR SIZES OF ANY WORKS ARE SHOWN, THESE ARE INDICATIVE ONLY TO DEMONSTRATE THE CAPABILITY OF THE SERVICING 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.
4. DRAWINGS ARE NOT INTENDED TO BE USED FOR TENDER, ESTIMATING OR CONSTRUCTION.
5. ALL LOTS SHALL BE PROVIDED WITH CONNECTION TO SEWER, WATER, ELECTRICITY, TELECOMMUNICATIONS AND A LAWFUL POINT OF STORMWATER DISCHARGE.
6. 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
- 20.0 — EXISTING CONTOURS
- PROPOSED RETAINING WALL
- POTENTIAL FUTURE RETAINING WALL
- PROPOSED SWALE
- INDICATIVE TOP OF BATTER

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

SURCHARGING OVERLAND FLOWS FROM SAG IN VILLA ST TO BE DIRECTED ALONG BOUNDARY IN PROPOSED DRAINAGE EASEMENT.

RETAINING WALL REQUIRED ADJACENT OVERLAND FLOW PATH

POTENTIAL OVERLAND FLOW PATH RECONFIGURATION AS PART OF FUTURE APPLICATION OVER LOT 6.

PROPOSED 1% AEP RL8.41 AHD LOCAL FLOOD LEVEL

EXISTING 1% AEP 8.3m AHD BRISBANE RIVER FLOOD LEVEL

1in3 BATTER

BIO-RETENTION AREA. POSITION AND ORIENTATION TO ENSURE OVERLAND FLOW PATH DOES NOT PASS THROUGH THE BIO-RETENTION AREA.

WORKS TO BE CONTAINED WITHIN PROPERTY BOUNDARY.

EXISTING RAIL BRIDGE.

EXISTING CLEVELAND RAIL LINE FORMATION

YERONGA MEMORIAL PARK

VILLA STREET

NORTH ROAD

SOUTH ROAD

EAST ROAD

PARK RD

LOCAL CATCHMENT FLOOD STORAGE COMPARISON (1% AEP SCENARIO):

PRE-DEMO (RPS SURFACE) FLOOD STORAGE BELOW RL8.41m AHD: 2973m³

DESIGN SURFACE FLOOD STORAGE BELOW RL8.41m AHD: 3974m³

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 = -5310m³
FILL = +11322m³
BALANCE = 6012m³

SCALE 1:500 (A1) 0 10 20

SCALE 1:1000 (A3) 0 10 20

Notes

D	UPDATED FOR FLOOD IMPACT ASSESSMENT	MK	AR	2022.07.08
C	FURTHER ISSUE RESPONSE	MK	AR	2022.02.10
B	FURTHER ISSUE LETTER	TJ	AR	2021.11.10
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Issued/Revision		By	Appd	YYYY.MM.DD

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Client/Project Logo

Client/Project
ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-100-P01.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BULK EARTHWORKS PLAN
CONCEPTUAL MASTER PLAN

Project No. 301048272
Scale 1:500 @A1
Revision D
Drawing No. CI-100-P01

Plotted: 8/07/2022 11:27:47 AM By: MILES, BEN
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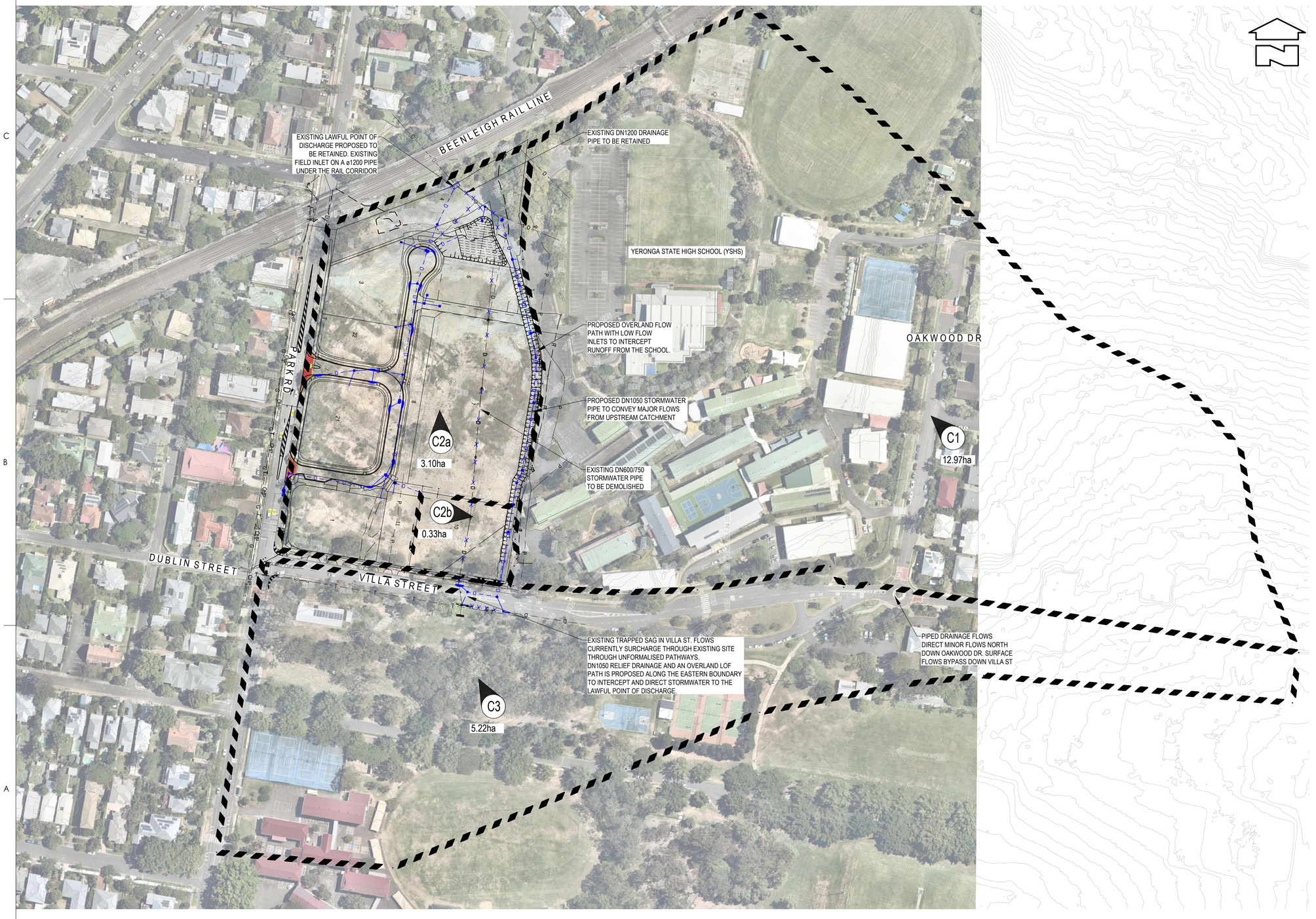
ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



LEGEND

- EXISTING 0.5m CONTOURS & HEIGHT
- PROPOSED CATCHMENT BOUNDARY
- INDICATIVE STORMWATER LINE & MANHOLE
- INDICATIVE STORMWATER LINE & PIT
- INDICATIVE STORMWATER OVERLAND FLOW PATH
- EXISTING STORMWATER LINE & MANHOLE
- EXISTING STORMWATER LINE & GULLY
- EXISTING STORMWATER LINE TO BE REMOVED

12.97ha C1 — PROPOSED CATCHMENT LABEL

SCALE 1:1250 (A1) 0 10 20

SCALE 1:2500 (A3) 0 10 20

D	UPDATED FOR FLOOD IMPACT ASSESSMENT	MK	AR	2022.07.08
C	FURTHER ISSUE RESPONSE	MK	AR	2022.02.10
B	FURTHER ISSUE LETTER	TJ	AR	2021.11.10
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ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-500-P01.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
CONCEPTUAL STORMWATER EXTERNAL CATCHMENT PLAN

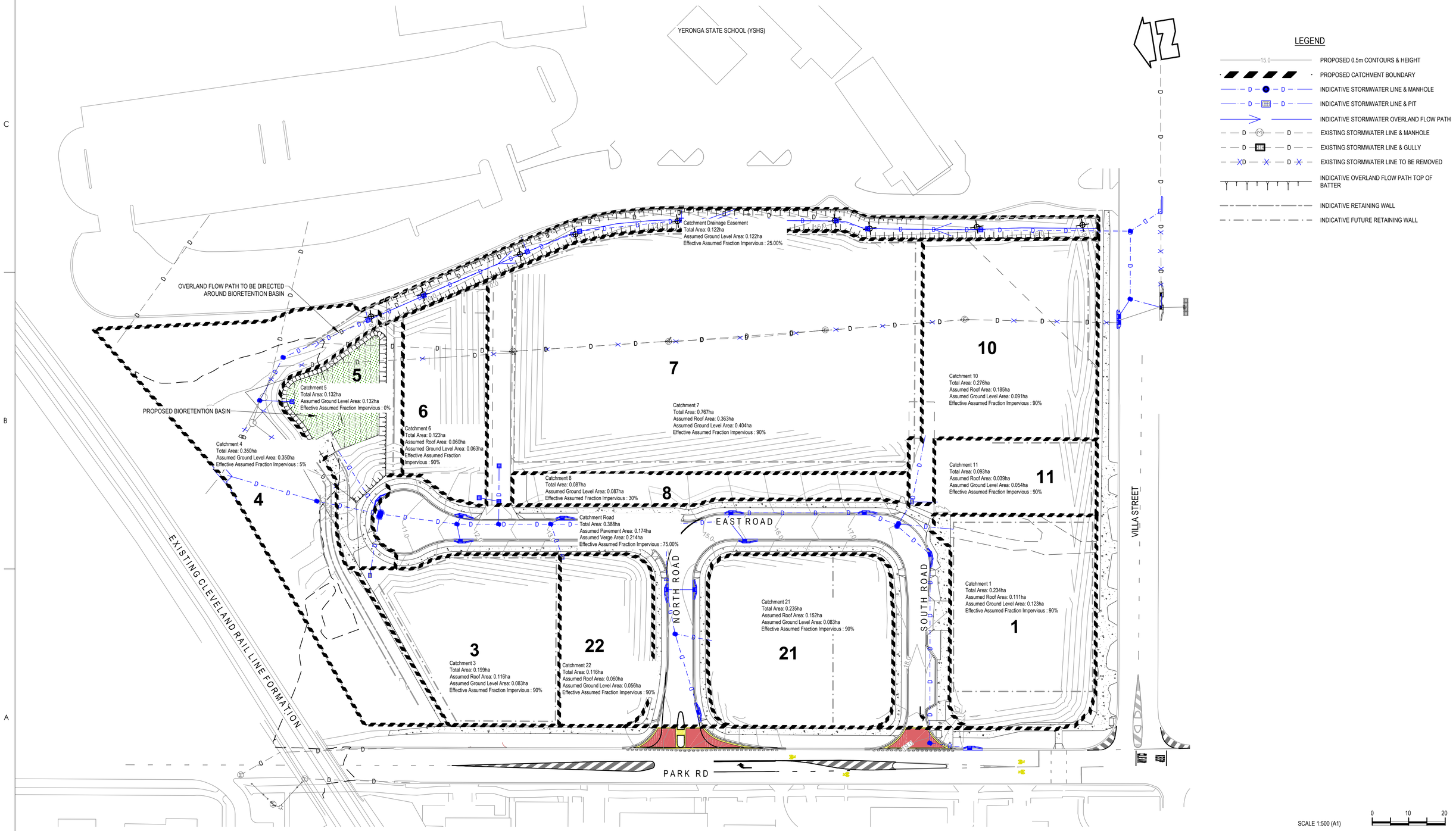
Project No.
301048272

Scale
1:1250 @A1

Revision
D

Drawing No.
CI-500-P01

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



Notes

D	UPDATED FOR FLOOD IMPACT ASSESSMENT	MK	AR	2022.07.08
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B	FURTHER ISSUE LETTER	TJ	AR	2021.11.10
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ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-500-P02.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

CONCEPTUAL STORMWATER QUALITY CATCHMENT PLAN

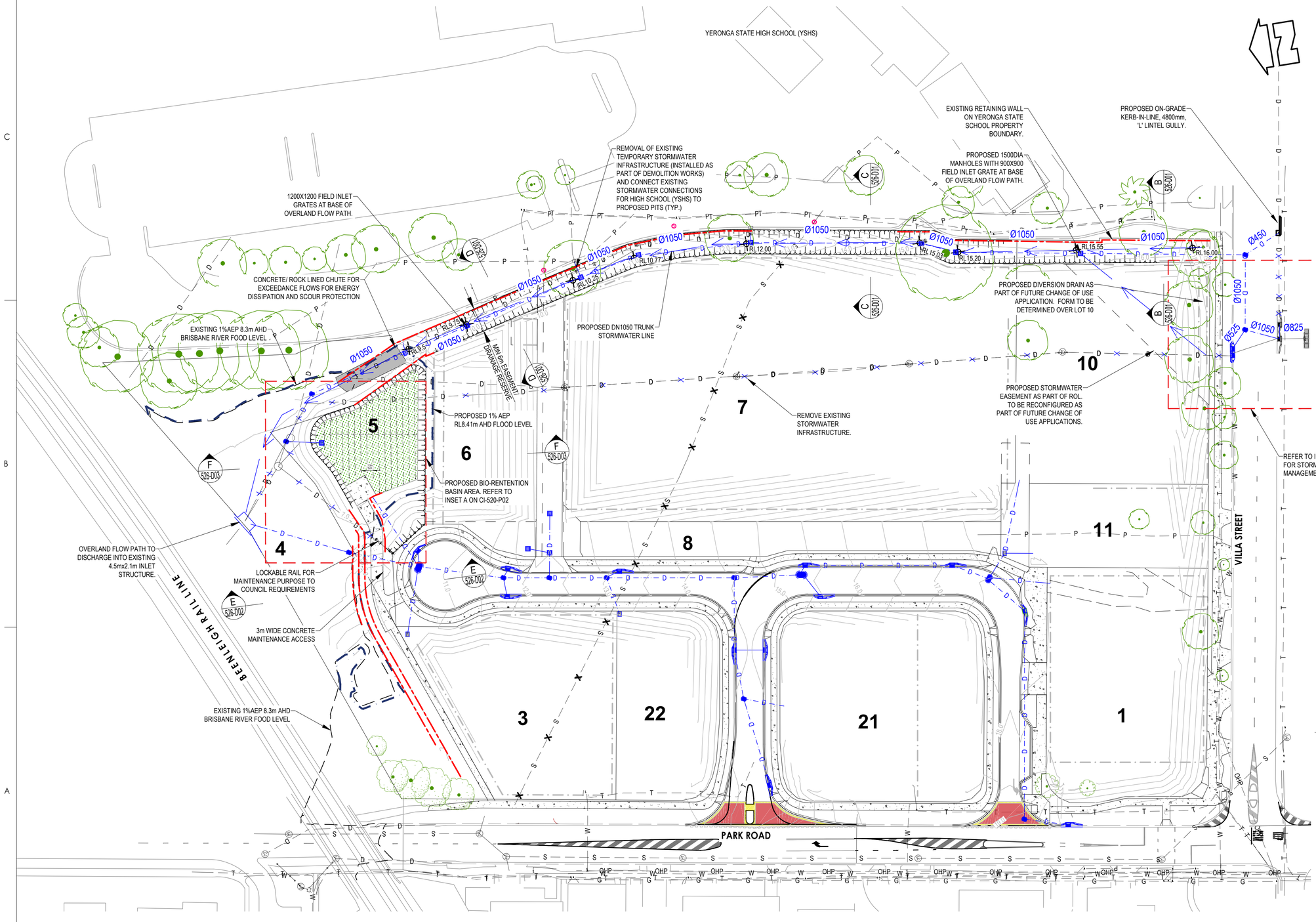
Project No.
301048272

Scale
1:500 @A1

Revision
D

Drawing No.
CI-500-P02

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



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

LEGEND

- PROPOSED 0.5m CONTOURS & HEIGHT
- 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
- EXISTING SEWER 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 (RL12.00)

MINIMUM LEVELS FOR FLOOD IMMUNITY

1% AEP FLOOD LEVEL (LOCAL CATCHMENT*): RL8.41m

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	8.91m (500mm)
	NCC CLASS 1-4 BUILDING - BASEMENT ENTRY	8.41m (0mm)
	OTHER CLASSES	NOT COMPATIBLE
6	NCC CLASS 1-4 BUILDING - HABITABLE ROOM	8.91m (500mm)
	NCC CLASS 1-4 BUILDING - HABITABLE ROOM	8.91m (500mm)
	NCC CLASS 1-4 BUILDING - BASEMENT ENTRY	8.41m (0mm)
	NCC CLASS 9a/c BUILDING - BUILDING FLOOR LEVEL	11.80 (0mm)
	NCC CLASS 9 BUILDING - BASEMENT ENTRY	8.41m (0mm)
8	OPEN SPACE	8.41m (0mm)
10	ALL USES (MIN RL ALONG VILLA ST FRONTAGE)	19.00m (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 FREEBOARD, AND CONTAINS THE SEVERE STORM ASSESSMENT WHICH ASSUMES BLOCKAGE OF THE PIPE SYSTEM IN VILLA ST.)

1:500 2 0 2 4 6 8 10 A1
1:1000 A3

Notes

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Client/Project
ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-520-P01-P02.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

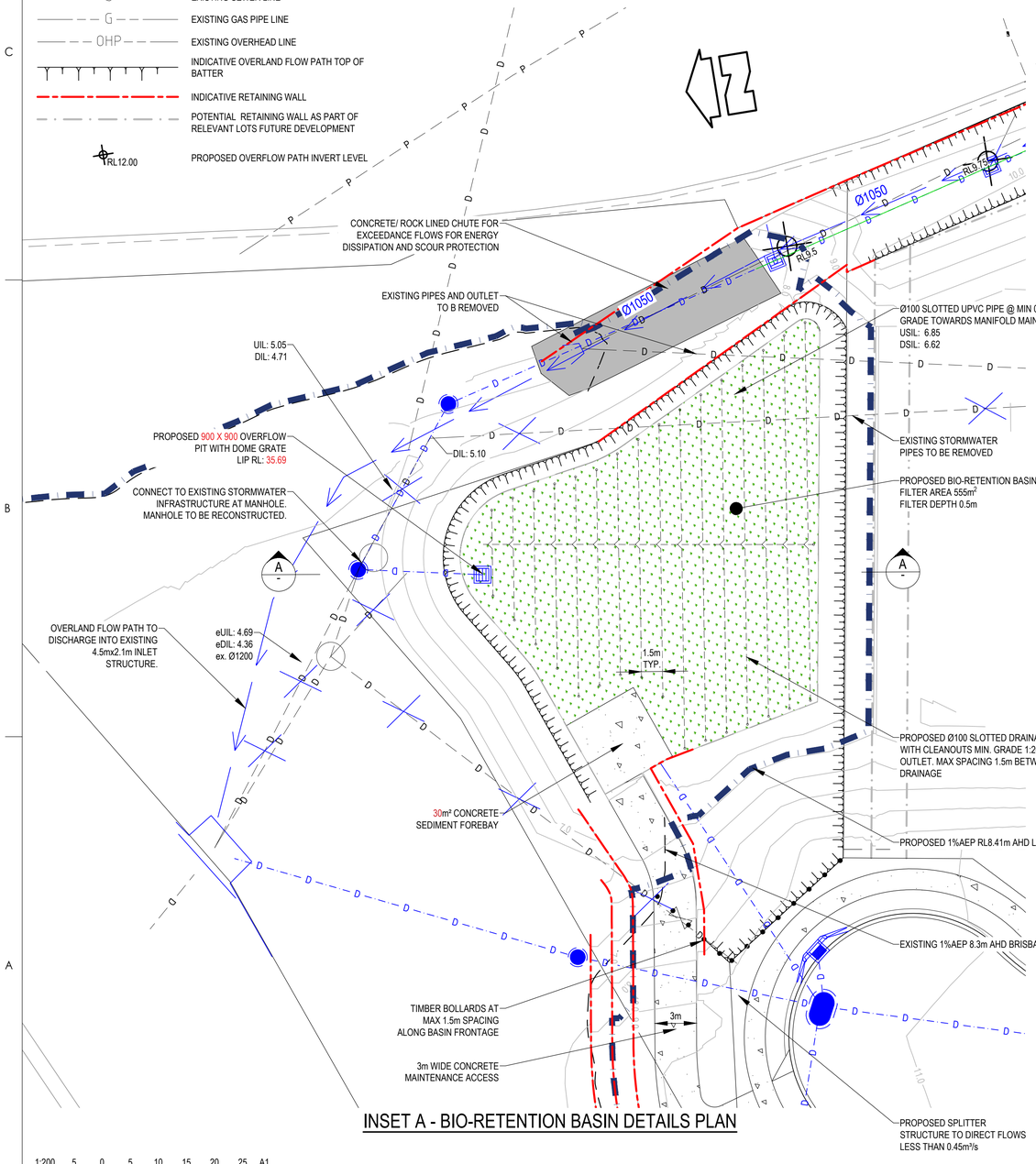
Title
CONCEPTUAL STORMWATER DRAINAGE PLAN

Project No. 301048272
Scale 1:500 @A1
Revision D
Drawing No. CI-520-P01

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD

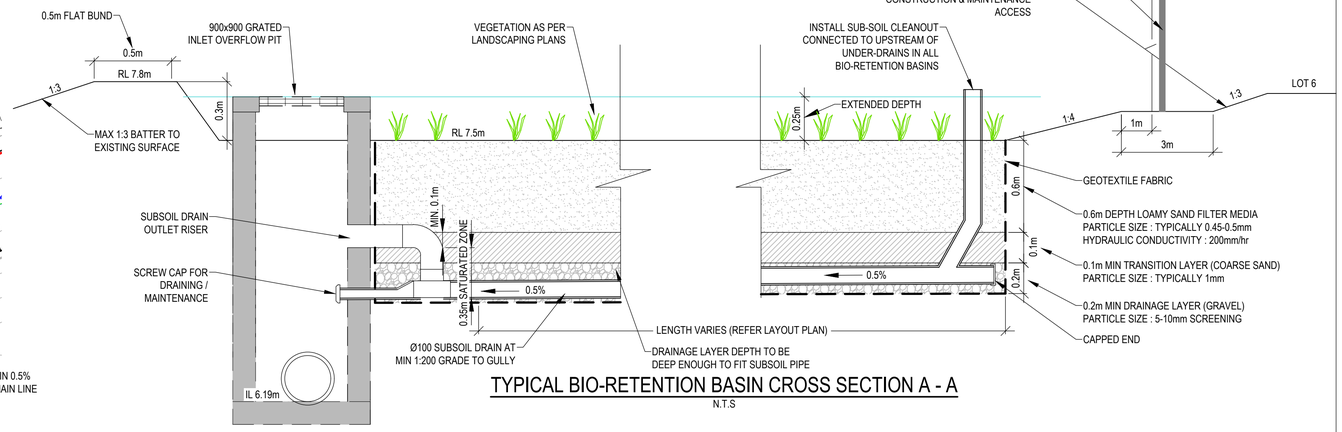
LEGEND

- 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
- INDICATIVE OVERLAND FLOW PATH TOP OF BATTER
- INDICATIVE RETAINING WALL
- POTENTIAL RETAINING WALL AS PART OF RELEVANT LOTS FUTURE DEVELOPMENT
- RL12.00 PROPOSED OVERFLOW PATH INVERT LEVEL



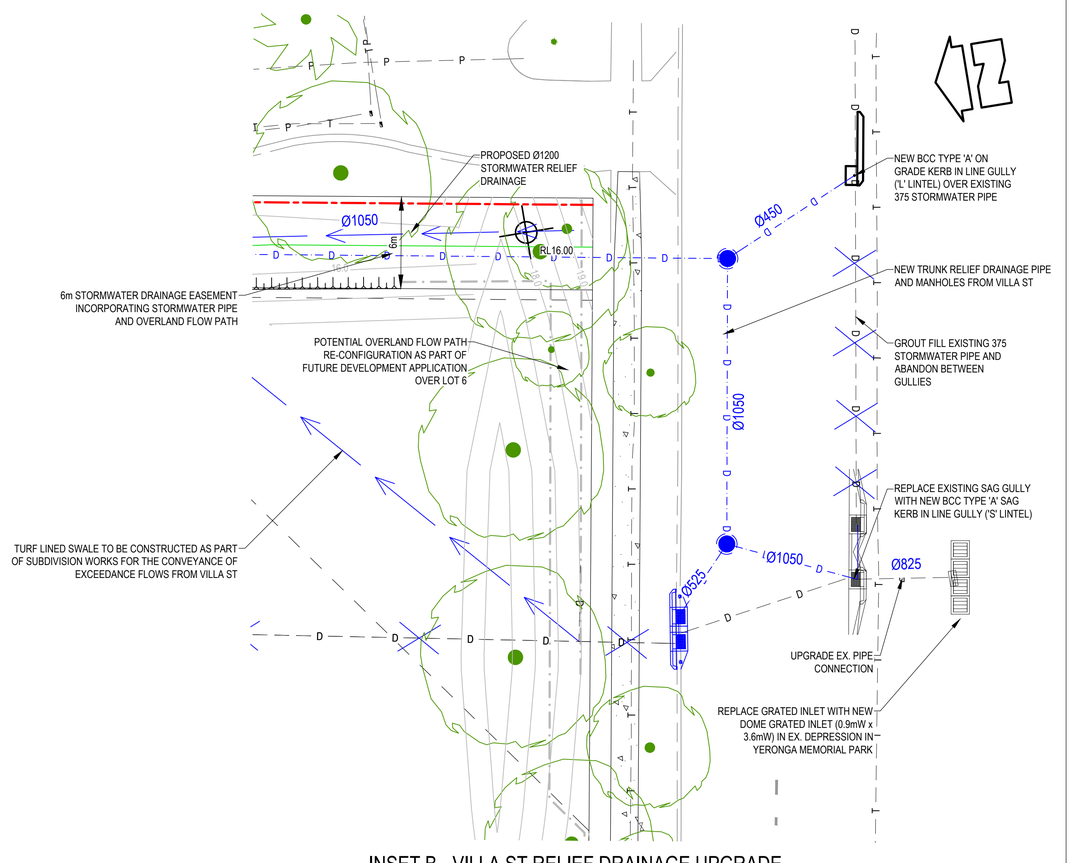
INSET A - BIO-RETENTION BASIN DETAILS PLAN

1:200 5 0 5 10 15 20 25 A1
1:400 A3



TYPICAL BIO-RETENTION BASIN CROSS SECTION A - A

N.T.S



INSET B - VILLA ST RELIEF DRAINAGE UPGRADE

Notes

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PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

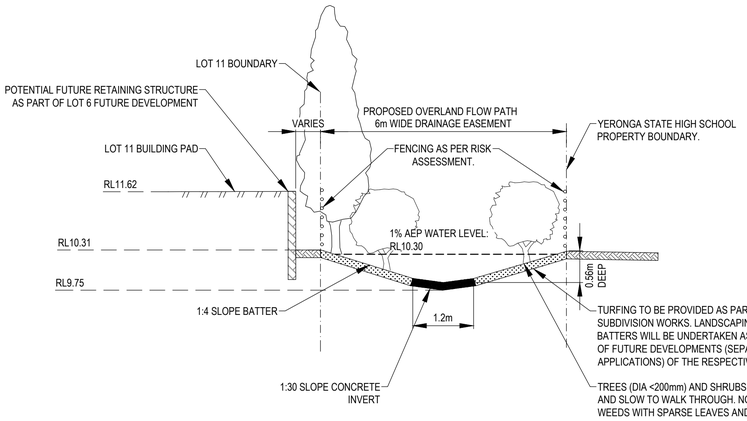
File Name: CI-520-P01-P02.DWG

MK	JW/SBJ	AR	2022.07.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
CONCEPTUAL STORMWATER MANAGEMENT PLAN

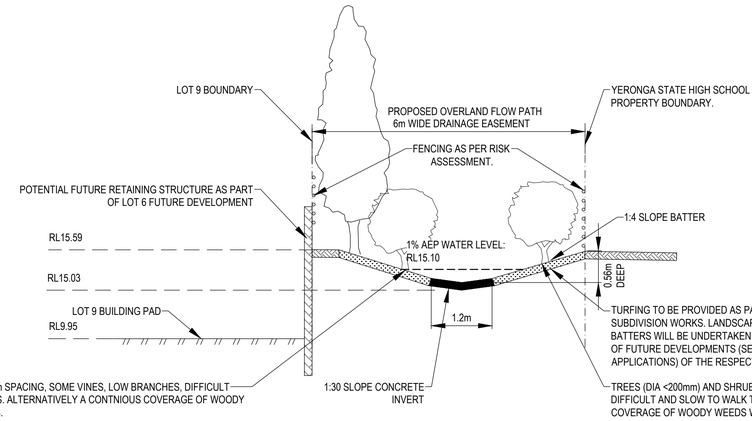
Project No. 301048272
Scale 1:200 @A1
Revision D
Drawing No. **CI-520-P02**

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



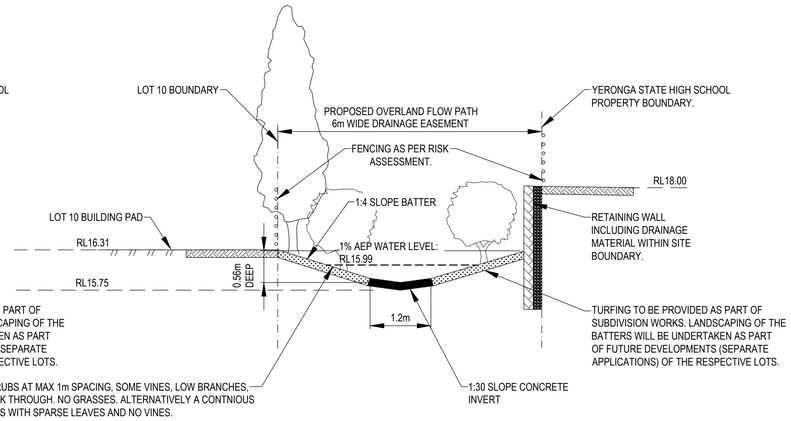
TYPICAL OVERLAND FLOW PATH SECTION D-D

N.T.S.



TYPICAL OVERLAND FLOW PATH SECTION C-C

N.T.S.



TYPICAL OVERLAND FLOW PATH SECTION B-B

N.T.S.

Notes

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ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-526-D01-D03.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

STORMWATER DRAINAGE DETAILS
SHEET 1 OF 3

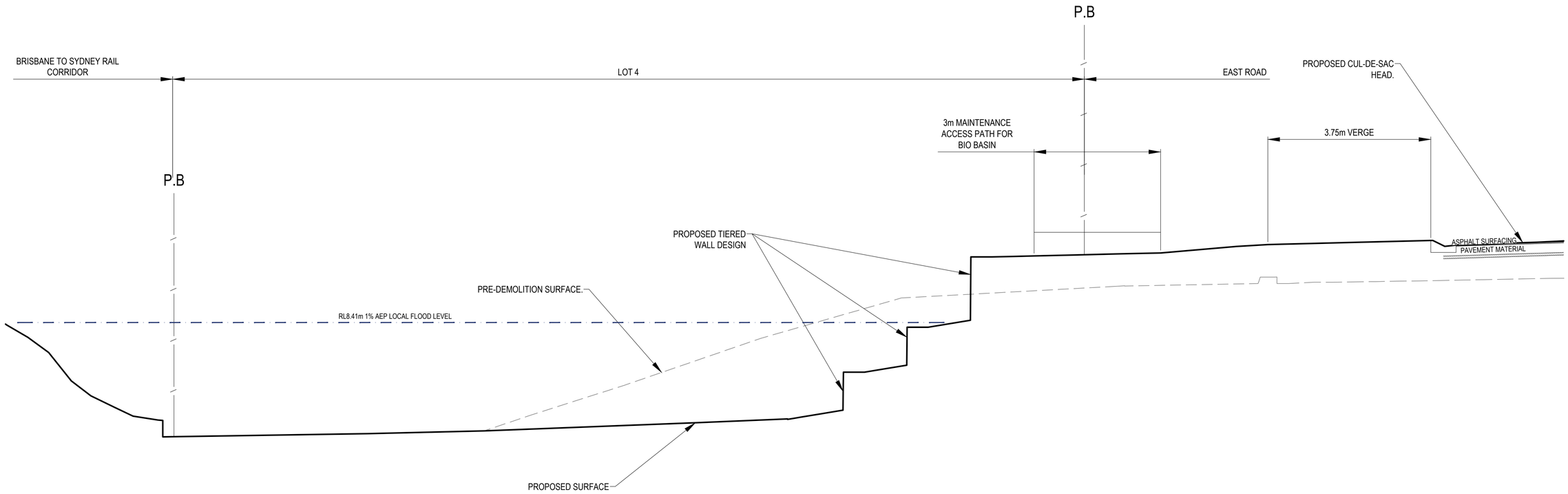
Project No. 301048272

Scale

Revision **D**

Drawing No. **CI-526-D01**

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



SECTION E-E
SCALE 1:50 (A1)
1:100 (A3)
520-P01

SCALE 1:50 (A1) 0 1 2
SCALE 1:100 (A3) 0 1 2

Notes

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70 PARK ROAD, YERONGA, BRISBANE

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Title
STORMWATER DRAINAGE DETAILS
SHEET 2 OF 3

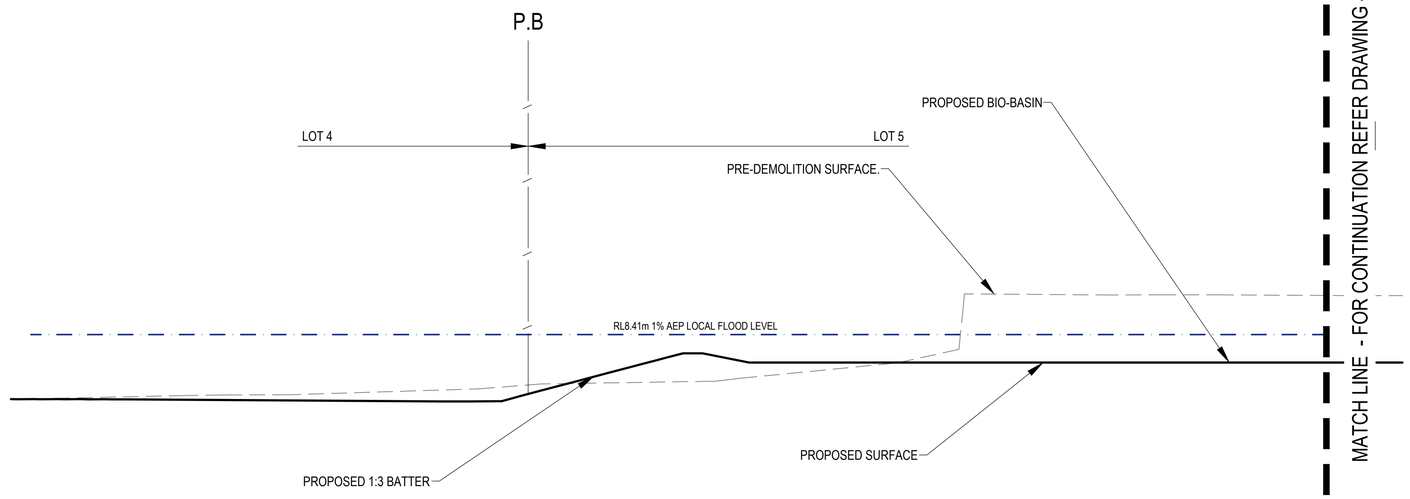
Project No.
301048272

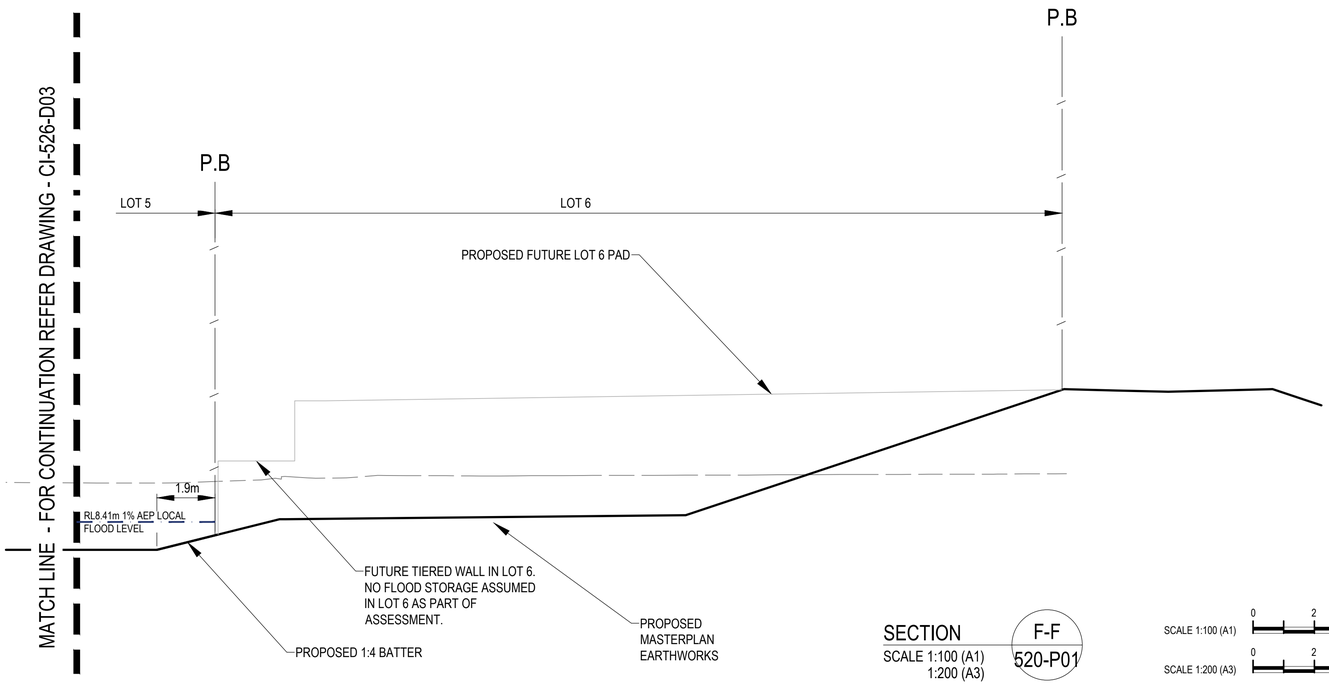
Scale
AS SHOWN

Revision
D

Drawing No.
CI-526-D02

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD





SECTION F-F
SCALE 1:100 (A1)
1:200 (A3)
520-P01

SCALE 1:100 (A1) 0 2 4
SCALE 1:200 (A3) 0 2 4

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70 PARK ROAD, YERONGA, BRISBANE

File Name: CI-526-D01-D03.DWG

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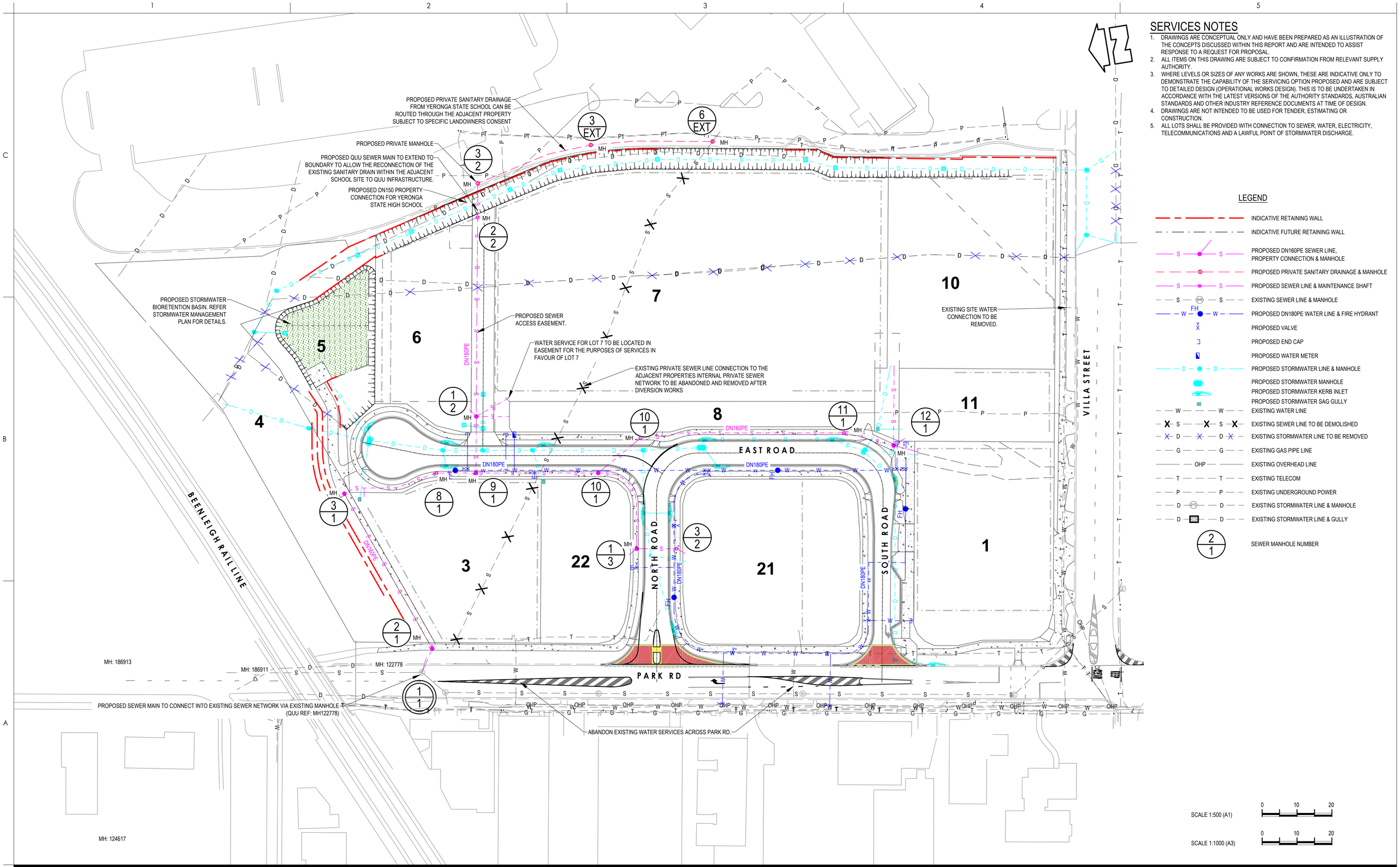
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
STORMWATER DRAINAGE DETAILS
SHEET 3 OF 3

Project No. 301048272
Scale AS SHOWN
Revision D
Drawing No. **CI-526-D03**

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



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LEGEND

- INDICATIVE RETAINING WALL
- INDICATIVE FUTURE RETAINING WALL
- PROPOSED DN160PE SEWER LINE, PROPERTY CONNECTION & MANHOLE
- PROPOSED PRIVATE SANITARY DRAINAGE & MANHOLE
- PROPOSED SEWER LINE & MAINTENANCE SHAFT
- EXISTING SEWER LINE & MANHOLE
- PROPOSED DN180PE WATER LINE & FIRE HYDRANT
- PROPOSED VALVE
- PROPOSED END CAP
- PROPOSED WATER METER
- PROPOSED STORMWATER LINE & MANHOLE
- PROPOSED STORMWATER MANHOLE
- PROPOSED STORMWATER KERB INLET
- PROPOSED STORMWATER SAG GULLY
- EXISTING WATER LINE
- EXISTING SEWER LINE TO BE DEMOLISHED
- EXISTING STORMWATER LINE TO BE REMOVED
- EXISTING GAS PIPE LINE
- EXISTING OVERHEAD LINE
- EXISTING TELECOM
- EXISTING UNDERGROUND POWER
- EXISTING STORMWATER LINE & MANHOLE
- EXISTING STORMWATER LINE & GULLY
- SEWER MANHOLE NUMBER

SCALE 1:500 (A1) 0 10 20

SCALE 1:1000 (A3) 0 10 20

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ECONOMIC DEVELOPMENT QUEENSLAND

PARKSIDE YERONGA - SUBDIVISION

70 PARK ROAD, YERONGA, BRISBANE

File Name:	CI-700-P01.DWG	MK	JW/SBJ	AR	2022.07.07
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

COMBINED SERVICES PLAN
CONCEPTUAL MASTER PLAN

Project No. 301048272

Scale 1:500 @A1

Revision D

Drawing No. **CI-700-P01**

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD

APPENDIX 5 – MUSIC Model Parameters & Output

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

MUSIC Model

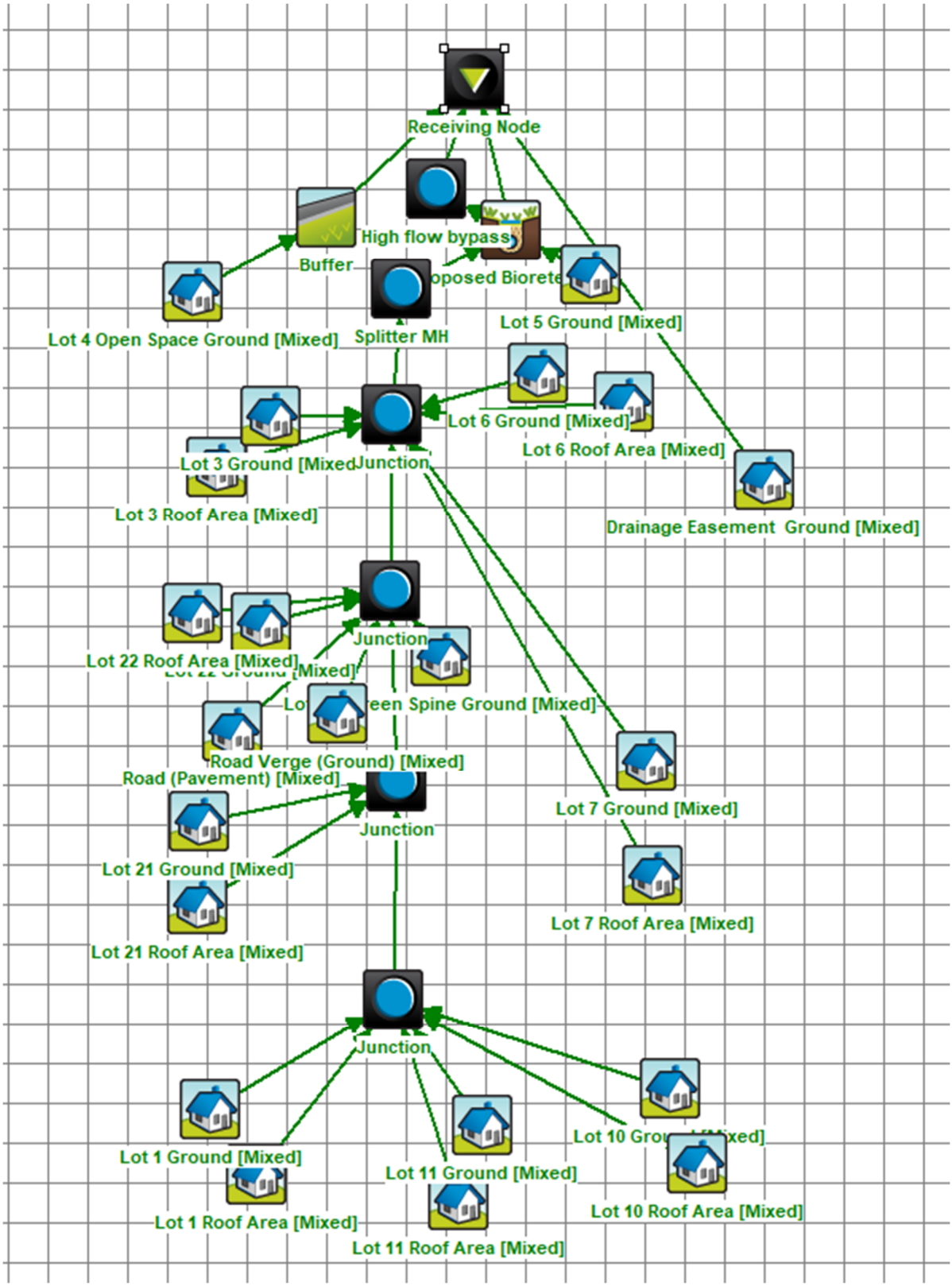

Figure 6-1: **MUSIC Model**

MUSIC Model Treatment Train Effectiveness

	Sources	Residual Load	% Reduction
Flow (ML/yr)	26.7	25.3	5
Total Suspended Solids (kg/yr)	4020	796	80.2
Total Phosphorus (kg/yr)	8.93	3.47	61.2
Total Nitrogen (kg/yr)	58.4	26	55.5
Gross Pollutants (kg/yr)	511	31.2	93.9

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. it's 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 **Maintenance**	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.

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	Ensure that perforated pipes are not blocked to prevent filter media and plants from becoming waterlogged. 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. Frequency - 6 MONTHLY AFTER RAIN
High flow inlet pits, overflow pits and other stormwater junction pits	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). Frequency - MONTHLY AND OCCASIONALLY AFTER RAIN
Other Routine Tasks	
Inspection after rainfall	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). Frequency - TWICE A YEAR AFTER RAIN

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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