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PROPOSED INDUSTRIAL SUBDIVISION

820 GREENBANK ROAD, NORTH MACLEAN

CIVIL ENGINEERING REPORT

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

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FOR: NORHART DEVELOPMENTS

REPORT NUMBER: R001-G24079

INNOVATIVE ENGINEERING WITH PERSONAL SERVICE

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1. Introduction

This report has been prepared to support the lodgement of a Reconfiguration of Lot (ROL) development application to approve the construction of a new industrial subdivision development. The development is proposed to take place over the following parcel of land:

Property Address:	820 Greenbank Road, North Maclean
Property Description:	Lot 2 on RP868726
Client:	Norhart Developments
Council:	Logan City Council
Registered Site Area:	202,500m^2

The site is located within a Priority Development Area (PDA) and, as such, falls under the planning and assessment jurisdiction of Economic Development Queensland (EDQ). This development application is subject to the provisions of the Greater Flagstone Urban Development Area Development Scheme, rather than the local government planning scheme.

The report describes the civil engineering issues associated with the development of the proposed land and includes discussion on the following engineering items;

- Stormwater Management (Quantity & Quality)
- Earthworks;
- Erosion and Sediment Control;
- Flooding;
- Water Connection; and
- Sewer Connection.

This report demonstrates that the proposed development can be suitably serviced with all engineering services described and supports the type and scale of development that is proposed.

1.1 Related Reports

The report is intended to be read in conjunction with the associated development submission documents, current as of the date of this report.

1.2 Previous Approvals

The subject site forms part of a previously approved development application (Approval Ref: DEV/2015/727) for an industrial subdivision in October 2016. This Civil Engineering Report has been prepared to address modifications to the floorplan and architectural layout proposed under the amended design as a new application, with due regard and consideration given to the previous approval.

2. Property Description

2.1 Site Locality

The proposed development is situated at 820 Greenbank Road, North Maclean and is described as Lot 2 on RP868726. The property is located within the Logan City Council Local Government Area and is in close proximity to local commercial and residential centres.

The subject site is bounded by large rural residential allotments to the north and west, Willowbrook Road to the south, existing bushland and a commercial development to the east. The total area of the existing allotment contained in this proposal is 202,500m^2. It is noted approximately 65,199m^2 will remain as vegetated open space (within covenants). The total developable site area excluding the vegetated open space is 137,301m^2.

Full details of the site topography and existing features are shown on the detailed site survey included in Appendix A.

A general locality plan is presented in Figure 2.1 below:

Figure 2.1: Site Locality (Courtesy of Queensland Globe – Accessed 01/07/2025)

2.2 Land Usage

The subject site is presently a vacant vegetated and grassed allotment.

The site is accessible via an existing vehicle crossover from Willowbrook Road.

2.3 Upstream Catchment

Investigation of regional contour data demonstrates that the development site is impacted by three upstream catchments. Refer to Section 6 of this report for the assessment of the upstream catchments and proposed diversion methods.

3. Proposed Development

The proposed development consists of:

- The construction of a new industrial subdivision, comprising twenty-eight (28) allotments, three (3) new proposed public roads to service the allotments and a stormwater basin.
- The construction of a stormwater diversion channel and pipe networks to capture and convey the stormwater runoff generated from three (3) upstream catchments.

Construction works for the site will consist of bulk earthworks and general lot shaping.

Additional work on site shall include the construction of water reticulation, sewer reticulation, electrical and telecommunications services and stormwater management works (quantity and quality).

External works for the development will comprise of works to facilitate the proposed realignment of Willowbrook Road and the upgrade of the Greenbank Road/Willowbrook Road intersection. It is also proposed as part of this development application that a trunk gravity sewer main is to be constructed traversing from the subject development site along Willowbrook Road and Greenbank Road discharging to a proposed regional sewer pump station (NM2) planned by Logan City Council. No further external works are proposed as part of this development.

4. Lawful Point of Discharge

In the existing case, the site contains no internal stormwater drainage infrastructure. The site is split into two (2) undeveloped catchments. Catchment 1 conveys generated stormwater runoff towards the eastern boundary via overland sheet flow discharging towards the large densely vegetated area to the east. Catchment 2 conveys the remainder of generated stormwater runoff towards the western boundary discharging flows towards the neighbouring properties to the west of the site via overland sheet flow.

In the developed case, the majority of the site's stormwater runoff will be directed solely to LPOD 1. Runoff will be captured, treated, and detained within a proposed combined bioretention and detention basin. Once flows exceed the basin's capacity, they will overflow via a high-flow weir and discharge at a controlled rate to the large vegetated open space to the east, maintaining the existing LPOD 1 flow path. The proposed broad-crested weir arrangement will convey excess flows as overland sheet flow toward the existing downstream property which remains consistent with the previous approval. This arrangement is outlined in the Engineering Drawings attached within Appendix B.

The proposed LPOD is compliant with the Greater Flagstone Development Scheme as the proposed development ensures that stormwater runoff at the site's boundaries does not exceed that which presently exists, and there is 'no net worsening' of flood conditions at the site's boundaries.

The proposed discharge arrangement is also considered to comply with the requirements of a lawful point of discharge and will be maintained following the development of the site. It is not anticipated that any stormwater will be directed towards any other adjacent properties that would cause an actionable nuisance.

QUDM (2017) provides a three-part framework for the identification of a lawful point of discharge for a development site. The first assessment item is to consider if the proposed development will alter the site's stormwater discharge characteristics in a manner that may substantially damage a third-party property. As the proposed development is not considered likely to worsen the flows received by the existing vegetated land adjacent the development site, the proposed point of discharge is considered to satisfy the requirements set out in Section 3.9.1 – Lawful Point of Discharge Test.

This compliance is further demonstrated in the following pages where it is shown that the proposed development will result in no worsening of peak flows from the development site.

5. Site Specific Hydrology

5.1 Introduction

The proposed development will involve the construction of industrial allotments, new roads and a stormwater basin. This type of development will result in an increase to the coefficient of discharge, and the peak stormwater discharge rates of the developed site.

This section of the report addresses peak stormwater discharge resulting from the site and identifies whether attenuation measures are necessary to ensure "no-worsening" of the peak flows from the site and provides sizing information for any required attenuation measures.

5.2 Methodology

The methodology of the hydrologic analysis involves the use of both the Rational Method and DRAINS runoff-routing software.

The Rational Method, as described by the Queensland Urban Drainage Manual (QUDM 2017), provides a simple means for the assessment of the peak discharge rate for design storms. The rational method does not provide a reliable basis for the determination of runoff volume or hydrograph shape.

DRAINS software (by Watercom) is a computer-based model that incorporates time-area routing processes to more accurately determine the volume and shape of the hydrograph during a storm event. DRAINS also includes storage-routing processes that can simulate the effect of stormwater detention systems.

The Rational Method is used in the hydrologic analysis to calibrate and verify the results of the DRAINS software modelling, in lieu of the availability of gauged information.

Once calibrated and verified, the DRAINS software modelling is used to calculate all the pre and post development hydrographs that are used in the assessment, and for the design of the proposed stormwater detention system.

5.3 Catchment Definition

In the existing case, the site has been modelled as two (2) catchments with the Fraction Imperviousness measured from the detailed site survey. In the developed case, the site is represented by two (2) catchments splitting the site between the proposed allotments and the road reserve with the Fraction Imperviousness assumed based on the typical industrial lot layouts taken from the MUSIC Modelling Guidelines Version 3.0 (2018). Table 5.1 below summarises the catchment properties used for the Rational Method calculations.

Applying the DRAINS IL-CL ARR 2019 model, impervious areas are separated into Effective and Remaining fractions. The Effective Impervious Area (EIA) refers to the portion of impervious surfaces that are directly connected to the drainage system, such as roof downpipes or paved surfaces draining to pits. The Remaining Impervious Area includes impervious surfaces that are not directly connected and may sheet flow over pervious areas, allowing for some infiltration and delay in runoff.

Table 5.1: Catchment Parameters

Catchment	Catchment Area	Effective Impervious Area	Remaining Impervious Area	Pervious Area
Pre-Developed Catchment 1	110,082m^2	0%	0%	100%
Pre-Developed Catchment 2	25,314m^2	0%	0%	100%
Post-Developed Catchment 1	26,217m^2	55%	30%	15%
Post-Developed Catchment 2	111,084^2	55%	30%	15%

Refer to the Engineering Drawings attached within Appendix B of this report for the pre-developed and post-developed catchment plans.

5.4 Site Specific Rational Method Calculations

Time of Concentration

The time of concentration for the pre- and post-development catchments have been calculated in accordance with QUDM. The Friends sheet flow equation has been used to determine the time of concentration (t_c) for the ground catchments. The time of concentration for the channel & piped catchments have been estimated using standard inlet times in combination with expected length of piped flows. Refer to Table 5.2 for the calculated time of concentration for each catchment.

Table 5.2: Time of Concentration

Catchment	Catchment Area	Time of Concentration
Pre-Developed Catchment 1	110,082m^2	23.70 minutes
Pre-Developed Catchment 2	25,314m^2	19.00 minutes
Post-Developed Catchment 1	26,217m^2	7.00 minutes
Post-Developed Catchment 2	111,084^2	8.60 minutes

C_{10} Value

The C_{10} values for the existing site conditions and developed site conditions have been calculated in accordance with QUDM (2016) Table 4.5.3. A summary of the C_{10} values adopted for the site are presented in Table 5.3 below.

Table 5.3: C10 Values

Catchment	Rainfall Intensity, $^1I_{10}$/ Fraction Impervious	C_{10}
Pre-Developed Catchment 1	58.00mm/hr / 0%	0.530
Pre-Developed Catchment 2	58.00mm/hr / 0%	0.530
Post-Developed Catchment 1	58.00mm/hr / 85%	0.850
Post-Developed Catchment 2	58.00mm/hr / 87%	0.850

Summary of Flow – Rational Method

The Rational Method was used to calculate runoff from the site in the pre-developed and post developed scenario. In the existing case, the site contains two (2) LPODs, with one discharging to the east and the other to the west. Under the proposed development scenario, all stormwater runoff from the site will be directed to LPOD 1 (east), thereby eliminating discharge to the west. As a result, LPOD 2 will not be considered in this report, and the assessment will focus solely on LPOD 1. The anticipated peak discharge for LPOD 1 is detailed in Table 5.4 below.

LPOD 1

Table 5.4: Development Runoff Calculations

AEP	39% (m^3/s)	18% (m^3/s)	10% (m^3/s)	5% (m^3/s)	2% (m^3/s)	1% (m^3/s)
Pre-developed Catchment 1	0.891	1.380	1.726	2.085	2.677	3.101
Post-developed Catchment 1	0.561	0.866	1.084	1.316	1.692	1.921
Post-developed Catchment 2	2.242	3.460	4.318	5.233	6.712	7.788
Peak Flow Increase	**+1.911**	**+2.946**	**+3.676**	**+4.464**	**+5.727**	**+6.608**

Table 5.4 demonstrates that the proposed development will result in an increase in stormwater flows towards LPOD 1. Therefore, it will be necessary to provide the development with on-site stormwater detention systems or mitigation methods to reduce the peak discharge of local storm events.

5.5 Detention Design Process

DRAINS hydrologic software has been utilised to undertake the assessment of pre-development and post-development stormwater discharge for the purposes of the on-site detention specification process.

DRAINS version 2025.01 has been utilised in this assessment.

DRAINS Parameters

Modifiable Inputs

The DRAINS software package has several inputs that can be used to manipulate the hydraulic behaviour of the Initial Loss – Continuing Loss (IL-CL) model. The values adopted in this model are all default values and are presented in Table 5.5 below.

Table 5.5: DRAINS Modifiable Inputs

Input	Modelled Value
Impervious Area Initial Loss (mm)	1
Impervious Area Continuing Loss (mm/hr)	0
Pervious Area Initial Loss (mm)	26.0
Pervious Area Continuing Loss (mm/hr)	1.9
Applicable Overland Flow Equation	Kinematic Wave Equation

A Pervious Area Initial Loss value of 26.0mm and Continuing Loss value of 1.9mm/hr were extracted from the ARR Data Hub and are specific to the site's geographical location.

An Impervious Area Initial Loss of 1mm and Continuing Loss of 0mm has been adopted as a default value for this site. The Kinematic Wave Equation has been adopted as the most accurate Overland Flow Equation for this model. The Kinematic Wave Equation is the default equation adopted in DRAINS and is most accurate when measuring non-uniform flows and flows that are affected by lateral inflows and outflows.

DRAINS Model Calibration

Table 5.6 below provides a summary of the process of calibration of the DRAINS model against Rational Method calculations.

The results indicate that the DRAINS model is programmed with a satisfactory level of accuracy for the purposes of this exercise.

Table 5.6: DRAINS Calibration – Existing Case

AEP	39% (m^3/s)	18% (m^3/s)	10% (m^3/s)	5% (m^3/s)	2% (m^3/s)	1% (m^3/s)
Rational Method	0.891	1.380	1.726	2.085	2.677	3.101
DRAINS	1.030	1.600	2.180	2.690	3.200	3.780

Detention Design Parameters

Figure 5.1 below shows a screenshot of the DRAINS model used to represent the stormwater runoff from the subject site.

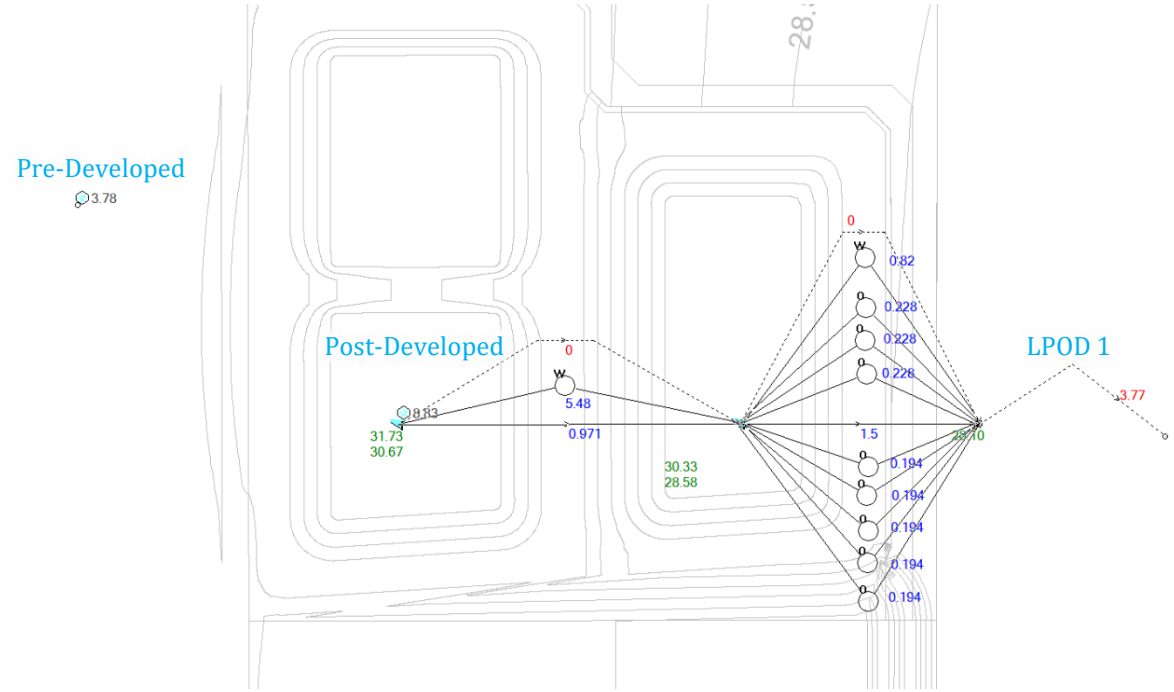


Figure 5.1: DRAINS Model Screenshot (1% AEP Storm Event)

A process of iteration using a combination of detention system water levels/ depths, storage and outlet pipework arrangements have been used to determine the optimal design for the detention system. Table 5.7 below provides the final dimensions of the detention system adopted in the model for the purpose of determining a volume of detention.

Detention for the site is proposed to be contained within a combined bio retention and detention basin. The basin is to be located towards the east of the development site and will receive flows generated from majority of the subject site. For further information on the location and details of the proposed detention area, refer to the Engineering Drawings attached within Appendix B.

Table 5.7: Detention System Design Parameters

Detention Basin Parameters	
Detention Base	881m^2
Detention Depth	2.25m
Total Detention Volume (Incl. Treatment Vol.)	7,618m^3
Low Flow Orifice	4 x Ø450mm RCP @ Base @1.0% Grade
High Flow Orifice	3 x Ø300mm @ 0.725m above Base 5 x Ø300mm @ 1.125m above Base
High Flow Weir	15m weir at top of Basin (RL 30.85m)

DRAINS Hydrologic Modelling Results

The on-site stormwater detention arrangement described in Table 5.7 has been designed to demonstrate that the proposed on-site detention strategy is effective in reducing developed case peak stormwater discharge to a rate that is less than the existing, pre-development case scenario.

The results of the assessment and confirmation of the achievement of the on-site detention objectives is displayed in Table 5.8 below.

Table 5.8: Development Runoff Calculations with Detention – DRAINS Model

Development Site Discharge						
AEP	**39%**	**18%**	**10%**	**5%**	**2%**	**1%**
$Q_{Pre\text{-}developed}$ (m^3/s)	1.030	1.600	2.180	2.690	3.200	3.780
$Q_{Detention\ Outlet}$ (m^3/s)	0.852	1.560	2.140	2.610	2.880	3.770
Peak Flow Reduction (m^3/s)	**-0.178**	**-0.040**	**-0.040**	**-0.080**	**-0.320**	**-0.010**

The comparison of pre-developed and attenuated post-developed with detention conditions demonstrates that no-worsening of peak discharges in the 39, 18, 10, 5, 2 and 1 percent AEP storm events is achievable with the detention system described in previous sections. For further information on the location and details of the proposed detention area, refer to the Engineering Drawings attached as Appendix B.

6. Upstream Catchment Diversion Works

The proposed development is impacted by three (3) upstream catchments that discharge stormwater runoff into the site through the northern, southern and western boundaries. The discharge locations of the three upstream catchments are depicted in Figure 6.1 below. Refer to the Pre-Developed Catchment Plan attached within Appendix B for more information.

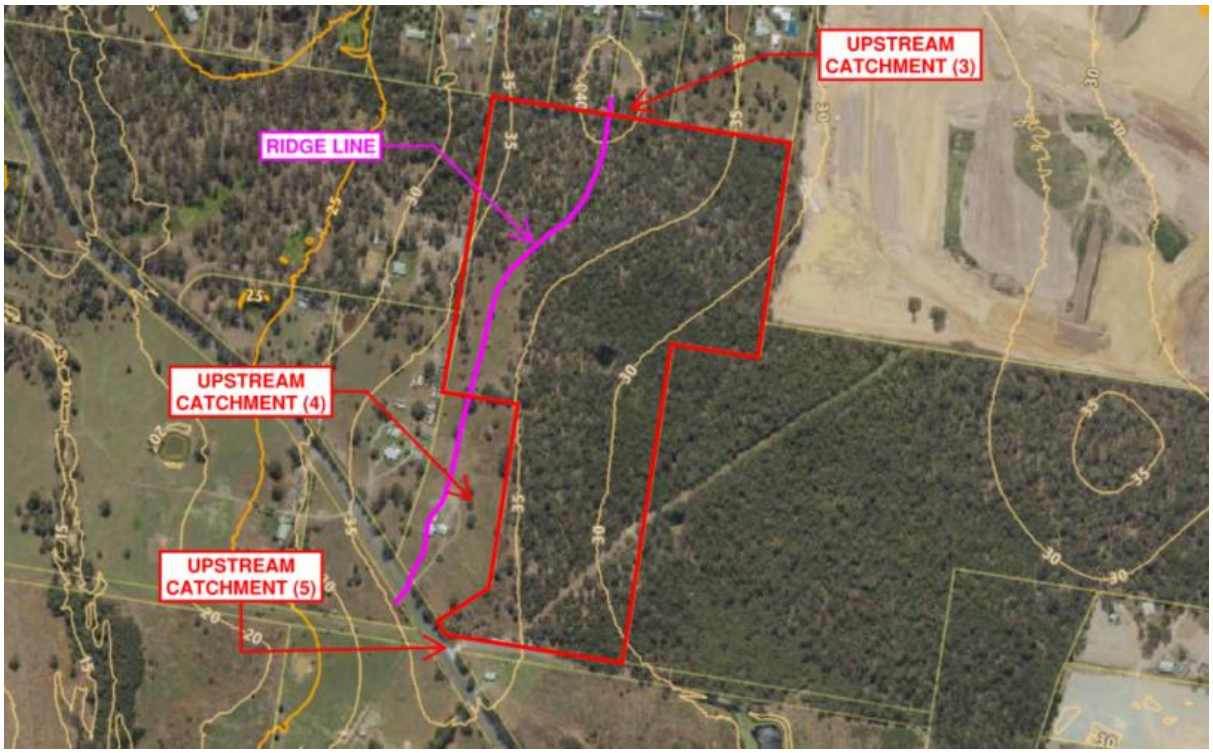


Figure 6.1: Upstream Catchment Discharge Locations

An analysis of the peak stormwater runoff generated from the three upstream catchments has been conducted in order to adequately design the diversion routes.

Figure 6.2 below illustrates the alignments of the proposed diversion channels and provides a naming convention for each channel, bund and pipe network that are referenced to in the following sections.

Figure 6.2: Diversion Channel Alignments & Naming Convention

6.1 Upstream Catchment 3

Catchment 3 comprises a small area to the north of the site. The catchment includes internal and external catchment areas. The stormwater runoff generated from this catchment discharges towards the development site via overland sheet flow. The total area of Catchment 3 is depicted in Figure 6.3 and Table 6.1 below.

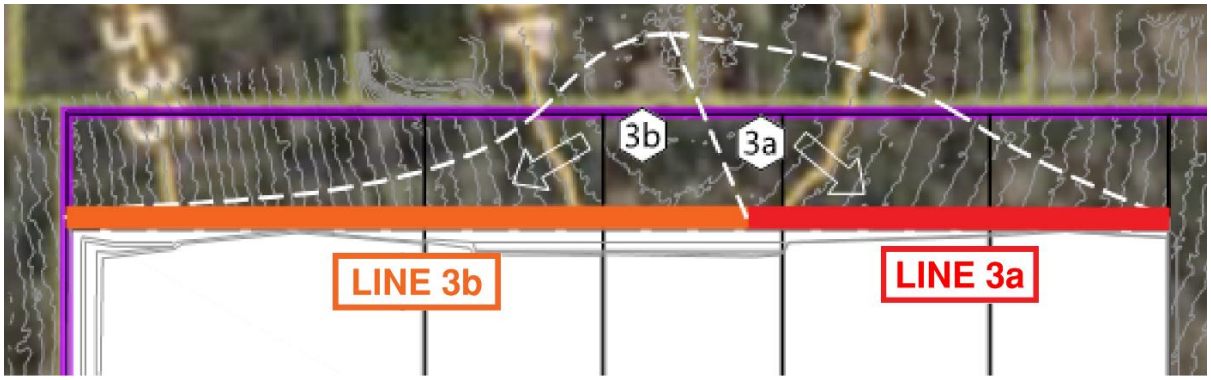


Figure 6.3: Upstream Catchment 3

The Rational Method was used to calculate the peak flows generated from the entirety of Catchment 3, splitting flows between the proposed discharge locations (Line 3a & 3b). The catchment parameters and peak flow results are summarised in Table 6.1 and Table 6.2 below.

Table 6.1: Catchment 3 Parameters

Catchment 4 Parameters	Line 3a	Line 3b
Catchment Area	2,780m^2	2,418m^2
Fraction Impervious	0%	0%
Time of Concentration	14.0 minutes	15.0 minutes
C_{10} Value	0.40	0.40

Table 6.2: Catchment 3 Runoff Calculations– Rational Method

Catchment 3 Discharge						
AEP	**39%**	**18%**	**10%**	**5%**	**2%**	**1%**
$Q_{Line\ 4a}$ (m^3/s)	0.097	0.150	0.187	0.226	0.290	0.335
$Q_{Line\ 4b}$ (m^3/s)	0.073	0.113	0.141	0.170	0.219	0.253
Total Flow	**0.171**	**0.264**	**0.328**	**0.396**	**0.509**	**0.588**

It is proposed that a bund will be constructed within the northern allotments traversing their respective northern boundaries to allow the upstream catchment to bypass the allotments. It is proposed that 0.5m high bund (Line 3a) will divert the generated stormwater runoff east toward the large open vegetated area. A 0.5m high bund (Line 3b) is to be constructed to divert the stormwater runoff generated west towards a large densely vegetated area. The bunds are to be constructed with batters at a 1 in 2 side slope and is designed to tie into the existing natural ground level, resulting in an approximate longitudinal grade of 3.4%.

The Manning's Channel Flow Equation was used to calculate the capacity of the proposed bund to ensure the proposed design provides adequate capacity to safely covey the 1% AEP peak flows generated from the catchment.

Table 6.3: Catchment 3 – Diversion Channel Design

Catchment 3 Diversion Channel (Line 3)						
Channel Dimensions	Depth (m)	Base (m)	Left Side Slope (1:x)	Right Side Slope (1:x)	Manning's 'n'	Slope (%)
	0.5	0	20	2	0.045	3.4%
Channel Properties	Flow Width	A	P	R	D*V	
	11.00m	2.75	11.13	0.25	0.807	
Channel Velocity, V (m/s)	1.613 m/s					
Channel Capacity, Q (m^3/s)	4.437 m^3/s					

Table 6.3 above demonstrates that the proposed bund has been designed to have adequate capacity to safely convey stormwater runoff generated from the entirety of Upstream Catchment 3 east and west of the development site.

Due to the expected depth and velocities of the proposed open channels, appropriate safety measures are to be implemented for the full length of the open channel to prohibit pedestrian access.

6.2 Upstream Catchment 4

Catchment 4 comprises of a large area to the southwest of the site. The stormwater runoff generated from this catchment discharges towards the development site via overland sheet flow. The total area of Catchment 4 is displayed in Figure 6.4 and Table 6.4 below.

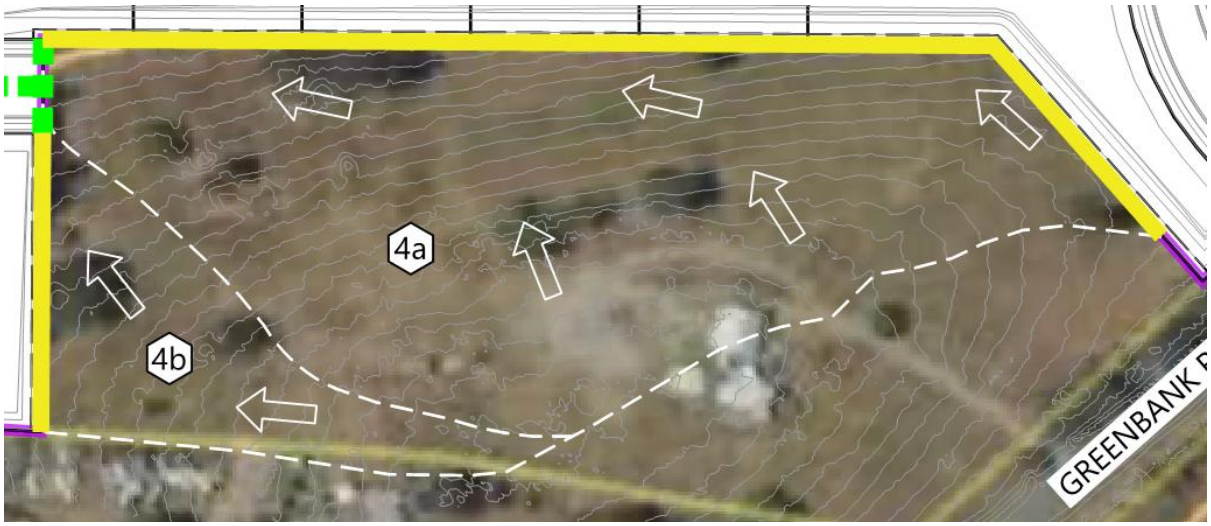


Figure 6.4: Upstream Catchment 4

The Rational Method was used to calculate the peak flows generated from the entirety of Catchment 4. The catchment parameters and peak flow results are summarised in Table 6.4 and Table 6.5 below.

Table 6.4: Catchment 4 Parameters

Catchment 4 Parameters	Line 4a	Line 4b
Catchment Area	18,647m^2	4,475m^2
Fraction Impervious	0%	0%
Time of Concentration	19.00 minutes	19.00 minutes
C_{10} Value	0.53	0.53

Table 6.5: Catchment 4 Runoff Calculations– Rational Method

Catchment 4 Discharge						
AEP	**39%**	**18%**	**10%**	**5%**	**2%**	**1%**
Q Line 4a (m^3/s)	0.586	0.907	1.128	1.363	1.752	2.027
Q Line 4b (m^3/s)	0.142	0.220	0.273	0.330	0.425	0.491
Total Flow	**0.729**	**1.127**	**1.401**	**1.693**	**2.177**	**2.519**

In the existing case, the entirety of Upstream Catchment 4 discharges directly into the site via overland sheet flow over the western boundary.

A 2.3m wide stormwater easement is proposed within the subject site along Lines 4a and 4b. Cut off drains are proposed to be constructed within the easement along the western boundary (Line 4a & Line 4b) to capture all flows up to a 1% AEP Design Storm. The stormwater runoff will be captured and diverted through a pipe network (Line 4c) discharging into the sites proposed detention basin on the eastern side of the property. External catchment flows are not considered in the hydraulic sizing of the developments treatment or detention system. Flows are designed to overflow over the external basin's weir and sheet flow to the LPOD (as is the case in the existing scenario).

The Manning's Equation was used to calculate the capacity of the proposed cut off swales and diversion pipe system to ensure the proposed design provides adequate capacity to safely covey the 1% AEP peak flows generated from the catchment.

Table 6.6: Catchment 4 – Line 4a Diversion Channel Design

Catchment 4 Diversion Cut Off Swale (Line 4a)						
Channel Dimensions	Depth (m)	Base (m)	Left Side Slope (1:x)	Right Side Slope (1:x)	Manning's 'n'	Slope (%)
	0.50	1	1	1	0.013	0.60%
Channel Properties	Flow Width	A	P	R	D*V	
	2.0m	0.750	2.414	0.311	1.367	
Channel Velocity, V (m/s)	2.733 m/s					
Channel Capacity, Q (m^3/s)	2.050 m^3/s					

Table 6.7: Catchment 4 – Line 4b Diversion Channel Design

Catchment 4 Diversion Cut Off Swale (Line 4b)						
Channel Dimensions	Depth (m)	Base (m)	Left Side Slope (1:x)	Right Side Slope (1:x)	Manning's 'n'	Slope (%)
	0.2	0.5	2	2	0.013	2.50%
Channel Properties	Flow Width	A	P	R	D*V	
	1.3m	0.180	1.394	0.129	0.621	
Channel Velocity, V (m/s)	3.107 m/s					
Channel Capacity, Q (m^3/s)	0.559 m^3/s					

Table 6.8: Catchment 4 - Diversion Pipe Design

Catchment 4 Diversion Pipe (Line 4c)		
Diameter (mm)	Manning's 'n'	Slope (%)
900	0.012	1.50%
Pipe Velocity, V (m/s)	4.304m/s	
Pipe Capacity, Q (m^3/s)	2.584m^3/s	

Table 6.6 and Table 6.7 above demonstrates that the proposed diversion channels have adequate capacity to safely convey stormwater runoff generated from the entirety of Catchment 4.

Due to the expected depth and velocities of the proposed open channels, appropriate safety measures are to be implemented for the full length of the open channel to prohibit pedestrian access.

Table 6.8 above demonstrates that the proposed pipe network design capturing the entirety of flows from Catchment 4 and conveying the stormwater runoff generated towards the proposed bio retention and detention basin.

6.3 Upstream Catchment 5

Catchment 5 comprises a small area to the south of the site. The catchment includes external catchment area, and the stormwater runoff generated from this catchment discharges towards the development site via overland sheet flow. The total area of Catchment 5 is considered to be minimal and is proposed to be captured by proposed stormwater infrastructure within Willowbrook Road and be conveyed towards the proposed stormwater basin servicing the development. The extent of Catchment 5 is depicted in Figure 6.5 below.

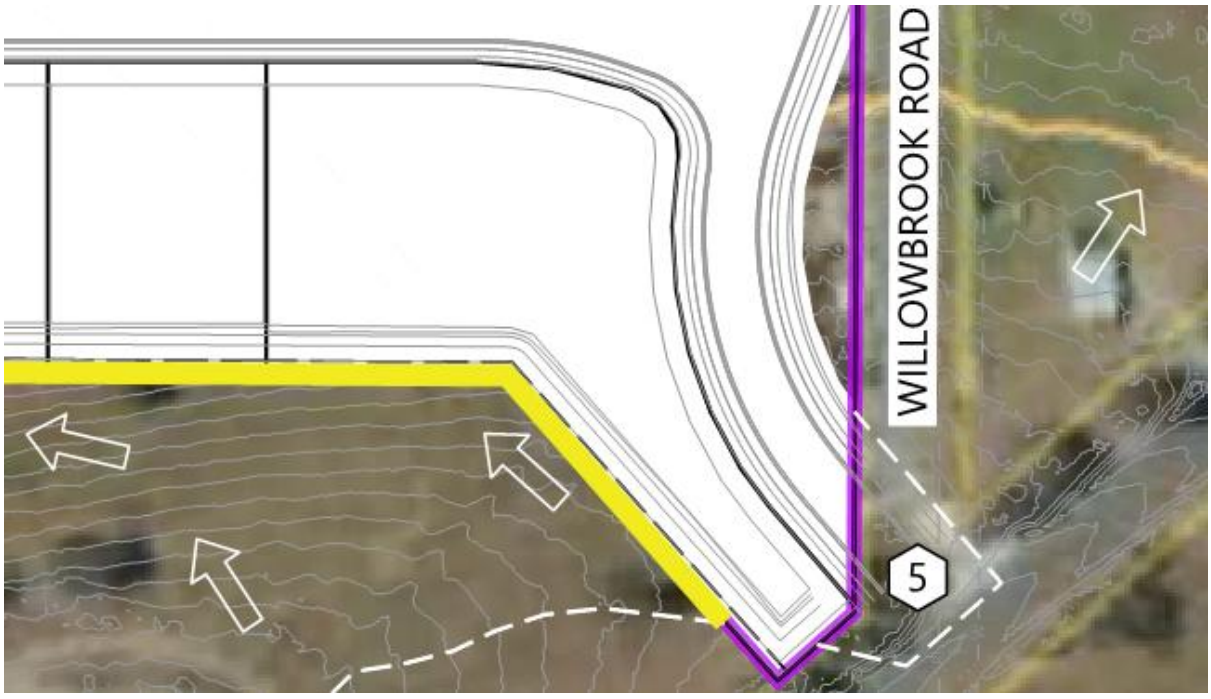


Figure 6.5: Upstream Catchment 5

7. Stormwater Quality

7.1 Introduction

This section of the report aims to identify the requirements for stormwater quality management resulting from the proposed development and outlines suitable stormwater treatment systems to comply with relevant requirements of the State Planning Policy and Logan City Council Development Guidelines.

7.2 State Planning Policy Assessment

An assessment has been undertaken to determine whether the development proposal necessitates compliance with the State Planning Policy (SPP) objectives. The following trigger questions are used to determine whether SPP compliance is required. If all trigger questions are answered "No", then SPP compliance is not required, and the development is subject to Local Authority Assessment only.

Table 7.1: State Planning Policy Trigger Questions

Trigger Question	Development Response
Material Change of Use for Urban Purposes with a land area greater than 2,500m^2 and:	No
a. Will result in an impervious area greater than 25% of the net developable area; or	N/A
b. Will result in 6 or more dwellings.	N/A
Reconfiguration of Lot for Urban Purposes that involves a land area greater than 2,500m^2, and will result in 6 or more lots.	Yes

As the above trigger questions are applicable to this development, the site **is** required to achieve the design objectives of the State Planning Policy.

7.3 Water Quality Objectives and Methodology

Table 7.1 indicates that the proposed development triggers the requirement for the development to achieve the Water Quality Objectives outlined in the State Planning Policy. As such, the development must demonstrate the following minimum reductions in mean annual pollutant loads from the unmitigated development:

Table 7.2-Water Quality Objectives

Pollutant	Minimum Reduction in Mean Load (%)
Total Suspended Solids (kg/yr)	80
Total Phosphorus (kg/yr)	60
Total Nitrogen (kg/yr)	45
Gross Pollutants (kg/yr)	90

To design and assess the achievement of these stormwater quality objectives the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6.4.0 has been utilised to size suitable stormwater quality improvement devices as described in the following sections.

7.4 Catchment Areas & Source Nodes

The catchment areas used in the MUSIC model for the site are limited to the net developable area of the development site and are outlined in Table 7.3 below:

Table 7.3-Pollutant Export Parameters

Catchment Type	Area
Roof Area (100% Impervious)	51,535m^2
Hardstand Area (100% Impervious)	5,153m^2
Landscape Area (100% Pervious)	15,461m^2
Internal Road Reserve (100% Impervious)	30,921m^2
External Road Area (85% Impervious)	26,217m^2
Treatment Basin (75% Impervious)	3,264m^2
Bypass Detention Basin (25% Impervious)	4,750m^2
Upstream Catchment 5 (Not Included in Model)	23,123m^2
Upstream Catchment 6 (Not Included in Model)	835m^2

7.5 Recorded Rainfall Data – Moreton Bay Regional Council

Rainfall data for the site was taken from the Greenbank Thompson Rd Rainfall Station (ID 40659) using the dates 01/01/1980 – 31/12/1989 in accordance with the Water By Design – MUSIC Modelling Guidelines (2018) using a 6-minute time step.

Rainfall over this time period was modelled using MUSIC to calculate the pollutant generation and treatment effectiveness of the proposed systems.

7.6 Rainfall-Runoff Parameters

Rainfall-runoff parameters were taken in accordance with the Water By Design – MUSIC Modelling Guidelines (2010) using *Urban Industrial* land use, as tabulated in Table 7.4 below:

Table 7.4-MUSIC Modelling Parameters

Parameter	Value
Rainfall threshold (mm)	1.00
Soil storage capacity (mm)	18
Initial storage (%)	10
Field capacity (mm)	80
Infiltration capacity coefficient a	243
Infiltration capacity exponent b	0.6
Initial depth (mm)	50
Daily recharge rate (%)	50
Daily baseflow rate (%)	0
Daily deep seepage rate	31

7.7 Pollutant Export Parameters

Pollutant export parameters were taken in accordance with Water By Design – MUSIC Modelling Guidelines (2010) using *Urban Industrial land* use.

The split catchment approach was utilised for each surface type, with the input parameters shown in Table 7.5 below:

Table 7.5: Pollutant Export Parameters

Flow Type	Surface Type	TSS log^{10} values		TP log^{10} values		TN log^{10} values	
Baseflow	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.45	-1.11	0.48	0.14	0.20
	Ground	0.78	0.45	-1.11	0.48	0.14	0.20
Stormflow	Roof	1.30	0.44	-0.89	0.36	0.25	0.32
	Roads	2.43	0.44	-0.30	0.36	0.25	0.32
	Ground	1.92	0.44	-0.59	0.36	0.25	0.32

7.8 Proposed Treatment System Details

The proposed stormwater quality treatment system will include a single bioretention area located at the eastern side of the proposed development. The entirety of Catchment 1 and 2 is to discharge into the bioretention basin. Flows from the bioretention basin will discharge through the filter media and into the detention area via the proposed three Ø375 RCP low flow pipes. Flows exceeding the 18% AEP design storm event ultimately discharge over the proposed weir towards the detention basin to the east of the site via overland sheet flow.

For further details on the implementation of the bio-retention areas, refer to the engineering drawings attached as Appendix B.

Bioretention Basin

A bio-retention basin is a vegetated region where runoff is filtered through a filter media layer (e.g. sandy loam) as it percolates downwards to receiving underlying reticulation. Specific vegetation is to be incorporated into the landscaping of bio-retention areas which effectively reduce nutrient loads. Appendix A of Healthy Waterways' Water Sensitive Urban Design Technical Guidelines for South East Queensland provides guidance on selecting appropriate plant species for systems where plants have a functional role in stormwater treatment.

Runoff from the development area will be treated by a bioretention basin, removing nutrients and suspended solids from the water column before flowing to the point of lawful discharge.

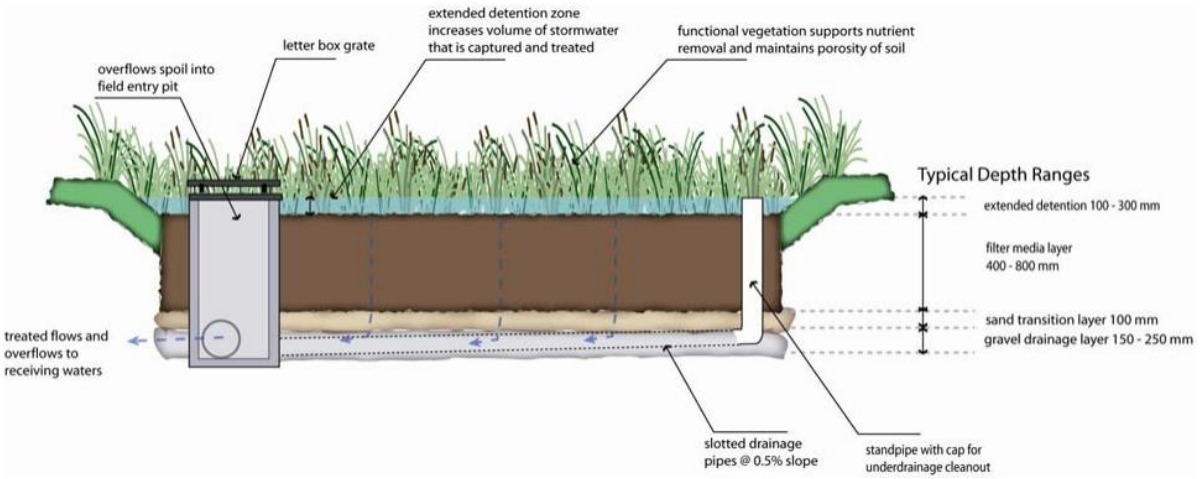


Figure 7.1: Example of Vegetated Bio-retention Basin

A schematic layout plan of the proposed bio-retention area is included in Appendix B. Details of the proposed bioretention basin are as presented in Table 7.6 below:

Table 7.6: Site Specific Treatment Train Requirements

Bio-Retention Area Parameters	Basin
Extended Detention Depth (m)	0.30
Filter Area (m²)	1,300
Unlined Filter Perimeter (m)	206.67
Saturated Hydraulic Conductivity (mm/h)	200
Filter Depth (m)	0.45
TN Content of Filter Media (mg/kg)	800
Orthophosphate Content of Filter Media (mg/kg)	40
Exfiltration Rate (mm/h)	0
Base Lining	Yes
Overflow Weir Width (m)	15

The proposed bioretention basin is considered to comply with the requirements set out in Appendix 2 of the Queensland State Planning Policy.

7.9 MUSIC Model Diagrams

A diagrammatic layout of the MUSIC model interface used to model the proposed development with the proposed treatment devices incorporated for the site is presented in Figure 7.2 below:

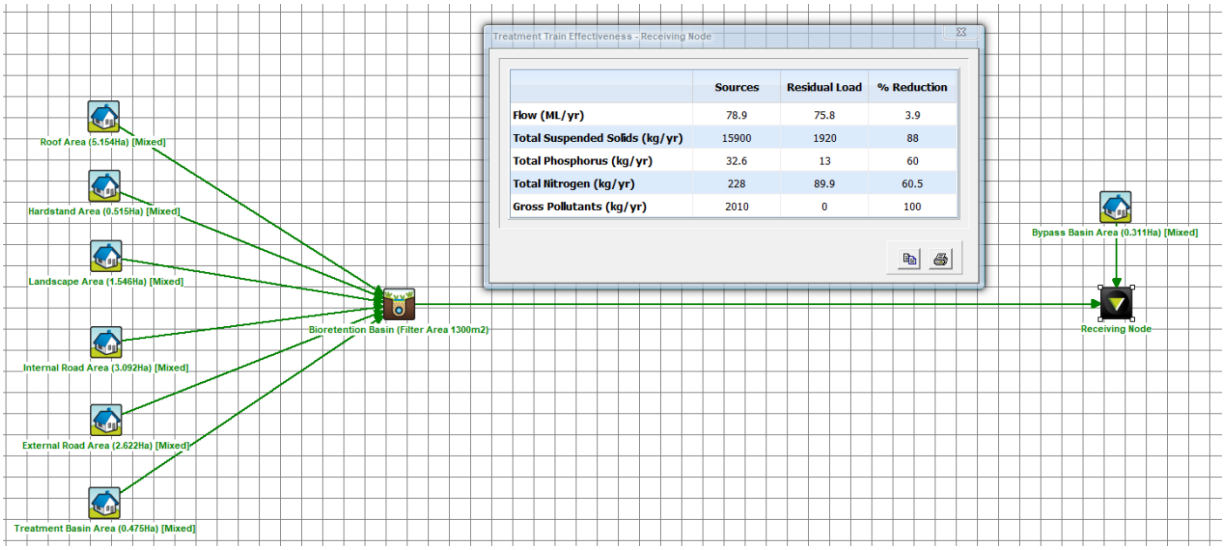


Figure 7.2: MUSIC Model Results

7.10 MUSIC Modelling Results

MUSIC was used to model the treatment train effectiveness in terms of the percentage of pollutants being removed from the system using the proposed treatment devices.

The results of the MUSIC modelling compared to the stated Water Quality Objectives (WQO's) are presented below:

Table 7.7: MUSIC Modelling Results

Potential Pollutant	Target WQO's	MUSIC Results
Total Suspended Solids (kg/yr)	80%	88.0%
Total Phosphorus (kg/yr)	60%	60.0%
Total Nitrogen (kg/yr)	45%	60.5%
Gross Pollutants (kg/yr)	90%	100%

The results indicate that the proposed treatment devices are efficient in achieving the water quality objectives and exceeds the minimum required pollutant reduction targets.

8. Conceptual Erosion and Sediment Control Plan

8.1 Introduction

During construction, it shall be the responsibility of the Principal Contractor to ensure that the development complies with the relevant erosion and sediment control objectives, as outlined in the State Planning Policy and Logan City Council's Planning Scheme.

This section of the report provides suggested inclusions in an erosion and sediment control plan for the proposed development site. This plan includes recommendations for monitoring & reporting responsibilities and the construction of site-specific sedimentation and erosion control measures. Detailed drawings specifying the proposed erosion and sediment control measures are to be provided at the Operational Works stage of the development.

8.2 General Erosion and Sediment Control Measures

It shall be the responsibility of the Principal Contractor to ensure the following erosion and sediment control measures are implemented on site:

- Clean stormwater runoff from upstream allotments is to be directed away from the development site using earth bunds or cut-off drains, as deemed appropriate by a suitable supervisor;
- The prevention of sediment runoff towards other allotments via the effective implementation of silt fences, sediment basins or other mitigation devices as deemed appropriate by a suitable supervisor;
- Sediment runoff shall also be prevented from entering the Council stormwater drainage system via the implementation of control measures such as gully pit sediment barriers;
- Erosion shakedown points shall be established at all vehicular access points, with shakedown areas regularly swept clean and sediment removed; and
- Erosion and sediment control measures are not to be removed from the development site until the site is completely rehabilitated, and the surface is capable of resisting erosion.

8.3 Spoil and Stockpile Management Measures

It shall be the responsibility of the Principal Contractor to ensure the following spoil and stockpile management measures are implemented on site:

- Where the stockpiling of spoil and excess earthworks is necessary on the development site, stockpiles shall be established as far away as possible from stormwater inlets and pipelines to reduce the likelihood of sediment runoff; and
- Stockpiles are to be established within a designated zone of fill material and should be surrounded with appropriate erosion and sediment control measures.

8.4 Training Requirements

It shall be the responsibility of the Principal Contractor to ensure the following training protocols are implemented on the development site:

- Site induction courses shall include details of an environmental management reporting system, through which personnel will be able to report perceived erosion and sediment control issues on site.

9. Engineering Constraints

9.1 Earthworks

The development will involve earthworks excavation and filling to reshape the current surface to facilitate the construction of the industrial allotments, roads and provide infrastructure trenches.

The development site is shown as not affected by Acid Sulfate Soils on Logan City Council's Online Mapping service, as shown in Figure 9.1 below.

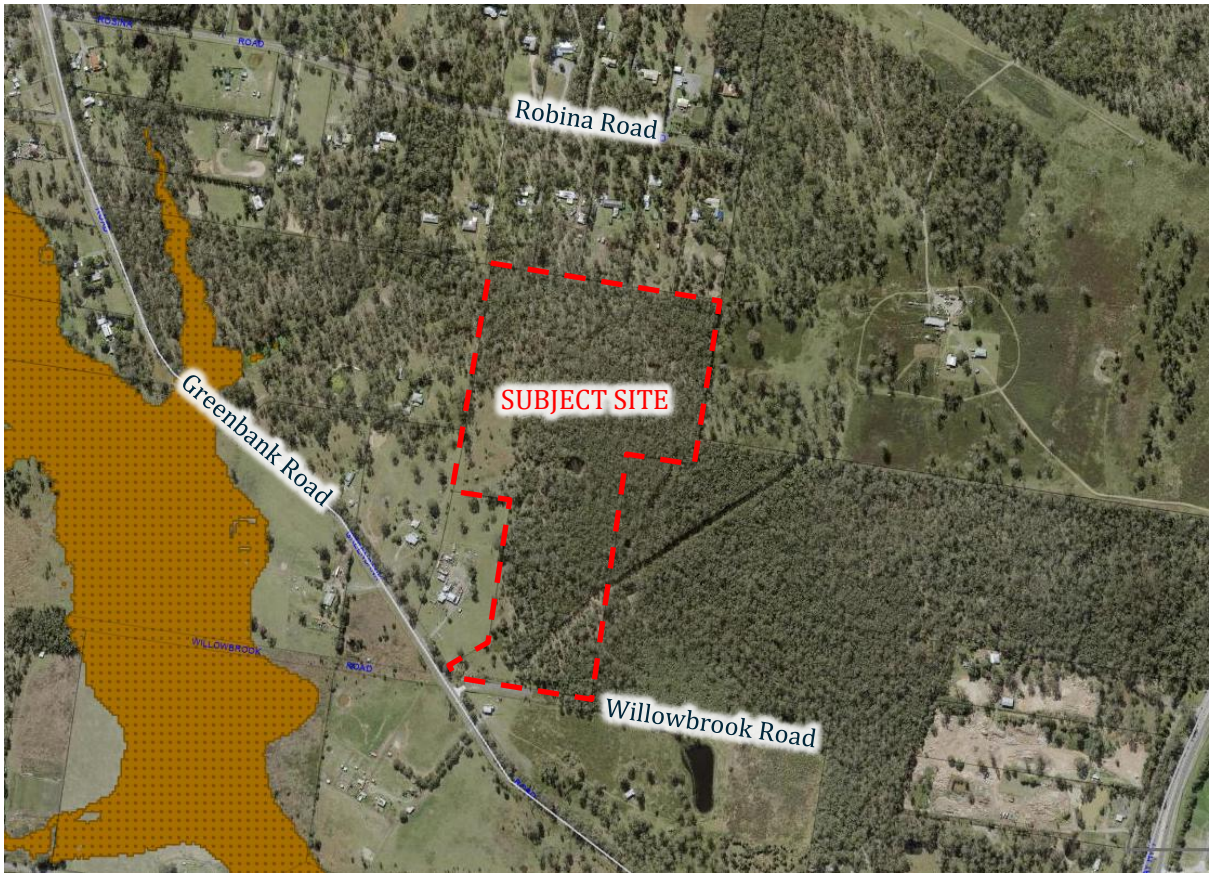


Figure 9.1: Excerpt from Logan City Council's Online Mapping Portal – Acid Sulfate Soils

Given that the proposed development is not located within the extent of Acid Sulfate Soils areas, an Acid Sulfate Assessment is not required for the proposed development.

9.2 Erosion and Sediment Control

During earthworks, there will be inevitable areas of exposed earth, stripped areas and stockpiles. Appropriate methods to manage this process and ensure minimal impacts to surrounding properties, infrastructure and receiving waters will therefore be required.

The development will therefore require the preparation of a comprehensive Erosion and Sediment Control Plan with supporting documentation, certified by a Registered Professional Engineer and Certified Professional in Erosion and Sediment Control. It is anticipated that the development conditions will reflect these requirements and require compliance with State Planning Policy 2017 and Logan City Council's Guidelines prior to the commencement of construction.

9.3 Vehicular Access

External works will be required within the Council verge to realign Willowbrook Road to permit heavy vehicular access to the proposed development.

The proposed internal road network has been designed to accommodate B-Double heavy vehicle movements, ensuring compliance with relevant design standards for industrial developments. For further detail, refer to the Traffic Impact Assessment Report (Doc Ref: 25-670) prepared by Pekol Traffic and Transport (PTT).

9.4 Willowbrook Road Realignment and Greenbank Road/Willowbrook Road Intersection Upgrade

To improve the functionality of the entrance into the development site, it is proposed that Willowbrook Road is to be realigned and an intersection upgrade provided to realigning Greenbank Road with Willowbrook Road to ensure accessibility for heavy vehicles.

The proposed road realignment has been designed to accommodate B-Double heavy vehicle movements, ensuring compliance with relevant design standards for industrial developments. For further detail, refer to the Traffic Impact Assessment Report (Doc Ref: 25-670) prepared by PTT.

9.5 Water Connection

Existing Connection

The site is currently a vacant lot comprising large densely vegetated areas and is currently not connected to existing Council Water Infrastructure.

The detailed site survey has been reviewed to assess the presence of water services available for the proposed development. An existing watermain is located within Willowbrook Road connecting into an existing Ø300 water main within Greenbank Road.

Proposed Connection

It is proposed that the development be serviced via a new potable water supply network comprising of diameters ranging from Ø150-Ø300 traversing the proposed road verges towards the site's frontage along existing Willowbrook Road to Greenbank Road. It is noted that prior network capacity assessment for water supply was undertaken as part of the previous DA approval. The nominated water main diameters will be confirmed in the detailed design phase. A cut-in connection is anticipated to the existing Ø300 main on the southern side of Greenbank Road. It is proposed that each individual allotment is to be serviced via individual Ø150 DICL water property connections. With the proposed industrial use, it is anticipated that the metering arrangements for domestic and fire supply will be situated 'on-lot' with final locations determined via subsequent individual MCU applications for the respective lots.

The indicative locations of the proposed water mains and water property connections are shown on the Engineering Drawings attached within Appendix B of this report.

Further design details of the water main & connection works will be provided during the Operational Works (OPW) phase. Potable water and fire servicing design layouts and connections will be subsequently documented by the Civil and Hydraulic Engineer as part of future OPW and plumbing and drainage applications for the respective lots.

9.6 Sewer Connection

Existing Services

The site is currently a vacant lot comprising large densely vegetated area and is currently not connected to existing Council Sewer Infrastructure.

The detailed site survey has been reviewed to assess the presence of sewer services available for the proposed development. An existing (recently constructed) Ø225 sewer rising main is located traversing Willowbrook Road however no serviceable sewer mains are present near to the development site.

Proposed Services

Our office and the Client (Norhart Developments) have met with EDQ for discussions on the master sewer servicing strategy for the site locality and surrounds. It was negotiated through these discussions that EDQ would accept an amendment in trunk sewer alignment compared to the current planned alignment – in that the sewer alignment from the subject development would traverse from internal to the site, southwest along Willowbrook Road, turning southeast down Greenbank Road to the nominated regional sewer pump station (SPS) site 'NM2' at the corner of Scott Lane and Greenbank Road. The chosen sewer alignment avoids the requirement of undertaking gravity sewer construction through multiple private properties.

It is proposed that each individual allotment is to be serviced via their own individual Ø150 gravity sewer property connections. The location of the proposed sewer mains and sewer property connections are shown on the Engineering Drawings attached within Appendix B of this report.

9.7 Electrical and Communications

A *Before You Dig Australia* application and detailed survey has confirmed presence of existing 11kV overhead power lines within the vicinity of the site. The existing powerlines dissect the southern portion of the site. To facilitate the development, it is proposed that segments of the existing overhead electrical power lines that traverse the site are relocated along the proposed public road reserves within the development site.

Three (3) locations for pad mount transformers (PMT) are included within the development plan and have been located in consultation with the appointed Electrical Engineer. It is anticipated that underground electrical lines will be installed to service the development lots with conduit runs proposed for both sides of all roads in accordance with Energex requirements.

PMTs are shown on the Engineering Drawings attached within Appendix B of this report.

Design connections to electrical and communications will be progressed in parallel with the development application by the respective Consultant.

10. Flooding

The development site is located partially within the extent of Flood Hazard affected areas, as shown from the screenshots of the Logan City Council's Interactive Mapping below:

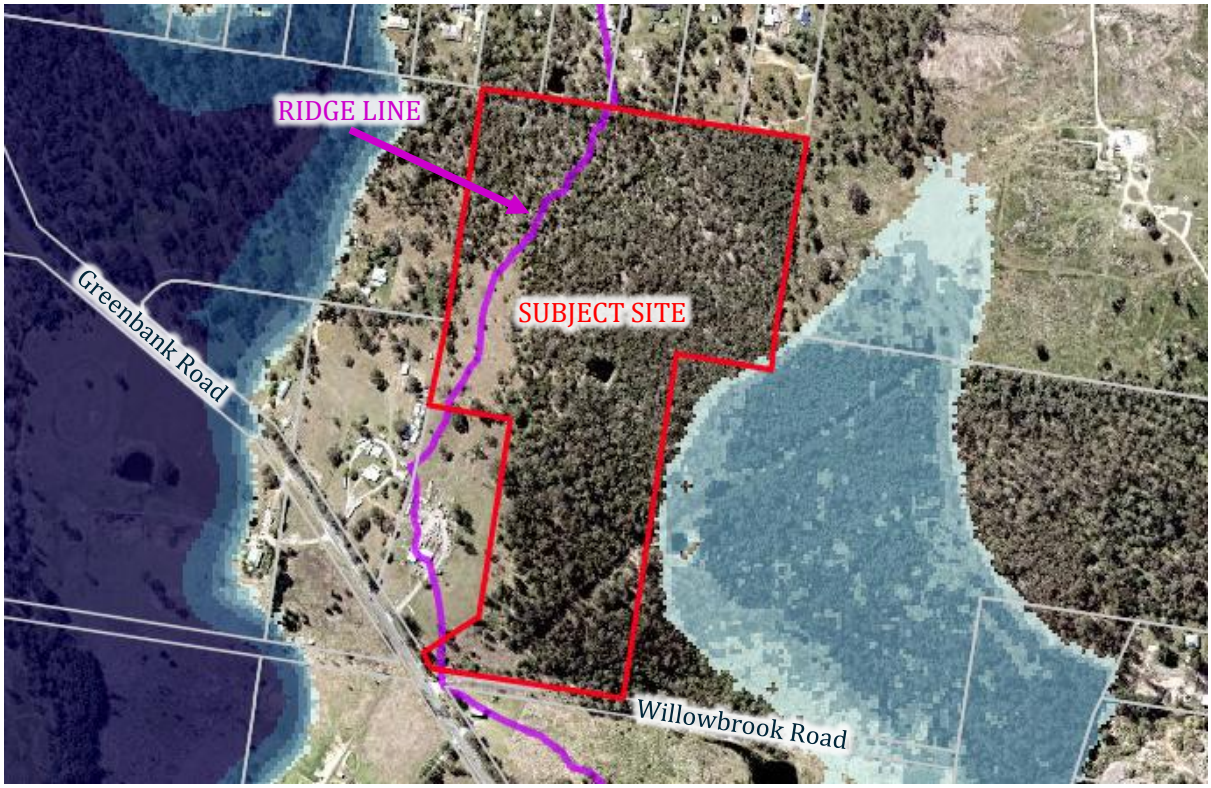


Figure 10.1: Excerpt from Logan City Council's Online Flood Portal – River Source Flooding

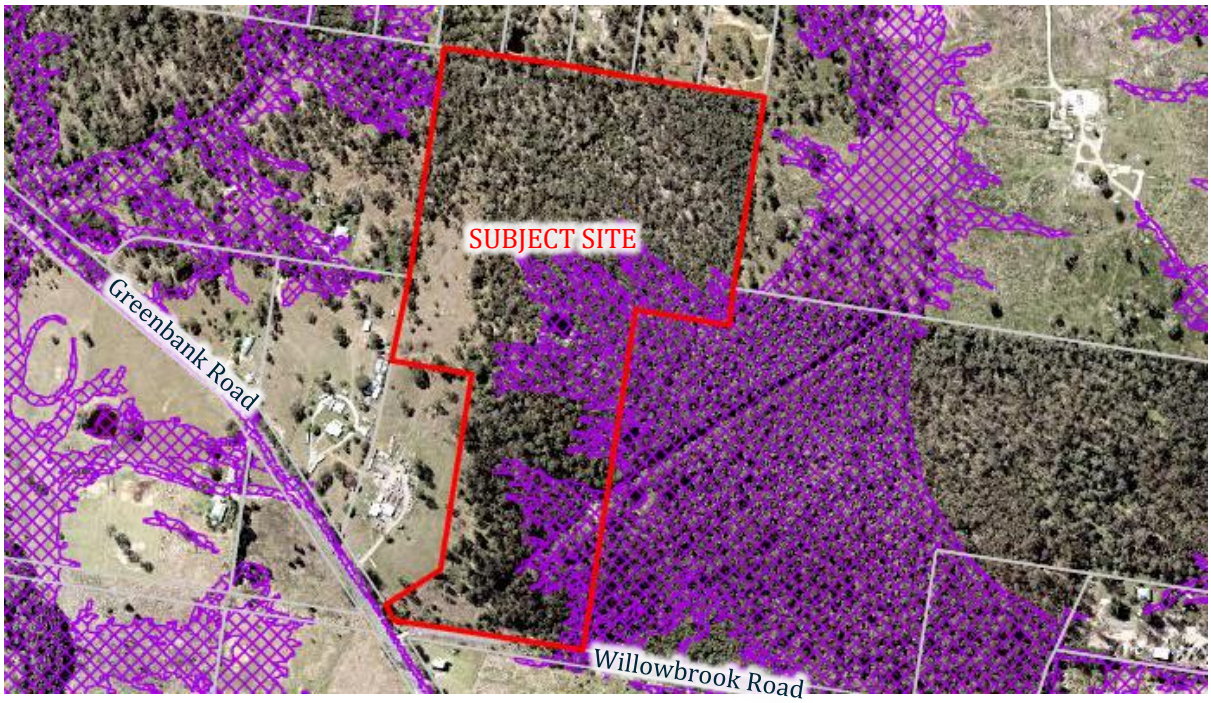


Figure 10.2: Excerpt from Logan City Council's Online Flood Portal – Overland Flow Flooding

The proposed development is located within the flood hazard zone as shown by the Logan City Council's Flood Hazard Overlay Mapping. Refer to Appendix C for the LCC Flood Hazard overlay code responses.

10.1 River Flooding

Figure 10.1 above illustrates that the site is only slightly affected by river source flooding as it only partially encroaches the eastern site boundary within the open-space vegetation area which is proposed to be maintained allowing for the low-impacted site area to remain undeveloped. No earthworks or construction activities are proposed in the location where Council flood mapping identifies the 1% AEP flood levels within the site. Therefore, a Flood Impact Assessment is not required for this development.

A Property Flood Report was generated for the subject site and provided the Defined Flood Level (DFL) for the site. A DFL has been assigned to the site incorporating climate change scenarios and the 2100 planning horizon. The DFL assigned to the site is RL27.2m (AHD).

In accordance with the LCC Flood Code, the lowest pad level within the development has been set at RL31.86 m AHD. Future development applications for individual allotments will be required to ensure that all essential building services are located no lower than RL27.7 m AHD, providing a minimum freeboard of 500 mm above the DFL. Given the proposed pad level of the lowest lot is some 4.6m higher than the DFL level achieving this requirement is expected to be readily achievable.

In addition to the above, while the site does not have flood-free access during the 1%AEP flood, the proposed new lots are not inundated during the 1% AEP design storm event. Given the industrial nature of the development, the absence of habitable uses, and the availability of sufficient warning time, it is considered unlikely that any persons would be sheltering on-site during a flood event. As such a Flood Emergency Management Plan should not be required as part of the ROL application. Any future applications on the subdivided allotments will require assessment based on their use as part of a future MCU application or similar. The site-specific use and application for the lots will be further addressed and confirmed through future MCU development applications for the individual allotments or similar, which is consistent with the previous development approval.

We note that the site is part of the Priority Development Area and consistent with the previous approval on the site and other similar ROL applications in the area, with intended industrial uses contemplated within the PDA. Our proposed ROL subdivision will have comparable access restrictions during the 1%AEP flood event as the previous approval and other approvals in the area.

10.2 Overland Flow Flooding

The development site is shown to be impacted by Overland Flow Flooding as shown from the excerpt of the Logan City Council. After investigation of regional contours and site-specific detail survey it is apparent that there are no defined gullies for stormwater runoff consistent with the mapping. In our opinion the Council's Overland Flow model is inaccurate, based on review of the site survey and it is not believed the proposed development is impacted by the overland flow paths depicted in Figure 10.2 above.

Figure 10.1 above illustrates a ridge running through the site which all existing flows conveyed from it will be captured, detained and returned to the proposed LPOD. Additionally, the source of the overland flood model shown within LCC's flood portal is presently a new commercial/industrial allotment currently under construction and would have been required to cater for any upstream flows impacting the neighbouring site reducing any overland flow path conveying near the proposed development.

The assessment of the three (3) existing upstream catchments entering the site and proposed diversion works is provided in Section 6 of this report which addresses the predevelopment and post development stormwater flows, and mitigates any impact on downstream properties through

stormwater detention to ensure the propose development limits stormwater discharge to match predevelopment flows.

11. Conclusion

This report has been prepared to support the lodgement of a Development Application to approve the construction of a new 28-lot industrial subdivision. The development is proposed to take place over the following parcel of land:

Property Address:	820 Greenbank Road, North Maclean
Property Description:	Lot 2 on RP868726
Client:	Norhart Developments
Council:	Logan City Council
Registered Site Area:	202,500m^2

This report has addressed the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report describes the design process for specifications of the following key infrastructure elements and will ensure the management of stormwater to achieve necessary standards.

- Stormwater detention for the proposed development,
    - The construction of a combined stormwater bio retention and detention basin containing 7,618m^3 of detention volume (refer to Section 5 of this report for outlet arrangements).
- Stormwater quality treatment for the proposed development,
    - The construction of a combined stormwater bio retention and detention basin containing 1,300m^2 of filter media area, to treat flows generated from majority of the site (refer Section 7 of this report for treatment arrangements).

This report has addressed the management of stormwater quantity and quality and demonstrated that no additional works are required to ensure that the proposed development complies with all necessary state and local government policies.

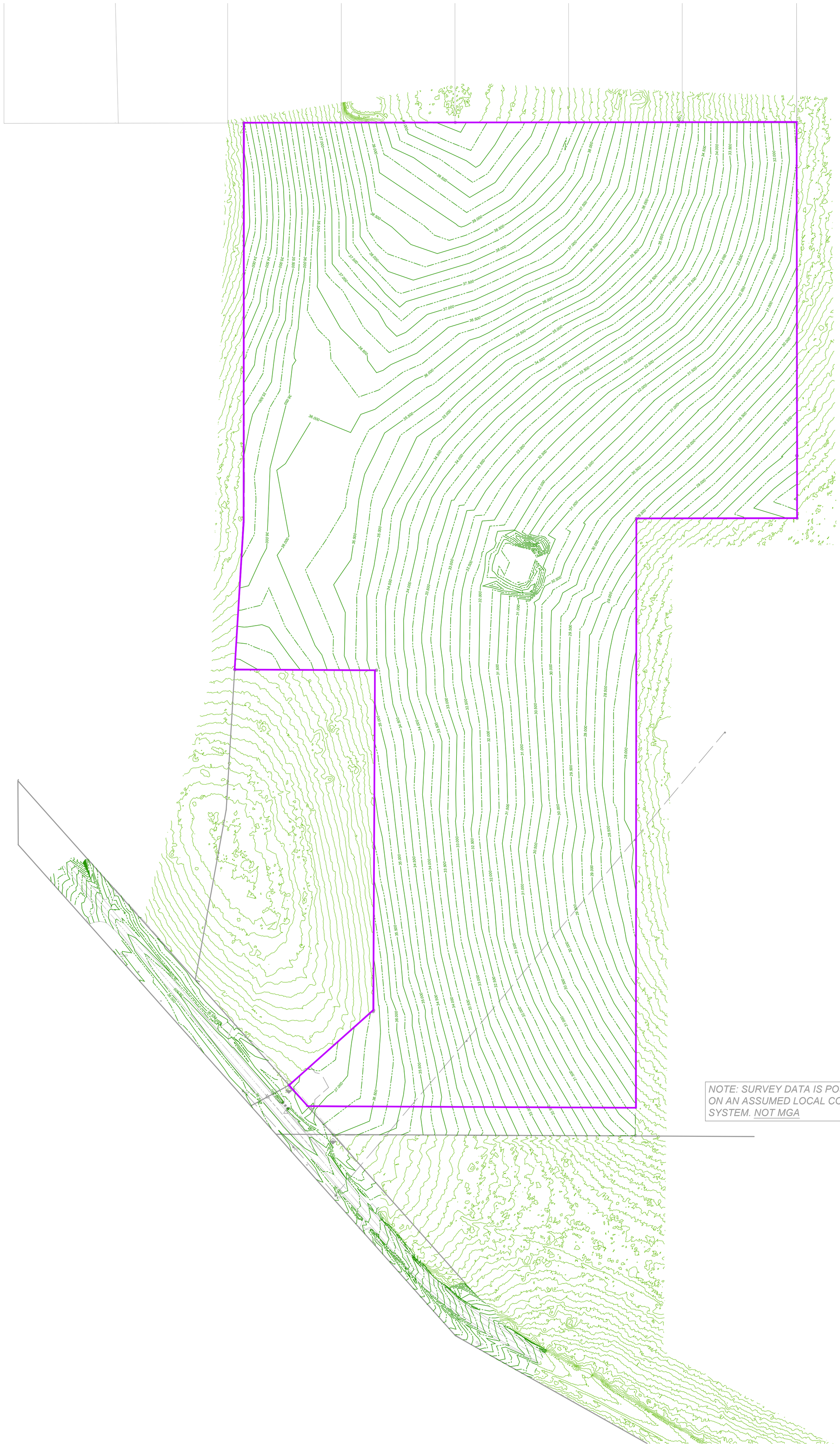
There are no apparent significant constraints on the execution of earthworks, sediment and erosion control, provision of vehicular access, or the drainage of stormwater from the site.

A summary of the proposed water and sewer connection strategy has been presented for Council's consideration.

This report demonstrates that the proposed development can be suitably serviced with all engineering services described and supports the type and scale and development that is proposed.

MICHAEL BALE & ASSOCIATES
Structural and Civil Engineering Consultancy

Appendix A
Site Survey



NOTE: SURVEY DATA IS POSITIONED ON AN ASSUMED LOCAL COORDINATE SYSTEM. NOT MGA

MICHAEL BALE & ASSOCIATES
Structural and Civil Engineering Consultancy

Appendix B
Engineering Drawings

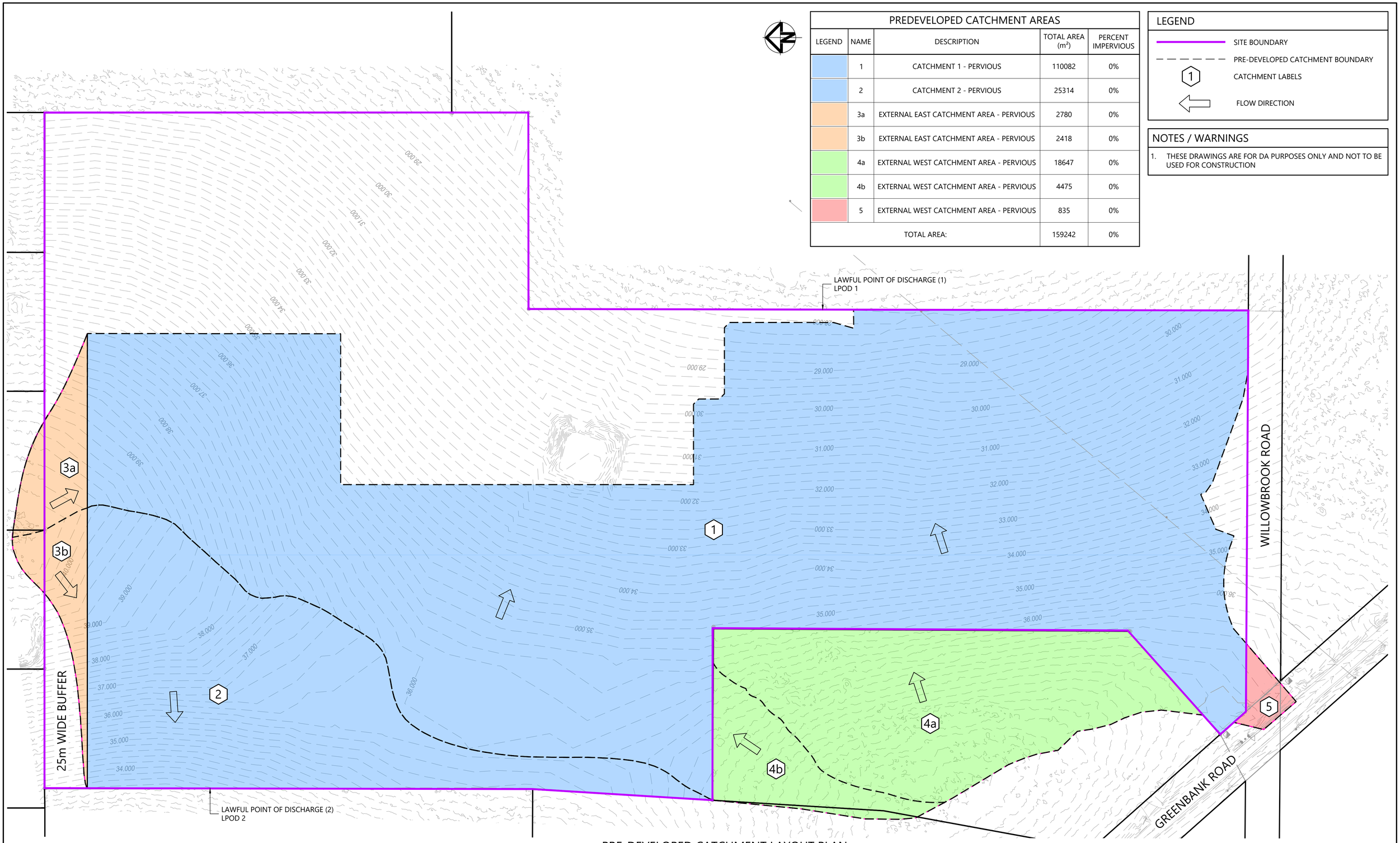
PREDEVELOPED CATCHMENT AREAS				
LEGEND	NAME	DESCRIPTION	TOTAL AREA (m^2)	PERCENT IMPERVIOUS
	1	CATCHMENT 1 - PERVIOUS	110082	0%
	2	CATCHMENT 2 - PERVIOUS	25314	0%
	3a	EXTERNAL EAST CATCHMENT AREA - PERVIOUS	2780	0%
	3b	EXTERNAL EAST CATCHMENT AREA - PERVIOUS	2418	0%
	4a	EXTERNAL WEST CATCHMENT AREA - PERVIOUS	18647	0%
	4b	EXTERNAL WEST CATCHMENT AREA - PERVIOUS	4475	0%
	5	EXTERNAL WEST CATCHMENT AREA - PERVIOUS	835	0%
TOTAL AREA:			159242	0%

LEGEND

- SITE BOUNDARY
- PRE-DEVELOPED CATCHMENT BOUNDARY
- CATCHMENT LABELS
- FLOW DIRECTION

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION



PRE-DEVELOPED CATCHMENT LAYOUT PLAN

SCALE 1:1000

ISSUE	DESCRIPTION	AUTHOR	DATE
02	FOR DA APPROVAL	DB	29.09.25
01	FOR DA APPROVAL	SB	11.07.25

29/Sep/2025 12:29 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

SCALE: SCALE 1:1000 (10 0 10 20 30 40 50)
1:1000 (A1) - 1:2000 (A3)

CLIENT: NORHART
24 Cansdale Street
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PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
PRE-DEVELOPED
CATCHMENT LAYOUT PLAN

NOTES:
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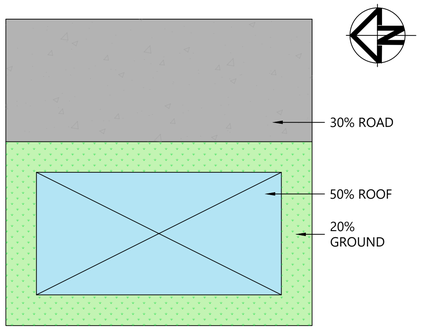
DRAWING No.	PROJECT No.	REVISION
DA01 -	G24079	- 02



TYPICAL INDUSTRIAL LOT

TAKEN FROM MUSIC MODELLING GUIDELINES v3.0 (2018)
SCALE 1:250

POST-DEVELOPED CATCHMENT AREAS

LEGEND	NAME	AREA (m^2)	DESCRIPTION	TOTAL AREA (m^2)	PERCENT IMPERVIOUS
	1	26217	ROAD RESERVE - IMPERVIOUS	26217	85%
	2	4750	TREATMENT ZONE	4750	75%
	3	3264	DETENTION ZONE (BYPASS)	3264	25%
TYPICAL INDUSTRIAL LOT: 111,084m^2 TAKEN FROM MUSIC MODELLING GUIDELINES v3.0 (2018)					
	4	51535	50% ROOF - IMPERVIOUS	103070	85%
		30921	30% INTERNAL ROAD - IMPERVIOUS		
		15461	15% LANDSCAPING - PERVIOUS		
		5153	5% HARSTAND - IMPERVIOUS		
TOTAL				137301	82%

LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- 1 CATCHMENT LABELS
- FLOW DIRECTION

NOTES / WARNINGS

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LAWFUL POINT OF DISCHARGE (1) LPOD 1

LAWFUL POINT OF DISCHARGE (2) LPOD 2

25m WIDE BUFFER

WILLOWBROOK ROAD

GREENBANK ROAD

POST-DEVELOPED CATCHMENT LAYOUT PLAN

SCALE 1:1000

ISSUE	DESCRIPTION	AUTHOR	DATE
02	FOR DA APPROVAL	DB	29.09.25
01	FOR DA APPROVAL	SB	11.07.25

29/Sep/2025 12:30 PM

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ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006

SCALE: 1:1000 (1:1000 (A1) - 1:2000 (A3))

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

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DRAWING No.	PROJECT No.	REVISION
DA02	G24079	02

LOT 39
SP338781

LOT 1
RP113251

LOT 17
RP173739

LOT 18
RP173739

LOT 19
RP173739

LOT 20
RP173739

LOT 21
RP173739

LOT 22
RP173739

LOT 1
RP121663

LOT 3
RP900179

LOT 2
SP327730

LOT 3
RP209351

LOT 1
RP136420

WILLOWBROOK ROAD (UNFORMED ROAD)

GREENBANK ROAD

LEGEND

- SITE BOUNDARY
- EASEMENT
- VEGETATION COVENANT OVER PROPOSED LOTS 14-17
- VEGETATION COVENANT OVER PROPOSED LOT 20

20
(VEGETATION COVENANT)
282.3
114.5
172.0

18
4214m²
(3138m²)
(1076m²)
25.0
73.0
74.8
43.0

19
3217m²
54.0
19.0
19.0
55.9

17
4082m²
(2833m²)
(1249m²)
79.0
50.0
21.9
44.9

20
5.9898ha
(0.2611ha)
EXTENT OF LOT 20
DEVELOPABLE AREA

16
3697m²
(2622m²)
(1075m²)
86.0

15
3697m²
(1075m²)

14
7397m²
(5247m²)
(2150m²)
25.0
61.0
86.1

13
4025m²
45.9
58.7

12
3738m²
35.9
69.4

11
2985m²
43.0
69.5

10
2999m²
70.7

9
3096m²
73.3

8
3228m²
43.5
76.0

21
4020m²
65.0
84.1

22
4064m²

23
4064m²

24
3998m²
63.6

NEW ROAD 2

NEW ROAD 3

25m BUFFER WIDE

3m WIDE EASEMENT

4.0m WIDE EASEMENT

2.5m WIDE EASEMENT

24m WIDE EASEMENT

900
8160m²
189.7
72.6
95.3
102.4
38.6
12.0

DRAINAGE RESERVE

25
5097m²
50.0
101.9

26
5092m²
101.8

27
5087m²
101.7

28
7665m²
80.4
35.6
16.0
44.9

PMT

NEW ROAD 1

7
2520m²
34.0
38.1
60.1

6
2584m²
43.0
60.2

5
2595m²
60.5

4
2606m²
60.7

3
2617m²
61.0

2
2628m²
61.3

1
6452m²
41.4
138.1

FUNCTIONAL LAYOUT OF INTERSECTION UPGRADE
REFER TRAFFIC IMPACT ASSESSMENT 25-670 BY PTT

DEVELOPMENT LAYOUT PLAN

SCALE 1:1000

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FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
DEVELOPMENT
LAYOUT PLAN

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DA03 -	G24079 -	02

NOTES

1. EARTHWORKS CUT AND FILL VOLUMES CONSIDER MATERIAL COMPACTED IN PLACE AND DO NOT INCLUDE A BULKING FACTOR FOR TRANSPORTATION.
2. CONTOURS AND DESIGN LEVELS SHOWN REPRESENT THE DESIGN FINISHED SURFACE LEVELS. CONTOUR INTERVALS ARE AT 0.5m.
3. 0.14m OF TOPSOIL STRIPPING HAS BEEN ALLOWED FOR IN THE EARTHWORKS MODELLING FOR ALL AREAS AS PER THE RECOMMENDATIONS OF SGS GEOTECHNICAL REPORT.
4. AN ALLOWANCE OF 0.540m HAS BEEN MADE IN THE BULK EARTHWORKS MODELLING TO ACCOUNT FOR ANTICIPATED FUTURE PAVEMENT BOX-OUT AND DETAILED CIVIL WORKS SURFACE GRADING, WITH LEVELS TO BE CONFIRMED.
5. THE DESIGN SURFACE LEVELS HAVE BEEN BOXED OUT BY 0.10m IN ROAD RESERVES TO ALLOW FOR VERGE WORKS. SIMILARLY, 0.10m BOX OUT HAS BEEN TAKEN OFF LOT AREAS TO ALLOW FOR TOPSOIL REPLACEMENT.

BULK EARTHWORKS SCHEDULE

CUT / FILL	ITEM	VOLUME (M^3)
FILL	TOTAL FILL	106228
CUT	TOTAL CUT	84411
	EXCESS OF FILL OVER CUT	21817

NOTES

6. ALL EARTHWORKS BATTERS SHOWN ARE 1V in 1.5H (FOR SHORT TERM GLOBAL SLOPE STABILITY) WITH 1.0m WIDE BENCHES INCORPORATED AT 2.0m HEIGHT INTERVALS.
7. A RETAINING WALL IS PROPOSED AS PART OF THE BASIN EMBANKMENT DESIGN TO REDUCE IMPACT ON VEGETATION.
8. NO ALLOWANCE IS MADE FOR UNSUITABLE MATERIAL IN THE FILLING OF THE EXISTING DAM.
9. THE BIO-RETENTION AND DETENTION BASINS HAVE BEEN SIZED USING DRAINS HYDROLOGICAL AND HYDRAULIC MODELLING.
10. NO ALLOWANCE HAS BEEN MADE FOR THE 'BOXING OUT' OF BIO-RETENTION BASIN ZONES FOR FILTER MEDIA AND DRAINAGE LAYERS.
11. ALL PROPOSED ALLOTMENTS ARE GRADED AT 1 in 150 MINIMUM FALL TO THE ROAD RESERVE. IT IS ASSUMED THAT THE ACCESS LOCATION FOR DRIVEWAYS IS APPROXIMATELY MID-LOT FRONTAGE UNLESS NOTED OTHERWISE.
12. THE ROAD CROSS SECTION ELEMENTS ARE DESIGNED AS AN INDUSTRIAL ACCESS STREET (24m WIDE).
13. ALL ALLOTMENTS ACHIEVE A MINIMUM 2,000m^2 TOTAL AREA.
14. NO ALLOWANCE HAS BEEN MADE FOR MATERIAL 'WON' FROM TRENCH SPOIL.
15. EXISTING BASE SURVEY PROVIDED BY CLIENT IS POSITIONED ON AN ARBITRARY COORDINATE SYSTEM, NOT MGA94 OR GDA2020

BULK EARTHWORKS LEGEND					
FILL	4.0	to	4.2	m	
	4.2	to	4.4	m	
	4.4	to	4.6	m	
	4.6	to	4.8	m	
	4.8	to	5.0	m	
	5.0	to	5.2	m	
	5.2	to	5.4	m	
	5.4	to	5.6	m	
	5.6	to	5.8	m	
	5.8	to	30	m	

BULK EARTHWORKS LEGEND					
FILL	2.0	to	2.2	m	
	2.2	to	2.4	m	
	2.4	to	2.6	m	
	2.6	to	2.8	m	
	2.8	to	3.0	m	
	3.0	to	3.2	m	
	3.2	to	3.4	m	
	3.4	to	3.6	m	
	3.6	to	3.8	m	
	3.8	to	4.0	m	

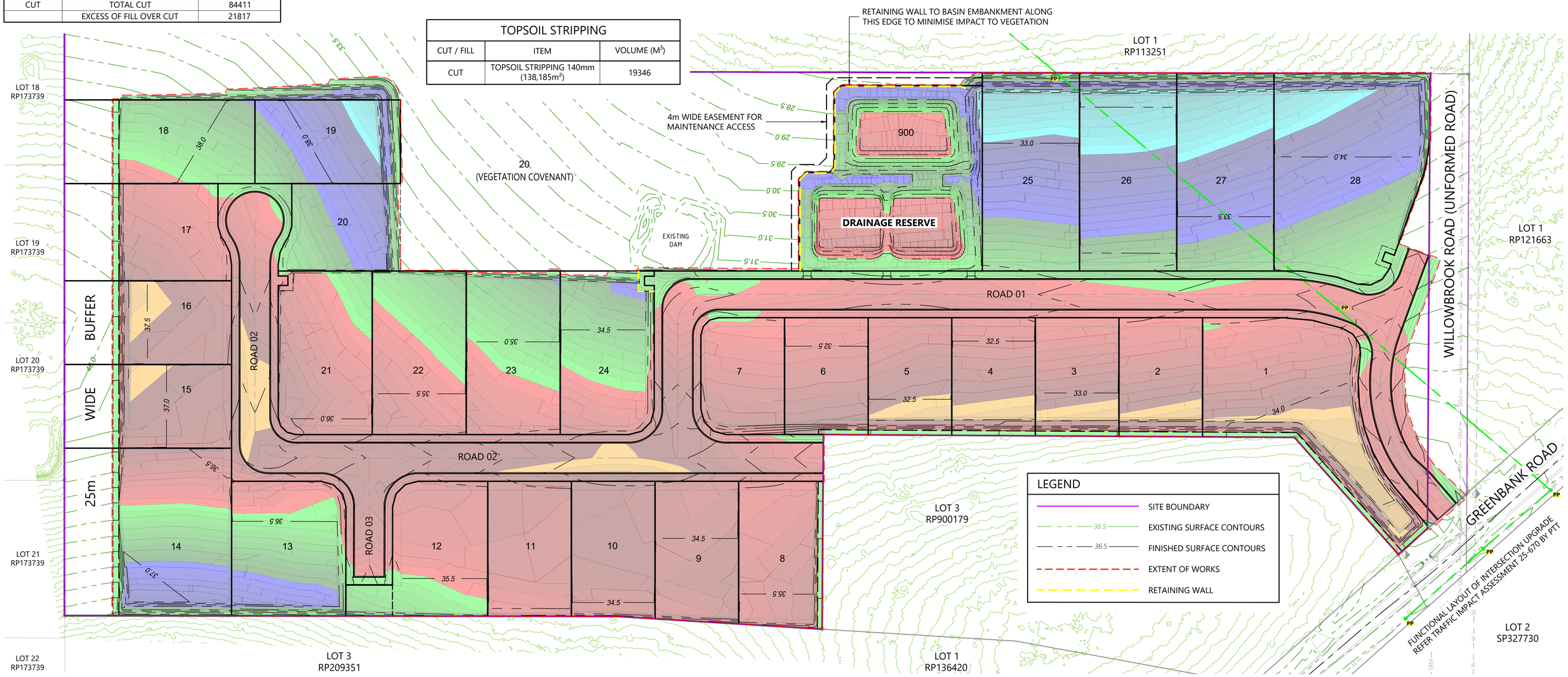
BULK EARTHWORKS LEGEND					
FILL	0.0	to	0.2	m	
	0.2	to	0.4	m	
	0.4	to	0.6	m	
	0.6	to	0.8	m	
	0.8	to	1.0	m	
	1.0	to	1.2	m	
	1.2	to	1.4	m	
	1.4	to	1.6	m	
	1.6	to	1.8	m	
	1.8	to	2.0	m	

BULK EARTHWORKS LEGEND					
CUT	-2.0	to	-1.8	m	
	-1.8	to	-1.6	m	
	-1.6	to	-1.4	m	
	-1.4	to	-1.2	m	
	-1.2	to	-1.0	m	
	-1.0	to	-0.8	m	
	-0.8	to	-0.6	m	
	-0.6	to	-0.4	m	
	-0.4	to	-0.2	m	
	-0.2	to	0.0	m	

BULK EARTHWORKS LEGEND					
CUT	-4.0	to	-3.8	m	
	-3.8	to	-3.6	m	
	-3.6	to	-3.4	m	
	-3.4	to	-3.2	m	
	-3.2	to	-3.0	m	
	-3.0	to	-2.8	m	
	-2.8	to	-2.6	m	
	-2.6	to	-2.4	m	
	-2.4	to	-2.2	m	
	-2.2	to	-2.0	m	

TOPSOIL STRIPPING

CUT / FILL	ITEM	VOLUME (M^3)
CUT	TOPSOIL STRIPPING 140mm (138,185m^2)	19346



BULK EARTHWORKS PLAN

SCALE 1:1000

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02	FOR DA APPROVAL	IG	29.09.25
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59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

SCALE: 1:1000 (10 0 10 20 30 40 50)
1:1000 (A1) - 1:2000 (A3)

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DRAWING TITLE:
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DA04 -	G24079	- 02

LEGEND

- SITE BOUNDARY
- UPSTREAM CATCHMENT BOUNDARY
- UPSTREAM CATCHMENT LABELS
- PROPOSED CONCEPTUAL STORMWATER PIPES
- PROPOSED CONCEPTUAL DIVERSION PIPES
- PROPOSED DIVERSION BUND
- PROPOSED DIVERSION SWALE/CHANNEL
- PROPOSED BIORETENTION/DETENTION BASIN
- PROPOSED CONCEPTUAL STORMWATER ACCESS CHAMBER
- PROPOSED CONCEPTUAL KERB INLET PITS
- PROPOSED CONCEPTUAL STORMWATER LOT CONNECTIONS
- PROPOSED CONCEPTUAL STORMWATER HEADWALL

NOTES / WARNINGS

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LOT 39
SP338781

LOT 17
RP173739

LOT 18
RP173739

LOT 19
RP173739

LOT 20
RP173739

LOT 21
RP173739

LOT 22
RP173739

LOT 3
RP209351

LOT 3
RP900179

LOT 1
RP136420

LOT 2
SP327730

LOT 1
RP121663

WILLOWBROOK ROAD (UNFORMED ROAD)

PROPOSED COMBINED BIO-RETENTION / DETENTION BASIN.
FILTER MEDIA AREA = 1300m^2
EXTENDED DETENTION DEPTH = 0.3m
DETENTION VOLUME = 7,618m^3
REFER TO DWG DA06-G24079 FOR DETAILS ON THE BASIN LAYOUT AND OUTLET DETAILS

PROPOSED RETAINING WALL

PROPOSED RETAINING WALL

3x PROPOSED INLET PIPES CONVEYING STORMWATER TO BASIN VIA COARSE SEDIMENT FOREBAYS

PROPOSED DIVERSION BUND (OUTSIDE OF 25m WIDE VEGETATION COVENANT) TO CONVEY STORMWATER FROM UPSTREAM CATCHMENT 3 EAST.
FOR MORE DETAILS REFER SECTION 6 OF CIVIL ENGINEERING REPORT (REF: R001-G24079) FOR DESIGN CALCULATIONS.

PROPOSED DIVERSION BUND (OUTSIDE OF 25m WIDE VEGETATION COVENANT) TO CONVEY STORMWATER FROM UPSTREAM CATCHMENT 3 WEST.
FOR MORE DETAILS REFER SECTION 6 OF CIVIL ENGINEERING REPORT (REF: R001-G24079) FOR DESIGN CALCULATIONS.

CUSTOM STORMWATER CHAMBERS TO CAPTURE AND CONVEY RUNOFF TOWARDS THE BASIN VIA INLET PIPES.

PROPOSED Ø900 STORMWATER PIPE @ 1.50% GRADE CONVEYING STORMWATER FROM UPSTREAM CATCHMENT 4 TOWARDS THE BASIN.

PROPOSED CUT-OFF DRAINS (WITHIN SUBJECT PROPERTY) TO CAPTURE AND CONVEY STORMWATER FROM UPSTREAM CATCHMENT 4 TOWARDS THE BASIN.
FOR MORE DETAILS REFER SECTION 6 OF CIVIL ENGINEERING REPORT (REF: R001-G24079) FOR DESIGN CALCULATIONS.

NEW ROAD 1
NEW ROAD 2
NEW ROAD 3

GREENBANK ROAD

FUNCTIONAL LAYOUT OF INTERSECTION UPGRADE
REFER TRAFFIC IMPACT ASSESSMENT 25-670 BY PTT

STORMWATER LAYOUT PLAN

SCALE 1:1000

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1:1000 (A1) - 1:2000 (A3)

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LAYOUT PLAN

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DA05	G24079	02

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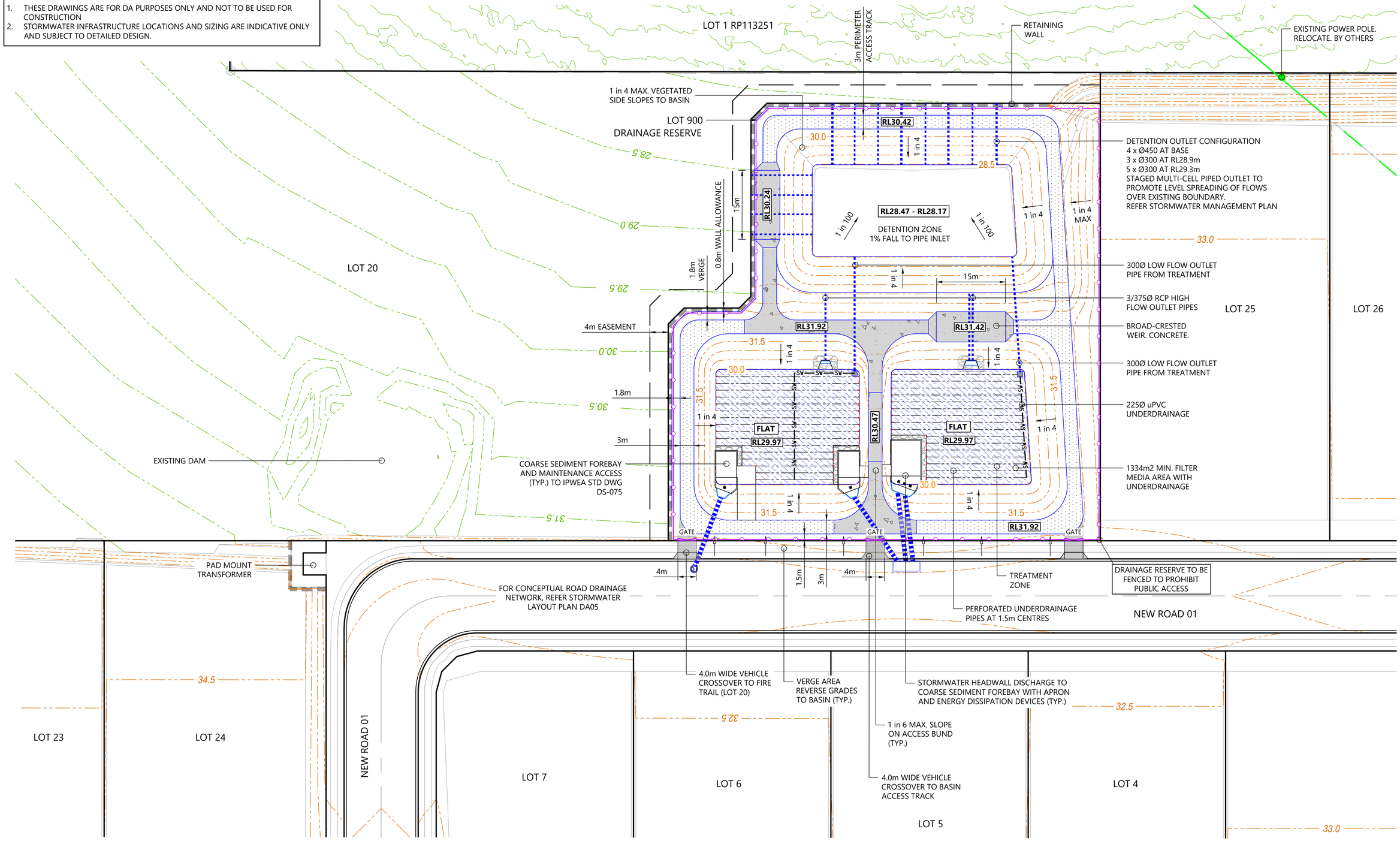

BIO-RETENTION AND DETENTION BASIN PLAN

SCALE 1:1000

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59 Anderson Street
Fortitude Valley QLD 4006
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SCALE: SCALE 1:400 (4 2 0 4 8 12 16 20)
1:400 (A1) - 1:800 (A3)

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BIO-RETENTION AND DETENTION BASIN PLAN

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29/Sep/2025 12:31 PM

LEGEND

- SITE BOUNDARY
- EX. WATER (GREENBANK RD)
- EX. WATER MAIN (WILLOWBROOK RD)
- EX. SEWER RISING MAIN
- DN300 WATER MAIN
- FUTURE DN300 WATER MAIN
- DN200 WATER MAIN
- DN150 WATER MAIN

NOTES / WARNINGS

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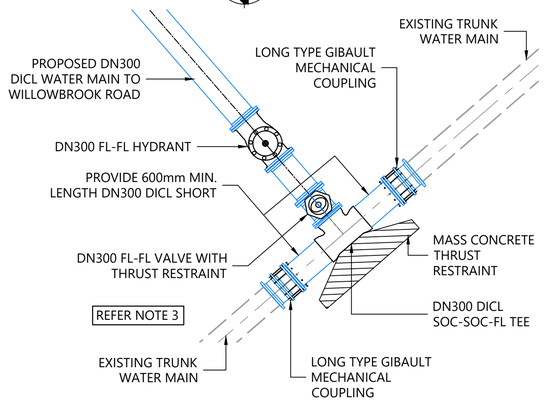
2. DMA FEED / PRV AND FLOW METER GENERAL ARRANGEMENT SHOWN ONLY. FINAL DETAILS TO BE CONFIRMED AT DETAILED DESIGN.
3. CUT IN CONNECTION AND OFFTAKE TEE ARRANGEMENT SHOWN INDICATIVELY. SUBJECT TO DETAILED DESIGN AND FURTHER SERVICES INVESTIGATION.

INSET A SCALE 1:40

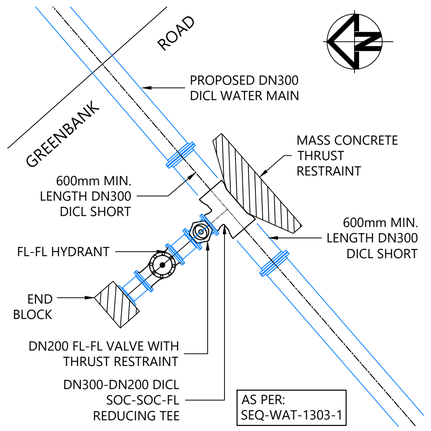
DN300 CUT IN CONNECTION

AS PER: SEQ-WAT-1105-1 AND SEQ-WAT-1105-2



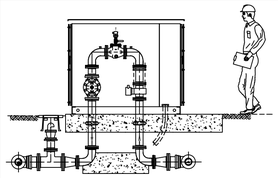
INSET B SCALE 1:40

PROVISION OF DN200 TEE



INSET C SCALE 1:40

DMA FEED (FLOW METER)



SECTION A

GENERAL ARRANGEMENT SHOWN IN ACCORDANCE WITH SEQ-WAT-1310-5-A PROVIDED BY EDQ

REFER NOTE 2

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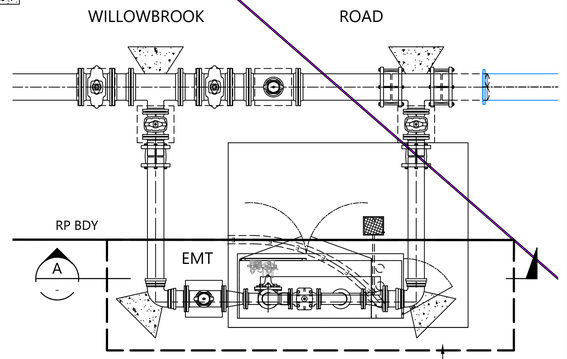
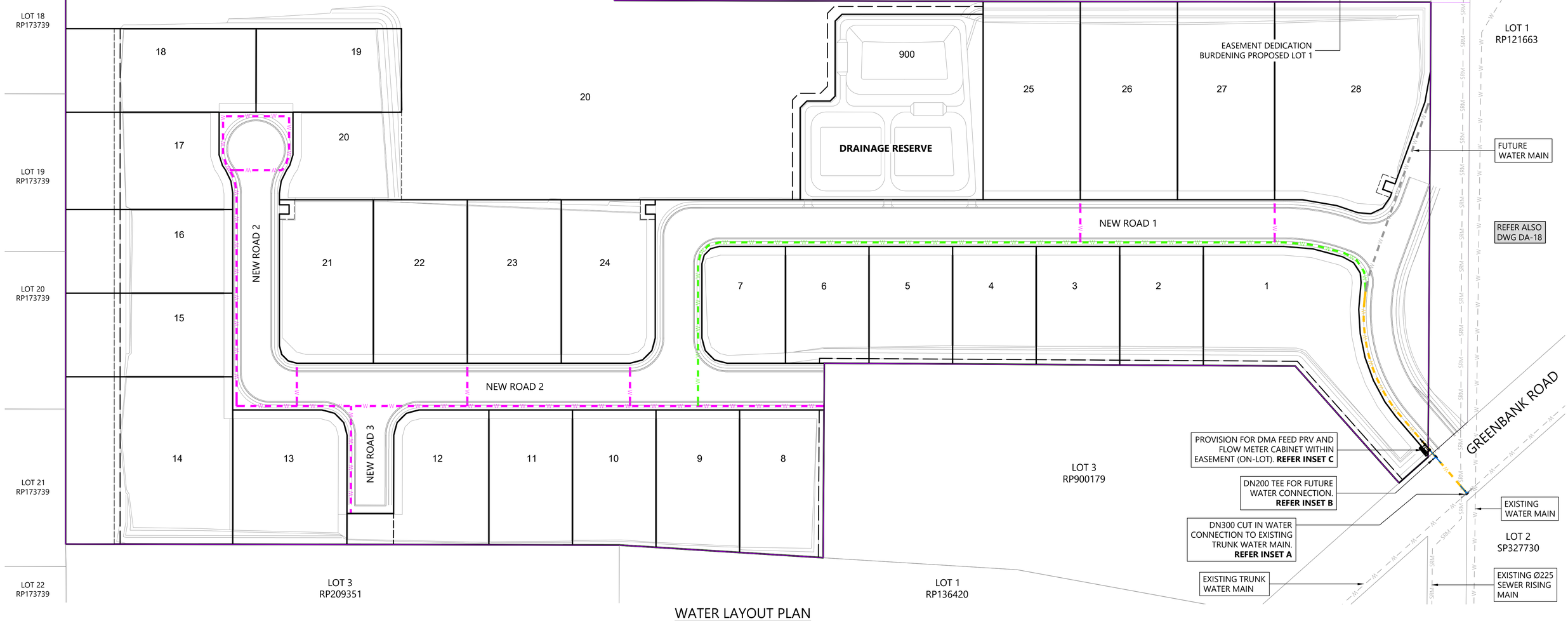
1:40 (A1) - 1:80 (A3)



WILLOWBROOK ROAD (UNFORMED ROAD)



WATER LAYOUT PLAN

SCALE 1:3000

ISSUE	DESCRIPTION	AUTHOR	DATE
02	FOR DA APPROVAL	IG	29.09.25
01	FOR DA APPROVAL	SB	11.07.25

29/Sep/2025 4:37 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006

SCALE 1:1000 10 0 10 20 30 40 50
1:1000 (A1) - 1:2000 (A3)

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

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Structural and Civil Engineering Consultancy
Level 3, 18 Orchid Avenue,
Surfers Paradise
PO BOX 1715, Surfers Paradise 4217
Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
WATER
LAYOUT PLAN

NOTES:
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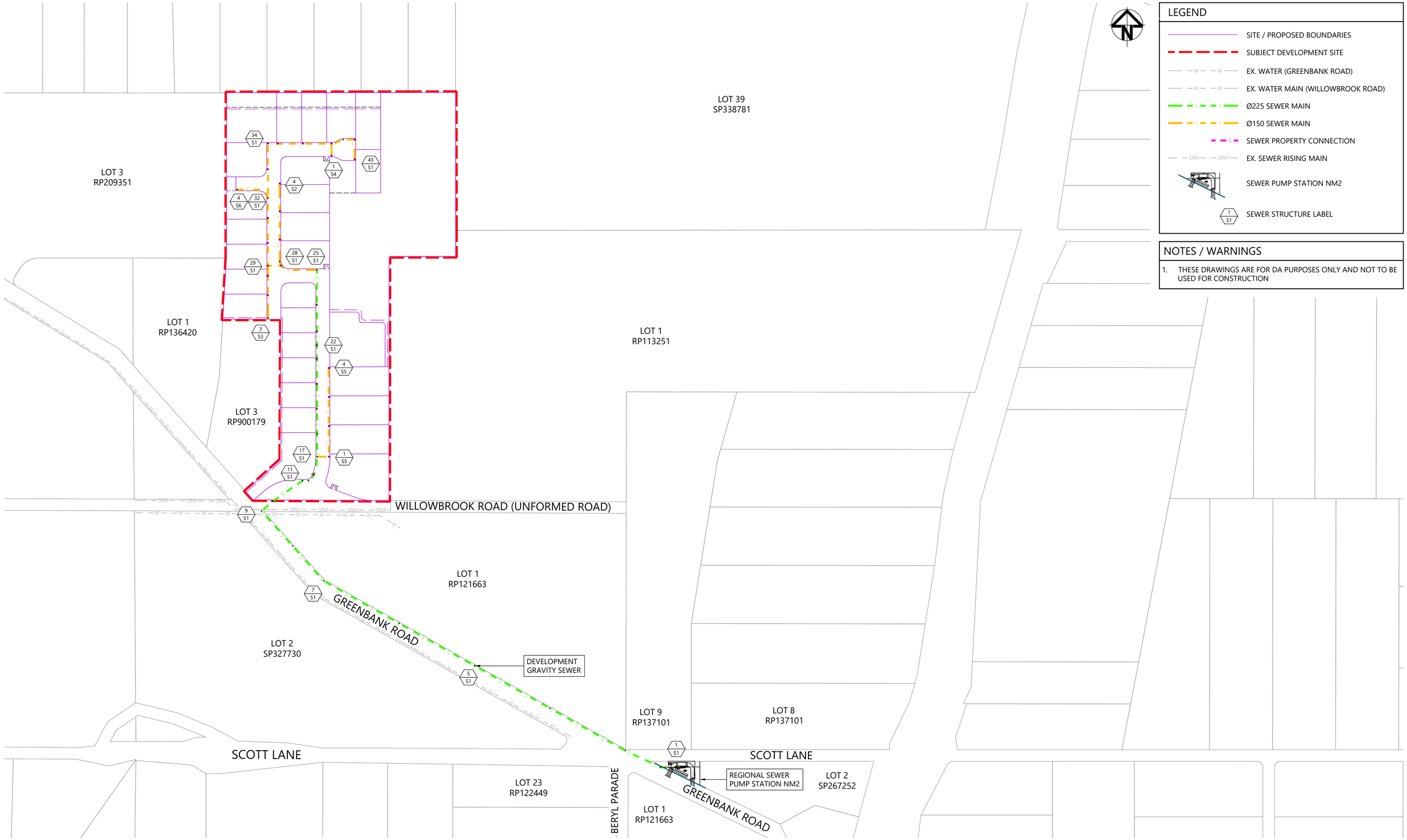
DRAWING No.	PROJECT No.	REVISION
DA07	G24079	02



LEGEND

- SITE / PROPOSED BOUNDARIES
- SUBJECT DEVELOPMENT SITE
- EX. WATER (GREENBANK ROAD)
- EX. WATER MAIN (WILLOWBROOK ROAD)
- Ø225 SEWER MAIN
- Ø150 SEWER MAIN
- SEWER PROPERTY CONNECTION
- EX. SEWER RISING MAIN
- SEWER PUMP STATION NM2
- SEWER STRUCTURE LABEL (1 / S1)

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

SEWER SERVICING STRATEGY

SCALE 1:3000

ISSUE	DESCRIPTION	AUTHOR	DATE
02	FOR DA APPROVAL	IG	29.09.25
01	FOR DA APPROVAL	SB	11.07.25

29/Sep/2025 12:31 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

SCALE: SCALE 1:3000 (50 0 50 100 150) 1:3000 (A1) - 1:6000 (A3)

ARCHITECT

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PO BOX 1715, Surfers Paradise 4217
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mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER SERVICING STRATEGY

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DRAWING No.	PROJECT No.	REVISION
DA08 –	G24079	– 02

LEGEND

- SITE / PROPOSED BOUNDARIES
- EX. WATER (GREENBANK ROAD)
- EX. WATER MAIN (WILLOWBROOK ROAD)
- Ø225 SEWER MAIN
- Ø150 SEWER MAIN
- SEWER PROPERTY CONNECTION
- EX. SEWER RISING MAIN
- SEWER STRUCTURE LABEL

NOTES / WARNINGS

1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION

LOT 39 SP338781

LOT 17 RP173739

LOT 18 RP173739

LOT 19 RP173739

LOT 20 RP173739

LOT 21 RP173739

LOT 22 RP173739

LOT 1 RP113251

LOT 1 RP121663

LOT 3 RP900179

LOT 3 RP209351

LOT 1 RP136420

LOT 2 SP327730

WILLOWBROOK ROAD (UNFORMED ROAD)

GREENBANK ROAD

NEW ROAD 1

NEW ROAD 2

NEW ROAD 3

DRAINAGE RESERVE

EXISTING WATER MAIN

EXISTING WATER MAIN

EXISTING Ø225 SEWER RISING MAIN

SEWER LAYOUT PLAN

SCALE 1:1000

ISSUE	DESCRIPTION	AUTHOR	DATE
02	FOR DA APPROVAL	IG	29.09.25
01	FOR DA APPROVAL	SB	11.07.25

29/Sep/2025 12:32 PM

STATUS: FOR DA APPROVAL
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R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

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59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

SCALE: 1:1000 (10 0 10 20 30 40 50)
1:1000 (A1) - 1:2000 (A3)

ARCHITECT

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Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER
LAYOUT PLAN

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DRAWING No.	PROJECT No.	REVISION
DA09	G24079	02

MAINTENANCE HOLE / SHAFT No.	1/S1	2/S1	3/S1	4/S1	5/S1	6/S1
MH / MS COVER TYPE	'	B/C	B/C	B/C	B/C	B/C
MH / MS TYPE	SPS	P3B	P3B	P3B	P3B	P3B
MH / MS DROP TYPE	'	V	V	V	V	V
LINE DEFLECTION & BRANCHES	'	25°	4°	-	-	-
INTERNAL CORROSION PROTECTION	'	Y	Y	Y	Y	Y
PROPERTY CONNECTION TYPE	'	-	-	-	-	-

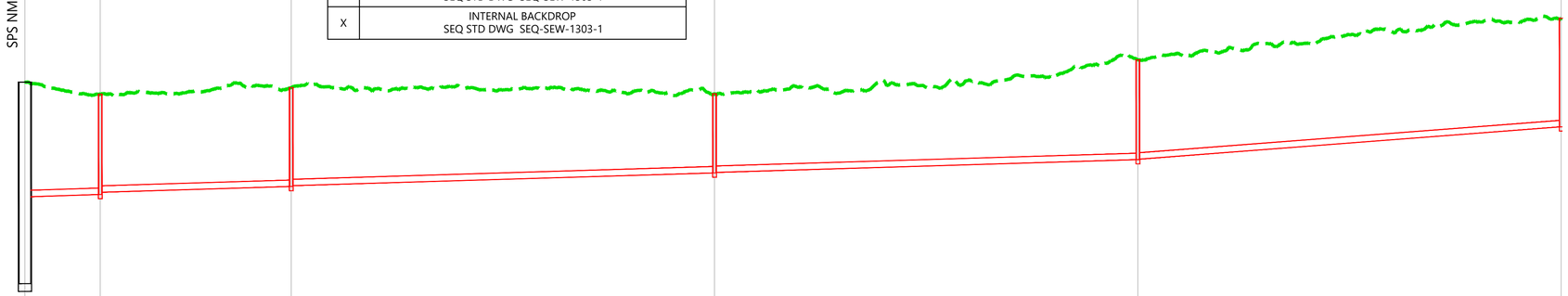
STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
B	NON-TRAFFICABLE LID
D	TRAFFICABLE LID
C	COMPOSITE

GENERAL NOTES	
1	ALL uPVC SEWER PIPE TO BE CLASS SN8 INCLUDING ALL PROPERTY CONNECTIONS.
2	EMBEDMENT TYPES AS INDICATED ON LONGITUDINAL SECTIONS AND SEQ-SEW-1201-1
3	CONTRACTOR TO VERIFY DOWNSTREAM EXISTING PIPE LEVELS PRIOR TO COMMENCEMENT OF PIPEWORK.
4	POLYETHYLENE (PE) LINING TO BE INSTALLED TO ALL MAINTENANCE STRUCTURES TYPE P3. REFER LONGITUDINAL SECTIONS. REFER ALSO SEQ-SPS-1407-1-A & 2-B
5	DESIGN OF DEEP SEWERS GREATER THAN 6 METRES TO BE CARRIED OUT BY A SUITABLY QUALIFIED STRUCTURAL ENGINEER IN ACCORDANCE WITH SEQ SEWER CODE CLAUSE 4.6.2.2 AND PE LINING REQUIREMENTS.
6	ALL MAINTENANCE HOLES WHERE TRAFFICABLE LIDS ARE SPECIFIED TO BE COMPOSITE LIDS AND FRAMES (NON-CORROSIVE). FOR ALL MANHOLES WHERE INTERNAL PROTECTION COATINGS ARE REQUIRED AS PER CLAUSE 7.6.2(I) TO (VII) OF THE SEWERAGE CLAUSE, REFER SEQ CIVIL IPAM LIST.

RIGSS STRUCTURE TYPES	
P3A	1050mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
P3B	1200mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1



PROPERTY DESCRIPTION		GREENBANK ROAD (RESERVE)				
PIPE SIZE (mm), CLASS		DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8
GRADE (1 IN X) CTR - CTR		1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 131
LENGTH		26.496	67.216	148.968	148.968	148.968
EMBEDMENT TYPE		4	4	4	4	4
PIPE GRADE (%)		0.300%	0.300%	0.300%	0.300%	0.762%
DEPTH TO INVERT	7.087	4.032 / 3.525	3.445 / 3.478	3.448 / 2.783	2.763 / 3.512	3.492 / 3.815
INVERT LEVEL	20.500	23.556 / 23.635	23.715 / 23.917	23.947 / 24.394	24.414 / 24.861	24.881 / 26.015
FINISHED SURFACE LEVEL	27.587	27.160	27.395	27.177	28.373	29.831
EXISTING SURFACE LEVEL	27.587	27.160	27.395	27.177	28.373	29.831
CHAINAGE	0.000	26.496	93.712	242.680	391.648	540.616

ALTERNATIVELY REHAU AWASHAFT MAY BE UTILISED TO A MAXIMUM DEPTH OF 6.0m FOR SEWER STRUCTURES

GRAVITY LINE S1

ISSUE	DESCRIPTION	AUTHOR	DATE
01	FOR DA APPROVAL	IG	29.09.25

29/Sep/2025 12:34 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

SCALE
HORIZ 1:1000 — 10 0 10 20 30 40 50 — 1:1000 (A1) - 1:2000 (A3)
VERT 1:100 — 1 0 1 2 3 4 5 — 1:100 (A1) - 1:200 (A3)

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

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Structural and Civil Engineering Consultancy
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Surfers Paradise
PO BOX 1715, Surfers Paradise 4217
Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER
LONGITUDINAL SECTIONS
SHEET 1 OF 6

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DRAWING No.	PROJECT No.	REVISION
DA12 -	G24079	- 01

MAINTENANCE HOLE / SHAFT No.	6/S1	7/S1	8/S1	9/S1	10/S1	11/S1	12/S1	13/S1	14/S1	15/S1	16/S1
MH / MS COVER TYPE	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C
MH / MS TYPE	P3B	P3B	CI	CI	CI	CI	CI	CI	CI	CI	P3B
MH / MS DROP TYPE	V	V	V	V	V	V	V	V	V	V	V
LINE DEFLECTION & BRANCHES	-	19°	-	91°	6°	39°	39° -10°	-28°	-28°	-14°	-10°
INTERNAL CORROSION PROTECTION	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PROPERTY CONNECTION TYPE	-	-	-	-	-	-	-	-	-	X	-

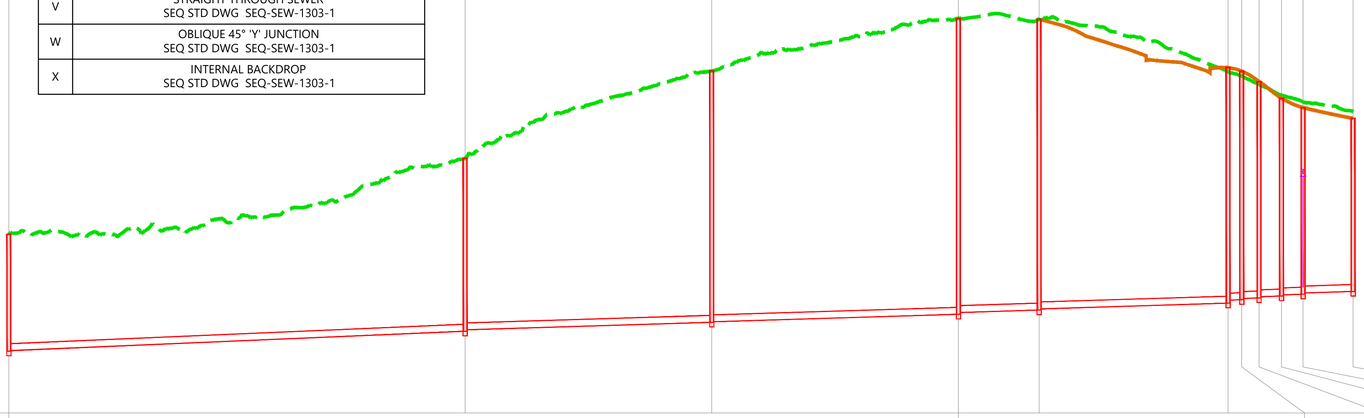
STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
B	NON-TRAFFICABLE LID
D	TRAFFICABLE LID
C	COMPOSITE

GENERAL NOTES	
1	ALL uPVC SEWER PIPE TO BE CLASS SN8 INCLUDING ALL PROPERTY CONNECTIONS.
2	EMBEDMENT TYPES AS INDICATED ON LONGITUDINAL SECTIONS AND SEQ-SEW-1201-1
3	CONTRACTOR TO VERIFY DOWNSTREAM EXISTING PIPE LEVELS PRIOR TO COMMENCEMENT OF PIPEWORK.
4	POLYETHYLENE (PE) LINING TO BE INSTALLED TO ALL MAINTENANCE STRUCTURES TYPE P3. REFER LONGITUDINAL SECTIONS. REFER ALSO SEQ-SPS-1407-1-A & 2-B
5	DESIGN OF DEEP SEWERS GREATER THAN 6 METRES TO BE CARRIED OUT BY A SUITABLY QUALIFIED STRUCTURAL ENGINEER IN ACCORDANCE WITH SEQ SEWER CODE CLAUSE 4.6.2.2 AND PE LINING REQUIREMENTS.
6	ALL MAINTENANCE HOLES WHERE TRAFFICABLE LIDS ARE SPECIFIED TO BE COMPOSITE LIDS AND FRAMES (NON-CORROSIVE). FOR ALL MANHOLES WHERE INTERNAL PROTECTION COATINGS ARE REQUIRED AS PER CLAUSE 7.6.2(I) TO (VII) OF THE SEWERAGE CLAUSE, REFER SEQ CIVIL IPAM LIST.

RIGSS STRUCTURE TYPES	
P3A	1050mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
P3B	1200mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1



PROPERTY DESCRIPTION	GREENBANK ROAD (RESERVE)										
PIPE SIZE (mm), CLASS	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	
GRADE (1 IN X) CTR - CTR	1 IN 237	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	
LENGTH	148.968	80.529	80.529	26.346	61.687	4.470	5.665	7.307	7.053	16.344	
EMBEDMENT TYPE	4	4	4	4	4	4	4	4	4	4	
PIPE GRADE (%)	0.422%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	
DEPTH TO INVERT	3.815 3.795	5.646 5.596	8.207 8.187	9.661 9.601	9.494 9.454	7.692 7.592	7.457 7.417	7.065 7.025	6.458 6.418	6.088 6.048	5.650
INVERT LEVEL	26.015 26.035	26.664 26.714	26.956 26.976	27.217 27.278	27.357 27.397	27.582 27.682	27.695 27.735	27.752 27.792	27.814 27.854	27.875 27.915	27.964
FINISHED SURFACE LEVEL	29.831	32.310	35.163	36.878	36.851	35.274	35.152	34.817	34.272	33.963	33.614
EXISTING SURFACE LEVEL	29.831	32.310	35.163	36.878	36.851	35.138	34.998	34.726	34.369	34.157	33.849
CHAINAGE	540.616	689.585	770.114	850.643	876.990	938.677	943.147	948.812	956.119	963.172	979.516

	WILLOWBROOK ROAD (RESERVE)			NEW ROAD 01 (RESERVE)			
PROPERTY DESCRIPTION							
PIPE SIZE (mm), CLASS	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8
GRADE (1 IN X) CTR - CTR	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333
LENGTH	26.346	61.687	4.470	5.665	7.307	7.053	16.344
EMBEDMENT TYPE	4	4	4	4	4	4	4
PIPE GRADE (%)	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%
DEPTH TO INVERT	9.661 9.601	9.494 9.454	7.692 7.592	7.457 7.417	7.065 7.025	6.458 6.418	6.088 6.048	5.650
INVERT LEVEL	27.217 27.278	27.357 27.397	27.582 27.682	27.695 27.735	27.752 27.792	27.814 27.854	27.875 27.915	27.964
FINISHED SURFACE LEVEL	36.878	36.851	35.274	35.152	34.817	34.272	33.963	33.614
EXISTING SURFACE LEVEL	36.878	36.851	35.138	34.998	34.726	34.369	34.157	33.849
CHAINAGE	850.643	876.990	938.677	943.147	948.812	956.119	963.172	979.516

GRAVITY LINE S1

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59 Anderson Street
Fortitude Valley QLD 4006

SCALE
HORIZ 1:1000 (1:1000 (A1) - 1:2000 (A3))
VERT 1:100 (1:100 (A1) - 1:200 (A3))

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

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mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER
LONGITUDINAL SECTIONS
SHEET 2 OF 6

NOTES:
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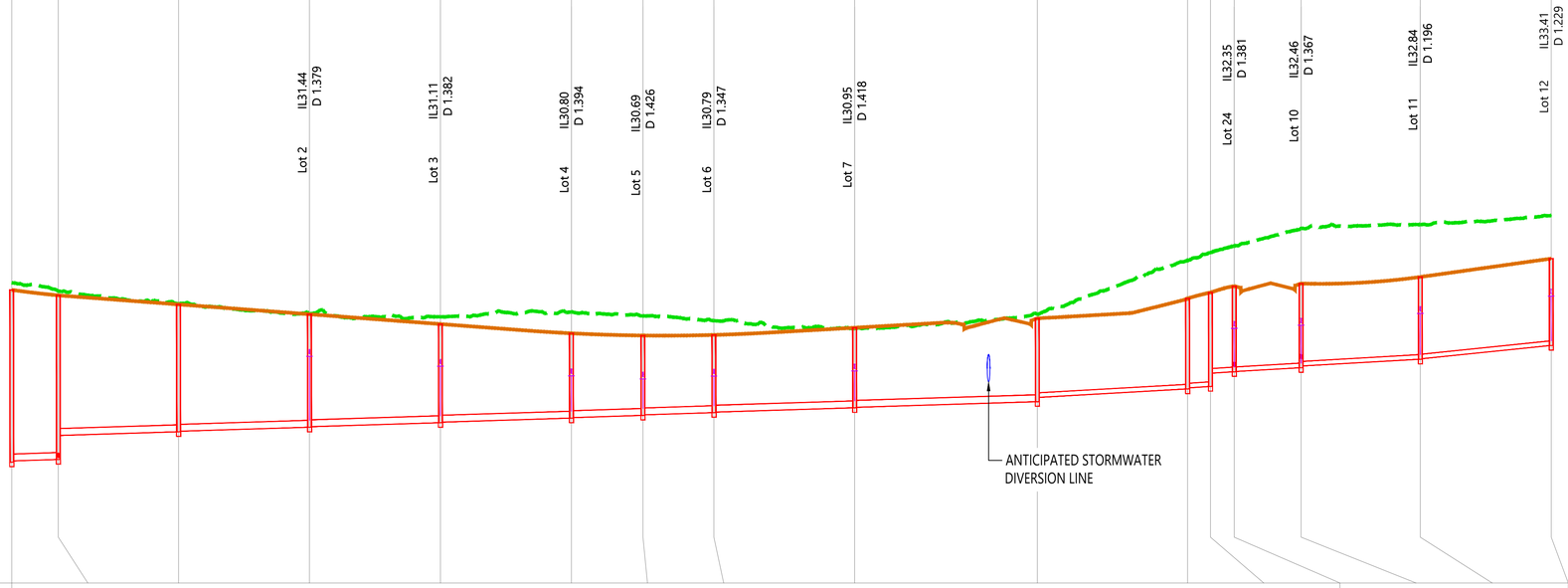
DRAWING No.	PROJECT No.	REVISION
DA13 -	G24079	- 01

MAINTENANCE HOLE / SHAFT No.	16/S1	17/S1	18/S1	19/S1	20/S1	21/S1	22/S1	23/S1	24/S1	25/S1	26/S1	27/S1	28/S1	29/S1	30/S1	31/S1
MH / MS COVER TYPE	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C
MH / MS TYPE	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3B	P3A	P3A	P3A	P3A
MH / MS DROP TYPE	V	X	V	V	V	V	V	V	V	V	V	W	V	V	V	V
LINE DEFLECTION & BRANCHES	39° -10°	39° -5° S5 85°	39°	39°	39°	39°	39°	39°	39°	-90° 39°	39° 15°	39° 30°	39° -45° S2 30°	39° 90° S3 -90°	-	-
INTERNAL CORROSION PROTECTION	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PROPERTY CONNECTION TYPE	-	-	-	X	X	X	X	X	X	-	-	-	X	X	X	X

STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
B	NON-TRAFFICABLE LID
D	TRAFFICABLE LID
C	COMPOSITE

GENERAL NOTES	
1	ALL uPVC SEWER PIPE TO BE CLASS SN8 INCLUDING ALL PROPERTY CONNECTIONS.
2	EMBEDMENT TYPES AS INDICATED ON LONGITUDINAL SECTIONS AND SEQ-SEW-1201-1
3	CONTRACTOR TO VERIFY DOWNSTREAM EXISTING PIPE LEVELS PRIOR TO COMMENCEMENT OF PIPEWORK.
4	POLYETHYLENE (PE) LINING TO BE INSTALLED TO ALL MAINTENANCE STRUCTURES TYPE P3. REFER LONGITUDINAL SECTIONS. REFER ALSO SEQ-SPS-1407-1-A & 2-B
5	DESIGN OF DEEP SEWERS GREATER THAN 6 METRES TO BE CARRIED OUT BY A SUITABLY QUALIFIED STRUCTURAL ENGINEER IN ACCORDANCE WITH SEQ SEWER CODE CLAUSE 4.6.2.2 AND PE LINING REQUIREMENTS.
6	ALL MAINTENANCE HOLES WHERE TRAFFICABLE LIDS ARE SPECIFIED TO BE COMPOSITE LIDS AND FRAMES (NON-CORROSIVE). FOR ALL MANHOLES WHERE INTERNAL PROTECTION COATINGS ARE REQUIRED AS PER CLAUSE 7.6.2(I) TO (VII) OF THE SEWERAGE CLAUSE, REFER SEQ CIVIL IPAM LIST.



PROPERTY DESCRIPTION	NEW ROAD 01 (RESERVE)												NEW ROAD 02 (RESERVE)		
PIPE SIZE (mm), CLASS	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN225 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8
GRADE (1 IN X) CTR - CTR	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 333	1 IN 180	1 IN 180	1 IN 180	1 IN 180	1 IN 180	1 IN 180	1 IN 100
LENGTH	15.297	39.470	43.000	43.000	43.000	23.498	23.303	46.199	60.000	49.345	7.514	7.800	21.946	39.135	43.000	
EMBEDMENT TYPE	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
PIPE GRADE (%)	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.300%	0.556%	0.556%	0.556%	0.556%	0.556%	1.000%	
DEPTH TO INVERT	5.650 5.610	5.384 4.594	4.179 4.159	3.708 3.688	3.236 3.216	2.784 2.764	2.621 2.601	2.550 2.530	2.628 2.608	2.734 2.591	2.972 2.932	3.083 2.643	2.806 2.796	2.762 2.702	2.701 2.681	2.853
INVERT LEVEL	27.964 28.004	28.050 28.840	28.958 28.978	29.107 29.127	29.256 29.276	29.405 29.425	29.496 29.516	29.586 29.606	29.744 29.764	29.944 30.088	30.362 30.402	30.444 30.884	30.927 30.937	31.059 31.119	31.337 31.357	31.787
FINISHED SURFACE LEVEL	33.614	33.434	33.138	32.815	32.493	32.189	32.117	32.136	32.372	32.679	33.334	33.527	33.733	33.822	34.037	34.640
EXISTING SURFACE LEVEL	33.849	33.575	33.156	32.842	32.731	32.887	32.759	32.606	32.348	32.803	34.578	34.841	35.054	35.632	35.757	36.053
CHAINAGE	979.516	994.813	1034.283	1077.283	1120.283	1163.283	1186.780	1210.084	1256.282	1316.283	1365.628	1373.141	1380.942	1402.888	1442.023	1485.023
GRAVITY LINE	S1															

RIGSS STRUCTURE TYPES	
P3A	1050mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
P3B	1200mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1

ALTERNATIVELY REHAU AWASHAFT MAY BE UTILISED TO A MAXIMUM DEPTH OF 6.0m FOR SEWER STRUCTURES

ISSUE	DESCRIPTION	AUTHOR	DATE
01	FOR DA APPROVAL	IG	29.09.25

29/Sep/2025 12:35 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No : | CERTIFIED

HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006

SCALE
HORIZ 1:1000 10 0 10 20 30 40 50
1:1000 (A1) - 1:2000 (A3)
VERT 1:100 1 0 1 2 3 4 5
1:100 (A1) - 1:200 (A3)

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

MICHAEL BALE & ASSOCIATES
Structural and Civil Engineering Consultancy
Level 3, 18 Orchid Avenue,
Surfers Paradise
PO BOX 1715, Surfers Paradise 4217
Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER
LONGITUDINAL SECTIONS
SHEET 3 OF 6

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DRAWING No.	PROJECT No.	REVISION
DA14 -	G24079	- 01

MAINTENANCE HOLE / SHAFT No.	31/S1	32/S1	33/S1	34/S1	35/S1	36/S1	37/S1	38/S1	39/S1	40/S1	41/S1	42/S1	43/S1	28/S1	1/S2	2/S2	3/S2
MH / MS COVER TYPE	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C	B/C
MH / MS TYPE	P3A	P3A	P3B	P3B	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A	P3A
MH / MS DROP TYPE	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
LINE DEFLECTION & BRANCHES	-	S6 -15°	-	90°	-	-	-9° S4 90°	-17°	-9°	17°	17°	90°	-	S1	15°	-	-
INTERNAL CORROSION PROTECTION	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PROPERTY CONNECTION TYPE	X	-	X	X	X	X	X	-	-	-	-	X	X	-	-	X	X

STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
B	NON-TRAFFICABLE LID
D	TRAFFICABLE LID
C	COMPOSITE

GENERAL NOTES	
1	ALL uPVC SEWER PIPE TO BE CLASS SN8 INCLUDING ALL PROPERTY CONNECTIONS.
2	EMBEDMENT TYPES AS INDICATED ON LONGITUDINAL SECTIONS AND SEQ-SEW-1201-1
3	CONTRACTOR TO VERIFY DOWNSTREAM EXISTING PIPE LEVELS PRIOR TO COMMENCEMENT OF PIPEWORK.
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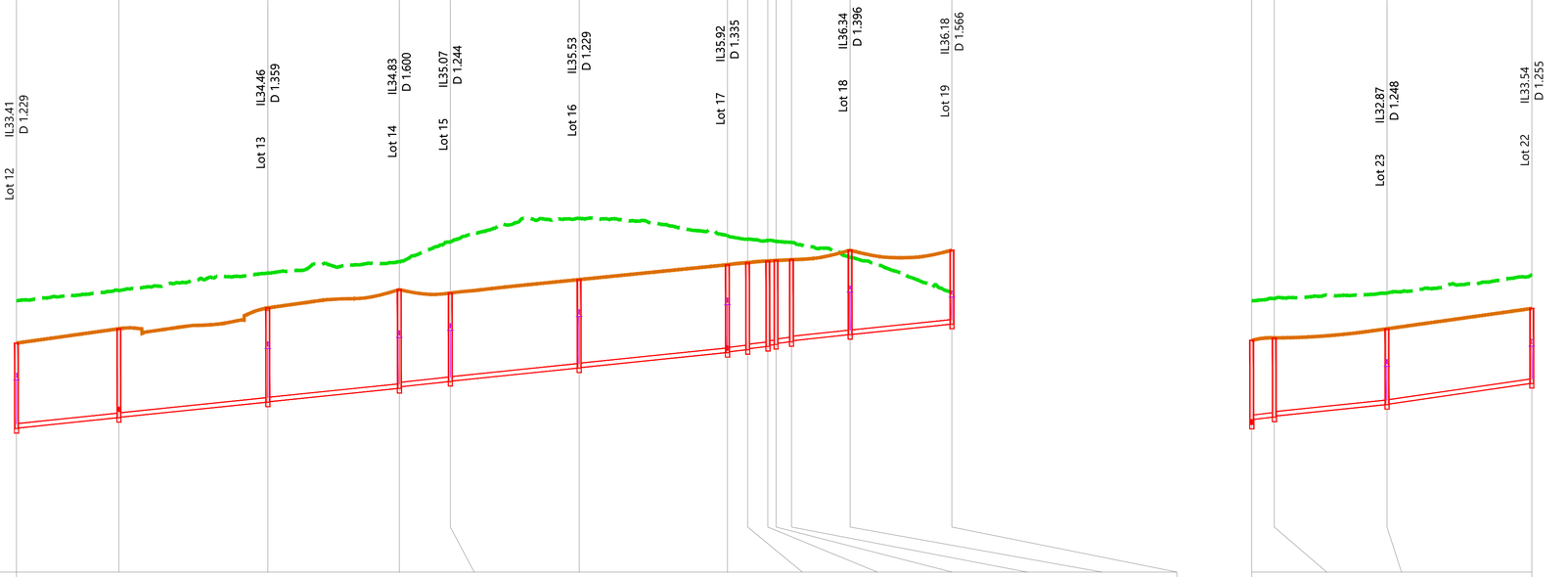

PROPERTY DESCRIPTION	NEW ROAD 02 (RESERVE)													NEW ROAD 02 (RESERVE)		
PIPE SIZE (mm), CLASS	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8	DN150 uPVC SN8
GRADE (1 IN X) CTR - CTR	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 100	1 IN 71
LENGTH	34.204	49.684	43.902	17.027	43.004	49.492	6.752	6.740	2.728	5.156	19.558	33.980		7.529	37.611	48.348
EMBEDMENT TYPE	4	4	4	4	4	4	4	4	4	4	4	4		4	4	4
PIPE GRADE (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%		1.000%	1.000%	1.418%
DEPTH TO INVERT	2.853 2.833	2.971 2.951	3.150 3.130	3.303 3.243	2.956 2.936	2.955 2.935	2.935 2.905	2.906 2.866	2.856 2.816	2.809 2.769	2.743 2.703	2.821 2.811	2.472	2.806 2.640	2.645 2.605	2.534 2.514	2.506
INVERT LEVEL	31.787 31.807	32.149 32.169	32.666 32.686	33.125 33.185	33.355 33.375	33.805 33.825	34.320 34.350	34.417 34.457	34.525 34.565	34.592 34.632	34.684 34.724	34.919 34.929	35.269	30.927 31.093	31.168 31.208	31.584 31.604	32.290
FINISHED SURFACE LEVEL	34.640	35.120	35.816	36.428	36.311	36.760	37.255	37.324	37.381	37.401	37.427	37.741	37.741	33.733	33.813	34.118	34.796
EXISTING SURFACE LEVEL	36.053	36.390	36.983	37.340	38.019	38.804	38.230	38.108	38.064	38.038	38.002	37.511	36.321	35.054	35.127	35.311	35.916
CHAINAGE	1485.023	1519.227	1568.912	1612.814	1629.841	1672.845	1722.336	1729.088	1735.828	1738.556	1743.712	1763.270	1797.250	0.000	7.529	45.140	93.488

GRAVITY LINE — S1 — S2

RIGSS STRUCTURE TYPES	
P3A	1050mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
P3B	1200mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1

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ISSUE	DESCRIPTION	AUTHOR	DATE
01	FOR DA APPROVAL	IG	29.09.25

29/Sep/2025 12:35 PM

STATUS: FOR DA APPROVAL — NOT FOR CONSTRUCTION

R.P.E.Q No : CERTIFIED

HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS — 59 Anderson Street, Fortitude Valley QLD 4006 — JENSEN BOWERS

SCALE: HORIZ 1:1000 (10 0 10 20 30 40 50) 1:1000 (A1) - 1:2000 (A3); VERT 1:100 (1 0 1 2 3 4 5) 1:100 (A1) - 1:200 (A3)

CLIENT: NORHART — 24 Cansdale Street, Yeronga QLD 4104

ARCHITECT:

MICHAEL BALE & ASSOCIATES
Structural and Civil Engineering Consultancy
Level 3, 18 Orchid Avenue,
Surfers Paradise
PO BOX 1715, Surfers Paradise 4217
Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE: FLAGSTONE INDUSTRIAL PARK 820 GREENBANK ROAD NORTH MACLEAN

DRAWING TITLE: SEWER LONGITUDINAL SECTIONS SHEET 4 OF 6

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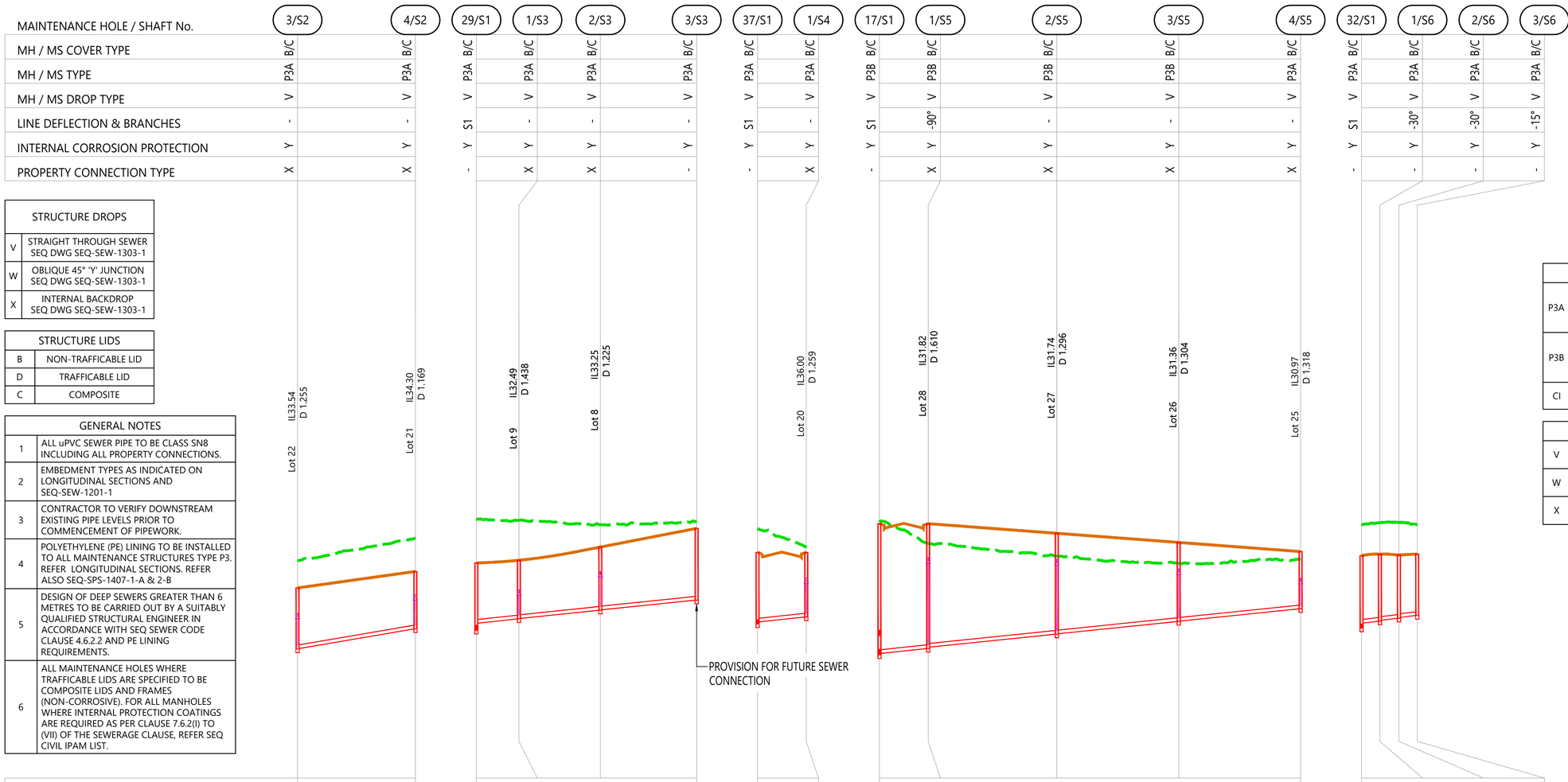
DRAWING No.	PROJECT No.	REVISION
DA15 -	G24079	- 01



STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
B	NON-TRAFFICABLE LID
D	TRAFFICABLE LID
C	COMPOSITE

GENERAL NOTES	
1	ALL uPVC SEWER PIPE TO BE CLASS SN8 INCLUDING ALL PROPERTY CONNECTIONS.
2	EMBEDMENT TYPES AS INDICATED ON LONGITUDINAL SECTIONS AND SEQ-SEW-1201-1
3	CONTRACTOR TO VERIFY DOWNSTREAM EXISTING PIPE LEVELS PRIOR TO COMMENCEMENT OF PIPEWORK.
4	POLYETHYLENE (PE) LINING TO BE INSTALLED TO ALL MAINTENANCE STRUCTURES TYPE P3. REFER LONGITUDINAL SECTIONS. REFER ALSO SEQ-SPS-1407-1-A & 2-B
5	DESIGN OF DEEP SEWERS GREATER THAN 6 METRES TO BE CARRIED OUT BY A SUITABLY QUALIFIED STRUCTURAL ENGINEER IN ACCORDANCE WITH SEQ SEWER CODE CLAUSE 4.6.2.2 AND PE LINING REQUIREMENTS.
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RIGSS STRUCTURE TYPES	
P3A	1050mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
P3B	1200mm DIA. PRE-CAST MAINTENANCE HOLE WITH CONVERSION SLAB AND PRE-CAST BASE. INSTALL DUCTILE IRON COVER SEQ STD DWG SEQ-SEW-1300-1
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1

| | | |

MAINTENANCE HOLE / SHAFT No.	3/S6	4/S6
MH / MS COVER TYPE	B/C	B/C
MH / MS TYPE	P3A	P3A
MH / MS DROP TYPE	V	V
LINE DEFLECTION & BRANCHES	-15°	-
INTERNAL CORROSION PROTECTION	Y	Y
PROPERTY CONNECTION TYPE	'	'

STRUCTURE DROPS	
V	STRAIGHT THROUGH SEWER SEQ DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ DWG SEQ-SEW-1303-1

STRUCTURE LIDS	
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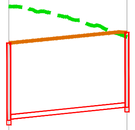
CI	1500mm DIA. CAST-INSITU MAINTENANCE HOLE AND CAST-INSITU BASE. INSTALL DUCTILE IRON COVER

PROPERTY CONNECTION TYPES	
V	STRAIGHT THROUGH SEWER SEQ STD DWG SEQ-SEW-1303-1
W	OBLIQUE 45° 'Y' JUNCTION SEQ STD DWG SEQ-SEW-1303-1
X	INTERNAL BACKDROP SEQ STD DWG SEQ-SEW-1303-1



PROVISION FOR FUTURE SEWER RISING MAIN CONNECTION

PROPERTY DESCRIPTION		NEW ROAD 03
PIPE SIZE (mm), CLASS		DN150 uPVC SN8
GRADE (1 IN X) CTR - CTR		1 IN 100
LENGTH		38.564
EMBEDMENT TYPE		4
PIPE GRADE (%)		1.000%
DEPTH TO INVERT	2.522 / 2.482	2.444
INVERT LEVEL	32.665 / 32.705	33.091
FINISHED SURFACE LEVEL	35.187	35.535
EXISTING SURFACE LEVEL	36.388	35.386
CHAINAGE	22.841	61.405

GRAVITY LINE S6

ALTERNATIVELY REHAU AWASHAFT MAY BE UTILISED TO A MAXIMUM DEPTH OF 6.0m FOR SEWER STRUCTURES

ISSUE	DESCRIPTION	AUTHOR	DATE
01	FOR DA APPROVAL	IG	29.09.25

29/Sep/2025 12:35 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

SCALE
HORIZ 1:1000 — 10 0 10 20 30 40 50
1:1000 (A1) - 1:2000 (A3)
VERT 1:100 — 1 0 1 2 3 4 5
1:100 (A1) - 1:200 (A3)

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

ARCHITECT

MICHAEL BALE & ASSOCIATES
Structural and Civil Engineering Consultancy
Level 3, 18 Orchid Avenue,
Surfers Paradise
PO BOX 1715, Surfers Paradise 4217
Ph: **07 5538 0431**
mail@michaelbale.com.au

PROJECT TITLE:
FLAGSTONE INDUSTRIAL PARK
820 GREENBANK ROAD
NORTH MACLEAN

DRAWING TITLE:
SEWER
LONGITUDINAL SECTIONS
SHEET 6 OF 6

NOTES:
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DRAWING No.	PROJECT No.	REVISION
DA17 -	G24079 -	01

NOTES / WARNINGS

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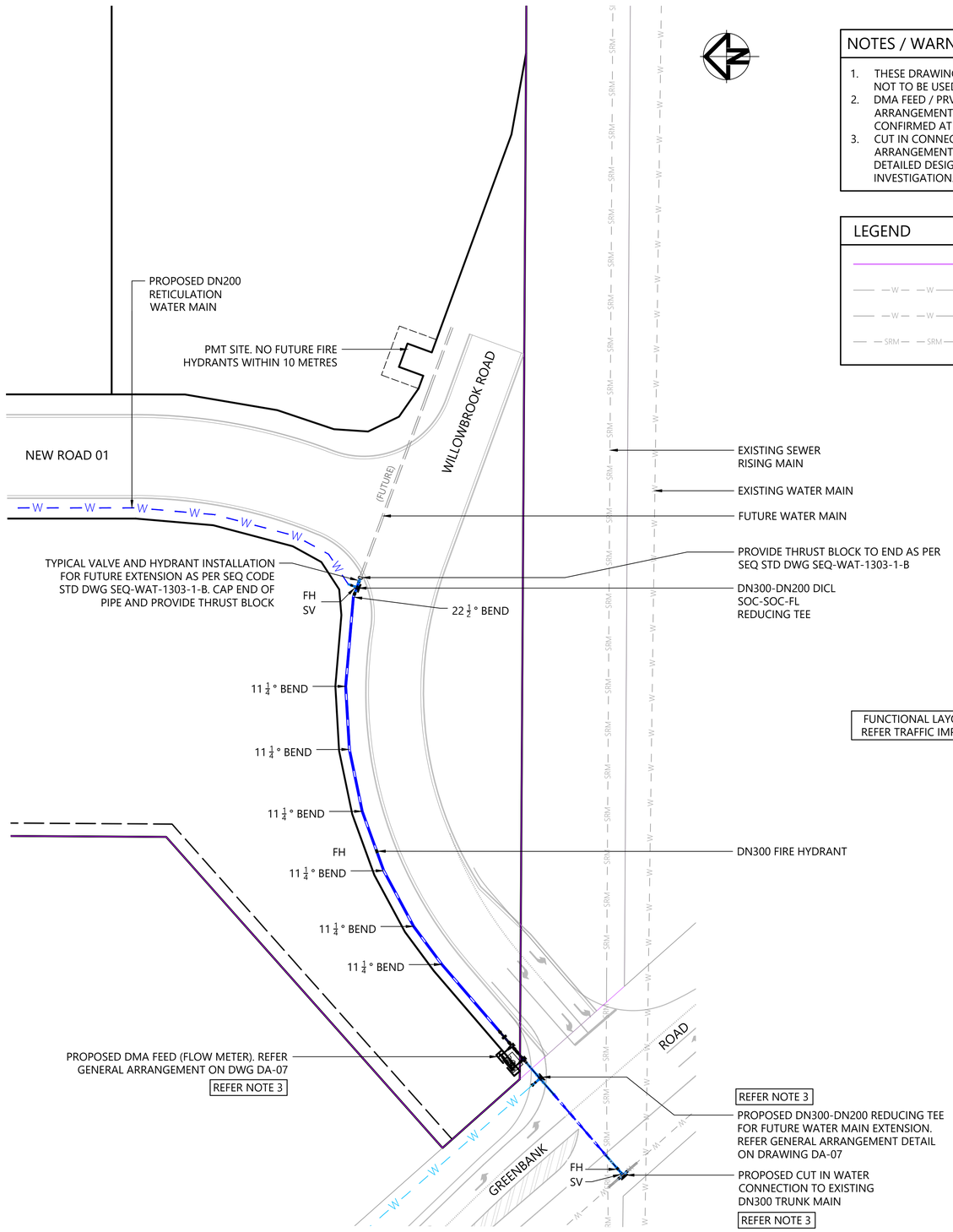
2. DMA FEED / PRV AND FLOW METER GENERAL ARRANGEMENT SHOWN ONLY. FINAL DETAILS TO BE CONFIRMED AT DETAILED DESIGN.
3. CUT IN CONNECTION AND OFFTAKE TEE ARRANGEMENT SHOWN INDICATIVELY. SUBJECT TO DETAILED DESIGN AND FURTHER SERVICES INVESTIGATION.

LEGEND

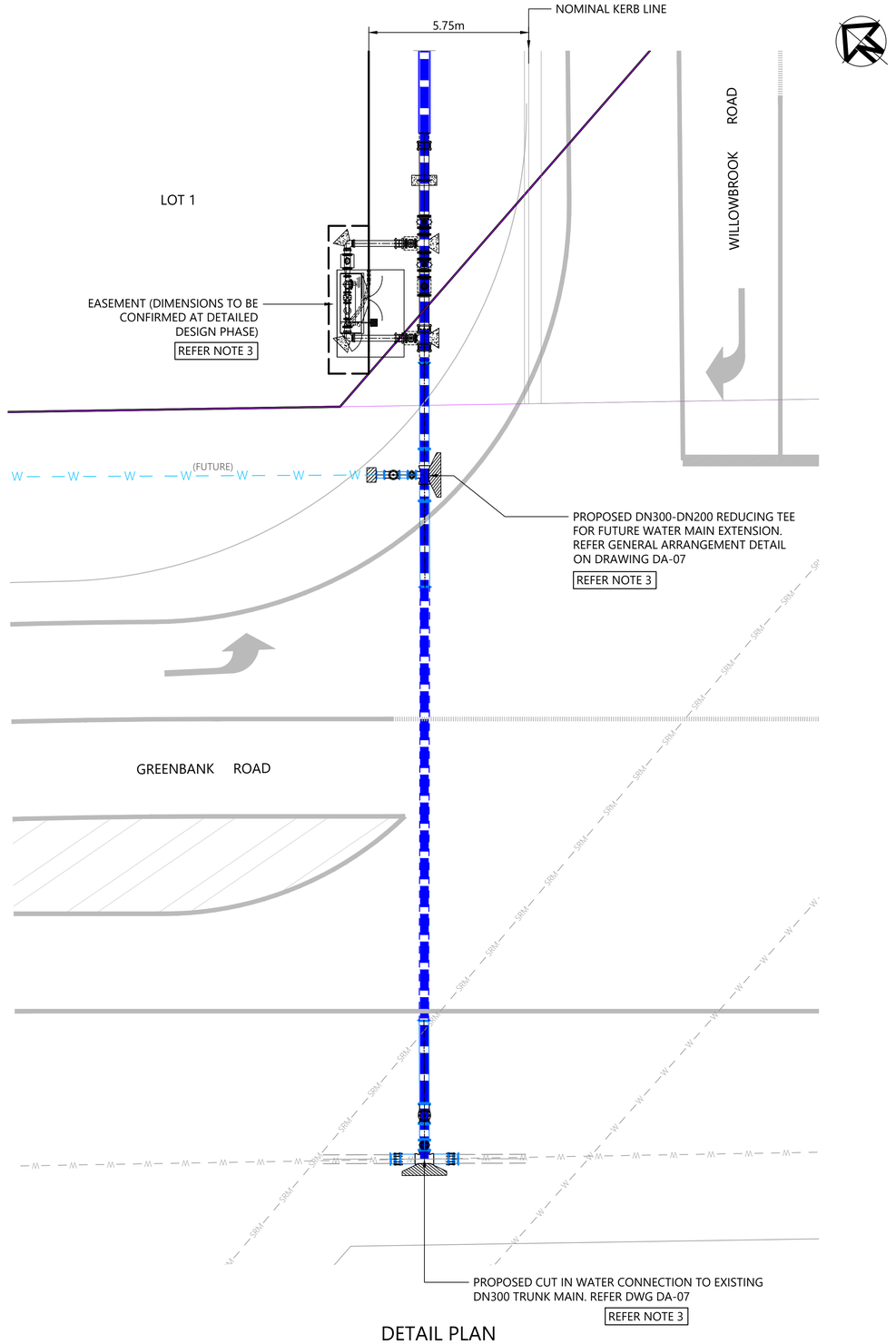
- SITE BOUNDARY
- EX. WATER (GREENBANK RD)
- EX. WATER MAIN (WILLOWBROOK RD)
- EX. SEWER RISING MAIN



FUNCTIONAL LAYOUT OF INTERSECTION UPGRADE
REFER TRAFFIC IMPACT ASSESSMENT 25-670 BY PTT

PRELIMINARY TRUNK WATER LAYOUT PLAN

SCALE 1:500



DETAIL PLAN

SCALE 1:100

ISSUE	DESCRIPTION	AUTHOR	DATE
01	FOR DA APPROVAL	IG	29.09.2025

29/Sep/2025 4:46 PM

STATUS: FOR DA APPROVAL
NOT FOR CONSTRUCTION

R.P.E.Q No :		CERTIFIED	
HEIGHT DATUM	AHD	DESIGNER	IG
GRID	LOCAL	CHECKER	MB
ORIGINAL SIZE	A1	APPROVER	MB

SURVEYOR: JENSEN BOWERS
59 Anderson Street
Fortitude Valley QLD 4006
JENSEN BOWERS

SCALE 1:100 (1:100 (A1) - 1:200 (A3))
SCALE 1:500 (1:500 (A1) - 1:1000 (A3))

CLIENT: NORHART
24 Cansdale Street
Yeronga QLD 4104

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FLAGSTONE INDUSTRIAL PARK
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NORTH MACLEAN

DRAWING TITLE:
PRELIMINARY TRUNK WATER LAYOUT PLAN

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DRAWING No.	PROJECT No.	REVISION
DA18	G24079	01