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MNCE Ref: C3602

SITE BASED STORMWATER MANAGEMENT PLAN

41 Glenbrook Drive, Nambour

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REPORT CONTROL SHEET

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1 INTRODUCTION

1.1 Overview and Background

A development application has been approved with conditions for the reconfiguration of Lot 2 SP273404 at 41 Glenbrook Drive, Nambour (Council Reference RAL19/0005). This report has been updated to address condition 30(a)(ii) of negotiated decision notice RAL19/0005.

The site is located within the Sunshine Coast Council local government area and has a total area of approximately 9.3ha. Figure 1.1 below provides an aerial locality of the site and adjacent areas.

Figure 1.1: Subject Site bound by Glenbrook Drive to the north, Strathford Avenue to the east and Nichols Street to the south (SC MyMaps-2017 Aerial)

The proposed development involves a residential subdivision resulting in 53 residential lots between 600m^2 and 7700m^2. Refer Appendix A for proposed development layout.

The site predominantly falls in a northerly direction and demonstrates a mean grade of approximately 15%. Council's as constructed stormwater drainage mapping suggests

that municipal stormwater drainage infrastructure headwalls into upstream end of the site and collector infrastructure is located towards the northern section of Strathford Avenue which conveys flows northwards towards Glenbrook Drive. This is the major Legal Point of Discharge (LPD) for the site.

The west part of the site discharges to the existing overland flow path located within the adjacent west properties of Lot 3 on RP226783 and Lot 4 on RP226783 which front the western boundary of the site. This overland flow path is the second Legal Point of discharge (LPD) for this part of the site.

There is a crest which runs off the end of Nichols Street that also creates a section of the site that flows to the south-west and discharges to adjacent lots in this area.

Refer Figure 1.2 below for as-constructed stormwater mapping.

Figure 1.2: Sunshine Coast Council Stormwater Infrastructure Mapping (MyMaps)

Following a review of Council's Stormwater Network Infrastructure Plan Mapping, it is noted that a future municipal stormwater quality treatment device is proposed within the subject site, refer Figure 1.3 below. It is understood that this infrastructure involves the implementation of a gross pollutant trap, however the location of this device is located on a ridge line and therefore details concerning the purpose of this device is unclear. As a result, this device has not been considered as part of the stormwater assessment of the site and it is requested that Council provide further details on the purpose of this device if it is required to be incorporated into the proposed development.

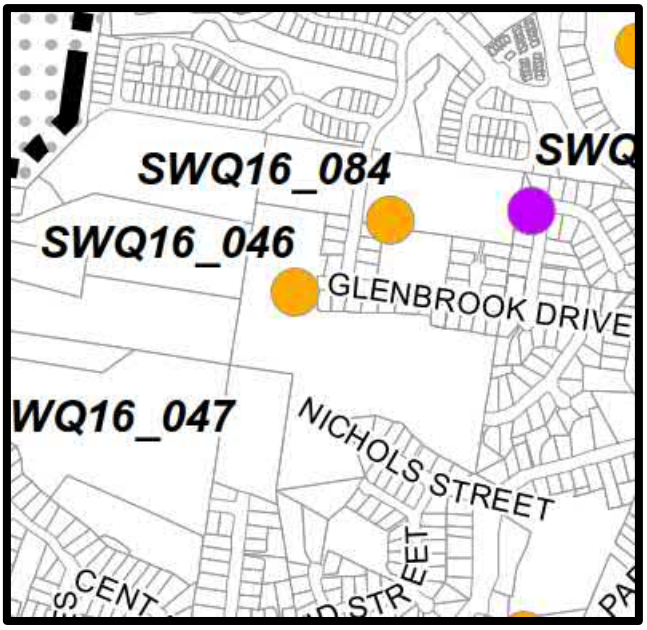


Figure 1.3: Sunshine Coast Council LGIP Mapping – Stormwater Network

1.2 Objectives and Scope

Milanovic Neale Consulting Engineers (MNCE) have been commissioned by Parker Property Ningi Pty Ltd to undertake an assessment of stormwater quality and quantity impacts associated with the proposed development. Stormwater management strategies are also to be identified for the proposed development as required.

The scope of works undertaken for this project is summarized below:

1. Assessment of the development against State and Local Government legislation to identify water quality management measures to be adopted for the proposed development.

2. Undertake pollutant export modelling of anticipated pre and post development pollutant concentrations and loads and conceptual design of water quality improvement devices.

3. Assessment of the pre and post development stormwater discharge and undertake preliminary design and commentary of any mitigation devices required to control site discharge if required.

Part of this assessment will also involve the implementation of the following amendments to the previous Stormwater Management Plan referenced in the conditions package. These amendments have been made at the request of Council:

30.(a)ii. Identify the emergency spillway for combined Basin 1 demonstrating constructability and functionality. Include stage vs discharge and stage vs storage relationship.

Refer Section 5.7, Section 6 and Appendix A for further details.

30.(a)iii. Identify pits and pipes for stormwater drainage system in the proposed drainage easements and drainage reserves.

Refer Appendix A for further details.

30.(a)iii. Include stormwater drainage layout plan in the report.

Refer Appendix A for further details.

2 DATA

2.1 State and Local Government Policies

The *Queensland Urban Drainage Manual (QUDM), the Urban Stormwater Quality Planning Guidelines 2010, the State Planning Policy – July 2017 and the Planning Scheme Policy for development works* from the *Sunshine Coast Planning Scheme 2014* have been used as a guide to establish the required stormwater objectives and requirements for the development.

2.2 Level and Modelling Data

Contour information for the site was obtained from survey data prepared by ONF Surveyors which comprise surface level contours at 1.0m intervals.

Rainfall data for the Nambour Region was extracted from AR&R 2016 through the IFD tool on the Bureau of Meteorology website.

The *Queensland Urban Drainage Manual (QUDM)*, *Australian Rainfall and Runoff 2016* and the *MUSIC Modelling Guidelines 2010* have been used as a guide to establish the modelling inputs and methodologies applicable for the development.

3 OPPORTUNITIES AND CONSTRAINTS

3.1 Site Opportunities

Currently there are no stormwater quality measures on site, thus there are some opportunities to improve the quality of the stormwater leaving the site before discharge through stormwater treatment devices. Significant drainage reserve areas have been dedicated within the proposed lot layout, meaning space for above ground treatment and detention can be provided.

3.2 Site Constraints

The primary constraints associated with the proposed development of the subject site are as follows;

1. The topography of the existing site is extremely steep in places and consideration will have to be given as to how major flows will drain through the site upon development. Several drainage easements are to therefore be dedicated within the proposed lot layout to convey inter-allotment and external catchment runoff to the legal points of discharge.

2. Under existing conditions, a significant ridgeline splits the site from the south in a north in a westerly direction off the end of Nichols Street. This topographical feature limits the available developable land and therefore promotes significant free drain areas which cannot be captured, treated and conveyed to a lawful point of discharge. Additional treatment and detention measures will therefore be required to account for uncontrolled site runoff. Further, no existing stormwater infrastructure is located to the west of the existing ridgeline, controlled developed flows within this area will consequently be discharged to surface towards an existing overland flow path which runs adjacent to the site's western boundary.

3. In order for the proposed development to satisfy maximum lot and access gradients, a significant degree of earthworks will be required in order to address the aforementioned topographical constraints. Large scale retaining wall solutions may be required in order to satisfy design objectives, although efforts will be made to minimise the extent of retaining where possible.

4 WATER QUALITY MANAGEMENT

This section of the report will provide an assessment of the development against State and Local Government legislation to identify water quality management measures to be adopted for the proposed development.

Pollutant export modelling will also be undertaken of anticipated pre-and post-development pollutant concentrations and loads and conceptual design of water quality improvement devices.

4.1 Risk Category

The *Planning Scheme Policy for development works* from the *Sunshine Coast Planning Scheme 2014* identifies triggers for the application of stormwater quality design objectives:

1. Material Change of Use for urban purposes that involves a lot size greater than 2,500m^2
2. Material Change of Use for industrial purpose that involves a lot size greater than 850m^2
3. Reconfiguring a Lot that includes a new road.

With respect to the above, the Policy can be applied to the lot reconfiguration component of the site due to point 3 being triggered. The development is in excess of 20 lots and is thus not within the allowable parameters for the implementation of Deemed to Comply Solutions. In order to demonstrate required stormwater quality objectives are achieved, pollutant export modelling will be incorporated in the design of stormwater quality treatment train for the site.

4.2 Water Quality Objectives

4.2.1 Construction Phase

The *Urban Stormwater Quality Guidelines 2010* identify that eroded soils and litter are major pollutant sources during construction activity. There is also potential for hydro-modification of streams due to increased run-off coefficients when subsoils are exposed, for longer term major developments. Water sensitive urban design principles and reducing erosion during construction are fundamental to achieving water quality objectives in relevant waterways.

It is therefore proposed to prepare an erosion and sediment management plan during the operational works phase of the development which will incorporate a range of control measures to be implemented during the construction phase of the project.

4.2.2 Operational Phase

Stormwater quality management design objectives for the operational phase of the development are identified in the following table in accordance with the *Urban Stormwater Quality Guidelines 2010.* These objectives provide an emphasis on the reduction of mean annual loadings associated with suspended sediments and nutrients.

Table 4.1: Stormwater Quality Objectives

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

4.3 Pollutant Export Modelling

4.3.1 Model Selection

In order to determine on site pollutant generation, discharge concentrations of target pollutants and the effectiveness of Stormwater Quality Improvement Devices the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) has been used to model the development proposal.

4.3.2 MUSIC Model Configuration

The following sections identify the modelling parameters used in the configuration of the MUSIC Model adopted for the development. The following figure provides a screenshot of the MUSIC model schematic for reference. Refer Appendix C for associated MUSIC model catchment plan.

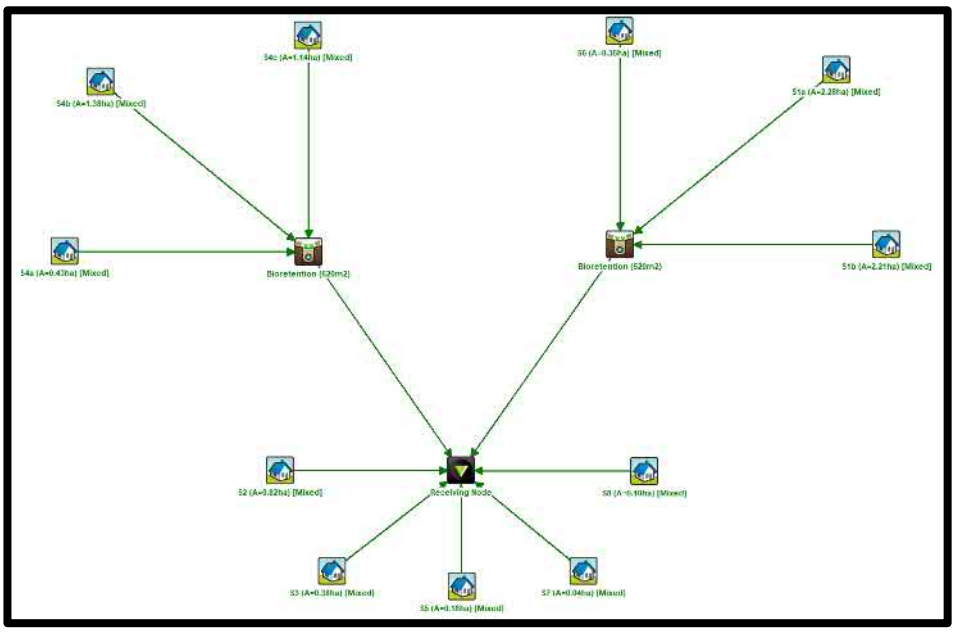


Figure 4.1: MUSIC Model Layout

4.3.2.1 Meteorological and Time Step

Meteorological Data used in the MUSIC model has been identified in accordance with the *MUSIC Modelling Guidelines 2010*, incorporating the following parameters:

Rainfall Period: 01/01/1989 12:00 AM to 31/12/1998 11:54 PM

Rainfall Station: 40282 NAMBOUR

A model time step of 6 minutes has also been adopted as recommended in Section 3.2 of the *MUSIC Modelling Guidelines 2010.*

4.3.2.2 Catchment Properties

The MUSIC model for the development adopts a lumped catchment approach, whereby the site has been broken down into a number of catchments with site specific land uses and their respective areas, in accordance with Table 3.6 in the MUSIC Modelling Guidelines. Table 4.2 provides a summary of the catchment data used in the MUSIC analysis. The location and extent of each of these catchment areas are identified within the developed stormwater management catchment plan in Appendix B.

Table 4.2: MUSIC Catchment Parameters

Catchment Name	Area (ha)	Fraction Impervious (%)	MUSIC Source Node
S1a	2.28	45	Residential
S1b	2.21	45	Residential
S2	0.82	0	Residential
S3	0.38	0	Residential
S4a	0.43	45	Residential
S4b	1.38	45	Residential
S4c	1.14	45	Residential
S5	0.18	45	Residential
S6	0.35	45	Residential
S7	0.04	90	Residential
S8	0.10	0	Residential

4.3.2.3 Rainfall Runoff Parameters

The following table provides a summary of the rainfall runoff parameters adopted for the source nodes used in the MUSIC analysis which has been extracted from Table 3.7 of the *MUSIC Modelling Guidelines 2010.*

Table 4.3: MUSIC Source Node Base and Storm Flow Concentration Parameters

Land Use	Parameter	Total Suspended Solids (Log_{10} mg/L)		Total Phosphorus (Log_{10} mg/L)		Total Nitrogen (Log_{10} mg/L)	
Urban Residential	Mean	1.0	2.18	-0.97	-0.47	0.20	0.20
	Std Deviation	0.34	0.39	0.31	0.32	0.26	0.23

4.3.2.4 Pollutant Export Parameters

The following table provides a summary of the pollutant export parameters for split catchment surface types which have been adopted for the source nodes used in the MUSIC analysis. This information has been extracted from Table 3.8 of the *MUSIC Modelling Guidelines 2010.*

Table 4.4: MUSIC Catchment Parameters

Parameter	Quantity
Rainfall Threshold (mm)	1
Soil Storage Capacity (mm)	500
Initial Storage (%)	10
Field Capacity (mm)	200
Infiltration Capacity Coefficient a	211
Infiltration Capacity Coefficient b	5
Daily Recharge Rate (%)	28
Daily Base-Flow Rate (%)	27
Daily Seepage Rate (%)	0

4.3.3 Developed Unmitigated Conditions

MUSIC Modelling has been performed to determine the pollutant export and corresponding concentrations from the development site under the proposed conditions. The mean annual loads that have been estimated for proposed unmitigated conditions are given in Table 4.5 below, also shown are the mean annual load percentage reductions required to meet current State Planning Policy objectives.

Table 4.5: MUSIC Unmitigated Mean Annual Loads (kg/yr)

Pollutant	Unmitigated Mean Annual Load (kg/yr)	Reduction required to meet Council Requirements (%)
Total Suspended Solids (TSS)	16600	80
Total Phosphorous (TP)	34	60
Total Nitrogen (TN)	171	45
Gross Pollutants (GP)	1760	90

Refer Appendix C for MUSIC summary report.

4.3.4 Developed Mitigated Conditions

The scale of the development is large enough to support the implementation of effective water quality design measures. Therefore, a consideration of a variety of best management measures has been given with a focus on water quality treatment measures and reducing polluted runoff volumes from the site.

Key elements of the proposed stormwater management plan are as follows:

- A bioretention basin with a surface area of 620m^2 is to be constructed at the north western corner of the site, integrated into the base of the proposed detention basin (see Section 5 below), to treat runoff associated with developed catchments S4A, S4B and S4C.
- A bioretention basin with a surface area of 520m^2 is to be constructed to the north east of the site, integrated into the base of the proposed detention basin (see Section 5 below), to treat runoff associated with developed catchments S1A, S1B and S6.
- Developed catchments S2, S3, S5, S7 and S8 are to free drain.
- Key bio retention basin parameters include:
  - Extended detention depth of 300mm
  - Saturated conductivity of 200 mm/hr
  - Filter depth of 600mm
  - TN content of 400 mg/kg
  - Orthophosphate content of 30 mg/kg
  - A sediment forebay on the inlet side of the basin

The table below demonstrates that the required pollutant reductions have been achieved through the implementation of the proposed stormwater treatment train.

Table 4.6: MUSIC Model Removal Efficiencies

Pollutant	Unmitigated Mean Annual Load (kg/yr)	Mitigated Mean Annual Load (kg/yr)	Reduction required to meet Council Requirements (%)	Removal Efficiency Achieved (%)
Total Suspended Solids (TSS)	16600	3250	80	80.4
Total Phosphorous (TP)	34	8.96	60	73.7
Total Nitrogen (TN)	171	83.6	45	51.2
Gross Pollutants (GP)	1760	45.4	90	97.4

5 WATER QUANTITY MANAGEMENT

This section of the report will provide an assessment of the pre and post development stormwater discharge and undertake preliminary design and commentary of any mitigation devices required to control site discharge.

5.1 Existing Conditions

This section of the report will analyse and comment on the existing site stormwater discharge conditions. The XP-RAFTS modelling software, utilising the Laurenson Routing Method will be used to generate the hydrographs and peak flows from the site for all storm events up to an including the 1% AEP storm event.

5.2 Existing Hydrologic Model

5.2.1 Catchment Definition

An examination of the existing site land topography and land use was undertaken to quantify the number of sub catchments and sub catchment areas applicable for the site. A total of 7 sub catchments were established, which consist of 3 external sub catchments which drain through the site and 4 internal sub catchments. Catchment areas internal to the existing site were defined in accordance with existing topographical features and associated runoff regimes. Refer Appendix B for existing site catchment plan.

Existing internal sub catchment areas were considered to be fully pervious as the existing site is vacant and entirely vegetated. External sub catchment areas to the south of the site (E1 & E2) were assigned a fraction impervious value of 45% which is considered reasonable for low density residential areas with an average lot size greater than 750m^2. A fraction impervious value of 20% was attributed to the external sub catchment area to the west of the site (E3) which is considered to appropriately represent impervious roof and hardstand coverage.

Refer Table 5.1 on the following page for existing site catchment details and Appendix B for existing catchment plan. The catchment roughness for pervious and impervious areas has been defined using a manning's 'n' value of 0.05 and 0.015. Catchment slopes have been determined upon review of a site survey documented by ONF Surveyors on 7th of August 2018.

Table 5.1: Catchment Data Summary Table

Catchment	Area (ha)	Impervious (%)	Slope (%)
E1	3.92	45	20
E2	0.15	45	8
E3	0.33	20	15
S1	5.05	0	15
S2	1.42	0	17
S3	2.12	0	17
S4	0.71	0	10

5.2.2 Rainfall Parameters and Losses

As indicated in Section 2.2 above, Rainfall data for the Nambour Region has been extracted from AR&R 2016 through the IFD tool on the Bureau of Meteorology website.

The uniform loss method was adopted to account for rainfall losses throughout the existing catchment. The previous Stormwater Management Plan by MNCE provided an initial loss value of 20mm which is believed to be appropriate and consistent with urban areas in South East Queensland and in particular for the subject site which has a large gradient. Council have requested however as a condition of the decision notice for an initial loss value for pervious areas of 40mm to be adopted. To comply with Council's requirement, the loss model has been therefore amended accordingly. Initial and continuing loss coefficients adopted for the impervious and pervious sub catchments have been tabulated below.

Table 5.2: Initial and Continuing Loss Parameters

Parameter	Value (mm)
Initial Loss (Impervious)	1.0
Initial Loss (Pervious)	40.0
Continuing Loss (Impervious)	0
Continuing Loss (Pervious)	2.4

Temporal patters applicable to East Coast North have been adopted in accordance with the *Australian Rainfall and Runoff, 2016*.

5.2.3 Existing Hydrological Results

The following table provides a summary of the peak discharge from the existing site that was estimated by the XP-RAFTS model for all storm events up to and including the 1% AEP storm event.

Table 5.3: Existing Site Peak Discharges

Storm Event	XP-RAFTS Western Flows Peak Runoff (m^3/s)	XP-RAFTS Eastern Flows Peak Runoff (m^3/s)
63% AEP	0.277	0.603
39% AEP	0.500	1.191
10% AEP	0.741	1.899
5% AEP	1.139	2.548
2% AEP	1.166	3.277
1% AEP	1.340	3.868

5.2.4 Runoff Comparison

QUDM Section 4.1.3 recommends hydrologic models are calibrated with actual flow data rather than to an alternate runoff routing model. In the absence of such data, Section 4.1.3 continues to state that as an alternative, model results may be compared with the results to a Rational Method peak discharge for catchments less than 500ha.

Based on the methods outlined in *QUDM*, the following parameters were used to estimate the peak runoff from the upstream catchment affecting the site. Refer Appendix E for detailed rational method calculation summary.

Table 5.4: Rational Method Parameters

Direction of Flow	Area (ha)	Runoff Coefficient (C10)	Time of Concentration (mins)
West	4.025	0.71	18
East	9.680	0.72	18

It is to be noted that the time of concentration for western flows (sub catchments E2, E3, S2 and S3) has been derived based on the combined application of Friend's Equation and Manning's Equation which is relative to the measured distance of overland sheet flow travel associated with sub catchment S2 and the length and profile of the collecting creek which runs adjacent to the site's western boundary. Refer Appendix B for existing catchment plan.

The time of concentration attributed to eastern flows (sub catchments E1, S1 and S4) is a product of Standard Inlet times and Friend's Equation.

The following table provides a comparison of the results of both the Rational Method and XP-RAFTS Model results for peak discharges up to and including the 1% AEP storm event.

Table 5.5: Existing Site Western Flow Peak Discharge Comparison

Storm Event	XP-RAFTS Western Flows Peak Runoff (m^3/s)	Rational Method Western Flows Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.277	0.488	0.211	43
39% AEP	0.500	0.647	0.147	23
10% AEP	0.741	1.065	0.741	30
5% AEP	1.139	1.275	0.139	11
2% AEP	1.166	1.606	0.440	27
1% AEP	1.340	1.846	0.340	27

Table 5.6: Existing Site Eastern Flow Peak Discharge Comparison

Storm Event	XP-RAFTS Eastern Flows Peak Runoff (m^3/s)	Rational Method Eastern Flows Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.603	1.206	0.603	50
39% AEP	1.191	1.597	0.406	25
10% AEP	1.899	2.629	0.730	28
5% AEP	2.548	3.149	0.601	19
2% AEP	3.277	3.964	0.687	17
1% AEP	3.868	4.557	0.689	15

As can be seen above, the Laurenson Routing Method established from the XP-RAFTS model generates peak flows that are different by up to 50% to what is estimated by the Rational Method. This is envisaged as a result of the change in initial loss value to 40mm required by Council as noted in Section 5.2.2 above. The consequence of this change in loss value has therefore resulted in a larger deviation away from Rational Method estimates in comparison to the original modelling proposed by Milanovic Neale Consulting Engineers, which had a typical similarity of 7%. Since the loss value has been amended as a requirement of Council, it is assumed that the XP-RAFTS peak flows are acceptable to Council despite the large differences in comparison to the Rational Method.

5.3 Developed Conditions

This section of the report will analyse and comment on the developed site stormwater discharge conditions. The XP-RAFTS modelling software, utilising the Laurenson Routing Method will be used to generate the hydrographs and peak flows from the site for all storm events up to an including the 1% AEP storm event.

5.4 Developed Unmitigated Model

5.4.1 Catchment Definition

An examination of the developed site land topography and land use was undertaken to establish the quantity of sub catchments applicable to the proposed development. A total of 14 sub catchments were established, which consist of 3 external sub catchments which drain towards the site and 11 internal sub catchments. Catchment areas internal to the developed site were defined in accordance with proposed development topography and associated runoff regimes. Refer to proposed earthworks plans by MNCE for developed site topography and Appendix B for developed site catchment plan.

Proposed internal sub catchment areas S1a, S1b, S4a, S4b, S5, S6 and S7 were assigned a fraction impervious value of 45% which is considered reasonable for low density residential areas with a minimum lot size of 600m^2. A fraction impervious value of 90% was attributed to sub catchment area S4c to account for the road reserve. Internal, landscaped, sub catchment area's S2, S3 and S8 were considered to be fully pervious. External sub catchment parameters were retained as per existing conditions.

Refer Table 5.7 on the following page for developed site catchment details, where proposed catchment slopes have been estimated from proposed earthworks plans by MNCE. A catchment plan representative of developed site conditions can be found in Appendix B.

Table 5.7: Catchment Data Summary Table

Catchment	Area (ha)	Impervious (%)	Slope (%)
E1	3.95	45	20
E2	0.12	45	8
E3	0.33	20	15
S1a	2.28	45	25
S1b	2.21	45	10
S2	0.82	0	25
S3	0.38	0	30
S4a	0.43	45	8
S4b	1.38	45	10
S4c	1.14	45	10
S5	0.18	45	15
S6	0.35	45	9
S7	0.04	90	10
S8	0.10	0	25

5.4.2 Rainfall Parameters and Losses

Rainfall Parameters and Losses have been adopted in accordance with Section 5.2.2 of this report.

5.4.3 Developed Hydrological Results

The following table provides a summary of the peak discharge from the developed site that was estimated by the XP-RAFTS model for all storm events up to and including the 1% AEP storm event.

Table 5.8: Developed Site Peak Discharges

Storm Event	XP-RAFTS Western Flows Peak Runoff (m^3/s)	XP-RAFTS Eastern Flows Peak Runoff (m^3/s)
63% AEP	0.619	1.311
39% AEP	0.750	1.618
10% AEP	1.198	2.553
5% AEP	1.515	2.921
2% AEP	1.942	3.680
1% AEP	2.255	4.366

5.4.4 Runoff Comparison

As noted in Section 5.2.4 of this report, a comparison between the XP-RAFTS discharge and Rational Method peak discharge is recommended to be undertaken by *QUDM*.

Based on the methods outlined in *QUDM*, the following parameters were used to estimate the peak runoff from the upstream catchment affecting the site. Refer Appendix E for detailed rational method calculation summary.

Table 5.9: Rational Method Parameters

Runoff Regime	Area (ha)	Runoff Coefficient (C10)	Time of Concentration (mins)
Controlled East S1a, S1b, S6, E1	8.275	0.75	15
Free Drain East S5, S7	0.220	0.75	5
Controlled West S4a, S4b, S4c, E2	3.070	0.78	13
Free Drain West S2, S3, S8, E3	1.630	0.71	18

It is to be noted that the time of concentration for all internal sub catchments, with the exception of S2, S3 and S8, and external catchments E1 and E2 have been defined in accordance with Standard Inlet Times. Sub catchments S2, S3 and E3 has been derived based on the combined application of Friend's Equation and Manning's Equation which is relative to the measured distance of overland sheet flow travel associated with sub catchment S2 and the length and profile of the collecting creek which runs adjacent to the site's western boundary. Refer Appendix B for developed site catchment plan.

The following table provides a comparison of the results of both the Rational Method and XP-RAFTS Model results for peak discharges up to and including the 1% AEP storm event.

Table 5.10: Developed Site Western Flow Peak Discharge Comparison

Storm Event	XP-RAFTS Total Peak Runoff (m^3/s)	Rational Method Total Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.619	0.691	0.072	10
39% AEP	0.750	0.916	0.166	18
10% AEP	1.198	1.510	0.312	21
5% AEP	1.515	1.801	0.286	16
2% AEP	1.942	2.270	0.328	14
1% AEP	2.255	2.571	0.316	12

Table 5.11: Developed Site Eastern Flow Peak Discharge Comparison

Storm Event	XP-RAFTS Total Peak Runoff (m^3/s)	Rational Method Total Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	1.311	1.298	0.013	1
39% AEP	1.618	1.718	0.376	6
10% AEP	2.553	2.831	0.139	10
5% AEP	2.921	3.371	0.145	14
2% AEP	3.680	4.277	0.069	14
1% AEP	4.366	4.902	0.041	11

As can be seen above, the Laurenson Routing Method established from the XP-RAFTS model generates peak flows that are generally different by up to 21% of what is estimated by the Rational Method. This is envisaged as a result of the change in initial loss value to 40mm required by Council as noted in Section 5.2.2 above. The consequence of this change in loss value has therefore resulted in a larger deviation away from Rational Method estimates in comparison to the original modelling proposed by Milanovic Neale Consulting Engineers, which generally had a similarity of 9%. Since the loss value has been amended as a requirement of Council, it is assumed that the XP-RAFTS peak flows are acceptable to Council despite the large differences in comparison to the Rational Method.

5.5 Potential Impacts of Development

The following table provides a summary of the peak runoff from the site under both existing and developed scenarios.

Table 5.11: Runoff Comparison – Western Flows

Storm Event	Existing Peak Runoff (m^3/s)	Developed Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.277	0.619	0.342	55
39% AEP	0.500	0.750	0.250	33
10% AEP	0.741	1.198	0.457	38
5% AEP	1.139	1.515	0.376	25
2% AEP	1.166	1.942	0.776	40
1% AEP	1.340	2.255	0.915	41

Table 5.12: Runoff Comparison – Eastern Flows

Storm Event	Existing Peak Runoff (m^3/s)	Developed Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.603	1.311	0.708	54
39% AEP	1.191	1.618	0.427	26
10% AEP	1.899	2.553	0.654	26
5% AEP	2.548	2.921	0.373	13
2% AEP	3.277	3.680	0.403	11
1% AEP	3.868	4.366	0.498	11

The proposed development has increased the proportion of the site that is impervious, consequently the runoff characteristics from the site will be altered as a result of the development. As demonstrated above, the development has increased western and eastern runoff volumes and peak flow rates downstream in comparison to existing conditions for all storm events. If left unmitigated, the developed runoff could have an adverse effect on downstream properties and/or stormwater infrastructure. It is therefore proposed that on-site detention systems be constructed within the site to mitigate increased peak discharges to below pre-development levels.

5.6 Proposed Mitigated Conditions

This section of the report will specify the mitigation device(s) required to detain the post development flow rate to match existing site runoff conditions. The XP-RAFTS modelling software, utilising the Laurenson Routing Method will be used to generate the hydrographs and peak flows from the mitigated site in conjunction with the design of on-site detention devices for all storm events up to an including the 1% AEP storm event.

5.7 Developed Mitigated Model

A detention basin is to be constructed for the eastern catchments, located towards the north east of the site to detain flows up to the 1% AEP for sub catchments S1a and S1b and up to the 5% AEP for sub catchment 6, prior to discharge. The detention system has also been designed to account for unmitigated, eastern sub catchments S5, S7 and S6 (>5% AEP). Detained flows are to be discharged into an existing stormwater line within Strathford Avenue North (Legal Point of Discharge) to the north of the proposed detention basin via a proposed stormwater system. An emergency overflow weir is to be provided at the eastern end of the basin to convey flows into the proposed new road/ Strathford Avenue North in the event that basin outlets are obstructed. Minimal hydraulic impact is considered to occur within the road carriageway in an emergency scenario due to the presence of several road gullies within this area.

A ground detention basin is to be constructed for the western catchments located at the site's north western corner to detain sub catchments S4a (<5% AEP), S4b and S4c and has also been designed to account for unmitigated, western sub catchment areas S2, S3 and S8. Detained flows are to be discharged internal to the site and runoff will therefore be discharged off site as overland flow into the adjoining western boundary overland flow path (Legal Point of Discharge). Scour protection will be designed as required at detailed design, however velocities are envisaged to be less than 1m/s from the basin outlet which is considered to be relatively low. An emergency overflow weir is to be provided along the basins western edge to convey basin flows in the event that outlets are obstructed.

All storm events up to and including the 1% AEP storm event have been modelled in the XP-RAFTS software package. Two retarding basins have been included in the proposed model to account for the proposed detention basins which are to consist of an integrated bioretention system at its base, as set out in Section 4.3.4 above and in accordance with Section 3.3.9 of *Bioretention Technical Design Guidelines (Version 1.1), Water by Design (2014).*

The following parameters were used to define a stage storage discharge relationship for the basin to the north east of the site:

- Maximum basin depth of 2.0m.
- Total Storage Volume of 2000m^3.
- 2 x 420mm low flow outlets at basin invert.
- 4 x 450mm mid flow outlets 600mm above basin invert.
- 1 x 4800mm overflow weir 1200mm above basin invert.

The following parameters were used to define a stage storage discharge relationship for the basin to the north western corner of the site:

- Maximum basin depth of 1.2m.
- Total Storage Volume of 1300m^3.
- 2 x 300mm low flow outlets at basin invert.
- 3 x 200mm mid flow outlets 760mm above basin invert.
- 1 x 1200mm overflow weir 1100mm above basin invert.

Refer to Appendix D for XP-RAFTS hydrographs and XP-RAFTS stage storage discharge relationship.

In the unlikely event that all eastern basin outlets become blocked, the following emergency measures have been incorporated:

- 1 x 8400mm emergency weir 1400mm above basin invert (outlet structure crest).
- 1 x 8400mm emergency weir 1700mm above basin invert (emergency outlet structure crest)
- 1 x 28500mm emergency spillway weir 1900mm above basin invert.

In the unlikely event that all western basin outlets become blocked, the following emergency measures have been incorporated:

- 1 x 3600mm emergency weir 1200mm above basin invert (outlet structure crest).
- 1 x 6000mm emergency spillway weir 1200mm above basin invert (emergency outlet structure crest).

Refer Section 6 for associated safety in design considerations.

The table below is a summary of the peak discharge flows from the site with the proposed detention measures implemented:

Table 5.13: Mitigated Western Runoff Comparison

Storm Event	Existing Peak Runoff (m^3/s)	Proposed Mitigated Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.277	0.254	-0.023	9
39% AEP	0.500	0.498	-0.002	1
10% AEP	0.741	0.699	-0.042	6
5% AEP	1.139	0.858	-0.281	32
2% AEP	1.166	1.148	-0.018	2
1% AEP	1.340	1.266	-0.074	6

Table 5.14: Mitigated Eastern Runoff Comparison

Storm Event	Existing Peak Runoff (m^3/s)	Proposed Mitigated Peak Runoff (m^3/s)	Difference	
			+/-	%
63% AEP	0.603	0.590	-0.013	2
39% AEP	1.191	1.170	-0.021	2
10% AEP	1.899	1.747	-0.152	9
5% AEP	2.548	2.078	-0.470	23
2% AEP	3.277	2.824	-0.453	16
1% AEP	3.868	3.386	-0.480	14

All storm events have been mitigated to below pre-developed levels; as such the proposal satisfies Council's condition of a non-worsening effect in regards to peak stormwater runoff. The significant reduction in peak discharge flows from site is a product of the proposed integrated detention and bioretention system, topographical constraints and consequent drainage reserve scale. In order for each combined system to achieve the required minimum bio retention area and also limit the extent of retaining within the proposed drainage reserve, a flood storage volume in excess of what is required is therefore proposed.

Peak basin ponding depths of approximately 0.9m and 1.2m are attributed to proposed western and eastern systems respectively, during a 5% AEP storm event. The proposed detention elements are therefore considered to comply with *SC6.14.3.6* of Council's *Planning Scheme Policy for Development Works* as these values do not exceed 1.2m.

6 SAFETY IN DESIGN CONSIDERATIONS

A safety audit assessment has been undertaken for the proposed combined bioretention-detention systems. in accordance with the recommendations outlined in *AS/NZS ISO 3100:2009 'Risk Management – Principles and Guidelines*' and *QUDM*.

The following tables provide further detail on the identification, analysis, evaluation and assessment of the risks associated with the proposed combined bioretention-detention systems.

In light of these Safety in Design Considerations, it is believed that the risks specified below have been mitigated as much as practical based on the application of Council guidelines and best practices.

Table 6.1: Safety in Design Considerations (Eastern System)

Risk Identification	Initial Risk Analysis			Identification and Evaluation of Design Outcomes	Residual Risk Analysis		
	Likelihood	Consequence	Rating		Likelihood	Consequence	Rating
Blockage of Low and Mid Flow Outlets	Likely	Very Minor	Medium	Basin flows will be discharged via the high flow weir in the event that low and mid flow outlets become blocked. This will result in a worsening of peak flow volumes downstream in comparison to existing conditions for minor events however these impacts are envisaged to be contained via Council infrastructure and road reserve. The following measures are proposed to reduce this design risk: • Trash racks are to be incorporated over outlets to reduce likelihood of blockage.	Possible	Very Minor	Low
Blockage of All Formal Structure Outlets (<=1% AEP)	Possible	Significant	High	Blockage to all formal structure outlets could lead to inundation of internal road and flows overtopping basin and impacting neighbouring private properties. The following measures are proposed to reduce this design risk: • Basin outlets to be split across two separate structures. • Crest of each structure to represent open intakes (Total weir length of 8.4m at 61.2m AHD).	Unlikely	Significant	Medium

Blockage of All Formal and Informal Structure Outlets (<=1% AEP)	Unlikely	Significant	Medium	Blockage of all structure outlets and the informal, open crest intakes could lead to inundation of internal road and flows overtopping basin and impacting neighbouring private properties. The following measures are proposed to reduce this design risk: • Crest of each structure to be fitted with Dome grate. • Addition of two emergency intake structures with open crest (Total weir length of 8.4m at 61.5m AHD).	Rare	Significant	Low
Blockage of All Formal and Informal Structure Outlets & Emergency Structures (<=1% AEP)	Rare	Significant	Medium	Blockage of all structure outlets, informal, open crest intakes could lead to inundation of internal road and flows overtopping basin and impacting neighbouring private properties. The following measures are proposed to reduce this design risk: • Crest of emergency structure to be fitted with Dome grate. • Addition of 28.5m emergency spillway weir at 61.7m AHD designed to discharge the 1% AEP catchment flow into the internal road network and ultimately Glenbrook Drive road reserve.	Very Rare	Significant	Low
Blockage of All Basin Outlets Formal, Informal & Emergency (PMF)	Rare	Significant	Medium	Complete blockage of all basin outlets in conjunction with the occurrence of a probable maximum flood would result in flows overtopping the basin and inundating neighbouring properties immediately downstream. The following measures are proposed to reduce this design risk: • Basin to incorporate waterproof retaining wall to a level of 62.8m AHD along its northern border to contain the PMF and promote flows towards the internal road network.	Very Rare	Significant	Low

Retaining Wall Failure	Unlikely	Significant	Medium	All retaining walls to be design and certified by an RPEQ to ensure structures are able to withstand loadings and remain durable for the required design life.	Rare	Significant	Medium
Non-Trafficable Site Access due to Blocked Basin (>=1% AEP)	Unlikely	Significant	Medium	In the event of basin blockage, road reserve inundation may exceed trafficable tolerances. The proposed road network has been designed to promote development runoff to the detention basin whilst limiting ponding depths to a maximum of 300mm within the proposed road network.	Very Rare	Significant	Low

Table 6.1: Safety in Design Considerations (Western System)

Risk Identification	Initial Risk Analysis			Identification and Evaluation of Design Outcomes	Residual Risk Analysis		
	Likelihood	Consequence	Rating		Likelihood	Consequence	Rating
Blockage of Low Flow Outlets	Likely	Very Minor	Medium	Basin flows can be discharged via the mid flow outlets, high flow weir and emergency weir if required in the event that the low flow outlets become blocked. This will result in a worsening of peak flow volumes downstream in comparison to existing conditions for minor events however these impacts are envisaged to be contained within the natural drainage channel downstream. The following measures are proposed to reduce this design risk: • Trash racks are to be incorporated over outlets to reduce likelihood of blockage.	Possible	Very Minor	Low
Blockage of All Structure Outlets (<=1% AEP)	Possible	Significant	High	Absence of secondary structure combined with blocked primary structure could lead to inundation of neighbouring aged care facility to the north. Basin to incorporate waterproof retaining wall designed to contain peak basin water level (<=1% AEP) assuming all outlets blocked with 0.3m freeboard. Contained flows would be discharged from the basin via an emergency overflow weir along the basins western edge into an existing natural drainage channel when blocked. This will result in a worsening of peak flow volumes downstream in comparison to existing conditions however these impacts are envisaged to be contained within the natural drainage channel downstream.	Unlikely	Minor	Low

				The following measures are proposed to reduce this design risk: • A dome grate is to be incorporated over primary structure high flow weir to reduce likelihood of blockage. • Trash racks are to be incorporated over all outlets to reduce likelihood of blockage.			
All Basin Outlets Blocked (PMF)	Rare	Significant	Medium	Basin designed to incorporate 4 outlets, high flow weir and emergency overflow weir. The scale of flood relief infrastructure and associated blockage protection devices, helps reduce the likelihood that all outlets will be blocked. A waterproof retaining wall I s proposed to contain blocked basin flows <=1% AEP with 0.3m freeboard. In the event that structure outlets are blocked and a PMP event occurs, basin flows will overtop emergency overflow weir and be discharged into the natural drainage channel downstream. Increased channel flow may lead to inundation of the aged care facility downstream, however these flows would be confined to an existing car parking area.	Very Rare	Significant	Low
Retaining Wall Failure	Unlikely	Significant	Medium	All retaining walls to be design and certified by an RPEQ to ensure structures are able to withstand loadings and remain durable for the required design life.	Rare	Significant	Medium

7 INTERPRETATION AND CONCLUSIONS

A legal point of discharge for the proposed development will be obtained by discharging eastern flows into existing municipal stormwater infrastructure within the northern section Strathford Avenue North road carriageway and by discharging western flows internal to the site towards a drainage waterway which runs parallel to the site's western boundary.

The proposed development, if unmitigated, would have a negative effect on runoff water quality from the site. Best practices in water quality design have been implemented to improve the quality of the stormwater runoff generated on the site.

The predicted pollutant export load concentrations for the mitigated conditions as determined by the MUSIC model show that the proposed water quality treatment measures comply with Council's mean annual load reduction requirements for total suspended solids (TSS), total phosphorous (TP), total nitrogen (TN) and gross pollutants (GP).

Key elements of the proposed stormwater management plan are as follows:

- A bioretention basin with a surface area of 900m^2 is to be constructed at the north western corner of the site, integrated into the base of the proposed detention basin (see below), to treat runoff associated with developed catchments S4a, S4b and S4c.
- A bioretention basin with a surface area of 800m^2 is to be constructed to the north east of the site, integrated into the base of the proposed detention basin (see below), to treat runoff associated with developed catchments S1a, S1b and S6.
- Developed catchments S2, S3 and S5 are to free draining and have been catered for in the proposed detention and treatment trains.
- Key bio retention basin parameters include:
  - Extended detention depth of 300mm
  - Saturated conductivity of 200 mm/hr
  - Filter depth of 600mm
  - TN content of 800 mg/kg
  - Orthophosphate content of 55 mg/kg
  - A sediment forebay on the inlet side of the basin

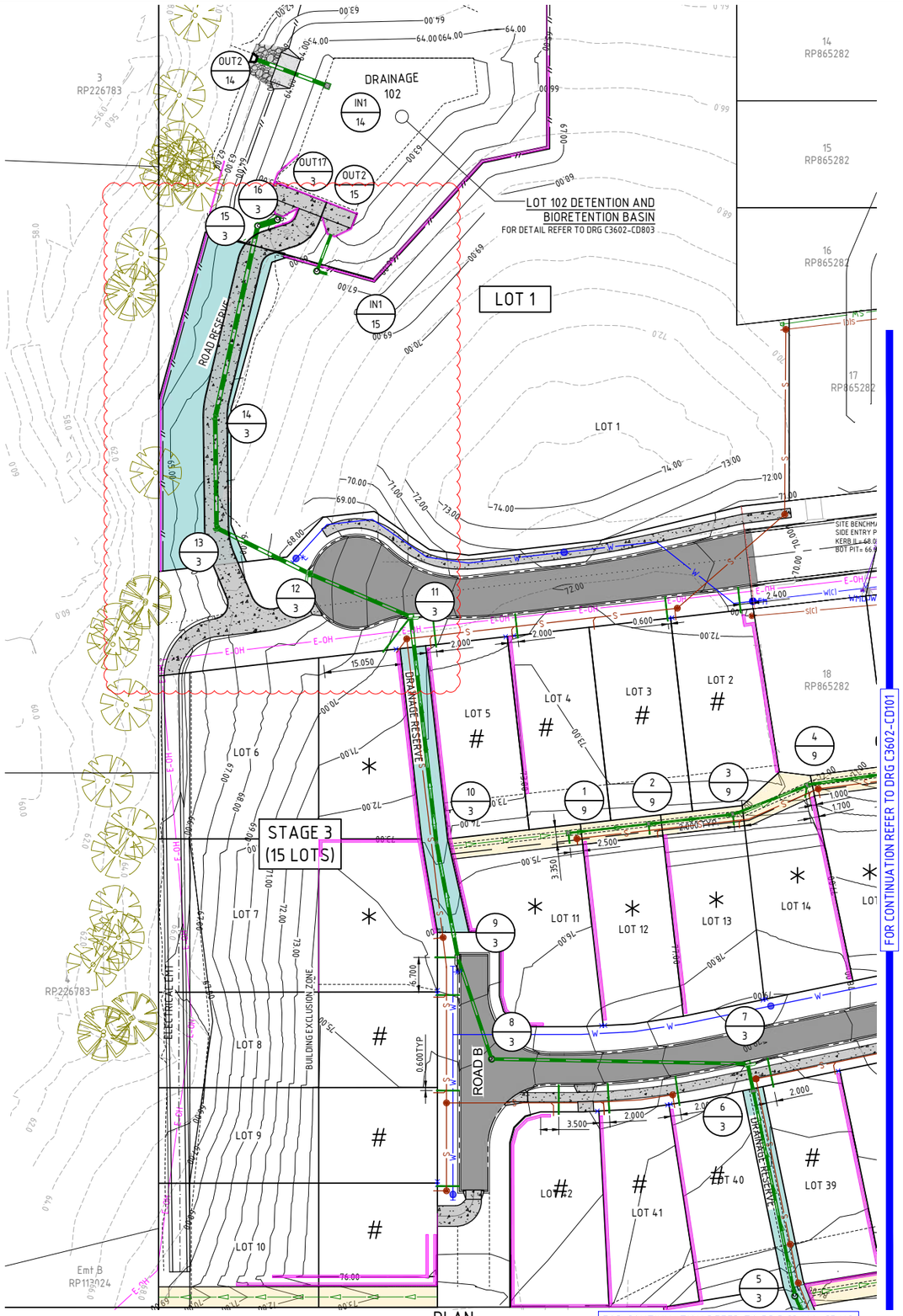
It is proposed to prepare an erosion and sediment management plan during the operational works phase of the development which will incorporate a range of control measures to be implemented during the construction phase of the project.

An analysis of the pre and post development site discharge has been undertaken which has revealed that the development has increased runoff volumes and peak flow rates downstream in comparison to the existing conditions for all storm events. As a result, if left unmitigated, the developed runoff could potentially have an adverse effect on downstream properties and/or stormwater infrastructure.

It is therefore proposed that a 2000m^3 detention basin is to be constructed towards the north east of the site and a 1300m^3 detention basin be constructed towards the site's north western corner, to mitigate increased peak discharges to below pre-development levels.

Refer Appendix A for proposed stormwater management layout.

APPENDIX A: Proposed Development Layout



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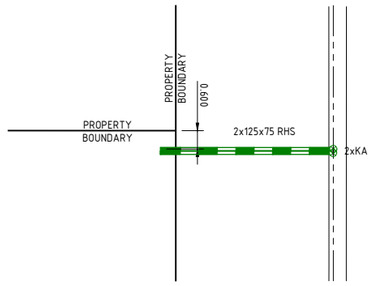
W(D)	EXISTING WATER MAIN [*] DENOTES UTILITY CLASSIFICATION)
SW(D)	EXISTING STORMWATER [*] DENOTES UTILITY CLASSIFICATION)
T(D)	EXISTING TELECOMMUNICATIONS [*] DENOTES UTILITY CLASSIFICATION)
E-OH	EXISTING OVERHEAD ELECTRICITY
W	PROPOSED WATER MAIN
S	PROPOSED SEWER MAIN
SW	PROPOSED STORMWATER
	PROPOSED RETAINING WALL
##.##	EXISTING CONTOURS
##.##	PROPOSED DESIGN CONTOURS
	PROPOSED TOP OF BATTER PROPOSED TOE OF BATTER
	PROPOSED ROAD RESERVE
	PROPOSED EASEMENT
1/1	PROPOSED DRAINAGE STRUCTURE NUMBER
1/1	EXISTING DRAINAGE STRUCTRUE NUMBER



ROOFWATER KERB OUTLET DETAIL
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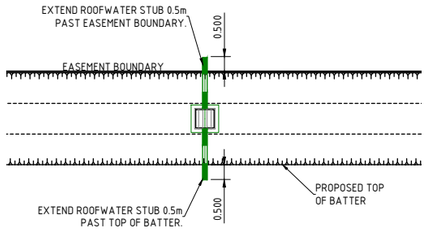

ROOFWATER PIT OUTLET DETAIL
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* ROOFWATER CONNECTION NOTE:
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\# KERB OUTLET NOTE:
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SCALE 1:500 (A1) 0 10 20 30m (SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

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LOT 2 ON SP273404

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REV.	DESCRIPTION	DATE	INIT.
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B	RFI RESPONSE	23.12.20	SG

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 1 OF 4

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD100 REV. B

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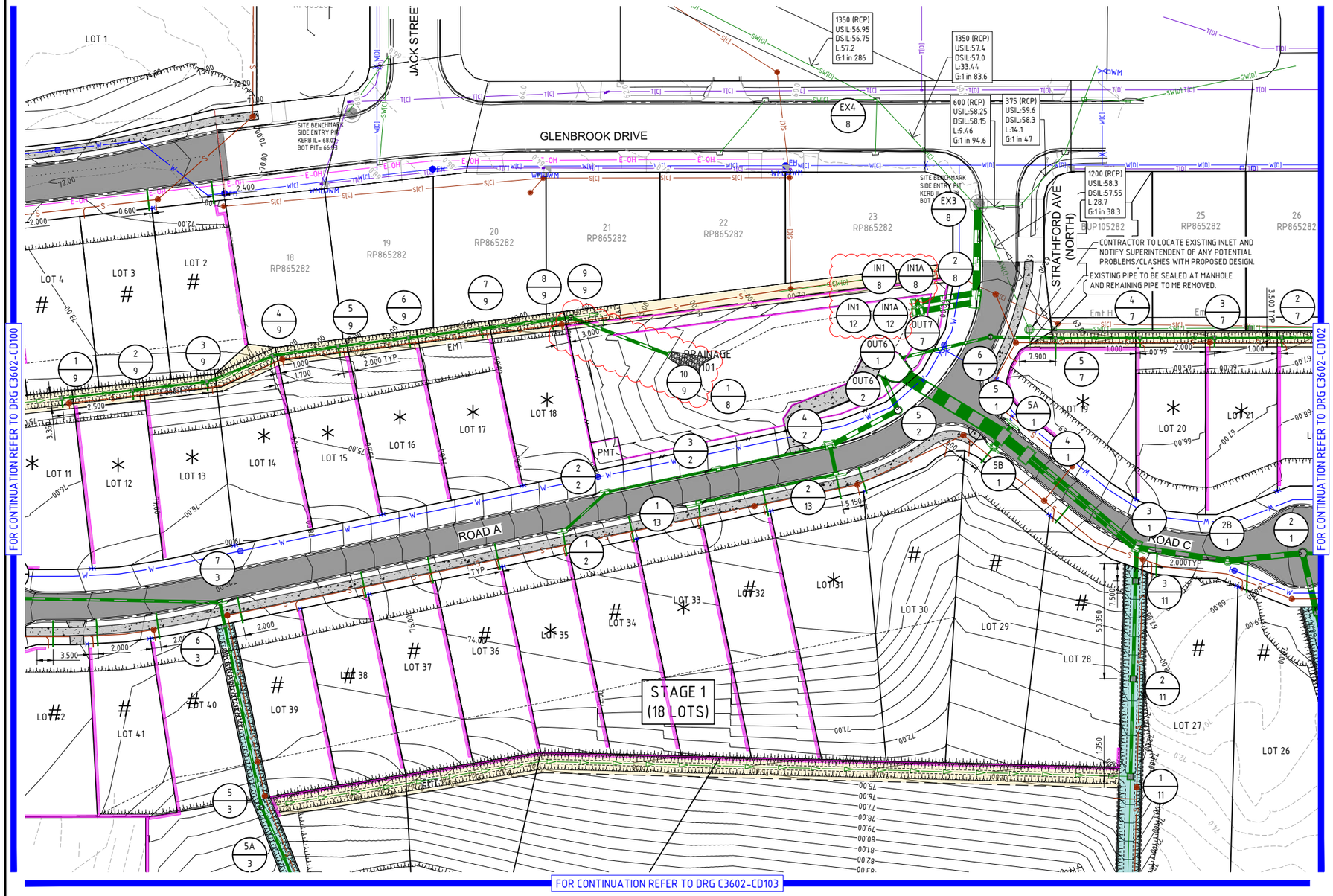

PLAN

SCALE 1:500

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W(D)	EXISTING WATER MAIN [*] DENOTES UTILITY CLASSIFICATION)
SW(D)	EXISTING STORMWATER [*] DENOTES UTILITY CLASSIFICATION)
T(D)	EXISTING TELECOMMUNICATIONS [*] DENOTES UTILITY CLASSIFICATION)
E-OH	EXISTING OVERHEAD ELECTRICITY
W	PROPOSED WATER MAIN
S	PROPOSED SEWER MAIN
SW	PROPOSED STORMWATER
	PROPOSED RETAINING WALL
##.##	EXISTING CONTOURS
##.##	PROPOSED DESIGN CONTOURS
	PROPOSED TOP OF BATTER PROPOSED TOE OF BATTER
	PROPOSED ROAD RESERVE
	PROPOSED EASEMENT
1/1	PROPOSED DRAINAGE STRUCTURE NUMBER
1/1	EXISTING DRAINAGE STRUCTRUE NUMBER

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LOT 2 ON SP273404

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B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 2 OF 4

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CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

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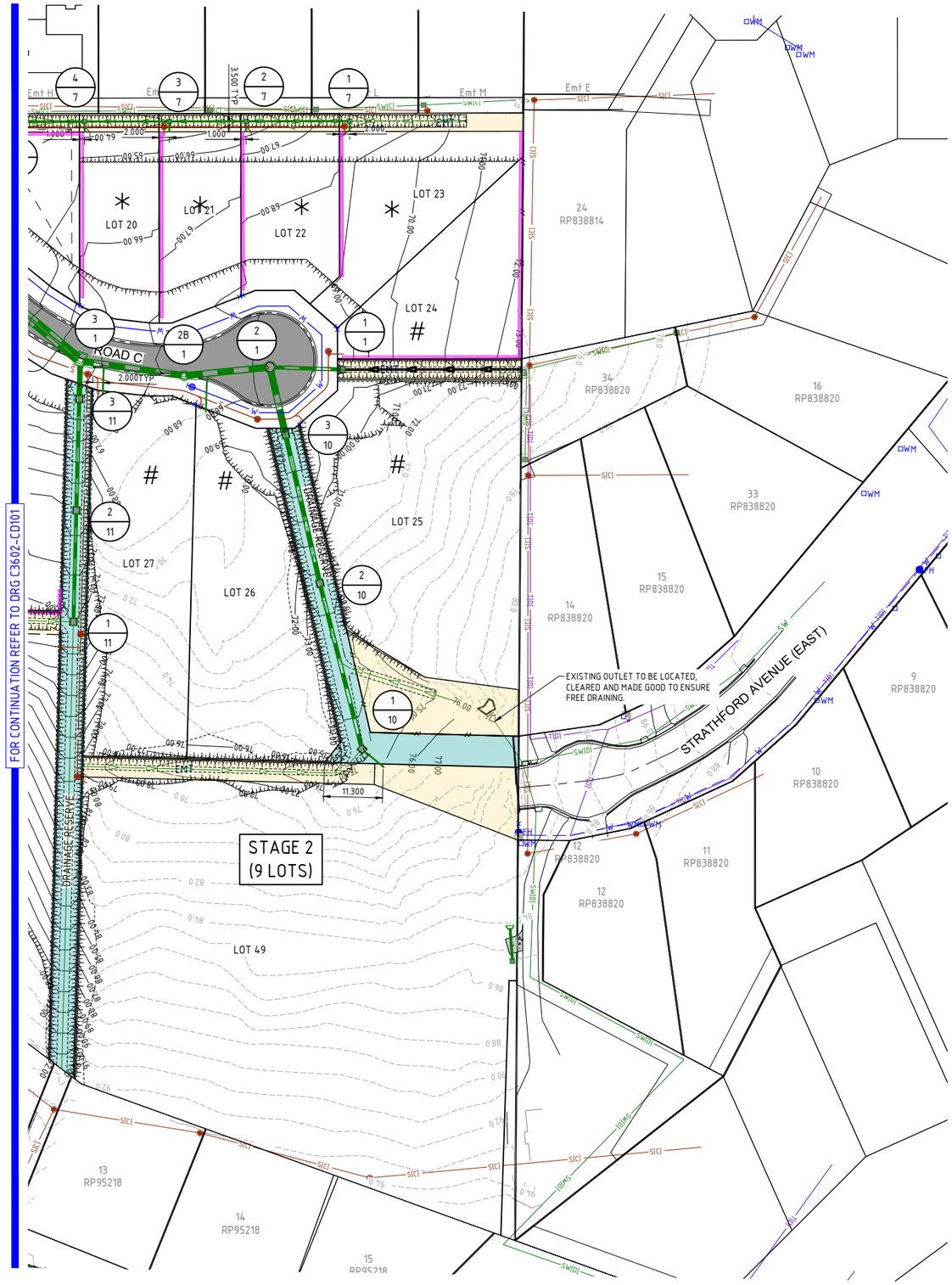

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LEGEND

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W(D)	EXISTING WATER MAIN [*] DENOTES UTILITY CLASSIFICATION)
SW(D)	EXISTING STORMWATER [*] DENOTES UTILITY CLASSIFICATION)
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A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE
CONSULTING ENGINEERS
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TRAFFIC
PROJECT MANAGEMENT
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CONTACT DETAILS
E mail@mnce.com.au
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 3 OF 4

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD102 REV. B

DO NOT SCALE FROM DRAWING
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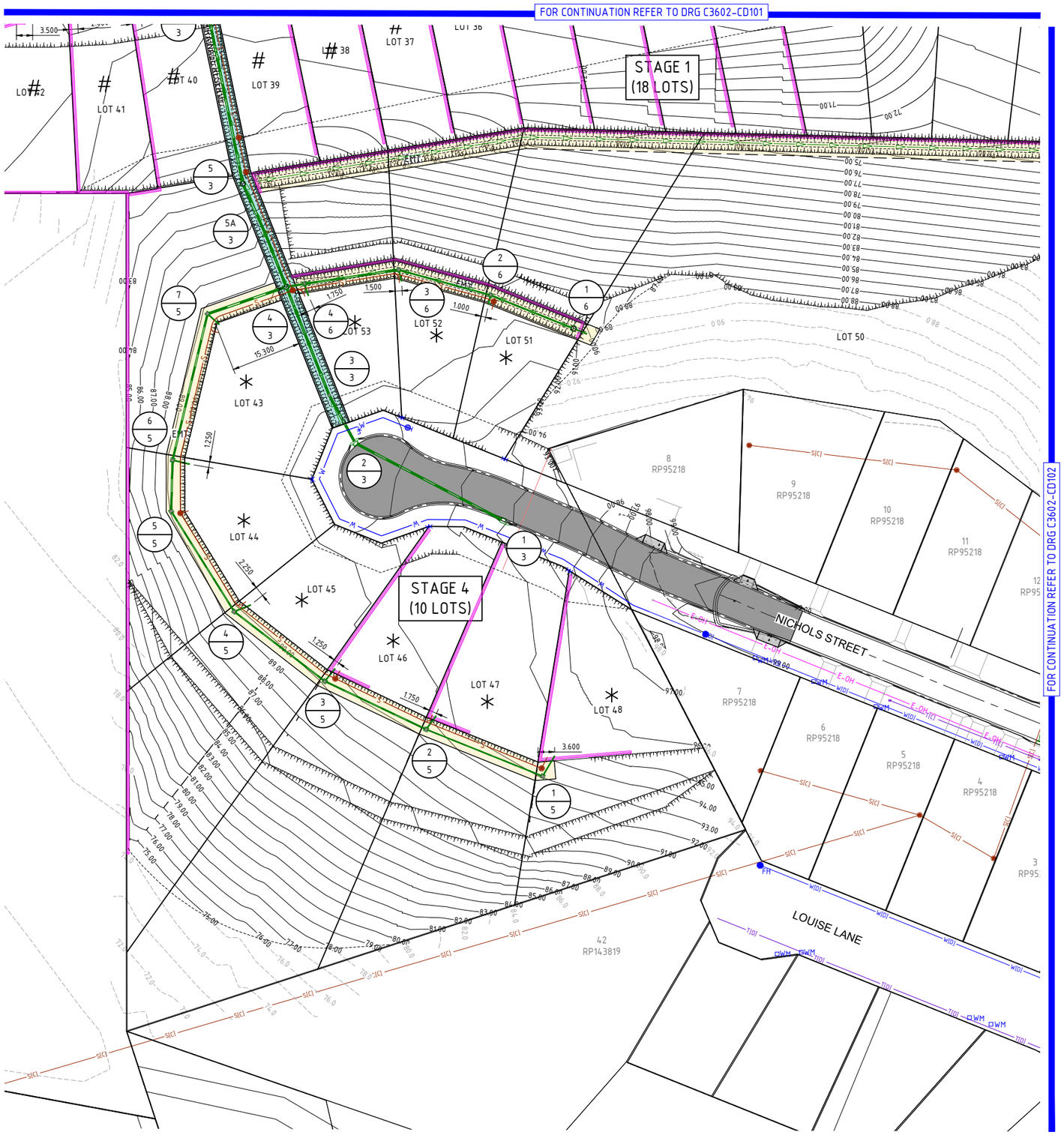

PLAN
SCALE 1:500

LEGEND

S(C)	EXISTING SEWER MAIN [*] DENOTES UTILITY CLASSIFICATION)
W(D)	EXISTING WATER MAIN [*] DENOTES UTILITY CLASSIFICATION)
SW(D)	EXISTING STORMWATER [*] DENOTES UTILITY CLASSIFICATION)
T(D)	EXISTING TELECOMMUNICATIONS [*] DENOTES UTILITY CLASSIFICATION)
E-OH	EXISTING OVERHEAD ELECTRICITY
W	PROPOSED WATER MAIN
S	PROPOSED SEWER MAIN
SW	PROPOSED STORMWATER
	PROPOSED RETAINING WALL
##.##	EXISTING CONTOURS
##.##	PROPOSED DESIGN CONTOURS
	PROPOSED TOP OF BATTER PROPOSED TOE OF BATTER
	PROPOSED ROAD RESERVE
	PROPOSED EASEMENT
1/1	PROPOSED DRAINAGE STRUCTURE NUMBER
1/1	EXISTING DRAINAGE STRUCTRUE NUMBER

NOTE:
CLASSIFICATION OF SUBSURFACE UTILITY INFORMATION IN ACCORDANCE WITH AUSTRALIAN STANDARD 5488.

* ROOFWATER CONNECTION NOTE:
SYMBOL DENOTES LOT IS TO BE SERVICED BY 1x⌀150 uPVC PIPE STUB FROM CHAMBER.

\# KERB OUTLET NOTE:
SYMBOL DENOTES LOT IS TO BE SERVICED BY 2x125x75 RHS FITTED TO METAL KERB ADAPTORS TO COUNCIL APPROVAL.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:500 (A1) 0 10 20 30m
(SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE LAYOUT PLAN SHEET 4 OF 4

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD103 REV. B

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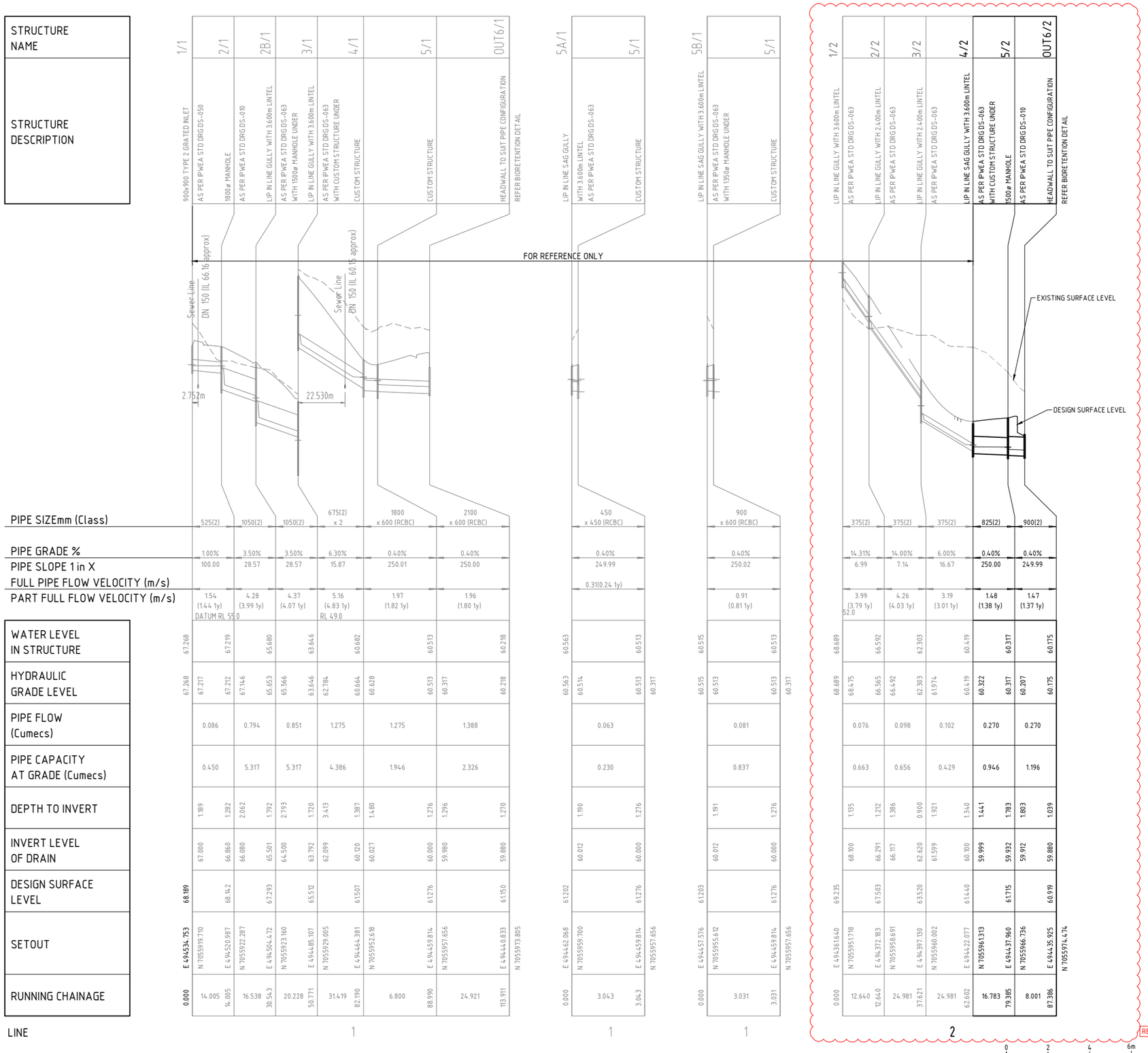

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

Q2 LONGITUDINAL SECTIONS

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 1 OF 4 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD200 REV. B

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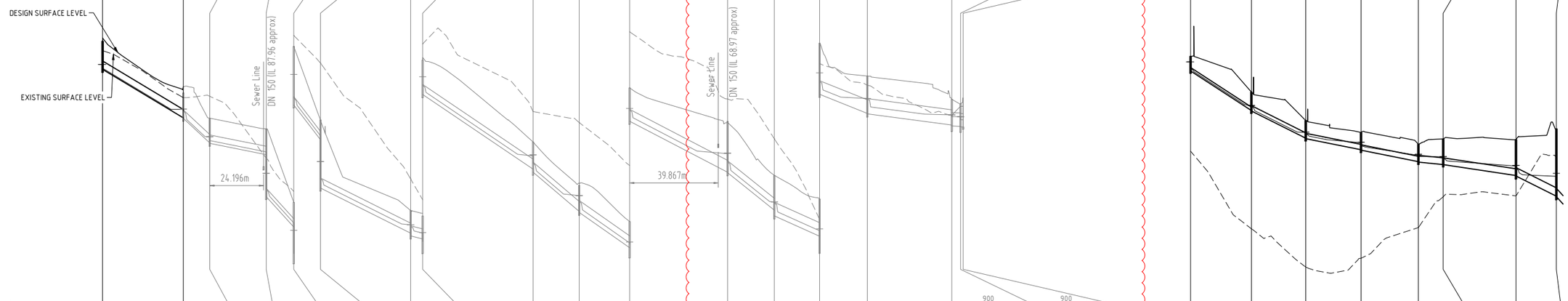

STRUCTURE NAME	1/3	2/3	3/3	4/3	5A/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3	12/3	13/3	14/3	15/3	16/3	OUT17/3
STRUCTURE DESCRIPTION	EXISTING LIP IN LINE GULLY	WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	LIP IN LINE SAG GULLY	WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	900x900 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	1050ø MANHOLE	WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	900x900 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	LIP IN LINE SAG GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	1050ø MANHOLE	WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	HEADWALL TO SUIT 900.06 ø PIPE
PIPE SIZEmm (Class)	375(2)	375(2)	375(2)	375(2)	375(2)	450(2)	450(2)	450(2)	450(2)	525(2)	525(2)	525(2)	600(2)	600(2)	675(2)	900 x 600 (RCBC)	900 x 600 (RCBC)	
PIPE GRADE %	6.00%	9.29%	2.00%	11.00%	13.00%	5.00%	2.50%	6.75%	8.50%	7.00%	5.20%	8.00%	4.50%	4.00%	1.32%	0.40%	0.40%	
PIPE SLOPE 1 in X	16.67	10.77	50.00	9.09	7.69	20.00	40.00	14.81	11.76	14.29	19.23	12.50	22.22	25.00	75.68	250.03	250.09	
FULL PIPE FLOW VELOCITY (m/s)	0.14(0.11 1y)							1.81(1.67 1y)	1.81(1.67 1y)		1.84(1.62 1y)			1.60(1.37 1y)				
PART FULL FLOW VELOCITY (m/s)	1.83 (1.69 1y)	3.18 (2.97 1y)	1.84 (1.72 1y)	5.24 (4.16 1y)	5.59 (5.48 1y)	3.90 (3.83 1y)	3.00 (2.95 1y)	4.37 (4.27 1y)	4.75 (4.65 1y)	4.83 (4.66 1y)	4.33 (4.18 1y)	5.16 (4.97 1y)	4.21 (4.04 1y)	4.04 (3.88 1y)	2.68 (2.57 1y)	1.60 (1.53 1y)	1.60 (1.53 1y)	
	DATUM RL 77.0				70.0			63.0			57.0			50.0				
WATER LEVEL IN STRUCTURE	92.697 / 90.696	89.454	87.811	85.251	81.338	78.497	78.148	74.639	72.810	70.724		68.714	66.524	65.320	64.168	63.433	63.350	63.215
HYDRAULIC GRADE LEVEL	92.697 / 92.527 / 90.681	90.655 / 89.454	89.282 / 87.675	87.139 / 85.251	84.256 / 81.338	80.600 / 78.497	78.450 / 78.100	77.799 / 74.592	74.313 / 72.810	72.591 / 70.724	70.684	68.694 / 68.374	66.524 / 66.510	65.243 / 64.968	64.168 / 64.165	63.433 / 63.355	63.350 / 63.220	63.215
PIPE FLOW (Cumecs)	0.015	0.059	0.059	0.285	0.287	0.287	0.288	0.288	0.288	0.412	0.412	0.441	0.463	0.468	0.468	0.468	0.468	
PIPE CAPACITY AT GRADE (Cumecs)	0.429	0.534	0.248	0.581	0.632	0.637	0.450	0.740	0.831	1.190	1.025	1.272	1.360	1.283	1.004	0.837	0.837	
DEPTH TO INVERT	1.258 / 1.123	1.143	1.111	1.131	1.155	3.041	1.108	2.627	0.886	3.056	1.017	1.140	1.032	1.548	1.246	1.353	1.172	1.215	1.179	1.499	2.287	2.307	1.563	1.819	1.670	2.297	1.678	1.698	1.156	1.198	1.013	1.038	0.000
INVERT LEVEL OF DRAIN	92.419 / 90.300	90.280	89.177	89.157	86.650	86.764	85.400	83.881	82.320	80.150	78.123	78.000	77.865	77.349	74.000	73.863	72.100	72.057	70.470	70.150	67.860	67.840	66.156	65.900	64.985	64.358	63.500	63.480	62.978	62.936	62.920	62.895	62.890
DESIGN SURFACE LEVEL	93.737 / 91.423	90.288	89.805	86.508	83.206	79.140	78.897	75.216	73.272	71.649	70.147	67.719	66.655	65.178	64.134	63.933	62.890	
SETOUT	E 494331730 N 7055820.712 / E 494302.484	N 7055842.230 E 494298.404	N 7055853.379 E 494292.804	N 7055878.121 E 494290.044	N 7055890.209 E 494286.820	N 7055901.772 E 494284.886	N 7055942.268 E 494284.595	N 7055947.669 E 494235.698	N 7055956.071 E 494232.211	N 7055976.515 E 494231.739	N 7055999.179	E 494233.176 N 7056043.186	E 494215.268 N 7056054.249	E 494198.599 N 7056065.905	E 494201.580 N 7056087.147	E 494218.349 N 7056122.555	E 494219.251 N 7056123.107	E 494219.871 N 7056124.090
RUNNING CHAINAGE	0.000 / 36.309 / 36.309	11.872 / 48.181	25.368 / 73.549	12.399 / 85.948	12.004 / 97.952	40.542 / 138.494	5.409 / 143.903	49.614 / 193.517	20.739 / 214.256	22.669 / 236.925	44.030	280.955 / 21.050 / 302.005	20.340 / 322.345	21.450 / 343.795	37.991 / 381.786	3.941 / 385.727	1.162 / 386.889	

3

STRUCTURE NAME	1/5	2/5	3/5	4/5	5/5	6/5	7/5	4/3
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)	150(U)	225(U)	225(U)	225(U)	300(U)	300(U)	375(2)	
PIPE GRADE %	6.50%	5.00%	2.00%	2.00%	1.00%	1.50%	5.00%	
PIPE SLOPE 1 in X	15.38	20.00	50.00	50.00	100.00	66.67	20.00	
FULL PIPE FLOW VELOCITY (m/s)	1.07(1.07 1y)	0.87(0.87 1y)	1.31(1.31 1y)	1.75(1.75 1y)	1.10(1.10 1y)	1.38(1.38 1y)	1.09(1.09 1y)	
PART FULL FLOW VELOCITY (m/s)	2.49 (2.49 1y)	2.67 (2.67 1y)	2.11 (2.11 1y)	2.23 (2.23 1y)	1.75 (1.75 1y)	2.15 (2.15 1y)	3.12 (3.12 1y)	
	RL77.0							
WATER LEVEL IN STRUCTURE	92.815 / 90.857	89.659	89.208	88.667	88.564	88.166	87.811	
HYDRAULIC GRADE LEVEL	92.815 / 92.560 / 90.857	90.850 / 89.649	89.608 / 89.185	89.091 / 88.618	88.618 / 88.551	88.506 / 88.140	88.066 / 87.675	87.139
PIPE FLOW (Cumecs)	0.020	0.040	0.060	0.080	0.080	0.100	0.120	
PIPE CAPACITY AT GRADE (Cumecs)	0.050	0.143	0.090	0.090	0.118	0.145	0.392	
DEPTH TO INVERT	0.656 / 0.830	0.850 / 0.792	0.812 / 0.773	0.793 / 0.783	0.803 / 1.152	1.152 / 1.606	1.626 / 3.021	
INVERT LEVEL OF DRAIN	92.405 / 90.628	90.608 / 89.387	89.367 / 88.870	88.850 / 88.334	88.314 / 88.202	88.202 / 87.711	87.691 / 86.784	
DESIGN SURFACE LEVEL	93.061 / 91.458	90.179	89.643	89.117	89.354	89.317	89.805	
SETOUT	E 494331828 N 7055764.365 / E 494308.299	N 7055778.285 E 494288.079	N 7055791.987 E 494270.895	N 7055809.958 E 494260.628	N 7055833.609 E 494262.614	N 7055844.592 E 494274.956	N 7055874.891 E 494292.804	N 7055878.121
RUNNING CHAINAGE	0.000 / 27.338 / 27.338	24.425 / 51.763	24.865 / 76.628	25.783 / 102.411	11.161 / 113.572	32.716 / 146.288	18.138 / 164.426	

5

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

LINE

Q2 LONGITUDINAL SECTIONS

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 2 OF 4 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD201 REV. B

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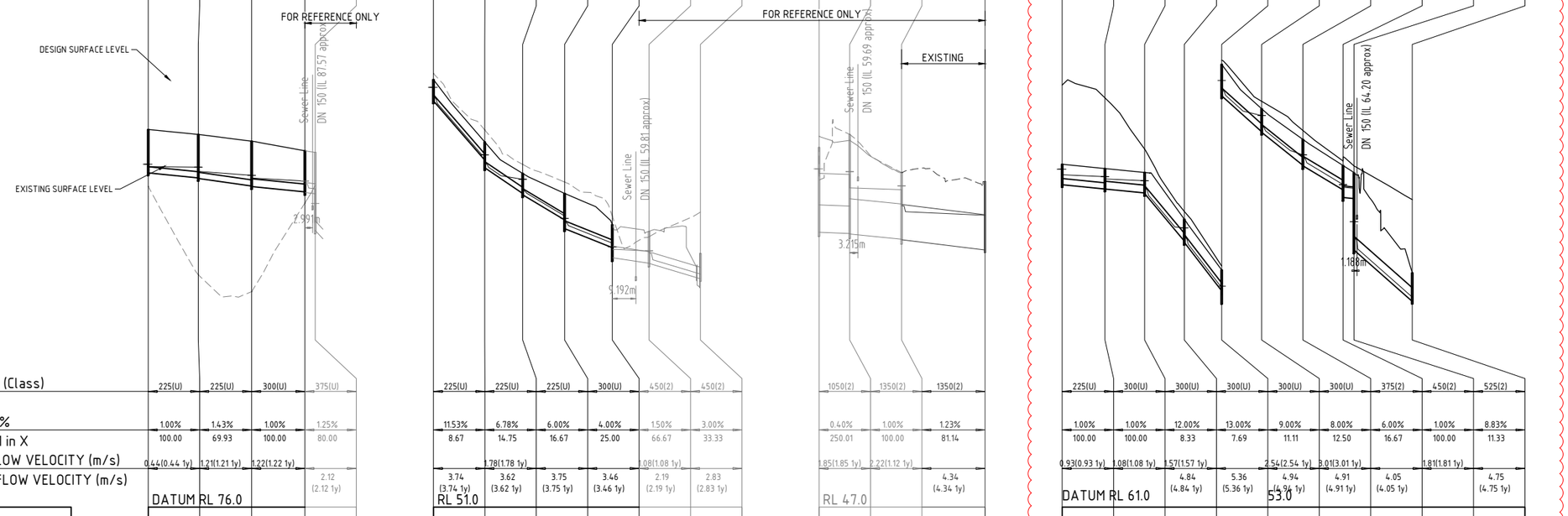

STRUCTURE NAME	1/6	2/6	3/6	4/6	4/3
STRUCTURE DESCRIPTION	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)	225(U)	225(U)	300(U)		375(U)
PIPE GRADE %	1.00%	1.43%	1.00%		1.25%
PIPE SLOPE 1 in X	100.00	69.93	100.00		80.00
FULL PIPE FLOW VELOCITY (m/s)	0.44(0.44 1y)	1.21(1.21 1y)	1.22(1.22 1y)		2.12 (2.12 1y)
PART FULL FLOW VELOCITY (m/s)	DATUM RL 76.0				
WATER LEVEL IN STRUCTURE	89.338	89.225	88.904	88.683	87.811
HYDRAULIC GRADE LEVEL	89.338	89.244	89.225	89.060	88.904	88.800	88.683	88.627	87.675	87.139
PIPE FLOW (Cumecs)		0.020	0.056	0.089	0.121
PIPE CAPACITY AT GRADE (Cumecs)		0.064	0.076	0.118	0.249
DEPTH TO INVERT		1.690	1.691	1.711	1.745	1.765	1.600	1.620	1.614
INVERT LEVEL OF DRAIN		89.000	88.805	88.785	88.488	88.468	88.261	88.241	88.191
DESIGN SURFACE LEVEL	90.690		90.496		90.233		89.861		89.805
SETOUT	E 494353.230 N 7055859.688	E 494336.472 N 7055869.592	E 494317.535 N 7055878.055	E 494296.819 N 7055878.167	E 494292.804 N 7055878.121
RUNNING CHAINAGE	0.000	19.466 19.466	20.742 40.208	20.716 60.924	4.015 64.939

STRUCTURE NAME	1/7	2/7	3/7	4/7	5/7	6/7	OUT7/7
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	900x900 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	HEADWALL TO SUIT PIPE CONFIGURATION REFER BIORETENTION DETAIL
PIPE SIZEmm (Class)	225(U)	225(U)	225(U)	300(U)	450(2)	450(2)
PIPE GRADE %	11.53%	6.78%	6.00%	4.00%	1.50%	3.00%
PIPE SLOPE 1 in X	8.67	14.75	16.67	25.00	66.67	33.33
FULL PIPE FLOW VELOCITY (m/s)	1.78(1.78 1y)			1.08(1.08 1y)	
PART FULL FLOW VELOCITY (m/s)	3.74 (3.74 1y)	3.62 (3.62 1y)	3.75 (3.75 1y)	3.46 (3.46 1y)	2.19 (2.19 1y)	2.83 (2.83 1y)
	RL 51.0					
WATER LEVEL IN STRUCTURE	67.330	64.700	63.753	62.230	61.121	60.972	60.064
HYDRAULIC GRADE LEVEL	67.330	67.041	64.700	64.441	63.753	63.391	62.230	62.137	61.121	61.012	60.960	60.930	60.064
PIPE FLOW (Cumecs)	0.045	0.082	0.116	0.151	0.172	0.172
PIPE CAPACITY AT GRADE (Cumecs)	0.217	0.167	0.157	0.237	0.349	0.493
DEPTH TO INVERT	0.833	0.704	1.004	0.780	0.830	1.030	1.368	0.897	1.288	1.242	0.990
INVERT LEVEL OF DRAIN	66.800	64.500	64.200	63.200	63.150	62.171	61.833	61.091	60.700	60.486	60.480	59.880
DESIGN SURFACE LEVEL	67.633	65.204	63.980	63.201	61.988	61.728	60.870
SETOUT	E 494543.327 N 7055966.738	E 494523.603 N 7055969.725	E 494509.016 N 7055971.934	E 494492.891 N 7055974.376	E 494474.548 N 7055977.154	E 494460.471 N 7055979.546	E 494440.517 N 7055977.985
RUNNING CHAINAGE	0.000	19.949 19.949	14.753 34.702	16.309 51.011	18.552 69.563	14.279 83.842	20.015 103.857

STRUCTURE NAME	IN1/8	2/8	EX3/8	EX4/8
STRUCTURE DESCRIPTION	CUSTOM STRUCTURE	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063 CUSTOM STRUCTURE BENEATH TO SUIT	EXISTING LIP IN LINE GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	EXISTING 1800ø MANHOLE
PIPE SIZEmm (Class)	1050(2)	1350(2)	1350(2)
PIPE GRADE %	0.40%	1.00%	1.23%
PIPE SLOPE 1 in X	250.01	100.00	81.14
FULL PIPE FLOW VELOCITY (m/s)	1.85(1.85 1y)	2.22(1.12 1y)	
PART FULL FLOW VELOCITY (m/s)	RL 47.0		4.34 (4.34 1y)
WATER LEVEL IN STRUCTURE	60.156	60.051	59.497	58.350
HYDRAULIC GRADE LEVEL	60.156	59.981	59.941	59.418	59.348	58.772	58.350
PIPE FLOW (Cumecs)	1.650	3.282	3.582
PIPE CAPACITY AT GRADE (Cumecs)	1.797	5.571	6.184
DEPTH TO INVERT	3.310	3.857	3.877	2.594	2.614	2.670
INVERT LEVEL OF DRAIN	57.690	57.642	57.622	57.420	57.400	57.000
DESIGN SURFACE LEVEL	61.000	61.499	60.014	59.670
SETOUT	E 494446.572 N 7055989.488	E 494458.406 N 7055988.180	E 494462.027 N 7056008.032	E 494443.706 N 7056034.821
RUNNING CHAINAGE	0.000	11.906 11.906	20.180 32.086	32.455 64.541

STRUCTURE NAME	1/9	2/9	3/9	4/9	5/9	6/9	7/9	8/9	9/9	OUT10/9
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	HEADWALL TO SUIT 525ø PIPE
PIPE SIZEmm (Class)	225(U)	300(U)	300(U)	300(U)	300(U)	300(U)	375(2)	450(2)	525(2)
PIPE GRADE %	1.00%	1.00%	12.00%	13.00%	9.00%	8.00%	6.00%	1.00%	8.83%
PIPE SLOPE 1 in X	100.00	100.00	8.33	7.69	11.11	12.50	16.67	100.00	11.33
FULL PIPE FLOW VELOCITY (m/s)	0.93(0.93 1y)	1.08(1.08 1y)	1.57(1.57 1y)	2.54(2.54 1y)	3.01(3.01 1y)	1.81(1.81 1y)	
PART FULL FLOW VELOCITY (m/s)	DATUM RL 61.0		4.84 (4.84 1y)	5.36 (5.36 1y)	4.94 (4.94 1y)	4.91 (4.91 1y)	4.05 (4.05 1y)		4.75 (4.75 1y)
					53.0				
WATER LEVEL IN STRUCTURE	74.145	73.854	73.696	71.861	69.596	68.230	66.703	65.543	64.104	61.168
HYDRAULIC GRADE LEVEL	74.145	73.928	73.854	73.764	73.696	73.504	71.861	71.604	69.596	69.304	68.230	67.884	66.703	66.652	65.543	65.493	64.104	63.534	61.168
PIPE FLOW (Cumecs)	0.043	0.079	0.114	0.149	0.185	0.219	0.254	0.287	0.287
PIPE CAPACITY AT GRADE (Cumecs)	0.064	0.118	0.410	0.427	0.355	0.335	0.429	0.285	1.336
DEPTH TO INVERT	0.797	0.796	0.796	0.816	0.851	0.898	0.812	1.223	0.895	0.915	1.006	1.026	0.947	1.244	1.004	3.004	1.111
INVERT LEVEL OF DRAIN	73.540	73.374	73.374	73.220	73.200	71.347	71.300	69.411	69.000	67.600	67.580	66.297	66.277	65.340	65.043	65.000	63.000	61.000
DESIGN SURFACE LEVEL	74.337	74.710	74.016	72.198	70.223	68.495	67.303	66.287	66.004	62.111
SETOUT	E 494257.044 N 7055997.114	E 494273.667 N 7055996.461	E 494289.088 N 7055995.854	E 494304.160 N 7055999.197	E 494318.689 N 7055999.158	E 494334.235 N 7055998.771	E 494350.265 N 7055998.270	E 494365.880 N 7055997.831	E 494370.132 N 7055997.711	E 494389.863 N 7055986.569
RUNNING CHAINAGE	0.000	16.636 16.636	15.433 32.069	15.438 47.507	14.529 62.036	15.551 77.587	16.038 93.625	15.621 109.246	4.254 113.500	22.660 136.160

STRUCTURE NAME	1/10	2/10	3/10	2/1
STRUCTURE DESCRIPTION	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1800ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)	600(2)	675(2)	1050(2)
PIPE GRADE %	5.00%	6.41%	1.00%
PIPE SLOPE 1 in X	20.00	15.61	100.00
FULL PIPE FLOW VELOCITY (m/s)	1.94(1.53 1y)	0.80(0.63 1y)
PART FULL FLOW VELOCITY (m/s)	4.91 (4.61 1y)	5.36 (5.01 1y)	2.65 (2.48 1y)
	RL 57.0		
WATER LEVEL IN STRUCTURE	74.028	69.392	67.256	67.219
HYDRAULIC GRADE LEVEL	74.028	73.110	69.392	68.816	67.256	67.220	67.212	67.146
PIPE FLOW (Cumecs)	0.716	0.716	0.716
PIPE CAPACITY AT GRADE (Cumecs)	1.434	2.211	2.842
DEPTH TO INVERT	1.761	1.428	4.151	1.739	1.759	2.042
INVERT LEVEL OF DRAIN	72.500	70.854	68.131	66.253	66.233	66.100
DESIGN SURFACE LEVEL	74.261	72.282	67.992	68.142
SETOUT	E 494527.402 N 7055847.008	E 494524.198 N 7055879.764	E 494521.990 N 7055909.004	E 494520.987 N 7055922.287
RUNNING CHAINAGE	0.000	32.912 32.912	29.323 62.235	13.321 75.556

LINE 6 7 8 9 10

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

Q2 LONGITUDINAL SECTIONS

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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CONTACT DETAILS
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W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 3 OF 4 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED JN	APPROVED	
DRAWING No. C3602 - CD202		REV. B

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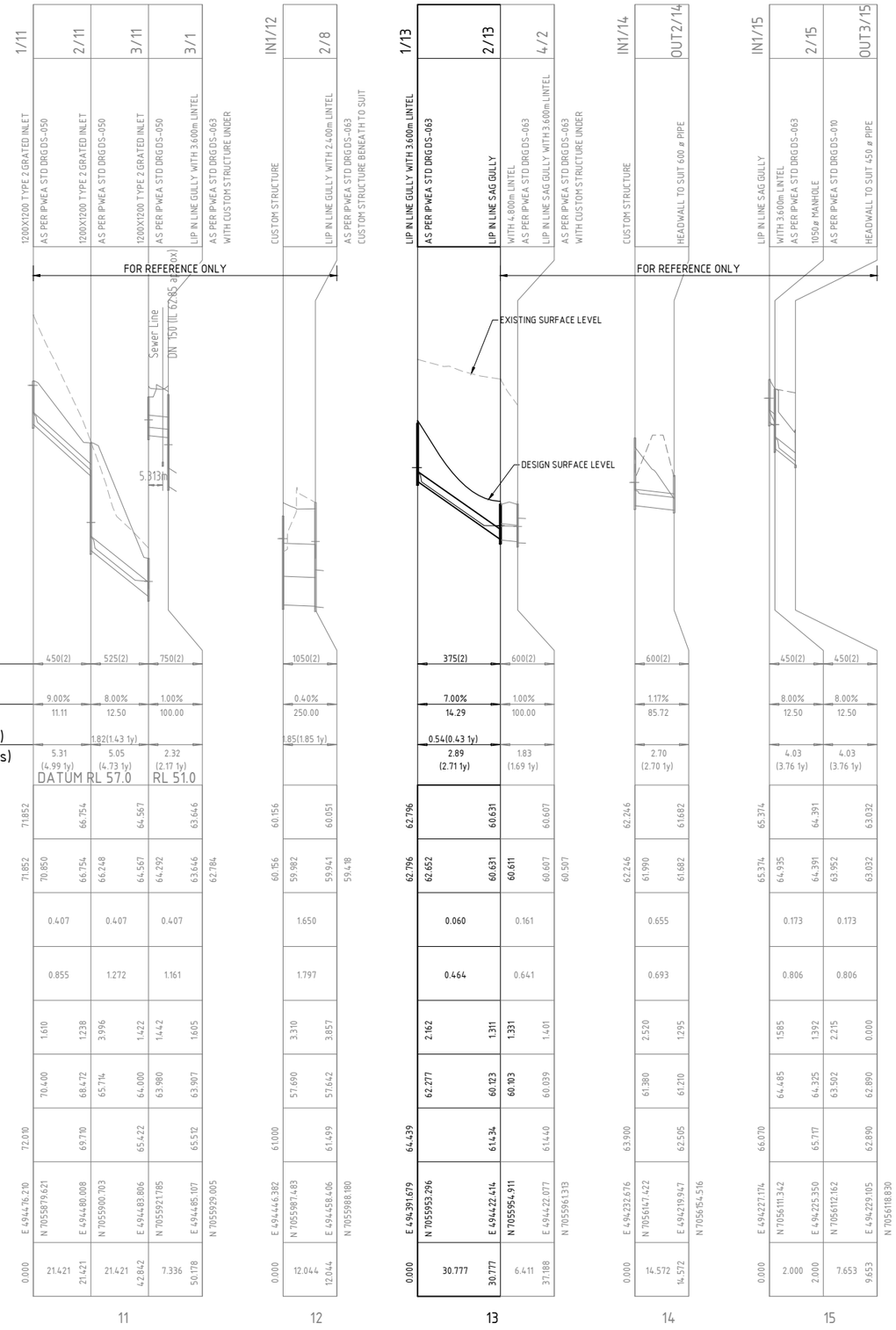

NOTE
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Q2 LONGITUDINAL SECTIONS

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 4 OF 4 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD203
REV. B

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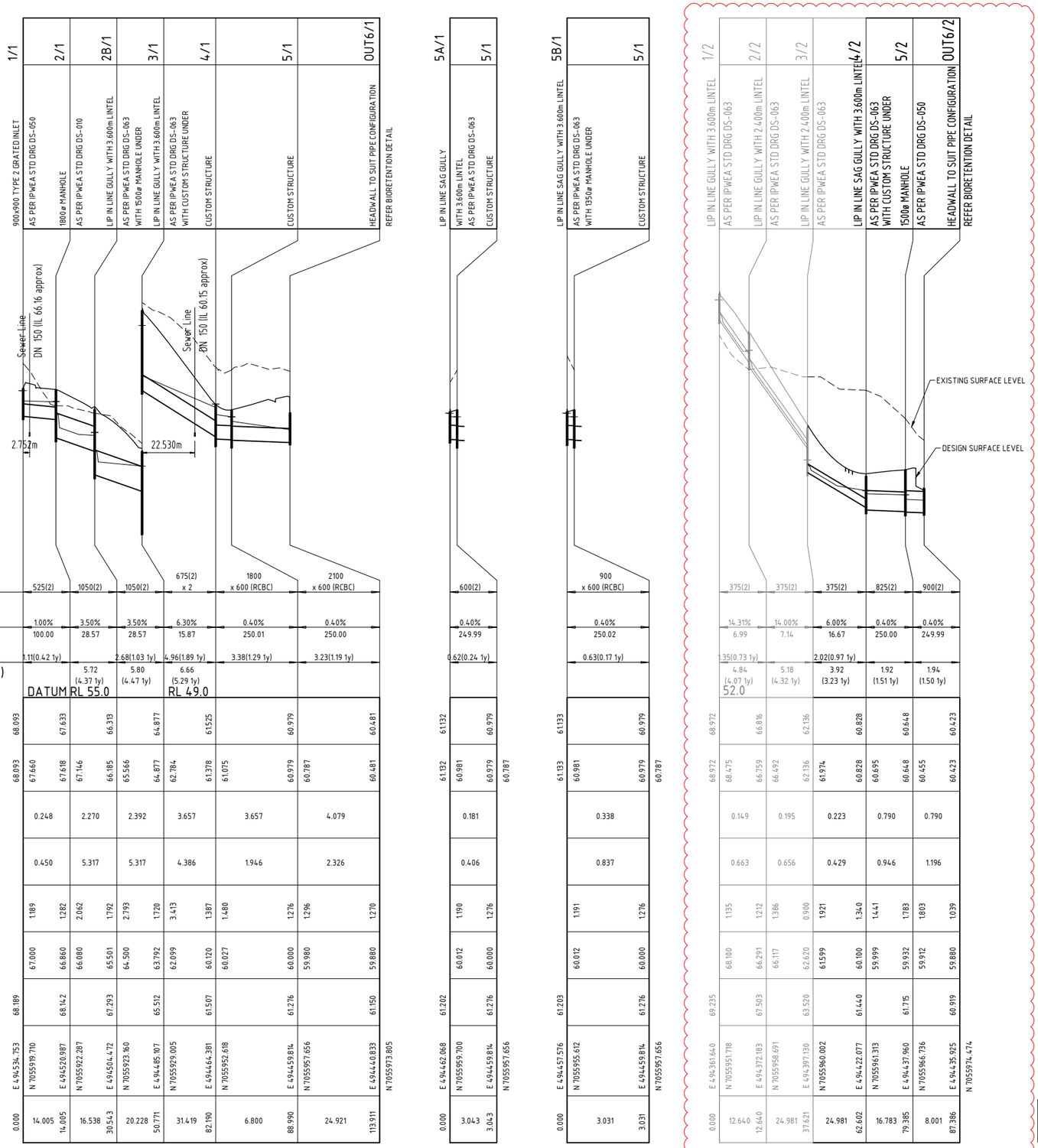

STRUCTURE NAME	1/1	2/1	2B/1	3/1	4/1	5/1	OUT6/1	5A/1	5/1	5B/1	5/1	1/2	2/2	3/2	4/2	5/2	OUT6/2
STRUCTURE DESCRIPTION	900x900 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050	1800ø MANHOLE	AS PER IPWEA STD DRG DS-010	LIP IN LINE GULLY WITH 3.600m LINTEL	AS PER IPWEA STD DRG DS-063 WITH 1500ø MANHOLE UNDER	LIP IN LINE GULLY WITH 3.600m LINTEL	AS PER IPWEA STD DRG DS-063 WITH CUSTOM STRUCTURE UNDER	CUSTOM STRUCTURE	CUSTOM STRUCTURE	HEADWALL TO SUIT PIPE CONFIGURATION REFER BIORETENTION DETAIL	LIP IN LINE SAG GULLY	WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	CUSTOM STRUCTURE	LIP IN LINE SAG GULLY WITH 3.600m LINTEL	AS PER IPWEA STD DRG DS-063 WITH 1350ø MANHOLE UNDER	CUSTOM STRUCTURE
PIPE SIZEmm (Class)		525(2)	1050(2)	1050(2)	675(2) x 2	1800 x 600 (RCBC)	2100 x 600 (RCBC)		600(2)		900 x 600 (RCBC)						
PIPE GRADE %		1.00%	3.50%	3.50%	6.30%	0.40%	0.40%		0.40%		0.40%						
PIPE SLOPE 1 in X		100.00	28.57	28.57	15.87	250.01	250.00		249.99		250.02						
FULL PIPE FLOW VELOCITY (m/s)		1.11(0.42 1y)		2.68(1.03 1y)	4.96(1.89 1y)	3.38(1.29 1y)	3.23(1.19 1y)		0.62(0.24 1y)		0.63(0.17 1y)						
PART FULL FLOW VELOCITY (m/s)			5.72 (4.37 1y)	5.80 (4.47 1y)	6.66 (5.29 1y)												
		DATUM RL 55.0			RL 49.0												
WATER LEVEL IN STRUCTURE	68.093	67.633	66.313	64.877	61.525	60.979	60.481	61.132	60.979	61.133	60.979	68.972	66.816	62.136	60.828	60.648	60.423
HYDRAULIC GRADE LEVEL	68.093	67.660	67.146	66.185	65.566	64.877	62.784	61.378	61.075	60.979	60.787	60.981	60.979	60.787	61.133	60.979	60.787	68.972	68.475	66.759	66.492	62.136	61.974	60.828	60.695	60.648	60.455	60.423
PIPE FLOW (Cumecs)		0.248	2.270	2.392	3.657	3.657	4.079		0.181		0.338		0.149	0.195	0.223	0.790	0.790
PIPE CAPACITY AT GRADE (Cumecs)		0.450	5.317	5.317	4.386	1.946	2.326		0.406		0.837		0.663	0.656	0.429	0.946	1.196
DEPTH TO INVERT		1.189 1.282	2.062 1.792	2.793 1.720	3.413 1.387	1.480 1.276	1.296 1.270		1.190 1.276		1.191 1.276		1.135 1.212	1.386 0.900	1.921 1.340	1.441 1.783	1.803 1.039
INVERT LEVEL OF DRAIN		67.000 66.860	66.080 65.501	64.500 63.792	62.099 60.120	60.027 60.000	59.980 59.880		60.012 60.000		60.012 60.000		68.100 66.291	66.117 62.620	61.599 60.100	59.999 59.932	59.912 59.880
DESIGN SURFACE LEVEL	68.189	68.142	67.293	65.512	61.507	61.276	61.150	61.202	61.276	61.203	61.276	69.235	67.503	63.520	61.440	61.715	60.919
SETOUT	E 494534.753	N 7055919.710 E 494520.987	N 7055922.287 E 494504.472	N 7055923.160 E 494485.107	N 7055929.005 E 494464.381	N 7055932.618 E 494459.814	N 7055957.656 E 494440.833 N 7055973.805	E 494462.068	N 7055959.700 E 494459.814 N 7055957.656	E 494457.576	N 7055955.612 E 494459.814 N 7055957.656	E 494361.640	N 7055951.718 E 494372.183	N 7055958.691 E 494397.130	N 7055960.002 E 494422.077	N 7055961.313 E 494437.960	N 7055966.736 E 494435.925 N 7055974.474
RUNNING CHAINAGE	0.000	14.005 14.005	16.538 30.543	20.228 50.771	31.419 82.190	6.800 88.990	24.921 113.911	0.000	3.043 3.043	0.000	3.031 3.031	0.000	12.640 12.640	24.981 37.621	24.981 62.602	16.783 79.385	8.001 87.386
LINE					1				1		1				2		

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MAJOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MINOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

Q100 LONGITUDINAL SECTIONS

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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CONTACT DETAILS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 1 OF 4 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD204 REV. B

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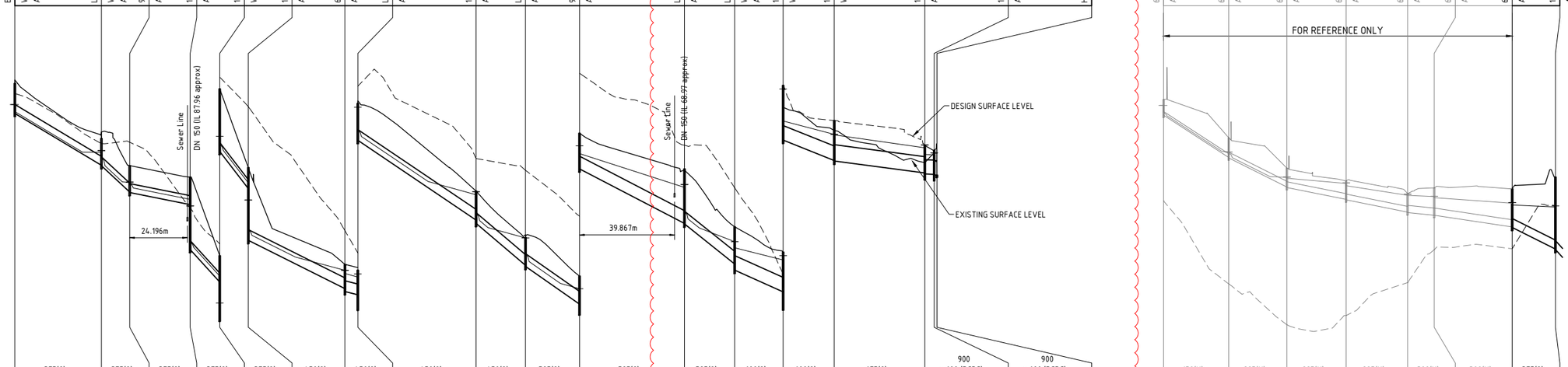

STRUCTURE NAME	1/3	2/3	3/3	4/3	5A/3	5/3	6/3	7/3	8/3	9/3	10/3	
STRUCTURE DESCRIPTION	EXISTING LIP IN LINE GULLY	WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	LIP IN LINE SAG GULLY	WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	900x900 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	1050ø MANHOLE WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	900x900 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050
PIPE SIZEmm (Class)		375(2)	375(2)	375(2)	375(2)	375(2)	450(2)	450(2)	450(2)	450(2)	525(2)	525(2)
PIPE GRADE %		6.00%	9.29%	2.00%	11.00%	13.00%	5.00%	2.50%	6.75%	8.50%	7.00%	5.20%
PIPE SLOPE 1 in X		16.67	10.77	50.00	9.09	7.69	20.00	40.00	14.81	11.76	14.29	19.23
FULL PIPE FLOW VELOCITY (m/s)		0.35(0.14 1y)	1.46(0.56 1y)				2.93(1.85 1y)	2.97(1.85 1y)	2.97(1.85 1y)	2.97(1.85 1y)	3.35(1.92 1y)	3.61(1.92 1y)
PART FULL FLOW VELOCITY (m/s)		2.41 (1.86 1y)	4.23 (3.22 1y)	2.39 (1.86 1y)	5.82 (4.82 1y)	6.26 (5.62 1y)	4.37 (3.93 1y)		4.94 (4.39 1y)	5.39 (4.78 1y)	5.62 (4.88 1y)	
		DATUM RL 77.0				70.0			63.0			57.0
WATER LEVEL IN STRUCTURE	92.851		90.916		89.595		88.594		84.517		81.843	
HYDRAULIC GRADE LEVEL	92.851	92.555	90.846	90.655	89.577	89.532	88.550	87.139	84.517	84.256	81.843	80.600
PIPE FLOW (Cumecs)		0.039		0.161		0.161		0.456		0.465		0.465
PIPE CAPACITY AT GRADE (Cumecs)		0.429		0.534		0.248		0.581		0.632		0.637
DEPTH TO INVERT		1.258	1.123	1.143	1.111	1.131	1.155	3.041	1.108	2.627	0.886	3.056
INVERT LEVEL OF DRAIN		92.479	90.300	90.280	89.177	89.157	88.650	86.764	85.400	83.881	82.320	80.150
DESIGN SURFACE LEVEL	93.737		91.423		90.288		89.805		86.508		83.206	
SETOUT	E 494331.730	N 7055820.712	E 494302.484	N 7055842.230	E 494298.404	N 7055853.379	E 494292.804	N 7055878.121	E 494290.044	N 7055890.209	E 494286.820	N 7055901.772
RUNNING CHAINAGE	0.000	36.309	36.309	11.872	48.181	25.368	73.549	12.399	85.948	12.004	97.952	40.542

STRUCTURE NAME	11/3	12/3	13/3	14/3	15/3	16/3	OUT17/3
STRUCTURE DESCRIPTION	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	LIP IN LINE SAG GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063	1050ø MANHOLE WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE WITH 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	HEADWALL TO SUIT 900.06 ø PIPE
PIPE SIZEmm (Class)	525(2)	600(2)	600(2)	675(2)	900 x 600 (RCBC)	900 x 600 (RCBC)	
PIPE GRADE %	8.00%	4.50%	4.00%	1.32%	0.40%	0.40%	
PIPE SLOPE 1 in X	12.50	22.22	25.00	75.68	250.03	250.09	
FULL PIPE FLOW VELOCITY (m/s)	3.96(2.06 1y)	3.49(1.67 1y)	3.56(1.68 1y)	2.83(1.33 1y)	1.93(0.91 1y)	1.93(0.91 1y)	
PART FULL FLOW VELOCITY (m/s)	6.14 (5.23 1y)						
			50.0				
WATER LEVEL IN STRUCTURE	69.493	67.093	66.505	64.597	64.152	63.818	63.490
HYDRAULIC GRADE LEVEL	69.373	68.374	67.093	66.838	66.324	65.161	64.597
PIPE FLOW (Cumecs)		0.887	1.020	1.040	1.043	1.043	1.043
PIPE CAPACITY AT GRADE (Cumecs)		1.272	1.360	1.283	1.004	0.837	0.837
DEPTH TO INVERT	2.287	2.307	1.563	1.819	1.670	2.297	1.678
INVERT LEVEL OF DRAIN	67.860	67.840	66.156	65.900	64.985	64.358	63.500
DESIGN SURFACE LEVEL	70.147	67.719	66.655	65.178	64.134	63.933	62.890
SETOUT	E 494233.176	N 7056043.186	E 494215.268	N 7056054.249	E 494198.599	N 7056065.905	E 494201.580
RUNNING CHAINAGE	280.955	21.050	302.005	20.340	322.345	21.450	343.795

STRUCTURE NAME	1/5	2/5	3/5	4/5	5/5	6/5	7/5	4/3
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	600x600 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1050ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)		150(U)	225(U)	225(U)	225(U)	300(U)	300(U)	375(2)
PIPE GRADE %		6.50%	5.00%	2.00%	2.00%	1.00%	1.50%	5.00%
PIPE SLOPE 1 in X		15.38	20.00	50.00	50.00	100.00	66.67	20.00
FULL PIPE FLOW VELOCITY (m/s)		1.07(1.07 1y)	0.87(0.87 1y)	1.31(1.31 1y)	1.75(1.75 1y)	1.10(1.10 1y)	1.38(1.38 1y)	1.09(1.09 1y)
PART FULL FLOW VELOCITY (m/s)		2.49 (2.49 1y)	2.67 (2.67 1y)					
		RL 77.0						
WATER LEVEL IN STRUCTURE	92.815		90.857		89.806		89.561		89.088		89.000		88.735		88.594
HYDRAULIC GRADE LEVEL	92.815	92.560	90.857	90.850	89.797	89.756	89.537	89.443	89.040	89.039	88.988	88.942	88.709	88.635	88.550	87.139
PIPE FLOW (Cumecs)		0.020		0.040		0.060		0.080		0.080		0.100		0.120	
PIPE CAPACITY AT GRADE (Cumecs)		0.050		0.143		0.090		0.090		0.118		0.145		0.392	
DEPTH TO INVERT		0.656	0.830	0.850	0.792	0.812	0.773	0.793	0.783	0.803	1.152	1.152	1.606	1.626	3.021
INVERT LEVEL OF DRAIN		92.405	90.628	90.608	89.387	89.367	88.870	88.850	88.334	88.314	88.202	88.202	87.711	87.691	86.784
DESIGN SURFACE LEVEL	93.061		91.458		90.179		89.643		89.117		89.354		89.317		89.805	
SETOUT	E 494331.828	N 7055764.365	E 494308.299	N 7055778.285	E 494288.079	N 7055791.987	E 494270.895	N 7055809.958	E 494260.628	N 7055833.609	E 494262.614	N 7055844.592	E 494274.956	N 7055874.891	E 494292.804	N 7055878.121
RUNNING CHAINAGE	0.000	27.338	27.338	24.425	51.763	24.865	76.628	25.783	102.411	11.161	113.572	32.716	146.288	18.138	164.426	

LINE 3 5

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MAJOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MINOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

Q100 LONGITUDINAL SECTIONS

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 2 OF 4 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD205 REV. B

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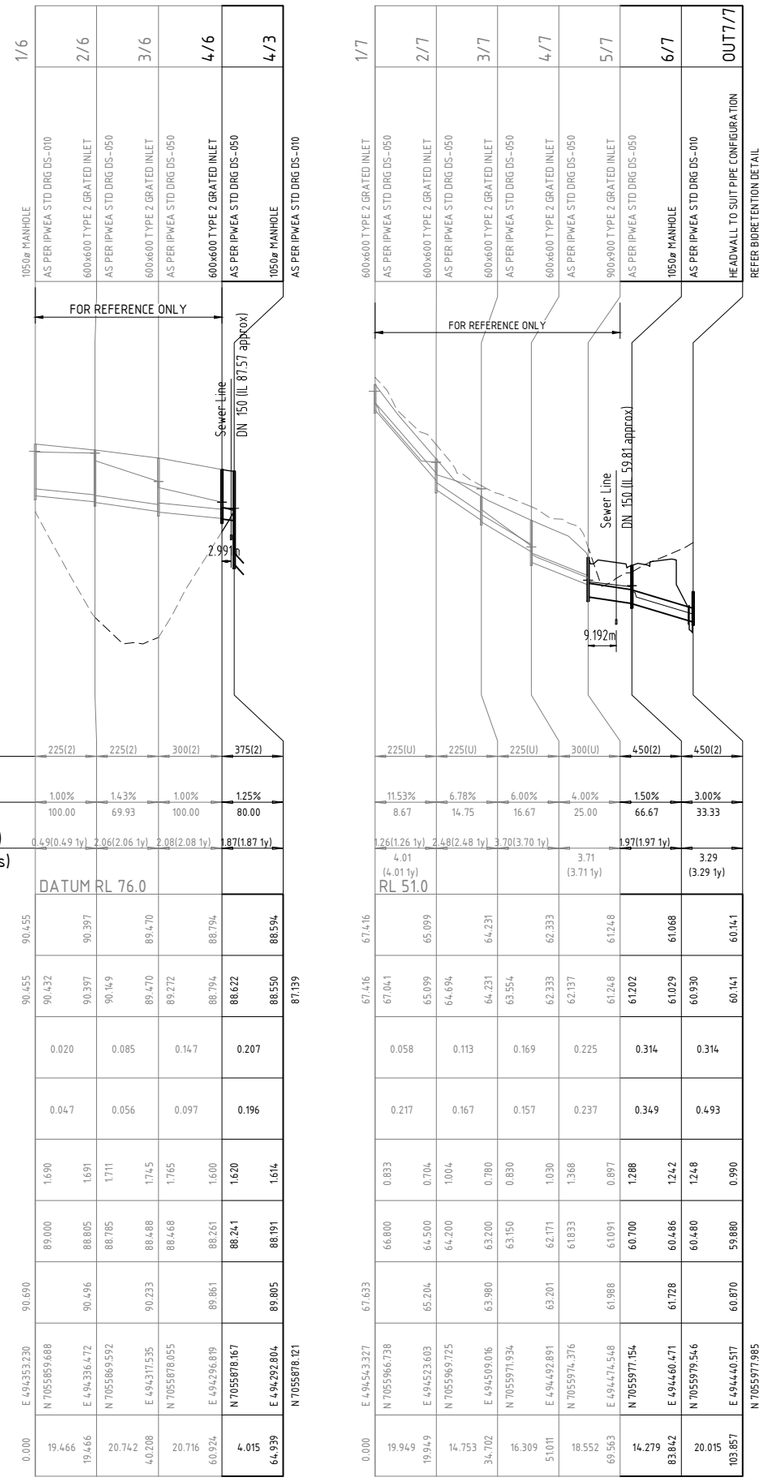

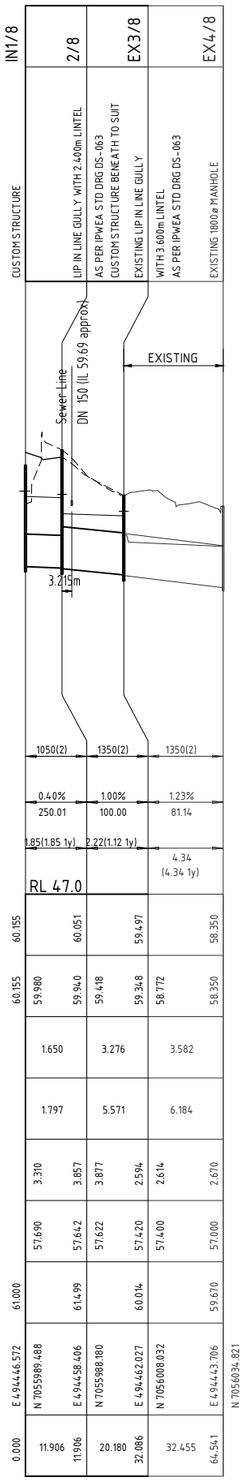

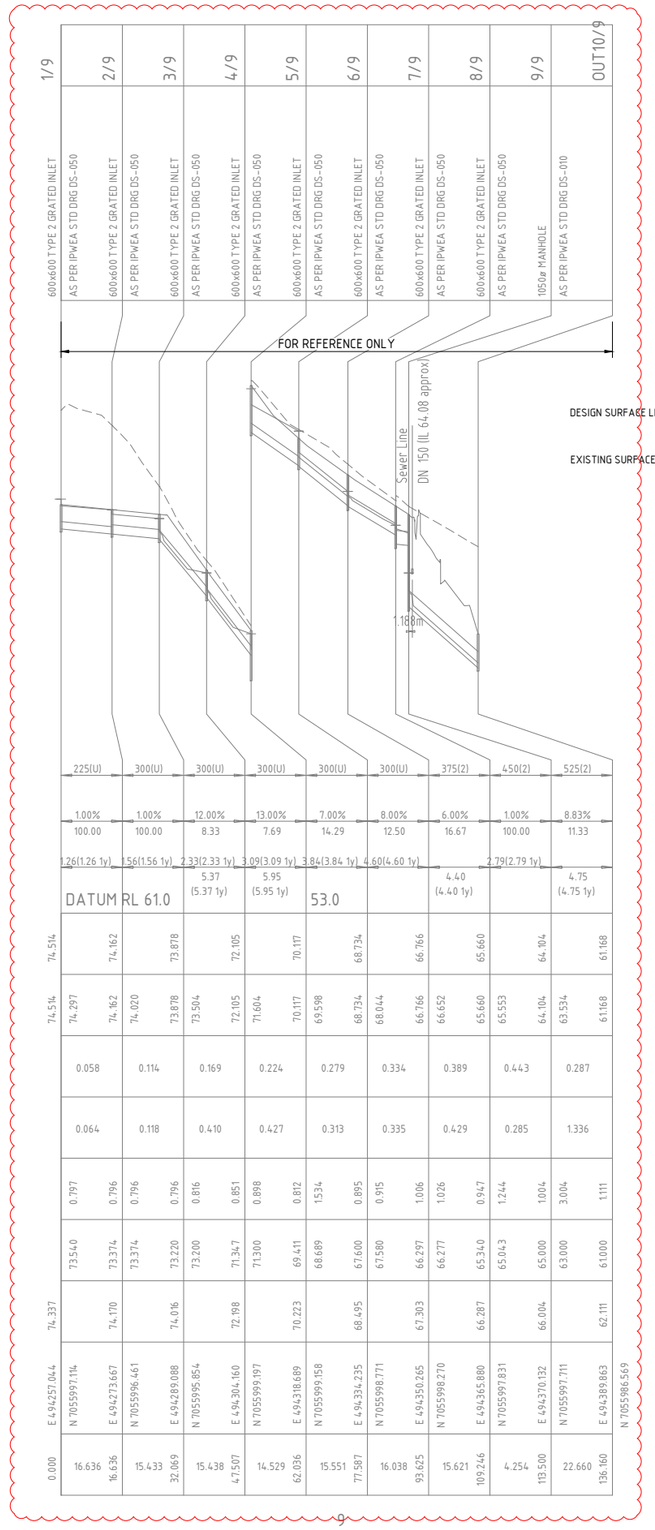

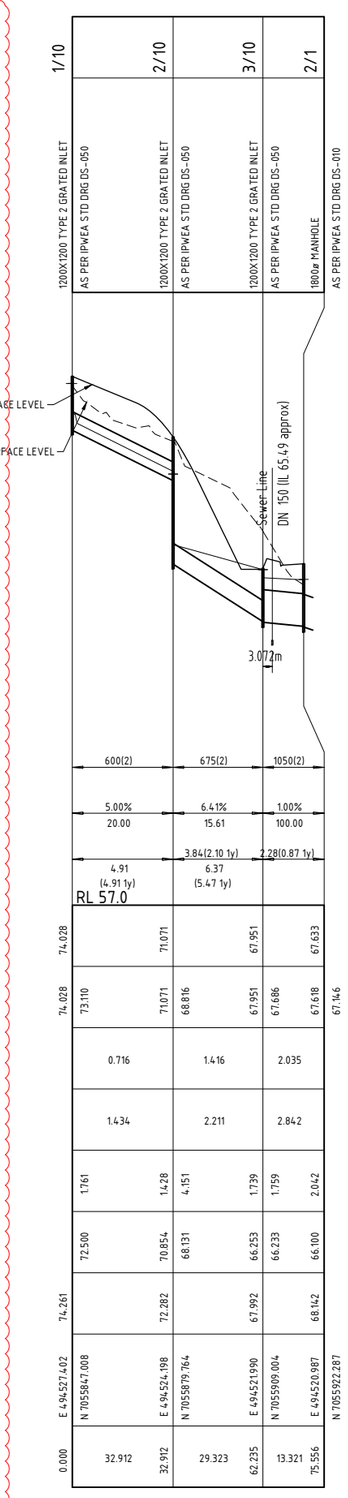

STRUCTURE NAME	1/6	2/6	3/6	4/6	4/3
STRUCTURE DESCRIPTION	1050ø MANHOLE	AS PER IPWEA STD DRG DS-010 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 1050ø MANHOLE
PIPE SIZEmm (Class)	225(2)	225(2)	300(2)	375(2)	
PIPE GRADE %	1.00%	1.43%	1.00%	1.25%	
PIPE SLOPE 1 in X	100.00	69.93	100.00	80.00	
FULL PIPE FLOW VELOCITY (m/s)	0.49(0.49 1y)	2.06(2.06 1y)	2.08(2.08 1y)	1.87(1.87 1y)	
PART FULL FLOW VELOCITY (m/s)	DATUM RL 76.0				
WATER LEVEL IN STRUCTURE	90.455	90.397	89.470	88.794	88.594
HYDRAULIC GRADE LEVEL	90.455 / 90.432	90.397 / 90.149	89.470 / 89.272	88.794 / 88.622	88.550 / 87.139
PIPE FLOW (Cumecs)	0.020	0.085	0.147	0.207	
PIPE CAPACITY AT GRADE (Cumecs)	0.047	0.056	0.097	0.196	
DEPTH TO INVERT	1.690	1.691 / 1.711	1.745 / 1.765	1.600 / 1.620	1.614
INVERT LEVEL OF DRAIN	89.000	88.805 / 88.785	88.488 / 88.468	88.261 / 88.241	88.191
DESIGN SURFACE LEVEL	90.690	90.496	90.233	89.861	89.805
SETOUT	E 494353.230 N 7055895.688	E 494336.472 N 7055869.592	E 494317.535 N 7055878.055	E 494296.819 N 7055878.167	E 494292.804 N 7055878.121
RUNNING CHAINAGE	0.000	19.466 / 19.466	20.742 / 40.208	20.716 / 60.924	4.015 / 64.939

LINE 6

STRUCTURE NAME	1/7	2/7	3/7	4/7	5/7	6/7	OUT7/7
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 900x900 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010 HEADWALL TO SUIT PIPE CONFIGURATION REFER BIORETENTION DETAIL
PIPE SIZEmm (Class)	225(U)	225(U)	225(U)	300(U)	450(2)	450(2)	
PIPE GRADE %	11.53%	6.78%	6.00%	4.00%	1.50%	3.00%	
PIPE SLOPE 1 in X	8.67	14.75	16.67	25.00	66.67	33.33	
FULL PIPE FLOW VELOCITY (m/s)	1.26(1.26 1y)	2.48(2.48 1y)	3.70(3.70 1y)		1.97(1.97 1y)		
PART FULL FLOW VELOCITY (m/s)	4.01 (4.01 1y) RL 51.0			3.71 (3.71 1y)			3.29 (3.29 1y)
WATER LEVEL IN STRUCTURE	67.416	65.099	64.231	62.333	61.248	61.068	60.141
HYDRAULIC GRADE LEVEL	67.416 / 67.041	65.099 / 64.694	64.231 / 63.554	62.333 / 62.137	61.248 / 61.202	61.029 / 60.930	60.141
PIPE FLOW (Cumecs)	0.058	0.113	0.169	0.225	0.314	0.314	
PIPE CAPACITY AT GRADE (Cumecs)	0.217	0.167	0.157	0.237	0.349	0.493	
DEPTH TO INVERT	0.833	0.704 / 1.004	0.780 / 0.830	1.030 / 1.368	0.897 / 1.288	1.242 / 1.248	0.990
INVERT LEVEL OF DRAIN	66.800	64.500 / 64.200	63.200 / 63.150	62.171 / 61.833	61.091 / 60.700	60.486 / 60.480	59.880
DESIGN SURFACE LEVEL	67.633	65.204	63.980	63.301	61.988	61.728	60.870
SETOUT	E 494543.327 N 7055966.738	E 494523.603 N 7055969.725	E 494509.016 N 7055971.934	E 494492.891 N 7055974.376	E 494474.548 N 7055977.154	E 494460.471 N 7055979.546	E 494440.517 N 7055977.985
RUNNING CHAINAGE	0.000	19.949 / 19.949	14.753 / 34.702	16.309 / 51.011	18.552 / 69.563	14.279 / 83.842	20.015 / 103.857

7

STRUCTURE NAME	IN1/8	2/8	EX3/8	EX4/8
STRUCTURE DESCRIPTION	CUSTOM STRUCTURE	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063 CUSTOM STRUCTURE BENEATH TO SUIT	EXISTING LIP IN LINE GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	EXISTING 1800ø MANHOLE
PIPE SIZEmm (Class)	1050(2)	1350(2)	1350(2)	
PIPE GRADE %	0.40%	1.00%	1.23%	
PIPE SLOPE 1 in X	250.01	100.00	81.14	
FULL PIPE FLOW VELOCITY (m/s)	1.85(1.85 1y)	2.22(1.12 1y)		
PART FULL FLOW VELOCITY (m/s)	RL 47.0		4.34 (4.34 1y)	
WATER LEVEL IN STRUCTURE	60.155	60.051	59.497	58.350
HYDRAULIC GRADE LEVEL	60.155 / 59.980	59.94.0 / 59.418	59.348 / 58.772	58.350
PIPE FLOW (Cumecs)	1.650	3.276	3.582	
PIPE CAPACITY AT GRADE (Cumecs)	1.797	5.571	6.184	
DEPTH TO INVERT	3.310	3.857 / 3.877	2.594 / 2.614	2.670
INVERT LEVEL OF DRAIN	57.690	57.642 / 57.622	57.420 / 57.400	57.000
DESIGN SURFACE LEVEL	61.000	61.499	60.014	59.670
SETOUT	E 494446.572 N 7055989.488	E 494458.406 N 7055988.180	E 494462.027 N 7056008.032	E 494443.706 N 7056034.821
RUNNING CHAINAGE	0.000	11.906 / 11.906	20.180 / 32.086	32.455 / 64.541

8

STRUCTURE NAME	1/9	2/9	3/9	4/9	5/9	6/9	7/9	8/9	9/9	OUT10/9
STRUCTURE DESCRIPTION	600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	AS PER IPWEA STD DRG DS-050 600x600 TYPE 2 GRATED INLET	1050ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)	225(U)	300(U)	300(U)	300(U)	300(U)	300(U)	375(2)	450(2)	525(2)	
PIPE GRADE %	1.00%	1.00%	12.00%	13.00%	7.00%	8.00%	6.00%	1.00%	8.83%	
PIPE SLOPE 1 in X	100.00	100.00	8.33	7.69	14.29	12.50	16.67	100.00	11.33	
FULL PIPE FLOW VELOCITY (m/s)	1.26(1.26 1y)	1.56(1.56 1y)	2.33(2.33 1y)	3.09(3.09 1y)	3.84(3.84 1y)	4.60(4.60 1y)		2.79(2.79 1y)		
PART FULL FLOW VELOCITY (m/s)	DATUM RL 61.0		5.37 (5.37 1y)	5.95 (5.95 1y)	53.0		4.40 (4.40 1y)		4.75 (4.75 1y)	
WATER LEVEL IN STRUCTURE	74.514	74.162	73.878	72.105	70.117	68.734	66.766	65.660	64.104	61.168
HYDRAULIC GRADE LEVEL	74.514 / 74.297	74.162 / 74.020	73.878 / 73.504	72.105 / 71.604	70.117 / 69.598	68.734 / 68.044	66.766 / 66.652	65.660 / 65.553	64.104 / 63.534	61.168
PIPE FLOW (Cumecs)	0.058	0.114	0.169	0.224	0.279	0.334	0.389	0.443	0.287	
PIPE CAPACITY AT GRADE (Cumecs)	0.064	0.118	0.410	0.427	0.313	0.335	0.429	0.285	1.336	
DEPTH TO INVERT	0.797	0.796	0.796	0.898	0.816 / 0.851	0.895 / 0.915	1.006 / 1.026	0.947 / 1.244	1.004 / 3.004	1.111
INVERT LEVEL OF DRAIN	74.337 / 73.540	73.374	73.374	71.300	73.200 / 71.347	67.600 / 67.580	66.297 / 66.277	65.340 / 65.043	65.000 / 63.000	61.000
DESIGN SURFACE LEVEL		74.170	74.016	72.198	69.411	68.495	67.303	66.287	66.004	62.111
SETOUT	E 494257.044 N 7055997.114	E 494273.667 N 7055996.461	E 494289.088 N 7055995.854	E 494304.160 N 7055993.197	E 494318.689 N 7055999.158	E 494334.235 N 7055998.771	E 494350.265 N 7055998.270	E 494365.880 N 7055997.831	E 494370.132 N 7055997.711	E 494389.863 N 7055986.569
RUNNING CHAINAGE	0.000	16.636 / 16.636	15.433 / 32.069	15.438 / 47.507	14.529 / 62.036	15.551 / 77.587	16.038 / 93.625	15.621 / 109.246	4.254 / 113.500	22.660 / 136.160

9

STRUCTURE NAME	1/10	2/10	3/10	2/1
STRUCTURE DESCRIPTION	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1800ø MANHOLE AS PER IPWEA STD DRG DS-010
PIPE SIZEmm (Class)	600(2)	675(2)	1050(2)	
PIPE GRADE %	5.00%	6.41%	1.00%	
PIPE SLOPE 1 in X	20.00	15.61	100.00	
FULL PIPE FLOW VELOCITY (m/s)		3.84(2.10 1y)	2.28(0.87 1y)	
PART FULL FLOW VELOCITY (m/s)	4.91 (4.91 1y) RL 57.0	6.37 (5.47 1y)		
WATER LEVEL IN STRUCTURE	74.028	71.071	67.951	67.633
HYDRAULIC GRADE LEVEL	74.028 / 73.110	71.071 / 68.816	67.951 / 67.686	67.618 / 67.146
PIPE FLOW (Cumecs)	0.716	1.416	2.035	
PIPE CAPACITY AT GRADE (Cumecs)	1.434	2.211	2.842	
DEPTH TO INVERT	1.761	1.428 / 4.151	1.739 / 1.759	2.042
INVERT LEVEL OF DRAIN	72.500	70.854 / 68.131	66.253 / 66.233	66.100
DESIGN SURFACE LEVEL	74.261	72.282	67.992	68.142
SETOUT	E 494527.402 N 7055841.008	E 494524.198 N 7055879.764	E 494521.990 N 7055909.004	E 494520.987 N 7055922.287
RUNNING CHAINAGE	0.000	32.912 / 32.912	29.323 / 62.235	13.321 / 75.556

10

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Q100 LONGITUDINAL SECTIONS

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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CONTACT DETAILS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 3 OF 4 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD206 REV. B

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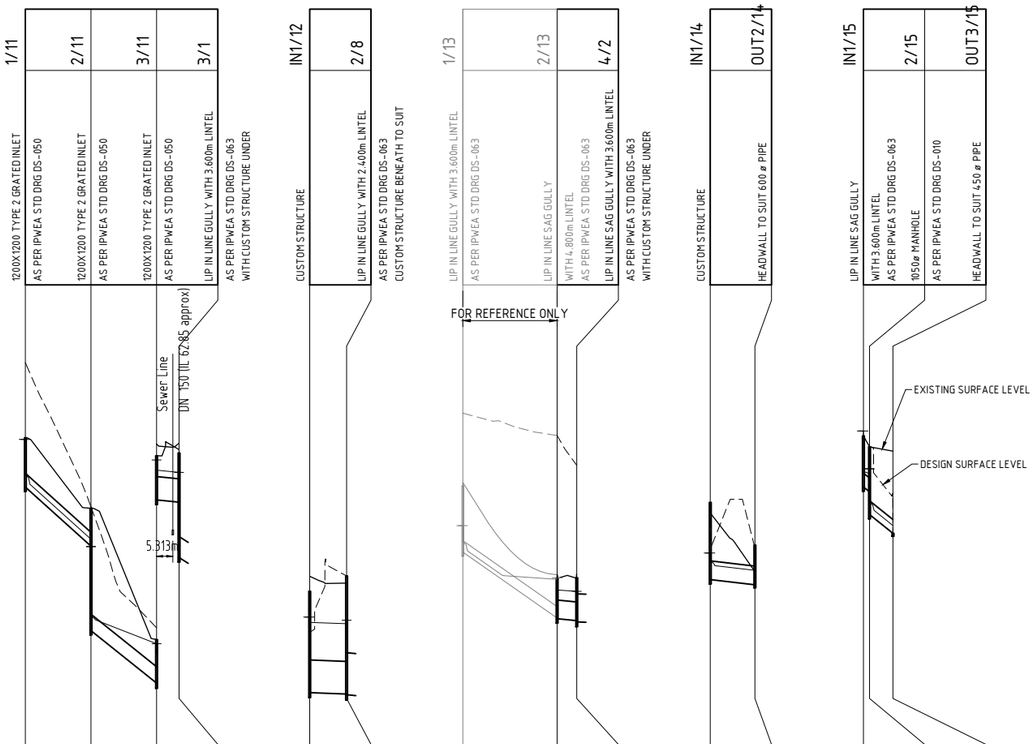

STRUCTURE NAME	1/11	2/11	3/11	3/1	IN1/12	2/8	1/13	2/13	4/2	IN1/14	OUT2/14	IN1/15	2/15	OUT3/15
STRUCTURE DESCRIPTION	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	1200X1200 TYPE 2 GRATED INLET AS PER IPWEA STD DRG DS-050	LIP IN LINE GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063 WITH CUSTOM STRUCTURE UNDER	CUSTOM STRUCTURE	LIP IN LINE GULLY WITH 2.400m LINTEL AS PER IPWEA STD DRG DS-063 CUSTOM STRUCTURE BENEATH TO SUIT	LIP IN LINE GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	LIP IN LINE SAG GULLY	LIP IN LINE SAG GULLY WITH 4.800m LINTEL AS PER IPWEA STD DRG DS-063 LIP IN LINE SAG GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063 WITH CUSTOM STRUCTURE UNDER	CUSTOM STRUCTURE	HEADWALL TO SUIT 600 ø PIPE	LIP IN LINE SAG GULLY WITH 3.600m LINTEL AS PER IPWEA STD DRG DS-063	1050ø MANHOLE AS PER IPWEA STD DRG DS-010	HEADWALL TO SUIT 450 ø PIPE
PIPE SIZEmm (Class)	450(2)	525(2)	750(2)		1050(2)		375(2)		600(2)	600(2)		450(2)	450(2)	
PIPE GRADE %	9.00%	8.00%	1.00%		0.40%		7.00%		1.00%	1.17%		8.00%	8.00%	
PIPE SLOPE 1 in X	11.11	12.50	100.00		250.00		14.29		100.00	85.72		12.50	12.50	
FULL PIPE FLOW VELOCITY (m/s)		3.80(2.00 1y)	2.56(0.98 1y)		1.85(1.85 1y)		1.32(0.60 1y)		1.83(0.62 1y)			3.12(1.19 1y)		
PART FULL FLOW VELOCITY (m/s)	5.38 (5.38 1y)	6.08 (5.18 1y)					3.72 (2.97 1y)			2.70 (2.70 1y)			5.33 (4.14 1y)	
	DATUM RL 57.0		RL 51.0											
WATER LEVEL IN STRUCTURE	71.956	68.456	65.285	64.877	60.155	60.051	63.139	61.434	60.995	62.246	61.682	66.230	64.996	63.145
HYDRAULIC GRADE LEVEL	71.956 / 70.850	68.456 / 66.248	65.285 / 64.951	64.877 / 62.784	60.155 / 59.981	59.940 / 59.418	63.139 / 62.652	61.388	61.040 / 60.995 / 60.914	62.246 / 61.990	61.682	66.230 / 64.906	64.845 / 63.952	63.145
PIPE FLOW (Cumecs)	0.428	0.850	1.168		1.650		0.146		0.535	0.655		0.496	0.496	
PIPE CAPACITY AT GRADE (Cumecs)	0.855	1.272	1.161		1.797		0.464		0.641	0.693		0.806	0.806	
DEPTH TO INVERT	1.610	1.238 / 3.996	1.422 / 1.442	1.605	3.310	3.857	2.162	1.311	1.331 / 1.401	2.520	1.295	1.666	1.473 / 2.215	0.000
INVERT LEVEL OF DRAIN	70.400	68.472 / 65.714	64.000 / 63.980	63.907	57.690	57.642	62.277	60.123	60.103 / 60.039	61.380	61.210	64.404	64.244 / 63.502	62.890
DESIGN SURFACE LEVEL	72.010	69.710	65.422	65.512	61.000	61.499	64.439	61.434	61.440	63.900	62.505	66.070	65.717	62.890
SETOUT	E 494476.210 N 7055879.621	E 494480.008 N 7055900.703	E 494483.806 N 7055921.785	E 494485.107 N 7055929.005	E 494446.382 N 7055987.483	E 494458.406 N 7055988.180	E 494391.679 N 7055953.996	E 494422.414	N 7055954.911 E 494422.077 N 7055961.313	E 494232.676 N 7056114.22	E 494219.947 N 7056154.516	E 494227.174 N 7056111.342	E 494225.350 N 7056112.162	E 494229.105 N 7056118.830
RUNNING CHAINAGE	0.000 21.421	21.421 21.421	21.421 42.842	7.336 50.178	0.000 12.044	12.044	0.000 30.777	30.777	6.411 31.188	0.000 14.572	14.572	0.000 2.000	2.000 7.653	9.653
LINE	11				12		13			14		15		

Q100 LONGITUDINAL SECTIONS

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SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER LONGITUDINAL SECTION SHEET 4 OF 4 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD207 REV. B

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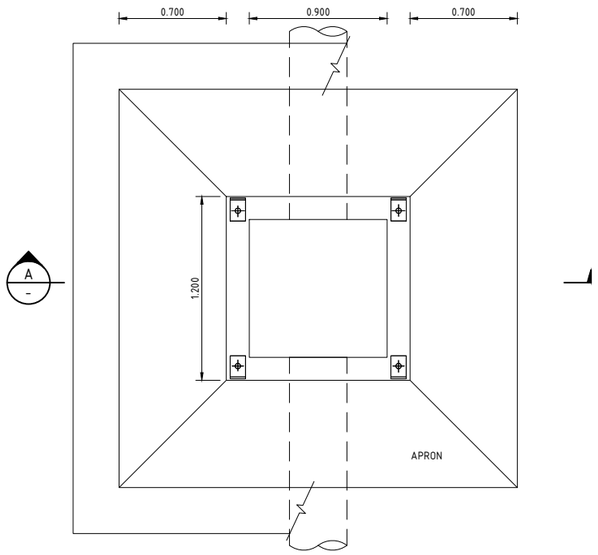
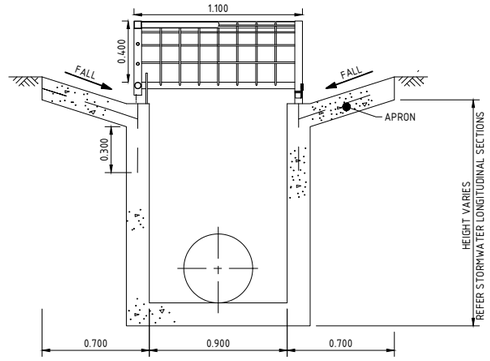
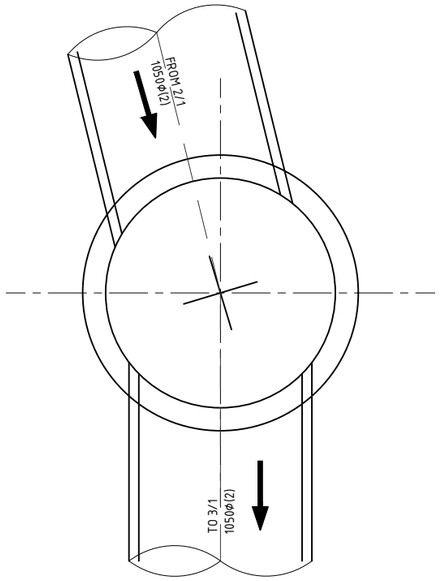


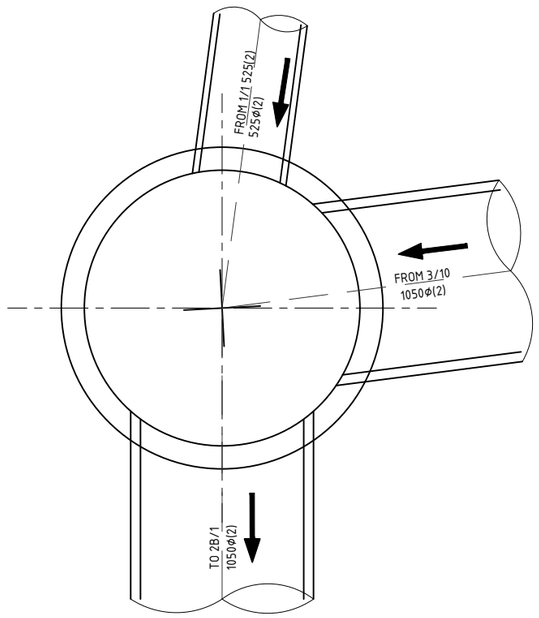
PLAN
SCALE 1:20



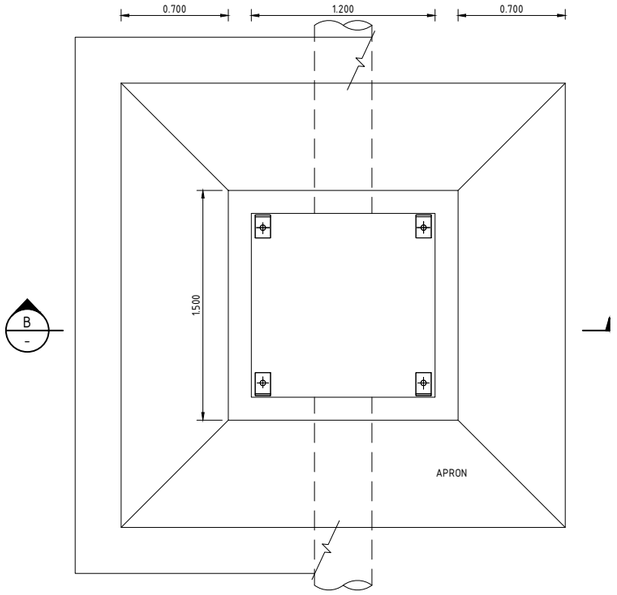
SECTION A
SCALE 1:20



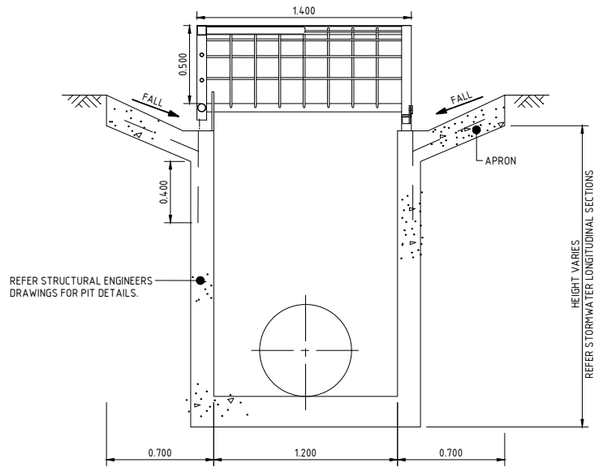
MANHOLE 2B/1 DETAIL
SCALE 1:20



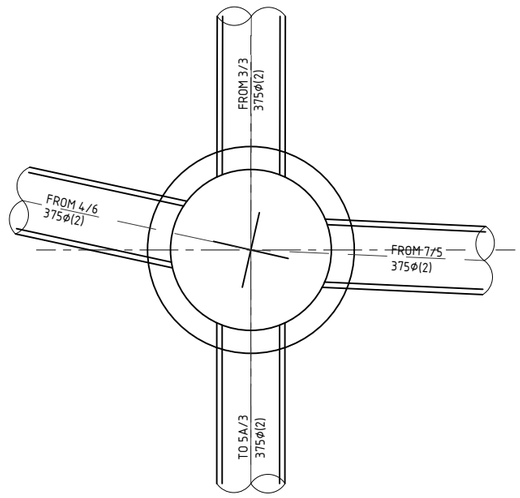
MANHOLE 2/1 DETAIL
SCALE 1:20



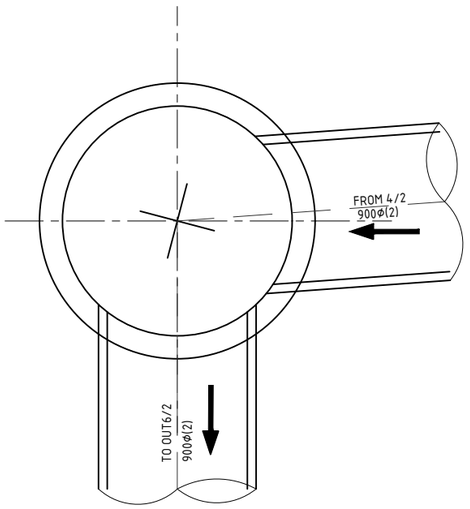
PLAN
SCALE 1:20



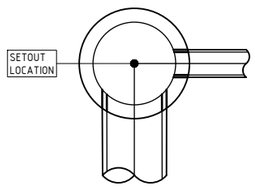
SECTION B
SCALE 1:20



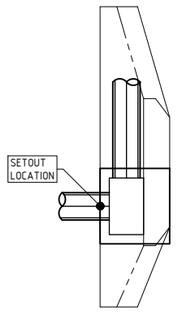
MANHOLE 4/3 DETAIL
SCALE 1:20



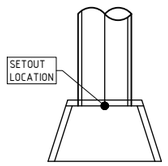
MANHOLE 5/2 DETAIL
SCALE 1:20



STORMWATER MANHOLE
SETOUT LOCATION



STORMWATER GULLY
SETOUT LOCATION



STORMWATER HEADWALL
SETOUT LOCATION

SCALE 1:20 (A1) 0 400 800 1200mm
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE
CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DETAILS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD300
REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

LEGEND

CATCHMENT AREA

CATCHMENT AREAS	
CATCHMENT NAME	AREA (HA)
EX5/8	1.5080
2/8	0.0090
2/6	0.0590
3/6	0.0550
4/6	0.0540
1/3	0.0500
2/3	0.1480
5A/3	0.0180
6/3	0.0230
9/3	0.5510
10/3	0.0150
11/3	0.1680
12/3	0.1100
13/3	0.0330
14/3	0.0100
IN1/15	0.7170
EX1/4	2.0700
1/10	0.9900
1/1	0.3710
2B/1	0.4220
1/11	1.7900
3/1	0.1560
5A/1	0.2260
5B/1	0.2540
1/9	0.0830

CATCHMENT AREAS	
CATCHMENT NAME	AREA (HA)
2/9	0.0620
3/9	0.0620
4/9	0.0640
5/9	0.0620
6/9	0.0590
7/9	0.6000
8/9	0.6000
1/2	0.3690
2/2	0.0700
3/2	0.0220
1/13	0.1720
2/13	0.3310
4/2	0.0490
1/7	0.0900
2/7	0.6500
3/7	0.6000
4/7	0.6000
5/7	0.0080
1/5	0.0880
2/5	0.0870
3/5	0.0800
4/5	0.0600
5/5	0.0615
6/5	0.0830

PLAN
SCALE 1:1000

SCALE 1:1000 (A1) 0 20 40 60m
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

MILANOVIC NEALE
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TRAFFIC
PROJECT MANAGEMENT
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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER CATCHMENT PLAN

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD400
REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN															HEADLOSSES					PART FULL						DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp								
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m		m		m	m	m/s	m	m	m	m	m	m	
2 2	IN1/12	IN1/12 to IN1A/12															26				5.00 5.00	154 154	3.857 3.857	1650		Additional (Pipe flow=	1650 flow: 1.65 Sum upstr	1.600 cumecs atten flows)	0.40	1050(2)	1.85(1.85 ty) (2.01)	0.01			0.174	1.00	0.175			1.00	0.175	0.34	0.005			58.772 58.766	60.046 60.041	60.221		60.221	59.533	IN1/12
2 2	IN1A/12	IN1A/12 to 2/8															26				5.01 5.01	154 154	3.857 3.857	1650		(Pipe flow=	1650 Sum upstr	12.044 atten flows)	0.40	1050(2)	1.85(1.85 ty) (2.01)	0.11		Qo 1.650 Do 1050 CHART 50 Du/Do1.00 alpha 2 K'w 0.13 Vu 1.91 WSE 0.08 Ku 0.34 Kw 0.48	0.174	0.34	0.059			0.48	0.083	0.34	0.041			58.754 58.706	59.982 59.941	60.041		60.065	59.592	IN1A/12
2 2	IN1/8	IN1/8 to IN1A/8															26				5.00 5.00	154 154	3.857 3.857	1650		Additional (Pipe flow=	1650 flow: 1.65 Sum upstr	1.613 cumecs atten flows)	0.40	1050(2)	1.85(1.85 ty) (2.01)	0.01			0.174	1.00	0.175			1.00	0.175	0.34	0.005			58.772 58.766	60.058 60.053	60.233		60.233	59.579	IN1/8
2 2	IN1A/8	IN1A/8 to 2/8															26				5.01 5.01	154 154	3.857 3.857	1650		(Pipe flow=	1650 Sum upstr	11.906 atten flows)	0.40	1050(2)	1.85(1.85 ty) (2.01)	0.11		Qo 1.650 Do 1050 CHART 50 Du/Do1.00 alpha 7 K'w 0.17 Vu 1.91 WSE 0.10 Ku 0.41 Kw 0.59	0.174	0.41	0.072			0.59	0.103	0.34	0.040			58.754 58.706	59.981 59.941	60.053		60.084	59.632	IN1A/8
2 2	2/8	2/8 to EX3/8	2/8			5.00 5.00	154 154		0.75 0.75	0.009 0.009	0.007 0.007	0.007 0.007	3 3	3	7.67	514	7	3 (UNLOCKED	0	EX3/8	5.12 5.12	153 153	7.721 7.721	3282		(Pipe flow=	3282 Sum upstr	20.180 atten flows)	1.00	1350(2)	2.22(2.22 ty) (3.77)	0.15		Qg 0.003 Qo 3.282 Do 1350 Routine 2.15 Join Pipes: IN1A/12 and IN1A/8 Vel 1.893 Vel2 1.893 Eq Dia 1484 Angle 261 Flow 3.279 Angle 81 Chart 47 S/Do 2.5 chartdeg Du/Do 1.10 K0 1.90 K0.5 2.00 Qu/Qo 1.00 Cg 0.00 K 1.90	0.251	2.08	0.523		S/Do 2.0 S/Do 1.5 Interp va CHART 46 S/Do 2.0 S/Do 1.5 Interp va	K0 2.41 K0.5 K0 2.65 K0.5 for S/Do 1. K0 2.07 K0.5 K0 2.09 K0.5 for S/Do 1.	2.52 K 2.41 2.52 K 2.65 77 Kw 2.5 1.82 K 2.07 2.31 K 2.09 77 Ku 2.0	0.633	0.35	0.070			58.994 58.792	59.418 59.348	59.941		60.051	61.499	2/8
2 2	EX3/8	EX3/8 to EX4/8	2/8,EX3/8			8.00 8.00	130 130		0.65 0.65	1.308 1.308	0.850 0.850	0.850 0.850	307 307	307 FLOW WIDTH DOWNSTREAM	7.67 2.385 m 1.563m	514	8	180 (UNLOCKED	127	EX4/8	8.00 8.00	130 130	8.571 8.571	3095		(Pipe	3582 low set by	32.455 user)	1.23	1350(2)	2.42(2.42 ty) (4.18)	0.22		Qg 0.794 Qo 3.582 Do 1350 Angle 44 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.78 Cg 0.52 K 1.86 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.04 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.46	0.298	1.93	0.576		Interp va CHART 38 S/Do 2.0 S/Do 1.5 Interp va	for S/Do 1. K0 1.84 K0.5 K0 2.05 K0.5 for S/Do 1.	2.43 K 2.4 53 Kw 2.43 1.75 K 1.72 1.84 K 1.95 53 Ku 1.91	0.725	0.41	0.134	0.749 (0.749 ty)	4.34 (4.34 ty)	58.772 58.372	58.772 58.350	59.348		59.497	60.014	EX3/8
2 2	**1/9**	**1/9 to 2/9**	**1/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.083 0.083**	**0.053 0.053**	**0.053 0.053**	**23 23**	**23 FLOW WIDTH/DEPTH 0.057Dp m**	**1.00**	**38**	**HD.08L2.4A.36**	**23 (UNLOCKED**	**0**	**2/9**	**5.00 5.00**	**154 154**	**0.053 0.100**	**43**		**Additional (Pipe flow=**	**43 flow: 0.020 Sum upstr**	**16.636 cumecs atten flows)**	**1.00**	**225(U)**	**0.93(0.93 ty) (1.40)**	**0.28**		**Qg 0.043 Qo 0.043 Do 225 CHRT 32: Vo2/2gDo 0.18 H/Do 0.61 Kg side flow 4.93 end flow 4.04**	**0.044**	**4.93**	**0.217**			**4.93**	**0.217**	**0.45**	**0.074**			**73.782 73.615**	**73.928 73.854**	**74.145**		**74.145**	**74.337**	**1/9**
2 2	**2/9**	**2/9 to 3/9**	**1/9;2/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.062 0.062**	**0.040 0.040**	**0.040 0.040**	**17 17**	**17 FLOW WIDTH/DEPTH 0.047Dp m**	**1.00**	**38**	**HD.08L2.4A.36**	**17 (UNLOCKED**	**0**	**3/9**	**5.28 5.28**	**151 151**	**0.140 0.187**	**78**		**Additional (Pipe flow=**	**79 flow: 0.020 Sum upstr**	**15.433 cumecs atten flows)**	**1.00**	**300(U)**	**1.08(1.08 ty) (1.63)**	**0.24**		**Qg 0.037 Qo 0.079 Do 300 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.47 K 1.04 S/Do 1.58 cor 0.47 Ku 1.51 Kw 1.51**	**0.059**	**1.51**	**0.090**			**1.51**	**0.090**	**0.44**	**0.068**			**73.678 73.524**	**73.764 73.696**	**73.854**		**73.854**	**74.170**	**2/9**
2 2	**3/9**	**3/9 to 4/9**	**1/9;2/9;3/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.062 0.062**	**0.040 0.040**	**0.040 0.040**	**17 17**	**17 FLOW WIDTH/DEPTH 0.047Dp m**	**1.00**	**38**	**HD.08L2.4A.36**	**17 (UNLOCKED**	**0**	**4/9**	**5.52 5.52**	**149 149**	**0.227 0.276**	**114**		**Additional (Pipe flow=**	**114 flow: 0.020 Sum upstr**	**15.438 cumecs atten flows)**	**12.00**	**300(U)**	**1.57(1.57 ty) (5.65)**	**0.16**		**Qg 0.037 Qo 0.114 Do 300 CHART 34 Angle 15 Case3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.32 K 1.23 S/Do 1.63 cor 0.30 Ku 1.53 Kw 1.53**	**0.126**	**1.53**	**0.192**			**1.53**	**0.192**	**0.93**	**0.143**	**0.110 (0.110 ty)**	**4.84 (4.84 ty)**	**73.504 71.652**	**73.504 71.861**	**73.696**		**73.696**	**74.016**	**3/9**
2 2	**4/9**	**4/9 to 5/9**	**1/9;2/9;3/9;4/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.064 0.064**	**0.041 0.041**	**0.041 0.041**	**18 18**	**18 FLOW WIDTH/DEPTH 0.048Dp m**	**13.90**	**38**	**HD.08L2.4A.36**	**18 (UNLOCKED**	**0**	**5/9**	**5.68 5.68**	**147 147**	**0.317 0.366**	**149**		**Additional (Pipe flow=**	**149 flow: 0.020 Sum upstr**	**14.529 cumecs atten flows)**	**13.00**	**300(U)**	**2.06(2.06 ty) (5.88)**	**0.12**		**Qg 0.037 Qo 0.149 Do 300 CHART 34 Angle 13 Case3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.25 K 1.04 S/Do 1.85 cor 0.15 Ku 1.19 Kw 1.19**	**0.216**	**1.19**	**0.257**			**1.19**	**0.257**	**1.59**	**0.231**	**0.124 (0.124 ty)**	**5.36 (5.36 ty)**	**71.604 69.715**	**71.604 69.596**	**71.861**		**71.861**	**72.198**	**4/9**
2 2	**5/9**	**5/9 to 6/9**	**1/9;2/9;3/9;4/9;5/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.062 0.062**	**0.040 0.040**	**0.040 0.040**	**17 17**	**17 FLOW WIDTH/DEPTH 0.047Dp m**	**13.60**	**38**	**HD.08L2.4A.36**	**17 (UNLOCKED**	**0**	**6/9**	**5.80 5.80**	**146 146**	**0.406 0.455**	**185**		**Additional (Pipe flow=**	**185 flow: 0.020 Sum upstr**	**15.551 cumecs atten flows)**	**9.00**	**300(U)**	**2.54(2.54 ty) (4.89)**	**0.10**		**Qg 0.036 Qo 0.185 Do 300 Flow 4/9 made eqv grate flow CHRT 32: Vo2/2gDo 1.08 H/Do 0.00 Kg side flow 2.73 end flow 2.53 K vals above for stepped pipes as grate flow grate flow decreased by 0.148 from 4/9**	**0.329**	**0.89**	**0.292**		CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.20 K 0.80 S/Do 1.96 cor 0.09 Ku 0.89 Kw 0.89 K vals step pipes as pipe flow Ku 0.89 Kw 0.89		**0.89**	**0.292**	**2.43**	**0.378**	**0.156 (0.156 ty)**	**4.94 (4.94 ty)**	**69.304 67.904**	**69.304 68.230**	**69.596**		**69.596**	**70.223**	**5/9**
2 2	**6/9**	**6/9 to 7/9**	**1/9;2/9;3/9;4/9;5/9 ;6/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.059 0.059**	**0.038 0.038**	**0.038 0.038**	**16 16**	**16 FLOW WIDTH/DEPTH 0.045Dp m**	**9.00**	**38**	**HD.08L2.4A.36**	**16 (UNLOCKED**	**0**	**7/9**	**5.90 5.90**	**145 145**	**0.493 0.543**	**219**		**Additional (Pipe flow=**	**219 flow: 0.020 Sum upstr**	**16.038 cumecs atten flows)**	**8.00**	**300(U)**	**3.01(3.01 ty) (4.61)**	**0.09**		**Qg 0.035 Qo 0.219 Do 300 CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.16 K 0.70 S/Do 2.13 cor 0.05 Ku 0.75 Kw 0.75**	**0.462**	**0.75**	**0.346**			**0.75**	**0.346**	**3.41**	**0.547**	**0.179 (0.179 ty)**	**4.91 (4.91 ty)**	**67.884 66.601**	**67.884 66.703**	**68.230**		**68.230**	**68.495**	**6/9**
2 2	**7/9**	**7/9 to 8/9**	**1/9;2/9;3/9;4/9;5/9 ;6/9;7/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.060 0.060**	**0.038 0.038**	**0.038 0.038**	**16 16**	**16 FLOW WIDTH/DEPTH 0.045Dp m**	**7.15**	**38**	**HD.08L2.4A.36**	**16 (UNLOCKED**	**0**	**8/9**	**5.99 5.99**	**145 145**	**0.581 0.630**	**254**		**Additional (Pipe flow=**	**254 flow: 0.020 Sum upstr**	**15.621 cumecs atten flows)**	**6.00**	**375(2)**	**2.30(2.30 ty) (3.89)**	**0.11**		**Qg 0.035 Qo 0.254 Do 375 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.80 Qg/Qo 0.14 K -0.03 S/Do 1.13 cor 0.22 Ku 0.19 Kw 0.19**	**0.270**	**0.19**	**0.051**			**0.19**	**0.051**	**2.10**	**0.328**	**0.208 (0.208 ty)**	**4.05 (4.05 ty)**	**66.652 65.715**	**66.652 65.547**	**66.703**		**66.703**	**67.303**	**7/9**
2 2	**8/9**	**8/9 to 9/9**	**1/9;2/9;3/9;4/9;5/9 ;6/9;7/9;8/9**			**5.00 5.00**	**154 154**		**0.64 0.64**	**0.060 0.060**	**0.038 0.038**	**0.038 0.038**	**16 16**	**16 FLOW WIDTH/DEPTH 0.045Dp m**	**6.40**	**38**	**HD.08L2.4A.36**	**16 (UNLOCKED**	**0**		**6.10 6.10**	**144 144**	**0.668 0.718**	**287**		**Additional (Pipe flow=**	**287 flow: 0.020 Sum upstr**	**4.254 cumecs atten flows)**	**1.00**	**450(2)**	**1.81(1.81 ty) (1.79)**	**0.04**		**Qg 0.035 Qo 0.287 Do 450 Flow 7/9 made eqv grate flow CHRT 32: Vo2/2gDo 0.37 H/Do 0.00 Kg side flow 4.42 end flow 3.78 K vals above for stepped pipes as grate flow grate flow decreased by 0.252 from 7/9**	**0.167**	**0.30**	**0.050**		CHART 33 Angle 0 S/Do 2.5 Du/Do 0.83 Qg/Qo 0.12 K 0.10 S/Do 1.11 cor 0.20 Ku 0.30 Kw 0.30 K vals step pipes as pipe flow Ku 0.30 Kw 0.30		**0.30**	**0.050**	**1.02**	**0.043**			**65.493 65.450**	**65.493 65.450**	**65.543**		**65.543**	**66.287**	**8/9**
2 2	**9/9**	**9/9 to OUT10/9**	**1/9;2/9;3/9;4/9;5/9 ;6/9;7/9;8/9**														**24**				**6.14 6.14**	**143 143**	**0.718 0.718**	**285**		**(Pipe flow=**	**287 Sum upstr**	**22.660 atten flows)**	**8.83**	**525(2)**	**1.28(1.28 ty) (5.97)**	**0.30**		**Qo 0.287 Do 525 Flow 8/9 made eqv grate flow CHRT 32: Vo2/2gDo 0.16 H/Do 0.00 Kg side flow 6.83 end flow 5.40 K vals above for stepped pipes as grate flow**	**0.084**	**6.83**	**0.570**			**6.83**	**0.570**	**0.41**	**0.093**	**0.168 (0.168 ty)**	**4.75 (4.75 ty)**	**63.534 61.534**	**63.534 61.177**	**64.104**		**64.104**	**66.004**	**9/9**
2 2	**1/5**	**1/5 to 2/5**															**24**				**5.00 5.00**	**154 154**	**0.047 0.047**	**20**		**Additional (Pipe flow=**	**20 flow: 0.020 Sum upstr**	**27.338 cumecs atten flows)**	**6.50**	**150(U)**	**1.07(1.07 ty) (2.65)**	**0.43**		**Qo 0.020 Do 150 CHRT 32: Vo2/2gDo 0.38 H/Do 0.00 Kg side flow 4.38 end flow 3.75**	**0.058**	**4.38**	**0.255**			**4.38**	**0.255**	**1.06**	**0.289**	**0.068 (0.068 ty)**	**2.49 (2.49 ty)**	**92.560 90.783**	**92.560 90.857**	**92.815**		**92.815**	**93.061**	**1/5**
2 2	**2/5**	**2/5 to 3/5**															**24**				**5.43 5.43**	**150 150**	**0.047 0.095**	**40**		**Additional (Pipe flow=**	**40 flow: 0.020 Sum upstr**	**24.425 cumecs atten flows)**	**5.00**	**225(U)**	**0.87(0.87 ty) (3.12)**	**0.41**		**Qo 0.040 Do 225 CHART 50 Du/Do0.67 alpha 3 K'w 0.14 Vu 1.10 WSE -0.08 Ku -2.29 Kw -2.07**	**0.039**	**0.20**	**0.007**			**0.20**	**0.007**	**0.39**	**0.096**	**0.087 (0.087 ty)**	**2.67 (2.67 ty)**	**90.850 89.628**	**90.850 89.649**	**90.857**		**90.857**	**91.458**	**2/5**
2 2	**3/5**	**3/5 to 4/5**															**24**				**5.84 5.84**	**146 146**	**0.095 0.144**	**58**		**Additional (Pipe flow=**	**60 flow: 0.020 Sum upstr**	**24.865 cumecs atten flows)**	**2.00**	**225(U)**	**1.31(1.31 ty) (1.98)**	**0.32**		**Qo 0.060 Do 225 CHART 50 Du/Do1.00 alpha 12 K'w 0.19 Vu 0.98 WSE 0.05 Ku 0.47 Kw 0.58**	**0.087**	**0.47**	**0.041**			**0.58**	**0.051**	**0.88**	**0.219**	**0.143 (0.143 ty)**	**2.11 (2.11 ty)**	**89.608 89.111**	**89.608 89.185**	**89.649**		**89.659**	**90.179**	**3/5**
2 2	**4/5**	**4/5 to 5/5**															**24**				**6.16 6.16**	**143 143**	**0.144 0.194**	**77**		**Additional (Pipe flow=**	**80 flow: 0.020 Sum upstr**	**25.783 cumecs atten flows)**	**2.00**	**225(U)**	**1.75(1.75 ty) (1.98)**	**0.25**		**Qo 0.080 Do 225 CHART 50 Du/Do1.00 alpha 21 K'w 0.21 Vu 1.48 WSE 0.12 Ku 0.60 Kw 0.75**	**0.156**	**0.60**	**0.094**			**0.75**	**0.117**	**1.56**	**0.403**	**0.177 (0.177 ty)**	**2.23 (2.23 ty)**	**89.091 88.575**	**89.091 88.618**	**89.185**		**89.208**	**89.643**	**4/5**

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

Q2 CALCULATIONS TABLE

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 1 OF 5 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD500 REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

LOCATION					TIME		SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN													HEADLOSSES					PART FULL						DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m	m	m	%	m	m	m/s	m	m	m	m	m	m	
2 2	5/5	5/5 to 6/5															24				6.41 6.41	141 141	0.194 0.194	76			80 (Pipe flow= Sum upstr atten flows)	11.161	1.00	300(U)	1.10(1.10 1y) (1.63)	0.17		Qo 0.080 Do 300 CHART 50 Du/Do0.75 alpha 33 K'w 0.23 Vu 2.01 WSE 0.05 Ku 0.01 Kw 0.79	0.062	0.01	0.000			0.79	0.049	0.46	0.051	0.183 (0.183 1y)	1.75 (1.75 1y)	88.618 88.506	88.618 88.551	88.618		88.667	89.117	5/5
2 2	6/5	6/5 to 7/5															24				6.58 6.58	140 140	0.194 0.246	96			100 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	32.716	1.50	300(U)	1.38(1.38 1y) (2.00)	0.40		Qo 0.100 Do 300 CHART 50 Du/Do1.00 alpha 12 K'w 0.19 Vu 1.12 WSE 0.06 Ku 0.47 Kw 0.59	0.097	0.47	0.045			0.59	0.058	0.71	0.233	0.185 (0.185 1y)	2.15 (2.15 1y)	88.506 88.015	88.506 88.140	88.551		88.564	89.354	6/5
2 2	7/5	7/5 to 4/3															24				6.98 6.98	137 137	0.246 0.298	113			120 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	18.138	5.00	375(2)	1.09(1.09 1y) (3.55)	0.28		Qo 0.120 Do 375 CHART 50 Du/Do0.80 alpha 58 K'w 0.27 Vu 1.38 WSE 0.10 Ku 1.22 Kw 1.65	0.061	1.22	0.074			1.65	0.100	0.47	0.085	0.142 (0.142 1y)	3.12 (3.12 1y)	88.066 87.159	88.066 87.675	88.140		88.166	89.317	7/5
2 2	1/6	1/6 to 2/6															24				5.00 5.00	154 154	0.047 0.047	20			20 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	19.466	1.00	225(UB)	0.44(0.44 1y) (1.40)	0.32		Qo 0.020 Do 225 CHRT 32: Vo2/2gDo 0.04 H/Do 0.01 Kg side flow 9.57 end flow 6.89	0.010	9.57	0.094			9.57	0.094	0.10	0.019			89.241 89.047	89.244 89.225	89.338		89.338	90.690	1/6
2 2	2/6	2/6 to 3/6	2/6			5.00 5.00	154 154		0.64 0.64	0.059 0.059	0.038 0.038	0.038 0.038	16 16 FLOW WIDTH/DEPTH 0.045Dp m	16	1.00	69	#D.12L2.4A.36	16 (UNLOCKED 0)	0	3/6	5.32 5.32	151 151	0.085 0.132	55			56 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	20.742	1.43	225(U)	1.21(1.21 1y) (1.67)	0.29		Qg 0.036 Qo 0.056 Do 225 CHART 33 Angle 7 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.65 K 1.78 S/Do 1.82 cor 0.42 Ku 2.20 Kw 2.20	0.075	2.20	0.165			2.20	0.165	0.75	0.156			89.026 88.730	89.060 88.904	89.225		89.225	90.496	2/6
2 2	3/6	3/6 to 4/6	2/6;3/6			5.00 5.00	154 154		0.64 0.64	0.055 0.055	0.035 0.035	0.035 0.035	15 15 FLOW WIDTH/DEPTH 0.043Dp m	15	1.00	69	#D.12L2.4A.36	15 (UNLOCKED 0)	0	4/6	5.61 5.61	148 148	0.167 0.216	89			89 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	20.716	1.00	300(U)	1.22(1.22 1y) (1.63)	0.28		Qg 0.034 Qo 0.089 Do 300 CHART 34 Angle 24 Case3 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.39 K 0.91 S/Do 1.43 cor 0.46 Ku 1.37 Kw 1.37	0.076	1.37	0.104			1.37	0.104	0.56	0.117			88.772 88.565	88.800 88.683	88.904		88.904	90.233	3/6
2 2	4/6	4/6 to 4/3	2/6;3/6;4/6			5.00 5.00	154 154		0.64 0.64	0.054 0.054	0.035 0.035	0.035 0.035	15 15 FLOW WIDTH/DEPTH 0.043Dp m	15	0.00	69	#D.12L2.4A.36	15 (UNLOCKED 0)	0	5A/3	5.89 5.89	145 145	0.251 0.301	121			121 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	4.015	1.25	375(U)	1.04(1.04 1y) (2.14)	0.06		Qg 0.034 Qo 0.121 Do 375 CHART 33 Angle 1 S/Do 2.5 Du/Do 0.80 Qg/Qo 0.28 K 0.57 S/Do 1.15 cor 0.45 Ku 1.02 Kw 1.02	0.055	1.02	0.056			1.02	0.056	0.29	0.012	0.190 (0.190 1y)	2.12 (2.12 1y)	88.627 88.576	88.627 88.391	88.683		88.683	89.861	4/6
2 2	1/3	1/3 to 2/3	1/3			5.00 5.00	154 154		0.75 0.75	0.047 0.047	0.035 0.035	0.035 0.035	15 15	15 FLOW WIDTH 0.159 m	14.00	14.23	7	15 (UNLOCKED 0)	0	2/3	5.00 5.00	154 154	0.035 0.035	15			15 (Pipe flow= Grate flow)	36.309	6.00	375(2)	0.14(0.11 1y) (3.89)	0.61		Qg 0.015 Qo 0.015 Do 375 CHRT 32: Vo2/2gDo 0.00 H/Do 0.00 Kg side flow 10.80 end flow 7.53 Part full downstream pipe	0.001	1.00	0.170	Upstream HGL 92.697 pipe obv 92.854 Set Kp 1.1		1.00 below outlet	0.170	0.01	0.003	0.048 (0.042 1y)	1.83 (1.69 1y)	92.854 90.675	92.527 90.681	92.697		92.697	93.737	1/3
2 2	2/3	2/3 to 3/3	1/3;2/3			5.00 5.00	154 154		0.75 0.75	0.144 0.144	0.108 0.108	0.108 0.108	46 46	46 FLOW WIDTH 0.161 m	0.05	183	13S.08	46 (UNLOCKED 0)	0	3/3	5.61 5.61	148 148	0.143 0.143	59			59 (Pipe flow= Sum upstr atten flows)	11.872	9.29	375(2)(0	0.42 1y) (4.83)	0.20		Qg 0.044 Qo 0.059 Do 375 Angle 34 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.24 Cg 1.25 K 1.94 S/Do 2.9 K0 1.98 K0.5 2.10 K 2.13 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.55	0.014	1.83	0.026		Interp vals for S/Do 1.11 Kw 2.87 CHART 39 S/Do 2.0 K0 1.86 K0.5 1.75 K 1.78 S/Do 1.5 K0 2.05 K0.5 1.86 K 1.72 Interp vals for S/Do 1.11 Ku 1.83	2.87	0.041	0.11	0.013	0.084 (0.075 1y)	3.18 (2.97 1y)	90.655 89.552	90.655 89.454	90.681		90.696	91.423	2/3
2 2	3/3	3/3 to 4/3	1/3;2/3														#D.08L3.6A.81				5.81 5.81	146 146	0.143 0.143	58			59 (Pipe flow= Sum upstr atten flows)	25.368	2.00	375(2)(0	0.42 1y) (2.24)	0.42		Qo 0.059 Do 375 CHART 50 Du/Do1.00 alpha 7 K'w 0.17 Vu 0.53 WSE 0.01 Ku 0.41 Kw 0.58 Part full downstream pipe	0.014	1.00	0.172	Upstream HGL 89.454 pipe obv 89.532 Set Kp 1.1		1.00 below outlet	0.172	0.11	0.029	0.125 (0.110 1y)	1.84 (1.72 1y)	89.532 89.025	89.282 88.775	89.454		89.454	90.288	3/3
2 2	4/3	4/3 to 5A/3	2/6;3/6;4/6;1/3;2/3														24				7.26 7.26	135 135	0.742 0.742	278			285 (Pipe flow= Sum upstr atten flows)	12.399	11.00	375(2)	2.58(1.10 1y) (5.26)	0.08		Qo 0.285 Do 375 Flow 4/6 made eqv grate flow Flow 3/3 made eqv grate flow Angle 93 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.41 Cg 1.10 K 2.14 S/Do 3.0 K0 2.00 K0.5 1.89 K 1.88 S/Do 2.5 K0 1.92 K0.5 2.12 K 2.14	0.339	1.58	0.536		Interp vals for S/Do 2.80 Kw 1.93 CHART 46 S/Do 3.0 K0 1.74 K0.5 1.52 K 1.51 S/Do 2.5 K0 1.82 K0.5 1.71 K 1.69 Interp vals for S/Do 2.80 Ku 1.59 K vals above for stepped pipes as grate flow	1.98	0.672	2.65	0.329	0.186 (0.116 1y)	5.24 (4.16 1y)	87.139 85.775	87.139 85.586	87.675		87.811	89.805	4/3
2 2	5A/3	5A/3 to 5/3	2/6;3/6;4/6;1/3;2/3 ;5A/3			5.00 5.00	154 154		0.60 0.60	0.018 0.018	0.011 0.011	0.011 0.011	5 5 FLOW WIDTH/DEPTH 0.020Dp m	5	1.00	38	#D.08L2.4A.36	5 (UNLOCKED 0)	0	6/3	7.34 7.34	134 134	0.753 0.753	280			287 (Pipe flow= Sum upstr atten flows)	12.004	13.00	375(2)	2.60(2.41 1y) (5.72)	0.08		Qg 0.004 Qo 0.287 Do 375 Flow 4/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.92 H/Do 0.00 Kg side flow 2.89 end flow 2.67 K vals above for stepped pipes as grate flow	0.345	2.89	0.995			2.89	0.995	2.69	0.323	0.178 (0.110 1y)	5.59 (5.48 1y)	84.256 82.695	84.256 82.498	85.251		85.251	86.508	5A/3
2 2	5/3	5/3 to 6/3	2/6;3/6;4/6;1/3;2/3 ;5A/3														24				7.42 7.42	133 133	0.753 0.753	278			287 (Pipe flow= Sum upstr atten flows)	40.542	5.00	450(2)	1.81(1.68 1y) (4.01)	0.37		Qo 0.287 Do 450 Flow 5A/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.37 H/Do 0.00 Kg side flow 4.42 end flow 3.78 K vals above for stepped pipes as grate flow	0.167	4.42	0.738			4.42	0.738	1.02	0.412	0.212 (0.203 1y)	3.90 (3.83 1y)	80.600 78.573	80.600 78.497	81.338		81.338	83.206	5/3
2 2	6/3	6/3 to 7/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3			5.00 5.00	154 154		0.60 0.60	0.023 0.023	0.014 0.014	0.014 0.014	6 6 FLOW WIDTH/DEPTH 0.023Dp m	6	8.00	38	#D.08L2.4A.36	6 (UNLOCKED 0)	0	9/3	7.79 7.79	131 131	0.767 0.767	279			288 (Pipe flow= Sum upstr atten flows)	5.409	2.50	450(2)	1.81(1.67 1y) (2.83)	0.05		Qg 0.005 Qo 0.288 Do 450 Flow 5/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.37 H/Do 0.00 Kg side flow 4.42 end flow 3.78 K vals above for stepped pipes as grate flow grate flow decreased by 0.283 from 5/3	0.167	0.28	0.047	CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.02 K 0.25 S/Do 1.10 cor 0.03 Ku 0.28 Kw 0.28 K vals above for stepped pipes as grate flow	0.28	0.047	1.02	0.055	0.261 (0.249 1y)	3.00 (2.95 1y)	78.450 78.315	78.450 78.126	78.497		78.497	79.140	6/3
2 2	7/3	7/3 to 8/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3														24				7.84 7.84	131 131	0.767 0.767	279			288 (Pipe flow= Sum upstr atten flows)	49.614	6.75	450(2)	1.81(1.67 1y) (4.65)	0.46		Qo 0.288 Do 450 Flow 6/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.37 H/Do 0.00 Kg side flow 4.42 end flow 3.78 K vals above for stepped pipes as grate flow grate flow decreased by 0.288 from 6/3	0.167	1.80	0.301	CHART 5: Ti 556 Do 750 theta 70 r/Do 1.76 Du 450 Du/Do 100 Kd 1.80 K'w 0.29 Vu 1.81 WSE 0.35 Ku 1.80 Kw 2.09 K vals above for stepped pipes as grate flow	2.09	0.349	1.02	0.507	0.195 (0.187 1y)	4.37 (4.27 1y)	77.799 74.450	77.799 74.592	78.100		78.148	78.897	7/3
2 2	8/3	8/3 to 9/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3														24				8.30 8.30	128 128	0.767 0.767	273			288 (Pipe flow= Sum upstr atten flows)	20.739	8.50	450(2)	1.81(1.67 1y) (5.22)	0.19		Qo 0.288 Do 450 Flow 7/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.37 H/Do 0.00 Kg side flow 4.42 end flow 3.78 K vals above for stepped pipes as grate flow grate flow decreased by 0.288 from 7/3	0.167	1.67	0.279	CHART 5: Ti 137 Do 750 theta 70 r/Do 1.25 Du 450 Du/Do 100 Kd 1.67 K'w 0.28 Vu 1.81 WSE 0.33 Ku 1.67 Kw 1.95 K vals above for stepped pipes as grate flow	1.95	0.326	1.02	0.212	0.183 (0.175 1y)	4.75 (4.65 1y)	74.313 72.550	74.313 72.810	74.592		74.639	75.216	8/3
2 2	9/3	9/3 to 10/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3			5.00 5.00	154 154		0.65 0.65	0.551 0.551	0.358 0.358	0.358 0.358	153 153 FLOW DEPTH 0.071 m	153	0.05	330	13S.15	153 (UNLOCKED 0)	0	10/3	8.49 8.49	127 127	1.125 1.125	397			412 (Pipe flow= Sum upstr atten flows)	22.669	7.00	525(2)	1.84(1.62 1y) (5.31)	0.21		Qg 0.126 Qo 0.412 Do 525 CHART 33 Angle 9 S/Do 2.5 Du/Do 0.86 Qg/Qo 0.31 K 0.89 S/Do 1.41 cor 0.38 Ku 1.27 Kw 1.27	0.173	1.27	0.219			1.27	0.219	0.84	0.190	0.217 (0.202 1y)	4.83 (4.66 1y)	72.591 71.004	72.591 70.724	72.810		72.810	73.272	9/3
2 2	10/3	10/3 to 11/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3			5.00 5.00	154 154		0.60 0.60	0.015 0.015	0.009 0.009	0.009 0.009	4 4 FLOW WIDTH/DEPTH 0.011Dp m	4	8.00	75	#D.08L3.6A.81	4 (UNLOCKED 0)	0	11/3	8.70 8.70	125 125	1.134 1.134	394			412 (Pipe flow= Sum upstr atten flows)	44.039	5.20	525(2)	1.84(1.62 1y) (4.58)	0.40		Qg 0.003 Qo 0.412 Do 525 Flow 9/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.32 H/Do 0.00 Kg side flow 4.72 end flow 4.02 K vals above for stepped pipes as grate flow grate flow decreased by 0.412 from 9/3	0.173	0.23	0.040	CHART 33 Angle 3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.01 K 0.22 S/Do 1.07 cor 0.01 Ku 0.23 Kw 0.23 K vals above for stepped pipes as grate flow	0.23	0.040	0.84	0.370	0.235 (0.219 1y)	4.33 (4.18 1y)	70.684 68.394	70.684 68.694	70.724		70.724	71.649	10/3

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

CALCULATIONS TABLE

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 2 OF 5 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD501 REV. B

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CALCULATIONS TABLE

LOCATION / TIME / SUB-CATCHMENT RUNOFF / INLET DESIGN

DESIGN ARI (yrs)	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT (%)	tc SUB-CATCHMENT TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/h)	C10 10yr RUNOFF CO-EFFICIENT	C CO-EFFICIENT OF RUNOFF	A SUB-CATCHMENT AREA (ha)	C×A EQUIVALENT AREA (ha)	+CA SUM OF (C × A) (ha)	Q SUB-CATCHMENT DISCHARGE (l/s)	FLOW IN K&C (INC. BYPASS) (l/s)	ROAD GRADE AT INLET (%)	MINOR FLOW ROAD CAPACITY (l/s)	INLET TYPE	Qg FLOW INTO INLET (l/s)	Qb BYPASS FLOW (l/s)	BYPASS STRUCTURE No.
2 2	11/3	11/3 to 12/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3			5.00 5.00	154 154		0.65 0.65	0.168 0.168	0.109 0.109	0.109 0.109	47 47	47 FLOW WIDTH 0.721 m	12.00	1350	7	44 (UNLOCKED ())	3	12/3
2 2	12/3	12/3 to 13/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3;12/3			5.00 5.00	154 154		0.65 0.65	0.109 0.109	0.071 0.071	0.071 0.071	30 30	33 FLOW WIDTH 0.000 m	0.05	338	14S.11	33 (UNLOCKED ())	0	13/3
2 2	13/3	13/3 to 14/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3;12/3;13/3			5.00 5.00	154 154		0.75 0.75	0.033 0.033	0.025 0.025	0.025 0.025	11 11	11 FLOW WIDTH 1.133 m	6.00	38	#D.08L2.4A.36	11 (UNLOCKED ())	0	14/3
2 2	14/3	14/3 to 15/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3;12/3;13/3;14/3			5.00 5.00	154 154		0.75 0.75	0.010 0.010	0.008 0.008	0.008 0.008	3 3	3 FLOW WIDTH 0.533 m	1.00	38	#D.08L2.4A.36	3 (UNLOCKED ())	0	
2 2	15/3	15/3 to 16/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3;12/3;13/3;14/3														24			
2 2	16/3	16/3 to OUT17/3	2/6;3/6;4/6;1/3;2/3;5A/3;6/3;9/3;10/3;11/3;12/3;13/3;14/3														24			
2 2	IN1/14	IN1/14 to OUT2/14															24			
2 2	EX1/4	EX1/4 to OUT2/4	EX1/4			8.00 8.00	130 130		0.65 0.65	2.070 2.070	1.346 1.346	1.346 1.346	486 486	380 +CrnFL 106 FLOW WIDTH 4.028 m DOWNSTREAM 2.748m	1.00	380	7	224 (UNLOCKED ())	156 106	Crn ×
2 2	IN1/15	IN1/15 to 2/15	IN1/15			8.00 8.00	130 130		0.65 0.65	0.717 0.717	0.466 0.466	0.466 0.466	168 168 FLOW WIDTH/DEPTH 0.000Dp m	168	1.00	1000	14S.11	168 (UNLOCKED ())	0	
2 2	2/15	2/15 to OUT3/15	IN1/15														24			
2 2	1/10	1/10 to 2/10	1/10			8.00 8.00	130 130		0.65 0.65	3.060 3.060	1.989 1.989	1.989 1.989	718 718 FLOW WIDTH/DEPTH 0.310Dp m	718	0.05	716	#D.31L4.8A1.44	716 (UNLOCKED ())	2	2/10
2 2	2/10	2/10 to 3/10	1/10;2/10			8.00 8.00	130 130		0.65 0.65	0.000 0.000	0.000 0.000	0.000 0.000	0 0 FLOW WIDTH/DEPTH 0.006Dp m	2	0.05	716	#D.31L4.8A1.44	2 (UNLOCKED ())	0	3/10
2 2	3/10	3/10 to 2/1	1/10;2/10														#D.31L4.8A1.44			
2 2	1/1	1/1 to 2/1	1/1			8.00 8.00	130 130		0.64 0.64	0.371 0.371	0.237 0.237	0.237 0.237	86 86 FLOW WIDTH/DEPTH 0.087Dp m	86	0.05	546	#D.3L3.6A.81	86 (UNLOCKED ())	0	2B/1
2 2	2/1	2/1 to 2B/1	1/10;2/10;1/1														24			

DRAIN DESIGN

STRUCTURE No.	tc CRITICAL TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/h)	+CA TOTAL (C × A) (ha)	Qt MAJOR TOTAL FLOW (l/s)	Qm MAJOR SURFACE FLOW CAPACITY (l/s)	Qs MAJOR SURFACE FLOW (l/s)	Qp PIPE FLOW (l/s)	L REACH LENGTH (m)	S PIPE GRADE (%)	PIPE / BOX DIMENSIONS (CLASS) (mm)	V FLOW VELOCITY FULL (PIPE GRADE VELOCITY) (m/s)	T TIME OF FLOW IN REACH (min)	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS
11/3	9.10 9.10	123 123	1.243 1.243	425			441 (Pipe flow= Sum upstr atten flows)	21.050	8.00	525(2)	1.97(1.72 1y) (5.68)	0.18		Qg 0.035 Qo 0.441 Do 525 Angle 60 Chart 43 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.35 K0.5 1.93 Qu/Qo 0.92 Cg 0.20 K 1.47 S/Do 2.0 K0 1.41 K0.5 2.25 K 1.58 S/Do 1.5 K0 1.58 K0.5 2.53 K 1.77
12/3	9.28 9.28	122 122	1.314 1.314	445			463 (Pipe flow= Sum upstr atten flows)	20.340	4.50	600(2)	1.59(1.37 1y) (4.65)	0.21		Qg 0.026 Qo 0.463 Do 600 Flow 11/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.21 H/Do 0.00 Kg side flow 5.79 end flow 4.77 K vals above for stepped pipes as grate flow grate flow decreased by 0.437 from 11/3
13/3	9.49 9.49	121 121	1.339 1.339	450			468 (Pipe flow= Sum upstr atten flows)	21.450	4.00	600(2)	1.60(1.37 1y) (4.39)	0.22		Qg 0.008 Qo 0.468 Do 600 Flow 12/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.21 H/Do 0.00 Kg side flow 5.75 end flow 4.75 K vals above for stepped pipes as grate flow grate flow decreased by 0.459 from 12/3 Angle 63 Chart 45 S/Do 2.5 chartdeg Du/Do 1.00 K0 2.16 K0.5 1.81 Qu/Qo 0.98 Cg 0.05 K 2.15
14/3	9.71 9.71	120 120	1.347 1.347	449			468 (Pipe flow= Sum upstr atten flows)	37.991	1.32	675(2)	1.27(1.09 1y) (2.73)	0.50		Qg 0.003 Qo 0.468 Do 675 CHART 34 Angle 13 Case3 S/Do 2.5 Du/Do 0.89 Qg/Qo 0.01 K 0.03 S/Do 1.00 cor 0.01 Ku 0.04 Kw 0.04
15/3	10.21 10.21	118 118	1.347 1.347	442			468 (Pipe flow= Sum upstr atten flows)	3.941	0.40	900 x 600 (RCBC)	0.87(0.75 1y) (1.55)	0.07		Qo 0.468 Do 720 CHART 50 Du/Do0.94 alpha 61 K'w 0.27 Vu 1.31 WSE 0.08 Ku 1.46 Kw 2.07 Part full downstream pipe
16/3	10.28 10.28	117 117	1.347 1.347	438			468 (Pipe flow= Sum upstr atten flows)	1.162	0.40	900 x 600 (RCBC)	0.87(0.75 1y) (1.55)	0.02		Qo 0.468 Do 720 CHART 50 Du/Do1.00 alpha 50 K'w 0.26 Vu 1.15 WSE 0.07 Ku 1.24 Kw 1.69 Part full downstream pipe
IN1/14	5.00 5.00	154 154	1.531 1.531	655			655 (Pipe flow set by user)	14.572	1.17	600(2)	2.24(2.24 1y) (2.37)	0.11		
EX1/4	8.00 8.00	130 130	1.345 1.345	486			224 (Pipe flow= Grate flow)	8.355	10.77	375(2)	2.03(2.03 1y) (5.21)	0.07		Qg 0.224 Qo 0.224 Do 375 CHRT 32: Vo2/2gDo 0.56 H/Do 0.00 Kg side flow 3.69 end flow 3.27
IN1/15	8.00 8.00	130 130	0.466 0.466	168			168 (Pipe flow= Grate flow)	2.000	8.00	450(2)	1.06(0.83 1y) (5.07)	0.03		Qg 0.168 Qo 0.168 Do 450 CHRT 32: Vo2/2gDo 0.13 H/Do 0.00 Kg side flow 7.39 end flow 5.74
2/15	8.03 8.03	129 129	0.466 0.466	167			168 (Pipe flow= Sum upstr atten flows)	7.653	8.00	450(2)	1.06(0.83 1y) (5.07)	0.12		Qo 0.168 Do 450 Flow IN1/15 made eqv grate flow CHRT 32: Vo2/2gDo 0.13 H/Do 0.00 Kg side flow 7.39 end flow 5.74 K vals above for stepped pipes as grate flow
1/10	8.00 8.00	130 130	1.989 1.989	718			716 (Pipe flow= Grate flow)	32.912	5.00	600(2)	2.45(1.93 1y) (4.91)	0.22		
2/10	8.22 8.22	128 128	1.989 1.989	707			716 (Pipe flow= Sum upstr atten flows)	29.323	6.41	675(2)	1.94(1.53 1y) (6.00)	0.25		
3/10	8.47 8.47	127 127	1.989 1.989	702			716 (Pipe flow= Sum upstr atten flows)	13.321	1.00	1050(2)	0.80(0.63 1y) (3.18)	0.22		Part full downstream pipe Upstream HGL 67.256 below outlet pipe obv 67.299 Set Kp to 1
1/1	8.00 8.00	130 130	0.237 0.237	86			86 (Pipe flow= Grate flow)	14.005	1.00	525(2)	0.38(0.30 1y) (2.01)	0.23		Qg 0.086 Qo 0.086 Do 525 CHRT 32: Vo2/2gDo 0.01 H/Do 0.00 Kg side flow 10.46 end flow 7.36 Part full downstream pipe
2/1	8.69 8.69	126 126	2.226 2.226	779			794 (Pipe flow= Sum upstr atten flows)	16.538	3.50	1050(2)	0.89(0.70 1y) (5.96)	0.28		Qo 0.794 Do 1050 Flow 1/1 made eqv grate flow Angle 83 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.90 Cg 0.26 K 1.98 S/Do 2.0 K0 2.44 K0.5 2.40 K 2.43 S/Do 1.5 K0 2.67 K0.5 2.58 K 2.65 Interp val for S/Do 1.11 Kw 2.82 CHART 46 S/Do 2.0 K0 2.04 K0.5 1.92 K 2.01 S/Do 1.5 K0 2.09 K0.5 2.31 K 2.15 Interp val for S/Do 1.11 Ku 2.26 K vals above for stepped pipes as grate flow grate flow decreased by 0.083 from 1/1 Routine 2.2 CHART 52 B 900 In line 1/1 Latrl 3/10 Determine Kl

HEADLOSSES / PART FULL / DESIGN LEVELS

STRUCTURE No.	V2/2g VELOCITY HEAD (m)	Ku U/S HEADLOSS COEFFICIENT	hu U/S PIPE STRUCT. HEADLOSS (m)	Kl LAT. HEADLOSS CO-EFFICIENT	hl LAT. PIPE STRUCT. HEADLOSS (m)	Kw W.S.E CO-EFFICIENT	hw CHANGE IN W.S.E (m)	Sf PIPE FRICTION SLOPE (%)	hf PIPE FRICTION HEADLOSS (L × Sf) (m)	DEPTH (m)	Vp VELOCITY (m/s)	OBVERT LEVELS (m)	DRAIN SECTION H.G.L (m)	UPSTREAM H.G.L (m)	LAT. H.G.L (m)	W.S.E. (m)	SURFACE OR K&C INVERT LEVEL (m)	STRUCTURE No.
11/3	0.198	1.62	0.320	Interp val for S/Do 1.64 Kw 1.72 CHART 42 S/Do 2.0 K0 1.35 K0.5 2.10 K 1.50 S/Do 1.5 K0 1.53 K0.5 2.17 K 1.66 Interp val for S/Do 1.64 Ku 1.62		1.72	0.340	0.96	0.202	0.217 (0.201 1y)	5.16 (4.97 1y)	68.374 66.690	68.374 66.524	68.694		68.714	70.147	11/3
12/3	0.129	0.11	0.014	CHART 33 Angle 3 S/Do 2.5 Du/Do 0.88 Qg/Qo 0.06 K 0.01 S/Do 1.02 cor 0.10 Ku 0.11 Kw 0.11 K vals step pipes as pipe flow Ku 0.11 Kw 0.11		0.11	0.014	0.52	0.106	0.245 (0.226 1y)	4.21 (4.04 1y)	66.510 65.595	66.510 65.243	66.524		66.524	67.719	12/3
13/3	0.130	2.11	0.275	S/Do 2.0 K0 2.47 K0.5 2.34 K 2.47 S/Do 1.5 K0 2.74 K0.5 2.80 K 2.75 Interp val for S/Do 1.58 Kw 2.70 CHART 44 S/Do 2.0 K0 1.99 K0.5 2.11 K 2.09 S/Do 1.5 K0 2.12 K0.5 2.17 K 2.13 Interp val for S/Do 1.58 Ku 2.11 K vals step pipes as pipe flow Ku 2.11 Kw 2.70		2.70	0.352	0.53	0.114	0.255 (0.234 1y)	4.04 (3.88 1y)	64.968 64.110	64.968 64.168	65.243		65.320	66.655	13/3
14/3	0.082	0.04	0.003			0.04	0.003	0.29	0.109	0.328 (0.301 1y)	2.68 (2.57 1y)	64.165 63.663	64.165 63.433	64.168		64.168	65.178	14/3
15/3	0.039	1.00	0.078	Upstream HGL 63.433 below outlet pipe obv 63.536 Set Kp to 1		1.00	0.078	0.13	0.005	0.325 (0.291 1y)	1.60 (1.53 1y)	63.536 63.520	63.355 63.350	63.433		63.433	64.134	15/3
16/3	0.039	1.00	0.130	Upstream HGL 63.350 below outlet pipe obv 63.495 Set Kp to 1		1.00	0.130	0.13	0.001	0.325 (0.291 1y)	1.60 (1.53 1y)	63.495 63.490	63.220 62.915	63.350		63.350	63.933	16/3
IN1/14	0.256	1.00	0.256			1.00	0.256	1.04	0.152	0.472 (0.472 1y)	2.70 (2.70 1y)	61.990 61.820	61.990 61.692	62.246		62.246	62.500	IN1/14
EX1/4	0.210	3.69	0.775			3.69	0.775	1.63	0.136	0.162 (0.162 1y)	4.88 (4.88 1y)	79.805 78.905	79.805 78.692	80.580		80.580	82.148	EX1/4
IN1/15	0.057	7.39	0.423			7.39	0.423	0.35	0.007	0.140 (0.123 1y)	4.01 (3.73 1y)	64.935 64.775	64.935 64.465	65.358		65.358	66.070	IN1/15
2/15	0.057	7.39	0.423			7.39	0.423	0.35	0.027	0.140 (0.123 1y)	4.01 (3.73 1y)	63.952 63.340	63.952 63.030	64.375		64.375	65.717	2/15
1/10	0.306	3.00	0.918			3.00	0.918	1.25	0.411	0.305 (0.266 1y)	4.91 (4.61 1y)	73.110 71.464	73.110 71.169	74.028		74.028	74.261	1/10
2/10	0.192	3.00	0.576			3.00	0.576	0.67	0.197	0.268 (0.236 1y)	5.36 (5.01 1y)	68.816 66.938	68.816 67.256	69.392		69.392	72.282	2/10
3/10	0.033	1.00	0.036			1.00	0.036	0.06	0.008	0.365 (0.322 1y)	2.65 (2.48 1y)	67.299 67.166	67.220 67.212	67.256		67.256	67.992	3/10
1/1	0.007	1.00	0.051	Upstream HGL 67.268 below outlet pipe obv 67.534 Set Kp to 1		1.00	0.051	0.04	0.005	0.157 (0.140 1y)	1.54 (1.44 1y)	67.534 67.394	67.217 67.212	67.268		67.268	68.189	1/1
2/1	0.040	1.64	0.066	Dl/Do 1.00 B/Do 0.86 Qu/Qo 0.90 Do/Du 2.00 Do/Dl 1.00 K'l 1.28 Ml 0.96 Kl=K'l×Ml= 1.23 Determine Ku K'u 1.50 Mu 0.96 Ku=K'u×Mu= 1.44 Kw=Ku= 1.44 Combined pipes in line case Join Pipes: 3/10 and 1/1 Vel1 0.388 Vel2 0.821 Eq Dia 1141 Angle 255 Flow 0.794 CHART 50 Du/Do1.09 alpha 0 K'w 0.05 Vu 0.78 WSE 0.03 Ku 0.60 Kw 0.64 Interpolated Ku= 1.37 Kw= 1.38 K vals step pipes as pipe flow Ku 1.37 Kw 1.38 Averaged Ku 1.64 Kw 1.81		1.81	0.073	0.08	0.013	0.278 (0.246 1y)	4.28 (3.99 1y)	67.146 66.567	67.146 65.796	67.212		67.219	68.142	2/1

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
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TRAFFIC
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 3 OF 5 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD502 REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

Q2 CALCULATIONS TABLE

LOCATION / TIME / SUB-CATCHMENT RUNOFF / INLET DESIGN

DESIGN ARI (yrs)	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT (%)	tc SUB-CATCHMENT TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/h)	C10 10yr RUNOFF CO-EFFICIENT	C CO-EFFICIENT OF RUNOFF	A SUB-CATCHMENT AREA (ha)	C×A EQUIVALENT AREA (ha)	+CA SUM OF (C × A) (ha)	Q SUB-CATCHMENT DISCHARGE (l/s)	FLOW IN K&C (INC. BYPASS) (l/s)	ROAD GRADE AT INLET (%)	MINOR FLOW ROAD CAPACITY (l/s)	INLET TYPE	Qg FLOW INTO INLET (l/s)	Qb BYPASS FLOW (l/s)	BYPASS STRUCTURE No.
2 2	2B/1	2B/1 to 3/1	1/10;2/10;1/1;2B/1			5.00 5.00	154 154		0.65 0.65	0.422 0.422	0.274 0.274	0.274 0.274	117 117	117 FLOW WIDTH 1.258 m DOWNSTREAM 0.466m	13.30	707	8	87 (UNLOCKED 0)	30	3/1
2 2	1/11	1/11 to 2/11	1/11			8.00 8.00	130 130		0.63 0.63	1.790 1.790	1.128 1.128	1.128 1.128	407 407	407 FLOW WIDTH/DEPTH 0.212Dp m	0.05	428	$D.22L4.8A1.44	407 (UNLOCKED 0)	0	2/11
2 2	2/11	2/11 to 3/11	1/11														$D.22L4.8A1.44			
2 2	3/11	3/11 to 3/1	1/11														$D.22L4.8A1.44			
2 2	3/1	3/1 to 4/1	1/10;2/10;1/1;2B/1;1 /11;3/1			5.00 5.00	154 154		0.65 0.65	0.156 0.156	0.101 0.101	0.101 0.101	43 43	73 FLOW WIDTH 0.947 m DOWNSTREAM 0.028m	13.30	707	8	62 (UNLOCKED 0)	11	5B/1
2 2	4/1	4/1 to 5/1	1/10;2/10;1/1;2B/1;1 /11;3/1														24			
2 2	5A/1	5A/1 to 5/1	5A/1			5.00 5.00	154 154		0.65 0.65	0.226 0.226	0.147 0.147	0.147 0.147	63 63	63 FLOW WIDTH 0.000 m	0.05	338	14S.11	63 (UNLOCKED 0)	0	
2 2	5B/1	5B/1 to 5/1	5B/1			5.00 5.00	154 154		0.65 0.65	0.254 0.254	0.165 0.165	0.165 0.165	71 71	81 FLOW WIDTH 0.098 m	0.05	338	14S.11	81 (UNLOCKED 0)	0	
2 2	5/1	5/1 to OUT6/1	1/10;2/10;1/1;2B/1;1 /11;3/1;5A/1;5B/1														24			
2 2	**1/2**	**1/2 to 2/2**	**1/2**			**5.00 5.00**	**154 154**		**0.65 0.65**	**0.369 0.369**	**0.240 0.240**	**0.240 0.240**	**103 103**	**103 FLOW WIDTH 1.140 m DOWNSTREAM 0.397m**	**15.94**	**741**	**8**	**76 (UNLOCKED 0)**	**26**	**1/13**
2 2	**2/2**	**2/2 to 3/2**	**1/2;2/2**			**5.00 5.00**	**154 154**		**0.75 0.75**	**0.070 0.070**	**0.053 0.053**	**0.053 0.053**	**23 22**	**23 FLOW WIDTH 0.329 m**	**15.94**	**741**	**7**	**23 (UNLOCKED 0)**	**0**	**3/2**
2 2	**3/2**	**3/2 to 4/2**	**1/2;2/2;3/2**			**5.00 5.00**	**154 154**		**0.75 0.75**	**0.022 0.022**	**0.017 0.017**	**0.017 0.017**	**7 7**	**7**	**15.94**	**741**	**7**	**7 (UNLOCKED 0)**	**0**	**4/2**
2 2	**1/13**	**1/13 to 2/13**	**1/13**			**5.00 5.00**	**154 154**		**0.65 0.65**	**0.172 0.172**	**0.112 0.112**	**0.112 0.112**	**48 48**	**74 FLOW WIDTH 0.936 m DOWNSTREAM 0.142m**	**15.94**	**741**	**8**	**60 (UNLOCKED 0)**	**15**	**2/13**
2 2	2/13	2/13 to 4/2	1/13;2/13			5.00 5.00	154 154		0.65 0.65	0.331 0.331	0.215 0.215	0.215 0.215	92 92	107 FLOW WIDTH 0.250 m	0.05	406	15S.14	107 (UNLOCKED 0)	0	4/2
2 2	4/2	4/2 to 5/2	1/2;2/2;3/2;1/13;2/1 3;4/2			5.00 5.00	154 154		0.75 0.75	0.049 0.049	0.037 0.037	0.037 0.037	16 16	16 FLOW WIDTH 0.000 m	15.94	338	14S.11	16 (UNLOCKED 0)	0	
2 2	5/2	5/2 to OUT6/2	1/2;2/2;3/2;1/13;2/1 3;4/2														24			

DRAIN DESIGN

STRUCTURE No.	tc CRITICAL TIME OF CONC. (min)	I RAINFALL INTENSITY (mm/h)	+CA TOTAL (C × A) (ha)	Qt MAJOR TOTAL FLOW (l/s)	Qm MAJOR SURFACE FLOW CAPACITY (l/s)	Qs MAJOR SURFACE FLOW (l/s)	Qp PIPE FLOW (l/s)	L REACH LENGTH (m)	S PIPE GRADE (%)	PIPE / BOX DIMENSIONS (CLASS) (mm)	V FLOW VELOCITY FULL (PIPE GRADE VELOCITY) (m/s)	T TIME OF FLOW IN REACH (min)	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS
2B/1	8.97 8.97	124 124	2.500 2.500	861			851 (Pipe flow= Sum upstr atten flows)	20.228	3.50	1050(2)	0.95(0.75 1y) (5.96)	0.34		Qg 0.070 Qo 0.851 Do 1050 Flow 2/1 made eqv grate flow CHRT 32: Vo2/2gDo 0.04 H/Do 0.00 Kg side flow 9.54 end flow 6.88 K vals above for stepped pipes as grate flow grate flow decreased by 0.781 from 2/1 Angle 14 Chart 36 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.51 K0.5 1.86 Qu/Qo 0.92 Cg 0.21 K 1.58
1/11	8.00 8.00	130 130	1.128 1.128	407			407 (Pipe flow= Grate flow)	21.421	9.00	450(2)	2.56(2.01 1y) (5.37)	0.14		
2/11	8.14 8.14	129 129	1.128 1.128	404			407 (Pipe flow= Sum upstr atten flows)	21.421	8.00	525(2)	1.82(1.43 1y) (5.68)	0.20		
3/11	8.34 8.34	128 128	1.128 1.128	401			407 (Pipe flow= Sum upstr atten flows)	7.336	1.00	750(2)	0.89(0.70 1y) (2.55)	0.12		Part full downstream pipe Upstream HGL 64.567 below outlet pipe obv 64.742 Set Kp to 1
3/1	9.31 9.31	122 122	3.729 3.729	1264			1275 (Pipe flow= Sum upstr atten flows)	31.419	6.30	675(2) x 2	1.73(1.37 1y) (5.95)	0.30		Qg 0.049 Qo 1.275 Do 954 Flow 2B/1 made eqv grate flow Flow 3/11 made eqv grate flow CHRT 32: Vo2/2gDo 0.22 H/Do 0.00
4/1	9.61 9.61	120 120	3.729 3.729	1243			1275 (Pipe flow= Sum upstr atten flows)	6.800	0.40	1800 x 600 (RCBC)	1.18(0.93 1y) (1.80)	0.10		Qo 1.275 Do 901 Flow 3/1 made eqv grate flow CHRT 32: Vo2/2gDo 0.12 H/Do 0.00 Kg side flow 7.57 end flow 5.84 K vals above for stepped pipes as grate flow grate flow decreased by 1.275 from 3/1
5A/1	5.00 5.00	154 154	0.147 0.147	63			63 (Pipe flow= Grate flow)	3.043	0.40	450 x 450 (RCBC)	0.31(0.24 1y) (1.13)	0.05		Qg 0.063 Qo 0.063 Do 450 CHRT 32: Vo2/2gDo 0.01 H/Do 0.12 Kg side flow 10.08 end flow 7.07
5B/1	5.00 5.00	154 154	0.165 0.165	71			81 (Pipe flow= Grate flow)	3.031	0.40	900 x 600 (RCBC)	0.15(0.11 1y) (1.55)	0.05		Qg 0.081 Qo 0.081 Do 720 CHRT 32: Vo2/2gDo 0.00 H/Do 0.00 Kg side flow 10.82 end flow 7.55 Part full downstream pipe
5/1	9.71 9.71	120 120	4.041 4.041	1347			1388 (Pipe flow= Sum upstr atten flows)	24.921	0.40	2100 x 600 (RCBC)	1.10(0.86 1y) (1.84)	0.38		Qo 1.388 Do 934 Flow 5A/1 made eqv grate flow Flow 5B/1 made eqv grate flow CHART 33 Angle 8 S/Do 2.5 Du/Do 0.96 Qg/Qo 0.08 K 0.41 S/Do 1.06 cor 0.14 Ku 0.55 Kw 0.55
1/2	**5.00 5.00**	**154 154**	**0.240 0.240**	**103**			**76 (Pipe flow= Grate flow)**	**12.640**	**14.31**	**375(2)**	**0.69(0.57 1y) (6.00)**	**0.21**		**Qg 0.076 Qo 0.076 Do 375 CHRT 32: Vo2/2gDo 0.06 H/Do 0.00 Kg side flow 8.81 end flow 6.55**
2/2	**5.21 5.21**	**152 152**	**0.293 0.293**	**124**			**98 (Pipe flow= Sum upstr atten flows)**	**24.981**	**14.00**	**375(2)**	**0.88(0.72 1y) (5.94)**	**0.42**		**Qg 0.022 Qo 0.098 Do 375 Flow 1/2 made eqv grate flow CHRT 32: Vo2/2gDo 0.11 H/Do 0.00 Kg side flow 7.82 end flow 5.98 K vals above for stepped pipes as grate flow grate flow decreased by 0.075 from 1/2 Angle 30 Chart 36 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.51 K0.5 1.86 Qu/Qo 0.77 Cg 0.54 K 1.70**
3/2	**5.63 5.63**	**148 148**	**0.310 0.310**	**127**			**102 (Pipe flow= Sum upstr atten flows)**	**24.981**	**6.00**	**375(2)**	**0.92(0.75 1y) (3.89)**	**0.42**		**Qg 0.007 Qo 0.102 Do 375 Flow 2/2 made eqv grate flow CHRT 32: Vo2/2gDo 0.12 H/Do 0.00 Kg side flow 7.63 end flow 5.87 K vals above for stepped pipes as grate flow**
1/13	**5.00 5.00**	**154 154**	**0.112 0.112**	**48**			**60 (Pipe flow= Grate flow)**	**30.777**	**7.00**	**375(2)**	**0.54(0.43 1y) (4.20)**	**0.51**		**Qg 0.060 Qo 0.060 Do 375 CHRT 32: Vo2/2gDo 0.04 H/Do 0.00 Kg side flow 9.65 end flow 6.94**
2/13	5.51 5.51	149 149	0.327 0.327	135			161 (Pipe flow= Sum upstr atten flows)	6.411	1.00	600(2)	0.55(0.42 1y) (2.19)	0.11		Qg 0.103 Qo 0.161 Do 600 Angle 90 Chart 47 S/Do 2.5 chartdeg Du/Do 0.63 K0 2.75 K0.5 2.27 Qu/Qo 0.36 Cg 1.16 K 2.20 S/Do 2.0 K0 2.85 K0.5 2.49 K 2.44 S/Do 1.5 K0 3.14 K0.5 2.93 K 2.90 Interp val for S/Do 1.08 Kw 3.28 CHART 46
4/2	6.05 6.05	144 144	0.674 0.674	270			270 (Pipe flow= Sum upstr atten flows)	16.783	0.40	825(2)	0.49(0.38 1y) (1.72)	0.28		Qg 0.015 Qo 0.270 Do 825 Routine 2.21 CHART 48 Du/Do 0.45 Qu/Qo 0.37 K 0.76 d/Do 2.0 chrt Qg/Qo 0.05 Kg 0.00 d/Do 1.5 chrt Qg/Qo 0.05 Kg 0.00 d/Do 1.00 Interp value Kg 0.00 Ku=Kw= 0.76 Combined pipes in line case Join Pipes: 3/2 and 2/13 Vel1 0.900 Vel2 0.550
5/2	6.33 6.33	142 142	0.674 0.674	266			270 (Pipe flow= Sum upstr atten flows)	8.001	0.40	900(2)	0.41(0.32 1y) (1.82)	0.13		Qo 0.270 Do 900 CHART 50 Du/Do0.92 alpha 86 K'w 0.30 Vu 0.50 WSE 0.02 Ku 1.73 Kw 2.18 Part full downstream pipe

HEADLOSSES / PART FULL / DESIGN LEVELS

STRUCTURE No.	V2/2g VELOCITY HEAD (m)	Ku U/S HEADLOSS COEFFICIENT	hu U/S PIPE STRUCT. HEADLOSS (m)	Kl LAT. HEADLOSS CO-EFFICIENT	hl LAT. PIPE STRUCT. HEADLOSS (m)	Kw W.S.E CO-EFFICIENT	hw CHANGE IN W.S.E (m)	Sf PIPE FRICTION SLOPE (%)	hf PIPE FRICTION HEADLOSS (L × Sf) (m)	DEPTH (m)	Vp VELOCITY (m/s)	OBVERT LEVELS (m)	DRAIN SECTION H.G.L (m)	UPSTREAM H.G.L (m)	LAT. H.G.L (m)	W.S.E. (m)	SURFACE OR K&C INVERT LEVEL (m)	STRUCTURE No.
2B/1	0.046	1.90	0.087	S/Do 2.0 K0 1.79 K0.5 2.07 K 1.85 S/Do 1.5 K0 2.11 K0.5 2.54 K 2.20 Interp val for S/Do 1.11 Kw 2.47 CHART 35 S/Do 2.0 K0 1.55 K0.5 1.74 K 1.59 S/Do 1.5 K0 1.75 K0.5 1.80 K 1.76 Interp val for S/Do 1.11 Ku 1.90 K vals step pipes as pipe flow Ku 1.90 Kw 2.47		2.47	0.114	0.09	0.018	0.288 (0.255 1y)	4.37 (4.07 1y)	65.566 64.858	65.566 64.097	65.653		65.680	67.293	2B/1
1/11	0.334	3.00	1.002			3.00	1.002	2.04	0.438	0.219 (0.191 1y)	5.31 (4.99 1y)	70.850 68.922	70.850 68.691	71.852		71.852	72.010	1/11
2/11	0.169	3.00	0.506			3.00	0.506	0.82	0.176	0.208 (0.183 1y)	5.05 (4.73 1y)	66.248 64.534	66.248 64.567	66.754		66.754	69.710	2/11
3/11	0.040	1.00	0.275			1.00	0.275	0.12	0.009	0.312 (0.273 1y)	2.32 (2.17 1y)	64.742 64.669	64.292 64.230	64.567		64.567	65.422	3/11
3/1	0.153	5.65	0.862	Kg side flow 5.65 end flow 4.67 K vals above for stepped pipes as grate flow		5.65	0.862	0.53	0.167	0.253 (0.223 1y)	5.16 (4.83 1y)	62.784 60.805	62.784 60.664	63.646		63.646	65.512	3/1
4/1	0.071	0.52	0.036	CHART 50 Du/Do1.06 alpha 1 K'w 0.11 Vu 1.78 WSE 0.05 Ku 0.52 Kw 0.77 K vals step pipes as pipe flow Ku 0.52 Kw 0.77		0.77	0.054	0.17	0.012	0.360 (0.307 1y)	1.97 (1.82 1y)	60.628 60.600	60.628 60.513	60.664		60.682	61.507	4/1
5A/1	0.005	10.08	0.049			10.08	0.049	0.03	0.001			60.462 60.450	60.514 60.513	60.563		60.563	61.202	5A/1
5B/1	0.001	1.00	0.002	Upstream HGL 60.515 below outlet pipe obv 60.612 Set Kp to 1		1.00	0.002	0.00	0.000	0.099 (0.080 1y)	0.91 (0.81 1y)	60.612 60.600	60.513 60.513	60.515		60.515	61.203	5B/1
5/1	0.062	1.00	0.196	K vals above for stepped pipes as grate flow Part full downstream pipe Upstream HGL 60.513 below outlet pipe obv 60.580 Set Kp to 1		1.00	0.196	0.14	0.035	0.338 (0.286 1y)	1.96 (1.80 1y)	60.580 60.481	60.317 59.880	60.513		60.513	61.276	5/1
1/2	**0.024**	**8.81**	**0.214**			**8.81**	**0.214**	**0.19**	**0.024**	**0.086 (0.078 1y)**	**3.99 (3.79 1y)**	**68.475 66.666**	**68.475 66.565**	**68.689**		**68.689**	**69.235**	**1/2**
2/2	**0.039**	**1.84**	**0.073**	**S/Do 2.0 K0 1.79 K0.5 2.07 K 1.94 S/Do 1.5 K0 2.11 K0.5 2.54 K 2.34 Interp val for S/Do 1.27 Kw 2.52 CHART 35 S/Do 2.0 K0 1.55 K0.5 1.74 K 1.65 S/Do 1.5 K0 1.75 K0.5 1.80 K 1.78 Interp val for S/Do 1.27 Ku 1.84 K vals step pipes as pipe flow Ku 1.84 Kw 2.52**		**2.52**	**0.100**	**0.31**	**0.078**	**0.098 (0.089 1y)**	**4.26 (4.03 1y)**	**66.492 62.995**	**66.492 62.718**	**66.565**		**66.592**	**67.503**	**2/2**
3/2	**0.043**	**7.63**	**0.329**			**7.63**	**0.329**	**0.34**	**0.085**	**0.125 (0.112 1y)**	**3.19 (3.01 1y)**	**61.974 60.475**	**61.974 60.419**	**62.303**		**62.303**	**63.520**	**3/2**
1/13	**0.015**	**9.65**	**0.144**			**9.65**	**0.144**	**0.12**	**0.036**	**0.091 (0.081 1y)**	**2.89 (2.71 1y)**	**62.652 60.498**	**62.652 60.478**	**62.796**		**62.796**	**64.439**	**1/13**
2/13	0.015	1.00	0.055	S/Do 2.0 K0 1.71 K0.5 2.01 K 2.06 S/Do 1.5 K0 2.10 K0.5 2.31 K 2.34 Interp val for S/Do 1.08 Ku 2.58 Part full downstream pipe Upstream HGL 60.478 below outlet pipe obv 60.713 Set Kp to 1		1.00	0.055	0.06	0.004	0.208 (0.181 1y)	1.83 (1.69 1y)	60.713 60.649	60.423 60.419	60.478		60.478	61.434	2/13
4/2	0.012	1.00	0.097	Eq Dia 687 Angle 141 Flow 0.255 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.83 Qg/Qo 0.05 K -0.25 S/Do 1.00 cor 0.10 Ku -0.15 Kw -0.15 Interpolated Ku= 0.76 Kw= 0.76 Part full downstream pipe Upstream HGL 60.419 below outlet pipe obv 60.837 Set Kp to 1		1.00	0.097	0.03	0.005	0.306 (0.269 1y)	1.48 (1.38 1y)	60.837 60.770	60.322 60.317	60.419		60.419	61.440	4/2
5/2	0.009	1.00	0.110	Upstream HGL 60.317 below outlet pipe obv 60.827 Set Kp to 1		1.00	0.110	0.02	0.002	0.295 (0.260 1y)	1.47 (1.37 1y)	60.827 60.795	60.207 60.190	60.317		60.317	61.715	5/2

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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CLIENT
PARKER PROPERTY NINGI PTY LTD

PROJECT
41 GLENBROOK DRIVE, NAMBOUR

TITLE
STORMWATER DRAINAGE CALCULATIONS SHEET 4 OF 5 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD503
REV. B

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LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN												HEADLOSSES								PART FULL		DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
2 2	1/7	1/7 to 2/7	1/7			5.00 5.00	154 154		0.64 0.64	0.090 0.090	0.058 0.058	0.058 0.058	25 25 FLOW	25 WIDTH/DEPTH 0.060Dp	13.20 m	38	ND.08L2.4A.36	25 (UNLOCKED	0 0)	2/7	5.00 5.00	154 154	0.058 0.105	45			45 Additional flow: 0.020 (Pipe flow= Sum upstr	19.94.9 cumecs atten flows)	11.53	225(U0	0.98(0.98 1y) (4.74)	0.33		Qg 0.045 Qo 0.045 Do 225 CHRT 32: Vo2/2gDo 0.20 H/Do 0.00 Kg side flow 5.89 end flow 4.84	0.049	5.89	0.289			5.89	0.289	0.49	0.098	0.074 (0.074 1y)	3.74 (3.74 1y)	67.041 64.741	67.041 64.700	67.330		67.330	67.633	1/7
2 2	2/7	2/7 to 3/7	1/7;2/7			5.00 5.00	154 154		0.64 0.64	0.065 0.065	0.042 0.042	0.042 0.042	18 18 FLOW	18 WIDTH/DEPTH 0.048Dp	11.60 m	38	ND.08L2.4A.36	18 (UNLOCKED	0 0)	3/7	5.33 5.33	151 151	0.147 0.194	81			82 Additional flow: 0.020 (Pipe flow= Sum upstr	14.753 cumecs atten flows)	6.78	225(U0	1.78(1.78 1y) (3.64)	0.14		Qg 0.038 Qo 0.082 Do 225 Flow 1/7 made eqv grate flow CHRT 32: Vo2/2gDo 0.67 H/Do 0.00 Kg side flow 3.38 end flow 3.06 K vals above for stepped pipes as grate flow grate flow decreased by 0.044 from 1/7	0.161	1.60	0.259		CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.46 K 1.44 S/Do 2.07 cor 0.16 Ku 1.60 Kw 1.60 K vals step pipes as pipe flow Ku 1.60 Kw 1.60	1.60	0.259	1.63	0.240	0.119 (0.119 1y)	3.62 (3.62 1y)	64.441 63.441	64.441 63.753	64.700		64.700	65.204	2/7
2 2	3/7	3/7 to 4/7	1/7;2/7;3/7			5.00 5.00	154 154		0.64 0.64	0.060 0.060	0.038 0.038	0.038 0.038	16 16 FLOW	16 WIDTH/DEPTH 0.045Dp	6.09 m	38	ND.08L2.4A.36	16 (UNLOCKED	0 0)	4/7	5.47 5.47	149 149	0.232 0.281	116			116 Additional flow: 0.020 (Pipe flow= Sum upstr	16.309 cumecs atten flows)	6.00	225(U0	2.54(2.54 1y) (3.42)	0.11		Qg 0.036 Qo 0.116 Do 225 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.31 K 1.10 S/Do 2.50 cor 0.00 Ku 1.10 Kw 1.10	0.329	1.10	0.362			1.10	0.362	3.30	0.538	0.155 (0.155 1y)	3.75 (3.75 1y)	63.391 62.413	63.391 62.343	63.753		63.753	63.980	3/7
2 2	4/7	4/7 to 5/7	1/7;2/7;3/7;4/7			5.00 5.00	154 154		0.64 0.64	0.060 0.060	0.038 0.038	0.038 0.038	16 16 FLOW	16 WIDTH/DEPTH 0.045Dp	4.59 m	38	ND.08L2.4A.36	16 (UNLOCKED	0 0)	5/7	5.58 5.58	148 148	0.319 0.367	151			151 Additional flow: 0.020 (Pipe flow= Sum upstr	18.552 cumecs atten flows)	4.00	300(U0	2.08(2.08 1y) (3.26)	0.15		Qg 0.036 Qo 0.151 Do 300 Flow 3/7 made eqv grate flow CHRT 32: Vo2/2gDo 0.73 H/Do 0.00 Kg side flow 3.25 end flow 2.97 K vals above for stepped pipes as grate flow grate flow decreased by 0.115 from 3/7	0.221	0.42	0.093		CHART 33 Angle 0 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.24 K 0.10 S/Do 1.30 cor 0.32 Ku 0.42 Kw 0.42 K vals step pipes as pipe flow Ku 0.42 Kw 0.42	0.42	0.093	1.63	0.302	0.176 (0.176 1y)	3.46 (3.46 1y)	62.137 61.395	62.137 61.271	62.230		62.230	63.201	4/7
2 2	5/7	5/7 to 6/7	1/7;2/7;3/7;4/7;5/7			5.00 5.00	154 154		0.60 0.60	0.008 0.008	0.005 0.005	0.005 0.005	2 2 FLOW	2 WIDTH/DEPTH 0.007Dp	0.05 m	75	ND.08L3.6A.81	2 (UNLOCKED	0 0)		5.73 5.73	147 147	0.372 0.421	172			172 Additional flow: 0.020 (Pipe flow= Sum upstr	14.219 cumecs atten flows)	1.50	450(U2	1.08(1.08 1y) (2.19)	0.22		Qg 0.022 Qo 0.172 Do 450 Flow 4/7 made eqv grate flow CHRT 32: Vo2/2gDo 0.13 H/Do 0.00 Kg side flow 7.30 end flow 5.68 K vals above for stepped pipes as grate flow grate flow decreased by 0.150 from 4/7 CHART 33 Angle 1 S/Do 2.5	0.059	1.00	0.109		Du/Do 0.67 Qg/Qo 0.13 K -1.24 S/Do 0.87 cor 0.25 Ku -0.99 Kw -0.99 K vals step pipes as pipe flow Ku -0.99 Kw -0.99 Part full downstream pipe Upstream HGL 61.121 below outlet pipe obv 61.150 Set Kp to -1	1.00	0.109	0.36	0.052	0.223 (0.223 1y)	2.19 (2.19 1y)	61.150 60.936	61.012 60.960	61.121		61.121	61.988	5/7
2 2	6/7	6/7 to OUT3/7	1/7;2/7;3/7;4/7;5/7														24				5.95 5.95	145 145	0.421 0.421	170			172 (Pipe flow= Sum upstr	20.015 atten flows)	3.00	450(U2	1.08(1.08 1y) (3.10)	0.31		Qo 0.172 Do 450 CHART 59 Du/Do 1.00 alpha 14 K w 0.20 Vu 1.08 WSE 0.04 Ku 0.50 Kw 0.70	0.059	0.50	0.030			0.70	0.042	0.36	0.073	0.184 (0.184 1y)	2.83 (2.83 1y)	60.930 60.330	60.930 60.064	60.960		60.972	61.128	6/7

Q2 CALCULATIONS TABLE

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MINOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MAJOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 5 OF 5 Q2 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD504 REV. B

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LOCATION					TIME		SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN														HEADLOSSES					PART FULL						DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C × A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C × A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L × Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
100 100	IN1/12	IN1/12 to IN1A/12															26				5.00 5.00	316 316	1.880 1.880	1650			1650 Additional flow: 1.650 cumecs (Pipe flow= Sum upstr atten flows)	1.600	0.40	1050(2)(1.85(1.85 ty) (2.01)	0.01			0.174	1.00	0.175			1.00	0.175	0.34	0.005			58.772 58.766	60.046 60.041	60.221		60.221	59.533	IN1/12
100 100	IN1A/12	IN1A/12 to 2/8															26				5.01 5.01	315 315	1.880 1.880	1645			1650 (Pipe flow= Sum upstr atten flows)	12.044	0.40	1050(2)(1.85(1.85 ty) (2.01)	0.11		Qo 1.650 Do 1050 CHART 50 Du/Do1.00 alpha 2 K'w 0.13 Vu 1.91 WSE 0.08 Ku 0.34 Kw 0.48	0.174	0.34	0.059			0.48	0.083	0.34	0.041			58.754 58.706	59.982 59.941	60.041		60.065	59.592	IN1A/12
100 100	IN1/8	IN1/8 to IN1A/8															26				5.00 5.00	316 316	1.880 1.880	1650			1650 Additional flow: 1.650 cumecs (Pipe flow= Sum upstr atten flows)	1.613	0.40	1050(2)(1.85(1.85 ty) (2.01)	0.01			0.174	1.00	0.175			1.00	0.175	0.34	0.005			58.772 58.766	60.058 60.053	60.233		60.233	59.579	IN1/8
100 100	IN1A/8	IN1A/8 to 2/8															26				5.01 5.01	315 315	1.880 1.880	1645			1650 (Pipe flow= Sum upstr atten flows)	11.906	0.40	1050(2)(1.85(1.85 ty) (2.01)	0.11		Qo 1.650 Do 1050 CHART 50 Du/Do1.00 alpha 7 K'w 0.17 Vu 1.91 WSE 0.10 Ku 0.41 Kw 0.59	0.174	0.41	0.072			0.59	0.103	0.34	0.040			58.754 58.706	59.981 59.941	60.053		60.084	59.632	IN1A/8
100 100	2/8	2/8 to EX3/8	2/8			5.00 5.00	316 316		1.00 1.00	0.009 0.009	0.009 0.009	0.009 0.009	8 8	8 FLOW WIDTH 0.042 m	7.67	514	7	8 (UNLOCKED)	0	EX3/8	5.12 5.12	313 313	3.768 3.768	3276			3287 (Pipe flow= Sum upstr atten flows)	20.180	1.00	1350(2)(2.22(2.21 ty) (3.77)	0.15		Qg 0.008 Qo 3.287 Do 1350 Routine 2.15 Join Pipes: IN1A/12 and IN1A/8 Vel1 1.893 Vel2 1.893 Eq Dia 1484 Angle 261 Flow 3.279 Angle 81 Chart 47 S/Do 2.5 chart deg Du/Do 1.10 K0 1.90 K0.5 2.00 Qu/Qo 1.00 Cg 0.01 K 1.90	0.251	2.08	0.523		S/Do 2.0 K0 2.41 K0.5 2.40 K 2.41 S/Do 1.5 K0 2.65 K0.5 2.52 K 2.65 Interp val for S/Do 0.77 Kw 2.52 CHART 46 S/Do 2.0 K0 2.07 K0.5 1.82 K 2.07 S/Do 1.5 K0 2.09 K0.5 2.31 K 2.09 Interp val for S/Do 0.77 Ku 2.08	2.52	0.633	0.35	0.070			58.994 58.792	59.418 59.348	59.941		60.051	61.499	2/8
100 100	EX3/8	EX3/8 to EX4/8	2/8;EX3/8			8.00 8.00	267 267		0.91 0.91	1.308 1.308	1.190 1.190	1.190 1.190	883 883	514 CrmFL 369 FLOW WIDTH 3.000 m DOWNSTREAM 2.263m	7.67	514	8	240 (UNLOCKED)	274 369	EX4/8 Crn ×	8.00 8.00	267 267	4.958 4.958	3678			3582 (Pipe flow set by user)	32.455	1.23	1350(2)(2.42(2.42 ty) (4.18)	0.22		Qg 0.778 Qo 3.582 Do 1350 Angle 44 Chart 39 S/Do 2.5 chart deg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.78 Cg 0.52 K 1.86 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.04 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.45	0.298	1.93	0.576		Interp val for S/Do 1.53 Kw 2.43 CHART 38 S/Do 2.0 K0 1.84 K0.5 1.75 K 1.79 S/Do 1.5 K0 2.05 K0.5 1.84 K 1.94 Interp val for S/Do 1.53 Ku 1.93	2.43	0.725	0.41	0.134	0.749 (0.749 ty)	4.34 (4.34 ty)	58.772 58.372	58.772 58.350	59.348		59.497	60.014	EX3/8
100 100	1/9	1/9 to 2/9	1/9			5.00 5.00	316 316		0.90 0.90	0.083 0.083	0.075 0.075	0.075 0.075	66 66 FLOW	66 WIDTH/DEPTH 0.080D(	1.00	38	HD.08L2.4A.36	38 (UNLOCKED)	28	2/9	5.00 5.00	316 316	0.075 0.098	86			58 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	16.636	1.00	225(U)(1.26(1.26 ty) (1.40)	0.22		Qg 0.058 Qo 0.058 Do 225 CHRT 32: Vo2/2gDo 0.34 H/Do 2.13 Kg side flow 2.68 end flow 2.42	0.081	2.68	0.217			2.68	0.217	0.81	0.135			73.782 73.615	74.297 74.162	74.514		74.514	74.337	1/9
100 100	2/9	2/9 to 3/9	1/9;2/9			5.00 5.00	316 316		0.90 0.90	0.062 0.062	0.056 0.056	0.056 0.056	49 49 FLOW	77 WIDTH/DEPTH 0.080D(	1.00	38	HD.08L2.4A.36	38 (UNLOCKED)	40	3/9	5.22 5.22	311 311	0.154 0.177	153			114 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	15.433	1.00	300(U)(1.56(1.56 ty) (1.63)	0.16		Qg 0.057 Qo 0.114 Do 300 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.50 K 1.17 S/Do 2.59 cor -0.03 Ku 1.14 Kw 1.14	0.124	1.14	0.142			1.14	0.142	0.92	0.142			73.678 73.524	74.020 73.878	74.162		74.162	74.170	2/9
100 100	3/9	3/9 to 4/9	1/9;2/9;3/9			5.00 5.00	316 316		0.90 0.90	0.062 0.062	0.056 0.056	0.056 0.056	49 49 FLOW	89 WIDTH/DEPTH 0.080D(	1.00	38	HD.08L2.4A.36	38 (UNLOCKED)	51	4/9	5.38 5.38	308 308	0.233 0.256	219			169 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	15.438	12.00	300(U)(2.33(2.33 ty) (5.65)	0.11		Qg 0.057 Qo 0.169 Do 300 CHART 34 Angle 15 Case3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.33 K 1.27 S/Do 2.23 cor 0.08 Ku 1.35 Kw 1.35	0.277	1.35	0.374			1.35	0.374	2.04	0.315	0.136 (0.136 ty)	5.37 (5.37 ty)	73.504 71.652	73.504 72.105	73.878		73.878	74.016	3/9
100 100	4/9	4/9 to 5/9	1/9;2/9;3/9;4/9			5.00 5.00	316 316		0.90 0.90	0.064 0.064	0.058 0.058	0.058 0.058	51 51 FLOW	102 WIDTH/DEPTH 0.080D(	13.90	38	HD.08L2.4A.36	38 (UNLOCKED)	65	5/9	5.49 5.49	306 306	0.314 0.338	287			224 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	14.529	13.00	300(U)(3.09(3.09 ty) (5.88)	0.08		Qg 0.056 Qo 0.224 Do 300 CHART 34 Angle 13 Case3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.25 K 1.05 S/Do 2.65 cor -0.02 Ku 1.03 Kw 1.03	0.487	1.03	0.501			1.03	0.501	3.59	0.522	0.157 (0.157 ty)	5.95 (5.95 ty)	71.604 69.715	71.604 70.117	72.105		72.105	72.198	4/9
100 100	5/9	5/9 to 6/9	1/9;2/9;3/9;4/9;5/9			5.00 5.00	316 316		0.90 0.90	0.062 0.062	0.056 0.056	0.056 0.056	49 49 FLOW	114 WIDTH/DEPTH 0.080D(	13.60	38	HD.08L2.4A.36	38 (UNLOCKED)	76	6/9	5.57 5.57	304 304	0.394 0.418	353			279 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	15.551	7.00	300(U)(3.84(3.84 ty) (4.31)	0.07		Qg 0.056 Qo 0.279 Do 300 Flow 4/9 made eqv grate flow CHRT 32: Vo2/2gDo 2.47 H/Do 1.99 Kg side flow 1.77 end flow 1.72 K vals above for stepped pipes as grate flow grate flow decreased by 0.223 from 4/9	0.752	0.69	0.519		CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.20 K 0.82 S/Do 4.65 cor -0.13 Ku 0.69 Kw 0.69 K vals stop pipes as pipe flow Ku 0.69 Kw 0.69	0.69	0.519	5.56	0.864			68.993 67.904	69.598 68.734	70.117		70.117	70.223	5/9
100 100	6/9	6/9 to 7/9	1/9;2/9;3/9;4/9;5/9 ;6/9			5.00 5.00	316 316		0.90 0.90	0.059 0.059	0.053 0.053	0.053 0.053	47 47 FLOW	123 WIDTH/DEPTH 0.080D(	9.00	38	HD.08L2.4A.36	38 (UNLOCKED)	85	7/9	5.64 5.64	303 303	0.471 0.494	416			334 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	16.038	8.00	300(U)(4.60(4.60 ty) (4.61)	0.06		Qg 0.056 Qo 0.334 Do 300 CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.17 K 0.72 S/Do 3.78 cor -0.08 Ku 0.64 Kw 0.64	1.078	0.64	0.690			0.64	0.690	7.97	1.278			67.884 66.601	68.044 66.766	68.734		68.734	68.495	6/9
100 100	7/9	7/9 to 8/9	1/9;2/9;3/9;4/9;5/9 ;6/9;7/9			5.00 5.00	316 316		0.90 0.90	0.060 0.060	0.054 0.054	0.054 0.054	47 47 FLOW	133 WIDTH/DEPTH 0.080D(	7.15	38	HD.08L2.4A.36	38 (UNLOCKED)	95	8/9	5.70 5.70	302 302	0.548 0.572	480			389 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	15.621	6.00	375(2)(3.52(3.52 ty) (3.89)	0.07		Qg 0.056 Qo 0.389 Do 375 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.80 Qg/Qo 0.14 K -0.01 S/Do 1.38 cor 0.19 Ku 0.18 Kw 0.18	0.632	0.18	0.114			0.18	0.114	4.93	0.770	0.280 (0.280 ty)	4.40 (4.40 ty)	66.652 65.715	66.652 65.660	66.766		66.766	67.303	7/9
100 100	8/9	8/9 to 9/9	1/9;2/9;3/9;4/9;5/9 ;6/9;7/9;8/9			5.00 5.00	316 316		0.90 0.90	0.060 0.060	0.054 0.054	0.054 0.054	47 47 FLOW	143 WIDTH/DEPTH 0.080D(	6.40	38	HD.08L2.4A.36	38 (UNLOCKED)	105		5.77 5.77	301 301	0.626 0.650	543			443 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	4.254	1.00	450(2)(2.79(2.79 ty) (1.79)	0.03		Qg 0.056 Qo 0.443 Do 450 Flow 7/9 made eqv grate flow CHRT 32: Vo2/2gDo 0.88 H/Do 0.13 Kg side flow 2.88 end flow 2.66 K vals above for stepped pipes as grate flow grate flow decreased by 0.388 from 7/9	0.397	0.27	0.107		CHART 33 Angle 0 S/Do 2.5 Du/Do 0.63 Qg/Qo 0.13 K 0.11 S/Do 1.35 cor 0.16 Ku 0.27 Kw 0.27 K vals stop pipes as pipe flow Ku 0.27 Kw 0.27	0.27	0.107	2.42	0.103			65.493 65.450	65.553 65.450	65.660		65.660	66.287	8/9
100 100	9/9	9/9 to OUT10/9	1/9;2/9;3/9;4/9;5/9 ;6/9;7/9;8/9														24				5.80 5.80	300 300	0.650 0.664	387			287 Additional flow: -0.150 cumecs (Pipe flow= Sum upstr atten flows)	22.660	8.83	525(2)(2.8(1.28 ty) (5.97)	0.30		Qo 0.287 Do 525 Flow 8/9 made eqv grate flow CHRT 32: Vo2/2gDo 0.16 H/Do 0.00 Kg side flow 6.83 end flow 5.40 K vals above for stepped pipes as grate flow	0.084	6.83	0.570			6.83	0.570	0.41	0.092	0.168 (0.168 ty)	4.75 (4.75 ty)	63.534 61.534	63.534 61.177	64.104		64.104	66.004	9/9
100 100	1/5	1/5 to 2/5															24				5.00 5.00	316 316	0.023 0.023	20			20 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	27.338	6.50	150(U)(1.07(1.07 ty) (2.65)	0.43		Qo 0.020 Do 150 CHRT 32: Vo2/2gDo 0.38 H/Do 0.00 Kg side flow 4.38 end flow 3.75	0.058	4.38	0.255			4.38	0.255	1.06	0.289	0.068 (0.068 ty)	2.49 (2.49 ty)	92.560 90.783	92.560 90.857	92.815		92.815	93.061	1/5
100 100	2/5	2/5 to 3/5															24				5.43 5.43	307 307	0.023 0.046	39			40 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	24.425	5.00	225(U)(0.87(0.87 ty) (3.12)	0.41		Qo 0.040 Do 225 CHART 50 Du/Do0.67 alpha 3 K'w 0.14 Vu 1.10 WSE -0.08 Ku -2.29 Kw -2.07	0.039	0.20	0.007			0.20	0.007	0.39	0.096	0.087 (0.087 ty)	2.67 (2.67 ty)	90.858 89.628	90.850 89.797	90.857		90.857	91.458	2/5
100 100	3/5	3/5 to 4/5															24				5.84 5.84	300 300	0.046 0.070	58			60 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	24.865	2.00	225(U)(1.31(1.31 ty) (1.98)	0.32		Qo 0.060 Do 225 CHART 50 Du/Do1.00 alpha 12 K'w 0.19 Vu 0.98 WSE 0.05 Ku 0.47 Kw 0.58	0.087	0.47	0.041			0.58	0.050	0.88	0.219			89.608 89.111	89.756 89.537	89.797		89.806	90.179	3/5
100 100	4/5	4/5 to 5/5															24				6.16 6.16	294 294	0.070 0.095	78			80 Additional flow: 0.029 cumecs (Pipe flow= Sum upstr atten flows)	25.783	2.00	225(U)(1.75(1.75 ty) (1.98)	0.25		Qo 0.080 Do 225 CHART 50 Du/Do1.00 alpha 21 K'w 0.21 Vu 1.48 WSE 0.12 Ku 0.60 Kw 0.75	0.156	0.60	0.094			0.75	0.118	1.56	0.403			89.091 88.575	89.443 89.040	89.537		89.561	89.643	4/5

Q100 CALCULATIONS TABLE

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MAJOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MINOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 1 OF 5 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED: JN	APPROVED	
DRAWING No. C3602 - CD505		REV. B

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

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LOCATION					TIME		SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN												HEADLOSSES					PART FULL						DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m			m	m	%	m	m	m/s	m	m	m	m	m	m	
100 100	5/5	5/5 to 6/5				6.41 6.41	290 290										24				80 (Pipe flow= Sum upstr atten flows)	11.161	1.00	300(U)	101(1.10 ty) (1.63)	0.17		Qa 0.080 Do 300 CHART 50 Du/Do0.75 alpha 33 K'w 0.23 Vu 2.01 WSE 0.05 Ku 0.01 Kw 0.79	0.062	0.01	0.001			0.79	0.049	0.46	0.051			88.618 88.506	89.039 88.988	89.040		89.088	89.117	5/5
100 100	6/5	6/5 to 7/5				6.58 6.58	287 287										24				100 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)	32.716	1.50	300(U)	138(1.38 ty) (2.00)	0.40		Qa 0.100 Do 300 CHART 50 Du/Do1.00 alpha 12 K'w 0.19 Vu 1.12 WSE 0.06 Ku 0.47 Kw 0.59	0.097	0.47	0.046			0.59	0.058	0.71	0.233			88.506 88.015	88.942 88.709	88.988		89.000	89.354	6/5
100 100	7/5	7/5 to 4/3				6.98 6.98	281 281										24				120 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)	18.138	5.00	375(2)	109(1.09 ty) (3.55)	0.28		Qa 0.120 Do 375 CHART 50 Du/Do0.80 alpha 58 K'w 0.27 Vu 1.39 WSE 0.10 Ku 1.22 Kw 1.65	0.061	1.22	0.074			1.65	0.100	0.47	0.085			88.066 87.159	88.635 88.550	88.709		88.735	89.317	7/5
100 100	1/6	1/6 to 2/6				5.00 5.00	316 316										24				20 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)	19.466	1.00	225(2)	49(0.49 ty) (1.14)	0.32		Qa 0.020 Do 225 CHRT 32: Vo2/2gDo 0.05 H/Do 5.25 Kg side flow 1.90 end flow 1.81	0.012	1.90	0.023			1.90	0.023	0.18	0.035			89.229 89.034	90.432 90.397	90.455		90.455	90.690	1/6
100 100	2/6	2/6 to 3/6	2/6			5.00 5.00	316 316		0.90 0.90	0.059 0.059	0.053 0.053	0.053 0.053	47 47 FLOW WIDTH/DEPTH 0.092Dp m	47	1.00	69	#D.12L2.4A.36	47 (UNLOCKED (i)	0	3/6	5.32 5.32	309 309	0.076 0.099				85 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)	20.742	1.43	225(2)	206(2.06 ty) (1.37)	0.17		Qg 0.065 Qo 0.085 Do 225 CHART 33 Angle 7 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.77 K 2.00 S/Do 7.04 cor -0.85 Ku 1.15 Kw 1.15	0.216	1.15	0.248			1.15	0.248	3.27	0.679			89.014 88.717	90.149 89.470	90.397		90.397	90.496	2/6
100 100	3/6	3/6 to 4/6	2/6;3/6			5.00 5.00	316 316		0.90 0.90	0.055 0.055	0.050 0.050	0.050 0.050	44 43 FLOW WIDTH/DEPTH 0.088Dp m	44	1.00	69	#D.12L2.4A.36	44 (UNLOCKED (i)	0	4/6	5.49 5.49	306 306	0.149 0.173				147 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)	20.716	1.00	300(2)	208(2.08 ty) (1.37)	0.17		Qg 0.063 Qo 0.147 Do 300 CHART 34 Angle 24 Case3 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.43 K 1.06 S/Do 3.34 cor -0.16 Ku 0.90 Kw 0.90	0.221	0.90	0.198			0.90	0.198	2.31	0.478			88.768 88.561	89.272 88.794	89.470		89.470	90.233	3/6
100 100	**4/6**	**4/6 to 4/3**	**2/6;3/6;4/6**			**5.00 5.00**	**316 316**		**0.90 0.90**	**0.054 0.054**	**0.049 0.049**	**0.049 0.049**	**43 43 FLOW WIDTH/DEPTH 0.087Dp m**	**43**	**0.00**	**69**	**#D.12L2.4A.36**	**43 (UNLOCKED (i)**	**0**	**5A/3**	**5.66 5.66**	**303 303**	**0.222 0.245**				**207 Additional flow: 0.02 cumecs (Pipe flow= Sum upstr atten flows)**	**4.015**	**1.25**	**375(2)**	**187(1.87 ty) (1.77)**	**0.04**		**Qg 0.061 Qo 0.207 Do 375 CHART 33 Angle 1 S/Do 2.5 Du/Do 0.80 Qg/Qo 0.30 K 0.63 S/Do 1.47 cor 0.34 Ku 0.97 Kw 0.97**	**0.178**	**0.97**	**0.172**			**0.97**	**0.172**	**1.39**	**0.056**			**88.616 88.566**	**88.622 88.566**	**88.794**		**88.794**	**89.861**	**4/6**
100 100	**1/3**	**1/3 to 2/3**	**1/3**			**5.00 5.00**	**316 316**		**1.00 1.00**	**0.047 0.047**	**0.047 0.047**	**0.047 0.047**	**41 41 FLOW WIDTH 0.625 m**	**41**	**14.00**	**1423**	**7**	**39 (UNLOCKED (i)**	**3**	**2/3**	**5.00 5.00**	**316 316**	**0.047 0.047**	**41**			**39 (Pipe flow= Grate flow)**	**36.309**	**6.00**	**375(2)**	**035(0.14 ty) (3.89)**	**0.61**		**Qg 0.039 Qo 0.039 Do 375 CHRT 32: Vo2/2gDo 0.02 H/Do 0.00 Kg side flow 10.37 end flow 7.31 Part full downstream pipe**	**0.006**	**1.00**	**0.296**	**Upstream HGL 92.850 below outlet pipe obv 92.854 Set Kp to 1**		**1.00**	**0.296**	**0.05**	**0.018**	**0.076 (0.050 ty)**	**2.41 (1.86 ty)**	**92.854 90.675**	**92.555 90.846**	**92.851**		**92.851**	**93.737**	**1/3**
100 100	**2/3**	**2/3 to 3/3**	**1/3;2/3**			**5.00 5.00**	**316 316**		**1.00 1.00**	**0.144 0.144**	**0.144 0.144**	**0.144 0.144**	**126 126 FLOW WIDTH 1.984 m**	**129**	**0.05**	**183**	**13S.08**	**129 (UNLOCKED (i)**	**0**	**3/3**	**5.61 5.61**	**304 304**	**0.191 0.191**	**161**			**161 (Pipe flow= Sum upstr atten flows)**	**11.872**	**9.29**	**375(2)**	**146(0.56 ty) (4.83)**	**0.14**		**Qg 0.124 Qo 0.161 Do 375 Angle 34 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.23 Cg 1.26 K 1.94 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.13 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.55**	**0.109**	**1.76**	**0.191**	**Interp val for S/Do 1.69 Kw 2.40 CHART 38 S/Do 2.0 K0 1.84 K0.5 1.75 K 1.72 S/Do 1.5 K0 2.05 K0.5 1.84 K 1.78 Interp val for S/Do 1.69 Ku 1.76**		**2.40**	**0.261**	**0.85**	**0.101**	**0.141 (0.086 ty)**	**4.23 (3.22 ty)**	**90.655 89.552**	**90.655 89.577**	**90.846**		**90.916**	**91.423**	**2/3**
100 100	**3/3**	**3/3 to 4/3**	**1/3;2/3**														**#D.08L3.6A.81**				**5.75 5.75**	**301 301**	**0.191 0.191**	**160**			**161 (Pipe flow= Sum upstr atten flows)**	**25.368**	**2.00**	**375(2)**	**146(0.56 ty) (2.24)**	**0.29**		**Qa 0.161 Do 375 CHART 50 Du/Do1.00 alpha 7 K'w 0.17 Vu 1.46 WSE 0.06 Ku 0.41 Kw 0.58**	**0.109**	**0.41**	**0.045**			**0.58**	**0.063**	**0.85**	**0.215**	**0.220 (0.127 ty)**	**2.39 (1.86 ty)**	**89.532 89.025**	**89.532 88.870**	**89.577**		**89.595**	**90.288**	**3/3**
100 100	**4/3**	**4/3 to 5A/3**	**2/6;3/6;4/6;1/3;2/3**														**24**				**7.26 7.26**	**277 277**	**0.582 0.582**	**448**			**456 (Pipe flow= Sum upstr atten flows)**	**12.399**	**11.00**	**375(2)**	**412(1.87 ty) (5.26)**	**0.05**		**Qa 0.456 Do 375 Flow 4/6 made eqv grate flow Flow 3/3 made eqv grate flow Angle 93 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.26 Cg 1.24 K 2.17 S/Do 4.0 K0 1.91 K0.5 1.66 K 1.60 S/Do 3.0 K0 2.00 K0.5 1.89 K 1.87 Interp val for S/Do 4.42 Kw 1.48 CHART 46 S/Do 4.0 K0 1.53 K0.5 1.43 K 1.41 S/Do 3.0 K0 1.74 K0.5 1.52 K 1.47 Interp val for S/Do 4.42 Ku 1.38 K vals above for stepped pipes as grate flow grate flow decreased by 0.189 from 4/6 Routine 2.14 Equiv defin 6 CHART 49 High vel lat 4/6 Dhv 375 Qhv 0.189**	**0.865**	**1.63**	**1.411**	**Dhv/Dlv 1.0 Dhv/Do 1.00 Qhv/Qo 0.41 H 2.01 Low vel latrl 7/5 Dlv 375 Qlv 0.118 Dlv/Do 1.00 Qlv/Qo 0.26 L 0.06 H-L 1.95 Ku=Kw= 1.95 Combined pipes in line case Join Pipes: 7/5 and 4/6 Vel1 1.709 Vel2 1.071 Eq Dia 516 Angle 167 Flow 0.307 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.38 Qg/Qo 0.33 K 1.15 S/Do 3.37 cor -0.12 Ku 1.03 Kw 1.03 Interpolated Ku= 1.89 Kw= 1.89 K vals step pipes as pipe flow Ku 1.89 Kw 1.89 Averaged Ku 1.63 Kw 1.68**		**1.68**	**1.455**	**6.76**	**0.838**	**0.250 (0.155 ty)**	**5.82 (4.82 ty)**	**87.139 85.775**	**87.139 85.650**	**88.550**		**88.594**	**89.805**	**4/3**
100 100	**5A/3**	**5A/3 to 5/3**	**2/6;3/6;4/6;1/3;2/3 ;5A/3**			**5.00 5.00**	**316 316**		**0.84 0.84**	**0.018 0.018**	**0.015 0.015**	**0.015 0.015**	**13 13 FLOW WIDTH/DEPTH 0.039Dp m**	**13**	**1.00**	**38**	**#D.08L2.4A.36**	**13 (UNLOCKED (i)**	**0**	**6/3**	**7.31 7.31**	**276 276**	**0.597 0.597**	**458**			**465 (Pipe flow= Sum upstr atten flows)**	**12.004**	**13.00**	**375(2)**	**412(2.66 ty) (5.72)**	**0.05**		**Qg 0.012 Qo 0.465 Do 375 Flow 4/3 made eqv grate flow CHRT 32: Vo2/2gDo 2.41 H/Do 0.00 Kg side flow 1.99 end flow 1.90 K vals above for stepped pipes as grate flow grate flow decreased by 0.454 from 4/3**	**0.903**	**0.29**	**0.261**			**0.29**	**0.261**	**7.06**	**0.847**	**0.240 (0.180 ty)**	**6.26 (5.62 ty)**	**84.256 82.695**	**84.256 82.560**	**84.517**		**84.517**	**86.508**	**5A/3**
100 100	**5/3**	**5/3 to 6/3**	**2/6;3/6;4/6;1/3;2/3 ;5A/3**														**24**				**7.36 7.36**	**276 276**	**0.597 0.597**	**458**			**465 (Pipe flow= Sum upstr atten flows)**	**40.542**	**5.00**	**450(2)**	**212.93(1.85 ty) (4.01)**	**0.23**		**Qa 0.465 Do 450 Flow 5A/3 made eqv grate flow CHRT 32: Vo2/2gDo 0.97 H/Do 0.00 Kg side flow 2.84 end flow 2.62 K vals above for stepped pipes as grate flow**	**0.438**	**2.84**	**1.243**			**2.84**	**1.243**	**2.67**	**1.082**	**0.286 (0.215 ty)**	**4.37 (3.93 ty)**	**80.600 78.573**	**80.600 78.892**	**81.843**		**81.843**	**83.206**	**5/3**
100 100	**6/3**	**6/3 to 7/3**	**2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3**			**5.00 5.00**	**316 316**		**0.84 0.84**	**0.023 0.023**	**0.019 0.019**	**0.019 0.019**	**17 17 FLOW WIDTH/DEPTH 0.046Dp m**	**17**	**8.00**	**38**	**#D.08L2.4A.36**	**17 (UNLOCKED (i)**	**0**	**9/3**	**7.59 7.59**	**272 272**	**0.616 0.616**	**465**			**473 (Pipe flow= Sum upstr atten flows)**	**5.409**	**2.50**	**450(2)**	**212.97(1.85 ty) (2.83)**	**0.03**		**Qg 0.014 Qo 0.473 Do 450 Flow 5/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.00 H/Do 0.68 Kg side flow 2.54 end flow 2.37 K vals above for stepped pipes as grate flow grate flow decreased by 0.459 from 5/3**	**0.450**	**0.30**	**0.135**			**0.30**	**0.135**	**2.76**	**0.149**			**78.450 78.315**	**78.757 78.608**	**78.892**		**78.892**	**79.140**	**6/3**
100 100	**7/3**	**7/3 to 8/3**	**2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3**														**24**				**7.62 7.62**	**272 272**	**0.616 0.616**	**465**			**473 (Pipe flow= Sum upstr atten flows)**	**49.614**	**6.75**	**450(2)**	**212.97(1.85 ty) (4.65)**	**0.28**		**Qa 0.473 Do 450 Flow 6/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.00 H/Do 0.00 Kg side flow 2.81 end flow 2.60 K vals above for stepped pipes as grate flow grate flow decreased by 0.473 from 6/3**	**0.450**	**1.80**	**0.809**			**2.09**	**0.941**	**2.76**	**1.368**	**0.261 (0.197 ty)**	**4.94 (4.39 ty)**	**77.799 74.450**	**77.799 75.064**	**78.608**		**78.740**	**78.897**	**7/3**
100 100	**8/3**	**8/3 to 9/3**	**2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3**														**24**				**7.90 7.90**	**268 268**	**0.616 0.616**	**458**			**473 (Pipe flow= Sum upstr atten flows)**	**20.739**	**8.50**	**450(2)**	**212.97(1.85 ty) (5.22)**	**0.12**		**Qa 0.473 Do 450 Flow 7/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.00 H/Do 0.00 Kg side flow 2.81 end flow 2.60 K vals above for stepped pipes as grate flow grate flow decreased by 0.473 from 7/3**	**0.450**	**1.67**	**0.751**			**1.95**	**0.878**	**2.76**	**0.572**	**0.243 (0.185 ty)**	**5.39 (4.78 ty)**	**74.313 72.550**	**74.313 73.249**	**75.064**		**75.191**	**75.216**	**8/3**

Q100 CALCULATIONS TABLE

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MAJOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MINOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 2 OF 5 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD506 REV. B

©MILANOVIC NEALE CONSULTING ENGINEERS

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN												HEADLOSSES					PART FULL						DESIGN LEVELS						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T		V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min		m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
100 100	9/3	9/3 to 10/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3			5.00 5.00	316 316		0.91 0.91	0.551 0.551	0.501 0.501	0.501 0.501	440 440	440 FLOW DEPTH 0.150 m	0.05	330	13S.15	330 (UNLOCKED	110 0)	10/3	8.02 8.02	267 267	1.117 1.117	828	(Pipe flow=	Sum upstr	750 atten flows)	22.669	7.00	525(2)	3.35(1.92 ty) (5.31)	0.11		Qg 0.279 Qo 0.750 Do 525 CHART 33 Angle 9 S/Do 2.5 Du/Do 0.86 Qg/Qo 0.37 K 1.07 S/Do 2.23 cor 0.08 Ku 1.15 Kw 1.15	0.572	1.15	0.658			1.15	0.658	2.78	0.631	0.307 (0.222 ty)	5.62 (4.88 ty)	72.591 71.004	72.591 71.118	73.249		73.249	73.272	9/3
100 100	10/3	10/3 to 11/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3			5.00 5.00	316 316		0.84 0.84	0.015 0.015	0.013 0.013	0.013 0.013	11 11	121 FLOW WIDTH/DEPTH 0.080Dg m	8.00	75	#D.08L3.6A.81	75 (UNLOCKED	46 0)	11/3	8.13 8.13	265 265	1.130 1.130	832	(Pipe flow=	Sum upstr	807 atten flows)	44.030	5.20	525(2)	3.61(1.92 ty) (4.58)	0.20		Qg 0.063 Qo 0.807 Do 525 Flow 9/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.24 H/Do 0.20 Kg side flow 2.51 end flow 2.35 K vals above for stepped pipes as grate flow grate flow decreased by 0.744 from 9/3	0.664	0.49	0.326		CHART 33 Angle 3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.08 K 0.44 S/Do 1.82 cor 0.05 Ku 0.49 Kw 0.49 K vals step pipes as pipe flow Ku 0.49 Kw 0.49	0.49	0.326	3.22	1.419			70.684 68.394	70.792 69.373	71.118		71.118	71.649	10/3
100 100	11/3	11/3 to 12/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3			5.00 5.00	316 316		0.91 0.91	0.168 0.168	0.153 0.153	0.153 0.153	134 134	180 FLOW WIDTH 1.626 m DOWNSTREAM 1.014m	12.00	1350	7	103 (UNLOCKED	77 0)	12/3	8.33 8.33	263 263	1.283 1.283	937	(Pipe flow=	Sum upstr	887 atten flows)	21.050	8.00	525(2)	3.96(2.06 ty) (5.68)	0.09		Qg 0.086 Qo 0.887 Do 525 Angle 60 Chart 43 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.35 K0.5 1.93 Qu/Qo 0.99 Cg 1.24 K 1.49 S/Do 4.0 K0 1.22 K0.5 1.56 K 1.30 S/Do 3.0 K0 1.33 K0.5 1.66 K 1.41	0.799	1.25	0.999		Interp val for S/Do 3.09 Kw 1.40 CHART 42 S/Do 4.0 K0 1.13 K0.5 1.48 K 1.22 S/Do 3.0 K0 1.13 K0.5 1.64 K 1.26 Interp val for S/Do 3.09 Ku 1.25	1.40	1.119	3.89	0.819	0.328 (0.223 ty)	6.14 (5.23 ty)	68.374 66.690	68.374 67.093	69.373		69.493	70.147	11/3
100 100	12/3	12/3 to 13/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3;12/3			5.00 5.00	316 316		0.91 0.91	0.109 0.109	0.099 0.099	0.099 0.099	87 87	164 FLOW WIDTH 2.475 m	0.05	183	13S.08	164 (UNLOCKED	0 0)	13/3	8.42 8.42	262 262	1.382 1.382	1006	(Pipe flow=	Sum upstr	1020 atten flows)	20.340	4.50	600(2)	3.49(1.67 ty) (4.65)	0.10		Qg 0.136 Qo 1.020 Do 600 Flow 11/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.02 H/Do 0.54 Kg side flow 2.60 end flow 2.40 K vals above for stepped pipes as grate flow grate flow decreased by 0.884 from 11/3	0.621	0.41	0.255		CHART 33 Angle 3 S/Do 2.5 Du/Do 0.88 Qg/Qo 0.13 K 0.35 S/Do 1.95 cor 0.06 Ku 0.41 Kw 0.41 K vals step pipes as pipe flow Ku 0.41 Kw 0.41	0.41	0.255	2.53	0.514			66.510 65.595	66.838 66.324	67.093		67.093	67.719	12/3
100 100	13/3	13/3 to 14/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3;12/3;13/3			5.00 5.00	316 316		1.00 1.00	0.033 0.033	0.033 0.033	0.033 0.033	29 29	29 FLOW WIDTH 2.233 m	6.00	38	#D.08L2.4A.36	29 (UNLOCKED	0 0)	14/3	8.52 8.52	261 261	1.415 1.415	1026	(Pipe flow=	Sum upstr	1040 atten flows)	21.450	4.00	600(2)	3.56(1.68 ty) (4.39)	0.10		Qg 0.024 Qo 1.040 Do 600 Flow 12/3 made eqv grate flow CHRT 32: Vo2/2gDo 1.06 H/Do 0.32 Kg side flow 2.64 end flow 2.44 K vals above for stepped pipes as grate flow grate flow decreased by 1.016 from 12/3 Angle 63 Chart 45 S/Do 2.5 chartdeg Du/Do 1.00 K0 2.16 K0.5 1.81 Qu/Qo 0.98 Cg 0.06 K 2.14	0.646	1.80	1.163		S/Do 4.0 K0 2.07 K0.5 1.58 K 2.04 S/Do 3.0 K0 2.15 K0.5 1.84 K 2.13 Interp val for S/Do 3.52 Kw 2.08 CHART 44 S/Do 4.0 K0 1.76 K0.5 1.60 K 1.75 S/Do 3.0 K0 1.85 K0.5 1.80 K 1.85 Interp val for S/Do 3.52 Ku 1.80 K vals step pipes as pipe flow Ku 1.80 Kw 2.08	2.08	1.344	2.63	0.564			64.968 64.110	65.161 64.597	66.324		66.505	66.655	13/3
100 100	14/3	14/3 to 15/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3;12/3;13/3;14/3			5.00 5.00	316 316		1.00 1.00	0.010 0.010	0.010 0.010	0.010 0.010	9 9	9 FLOW WIDTH 1.000 m	1.00	38	#D.08L2.4A.36	9 (UNLOCKED	0 0)		8.62 8.62	260 260	1.425 1.425	1029	(Pipe flow=	Sum upstr	1043 atten flows)	37.991	1.32	675(2)	2.83(1.33 ty) (2.73)	0.22		Qg 0.007 Qo 1.043 Do 675 CHART 34 Angle 13 Case3 S/Do 2.5 Du/Do 0.89 Qg/Qo 0.01 K 0.04 S/Do 1.63 cor 0.01 Ku 0.05 Kw 0.05	0.408	0.05	0.020			0.05	0.020	1.43	0.542			64.165 63.663	64.577 64.035	64.597		64.597	65.178	14/3
100 100	15/3	15/3 to 16/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3;12/3;13/3;14/3														24				8.84 8.84	257 257	1.425 1.425	1017	(Pipe flow= | Sum upstr | 1043 atten flows)	3.941	0.40	900 x 600 (RC	1.93(0.91 ty) BC) (1.55)	0.03		Qo 1.043 Do 720 CHART 50 Du/Do0.94 alpha 61 K'w 0.27 Vu 2.92 WSE 0.39 Ku 1.46 Kw 2.08	0.190	1.46	0.278			2.08	0.395	0.62	0.024			63.536 63.520	63.757 63.733	64.035		64.152	64.134	15/3
100 100	16/3	16/3 to OUT17/3	2/6;3/6;4/6;1/3;2/3 ;5A/3;6/3;9/3;10/3; 11/3;12/3;13/3;14/3														24				8.87 8.87	257 257	1.425 1.425	1017	(Pipe flow= | Sum upstr | 1043 atten flows)	1.162	0.40	900 x 600 (RC	1.93(0.91 ty) BC) (1.55)	0.01		Qo 1.043 Do 720 CHART 50 Du/Do1.00 alpha 50 K'w 0.26 Vu 2.56 WSE 0.32 Ku 1.24 Kw 1.69	0.190	1.24	0.236			1.69	0.321	0.62	0.007			63.495 63.490	63.497 63.490	63.733		63.818	63.933	16/3
100 100	IN1/14	IN1/14 to OUT2/14															24				5.00 5.00	316 316	0.746 0.746	655	(Pipe flow set by	user)	655	14.572	1.17	600(2)	2.24(2.24 ty) (2.37)	0.11			0.256	1.00	0.256			1.00	0.256	1.04	0.152	0.472 (0.472 ty)	2.70 (2.70 ty)	61.990 61.820	61.990 61.692	62.246		62.246	62.500	IN1/14
100 100	EX1/4	EX1/4 to OUT2/4	EX1/4			8.00 8.00	267 267		0.91 0.91	2.070 2.070	1.884 1.884	1.884 1.884	1397 1397	699 CrnFL 699 FLOW WIDTH 5.179 m DOWNSTREAM 3.993m	1.00	380	7	326 (UNLOCKED | 372 0) 699	Crn ×	8.00 8.00	267 267	1.884 1.884	1397	(Pipe flow= | Grate flow)	326	8.355	10.77	375(2)	2.96(2.03 ty) (5.21)	0.05		Qg 0.326 Qo 0.326 Do 375 CHRT 32: Vo2/2gDo 1.19 H/Do 0.00 Kg side flow 2.63 end flow 2.43	0.447	2.63	1.174			2.63	1.174	3.47	0.290	0.202 (0.162 ty)	5.37 (4.88 ty)	79.805 78.905	79.805 78.732	80.979		80.979	82.148	EX1/4
100 100	IN1/15	IN1/15 to 2/15	IN1/15			8.00 8.00	267 267		0.91 0.91	0.717 0.717	0.652 0.652	0.652 0.652	484 484	484 FLOW WIDTH/DEPTH 0.000Dg m	1.00	1000	14S.11	484 (UNLOCKED | 0 0)		8.00 8.00	267 267	0.652 0.652	484	(Pipe flow= | Grate flow)	484	2.000	8.00	450(2)	3.04(1.16 ty) (5.07)	0.01		Qg 0.484 Qo 0.484 Do 450 CHART 32: Vo2/2gDo 1.05 H/Do 0.11 Kg side flow 2.72 end flow 2.52	0.471	2.72	1.281			2.72	1.281	2.88	0.058			64.806 64.646	64.858 64.800	66.139		66.139	66.070	IN1/15
100 100	2/15	2/15 to OUT3/15	IN1/15														24				8.01 8.01	267 267	0.652 0.652	484	(Pipe flow= | Sum upstr | 484 atten flows)	7.653	8.00	450(2)	3.04(1.16 ty) (5.07)	0.04		Qo 0.484 Do 450 Flow IN1/15 made eqv grate flow CHRT 32: Vo2/2gDo 1.05 H/Do 0.00 Kg side flow 2.76 end flow 2.55 K vals above for stepped pipes as grate flow grate flow decreased by 0.484 from IN1/15	0.471	1.80	0.848		CHART 51 Ti 694 Do 450 theta 95 r/Do 2.25 Du 450 Du/Do 1.00 Kd 1.80 K'w 0.30 Vu 3.04 WSE 0.99 Ku 1.80 Kw 2.10 K vals step pipes as pipe flow Ku 1.80 Kw 2.10	2.10	0.991	2.88	0.220	0.251 (0.146 ty)	5.30 (4.11 ty)	63.952 63.340	63.952 63.141	64.800		64.943	65.717	2/15
100 100	1/10	1/10 to 2/10	1/10			8.00 8.00	267 267		0.91 0.91	3.060 3.060	2.785 2.785	2.785 2.785	2066 2065	2066 FLOW WIDTH/DEPTH 0.310Dg m	0.05	716	#D.31L4.8A1.44	716 (UNLOCKED | 1349 0)	2/10	8.00 8.00	267 267	2.785 2.785	2066	(Pipe flow= | Grate flow)	716	32.912	5.00	600(2)	4.52(4.45 ty) (4.91)	0.22			0.306	3.00	0.918			3.00	0.918	1.25	0.411	0.305 (0.305 ty)	4.91 (4.91 ty)	73.110 71.464	73.110 71.169	74.028		74.028	74.261	1/10
100 100	2/10	2/10 to 3/10	1/10;2/10			8.00 8.00	267 267		0.91 0.91	0.000 0.000	0.000 0.000	0.000 0.000	0 0	1349 FLOW WIDTH/DEPTH 0.310Dg m	0.05	716	#D.31L4.8A1.44	716 (UNLOCKED	633 0)	3/10	8.22 8.22	264 264	2.785 2.785	2042	(Pipe flow=	Sum upstr	1416 atten flows)	29.323	6.41	675(2)	3.84(2.10 ty) (6.00)	0.13			0.752	3.00	2.255			3.00	2.255	2.63	0.771	0.399 (0.280 ty)	6.37 (5.47 ty)	68.816 66.938	68.816 67.951	71.071		71.071	72.282	2/10
100 100	3/10	3/10 to 2/1	1/10;2/10;3/10			8.00 8.00	267 267		0.91 0.91	0.000 0.000	0.000 0.000	0.000 0.000	0 0	633 FLOW WIDTH/DEPTH 0.285Dg m	0.05	716	#D.31L4.8A1.44	633 (UNLOCKED	0 0)	2B/1	8.35 8.35	263 263	2.785 2.785	2035	(Pipe flow=	Sum upstr	2035 atten flows)	13.321	1.00	1050(2)	2.28(0.87 ty) (3.18)	0.10			0.265	1.00	0.265			1.00	0.265	0.51	0.068			67.299 67.166	67.686 67.618	67.951		67.951	67.992	3/10
100 100	1/1	1/1 to 2/1	1/1			8.00 8.00	267 267		0.90 0.90	0.371 0.371	0.334 0.334	0.334 0.334	248 248	248 FLOW WIDTH/DEPTH 0.177Dg m	0.05	546	#D.3L3.6A.81	248 (UNLOCKED | 0 0)	2B/1	8.00 8.00	267 267	0.334 0.334	248	(Pipe flow= | Grate flow)	248	14.005	1.00	525(2)	1.11(0.42 ty) (2.01)	0.21		Qg 0.248 Qo 0.248 Do 525 CHRT 32: Vo2/2gDo 0.12 H/Do 0.24 Kg side flow 6.89 end flow 5.33	0.063	6.89	0.433			6.89	0.433	0.30	0.042			67.534 67.394	67.660 67.618	68.093		68.093	68.189	1/1

Q100 CALCULATIONS TABLE

NOTE
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DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE
CONSULTING ENGINEERS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 3 OF 5 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD507 REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

LOCATION					TIME		SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN													HEADLOSSES										PART FULL		DESIGN LEVELS						
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C x A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L x Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
						tc	I	C10	C	A	CxA	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
100 100	2/1	2/1 to 2B/1	1/10;2/10;3/10;1/1			8.45 8.45	262 262			3.119 3.119			2270				24				8.45 8.45	262 262	3.119 3.119	2270			2270 (Pipe flow= Sum upstr	16.538 atten flows)	3.50	1050(22	2.54(0.96 ty) (5.96)	0.11		Qo 2.270 Do 1050 Flow 1/1 made eqv grate flow Angle 83 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.89 Cg 0.27 K 1.98 S/Do 2.0 K0 2.44 K0.5 2.40 K 2.43 S/Do 1.5 K0 2.67 K0.5 2.58 K 2.65 Interp val for S/Do 1.78 Kw 2.53 CHART 46 S/Do 2.0 K0 2.04 K0.5 1.92 K 2.01 S/Do 1.5 K0 2.09 K0.5 2.31 K 2.15 Interp val for S/Do 1.78 Ku 2.07 K vals above for stepped pipes as grate flow grate flow decreased by 0.243 from 1/1 Routine 2.2 CHART 52 B 900 In line 1/1 Latrl 3/10 Determine Kl	0.329	1.43	0.472	Dl/Do 1.00 B/Do 0.86 Qu/Qo 0.11 Do/Du 2.00 Do/Dl 1.00 K'1 1.28 Ml 0.95 Kl=K'1×Ml= 1.22 Determine Ku K'u 1.50 Mu 0.95 Ku=K'u×Mu= 1.43 Kw=Ku= 1.43 Combined pipes in line case Join Pipes: 3/10 and 1/1 Vel1 1.123 Vel2 2.341 Eq Dia 1143 Angle 254 Flow 2.270 CHART 50 Du/Do1.09 alpha 0 K'w 0.05 Vu 2.21 WSE 0.21 Ku 0.60 Kw 0.64 Interpolated Ku= 1.36 Kw= 1.36 K vals step pipes as pipe flow Ku 1.36 Kw 1.36 Averaged Ku 1.43 Kw 1.48	1.48	0.487	0.64	0.106	0.486 (0.289 ty)	5.72 (4.37 ty)	67.146 66.567	67.146 66.185	67.618		67.633	68.142	2/1
100 100	2B/1	2B/1 to 3/1	1/10;2/10;3/10;1/1;2 B/1			5.00 5.00	316 316		0.91 0.91	0.422 0.422	0.384 0.384	0.384 0.384	337 337	337 FLOW WIDTH 2.151 m DOWNSTREAM 1.523m	13.30	707	8	170 (UNLOCKED	167 0)	3/1	8.56 8.56	260 260	3.503 3.503	2530			2392 (Pipe flow= Sum upstr	20.228 atten flows)	3.50	1050(22	2.68(1.03 ty) (5.96)	0.13		Qg 0.140 Qo 2.392 Do 1050 Flow 2/1 made eqv grate flow CHRT 32: Vo2/2gDo 0.34 H/Do 0.00 Kg side flow 4.57 end flow 3.91 K vals above for stepped pipes as grate flow grate flow decreased by 2.253 from 2/1 Angle 14 Chart 36 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.51 K0.5 1.86 Qu/Qo 0.94 Cg 0.15 K 1.56	0.366	1.69	0.619	S/Do 2.0 K0 1.79 K0.5 2.07 K 1.84 S/Do 1.5 K0 2.11 K0.5 2.54 K 2.17 Interp val for S/Do 1.70 Kw 2.04 CHART 35 S/Do 2.0 K0 1.55 K0.5 1.74 K 1.58 S/Do 1.5 K0 1.75 K0.5 1.80 K 1.76 Interp val for S/Do 1.70 Ku 1.69 K vals step pipes as pipe flow Ku 1.69 Kw 2.04	2.04	0.747	0.71	0.143	0.501 (0.301 ty)	5.80 (4.47 ty)	65.566 64.858	65.566 64.877	66.185		66.313	67.293	2B/1
100 100	1/11	1/11 to 2/11	1/11			8.00 8.00	267 267		0.89 0.89	1.790 1.790	1.593 1.593	1.593 1.593	1181 1182 FLOW WIDTH/DEPTH 0.220Dp m	1181	0.05	428	#D.22L4.8A1.44	428 (UNLOCKED	753 0)	2/11	8.00 8.00	267 267	1.593 1.593	1181			428 (Pipe flow= Grate	21.421 flow)	9.00	450(21	2.69(2.69 ty) (5.37)	0.13			0.369	3.00	1.106			3.00	1.106	2.26	0.484	0.225 (0.225 ty)	5.38 (5.38 ty)	70.850 68.922	70.850 68.697	71.956		71.956	72.010	1/11
100 100	2/11	2/11 to 3/11	1/11;2/11			8.00 8.00	267 267		0.89 0.89	0.000 0.000	0.000 0.000	0.000 0.000	0 0 FLOW WIDTH/DEPTH 0.220Dp m	753	0.05	428	#D.22L4.8A1.44	428 (UNLOCKED	325 0)	3/11	8.13 8.13	265 265	1.593 1.593	1173			850 (Pipe flow= Sum upstr	21.421 atten flows)	8.00	525(23	3.80(2.00 ty) (5.68)	0.09			0.736	3.00	2.208			3.00	2.208	3.57	0.765	0.319 (0.219 ty)	6.08 (5.18 ty)	66.248 64.534	66.248 65.285	68.456		68.456	69.710	2/11
100 100	3/11	3/11 to 3/1	1/11;2/11;3/11			8.00 8.00	267 267		0.89 0.89	0.000 0.000	0.000 0.000	0.000 0.000	0 0 FLOW WIDTH/DEPTH 0.183Dp m	325	0.05	428	#D.22L4.8A1.44	325 (UNLOCKED	0 0)	3/1	8.22 8.22	264 264	1.593 1.593	1168			1168 (Pipe flow= Sum upstr	7.336 atten flows)	1.00	750(22	2.56(0.98 ty) (2.55)	0.05			0.334	1.00	0.334			1.00	0.334	1.01	0.074			64.742 64.669	64.951 64.877	65.285		65.285	65.422	3/11
100 100	3/1	3/1 to 4/1	1/10;2/10;3/10;1/1;2 B/1;1/11;2/11;3/11;3/ 1			5.00 5.00	316 316		0.91 0.91	0.156 0.156	0.142 0.142	0.142 0.142	125 125 FLOW WIDTH 2.009 m DOWNSTREAM 1.364m	292	13.30	707	8	156 (UNLOCKED	136 0)	5B/1	8.69 8.69	259 259	5.238 5.238	3768			3657 (Pipe flow= Sum upstr	31.419 atten flows)	6.30	675(21 x 2	4.96(1.89 ty) (5.95)	0.11		Qg 0.128 Qo 3.657 Do 954 Flow 2B/1 made eqv grate flow Flow 3/11 made eqv grate flow CHRT 32: Vo2/2gDo 1.83 H/Do 0.00 Kg side flow 2.20 end flow 2.09 K vals above for stepped pipes as grate flow grate flow decreased by 2.383 from 2B/1 grate flow decreased by 1.146 from 3/11 Routine 2.13 Equiv defln 51 CHART 49 High vel lat 2B/1 Dlv 1050 Qlv 2.383 Dlv/Dlv 1.4 Dlv/Do 1.10 Qlv/Qo 0.65 H 2.19 Low vel latrl 3/11 Dlv 750 Qlv 1.146 Dlv/Do 0.79	1.254	1.67	2.093	Qlv/Qo 0.31 L 0.28 H-L 1.91 Ku=Kw= 1.91 Combined pipes in line case Join Pipes: 2B/1 and 3/11 Vel1 2.752 Vel2 2.594 Eq Dia 1289 Angle 174 Flow 3.529 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.35 Qg/Qo 0.03 K 0.33 S/Do 1.66 cor 0.03 Ku 0.36 Kw 0.36 Interpolated Ku= 1.03 Kw= 1.03 K vals step pipes as pipe flow Ku 1.03 Kw 1.03 Averaged Ku 1.67 Kw 1.67	1.67	2.093	4.38	1.376	0.478 (0.266 ty)	6.66 (5.29 ty)	62.784 60.805	62.784 61.367	64.877		64.877	65.512	3/1
100 100	4/1	4/1 to 5/1	1/10;2/10;3/10;1/1;2 B/1;1/11;2/11;3/11;3/ 1														24				8.80 8.80	257 257	5.238 5.238	3739			3657 (Pipe flow= Sum upstr	6.800 atten flows)	0.40	1800 x 600 (RCBC)	3.38(1.29 ty) (1.80)	0.03		Qo 3.657 Do 901 Flow 3/1 made eqv grate flow CHRT 32: Vo2/2gDo 0.97 H/Do 0.73 Kg side flow 2.55 end flow 2.37 K vals above for stepped pipes as grate flow grate flow decreased by 3.657 from 3/1	0.582	0.52	0.303	CHART 50 Du/Do1.06 alpha 1 K'w 0.11 Vu 5.12 WSE 0.45 Ku 0.52 Kw 0.77 K vals step pipes as pipe flow Ku 0.52 Kw 0.77	0.77	0.450	1.41	0.096			60.628 60.600	61.064 60.968	61.367		61.514	61.507	4/1
100 100	5A/1	5A/1 to 5/1	5A/1			5.00 5.00	316 316		0.91 0.91	0.226 0.226	0.206 0.206	0.206 0.206	181 181 FLOW WIDTH 2.049 m	181	0.05	338	14S.11	181 (UNLOCKED	0 0)		5.00 5.00	316 316	0.206 0.206	181			181 (Pipe flow= Grate	3.043 flow)	0.40	450 x 450 (RCBC)	0.89(0.34 ty) (1.13)	0.05		Qg 0.181 Qo 0.181 Do 450 CHRT 32: Vo2/2gDo 0.09 H/Do 1.14 Kg side flow 4.79 end flow 3.77	0.040	4.79	0.193			4.79	0.193	0.25	0.008			60.462 60.450	60.976 60.968	61.169		61.169	61.202	5A/1
100 100	5B/1	5B/1 to 5/1	5B/1			5.00 5.00	316 316		0.91 0.91	0.254 0.254	0.231 0.231	0.231 0.231	203 203	338 FLOW WIDTH 3.667 m	0.05	338	14S.11	338 (UNLOCKED	0 0)		5.00 5.00	316 316	0.231 0.231	203			338 (Pipe flow= Grate	3.031 flow)	0.40	900 x 600 (RCBC)	0.63(0.17 ty) (1.55)	0.05		Qg 0.338 Qo 0.338 Do 720 CHRT 32: Vo2/2gDo 0.03 H/Do 0.60 Kg side flow 7.59 end flow 5.50	0.020	7.59	0.154			7.59	0.154	0.07	0.002			60.612 60.600	60.970 60.968	61.124		61.124	61.203	5B/1
100 100	5/1	5/1 to OUT6/1	1/10;2/10;3/10;1/1;2 B/1;1/11;2/11;3/11;3/ 1;5A/1;5B/1														24				8.83 8.83	257 257	5.675 5.675	4051			4079 (Pipe flow= Sum upstr	24.921 atten flows)	0.40	2100 x 600 (RCBC)	3.23(1.19 ty) (1.84)	0.13		Qo 4.079 Do 934 Routine 3.5 Join Pipes: 4/1 and 5A/1 Vel1 5.740 Vel2 0.924 Eq Dia 933 Angle 184 Flow 3.804 Routine 2.1 CHART 52 B 3200 In line Eqv 4/1 & 5A/1 Latrl 5B/1 Determine Kl Dl/Do 0.77 B/Do 3.43 Qu/Qo 0.93 Do/Du 1.00 Do/Dl 1.30 K'1 2.19 Ml 0.16 Kl=K'1×Ml= 0.35	0.532	0.34	0.181	Determine Ku K'u 2.76 Mu 0.13 Ku=K'u×Mu= 0.36 Kw=Ku= 0.36 Combined pipes in line case Join Pipes: Eqv 4/1 & 5A/1 and 5B/1 Vel1 5.566 Vel2 0.675 Eq Dia 996 Angle 190 Flow 4.079 CHART 50 Du/Do1.07 alpha 0 K'w 0.05 Vu 5.24 WSE 0.35 Ku 0.53 Kw 0.66 Interpolated Ku= 0.34 Kw= 0.33	0.34	0.181	1.23	0.307			60.580 60.481	60.787 60.481	60.968		60.968	61.276	5/1
100 100	1/2	1/2 to 2/2	1/2			5.00 5.00	316 316		0.91 0.91	0.369 0.369	0.336 0.336	0.336 0.336	295 295	295 FLOW WIDTH 1.975 m DOWNSTREAM 1.386m	15.94	741	8	149 (UNLOCKED	146 0)	1/13	5.00 5.00	316 316	0.336 0.336	295			149 (Pipe flow= Grate	12.640 flow)	14.31	375(21	3.35(0.73 ty) (6.00)	0.16		Qg 0.149 Qo 0.149 Do 375 CHRT 32: Vo2/2gDo 0.25 H/Do 0.00 Kg side flow 5.35 end flow 4.45	0.093	5.35	0.497			5.35	0.497	0.73	0.092	0.121 (0.089 ty)	4.84 (4.07 ty)	68.475 66.666	68.475 66.759	68.972		68.972	69.235	1/2
100 100	2/2	2/2 to 3/2	1/2;2/2			5.00 5.00	316 316		1.00 1.00	0.070 0.070	0.070 0.070	0.070 0.070	61 61	61 FLOW WIDTH 0.826 m DOWNSTREAM 0.104m	15.94	741	7	48 (UNLOCKED	13 0)	3/2	5.16 5.16	312 312	0.406 0.406	352			195 (Pipe flow= Sum upstr	24.981 atten flows)	14.00	375(21	3.76(0.93 ty) (5.94)	0.24		Qg 0.048 Qo 0.195 Do 375 Flow 1/2 made eqv grate flow CHRT 32: Vo2/2gDo 0.42 H/Do 0.00 Kg side flow 4.16 end flow 3.62 K vals above for stepped pipes as grate flow grate flow decreased by 0.147 from 1/2 Angle 30 Chart 36 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.51 K0.5 1.86 Qu/Qo 0.76 Cg 0.57 K 1.71	0.158	1.69	0.267	S/Do 2.0 K0 1.79 K0.5 2.07 K 1.96 S/Do 1.5 K0 2.11 K0.5 2.54 K 2.39 Interp val for S/Do 1.86 Kw 2.06 CHART 35 S/Do 2.0 K0 1.55 K0.5 1.74 K 1.62 S/Do 1.5 K0 1.75 K0.5 1.80 K 1.78 Interp val for S/Do 1.86 Ku 1.69 K vals step pipes as pipe flow Ku 1.69 Kw 2.05	2.05	0.324	1.24	0.309	0.140 (0.100 ty)	5.18 (4.32 ty)	66.492 62.995	66.492 62.760	66.759		66.816	67.503	2/2

NOTE
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Q100 CALCULATIONS TABLE

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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 4 OF 5 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD508
REV. B

© MILANOVIC NEALE CONSULTING ENGINEERS

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN						
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb	
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C × A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s	
100 100	3/2	3/2 to 4/2	1/2;2/2;3/2			5.00 5.00	316 316		1.00 1.00	0.022 0.022	0.022 0.022	0.022 0.022	19 19	33 FLOW WIDTH 0.497 m	15.94	741	7	32 (UNLOCKED 0)	1	4/2
100 100	1/13	1/13 to 2/13	1/13			5.00 5.00	316 316		0.91 0.91	0.172 0.172	0.157 0.157	0.157 0.157	138 137	284 FLOW WIDTH 1.938 m DOWNSTREAM 1.343m	15.94	741	8	146 (UNLOCKED 0)	138	2/13
100 100	**2/13**	**2/13 to 4/2**	**1/13;2/13**			**5.00 5.00**	**316 316**		**0.91 0.91**	**0.331 0.331**	**0.302 0.302**	**0.302 0.302**	**265 265**	**403 FLOW WIDTH 4.501 m**	**0.05**	**406**	**15S.14**	**403 (UNLOCKED 0)**	**0**	**4/2**
100 100	**4/2**	**4/2 to 5/2**	**1/2;2/2;3/2;1/13;2/1 3;4/2**			**5.00 5.00**	**316 316**		**1.00 1.00**	**0.049 0.049**	**0.049 0.049**	**0.049 0.049**	**43 43**	**44 FLOW WIDTH 0.000 m**	**15.94**	**338**	**14S.11**	**44 (UNLOCKED 0)**	**0**	
100 100	**5/2**	**5/2 to OUT6/2**	**1/2;2/2;3/2;1/13;2/1 3;4/2**														**24**			
100 100	1/7	1/7 to 2/7	1/7			5.00 5.00	316 316		0.90 0.90	0.090 0.090	0.081 0.081	0.081 0.081	71 71	71 FLOW WIDTH/DEPTH 0.080Dp m	13.20	38	#D.08L2.4A.36	38 (UNLOCKED 0)	34	2/7
100 100	2/7	2/7 to 3/7	1/7;2/7			5.00 5.00	316 316		0.90 0.90	0.065 0.065	0.059 0.059	0.059 0.059	51 51	84 FLOW WIDTH/DEPTH 0.080Dp m	11.60	38	#D.08L2.4A.36	38 (UNLOCKED 0)	47	3/7
100 100	3/7	3/7 to 4/7	1/7;2/7;3/7			5.00 5.00	316 316		0.90 0.90	0.060 0.060	0.054 0.054	0.054 0.054	47 47	94 FLOW WIDTH/DEPTH 0.080Dp m	6.09	38	#D.08L2.4A.36	38 (UNLOCKED 0)	57	4/7
100 100	4/7	4/7 to 5/7	1/7;2/7;3/7;4/7			5.00 5.00	316 316		0.90 0.90	0.060 0.060	0.054 0.054	0.054 0.054	47 47	104 FLOW WIDTH/DEPTH 0.080Dp m	4.59	38	#D.08L2.4A.36	38 (UNLOCKED 0)	67	5/7
100 100	**5/7**	**5/7 to 6/7**	**1/7;2/7;3/7;4/7;5/7**			**5.00 5.00**	**316 316**		**0.84 0.84**	**0.008 0.008**	**0.007 0.007**	**0.007 0.007**	**6 6**	**73 FLOW WIDTH/DEPTH 0.078Dp m**	**0.05**	**75**	**#D.08L3.6A.81**	**73 (UNLOCKED 0)**	**0**	
100 100	**6/7**	**6/7 to OUT7/7**	**1/7;2/7;3/7;4/7;5/7**														**24**			

	DRAIN DESIGN													
	tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T		
STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C × A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS
	min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min		
3/2	5.40 5.40	308 308	0.428 0.428	366			223 (Pipe flow= Sum upstr atten flows)	24.981	6.00	375(2)	2.02(0.97 1y) (3.89)	0.21		Qg 0.031 Qo 0.223 Do 375 Flow 2/2 made eqv grate flow CHRT 32: Vo2/2gDo 0.55 H/Do 0.00 Kg side flow 3.71 end flow 3.29 K vals above for stepped pipes as grate flow grate flow decreased by 0.192 from 2/2
1/13	5.00 5.00	316 316	0.157 0.157	138			146 (Pipe flow= Grate flow)	30.777	7.00	375(2)	1.32(0.60 1y) (4.20)	0.39		Qg 0.146 Qo 0.146 Do 375 CHRT 32: Vo2/2gDo 0.24 H/Do 0.00 Kg side flow 5.48 end flow 4.55
2/13	**5.39 5.39**	**308 308**	**0.459 0.459**	**393**			**535 (Pipe flow= Sum upstr atten flows)**	**6.411**	**1.00**	**600(2)**	**1.83(0.62 1y) (2.19)**	**0.06**		**Qg 0.392 Qo 0.535 Do 600 Angle 90 Chart 47 S/Do 2.5 chartdeg Du/Do 0.63 K0 2.75 K0.5 2.27 Qu/Qo 0.27 Cg 1.24 K 2.16 S/Do 2.0 K0 2.85 K0.5 2.49 K 2.41 S/Do 1.5 K0 3.14 K0.5 2.93 K 2.88**
4/2	**5.61 5.61**	**304 304**	**0.936 0.936**	**790**			**790 (Pipe flow= Sum upstr atten flows)**	**16.783**	**0.40**	**825(2)**	**1.43(0.53 1y) (1.72)**	**0.20**		**Qg 0.042 Qo 0.790 Do 825 Routine 2.21 CHART 48 Du/Do 0.45 Qu/Qo 0.28 K 1.33 d/Do 2.0 chrt Qg/Qo 0.05 Kg 0.00 d/Do 1.5 chrt Qg/Qo 0.05 Kg 0.00 d/Do 1.00 Interp value Kg 0.00 Ku=Kw= 1.34 Combined pipes in line case Join Pipes: 3/2 and 2/13 Vel1 1.994 Vel2 1.867**
5/2	**5.81 5.81**	**300 300**	**0.936 0.936**	**780**			**790 (Pipe flow= Sum upstr atten flows)**	**8.001**	**0.40**	**900(2)**	**1.20(0.45 1y) (1.82)**	**0.11**		**Qo 0.790 Do 900 CHART 50 Du/Do0.92 alpha 86 K'w 0.30 Vu 1.48 WSE 0.16 Ku 1.73 Kw 2.18 Part full downstream pipe**
1/7	5.00 5.00	316 316	0.081 0.104	91			58 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	19.949	11.53	225(U)	1.26(1.26 1y) (4.74)	0.26		Qg 0.058 Qo 0.058 Do 225 CHRT 32: Vo2/2gDo 0.34 H/Do 0.00 Kg side flow 4.63 end flow 3.95
2/7	5.26 5.26	310 310	0.162 0.185	159			113 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	14.753	6.78	225(U)	2.48(2.48 1y) (3.64)	0.10		Qg 0.057 Qo 0.113 Do 225 Flow 1/7 made eqv grate flow CHRT 32: Vo2/2gDo 1.30 H/Do 1.05 Kg side flow 2.24 end flow 2.11 K vals above for stepped pipes as grate flow grate flow decreased by 0.056 from 1/7
3/7	5.36 5.36	308 308	0.239 0.262	224			169 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	16.309	6.00	225(U)	3.70(3.70 1y) (3.42)	0.07		Qg 0.057 Qo 0.169 Do 225 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.33 K 1.17 S/Do 4.48 cor -0.20 Ku 0.97 Kw 0.97
4/7	5.43 5.43	307 307	0.316 0.340	290			225 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)	18.552	4.00	300(U)	3.10(3.10 1y) (3.26)	0.10		Qg 0.056 Qo 0.225 Do 300 Flow 3/7 made eqv grate flow CHRT 32: Vo2/2gDo 1.61 H/Do 0.00 Kg side flow 2.30 end flow 2.18 K vals above for stepped pipes as grate flow grate flow decreased by 0.169 from 3/7
5/7	**5.53 5.53**	**305 305**	**0.347 0.370**	**313**			**314 Additional flow: 0.020 cumecs (Pipe flow= Sum upstr atten flows)**	**14.279**	**1.50**	**450(2)**	**1.97(1.97 1y) (2.19)**	**0.12**		**Qg 0.090 Qo 0.314 Do 450 Flow 4/7 made eqv grate flow CHRT 32: Vo2/2gDo 0.44 H/Do 0.12 Kg side flow 3.97 end flow 3.48 K vals above for stepped pipes as grate flow grate flow decreased by 0.224 from 4/7**
6/7	**5.65 5.65**	**303 303**	**0.370 0.370**	**312**			**314 (Pipe flow= Sum upstr atten flows)**	**20.015**	**3.00**	**450(2)**	**1.97(1.97 1y) (3.10)**	**0.17**		**Qo 0.314 Do 450 CHART 50 Du/Do1.00 alpha 14 K'w 0.20 Vu 1.97 WSE 0.14 Ku 0.50 Kw 0.70**

	HEADLOSSES									PART FULL		DESIGN LEVELS						
	V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
STRUCTURE No.	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L × Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
	m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
3/2	0.208	0.78	0.162	CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.14 K 0.62 S/Do 1.44 cor 0.16 Ku 0.78 Kw 0.78 K vals step pipes as pipe flow Ku 0.78 Kw 0.78		0.78	0.162	1.62	0.405	0.192 (0.128 1y)	3.92 (3.23 1y)	61.974 60.475	61.974 60.828	62.136		62.136	63.520	3/2
1/13	0.089	5.48	0.487			5.48	0.487	0.69	0.214	0.145 (0.095 1y)	3.72 (2.97 1y)	62.652 60.498	62.652 61.233	63.139		63.139	64.439	1/13
2/13	**0.171**	**2.11**	**0.360**	**Interp val for S/Do 1.95 Kw 2.46 CHART 46 S/Do 2.0 K0 1.71 K0.5 2.01 K 2.09 S/Do 1.5 K0 2.10 K0.5 2.31 K 2.36 Interp val for S/Do 1.95 Ku 2.11**		**2.46**	**0.419**	**0.70**	**0.045**			**60.713 60.649**	**60.873 60.828**	**61.233**		**61.292**	**61.434**	**2/13**
4/2	**0.104**	**1.00**	**0.133**	**Eq Dia 707 Angle 132 Flow 0.748 CHART 33 Angle 0 S/Do 2.5 Du/Do 0.86 Qg/Qo 0.05 K -0.11 S/Do 1.00 cor 0.10 Ku -0.01 Kw -0.01 Interpolated Ku= 1.34 Kw= 1.34 Part full downstream pipe Upstream HGL 60.828 below outlet pipe obv 60.837 Set Kp to 1**		**1.00**	**0.133**	**0.28**	**0.047**	**0.586 (0.321 1y)**	**1.92 (1.51 1y)**	**60.837 60.770**	**60.695 60.648**	**60.828**		**60.828**	**61.440**	**4/2**
5/2	**0.073**	**1.00**	**0.193**	**Upstream HGL 60.648 below outlet pipe obv 60.827 Set Kp to 1**		**1.00**	**0.193**	**0.17**	**0.014**	**0.543 (0.309 1y)**	**1.94 (1.50 1y)**	**60.827 60.795**	**60.455 60.438**	**60.648**		**60.648**	**61.715**	**5/2**
1/7	0.081	4.63	0.375			4.63	0.375	0.81	0.162	0.085 (0.085 1y)	4.01 (4.01 1y)	67.041 64.741	67.041 65.099	67.416		67.416	67.633	1/7
2/7	0.313	1.29	0.405	CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.50 K 1.51 S/Do 3.73 cor -0.22 Ku 1.29 Kw 1.29 K vals step pipes as pipe flow Ku 1.29 Kw 1.29		1.29	0.405	3.14	0.463			64.441 63.441	64.694 64.231	65.099		65.099	65.204	2/7
3/7	0.698	0.97	0.677			0.97	0.677	7.00	1.141			63.391 62.413	63.554 62.413	64.231		64.231	63.980	3/7
4/7	0.490	0.40	0.196	CHART 33 Angle 0 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.25 K 0.17 S/Do 1.64 cor 0.23 Ku 0.40 Kw 0.40 K vals step pipes as pipe flow Ku 0.40 Kw 0.40		0.40	0.196	3.62	0.671	0.236 (0.236 1y)	3.71 (3.71 1y)	62.137 61.395	62.137 61.331	62.333		62.333	63.201	4/7
5/7	**0.198**	**0.23**	**0.046**	**CHART 33 Angle 1 S/Do 2.5 Du/Do 0.67 Qg/Qo 0.29 K -0.20 S/Do 1.22 cor 0.43 Ku 0.23 Kw 0.23 K vals step pipes as pipe flow Ku 0.23 Kw 0.23**		**0.23**	**0.046**	**1.21**	**0.173**			**61.150 60.936**	**61.202 61.029**	**61.248**		**61.248**	**61.988**	**5/7**
6/7	**0.198**	**0.50**	**0.099**			**0.70**	**0.138**	**1.21**	**0.243**	**0.261 (0.261 1y)**	**3.29 (3.29 1y)**	**60.930 60.330**	**60.930 60.141**	**61.029**		**61.068**	**61.728**	**6/7**

Q100 CALCULATIONS TABLE

NOTE
STORMWATER NETWORK DESIGNED TO CONVEY MAJOR FLOWS SHOWN IN BOLD. ALL OTHER SECTIONS ARE DESIGNED TO CONVEY MINOR FLOWS AND ASSOCIATED CALCULATIONS ARE FOR REFERENCE ONLY.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT

BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET 5 OF 5 Q100 FLOWS

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD509 REV. B

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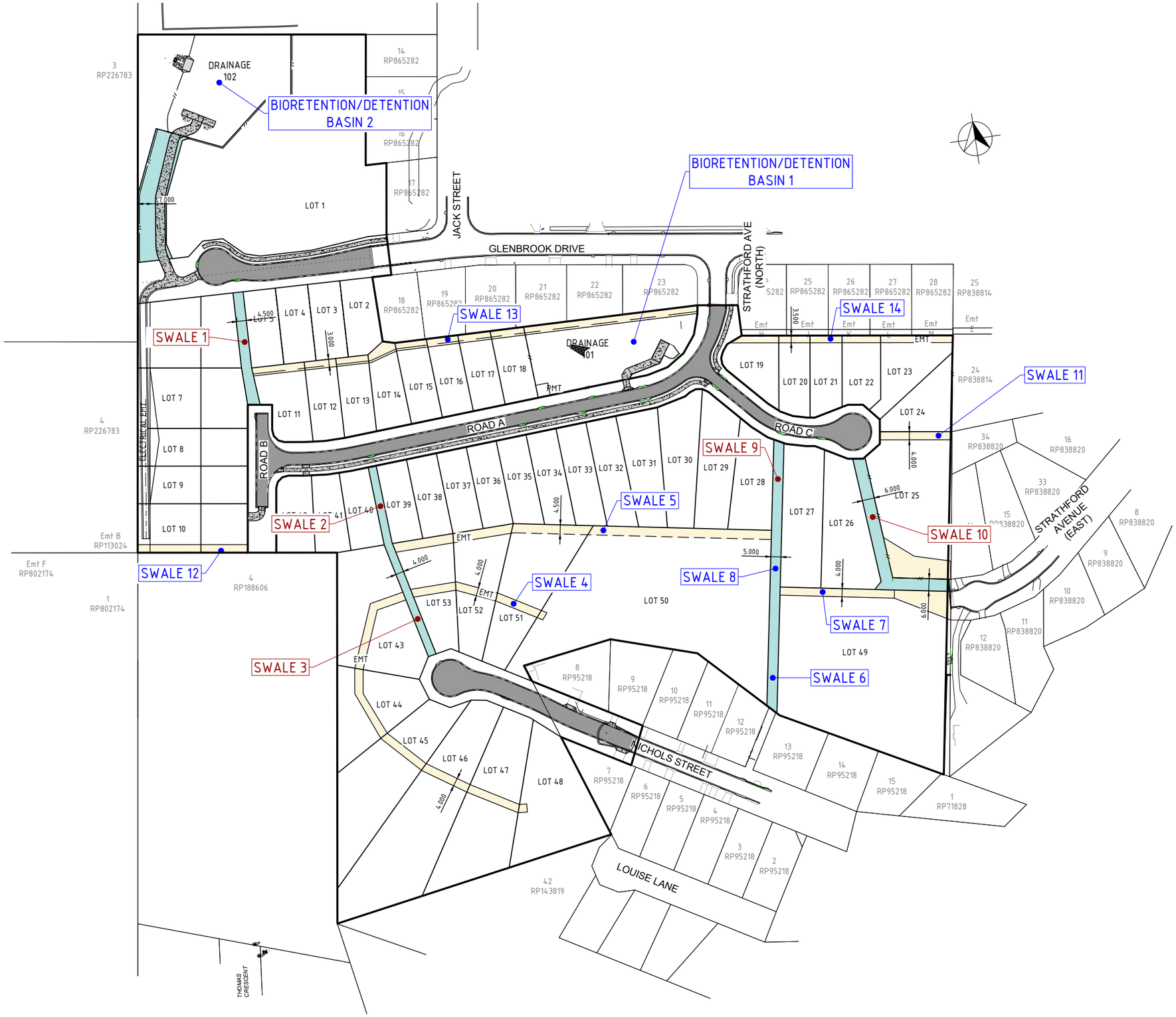
NOT FOR CONSTRUCTION



LEGEND

- PROPERTY BOUNDARY
- PROPOSED EASEMENT
- PROPOSED DRAINAGE RESERVE
- SWALE 10 — MAJOR FLOW SWALE
- SWALE 10 — EMERGENCY RELIEF SWALE

NOTE:
REFER TO SKS500 FOR CATCHMENT AREAS.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

SCALE 1:1000 (A1) 0 20 40 60m
(SCALE BEFORE REDUCTION)

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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JAS-ANZ
SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE LAYOUT PLAN

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD600 REV. B

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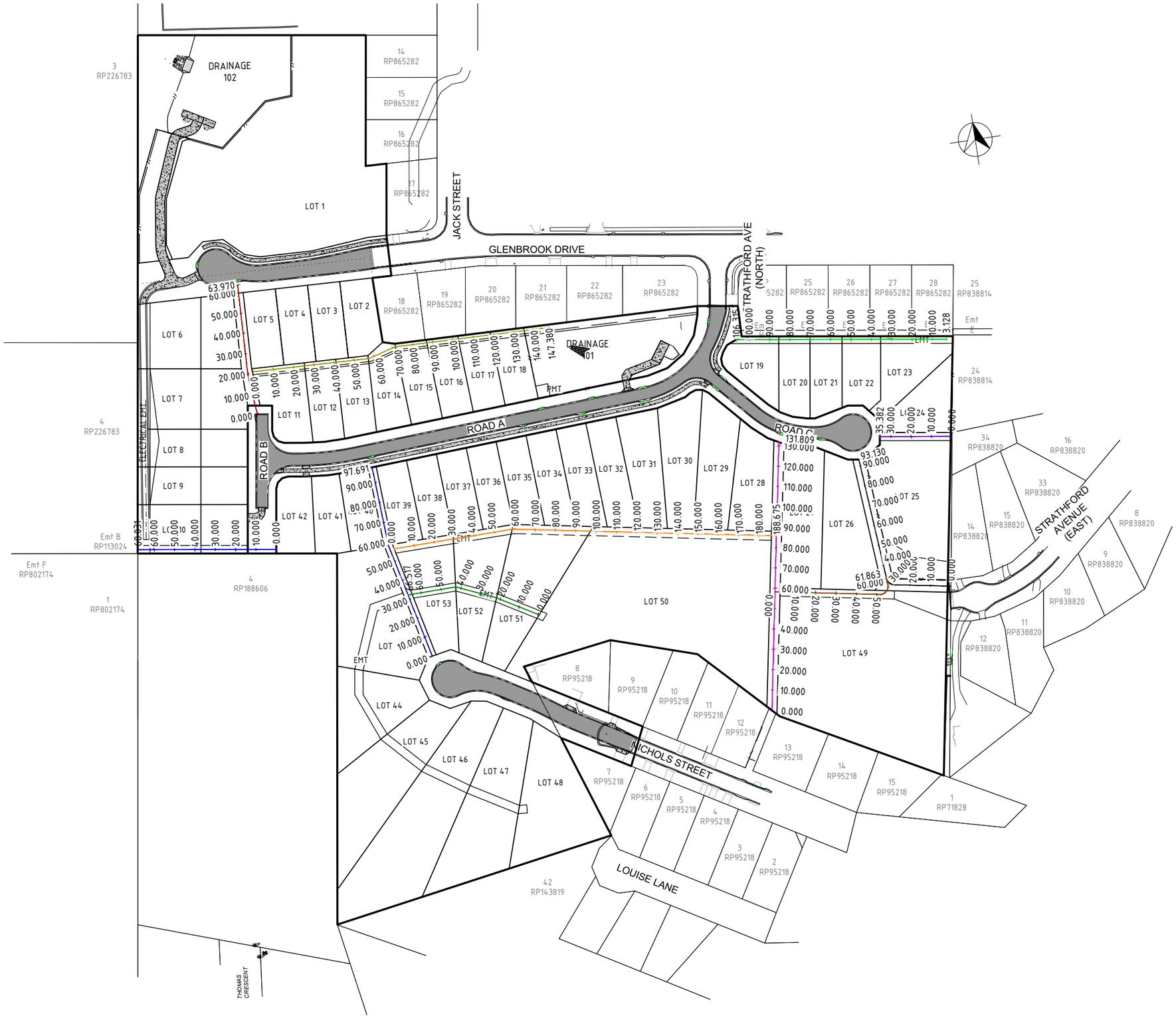

LEGEND

- SWALE 1
- SWALE 2 &3
- SWALE 4
- SWALE 5
- SWALE 6, 8 & 9
- SWALE 7
- SWALE 10
- SWALE 11
- SWALE 12
- SWALE 13
- SWALE 14

NOTE:
REFER TO SKS500 FOR CATCHMENT AREAS.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

SCALE 1:1000 (A1) 0 20 40 60m
(SCALE BEFORE REDUCTION)

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS

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JAS-ANZ

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE CHAINAGE PLAN

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD601
REV. B

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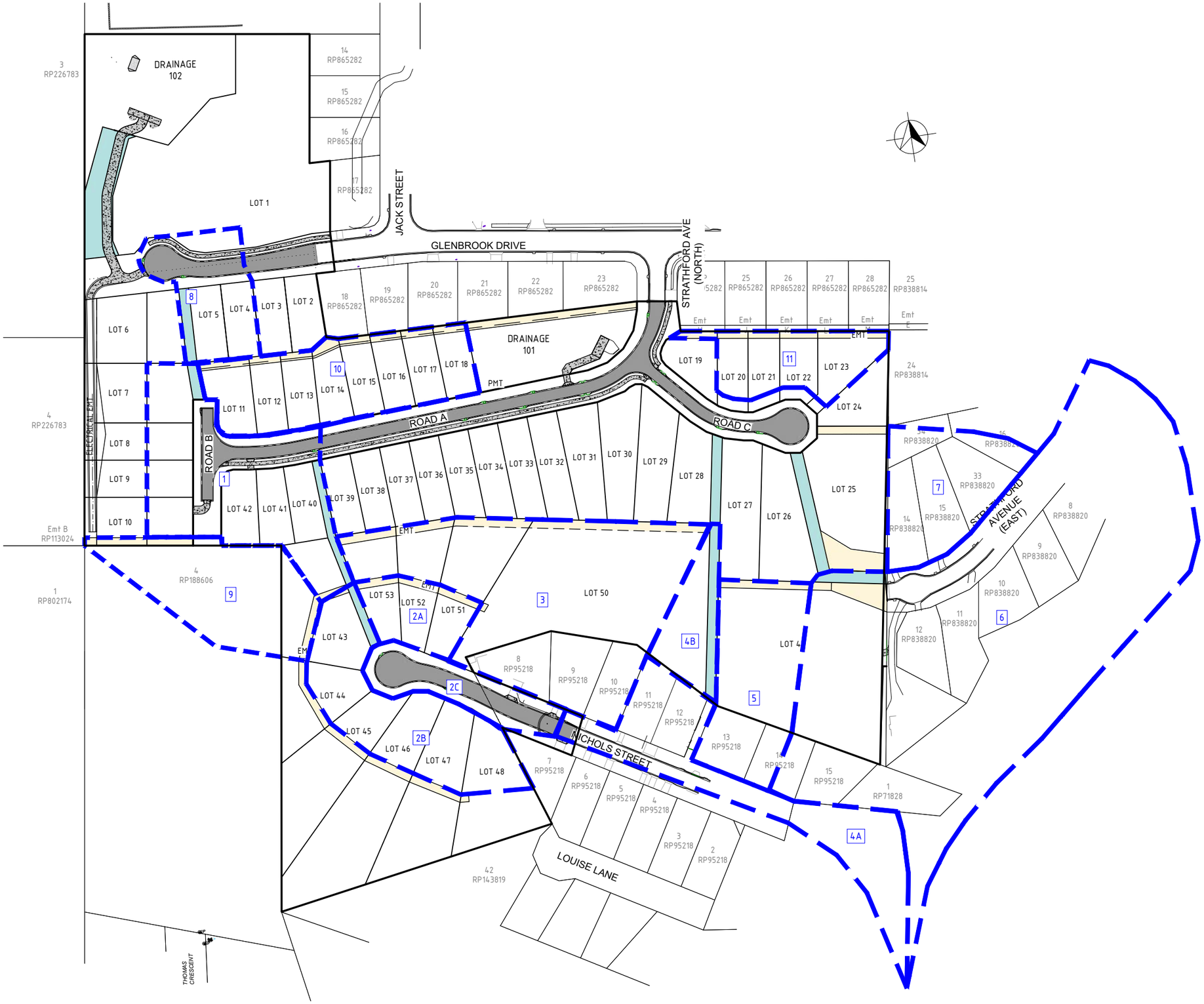
NOT FOR CONSTRUCTION



LEGEND

CATCHMENT AREA

CATCHMENT AREAS

CATCHMENT NAME	AREA (HA)	C_{10}	tc	Q_{100}
1	0.565	0.76	5	0.485
2A	0.168	0.75	5	0.134
2B	0.470	0.75	5	0.376
2C	0.204	0.76	5	0.165
3	1.073	0.74	8	0.725
4A	0.516	0.76	5	0.418
4B	0.171	0.74	8	0.116
5	0.443	0.74	8	0.299
6	2.590	0.76	5	2.100
7	0.357	0.75	8	0.245
8	0.268	0.76	5	0.255
9	0.379	0.74	8	0.233
10	0.510	0.75	5	0.408
11	0.252	0.75	5	0.200

NOTE:
REFER TO SKS500 FOR CATCHMENT AREAS.

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

SCALE 1:1000 (A1) 0 20 40 60m
(SCALE BEFORE REDUCTION)

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE CATCHMENT PLAN

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD602 REV. B

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HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%)
VERTICAL GRADE LENGTH

VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

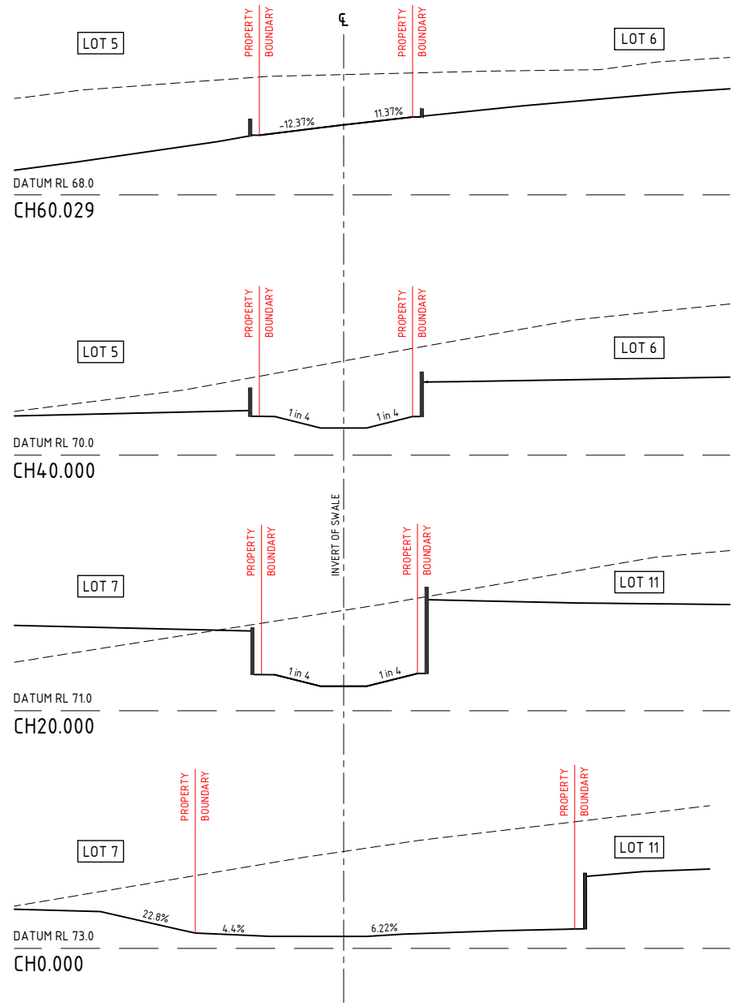
DATUM R.L.20.000

NAT. SURFACE ON ROAD CENTRELINE	76.164	75.921	75.700	75.479	75.281	75.125	74.615	74.276	73.962	73.560	73.442	73.076	72.864	71.932	71.211
CUT / FILL DEPTHS	-2.773	-2.613	-2.51	-2.494	-2.518	-2.537	-2.512	-2.477	-2.471	-2.368	-2.305	-2.19	-2.278	-1.646	-1.044
DESIGN LEVELS ON ROAD CENTRELINE	73.391	73.308	73.190	72.986	72.764	72.588	72.104	71.799	71.490	71.192	71.136	70.886	70.586	70.286	70.167
CHAINAGE	0.000	2.757	5.257	7.757	10.000	11.777	16.668	20.000	24.168	30.000	31.668	40.000	50.000	60.000	63.970

LONGITUDINAL SECTION - SWALE 01 (EMERGENCY RELIEF)

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

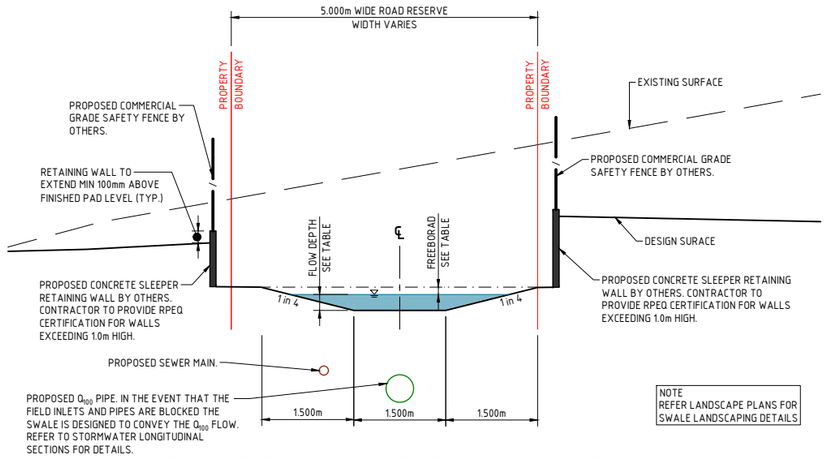
NOTE
SWALE TRANSITION FROM CH 54.026 TO CH 60.029 & MATCH NEATLY INTO VERGE. ENSURE SWALE DRAINS FREELY ACROSS VERGE.



CROSS SECTIONS - SWALE 01 (EMERGENCY RELIEF)

SCALE 1:100

CHANNEL PROPERTIES - SWALE 01 (CATCHMENT 2A,2B[Q_{20}],2C)	
DESIGN Q_{100} (m^3/s)	1.010
MANNINGS (n)	0.035 (TURF)
LONG SLOPE (m/m)	0.05
VELOCITY (m/s)	1.890
DV PRODUCT (m^2/S)	0.420
FLOW DEPTH (m)	0.220



NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS

SWALE TYPICAL SECTION - SWALE 01 EMERGENCY RELIEF

SCALE 1:50

SWALE 01 (EMERGENCY RELIEF) SETOUT TABLE							
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	494233.079	7055977.333	354°17'37.90"			
	10.000	494232.085	7055987.284	354°17'37.90"			
TC	11.777	494231.908	7055989.052	354°17'37.90"			
IP 2	17.972	494231.291	7055995.227		R = 89.201	12.391	7°57'32.21"
	20.000	494231.468	7055997.260	359°34'32.48"			
CT	24.168	494231.535	7056001.427	2°15'10.11"			
	30.000	494231.764	7056007.255	2°15'10.11"			
	40.000	494232.157	7056017.247	2°15'10.11"			
	50.000	494232.550	7056027.240	2°15'10.11"			
	60.000	494232.943	7056037.232	2°15'10.11"			
IP 3	63.970	494233.100	7056041.199	2°15'10.11"			

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
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PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 01 (EMERGENCY RELIEF) LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD700 REV. B

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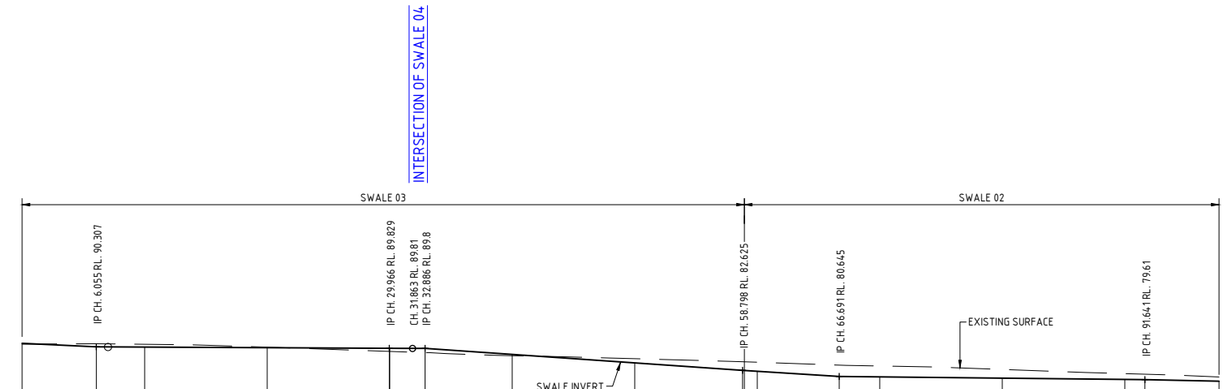


HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%)
VERTICAL GRADE LENGTH

VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

DATUM R.L 29.000

NAT. SURFACE ON ROAD CENTRELINE	91.164	91.312	91.134	90.192	88.815	88.810	88.442	87.425	86.432	85.448	85.281	84.331	84.054	82.920	81.570	81.381	80.477
CUT / FILL DEPTHS	0.291	-1.005	-0.905	-0.164	1.014	1.018	1.357	0.405	-1.37	-2.823	-2.957	-3.686	-3.546	-2.828	-1.892	-1.712	-1.374
DESIGN LEVELS ON ROAD CENTRELINE	91.455	90.307	90.228	90.028	89.829	89.829	89.800	87.830	85.061	82.625	82.324	80.645	80.508	80.093	79.678	79.610	79.102
CHAINAGE	0.000	6.055	10.000	20.000	29.966	30.000	32.886	40.000	50.000	58.798	60.000	66.691	70.000	80.000	90.000	91.641	97.691

LONGITUDINAL SECTION - SWALE 02 & 03 (EMERGENCY RELIEF)

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

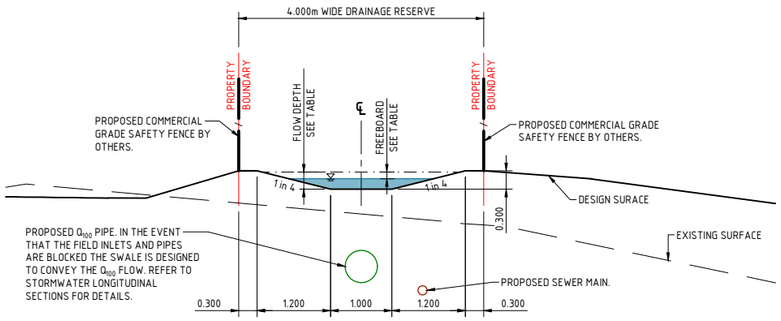
NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS

CHANNEL PROPERTIES - SWALE 02
(CATCHMENT 2A, 2B[Q_{100}],2C)

DESIGN Q_{100} (m^3/s)	0.550
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.090
VELOCITY (m/s)	1.570
DV PRODUCT (m^2/S)	0.310
FLOW DEPTH (m)	0.200
FREEBOARD (m)	0.100

CHANNEL PROPERTIES - SWALE 03
(CATCHMENT 2A, 2B[Q_{100}],2C)

DESIGN Q_{100} (m^3/s)	0.550
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.15
VELOCITY (m/s)	1.890
DV PRODUCT (m^2/S)	0.320
FLOW DEPTH (m)	0.170
FREEBOARD (m)	0.100

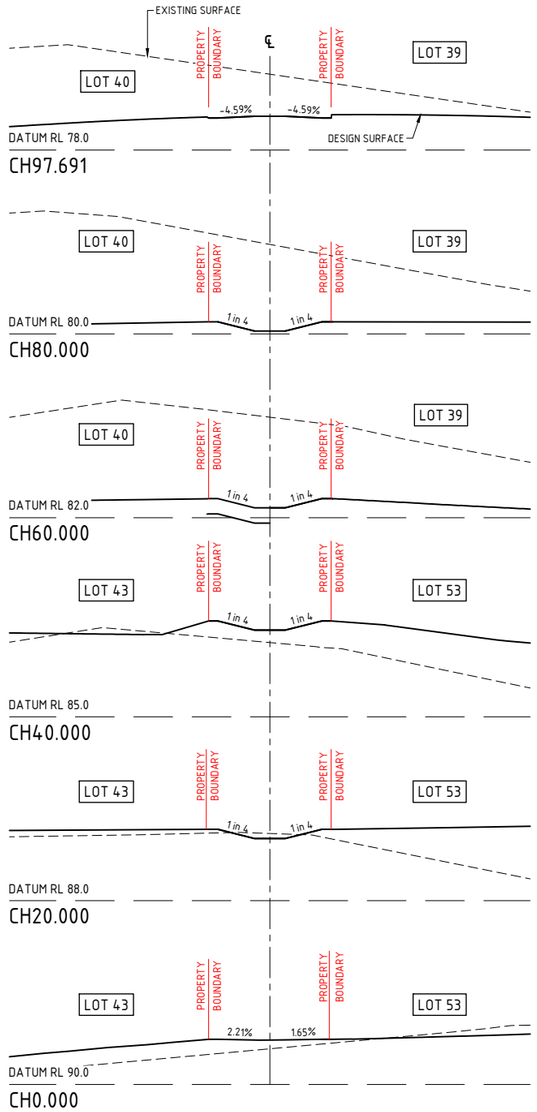


SWALE TYPICAL SECTION - SWALE 02 & 03 (EMERGENCY RELIEF)

SCALES 1:50

SWALE 02 03 SETOUT TABLE

PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494300.010	7055846.559	347°08'19.03"
	10.000	494297.784	7055856.309	347°08'19.03"
	20.000	494295.558	7055866.058	347°08'19.03"
	30.000	494293.332	7055875.807	347°08'19.03"
	40.000	494291.107	7055885.556	347°08'19.03"
	50.000	494288.881	7055895.305	347°08'19.03"
IP 2	58.948	494286.889	7055904.029	
	60.000	494286.834	7055905.079	356°59'30.22"
	70.000	494286.309	7055915.065	356°59'30.22"
	80.000	494285.784	7055925.052	356°59'30.22"
	90.000	494285.259	7055935.038	356°59'30.22"
IP 3	97.691	494284.856	7055942.718	356°59'30.22"



CROSS SECTIONS - SWALE 02 & 03 (EMERGENCY RELIEF)

SCALE 1:100

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 02 & 03 (EMERGENCY RELIEF) LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD701 REV. B

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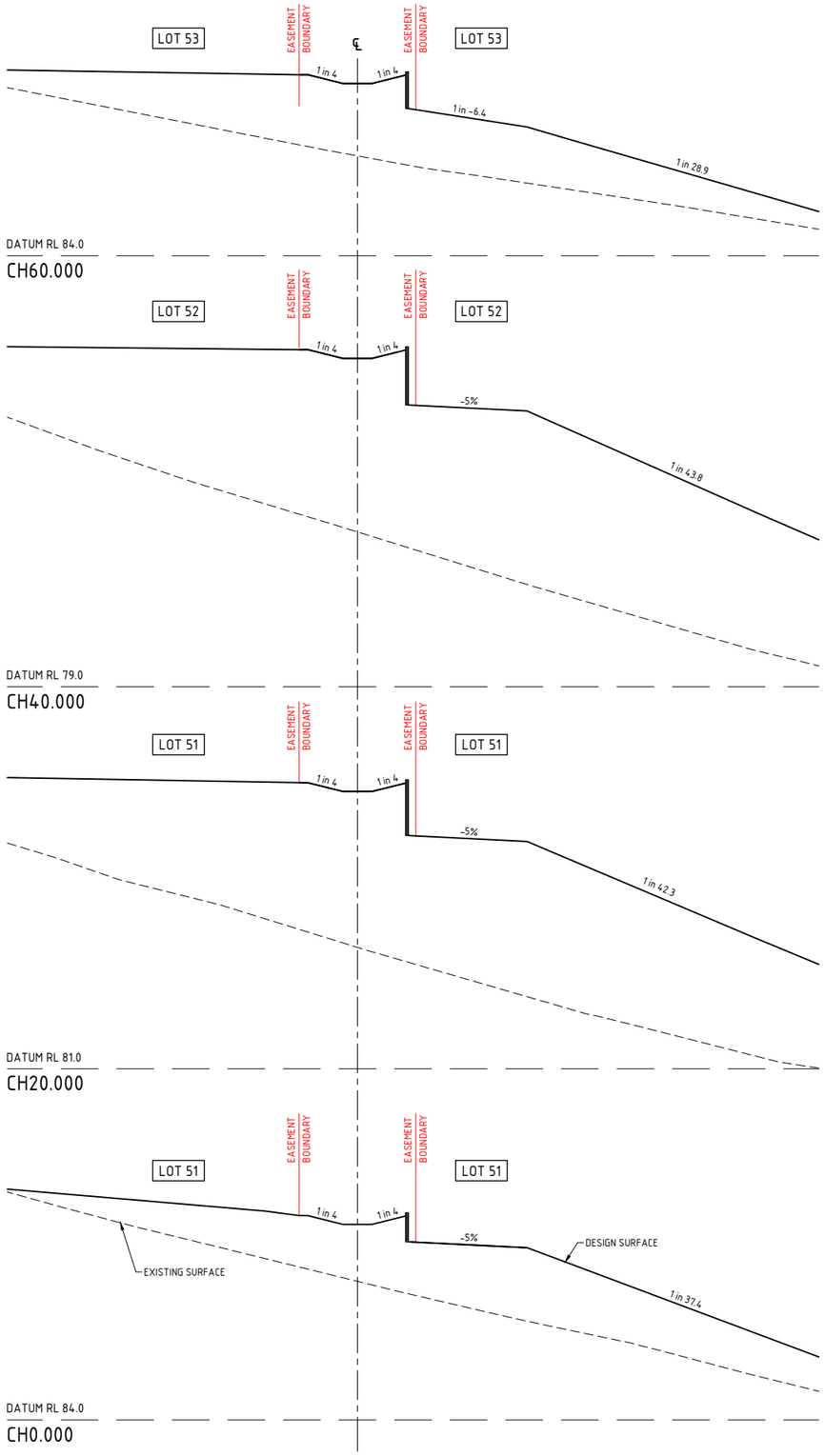
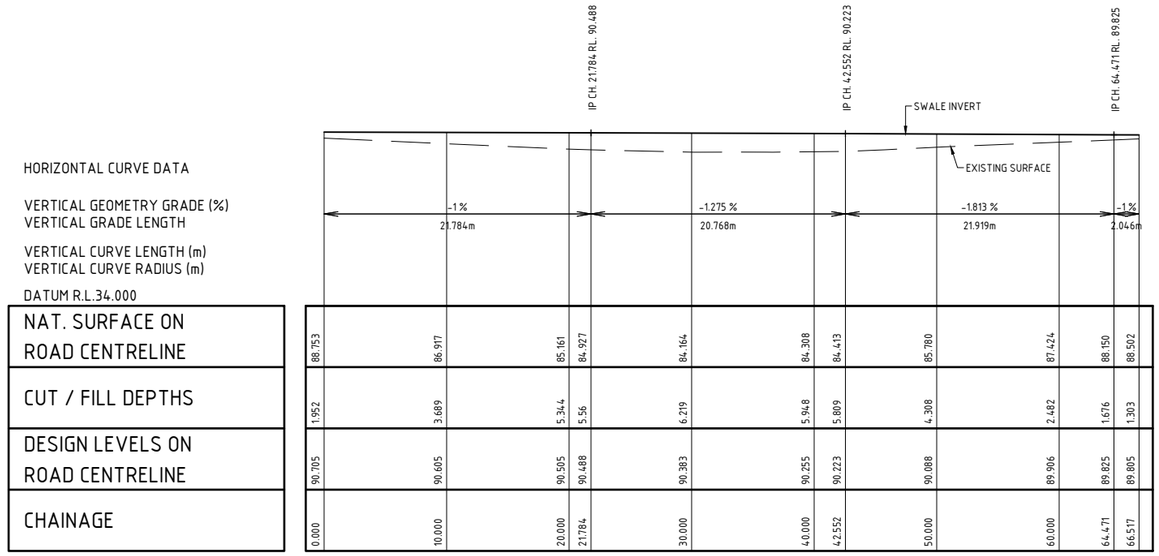


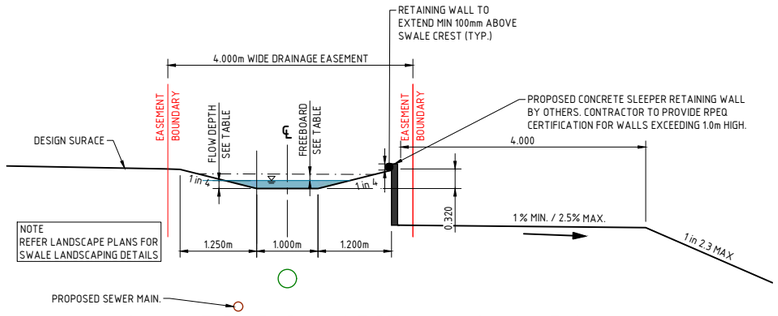
CROSS SECTIONS - SWALE 04

SCALE 1:100



LONGITUDINAL SECTION - SWALE 04

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)



SWALE TYPICAL SECTION - SWALE 04

SCALES 1:50

CHANNEL PROPERTIES - SWALE 04

(CATCHMENT 2A)

DESIGN Q_{100} (m^3/s)	0.130
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.01
VELOCITY (m/s)	0.530
DV PRODUCT (m^2/S)	0.080
FLOW DEPTH (m)	0.160
FREEBOARD (m)	0.150

SWALE 4 SETOUT TABLE

PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494354.521	7055858.924	300°35'01.97"
	10.000	494345.912	7055864.012	300°35'01.97"
	20.000	494337.303	7055869.100	300°35'01.97"
IP 2	21.784	494335.768	7055870.008	
	30.000	494328.251	7055873.326	293°48'54.83"
	40.000	494319.103	7055877.364	293°48'54.83"
IP 3	42.552	494316.768	7055878.394	
	50.000	494309.320	7055878.309	269°20'52.95"
	60.000	494299.321	7055878.196	269°20'52.95"
IP 4	66.517	494292.804	7055878.121	269°20'52.95"

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)

SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)

SCALE 1:200 (A1) 0 4 8 12m (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 04 LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD702 REV. B

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HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%) / VERTICAL GRADE LENGTH: -1% 0.091m; -2.695 % 12.227m; -14.195 % 14.721m; -15 % 30.04m; -3.809 % 88.548m; -3.815 % 35.016m

VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

DATUM R.L.22.000

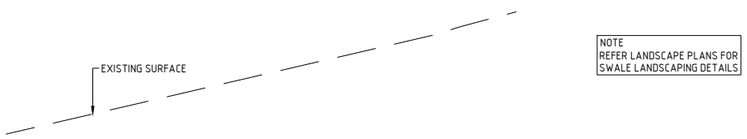
NAT. SURFACE ON ROAD CENTRELINE	84.969	84.953	83.044	82.558	80.920	79.417	78.786	76.528	76.155	76.446	76.611	77.310	78.009	78.662	79.316	80.080	80.188	79.456	78.732	77.965	77.392				
CUT / FILL DEPTHS	-1.277	-1.262	0.38	0.803	1.351	1.854	2.042	2.8	1.672	0.319	0.043	-1.037	-2.116	-3.15	-4.185	-5.33	-5.819	-5.468	-5.125	-4.572	-4.166				
DESIGN LEVELS ON ROAD CENTRELINE	83.692	83.691	83.424	83.361	82.271	81.272	80.827	79.327	77.827	76.766	76.654	76.273	75.893	75.512	75.131	74.750	74.369	73.988	73.607	73.393	73.226				
CHAINAGE	0.000	0.091	10.000	12.318	20.000	27.039	30.000	40.000	50.000	57.079	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	145.627	150.000				

- JOINS BELOW -

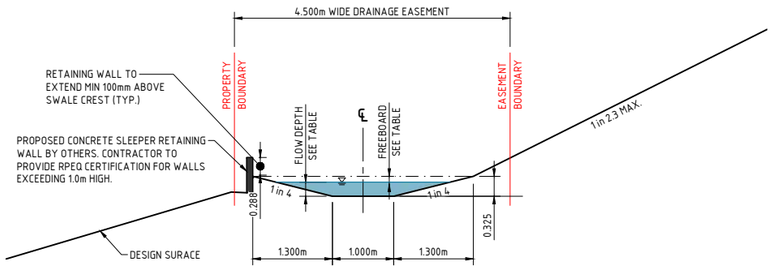
LONGITUDINAL SECTION - SWALE 05

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

CHANNEL PROPERTIES - SWALE 05 (CATCHMENT 3)	
DESIGN Q_{100} (m^3/s)	0.730
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.09
VELOCITY (m/s)	1.680
DV PRODUCT (m^2/S)	0.380
FLOW DEPTH (m)	0.230
FREEBOARD (m)	0.100



NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS



SWALE SECTION - SWALE 05

SCALES 1:50

SWALE 05 SETOUT TABLE				
PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494289.503	7055901.554	89°20'52.93"
	10.000	494299.503	7055901.668	89°20'52.93"
	20.000	494309.502	7055901.781	89°20'52.93"
	30.000	494319.501	7055901.895	89°20'52.93"
	40.000	494329.501	7055902.009	89°20'52.93"
	50.000	494339.500	7055902.123	89°20'52.93"
IP 2	59.495	494348.995	7055902.231	
	60.000	494349.491	7055902.142	100°11'19.24"
	70.000	494359.334	7055900.373	100°11'19.24"
	80.000	494369.176	7055898.604	100°11'19.24"
	90.000	494379.018	7055896.835	100°11'19.24"
	100.000	494388.861	7055895.066	100°11'19.24"
	110.000	494398.703	7055893.297	100°11'19.24"
	120.000	494408.545	7055891.528	100°11'19.24"
	130.000	494418.388	7055889.759	100°11'19.24"
	140.000	494428.230	7055887.990	100°11'19.24"
	150.000	494438.072	7055886.221	100°11'19.24"
	160.000	494447.914	7055884.453	100°11'19.24"
	170.000	494457.757	7055882.684	100°11'19.24"
	180.000	494467.599	7055880.915	100°11'19.24"
IP 3	188.675	494476.138	7055879.380	100°11'19.24"

HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%) / VERTICAL GRADE LENGTH: -3.815 % 35.016m; -1 % 2.64m

VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

DATUM R.L.22.000

NAT. SURFACE ON ROAD CENTRELINE	77.965	77.392	77.821	76.679	75.405	75.312	74.937
CUT / FILL DEPTHS	-4.572	-4.166	-4.977	-4.216	-3.324	-3.256	-2.907
DESIGN LEVELS ON ROAD CENTRELINE	73.393	73.226	72.844	72.463	72.081	72.057	72.030
CHAINAGE	145.627	150.000	160.000	170.000	180.000	180.643	183.283

- JOINS ABOVE -

LONGITUDINAL SECTION - SWALE 05

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 05 LONGITUDINAL AND TYPICAL SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		
DRAWING No.		REV.
C3602 - CD703		B

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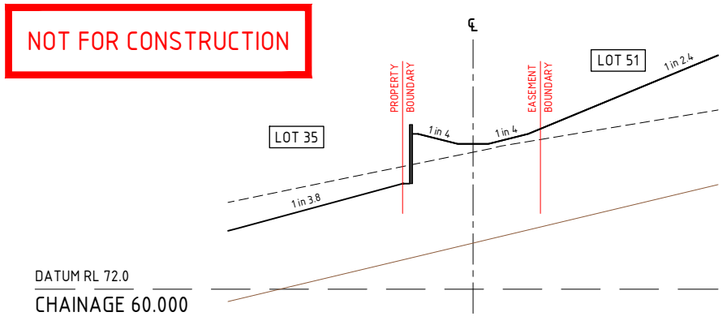
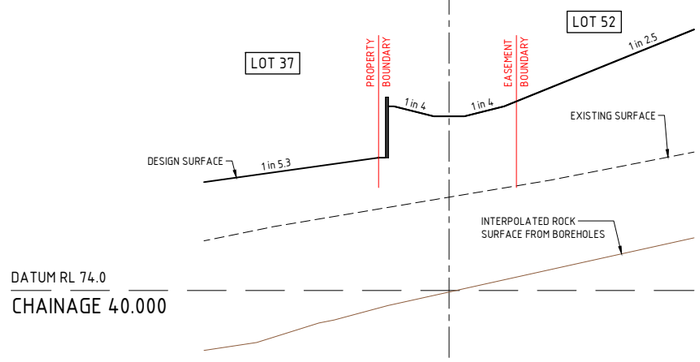
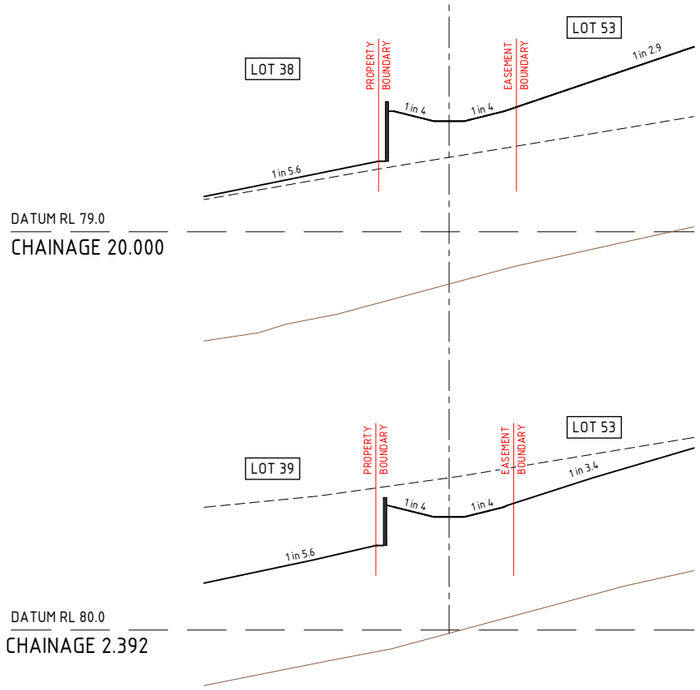
NOT FOR CONSTRUCTION



CHAINAGE 60.000

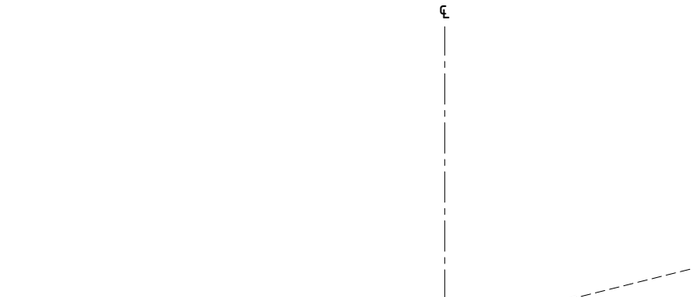


CHAINAGE 40.000



CHAINAGE 20.000

CHAINAGE 2.392



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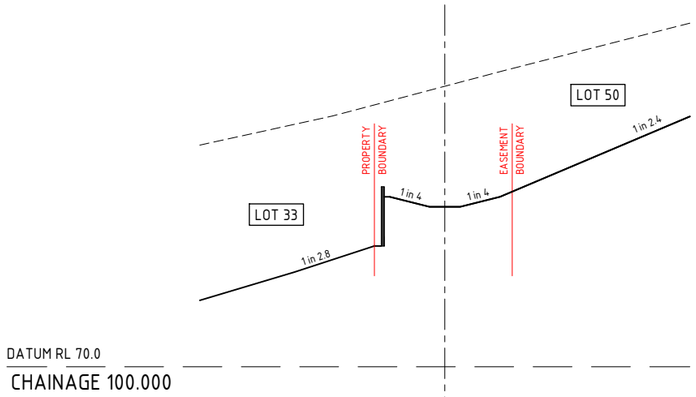
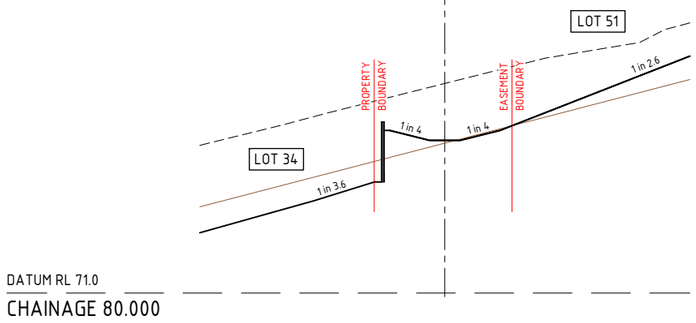
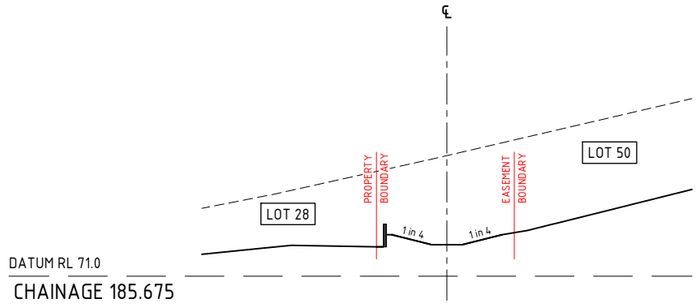


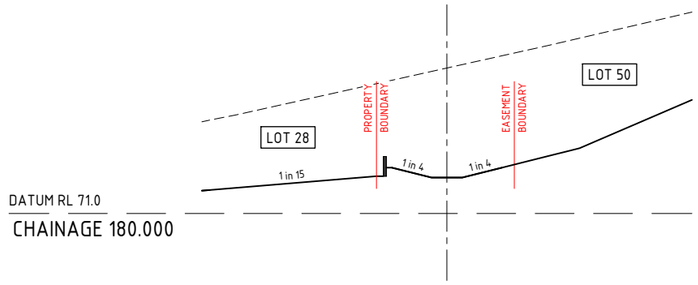
CHAINAGE 100.000



CHAINAGE 80.000



CHAINAGE 185.675



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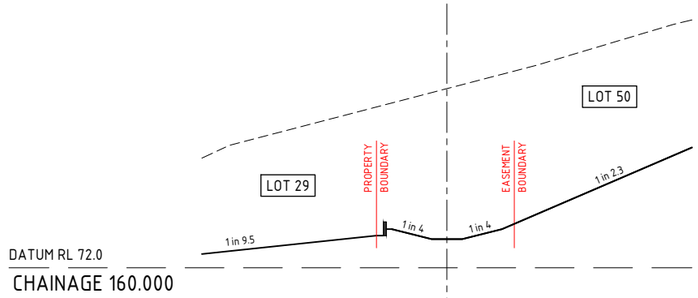

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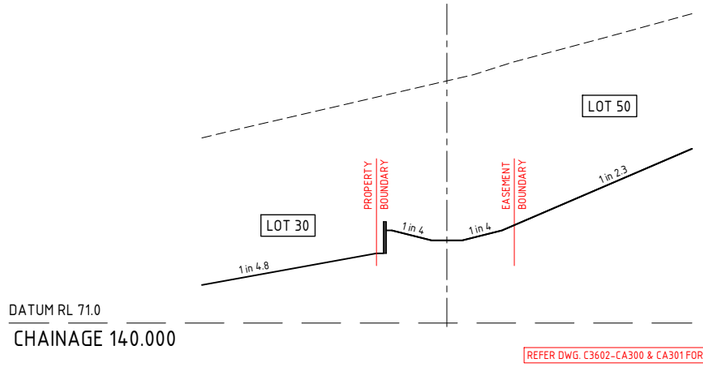

CHAINAGE 140.000

CROSS SECTIONS - SWALE 05

SCALE 1:100

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 05 CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD704 REV. B

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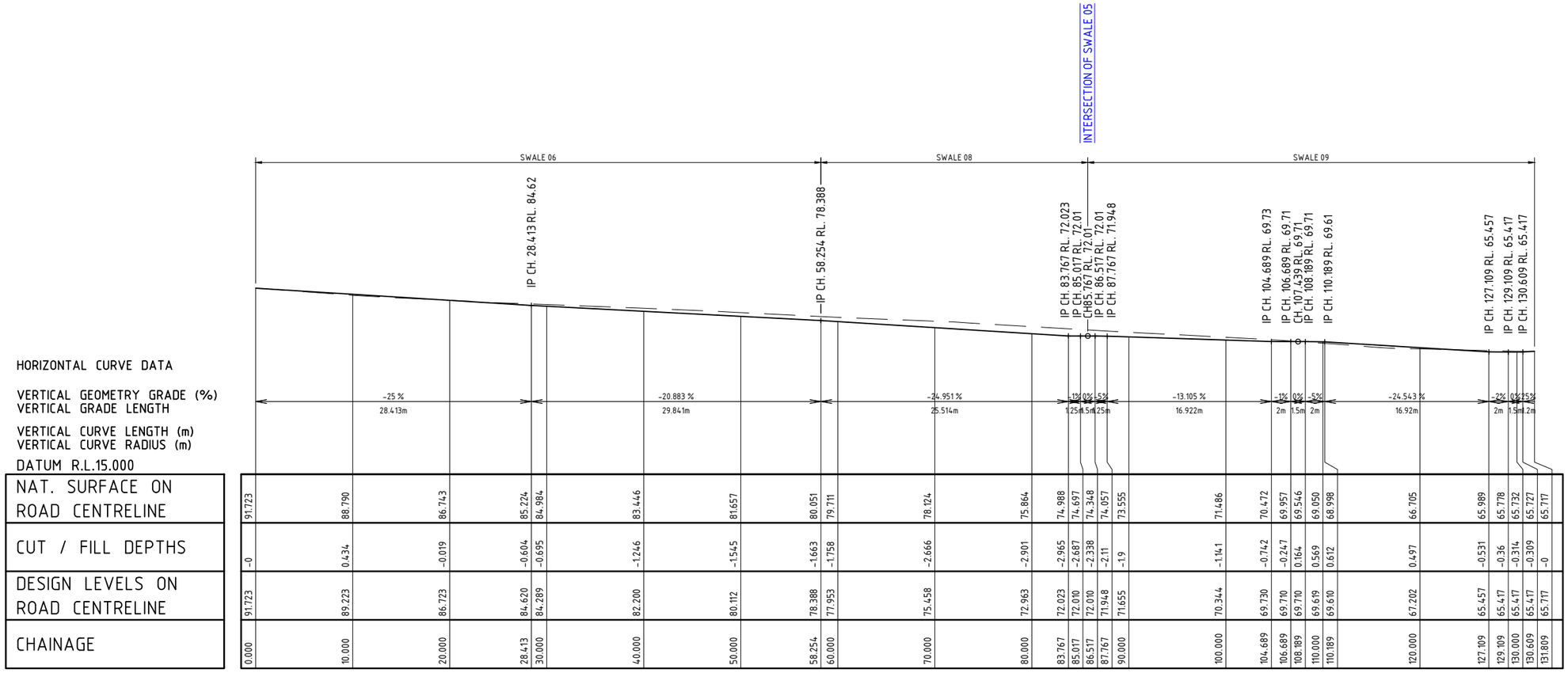
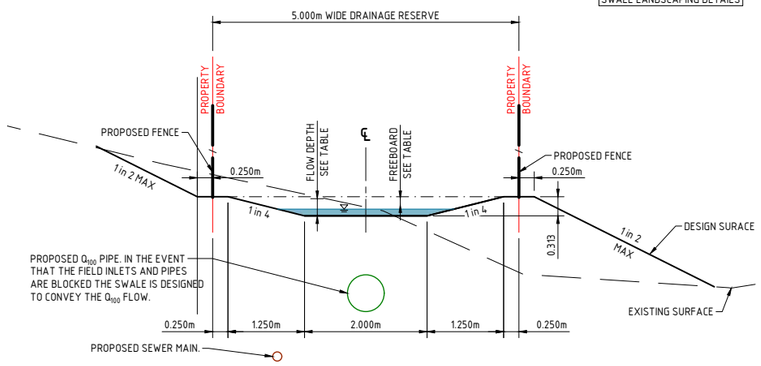


LONGITUDINAL SECTION - SWALE 06, 08 & 09
(EMERGENCY RELIEF)

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS



SWALE SECTION - SWALE 06, 08 & 09
(EMERGENCY RELIEF)

CHANNEL PROPERTIES - SWALE 06 (CATCHMENT 4A)	
DESIGN Q_{100} (m^3/s)	0.420
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.23
VELOCITY (m/s)	1.820
DV PRODUCT (m^2/S)	0.170
FLOW DEPTH (m)	0.100
FREEBOARD (m)	0.220

CHANNEL PROPERTIES - SWALE 08 (CATCHMENT 4A & 4B)	
DESIGN Q_{100} (m^3/s)	0.530
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.22
VELOCITY (m/s)	1.940
DV PRODUCT (m^2/S)	0.220
FLOW DEPTH (m)	0.110
FREEBOARD (m)	0.200

CHANNEL PROPERTIES - SWALE 09 (CATCHMENT 3, 4A & 4B)	
DESIGN Q_{100}(m^3/s)	1.260
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.13
VELOCITY (m/s)	2.130
DV PRODUCT (m^2/S)	0.440
FLOW DEPTH (m)	0.210
FREEBOARD (m)	0.100

SWALE 06 08 09 SETOUT TABLE

PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494460.967	7055794.965	10°12'26.43"
	10.000	494462.739	7055804.807	10°12'26.43"
	20.000	494464.511	7055814.649	10°12'26.43"
	30.000	494466.283	7055824.490	10°12'26.43"
	40.000	494468.055	7055834.332	10°12'26.43"
	50.000	494469.828	7055844.174	10°12'26.43"
	60.000	494471.600	7055854.015	10°12'26.43"
	70.000	494473.372	7055863.857	10°12'26.43"
	80.000	494475.144	7055873.699	10°12'26.43"
	90.000	494476.916	7055883.541	10°12'26.43"
	100.000	494478.688	7055893.382	10°12'26.43"
	110.000	494480.460	7055903.224	10°12'26.43"
	120.000	494482.232	7055913.066	10°12'26.43"
	130.000	494484.004	7055922.908	10°12'26.43"
IP 2	131.809	494484.325	7055924.688	10°12'26.43"

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 06,08 &09 (EMERGENCY RELIEF) LONGITUDINAL AND TYPICAL SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED: JN	APPROVED	
DRAWING No. C3602 - CD705		REV. B

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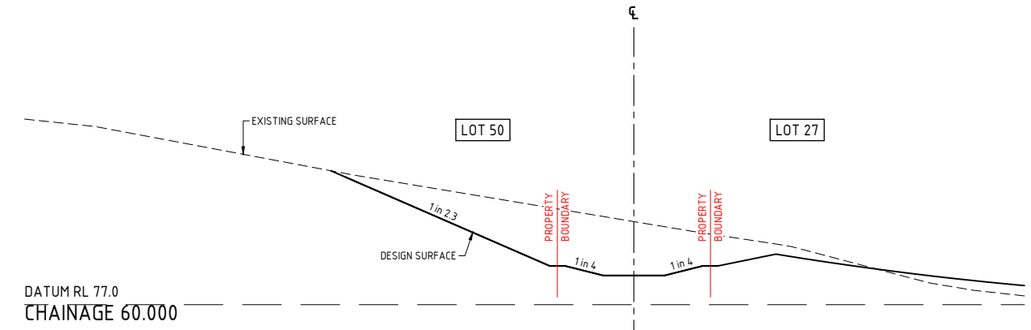

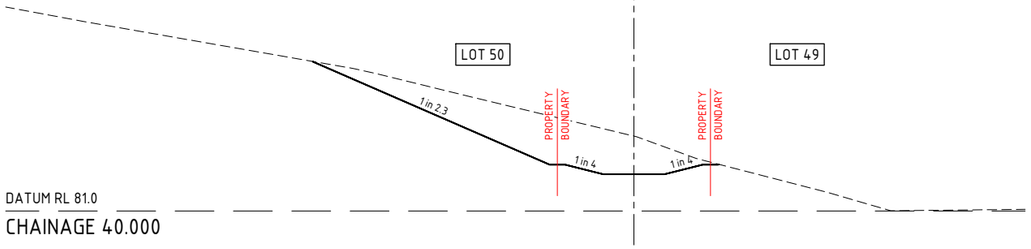

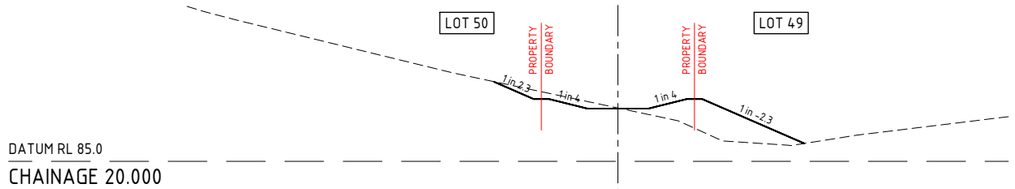

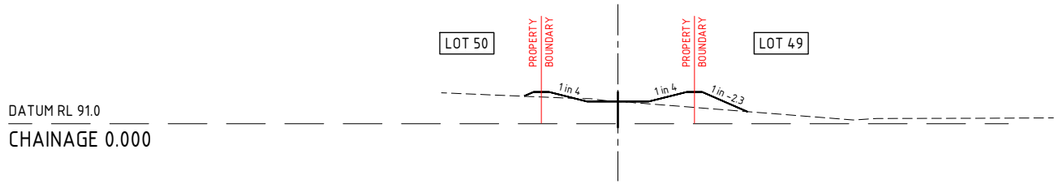

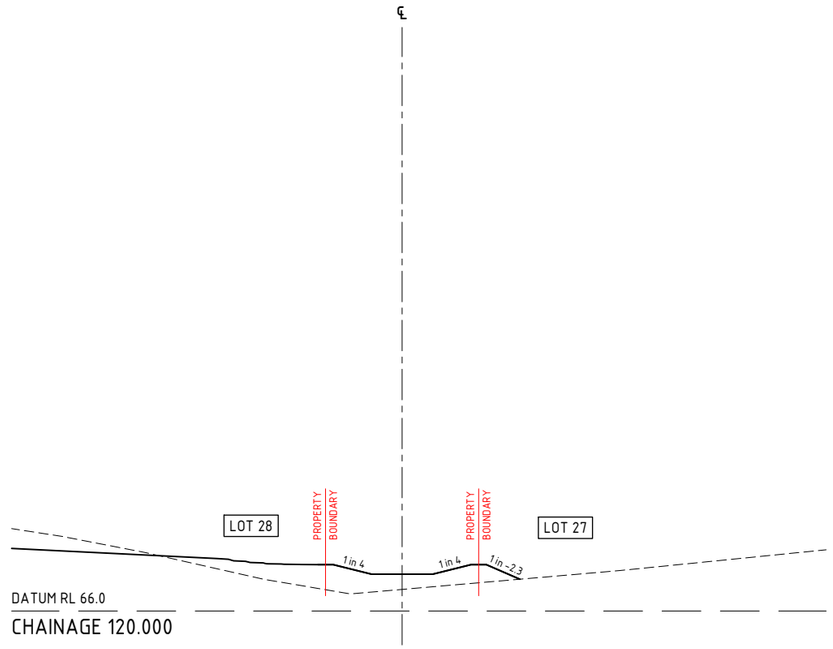

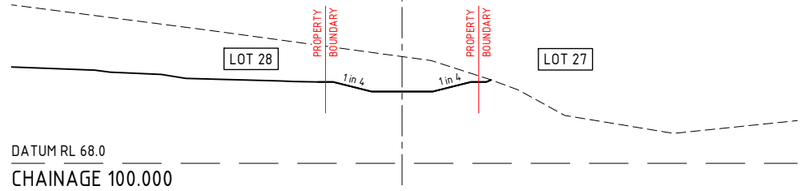

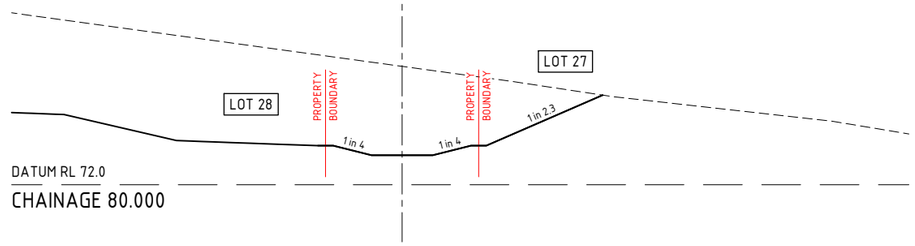

CROSS SECTIONS - SWALE 06, 08 AND 09 (EMERGENCY RELIEF)

SCALE 1:100

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)

SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS

CIVIL
STRUCTURAL
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IPSWICH PH No. (07) 3281 6603
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CONTACT DETAILS
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JAS-ANZ

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 06, 08 & 09 CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD706 REV. B

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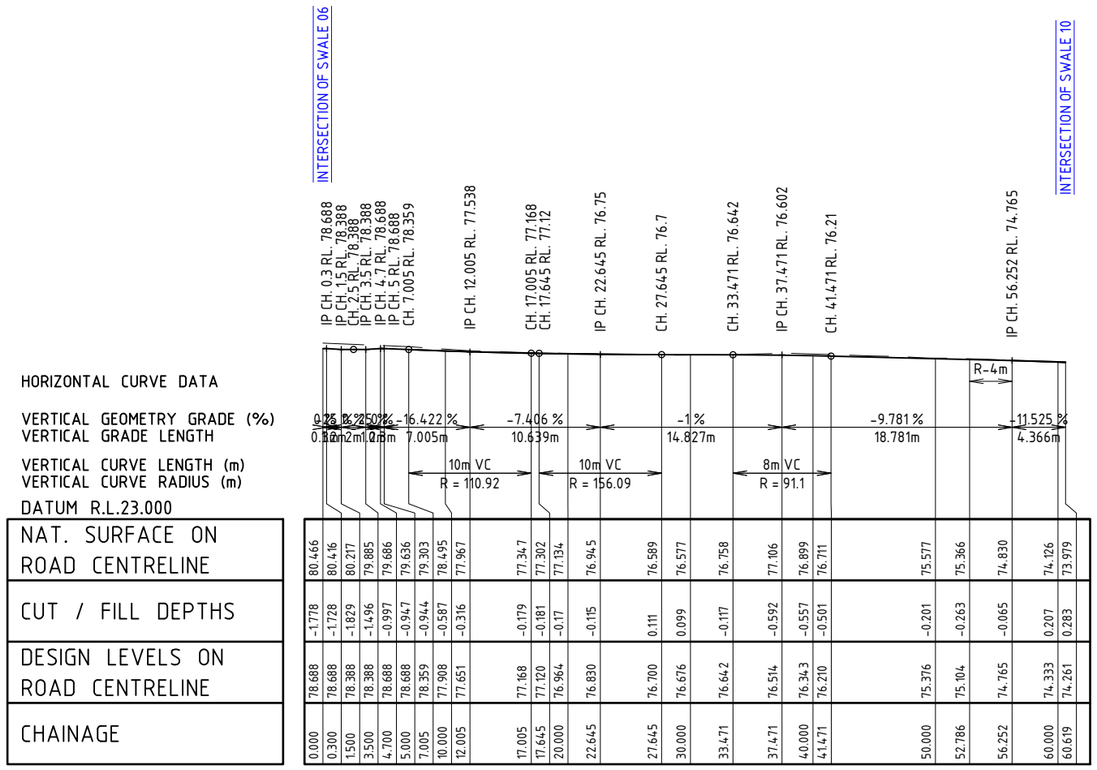
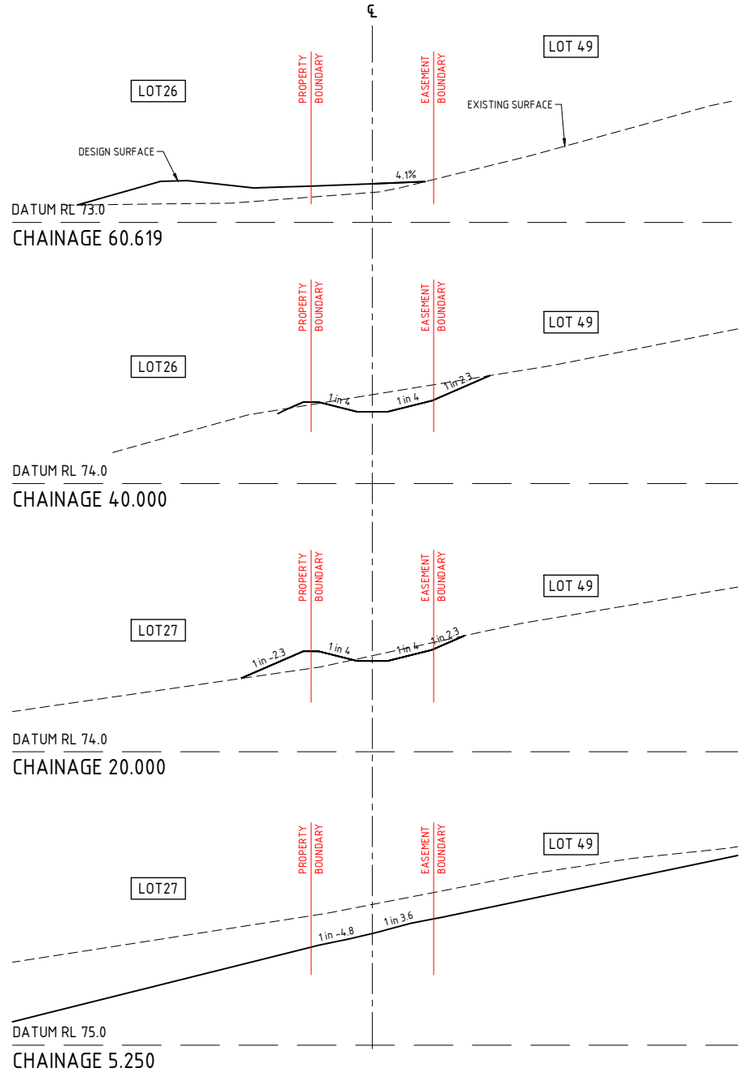


LONGITUDINAL SECTION - SWALE 07

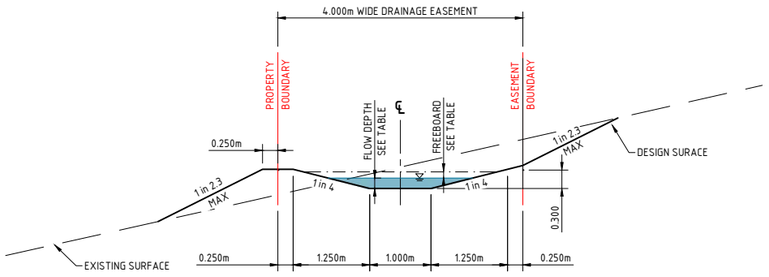
SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)



CROSS SECTIONS - SWALE 07

SCALE 1:100

NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS



SWALE SECTION - SWALE 07

SCALES 1:50

CHANNEL PROPERTIES - SWALE 07 (CATCHMENT 5)	
DESIGN Q_{100} (m^3/s)	0.300
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.08
VELOCITY (m/s)	1.260
DV PRODUCT (m^2/S)	0.190
FLOW DEPTH (m)	0.150
FREEBOARD (m)	0.160

SWALE 07 SETOUT TABLE

PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	494468.830	7055852.740	100°12'26.42"			
	10.000	494478.672	7055850.968	100°12'26.42"			
	20.000	494488.513	7055849.196	100°12'26.42"			
	30.000	494498.355	7055847.424	100°12'26.42"			
	40.000	494508.197	7055845.652	100°12'26.42"			
	50.000	494518.039	7055843.879	100°12'26.42"			
TC	52.786	494520.780	7055843.386	100°12'26.42"			
IP 2	54.519	494522.601	7055843.058		R = -4.000	3.467	49°39'29.13"
CT	56.252	494524.031	7055844.234	50°32'57.29"			
	60.000	494526.924	7055846.615	50°32'57.29"			
IP 3	60.619	494527.402	7055847.008	50°32'57.29"			

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 07 LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD707 REV. B

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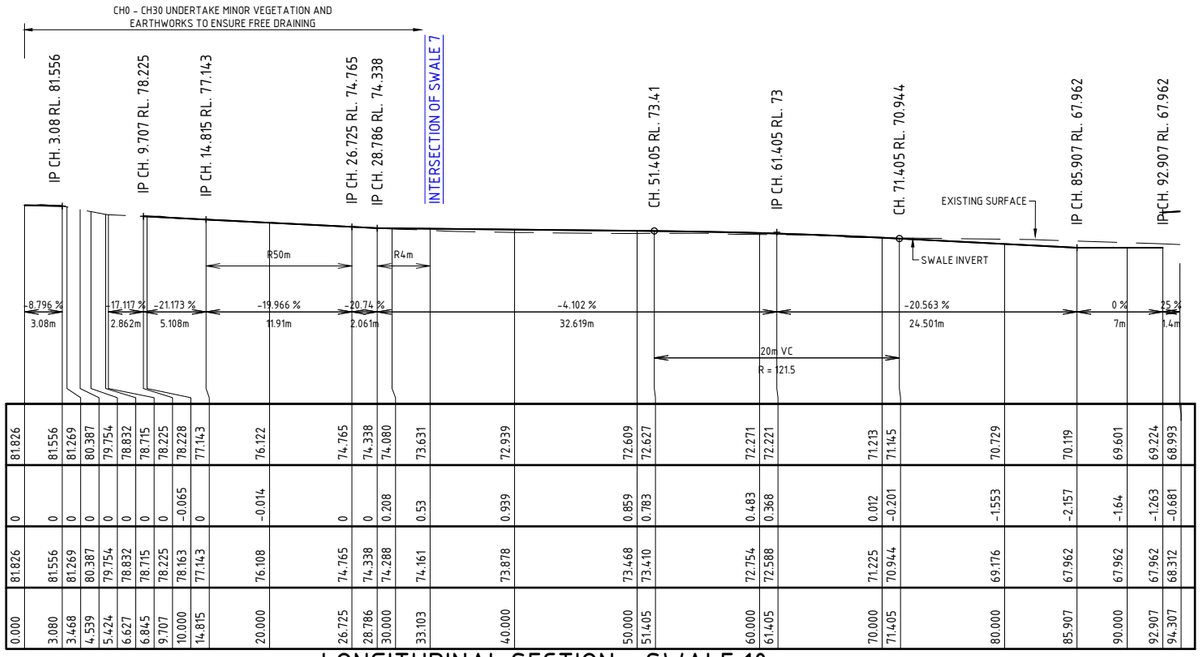


HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%)
VERTICAL GRADE LENGTH

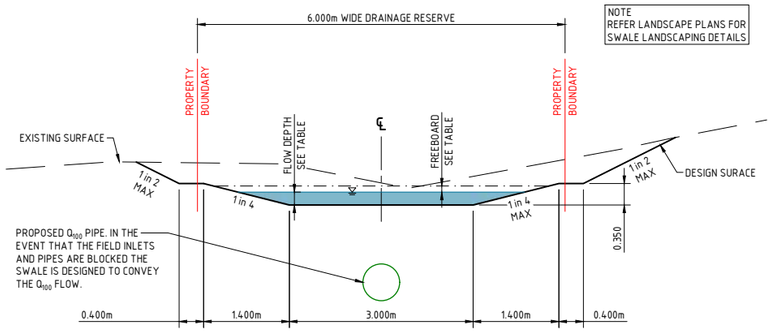
VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

DATUM R.L.17.000

VERTICAL GEOMETRY GRADE (%)	-8.796 %		-17.117 %	-21.173 %		-19.966 %		-20.74 %			-4.102 %					-20.563 %			0 %	25.2 %	
VERTICAL GRADE LENGTH	3.08m		2.862m	5.108m		11.91m		2.061m			32.619m					24.501m			7m	1.4m	
NAT. SURFACE ON ROAD CENTRELINE	81.826	81.556	81.269	80.387	79.754	78.832	78.715	78.225	78.228	77.143	76.122	74.765	74.338	74.080	73.631	72.939	72.609	72.627	72.271	72.221	71.213	71.145	70.729	70.119	69.601	69.224	68.993
CUT / FILL DEPTHS	0	0	0	0	0	0	0	0	-0.065	0	-0.014	0	0	0.208	0.53	0.939	0.859	0.783	0.483	0.368	0.012	-0.201	-1.553	-2.157	-1.64	-1.263	-0.681
DESIGN LEVELS ON ROAD CENTRELINE	81.826	81.556	81.269	80.387	79.754	78.832	78.715	78.225	78.163	77.143	76.108	74.765	74.338	74.288	74.161	73.878	73.468	73.410	72.754	72.588	71.225	70.944	69.176	67.962	67.962	67.962	68.312
CHAINAGE	0.000	3.080	3.468	4.539	5.424	6.627	6.845	9.707	10.000	14.815	20.000	26.725	28.786	30.000	33.103	40.000	50.000	51.405	60.000	61.405	70.000	71.405	80.000	85.907	90.000	92.907	94.307

LONGITUDINAL SECTION – SWALE 10 (EMERGENCY RELIEF)

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)



NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS

SWALE SECTION – SWALE 10 (EMERGENCY RELIEF) CH 0 – 30 TYP

SCALES 1:50

SWALE 10 SETOUT TABLE

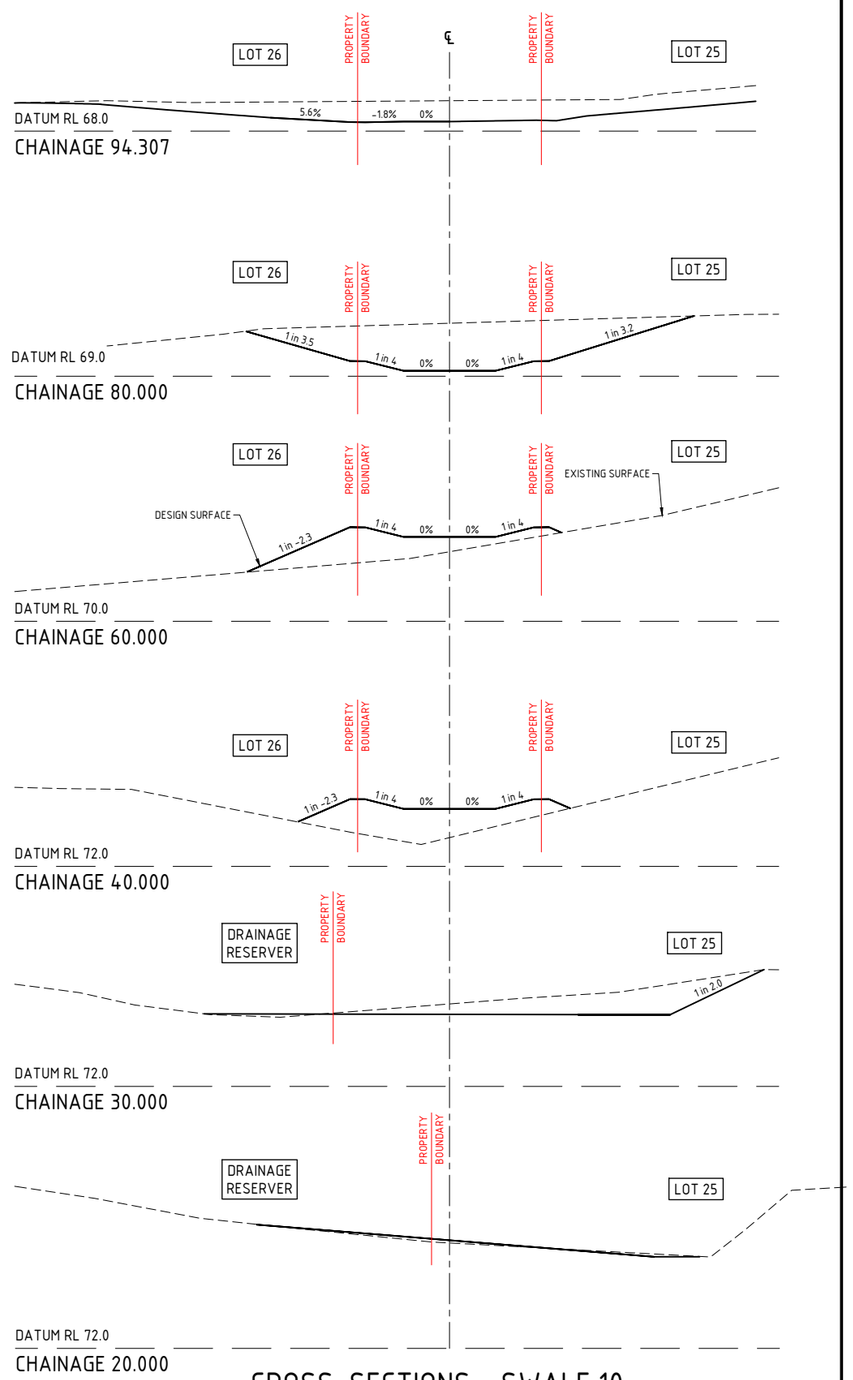
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	494556.700	7055838.952	280°12'26.42"			
	10.000	494546.858	7055840.724	280°12'26.42"			
TC	14.815	494542.119	7055841.578	280°12'26.42"			
	20.000	494537.073	7055842.759	286°08'56.35"			
IP 2	20.770	494536.230	7055842.638		R = 50.000	11.910	13°38'53.49"
CT	26.725	494530.758	7055845.058	293°51'19.91"			
TC	28.786	494528.873	7055845.892	293°51'19.91"			
	30.000	494527.854	7055846.542	311°14'18.26"			
IP 3	30.945	494526.682	7055846.860		R = 4.000	4.316	61°49'34.06"
CT	33.103	494526.502	7055849.249	355°40'53.97"			
	40.000	494525.983	7055856.126	355°40'53.97"			
	50.000	494525.230	7055866.098	355°40'53.97"			
	60.000	494524.477	7055876.070	355°40'53.97"			
	70.000	494523.724	7055886.041	355°40'53.97"			
	80.000	494522.971	7055896.013	355°40'53.97"			
	90.000	494522.218	7055905.984	355°40'53.97"			
IP 4	94.307	494521.893	7055910.279	355°40'53.97"			

CHANNEL PROPERTIES – SWALE 10

(CATCHMENT 5 & 6)

DESIGN Q_{100} (m^3/s)	2.400
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.13
VELOCITY (m/s)	2.430
DV PRODUCT (m^2/S)	0.590
FLOW DEPTH (m)	0.250
FREEBOARD (m)	0.100

NOTE: SWALE FLOW VELOCITY TO BE REDUCED TO ACCEPTABLE LEVELS THROUGH INCORPORATION OF ENERGY DISSIPATION DEVICES. DETAILS TO BE PROVIDED AT LATER DESIGN STAGE.



CROSS SECTIONS – SWALE 10

SCALE 1:100

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
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PROJECT MANAGEMENT
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IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 10 LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		
DRAWING No.		REV.
C3602 – CD708		B

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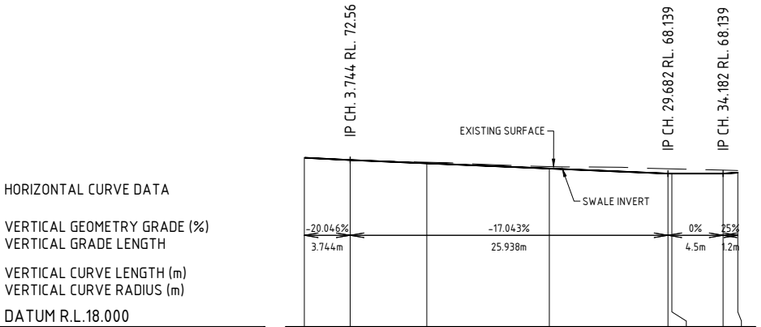
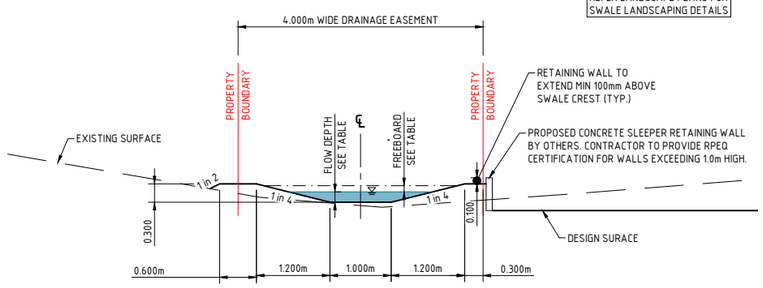


HORIZONTAL CURVE DATA								
VERTICAL GEOMETRY GRADE (%)	-20.046%		-17.043%			0%	25%	
VERTICAL GRADE LENGTH	3.744m		25.938m			4.5m	1.2m	
VERTICAL CURVE LENGTH (m)								
VERTICAL CURVE RADIUS (m)								
DATUM R.L.18.000								
NAT. SURFACE ON ROAD CENTRELINE	73.310	72.434	71.851	70.426	69.714	69.683	69.272	69.147
CUT / FILL DEPTHS	0	0.126	-0.358	-0.636	-1.575	-1.544	-1.133	-0.708
DESIGN LEVELS ON ROAD CENTRELINE	73.310	72.560	71.493	69.789	68.139	68.139	68.139	68.439
CHAINAGE	0.000	3.744	10.000	20.000	29.682	30.000	34.182	35.382

LONGITUDINAL SECTION - SWALE 11

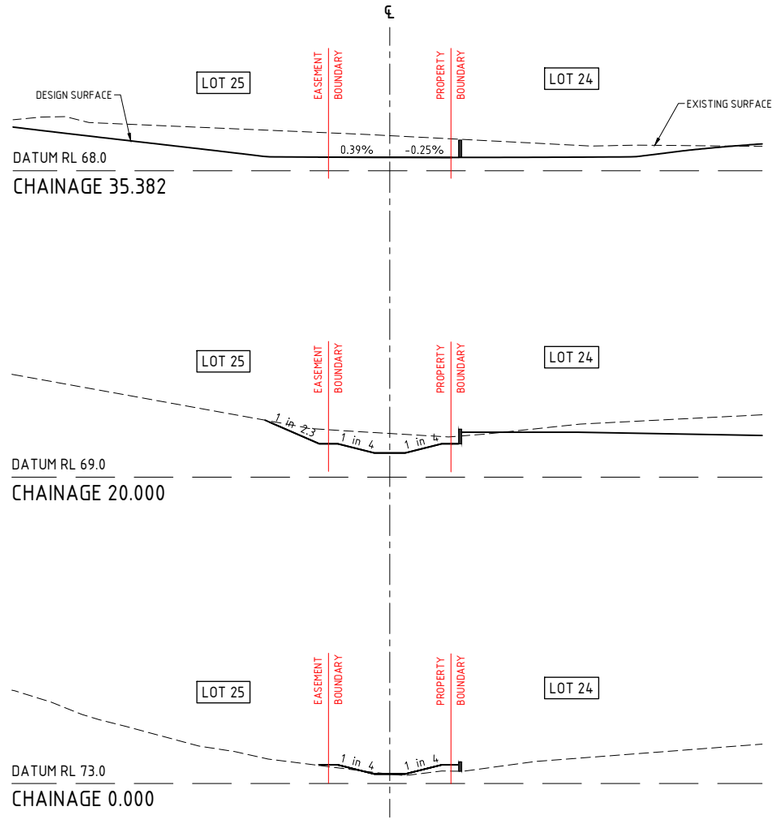
SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS



SWALE SECTION - SWALE 11

SCALES 1:50



CROSS SECTIONS - SWALE 11

SCALE 1:100

SWALE 11 SETOUT TABLE				
PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494568.747	7055914.562	278°36'41.00"
	10.000	494558.860	7055916.059	278°36'41.00"
	20.000	494548.972	7055917.556	278°36'41.00"
	30.000	494539.085	7055919.054	278°36'41.00"
IP 2	35.382	494533.764	7055919.860	278°36'41.00"

CHANNEL PROPERTIES - SWALE 11 (CATCHMENT 7)	
DESIGN Q_{100} (m^3/s)	0.240
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.13
VELOCITY (m/s)	1.440
DV PRODUCT (m^2/S)	0.170
FLOW DEPTH (m)	0.120
FREEBOARD (m)	0.180

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 11 LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		
DRAWING No.		REV.
C3602 - CD709		B

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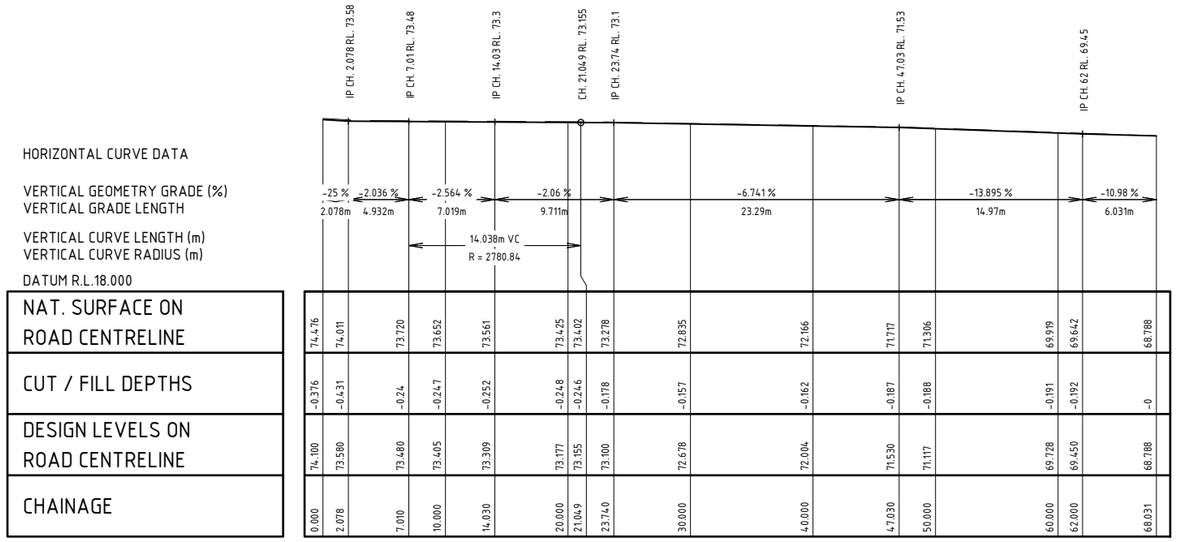
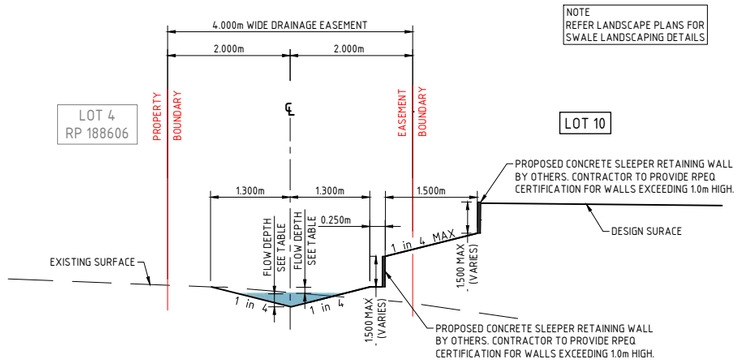


LONGITUDINAL SECTION - SWALE 12

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)



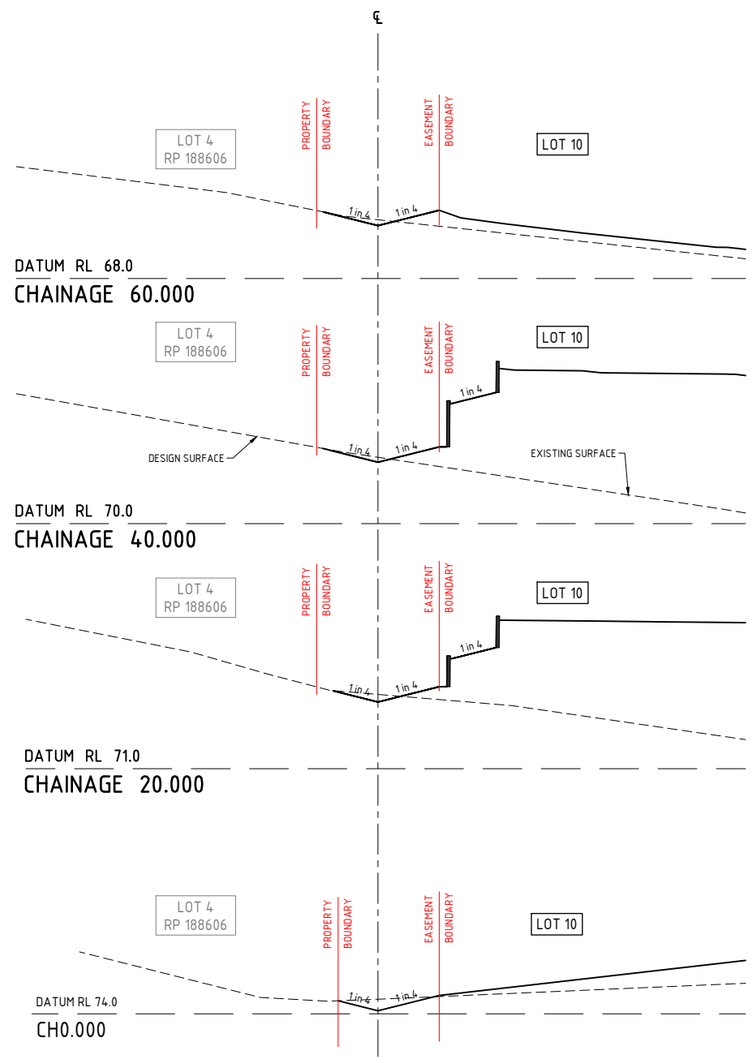
NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS

SWALE SECTION - SWALE 12

SCALES 1:50

CHANNEL PROPERTIES - SWALE 12 (CATCHMENT 9)	
DESIGN Q_{100} (m^3/s)	0.230
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.07
VELOCITY (m/s)	1.200
DV PRODUCT (m^2/S)	0.260
FLOW DEPTH (m)	0.220
FREEBOARD (m)	0.110

SWALE 12 SETOUT TABLE				
PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494232.206	7055909.962	278°39'41.00"
	10.000	494222.320	7055911.467	278°39'41.00"
	20.000	494212.434	7055912.973	278°39'41.00"
	30.000	494202.548	7055914.479	278°39'41.00"
	40.000	494192.662	7055915.985	278°39'41.00"
	50.000	494182.776	7055917.491	278°39'41.00"
	60.000	494172.890	7055918.997	278°39'41.00"
IP 2	68.031	494164.951	7055920.207	278°39'41.00"



CROSS SECTIONS - SWALE 12

SCALE 1:100

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 12 LONGITUDINAL AND CROSS SECTIONS

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED: JN	APPROVED	
DRAWING No. C3602 - CD710		REV. B

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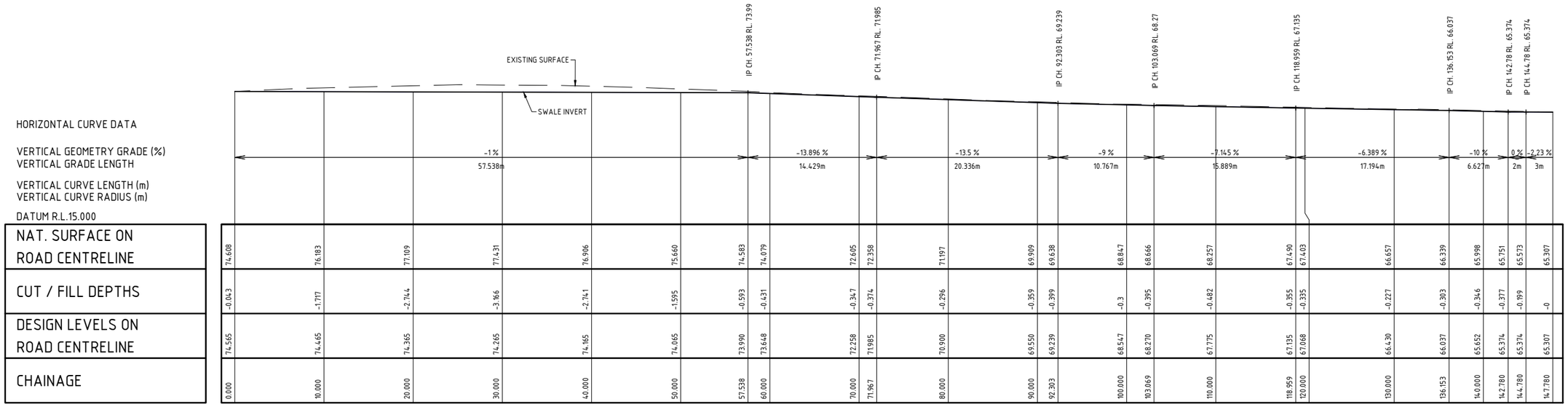


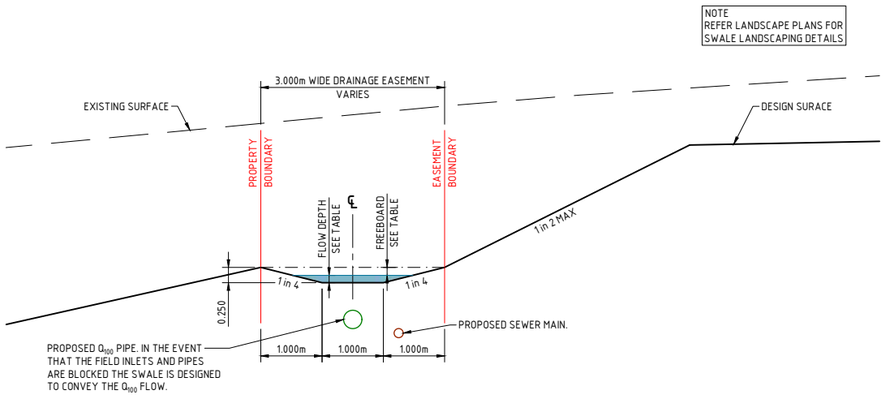
LONGITUDINAL SECTION - SWALE 13

SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

CHANNEL PROPERTIES - SWALE 14

(CATCHMENT 10)

DESIGN Q_{100} (m^3/s)	0.410
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.07
VELOCITY (m/s)	1.150
DV PRODUCT (m^2/S)	0.160
FLOW DEPTH (m)	0.140
FREEBOARD (m)	0.110



SWALE SECTION - SWALE 13

SCALES 1:50

SWALE 13 SETOUT TABLE

PT	CHAINAGE	EASTING	NORTHING	BEARING
IP 1	0.000	494234.222	7055998.012	92°15'10.22"
	10.000	494244.214	7055997.619	92°15'10.22"
	20.000	494254.206	7055997.226	92°15'10.22"
	30.000	494264.199	7055996.833	92°15'10.22"
	40.000	494274.191	7055996.440	92°15'10.22"
	50.000	494284.183	7055996.047	92°15'10.22"
IP 2	57.138	494291.316	7055995.766	
	60.000	494294.078	7055996.514	74°51'10.24"
	70.000	494303.731	7055999.127	74°51'10.24"
IP 3	71.567	494305.243	7055999.537	
	80.000	494313.673	7055999.299	91°36'40.98"
	90.000	494323.669	7055999.018	91°36'40.98"
	100.000	494333.665	7055998.737	91°36'40.98"
	110.000	494343.661	7055998.456	91°36'40.98"
	120.000	494353.657	7055998.175	91°36'40.98"
	130.000	494363.653	7055997.893	91°36'40.98"
	140.000	494373.649	7055997.612	91°36'40.98"
IP 4	147.380	494381.027	7055997.405	91°36'40.98"

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)

SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

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E mail@mnce.com.au
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 13 LONGITUDINAL AND TYPICAL SECTION

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
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DRAWING No. C3602 - CD711 REV. B

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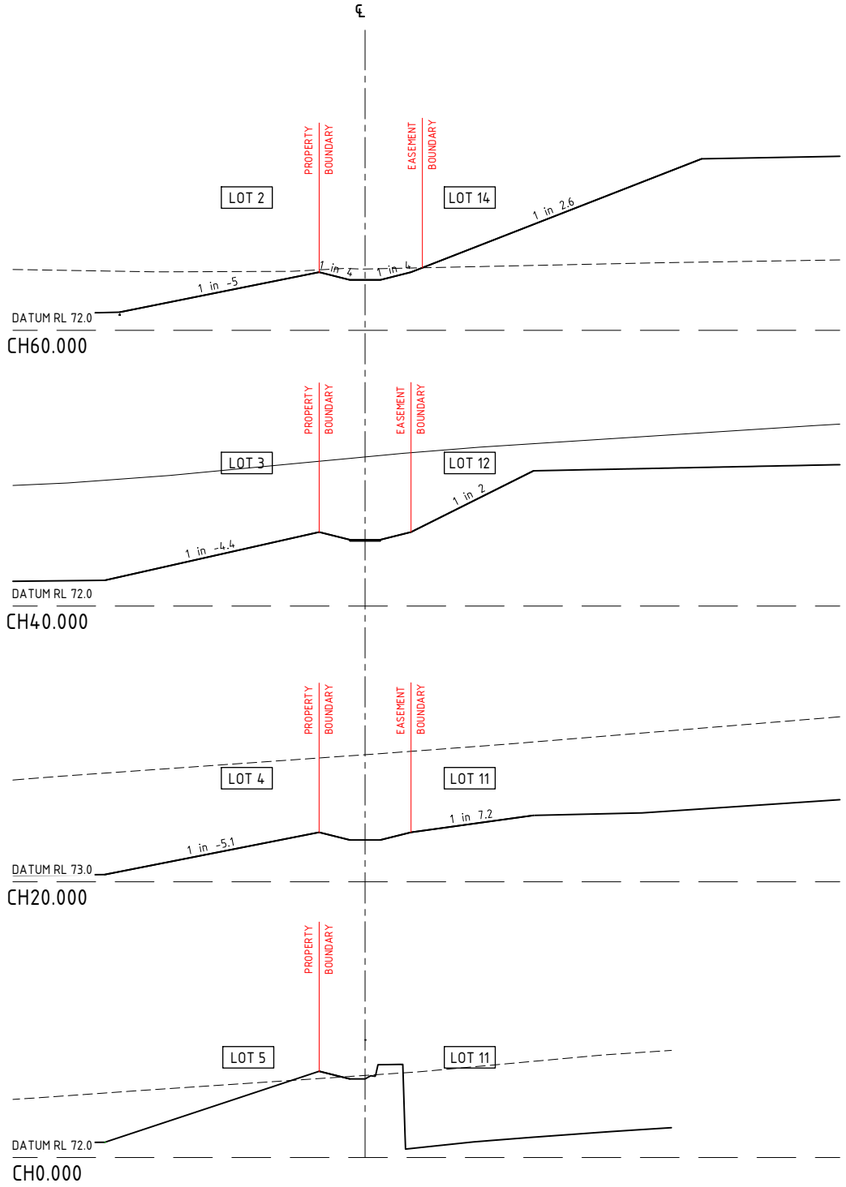

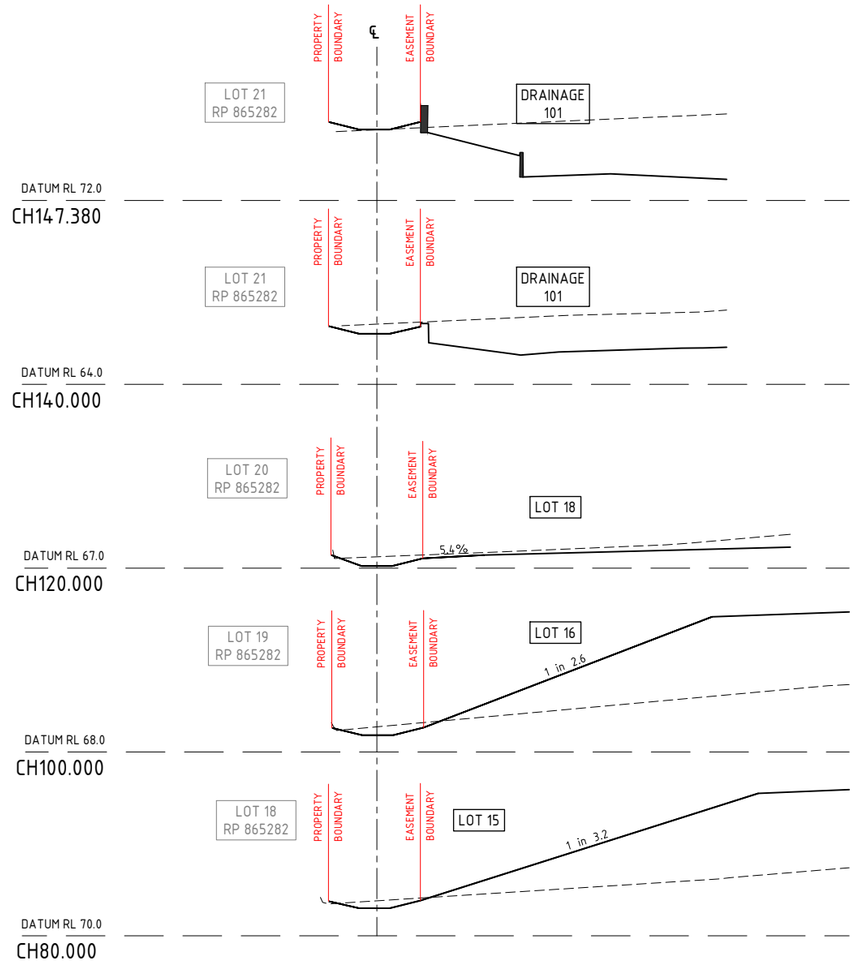

CROSS SECTIONS - SWALE 13

SCALE 1:100

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)

SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

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JAS-ANZ SGS

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 13 CROSS SECTION

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

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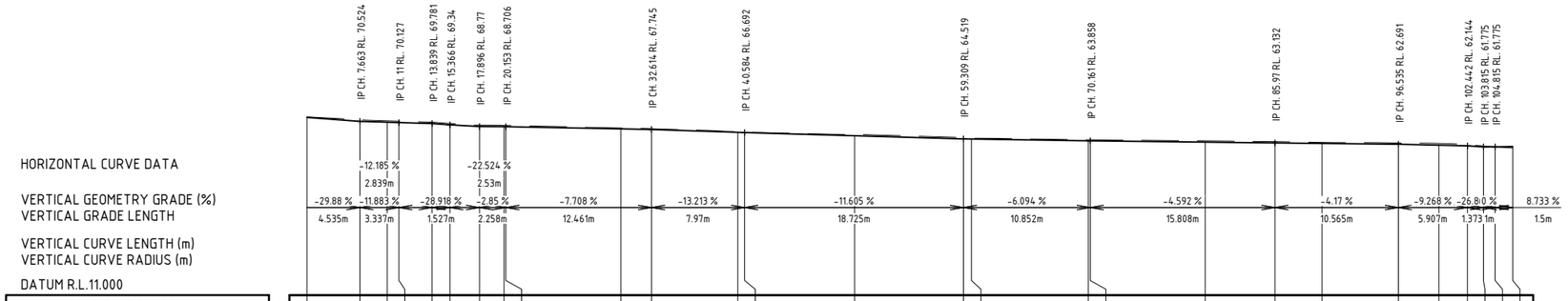


NAT. SURFACE ON ROAD CENTRELINE	72.044	71.070	70.698	70.579	70.238	69.795	69.236	69.137	69.125	68.248	67.998	66.926	66.813	66.029	64.940	64.801	64.232	64.224	63.831	63.582	63.336	63.116	62.953	62.490	62.092	61.803	61.368
CUT / FILL DEPTHS	-0.166	-0.547	-0.452	-0.452	-0.457	-0.455	-0.466	-0.428	-0.419	-0.301	-0.253	-0.157	-0.121	-0.43	-0.421	-0.324	-0.365	-0.366	-0.425	-0.451	-0.352	-0.425	-0.583	-0.346	-0.317	-0.028	0.538
DESIGN LEVELS ON ROAD CENTRELINE	71.879	70.524	70.246	70.127	69.781	69.340	68.770	68.710	68.706	67.947	67.745	66.769	66.692	65.599	64.519	64.477	63.868	63.858	63.406	63.132	62.964	62.691	62.370	62.144	61.775	61.775	61.906
CHAINAGE	3.128	7.663	10.000	11.000	13.839	15.366	17.896	20.000	20.153	30.000	32.614	40.000	40.584	50.000	59.309	60.000	70.000	70.161	80.000	85.970	90.000	96.535	100.000	102.442	103.815	104.815	106.315

LONGITUDINAL SECTION - SWALE 14

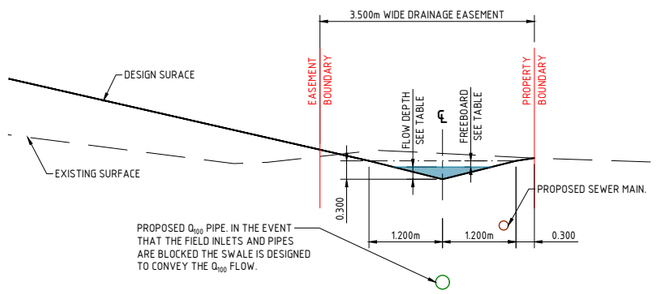
SCALES 1:250 (HORIZONTAL) / 1:1000 (VERTICAL)

CHANNEL PROPERTIES - SWALE 14

(CATCHMENT 11)

DESIGN Q (m^3/s)	0.200
MANNINGS (n)	0.050
LONG SLOPE (m/m)	0.10
VELOCITY (m/s)	1.362
DV PRODUCT (m^2/S)	0.280
FLOW DEPTH (m)	0.200
FREEBOARD (m)	0.100

NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS

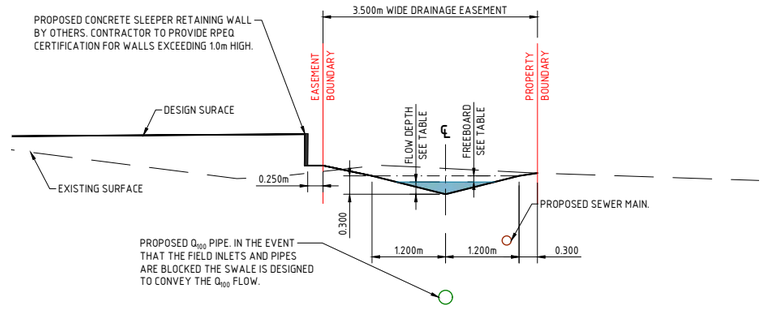


SWALE SECTION - SWALE 14

CH 0.00 TO CH 85.97

SCALES 1:50

NOTE
REFER LANDSCAPE PLANS FOR SWALE LANDSCAPING DETAILS



SWALE SECTION - SWALE 14

CH 85.97 TO CH 106.315

SCALES 1:50

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)

SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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A	APPROVAL ISSUE	02.10.20	CA
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 14 LONGITUDINAL AND TYPICAL SECTION

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD713 REV. B

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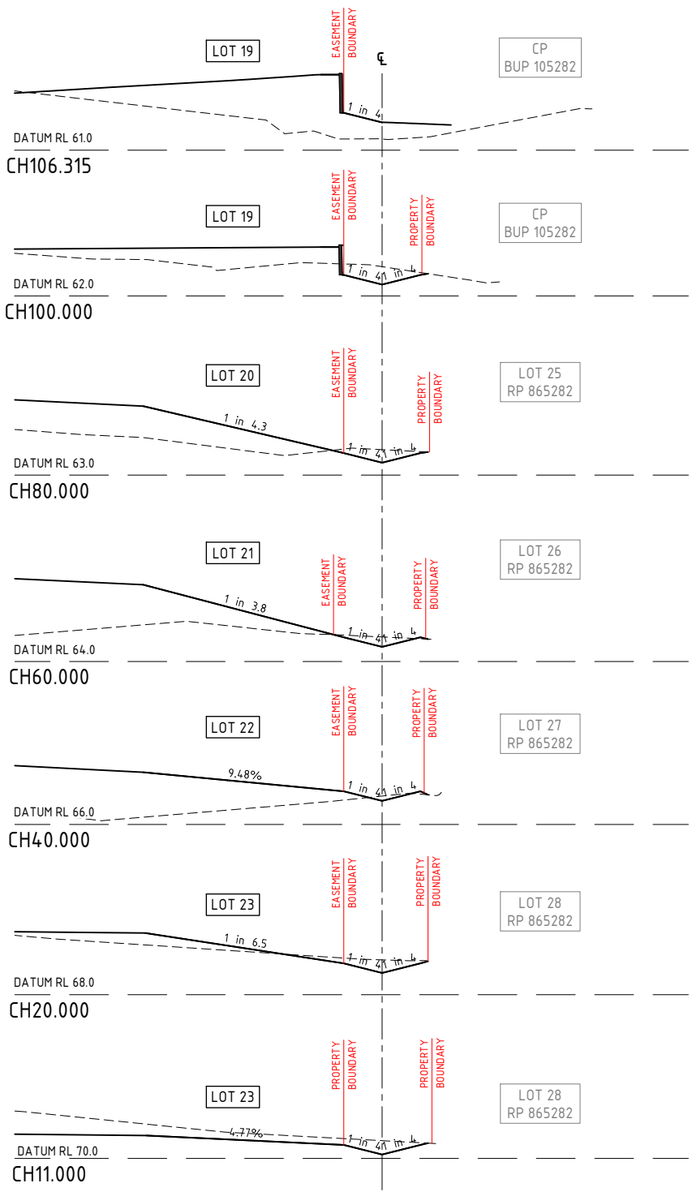

CROSS SECTIONS - SWALE 14

SCALE 1:100

SWALE 14 SETOUT TABLE					
PT	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING
IP 1	3.128	494573.316	7055962.197	71.879	278°36'41.00"
	10.000	494566.521	7055963.226	70.246	278°36'41.00"
	20.000	494556.634	7055964.723	68.710	278°36'41.00"
	30.000	494546.747	7055966.220	67.947	278°36'41.00"
	40.000	494536.859	7055967.718	66.769	278°36'41.00"
	50.000	494526.972	7055969.215	65.599	278°36'41.00"
	60.000	494517.085	7055970.712	64.477	278°36'41.00"
	70.000	494507.198	7055972.210	63.868	278°36'41.00"
	80.000	494497.310	7055973.707	63.406	278°36'41.00"
	90.000	494487.423	7055975.204	62.964	278°36'41.00"
	100.000	494477.536	7055976.702	62.370	278°36'41.00"
IP 2	106.315	494471.292	7055977.647	61.906	278°36'41.00"

NOT FOR CONSTRUCTION

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

SCALE 1:50 (A1) 0 1 2 3m (SCALE BEFORE REDUCTION)
SCALE 1:250 (A1) 0 5 10 15m (SCALE BEFORE REDUCTION)
SCALE 1:1000 (A1) 0 20 40 60m (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
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REV.	DESCRIPTION	DATE	INIT.
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: SWALE 14 CROSS SECTION

DRAWN	DESIGNED	DATE
CA	SM	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD714 REV. B

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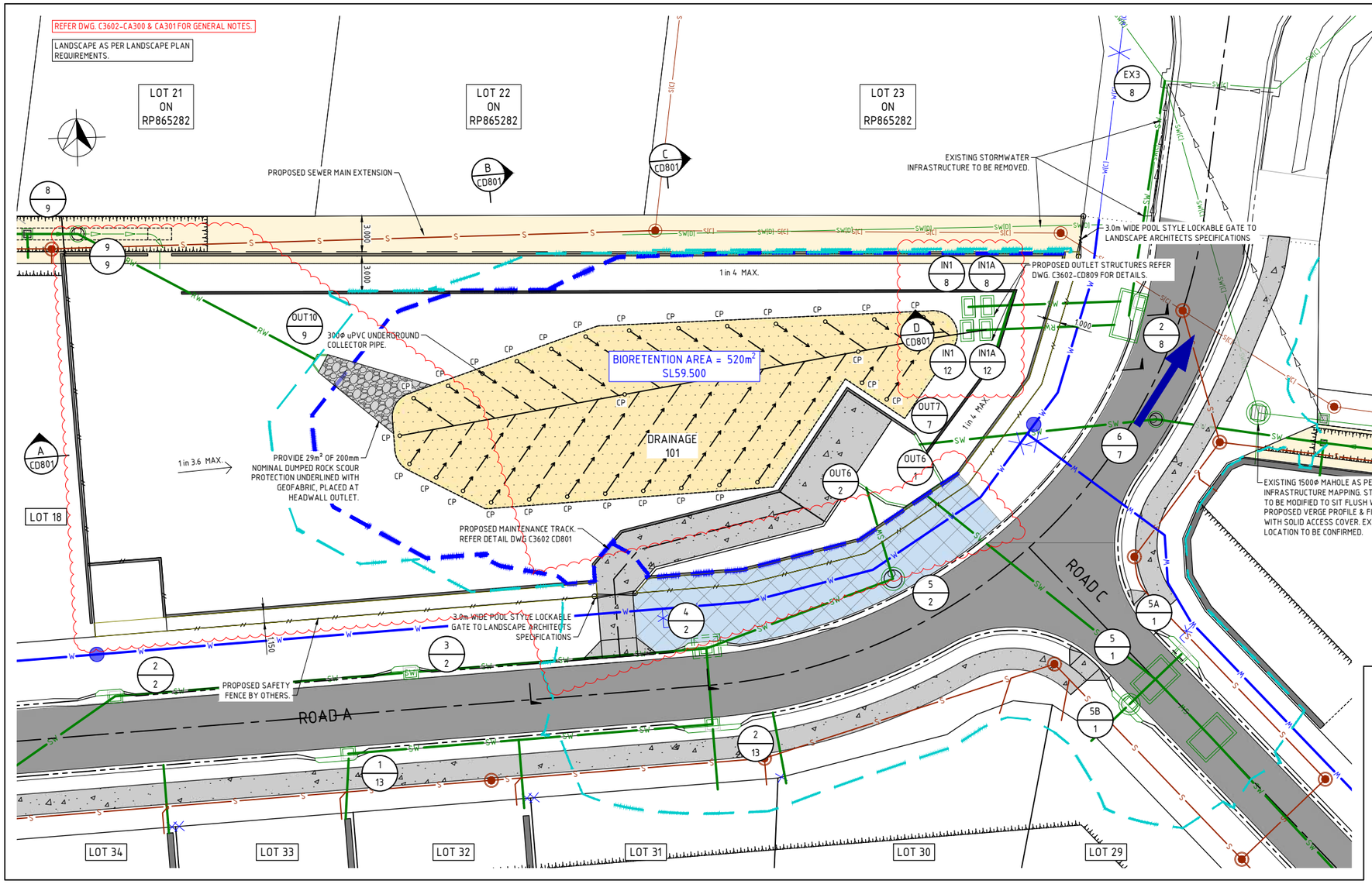

PLAN
SCALE 1:200

LEGEND

- EXISTING SEWER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING WATER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING STORMWATER (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING TELECOMMUNICATIONS (*) DENOTES UTILITY CLASSIFICATION)
- PROPOSED STORMWATER
- PROPOSED BIO RETENTION AREA
- EMERGENCY SPILLWAY AREA
- EMERGENCY OVERFLOW
- PROPOSED TOP OF BATTER
- PROPOSED TOE OF BATTER
- PROPOSED RETAINING WALL
- PROPOSED 1%AEP TWL
- PROPOSED 1%AEP TWL (ALL OUTLETS BLOCKED)
- PROPOSED DRAINAGE STRUCTURE NUMBER
- PROPOSED SLOTTED UNDER DRAINAGE
- BIORETENTION BASIN CLEANOUT POINT. REFER TO DETAIL ON C3602-CD809.

WATERPROOFING NOTE:
ALL RETAINING WALLS WITHIN DRAINAGE LOT 101 TO HAVE WATERPROOFING.

EDUCATION SIGNAGE:
PERMANENT EDUCATION SIGNAGE MUST BE ERECTED. WORDING FOR THE SIGNAGE AS FOLLOWS:

BIORETENTION BASIN - THIS BIORETENTION BASIN REDUCES THE POLLUTION OF OUR WATERWAYS BY REDUCING THE AMOUNT OF HEAVY METALS, LITTER, SUSPENDED SOLIDS, AND NUTRIENTS DISCHARGED TO TUCKERS CREEK.

DRAINAGE 101 BASIN STAGE STORAGE DISCHARGE TABLE

OPERATION	OUTFLOW MECHANISM	STAGE STORAGE DISCHARGE TABLE		
		BASIN LEVEL (m)	VOLUME (m^3)	OUTFLOW (m^3)
NORMAL	STRUCTURE OUTLETS	0.000	0.000	0.000
		0.100	199.300	0.000
		0.200	276.000	0.260
		0.300	355.700	0.368
		0.400	438.200	0.450
		0.500	524.100	0.520
		0.600	613.500	0.581
		0.700	706.500	0.637
		0.800	803.000	0.688
		0.900	903.200	1.333
		1.000	1007.300	1.624
		1.100	1115.400	1.856
		1.200	1227.500	2.057
		1.300	1343.200	2.489
		1.400	1462.300	3.117
EMERGENCY - (ALL STRUCTURE OUTLETS BLOCKED)	CREST OF OUTLET STRUCTURE (EFFECTIVE WEIR LENGTH = 8.4m)	1.500	1585.100	0.444
		1.600	1711.800	1.255
		1.700	1842.100	2.305
EMERGENCY - (ALL STRUCTURE OUTLETS & CRESTS BLOCKED)	CREST EMERGENCY STRUCTURES (EFFECTIVE WEIR LENGTH = 8.4m)	1.800	1976.000	0.444
		1.900	2006.200	1.255
EMERGENCY (ALL STRUCTURE OUTLETS & CRESTS & EMERGENCY STRUCTURES BLOCKED)	EMERGENCY SPILLWAY WEIR (EFFECTIVE WEIR LENGTH = 28.5m)	2.000	2142.500	1.505
		2.100	2278.800	4.257

FILTER MATERIAL CALCULATIONS:

BIO-DETENTION BASIN
FILTRATION RATE (DARCY'S EQUATION)

$Q_{MAX} = K_{SAT} \times A \times \frac{h_{MAX} + d}{d}$

$= 5.6 \times 10^{-5} \times 520 \times \frac{0.300+0.7}{0.7}$

$Q_{MAX} = 0.04m^3/s$

UNDERDRAINAGE CAPACITY
$Q_{SLOTTED}$ = no.pipes > 1.2 Q_{MAX}
90 mm Φ SLOTTED uPVC AT 1 IN 200

$Q_{SLOTTED} = 0.003m3/s$

No. PIPES= $\frac{1.2 \times 0.04}{0.003}$
Min. No. PIPES REQ = 16

COLLECTOR PIPE CAPACITY

$Q_{CAP\ COLLECTOR} > 1.2 \times Qmax$
$Q_{CAP\ COLLECTOR} > 0.048m^3/s$

COLLECTOR PIPE = 300mm Φ NON SLOTTED uPVC AT 1 IN 200
$Q_{CAP\ COLLECTOR} = 0.074m^3/s > 0.048\ m^3/s$ OK

SCALE 1:200 (A1) 0 4 8 12m
(SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
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W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 101 DETENTION AND BIORETENTION DETAILS SHEET 1 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD800
REV. B

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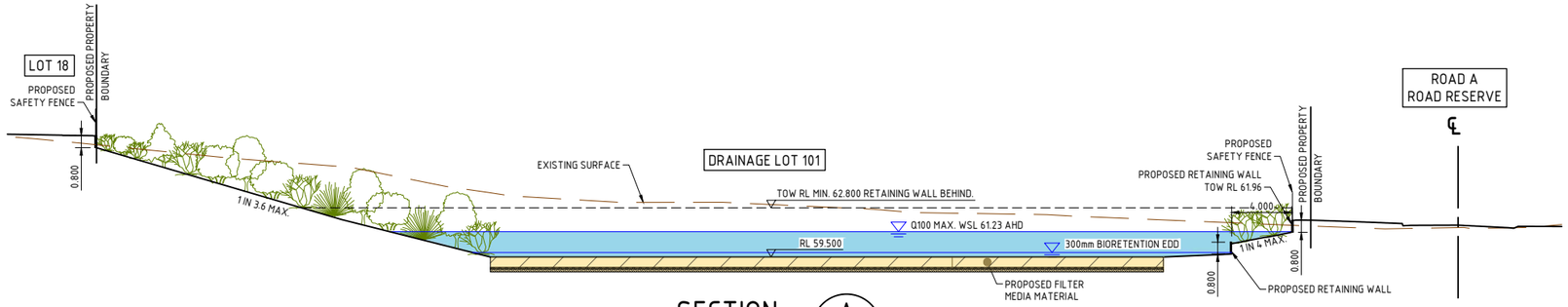
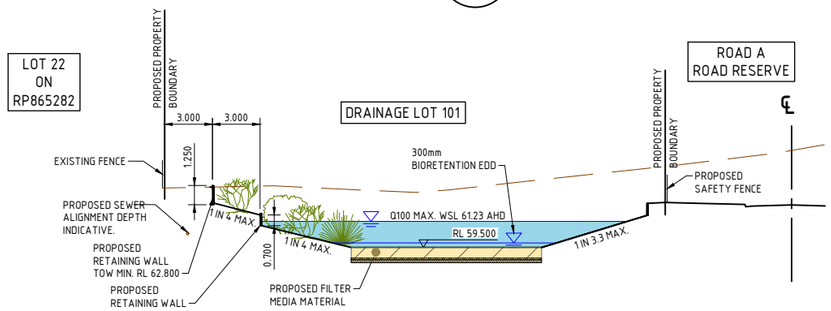
REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

LANDSCAPE AS PER LANDSCAPE PLAN REQUIREMENTS.

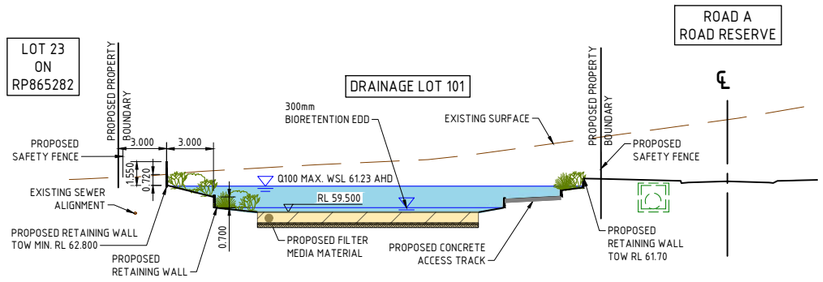
WATERPROOFING NOTE:
ALL RETAINING WALLS WITHIN DRAINAGE LOT 101 TO HAVE WATERPROOFING.



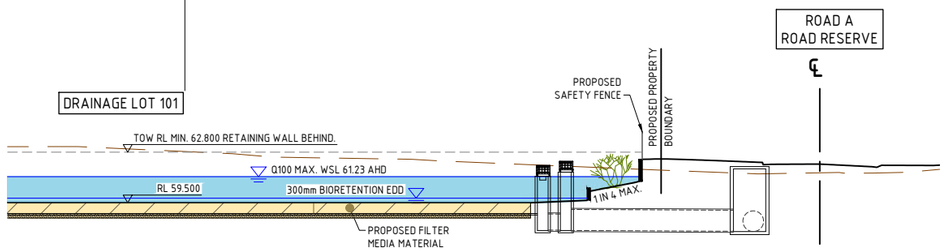
SECTION A CD800
SCALE 1:200



SECTION B CD800
SCALE 1:200



SECTION C CD800
SCALE 1:200



SECTION D CD800
SCALE 1:200

SCALE 1:200 (A1) 0 4 8 12m
(SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL STRUCTURAL TRAFFIC PROJECT MANAGEMENT
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 101 DETENTION AND BIORETENTION DETAILS SHEET 2 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD801 REV. B

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

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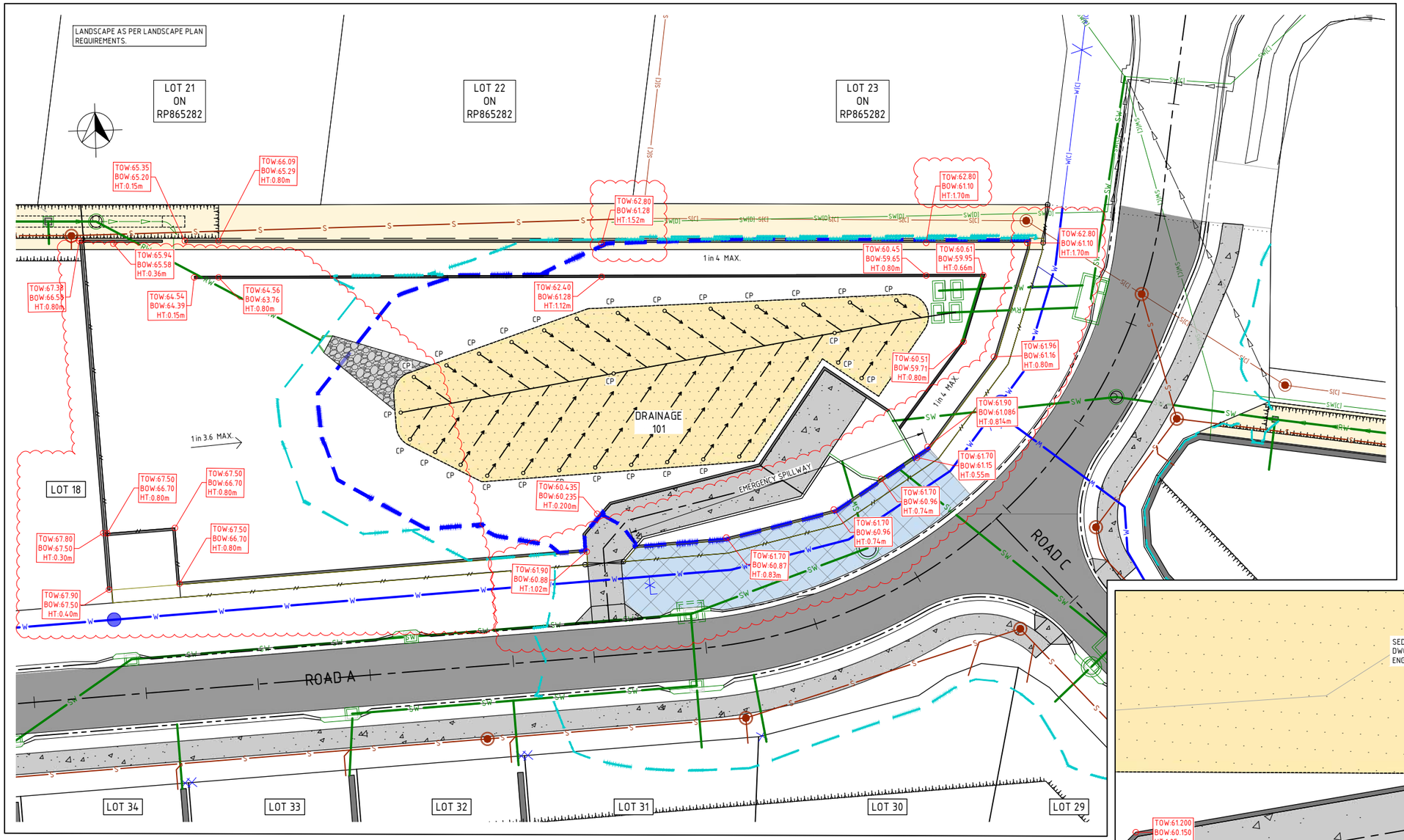
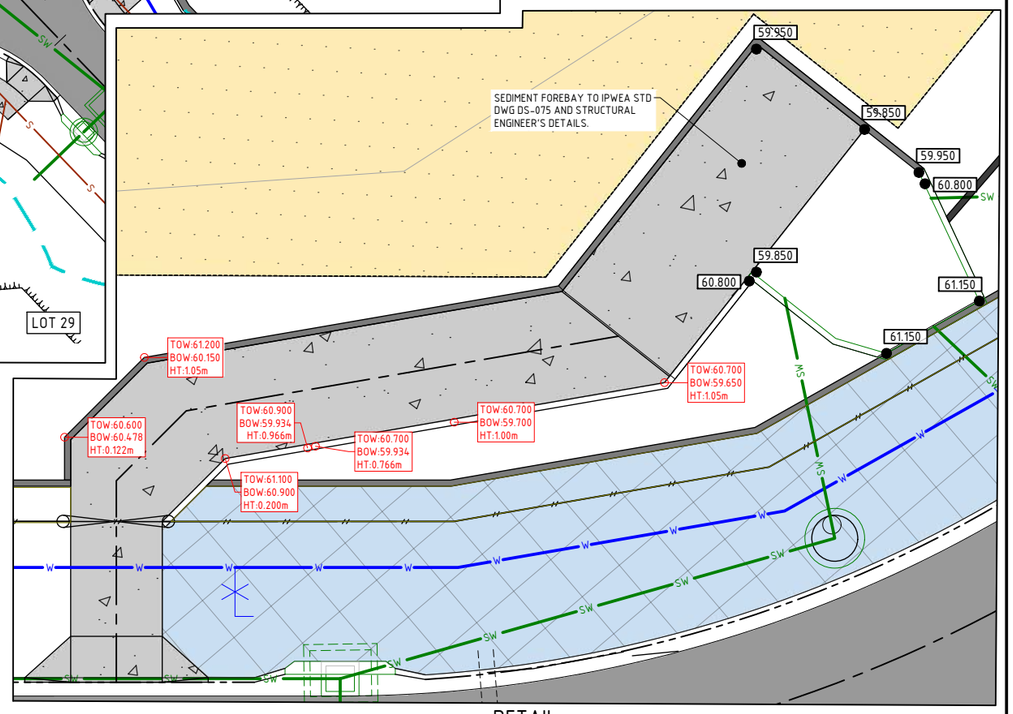


PLAN
SCALE 1:200

LEGEND

- EXISTING SEWER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING WATER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING STORMWATER (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING TELECOMMUNICATIONS (*) DENOTES UTILITY CLASSIFICATION)
- PROPOSED STORMWATER
- PROPOSED BIO RETENTION AREA
- EMERGENCY SPILLWAY AREA
- PROPOSED TOP OF BATTER
- PROPOSED TOE OF BATTER
- PROPOSED RETAINING WALL
- PROPOSED 1%AEP TWL
- PROPOSED 1%AEP TWL (ALL OUTLETS BLOCKED)
- PROPOSED SLOTTED UNDER DRAINAGE
- CP — BIORETENTION BASIN CLEANOUT POINT. REFER TO DETAIL ON C3602-CD809.

WATERPROOFING NOTE:
ALL RETAINING WALLS WITHIN DRAINAGE LOT 101 TO HAVE WATERPROOFING.



DETAIL
SCALE 1:100

SCALE 1:100 (A1) 0 2 4 6m (SCALE BEFORE REDUCTION)

SCALE 1:200 (A1) 0 4 8 12m (SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
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W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 101 DETENTION AND BIORETENTION DETAILS SHEET 3 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD802 REV. B

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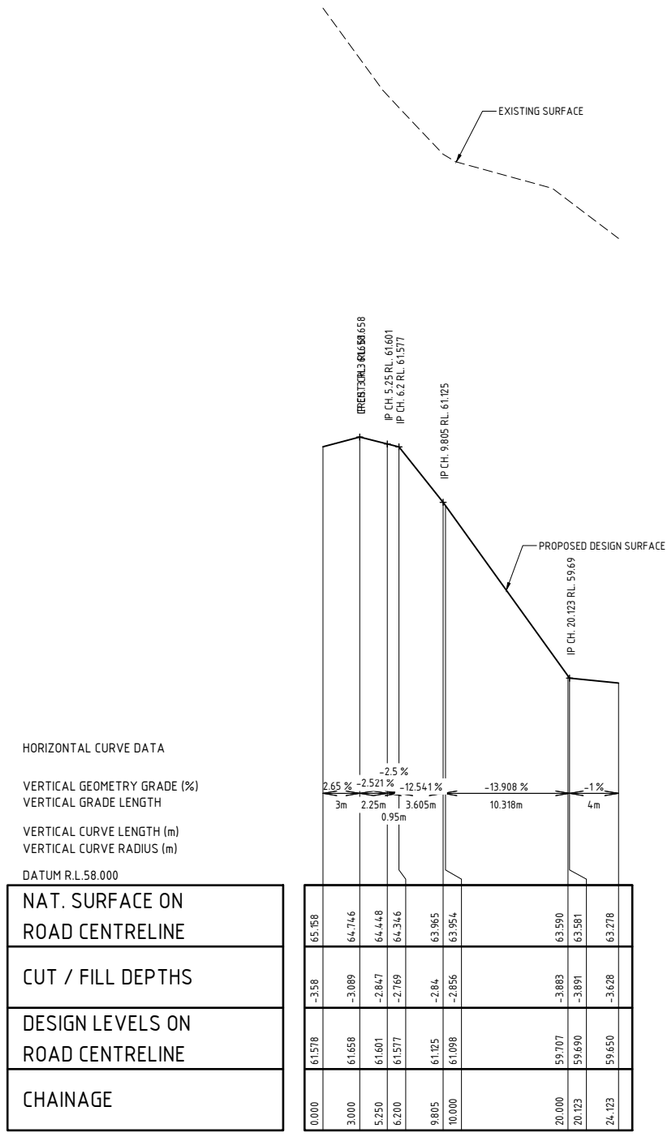
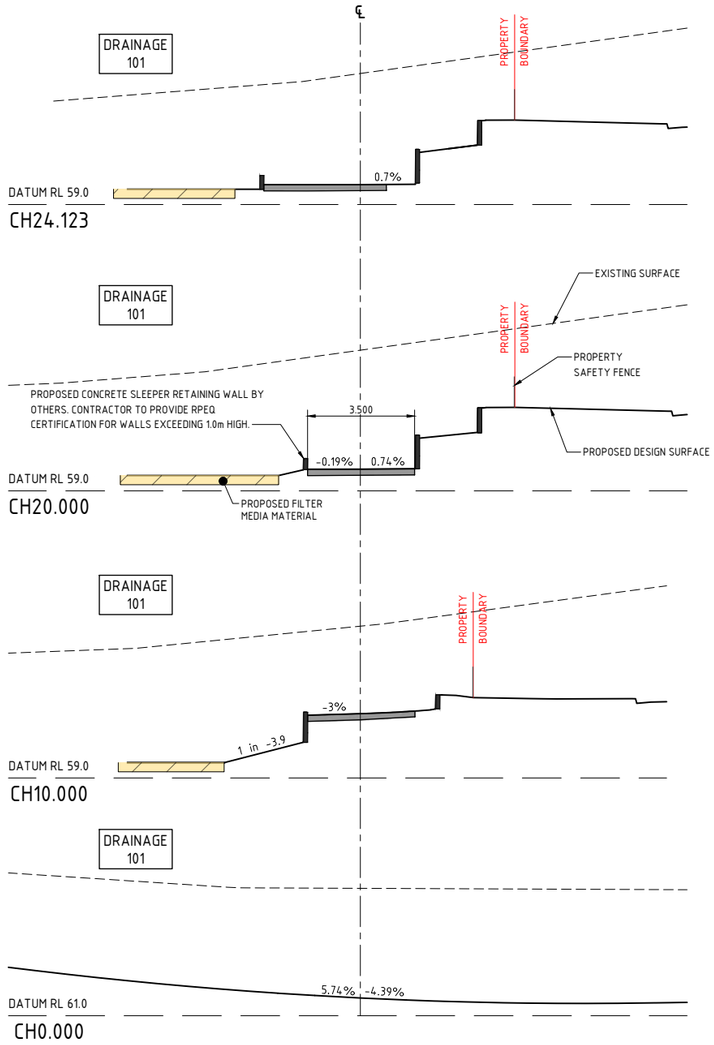


BIORENTENTION BASIN ACCESS LOT 101
LONGITUDINAL SECTION
HORIZONTAL SCALE - 1:250
VERTICAL SCALE - 1:25



BIORENTENTION BASIN ACCESS LOT 101
CROSS SECTIONS
SCALE - 1:100

SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE
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JAS-ANZ
SGS

CLIENT
PARKER PROPERTY NINGI PTY LTD

PROJECT
41 GLENBROOK DRIVE, NAMBOUR

TITLE
LOT 101 BIORETENTION ACCESS LONG SECTION & CROSS SECTION

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD803
REV. B

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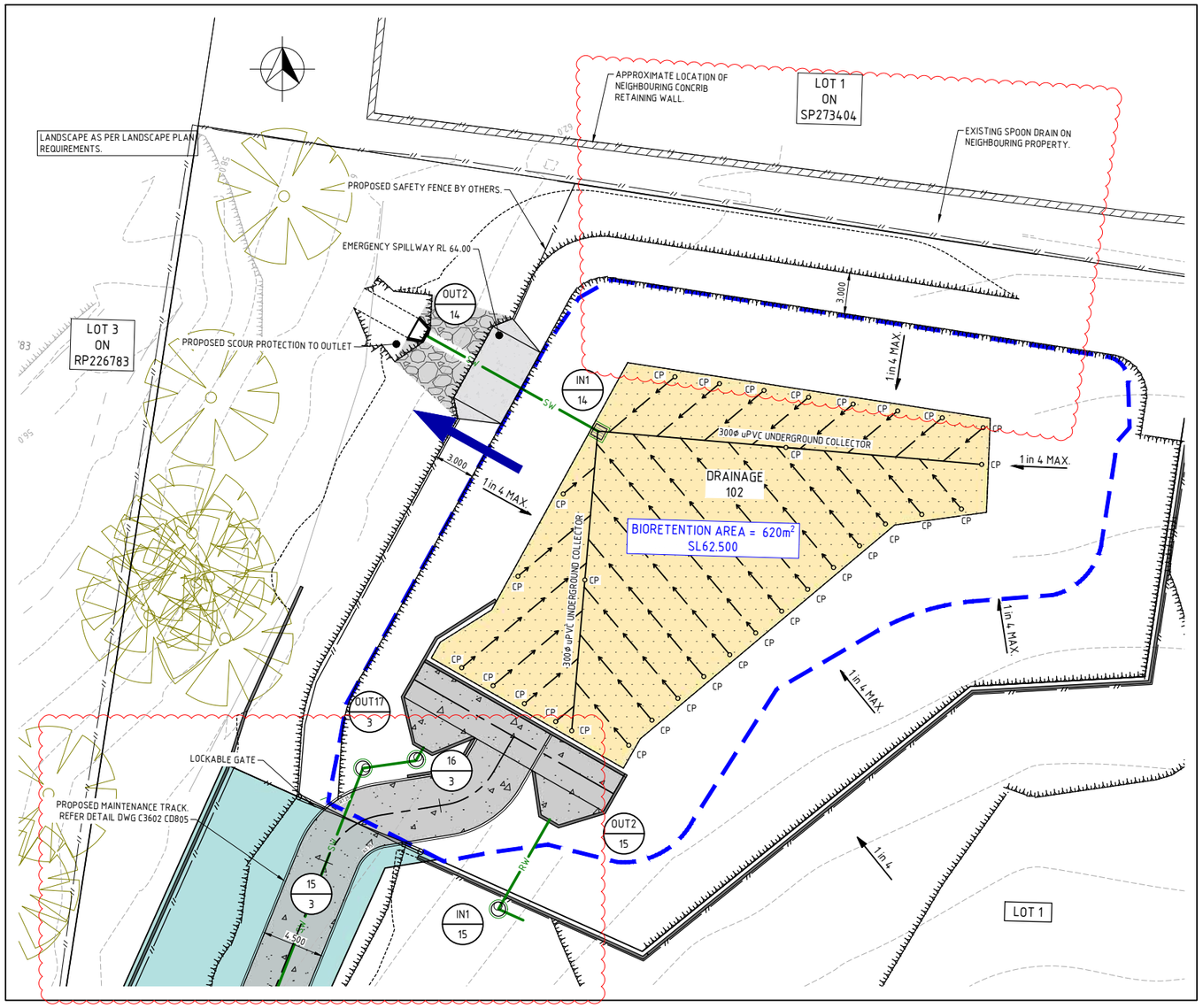


PLAN
SCALE 1:200

FILTER MATERIAL CALCULATIONS:

BIO-DETENTION BASIN
FILTRATION RATE (DARCY'S EQUATION)

$Q_{MAX} = K_{SAT} \times A \times \frac{h_{MAX} + d}{d}$

$= 5.6 \times 10^{-5} \times 620 \times \frac{0.300+0.7}{0.7}$

$Q_{MAX} = 0.05 m^3/s$

UNDERDRAINAGE CAPACITY
$Q_{SLOTTED}$ = no.pipes > 1.2 Q_{MAX}
90 mm Φ SLOTTED uPVC AT 1 IN 200

$Q_{SLOTTED} = 0.003 m3/s$

No. PIPES = $\frac{1.2 \times 0.05}{0.003}$

MIN. No. PIPES REQ = 20

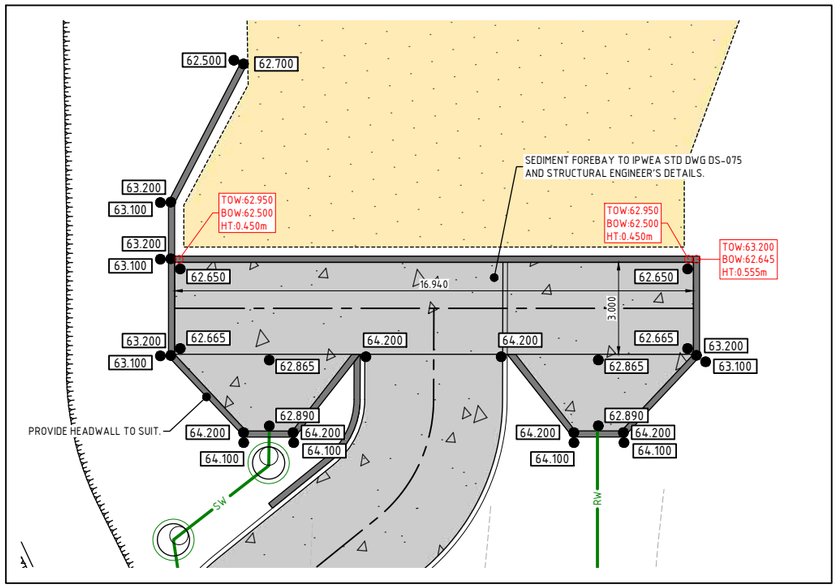
COLLECTOR PIPE CAPACITY

$Q_{CAP\ COLLECTOR} > 1.2 \times Qmax$
$Q_{CAP\ COLLECTOR} > 1.2 \times 0.05$
$Q_{CAP\ COLLECTOR} > 0.060 m^3/s$

COLLECTOR PIPE = 300mm Φ NON SLOTTED uPVC AT 1 IN 200
$Q_{CAP\ COLLECTOR} = 0.074 m^3/s > 0.060\ m^3/s$ OK

DRAINAGE 102 BASIN STAGE STORAGE DISCHARGE TABLE

BASIN LEVEL (m)	VOLUME (m^3)	OUTFLOW (m^3)
0.000	0.000	0.000
0.100	86.000	0.000
0.200	176.300	0.133
0.300	271.000	0.188
0.400	370.200	0.230
0.500	474.000	0.265
0.600	582.500	0.297
0.700	6925.800	0.325
0.800	814.100	0.351
0.900	937.400	0.464
1.000	1065.800	0.523
1.100	1199.500	0.573
1.200	1338.500	0.680



SEDIMENT FOREBAY DETAIL - DRAINAGE LOT 102
SCALE 1:100

LEGEND

- EXISTING SEWER MAIN [*] DENOTES UTILITY CLASSIFICATION)
- EXISTING WATER MAIN [*] DENOTES UTILITY CLASSIFICATION)
- EXISTING STORMWATER [*] DENOTES UTILITY CLASSIFICATION)
- EXISTING TELECOMMUNICATIONS [*] DENOTES UTILITY CLASSIFICATION)
- PROPOSED STORMWATER
- PROPOSED BIO RETENTION AREA
- EMERGENCY OVERFLOW
- PROPOSED TOP OF BATTER / PROPOSED TOE OF BATTER
- PROPOSED RETAINING WALL
- PROPOSED 1%AEP TWL
- PROPOSED 1%AEP TWL (ALL OUTLETS BLOCK)
- PROPOSED DRAINAGE STRUCTURE NUMBER
- PROPOSED SLOTTED UNDER DRAINAGE
- CP — BIORETENTION BASIN CLEANOUT POINT. REFER TO DETAIL ON C3602-CD809.

SCALE 1:200 (A1) 0 4 8 12m
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

MILANOVIC NEALE CONSULTING ENGINEERS
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CONTACT DETAILS
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W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 102 DETENTION AND BIORETENTION DETAILS SHEET 1 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD804 REV. B

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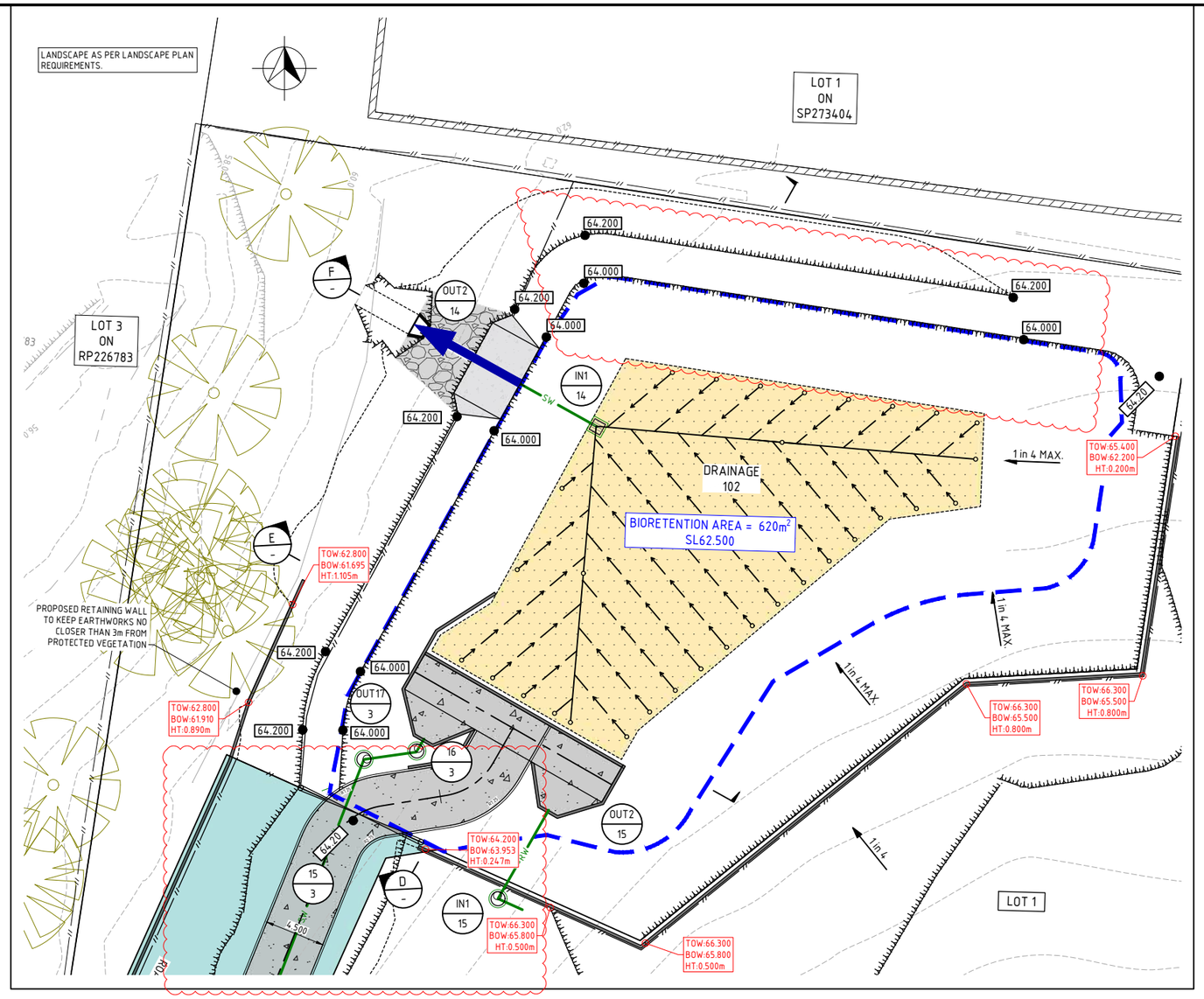


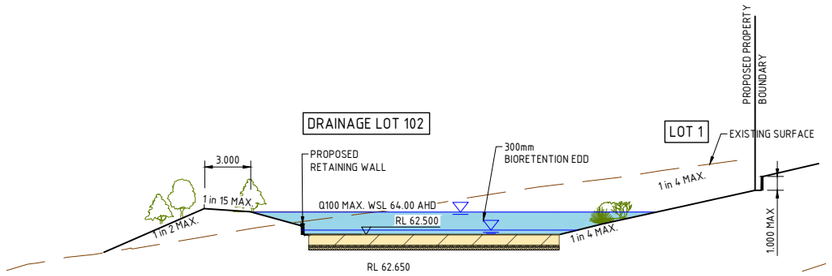
PLAN
SCALE 1:200

LEGEND

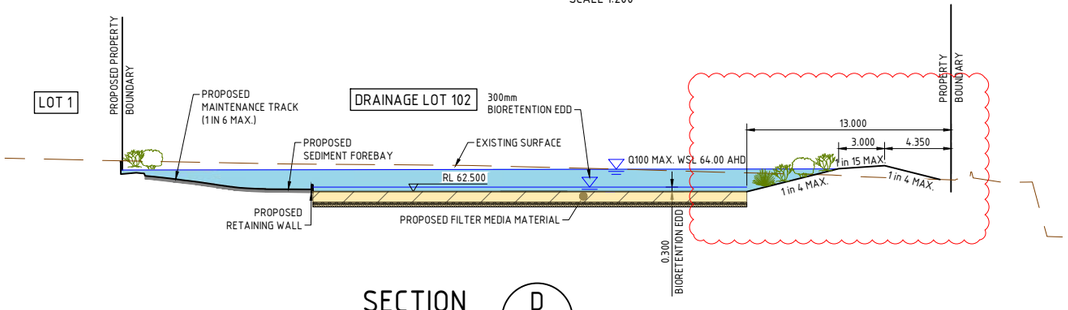
- EXISTING SEWER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING WATER MAIN (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING STORMWATER (*) DENOTES UTILITY CLASSIFICATION)
- EXISTING TELECOMMUNICATIONS (*) DENOTES UTILITY CLASSIFICATION)
- PROPOSED STORMWATER
- PROPOSED BIO RETENTION AREA
- EMERGENCY OVERFLOW
- PROPOSED TOP OF BATTER
- PROPOSED TOE OF BATTER
- PROPOSED RETAINING WALL
- PROPOSED 1%AEP TWL
- PROPOSED 1%AEP TWL (ALL OUTLETS BLOCK)
- PROPOSED DRAINAGE STRUCTURE NUMBER
- PROPOSED SLOTTED UNDER DRAINAGE
- CP — BIORETENTION BASIN CLEANOUT POINT. REFER TO DETAIL ON C3602-CD809.
- ##.## — PROPOSED DESIGN FINISHED LEVEL

EDUCATION SIGNAGE:
PERMANENT EDUCATION SIGNAGE MUST BE ERECTED. WORDING FOR THE SIGNAGE AS FOLLOWS:

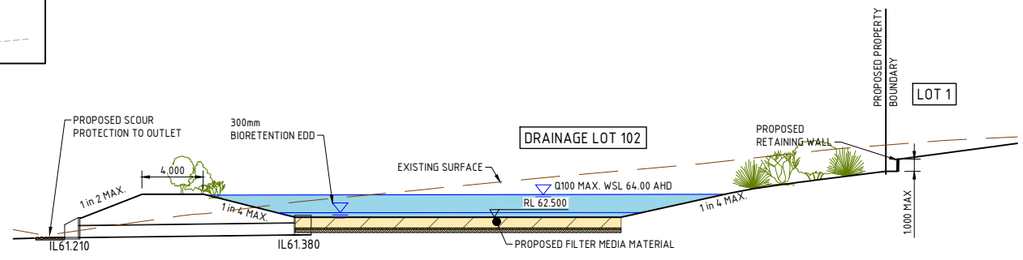
BIORETENTION BASIN – THIS BIORETENTION BASIN REDUCES THE POLLUTION OF OUR WATERWAYS BY REDUCING THE AMOUNT OF HEAVY METALS, LITTER, SUSPENDED SOLIDS, AND NUTRIENTS DISCHARGED TO TUCKERS CREEK.



SECTION E
SCALE 1:200



SECTION D
SCALE 1:200



SECTION F
SCALE 1:200

SCALE 1:200 (A1) 0 4 8 12m
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

MILANOVIC NEALE CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
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GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 102 DETENTION AND BIORETENTION DETAILS SHEET 2 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 – CD805 REV. B

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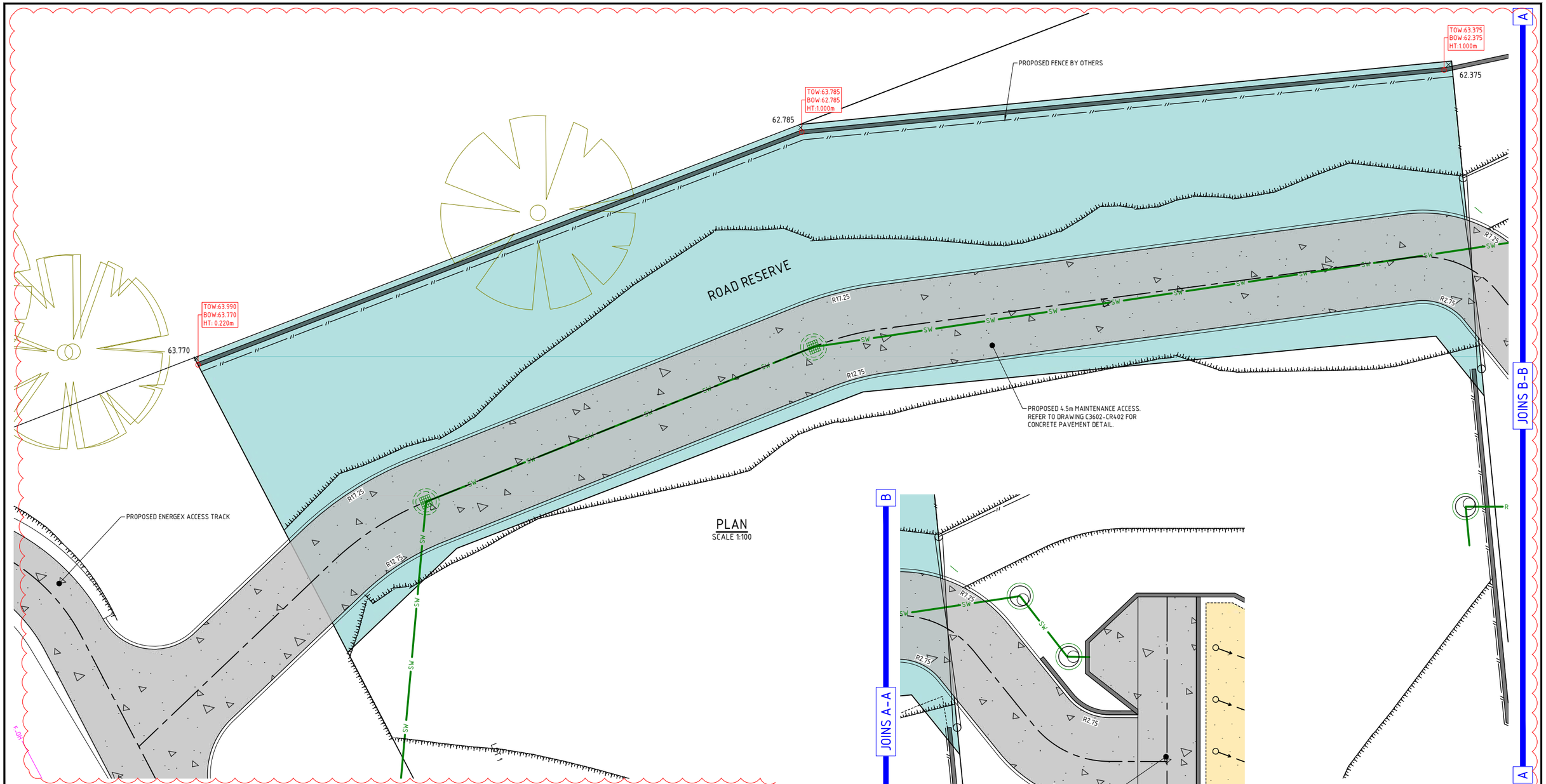

PLAN
SCALE 1:100

PLAN
SCALE 1:100

LEGEND

SEW	EXISTING SEWER MAIN (*) DENOTES UTILITY CLASSIFICATION)
WTR	EXISTING WATER MAIN (*) DENOTES UTILITY CLASSIFICATION)
SW(D)	EXISTING STORMWATER (*) DENOTES UTILITY CLASSIFICATION)
TEL	EXISTING TELECOMMUNICATIONS (*) DENOTES UTILITY CLASSIFICATION)
SW	PROPOSED STORMWATER
	PROPOSED BIO RETENTION AREA
	EMERGENCY OVERFLOW
	PROPOSED TOP OF BATTER / PROPOSED TOE OF BATTER
	PROPOSED RETAINING WALL
	PROPOSED 1%AEP TWL
	PROPOSED 1%AEP TWL (ALL OUTLETS BLOCK)
1 / 1	PROPOSED DRAINAGE STRUCTURE NUMBER
	PROPOSED SLOTTED UNDER DRAINAGE
CP	BIORETENTION BASIN CLEANOUT POINT. REFER TO DETAIL ON C3602-CD809.
##.##	PROPOSED DESIGN FINISHED LEVEL

SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

MILANOVIC NEALE
CONSULTING ENGINEERS
CIVIL
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PROJECT MANAGEMENT
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W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 102 DETENTION AND BIORETENTION DETAILS SHEET 3 OF 3

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		
DRAWING No.		REV.
C3602 - CD806		B

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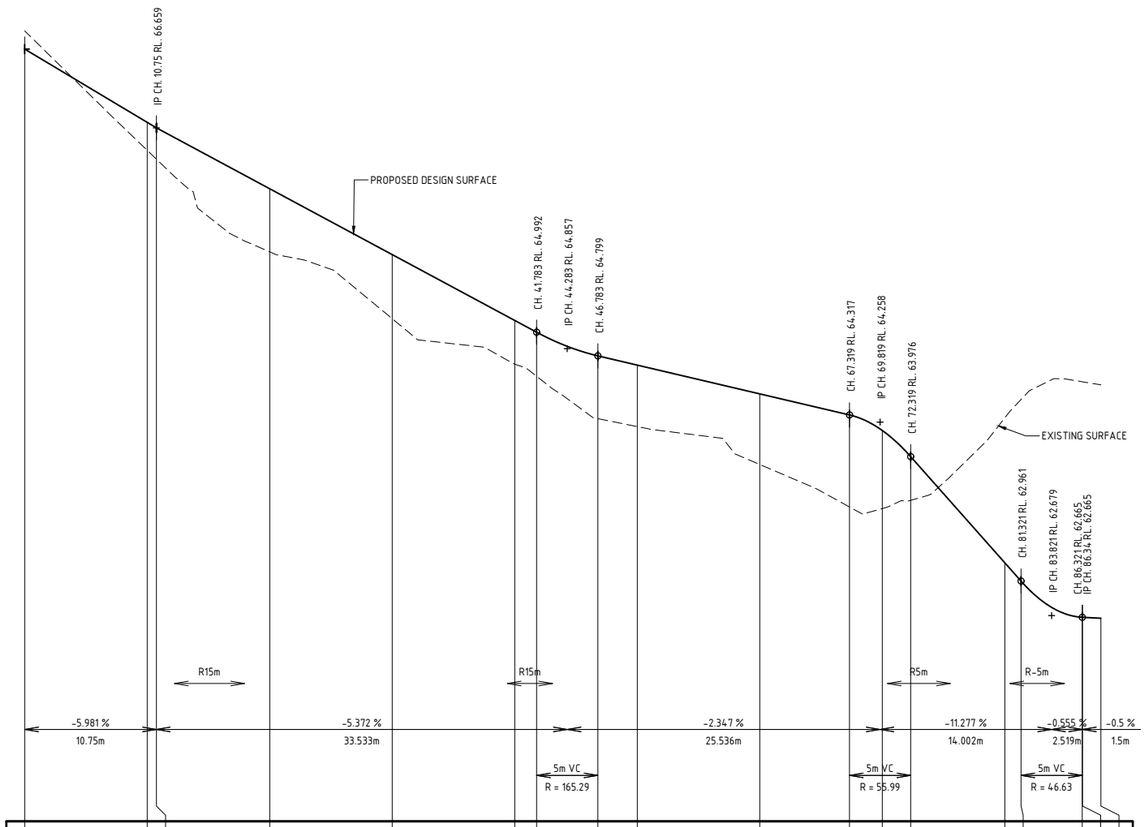

HORIZONTAL CURVE DATA

VERTICAL GEOMETRY GRADE (%)
VERTICAL GRADE LENGTH

VERTICAL CURVE LENGTH (m)
VERTICAL CURVE RADIUS (m)

DATUM R.L.61.000

NAT. SURFACE ON ROAD CENTRELINE	67.450		66.476	66.404	65.647	65.102	64.731	64.621	64.286	64.221	63.912	63.566	63.553	63.613	64.293	64.451	64.587	64.587	64.562
CUT / FILL DEPTHS			0.228	0.255	0.515	0.523	0.357	0.371	0.512	0.502	0.576	0.751	0.637	0.363	-1.183	-1.49	-1.922	-1.922	-1.904
DESIGN LEVELS ON ROAD CENTRELINE			66.704	66.659	66.162	65.625	65.087	64.992	64.799	64.723	64.488	64.317	64.190	63.976	63.310	62.961	62.665	62.665	62.658
CHAINAGE	0.000		10.000	10.750	20.000	30.000	40.000	41.783	46.783	50.000	60.000	67.319	70.000	72.319	80.000	81.321	86.321	86.340	87.840

SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

BIORETENTION BASIN ACCESS LOT102
LONGITUDINAL SECTION

HORIZONTAL SCALE - 1:250
VERTICAL SCALE - 1:25

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
A	APPROVAL ISSUE	02.10.20	CA
B	RFI RESPONSE	23.12.20	SG

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

MILANOVIC NEALE
CONSULTING ENGINEERS
CIVIL
STRUCTURAL
TRAFFIC
PROJECT MANAGEMENT
BRISBANE PH No. (07) 3255 1877
IPSWICH PH No. (07) 3281 6603
SYDNEY PH No. 1300 827 901
GOLD COAST PH No. 1300 827 901
CONTACT DETAILS
E mail@mnce.com.au
W www.mnce.com.au

CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 102 BIORETENTION ACCESS LONG SECTION

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD807
REV. B

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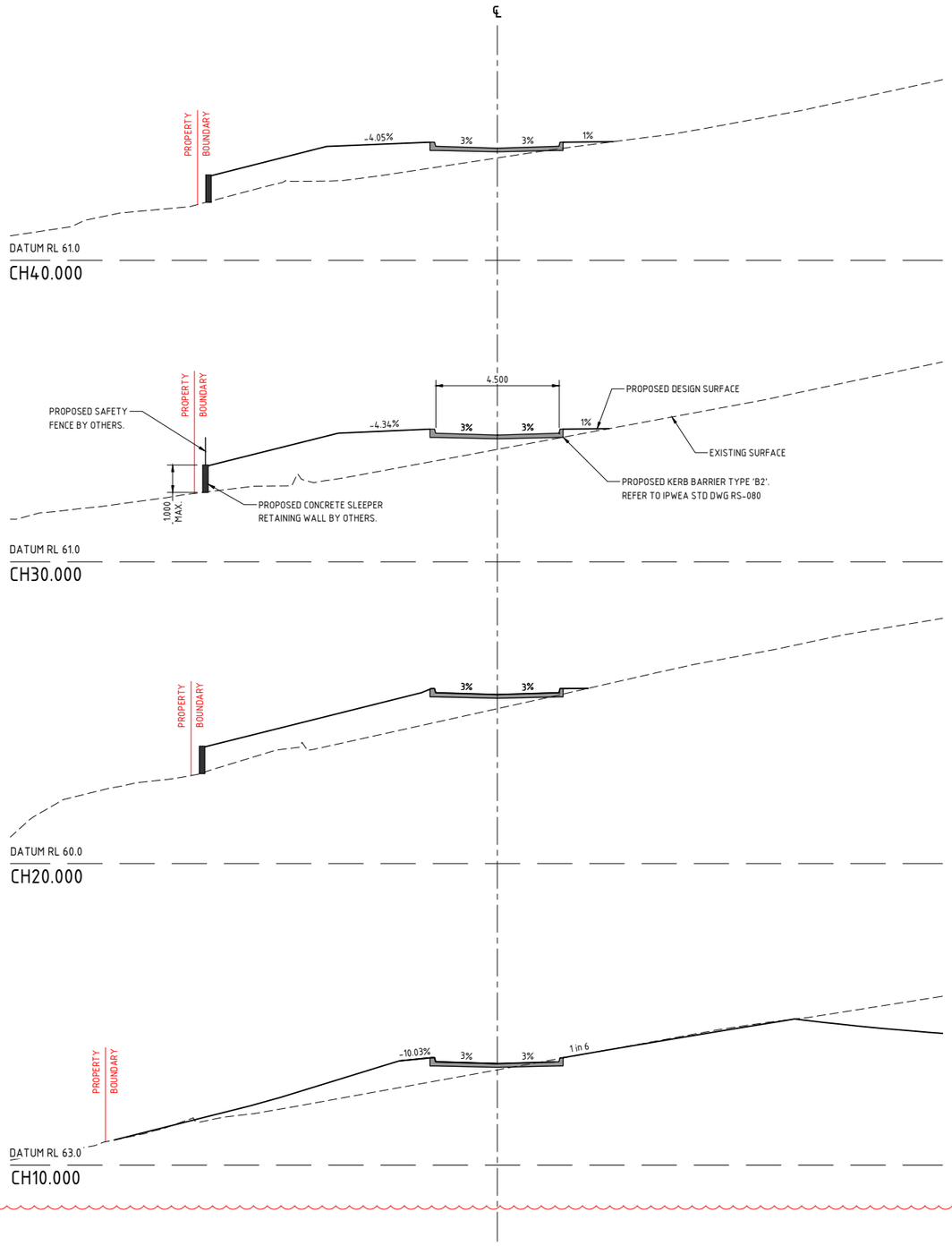

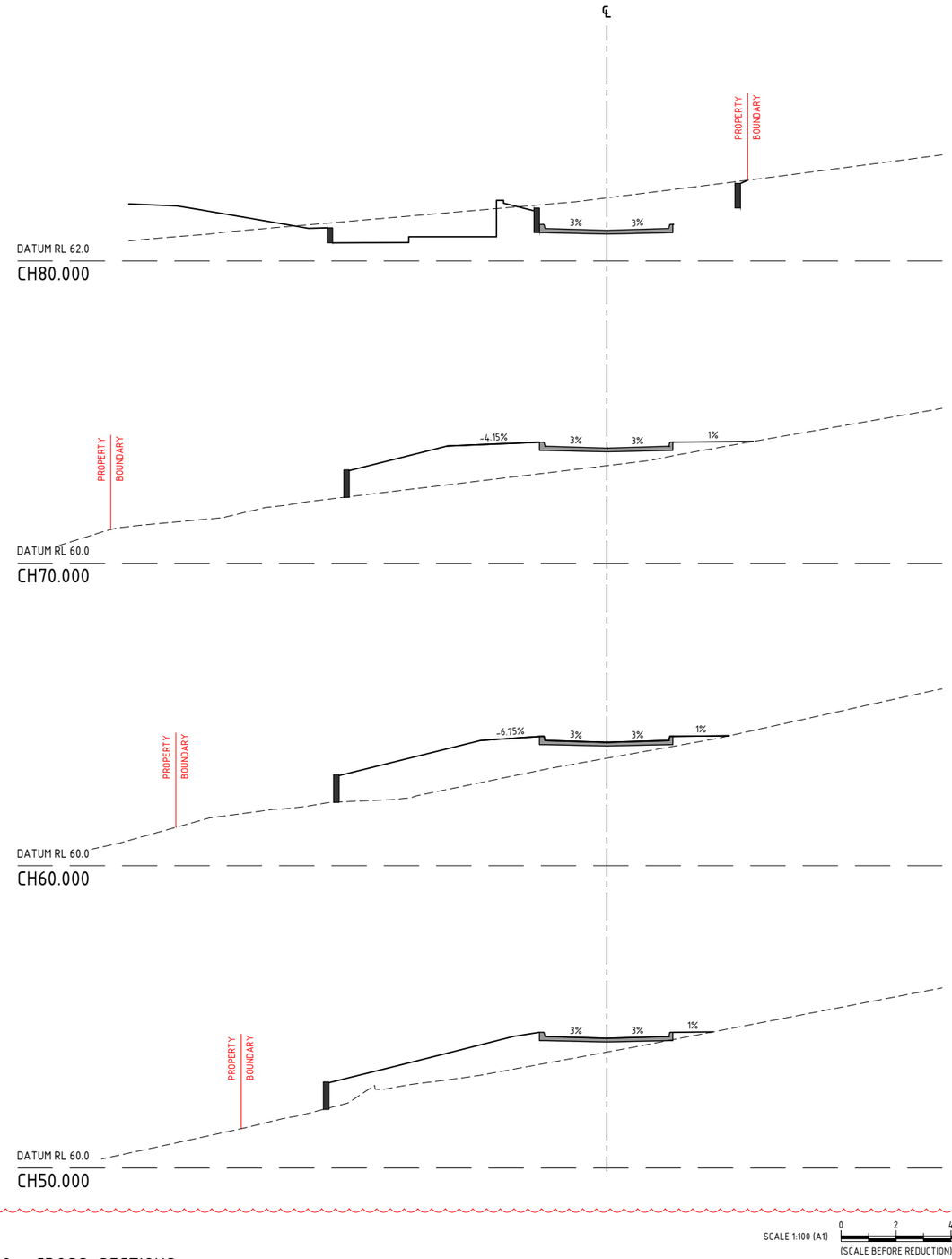

SCALE 1:100 (A1) 0 2 4 6m
(SCALE BEFORE REDUCTION)

ACCESS TRACK BIORETENTION 102 - CROSS SECTIONS

SCALE 1:100

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

DO NOT SCALE FROM DRAWING
ALL SCALES ARE AS SHOWN (A1)

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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: LOT 102 BIORETENTION ACCESS CROSS SECTION

DRAWN	DESIGNED	DATE
CA	CFR	AUG 2020
CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD808
REV. B

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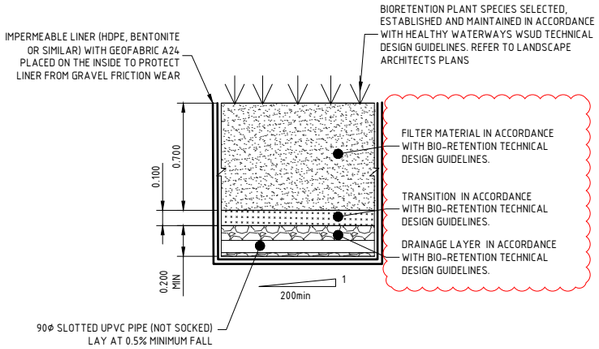
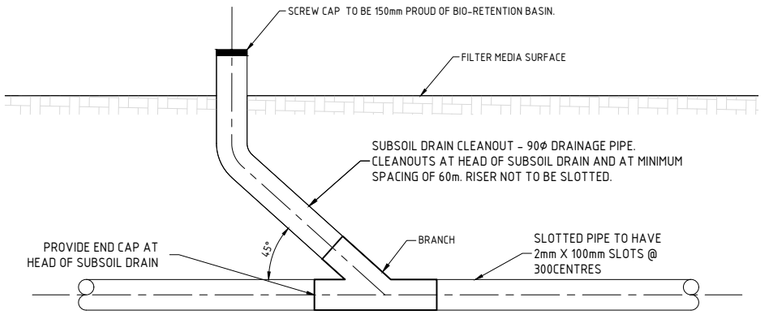


BIO-RETENTION BASIN FILTER MATERIAL DETAIL

SCALE 1:20

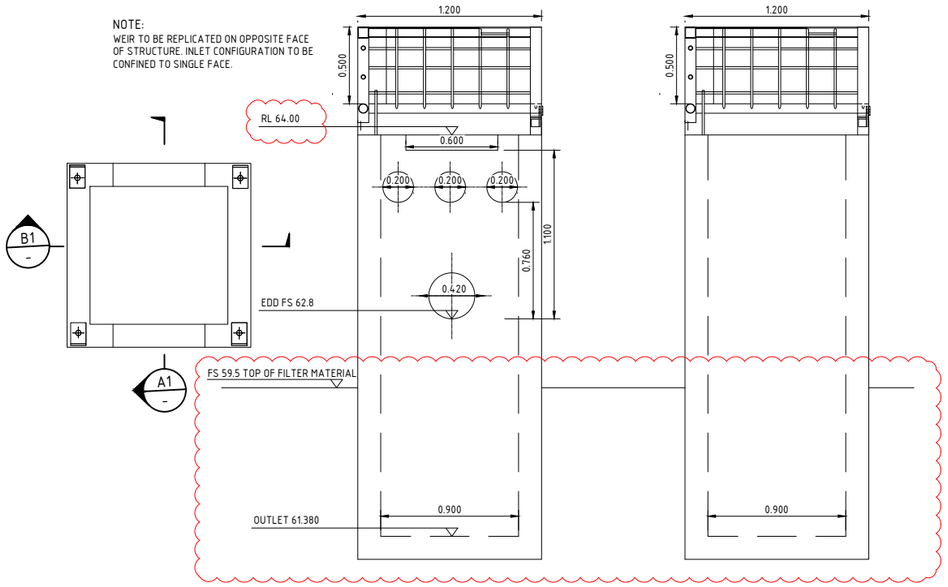


FILTER MATERIAL DRAIN CLEANOUT DETAIL

(SECTIONAL VIEW - NTS)

NOTES:
1. CLEANOUTS TO BE PROVIDED AT THE HEAD OF EACH SLOTTED PIPE WITHIN
2. SLOTTED PIPES TO SUBSOIL DRAINS TO BE MINIMUM 90mm DIAMETER:
   - uPVC PIPES AND FITTINGS FOR DRAIN, WAST AND VENT APPLICATIONS, JOINT TYPE, SOLVENT WELDED, MINIMUM SEWER CLASS SN8 MANUFACTURED IN ACCORDANCE WITH AS1260.

NOTE:
WEIR TO BE REPLICATED ON OPPOSITE FACE OF STRUCTURE. INLET CONFIGURATION TO BE CONFINED TO SINGLE FACE.



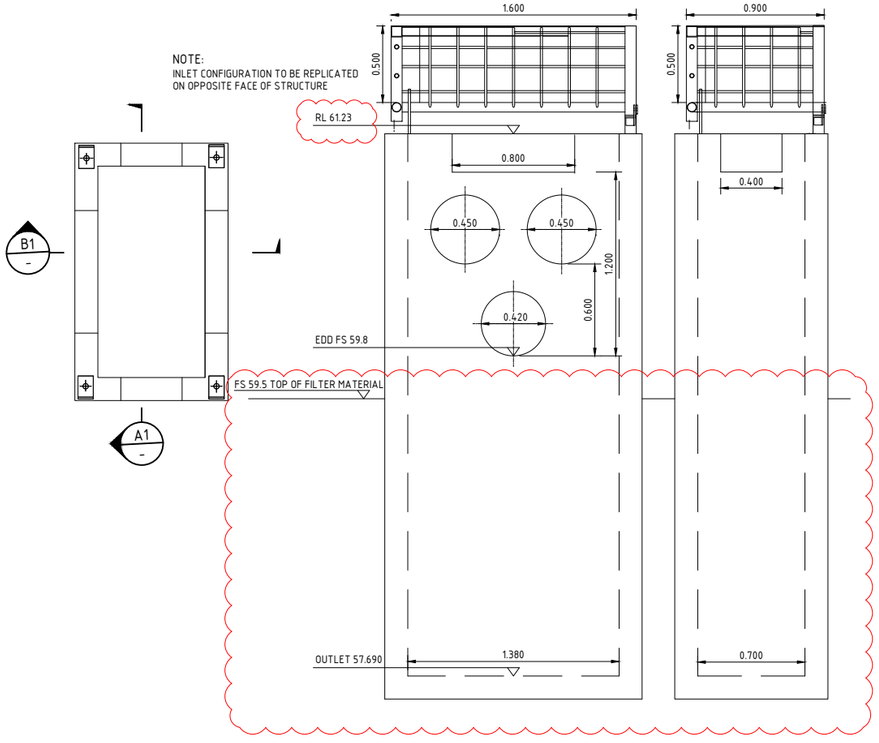
SECTION A1 - SECTION B1

SCALE 1:20

INLET STRUCTURE IN 1/14

SCALE 1:20

NOTE:
INLET CONFIGURATION TO BE REPLICATED ON OPPOSITE FACE OF STRUCTURE

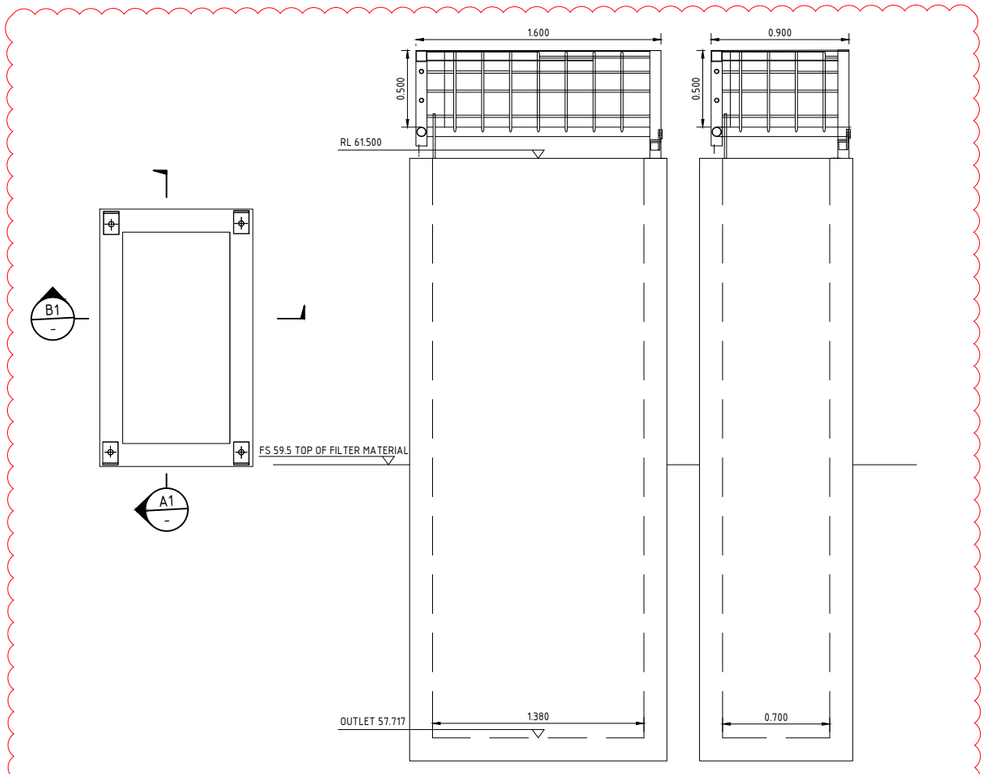


INLET STRUCTURE IN 1/8 & IN 1/12 DETAIL

SCALE 1:20

SECTION A1 - SECTION B1

SCALE 1:20



INLET STRUCTURE IN 1A/8 & IN 1A/12 DETAIL

SCALE 1:20

SECTION A1 - SECTION B1

SCALE 1:20

SCALE 1:20 (A1) 0 400 800 1200mm

(SCALE BEFORE REDUCTION)

REFER DWG. C3602-CA300 & CA301 FOR GENERAL NOTES.

REAL PROPERTY DESCRIPTION
LOT 2 ON SP273404

REV.	DESCRIPTION	DATE	INIT.
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CLIENT: PARKER PROPERTY NINGI PTY LTD

PROJECT: 41 GLENBROOK DRIVE, NAMBOUR

TITLE: DETENTION & BIORETENTION TYPICAL DETAILS

DRAWN	DESIGNED	DATE
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CHECKED	APPROVED	
JN		

DRAWING No. C3602 - CD809 REV. B

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APPENDIX B: EXISTING AND DEVELOPED SITE CATCHMENT PLANS

Catchment	Area (Ha)	Imp (%)	G(%)
E1	3.92	45	20
E2	0.15	45	8
E3	0.33	20	15
S1	5.05	0	15
S2	1.42	0	17
S3	2.12	0	17
S4	0.71	0	10

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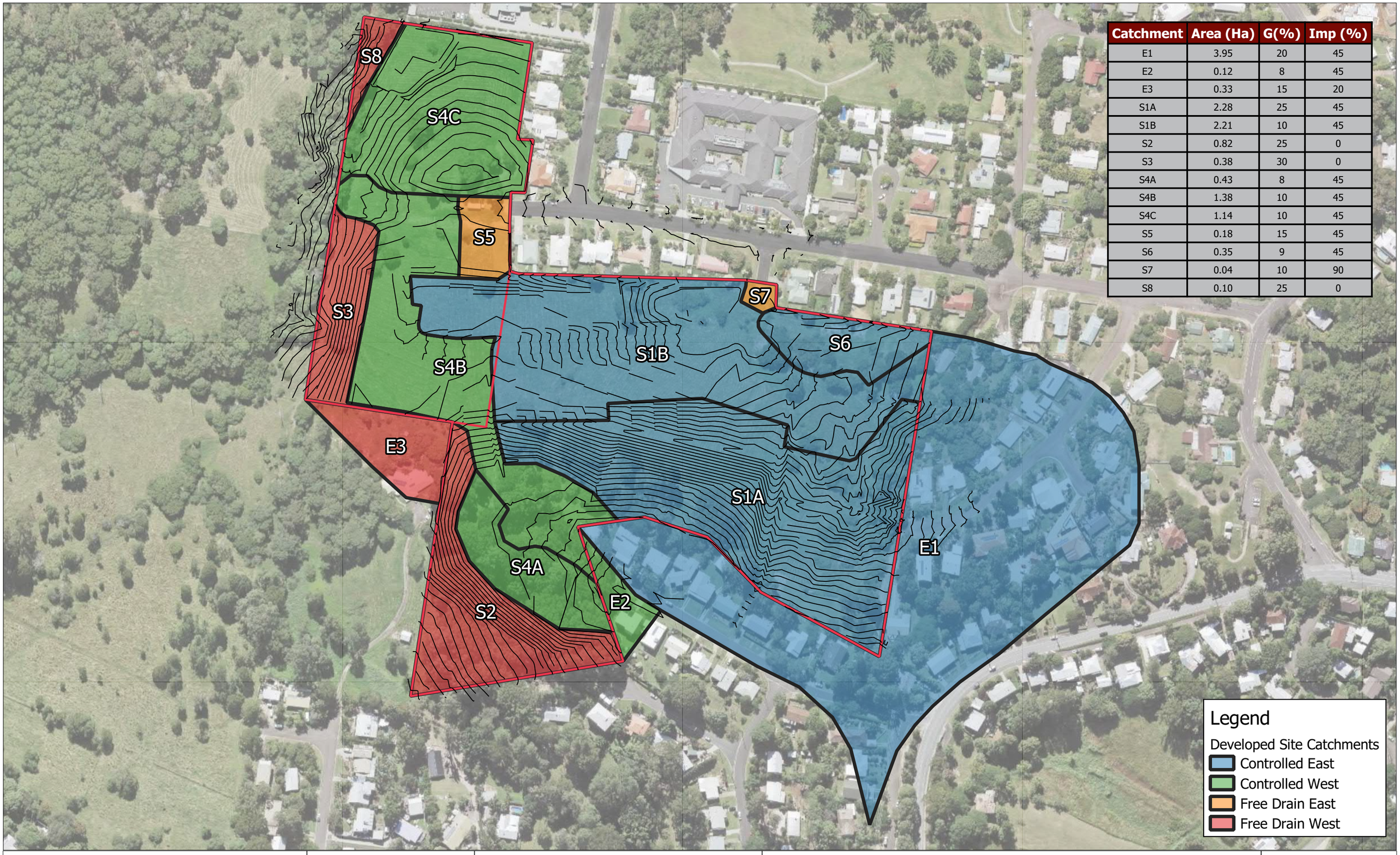
0 40 80 120 m

Scale in metres (1:2200 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 56

Figure 1 - Existing Catchment Plan

Job Number: C3602
Revision: A
Drawn: CFr
Date: 28 /11 /2019



Catchment	Area (Ha)	G(%)	Imp (%)
E1	3.95	20	45
E2	0.12	8	45
E3	0.33	15	20
S1A	2.28	25	45
S1B	2.21	10	45
S2	0.82	25	0
S3	0.38	30	0
S4A	0.43	8	45
S4B	1.38	10	45
S4C	1.14	10	45
S5	0.18	15	45
S6	0.35	9	45
S7	0.04	10	90
S8	0.10	25	0

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0 40 80 120 m

Scale in metres (1:2200 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 56

Figure 2 - Developed Catchment Plan

Job Number: C3602
Revision: A
Drawn: CFr
Date: 10 /12 /2019

APPENDIX C: Music Model Catchment Plan & Summary Report

Source nodes
Location,S1a (A=2.28ha),S1b (A=2.21ha),S6 (A=0.35ha),S4a (A=0.43ha),S4b (A=1.38ha),S4c (A=1.14ha),S2 (A=0.82ha),S5 (A=0.18ha),S3 (A=0.38ha),S7 (A=0.04ha),S8 (A=0.10ha)
ID,4,5,6,7,8,9,10,11,12,13,14
Node Type,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode
Zoning Surface Type,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed,Mixed
Total Area (ha),2.28,2.21,0.35,0.43,1.38,1.14,0.82,0.18,0.38,0.04,0.1
Area Impervious (ha),1.03688955223881,1.0050552238806,0.159171641791045,0.195553731343284,0.62759104477612,1.02540447761194,0,0.0807246268656716,0,0.0179388059701493,0
Area Pervious (ha),1.24311044776119,1.2049447761194,0.190828358208955,0.234446268656716,0.75240895522388,0.114595522388059,0.82,0.0992753731343284,0.38,0.0220611940298507,0.1
Field Capacity (mm),200,200,200,200,200,200,200,200,200,200,200
Pervious Area Infiltration Capacity coefficient - a,211,211,211,211,211,211,211,211,211,211,211
Pervious Area Infiltration Capacity exponent - b,5,5,5,5,5,5,5,5,5,5,5
Impervious Area Rainfall Threshold (mm/day),1,1,1,1,1,1,1,1,1,1,1
Pervious Area Soil Storage Capacity (mm),500,500,500,500,500,500,500,500,500,500,500
Pervious Area Soil Initial Storage (% of Capacity),10,10,10,10,10,10,10,10,10,10,10
Groundwater Initial Depth (mm),50,50,50,50,50,50,50,50,50,50,50
Groundwater Daily Recharge Rate (%),28,28,28,28,28,28,28,28,28,28,28
Groundwater Daily Baseflow Rate (%),27,27,27,27,27,27,27,27,27,27,27
Groundwater Daily Deep Seepage Rate (%),0,0,0,0,0,0,0,0,0,0,0
Stormflow Total Suspended Solids Mean (log mg/L),2.18,2.18,2.18,2.18,2.18,2.18,2.18,2.18,2.18,2.18,2.18
Stormflow Total Suspended Solids Standard Deviation (log mg/L),0.39,0.39,0.39,0.39,0.39,0.39,0.39,0.39,0.39,0.39,0.39
Stormflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Suspended Solids Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Stormflow Total Phosphorus Mean (log mg/L),-0.47,-0.47,-0.47,-0.47,-0.47,-0.47,-0.47,-0.47,-0.47,-0.47,-0.47
Stormflow Total Phosphorus Standard Deviation (log mg/L),0.32,0.32,0.32,0.32,0.32,0.32,0.32,0.32,0.32,0.32,0.32
Stormflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Phosphorus Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Stormflow Total Nitrogen Mean (log mg/L),0.26,0.26,0.26,0.26,0.26,0.26,0.26,0.26,0.26,0.26,0.26
Stormflow Total Nitrogen Standard Deviation (log mg/L),0.23,0.23,0.23,0.23,0.23,0.23,0.23,0.23,0.23,0.23,0.23
Stormflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Nitrogen Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Baseflow Total Suspended Solids Mean (log mg/L),1,1,1,1,1,1,1,1,1,1,1
Baseflow Total Suspended Solids Standard Deviation (log mg/L),0.34,0.34,0.34,0.34,0.34,0.34,0.34,0.34,0.34,0.34,0.34
Baseflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Suspended Solids Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Baseflow Total Phosphorus Mean (log mg/L),-0.97,-0.97,-0.97,-0.97,-0.97,-0.97,-0.97,-0.97,-0.97,-0.97,-0.97
Baseflow Total Phosphorus Standard Deviation (log mg/L),0.31,0.31,0.31,0.31,0.31,0.31,0.31,0.31,0.31,0.31,0.31
Baseflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Phosphorus Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Baseflow Total Nitrogen Mean (log mg/L),0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2
Baseflow Total Nitrogen Standard Deviation (log mg/L),0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2
Baseflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Nitrogen Serial Correlation,0,0,0,0,0,0,0,0,0,0,0
Flow based constituent generation - enabled,Off,Off,Off,Off,Off,Off,Off,Off,Off,Off,Off
Flow based constituent generation - flow file, , , , , , , , , , ,
Flow based constituent generation - base flow column, , , , , , , , , , ,
Flow based constituent generation - pervious flow column, , , , , , , , , , ,
Flow based constituent generation - impervious flow column, , , , , , , , , , ,
Flow based constituent generation - unit, , , , , , , , , , ,
OUT - Mean Annual Flow (ML/yr),20.6,20.0,3.17,3.89,12.5,14.8,4.18,1.63,1.94,0.362,0.510
OUT - TSS Mean Annual Load (kg/yr),4.20E3,4.05E3,637,767,2.53E3,3.33E3,622,334,278,73.9,74.2
OUT - TP Mean Annual Load (kg/yr),8.37,8.31,1.28,1.58,5.08,6.49,1.37,0.666,0.637,0.147,0.172
OUT - TN Mean Annual Load (kg/yr),42.0,41.2,6.51,8.08,25.8,31.2,8.11,3.34,3.89,0.744,0.987
OUT - Gross Pollutant Mean Annual Load (kg/yr),470,456,72.2,88.7,285,343,0.00,37.1,0.00,8.25,0.00

Rain In (ML/yr),34.5186,33.4589,5.29892,6.51009,20.8928,17.2593,12.4146,2.72515,5.7531,0.60559,1.51397
ET Loss (ML/yr),13.8546,13.4292,2.12679,2.61292,8.38564,2.42442,8.22165,1.09378,3.81004,0.243062,1.00264
Deep Seepage Loss (ML/yr),0,0,0,0,0,0,0,0,0,0,0
Baseflow Out (ML/yr),2.42207,2.34771,0.371809,0.456794,1.46599,0.220188,1.58381,0.191216,0.73396,0.0424924,0.193148
Imp. Stormflow Out (ML/yr),14.252,13.8144,2.1878,2.68787,8.62618,14.252,0,1.12516,0,0.250035,0
Perv. Stormflow Out (ML/yr),3.97331,3.85133,0.609939,0.749353,2.4049,0.36121,2.59818,0.313683,1.20403,0.0697073,0.316851
Total Stormflow Out (ML/yr),18.2253,17.6657,2.79774,3.43722,11.0311,14.6132,2.59818,1.43884,1.20403,0.319742,0.316851
Total Outflow (ML/yr),20.6474,20.0134,3.16955,3.89402,12.4971,14.8334,4.18199,1.63005,1.93799,0.362234,0.509999
Change in Soil Storage
(ML/yr),0.0167376,0.0162237,0.0025694,0.0031567,0.0101306,0.0015216,0.0109448,0.0013214,0.005072,0.0002936,0.0013347
TSS Baseflow Out (kg/yr),32.8121,31.9115,5.03147,6.19308,19.912,2.99073,21.4914,2.59133,9.96618,0.576222,2.61345
TSS Total Stormflow Out (kg/yr),4170.16,4015.1,632.464,760.694,2514.75,3325.76,600.666,331.007,267.615,73.3091,71.5915
TSS Total Outflow (kg/yr),4202.97,4047.02,637.495,766.887,2534.66,3328.75,622.157,333.598,277.582,73.8853,74.2049
TP Baseflow Out (kg/yr),0.333085,0.32425,0.0509966,0.0626947,0.202526,0.030419,0.219031,0.0263736,0.101378,0.005856,0.0266975
TP Total Stormflow Out (kg/yr),8.04008,7.98941,1.23251,1.51523,4.88144,6.45481,1.14724,0.639944,0.535945,0.141153,0.145488
TP Total Outflow (kg/yr),8.37316,8.31366,1.28351,1.57792,5.08396,6.48522,1.36627,0.666318,0.637323,0.147009,0.172185
TN Baseflow Out (kg/yr),4.2613,4.13529,0.654856,0.804267,2.58182,0.387783,2.78867,0.337625,1.29575,0.0748606,0.340838
TN Total Stormflow Out (kg/yr),37.7369,37.1116,5.8577,7.27789,23.2591,30.7685,5.3263,3.00403,2.59456,0.669529,0.64604
TN Total Outflow (kg/yr),41.9982,41.2469,6.51256,8.08216,25.8409,31.1563,8.11497,3.34165,3.89031,0.74439,0.986878
GP Total Outflow (kg/yr),486.449,471.514,74.6742,91.7425,294.43,344.925,0,38.4038,0,8.53418,0

No Imported Data Source nodes

USTM treatment nodes
Location,Bioretention (520m2),Bioretention (620m2)
ID,1,3
Node Type,BioRetentionNodeV4,BioRetentionNodeV4
Lo-flow bypass rate (cum/sec),0,0
Hi-flow bypass rate (cum/sec),100,100
Inlet pond volume, ,
Area (sqm),520,620
Initial Volume (m^3), ,
Extended detention depth (m),0.3,0.3
Number of Rainwater tanks, ,
Permanent Pool Volume (cubic metres), ,
Proportion vegetated, ,
Equivalent Pipe Diameter (mm), ,
Overflow weir width (m),80,90
Notional Detention Time (hrs), ,
Orifice Discharge Coefficient, ,
Weir Coefficient,1.7,1.7
Number of CSTR Cells,3,3
Total Suspended Solids - k (m/yr),8000,8000
Total Suspended Solids - C* (mg/L),20,20
Total Suspended Solids - C** (mg/L), ,
Total Phosphorus - k (m/yr),6000,6000
Total Phosphorus - C* (mg/L),0.13,0.13
Total Phosphorus - C** (mg/L), ,
Total Nitrogen - k (m/yr),500,500
Total Nitrogen - C* (mg/L),1.4,1.4
Total Nitrogen - C** (mg/L), ,
Threshold Hydraulic Loading for C** (m/yr), ,
Horizontal Flow Coefficient,3,3
Reuse Enabled,Off,Off
Max drawdown height (m), ,
Annual Demand Enabled,Off,Off
Annual Demand Value (ML/year), ,
Annual Demand Distribution, ,
Annual Demand Monthly Distribution: Jan, ,
Annual Demand Monthly Distribution: Feb, ,
Annual Demand Monthly Distribution: Mar, ,
Annual Demand Monthly Distribution: Apr, ,
Annual Demand Monthly Distribution: May, ,
Annual Demand Monthly Distribution: Jun, ,
Annual Demand Monthly Distribution: Jul, ,
Annual Demand Monthly Distribution: Aug, ,

Annual Demand Monthly Distribution: Sep, ,
Annual Demand Monthly Distribution: Oct, ,
Annual Demand Monthly Distribution: Nov, ,
Annual Demand Monthly Distribution: Dec, ,
Daily Demand Enabled,Off,Off
Daily Demand Value (ML/day), ,
Custom Demand Enabled,Off,Off
Custom Demand Time Series File, ,
Custom Demand Time Series Units, ,
Filter area (sqm),520,620
Filter perimeter (m),0.01,0.01
Filter depth (m),0.6,0.6
Filter Median Particle Diameter (mm), ,
Saturated Hydraulic Conductivity (mm/hr),200,200
Infiltration Media Porosity,0.35,0.35
Length (m), ,
Bed slope, ,
Base Width (m), ,
Top width (m), ,
Vegetation height (m), ,
Vegetation Type,Vegetated with Effective Nutrient Removal Plants,Vegetated with Effective Nutrient Removal Plants
Total Nitrogen Content in Filter (mg/kg),400,400
Orthophosphate Content in Filter (mg/kg),30,30
Is Base Lined?,No,No
Is Underdrain Present?,Yes,Yes
Is Submerged Zone Present?,No,No
Submerged Zone Depth (m), ,
B for Media Soil Texture,13,13
Proportion of upstream impervious area treated, ,
Exfiltration Rate (mm/hr),0,0
Evaporative Loss as % of PET,100,100
Depth in metres below the drain pipe, ,
TSS A Coefficient, ,
TSS B Coefficient, ,
TP A Coefficient, ,
TP B Coefficient, ,
TN A Coefficient, ,
TN B Coefficient, ,
Sfc,0.61,0.61
S*,0.37,0.37
Sw,0.11,0.11
Sh,0.05,0.05
Emax (m/day),0.008,0.008
Ew (m/day),0.001,0.001
IN - Mean Annual Flow (ML/yr),43.8,31.2
IN - TSS Mean Annual Load (kg/yr),8.89E3,6.63E3
IN - TP Mean Annual Load (kg/yr),18.0,13.1
IN - TN Mean Annual Load (kg/yr),89.8,65.1
IN - Gross Pollutant Mean Annual Load (kg/yr),999,717
OUT - Mean Annual Flow (ML/yr),42.3,29.4
OUT - TSS Mean Annual Load (kg/yr),1.51E3,550
OUT - TP Mean Annual Load (kg/yr),4.22,1.87
OUT - TN Mean Annual Load (kg/yr),41.8,24.8
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00
Flow In (ML/yr),43.8127,31.2109
ET Loss (ML/yr),1.54862,1.82233
Infiltration Loss (ML/yr),0,0
Low Flow Bypass Out (ML/yr),0,0
High Flow Bypass Out (ML/yr),0,0
Orifice / Filter Out (ML/yr),31.0642,24.8658
Weir Out (ML/yr),11.1796,4.50707
Transfer Function Out (ML/yr),0,0
Reuse Supplied (ML/yr),0,0
Reuse Requested (ML/yr),0,0
% Reuse Demand Met,0,0
% Load Reduction,3.5809,5.88909

TSS Flow In (kg/yr),8882.49,6626.83
TSS ET Loss (kg/yr),0,0
TSS Infiltration Loss (kg/yr),0,0
TSS Low Flow Bypass Out (kg/yr),0,0
TSS High Flow Bypass Out (kg/yr),0,0
TSS Orifice / Filter Out (kg/yr),71.2333,60.2466
TSS Weir Out (kg/yr),1443.18,489.811
TSS Transfer Function Out (kg/yr),0,0
TSS Reuse Supplied (kg/yr),0,0
TSS Reuse Requested (kg/yr),0,0
TSS % Reuse Demand Met,0,0
TSS % Load Reduction,82.9506,91.6995
TP Flow In (kg/yr),17.963,13.142
TP ET Loss (kg/yr),0,0
TP Infiltration Loss (kg/yr),0,0
TP Low Flow Bypass Out (kg/yr),0,0
TP High Flow Bypass Out (kg/yr),0,0
TP Orifice / Filter Out (kg/yr),0.68621,0.560404
TP Weir Out (kg/yr),3.53634,1.31037
TP Transfer Function Out (kg/yr),0,0
TP Reuse Supplied (kg/yr),0,0
TP Reuse Requested (kg/yr),0,0
TP % Reuse Demand Met,0,0
TP % Load Reduction,76.4931,85.765
TN Flow In (kg/yr),89.727,65.0537
TN ET Loss (kg/yr),0,0
TN Infiltration Loss (kg/yr),0,0
TN Low Flow Bypass Out (kg/yr),0,0
TN High Flow Bypass Out (kg/yr),0,0
TN Orifice / Filter Out (kg/yr),19.2501,15.5436
TN Weir Out (kg/yr),22.5526,9.19118
TN Transfer Function Out (kg/yr),0,0
TN Reuse Supplied (kg/yr),0,0
TN Reuse Requested (kg/yr),0,0
TN % Reuse Demand Met,0,0
TN % Load Reduction,53.4113,61.978
GP Flow In (kg/yr),998.629,716.592
GP ET Loss (kg/yr),0,0
GP Infiltration Loss (kg/yr),0,0
GP Low Flow Bypass Out (kg/yr),0,0
GP High Flow Bypass Out (kg/yr),0,0
GP Orifice / Filter Out (kg/yr),0,0
GP Weir Out (kg/yr),0,0
GP Transfer Function Out (kg/yr),0,0
GP Reuse Supplied (kg/yr),0,0
GP Reuse Requested (kg/yr),0,0
GP % Reuse Demand Met,0,0
GP % Load Reduction,100,100
PET Scaling Factor,2.1,2.1

No Generic treatment nodes

Other nodes
Location,Receiving Node
ID,2
Node Type,ReceivingNode
IN - Mean Annual Flow (ML/yr),80.3
IN - TSS Mean Annual Load (kg/yr),3.45E3
IN - TP Mean Annual Load (kg/yr),9.08
IN - TN Mean Annual Load (kg/yr),83.7
IN - Gross Pollutant Mean Annual Load (kg/yr),45.4
OUT - Mean Annual Flow (ML/yr),80.3
OUT - TSS Mean Annual Load (kg/yr),3.45E3
OUT - TP Mean Annual Load (kg/yr),9.08
OUT - TN Mean Annual Load (kg/yr),83.7
OUT - Gross Pollutant Mean Annual Load (kg/yr),45.4

% Load Reduction,4.05
TSS % Load Reduction,79.6
TN % Load Reduction,51.3
TP % Load Reduction,73.4
GP % Load Reduction,97.4

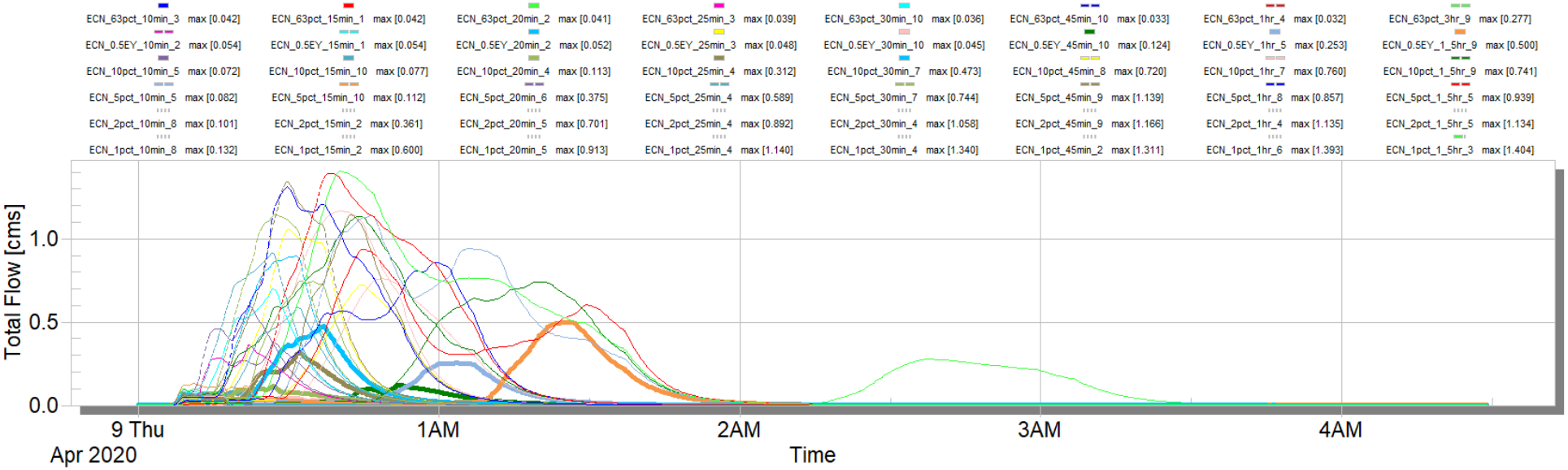
Links
Location,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link
Source node ID,9,8,7,10,3,1,6,4,5,11,12,13,14
Target node ID,3,3,3,2,2,2,1,1,1,2,2,2,2
Muskingum-Cunge Routing,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed
Muskingum K, , , , , , , , , , , , ,
Muskingum theta, , , , , , , , , , , , ,
IN - Mean Annual Flow (ML/yr),14.8,12.5,3.89,4.18,29.4,42.3,3.17,20.6,20.0,1.63,1.94,0.362,0.510
IN - TSS Mean Annual Load (kg/yr),3.33E3,2.53E3,767,622,550,1.51E3,637,4.20E3,4.05E3,334,278,73.9,74.2
IN - TP Mean Annual Load (kg/yr),6.49,5.08,1.58,1.37,1.87,4.22,1.28,8.37,8.31,0.666,0.637,0.147,0.172
IN - TN Mean Annual Load (kg/yr),31.2,25.8,8.08,8.11,24.8,41.8,6.51,42.0,41.2,3.34,3.89,0.744,0.987
IN - Gross Pollutant Mean Annual Load (kg/yr),343,285,88.7,0.00,0.00,0.00,72.2,470,456,37.1,0.00,8.25,0.00
OUT - Mean Annual Flow (ML/yr),14.8,12.5,3.89,4.18,29.4,42.3,3.17,20.6,20.0,1.63,1.94,0.362,0.510
OUT - TSS Mean Annual Load (kg/yr),3.33E3,2.53E3,767,622,550,1.51E3,637,4.20E3,4.05E3,334,278,73.9,74.2
OUT - TP Mean Annual Load (kg/yr),6.49,5.08,1.58,1.37,1.87,4.22,1.28,8.37,8.31,0.666,0.637,0.147,0.172
OUT - TN Mean Annual Load (kg/yr),31.2,25.8,8.08,8.11,24.8,41.8,6.51,42.0,41.2,3.34,3.89,0.744,0.987
OUT - Gross Pollutant Mean Annual Load (kg/yr),343,285,88.7,0.00,0.00,0.00,72.2,470,456,37.1,0.00,8.25,0.00

Catchment Details
Catchment Name,C3602-191112-CALCS-MUSIC-REVF
Timestep,6 Minutes
Start Date,1/01/1989
End Date,31/12/1998 11:54:00 PM
Rainfall Station, 40282 NAMBOUR
ET Station,User-defined monthly PET
Mean Annual Rainfall (mm), 1520
Mean Annual ET (mm), 1677

APPENDIX D: XP-RAFTS Hydrographs and Stage Storage Relationship

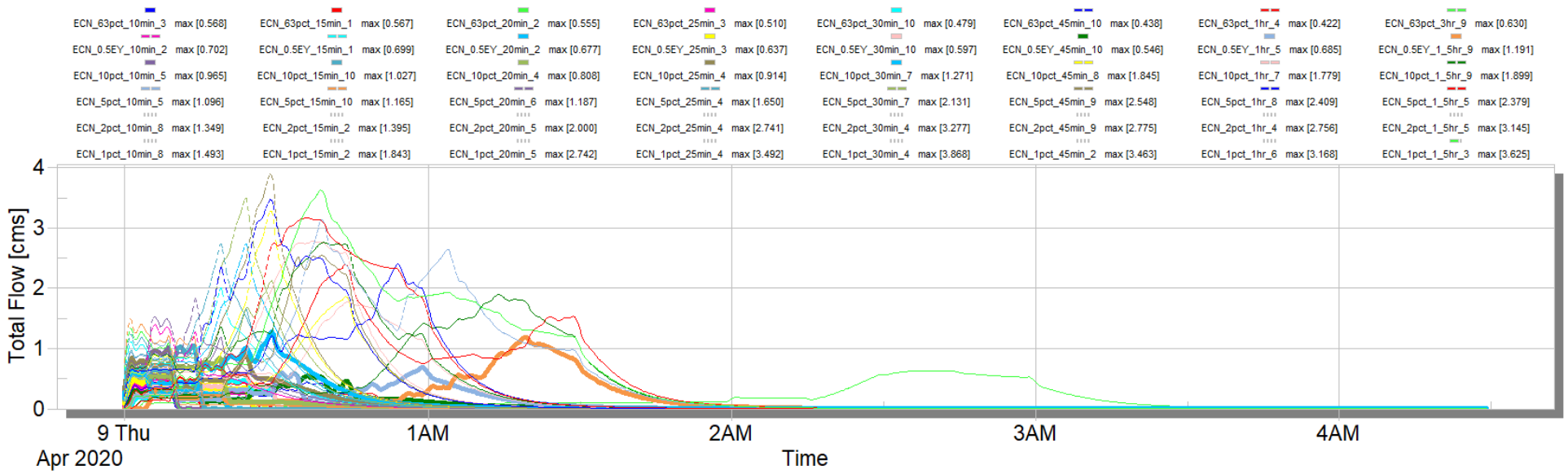
Ex West [ALL STORMS]

Total Flow



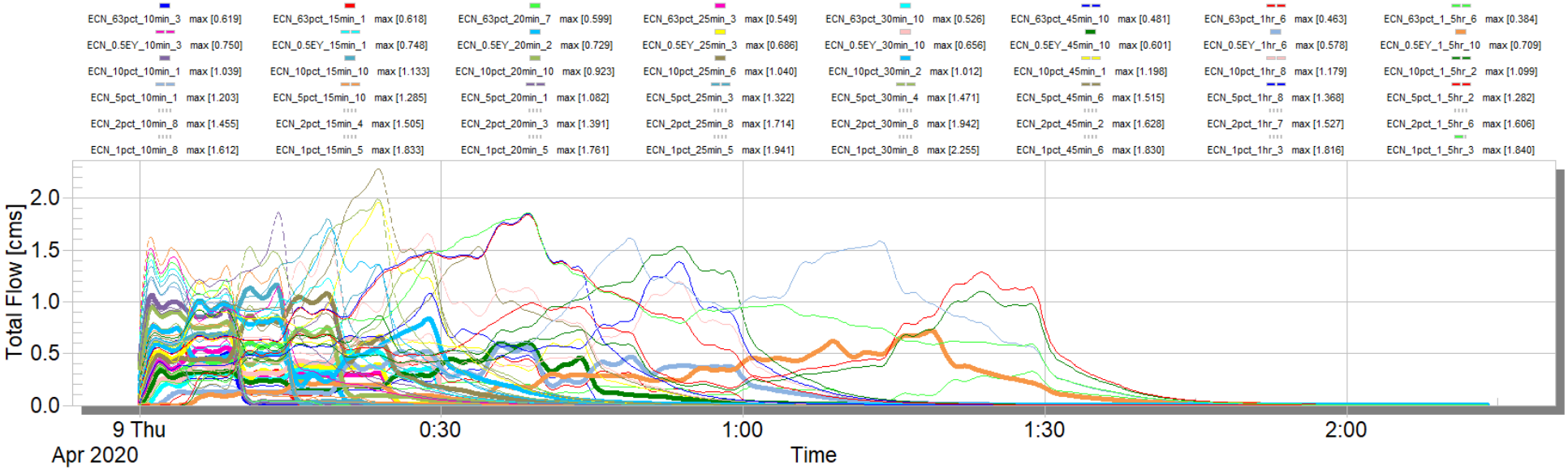
Ex East [ALL STORMS]

Total Flow



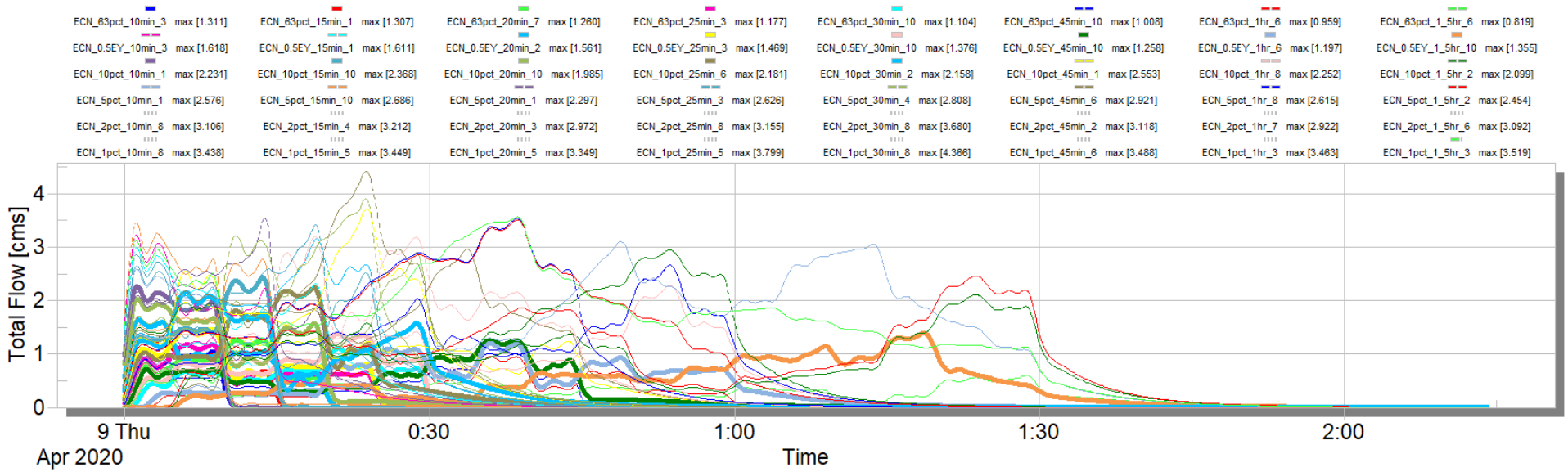
Dev West [ALL STORMS]

Total Flow



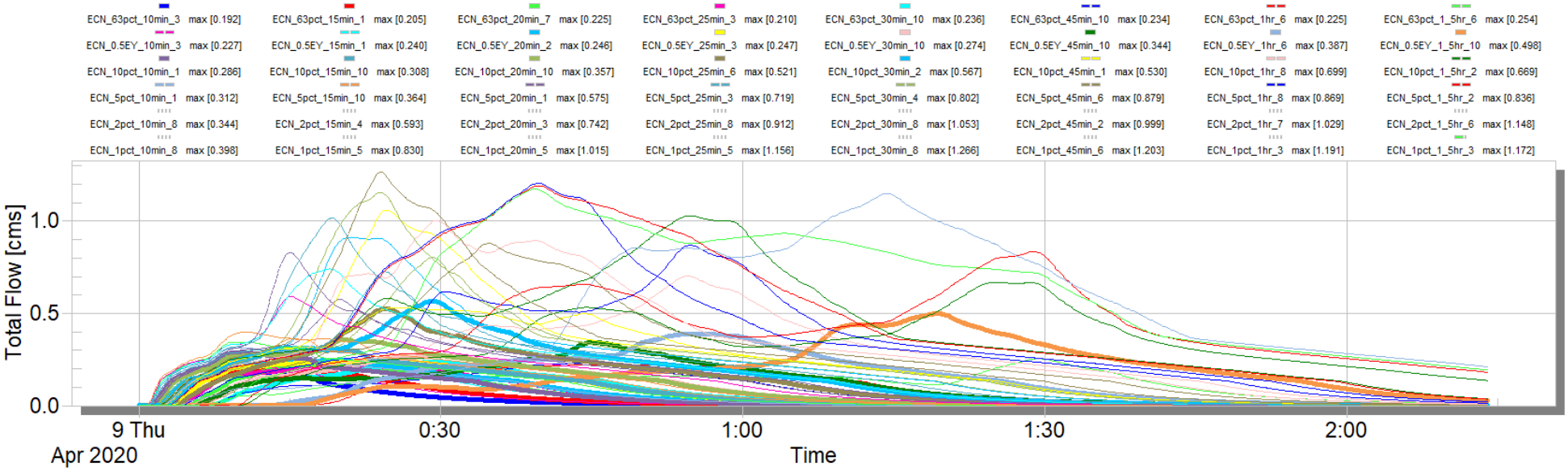
Dev East [ALL STORMS]

Total Flow



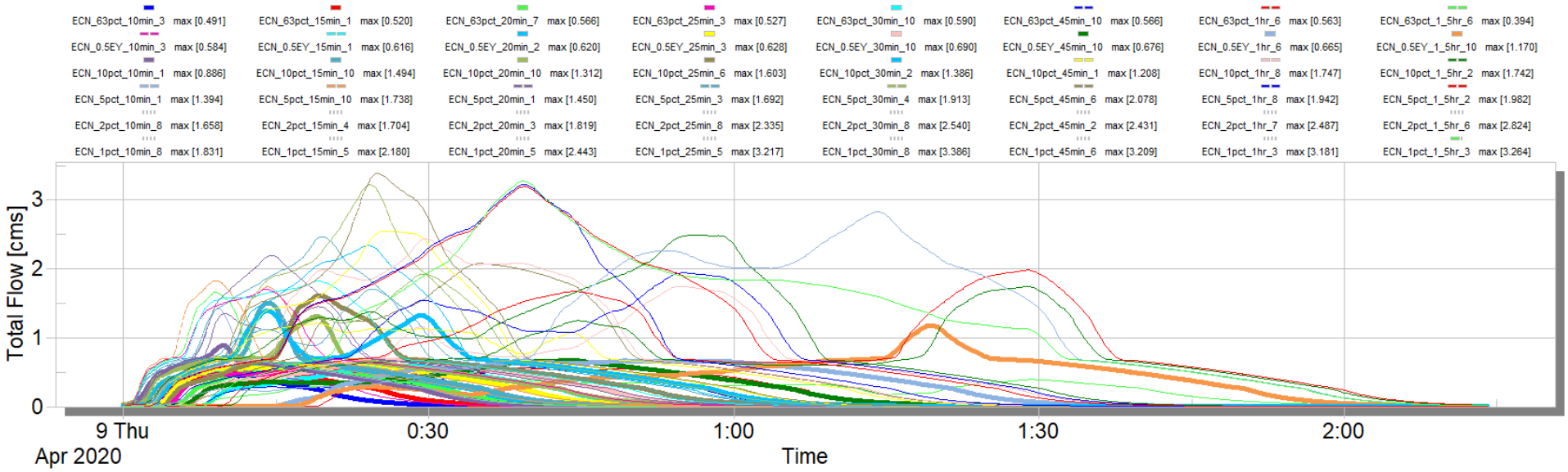
Mit West [ALL STORMS]

Total Flow



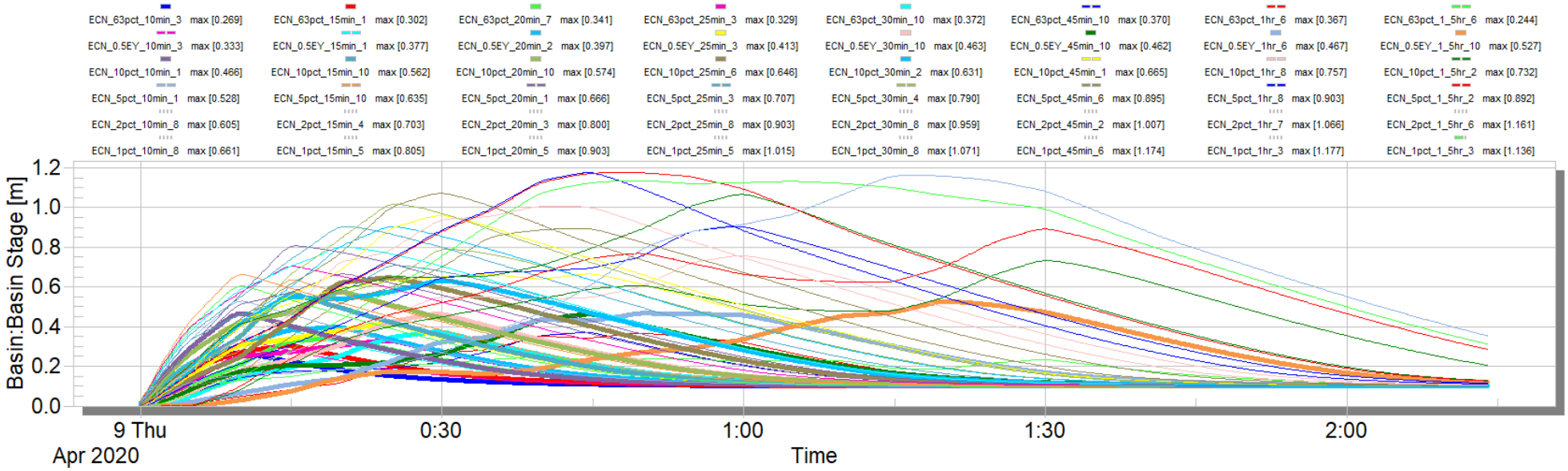
Mit East [ALL STORMS]

Total Flow



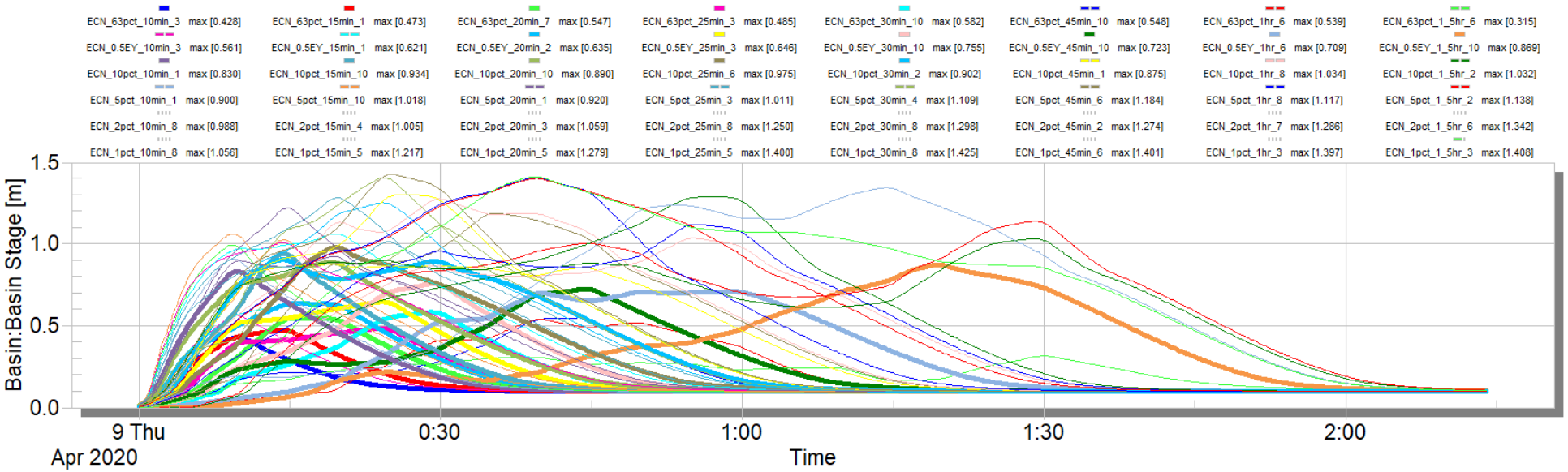
West Basin [ALL STORMS]

Basin:Basin Stage



East Basin [ALL STORMS]

Basin:Basin Stage



Detention Tank Design

Orifice Details

Low Flow		Mid Flow				High Flow Conditions	Weir		Number	1
Size (m)	0.3	Size (m)	0.2	Number	3	Length (m)	1.2		Height (m)	1.1
Number	2	Height (m)	0.76							

Basin Level (m)	S.A. (m^2)	Ave S.A. (m^2)	Thickness (m)	Volume (m^3)	Cumulative Volume (m^3)
0.000		0.000	0.000	0.000	0.000
0.100		0.000	0.100	86.000	86.000
0.200		0.000	0.100	90.300	176.300
0.300		0.000	0.100	94.700	271.000
0.400		0.000	0.100	99.200	370.200
0.500		0.000	0.100	103.800	474.000
0.600		0.000	0.100	108.500	582.500
0.700		0.000	0.100	113.300	695.800
0.800		0.000	0.100	118.300	814.100
0.900		0.000	0.100	123.300	937.400
1.000		0.000	0.100	128.400	1065.800
1.100		0.000	0.100	133.700	1199.500
1.200		0.000	0.100	139.000	1338.500

Low Flow Details

Basin Level (m)	Head (m)	$Q_{Orifice}$ (m^3/s)
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.100	0.133
0.300	0.200	0.188
0.400	0.300	0.230
0.500	0.400	0.265
0.600	0.500	0.297
0.700	0.600	0.325
0.800	0.700	0.351
0.900	0.800	0.375
1.000	0.900	0.398
1.100	1.000	0.420
1.200	1.100	0.440

Mid Flow Details

Basin Level (m)	Head (m)	$Q_{Orifice}$ (m^3/s)
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.000	0.000
0.300	0.000	0.000
0.400	0.000	0.000
0.500	0.000	0.000
0.600	0.000	0.000
0.700	0.000	0.000
0.800	0.000	0.000
0.900	0.100	0.088
1.000	0.200	0.125
1.100	0.300	0.153
1.200	0.400	0.177

High Flow Details

Basin Level (m)	Head (m)	**Qweir** (m^3/s)
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.000	0.000
0.300	0.000	0.000
0.400	0.000	0.000
0.500	0.000	0.000
0.600	0.000	0.000
0.700	0.000	0.000
0.800	0.000	0.000
0.900	0.000	0.000
1.000	0.000	0.000
1.100	0.000	0.000
1.200	0.100	0.063

Stage Storage Discharge Table

Basin Level (m)	Volume (m^3)	Outflow (m^3)
0.000	0.000	0.000
0.100	86.000	0.000
0.200	176.300	0.133
0.300	271.000	0.188
0.400	370.200	0.230
0.500	474.000	0.265
0.600	582.500	0.297
0.700	695.800	0.325
0.800	814.100	0.351
0.900	937.400	0.464
1.000	1065.800	0.523
1.100	1199.500	0.573
1.200	1338.500	0.680

Detention Tank Design

Orifice Details

Low Flow		Mid Flow				High Flow Conditions	Weir		Number	1
Size (m)	0.42	Size (m)	0.45	Number	4	Length (m)	4.8		Height (m)	1.2
Number	2	Height (m)	0.6							

Basin Level (m)	S.A. (m^2)	Ave S.A. (m^2)	Thickness (m)	Volume (m^3)	Cumulative Volume (m^3)
0.000	0.000	0.000	0.000	0.000	0.000
0.100	858.662	429.331	0.100	199.330	199.330
0.200	971.570	915.116	0.100	76.673	276.003
0.300	1006.395	988.983	0.100	79.670	355.673
0.400	1040.076	1023.236	0.100	82.586	438.259
0.500	1074.430	1057.253	0.100	85.808	524.067
0.600	1105.848	1090.139	0.100	89.402	613.469
0.700	1136.137	1120.993	0.100	92.995	706.464
0.800	1165.346	1150.742	0.100	96.543	803.007
0.900	1193.629	1179.488	0.100	100.210	903.217
1.000	1221.006	1207.318	0.100	104.067	1007.284
1.100	1247.460	1234.233	0.100	108.104	1115.388
1.200	1273.050	1260.255	0.100	112.097	1227.485
1.300	1297.149	1285.100	0.100	115.695	1343.180
1.400	1320.047	1308.598	0.100	119.167	1462.347
1.500	1342.898	1331.473	0.100	122.776	1585.123
1.600	1365.766	1354.332	0.100	126.631	1711.754
1.700	1388.787	1377.277	0.100	130.378	1842.132
1.800	1411.914	1400.351	0.100	133.881	1976.013
1.900	1435.034	1423.474	0.100	30.179	2006.192
2.000	1458.150	1446.592	0.100	0.000	2006.192

Low Flow Details

Basin Level (m)	Head (m)	$Q_{Orifice}$ *(m^3/s)*
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.100	0.260
0.300	0.200	0.368
0.400	0.300	0.450
0.500	0.400	0.520
0.600	0.500	0.581
0.700	0.600	0.637
0.800	0.700	0.688
0.900	0.800	0.736
1.000	0.900	0.780
1.100	1.000	0.822
1.200	1.100	0.862
1.300	1.200	0.901
1.400	1.300	0.938
1.500	1.400	0.973
1.600	1.500	1.007
1.700	1.600	1.040
1.800	1.700	1.072
1.900	1.800	1.103
2.000	1.900	1.133

Mid Flow Details

Basin Level (m)	Head (m)	$Q_{Orifice}$ (m^3/s)
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.000	0.000
0.300	0.000	0.000
0.400	0.000	0.000
0.500	0.000	0.000
0.600	0.000	0.000
0.700	0.000	0.000
0.800	0.000	0.000
0.900	0.100	0.597
1.000	0.200	0.844
1.100	0.300	1.034
1.200	0.400	1.194
1.300	0.500	1.335
1.400	0.600	1.462
1.500	0.700	1.580
1.600	0.800	1.689
1.700	0.900	1.791
1.800	1.000	1.888
1.900	1.100	1.980
2.000	1.200	2.068

High Flow Details

Basin Level (m)	Head (m)	**Qweir** (m^3/s)
0.000	0.000	0.000
0.100	0.000	0.000
0.200	0.000	0.000
0.300	0.000	0.000
0.400	0.000	0.000
0.500	0.000	0.000
0.600	0.000	0.000
0.700	0.000	0.000
0.800	0.000	0.000
0.900	0.000	0.000
1.000	0.000	0.000
1.100	0.000	0.000
1.200	0.000	0.000
1.300	0.100	0.253
1.400	0.200	0.717
1.500	0.300	1.317
1.600	0.400	2.028
1.700	0.500	2.834
1.800	0.600	3.726
1.900	0.700	4.695
2.000	0.800	5.736

Stage Storage Discharge Table

Basin Level (m)	Volume (m^3)	Outflow (m^3)
0.000	0.000	0.000
0.100	199.330	0.000
0.200	276.003	0.260
0.300	355.673	0.368
0.400	438.259	0.450
0.500	524.067	0.520
0.600	613.469	0.581
0.700	706.464	0.637
0.800	803.007	0.688
0.900	903.217	1.333
1.000	1007.284	1.624
1.100	1115.388	1.856
1.200	1227.485	2.057
1.300	1343.180	2.489
1.400	1462.347	3.117
1.500	1585.123	3.870
1.600	1711.754	4.724
1.700	1842.132	5.665
1.800	1976.013	6.686
1.900	2006.192	7.778
2.000	2006.192	8.937

APPENDIX E: Rational Method Calculation Summary

RATIONAL METHOD CALCULATIONS - EXISTING SITE (WESTERN FLOWS)

Job Reference	C3602
Site Address	41 Glenbrook Drive, Nambour
Council	Sunshine Coast Council

Number of Sub-Catchments	4	
Minor Storm Event	5% AEP	(As per QUDM Table 7.02.1)
Major Storm Event	1% AEP	(As per QUDM Table 7.02.1)

Subcatchment Summary Table

Number	Catchment Name	Catchment Description	C_{10}	tc
1	E2	Low density residential area (including roads)Average lot ≥ 650m²	0.76	18
2	E3	Rural areas (2-5 dwelling units/ha)	0.74	18
3	S2	Open Space (eg parks)	0.70	18
4	S3	Open Space (eg parks)	0.70	18

Site C_{10} 0.71

Catchment Calculations (Major and Minor Storm ARI's)

Number	Area	C20	I20	5% AEP	C100	I100	1% AEP
	ha		mm/hr	m³/s		mm/hr	m³/s
1	0.150	0.80	154	0.051	0.91	195	0.074
2	0.330	0.78	154	0.110	0.89	195	0.159
3	1.425	0.74	154	0.448	0.84	195	0.648
4	2.120	0.74	154	0.667	0.84	195	0.965

Total Runoff	Minor	1.275	m³/s
	Major	1.846	m³/s
Total Area		4.025	ha

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	m
Number of Pipes		
Grade		m/m
mannings		
Pipe Capacity		m^3/s
Pipe Velocity		m/s
Capacity @ 3m/s		m^3/s
Overland Flow		m^3/s

Runoff Summary

Freq.	Peak Discharge	
4 EY	0.244	m^3/s
63% AEP	0.488	m^3/s
39% AEP	0.647	m^3/s
15% AEP	0.869	m^3/s
10% AEP	1.065	m^3/s
5% AEP	1.275	m^3/s
2% AEP	1.606	m^3/s
1% AEP	1.846	m^3/s

RATIONAL METHOD CALCULATIONS - EXISTING SITE (EASTERN FLOWS)

Job Reference	C3602
Site Address	41 Glenbrook Drive, Nambour
Council	Sunshine Coast Council

Number of Sub-Catchments	3	
Minor Storm Event	5% AEP	(As per QUDM Table 7.02.1)
Major Storm Event	1% AEP	(As per QUDM Table 7.02.1)

Subcatchment Summary Table

Number	Catchment Name	Catchment Description	C_{10}	tc
1	E1	Low density residential area (including roads)Average lot ≥ 650m²	0.76	18
2	S1	Open Space (eg parks)	0.70	18
3	S4	Open Space (eg parks)	0.70	18

Site C_{10} 0.72

Catchment Calculations (Major and Minor Storm ARI's)

Number	Area	C20	I20	5% AEP	C100	I100	1% AEP
	ha		mm/hr	m³/s		mm/hr	m³/s
1	3.920	0.80	154	1.338	0.91	195	1.936
2	5.050	0.74	154	1.588	0.84	195	2.298
3	0.710	0.74	154	0.223	0.84	195	0.323

Total Runoff	Minor	3.149	m³/s
	Major	4.557	m³/s
Total Area		9.680	ha

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	m
Number of Pipes		
Grade		m/m
mannings		
Pipe Capacity		m^3/s
Pipe Velocity		m/s
Capacity @ 3m/s		m^3/s
Overland Flow		m^3/s

Runoff Summary

Freq.	Peak Discharge	
4 EY	0.603	m^3/s
63% AEP	1.206	m^3/s
39% AEP	1.597	m^3/s
15% AEP	2.146	m^3/s
10% AEP	2.629	m^3/s
5% AEP	3.149	m^3/s
2% AEP	3.964	m^3/s
1% AEP	4.557	m^3/s

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE (West Flows)

Job Reference	C3602
Site Address	41 Glenbrook Drive, Nambour
Council	Sunshine Coast Council

Number of Sub-Catchments	8	
Minor Storm Event	5% AEP	(As per QUDM Table 7.02.1)
Major Storm Event	1% AEP	(As per QUDM Table 7.02.1)

Subcatchment Summary Table

Number	Catchment Name	Catchment Description	C_{10}	tc
1	E2	Low density residential area (including roads)Average lot ≥ 650m²	0.76	13
2	E3	Rural areas (2-5 dwelling units/ha)	0.74	18
3	S2	Open Space (eg parks)	0.70	18
4	S3	Open Space (eg parks)	0.70	18
5	S4a	Low density residential area (including roads)Average lot ≥ 650m²	0.76	13
6	S4b	Low density residential area (including roads)Average lot ≥ 650m²	0.76	13
7	S4c	Low-medium to high density residential areas	0.88	13
8	S8	Open Space (eg parks)	0.70	18

Site C_{10} 0.77

Catchment Calculations (Major and Minor Storm ARI's)

Number	Area	C20	I20	5% AEP	C100	I100	1% AEP
	ha		mm/hr	m³/s		mm/hr	m³/s
1	0.120	0.80	178	0.047	0.91	226	0.069
2	0.330	0.78	154	0.110	0.89	195	0.159
3	0.820	0.74	154	0.258	0.84	195	0.373
4	0.380	0.74	154	0.119	0.84	195	0.173
5	0.430	0.80	178	0.170	0.91	226	0.246
6	1.380	0.80	178	0.545	0.91	226	0.790
7	1.140	0.92	178	0.521	1.00	226	0.716
8	0.100	0.74	154	0.031	0.84	195	0.046

Total Runoff	Minor	1.801	m³/s
	Major	2.571	m³/s
Total Area		4.700	ha

Overland Flow Calculations		
Trunk SW Infrastructure		
Pipe Diameter	N/A	m
Number of Pipes		
Grade		m/m
mannings		
Pipe Capacity		m^3/s
Pipe Velocity		m/s
Capacity @ 3m/s		m^3/s
Overland Flow		m^3/s

Runoff Summary		
Freq.	Peak Discharge	
4 EY	0.345	m^3/s
63% AEP	0.691	m^3/s
39% AEP	0.916	m^3/s
15% AEP	1.233	m^3/s
10% AEP	1.510	m^3/s
5% AEP	1.801	m^3/s
2% AEP	2.270	m^3/s
1% AEP	2.571	m^3/s

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE (East Flows)

Job Reference	C3602
Site Address	41 Glenbrook Drive, Nambour
Council	Sunshine Coast Council

Number of Sub-Catchments	6	
Minor Storm Event	5% AEP	(As per QUDM Table 7.02.1)
Major Storm Event	1% AEP	(As per QUDM Table 7.02.1)

Subcatchment Summary Table

Number	Catchment Name	Catchment Description	C_{10}	tc
1	E1	Low density residential area (including roads)Average lot ≥ 650m²	0.76	15
2	S1a	Low density residential area (including roads)Average lot ≥ 650m²	0.76	15
3	S1b	Low density residential area (including roads)Average lot ≥ 650m²	0.76	15
4	S5	Low density residential area (including roads)Average lot ≥ 650m²	0.76	5
5	S6	Low density residential area (including roads)Average lot ≥ 650m²	0.76	15
6	S7	Significant paved areas	0.88	5

Site C_{10} 0.76

Catchment Calculations (Major and Minor Storm ARI's)

Number	Area	C20	I20	5% AEP	C100	I100	1% AEP
	ha		mm/hr	m³/s		mm/hr	m³/s
1	3.950	0.80	167	1.462	0.91	212	2.121
2	2.280	0.80	167	0.844	0.91	212	1.225
3	2.210	0.80	167	0.818	0.91	212	1.187
4	0.180	0.80	247	0.099	0.91	320	0.146
5	0.350	0.80	167	0.130	0.91	212	0.188
6	0.040	0.92	247	0.025	1.00	320	0.036

Total Runoff	Minor	3.378	m³/s
	Major	4.902	m³/s
Total Area		9.010	ha

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	m
Number of Pipes		
Grade		m/m
mannings		
Pipe Capacity		m^3/s
Pipe Velocity		m/s
Capacity @ 3m/s		m^3/s
Overland Flow		m^3/s

Runoff Summary

Freq.	Peak Discharge	
4 EY	0.649	m^3/s
63% AEP	1.298	m^3/s
39% AEP	1.718	m^3/s
15% AEP	2.305	m^3/s
10% AEP	2.831	m^3/s
5% AEP	3.378	m^3/s
2% AEP	4.277	m^3/s
1% AEP	4.902	m^3/s