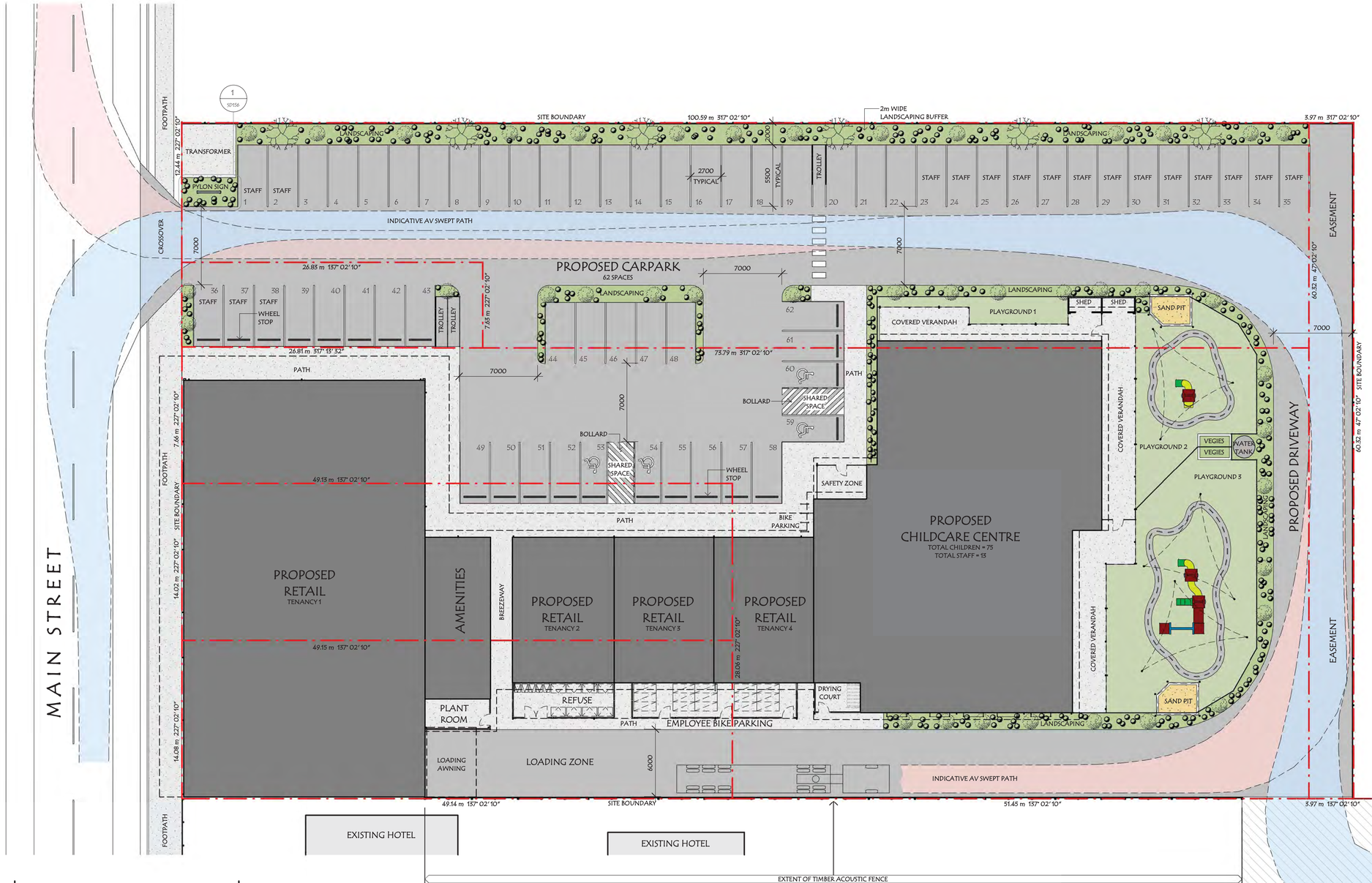
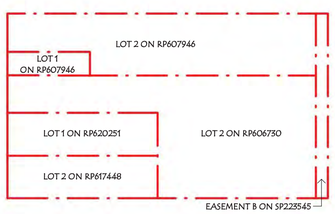


SITE PLAN

1 : 200



PROPERTY INFORMATION

1 : 1000

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

25 May 2016

DATE

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Scale 1:200 (m)

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B	AV ACCESS PATHS	OW	02/11/15
C	STAFF PARKING INDICATED	OW	14/03/16
D	REVISED TENANCY LAYOUT	OW	04/05/16

SITE INFORMATION

LOT: 1 & 2
ON PLAN: RP607946, RP620251
PARISH: MURCHISON
COUNTY: LIVINGSTONE
AREA: 6,312m²

BUILDING INFORMATION

CONSTRUCTION TYPE: C

BUILDING CLASSIFICATION: 6, 9b

GENERAL NOTES

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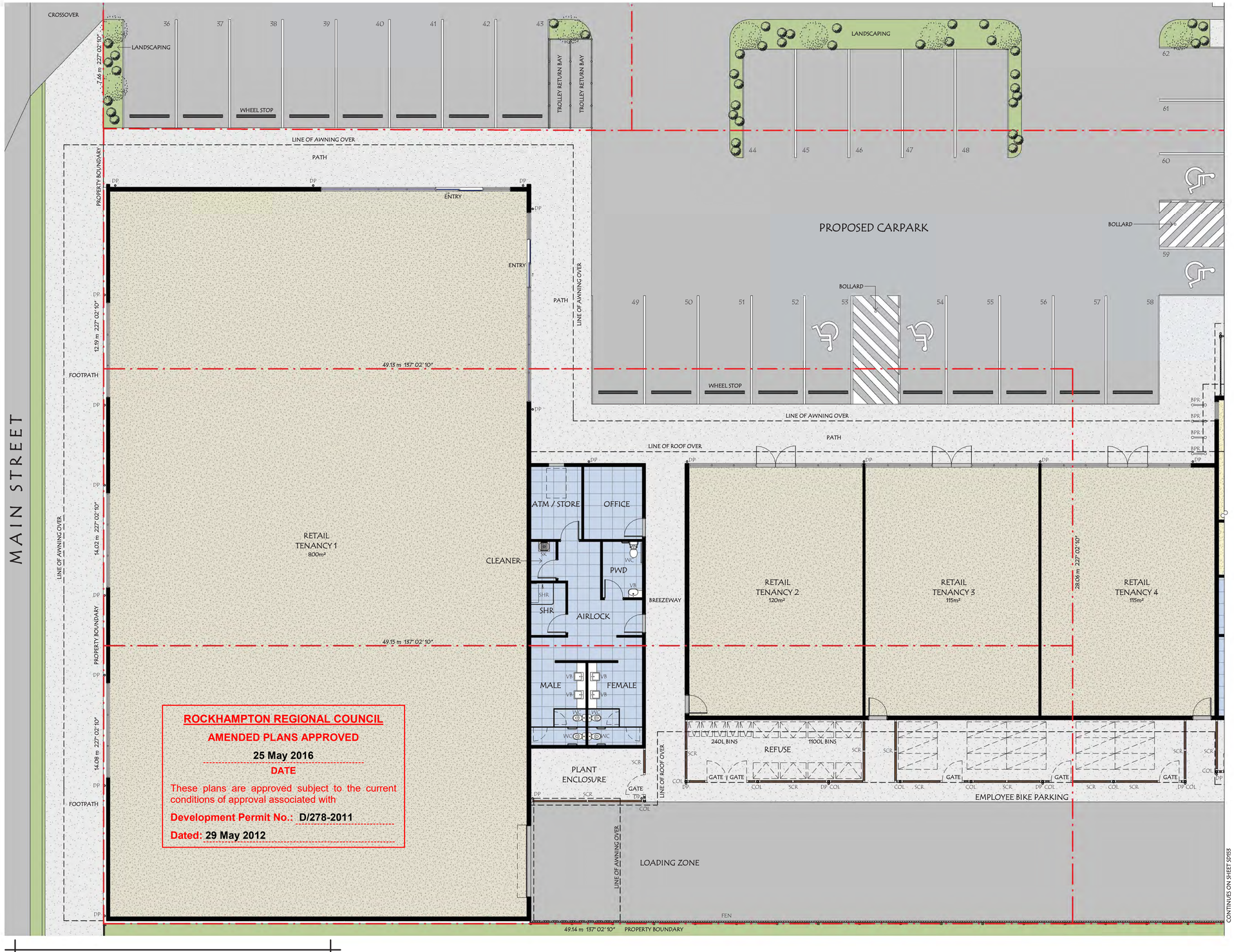
PROPOSED RETAIL & CHILDCARE CENTRE

LOCATION
MAIN STREET, ROCKHAMPTON

CLIENT
POWERCAT DEVELOPMENTS PTY LTD

TITLE
SITE PLAN

date:	drawn:
AUGUST 2015	OW
scale:	**checked:**
A1: 1:200 A3: 1:400	BC
drawing no:	**revision:**
0649 SD151	D



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FLOOR PLAN

RETAIL 1 : 100

LEGEND

COL	COLUMN
DP	DOWNPIPE
FEN	FENCE
SCR	SCREEN
SHR	SHOWER
SK	SINK
VB	VANITY BASIN
WC	WATER CLOSET

1 0 1 2 3
Scale 1:100 (m)

ISSUE	DESCRIPTION	DRAWN	DATE
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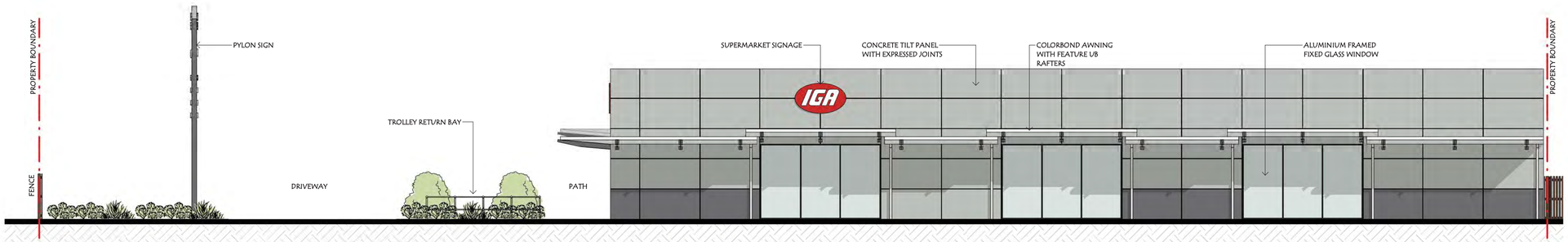
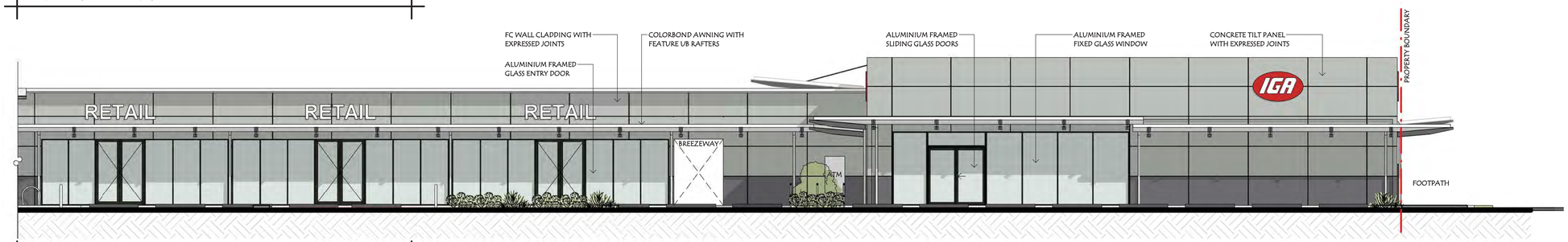
A1: 1:100 A3: 1:200	BC
drawing no:	**revision:**
0649 SD152	B



ELEVATION

RETAIL - SOUTH-EAST 1 : 100



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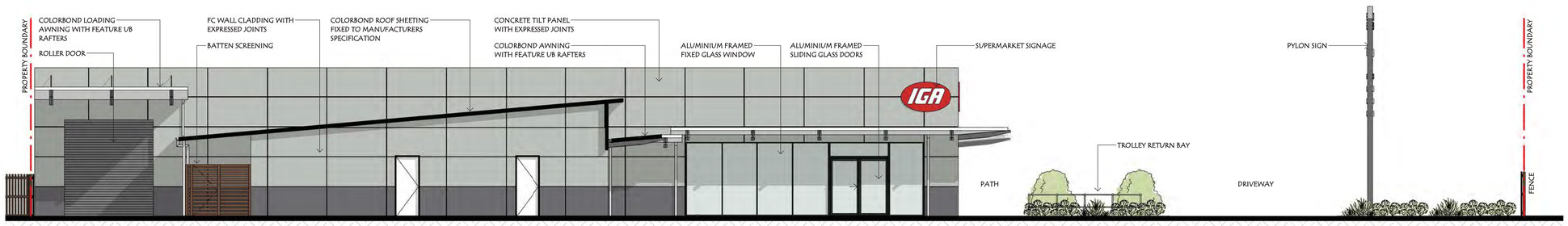

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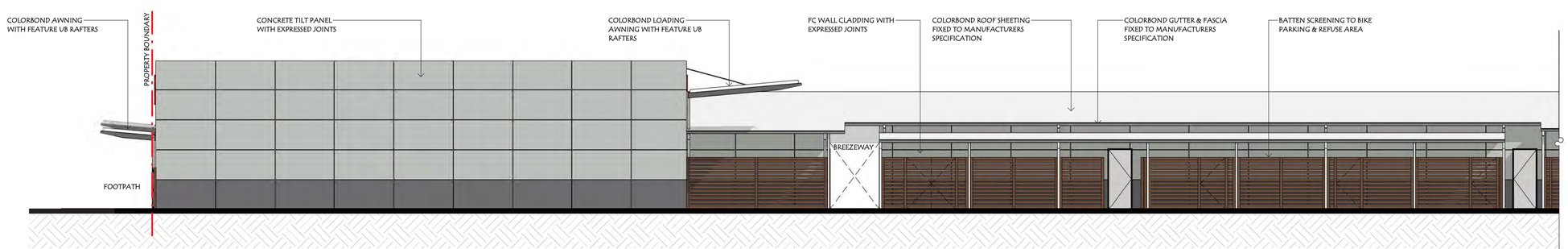

ELEVATION

RETAIL - NORTH-EAST 1 : 100

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Scale 1:100 (m)

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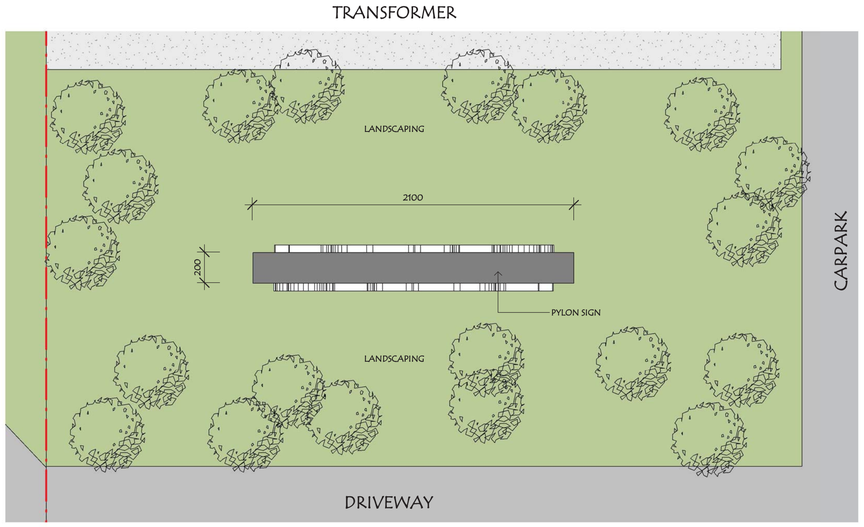
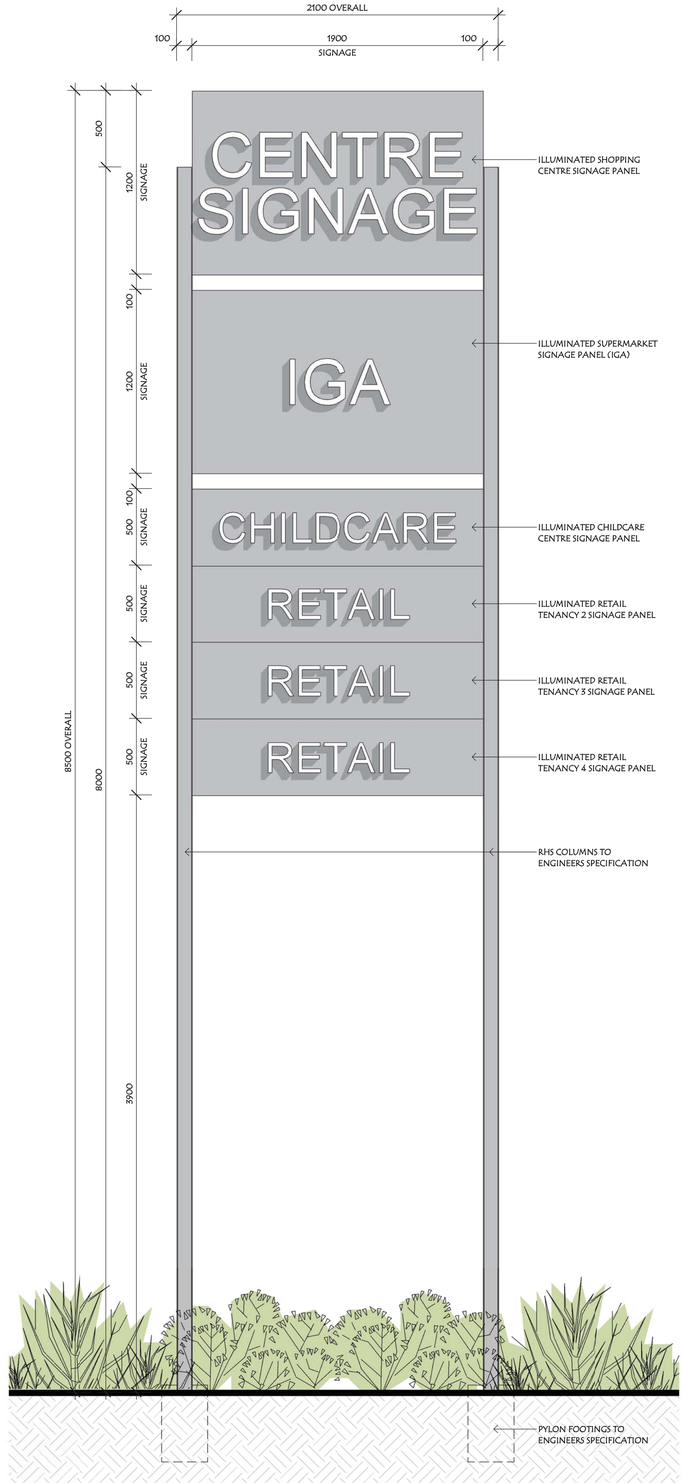


PYLON SIGN DETAIL

LAYOUT PLAN 1 : 20



ELEVATION

FRONT / REAR 1 : 20

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Scale 1:20 (m)

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A1: 1:20 **A3: 1:40**	BC
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0649 SD156	B

CONTOUR

STORMWATER MANAGEMENT PLAN

PROPOSED RETAIL, MEDICAL & CHILDCARE CENTRE

28 MAIN STREET, ROCKHAMPTON

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

25 May 2016

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/278-2011

Dated: 29 May 2012

Prepared For:

Powercat Development Pty Ltd.

Ref: 1391 – SWMP01

(11 January 2016)

Final Issue Approval			
Date	**Name**	**Signature**	**Document Status**
11/01/2016	Brett Thomson (RPEQ NO.6068)		Preliminary Issue

Revision Record					
Rev	**Date**	**Comments**	**Status**	**Author**	**Reviewer**
01	11/01/2016	Preliminary Issue	A	ARC	CDF

A - Approval	B - Building Approval	C - Construction	P - Preliminary
R - Revision	T - For Tender	X - Information	D-Draft

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1 INTRODUCTION

This Stormwater Management Plan has been commissioned by Powercat Development Pty Ltd (Powercat) and forms part of a Material Change of Use application for submission to Rockhampton Regional Council (RRC). The subject site consists of land parcels, described as Lot 1 on RP607946, Lot 2 on RP607946, Lot 1 on RP620251, Lot 2 on RP620251 and Lot 2 on RP617448, Parish of Murchison, County of Livingstone.

The land has a physical address of 28 Main Street, Park Avenue, Rockhampton. A locality sketch is shown below.

Figure 1-1 Site Locality (Accessed from Google Maps 08.01.2016)

This report describes existing site features, and proposes preliminary stormwater design parameters for the development of the subject site. The report has been compiled considering the specifics of the site and the development including, consultation with associated consultants, previous development applications to Rockhampton Regional Council, review of available Dial Before You Dig data for existing infrastructure, site survey and compliance review of Council's codes and policies.

Contour understands that the proposed development is being submitted to council as two separate applications (retail and childcare). This report is a holistic report and covers both proposed uses and applications.

Hydrologic and hydraulic analyses have been undertaken to determine the preliminary infrastructure requirements for the site. The purpose of these analyses is to investigate how stormwater can be effectively managed on site and to ensure that the proposed development does not cause an actionable nuisance. Response to council's stormwater management code is provided in Appendix E.

1.1 SITE CONTEXT

The subject site is approximately 6,233m^2 in area, and is essentially rectangle in shape; being approximately 56 metres east to west, and 100 metres south to north. The site is adjacent to the existing Park Avenue Hotel Motel which is located on the corner of Main Street and Haynes Street, Park Avenue. To the north and west of the proposed development are existing homes.

The existing topography of the subject site is generally flat with approximate RLs ranging between 12.0m and 10.8m AHD. Stormwater from the lot generally sheet flows in a north westerly direction into Easement B on SP223545. The stormwater then flows into the existing dam located on Lot 7 on RP606730 to the north through Easement A on RP886441. There are no existing dwellings on the proposed site and is currently covered in grass.

Detailed field survey of the subject site has been completed by Hoffmann Surveyors, Rockhampton

There are existing easements to the north and to the north east of the proposed development which are in favour of Council. It is understood that these easements are associated with access and stormwater easements.

With regard to local services, extracts from a recent Dial Before You Dig search are included as part of this report in Appendix D. More detailed commentary on these services is provided later in this report.

1.2 PROPOSAL DETAILS

The client, Powercat, is proposing to utilise 5 existing lots (as detailed above), and develop these parcels of land into a Retail, Medical and Childcare Centre. The new proposed centre is to contain approximately 62 car parking spaces, loading zones, employee bike parking and landscaping areas.

The current development proposal is represented by the Architectural drawings by BRD Group within Appendix A of this report.

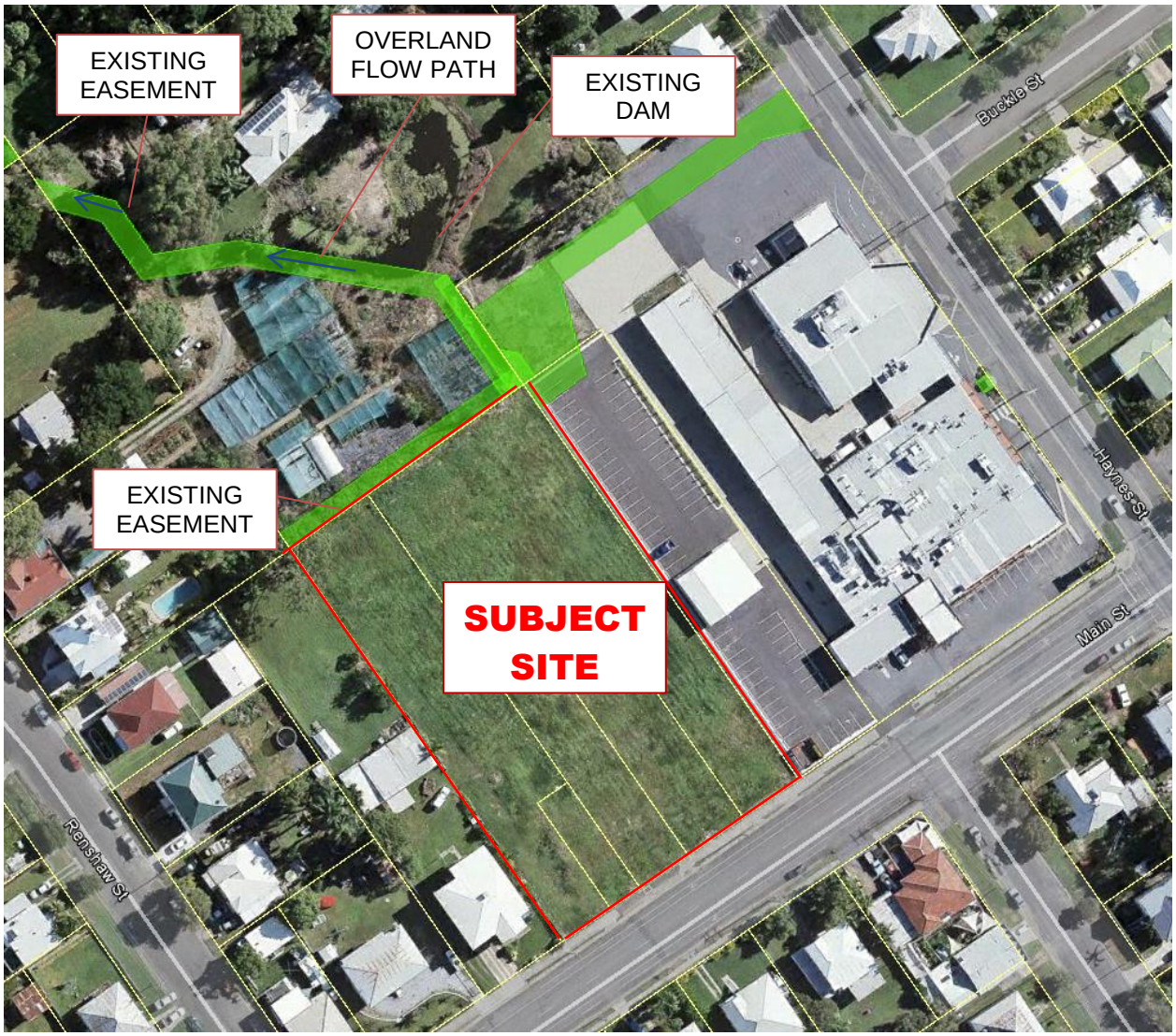


Figure 1-2 Aerial Photo (Accessed from Google Earth 11.01.2016)

Figure 1-3 Aerial Photo looking at overall Catchment and discharge point (Accessed from Google Earth 11.01.2016)

1.3 SITE FLOODING

A Flood Check of the site was conducted using the Rockhampton Regional Councils Planning Scheme 2015 overlay mapping system. The Flood hazard mapping shows that the proposed site is not subject to impacts from floodplain flooding or any Fitzroy River flooding.

The following figure below shows the flooding overlay map for the proposed site.

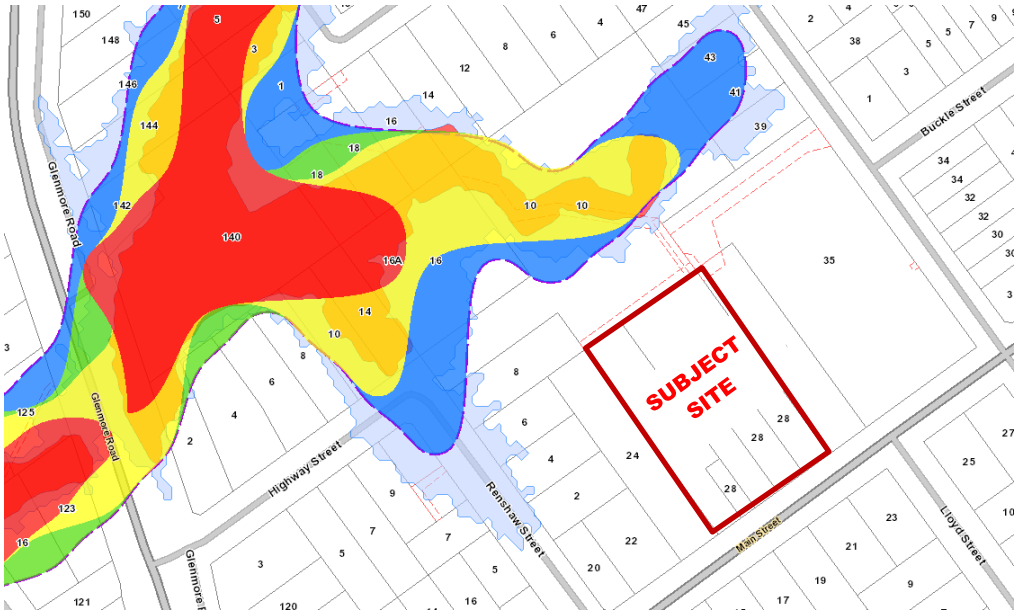


Figure 1-4 Rockhampton Regional Planning Scheme Maps - Flood Overlay (Accessed 11.01.2016)

2 DRAINAGE

2.1 GENERAL

The proposed design generally complies with the requirements of the Queensland Urban Drainage Manual (QUDM), Council's Planning Scheme and any other relevant codes or guidelines.

2.2 DRAINAGE

A conceptual stormwater drainage infrastructure layout is shown on Contour plans 1391-SW1 and 1391-SW2, presented in Appendix A. Design of the overall drainage system generally complies with the Major/Minor drainage requirements as per QUDM.

The recommended minor storm design event is the 10 year ARI based on central business and commercial use in accordance with Table 7.3.1 of QUDM. It is proposed that the minor storm design event (10 year ARI) will be collected and conveyed to the legal point of discharge. The minor drainage system is to be designed in accordance with QUDM and generally consist of Field Inlets or Kerb Gully Pits installed to collect surface runoff from roads, car parks, pathways and other non-roofed areas, plus additional pipe linkages to capture roof-water drainage from buildings. It is proposed that there will be no roof-water harvesting and re-use as part of this development.

The combined minor/major drainage system will be designed to cater for the 100 year ARI flows in accordance with table 7.3.2 of QUDM. Generally the major drainage system will consist of overland flow (Q100-Q10 piped) controlled within road corridors of the development to ensure acceptable freeboard to the respective premises.

2.3 LEGAL POINT OF DISCHARGE

Contour understands that the subject site has an existing approval for a retail development (D/278-2011). The previous approval has established a legal point of discharge within the rear adjoining allotment (7/RP606730) and easement (B/SP223545). It is understood that the previously approved legal point of discharge and arrangement will serve as the legal point of discharge for this development.

It is proposed to discharge stormwater into the existing dam to the north of the site. Generally stormwater will discharge as piped drainage or as sheet flow. Some minor works may be required within the easement area to minimise nuisance and direct flows to the existing dam.

It is considered that discharging stormwater, in the manner described above will not cause an actionable nuisance. As such it is considered that a lawful point of discharge has been established in accordance with the QUDM Section 3.4.

3 WATER QUANTITY MANAGEMENT

3.1 STORMWATER QUANTITY MANAGEMENT STRATEGY

This section outlines the water quantity analysis undertaken to determine the preliminary stormwater infrastructure requirements Stormwater Quantity Management Strategy

On-site detention storage can readily be provided for the proposed development via number of methods including;

- Underground detention tank/s
- On pavement detention; and
- Bioretention/detention basins

Indicative stormwater quantity mitigation measures are outlined on Contour Plans 1391-SW01 and 1391-SW02 in Appendix B. Detailed design stages will confirm the ultimate stormwater quantity mitigation measures and configuration.

The constrained nature of the proposed development layout does not make allowances for adequate capture or direction of major storm flows to the proposed water quantity mitigation measures. As such the minor storm discharges (10year ARI) have been adopted as the discharges captured and mitigated by the proposed detention measures. Major flows have been assumed to bypass the proposed mitigation measures. This has been reflected in the water quantity modelling.

3.2 INTERNAL CATCHMENT CHARACTERISTICS

For the purposes of determining preliminary water quantity mitigation infrastructure the site has been considered as a single catchment. Fraction Impervious values have been calculated based on development proposal plans. Catchment details, across the subject site are detailed in Table 3-1 and Table 3-2 for the pre and post developed catchment respectively. A sketch of the conceptual earthworks levels can be found in Appendix B.

Table 3-1 Catchment areas and fractions impervious, pre-developed case

	Pre-developed
Impervious Area, ha	0.00
Pervious Area, ha	0.6233
Fraction Impervious	0%
Total Area, ha	0.6233

Table 3-2 Catchment areas and fractions impervious, post-developed case

	Post-developed
Impervious Area, ha	0.5420
Pervious Area, ha	0.0813
Fraction Impervious	87%
Total Area, ha	0.6233

An initial and continuing loss model has been adopted for XP-RAFTS model. Parameters have generally been based on recommendations set out within Australian Rainfall and Runoff (ARR) and outlined in Table 3-3 below. Within the model, pervious and impervious areas were split into sub-catchment areas based on the fraction impervious.

Table 3-3 Loss Parameters

Losses	Initial	Continuing
Pervious	20	2.5
Impervious	1.5	0

3.3 RUNOFF-ROUTING MODELLING

Hydrological analysis of the pre and post development conditions was modelled using XP-RAFTS runoff routing software. The parameters adopted were generally based on recommendations in Australian Rainfall and Runoff and the Queensland Urban Drainage Manual.

The modelled discharges were compared with the Rational Method calculations for the pre-developed case to validate the XP-RAFTS model. As outlined in Table 3-4 modelled site discharge compares well with the discharges calculated by the Rational Method. The peak discharges, which were estimated using XP-RAFTS, were adopted for the hydraulic modelling.

Table 3-4 Summary of Peak Discharges, pre-developed case

	Peak Discharges (Rational Method), m^3/s	Peak Discharges (XP-RAFTS), m^3/s
2 Year ARI	0.076	0.073
5 Year ARI	0.110	0.124
10 Year ARI	0.133	0.153
20 Year ARI	0.162	0.186
50 Year ARI	0.212	0.219
100 Year ARI	0.249	0.258

The post-developed unmitigated catchment modelling results are summarised in Table 3-5.

Table 3-5 Summary of Peak Discharges for post-developed (Unmitigated) case

	Peak Discharges (XPRAFTS), m^3/s
2 Year ARI	0.195
5 Year ARI	0.256
10 Year ARI	0.292
20 Year ARI	0.340
50 Year ARI	0.380
100 Year ARI	0.428

3.4 DETENTION BASIN DETAILS

As previously noted, the development proposal includes a detention Tank as a stormwater quantity mitigation measure. The underground tank is situated under the proposed childcare centre playground. The details of the proposed detention basins are outlined in Table 3-6. These details have been determined based on the hydrologic and hydraulic analyses undertaken as part of this report. These requirements may be reviewed during detailed design stages.

Table 3-6 Detention Tank Details

Features	Detention Tank
Detention Volume(m^3)	245 m^3
Low Flow orifice(mm)	230
High flow weir, height above basin invert(m)	1
High flow weir, length(m)	1
Depth of Tank(m)	1.2m

3.5 XP-RAFTS RESULTS

Critical duration design storm peak flows for the pre and post developed cases are presented in Table 3-7 below. The post developed case includes the proposed detention tanks.

Table 3-7 Peak Discharge Results

Catchment	Site	
	Pre-developed Discharge(m^3/s)	Post-developed (mitigated) Discharge(m^3/s)
2 year ARI	0.073	0.056
5 year ARI	0.124	0.066
10 year ARI	0.153	0.085
20 year ARI	0.186	0.146
50 year ARI	0.219	0.202
100 year ARI	0.258	0.245

It is noted that comparisons for other non-critical durations have been made and generally peak design discharges for all storm durations were not increased when compared with the corresponding duration, pre-developed case.

It is acknowledged that the proposed play area includes shade sail structures. Detailed design stages may incorporate the proposed support structures as part of the detention tank infrastructure.

4 WATER QUALITY MANAGEMENT

4.1 GENERAL

This assessment identifies issues relating to storm water runoff quality and assesses possible methods of treatment if required. The aim of this section of the report is to determine practical approaches to achieving stormwater quality objectives of the SPP and councils planning scheme.

The objectives for stormwater quality management are outlined in

- Rockhampton Regional Council Planning Scheme 2015, Scheme 6.19 – Stormwater Management Planning Scheme Policy
- Capricorn Municipal Development Guidelines – D5 Stormwater Drainage Design.
- Urban stormwater – Queensland best practice environmental management guidelines 2009 Technical note: Derivation of Design Objectives

To meet these objectives, it is proposed to incorporate a tertiary stormwater quality treatment device before discharging from the proposed site. The tertiary treatment device proposed is a Humes Jelly Fish treatment system. The stormwater run-off from the driveway, roof and landscaping area will enter this system and be treated before entering the proposed detention tank.

The proposed stormwater quality treatment devices are outlined on Contour Drawings 1391-SW1 in Appendix B. These treatment devices are conceptual in nature and are subject to change during future detailed design stages of the project and subsequent operational works approval.

4.1.1 Construction Phase – Design Objectives

In accordance with the State Planning Policy (SPP) Appendix C, the proposed development has been planned, designed, constructed and operated to manage stormwater from the site to maintain and support the environmental value surrounding the development. The table below outlines the design objectives required for this site during the construction phase.

Table 4-1 Construction Phase – Design Objectives

Issue		Source
Drainage control	Temporary Drainage Works	1. Design life and design storm for temporary drainage works: • Disturbed area open for <12 months – 1 in 2-year ARI event • Disturbed area open for 12-24 months – 1 in 5-year ARI event • Disturbed area open for >24 months – 1 in 10-year ARI event 2. Design capacity excludes minimum 150 mm freeboard 3. Temporary culvert crossing—minimum 1 in 1-year ARI hydraulic capacity
Erosion control	Erosion control measures	1. Minimise exposure of disturbed soils at any time 2. Divert water run-off from undisturbed areas around disturbed areas 3. Determine the erosion risk rating using local rainfall erosivity, rainfall depth, soil-loss rate or other acceptable methods 4. Implement erosion control methods corresponding to identified erosion risk rating

Sediment control	Sediment control measures Design storm for sediment control basins Sediment basin dewatering	1. Determine appropriate sediment control measures using: • potential soil loss rate, or • monthly erosivity, or • average monthly rainfall 2. Collect and drain stormwater from disturbed soils to sediment basin for design storm event: • design storm for sediment basin sizing is 80th% five-day event or similar 3. Site discharge during sediment basin dewatering: • TSS < 50 mg/L TSS, and • Turbidity not >10% receiving waters turbidity, and • pH 6.5–8.5
Water quality	Litter and other waste, hydrocarbons and other contaminants	1. Avoid wind-blown litter; remove gross pollutants 2. Ensure there is no visible oil or grease sheen on released waters 3. Dispose of waste containing contaminants at authorised facilities
Waterway stability and flood flow management	Changes to the natural waterway hydraulics and hydrology	Refer Constructed Wetland Design Report by Contour dated November 2015 for details of proposed changes to the existing waterway. Refer also Preliminary Hydraulic Assessment by Contour Dated November 2015 for details of hydraulics and hydrology.

4.1.2 Post Construction Phase – Design Objectives

Table 3-2 below outlines the design objectives for the Post Construction or operational phase of the development.

Table 4-2 Post Construction Phase – Design Objectives

Climatic Region	Total Suspended Solids (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants (>5mm)
Central Queensland (South)	85%	60%	45%	90%

4.2 SOURCE NODES

For the purposes of stormwater quality assessment the site was broken down into various catchments based on the site topography, surface types and land use. Reference should be made to Appendix B, for details of the stormwater quality catchments.

The intent of the water quality treatment measures is to achieve the required load reduction targets for areas of the site prior to discharging to the existing easement.

Table 4-3 below shows the areas assigned to each source node.

Table 4-3 MUSIC Mode Catchment Areas

		Catchment
Area	**Fraction Impervious (%)**	**A(ha)**
Roof	100	0.196
Road	100	0.346
Ground Level	0	0.081
Total Area		0.623

4.3 MUSIC MODEL

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) version 6.1 was used to determine the required stormwater treatment devices to achieve the requirements of the SPP.

A model schematic is shown on Figure 4-1.

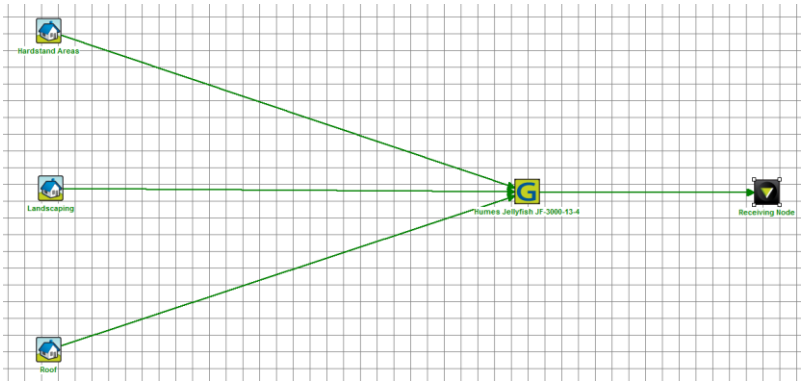


Figure 4-1 MUSIC Model Schematic

The rainfall and evapotranspiration data series, which were observed at the Rockhampton Aero Station over a 10 year period from 1 January 1980 to 31 December 1989, were used in accordance with the MUSIC Modelling Guidelines.

Key treatment node input parameters are outlined in Table 4-4 MUSIC Humes Jelly Fish Treatment Node.

Table 4-4 MUSIC Humes Jelly Fish Treatment Node

Catchment Parameters
Humes JellyFish
1 Humes JellyFish (JF-3000-13-3). Treatment node provided by Humes in accordance with their third party and peer reviewed field data.

4.4 MODELLING RESULTS

Table 4.4 below shows the pollutant reductions achieved by the proposed treatment train. It can be seen that the treatment train reaches the required reductions of Gross Pollutants, Total Suspended Solids, Total Phosphorus and Total Nitrogen outlined in the State Planning Policy 2014 and councils planning scheme.

Table 4-5 Summary of MUSIC Modelling Results

	Pollutant Removal Efficiency, %			
	Total Suspended Solids (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants
Developed, mitigated catchment.	**85%**	**62.3%**	**52.1%**	**97.8%**
Water Quality Objectives.	85%	60%	45%	90%

5 SUMMARY

It is proposed that the existing properties at 28 Main Street, Park Avenue be redeveloped to create a retail, medical and childcare centre. The property is properly described as Lot 1 on RP607946, Lot 2 on RP607946, Lot 1 on RP620251, Lot 2 on RP620251 and Lot 2 on RP617448

The preliminary stormwater infrastructure requirements for the project have been determined and are presented on drawings in Appendix B.

The proposed stormwater infrastructure discharges to the existing easement and directly to the existing dam on Lot 7 on RP606730 in accordance with previous council approvals. It is proposed that an on-site stormwater detention system be constructed to meet the pre-development discharge flows from the proposed development. This on-site detention system must hold 240kL of stormwater with a low flow piped outlet and a high flow weir outlet.

A water quality treatment device called Humes Jelly Fish (model JF-3000-13-3) is to be utilised to ensure the water quality objectives are met for Central Queensland (South). The configuration of this system has been shown on drawing 1391-SW1.

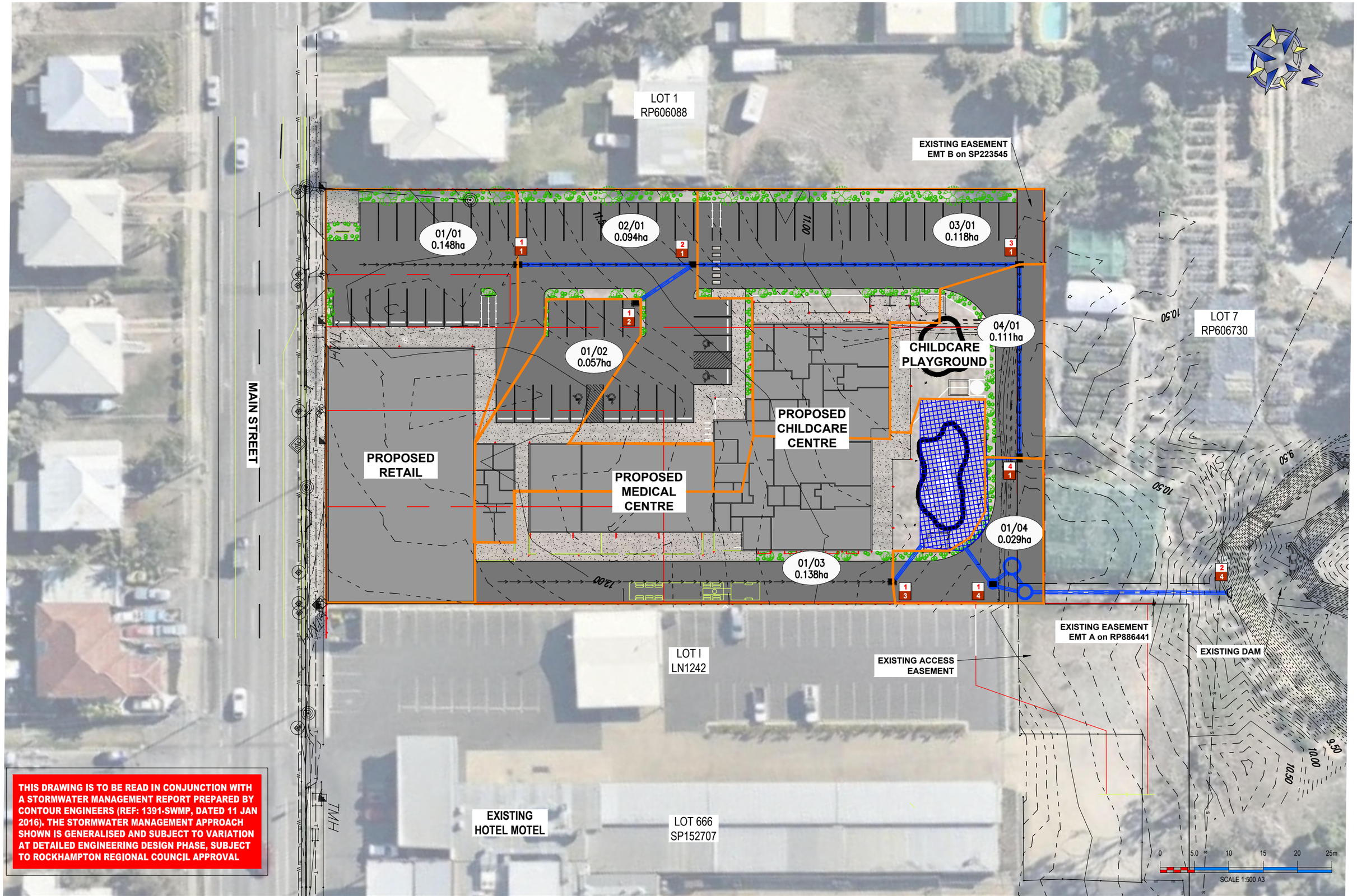
We consider the analyses contained within this report for proposed stormwater infrastructure, demonstrates that stormwater can effectively be managed onsite.

6 QUALIFICATIONS

This report has been prepared, by Contour Consulting Engineers Pty Ltd, under the direction of a Registered Professional Engineer of Queensland, to document the process undertaken to determine the preliminary stormwater infrastructure requirements for the proposed Retail, Medical & Childcare centre at 28 Main Street, Rockhampton.

This report is only to be used in full, and may not be used to support objectives other than those set out herein, except where written approval is provided by Contour Consulting Engineers

Appendix B. Contour Stormwater Plan



THIS DRAWING IS TO BE READ IN CONJUNCTION WITH A STORMWATER MANAGEMENT REPORT PREPARED BY CONTOUR ENGINEERS (REF: 1391-SWMP, DATED 11 JAN 2016). THE STORMWATER MANAGEMENT APPROACH SHOWN IS GENERALISED AND SUBJECT TO VARIATION AT DETAILED ENGINEERING DESIGN PHASE, SUBJECT TO ROCKHAMPTON REGIONAL COUNCIL APPROVAL

CONTOUR
Consulting Engineers
A.B.N. 62 117 061 659
PO Box 474, Buddina 4575, Qld
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Ph. (07) 5493 9777 Fax (07) 5493 6888
Website: www.ContourCE.com.au
Registered ISO 9001:2008
Quality Assured International 3rd Party Accredited

PLAN DETAILS:

Designed:	ARC
Drawn:	ARC
Checked:	CDF
Datum:	AHD
Date:	2016

Director: BRETT THOMSON (RPEQ 6068)
(FOR & ON BEHALF OF CONTOUR C/E PTY LTD)

PLAN AMENDMENTS:

Rev	Date	Comment	Altered	Checked

RETAIL, MEDICAL & CHILDCARE CENTRE
28 MAIN STREET, PARK AVENUE
FOR POWERCAT

PLAN TITLE:

STORMWATER MANAGEMENT PLAN
SITE CATCHMENT PLAN

NOT FOR CONSTRUCTION

PLAN No: 1391-SW2 REVISION: 1 SHEET: 1 OF 1

FILE LOCATION: J:\CIV\01391 28 MAIN STREET, ROCKHAMPTON\DESIGN - CIVIL\ACAD\1391-SW1.DWG

LOT 1
RP606088

600mm CONCRETE CHANNEL

900x600 V-GRATED GULLY PIT

900x600 V-GRATED GULLY PIT

EXISTING EASEMENT
EMT B on SP223545

Ø300 RCP CL3
USIL 10.67
DSIL 10.54
G = 0.5%
L = 24.60m

Ø300 RCP CL3
USIL 10.52
DSIL 10.28
G = 0.5%
L = 46.24m

11.00

RL11.80

RL11.60

RL11.55

900x600 V-GRATED GULLY PIT

Ø300 RCP CL3
USIL 10.26
DSIL 10.12
G = 0.5%
L = 28.45

10.50

RL11.60

900x600 GULLY PIT

Ø300 RCP CL3
USIL 10.58
DSIL 10.54
G = 0.5%
L = 8.75m

CHILDCARE
PLAYGROUND

UNDERGROUND DETENTION TANK
VOLUME = 240kL
DEPTH OF TANK = 1.2m
WEIR LEVEL = RL10.73
BOTTOM OF TANK = RL 9.73

MAIN STREET

PROPOSED
CHILDCARE
CENTRE

LOT 7
RP606730

PROPOSED
RETAIL

PROPOSED
MEDICAL
CENTRE

RL11.30

RL11.35

1mL x 0.2mH OPEN WEIR 1.0m
ABOVE INVERT OF TANK

A
-

PROPOSED HUMES JELLY FISH WATER QUALITY TREATMENT SYSTEM (JF-3000-13-3). SYSTEM TO HAVE A DIVERSION AND COLLECTION CHAMBER FOR HIGH BYPASS FLOWS.
Ø375 uPVC PIPE TO BE USED IN SYSTEM.
REFER TO MANUFACTURER FOR DETAILS

LOW FLOW PIPE TO HAVE 230mm ORIFICE PLATE CONSTRUCTED AT INLET

RL12.20

12.00

RL11.35

RL10.70

600mm CONCRETE CHANNEL

Ø375 RCP CL3
USIL 9.73
DSIL 9.69
G = 0.5%
L = 6.47

Ø375 RCP CL2
USIL 9.67
DSIL 9.66
G = 0.5%
L = 3.0

Ø375 RCP CL2
USIL 9.64
DSIL 9.50
G = 0.5%
L = 28.37

EXISTING EASEMENT
EMT A on RP886441

EXISTING DAM

LOT I
LN1242

PROVIDE 900x600
GRATED INLET TO 01/04

EXISTING
HOTEL MOTEL

LOT 666
SP152707

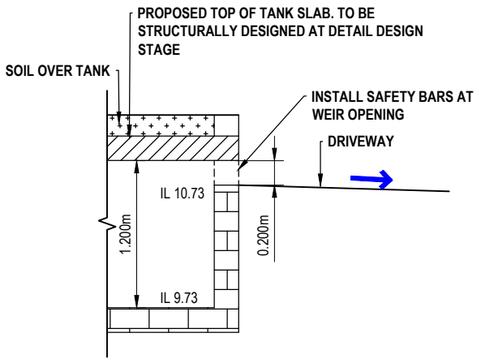
TMH

9.50

10.00

10.50

0 5.0 10 15 20 25m
SCALE 1:500 A3



PROPOSED OPEN WEIR AND DETENTION TANK

SECTION A
SCALE 1:50

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH A STORMWATER MANAGEMENT REPORT PREPARED BY CONTOUR ENGINEERS (REF: 1391-SWMP, DATED 11 JAN 2016). THE STORMWATER MANAGEMENT APPROACH SHOWN IS GENERALISED AND SUBJECT TO VARIATION AT DETAILED ENGINEERING DESIGN PHASE, SUBJECT TO ROCKHAMPTON REGIONAL COUNCIL APPROVAL

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Director: BRETT THOMSON (RPEQ 6068)
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PLAN AMENDMENTS:

Rev	Date	Comment	Altered	Checked

RETAIL, MEDICAL & CHILDCARE CENTRE
28 MAIN STREET, PARK AVENUE
FOR POWERCAT

PLAN TITLE:

STORMWATER MANAGEMENT PLAN
STORMWATER LAYOUT

NOT FOR CONSTRUCTION

PLAN No: **1391-SW1** REVISION: **1** SHEET: 1 OF 1

FILE LOCATION: J:\CIV\01391 28 MAIN STREET, ROCKHAMPTON\DESIGN - CIVIL\ACAD\1391-SW1.DWG

Appendix C. State Planning Policy – Water Quality

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Plan to avoid/minimise new impacts		
PO1 The development is planned and designed considering the land use constraints of the site for achieving stormwater design objectives.	**AO1.1** A site stormwater quality management plan (SQMP) is prepared, and: a. is consistent with any local area stormwater management planning, and b. provides for achievable stormwater quality treatment measures meeting design objectives listed below in Table A (construction phase) and Table B (post construction phase), or current best practice environmental management, reflecting land use constraints, such as: • erosive, dispersive and/or saline soil types • landscape features (including landform) • acid sulfate soil and management of nutrients of concern • rainfall erosivity.	WQO are met by incorporating treatment device into the proposed development
PO2 Development does not discharge wastewater to a waterway or off site unless demonstrated to be best practice environmental management for that site.	**AO2.1** A wastewater management plan (WWMP) is prepared by a suitably qualified person and addresses: a. wastewater type, and b. climatic conditions, and c. water quality objectives (WQOs), and d. best-practice environmental management, and **AO2.2** The WWMP provides that wastewater is managed in accordance with a waste management hierarchy that: a. avoids wastewater discharges to waterways, or b. if wastewater discharge to waterways cannot practicably be avoided, minimises wastewater discharge to waterways by re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.	N/A N/A
PO3 Any non-tidal artificial waterway is located in a way that is compatible with the land use constraints of the site for protecting water environmental values in existing natural waterways.	**AO3.1** If the proposed development involves a non-tidal artificial waterway: a. environmental values in downstream waterways are protected, and b. any groundwater recharge areas are not affected, and c. the location of the waterway incorporates low lying areas of a catchment connected to an existing waterway, and d. existing areas of ponded water are included, and	N/A

	AO3.2 Non-tidal artificial waterways are located: a. outside natural wetlands and any associated buffer areas, and b. to minimise disturbing soils or sediments, and c. to avoid altering the natural hydrologic regime in acid sulfate soil and nutrient hazardous areas.	N/A
PO4 Any non-tidal artificial waterway is located in a way that is compatible with existing tidal waterways.	**AO4.1** Where a non-tidal artificial waterway is located adjacent to, or is connected to, a tidal waterway by means of a weir, lock, pumping system or similar: a. there is sufficient flushing or a tidal range of >0.3 m, or b. any tidal flow alteration does not adversely impact on the tidal waterway, or c. there is no introduction of salt water into freshwater environments.	N/A
Design to avoid/minimise new impacts		
PO5 Any non-tidal artificial waterway is not designed only for stormwater flow management or stormwater quality management.	**AO5.1** Any non-tidal artificial waterway is designed and managed for any of the following end-use purposes: a. amenity including aesthetics, landscaping and recreation, or b. flood management, or c. stormwater harvesting as part of an integrated water cycle management plan, or d. aquatic habitat, and **AO5.2** The end-use purpose of any non-tidal artificial waterway is designed and operated in a way that protects water environmental values.	N/A N/A

Construct to avoid/minimise new impacts		
PO6 Construction activities for the development avoid or minimise adverse impacts on stormwater quality.	**AO6.1** An erosion and sediment control plan (ESCP) demonstrates that release of sediment-laden stormwater is avoided for the nominated design storm, and minimised when the nominated design storm is exceeded, by addressing design objectives listed below in Table A (construction phase) or local equivalent, for: a. drainage control, and b. erosion control, and c. sediment control, and d. water quality outcomes, and **AO6.2** Erosion and sediment control practices (including any proprietary erosion and sediment control products) are designed, installed, constructed, operated, monitored and maintained, and any other erosion and sediment control practices are carried out in accordance with local conditions and appropriate recommendations from a suitably qualified person, or **AO6.3** The ESCP demonstrates how stormwater quality will be managed in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to Acceptable Outcome AO6.1.	An erosion and sediment control plan (ESCP) will be prepared as part of a future detailed design phases. N/A N/A
PO7 Operational activities for the development avoid or minimises changes to waterway hydrology from adverse impacts of altered stormwater quality and flow.	**AO7.1** Development incorporates stormwater flow control measures to achieve the design objectives set out below in Table A (construction phase) and Table B (post construction phase). Both the construction and operational phases for the development comply with design objectives in Table A (construction phase), and Table B (post construction phase), or current best practice environmental management, including management of frequent flows, peak flows, and construction phase hydrological impacts.	An erosion and sediment control plan (ESCP) and detail design, will be prepared as part of a future detailed design phases.
PO8 Any treatment and disposal of waste water to a waterway accounts for: • the applicable water quality objectives for the receiving waters, and • adverse impact on ecosystem health or receiving waters,	**AO8.1** See AO2.1	N/A

and • in waters mapped as being of high ecological value, the adverse impacts of such releases and their offset.		
PO9 Wastewater discharge to a non-tidal artificial waterway is managed in a way that maintains ecological processes, riparian vegetation, waterway integrity, and downstream ecosystem health.	**AO9.1** Wastewater discharge to non-tidal artificial waterways is managed to avoid or minimise the release of nutrients of concern so as to minimise the occurrence, frequency and intensity of coastal algal blooms, and **AO9.2** Development in coastal catchments avoids or minimises and appropriately manages soil disturbance or altering natural hydrology, and *Editor's note: Compliance with this outcome may be demonstrated by following the management advice in the guideline: Implementing Policies and Plans for Managing Nutrients of Concern for Coastal Algal Blooms in Queensland by the Department of Environment and Heritage Protection.* **AO9.3** Development in coastal catchments: a. avoids lowering groundwater levels where potential or actual acid sulfate soils are present, and b. manages wastewaters so that: (i) the pH of any wastewater discharged is maintained between 6.5 and 8.5 to avoid mobilisation of acid, iron, aluminium, and metals, and (ii) holding times of neutralised wastewaters ensures the flocculation and removal of any dissolved iron prior to release, and (iii) visible iron floc is not present in any discharge, and (iv) precipitated iron floc is contained and disposed of, and (v) wastewater and precipitates that cannot be contained and treated for discharge on site are removed and disposed of through trade waste or another lawful method.	N/A N/A N/A

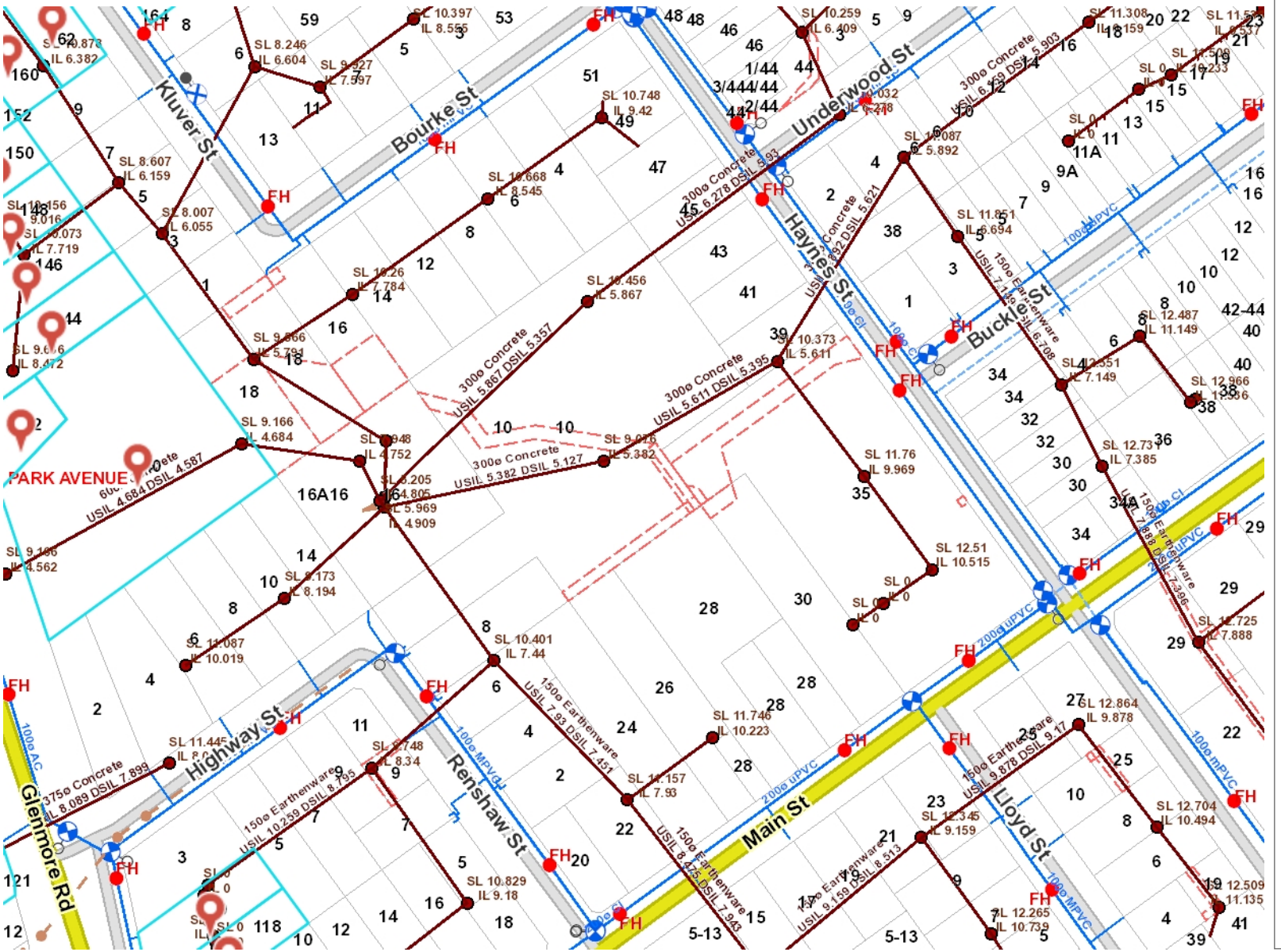
PO10 Any non-tidal artificial waterway is managed and operated by suitably qualified persons to achieve water quality objectives in natural waterways.	**AO10.1** Any non-tidal artificial waterway is designed, constructed and managed under the responsibility of a suitably qualified registered professional engineer, Queensland (RPEQ) with specific experience in establishing and managing artificial waterways, and **AO10.2** Monitoring and maintenance programs adaptively manage water quality in any non-tidal artificial waterway to achieve relevant water-quality objectives downstream of the waterway, and **AO10.3** Aquatic weeds are managed in any non-tidal artificial waterway to achieve a low percentage of coverage of the water surface area (less than 10%). Pests and vectors (such as mosquitoes) are managed through avoiding stagnant water areas, providing for native fish predators, and any other best practices for monitoring and treating pests, and **AO10.4** Any non-tidal artificial waterway is managed and operated by a responsible entity under agreement for the life of the waterway. The responsible entity is to implement a deed of agreement for the management and operation of the waterway that: a. identifies the waterway, and b. states a period of responsibility for the entity, and c. states a process for any transfer of responsibility for the waterway, and d. states required actions under the agreement for monitoring the water quality of the waterway and receiving waters, and e. states required actions under the agreement for maintaining the waterway to achieve the outcomes of this code and any relevant conditions of a development approval, and f. identifies funding sources for the above, including bonds, headworks charges or levies.	N/A N/A N/A, N/A

Appendix D. Dial Before You Dig

DBYD Number: 10121092

Sequence Number: 50058694

Glenmore Road Park Avenue QLD 4701



DBYD - RRC Sewer and Water Infrastructure Services

Legend - Water and Private Water

- Unknown
- Intake
- Pump Station
- Treatment Plant
- Reservoirs
- Hydrants
- Unknown Valve Type
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
- Valve Normally Closed
- Unknown Main Type
- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Water Service
- Abandoned Mains
- Abandoned Valves
- Unknown
- Intake
- Pump Station
- Treatment Plant
- Private Reservoir
- Private Water Hydrants
- Private Water Valves
- Private Water Joint
- Private Water Meters
- Private Water Maintenance Chambers
- Private Water Abandoned Valves
- Private Water Mains
- Private Water Service
- Private Water Abandoned Mains

Legend - Sewer and Private Sewer

- Pump Station
- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Access Chambers
- Roll Over
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned
- Pump Station
- Treatment Plant
- Sewer Access Chambers Private
- Sewer Joints Private
- Sewer Valves Private
- Sewer Gravity Mains Private
- Sewer Rising Mains Private
- Sewer Jump Ups Private
- Sewer Mains Abandoned Private
- Sewer Access Chambers Abandoned Private

NOTE: Dial Before You Dig maps DO NOT contain stormwater infrastructure.

If you require a map showing stormwater data, please email GIS@rrc.qld.gov.au and request an Enchanced Feature Map for stormwater.

A4 Page scale at 1: 2,218.68

GDA_1994_MGA_Zone_56

Printed from GeoCortex on 11/01/2016

Rockhampton Regional Council

Appendix E. Council Stormwater Management Code

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section A — If for a material change of use, reconfiguring a lot, operational work or building work		
Stormwater management - General		
PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to: (a) ensure that flooding impacts do not increase, including upstream or downstream of the development site; (b) avoid net worsening of stormwater peak discharges and runoff volumes; and (c) maximise the use of water sensitive urban design principles. Editor's note—A site-based stormwater management plan may be required to demonstrate compliance with the performance outcome.	AO1.1 Development provides a stormwater management system which is designed in compliance with SC6.19 — Stormwater management planning scheme policy, Queensland Urban Drainage Manual, Capricorn Municipal Design Guidelines and Australian Rainfall and Runoff. AND AO1.2 Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage easement, public reserve, public pathway, park or waterway corridor. AND AO1.3 Stormwater is conveyed to a lawful point of discharge in accordance with the Queensland Urban Drainage Manual. AND AO1.4 Development minimises large impervious areas and maximises opportunities for capture and reuse.	Detailed Stormwater design generally complies with QUDM, AR&R along with Capricorn Municipal Design Guidelines N/A private infrastructure Complies, Stormwater is discharged to a legal point of discharge. Refer to report for details Design optimises opportunities to capture all runoff and discharge in a non-worsening matter.
PO2 Development provides a stormwater management system which: (a) has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments;	AO2.1 Development provides a stormwater conveyance system which is designed to safely convey flows associated with all internal and external contributing catchment(s).	Preliminary Stormwater infrastructure is shown on Contour Plans. Detailed design stages will confirm the capacity of the conveyance systems.

(b) maximises the use of natural waterway corridors and natural channel design principles; and (c) efficiently integrates with existing stormwater treatments upstream and downstream.		
PO3 Development ensures that the location and design of stormwater detention and water quality treatment facilities: (a) minimise risk to people and property; (b) provide for safe access and maintenance; (c) minimise ecological impacts to creeks and waterways; and (d) provide for the safe recreational use of stormwater management features.	AO3.1 Development provides for stormwater detention and water quality treatment facilities which are located outside of a waterway. AND AO3.2 Development provides for stormwater detention in accordance with Queensland Urban Drainage Manual, Capricorn Municipal Design Guidelines and Australian Rainfall and Runoff . AND AO3.3 Development provides a stormwater quality treatment system which is designed in accordance with State Planning Policy - Water Quality.	Onsite detention and water quality measures are located at just prior to the legal point of discharge for the site. These are in the form of an Underground Detention tank and a Humes JellyFish treatment device. Detention tanks for Stormwater have been designed to generally comply with QUDM Section 5 along with AR&R and Capricorn Municipal Design Guidelines Stormwater Quality has been designed in accordance with the Water by Design- MUSIC Modelling Guidelines as set out in the State Planning Policy- Water Quality

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section A — If for a material change of use, reconfiguring a lot, operational work or building work		
Environmental Values		
PO4 Development and drainage works including stormwater channels, creek modification works, bridges, culverts and major drains, protect and enhance the environmental values of the waterway	AO4.1 Development ensures natural waterway corridors and drainage paths are retained. AND AO4.2	No Natural waterways or paths have been altered with in the proposed development. NA no natural channels are

corridors and drainage paths and permit terrestrial and aquatic fauna movement. Editor's note—Compliance with the performance outcomes and acceptable outcomes should be demonstrated by the submission of a site-based stormwater management plan for development.	Development incorporates the use of natural channel design principles in constructed components to maximise environmental benefits and waterway stability. AND AO4.3 Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the Queensland Urban Drainage Manual, Capricorn Municipal Design Guidelines and Australian Rainfall and Runoff.	proposed. Development features a detention basin which reduces the flow rate at the outlet of the stromwater. This minimises scour in accordance with QUDM, AR&R along with Capricorn Muncipal Design Guidelines
PO5 Development protects and enhances the environmental and water quality values of waterways, creeks and estuaries within or external to the site. Editor's note—The State Planning Policy - Guideline - Water Quality and Section 9 of the Environmental Protection Act 1994 define environmental values as 'a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety.'	No acceptable outcome is nominated.	Development protects the environmental and water quality values by filtering out TSS, TP & TN which helps to protect the surrounding waterways.

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section A — If for a material change of use, reconfiguring a lot, operational work or building work		
Stormwater flowpath tenure		
PO6 All overland stormwater flow paths are maintained under tenure arrangements that facilitate efficient infrastructure and enhance environmental sustainability.	No acceptable outcome is nominated.	All overland flow paths are maintained under tenure agreements as a part of this development. In line with previous approvals.

Editor's note—As a guide, Council prefers easements over an overland stormwater flow path where it is reasonable to assume that the property owner will maintain the area in a manner that is consistent with the balance of the parent lot. For overland stormwater flow paths where it would not be reasonable, or it would be impractical for the property owner to maintain the area of the easement consistent with the surrounding lot(s), Council prefers the area of the flow path to be dedicated as freehold tenure in favour of Council.		

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section A — If for a material change of use, reconfiguring a lot, operational work or building work		
Efficiency and whole of life cycle cost		
PO7 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. Editor's note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for development.	No acceptable outcome is nominated.	The proposed development ensures there is adequate space on site to incorporate an effective Stormwater management plan that generally complies with requirements set out in QUDM.
PO8 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the: (a) existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades; (b) safe management of stormwater discharge	No acceptable outcome is nominated.	The proposed development provides an orderly plan of the storm water infrastructure which deals with infrastructure upgrades, safe management of discharge and implications for adjacent development

from existing and future upslope development; and (c) implications for adjacent and down-slope development.		
PO9 Development provides proposed stormwater infrastructure which: (a) remains fit for purpose for the life of the development and maintains full functionality in the design storm event; and (b) can be safely accessed and maintained in a cost effective way.	No acceptable outcome is nominated.	The development Stormwater uses a cost effective JellyFish which can be cleaned efficiently along with fit for purpose infrastructure

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section A — If for a material change of use, reconfiguring a lot, operational work or building work		
Erosion and sediment control		
PO10 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: (a) the environmental values and water quality objectives of waters; (b) waterway hydrology; and (c) the maintenance	AO10.1 Water sensitive urban design and erosion and sediment control measures are implemented in accordance with the State Planning Policy - Guideline - Water Quality. AO10.2 Unnecessary disturbance to soil, waterways or drainage channels is avoided and all soil surfaces remain effectively stabilised against erosion during construction and in the long-term. AO10.3 Erosion and sediment control plans and measures are implemented during land disturbing activities to achieve the protection of environmental values of waters and the function of stormwater infrastructure.	WSUD and Erosion control measures are implement in accordance with State Planning Policy- Water Quality Un necessary disturbance to soil, waterways and drainage has been avoided in the proposed development along with erosion and sediment control procedures to be incorporated in the detailed design stage. Erosion and sediment control procedures will protect the environmental values of waters and function of the Stormwater infrastructure

and serviceability of stormwater infrastructure.		

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section B — Additional criteria which apply to: (a) material change of use for an urban purpose which involves greater than 2500 square metres of land or six (6) or more dwellings: (b) reconfiguring a lot for an urban purpose which: (i) would result in six (6) or more residential lots: or (ii) provides for six (6) or more dwellings: or (iii) involves greater than 2,500 swuare metres of land and results in an increased number of lots: and (c) operational work for an urban purpose which involves disturbing greater that 2,500 square metres of land.		
Water Quality		
PO11 For development proposals within the Fitzroy River sub-basin, relevant environmental values are recognised and enhanced, and relevant water quality objectives are addressed. Editor's note—Section 3.2 of Queensland Water Quality Guidelines 2009 identifies values for water quality for waters in the Central Coast Queensland region. AO11.1 Development complies with the provisions of the State Planning Policy - Guideline - Water Quality.	AO11.1 Development complies with the provisions of the State Planning Policy - Guideline - Water Quality. AO11.2 Development adjoining the full supply height above the Fitzroy River Barrage includes the provision of an effective buffer that assists in filtering runoff, including: (a) a buffer distance of 100 metres to the water supply height of the barrage which excludes cropping or grazing of a low intensity nature; and fencing and water troughs installed on the land to prevent encroachment of animals within 100 metres of the full supply height above the barrage	Proposed development complies with provisions of State Planning Policy- Guideline- Water Quality

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section B — Additional criteria which apply to: (a) material change of use for an urban purpose which involves greater than 2500 square metres of land or six (6) or more dwellings: (b) reconfiguring a lot for an urban purpose which: (i) would result in six (6) or more residential lots: or (ii) provides for six (6) or more dwellings: or (iii) involves greater than 2,500 swuare metres of land and results in an increased number of lots: and (c) operational work for an urban purpose which involves disturbing greater that 2,500 square metres of land.		
Protecting Water Quality		
PO12 The development is compatible with the land use constraints of the site for: (a) achieving stormwater design objectives; and avoiding or minimising the entry of contaminants into, and transport of contaminants in stormwater.	AO12.1 Development is undertaken in accordance with a site based stormwater management plan that: (a) is consistent with the State Planning Policy - Guideline - Water Quality; (b) provides for achievable stormwater quality treatment measures reflecting land use constraints, such as soil type, landscape features (including landform), nutrient hazardous areas, acid sulfate soil and rainfall erosion potential; and (c) accounts for development type, construction phase, local landscape, climatic conditions and design objectives. Editor's note—SC6.19 — Stormwater management planning scheme policy provides guidance on preparing a stormwater quality management plan.	The proposed development ensures there is an effective Stormwater management plan that generally complies with requirements set out in the State Planning Policy and provides achievable quality treatment measures.
PO13 Construction activities for the development avoid or minimise adverse impacts on stormwater quality.	AO13.1 Development is undertaken in accordance with a site based erosion and sediment control plan that demonstrates the release of sediment laden stormwater is avoided for the nominated design storm, and minimised when the nominated design storm is exceeded. AND AO13.2	Development will be taken out in accordance with measures set out in the Erosion and Sediment Control practices

	Erosion and sediment control practices, including any proprietary erosion and sediment control products, are designed, installed, constructed, operated, monitored and maintained, and any other erosion and sediment control practices are carried out, in accordance with local conditions and appropriate recommendations.	Erosion and Sediment control procedures to be followed to standard
PO14 Construction and operation activities for the development avoid or minimise changes to waterway hydrology from adverse impacts of altered stormwater quality and flow.	AO14.1 Development incorporates stormwater flow control measures to achieve at least the design objectives set out in the State Planning Policy - Guideline - Water Quality. AND AO14.2 Both the construction and operational phases for the development comply with the advice and design objectives in the State Planning Policy - Guideline - Water Quality including management of frequent flows, peak flows and construction phase hydrological impacts.	Develpoment incorporates a detention basin to control flow. Construction Phases to comply with the State Planning Policy

Performance Outcomes (PO)	Acceptable Outcomes (AO)	Response
Section B — Additional criteria which apply to: (a) material change of use for an urban purpose which involves greater than 2500 square metres of land or six (6) or more dwellings: (b) reconfiguring a lot for an urban purpose which: (i) would result in six (6) or more residential lots: or (ii) provides for six (6) or more dwellings: or (iii) involves greater than 2,500 swuare metres of land and results in an increased number of lots: and (c) operational work for an urban purpose which involves disturbing greater that 2,500 square metres of land.		
Protecting Water Quality in existing natural waterways		
PO15 The waterway is not designed only for stormwater flow management or stormwater quality management.	AO15.1 The waterway is designed and managed for any of the following end use purposes: (a) amenity including aesthetics,	Waterway is not disturbed as a non-worsening flow has been achieved

	landscaping and recreation; (b) flood management; (c) stormwater harvesting as part of an integrated water cycle management plan; (d) as a sustainable aquatic habitat; and the protection of water environmental values.	
PO16 The waterway is located in a way that is compatible with existing tidal waterways.	AO16.1 Where the waterway is located adjacent to, or connected to, a tidal waterway by means of a weir, lock, pumping system or similar: (a) there is sufficient flushing or a tidal range of more than 0.3 metres; or (b) any tidal flow alteration does not adversely impact on the tidal waterway; or there is no introduction of salt water into freshwater environments.	N/A
PO17 The construction phase for the waterway is compatible with protecting water environmental values in existing natural waterways.	AO17.1 Erosion and sediment control measures are incorporated during construction to achieve design objectives set out in Chapter 4 of the State Planning Policy - Guideline - Water.	N/A
PO18 Stormwater overflows from the waterway do not result in lower water quality objectives in existing natural waterways.	AO18.1 Stormwater run-off that may enter the non-tidal waterway is pre-treated in accordance with the guideline design objectives, water quality objectives of local waterways, and any relevant local area stormwater management plan.	N/A

Wednesday, 21 December 2011

Our Ref: 11032 / Office: Sunshine Coast
Council Ref: D/278-2011

The Chief Executive Officer
Rockhampton Regional Council
PO Box 1860
Rockhampton QLD 4700

ATTENTION: Amanda O'Mara

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D/278-2011
Dated 22.5.2012

Dear Amanda

INFORMATION RESPONSE

DEVELOPMENT PERMIT FOR MATERIAL CHANGE OF USE (SHOP) AND OPERATIONAL WORKS (SIGNAGE – PYLON SIGN)

MAIN STREET, PARK AVENUE, ROCKHAMPTON
LOT 1 & 2 ON RP607946, LOT 1 & 2 ON RP620251, LOT 2 RP617448, EASEMENT B SP 223545 (RIGHT OF WAY), EASEMENT A RP 886441 (PIPE LINE ACCESS AND DRAINAGE), EASEMENT C SP 232226 (DRAINAGE), LOT 666 SP152707 (ACCESS) AND LOT 1 LN1242 (ACCESS)

Further to Council's Information Request for the abovementioned proposal we now respond in full to each of the items raised.

The following specialist consultant documentation has been prepared in response to Council's information request:

Attachment 1 - Revised Proposal Plans prepared by BEAT Architects
Attachment 2 - Traffic Engineering Response prepared by TTM
Attachment 3 - Civil Engineering Response prepared by Farr Engineers

These documents have been referred to throughout our response to Council's information request items below:

Item 1
The building bulk and general appearance of the facade on the southern boundary is dominated by a wall of approximately seventy-four (74) metres in length. Therefore, to properly assess the building design and appearance please provide an amended plan of the South Eastern Elevation of the proposal in a suitable scale and in colour to demonstrate compliance with Performance Criteria P12 of the Activity Centres Code in the Rockhampton City Plan 2005.

Response: As verbally requested, please refer to the rescaled Elevation Plans prepared by BEAT Architects included as Attachment 1. All elevations have now been provided at a closer scale. The NE

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Sunshine Coast
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Alexandra Headland Qld 4572
PO Box 6380, Maroochydore BC Qld 4558
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North Queensland
1C/41 Sturt Street, Townsville Qld 4810
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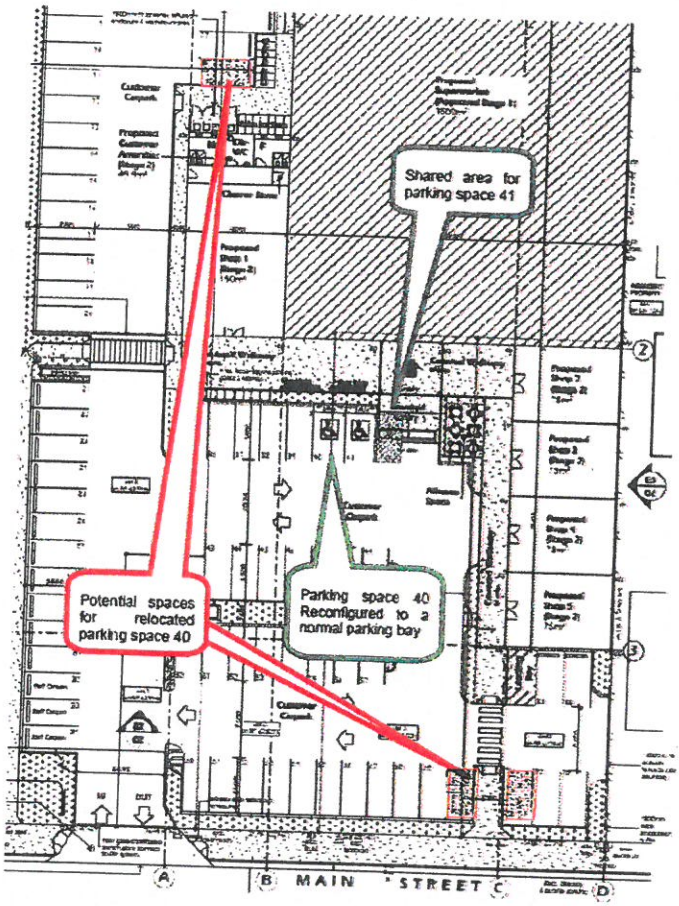
Ken Hicks & Associates Pty Ltd ACN 010 278 823 ABN 74 308 405 611 trading as KHA Development Managers

elevation (view from the adjacent PA hotel/motel) has a fire-rated concrete tilt-up wall, articulated with downpipes & decorative horizontal rebates. This detail is now evident in the closer scaled elevations.

In response to the Traffic Engineering items raised by Council, TTM have recommended some minor amendments to the Site Plan, specifically amended PWD bays to meet AS2890.6 (refer diagram below).



Item 2
It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two, that stage one has already been approved and the supermarket would be expected to generate in the order of 188 vehicles per hour (vph) during the Friday post morning (PM) peak. (Stage one traffic impact report has not been submitted with this application). Note that Council has considered this proposal as a new application (stage one and stage two). Thus any stage one document/reports referenced as approved previously in this application or associated with this development in any way must be updated/modified to incorporate all associated changes and submitted as part of the response to the information request. Any modification/update required in the traffic survey data must be incorporated as necessary.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 3
It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two, that the existing traffic volumes in the vicinity of the subject site were obtained from manual traffic surveys undertaken at the Main Street/Haynes Street and Main Street/Glenmore Road intersections. The traffic surveys recorded all movements over fifteen (15) minute intervals on Friday 19 February 2010 between 1400 hours and 1800 hours. Please note that the subject vicinity has a number of schools. Thus provide details and justify the reasons for ignoring morning school peaks during the above survey.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 4
The operational characteristics of the Main Street/Haynes Street intersection during 2022 base and design peak scenarios indicates that the maximum ninety-fifth (951h) percentile Back of Queue at Main Street - East will be around 121 metres. Please provide what arrangements/precautionary actions are in place to eliminate the impact of such a queue. Attention must also be given to the newly constructed carpark for the school in the close vicinity of the intersection.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 5
Please provide details demonstrating compliance of the proposed car parking for disabled people/accessible car parking space with Australian Standard AS2890.6.2009: Off Street Parking for People with Disabilities.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 6
Please provide dimension/details of loading bays in accordance with Australian Standard AS2890.2 (as amended).

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 7
Figure A7, dated 12 August 2011 submitted as part of the Traffic Impact Assessment Report dated 16 August 2011 for stage two indicates all ingress and egress movements of Heavy Rigid Vehicles (HRV) via Main Street. Please confirm the necessity of both ingress and egress of Heavy Rigid Vehicles (HRV) into the site via access the crossover located at Main Street frontage.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 8
Demonstrate the impact of left and right turning movements of semi trailers on to Main Street on the existing on-street parking along Main Street.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 9
Please provide details of the on-street parking spaces which may be required to be removed due to the proposed development (that is, both due to maintain adequate sightlines at access and semi-trailer movements). Indicate the extent of the parking

restrictions. Note that the proposed development is short of two (2) off-street car parking spaces and it is stated that on-street parking could be utilised during minor over flow. The location of and restrictions to kerb-side parking will be required to be established. Thus please identify how many on-street parking spaces will be removed due to this development and provide a modified kerb side parking layout for the full frontage.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 10
Please re-calculate the parking requirements based on Gross Floor Area as per the Rockhampton City Plan 2005 and appropriately correct all plans.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 11
It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two that the traffic generation rate of 12.5 vehicles per hour (vph)/1 00 square metres gross lettable floor area (Friday post morning (PM) peak, higher of the weekday peaks) has been adopted for this assessment. The summary of the findings, however, indicates that fifty-six (56) vehicles per hour (vph) would be generated by the additional 450 square metres of gross lettable floor area of speciality shops during the post morning (PM) peak period (that is, 1500 hours -1600 hours) of a typical Thursday afternoon. Please clarify the discrepancies between the peak post morning (PM) days.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 12
Figure A6, dated 12 August 2011 submitted as part of the Traffic Impact Assessment Report dated 16 August 2011 for stage two indicates both semi-trailer and Heavy Rigid Vehicles (HRV). Please clarify and amend as necessary.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 13
Please confirm that the access easement does not require any alterations in the existing hotel carparking layout and proposed development at Lot 1 on LN1242 (currently with Council for assessment). Bear in mind that there is set back issue.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 14
Provide details how the bicycle users will use the facility. Proposed traffic environment within the site will only suit bicycle users to share the vehicle manoeuvring area with all other vehicles.

Response: Please refer to Traffic Engineering Response prepared by TTM included as Attachment 2.

Item 15
The site based stormwater management plan and CSK 200 (Issue two) indicates that "site discharges to the existing dam in accordance with stage one approval". Note that Council will consider this proposal as a new application. Thus any stage one documents and drawings must be updated/modified as necessary and submitted as part of the response to the information request.

Further, response must include the following details as a minimum:

15.1 The lawful point of discharge in accordance with Queensland Urban Design Manual.
15.2 Satisfactory documentary evidence that an easement for stormwater drainage has been registered over lot 7 on RP606730 in favour of and nominating all of the existing lots that are part of the development site as the benefited lots. All the easement widths must be indicated.
15.3 An easement document including conditions agreed to by Council, the applicant and the adjoining landowners.
15.4 Please provide complete details of the work items (that is - excavation/re-profiling) associated with the stormwater discharge, specifically works required in the indicated dam area and further down stream. You may refer to the previous drawing "Proposed Easement and Additional Excavation 207060 SK 600_A dated 10 November 2009"
15.5 Provide a comprehensive drawing indicating all the associated easements and widths. Any previous drawings must be modified if necessary to include the additional catchment area (part of catchments Pavement A and Pavement B).

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 16
It is indicated in the table 7.1 (Water Quality Targets for development site) of the site based stormwater management plan the percentage of average annual Gross Pollutants load will be eighty (80) percent. Please confirm all the adopted water quality targets in accordance with Healthy Waterways, Water Sensitive Urban Design (WSUD) guidelines. Specifically choose the appropriate region suitable for Rockhampton and associated design parameters. Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model results must comply with the above chosen design parameters.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 17
Please provide cross sections of both overflow pits and surcharge pit located inside the bio - retention basins as indicated on submitted drawing CSK 200 (Issue 2) dated 26 August 2011 with associated levels.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 18
Runoff from catchment "Pavement C" is directly connected to detention tank A without going through the Humeseptor oil/sediment separator. Note that it appears most of this Pavement C area falls within the loading area. Thus please provide details to justify this arrangement and demonstrate that this arrangement will not compromise the water quality objectives of the receiving water body.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 19
Please provide cross section details of all detention tanks with inflow and outflow pipe outlets sizes, inverts and chambers (if any). Please provide calculations for the sizing of the outflow pipe outlets of the detention tanks for the predevelopment controlled flow.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 20
Please demonstrate that the outflow rate from the detention tank B is sufficient to keep the flow towards the humeseptor.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

Item 21
Please explain the function of the surcharge pit within the Bio-Retention basin (1 03.9 square metres) and provide details of the rainfall event (such as 02, Q3 month, Q5 etcetera) for which the bio retention systems have been designed. Please demonstrate that the associate basin capacities are sufficient to hold and treat the intended runoff. Please provide details on how both bio retention areas will function during a major event to facilitate the anticipated filtering process.

Response: Please refer to Civil Engineering Response prepared by prepared by Farr Engineers included as Attachment 3.

The Information and Referral Stage of IDAS has now concluded. We ask that you now provide details of adjoining owners in order that we may commence the public notification of the application.

Should you have any questions with respect to the above, please do not hesitate to contact me direct.

Yours faithfully
KHA DEVELOPMENT MANAGERS

Liam Pinese
SENIOR PLANNER

Information Request Response Form
(to be returned to the Assessment Manager with the response)

I Liam Pinese choose to respond to the Assessment Manager's Information Request:

☑ in full;

OR

☐ in part, with this notice asking the Assessment Manager and each referral agency to proceed with the assessment of the application;

OR

☐ stating that I do not intend to supply any of the information requested; and asking the Assessment Manager and each referral agency to proceed with the assessment of the application.

A copy of the response to the Assessment Manager's information request has been provided to all Referral Agencies nominated on the Acknowledgement Notice.

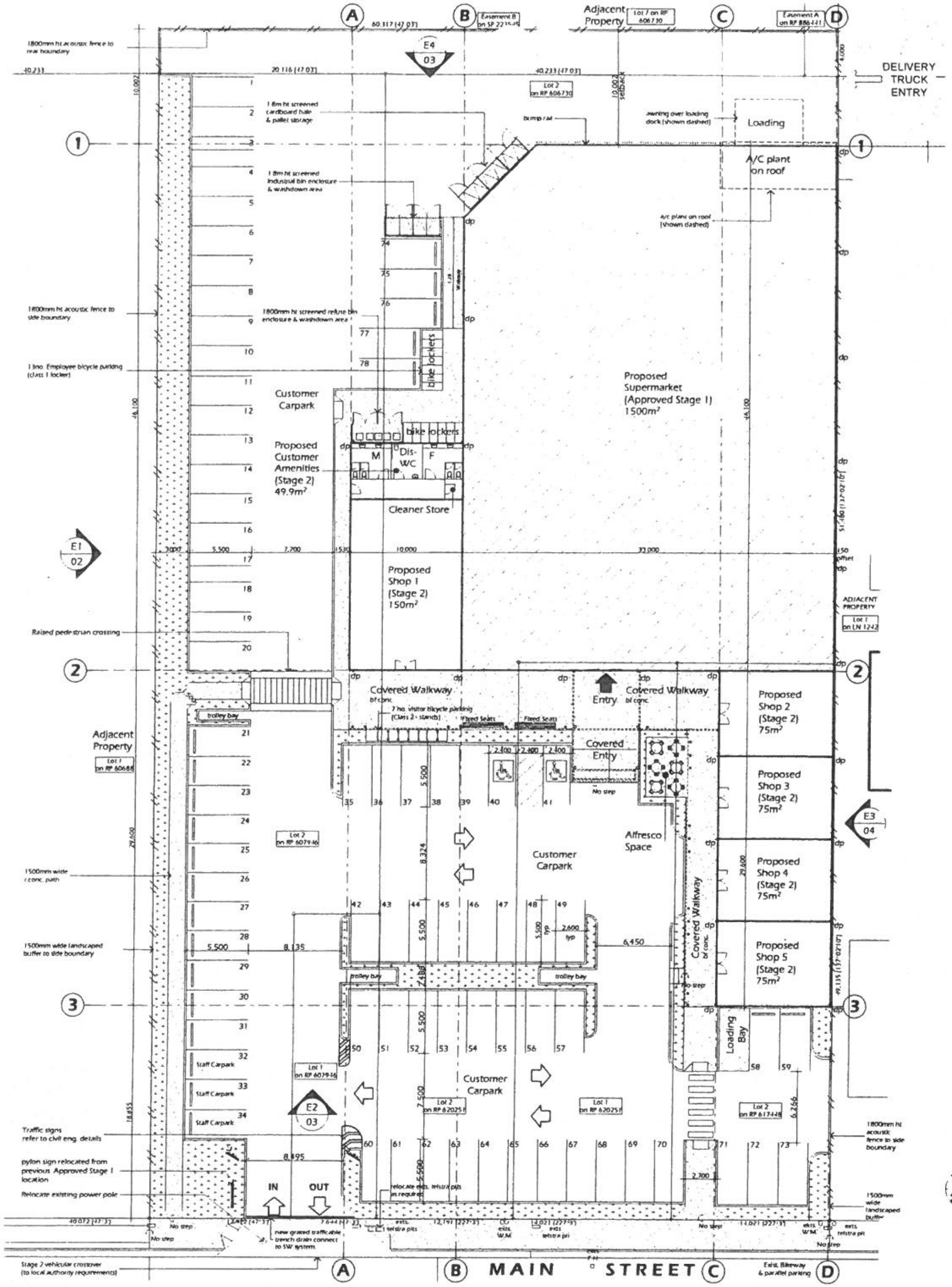
I understand the requirements of this Information Request as listed above.

Signed : _____ Date : 21/12/11

Position : Senior Town Planner

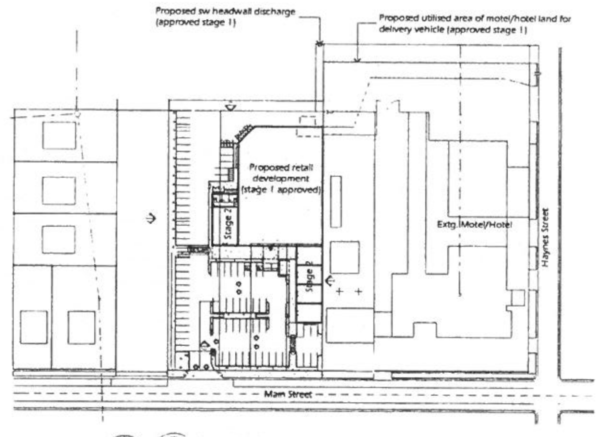
ATTACHMENT 1

Revised Proposal Plans
Prepared by BEAT Architects



1 Site Plan - Stage 2

scale 1:200 on A1, 1:400 on A3



2 Locality Plan

1:1000 on A1, 1:2000 on A3

Development Application Notes

Item	Required	Achieved
1. Zoning	Local Business & Residential	Local Business
2. Maximum GLA	-	Supermarket = 1500m² Specialty Stores = 450m² TOTAL = 1950m² Customer amenities = 49.9m²
3. Maximum Site Cover	60%	33% (1999.9m²/6073.9 m²)
4. Maximum Building Height	9m	5.5m
Maximum Pylon Sign Height	8.5m	8.2m
5. Carparking	78 (1/25m² GLD)	78 (incl. 2 disabled parks) 3 trolley return bays provided
6. Setbacks	6m to side boundary to a residential area (including min 3m landscape buffer) 6m to rear boundary to a residential area 1.5m landscape buffer to front alignment	Achieved (refer to plan)
7. Fencing	1800 high acoustic & visual fence	Achieved (refer to plan)
8. Waste Management	Nominate Storage Area inclosed with 1800high wall	Provided
9. Additional Carparking Requirements	Bicycle Facilities Employee - 1 space per 150m² of GLA (Class 1 system, 13 required) Visitor space - 1 space per 300m² of GLA (Class 2 system, 7 required)	Provided Employee - 13 bicycle lockers provided Visitor - 7 dual tyre locking stands provided

Property Description
Lot 1 on RP 620251
Lot 2 on RP 620251
Lot 2 on RP 617448
Lot 1 on RP 607946
Lot 2 on RP 607946
Lot 1 on RP 606088
Lot 2 on RP 607946
Easement A on RP 886441
Easement B on RP 8223545
Parish of Murchison
County of Livingstone
Site Area = 6073.9 m² (not including easements)
Easement Area = 237.8 m²

Notes:
1. Refer to Traffic Engineer Report for Delivery Vehicle Turning Circles
2. All Services shown approx only.

Site Legend

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rev	date	description
P1	30.11.10	Preliminary issue
P2	02.12.10	Preliminary issue
P3	05.04.11	Preliminary issue
P4	18.05.11	Bins Amended
P5	23.05.11	Supermarket Entry Shifted
P6	25.05.11	Alfresco area added
P7	23.06.11	Customer amenities amended
P8	28.06.11	Linemarking amended
P9	07.07.11	doors added to specialty shops, veranda columns repositioned, covered entry roof reduced
P10	02.08.11	bin enclosure shifted, retention & detention tank, bioretention area added, sw pits and drain added
P11	12.08.11	retention & detention tank removed, sw pits removed
P12	15.12.11	MCU Application Issue

IF IN DOUBT, ASK

client: Powercat Developments

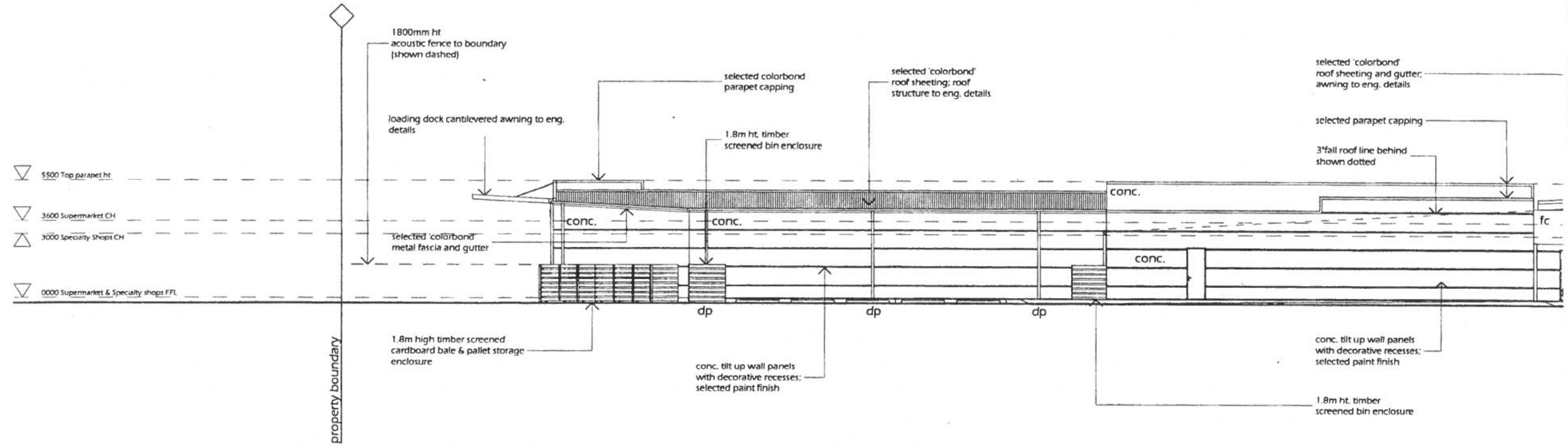
project: Proposed Retail Development Stage 2

address: Main Street, Park Avenue, North Rockhampton

title: Site Plan, Stage 2

BROWN EVANS + ASSOCIATES ARCHITECTS

design: ME | drawn: DG | scale: as shown | job no: 08389 | date: 18/05/2011 | dwg no: SD01 | A1 | sheet 1 of 2 | rev P12



E1 01 **South Western Elevation Part 1**
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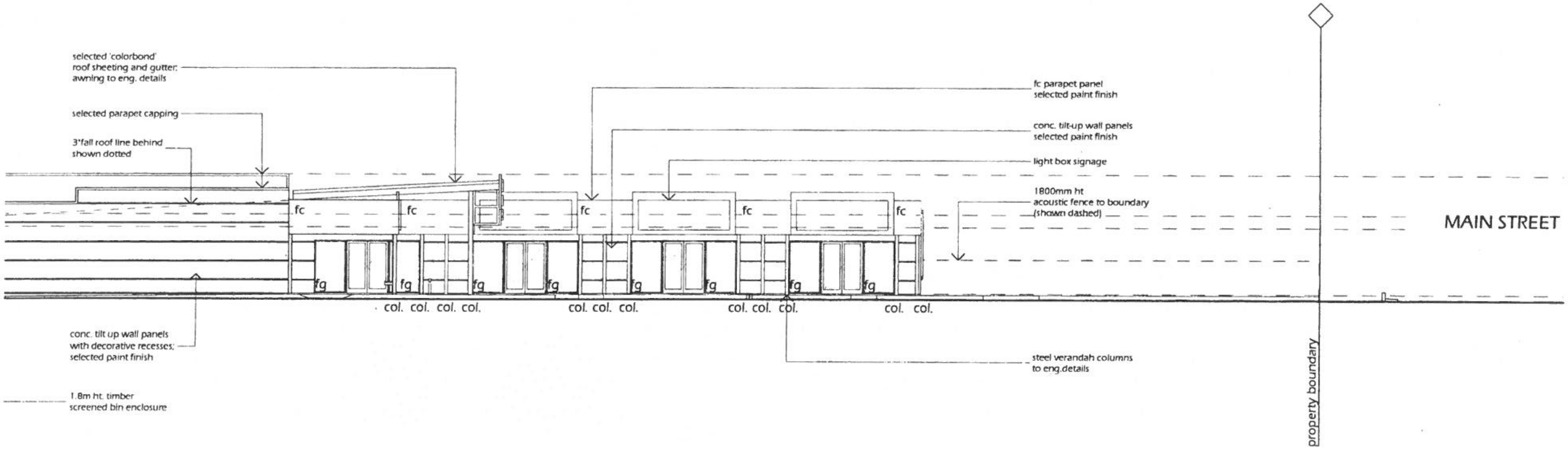

E1 01 **South Western Elevation Part 2**
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rev	date	description	dwn
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P2	12.05.11	Preliminary Issue	JJ
P3	15.12.11	MCU Application Issue	JJ

IF IN DOUBT, ASK

client: Powercat Developments
project: Proposed Retail Development - Stage 2
address: Main Street, Park Avenue, North Rockhampton
title: Elevations

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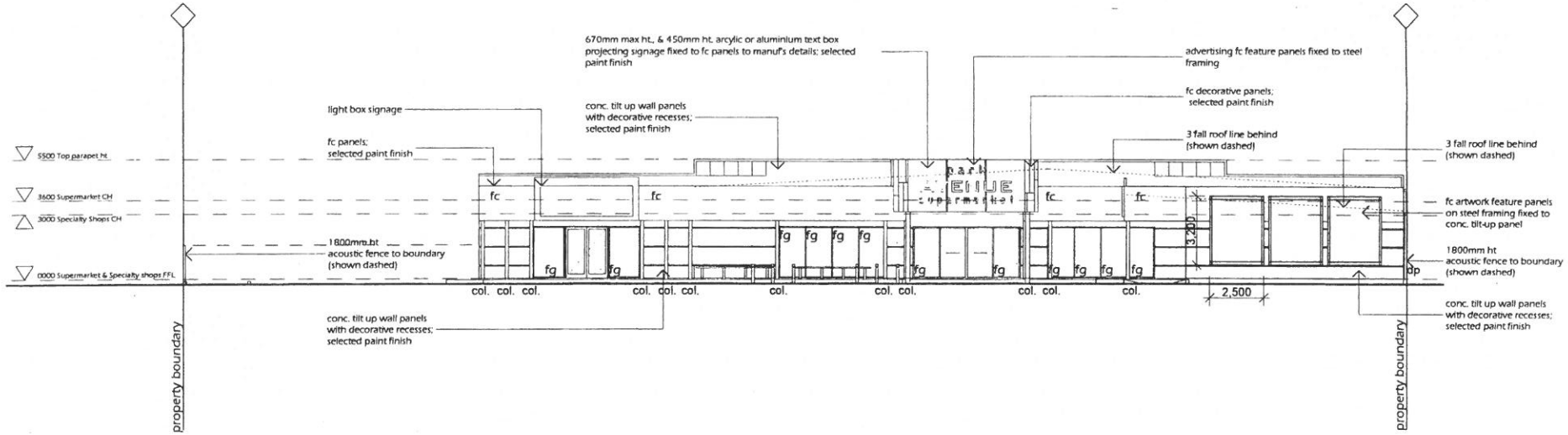
The Royal Australian Institute of Architects Membership 11797

drawn: ME | drawn: DG | chkd:
scale: as shown | job no: 06389
date: 07/07/2011 | dwg no: SD02
orig. size: A1 | sheet: 1 of 31 | rev: P3



E2 01 **South Eastern Elevation**

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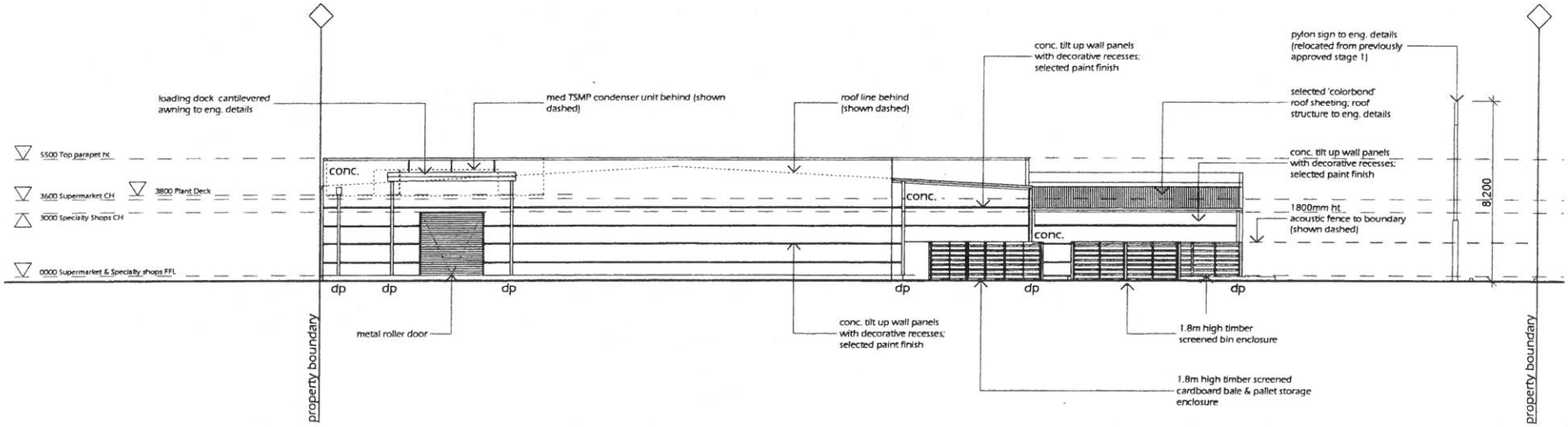

E4 01 **North Western Elevation**

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no.	date	description	drwn
P1	01.09.11	Preliminary Issue	JJ
P2	12.09.11	Preliminary Issue	JJ
P3	15.12.11	MCU Application Issue	JJ

IF IN DOUBT, ASK

client: **Powercat Developments**

project: **Proposed Retail Development - Stage 2**

address: **Main Street Park Avenue North Rockhampton**

title: **Elevations**

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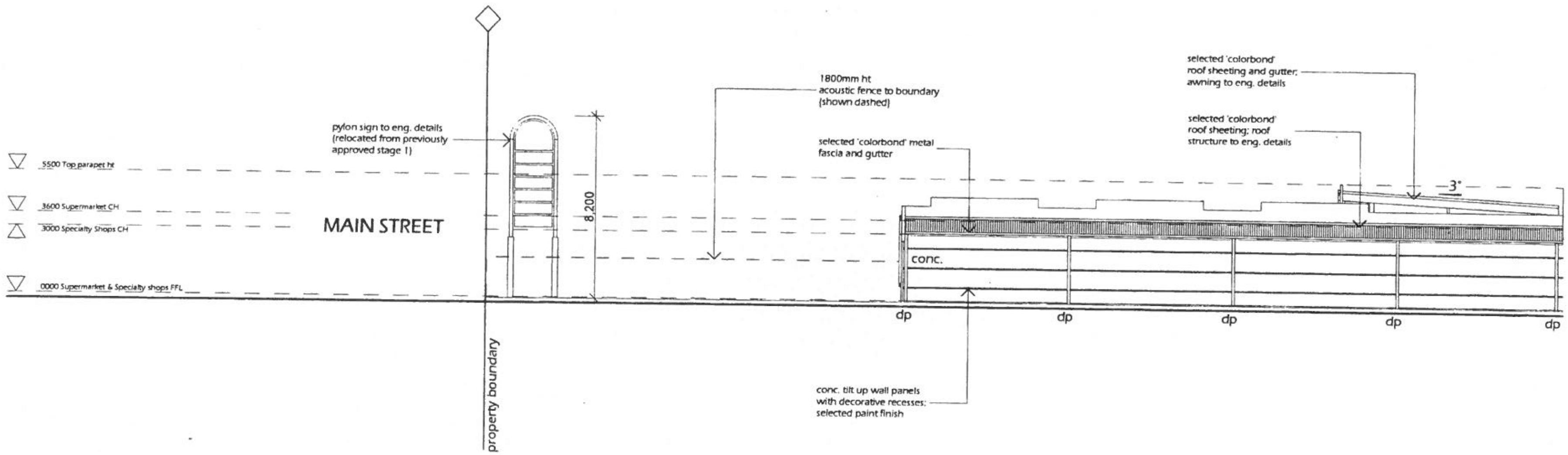
design ME | drawn DG | check
scale as shown | job no. 08388
date 07/07/2011 | dwg no. SD03
orig. size A1 | sheet 2 of 3 | rev P3



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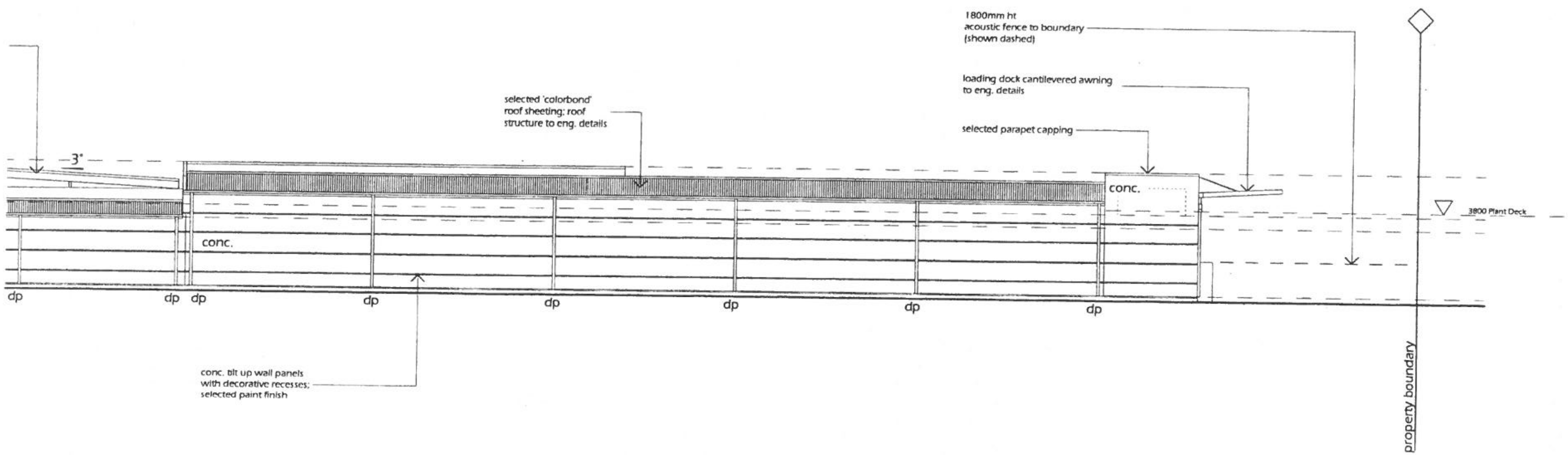

E3 01 **North Eastern Elevation Part 2**
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rev	date	description	dwn
P1	01 07 11	Preliminary Issue	JJ
P2	12 08 11	Preliminary Issue	JJ
P3	15 12 11	MCU Application Issue	JJ

IF IN DOUBT, ASK

client: Powercat Developments

project: Proposed Retail Development - Stage 2:

address: Main Street, Park Avenue, North Rockhampton

title: Elevations

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design: ME	drawn: DG	chkd:	
scale: as shown		job no: 08389	
date: 07/07/2011		dwg no: S004	
dwg size: A1	sheet: 3 of 3	rev: P3	

ATTACHMENT 2

Traffic Engineering Response
Prepared by TTM

TRAFFIC . PARKING . ACOUSTICS

14th December 2011
Our Ref: 11SCT0020
Your Ref:

ATT: Liam Pinese
Powercat Developments PTY Ltd Tte
c/o KHA Development Manager
PO Box 6380
Maroochydore BC, QLD 4558

Retail Development - Park Avenue, Rockhampton

Response Letter to Council

Dear Liam,

1. Introduction

TTM has been commissioned by Powercat Developments Pty Ltd Tte to respond to the information request received from Rockhampton Regional Council (MRC) dated 6th October 2011 in relation to the traffic aspects of the proposed development as follows:

2. It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two that stage one has already been approved and the supermarket would be expected to generate in the order of 188 vehicles per hour (vph) during the Friday post morning (PM) peak. (Stage one traffic impact report has not been submitted with this application). Note that Council has considered this proposal as a new application (stage one and stage two). Thus any stage one document/reports referenced as approved previously in this application or associated with this development in any way must be updated/ modified to incorporate all associated changes and submitted as part of the response to the information request. Any modification/update required in the traffic survey data must be incorporated as necessary.

3. It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two, that the existing traffic volumes in the vicinity of the subject site were obtained from manual traffic surveys undertaken at the Main Street/ Hanes Street and Main Street/ Glenmore Road intersections. The traffic surveys recorded all movements over fifteen (15) minute intervals on Friday 19 February 2010 between 1400 hours and 1800 hours. Please note that the subject vicinity has a number of schools. Thus provide details and justify the reasons for ignoring morning school peaks during the above survey.

4. The operational characteristics of the Main Street/ Haynes Street intersection during 2022 base and design peak scenarios indicates that the maximum ninety-fifth (95th) percentile Back of Queue at Main Street – East will be around 121 metres. Please provide what arrangements / precautionary actions are in place to eliminate the impact of such a queue.

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Attention must also be given to the newly constructed car park for the school in the close vicinity of the intersection.

5. Please provide details demonstrating compliance of the proposed car parking for disabled people/ accessible car parking space with Australian Standard AS2890.6.2009: Off Street Parking for People with □isabilities.

6. Please provide dimension/details of loading bays in accordance with Australian Standard AS2890.2 (as amended).

□. Figure A□, dated 12 August 2011 submitted as part of the Traffic Impact Assessment Report dated 16 August 2011 for stage two indicates all ingress and egress movements of Heavy Rigid □ehicles (HR□) via Main Street. Please confirm the necessity of both ingress and egress of Heavy Rigid □ehicles (HR□) into the site via access the crossover location at Main Street frontage.

8. □emonstrate the impact of left and right turning movements of semi trailers on to Main Street on the existing on-street parking along Main Street

9. Please provide details of the on-street parking spaces which may be required to be removed due to the proposed development (that is, both due to maintain adequate sightlines at access and semi-trailer movements). Indicate to the extent of the parking restrictions. Note that the proposed development is short of two (2) off-street car parking spaces and it is stated that on-street parking could be utili□ed during minor over flow. The location of and restrictions to kerb-side parking will be required to be established. Thus please identify how many on-street parking spaces will be removed due to this development and provide a modified kerb side parking layout for the full frontage.

10. Please re-calculate the parking requirements based on Gross Floor Area as per the Rockhampton City Plan 2005) and appropriately correct all plans.

11. It is stated in the submitted Traffic Impact Assessment Report dated 16 August 2011 for stage two that the traffic generation rate of 12.5 vehicles per hour (vph)/100 square metres gross lettable floor area (Friday post morning (PM) peak, higher of the weekday peaks) has been adopted for this assessment. The summary of findings, however, indicates that fifty six (56) vehicles per hour (vph) would be generated by the additional 450 square metres of gross lettable floor area of specialty shops during the post morning (PM) peak period (that is, 1500 hours – 1600 hours) of a typical Thursday afternoon. Please clarify the discrepancies between the peak post morning (PM) days.

12. Figure A6, dated 12 August 2011 submitted as part of the Traffic Impact Assessment report dated 16 August 2011 for stage two indicates both semi-trailer and Heavy Rigid □ehicles (HR□). Please clarify and amend as necessary.

13. Please confirm that the access easement does not require any alterations in the existing hotel car parking layout and proposed development at □ot 1 on □N1242 (currently with Council for assessment). Bear in mind that there is a set back issue.

14. Provide details how the bicycle users will use the facility. Proposed traffic environment within the site will only suit bicycle users to share the vehicle manoeuvring area with all other vehicles.

2. Context (Response to Item 2)

The site is located at 26 □ 28 Main □treet in Park Avenue, as shown in □igure 1□The site has road frontages to Main □treet only and is currently vacant□

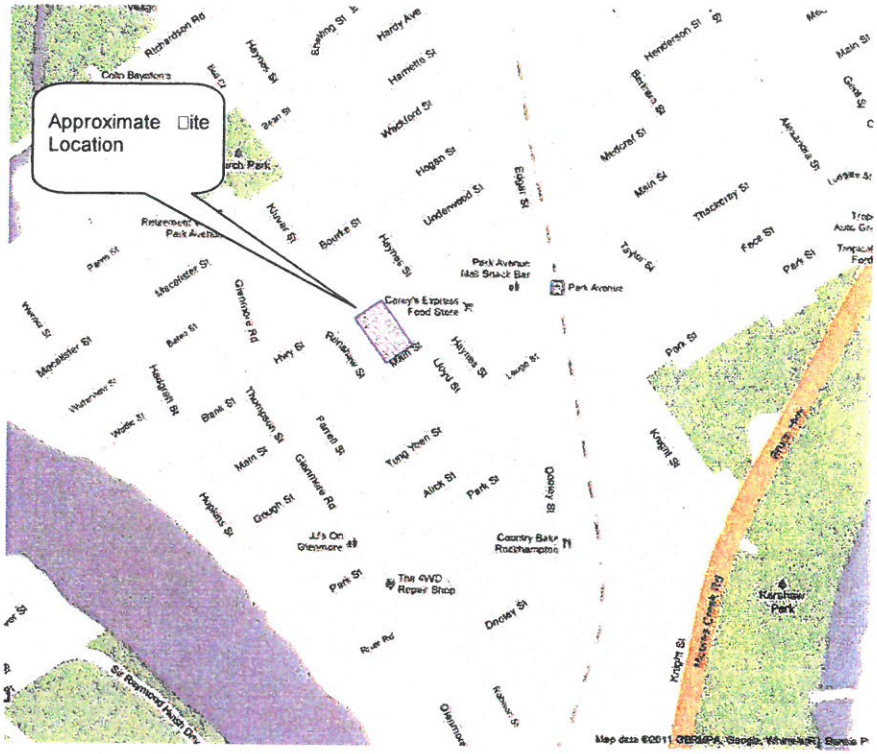

Figure 1: Site Location

The development proposal is for a 1,500m^2 supermarket with five specialty shops comprising 450m^2□

TTM have been unable to receive an editable copy of any previous traffic reports and as such this letter will provide an assessment of the overall development with Council□s R□□as a guide□

3. Morning (AM) peak (Response to Item 3)

□t is generally considered appropriate to assess traffic generation for a retail development in the AM peak period at a rate of 25□ of the PM peak period□As such retail developments rarely have the level of impact on the local road network in the AM peak as they do in the PM peak□The proposed development (□tage 1 and 2) is anticipated to generate 244vph in the PM peak□As such this same development is expected to generate only 61vph in the AM peak□

Considering that this is split between incoming and outgoing vehicles and in various directions (to □from the east □west) it is anticipated that the 61vph generated by this development in the AM peak will have, at worst, a minor impact on the local road network□□urthermore, school peaks, as

discussed in □tem 3 of Council□s R□□ generally occur at a different time (i□e□8:30□□:30am) than retail □commercial AM peak periods (□:30□8:30am)

4. SIDRA analysis (Response to Item 4)

TTM have analysed the Main □treet □□aynes □treet intersection using □idra version 5□0□□The traffic volumes in the previous traffic report for the total development have been used for this analysis□

TTM have used a short right turn lane from the eastern and western legs of Main □treet for this intersection analysis□This is because the Main □treet carriageway is more than 12m wide, and the Main □treet lanes entering the intersection are 6m wide□□iven the no standing restrictions on these two lanes for 20m prior to the intersection, these legs are wide enough to accommodate 2 alongside each other vehicles for this 20m distance□The eastern Main □treet leg has been modelled as 30m as there is an access beside the existing no standing sign

The short right turn lanes have been modelled as opposed to short left turns lanes, as through traffic is more likely to follow a slow left turning vehicle than a stationary right turning vehicle if given the choice□

The intersection layout used and detailed □idra results are shown in Attachment A□A summary of the □idra results is shown below in Table 1□

Table 1: Summary of Sidra Outputs

Case	Degree of Saturation	Maximum Average Delay	Maximum Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2012 PM Base Case	52□4□	20□3	C	25□□	35□3	35□6	24□2
2012 PM Pro□ect Case	54□5□	20□6	C	26□□	38□□	41□0	32□1
2022 PM Base Case	□3□4□	23□□	C	3□□2	48□□	4□□□	32□5
2022 PM Pro□ect Case	□6□2□	25□5	C	3□□0	51□□	53□□	40□6

The results in Table 1 show that the development will have a minor impact on the operation of the Main □treet □□aynes □treet intersection in 2012 and 2022□These results also show that the maximum queue from the eastern Main □treet leg is anticipated to be less than 54m in the 2022 pro□ect case scenario□As such the existing school access on this leg is beyond the influence of queuing at the Main □treet □□aynes □treet intersection under normal conditions□

5. PWD Bays (Response to Item 5)

TTM recommend that P□ D bays be located and designed as per A□28□0□6□As such TTM recommend that parking space 41 remain as a P□ D space and the ad□acent entry walkway be the shared area for that space i□e□provided at same level as P□ D bay□

TTM also recommend that parking space 40 be reconfigured into a normal bay and the P□ D bay be relocated to parking space □0, □1, or □8, and the ad□acent walkway be the shared area for that space i□e□provided at same level as P□ D bay□

These recommendations are shown in □igure 2 below□

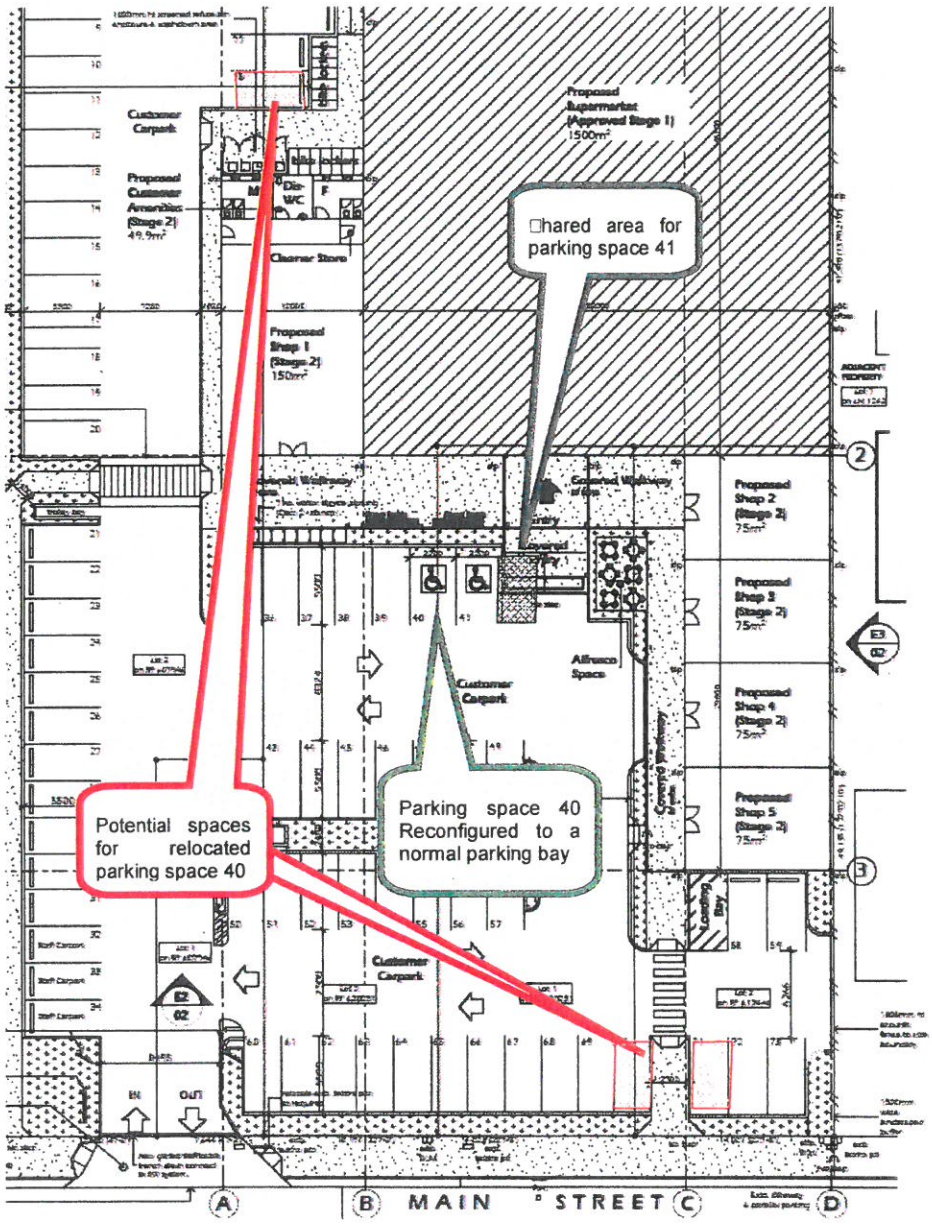

Figure 2: TTM Recommendations for PWD bays.

6. Loading Bays (Response to Item 6)

TTM recommend the northern loading bay be suitable for an A□ i□e□1□□0m x 3□5m□

The southern loading bay is designed with the performance solution of providing access to a van□ As shown in □igure 3, below, a van is able to adequately manoeuvre into and from the southern loading bay□

□t is anticipated that an □R□ or MR□ may require access to this location on infrequent occasions□ □hould a larger vehicle up to an MR□, require access this area, they can stand ad□acent to □hop 4 and 5, and therefore will not require any reverse manoeuvre within the development□This is shown in □igure 4□

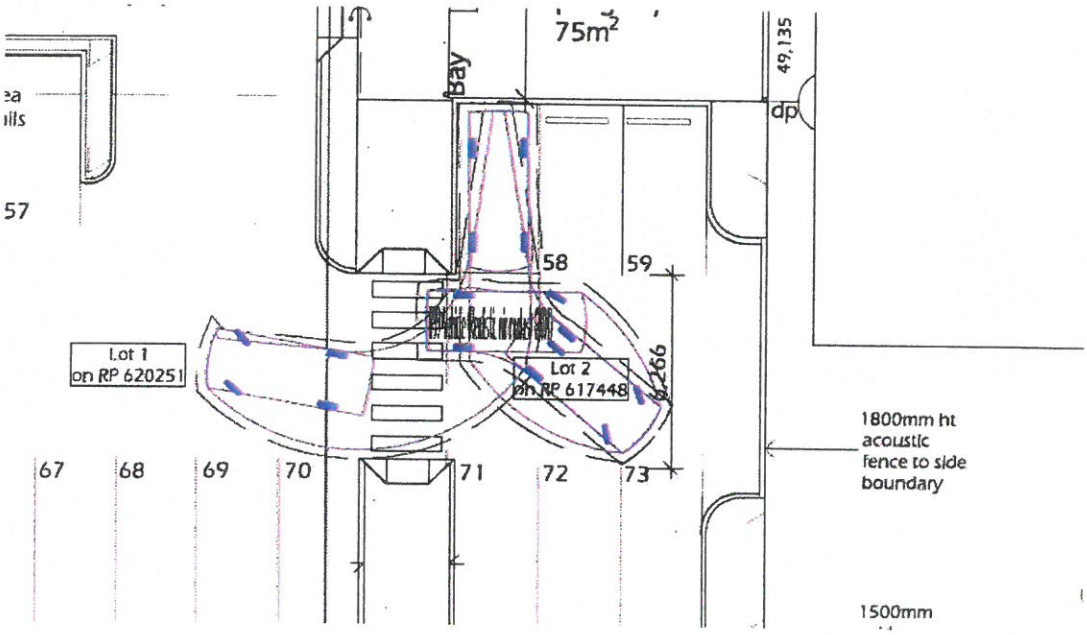

Figure 3: Van Manoeuvring in Southern Loading Bay

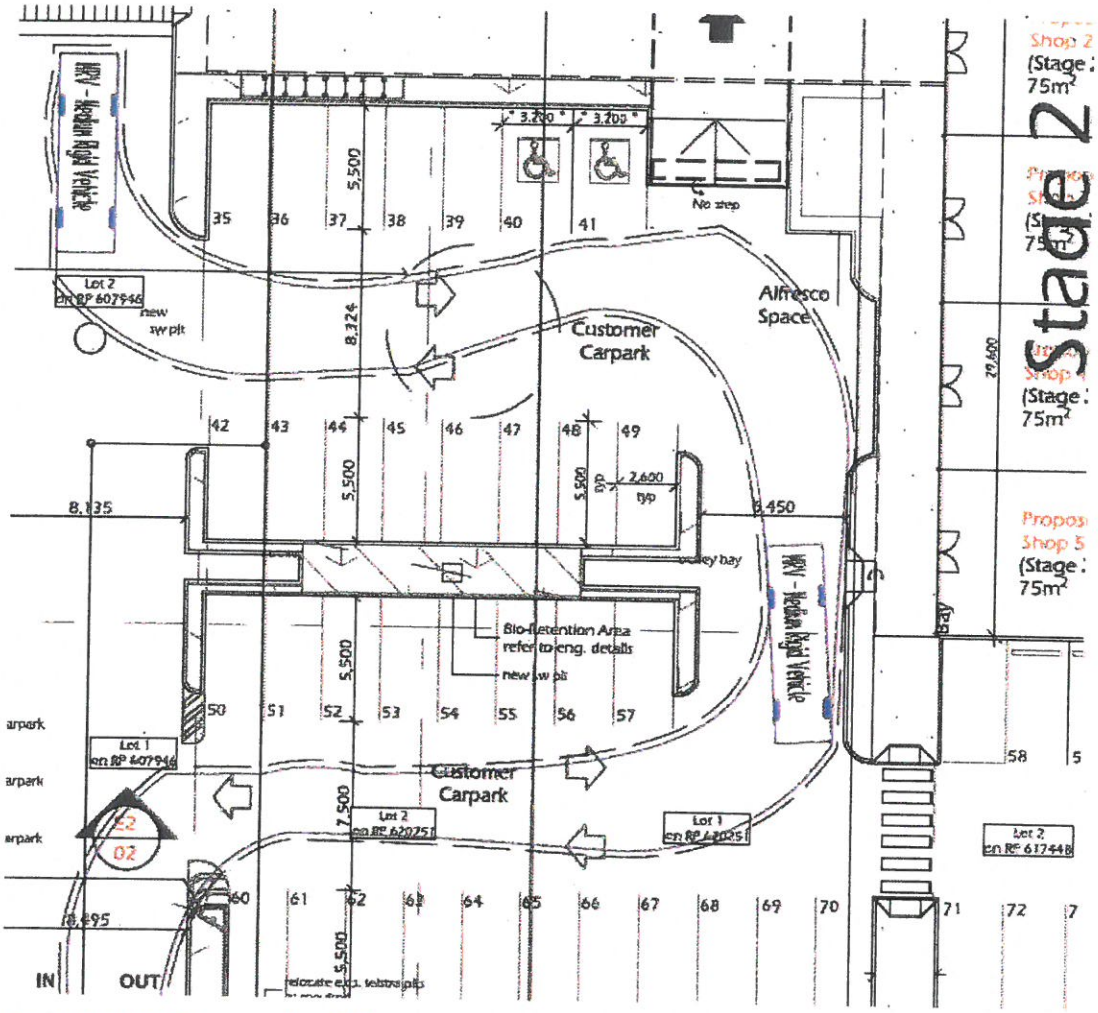

Figure 4: MRV Manoeuvring Adjacent to Shop 4 and 5

7. Service Vehicle Movements

a. Internal Service Vehicle Movements (Response to Item 7)

TTM recommend that all service vehicles, of MR□ si□e or larger, access the site from the □aynes □treet easement, including most refuse collection vehicle ingress□□R□s and vans are able to access the site via Main □treet with a negligible impact on its operation□

This being said, refuse collection vehicle access to the site can be undertaken via Main □treet, only outside opening hours of the development, when vehicle and pedestrian movements through the car park will be minimal □nil, and outside peak traffic periods on Main □treet i□e□prior to □am and after □pm□This has been considered to provide a choice of access options for refuse collection vehicles only□

b. External Service Vehicle Movements (Response to Item 8 and 9)

TTM have undertaken a swept path analysis for A□s and □R□s exiting the site via Main □treet□ This is shown attached this letter in Attachment B□This analysis shows that on□street parking may have to be removed from the southern side of Main □treet approximately 20m west of the proposed access location□This is unlikely to result in the loss of more than 2 on□street parking spaces, due to existing domestic accesses□

c. General Service Vehicle Movements (Response to Item 12 and 13)

The service vehicle identified and used in □igure A6 is an □R□□As manoeuvring of an A□ is shown in □igure A5, TTM believe this is suitable□

□igure 5 shows the swept path analysis of an A□ and □R□ accessing the proposed loading area from □aynes □treet□This swept path analysis that no modification to the easement is required, beyond a slight widening of the □aynes □treet access indicated in the previous traffic report□

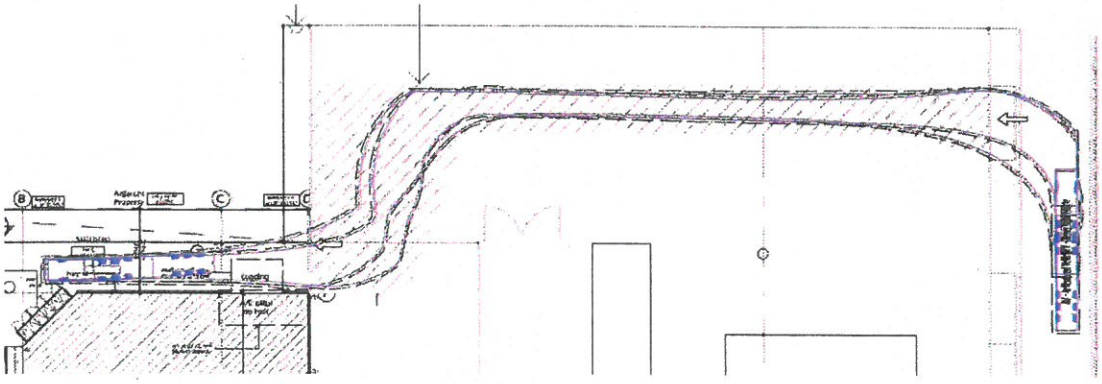

Figure 5: HRV / AV Accessing Site from Haynes Street

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8. Parking Supply (Response to Item 10)

TTM have been informed that the total □□A of the development is 1□50m^2□The Parking and Access Code from the Rockhampton City Plan 2005 requires 1 parking space per 25m^2 for a shop in a District and Local □hopping □□eighbourhood Centre□As such □8 parking spaces are required for this development by the Rockhampton City Plan 2005□The proposed development provides □8 parking spaces which is considered suitable□

9. Traffic Generation Peak Days (Response to Item 11)

The previous traffic report used □riday afternoon traffic data and □riday afternoon traffic generation data□The comment regarding a □typical Thursday afternoon□in this previous report appears to be a typographical error□

The □riday afternoon figures and rates used in the previous report are considered suitable□

10. Bicycle Access (Response to Item 14)

Bicycle access will be from Main □treet only, and will not be permitted from □aynes □treet□The development plans offer two pedestrian paths from Main □treet which allows cyclists to walk to the bicycle lockers□

□xperienced cyclists and cyclists knowledgeable with the development i□e□staff, are likely to cycle into car park with all other vehicles□Beginner cyclists and cyclists unfamiliar with the development are likely to dismount prior to accessing the car park□

□hould Council believe it necessary, the development is prepared to locate signs indicating cyclists to dismount at the main pedestrian access to the development from Main □treet□

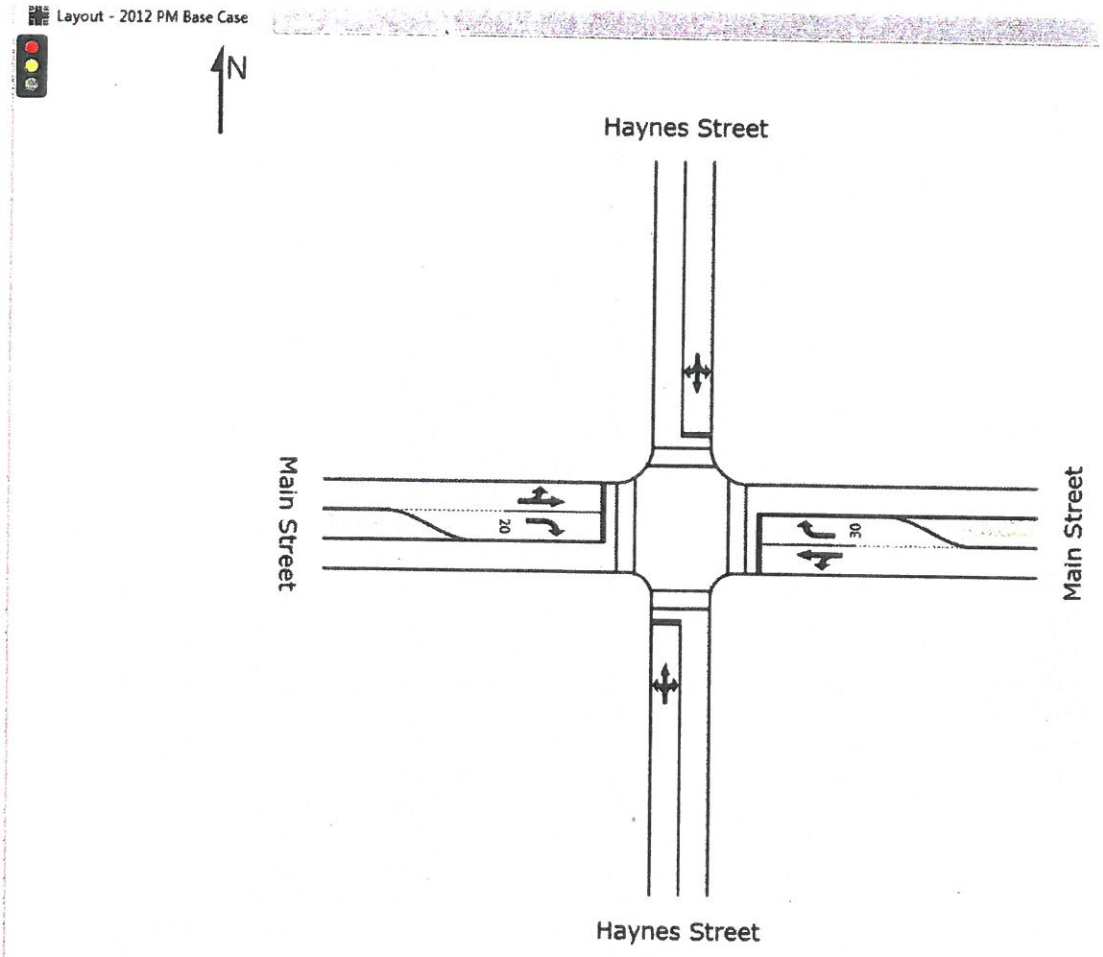
TTM can find no traffic engineering reason why the proposed shopping centre should not be granted the relevant approvals□□f you have any queries in relation to the information provided, please feel free to contact □ary □arris on 332□ □500□

Yours faithfully,

Gary Harris

Traffic □ngineer

Att: Main □treet □□aynes □treet □idra layout and results
A□ and □R□ swept paths at Main □treet access□


Layout - 2012 PM Base Case
N
Haynes Street
Main Street
Main Street
20
30
Haynes Street

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MOVEMENT SUMMARY

Main Street / Haynes Street
2012 PM Base Case

Site: 2012 PM Base Case

Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Haynes Street											
1	L	1	5.0	0.360	20.1	LOS C	3.5	25.7	0.81	0.80	39.1
2	T	43	5.0	0.373	11.9	LOS B	3.5	25.7	0.81	0.66	40.4
3	R	108	5.0	0.373	20.4	LOS C	3.5	25.7	0.81	0.81	39.1
Approach		153	5.0	0.373	18.0	LOS B	3.5	25.7	0.81	0.77	39.5
East: Main Street											
4	L	107	5.0	0.330	16.6	LOS B	4.8	35.3	0.71	0.84	42.4
5	T	152	5.0	0.330	8.5	LOS A	4.8	35.3	0.71	0.59	44.7
6	R	200	5.0	0.524	19.0	LOS B	4.2	30.6	0.77	0.80	38.5
Approach		459	5.0	0.524	15.0	LOS B	4.8	35.3	0.73	0.74	41.8
North: Haynes Street											
7	L	161	5.0	0.387	20.1	LOS C	4.9	35.6	0.81	0.81	39.2
8	T	51	5.0	0.387	11.8	LOS B	4.9	35.6	0.81	0.67	40.5
9	R	12	5.0	0.366	20.3	LOS C	4.9	35.6	0.81	0.81	39.2
Approach		223	5.0	0.387	18.2	LOS B	4.9	35.6	0.81	0.78	39.5
West: Main Street											
10	L	35	5.0	0.225	16.5	LOS B	3.3	24.2	0.67	0.67	43.3
11	T	144	5.0	0.225	8.1	LOS A	3.3	24.2	0.67	0.55	46.0
12	R	2	5.0	0.008	17.9	LOS B	0.0	0.3	0.67	0.85	40.2
Approach		181	5.0	0.225	9.8	LOS A	3.3	24.2	0.67	0.61	45.4
All Vehicles		1016	5.0	0.524	15.3	LOS B	4.9	35.6	0.75	0.73	41.5

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM)
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	9.8	LOS A	0.0	0.0	0.70	0.70
P3	Across E approach	53	14.5	LOS B	0.1	0.1	0.85	0.85
P5	Across N approach	53	9.8	LOS A	0.0	0.0	0.70	0.70
P7	Across W approach	53	14.5	LOS B	0.1	0.1	0.85	0.85

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MOVEMENT SUMMARY

Site: 2012 PM Project Case

Main Street / Haynes Street
2012 PM Project Case

Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Haynes Street											
1	L	6	5.0	0.369	20.4	LOS C	3.7	26.7	0.81	0.80	39.1
2	T	43	5.0	0.369	12.0	LOS B	3.7	26.7	0.81	0.67	40.3
3	R	108	5.0	0.390	20.5	LOS C	3.7	26.7	0.81	0.81	39.0
Approach		158	5.0	0.390	18.2	LOS B	3.7	26.7	0.81	0.77	39.4
East: Main Street											
4	L	107	5.0	0.362	17.1	LOS B	5.3	36.9	0.72	0.85	42.4
5	T	178	5.0	0.362	8.7	LOS A	5.3	36.9	0.72	0.61	44.6
6	R	200	5.0	0.545	20.0	LOS C	4.4	32.3	0.80	0.80	38.7
Approach		485	5.0	0.545	15.2	LOS B	5.3	36.9	0.75	0.74	41.6
North: Haynes Street											
7	L	161	5.0	0.462	20.5	LOS C	5.6	41.0	0.84	0.81	38.9
8	T	51	5.0	0.461	12.2	LOS B	5.6	41.0	0.84	0.70	40.0
9	R	43	5.0	0.461	20.6	LOS C	5.6	41.0	0.84	0.82	38.9
Approach		255	5.0	0.462	18.9	LOS B	5.6	41.0	0.84	0.79	39.1
West: Main Street											
10	L	66	5.0	0.299	16.8	LOS B	4.4	32.1	0.70	0.86	42.9
11	T	171	5.0	0.299	8.4	LOS A	4.4	32.1	0.70	0.56	45.3
12	R	7	5.0	0.026	18.8	LOS B	0.2	1.2	0.70	0.66	39.6
Approach		244	5.0	0.299	11.0	LOS B	4.4	32.1	0.70	0.66	44.4
All Vehicles		1142	5.0	0.545	15.5	LOS B	5.6	41.0	0.77	0.74	41.2

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	9.8	LOS A	0.0	0.0	0.70	0.70
P3	Across E approach	53	14.5	LOS B	0.1	0.1	0.85	0.85
P5	Across N approach	53	9.8	LOS A	0.0	0.0	0.70	0.70
P7	Across W approach	53	14.5	LOS B	0.1	0.1	0.85	0.85

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MOVEMENT SUMMARY

Site: 2022 PM Base Case

Main Street / Haynes Street
2022 PM Base Case

Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Haynes Street											
1	L	1	5.0	0.540	21.8	LOS C	5.1	37.2	0.88	0.85	36.1
2	T	59	5.0	0.563	13.6	LOS B	5.1	37.2	0.88	0.76	38.9
3	R	145	5.0	0.563	22.1	LOS C	5.1	37.2	0.88	0.85	36.1
Approach		205	5.0	0.563	19.6	LOS B	5.1	37.2	0.88	0.83	36.3
East: Main Street											
4	L	144	5.0	0.444	17.5	LOS B	6.6	47.9	0.75	0.85	42.1
5	T	204	5.0	0.444	9.1	LOS A	6.6	47.9	0.75	0.64	44.0
6	R	268	5.0	0.734	23.7	LOS C	6.7	48.9	0.85	0.91	36.3
Approach		617	5.0	0.734	17.4	LOS B	6.7	48.9	0.80	0.81	39.9
North: Haynes Street											
7	L	216	5.0	0.516	20.8	LOS C	6.5	47.7	0.86	0.82	36.8
8	T	67	5.0	0.516	12.4	LOS B	6.5	47.7	0.86	0.72	39.6
9	R	15	5.0	0.517	20.9	LOS C	6.5	47.7	0.86	0.83	38.8
Approach		298	5.0	0.516	18.9	LOS B	6.5	47.7	0.86	0.80	39.0
West: Main Street											
10	L	46	5.0	0.302	16.8	LOS B	4.5	32.5	0.70	0.87	43.1
11	T	194	5.0	0.302	8.4	LOS A	4.5	32.5	0.70	0.58	45.5
12	R	3	5.0	0.012	19.5	LOS B	0.1	0.5	0.72	0.66	39.1
Approach		243	5.0	0.302	10.2	LOS B	4.5	32.5	0.70	0.64	45.0
All Vehicles		1363	5.0	0.734	16.8	LOS B	6.7	48.9	0.81	0.76	40.3

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM)
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	9.6	LOS A	0.0	0.0	0.70	0.70
P3	Across E approach	53	14.5	LOS B	0.1	0.1	0.85	0.85
P5	Across N approach	53	9.6	LOS A	0.0	0.0	0.70	0.70
P7	Across W approach	53	14.5	LOS B	0.1	0.1	0.85	0.85

ttm
Traffic Parking Acoustics

MOVEMENT SUMMARY

Site: 2022 PM Project Case

Main Street / Haynes Street
2022 PM Project Case

Signals - Fixed Time Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

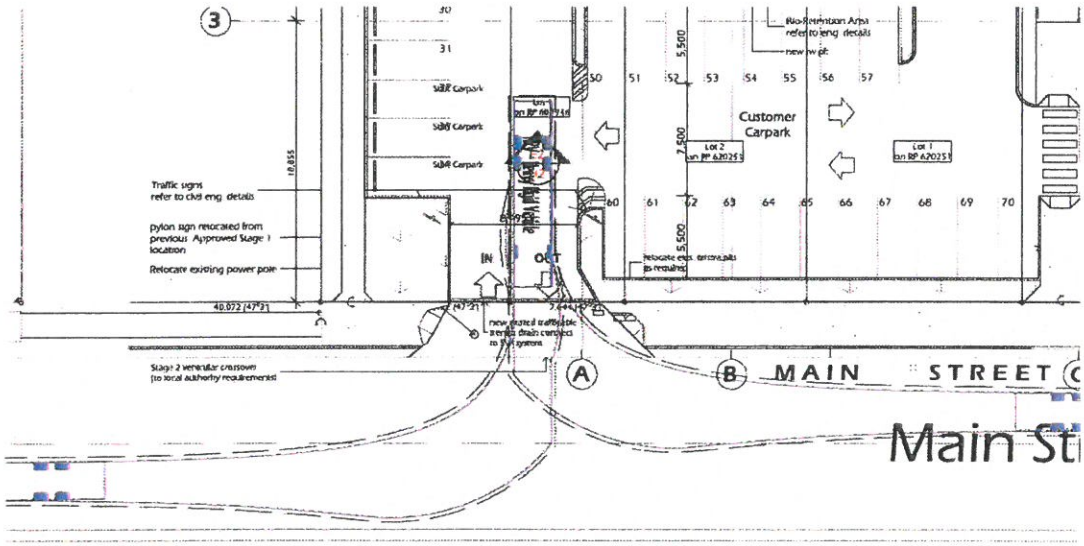
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Haynes Street											
1	L	7	5.0	0.613	22.4	LOS C	5.3	39.0	0.89	0.87	37.8
2	T	59	5.0	0.611	14.0	LOS B	5.3	39.0	0.89	0.79	38.5
3	R	145	5.0	0.611	22.5	LOS C	5.3	39.0	0.89	0.87	37.8
Approach		212	5.0	0.611	20.2	LOS C	5.3	39.0	0.89	0.85	38.0
East: Main Street											
4	L	144	5.0	0.477	17.6	LOS B	7.1	51.7	0.77	0.86	42.1
5	T	231	5.0	0.477	9.2	LOS A	7.1	51.7	0.77	0.65	43.9
6	R	268	5.0	0.762	25.5	LOS C	7.1	51.7	0.89	0.94	35.2
Approach		643	5.0	0.762	17.9	LOS B	7.1	51.7	0.82	0.82	39.5
North: Haynes Street											
7	L	216	5.0	0.597	21.4	LOS C	7.4	53.9	0.89	0.84	38.3
8	T	67	5.0	0.597	13.0	LOS B	7.4	53.9	0.89	0.76	39.1
9	R	46	5.0	0.597	21.5	LOS C	7.4	53.9	0.89	0.84	38.3
Approach		329	5.0	0.597	19.7	LOS B	7.4	53.9	0.89	0.83	38.5
West: Main Street											
10	L	76	5.0	0.376	17.1	LOS B	5.6	40.6	0.73	0.87	42.7
11	T	220	5.0	0.376	8.8	LOS A	5.6	40.6	0.73	0.61	44.9
12	R	8	5.0	0.033	19.7	LOS B	0.2	1.4	0.73	0.69	39.0
Approach		306	5.0	0.376	11.2	LOS B	5.6	40.6	0.73	0.66	44.1
All Vehicles		1491	5.0	0.762	17.2	LOS B	7.4	53.9	0.83	0.80	39.9

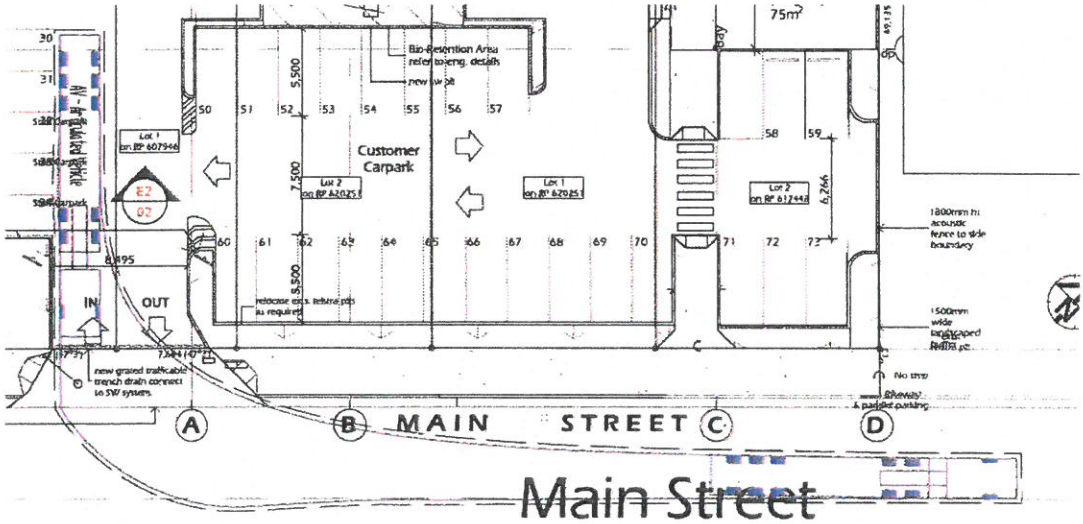
Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM)
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

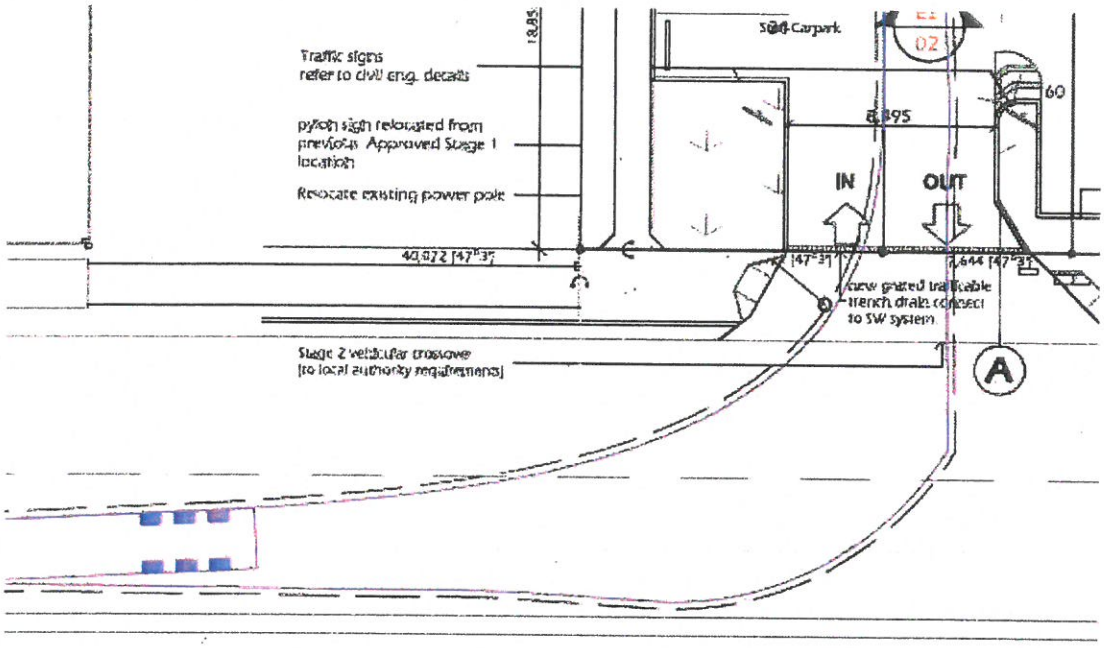
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	9.6	LOS A	0.0	0.0	0.70	0.70
P3	Across E approach	53	14.5	LOS B	0.1	0.1	0.65	0.65
P5	Across N approach	53	9.6	LOS A	0.0	0.0	0.70	0.70
P7	Across W approach	53	14.5	LOS B	0.1	0.1	0.65	0.65

Attachment 2: HRV and AV Exiting to Main Street






Traffic signs
refer to civil eng. details
pylon sign relocated from
previous Approved Stage 1
location
Relocate existing power pole
Stage 2 vehicular crossover
(to local authority requirements)
IN
OUT
A
60

ATTACHMENT 3

Civil Engineering Response
Prepared by Farr Engineers

farr engineers
Associates Pty Ltd

Level 3
457 Upper Edward St.
SPRING HILL

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ABN 90 092 733 830

20 December 2011

210086

Development Assessment Branch
Rockhampton Regional Council
PO Box 1860
Rockhampton QLD 4700

Attention: Amanda O'Mara

Dear Sir,

Re: Shopping Centre Stage 2
28-30 Main St. Park Avenue
(RCC Ref: D/278-2011)
Information Request Response

We refer you to the above-mentioned Development Application for the proposed development known as Park Avenue Shopping Centre..

This letter and the accompanying documentation are provided as a partial formal response to address the information request dated 6 October 2011, Other parties are addressing the balance of the points raised. The responses below have been provided as per the numbering of the Information request.

Item 15

15.1

A new easement has been registered in accordance with the requirements of the stage 1 application that provides for site runoff to a lawful point of discharge being the Council owned property Lot 1 RP 606676. The documents have been updated to show this easement.

15.2

Refer easement documents lodged with the original application and attached again for your reference.

15.3.

See 15.2

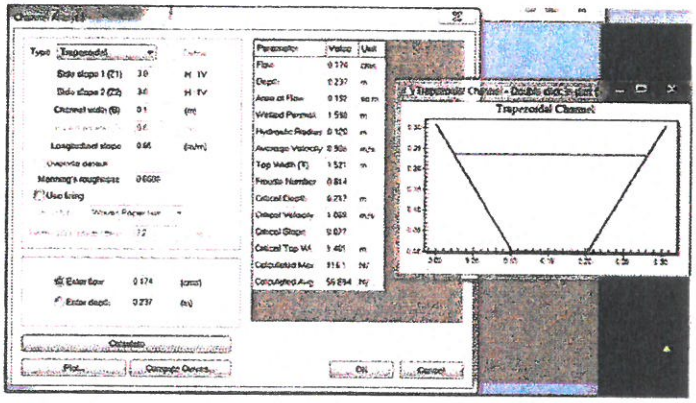
15.4

Refer drawing 207060 CSK 201_A showing the registered easement in accordance with documentation lodged with the DA. The works involved downstream of the dam and in Council controlled land to ensure runoff does not impact on privately owned land is shown on the documents and in sections attached. Note that these works do not allow for additional runoff from other catchments external to the subject site that have the capacity to increase the flows in the channel.

15.5

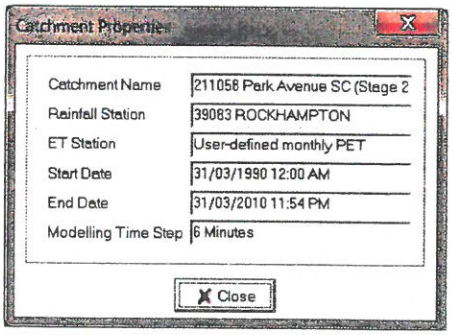
Refer drawing 207060 CSK 201_A showing the registered easement widths in accordance with documentation lodged with the DA. The works involved downstream of the dam and in Council controlled land to ensure runoff does not impact on privately owned land provide for the additional flows of the enlarged site. Note that these works do not allow for additional runoff from other catchments external to the subject site that have the capacity to increase the flows in the channel.

The mitigated runoff from the site is easily contained within the 5 metre easement width, and in fact only requires a channel width of 1.57 metres assuming 1:3 landscaped sides and a conservative value for both the mannings n (0.06) and the longitudinal fall in the channel (0.5%) - refer calculations below



Item 16

The MUSIC analysis undertaken shows a reduction in gross pollutants of 90%, and suspended sediment as 80%. As discussed in the submitted report, the reductions are in line with best practice which is the Healthy Waterways WSUD guidelines. The modelling has been based on a data set for Rockhampton as per below..



Item 17

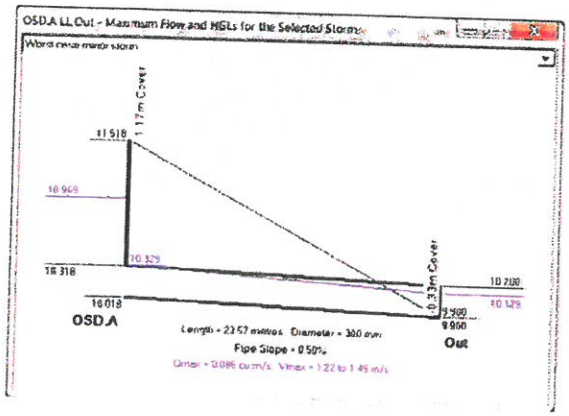
Refer attached sections through the BioBasin Pits with associated levels. Also attached is an updated version of drawing 211058 C200 showing pipe inverts and surface levels as requested.

Item 18

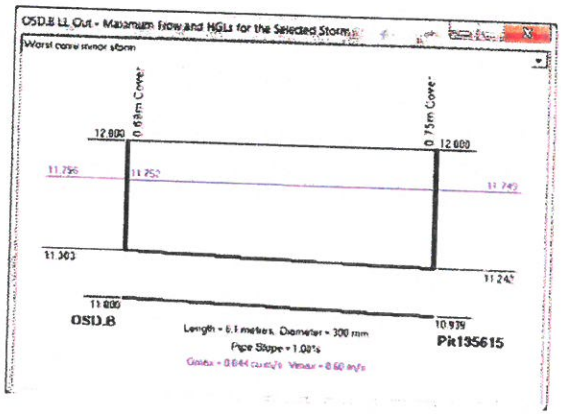
Runoff from catchment C has been redirected to the GPT as requested. This will have the effect of improving the water quality outcomes.

Item 19

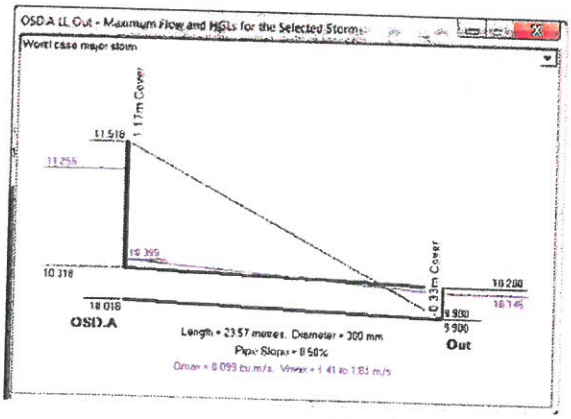
The on-site detention system inflow and outflow pipe sizes are shown on the attached revised C200. We do not understand the query re "predevelopment controlled flow". Assuming this is meant to read "post development controlled flow" then details are provided for the outlets on the attached details. The calculations are from the DRAINS model (which has been modified slightly) below and the input and output data are attached for the major and minor flows.



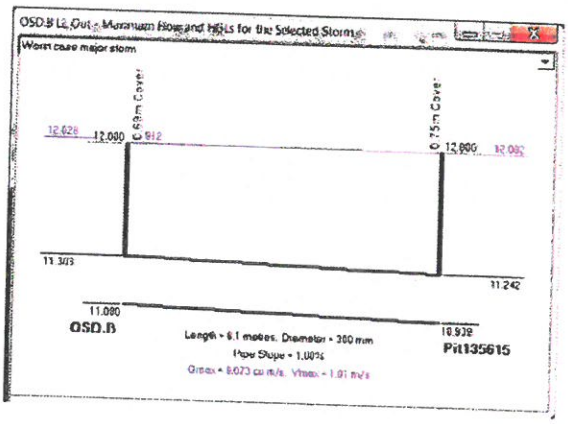
Minor Storm Outlet from Detention Tank A



Outlet from Detention Tank B



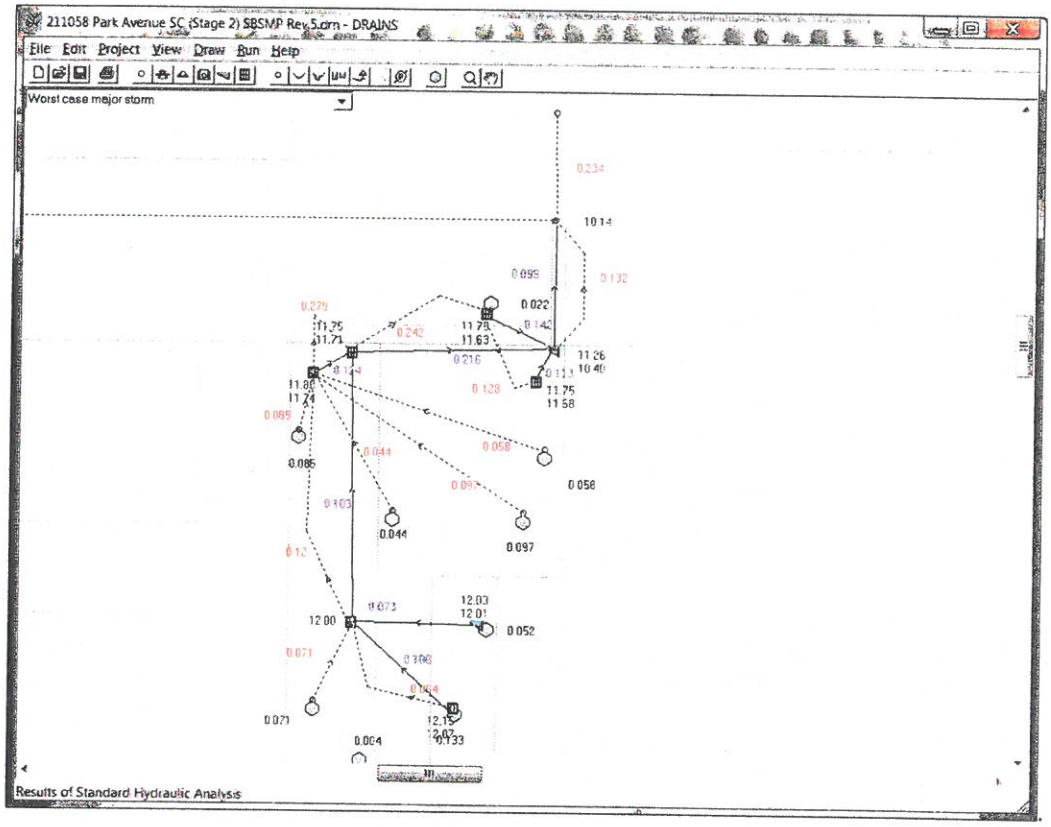
Major Storm Outlet from Detention Tank A



Outlet from Detention Tank B

In the case where the flows are to be mitigated from a quantity point of view, it is necessary to have the major flows captured and fed back into the detention basins. In this case, the overland flow from Biobasin B is recaptured by means of sag pits in both the top of the detention tank A, and also the grated gullies at the rear of the development.

The actual quantity of flow required to be recaptured is relatively small, and the 2 600x600 pits have a capacity as sag pits of 125 l/1 with 100mm of ponding at the pit. This is sufficient to absorb the overland flow of 240 l/s emanating from the Biobasin in a major storm. The DRAINS model has been altered to show that the overland flow is recaptured into the detention basin by two downstream 600x600 sag pits- see diagrammatically below and in the attached results for the minor (10yr) and major (100 yr) flows.



Major Storm (100 yr Return) Pipe and Overflow Route Flows showing Pit recapture of overland flows

Item 20

In order to be certain that the outlet from the Bio Basin A does not return into the Detention Tank B for all events, we have shown a reflux valve on the detention tank B outlet.

Item 21

The surcharge inlet pit in the Biobasin is necessary due to the invert of the outlet of the system into the easement necessitates that the top level of the biobasin treatment media is above the inlet pipe invert. The system is nonetheless free draining as the inlet pit can have a low flow agricultural drainage outlet into the lower level of the biobasin filter media to ensure the sytem does not hold water after a rainfall event. Refer attached details of the inlet and outlet pits in the bio basins.

The Bio Basins have been sized from a MUSIC analysis, which does not inter alia treat the flows on a specific return event basis, but rather analyses the rainfall records on a 6 minute time step to determine the treatment efficiencies for the aggregate of all storm events in the rainfall data period used. The basin inlets and outlets are sized on a minor storm event, and in a major event it is possible that the basins overtop and drain as is normally the case for major events by overland flow to a discharge point. In terms of the treatment of runoff in a major storm event, the MUSIC analysis considers the flows from major storm events as bypassing the treatment system

We trust that the information made available is satisfactory. Should you, have any queries please do not hesitate to contact myself or Andrew Farr on (07) 3839 6788 at your earliest convenience.

Yours faithfully,
FARR ENGINEERS Associates Pty. Ltd.

A. C, FARR

Farr engineers
Associates Pty Ltd

Level 3
457 Upper Edward St.
SPRING HILL

PO Box 104
SPRING HILL 4004

TEL 07 38396788
FAX 07 38396799

postmaster@farrengineers.com.au

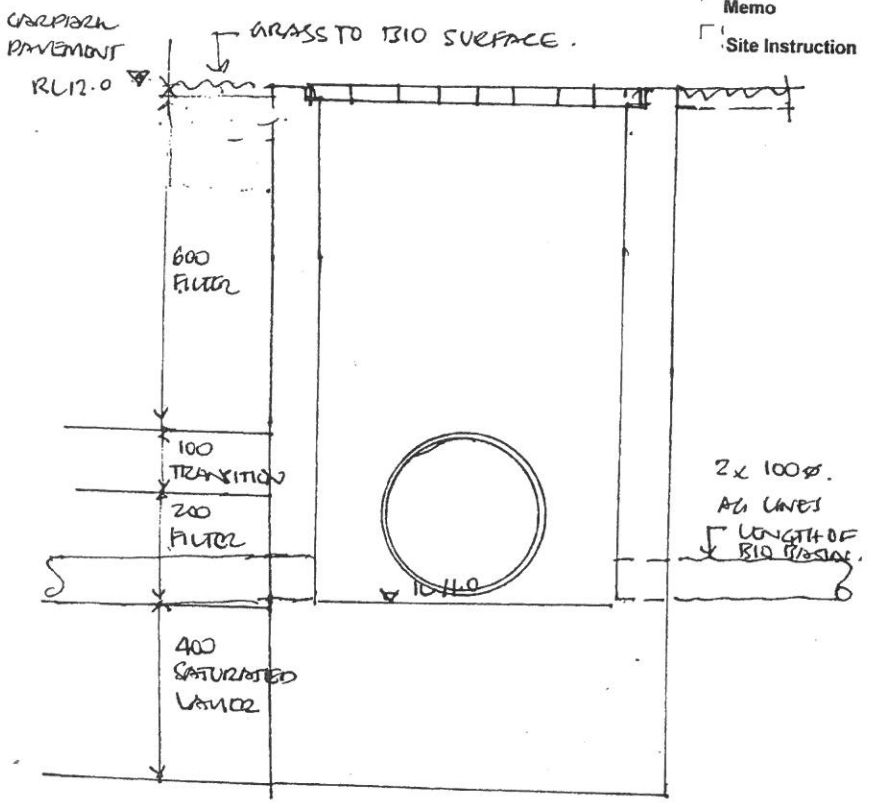
ABN 90 092 733 830

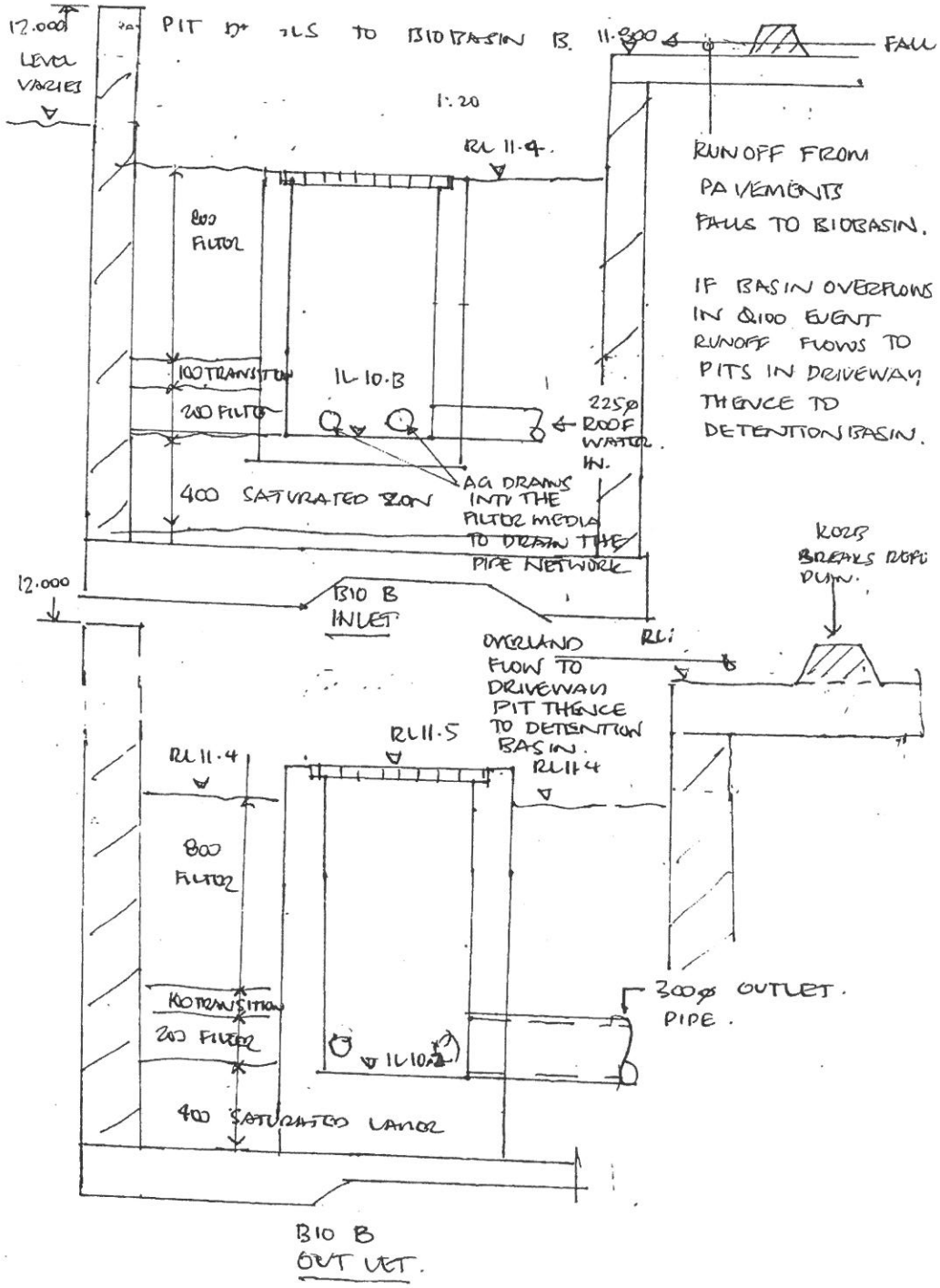
To: RRC
Project: PARKAVSCST2
Co:
Date: 16 DEC 11.
From: Andrew Farr
Pages:
CC:
Job No: 211 058

Re: PIT DETAILS TO BIO BASINS.

- [ ] Fax
- [ ] Email
- [ ] Transmittal
- [ ] Memo
- [ ] Site Instruction

BIO BASIN A





Farr engineers
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ABN 90 092 733 830

To: RRC

Project: RARC AV ST II

Co:

Date: 20 DEC.

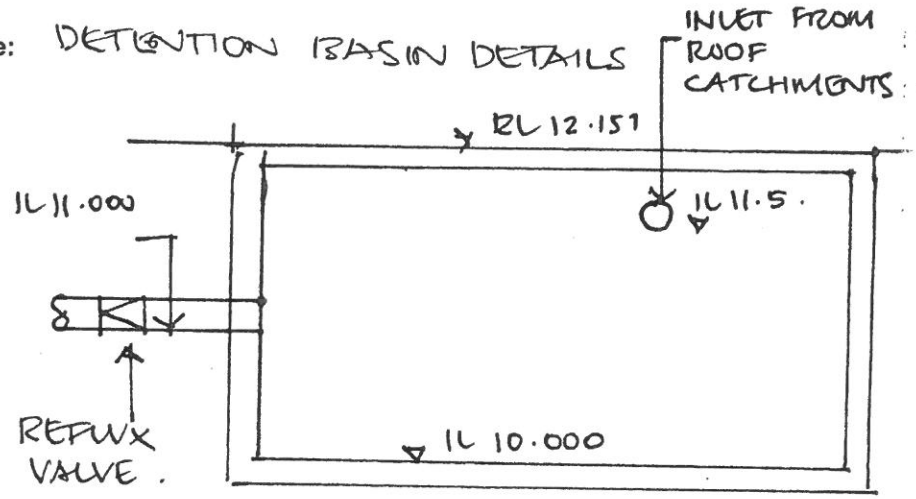
From: Andrew Farr

Pages:

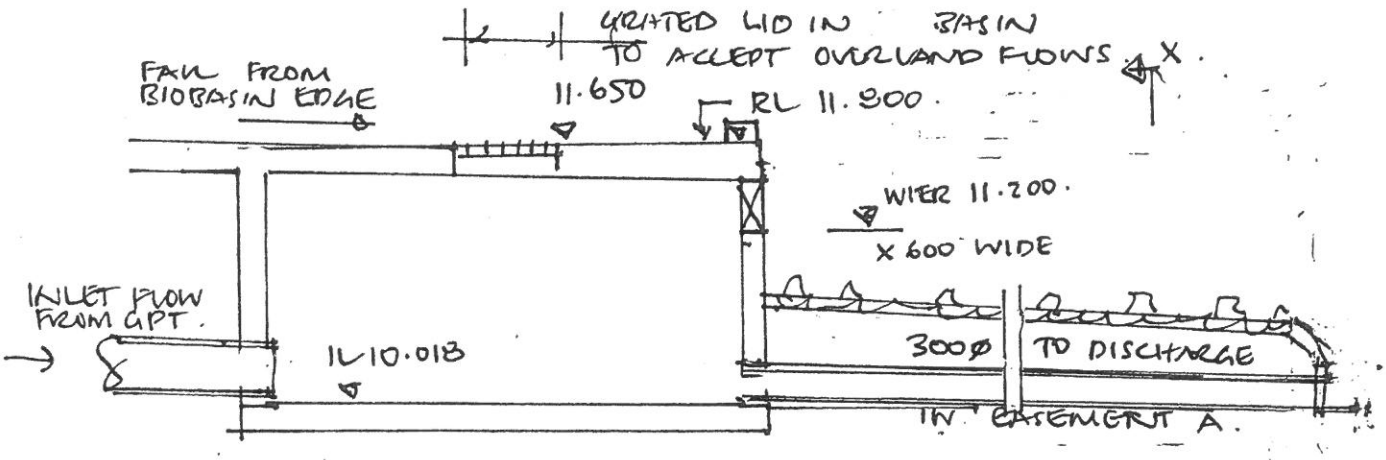
CC:

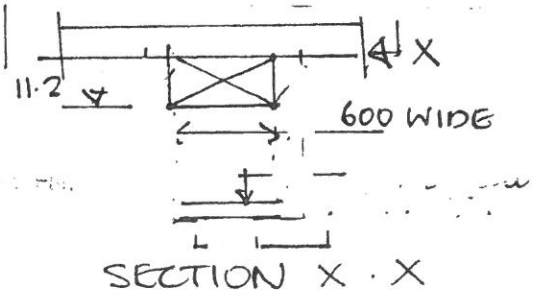
Job No: 21053

Re: DETENTION BASIN DETAILS



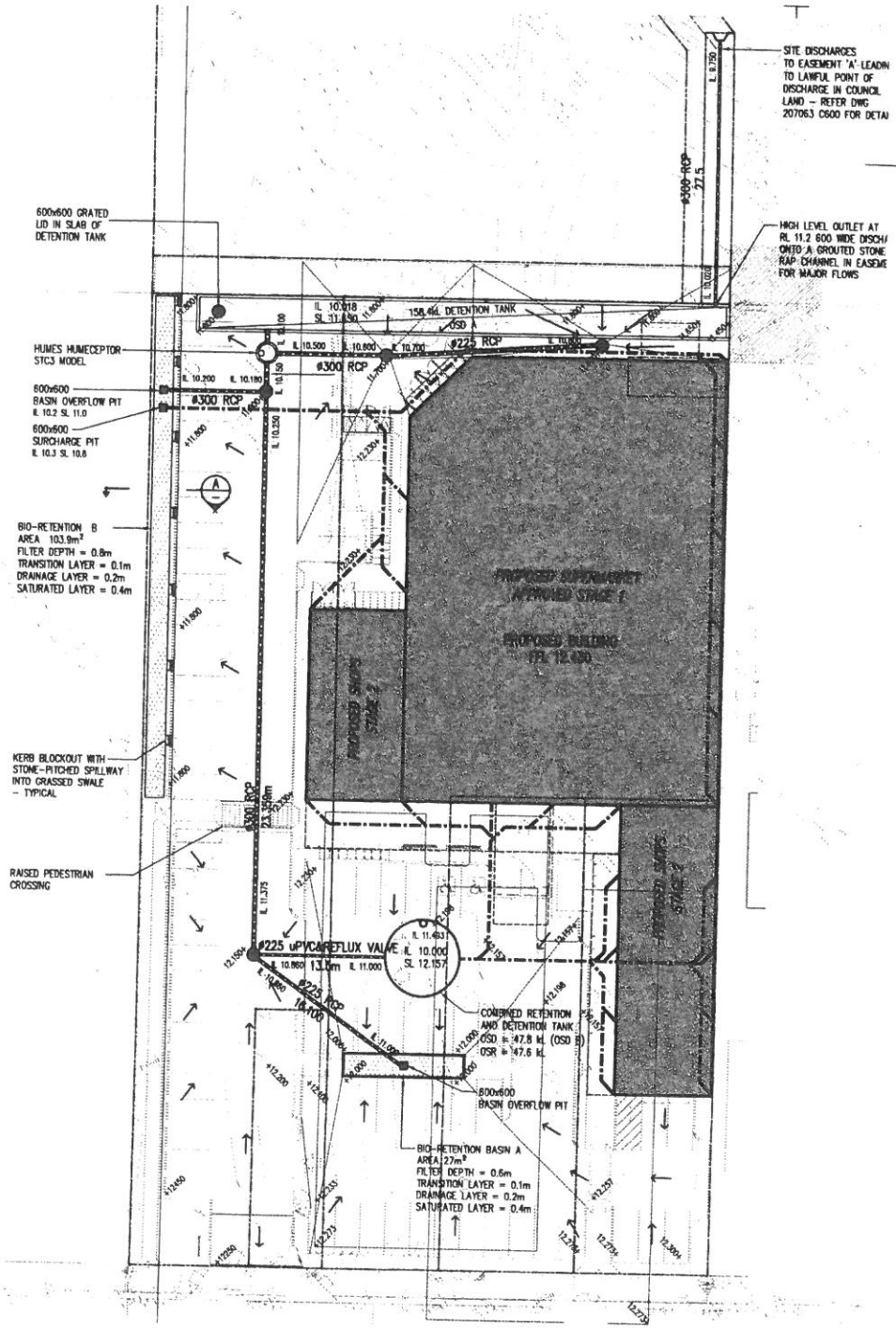
DETENTION BASIN A CROSS SECTION 1:50

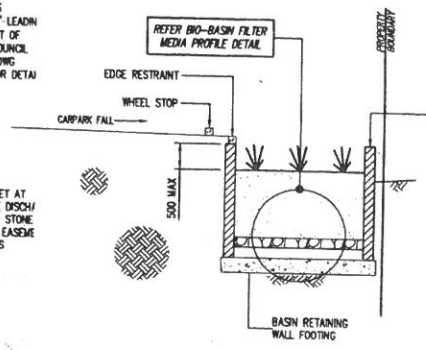




DETENTION BASIN. B CROSS SECTION.

SECTION X.X



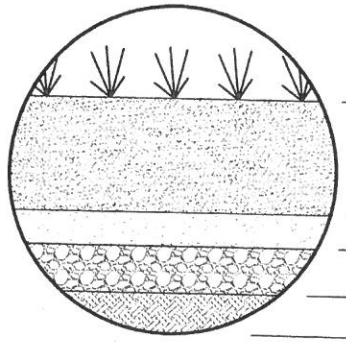


TYPICAL SECTION A
SCALE 1:50

LEGEND

- RP BOUNDARY
- STORMWATER PIPE
- ROOFWATER DRAINAGE
- BATTER
- SURFACE FLOW
- INLET PIT
- INLET PIT

CONCEPTUAL DETAIL NOTE:
ALL INFORMATION ON PLAN IS CONCEPTUAL ONLY AND SUBJECT TO FUTURE DETAILED DESIGN. THE INFORMATION IS NOT SUITABLE FOR CONSTRUCTION PURPOSES.



BIO-BASIN FILTER MEDIA PROFILE
NTS

LANDSCAPING TO BE SPECIFIED AND CERTIFIED BY LANDSCAPE ARCHITECT IN ACCORDANCE WITH HEALTHY WATERWAYS WATER-SENSITIVE URBAN DESIGN TECHNICAL GUIDELINES

800 FILTER MEDIA LAYER
SANDY LOAM (MEAN PARTICLE SIZE 0.45mm.)
HYDRAULIC CONDUCTIVITY 180mm/hr.
REFER BIO-RETENTION BASIN FILTER MEDIA NOTE.

100 TRANSITIONAL LAYER
COARSE SAND (1mm MEAN PARTICLE SIZE)

200 DRAINAGE LAYER
FINE WASHED GRAVEL (5mm MEAN PARTICLE SIZE)

400mm SATURATED ZONE
FINE WASHED GRAVEL (10mm MEAN PARTICLE SIZE)
2% FINE STRAW
4% HARDWOOD CHIPS

DRAWN		DESIGNED THN	CHECKED THN
PROJECT ENGINEER	THN	DESIGN VERIFICATION	
PROJECT DIRECTOR	ACF	DATE	07/11

NOTE:
Prior to commencing Construction verify all dimensions against Architect's, other Consultant's and Sub-Contractor's drawings.

REV	DATE	AMENDMENT	INIT.
J	20/12/11	RFI ISSUE	AF
2	28/08/11	DA ISSUE	
1	29/07/11	CLIENT ISSUE	

AMENDMENTS

CLIENT
POWERCAT PARTNERS PTY LTD

ARCHITECT
BEAT ARCHITECTS

PROJECT
PARK AVENUE SHOPPING CENTRE (STAGE 2)
26-28 MAIN STREET
PARK AVENUE QLD

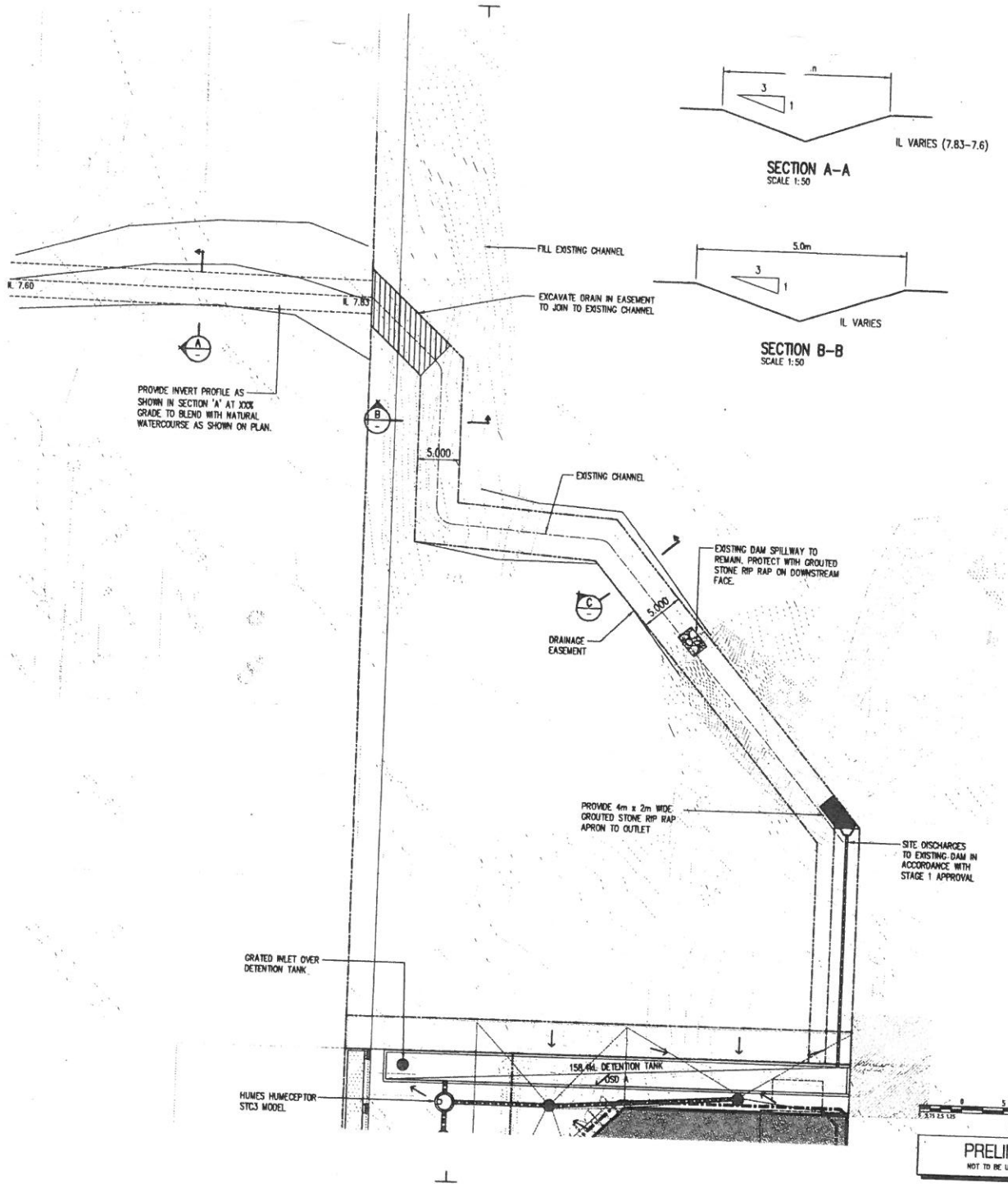
TITLE
CONCEPTUAL STORMWATER MANAGEMENT PLAN

SCALE 1:250 (A1)

PRELIMINARY ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

SCALE AT A1		
1:250		
PROJECT No.	DRAWING No.	ISSUE
211058	CSK200	3

ORIGINAL SHEET SIZE A1-594 x 841mm



SECTION A-A
SCALE 1:50

SECTION B-B
SCALE 1:50

LEGEND

- RP BOUNDARY
- STORMWATER PIPE
- ROOFWATER DRAINAGE
- BATTER
- SURFACE FLOW
- INLET PIT
- INLET PIT

CONCEPTUAL DETAIL NOTE:
ALL INFORMATION ON PLAN IS CONCEPTUAL ONLY AND SUBJECT TO FUTURE DETAILED DESIGN. THE INFORMATION IS NOT SUITABLE FOR CONSTRUCTION PURPOSES.

DRAWN	THN	CHECKED	THN
PROJECT ENGINEER	THN	DESIGN VERIFIER	THN
PROJECT DIRECTOR	ACF	DATE	07/11

NOTE:
Prior to commencing Construction verify all dimensions against Architect's, other Consultant's and Sub-Contractor's drawings.

REV	DATE	AMENDMENT	INIT.
1			

AMENDMENTS

CLIENT
POWERCAT PARTNERS PTY LTD

ARCHITECT
BEAT ARCHITECTS

PROJECT
PARK AVENUE
SHOPPING CENTRE (STAGE 2)
26-28 MAIN STREET
PARK AVENUE QLD

TITLE
DOWNSTREAM DISCHARGE EASEMENT PLAN

SCALE 1:250 (A1)

PRELIMINARY ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

SCALE AT A1		
1:250		
PROJECT No.	DRAWING No.	ISSUE
211058	CSK201	1

PIT / NODE DETAILS Version 10

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph
N.28.Ex	Node					12.4			0		442.782	393.003		7	
N.26B.Ex	Node					11.8			0		427.767	436.708		16	
26-28 Out	Node					10.8			0		407.25	485.62		30	
Dam	Node					9.6			0		721.379	537.904		352	
N.26A.Ex	Node					12			0		394.056	397.809		5674146	
Dam.Ex	Node								0		430.887	531.939		5674155	
Pit135615	OnGrade	Generic Pits (60(	600 x 900 (0.5% grade)		1.5	12			0	0.5	677.613	424.76	No	5685533 1 x Ku	No
Pit135582	Sag	Generic Pits (60(	600 x 900 (2% g	0.8	1.5	11.6	0.15		0	0.5	677.213	484.377	No	5678062 1 x Ku	No
Out	Node					9.9			0		721.391	514.176		346	
N.Pave.A	Node								0		669.209	407.46		5674175	
N.Bio.A	Node								0		665.27	467.336		5674185	
N.Roof.C	Node								0		719.434	463.397		5674211	
N.Pave.B	Node								0		686.344	449.609		5674223	
N.Roof.B	Node								0		714.904	449.412		5674230	
N.D'way	Node								0		679.648	392.688		5674259	
Pit135583	Sag	Generic Pits (60(	600 x 900 (2% g	0.8	1.5	11.6	0.15		0	0.5	706.71	493.169	No	5678068 1 x Ku	No
Pit135617	Sag	Generic Pits (60(	600 x 600 (1% g	40	1.5	11.4	0.4		0	0.5	668.585	479.908	No	5685535 1 x Ku	No
Pit135676	Sag	Generic Pits (60(	600 x 600 (2% g	1	1.5	11.6	0.15		0	0.5	717.497	478.267	No	5703856 1 x Ku	No
Pit135857	Sag	Generic Pits (60(	600 x 600 (2% g	1	1.5	12	0.15		0	0.5	700.132	405.884	No	5751341 1 x Ku	No

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Init Vol. (cu.m)	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id
OSD.B	11	47.8	0	Culvert	0.5						705.45	424.398	No		5674169
	12	47.8													
OSD.A	10.018	176	0	Orifice		225	10.15				721.206	485.259	No		5674162
	10.918	176													
	11.518	176													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Roofed %	Impervious %	Pervious %	Impervious Tc (min)	Pervious Tc (min)	Impervious C10	Pervious C10
C28.Ex	N.28.Ex	0.061	0	0	100	0	0	0.9	0.7
C.26B.Ex	N.26B.Ex	0.287	0	0	100	0	0	0.9	0.7
C.26A.Ex	N.26A.Ex	0.287	0	0	100	0	0	0.9	0.7
C.Roof.A	OSD.B	0.058	0	100	0	5	0	0.9	0.7
C.Pave.A	N.Pave.A	0.08	0	100	0	5	0	0.9	0.7
C.Bio.A	N.Bio.A	0.095	0	100	0	5	0	0.9	0.7
C.Roof.C	N.Roof.C	0.065	0	100	0	5	0	0.9	0.7
C.Pave.B	N.Pave.B	0.049	0	100	0	5	0	0.9	0.7
C.Roof.B	N.Roof.B	0.109	0	100	0	5	0	0.9	0.7
C.D'way	N.D'way	0.005	0	100	0	5	0	0.9	0.7

C.Pave.C	Pit135583	0.025	0	100	0	5	0	0.9	0.7
C.Bio.B	Pit135857	0.149	0	100	0	5	0	0.9	0.7

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)
OSD.B LL Out	OSD.B	Pit135615	6.1	11	10.939	1	uPVC, under roa	300	303	0.012	NewFixed	1	OSD.B		0				
Pipe339	Pit135615	Pit135582	23.5	11.375	10.25	4.79	Concrete, under	300	300	0.013	New	1	Pit135615		0				
Pipe276	Pit135582	OSD.A	10	10.15	10.1	0.5	Concrete, under	300	300	0.013	NewFixed	1	Pit135582		0				
OSD.A LL Out	OSD.A	Out	23.57	10.018	9.9	0.5	Concrete, under	300	300	0.013	NewFixed	1	OSD.A		0				
Pipe277	Pit135583	OSD.A	5	10.15	10.1	1	Concrete, under	300	300	0.013	NewFixed	1	Pit135583		0				
Pipe337	Pit135617	Pit135582	5	10.2	10.15	1	Concrete, under	300	300	0.013	New	1	Pit135617		0				
Pipe425	Pit135676	OSD.A	5	10.2	10.15	1	Concrete, under	300	300	0.013	NewFixed	1	Pit135676		0				
Pipe673	Pit135857	Pit135615	16	11	10.86	0.88	Concrete, under	300	300	0.013	New	1	Pit135857		0				

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of Servic	Chg (m)	Bottom Elev (m)	Height of Servic	Chg (m)	Bottom Elev (m)	Height of Servic	etc
			(m)			(m)			(m)	etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id
Overland Flow 2	N.28.Ex	N.26B.Ex	0.1				Grassed Trap Cl	0.3	0.3	0.6	0.92	0	29
Overland Flow 2	N.26B.Ex	26-28 Out	0.1				Grassed Trap Cl	0.3	0.3	0.6	1.747	0	31
Total Pre Flow	26-28 Out	Dam.Ex	0.1				Dummy Overflov	0.3	0.3	0.6	1	0	5674157
Overland Flow 2	N.26A.Ex	26-28 Out	0.1				Grassed Trap Cl	0.3	0.3	0.6	1.747	0	5674151
OF1686	Pit135615	Pit135617	1				Dummy Overflov	0.3	0.3	0.6	1	0	5695481
OF1345	Pit135582	Pit135583	0.5				Dummy Overflov	0.3	0.3	0.6	1	0	5678067
OSD.A HL Out	OSD.A	Out	0.1	11	0.6	1.7	Dummy Overflov	0.3	0.3	0.6	1	0	347
Total Post Flow	Out	Dam	0.1				Dummy Overflov	0.3	0.3	0.6	4.75	0	354
OF.Pave.A	N.Pave.A	Pit135615	0.1				Dummy Overflov	0.3	0.3	0.6	1	0	5674177
OF1343	N.Bio.A	Pit135617	0.5				Dummy Overflov	0.3	0.3	0.6	1	0	5678064
OF.Roof.C	N.Roof.C	Pit135617	0.1				Dummy Overflov	0.3	0.3	0.6	1	0	5674213
OF.Pave.B	N.Pave.B	Pit135617	0.1				Dummy Overflov	0.3	0.3	0.6	1	0	5674226
OF.Roof.B	N.Roof.B	Pit135617	0.1				Dummy Overflov	0.3	0.3	0.6	1	0	5674233
OF.D'way	N.D'way	Out	5				Dummy Overflov	0.3	0.3	0.6	1	0	5674261
OF1452	Pit135583	Pit135676	0.5				Dummy Overflov	0.3	0.3	0.6	1	0	5678428
OF1572	Pit135617	Pit135582	0.5				Dummy Overflov	0.3	0.3	0.6	1	0	5685538
OF2404	Pit135857	Pit135615	0.5				Dummy Overflov	0.3	0.3	0.6	1	0	5751343

DRAINS results prepared 20 December, 2011 from Version 2011.17

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit135615	11.75		0.04		0.25	0.01	Inlet Capacity
Pit135582	11.43	11.6	0	0	0.17	0	None
Out	10.13		0.003				
Pit135583	10.97	11.63	0.013	0.1	0.63	0	Inlet Capacity
Pit135617	11.58	11.71	0.17	21.4	-0.18	0	Outlet System
Pit135676	10.97	11.6	0	0	0.63		None
Pit135857	11.88	12.11	0.075	0.5	0.12	0	Inlet Capacity

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Impervious Max Q (cu.m/s)	Pervious Max Q (cu.m/s)	Impervious Tc (min)	Pervious Tc (min)	Due to Storm
C28.Ex	0.013	0	0.013	0	21.49	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
C.26B.Ex	0.075	0	0.075	0	14.35	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
C.26A.Ex	0.061	0	0.061	0	22.91	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
C.Roof.A	0.029	0.029	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.A	0.04	0.04	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Bio.A	0.048	0.048	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Roof.C	0.033	0.033	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.B	0.025	0.025	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Roof.B	0.055	0.055	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.D'way	0.003	0.003	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.C	0.013	0.013	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Bio.B	0.075	0.075	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

Outflow Volumes for Total Catchment (0.63 impervious + 0.63 pervious = 1.27 total ha)

Storm	Total Rainfall	Total Runoff	Impervious Runoff	Pervious Runoff
	cu.m	cu.m (Runoff %)	cu.m (Runoff %)	cu.m (Runoff %)
AR&R 10 year, 5	213.78	171.03 (80.0%)	96.20 (90.0%)	74.82 (70.0%)
AR&R 10 year, 1	415.92	332.74 (80.0%)	187.17 (90.0%)	145.57 (70.0%)
AR&R 10 year, 3	596.9	477.52 (80.0%)	268.60 (90.0%)	208.92 (70.0%)
AR&R 10 year, 4	714.38	571.50 (80.0%)	321.47 (90.0%)	250.03 (70.0%)
AR&R 10 year, 1	812.8	650.24 (80.0%)	365.76 (90.0%)	284.48 (70.0%)
AR&R 10 year, 2	1061.72	849.38 (80.0%)	477.77 (90.0%)	371.60 (70.0%)
AR&R 10 year, 4	1423.04	1138.29 (80.0%)	640.23 (90.0%)	498.06 (70.0%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
OSD.B LL Out	0.044	0.6	11.752	11.749	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Pipe339	0.093	1.55	11.613	11.426	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Pipe276	0.191	2.7	11.098	10.969	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
OSD.A LL Out	0.086	1.49	10.329	10.129	AR&R 10 year, 1 hour storm, average 64 mm/h, Zone 3
Pipe277	0.012	0.17	10.969	10.969	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
Pipe337	0.123	1.74	11.462	11.426	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
Pipe425	0.002	0.03	10.969	10.969	AR&R 10 year, 2 hours storm, average 41.8 mm/h, Zone 3
Pipe673	0.072	1.02	11.808	11.749	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Overland Flow 2	0.013	0.013	6.74061E+22	0.063	0.01	2.63	0.09	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Overland Flow 2	0.087	0.087	0	0.15	0.03	3.5	0.21	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
Total Pre Flow	0.14	0.14	0	0.004	0	100	0.32	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
Overland Flow 2	0.061	0.061	0	0.124	0.02	3.24	0.19	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
OF1686	0.01	0.01	0	0	0	100	0.2	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

OF1345	0	0	-9984.192	0	0	0	0
OSD.A HL Out	0	0	0	0	0	0	0
Total Post Flow	0.087	0.087	0	0.002	0	100	0.36 AR&R 10 year, 1 hour storm, average 64 mm/h, Zone 3
OF.Pave.A	0.04	0.04	0	0.002	0	100	0.17 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF1343	0.048	0.048	0	0.002	0	100	0.2 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Roof.C	0.033	0.033	0	0.001	0	100	0.22 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Pave.B	0.025	0.025	0	0.001	0	100	0.17 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Roof.B	0.055	0.055	0	0.002	0	100	0.23 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.D'way	0.003	0.003	0	0	0	100	0.05 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF1452	0	0	0	0	0	0	0
OF1572	0	0	60.598	0	0	0	0
OF2404	0	0	60.598	0	0	0	0

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD.B	11.76	36.1	0.044	0.044	0
OSD.A	10.97	167.3	0.086	0.086	0

CONTINUITY CHECK for AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
N.28.Ex	20.07	20.07	0	0
N.26B.Ex	114.49	114.49	0	0
26-28 Out	208.92	208.91	0	0
Dam	245.3	245.3	0	0
N.26A.Ex	94.42	94.42	0	0
Dam.Ex	208.91	208.91	0	0
OSD.B	24.53	6.32	18.22	0
Pit135615	102.07	102.51	0	-0.4
Pit135582	240.75	240.59	0	0.1
OSD.A	250.94	243.2	7.74	0

Out	245.32	245.31	0	0
N.Pave.A	33.84	33.84	0	0
N.Bio.A	40.19	40.19	0	0
N.Roof.C	27.49	27.49	0	0
N.Pave.B	20.73	20.73	0	0
N.Roof.B	46.11	46.11	0	0
N.D'way	2.11	2.11	0	0
Pit135583	10.57	10.44	0	1.3
Pit135617	140.64	144.36	0	-2.6
Pit135676	0	-0.08	0	0
Pit135857	63.03	61.91	0	1.8

Run Log for 211058 Park Avenue SC (Stage 2) SBSMP Rev.5.dm run at 19:07:51 on 20/12/2011

No water upwelling from any pit.

Freeboard was less than 0.15m at Pit135857, Pit135617

To see more detailed results select the Edit/Copy Results to Spreadsheet menu item, and paste them into a spreadsheet.

Flows were safe in all overflow routes.

The following detention basins have little effect (less than 2%) in reducing peak discharge: OSD.B You might consider upsizing these, or removing them from the model.

DRAINS results prepared 20 December, 2011 from Version 2011.17

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit135615	11.75		0.04		0.25	0.01	Inlet Capacity
Pit135582	11.43	11.6	0	0	0.17	0	None
Out	10.13		0.003				
Pit135583	10.97	11.63	0.013	0.1	0.63	0	Inlet Capacity
Pit135617	11.58	11.71	0.17	21.4	-0.18	0	Outlet System
Pit135676	10.97	11.6	0	0	0.63		None
Pit135857	11.88	12.11	0.075	0.5	0.12	0	Inlet Capacity

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Impervious Max Q (cu.m/s)	Pervious Max Q (cu.m/s)	Impervious Tc (min)	Pervious Tc (min)	Due to Storm
C28.Ex	0.013	0	0.013	0	21.49	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
C.26B.Ex	0.075	0	0.075	0	14.35	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
C.26A.Ex	0.061	0	0.061	0	22.91	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
C.Roof.A	0.029	0.029	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.A	0.04	0.04	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Bio.A	0.048	0.048	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Roof.C	0.033	0.033	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.B	0.025	0.025	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Roof.B	0.055	0.055	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.D'way	0.003	0.003	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Pave.C	0.013	0.013	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
C.Bio.B	0.075	0.075	0	5	0	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

Outflow Volumes for Total Catchment (0.63 impervious + 0.63 pervious = 1.27 total ha)

Storm	Total Rainfall	Total Runoff	Impervious Runoff	Pervious Runoff
	cu.m	cu.m (Runoff %)	cu.m (Runoff %)	cu.m (Runoff %)
AR&R 10 year, 5	213.78	171.03 (80.0%)	96.20 (90.0%)	74.82 (70.0%)
AR&R 10 year, 1	415.92	332.74 (80.0%)	187.17 (90.0%)	145.57 (70.0%)
AR&R 10 year, 3	596.9	477.52 (80.0%)	268.60 (90.0%)	208.92 (70.0%)
AR&R 10 year, 4	714.38	571.50 (80.0%)	321.47 (90.0%)	250.03 (70.0%)
AR&R 10 year, 1	812.8	650.24 (80.0%)	365.76 (90.0%)	284.48 (70.0%)
AR&R 10 year, 2	1061.72	849.38 (80.0%)	477.77 (90.0%)	371.60 (70.0%)
AR&R 10 year, 4	1423.04	1138.29 (80.0%)	640.23 (90.0%)	498.06 (70.0%)

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
OSD.B LL Out	0.044	0.6	11.752	11.749	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Pipe339	0.093	1.55	11.613	11.426	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Pipe276	0.191	2.7	11.098	10.969	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
OSD.A LL Out	0.086	1.49	10.329	10.129	AR&R 10 year, 1 hour storm, average 64 mm/h, Zone 3
Pipe277	0.012	0.17	10.969	10.969	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
Pipe337	0.123	1.74	11.462	11.426	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
Pipe425	0.002	0.03	10.969	10.969	AR&R 10 year, 2 hours storm, average 41.8 mm/h, Zone 3
Pipe673	0.072	1.02	11.808	11.749	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Overland Flow 2	0.013	0.013	6.74061E+22	0.063	0.01	2.63	0.09	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
Overland Flow 2	0.087	0.087	0	0.15	0.03	3.5	0.21	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
Total Pre Flow	0.14	0.14	0	0.004	0	100	0.32	AR&R 10 year, 15 minutes storm, average 131 mm/h, Zone 3
Overland Flow 2	0.061	0.061	0	0.124	0.02	3.24	0.19	AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3
OF1686	0.01	0.01	0	0	0	100	0.2	AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3

OF1345	0	0	-9984.192	0	0	0	0
OSD.A HL Out	0	0	0	0	0	0	0
Total Post Flow	0.087	0.087	0	0.002	0	100	0.36 AR&R 10 year, 1 hour storm, average 64 mm/h, Zone 3
OF.Pave.A	0.04	0.04	0	0.002	0	100	0.17 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF1343	0.048	0.048	0	0.002	0	100	0.2 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Roof.C	0.033	0.033	0	0.001	0	100	0.22 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Pave.B	0.025	0.025	0	0.001	0	100	0.17 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.Roof.B	0.055	0.055	0	0.002	0	100	0.23 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF.D'way	0.003	0.003	0	0	0	100	0.05 AR&R 10 year, 5 minutes storm, average 202 mm/h, Zone 3
OF1452	0	0	0	0	0	0	0
OF1572	0	0	60.598	0	0	0	0
OF2404	0	0	60.598	0	0	0	0

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD.B	11.76	36.1	0.044	0.044	0
OSD.A	10.97	167.3	0.086	0.086	0

CONTINUITY CHECK for AR&R 10 year, 30 minutes storm, average 94 mm/h, Zone 3

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
N.28.Ex	20.07	20.07	0	0
N.26B.Ex	114.49	114.49	0	0
26-28 Out	208.92	208.91	0	0
Dam	245.3	245.3	0	0
N.26A.Ex	94.42	94.42	0	0
Dam.Ex	208.91	208.91	0	0
OSD.B	24.53	6.32	18.22	0
Pit135615	102.07	102.51	0	-0.4
Pit135582	240.75	240.59	0	0.1
OSD.A	250.94	243.2	7.74	0

Out	245.32	245.31	0	0
N.Pave.A	33.84	33.84	0	0
N.Bio.A	40.19	40.19	0	0
N.Roof.C	27.49	27.49	0	0
N.Pave.B	20.73	20.73	0	0
N.Roof.B	46.11	46.11	0	0
N.D'way	2.11	2.11	0	0
Pit135583	10.57	10.44	0	1.3
Pit135617	140.64	144.36	0	-2.6
Pit135676	0	-0.08	0	0
Pit135857	63.03	61.91	0	1.8

Run Log for 211058 Park Avenue SC (Stage 2) SBSMP Rev.5.dm run at 19:16:30 on 20/12/2011

No water upwelling from any pit.

Freeboard was less than 0.15m at Pit135857, Pit135617

To see more detailed results select the Edit/Copy Results to Spreadsheet menu item, and paste them into a spreadsheet.

Flows were safe in all overflow routes.

The following detention basins have little effect (less than 2%) in reducing peak discharge: OSD.B You might consider upsizing these, or removing them from the model.