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OUR REF: 5093 GJS

21 June 2012

The Chief Executive Officer
Gold Coast City Council
PO Box 5042
GOLD COAST MC QLD. 9729



GOLD COAST CITY COUNCIL	
CUSTOMER SERVICE - NERANG	
RECEIVED TIME:	3-55 AM/PM
DATE:	21-6-12
RECEIPT No:	
SIGNED BY:	maig

Attention: Monique Anderson

Dear Monique,

**RE: COPY OF CONCURRENCE AGENCY INFORMATION REQUEST
RESPONSE - DEVELOPMENT APPLICATION FOR A PRELIMINARY
APPROVAL FOR MAKING A MATERIAL CHANGE OF USE TO
OVERRIDE THE PLANNING SCHEME FOR INDUSTRY USES**

**PROPERTY: 31 YELLOWOOD ROAD / 60 STAPLYTON JACOBS WELL ROAD
STAPLYTON / 82 CHRISTENSEN ROAD STAPLYTON (LOT 4 ON
RP6843 / LOT 1 ON RP6882 / LOT 240 ON W31320)**

APPLICATION NO.: MCU201100650

The Department of Environment and Resource Management (DERM) was a concurrence agency for this application. In this regard, DERM issued an information requested dated the 16th March 2012.

In accordance with s278(2) of the Sustainable Planning Act 2009 a copy of the information request response to DERM dated the 20th June 2012 is attached.

Should any further information be required as part of this application, please don't hesitate to contact myself on the details provided below.

Yours faithfully,

GASSMAN DEVELOPMENT PERSPECTIVES

GARY SAVINS

Enclosed
Attachment A – DERM Information Request Response



Quality
ISO 9001

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Attachment A

DERM Information Request Response

Prepared by: Gassman Development Perspectives



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OUR REF: 5093 GJS

20 June 2012

The Chief Executive Officer
Department of Environment and Resource Management
PO Box 864
IPSWICH QLD 4207

Attention: Kathryn Tibbles

Dear Kathryn,

**RE: RESPONSE TO DEPARTMENT ENVIRONMENT AND RESOURCE
MANAGEMENT INFORMATION REQUEST - DEVELOPMENT
APPLICATION FOR A PRELIMINARY APPROVAL FOR MAKING A
MATERIAL CHANGE OF USE TO OVERRIDE THE PLANNING SCHEME
FOR INDUSTRY USES**

**PROPERTY: 31 YELLOWOOD ROAD, STAPYLTON; 60 STAPYLTON JACOBS WELL
ROAD, STAPYLTON & 82 CHRISTENSEN ROAD, STAPYLTON (LOT 4
ON RP6843; LOT 1 ON RP6882 & LOT240 ON W31320)**

DEPT. REF.: IC0212BEE0017_GOL2963_487310

The following is in response to an Information Request made by the Department of Environment and Resource Management (the Department) dated the 16th March 2012, with respect to the abovementioned application over the subject site. Given the nature of the response, the applicant considers this to be a full response to the information request as per the duly completed 'Notice of Information Request Response' included at **Attachment A**.

DERM Item 1 – Policy against which the application was assessed:

The development application for a preliminary approval for material change of use (MCU) to override the planning scheme for freehold Lots 4 RP6843, 1 RP6882 and 240 W31320 pursuant to section 242 Sustainable Planning Act 2009 is being assessed against Criteria Table F of the Department of Environment and Resource Management (DERM) Concurrence Agency Policy for Material Change of Use dated 21 October 2009 (the policies), and PART P of the Regional Vegetation Management Code for Southeast Queensland Bioregion, dated 6 November 2009 (the code), based on the following reasons:

- a) *Certified Regional Ecosystem Mapping overlayed with the site plan indicates clearing of assessable mapped remnant Of Concern and Least Concern regional ecosystem may occur as a result of the MCU*
 - o *Areas zoned as open space are not considered urban areas, as such, remnant vegetation located in this zone is assessable vegetation*



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- b) *The application is for 'any other relevant purpose' as per Assessment Table 1, Columns 1(b) of the MCU policy.*
- c) *Assessment Table 1 of the policy directs that an application for a MCU for any other relevant purpose must be assessed against Criteria Table F-2 if clearing as a result of the MCU involves the clearing of a remnant least concern regional ecosystem.*
- d) *For clearing as a result of the MCU to be approved, Criteria Table F directs that an application must meet Performance Requirements F1 and F2 of Table F-2 and Performance Requirements 2 to 10 of PART P of the code (please refer to section 2 below).*

GDP Comment:

Item 1 of the information request identified the relevant provisions of the Department's policy that the application for development is to be assessed against. These comments are noted.

DERM Item 2.1

2.1 Please confirm there is no alternative site or configuration for proposed Lot 15 with associated bioretention basin located in the southern part of Lot 240 W31320 (please refer diagram 1). In your response please consider the items referred to below.

GDP Comment

In accordance with this request from the Department, further detailed investigations were undertaken in relation to the siting of the proposed bioretention basin located in the southern part of Lot 240 on W31320.

In this respect, it is confirmed that there is not considered to be any alternative site or configuration for the bioretention basin located in the southern part of Lot 240 W31320 given the existing topography, the required grading of any future the lot and the areas proximity to essential habitat areas. It should be noted that the size of the basin as depicted in the supporting stormwater management plan includes all batters and represents the total extent of works meaning that no vegetation outside of this area will be damaged or removed.

It is also considered important for the Department to note that this current application does not include any reconfiguration component. Where lot boundaries have been identified, they are indicative only and have been provided for illustrative purposes as to the likely form future development may take.

Please refer to **Attachment B – Stormwater Management Plan** for further information in relation to this matter.

DERM Item 2.2

2.2 In the context of clearing for proposed Lot 15 and associated bio-retention basin, insufficient information was provided to demonstrate compliance with Performance Requirements (PR's) PR P.2, PR P.3, PR P.4, PR P.7 and PR P.8 of the code. Please provide further information to

demonstrate compliance with these performance requirements. In your response please take the following into consideration.

- a) Clearing of assessable vegetation (i.e remnant vegetation located in the Open Space zone) may occur as a result of the MCU for fences, firebreaks and bulk earthworks. As such, clearing of assessable vegetation as a result of the MCU:
 - may occur within 10 metres of the high bank of Sandy Creek
 - may occur within 100 metres of a natural wetland.*
- b) Clearing of assessable vegetation may increase edge effects which may impact on the ecosystem functioning of the watercourse/wetland area. The vegetation located adjacent to the high bank of the watercourses acts as a buffer to the watercourse/wetland area.*
- c) Clearing may occur where the width of assessable mapped remnant vegetation is less than 100 metres and clearing may reduce of the width of assessable mapped remnant vegetation to less than 100 metres.*
- d) The watercourse wetland area also contains a mapped Of Concern regional ecosystem and essential habitat. As such, any activities that may impact on the ecosystem functioning of this area may require an offset.*

GDP Comment:

In accordance with this request from the Department, detailed assessment against the Regional Vegetation Management Code for Southeast Queensland Bioregion was undertaken and accompanies this information request response.

Further additional information added to the table has been highlighted in red text for quick reference of the Department in relation to this specific request above and beyond the information that has previously been provided.

Please refer to **Attachment C** – Regional Vegetation Management Code Assessment for further information in relation to this matter.

Additionally, as a result of information request responses to both the Gold Coast City Council and other State referral agencies an amended Generations Industrial Park Place Code has been prepared. For the purposes of completeness, a copy of this Place Code is attached to this information request response for the benefit of the Department.

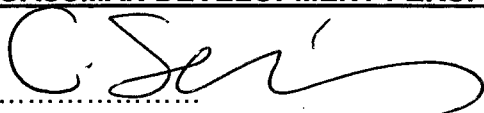
Please refer to **Attachment D** – Generations Industrial Park Place Code for further information in relation to this matter.

We feel that the above information satisfactorily responds and addresses all the matters raised by the Department. Accordingly, we look forward to the Department's timely and favourable determination of the application.

Should any further information be required as part of this application, please don't hesitate to contact myself on the details provided below.

Yours faithfully,

GASSMAN DEVELOPMENT PERSPECTIVES

A handwritten signature in black ink, appearing to read 'C. Savins', written over a dotted line.

GARY SAVINS

Senior Town Planner

Enclosed

Attachment A – Duly Completed Notice of Response to Information Request

Attachment B – Stormwater Management Plan

Attachment C – Regional Vegetation Management Code Assessment

Attachment D - Generations Industrial Park Place Code June 2012

Attachment A

Duly Completed Notice of Response to Information Request

Prepared by: Gassman Development Perspectives

Notice of Response to Information Request

Patricia Hester and William Hester
C/- Gassman Development Perspectives
PO Box 392
BEENLEIGH QLD 4207

DERM reference: IC0212BEE0017_GOL2963_487310

Regional Planning and Coordination
Department of Environment and Resource Management
PO Box 1164
BEENLEIGH QLD 4207

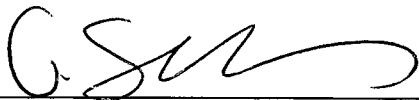
Dear Sir/Madam

PRELIMINARY APPROVAL FOR MATERIAL CHANGE OF USE TO OVERRIDE THE PLANNING SCHEME FOR INDUSTRY USE OVER LOT 4 ON RP6843, LOT 1 ON RP6882 and LOT 240 ON W31320 (31 YELLOWOOD ROAD, 60 STAPYLTON JACOBS WELL ROAD AND 82 CHRISTENSEN ROAD, STAPYLTON) – GOLD COAST CITY COUNCIL – RESPONSE TO INFORMATION REQUEST

I am responding to your Information Request by:

- ☒ Enclosing all of the information requested.
- ☐ Enclosing part of the information requested and asking that the requesting authority proceed with the assessment of the application.
- ☐ Advising that I do not intend to supply any of the information requested and asking that the requesting authority proceed with the assessment of the application.

Signed



[Signature]

GARY SAVINS c/o P+N HESTER

[Print name]

20/06/12

[Date]

Attachment B

Stormwater Management Plan

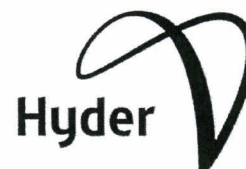
Prepared by: HYDER Consulting Pty Ltd



GENERATIONS INDUSTRIAL PARK

STORMWATER MANAGEMENT PLAN

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PATRICIA & WILLIAM HESTER

GENERATIONS INDUSTRIAL PARK

STAPYLTON-JACOBS WELL ROAD, STAPYLTON

STORMWATER MANAGEMENT PLAN

Author Rodney J Ronalds

Checker Ben Frost

Approver Travis Seresheff

Report No F0002-AA003837-AAR-02

Date 20th June 2012

This report has been prepared for Patricia & William Hester in accordance with the terms and conditions of appointment for Stapylton-Jacobs Well Road, Stapylton dated February 2011. Hyder Consulting Pty Ltd (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

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Appendix E

GROSS POLLUTANT TRAP PRODUCT INFORMATION

1 SUMMARY

This Stormwater Management Plan (SWMP) has been prepared for submission to the Gold Coast City Council to support Gassman Development Perspectives in their intention to gain approval for a material change of land use from the existing land use designation (Future business and Industry) to various preferred industrial uses pursuant to s.242 of the Sustainable Planning Act 2009.

The following report outlines the likely measures to be implemented on-site in relation to stormwater management as part of the delivery of the industrial land uses as promoted by the s.242 preliminary approval application.

This SWMP has been prepared to demonstrate suitable compliance with local, state and national requirements in the planning and design of the proposed subdivision with respect to stormwater management.

This SWMP covers two primary objectives;

1. Site Based Hydrologic/Hydraulic Assessment

This SWMP aims to demonstrate a no-worsening effect on the capacity, performance and potential effect of flooding of the downstream infrastructure owned by Gold Coast City Council, neighbouring properties and the receiving South-East Queensland waterways. In doing so, hydrologic modelling has been undertaken to determine the existing and proposed case stormwater runoff and local flooding characteristics. Measures are presented within this report to mitigate any potential negative impacts which may result from the development; the results of the proposed mitigation measures are then modelled to demonstrate effectiveness.

2. Water Sensitive Urban Design

This SWMP aims to address the water quality objectives of the proposed development in both the operational and construction phases. Details are provided of suitable stormwater quality improvement devices which are modelled to demonstrate effectiveness in the satisfactory removal of pollutants. Construction phase water quality treatment measures are also discussed.

2 SITE DESCRIPTION

2.1 Site Locality

The subject site for the proposed development is located within the Stapylton region of the Gold Coast and is bounded by Stapylton-Jacobs Well Road to the north-west and Christensen Road to the south. The site is also bound by a residential/retirement village to the south-west, existing industrial development to the north and the current construction of industrial development to the east.

Figure 2.1 provides a site locality plan.



Figure 2.1 – Site Locality Plan

2.2 Property Description

The proposed industrial use covers two registered properties, described as Lot 1 on RP6882 and Lot 240 on W31320.

Lot 4 on RP6843 is also relevant to the application as the proposed location of future flood plain storage loss compensation.

2.3 Zoning

The subject site is identified on the Yatala Enterprise Area Local Area Plan – Precincts (GCCC LAP Map 29.2) and is described as “Future Industry”. The subject site is also identified on the on the Yatala Enterprise Area Local Area Plan – Ultimate Precincts (GCCC LAP Map 29.4) and is described as “General Impact Business and Industry”.

2.4 Area of Land

For site based stormwater management purposes, the total area of the site is taken as 73.114ha. Each individual allotment has the following registered areas:

- LOT 1 RP6882 = 205,050m²
- LOT 240 W31320 = 532,558m²

Lot 4 on RP6843 is referenced as the location of future flood plain storage loss compensation, however for the general basis of this report – development on Lots 1 on RP6882 and 240 on W31320 have only been focussed on.

2.5 Site Conditions and Built Form Elements

In its existing state Lot 1 on RP6882 is occupied by a number of built form elements which include a brick farm-house building, ten (10) sheds, access tracks, fenced areas and earth-cut dams.

Lot 240 on W31320 is largely undeveloped consisting of open space, with the exception of an area of approximately 1.35ha, known as Lease A on SP125788, which is currently cleared for usage as industrial buildings and storage of stockpiled materials. Lease A on SP125788 consists of large impervious areas for parking and access, large industrial sheds and two (2) large dams which receive runoff from the area at the two lowest regions of the area prior to discharge of runoff into the surrounding undeveloped areas.

2.6 Existing Surface Levels

The site is generally dissected in a north-south fashion by a ridge line, connecting levels of approximately 25m AHD on the northern boundary to levels of approximately 30m AHD on the south-western boundary with minimum ridge-line levels of approximately 18m AHD.

From this general ridge-line through the centre of the site, the site falls to the west toward Stapylton-Jacobs Well Road to lowest site levels of 3.8m AHD, to the north toward Emeri Street to lowest site levels of 17.21m AHD, and to the east toward the adjoining property where a vegetation conservation area is to be dedicated as part of the proposed development. To the east the site falls toward two localised points where the lowest site levels are 8.38m and 9.98m from north to south respectively.

The small portion of Lot 240 on W31320 located to the south of Christensen Road generally falls to the south toward Sandy Creek from maximum levels around 15.6m AHD to minimum levels on the upper fringe of the creek bank at 8.38m AHD.

3 HYDROLOGIC ASSESSMENT

3.1 Rainfall Data

Rainfall intensity-frequency-distribution (IFD) data for the site has been gathered using the Gold Coast City Councils Design Rainfall Isopleth Charts, Skew Coefficient Charts, and Geographical Factor F2 & F50 Charts (Standard Drawings 05-03-401 to 05-03-409). As necessary, the charts have been interpolated to accurately describe the subject site. Standard Rainfall intensities used for generating IFD data are presented in Table 3.1.

Table 3.1 Rainfall Intensity Data

	1 Hour Duration	12 Hour Duration	72 Hour Duration
50 Year ARI	75.99mm/hr	19.13mm/hr	6.57mm/hr
2 Year ARI	44.08mm/hr	9.22mm/hr	2.84mm/hr

- Skewness = 0
- Geographic Factor F2 = 5.09
- Geographic Factor F50 = 19.12

3.2 Existing Case Catchments

As described in Section 2.6, the site is dissected by a general ridge line which causes runoff to be split and spread from the site in many directions. As a result the site contains a number of internal catchments and a number of lawful points of discharge.

Figure 3.1 below presents a description of the catchment boundaries described in Section 2.6.



Figure 3.1 – Existing Case Catchment Areas

It is noted that the site has been separated into ten (10) internal catchment areas and two (2) external catchment areas. The existing development on Lease A on SP125788 has also been recognised and separated from the major catchments 6 and 7 and identified as Sub-catchments 6a and 7a respectively for the premise of the hydrologic assessment.

3.3 Existing Lawful Points of Discharge

From the ten (10) catchments described above, it is noted that five (5) existing lawful points of discharge currently exist; one toward Stapylton Jacobs Creek Road, one toward Emiri Street in the North, two toward the eastern property boundary and one to the south toward Sandy Creek.

The existing lawful points of discharge area shown on Figure 3.2 below:

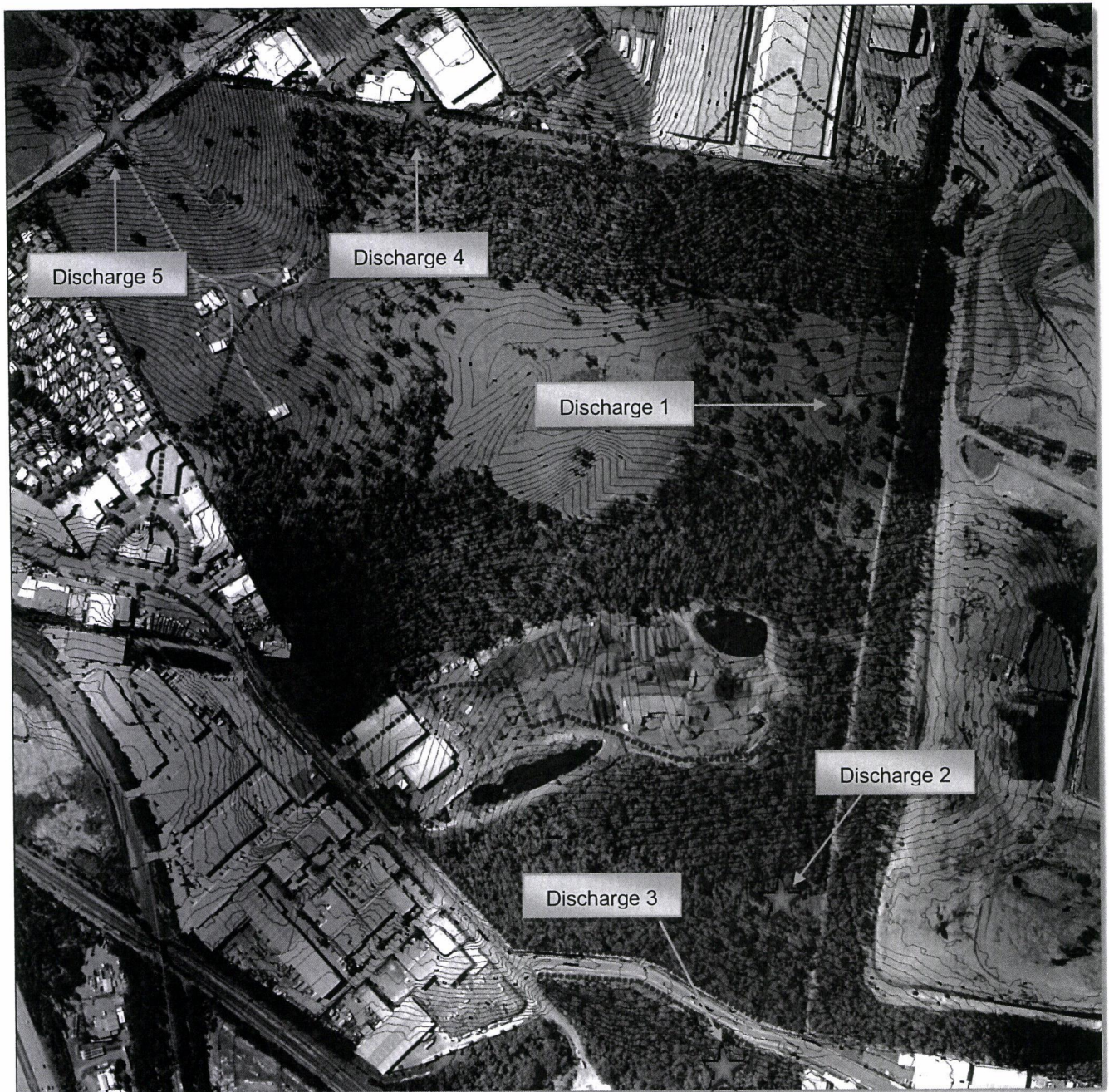


Figure 3.2 – Lawful Points of Discharge

It is noted that a total of six (6) internal catchments (including sub-catchment 6a in Lease A on SP125788) and two (2) external catchments contribute runoff to Discharge1. This approach has been adopted to more accurately reflect the hydraulic behaviour of the full catchment area including the collection of the catchments via the central semi-permanent waterway. This approach additionally allows for more detail and accuracy during the developed case assessment.

Table 3.1 – Lawful Point of Discharge and Catchment Summary

Lawful Point of Discharge	Contributing Catchment Label	Total Area (ha)
1	1	12.64
	2	7.11
	3	3.01
	4	7.31
	5	4.06
	6	9.46
	X1	1.49
	X2	2.15
2	7	11.66
3	8	0.76
4	9	2.20
5	10	8.60

Hyder Drawing K009-AA003837 shows the catchment boundaries, site contours and lawful points of discharge in further details and is included as an Appendix to this report

3.4 Hydrologic Calculations

To evaluate the potential impacts of the proposed development on the existing downstream receiving infrastructure/waterways a hydrologic assessment has been undertaken on both the existing case and the proposed developed case for the affected catchments.

XP-RAFTS hydrologic modelling software has been used to calculate event hydrographs for each sub-catchment's resultant discharge. XP-RAFTS requires input parameters of catchment area, initial and continuing losses, imperviousness, slope and Manning's roughness coefficients in addition to rainfall data to determine storm event hydrographs. XP-RAFTS additionally allows for the detailed modelling of stormwater detention structures and routing through channels and pipes.

XP-RAFTS forms the basis of the hydrologic calculations presented in the report. In the following sections the process, inputs and results of the XP-RAFTS based hydrological analysis are presented.

The peak discharge flow rates generated by XP-RAFTS have been verified/calibrated against detailed Rational Method calculations undertaken in accordance with QUDM (2008). The results of the verification are presented separately in Section 3.9.

3.5 Existing Case Hydrology

The existing case hydrology was modelled using XP-RAFTS with all input parameters determined via a detailed assessment of each sub-catchment.

Table 3.1 provides the input parameters used for each existing sub-catchment:

Table 3.1 – Existing Sub-Catchment Summary

Lawful Point of Discharge	Contributing Catchment	Contributing Catchment Area (ha)	Percentage Impervious (%)	Vectored Slope (%)	Manning's Roughness (n)
1	1	12.64	0	5.41	0.08
	2	7.11	0	5.95	0.05
	3	3.01	0	5.54	0.08
	4	7.31	0	5.80	0.10
	5	4.06	0	4.02	0.05
	6	4.71	0	3.91	0.10
	6a	4.75	40	3.50	0.03
	X1	1.49	90	1.00	0.02
	X2	2.15	90	1.00	0.02
	7	8.25	0	3.51	0.06
2	7a	3.41	50	2.50	0.02
3	8	0.76	0	3.00	0.06
4	9	2.20	0	2.21	0.06
5	10	8.60	7.5	6.20	0.03

In addition to the flow runoff volumes generated by each internal catchment and sub-catchment a number of physical hydraulic factors impact the behaviour of stormwater runoff at the discharge locations. It is important to include these physical factors in the modelling as they may potentially cause hydrograph lag or coincident peak in the discharging flow.

Specifically, it is observed that Catchments 1, 2 and 3 converge at a junction around the centre of the site where a low-lying semi-permanent sluggish waterway carries the converged flow in a west to east direction before joining runoff from Catchments 6 and 7 at Discharge 1. Additionally, both catchments which are subject to the existing industrial usage on Lease A on SP125788 (6a and 7a) have constructed dams which receive stormwater and control runoff prior to discharge, acting as stormwater detention basins.

To reflect these physical impacts on the existing hydrology, these physical factors have been incorporated into the modelling of the existing case of the site.

Figure 3.3 below presents a diagram of the modelling environment used in XP-RAFTS, showing the connection of catchment nodes to the physical barriers described above and the lawful points of discharge.

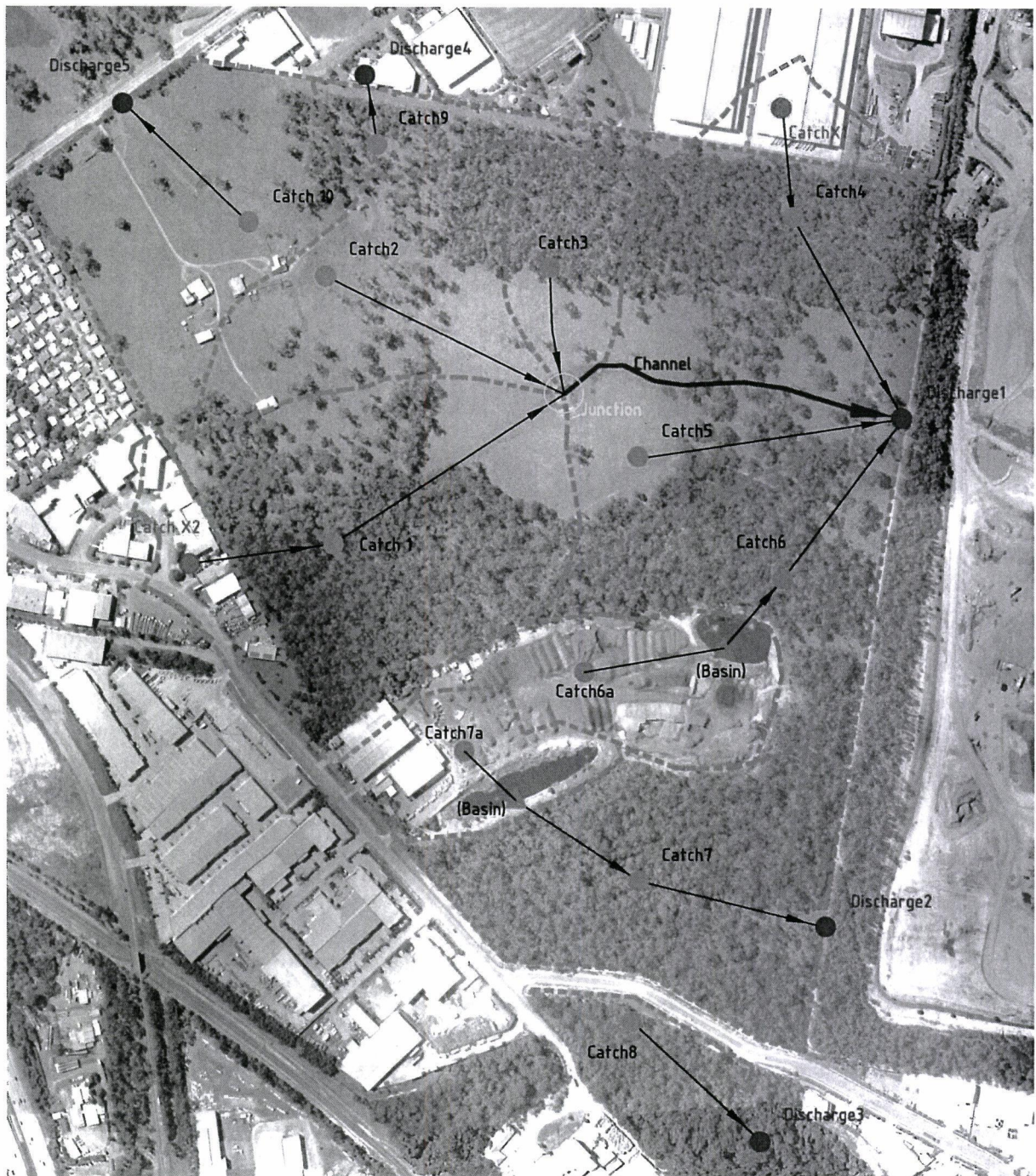


Figure 3.3 – Diagram of Existing Case XP-RAFTS Modelling Environment

Details of the existing physical constraints on the stormwater runoff which have been modelled are summarised below:

Existing Overland Channel Details:

- Length = 520m
- Slope = 0.7%
- Lateral inflow = 60m
- Channel banks = 1:10 slope up to 0.3m height and 1:20 slope above

Existing Basin in Catchment 6a:

- Detention storage depth available = 300mm
- Detention storage volume = 1,080m³
- Spillway = 15m width at 100mm stage

Existing Basin in Catchment 7a:

- Detention storage depth available = 300mm
- Detention storage volume = 1,200m³
- Spillway = 30m width at 100mm stage

For each point of discharge a range of storm events were modelled for each standard ARI to determine the critical storm duration. Table 3.2 below shows the critical storm durations which were identified as yielding the highest peak discharge flow rates for each lawful point of discharge.

Table 3.2 Critical Storm Durations

Lawful Point of Discharge	Critical Storm Duration
1	60/90 mins
2	90 mins
3	25 mins
4	60 mins
5	25 mins

Figures 3.4 to 3.8 below present the critical storm duration hydrographs for each lawful point of discharge in the existing case scenario.

The maximum peak discharge flow rates for each lawful point of discharge depicted on these hydrographs for each ARI storm event will become the design objectives for the developed case scenario.

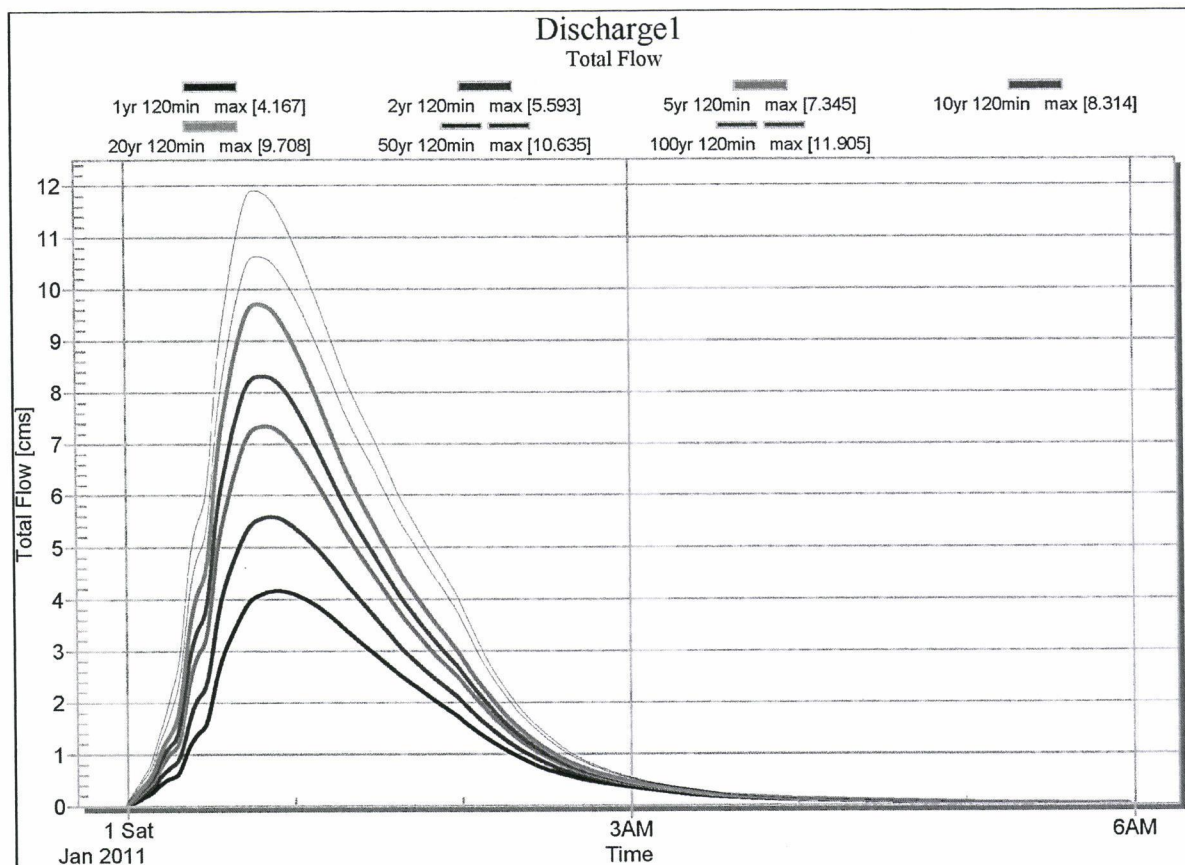


Figure 3.4 – Lawful Point of Discharge 1 Existing Flow Hydrograph

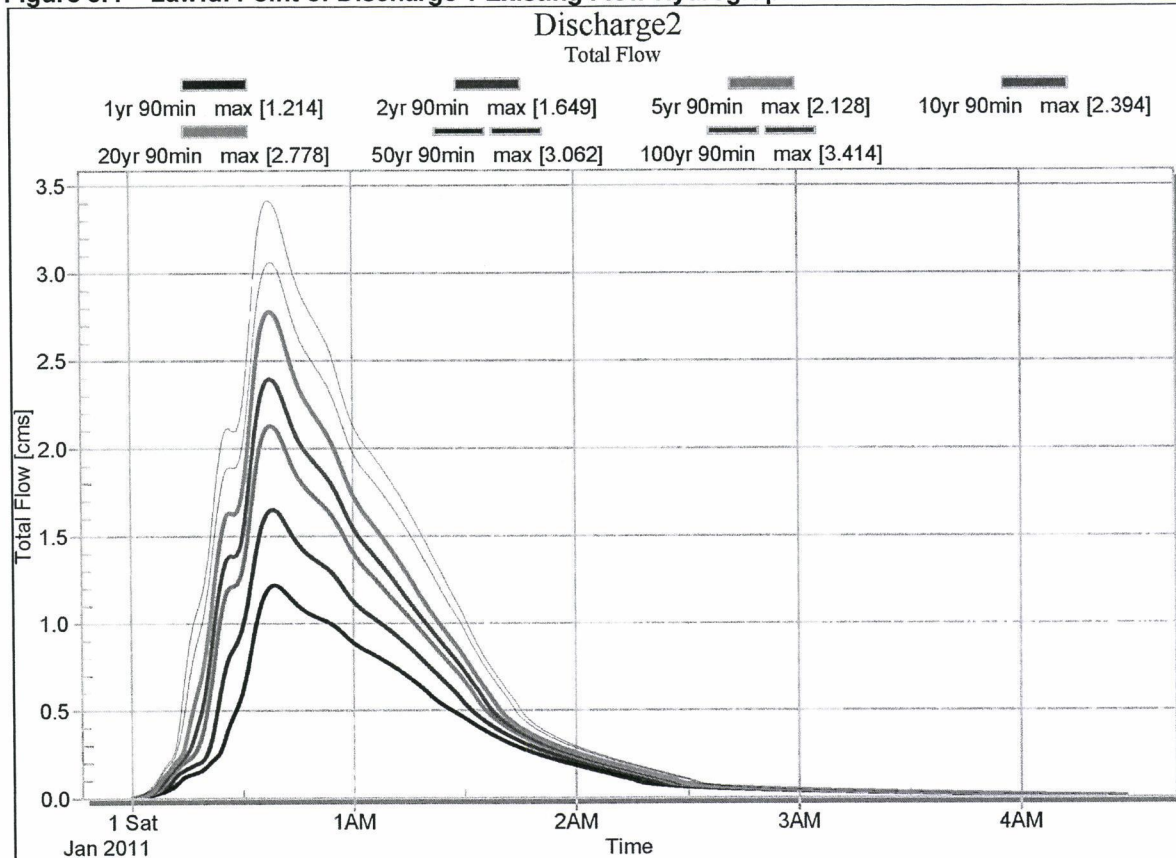


Figure 3.5 – Lawful Point of Discharge 2 Existing Flow Hydrograph

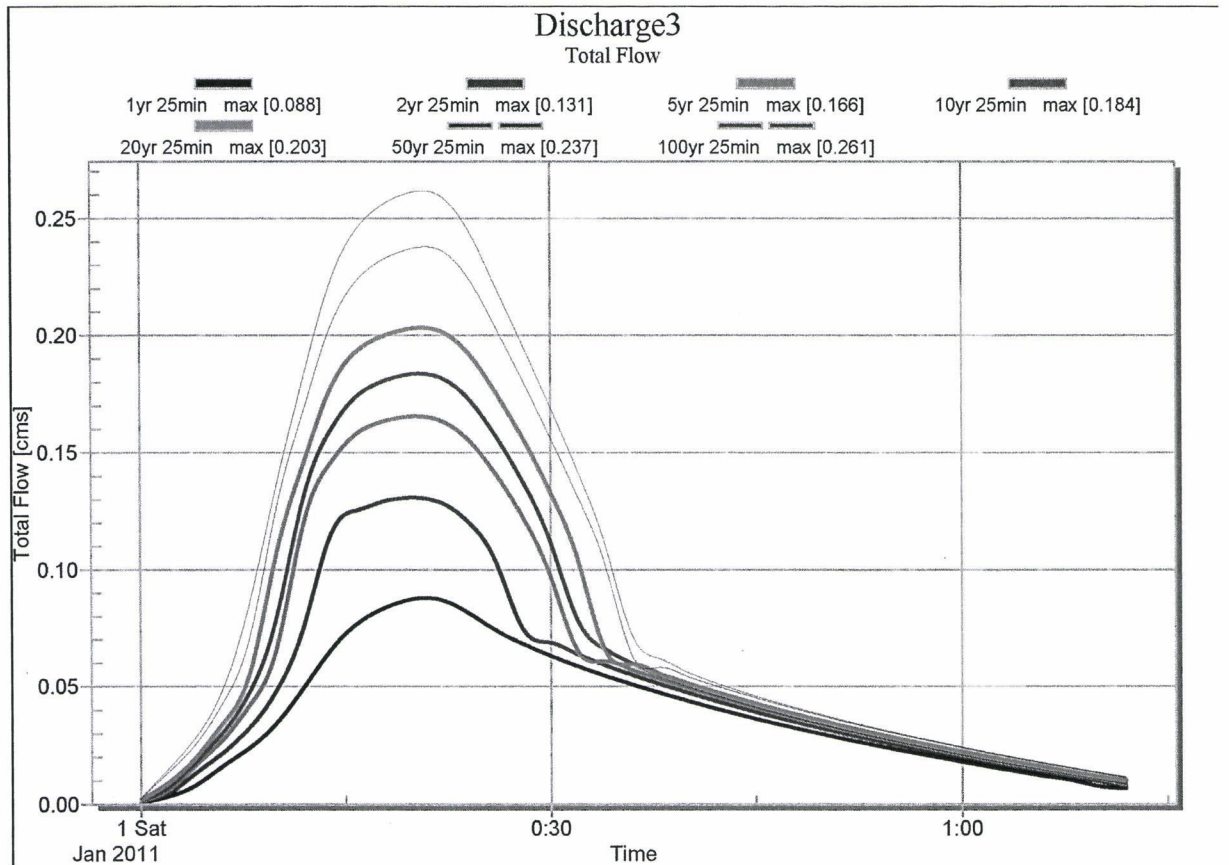


Figure 3.6 – Lawful Point of Discharge 3 Existing Flow Hydrograph

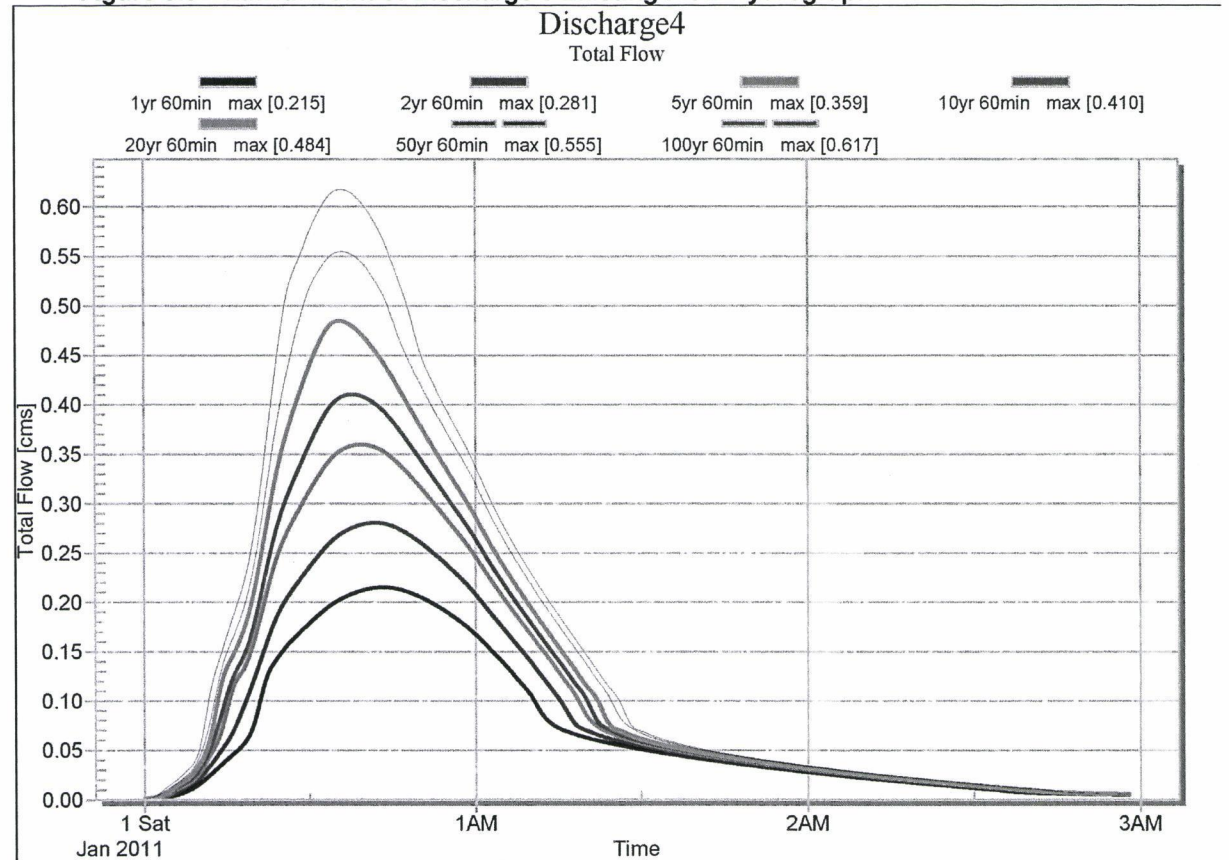


Figure 3.7 - Lawful Point of Discharge 4 Existing Flow Hydrograph

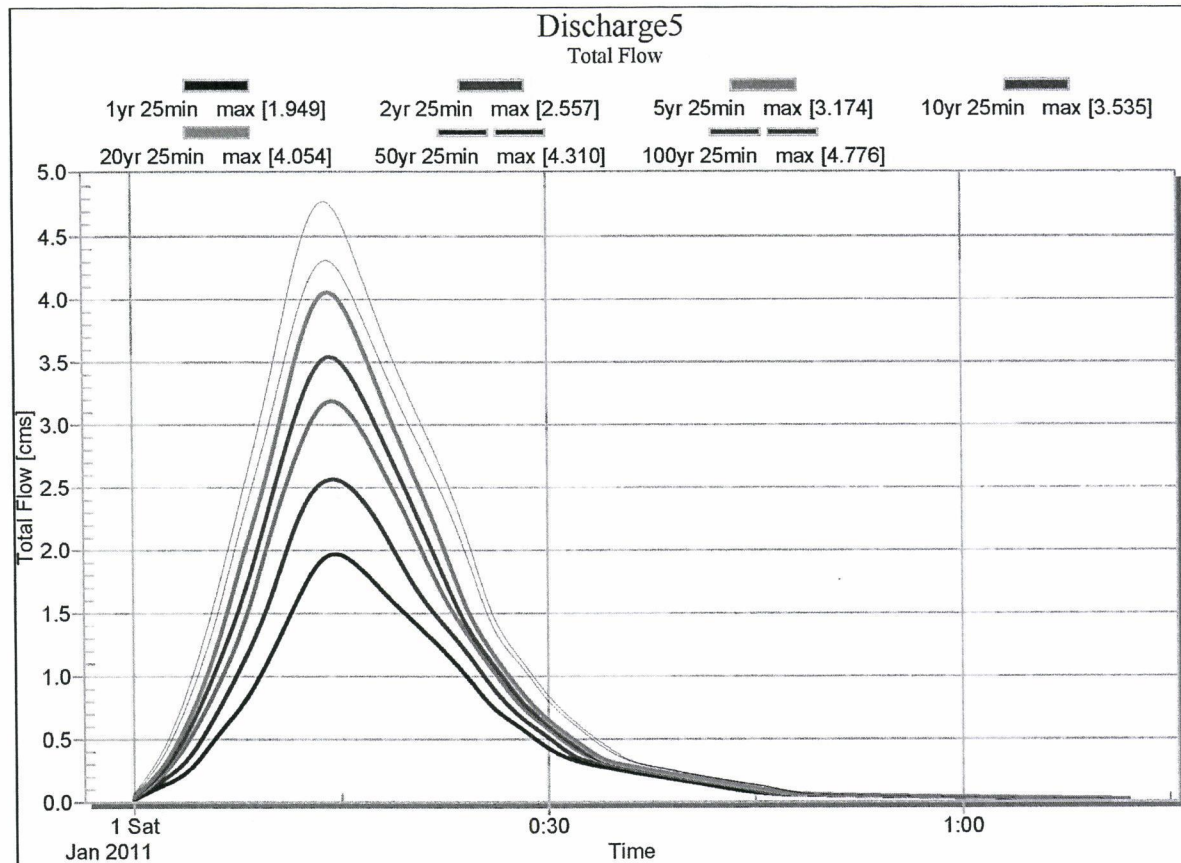


Figure 3.8 - Lawful Point of Discharge 4 Existing Flow Hydrograph

3.6 Developed Case Catchment Augmentation

As an inevitable result of the earthworks and modifications to the ground level involved in the creation of developable allotments the stormwater catchment boundaries, land-fall gradients and imperviousness of the surfaces are altered. These alterations generally lead to shortened times of concentration and increased total peak stormwater runoff.

Figure 3.9 below presents a description of the catchment boundaries which would be resultant from the proposed development.

It is noted that each of the lawful points of discharge remain in the same location as the existing case scenario. It is also noted that the catchment and discharge naming conventions remain to allow for comparison and assessment of potential impacts.



Figure 3.9 – Developed Case Catchment Areas

Table 3.3 below presents a summary of the resulting catchment parameters anticipated during the developed and operational scenario of the site.

Table 3.3 – Developed Catchment

Lawful Point of Discharge	Contributing Catchment	Contributing Catchment Area (ha)	Percentage Impervious (%)	Vectored Slope (%)	Manning's Roughness (n)
1	1	19.37	90	1.0	0.020
	4	5.630	90	1.0	0.020
	5	3.777	90	1.0	0.020
	6	9.590	90	1.0	0.020
	X1	1.490	90	1.0	0.020
	X2	2.150	90	1.0	0.020
2	7a	6.097	90	1.0	0.020
	7b	5.055	90	1.0	0.020
3	8	0.639	90	1.0	0.020
4	9	0.800	90	1.0	0.020
5	10a	7.701	90	1.0	0.020
	10b	3.856	90	1.0	0.020

3.7 Developed Case Hydrology & Stormwater Detention

In addition to creating a separate XP-RAPTS model to represent the augmented developed case catchment scenario, stormwater detention structures have been included in the modelling which are specifically designed to mitigate increases in peak stormwater runoff resulting from the development of the site.

The peak discharge flow rates for each lawful point of discharge shown on Figures 3.3 to 3.8 were used as the design objectives for each detention basin.

The stormwater detention basins have been specifically designed in accordance with GCCC and QUDM requirements to ensure that peak discharge flow rates are not increased during critical storm durations for all standard ARI's up to 1 in 100 year events.

Details of the proposed stormwater detention devices area as follows:

Detention Basin 1 (Catchment 5):

- Total depth = 1.5m (base = RL11.5m AHD, crest = RL13.0m AHD)
- Detention storage depth in basin = 1.2m (allowing 300mm freeboard)
- Detention storage volume = 2,570m³
- Spillway = 8m width at RL12.5m AHD
- Outlet pipe = 2No. 750mm @ 0.8%

Detention Basin 2 (Catchment 7):

- Total depth = 1.5m (base = RL12.0m AHD, crest = RL13.5m AHD)
- Detention storage depth in basin = 1.2m (allowing 300mm freeboard)
- Detention storage volume = 3,950m³
- Spillway = 8m width at RL13.0m AHD
- Outlet pipe = 2No. 900mm @ 1.0%

Detention Basin 3 (Catchment 1):

- Total depth = 1.5m (base = RL9.5m AHD, crest = RL11.0m AHD)
- Detention storage depth in basin = 1.2m (allowing 300mm freeboard)
- Detention storage volume = 12,360m³
- Spillway = 10.5m width at RL10.3m AHD
- Outlet pipe = 4No. 900mm @ 0.8 %

Detention Basin 4 (Catchment 8):

- Total depth = 1.5m (base = RL12.0m AHD, crest = RL13.0m AHD)
- Detention storage depth in basin = 0.7m (allowing 300mm freeboard)
- Detention storage volume = 205m³
- Spillway = 1.5m width at RL12.6m AHD
- Outlet pipe = 1No. 375mm @ 0.5 %



Figure 3.10 – Diagram of Developed Case XP-RAFTS Modelling Environment

Figures 3.11 to 3.15 below present the critical storm duration hydrographs for each lawful point of discharge in the developed case scenario.

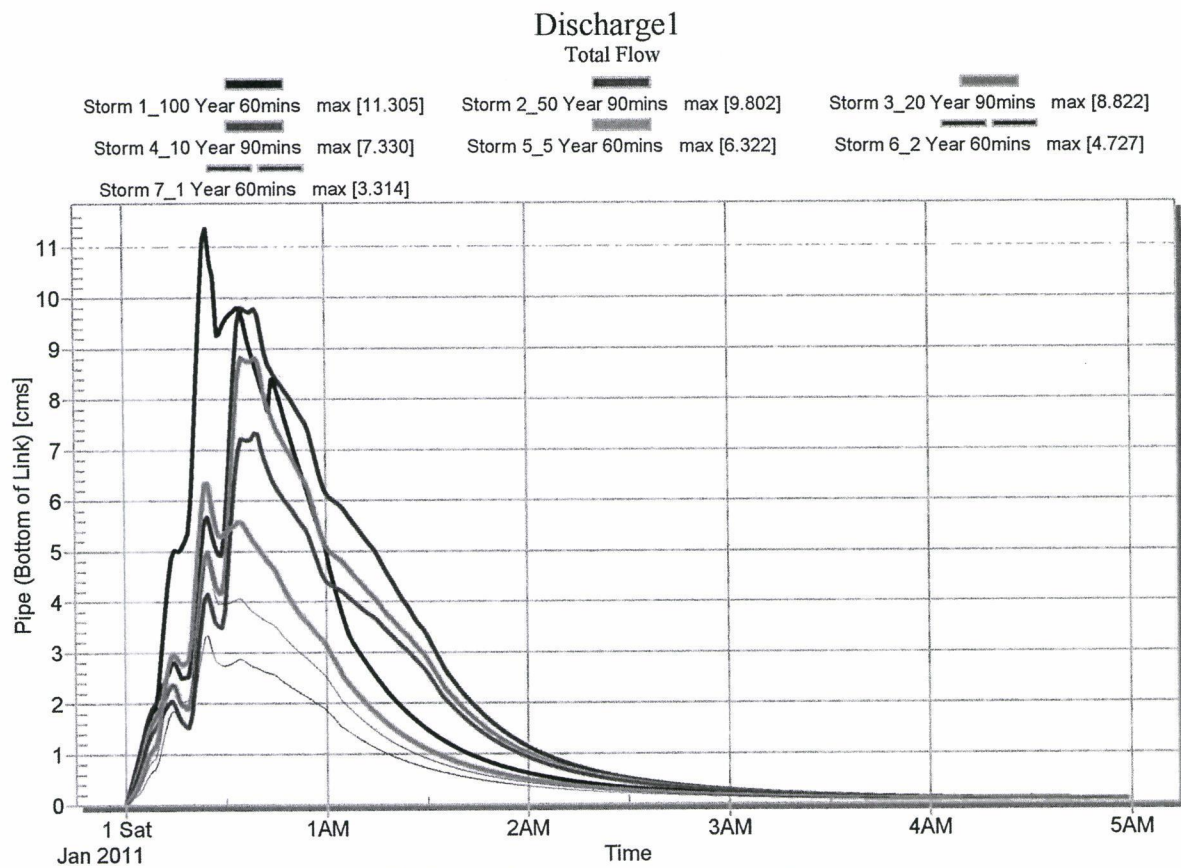


Figure 3.11 - Lawful Point of Discharge 1 Developed Flow Hydrograph

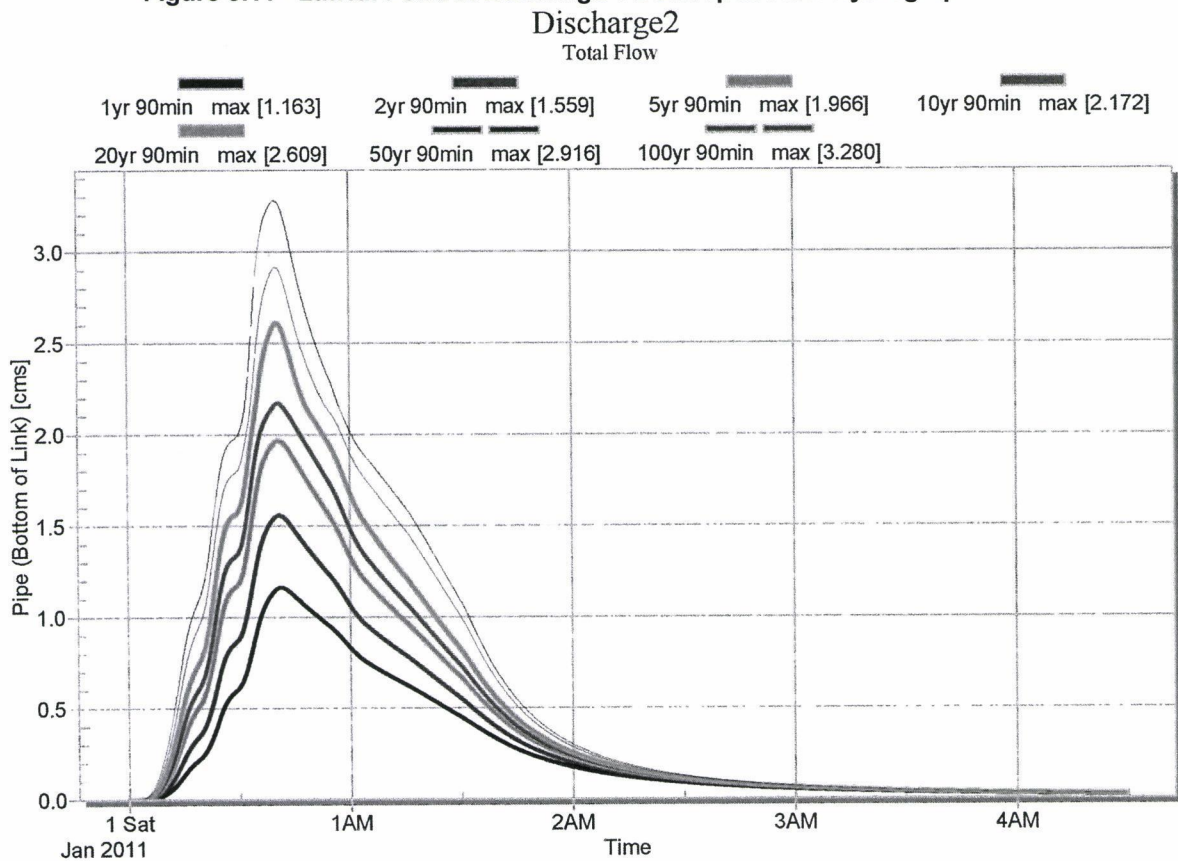


Figure 3.12 - Lawful Point of Discharge 2 Developed Flow Hydrograph

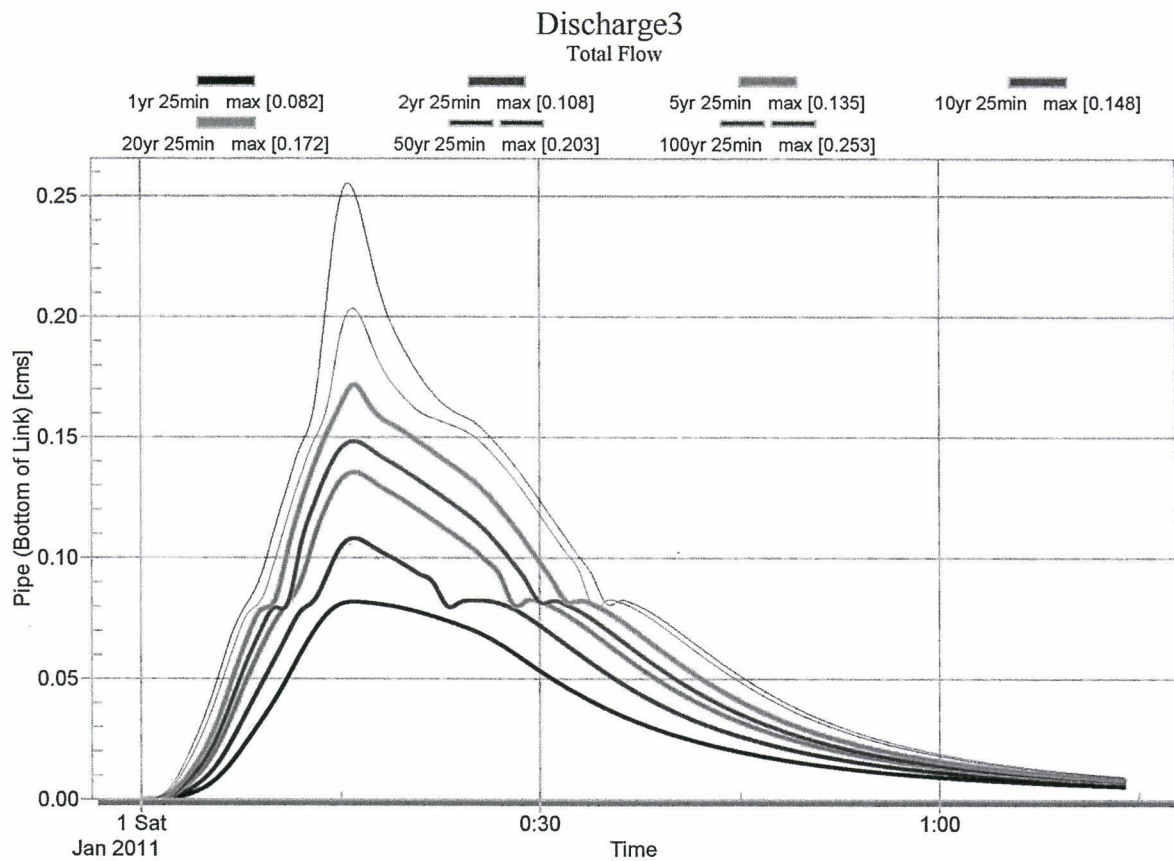


Figure 3.13 - Lawful Point of Discharge 3 Developed Flow Hydrograph

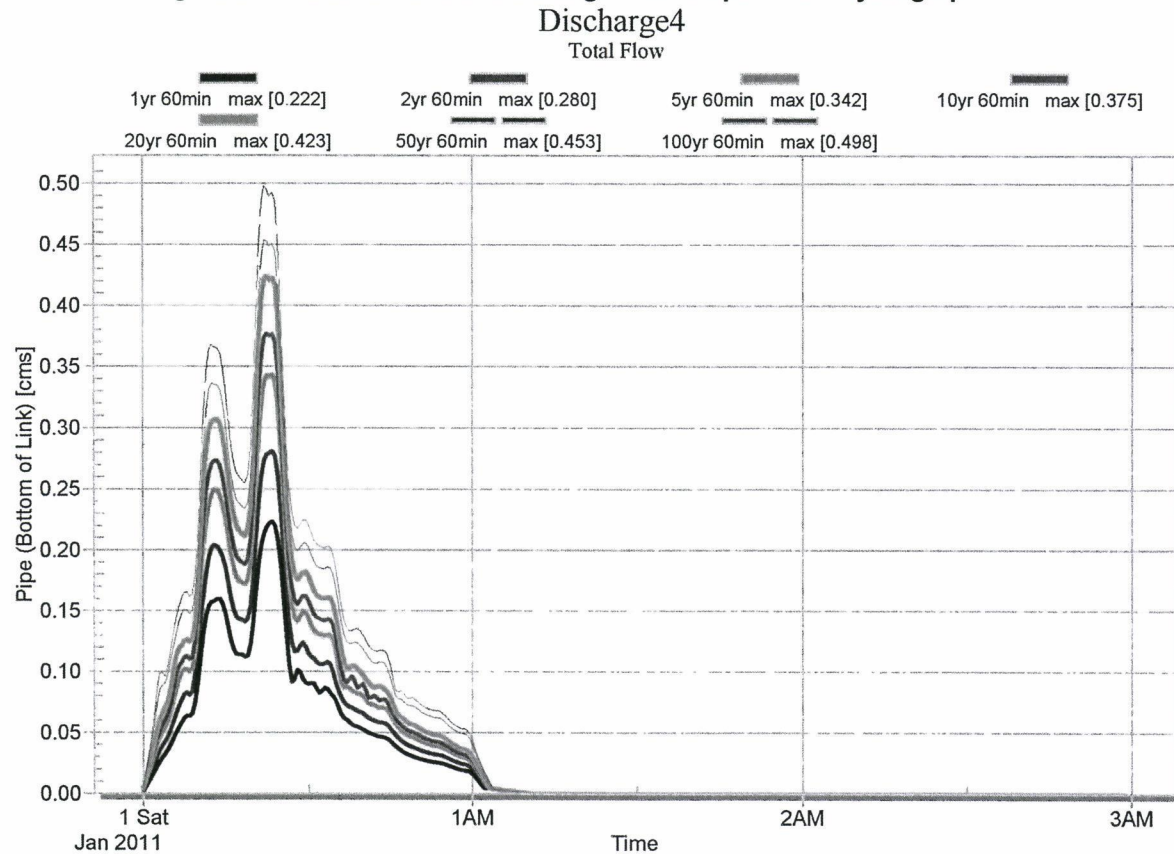


Figure 3.14 - Lawful Point of Discharge 4 Developed Flow Hydrograph

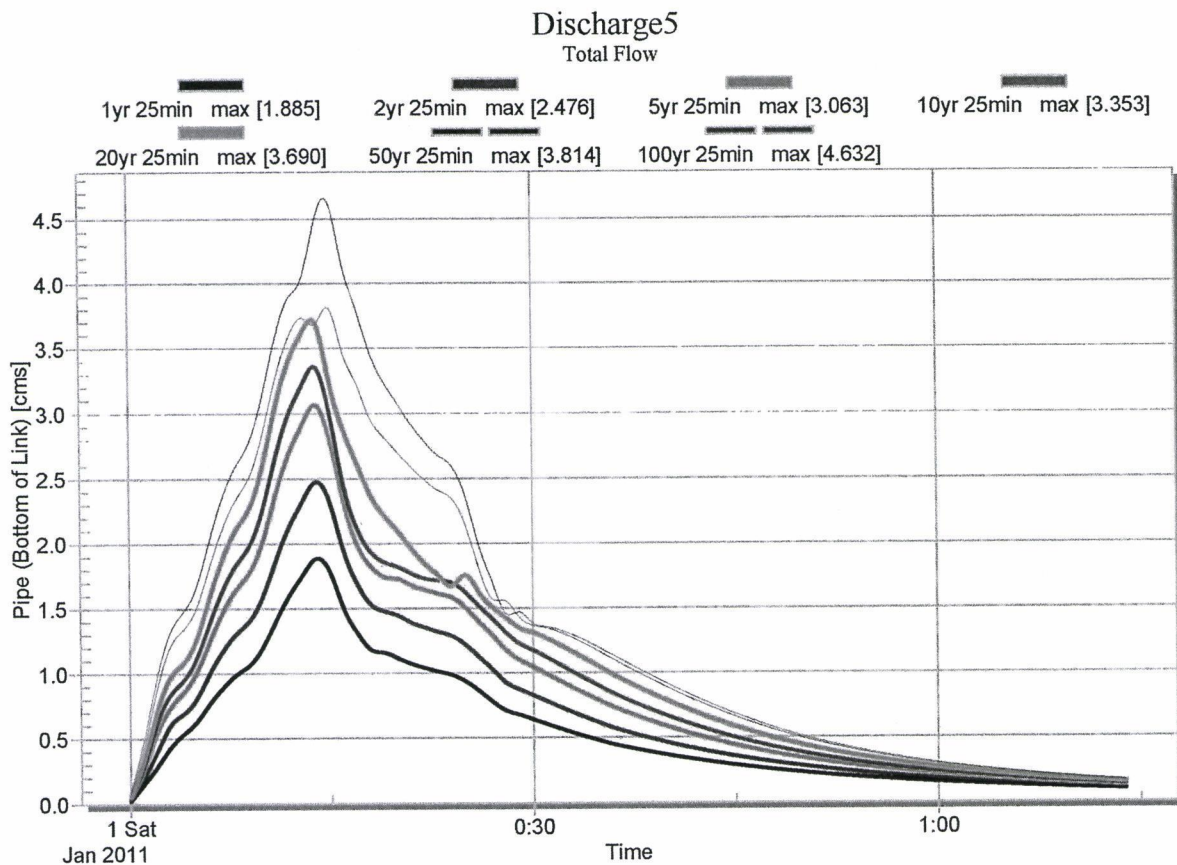


Figure 3.15 - Lawful Point of Discharge 5 Developed Flow Hydrograph

3.8 Detailed Detention Basin Information

The following tables have been included to show the model results with respect to the extended detention depth, stage-storage relationship and maximum water depths during 20 year ARI and 100 year ARI events.

This information has been specifically requested by GCCC during an information request dated 21st December 2011.

Table 3.4 – Basin 1 Stage Storage & Important Information

Level (m)	Storage (m3)	Important Information
11.5	0	Base = 11.5m AHD
11.6	0	
11.7	0	Extended Detention Zone
11.8	0	
11.9	284.508	
12	569.016	
12.1	853.524	
12.2	1138.032	
12.3	1422.54	
12.4	1707.048	
12.5	1991.556	
12.6	2276.064	Max Q20 Water Level = 12.62m
12.7	2560.572	Max Q100 Water Level = 12.7m
12.8	2845.08	
12.9	3129.588	Freeboard Zone
13	3414.096	

Table 3.5 – Basin 2 Stage Storage & Important Information

Level (m)	Storage (m3)	Important Information
12	0	Base = 12.0m AHD
12.1	0	
12.2	0	Extended Detention Zone
12.3	0	
12.4	448.128	
12.5	896.256	
12.6	1344.384	
12.7	1792.512	
12.8	2240.64	
12.9	2688.768	
13	3136.896	
13.1	3585.024	Max Q20 Water Level = 13.08m
13.2	4033.152	Max Q100 Water Level = 13.188m
13.3	4481.28	
13.4	4929.408	Freeboard Zone
13.5	5377.536	

Table 3.6 – Basin 3 Stage Storage & Important Information

Level (m)	Storage (m3)	Important Information
9.5	0	Base = 9.5m AHD
9.6	0	
9.7	0	Extended Detention Zone
9.8	3427.0	
9.9	4622.445	
10	5844.601	
10.1	7093.631	
10.2	8369.662	
10.3	9672.823	
10.4	11003.243	
10.5	12361.047	
10.6	13746.366	Max Q20 Water Level = 10.536m
10.7	15159.327	Max Q100 Water Level = 10.666m
10.8	16600.057	
10.9	18068.685	Freeboard Zone
11	19569.339	

Table 3.7 – Basin 4 Stage Storage & Important Information

Level (m)	Storage (m3)	Important Information
12	0	Base = 12.0m AHD
12.1	29.35	
12.2	58.7	
12.3	88.05	
12.4	117.4	
12.5	146.75	
12.6	176.1	Max Q20 Water Level = 12.600m
12.7	205.45	Max Q100 Water Level = 10.686m
12.8	234.8	
12.9	264.15	Freeboard Zone
13	293.5	

3.9 Detention Basin Performance

In addition to the hydrographs presented in the sections above, Table 3.8 below provides a concise summary of the pre and post development flow rates for each catchment, and an indication of the detention basin performance in achieving objectives. This table was specifically requested by GCCC during an information request dated 21st December 2011.

Table 3.8 – Pre and post Development Flow Rates for All Storms at all Discharge Points

Lawful Point of Discharge	Storm Event (ARI)	Pre-Development Runoff (m ³ /s)	Post-Development Runoff (m ³ /s)	Post-Development Runoff including Detention (m ³ /s)
1	Q1	4.330	11.108	3.314
	Q2	5.813	14.109	4.727
	Q5	7.613	17.450	6.322
	Q10	8.514	16.213	7.330
	Q20	9.890	18.437	8.822
	Q50	11.141	18.665	9.802
	Q100	12.402	25.204	11.305
2	Q1	1.214	2.496	1.163
	Q2	1.649	3.201	1.559
	Q5	2.128	3.977	1.966
	Q10	2.394	4.402	2.172
	Q20	2.778	4.977	2.609
	Q50	3.062	5.027	2.916
	Q100	3.414	5.525	3.280
3	Q1	0.088	0.209	0.082
	Q2	0.131	0.264	0.108
	Q5	0.166	0.321	0.135
	Q10	0.184	0.351	0.148
	Q20	0.203	0.395	0.172
	Q50	0.237	0.404	0.203
	Q100	0.261	0.441	0.253

Table 3.8 (Continued)

	Storm Event (ARI)	Pre-Development Runoff (m ³ /s)	Post-Development Runoff (m ³ /s)	Post-Development Runoff including Detention (m ³ /s)
4	Q1	0.215	0.222	n/a
	Q2	0.281	0.280	n/a
	Q5	0.359	0.342	n/a
	Q10	0.410	0.375	n/a
	Q20	0.484	0.423	n/a
	Q50	0.555	0.453	n/a
	Q100	0.617	0.498	n/a
5	Q1	1.949	3.761	1.885
	Q2	2.557	4.733	2.496
	Q5	3.174	5.757	3.063
	Q10	3.535	6.311	3.353
	Q20	4.054	7.092	3.690
	Q50	4.310	7.250	3.814
	Q100	4.776	7.904	4.632

3.10 Model Verification

The Rational Method as described by QUDM (2008) was employed to verify the results generated by the XP-RAFTS hydrologic model. Table 3.3 below presents the input parameters used for calculating peak discharge flow rates via the Rational Method, Table 3.4 below presents a comparison of the Rational Method results against the XP-RAFTS results.

Table 3.8 – Rational Method Calculation Inputs

Discharge	Area (ha)	Coefficient of Runoff	Calculation Method & Parameters	Total Time of Concentration
1 (existing)	43.59	0.62	Bransby Williams: Flow Path Length = 905m Equal Area Slope = 1.1%	35mins
2 (existing)	11.66	0.62	Bransby Williams: Flow Path Length = 580m Equal Area Slope = 1.6%	24mins
3 (existing)	0.76	0.62	Sheet Flow Equation: Flow Path Length = 80m Surface Slope = 3%	15mins
4 (existing)	2.20	0.52	Bransby Williams: Flow Path Length = 320m Equal Area Slope = 2.2%	14mins
5 (existing)	8.80	0.8	Bransby Williams: Flow Path Length = 440m Equal Area Slope = 5.9%	14mins
1 (developed)	42.01	0.95	Standard Inlet = 5mins Pipe & Channel = 1000m	15mins
2 (developed)	11.66	0.95	Standard Inlet = 5mins Pipe & Channel = 500m	10mins
3 (developed)	0.64	0.95	Standard Inlet = 5mins Pipe & Channel = 150m	6mins
4 (developed)	0.81	0.95	Standard Inlet = 5mins Pipe & Channel = 100m	6mins
5 (developed)	11.83	0.95	Standard Inlet = 5mins Pipe & Channel = 330m	10mins

Table 3.4 – Rational Method / XPRAFTS Model Verification Table

Discharge	Storm Event	Rational Method	XPRAFTS	Difference
1 (existing)	Q2	4.33	5.30	22%
	Q10	6.79	8.15	20%
	Q100	11.39	11.52	1%
2 (existing)	Q2	1.32	1.60	21%
	Q10	2.06	2.17	5%
	Q100	3.45	3.28	-5%
3 (existing)	Q2	0.11	0.11	0%
	Q10	0.17	0.15	-12%
	Q100	0.29	0.25	-14%
4 (existing)	Q2	0.29	0.28	-3%
	Q10	0.45	0.37	-18%
	Q100	0.76	0.50	-34%
5 (existing)	Q2	1.68	2.48	48%
	Q10	2.62	3.35	28%
	Q100	4.38	4.63	6%
1 (developed)	Q2	8.94	11.25	26%
	Q10	13.94	15.85	14%
	Q100	21.53	20.04	-7%
2 (developed)	Q2	2.9	3.20	10%
	Q10	4.51	4.40	-2%
	Q100	6.96	5.53	-21%
3 (developed)	Q2	0.22	0.26	18%
	Q10	0.34	0.35	3%
	Q100	0.50	0.44	-12%
4 (developed)	Q2	0.28	0.28	0%
	Q10	0.43	0.37	-14%
	Q100	0.63	0.50	-21%
5 (developed)	Q2	3.42	4.73	38%
	Q10	5.31	6.31	19%
	Q100	7.75	7.90	2%

It is noted that the calculated discharge from each sub-catchment in each condition of development is within an allowable range of error to consider the XP-RAFTS model verified by the Rational Method calculations.

4 HYDRAULIC ASSESSMENT (FLOODING)

4.1 Existing Case Site Flooding

The subject site is identified on Gold Coast City Council Natural Hazard (Flood) Management Areas – Overlay May OM17-5. An extract of which is presented below:

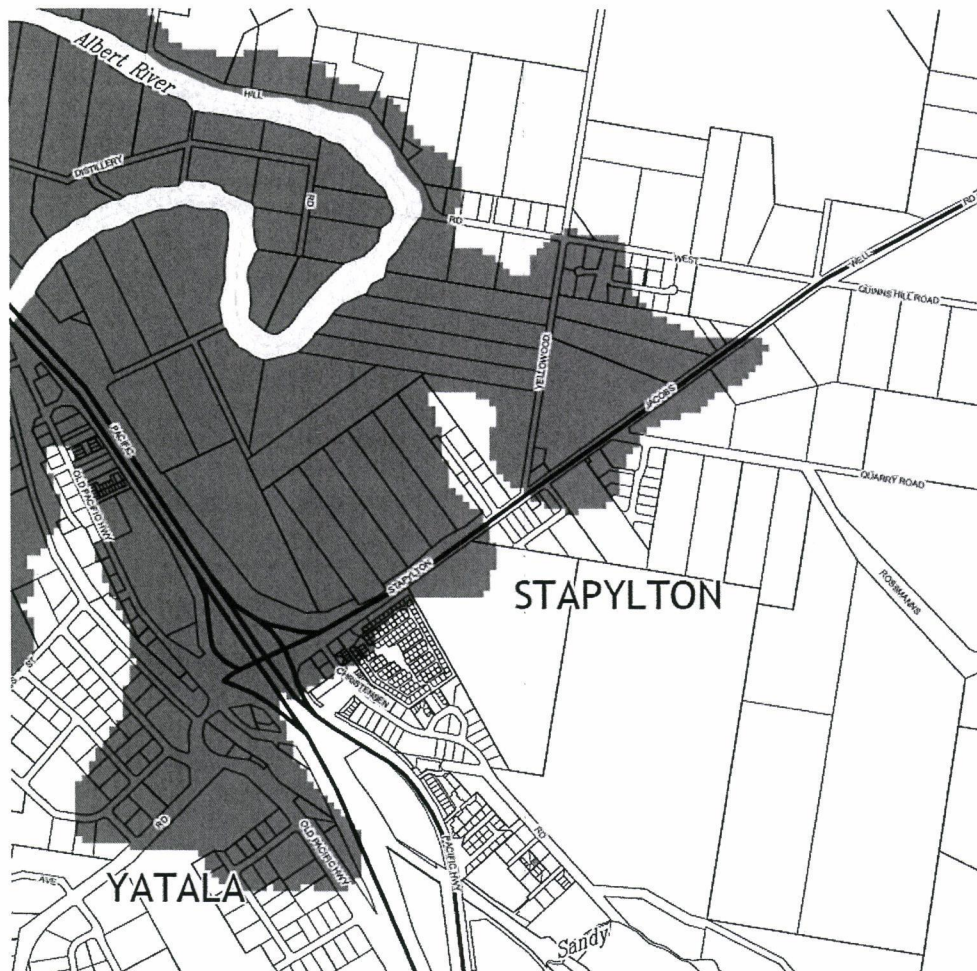


Figure 4.1 – GCCC Overlay May OM17-5.

In addition to this, Gold Coast City Council has issued a flood search report for the site indicating that the designated flood level is at RL 8.6m AHD; some 5.0m above the lowest site levels located around the culverts under Stapylton-Jacobs Well Road.

This mapping indicates that the site is subject to flooding from the Albert River. To ensure that this assumption is correct and that local flooding impacts are not affecting the site in excess of the regional floods, a one-dimensional HEC-RAS flood model of the subject site was created.

The results of the existing site flood modelling are presented below. Whilst indicating that the actual site flooding is not as extreme as the GCCC mapping, a large amount of inundation still occurs surrounding the Stapylton-Jacobs Well Road boundary of the site.



Figure 4.2 – GCCC Mapping & HEC-RAS Modelled Q100 Flooding in Plan (Local & Regional)

Further investigation of the on-site flooding in section reveal that regional flooding far exceeds local events and has a major impact on the site frontage to Stapylton-Jacobs Well Road.

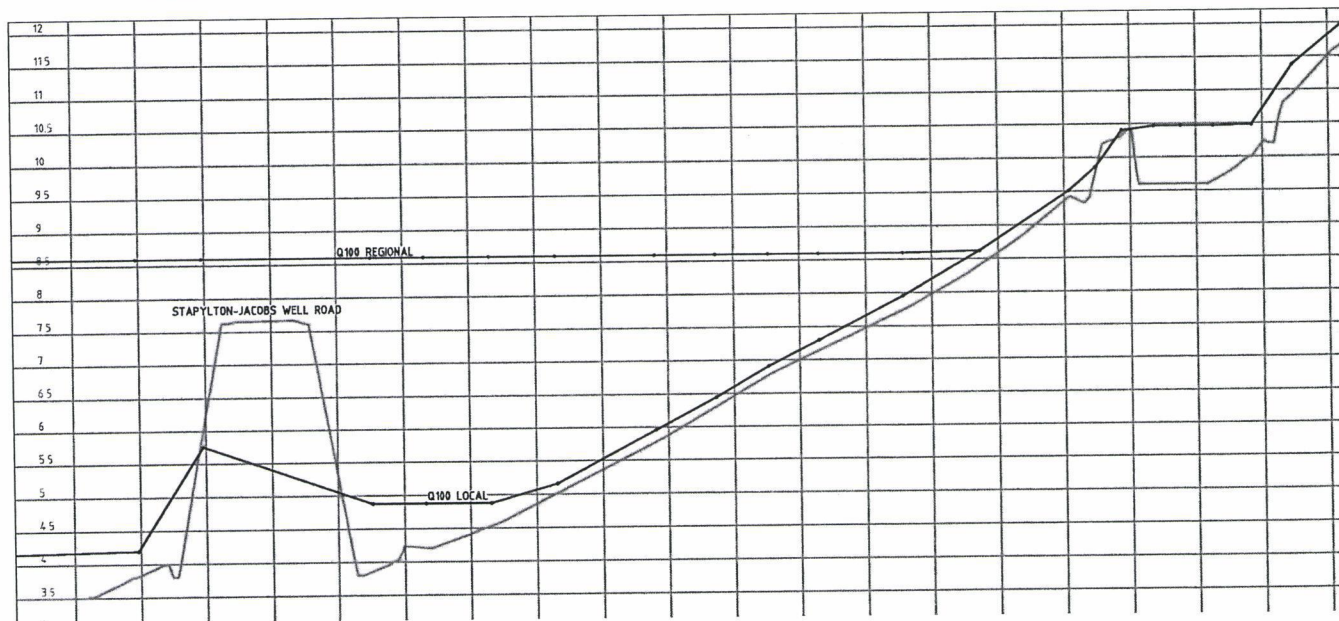


Figure 4.3 – Q100 Flooding at Stapylton-Jacobs Well Road Section (Local & Regional)

4.2 Existing Scenario Flood Volumes

On-site regional flood storage volumes have been calculated for the site based on the GCCC provided flood level of 8.6m AHD and the existing surface levels within the property boundary.

The exact volume of on-site regional flood storage is equal to **19,970m³**.

A description of the area used to calculate the regional flood storage volume is shown below:

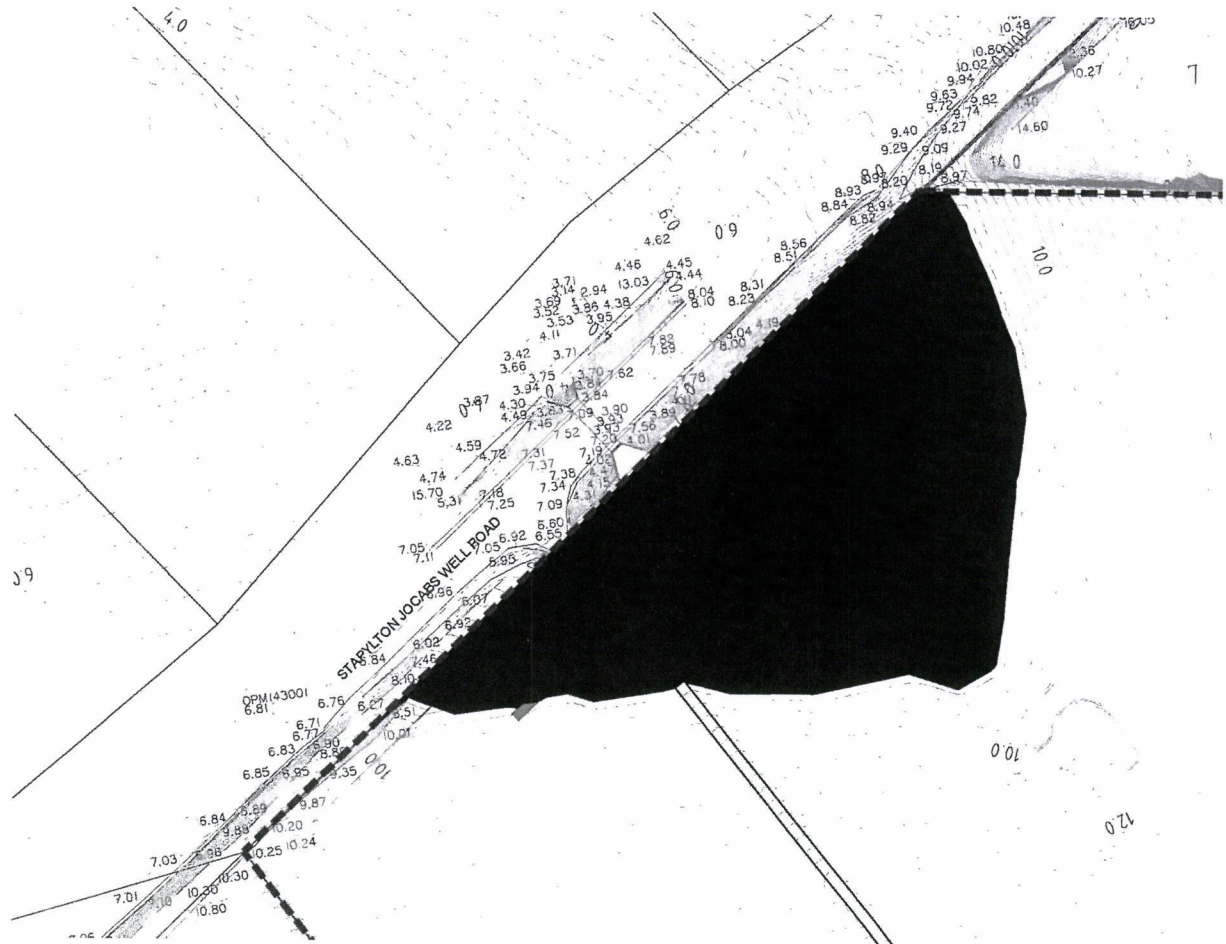


Figure 4.4 – Existing Regional Flood Volume Storage Calculation Description

4.3 Developed Scenario Site Flooding

To provide safe building levels for the proposed development, site earthworks are proposed to raise all allotment levels above the regional Q100 flood level, with the additional provision of freeboard as necessary.

In addition, the internal roadways have been designed to provide free conveyance of local storm events up to Q100.

A combined one-dimensional hydraulic model was created using HEC-RAS to assess the effectiveness of the roadways in conveying local storm events in combination with a simultaneous regional flooding event from the Albert River. At the critical location at the intersection of Road 1 and Stapylton-Jacobs Well Road the flooding extents are shown diagrammatically below:

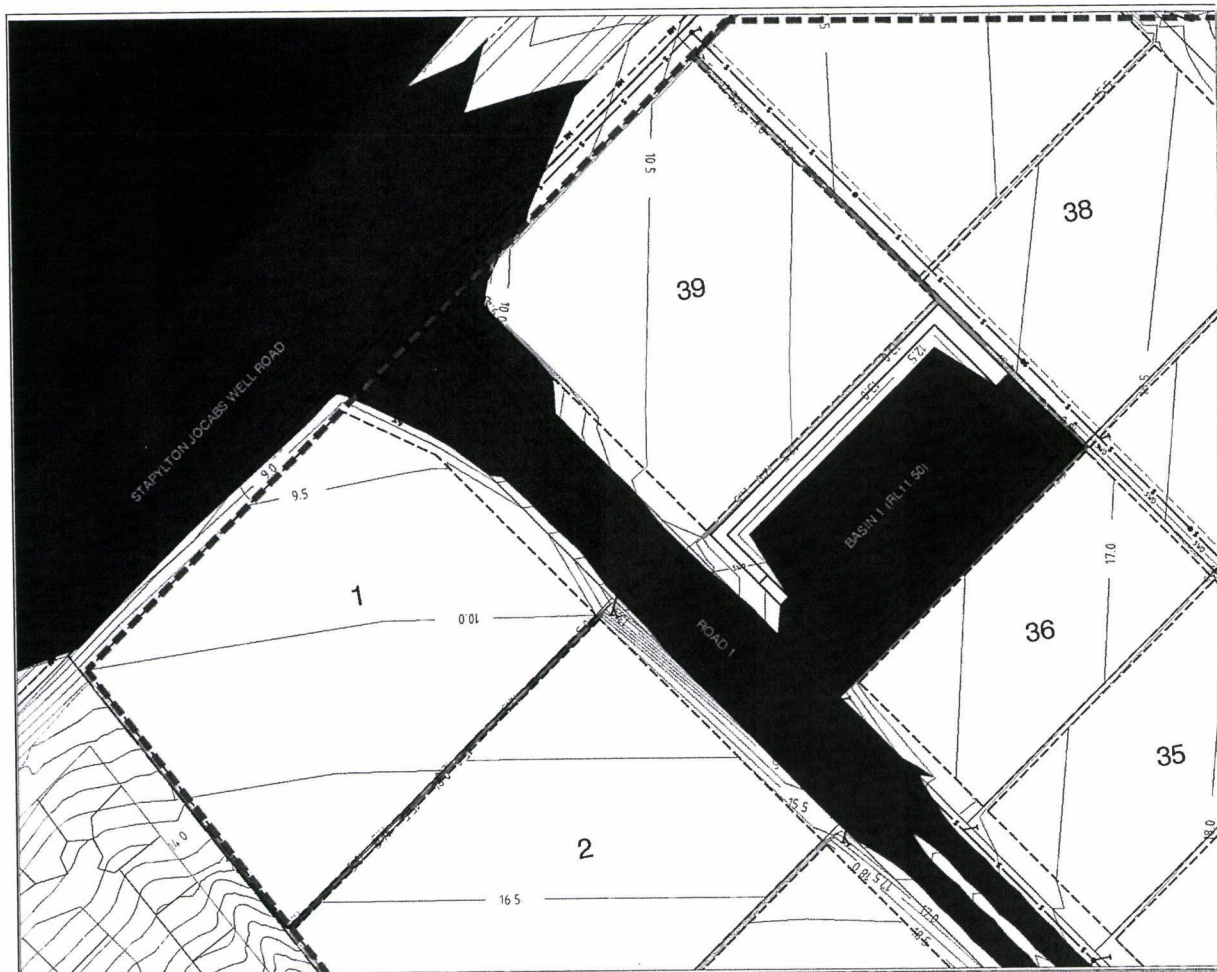


Figure 4.5 – Developed Case Flooding (Combined Local & Regional)

Regional flooding conditions do not affect the other four points of discharge. At these locations the combination of piped reticulation and overland flow via the roadways has been adequately designed to ensure the safe discharge of local storm event runoff.

The design of the proposed allotments and internal roadways has been undertaken to ensure that the proposed development is not unduly affected by local or regional flooding effects.

4.4 Developed Scenario Flood Volumes

As mentioned above, it is proposed to raise all allotments to safe levels above the regional Q100 flood event.

It is acknowledged that the filling of land within regional flood designated areas without the provision of compensatory flood storage can have adverse effects on the flood levels of adjoining properties or elsewhere within the flood extents.

It is therefore proposed that a compensatory excavation of **19,970m³** is undertaken on the allotments to the north-west of the subject site, identified as Lot 4 on RP6843, which is also owned by the property owner of the subject site.

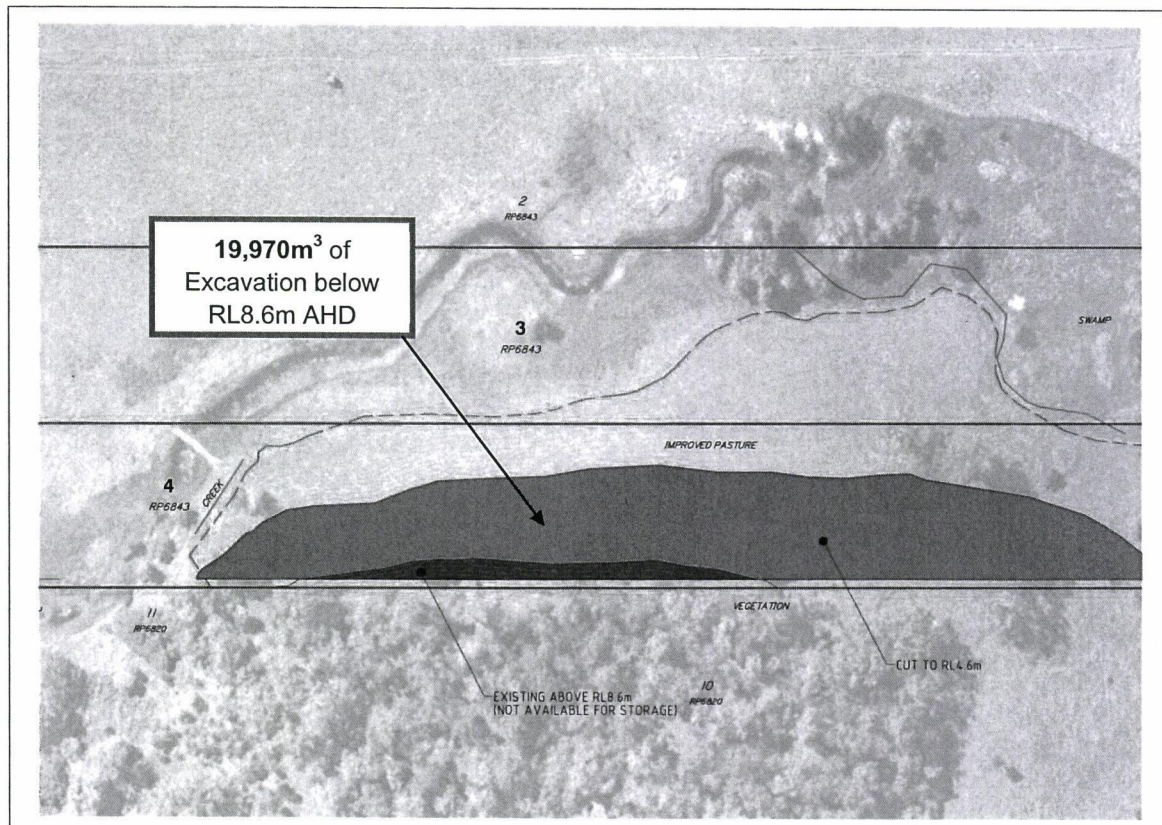


Figure 4.6 – Compensatory Excavation for Flood Storage Volume Balance

The area identified in Figure 4.6 is located immediately north-west of the subject site and is within the same flood plain which affects the subject site. Excavation of 19,970m³ of material below RL8.6m AHD and above the standing water line in this area will ensure a balance of flood storage volumes lost from the proposed development of the subject site.

Using three dimensional modelling of the site, the area identified in green above, excavated to RL4.6m AHD will provide suitable flood storage balance to compensate for the loss incurred by the filling of the subject site

4.5 Emergency Access and Egress

The proposed development has a total of four (4) main access locations. The intersection of Road 1 and Stapylton-Jacobs Well Road is subject to major flood inundation (refer to Figure 4.5) and is therefore unsuitable for access or egress during any flood events.

The staging of the development must be planned so that at least one of the following proposed alternative access and egress locations are available at all times the site is in operation:

- Road 3 and Debortoli Road (North)
- Angel Raod (North)
- Road 1 and Christensen Road (South)
- Road 4 and Christensen Road (West)

5 WATER SENSITIVE URBAN DESIGN (STORMWATER QUALITY)

5.1 Water Quality Environmental Values and Water Quality Objectives (WQO)

The Generations Industrial Park is located within the lower sub-catchments of the Logan River. As described previously in Section 3.4, stormwater runoff from the site is directed toward five (5) clearly defined and separate lawful points of discharge. From these points of discharge, runoff is directed in one of two general directions; either to the north-west and toward the Albert River, or to the south-east and toward Sandy Creek. Ultimately however both downstream receiving waterways join the Logan River at its lower estuarine reaches prior to discharge into the Southern Bay.

The Albert River receives runoff from approximately 10.8ha of the site. This runoff is directed under the culverts in Stapylton-Jacobs Well Road and via drainage in Debortoli Road, across the flood plain on the adjoining property and into the river.

The Sandy Creek receives runoff from approximately 43.4ha of the site. The runoff is directed toward the western boundary of the site where it is either received via drainage in the adjoining properties, or directly into the creek.

Both the Albert River and Logan River estuarine regions surrounding the development site are currently struggling with water quality issues. The Albert Estuary and Logan Estuary both received an "F" on the 2010 Healthy Waterways Report Card Results, being attributed to poor water quality, continued high nutrients, turbidity and low dissolved oxygen.

It is for these reasons that stormwater quality issues have been addressed in detail during the planning and design of the proposed development.

The Queensland Government Department of Environment and Resource Management has released specific Environmental Values and Water Quality Objectives for both the Albert River and the Logan River under Schedule 1 of the Environmental Protection (Water) Policy 2009. Both documents stipulate that stormwater design objectives for urban development are to be as per the "Urban Stormwater Quality Planning Guidelines 2009 (2010, as amended).

Therefore, in accordance with the Environmental Protection (Water) Policy 2009, the identified Water Quality Objectives are defined as:

Table 5.1 – Construction Phase Performance Criteria

Pollutant	Criteria
Drainage Control	Design life and design storm of temporary drainage works: 1. Disturbed area open for <12 months—1 in 2 ARI 2. Disturbed area open for 12-24 months—1 in 5 ARI 3. Disturbed area open for > 24 months—1 in 10 ARI
Erosion Control	1. Minimise exposure of disturbed soils at any time 2. Avoid or minimise large construction activities in the wet season 3. Divert water run-off from undisturbed areas around disturbed areas 4. Use erosion risk ratings to determine appropriate erosion control measures
Sediment Control	Use soil loss rates to determine appropriate sediment control measures Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water run-off Site discharge during sediment basin dewatering should not exceed 50 mg/L TSS and pH between 6.5–8.5
Water Quality Outcomes	Stormwater flows from undisturbed and disturbed areas —manage to help protect environmental values Coarse sediment —coarse sediment is retained on site Fine sediment —Site discharge during sediment basin dewatering has a TSS concentration less than 50 mg/L Turbidity —Site discharge during sediment basin dewatering has a turbidity (NTU) less than 10% above receiving waters turbidity— measured immediately upstream of the site Nutrients (N & P) —Nitrogen and phosphorus are managed through sediment control. pH —Site discharge during sediment basin dewatering has a pH range 6.5–8.5 Litter and other waste —Prevent litter/waste entering the site, the stormwater system or watercourses that discharge from the site. Also minimise or sufficiently contain on-site litter and waste production and regularly clear waste bins Hydrocarbons and other contaminants —Hydrocarbons and other contaminants are prevented from entering the stormwater system or internal watercourses that discharge from the site Wash down water —Wash down water is prevented from entering the stormwater system or internal watercourses that discharge from the site Cations and anions —Cations and anions including aluminium, iron and sulfate are managed as required under an approved acid sulphate soil management plan
Stormwater Drainage / Flow Management	Hydraulics and hydrology—Take all reasonable and practicable measures to minimise significant changes to the natural waterway hydraulics and hydrology from: • peak flow for the one-year and 100-year ARI event (respectively for aquatic ecosystems and flood protection) • run-off frequency and volumes entering receiving waters • uncontrolled release of contaminated stormwater

Table 5.2 – Water Quality Operational Phase Performance Criteria

Pollutant	Minimum reductions in mean annual loads from unmitigated development (%)
Total Suspended Solids (TSS)	80
Total Phosphorus (TP)	60
Total Nitrogen (TN)	45
Gross Pollutants > 5mm	90

5.2 Proposed Stormwater Improvement Devices

Water Sensitive Urban Design (WSUD) aims to minimise the impact of a development on the natural water cycle by reducing the export of pollutants, sediments and nutrients from the site into the natural watercourse. In order to treat the stormwater runoff from the site, various treatment devices can be used throughout the development area and these concepts can be integrated into the overall design of the road layouts, road cross sections, stormwater layouts and water supply reticulation systems. Stormwater from the development will follow a specially designed *stormwater quality treatment train* prior to discharge from the site, which will ensure compliance with the water quality objectives.

As identified in Section 3 there are five separate Lawful points of discharge. The proposed stormwater treatment train shall include specific devices aimed at achieving the water quality objectives at each of the discharge locations.

The stormwater treatment train for each discharge location shall include a combination of the following treatment devices:

5.2.1 Rainwater Tanks

Rainwater tanks behave as stormwater quality improvement devices by removing stormwater from the treatment train which is used for irrigation, toilet flushing, car washing and various other non-potable uses.

Rainwater tanks are a requirement of all new developments under the Queensland Development Code so it is therefore considered appropriate to assume and model a volume of rainwater capture and re-use in the assessment of stormwater quality and treatment train effectiveness.

The following steps were taken to calculate the volume of rainwater tanks which are assumed to be included in the operational phase of the development and the amount of re-used rainwater which will be removed from the treatment train for toilet flushing.

1. The total equivalent tenements (ETs) assumed to use each lot and catchment area was calculated using the development yield of 12ET/ha.
2. A conversion of 4 equivalent people (EP) per ET was then used to calculate the total people using the developed areas.

3. Using the Building Code of Australia (BCA), Section F states that one pedestal is required for each 20 people for the proposed type of development.
4. The Queensland Development Code (QDC) MP4.3 states that the proposed type of buildings in the operational phase are required to supply 50% of the total toilets with flushing water from an alternative source. The code then states that each required toilet is to be supported by 1,500L of tank storage capacity if a rainwater tank is to be used.
5. A total tank volume for each MUSIC modelled catchment was then calculated based on the proposed end usage and the toilet flushing requirements in accordance with the BCA and QDC.
6. The re-use rate of the captured rainwater for toilet flushing was then calculated using the Water by Design MUSIC Modelling Guidelines to be 40L/person/day.

Table 5.3 below provides a summary of the modelled rainwater tank inputs and calculations:

Table 5.3 – Rainwater Tank Modelling Summary

Sub-Catchment	Area (ha)	ET's (12ET/ha)	EP's (4EP/ET)	Pedestals	Required Pedestals (50%)	Tank Vol (kL)	Re-use (kL/d)
1	19.37	309.92	1239.68	62	31	46.5	49.5872
4	5.63	90.08	360.32	19	10	15	14.4128
5	3.777	60.432	241.728	13	7	10.5	9.66912
6	9.59	153.44	613.76	31	16	24	24.5504
7a	6.067	97.072	388.288	20	10	15	15.53152
7b	5.055	80.88	323.52	17	9	13.5	12.9408
8	0.639	10.224	40.896	3	2	3	1.63584
9	0.8	12.8	51.2	3	2	3	2.048
10a	7.701	123.216	492.864	25	13	19.5	19.71456
10b	3.86	61.76	247.04	13	7	10.5	9.8816

5.2.2 Bio-Retention Basins

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

Bio-retention areas are incorporated into the proposed development with both sediment forebays and planted bio-retention filter areas. The sediment forebay is to mitigate the accumulation of coarse sediment near the basin inflow, which may smother vegetation and reduce infiltration.

A typical section of a bio-retention area is presented in Figure 4.1 below.

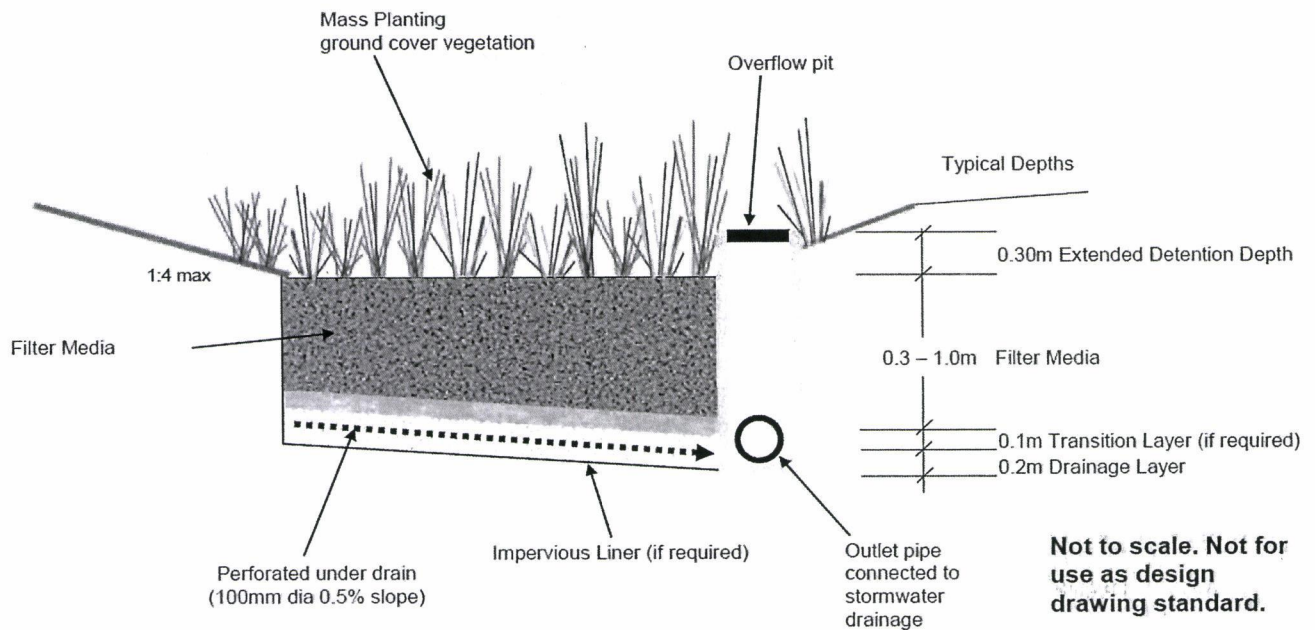


Figure 5.1 – Bio-Retention Basin Typical Cross-Section (courtesy of Healthy Waterways)

Sediment Forebays

Given the potential for coarse sediment accumulation in the proposed industrial-use allotments being created it is considered critical to ensure the accurate design and provision of sediment forebays upstream of each of the proposed bio-retention basins to ensure that the vegetation within the basin is not smothered by high sediment loadings, and that the receiving waterways downstream are also protected.

Each sediment forebay has been designed specifically in accordance with Section 5.3.3.2 of the Healthy Waterways WSUD Technical Guidelines (2006). Each forebay has been designed to achieve 80% efficiency in the removal of particles that are 1mm or greater in diameter from the 1 year ARI storm event and provide appropriate storage for coarse sediment to ensure de-silting is required once every 2 years.

Bio-retention Areas

Each bio-retention area has been designed specifically in accordance with Chapter 5 of the Healthy Waterways WSUD Technical Guidelines (2006). All bio-filtration areas have been modelled with an extended detention depth of 0.3m, a high flow bypass relative to the inlet from the internal reticulation (i.e. 2 year ARI storm event), filter median particle diameter of 0.45mm and a saturated hydraulic conductivity of 200mm/hr (sandy loam). The following table summarises the individual spatial requirements of the bio-retention areas in each area of the development.

Details of the exact locations and design of the proposed treatment devices areas are also presented in the Engineering Drawings in Appendix B.

Table 5.4 – Bio-Retention Area Requirements

Basin	Contributing Catchments	Contributing Catchment area	Coarse Sediment Forebay Details	Filter Media Surface Area	Total Base Area of Basin
Basin 1	Catchment 10	3.86ha	Area = 17m ² depth = 0.5m	2,080m ²	2,097m ²
Basin 2	Catchment 7	1.80ha	Area = 15m ² depth = 0.5m	1,300m ²	3,657m ²
Basin 3	Catchment 1	19.37ha	Area = 37m ² depth = 0.3m	3,900m ²	10,975m ²
	Catchment 4	5.63ha	Area = 14m ² depth = 0.3m		
	Catchment 5	3.77ha	Area = 8m ² depth = 0.3m		
	Catchment 6	9.59ha	Area = 17m ² depth = 0.3m		
Basin 4	Catchment 8	0.22ha	Area = 2m ² depth = 0.3m	0m ²	165m ²

The Bio-retention basins have additionally been modelled with the following general data for the filter media and civil engineering design:

Table 5.5 – Bio-retention Basin General Data Summary

Basin	Filter Depth	Filter Media Hydraulic Conductivity	Submerged Zone with Carbon (Wood chips)	Filter Media Surface Area	Total Base Area of Basin
Basin 1	500mm	200mm/hr	250mm	2,080m ²	2,097m ²
Basin 2	500mm	200mm/hr	0mm	1,300m ²	3,657m ²
Basin 3	500mm	200mm/hr	0mm	3,900m ²	10,975m ²

5.2.3 Gross Pollutant Traps

Gross Pollutant Traps (GPT's) are devices used for the removal of solids conveyed by stormwater. The GPTs which are proposed for use in the site are Rocla CDS Units (or approved equivalents), which also target the removal of smaller particles, as well as oil and grit. A GPT like the CDS unit protects lakes, rivers, streams and coastal areas from hazardous material spills and daily stormwater runoff.

The CDS unit includes a continuously deflective screen to divert solids in the stormwater and a sump designed to capture and store gross pollutants and coarse sediment.

The GPTSs have been specifically sized to receive the piped reticulation system on-line (i.e. Q2) and divert and treat the more frequent design flows closer to $Q_{3\text{month}}$.

The CDS GPT unit is a major component of the stormwater treatment train and is relied upon for a large portion of the treatment to runoff discharging toward Albert River. The First Defence GPT unit is a smaller system, included to assist treatment to the runoff directed to Debortoli road, which does not discharge via any bio-retention.

Water by Design Music Modelling Guidelines (2010) state that where GPTs are reported, accompanying information must be provided to describe the independently verified pollutant reduction parameters, performance under dry weather flows, high flow bypass rate, and calculations relating to storage volumes. An independent assessment of the CDS units has been undertaken by Alison et al (1999) which provides pollutant reduction parameters and dry weather performance. No such independent testing data is available for the First Defence unit, therefore the pollutant reduction values provided in the GCCC Music Modelling guidelines (2006) have been employed.

In accordance with Alison et al (1999) and the GCCC Music Modelling Guidelines (2006), the following pollutant reduction values have been applied to each of the GPT units:

Table 5.6 – GPT Pollutant Reductions

Pollutant	CDS Unit	First Defence
TSS	91%	50%
TP	30%	20%
TN	13%	0%

The high flow bypass rates for the GPT systems have been designed using the hydrologic assessment presented in Section 3. Below is a summary of each unit.

Table 5.7 – GPT Flow Rates

Unit	Location	Catchment Area	Q2 Flow Rate	$Q_{3\text{month}}$ Flow Rate
CDS1015	Stapylton-Jacobs Well Road Discharge (Catchment 10)	11.561ha	2.48m ³ /s	0.94m ³ /s
First Defence	Debortoli Road Discharge (Catchment 9)	0.812ha	0.13m ³ /s	0.34m ³ /s

The storage capacity of the GPT units has been confirmed via the use of manufacturer's specifications and the results of the MUSIC modelling of the pollutant generation and capture. Volumetric conversions have been calculated based on a rate of 260kg/m³ for gross pollutants and 1600kg/m³ for TSS.

Table 5.8 – GPT Storage Volume

Unit	Sump Volume	Mean Annual Loads of Suspended Solids	Mean Annual Loads of Gross Pollutants
CDS1015	>10.0m ³	4020kg/year (2.52m ³ /year)	516.1kg/year (2.07m ³ /year)
First Defence	2.46m ³	870kg/year (0.55m ³ /year)	138.6kg/year (0.53m ³ /year)

Based on three outputs, the CDS1015 will accumulate 4.59m³ of combined TSS and gross pollutants a year. The First Defence will accumulate 1.08m³ of combined TSS and gross pollutants a year.

Therefore, each unit will require cleaning out at an average rate of once every two years.

Additional information was requested from GCCC in the information request dated 21st December 2011. In response, and in addition to the information included above, additional information from the product manufacturer, Rocla, has been included in Appendix E.

5.2.4 Grass Swale

Referring to Figures 3.9 and 3.10, Catchment 6 directs runoff toward Discharge 1 and ultimately toward Sandy Creek. Whilst the exact lot layout and site earthworks within this catchment are not fully determined at the time of preparation of this report, site constraints resulting from the existing topography and proposed layout of the surrounding allotments are likely to restrict the ability for this catchment to be directed into Basin 3.

The modelling of the site, which is discussed in the next section, indicates that the overall discharge toward Sandy creek is compliant with regards to nitrogen and phosphorus reductions based solely on the two large bio retention basins (Basin 2 & Basin 3), however the untreated discharge from Catchment 6 contributes too much total suspended solids.

Based on the topography of the catchment, it is expected that the site will be generally graded toward the eastern property boundary where a drainage system will most likely be located to direct runoff in a northerly direction toward Discharge 1. Based on this assumption, the allocation of a grass swale in the future design is proposed to both convey this runoff, and provide the necessary TSS reduction to contribute to the overall compliance of the Sandy Creek discharge.

A grass swale has therefore been modelled with 100m length (i.e. half the assumed constructed length), a 1m base, a 4m wide top width and 1 in 4 batters, running at a nominal 1% grade.

A sensitivity analysis has also been undertaken on Catchment 6 to provide options for the future development of the allotments, which has indicated that a CDS1015 GPT unit (or approved equivalent) may be utilised in replacement of the swale.

5.3 Modelling of the Developed Site

Modelling of the site was undertaken using the 'Model for Urban Stormwater Improvement Conceptualisation (MUSIC)' as promoted by the South East Queensland Healthy Waterways Partnership. An appropriate type of land use was applied to all developed sub-catchments based on the proposed development's characteristics for an industrial land use. Each individual

treatment system was assigned the relevant modelling treatment module. Consequently, a treatment train was established for each sub-catchment and ultimately combined to control the total discharge from the development area.

5.3.1 Rainfall Data

Meteorological data for input to MUSIC was obtained for the "Beenleigh Bowls Club", Station ID 40406, from the Australian Bureau of Meteorology. Six-minute time step rainfall data was obtained from the years 1990 - 2000.

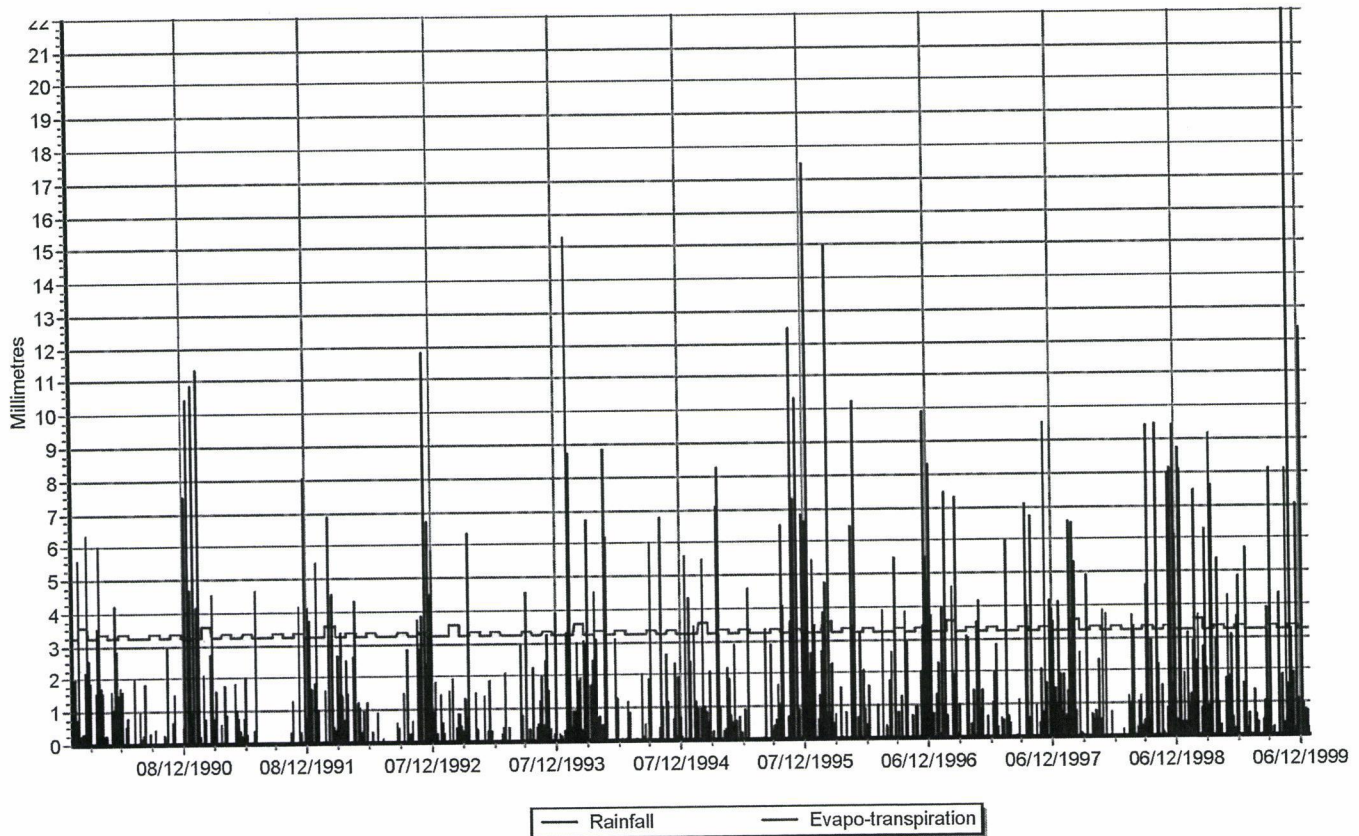


Figure 5.2 Bureau of Meteorology Rainfall Data

The catchment parameters of the MUSIC modelling were applied in accordance with the South East Queensland Healthy Waterways Partnerships' Water by Design MUSIC Modelling Guidelines for South East Queensland Version 1 (2010).

5.3.2 Pollutant Source Node Details

Table 4.6 and 4.7 below show the pollutant source node parameters input to the MUSIC model determined using the South East Queensland Healthy Waterways Partnership's Water by Design MUSIC Modelling Guidelines for South East Queensland.

Table 5.9 – Rainfall – Runoff Parameters

(Industrial)	
Soil Storage Capacity (mm)	18
Initial Storage (%)	10
Field Capacity (mm)	80
Initial Depth (mm)	50
Daily Recharge Rate (%)	0
Daily Baseflow Rate (%)	0

Table 5.10 –Rainfall – Runoff Parameters

Lumped Industrial Catchment	TSS log values		TP log values		TN log values	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Base Flow	0.78	0.45	-1.11	0.48	0.14	0.20
Storm Flow	1.92	0.44	-0.59	0.36	0.25	0.32

5.3.3 MUSIC Model Layout

The layout of the site and the proposed drainage pattern were considered in the creation of the MUSIC model. Figure 4.3 below presents the layout of source, treatment and receiving nodes used in the modelling.

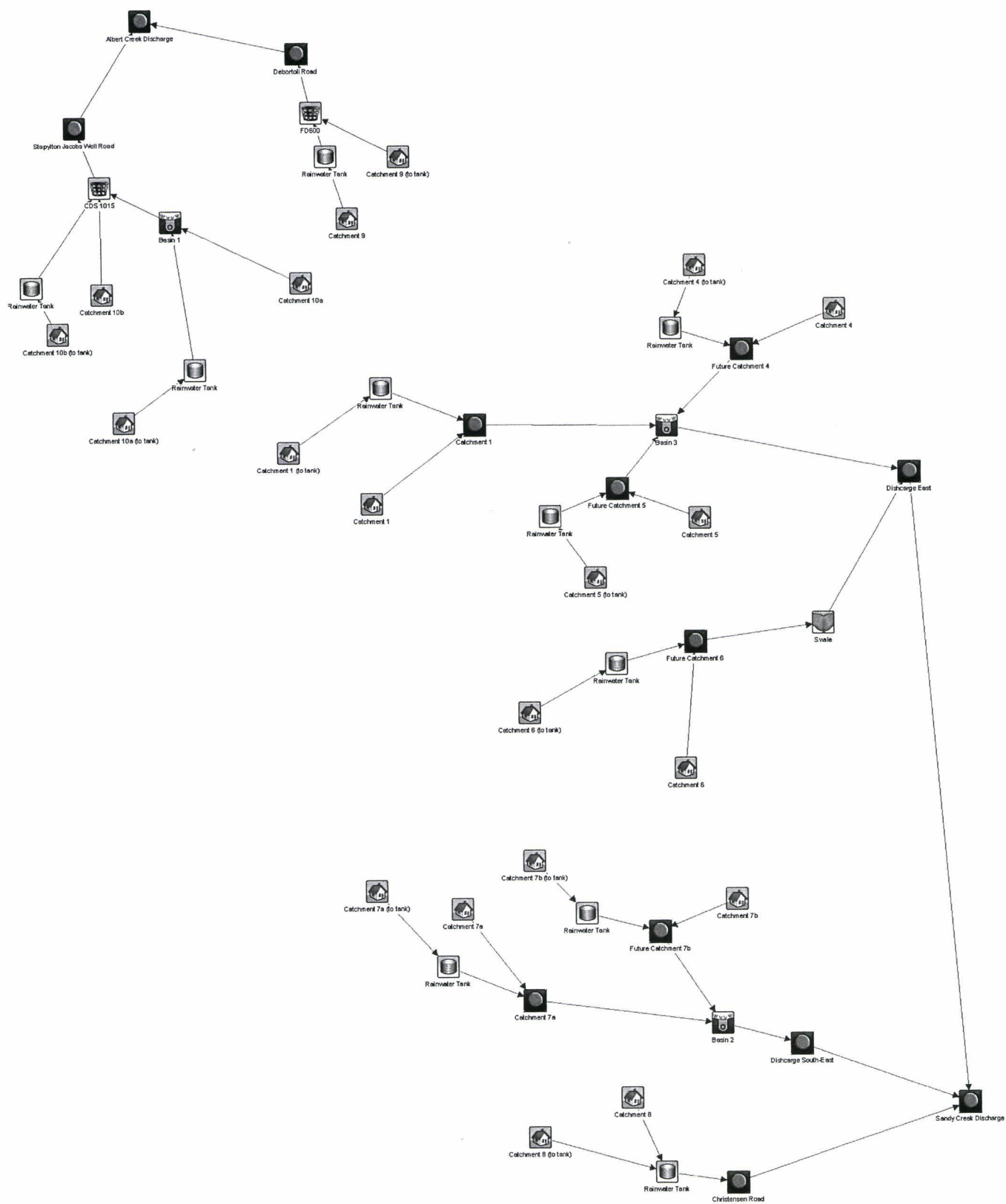


Figure 5.3 – MUSIC Model Layout

5.3.4 MUSIC Results

The results of the treatment train effectiveness for each identified lawful point of discharge are presented below.

Treatment Train Effectiveness - Albert Creek Discharge			
	Sources	Residual Load	% Reduction
Flow (ML/yr)	131	123	6.0
Total Suspended Solids (kg/yr)	18.1E3	3.28E3	81.8
Total Phosphorus (kg/yr)	46.6	18.2	60.9
Total Nitrogen (kg/yr)	310	165	46.8
Gross Pollutants (kg/yr)	3.12E3	49.5	98.4

Figure 5.4 – MUSIC Results – Albert Creek Discharge

Treatment Train Effectiveness - Sandy Creek Discharge			
	Sources	Residual Load	% Reduction
Flow (ML/yr)	492	472	3.9
Total Suspended Solids (kg/yr)	69.2E3	12.5E3	82.0
Total Phosphorus (kg/yr)	178	57.7	67.5
Total Nitrogen (kg/yr)	1.15E3	625	45.7
Gross Pollutants (kg/yr)	11.7E3	0.00	100.0

Figure 5.5 – MUSIC Results – Sandy Creek Discharge

It is noted that the MUSIC results indicate that the treatment train is effective for each lawful point of discharge in achieving the load reduction targets given in Table 4.2.

5.4 Construction Phase Water Quality

During the construction phase of the development, an Erosion and Sediment Control Program will be implemented to minimise water quality impacts. A detailed Erosion and Sediment Control Program will be employed throughout the site; the sediment control measures shall include silt fences, cut-off drains for polluted stormwater and diversion channels for clean stormwater run-off, gully pit sediment barriers, field inlet sediment traps and temporary bio-retention filter protection.

Details of the sediment and erosion control measures shall be provided on the engineering drawings for the clearing, site earthworks and civil engineering works. The stormwater detention/bio-retention basins which are to be utilised in the operational phase have been

strategially located to serve as construction phase sediment basins for 1 – 5, 7, 8 and 10. Catchments 9 and 6 do not discharge via basins in the developed case scenario and will therefore most likely require the construction of temporary sediment basins during construction phase.

Details of the required construction phase water quality control measures shall be provide on the engineering drawings and shall be in accordance with the Queensland Stat Planning Policy for Healthy Waters (SPP4/10). However, the contractor shall be responsible for the provision of the construction phase water quality objectives which shall be enforced by the preparation and implementation of a Erosion and Sediment Control Program.

The following information is provided to identify controls and procedures, and who is responsible for them, which will be incorporated into the Erosion and Sediment Control Program.

5.4.1 Pre-Construction

- Establish a single stabilised entry/exit point (rumble pad) for each stage of construction. This point should also include a vehicle shakedown device to mitigate the transportation of dust and dirt.
- Sediment fences are to be placed along the low side of the site to slow flows, reduce scour and capture some sediment runoff.
- Sediment fences are to be constructed at the base of fill embankments.
- Divert up-slope water around the work site and appropriately stabilise any drainage channels.
- Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds.
- Diversion banks are to be created at the upstream boundary of construction activities to ensure upstream runoff is diverted around any areas to be exposed. Catch drains are to be created at the downstream boundary of construction activities.
- Construction of temporary sediment basins.
- Site personnel are to be educated to the sediment and erosion control measures implemented on site.

5.4.2 During Construction

- Progressive re-vegetation of filled areas and fill batters.
- Construction activities are to be confined to the necessary construction areas.
- The provision of a construction exit to prevent the tracking of debris from tyres of vehicles onto public roads. Only one construction exit will be nominated to limit the movement of construction equipment.
- The topsoil stockpile location will be nominated to coincide with areas previously disturbed. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile if required.
- Roof downpipes should be installed as soon as practicable after the roof is laid.
- Transport loads that are subject to loss through wind or spillage shall be covered or sealed to prevent entry of pollutants to the stormwater system.
- Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures. Following rainfall events greater than 50mm inspection of erosion

control measures and removal of collected material should be undertaken. Replacement of any damaged equipment should be preformed immediately.

5.4.3 Post Construction

- The Contractor/Developer will be responsible for the maintenance of erosion and sediment control devices from the possession of the site until the site is accepted 'Off Maintenance' or until stabilisation has occurred to the satisfaction of the superintendent and Council.
- Key stormwater quality improvement devices requiring maintenance during the operational phase of the project following construction are the bio-retention areas and the gross pollutant traps.

Maintenance requirements for these devices consist of:

- Regular and storm event inspection to ensure:
 - Sufficient vegetation within bio-retention areas; and
 - Ensuring no erosion has occurred.
 - Regular mowing/harvesting to ensure vegetation is maintained at acceptable levels.
 - Removal of litter within verges, swales and bio-retention areas.
 - Regular trash removal.
- The Sediment and Erosion Control Management Plans should be provided to all people involved with the site, including sub-contractors, private certifiers, home owners and regulators. These guidelines have been formed in accordance with the Healthy Waterways Fact Sheet 'Erosion and Sediment Control Management Plans' and the 'Best Practice Erosion and Sediment Control.'

5.5 Water Quality Monitoring Program

This development does propose the use of water sensitive practices and the associated stormwater quality management practices at the outlet areas. The stormwater runoff will eventually discharge into sensitive waterways, but there is no proposal for water quality monitoring within the drainage infrastructure downstream of the site to be undertaken. The stormwater treatment devices used in this plan are based upon the Healthy Waterways Technical Design Guidelines for South East Queensland and represent best mangment practices.

A form for release of sediment-laden stormwater from the site and an inspection record of stormwater quality improvement devices will be developed. It is intended that each release resulting from a storm event generating more than 100mm in a twenty-four hour period be recorded on the form to ensure ongoing monitoring, management and reporting of releases from the site.

6 MAINTENANCE

All the stormwater quantity and quality controls detailed in this document shall be handed over to Gold Coast City Council.

The coarse sediment forebays have been designed to reduce the maintenance requirements and cleaning frequency as much as possible. Instead of desilting occurring every year the forebays have been designed that desilting should take place once every two years.

The Gross Pollutant traps additionally have been allocated adequate sump storage volume to allow for two average years of accumulation before requiring clean-out.

Particular care has been taken in the design of the proposed stormwater treatment train to reduce the maintenance requirements as much as possible.

It is strongly recommended that inspections are performed on the bio-retention areas upon completion of construction and at regular maintenance intervals of a maximum of 6 months. Regular maintenance of the bio-retention areas should be completed to ensure that the bio-retention media and under-drainage, outlet structures, landscaping and associated infrastructure is operating at full design specification. Any construction amendments that are required should be completed in accordance with the Healthy Waterways WSUD Technical Guidelines (2006) Chapter 5.

Mandatory inspections will be required to be undertaken for commencement of the On-Maintenance and Off-Maintenance phases.

It is generally understood that On-Maintenance acceptance of bio-retention basins will only occur upon 80% completion of development of the upstream catchment area. Therefore, if staged construction is proposed the developer is advised to protect the bio-retention filter media with geo-fabric covering, silt fences and regular maintenance of the coarse sediment forebays.

Example Inspection checklists are presented as an appendix to this report.

7 CONCLUSION

This Stormwater Management Plan (SWMP) has been prepared for submission Gold Coast city Council in support of a development application for the proposed "Generations Industrial Park" development at Stapylton, Queensland, Australia.

This SWMP has been prepared to demonstrate suitable compliance with local, state and national requirements as required satisfying the requirements of each stakeholder.

This SWPM has covered the two primary objectives,

3. Hydrologic/Hydraulic assessment of the site.

Five lawful points of discharge have been identified for the site. For each lawful point of discharge the contributing catchment areas have been assessed and the existing case runoff characteristics have been presented.

The impact of the proposed development on the existing case runoff characteristics has been presented.

To mitigate the potential increase in peak discharge runoff from the site and local storm event flooding levels on the adjoining properties stormwater detention structures have been designed and assessed for performance

It has been demonstrated that the proposed stormwater detention devices are effective in restoring the existing case runoff characteristics to the developed site and no-worsening of infrastructure capacity or flooding levels to any downstream properties are expected.

4. Water Sensitive Urban Design.

To achieve operational phase stormwater quality objectives a number of stormwater treatment devices have been proposed. The effectiveness of the proposed stormwater treatment train has been modelled and assessed for compliance with local, state and national requirements.

It has been demonstrated that the proposed development of the site has adequate stormwater quality controls to achieve all necessary compliance.

Specific construction phase stormwater quality objectives and control measures have been presented which are to be complied with during the preparation and implementation of future construction phase erosion and sediment control plans.

8

CERTIFICATION

Hyder Consulting as professional Civil & Environmental Engineers certify that the proposed stormwater treatment train contained within this report and associated design drawings is a true and accurate reflection of the proposed measures to be incorporated into the development.

Travis Seresheff

RPEQ 8677

Date

Travis Seresheff
20/6/2012

9 REFERENCES

Allison, R, Walker, T, Wong, T & Wooton, R (1999), Removal of Suspended Solids and Associated Pollutants by a CDS Gross Pollutant Trap, Cooperative Research Centre for Catchment Hydrology.

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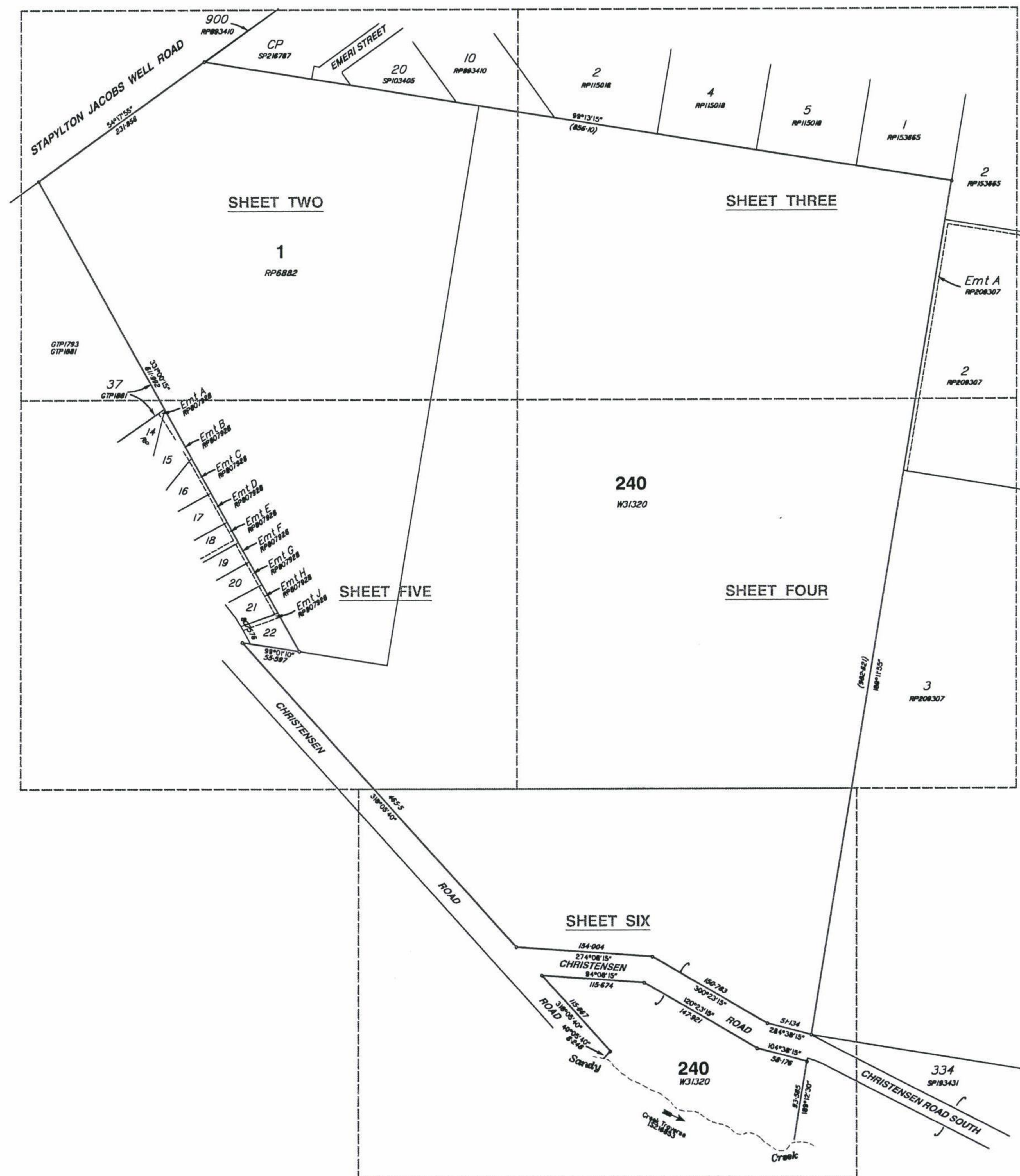
Queensland Government (2008), Queensland Urban Drainage Manual

Queensland Development Code (2008), Part MP 4.3 – Alternative Water Sources

Water By Design (2010), MUSIC Modelling Guidelines Vol 1.0

APPENDIX A

SITE SURVEY DATA



Notes

This plan has been prepared for the exclusive use and purposes of the client as stated on this plan and should not be used by any other person or corporation and for any other purpose.

Properly boundaries have not been defined by this survey and have been compiled from 15216853.

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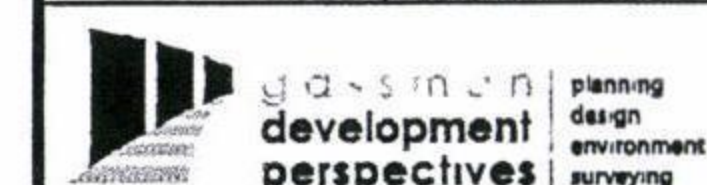
Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**

County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	15216853	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Hall
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		Date Designed	

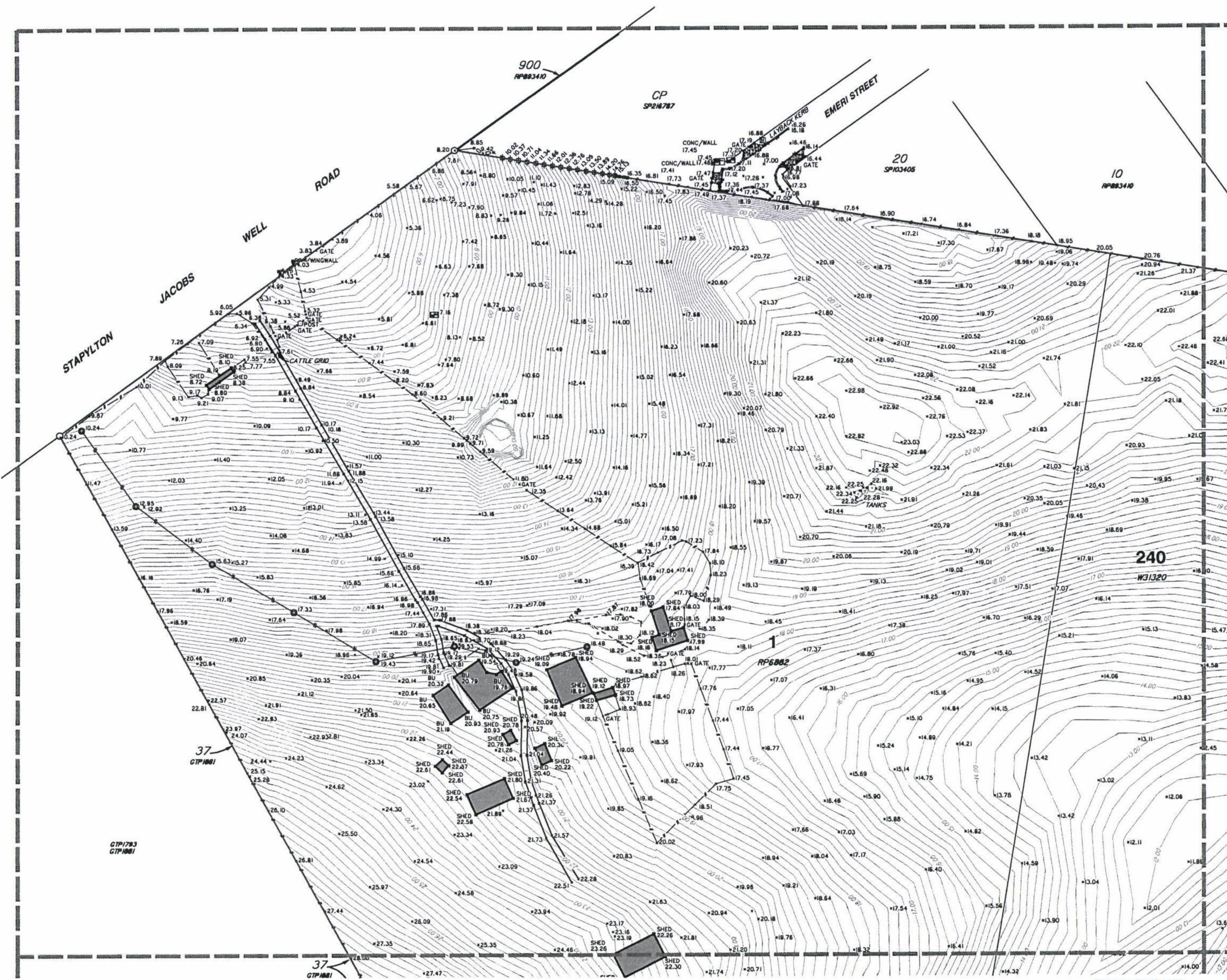


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REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**

SHEET 1 OF 6



- LEGEND**
- PERMANENT MARK
 - SEWER MANHOLE
 - SEWER INSPECTION OUTLET
 - ELECTRICITY PILLAR
 - ELECTRICITY POLE
 - ELECTRICITY POLE WITH LIGHT
 - TELSTRA PIT
 - MANHOLE
 - STORMWATER MANHOLE
 - GULLY TRAP
 - WATER METER
 - FIRE HYDRANT
 - VALVE
 - GATE
 - BOLLARD
 - CONCRETE
 - EDGE OF BITUMEN
 - FENCE
 - OVERHEAD ELECTRICITY
 - OPEN DRAIN
 - RETAINING WALL
 - EDGE OF GARDEN
 - CONTOUR LEVEL

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Over Lot 1 on RP6882 and Lot 240 on WD31320	
Parish of ALBERT	
County of Ward	
Local Govt GOLD COAST CITY COUNCIL	
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Meridian	IS133471
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F.B.	No
Origin	PSM 133471
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Date Surveyed	Jan 2011
Surveyor	A. Macdonald
Drawn	S. Holt
Date Drafted	02-02-2011
Checked	RL 22.169
Designed	
Drawn	
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PLAN No. 5093 S CD 01



LEGEND

- PERMANENT MARK
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- SEWER INSPECTION OUTLET
- ELECTRICITY PILLAR
- ELECTRICITY POLE
- ELECTRICITY POLE WITH LIGHT
- TELSTRA PIT
- MANHOLE
- STORMWATER MANHOLE
- GULLY TRAP
- WATER METER
- FIRE HYDRANT
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- BOLLARD
- CONCRETE
- CONCRETE
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- FENCE
- OVERHEAD ELECTRICITY
- OPEN DRAIN
- RETAINING WALL
- EDGE OF GARDEN
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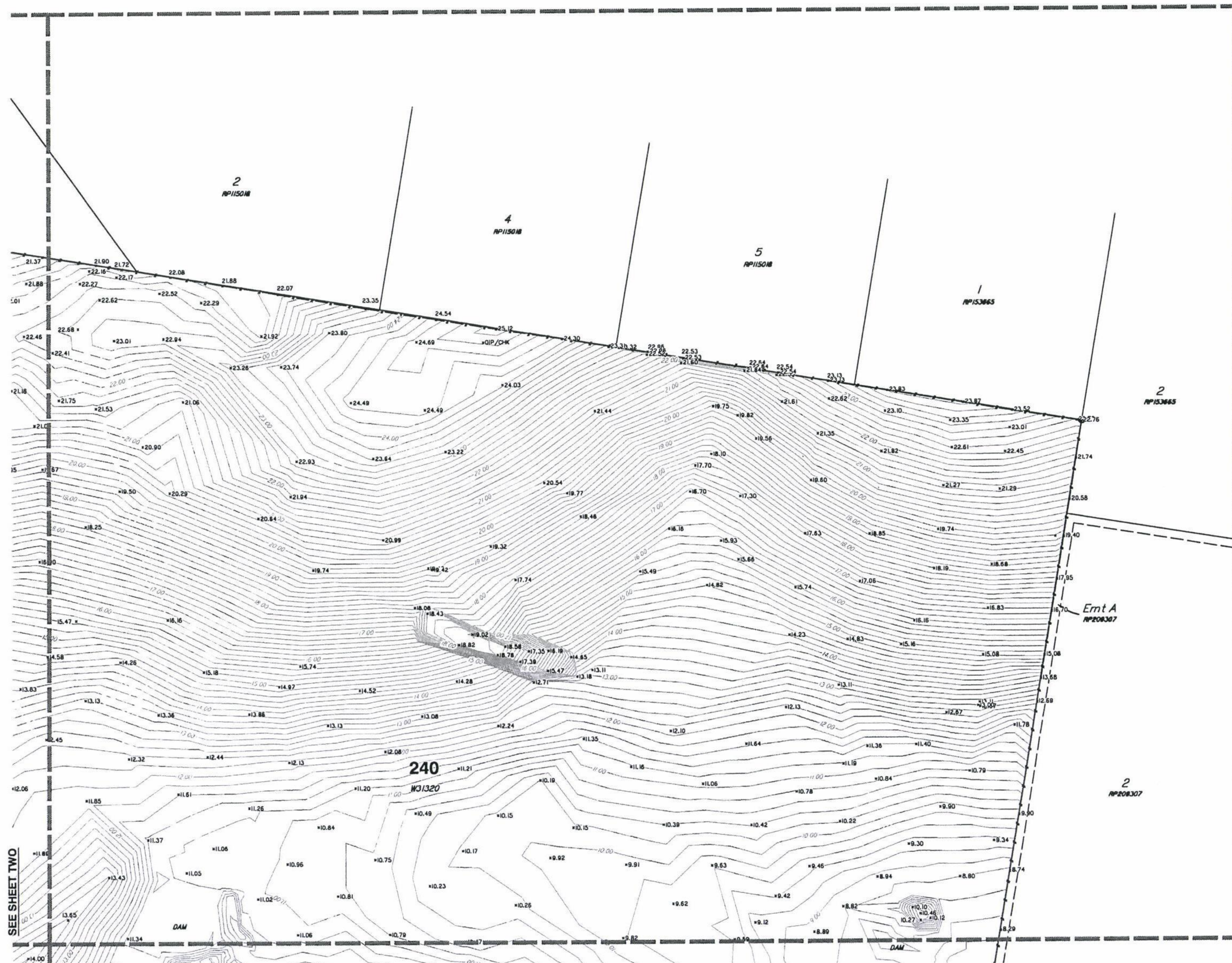
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17 Creek Street Brisbane Q. 4000
t: (07) 222 1732
f: (07) 222 17308
Gold Coast and Logan Office
Access Business Park
76 Business Street Tallegra Q. 4207
t: (07) 287 7333
f: (07) 287 7461
e: mail@gassman.com.au
w: www.gassman.com.au

REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**

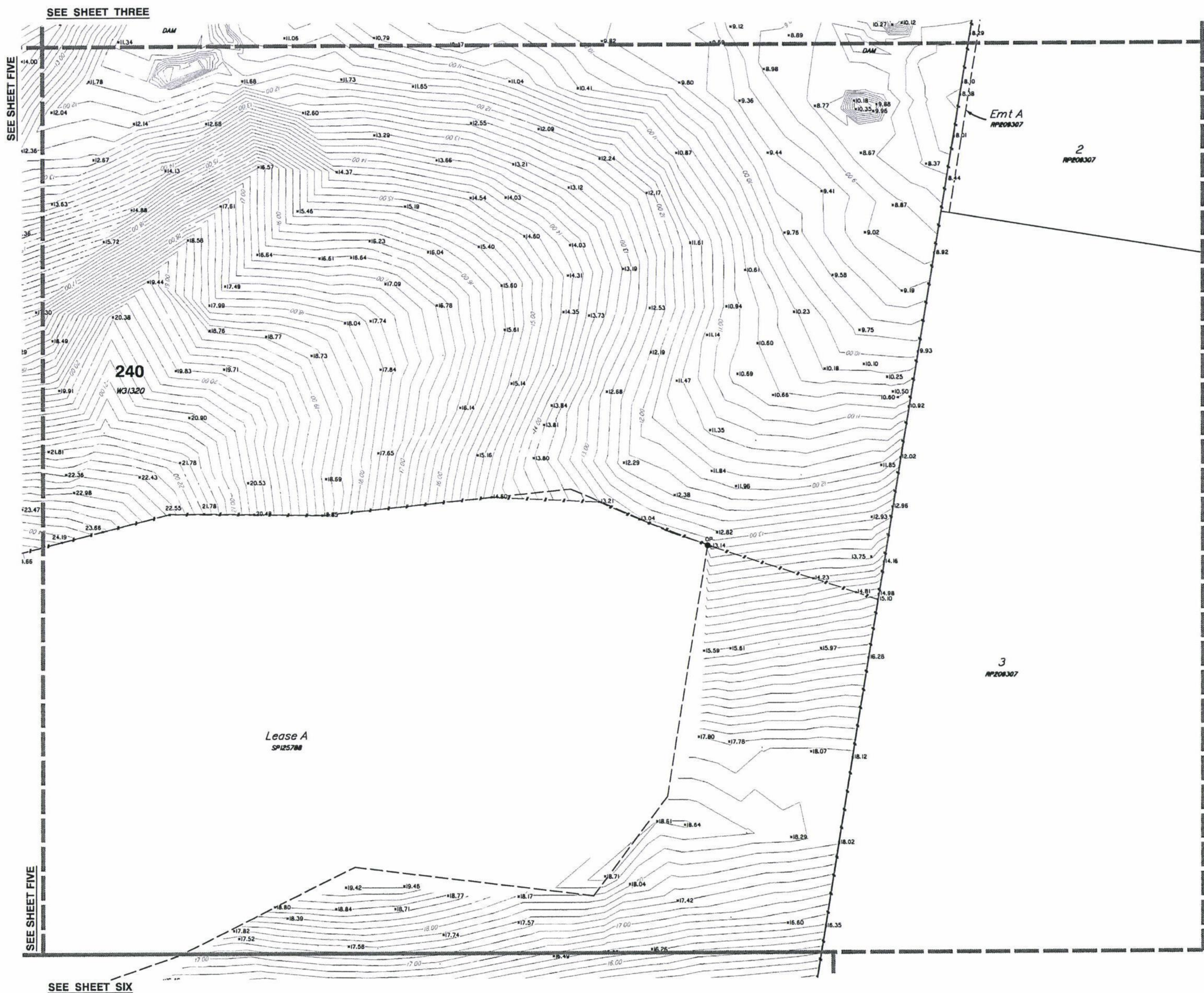


SEE SHEET TWO

SEE SHEET FOUR

Scale 1:1000 - Lengths are in Metres.

0 10 20 30 40 50 60 70 80



- LEGEND**
- PERMANENT MARK
 - SEWER MANHOLE
 - ELECTRICITY PILLAR
 - ELECTRICITY POLE
 - ELECTRICITY POLE WITH LIGHT
 - TELSTRA PIT
 - MANHOLE
 - STORMWATER MANHOLE
 - GULLY TRAP
 - WATER METER
 - FIRE HYDRANT
 - VALVE
 - GATE
 - BOLLARD
 - CONCRETE
 - EDGE OF BITUMEN
 - FENCE
 - OVERHEAD ELECTRICITY
 - OPEN DRAIN
 - RETAINING WALL
 - EDGE OF GARDEN
 - CONTOUR LEVEL

Notes

This plan has been prepared for the exclusive use and purposes of the client as stated on this plan and should not be used by any other person or corporation and for any other purpose.

Properly boundaries have not been defined by this survey and have been compiled from IS216853.

Only those underground features and services as shown on this plan have been located by this survey. Prior to any construction, demolition or excavation on the site, the relevant authority should be contacted for the location of any further underground services and detailed location of all services.

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Client

HESTER

Project

CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**

County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum A.H.D.
Meridian IS216853
Contour Interval 0.2
F.B. No
Origin PSM 133471
RI 22.169

Date Surveyed Jan 2011
Surveyor A. Macdonald
Drawn S. Holt
Date Drafted 02-02-2011
Checked

Scale (on A1 original)
1:1000

Designed
Drawn
Date Designed

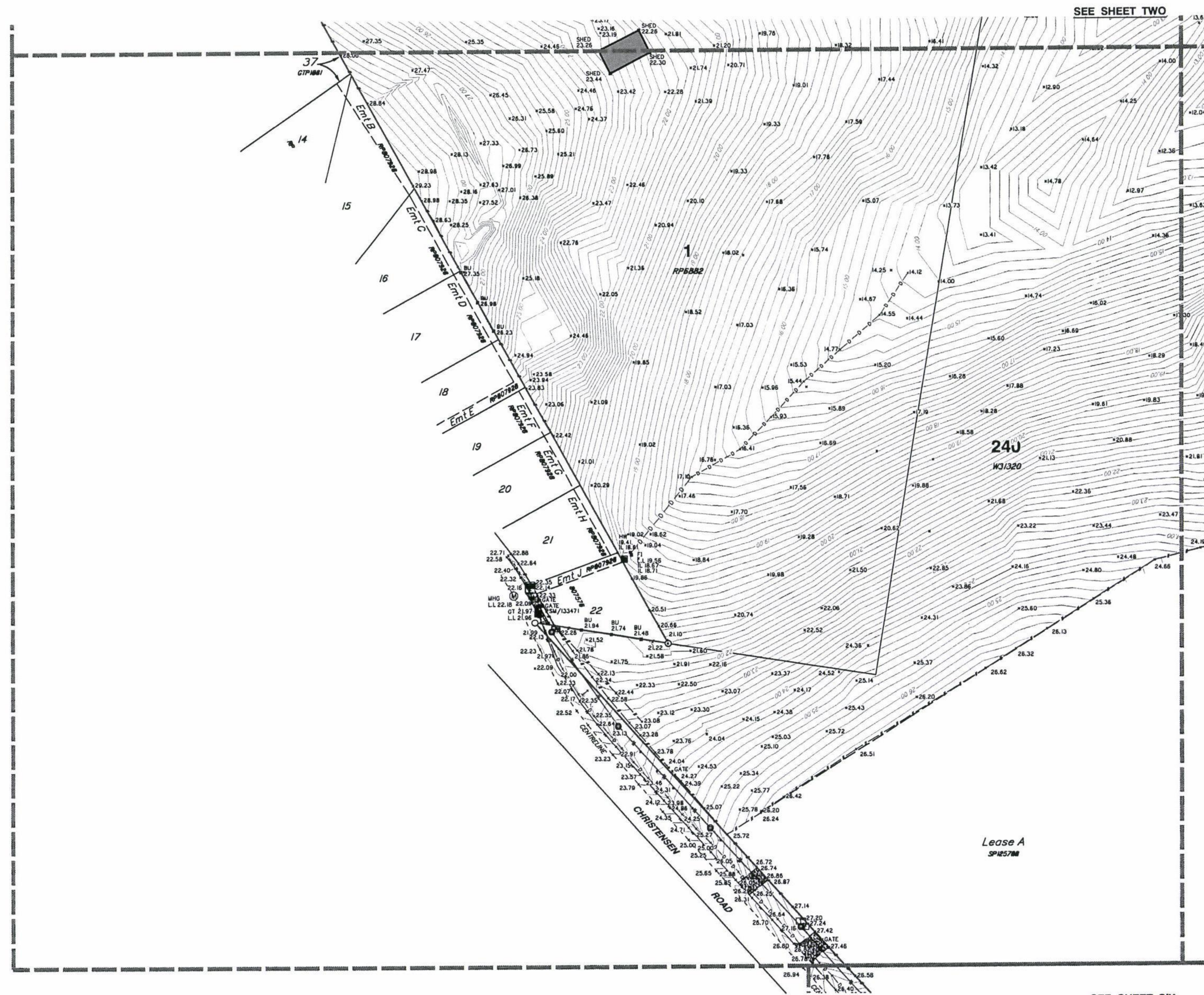


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f: (07) 32517206
Gold Coast and Logan Office
Access Business Park
70 Business Street Yatala G. 4207
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f: (07) 32875481
e: r.mall@gosman.com.au
w: www.gosman.com.au

REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**

SHEET 4 OF 6



- LEGEND**
- PERMANENT MARK
 - SEWER MANHOLE
 - SEWER INSPECTION OUTLET
 - ELECTRICITY PILLAR
 - ELECTRICITY POLE
 - ELECTRICITY POLE WITH LIGHT
 - MANHOLE
 - STORMWATER MANHOLE
 - GULLY TRAP
 - WATER METER
 - FIRE HYDRANT
 - VALVE
 - GATE
 - BOLLARD
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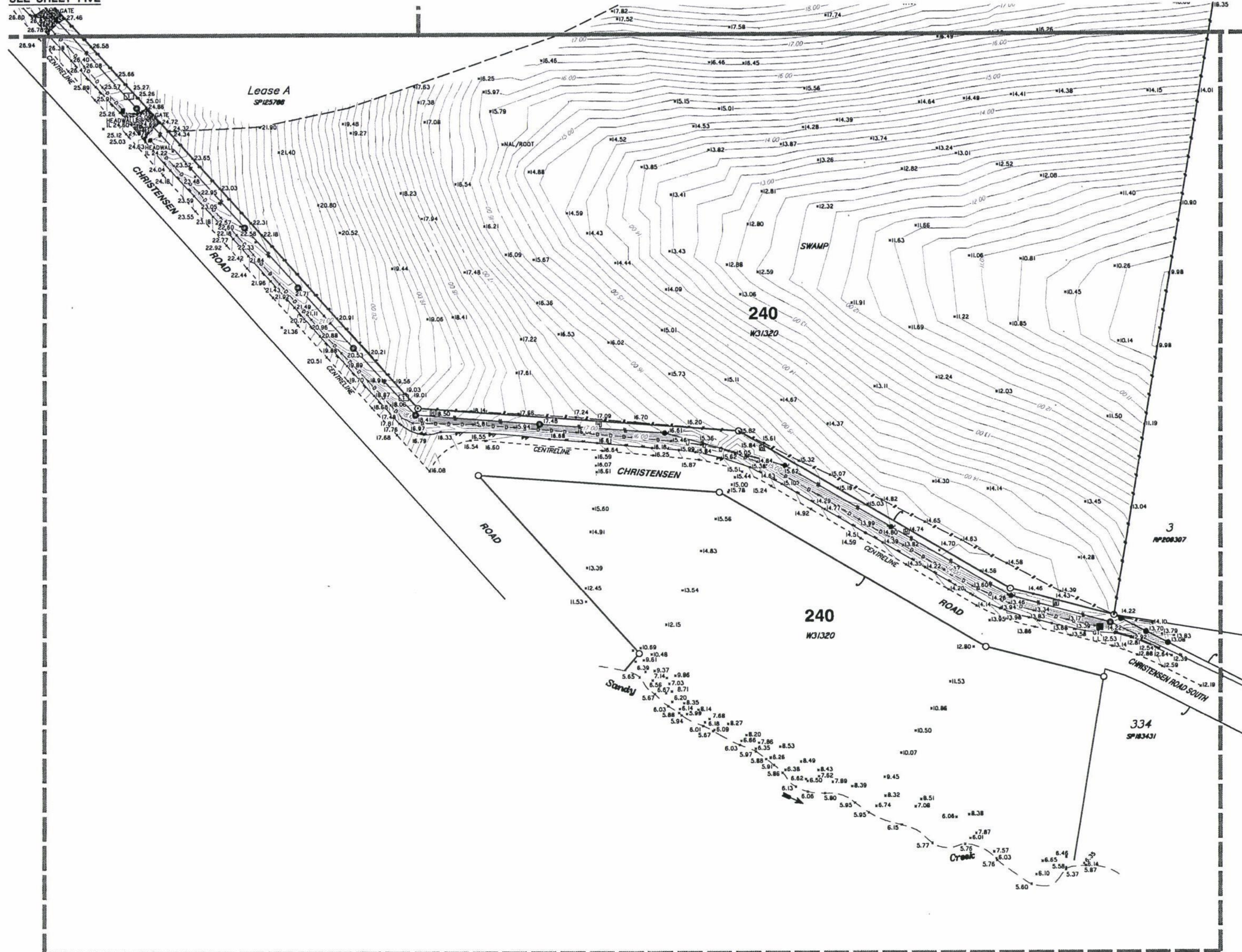
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Client		HESTER	
Project		CONTOUR AND DETAIL PLAN	
Over Lot 1 on RP6882 and Lot 240 on WD31320			
Parish of ALBERT			
County of Ward			
Local Govt GOLD COAST CITY COUNCIL			
Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	IS216853	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Hall
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471	Checked	
	RL 22.169		
Scale (on A1 original)		Designed	
1:1000		Drawn	
		Date Designed	
			
ACN 010 752 338 Brisbane Office Level 13 97 Creek Street Brisbane Q. 4000 t (07) 32216732 f (07) 32217308 Gold Coast and Logan Office Access Business Park 76 Business Street Tallegra Q. 4207 t (07) 38073333 f (07) 32875401 e. mail@gossman.com.au w. www.gossman.com.au			
REFERENCE No. 5093-10			
PLAN No. 5093 S CD 01			



SEE SHEET FIVE

SEE SHEET FOUR



LEGEND

- PERMANENT MARK
- SEWER MANHOLE
- SEWER INSPECTION OUTLET
- ELECTRICITY PILLAR
- ELECTRICITY POLE
- ELECTRICITY POLE WITH LIGHT
- TELSTRA PIT
- MANHOLE
- STORMWATER MANHOLE
- GULLY TRAP
- WATER METER
- FIRE HYDRANT
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Client

HESTER

Project

CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of **ALBERT**

County of **Ward**

Local Govt **GOLD COAST CITY COUNCIL**

Level Datum A.H.D.

Meridian IS216853

Contour Interval 0.2

F.B. No

Origin PSM 133471

Scale (on A1 original)

1:1000

Date Surveyed Jan 2011

Surveyor A. Macdonald

Drawn S. Holt

Date Drafted 02-02-2011

Checked

RL 22.169

Designed

Date Designed



**development
perspectives**

planning
design
environment
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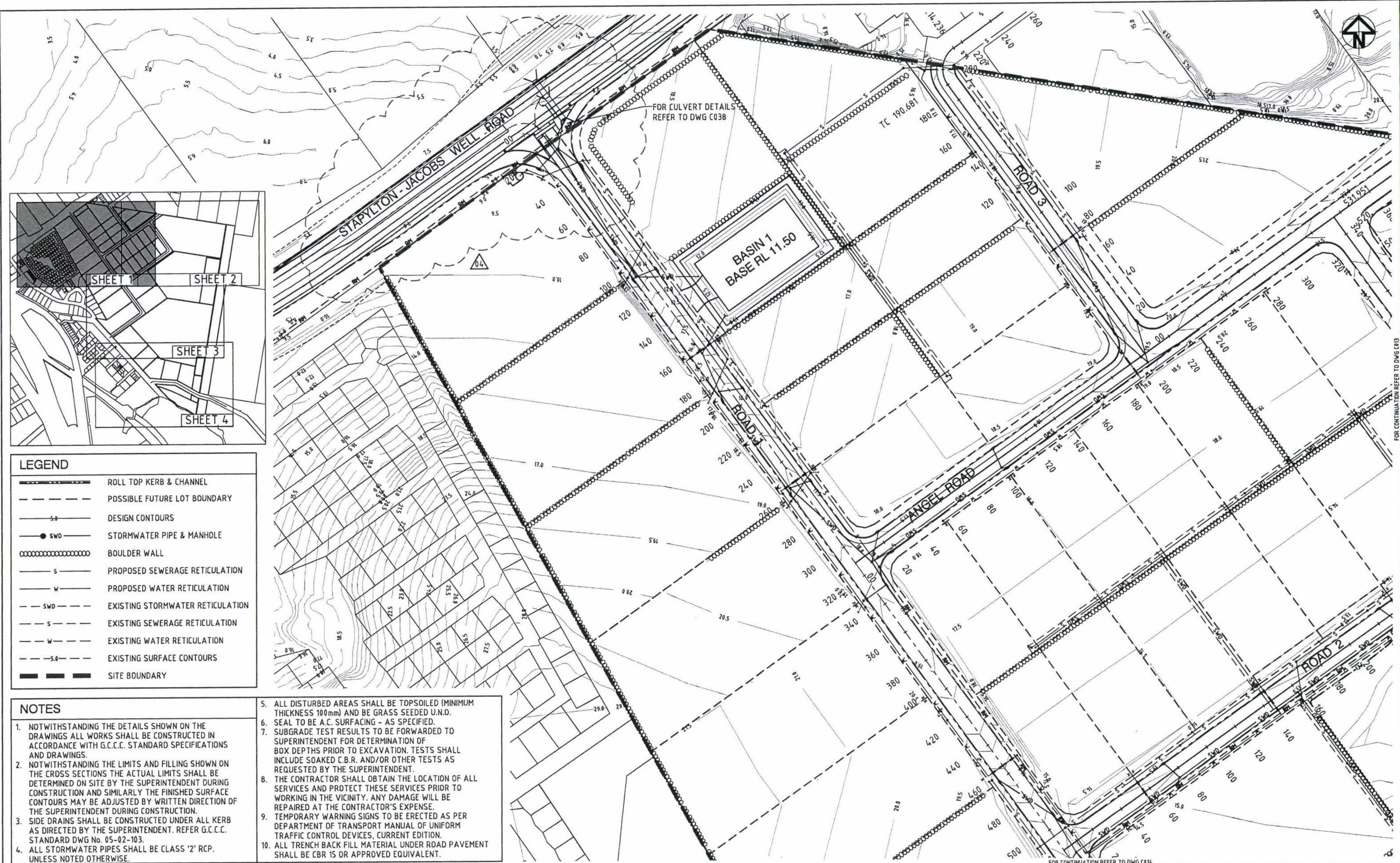
REFERENCE No. **5093-10**

PLAN No. **5093 S CD 01**

SHEET 6 OF 6

APPENDIX B

ENGINEERING DRAWINGS



LEGEND

- ROLL TOP KERB & CHANNEL
- POSSIBLE FUTURE LOT BOUNDARY
- DESIGN CONTOURS
- SWD STORMWATER PIPE & MANHOLE
- BOULDER WALL
- PROPOSED SEWERAGE RETICULATION
- PROPOSED WATER RETICULATION
- EXISTING STORMWATER RETICULATION
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING SURFACE CONTOURS
- SITE BOUNDARY

- NOTES**
- NOTWITHSTANDING THE DETAILS SHOWN ON THE DRAWINGS ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH G.C.C.C. STANDARD SPECIFICATIONS AND DRAWINGS.
 - NOTWITHSTANDING THE LIMITS AND FILLING SHOWN ON THE CROSS SECTIONS THE ACTUAL LIMITS SHALL BE DETERMINED ON SITE BY THE SUPERINTENDENT DURING CONSTRUCTION AND SIMILARLY THE FINISHED SURFACE CONTOURS MAY BE ADJUSTED BY WRITTEN DIRECTION OF THE SUPERINTENDENT DURING CONSTRUCTION.
 - SIDE DRAINS SHALL BE CONSTRUCTED UNDER ALL KERB AS DIRECTED BY THE SUPERINTENDENT. REFER G.C.C.C. STANDARD DWG No. 05-02-103.
 - ALL STORMWATER PIPES SHALL BE CLASS '2' RCP, UNLESS NOTED OTHERWISE.
 - ALL DISTURBED AREAS SHALL BE TOPSOILED (MINIMUM THICKNESS 100mm) AND BE GRASS SEED U.N.D.
 - SEAL TO BE A.C. SURFACING - AS SPECIFIED.
 - SUBGRADE TEST RESULTS TO BE FORWARDED TO SUPERINTENDENT FOR DETERMINATION OF BOX DEPTHS PRIOR TO EXCAVATION. TESTS SHALL INCLUDE SOAKED C.B.R. AND/OR OTHER TESTS AS REQUESTED BY THE SUPERINTENDENT.
 - THE CONTRACTOR SHALL OBTAIN THE LOCATION OF ALL SERVICES AND PROTECT THESE SERVICES PRIOR TO WORKING IN THE VICINITY. ANY DAMAGE WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
 - TEMPORARY WARNING SIGNS TO BE ERCTED AS PER DEPARTMENT OF TRANSPORT MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION.
 - ALL TRENCH BACK FILL MATERIAL UNDER ROAD PAVEMENT SHALL BE CBR 15 OR APPROVED EQUIVALENT.

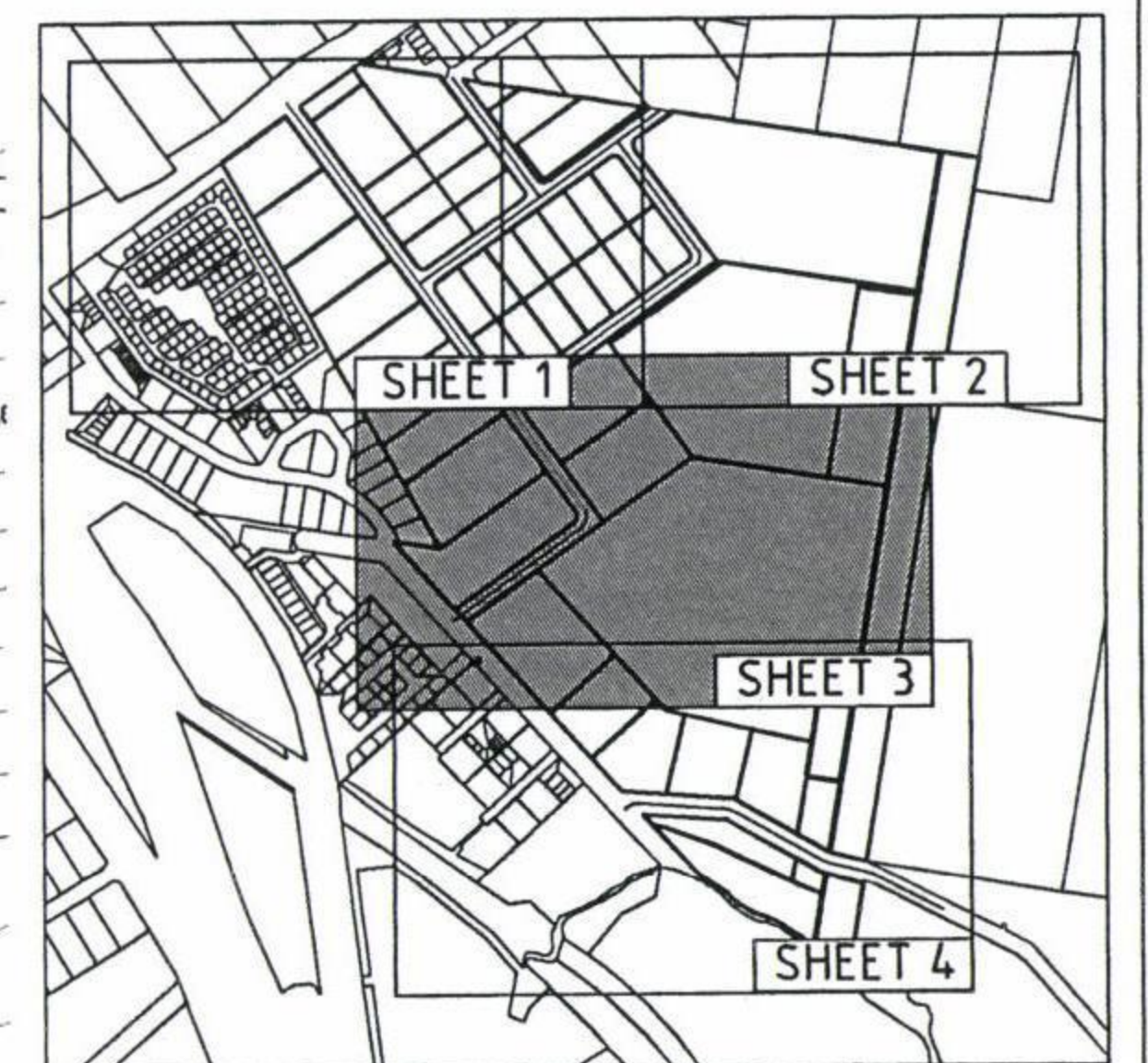
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03	ISSUE FOR SUBMISSION TO G.C.C.C.	ND	19.08.11	Architect		Filename: C012-C015-AA003837-01-ROAD WRKS & DRAINAGE.DWG		Approved		Title		Drawing No	
02	DESIGN AMENDED	ND	20.07.11					REPO No.		ROADWORKS & DRAINAGE LAYOUT PLAN SHEET 1 OF 4		C012	
01	ORIGINAL ISSUE	ND	06.01.11					Current Issue Signatures		Project No.		AA003837	
								Scales		1:1000		Issue	
								Original Size		A1		04	
								Height Datum		DATUM			
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04 DRAWINGS AMENDED AS PER COUNCIL RFI ND 15.06.12 03 ISSUE FOR SUBMISSION TO G.C.C.C. ND 19.08.11 02 DESIGN AMENDED ND 20.07.11 01 ORIGINAL ISSUE ND 06.01.11			Scale  1 : 1000		Architect				Approved R.E.P.O No:		Title ROADWORKS & DRAINAGE LAYOUT PLAN SHEET 2 OF 4		Drawing No Project No Issue C013 AA003837 04	
Issue Description Date					Filename: C012-C015-AA003837-01-ROAD WRKS & DRAINAGE.DWG				Scales 1:1000 Current Issue Signatures Author NDREISE Designer T DINGLE Reviewer MBRAY Height DATUM Grid GRID		Copyright reserved		20/Jun/2012 2:06 PM F:\AA003837\LE-CAD\VC-Civil\VC-Final\C012-C015-AA003837-01-Road Wrks & Drainage.dwg	



NOTES
1. FOR LEGEND AND NOTES REFER TO DWG C012-AA003837



					Surveyor GASSMAN DEVELOPMENT PERSPECTIVES		Client MRS PATRICIA & MR WILLIAM HESTER		Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION		Project STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE		 HYDER CONSULTING PTY. LTD ABN 48 010 924 880 P O Box 1053, Southport, Queensland, 4215 Australia Tel: (+617) 5532 3933 Fax: (+617) 5591 4778 E-mail: goldcoast@hyderconsulting.com Web: www.hyderconsulting.com	
					Architect				Approved R.E.P.D. No:		Title ROADWORKS & DRAINAGE LAYOUT PLAN SHEET 3 OF 4			
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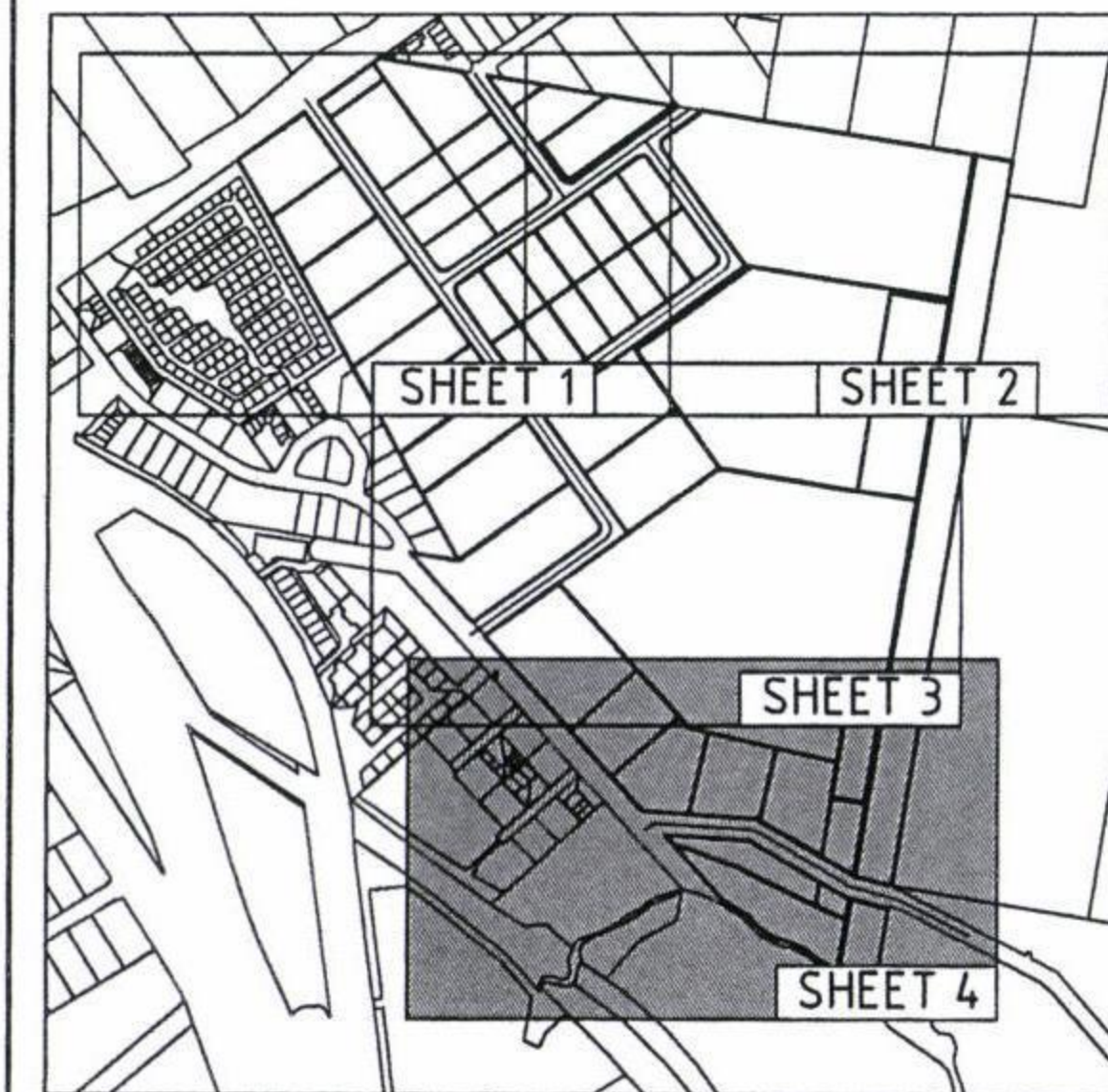
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02 DESIGN AMENDED ND 20.07.11		
01 ORIGINAL ISSUE ND 06.01.11		

Issue	Description	Date
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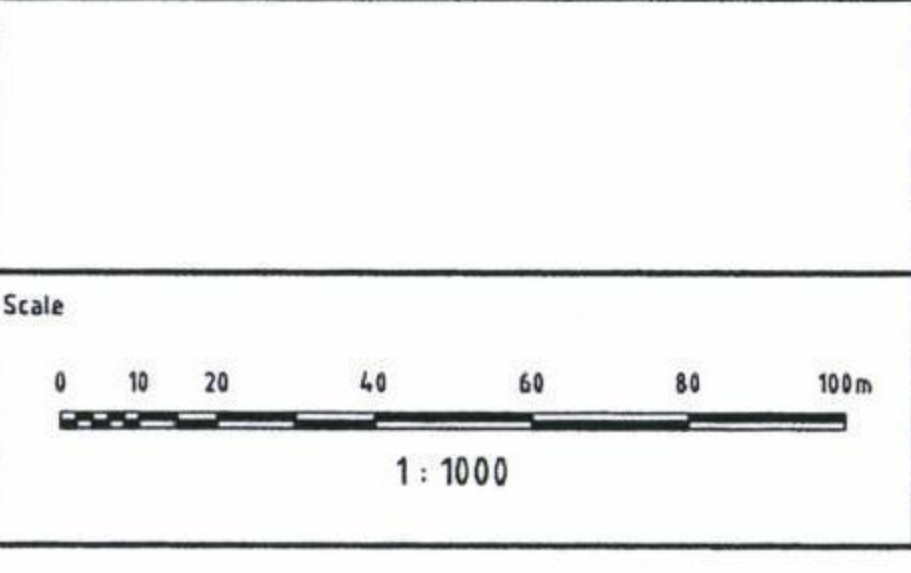
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1. FOR LEGEND AND NOTES REFER TO DWG C012-AA003837



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03	ISSUE FOR SUBMISSION TO G.C.C.C.	ND 19.08.11
02	DESIGN AMENDED	ND 20.07.11
01	ORIGINAL ISSUE	ND 06.01.11



Surveyor	GASSMAN DEVELOPMENT PERSPECTIVES
Architect	
Client	MRS PATRICIA & MR WILLIAM HESTER
Filename:	C012-C015-AA003837-01-ROAD WRKS & DRAINAGE.DWG

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Approved	REP'D No
Scales	1:1000
Original Size	A1
Height Datum	DATUM
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Project	STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE
Title	ROADWORKS & DRAINAGE LAYOUT PLAN SHEET 4 OF 4

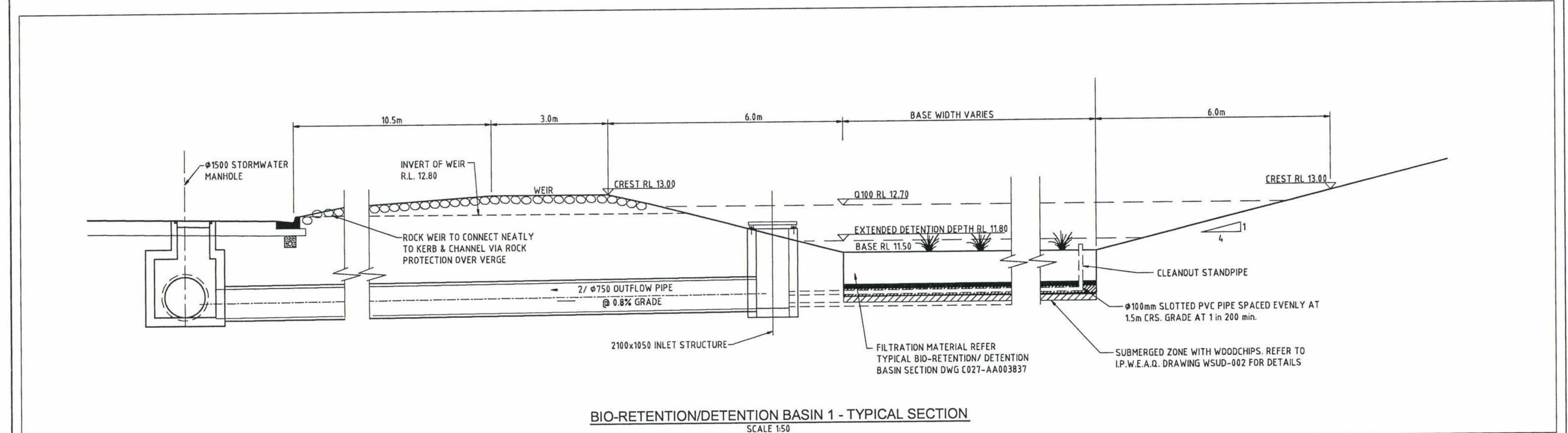
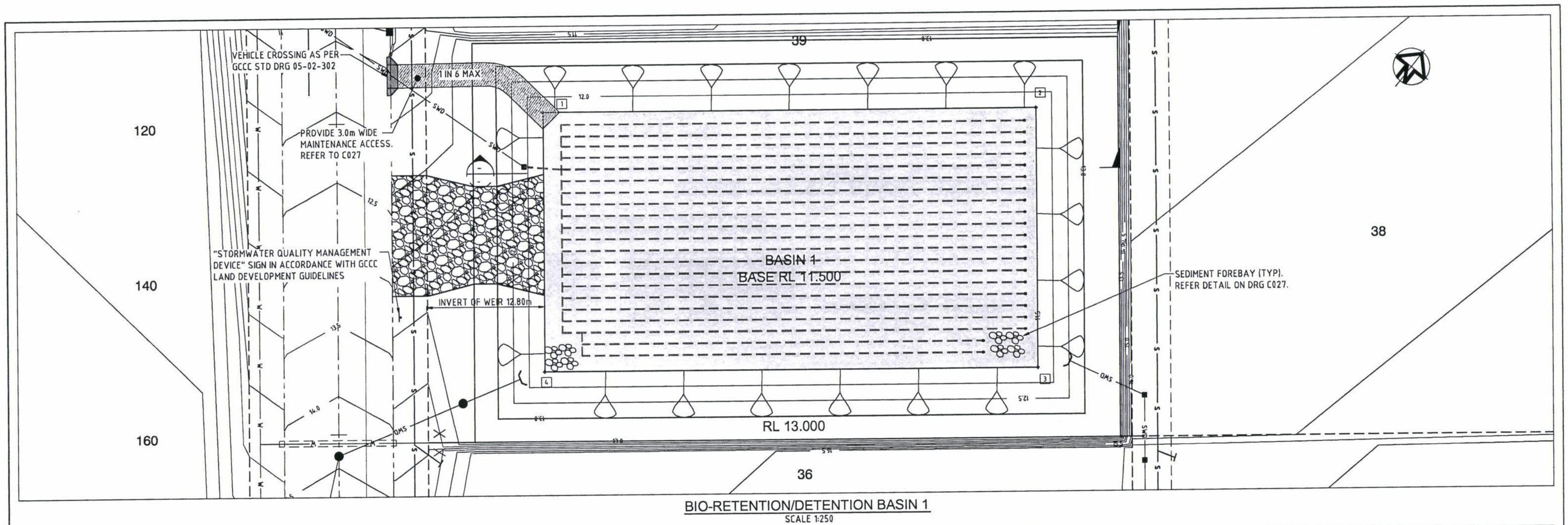
Author	NDREISE
Designer	T.DINGLE
Reviewer	MBRAY
Grid	© Copyright reserved

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E-mail: goldcoast@hyderconsulting.com
Web: www.hyderconsulting.com

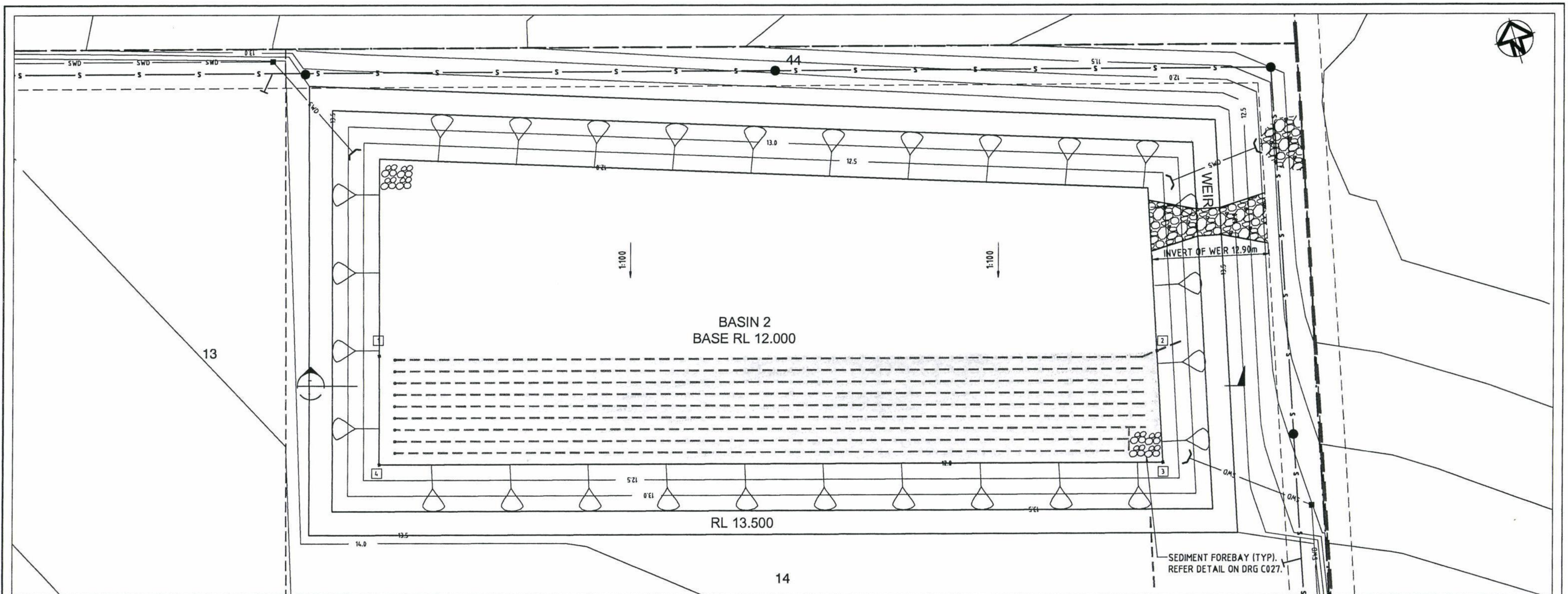
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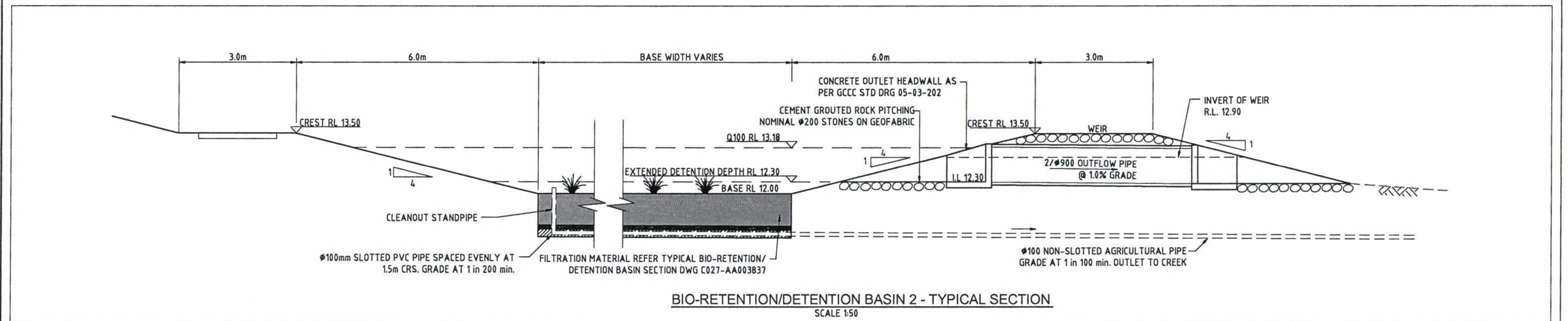
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					Surveyor		GASSMAN DEVELOPMENT PERSPECTIVES		Client		Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION		Project STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE		 HYDER CONSULTING PTY. LTD ABN 48 010 024 806 P O Box 1053, Southport, Queensland, 4215 Australia Tel: (+617) 5532 3933 Fax: (+617) 5501 4778 E-mail: goldcoast@hyderconsulting.com Web: www.hyderconsulting.com	
					Architect		MRS PATRICIA & MR WILLIAM HESTER				Approved R.E.P.D. No:		Title BIO RETENTION / DETENTION BASIN 1 LAYOUT PLAN			
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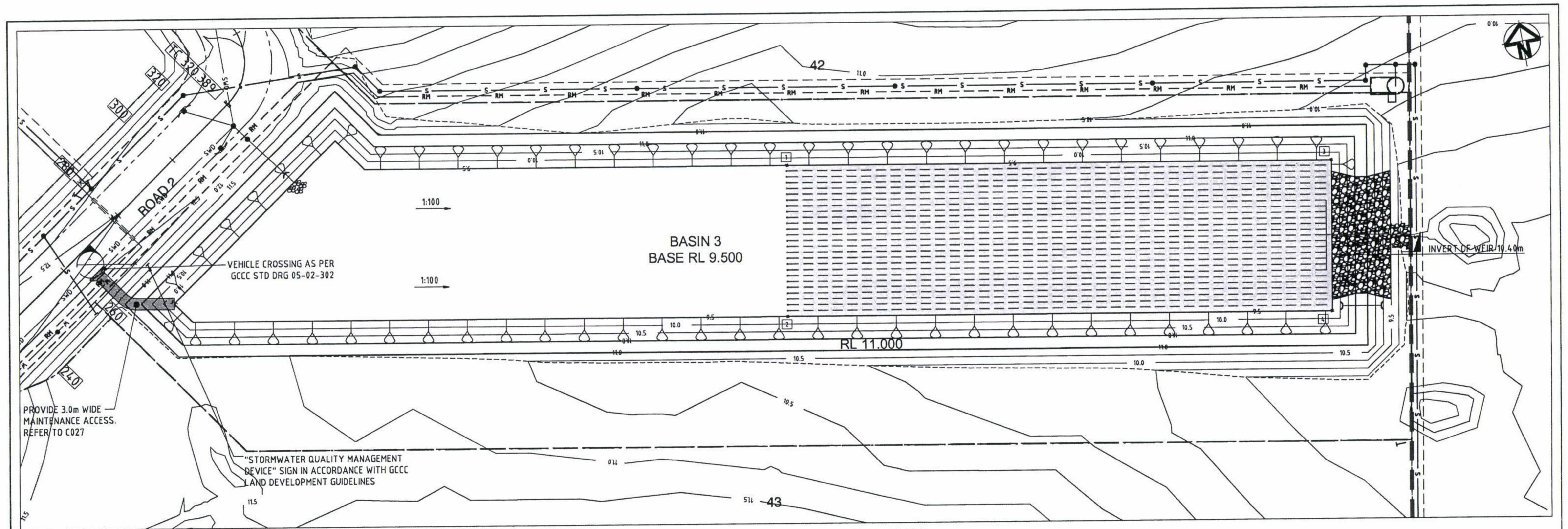


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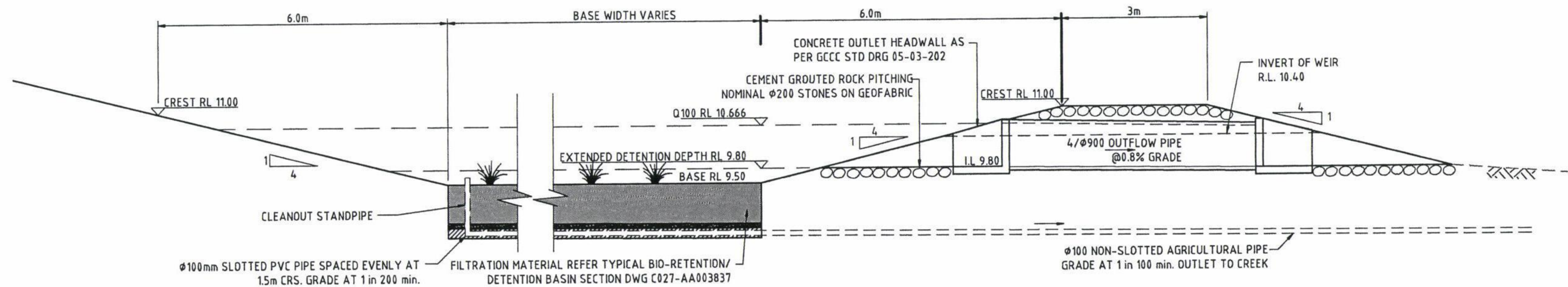


BIO-RETENTION/DETENTION BASIN 2 - TYPICAL SECTION
SCALE 1:50

			Surveyor		Client		Status		Project		 HYDER CONSULTING PTY. LTD ABN 48 010 924 866 P O Box 1653, Southport, Queensland, 4215 Australia Tel: (+617) 5532 3933 Fax: (+617) 5591 4778 E-mail: goldcoast@hyderconsulting.com Web: www.hyderconsulting.com	
			GASSMAN DEVELOPMENT PERSPECTIVES		MRS PATRICIA & MR WILLIAM HESTER		PRELIMINARY NOT TO BE USED FOR CONSTRUCTION		STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE			
			Architect				Approved		R.E.P.D No :			
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					DESIGN AMENDED		Designer		T.DINGLE			
					ORIGINAL ISSUE		Reviewer		M.BRAY		Drawing No. C024 — Project No. AA003837 — Issue 04	
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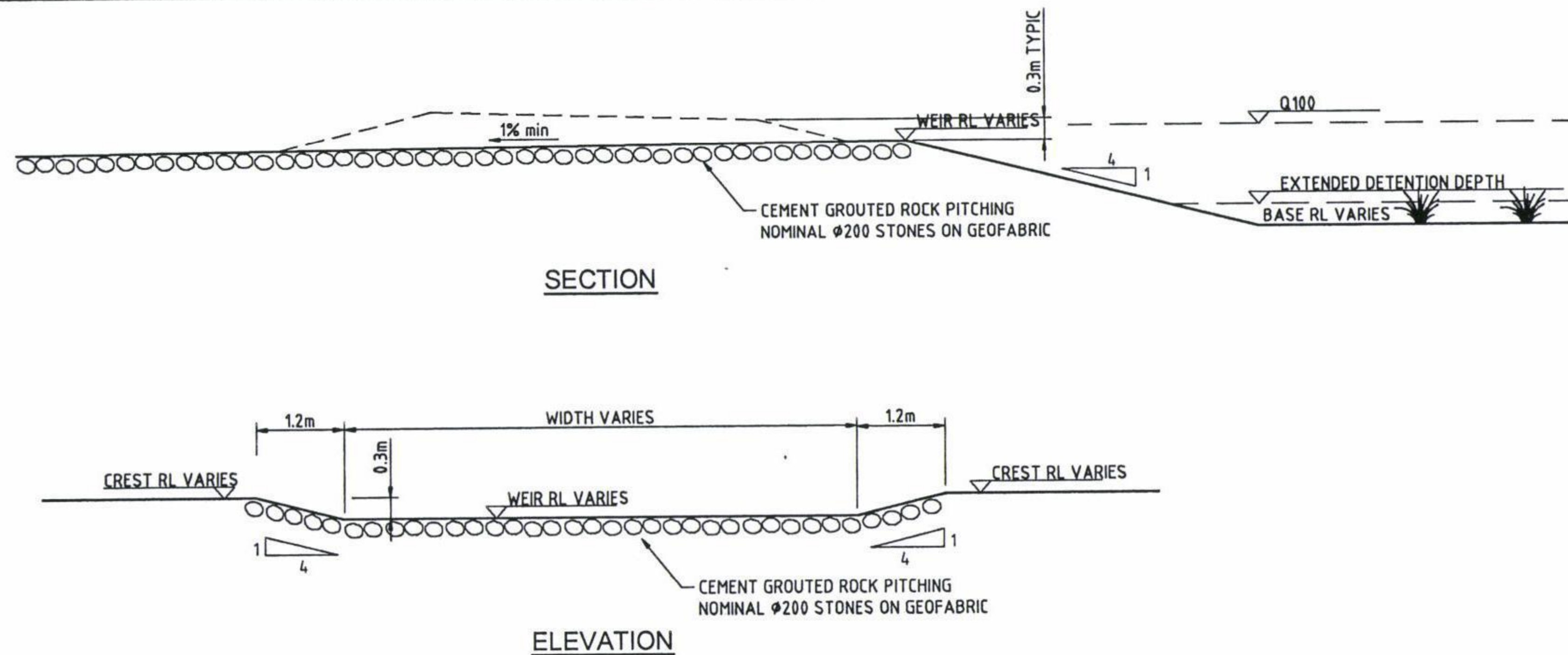
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SCALE 1:50

				Surveyor		GASSMAN DEVELOPMENT PERSPECTIVES		Client		Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION		Project STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE		 HYDER CONSULTING PTY. LTD ABN 48 010 924 850 P O Box 1653, Southport, Queensland, 4215 Australia Tel: (+617) 5532 3933 Fax: (+617) 5591 4778 E-mail: goldcoast@hyderconsulting.com Web: www.hyderconsulting.com	
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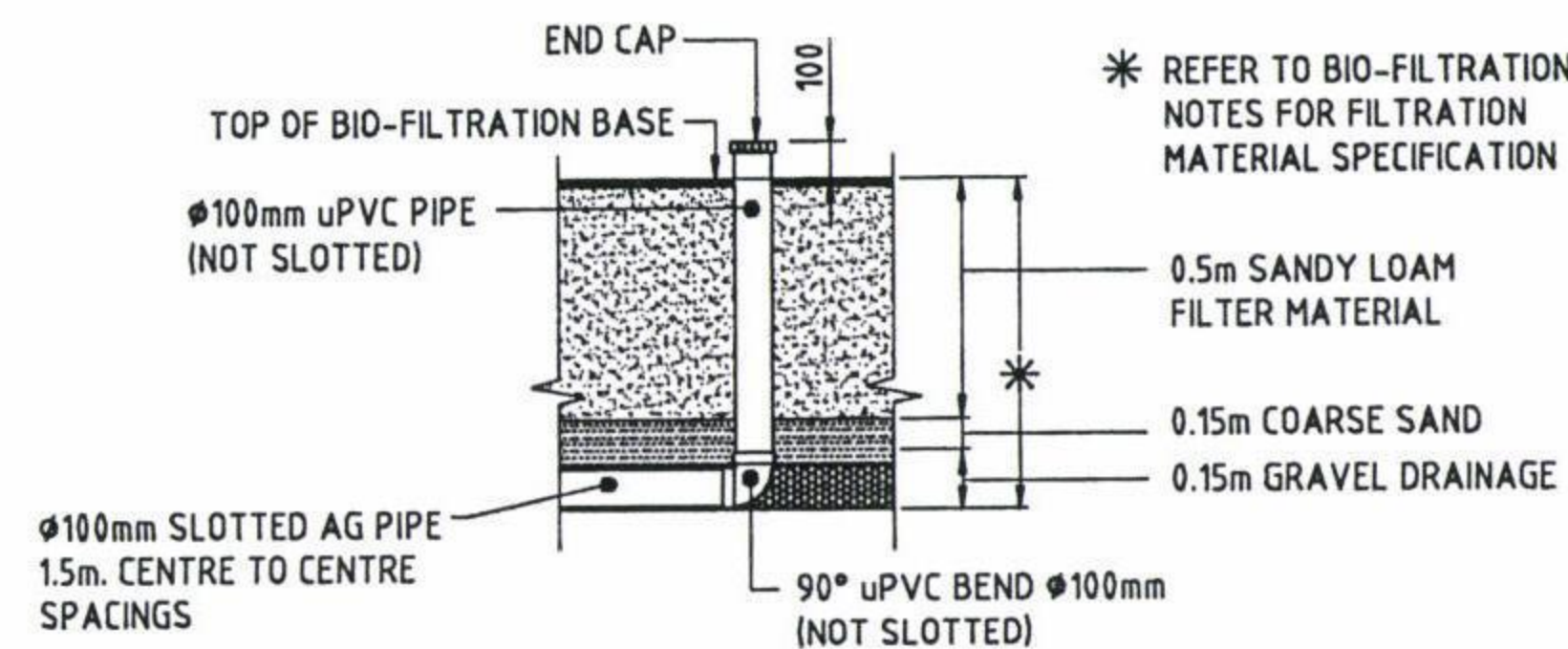
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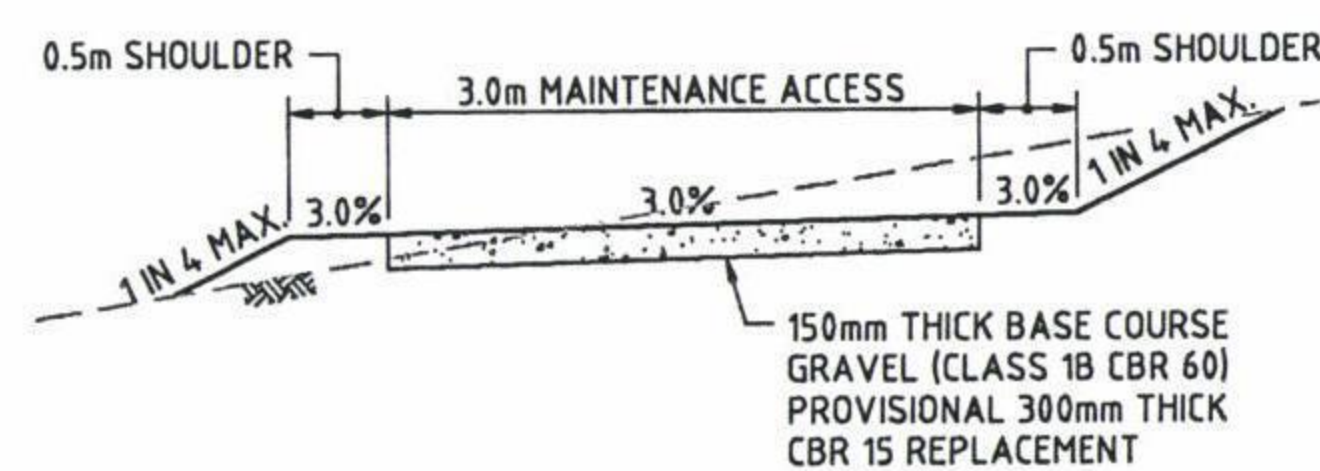
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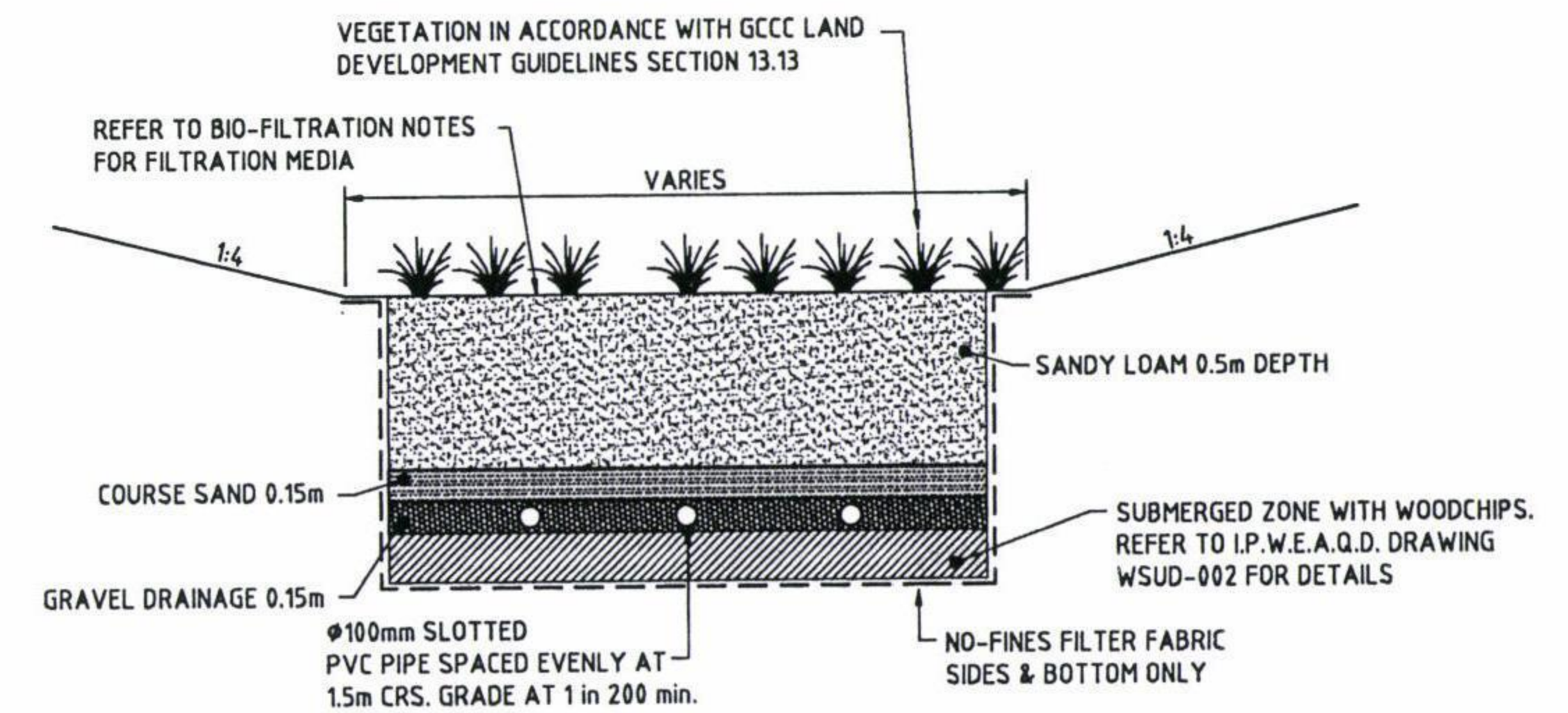
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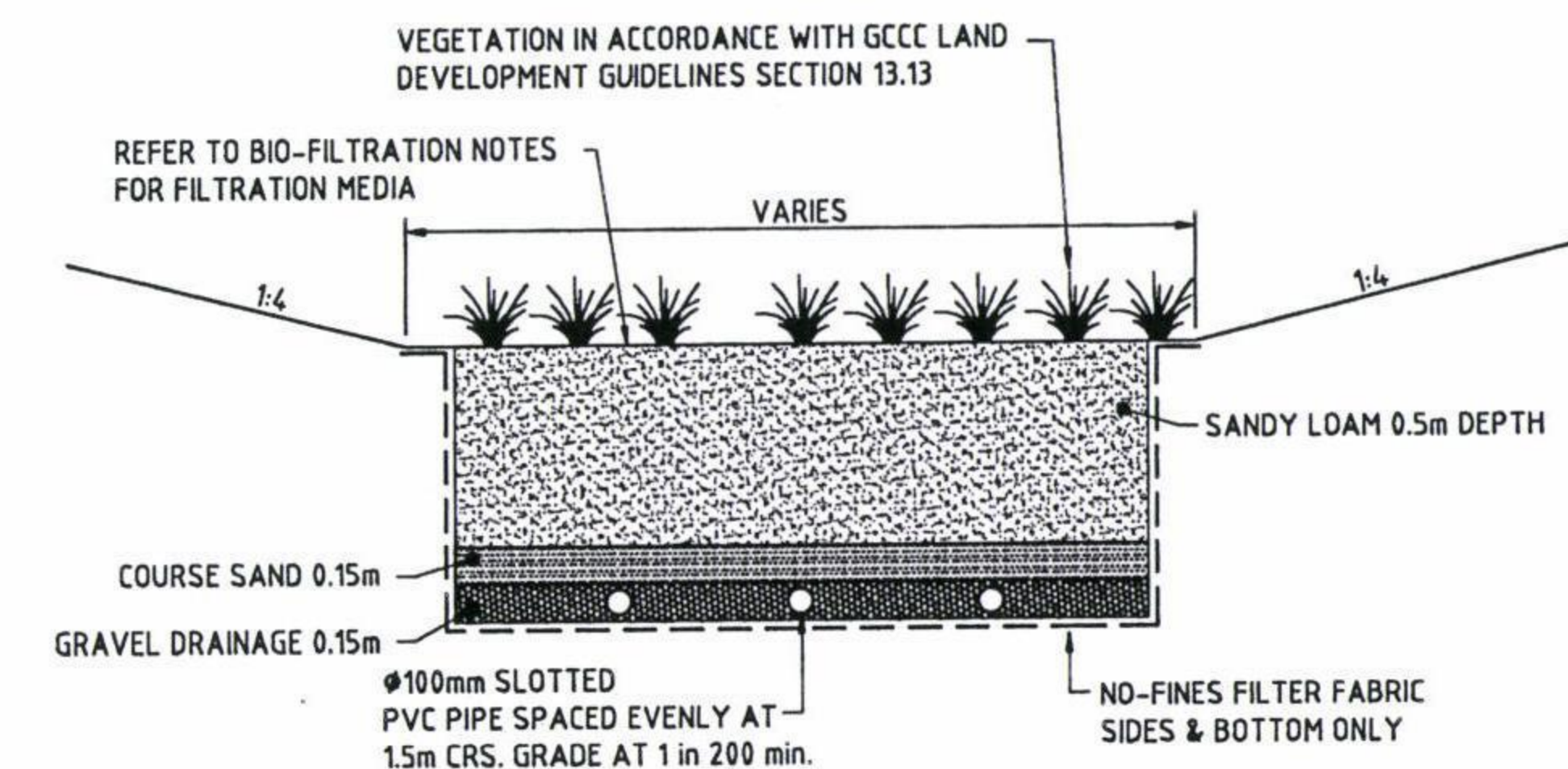
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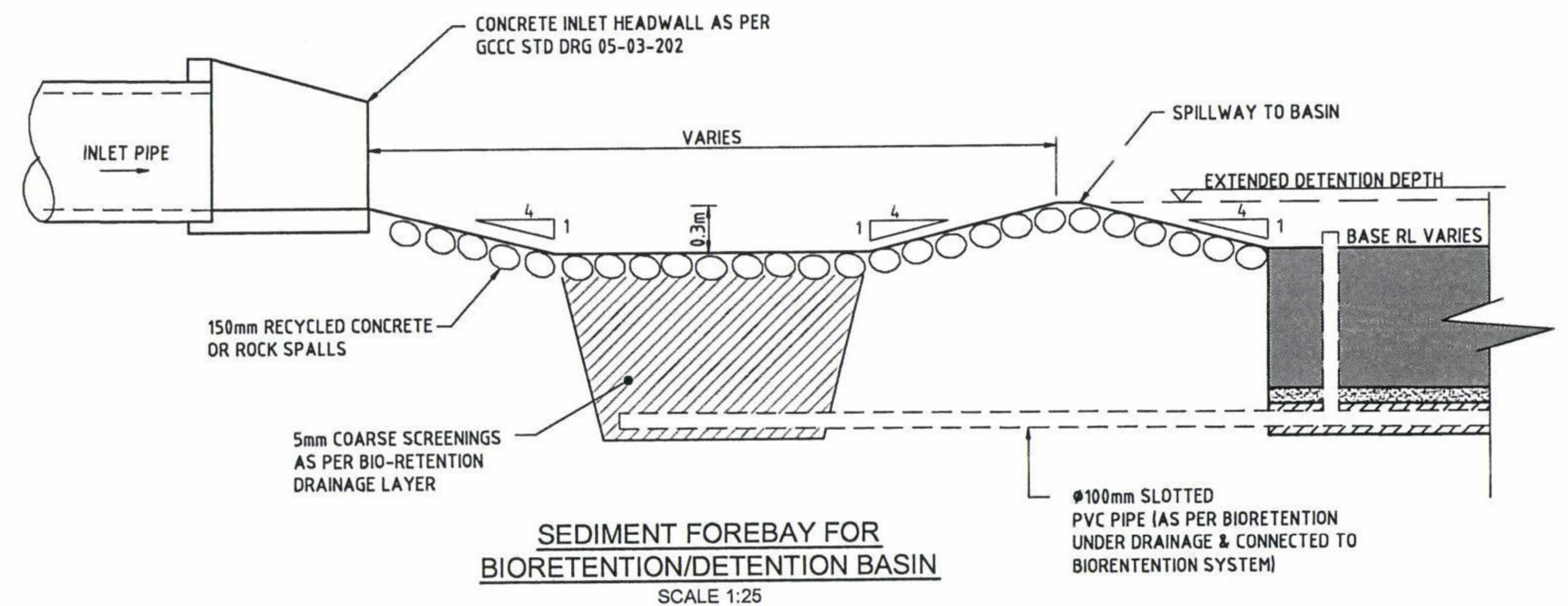
TYPICAL SECTION - MAINTENANCE ACCESS
N.T.S.



TYPICAL BIO-RETENTION FILTER SECTION
BASIN 1
SCALE 1:25



TYPICAL BIO-RETENTION FILTER SECTION
BASIN 2 & 3
SCALE 1:25



SEDIMENT FOREBAY FOR
BIORETENTION/DETENTION BASIN
SCALE 1:25

SURFACE TREATMENT DETAILS

TURFING TO ALL AREAS 1:4 SLOPE OR FLATTER.
VEGETATION TO ALL AREAS STEEPER THAN 1:4. REFER
TO LANDSCAPE ARCHITECT DRAWINGS AND WETLAND
SPECIFICATION FOR DETAILS

BIO-FILTRATION NOTES

MINIMUM FILTER DEPTH IS TO BE 1.2m AND IS TO CONSIST
OF THE FOLLOWING MEDIA:

× 0.5m OF SANDY LOAM MATERIAL WITH A HYDRAULIC
CONDUCTIVITY OF 50-200mm/h AND A PARTICLE SIZE OF
0.45-0.5mm.

× 0.15m OF COURSE SAND. PARTICLE SIZE TYPICALLY 1mm.

× 0.15m OF GRAVEL DRAINAGE. PARTICLE SIZE 5-10mm
SCREENING.

× CONTRACTOR TO ERECT SIGNAGE IDENTIFYING THE
PURPOSE OF THE BIO-RETENTION / DETENTION BASIN AS
PER COUNCIL REQUIREMENTS.

				Surveyor		GASSMAN DEVELOPMENT PERSPECTIVES		Client		MRS PATRICIA & MR WILLIAM HESTER		Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION		Project STAPYLTON, JACOBS WELL HESTER DEVELOPMENT SITE		 HYDER CONSULTING PTY. LTD ABN 48 010 924 800 P O Box 1653, Southport, Queensland, 4215 Australia Tel: (+617) 5532 3033 Fax: (+617) 5591 4778 E-mail: goldcoast@hyderconsulting.com Web: www.hyderconsulting.com	
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04		DRAWINGS AMENDED AS PER COUNCIL RFI		ND	15.06.12
03		ISSUE FOR SUBMISSION TO G.C.C.C.		ND	19.08.11
02		DESIGN AMENDED		ND	20.07.11
01		ORIGINAL ISSUE		ND	06.01.11

Issue		Description		Date	

Scale		0.5 1 1.5 2 2.5m	
		1 : 25	
		0 0.5 1 2 3 4 5m	
		1 : 50	

Architect			
Filename:		C023-C027-AA003837-01-BASINS.DWG	

Drawing No.		Project No.		Issue	
C027		AA003837		04	

APPENDIX C

GCCC DEVELOPMENT CODES



Part 7 Codes

Division 2 Specific Development Codes

Chapter 39 Works for Infrastructure

1.0 Purpose

This code seeks to ensure that all works for infrastructure, including roads, stormwater drainage and the provision of public utilities and services including sewerage reticulation, water supply reticulation, electricity and street lighting, reticulated gas and ancillary works are provided with best management land development practices in accordance with **Planning Scheme Policy 11 – Land Development Guidelines**.

This code also seeks to promote development that is more sustainable. This is to be facilitated through the design and provision of water and sewerage infrastructure to and within allotments that:

- reduces consumption of potable water by implementing measures that enable the sustainable use of recyclable water for non-potable uses;
- is cost effective over its life cycle; and
- minimises the potential for stormwater and ground water to enter the City's wastewater system.

2.0 Application

2.1 This code applies to development indicated as code assessable by the Table of Development in the domain or Local Area Plan (LAP), within which the development is proposed.

2.2 The provisions of this code apply to the life of any development, as well as to the construction period of the development. All information required to support an application, including engineering analyses, calculations, reports and drawings, shall be in accordance with **Planning Scheme Policy 11 – Land Development Guidelines**.

2.3 Performance Criteria PC1-PC11 apply to all code and impact assessable development subject to this code.

3.0 Development Requirements

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Development that is Code Assessable or Impact Assessable			
Road Design and Construction			
PC1 All roads must be designed and constructed to address connectivity, functionality, safety and serviceability of the road network and to ensure a functional road hierarchy.	AS1 The road is designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines .	AS1 - Complies All roads are designed in accordance with GCCC Land Development Guidelines, Volume6 - Standard Specifications and Drawings for Roadwork's.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Stormwater Drainage Design and Management			
PC2 Stormwater drainage design and construction must: a) integrate hydrologic and hydraulic elements; b) demonstrate a feasible and functional drainage system; and c) not cause adverse stormwater drainage impacts on areas external and internal to the site.	AS2.1 Stormwater drainage system is designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines. AS2.2 The stormwater drainage system connects to a legal point of discharge.	AS2.1 - Complies A Site Based Stormwater Management Plan (Report No. F0002-AA003837-AAR) has been prepared by Hyder Consulting. Stormwater drainage for the proposed development will be designed in accordance with GCCC Guidelines including the utilisation of stormwater quality improvement devices. AS2.2 - Complies The Site Based Stormwater Management Plan (Report No. F0002-AA003837-AAR) demonstrates that the proposed stormwater drainage will maintain the existing discharge points of the development site as the legal point of discharge.	
Street Lighting			
PC3 Street lighting must be provided to enhance safety and amenity of pedestrians and to improve traffic operations at intersections and hazardous locations.	AS3 Street lighting is designed and located in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines.	AS3 – Complies Street Lighting will be provided in accordance with the Land Development Guidelines	
Water Supply Reticulation Design			
PC4 Water supply reticulation must be provided to convey potable water to all properties with adequate quality, pressure and volume of flow for household and fire fighting purposes. (Except properties in the Rural and Conservation Domain).	AS4 Water supply reticulation is designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines.	AS4 - Complies Water will be supplied from an extension of mains along Emeri Street, Christensen Road and Stapylton Jacobs Well Road. Refer to the Engineering Services Report (Report No. F001-AA003837-AAR) for further details.	
Sewerage Reticulation Design			
PC5 Sewerage reticulation must be provided to	AS5 Sewerage reticulation is designed and	AS5 - Complies Sewerage will be serviced by multiple	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
ensure adequate quality, having regard to health and environmental issues relating to the provision of sewer infrastructure.	constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines .	external trunk sewer lines connecting to the approved internal trunk system. Refer to the Engineering Services Report (Report No. F001-AA003837-AAR) for further details.	
Open Space Design			
PC6 Open space areas must be designed to an appropriate standard, having regard to their intended recreational and environmental values	AS6 Open space areas are designed and embellished in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines .	AS6 – Complies Open Space areas will be designed and embellished in accordance with the Land Development Guidelines.	
Off Street Vehicle Parking			
PC7 Car parking areas must be located and designed to encourage their use in preference to on street parking, having regard to relative walking distances and visibility from the road.	AS7 Car parking areas area located and designed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines .	AS7 - Not Applicable It is not proposed to construct off street vehicle parking that will be a Council asset as part of this development. Therefore PC7 does not apply.	
Driveways			
PC8 Driveways must be designed to ensure convenient access of vehicle to road, including manoeuvring of heavy vehicles and service vehicles.	AS8 Driveways are designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines .	AS8 - Complies Driveways within the development will be designed to comply with Council's Planning Scheme – Policy 11 “Land Development Guidelines”.	
Developer Infrastructure Contributions			
PC9 Infrastructure developer contributions must be provided in accordance with the Priority Infrastructure Plan.	AS9 No Acceptable Solution provided.	AS9 - Complies It is accepted that Council will levy the appropriate infrastructure developer contributions at the time of issuing the development permit conditions.	
PC10 For premises identified on Overlay Map OM25 – Future Water Innovations as being within the Pimpama-Coomera Water Future	AS10.1 A dual water reticulation system is designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 –	PC10 – Not Applicable The development site is not identified as being part of the Future Water Innovations zone as per Overlay Map OM25.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Master Plan Area, a dual water reticulation system must be provided to enable future conveyance to the development of recycled water for non-potable uses in addition to the conveyance of potable water.	Land Development Guidelines. AS10.2 The development is connected to Council's potable water and recycled water supply reticulation systems at any points nominated by Council.	Therefore PC10 does not apply	
PC11 For premises identified on Overlay Map OM25 – Future Water Innovations as being within the Pimpama-Coomera Water Future Master Plan Area, sewerage infrastructure must be designed to minimise inflow and infiltration.	AS11 Reduced infiltration gravity sewers are designed and constructed in accordance with the relevant sections of Planning Scheme Policy 11 – Land Development Guidelines.	PC11 – Not Applicable The development site is not identified as being part of the Future Water Innovations zone as per Overlay Map OM25. Therefore PC11 does not apply	



Part 7 Codes
Division 3 Constraint Codes
Chapter 14 Sediment and Erosion Control

1.0 Purpose

This code seeks to minimise environmental harm caused by the effects of erosion and sedimentation, associated with the development of land. This code also seeks to ensure that ecologically sustainable management practices are undertaken during and following the development of land by:

- requiring the conservation of existing vegetation, including ground cover, on the land or, if cleaning is essential, replanting of vegetation and grass;
- ensuring that soil and other debris (whether transported by water or wind) do not leave the development site;
- minimising water flow paths and water volumes which traverse development sites, and avoiding where possible sediments leaving the site;
- ensuring the prompt and effective stabilisation and restoration of disturbed lands;
- requiring, when appropriate, an Erosion and Sedimentation Control Program;
- minimising the area and exposure time of disturbed land;
- minimising stormwater runoff events from disturbed areas;
- requiring the monitoring of impacts on receiving water bodies, as a measure of the effectiveness of the control devices.

2.0 Application

2.1 This code applies to development that is indicated as code or impact assessable by the Table of Development of the domain or Local Area Plan (LAP) within which the development is proposed.

2.2 Performance Criteria PC1-PC3 apply to all development referred to in this code.

3.0 Development Requirements

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Development that is Code Assessable or Impact Assessable			
Erosion Risk			
PC1 All development must not cause erosion or allow sediments to leave the site.	AS1 An Erosion and Sedimentation Hazard Assessment has been undertaken in accordance with the criteria listed in Table 14-1 – Erosion Hazard Assessment Form , and the total score does not exceed 11 points.	AS1 – complies An Erosion and Sedimentation Hazard Assessment has been undertaken. The score exceeds 11 points. A sediment & erosion control plan will be provided as part of the Development	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
		Application and Operational Works Application which will address this issue. Refer to Drawings C003-C006 - AA003837 & C007-AA002702 and Site based Stormwater Management plan (Report No. F0002-AA003837-AAR) for further details.	
Erosion Control			
PC2 All development must not cause erosion or allow sediments to leave the site.	AS2 An Erosion and Sedimentation Control Program has been prepared by a competent person, in accordance with Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites, and demonstrates that: a) the environmental effects of sedimentation and erosion are controlled by best practice management measures; b) sediments resulting from the development are contained within the site; and c) development adjacent to the bank or the bed of a stream or watercourse, addresses environmental impact on waterbodies.	AS2 - Compliance A site based Stormwater Management Plan (Report No. F0002-AA003837-AAR) has been prepared which incorporates erosion and sediment control management strategies in accordance with the Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites. Hyder drawings C003-C006 - AA003837 & C007-AA002702 illustrate sediment and erosion control measures.	
Upslope Runoff			
PC3 All up-slope runoff must be diverted around areas to be disturbed.	AS3.1.1 Catch drains are utilised to divert the upstream runoff to a legal point of discharge. OR AS3.1.2 Alternative methods are used to divert upstream water from exposed or disturbed land.	AS3.1.1 – Complies Diversion channels will divert upstream flows away from construction areas. Refer to Drawings C003-C006 - AA003837 & C007-AA002702 and the Site based Stormwater Management plan (Report No. F0002-AA003837-AAR) for further details. AS3.1.2 – Not Applicable	



Table 14-1 – Erosion Hazard Assessment Form

Controlling Factors	Points	Score	Checking
Average slope of the whole site, prior to building works: - Slope < 3% 3% Slope < 5% 5% Slope < 10% 10% Slope < 15% - Slope is greater than 15%	0 1 2 4 5	2	
Soil type¹: - Sandy soil/gravel - Sandy loam - Clay loam - Clay soil	0 1 2 2	2	
Anticipated duration of site disturbance^{2,3}: - Duration < 2 weeks 2 weeks Duration < 3 months 3 months Duration < 6 months - Duration > 6 months	0 2 4 5	5	
Month that works are undertaken: - August, September - April, May, June, July, November, October - March, December - January, February	0 1 2 3	1	
Offsite sediment control (ie. down slope of the soil disturbance): Score 1 point if there is no purpose built, operational and well maintained sediment trap (eg. sediment basin, gross pollutant trap or purpose built wetland) to catch sediment before it enters a waterbody with environmental values (eg. creek, natural wetland, river or bay)⁴.	1	0	
Runoff entering the site: Score 1 point if stormwater runoff entering the site is not diverted away from the soil disturbance.	1	0	
Extent of site disturbance: - Score 2 points if building work requires reshaping of the ground surface (eg. 'cut and fill' works)⁵; - Score 5 points if the area to be disturbed is greater than 600m²;	2 5	5	
Works within environmentally sensitive areas: - Score 11 points if the disturbance is within the banks of a watercourse⁶; - Score 5 points if the disturbance is within 50 metres of the top of bank of a watercourse;	11 5	0	



Controlling Factors	Points	Score	Checking
▪ Score 2 points if the disturbance is between 50 and 100 metres of the top of bank of a watercourse.	2		
Total Score^{6,7}			

Notes:

1. **Where there is more than one type of soil on the site, select the category with the highest point value;**
2. **The time from when the building site will first become vulnerable to erosion to the time the soil will be fully stabilised (eg. grassing);**
3. **If this time span covers more than one category, select the category with the highest point value. Note that if there is no grass/vegetation cover on the site before building work has started, the time span starts from the time this form is completed;**
4. **If you are not sure, score 1 point;**
5. **For the purpose of this form, 'cut and fill' works are those that will result in a steep batter or retaining wall above and/or below the building slab, greater than 1 metre in height. If the building slab has already been fully cut and stabilised (eg. grassed) during the subdivision stage, score 0 points;**
6. **For a high risk site, the total score is $\geq$ critical score;**
7. **For a low risk site, the total score is $<$ critical score;**
8. **Watercourse means any clearly identifiable creek, stream or river, whether flowing permanently or intermittently.**



Part 7 Codes

Division 3 Constraint Codes

Chapter 8 Flood Affected Areas

1.0 Purpose

To ensure that, where premises within flood affected areas are to be developed, adequate measures are taken to:

- ensure that the development does not cause, or have the cumulative potential to cause, real damage (as defined below);
- provide standards for development in these areas that will ensure that the runoff from land and/or premises does not create any adverse environmental impacts.

Key objectives include:

- a) avoiding, if practicable, or otherwise lessening, the adverse impacts of flooding;
- b) maintaining or improving the City's counter disaster response efforts during a flood emergency;
- c) equitably sharing development constraints and development potential within a single river catchment and its sub catchments;
- d) equitably sharing the costs and benefits of flood mitigation infrastructure within a river catchment and its sub-catchments;
- e) protecting the flood storage function of the City's flood plains;
- f) protecting the flood discharge capacity of the City's rivers, streams and canals;
- g) achieving and maintaining a best practice approach to flood plain management;
- h) protecting ocean beaches and the shores and banks of estuaries, lakes, canals, rivers, streams and other waterbodies from erosion.

This code seeks to manage the effects of flooding on flood prone land, where it relates to new and existing development, infrastructure and ecosystems, by requiring:

- certified engineering hydraulic management plans or studies;
- specific design criteria for certain types of land uses.

All such proposals for development will be fully evaluated against the following criteria:

- real damage: whether the development is likely to cause damage that would adversely affect land and/or premises to an extent likely to be actionable;
- cumulative impact: whether the cumulative impact of development is likely to cause real damage;
- flood hazard: whether the development is likely to cause or worsen flood hazard;
- risks: whether the risks associated with the development are fully known, quantifiable and capable of being dealt with to Council's satisfaction, without any uncertainties; and
- flood mitigation: whether flood mitigation works, intended to reduce flood risk, hazard and damage, do so without adversely impacting upon other land and/or premises.



2.0 Application

- 2.1 This code applies to development that is indicated as self, code or impact assessable in the Table of Development to the domain or Local Area Plan (LAP) within which the development is proposed. In particular, this code applies to any site that is located within a Flood Affected Area*, defined as follows:
- flood prone land; or
 - premises where access would be adversely affected during a range of floods, up to and including the designated flood.

*Refer to **Overlay Map OM17 – Natural Hazard (Flood) Management Areas** sheets 1-35.

- 2.2 This code does not apply to Class 1 or Class 10 buildings as defined in the **Building Code of Australia**, except where Council has declared an area to be flood liable under **Section 53** of the **Queensland Building Regulations**. However, this code provides recommendations for minimum floor levels for Class 1 and Class 10 buildings within flood prone land.
- 2.3 Note that where Operational Work is being undertaken within flood affected areas that results in a disturbance to the surface of the land, **Specific Development Code 11 – Changes to Ground Level and Creation of New Waterbodies** and **Constraint Code 14 – Sediment and Erosion Control** are also relevant.
- 2.4 Performance Criteria PC1-PC14 apply to all code and impact assessable development subject to this code. For development identified as self assessable in the relevant domain or LAP, only the acceptable solutions to Performance Criteria PC1-PC4 apply.

3.0 Development Requirements

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Development that is Self Assessable, Code Assessable or Impact Assessable			
Flood Storage			
PC1 All development activity conducted on land below the designated flood level must not detrimentally affect the flood storage capacity of the catchment and the drainage regime.	AS1 The flood storage volume on the site is maintained up to the Designated Flood Level. Note: <i>The Designated Flood Level can be obtained from Council's Flood Search.</i>	AS1 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the flood storage requirements for the proposed development.	
Building Floor Levels			
PC2 Building floor levels of habitable rooms must be raised to provide an allowance for the hydraulic gradient above the main floodway, so as to meet the requirements of the Standard Building Regulation and Building Code of Australia .	AS2.1.1 An allowance of at least 300mm is added to the Designated Flood Level for habitable rooms, or other allowance amount specified in a Local Area Plan. OR AS2.1.2	AS2.1.1 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the 300mm Freeboard requirements for the proposed development.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Note: <i>Performance criteria for setting building floor levels are set out in the Standard Building Regulation and Building Code of Australia. However, it should be noted that Designated Flood Levels provided by Council relate to mainstream flood flow paths and do not include allowances for the hydraulic gradients from residential areas to the main floodway.</i>	Damaged residential buildings are reconstructed to have a Design Floor Level at or above the level that existed prior to the building's damage, provided that the building work is limited to reinstatement. AS2.2 Where the building has been destroyed by flood, the reconstructed floor level accords with AS2.1.1.	AS2.2 – Not Applicable No onsite existing buildings exist that have being destroyed by floods therefore AS2.2 is not applicable.	
PC3 Building floor levels of garages and non habitable rooms must be constructed at a height that reflects an acceptable flood risk for their purpose. Note: <i>PC3 does not apply to:</i> a) <i>extensions to existing buildings;</i> b) <i>structures detached from a dwelling, for which the use is ancillary to that of a dwelling, provided that use is not listed in column 1 of Table to Acceptable Solution AS7.1.</i>	AS3.1 Building floor levels of garages and non habitable rooms, constructed at approximately the same level as, and attached to, the main dwelling, is constructed at a height above the Designated Flood Level, except where the dwelling has a suspended floor, constructed one metre or more above ground, or where the building is to be constructed within a Rural Domain. AS3.2 Non-habitable rooms and garages, detached from the fabric but within the curtilage of a building, that are not for the storage of goods are constructed above or below the Designated Flood Level.	AS3.1 & AS3.2 – Complies Hyder Consulting drawings C008-C011 – AA003837 illustrate a minimum lot pad level of RL9.20 AHD metres which is above Council's Recommended Q100 Flood Level of RL8.6 AHD. All structures built within the site will therefore be above the designated flood level demonstrating compliance to AS3.1 and AS3.2.	
Overland Flow			
PC4 Building work must not provide obstructions to the free passage of stormwater through a property.	AS4 Overland flowing stormwater is allowed free passage between the street and any waterway at the rear of the property, in accordance with the provisions of the Building Code of Australia.	AS4 – Complies As per Hyder drawings C012-C015 – AA003837 overland flow is permissible through the provision of easements, stormwater infrastructure and basins which are in accordance with the Building Code of Australia.	

Development that is Code Assessable or Impact Assessable

Flooding Risk



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
PC5 Development in flood affected areas must not cause, or have the cumulative potential to cause, real damage, must not increase the level of risk to life, or be to the detriment of flood evacuation procedures.	AS5 Development does not: a) increase the number of people calculated to be at risk from flooding; b) increase the number of people likely to need evacuation; c) shorten flood warning times; d) impact on the ability of traffic to use evacuation routes, or unreasonably increase traffic volumes on evacuation routes, or as identified within Council's Counter Disaster Plan (flooding); e) place additional burdens on Council's resources or emergency services; f) increase the duration of flooding, unless that increase is part of a Council approved flood mitigation strategy.	AS5 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the effects of flooding as well as associated requirements of safety, mitigation and preservation of existing flood characteristics for the proposed development.	
Flood Storage and Conveyance			
PC6 Development with plans for earthworks in a floodplain on or over a water body or within a flood affected area below the Designated Flood Level must allow for the maintenance of flood storage, and flood conveyance of flood and drainage channels and overland flow paths.	AS6.1 Provide flood storage calculations that demonstrate that flood storage volume, over the site below the Designated Flood Level, is maintained or increased. AS6.2 A certified hydraulic study (and, if necessary, a hydrologic study) is prepared by a suitably qualified and experienced engineer to investigate the hydraulic characteristics of both the undeveloped and developed site and make comparisons between them. Proposed developments in, on or over a water body, or within a flood affected area, must be tested for: a) the 50%, 20%, 10%, 5%, 2% and 1% Annual Exceedance Probability (AEP) for local flood events; b) the 5%, 2%, and 1% AEP floods and the designated flood and design flood AEP	AS6.1 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the flood storage requirements for the proposed development. AS6.2 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the existing and developed cases of the site with regards to hydraulic/ hydrologic characteristics and impacts of the site.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	(as specified in Table to Acceptable Solution AS7.1) for riverine flood events, c) any resultant afflux or increase in flood velocities sufficient to cause real damage to premises. The Assessment Manager may also require the development to be assessed against rarer floods. AS6.3 The Assessment Manager may decide that a hydraulic and/or hydrological study is not necessary if in the Assessment Manager's opinion: a) a relevant study, that is not outdated, demonstrates there are no significant flooding impacts that were not covered in the relevant study; or b) the flooding impact of the approval, in relation to the development, is minor, c) in which event the Assessment Manager must provide a written notice to that effect to the applicant.		
Development for Certain Purposes			
PC7 Development listed in Table to Acceptable Solution AS7.1 must allow for flood events and be constructed at a level above most floods.	AS7.1 Development is designed for the Design Flood AEP, as specified in Table to Acceptable Solution AS7.1. Note: <i>The designated flood level for residential buildings in general is a 1% flood level except for:</i> a) <i>Broadwater – the 1% AEP storm surge level, plus an allowance of 0.27 metres, to account for sea level rise resulting from climate change;</i> b) <i>Logan and Albert Rivers – the designated flood is based, in part, on rainfall that occurred during the January 1974 flood and assumptions made regarding the ultimate level of development, in accordance</i>	AS7.1 & AS7.2 – Complies The development as part of the Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) has being designed for the designated flood level issued by Council and in accordance with Table to Acceptable Solution AS7.1, Light Industry/warehousing.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	<i>with the relevant local planning instruments; and</i> c) <i>Historical flood level is the only information available to be specified designated flood level.</i> AS7.2 Development is constructed at or above the Design Flood Reclamation Level, shown in the Table to Acceptable Solution AS7.1, where the Designated Flood is the 1% AEP flood event, except as follows: a) Broadwater: the 1% AEP storm surge level, plus an allowance of 0.27 metres, to account for sea level rise resulting from climate change; b) Logan and Albert Rivers: the designated flood is based, in part, on rainfall that occurred during the January 1974 flood and assumptions made regarding the ultimate level of development, in accordance with the relevant local planning instruments; and c) Coomera River: the designated flood is based on the modelled 1% AEP flood event or historic levels, whichever is the higher.		
PC8 Development must consider hydrologic and hydraulic impacts of development in flood affected areas with regard to future climate change.	AS8 No acceptable solution provided. Note: <i>As part of a Hydrologic and hydraulic impact assessment, investigation has been undertaken to determine the impacts of future climate change. The findings of the investigation may be used to modify modelling parameters and boundary conditions used in modelling the hydrologic and hydraulic impacts of development in flood affected areas.</i>	AS8 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the existing and developed cases of the site with regards to hydraulic/hydrologic characteristics and impacts of the site.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
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Table to Acceptable Solution AS7.1

Land Use	Design Flood
Disaster management facilities	0.2% AEP
Hospitals	0.2% AEP
Major electrical switchyards, power stations, water treatment plants	0.2% AEP
Fire/police stations	0.5% AEP
Places of refuge	0.5% AEP
Electricity substations	0.5% AEP
Sewage treatment plants	0.5% AEP
Homes for the aged, hospice	0.5% AEP
Regional fuel storage	0.5% AEP
Food storage warehouses	0.5% AEP
Hotel residential	Designated flood
Educational facilities	Designated flood
Residential buildings	Designated flood
Camping grounds, caravan parks and relocatable homes reclamation levels	Designated flood
Commercial	Designated flood
Light industrial/warehousing	Designated flood
Theme parks	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in AS10.1
Clubs/non-habitable buildings associated with enjoyment of public open space	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in AS10.1
Car parking below buildings	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in AS10.1
Open space	Not specified, but ancillary structures are subject to appropriate hazard conditions in the designated flood, as specified in AS10.1
Rural	Not specified

Hazard Considerations for Development

PC9	AS9	AS9 – Complies	
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Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Development listed in the Table to Acceptable Solution AS9 below must be designed and constructed to avoid causing exposure to undue flood hazard.	Development is to be designed and constructed so that users are not exposed to a greater degree of hazard than shown in Table to Acceptable Solution AS9 for the range of flows specified in AS7.1 .	A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the appropriate degree of hazard as per Table to Acceptable Solution AS9; Commercial/Industrial.	

Table to Acceptable Solution AS9

Land-Use	Appropriate Degree of Hazard				
	Nil	Low	Medium	High	Extreme
Public open space/recreation	✓	✓	✓	✓	✓
Theme parks	✓	✓	✓	✓	
Clubs/non-habitable buildings associated with enjoyment of public open space	✓	✓	✓	✓	
Commercial/industrial	✓	✓	✓		
Residential	✓	✓	✓		
Public institutions	✓	✓	✓		
Car parking below buildings	✓	✓	✓	✓	
Caravan parks	✓	✓	✓		
Council offices	✓	✓			
Schools	✓	✓			
Homes for the elderly	✓	✓			
Hospitals	✓	✓			
SES	✓	✓			
Police/fire stations	✓	✓			
Museums/libraries/archives/ infrastructure plan repositories	✓				
Telephone exchanges	✓				

Note: ✓ Indicates an appropriate land use.



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
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The above table examines the appropriateness of land use decisions from the aspect of flood hazard only. As such, it does not confer any land use rights or provide any indication that Council will reject or favourably consider various uses in particular areas. Such consideration will be dealt with appropriately, in the context of the Planning Scheme, and based upon full consideration of all relevant issues.

Access Criteria with Respect to Hazard

PC10 All proposed development must demonstrate that sufficient access or egress will be available to enable evacuation during a range of floods, up to and including the designated flood.	AS10.1 Development, not including underground car parks, must ensure that evacuation opportunities exist in accordance with the minimum levels of exposure outlined in Table to Acceptable Solution AS10.1, where means of access or egress may be: a) an access route that is below the level of the designated flood, provided that route is classed as a low hazard, as defined in Table to Acceptable Solution AS10.1; or b) an access route that is not the main access route. However, it must remain effective for the duration of a range of flood events, up to and including the designated flood; or c) a temporary access arrangement, provided that access can be gained without significant preparation time being required; The access or egress must: a) in the event of a designated flood: ▪ not expose users to undue risk; ▪ not cause, or have the cumulative potential to cause, real damage to land and/or premises; ▪ not interrupt or materially change the surface water drainage from or onto adjoining land; b) not create, in the event of a flood, a sudden change in flow distributions, flood level or velocity that could result in: ▪ the breaking of a levee; or	AS10.1 - Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the evacuation procedures and escape routes in the event of a Q100 flood event, in accordance with Table to Acceptable Solution AS10.1. The plan demonstrates that the entire site still has safe access to roadways and pedestrian routes as well as access to the adjacent traffic networks to the North-East and South-West during the event.	
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Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	- the establishment of blockage of a breakout; or - excessive scour; or - sedimentation; or - increased flood hazard.		

Table to Acceptable Solution AS10.1

Criteria	Degree of Flood Hazard			
	Low	Medium	High	Extreme
Wading ability	If necessary children and the elderly could wade. (Generally, safe wading velocity depth product is less than 0.25.)	Fit adults can wade. (Generally, safe wading velocity depth product is less than 0.4.)	Fit adults would have difficulty wading. (Generally, where wading velocity depth product is less than 0.6.)	Wading is not an option.
Evacuation distances	< 200 metres	200 – 400 metres	400 – 600 metres	> 600 metres
Maximum flood depths	< 0.3 metres	< 0.6 metres	< 1.2 metres	> 1.2 metres
Maximum flood velocity	< 0.4 metres per second	< 0.8 metres	< 1.5 metres	> 1.5 metres
Typical means of egress	Sedan	Sedan early, but 4WD or trucks later	4WD or trucks only in early stages, boats or helicopters	Large trucks, boats or helicopters
Timing Note: This category cannot be implemented until evacuation times have been established in the Counter Disaster Plan (flooding).	Ample for flood forecasting. Warning and evacuation routes remain passable for twice as long as evacuation time.	Evacuation routes remain trafficable for 1.5 times as long as the evacuation time.	Evacuation routes remain trafficable for only up to minimum evacuation time.	There is insufficient evacuation time.

Note: *The evacuation times for various facilities or areas would (but not necessarily) be included in the Counter Disaster Plan (flooding).
Generally, safe wading conditions assume even walking surfaces with no obstructions, steps, soft underfoot, etc.*

Filling, Excavation and Contouring

PC11 Any change to ground level, by way of filling, excavation or contouring, must not result in real damage, flood hazard or impediment to any Counter Disaster Plan, measure or create unreasonable change in the exposure to flood hazard.	AS11.1.1 Changes to ground level, by way of filling, excavating or contouring, comply with a hydraulic master plan approved by Council. OR AS11.1.2 A flood study is prepared in accordance with	AS11.12 Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the flood hazard issues associated with the developed characteristics of the site.	
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Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	the requirements set out in AS6.1 and AS6.2 , is approved by Council, and it is established that the development complies with, or does not impede, any Counter Disaster Plan measure.		
PC12 Filling, excavation or contouring must not cause sedimentation, erosion or adverse impact on the City's drainage network.	AS12 No acceptable solution provided. For guidance, please refer to Constraint Code 14 – Sediment and Erosion Control .	AS12 - Complies Sediment and Erosion Control measures are included as part of the Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting. Constraint Code 14 – Sediment and Erosion Control also forms part of the site's DA submission.	
Landscaping			
PC13 Landscaping must not impede a natural watercourse, a flood channel or an overland flow path.	AS13.1.1 Landscaping complies with a hydraulics master plan approved by Council. OR AS13.1.2 A flood study, allowing for the landscaping, is prepared in accordance with the requirements of AS6.2 , and is approved by the Assessment Manager.	AS13.1.2 – Complies A Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) incorporating Flood Management has been prepared by Hyder Consulting and addresses the hydraulics and hydrology of the site in the development case (includes landscaping).	
Building Floor Levels			
PC14 Buildings that are to be constructed on flood prone land shall not be inundated by floodwaters during a designated flood event.	AS14.1 Development is constructed at or above the Specified Minimum Flood AEP plus the Minimum Design Freeboard, as set out in column 2 of the Table to Acceptable Solution AS14.1 . AS14.2 Where a proposed land use does not reasonably apply to any land use listed in the Table to Acceptable Solution AS14.1 , the	AS14.1 - Complies Hyder drawings C008-C011 – AA003837 as well as the Site Based Stormwater Management Plan (Report No F0002-AA003837-AAR-01) illustrate that the proposed minimum site levels are in accordance with Table to Acceptable Solutions AS14.1; light industrial/warehousing.	



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	applicant is to submit: a) the proposed minimum flood AEP for building floor levels; b) the proposed design freeboard above the specified flood level; and c) a flood hazard and flood risk assessment for the proposed development, assessing the effects on costs, safety, access and potential losses. AS14.3 It is noted that PC14 does not apply to: a) garages below residential buildings; b) garages below commercial premises; and c) garages below industrial premises, provided there are suitable means to restrict motor vehicles being washed away during a flood event.		

Table to Acceptable Solution 14.1

Land Use	Specified Minimum Flood AEP Plus Minimum Design Freeboard
Disaster management facilities	0.2% AEP + 500mm
Hospitals	0.2% AEP + 500mm
Major electrical switchyards, Power stations, Water treatment plants ¹	0.2% AEP + 500mm
Fire and Police stations ²	0.5% AEP + 400mm
Places of refuge	0.5% AEP + 400mm
Electricity Substations ¹	0.5% AEP + 400mm
Sewage Treatment Plants ³	0.5% AEP + 400mm
Homes for the aged, Hospice ⁴	0.5% AEP + 400mm
Regional fuel storage	0.5% AEP + 400mm
Food storage warehouses	0.5% AEP + 400mm
Hotel residential	Designated flood + 300mm
Educational facilities ⁵	Designated flood + 300mm



Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Residential buildings		Designated flood + 300mm	
Camping grounds, Caravan parks and Relocatable homes reclamation levels		Designated flood + 300mm	
Commercial ⁶		Designated flood	
Light Industrial / Warehousing ⁶		Designated flood	
Theme Parks		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Clubs/ Non-habitable buildings associated with enjoyment of public open space		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Car parking below buildings		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Open space		Not specified, but ancillary structures are subject to appropriate hazard considerations at the designated flood.	
Rural		Not specified	

Note: AEP is the Annual Accedence Probability

Notes for Table of AS14.1

1. Applies to switchyard components necessary for the operation of the facility during a flood emergency. This shall be determined by Powerlink.
2. Excludes 'shop front' facilities and those not likely to be utilised during a flood emergency.
3. Specifically, bunds, electrical and mechanical equipment necessary for the continued operation of a sewage treatment plant shall not be at risk of inundation during a flood emergency.
4. The flood immunity specified is to meet the objective of not adding to the burden of flood emergency services.
5. It is not necessary that all rooms within an education facility be above the 1% AEP level. However, there should be sufficient space to accommodate the whole of the school population for the continuation of education, immediately after a flood.
6. Freeboard is not specified, as it is considered that commercial risk provisions should apply. If such land is developed to a flood immunity less than 1% AEP (as may be permitted by any local planning instrument), Council may endorse rates notices accordingly.

APPENDIX D

STORMWATER TREATMENT DEVICE MAINTENANCE CHECKLISTS

BIORETENTION BASIN DESIGN ASSESSMENT CHECKLIST			
Asset I.D.			DA No.
Basin Location:			
Hydraulics:	Minor Flood (m ³ /s):	Major Flood (m ³ /s):	
Area:	Catchment Area (ha):	Bioretention Area (ha):	
TREATMENT			
Treatment performance verified from curves?			
BIORETENTION MEDIA AND UNDER-DRAINAGE			
Design documents bioretention area and extended detention depth as defined by treatment performance requirements.			
Overall flow conveyance system sufficient for design flood event(s)?			
Where required, bypass sufficient for conveyance of design flood event?			
Where required scour protection provided at inflow point to bioretention?			
Bioretention media specification includes details of filter media, drainage layer and transition layer (if required)?			
Design saturated hydraulic conductivity included in specification?			
Transition layer provided where drainage layer consists of gravel (rather than coarse sand)?			
Perforated pipe capacity > infiltration capacity of filter media?			
Selected filter media hydraulic conductivity > 10 x hydraulic conductivity of surrounding soil?			
Liner provided if selected filter media hydraulic conductivity < 10 x hydraulic conductivity of surrounding soil?			
Maximum spacing of collection pipes < 1.5m?			
Collection pipes extended to surface to allow inspection and flushing?			
*Maximum upstream flood conveyance complies with QUDM?			
*Overflow pit has set down of at least 50mm below kerb invert? (where conventional gully/lintel used downstream of bioretention then no overflow pit required)			
BASIN			
Bioretention area and extended detention depth documented to satisfy treatment requirements?			
Overflow pit crest set at top of extended detention?			
Maximum ponding depth will not impact on public safety?			
Maintenance access provided to surface of bioretention system (for larger systems)?			
Protection from coarse sediments provided (where required) with a sediment forebay?			
Protection from gross pollutants provided (where required)?			
LANDSCAPE			
Plant species selected can tolerate extended dry periods, periodic inundation and design velocities?			
Bioretention design and plant species selected integrate with surrounding landscape or built environment design?			
*Planting design conforms with acceptable sight line and safety requirements?			
COMMENTS			

* Streetscape application only

BIORETENTION BASIN CONSTRUCTION INSPECTION CHECKLIST											
Asset I.D.					Inspected By:						
Site:					Date:						
					Time:						
Constructed By:					Weather:						
					Contact During Visit:						
Items inspected		Checked		Satisfactory		Items inspected		Checked		Satisfactory	
		Y	N	Y	N			Y	N	Y	N
DURING CONSTRUCTION & ESTABLISHMENT											
A. FUNCTIONAL INSTALLATION						Structural components					
Preliminary Works						15. Location and configuration of inflow systems as designed					
1. Erosion and sediment control plan adopted						16. Location and levels of overflow pits as designed					
2. Temporary traffic/safety control measures						17. Under-drainage connected to overflow pits as designed					
3. Location same as plans						18. Concrete and reinforcement as designed					
4. Site protection from existing flows						19. Set down to correct level for flush kerbs (streetscape applications only)					
Earthworks and Filter Media						20. Kerb opening width as designed					
5. Bed of basin correct shape and slope											
6. Batter slopes as plans						B. SEDIMENT & EROSION CONTROL (IF REQUIRED)					
7. Dimensions of bioretention area as plans						21. Stabilisation immediately following earthworks and planting of terrestrial landscape around basin					
8. Confirm surrounding soil type with design						22. Silt fences and traffic control in place					
9. Confirm filter media specification in accordance with Step 4						23. Temporary protection layers in place					
9. Provision of liner (if required)											
10. Under-drainage installed as designed						C. OPERATIONAL ESTABLISHMENT					
11. Drainage layer media as designed						24. Temporary protection layers and associated silt removed					
12. Transition layer media as designed (if required)						Vegetation					
14. Extended detention depth as designed						25. Planting as designed (species and densities)					
						26. Weed removal and watering as required					
FINAL INSPECTION											
1. Confirm levels of inlets and outlets						6. Check for uneven settling of banks					
2. Confirm structural element sizes						7. Under-drainage working					
3. Check batter slopes						8. Inflow systems working					
4. Vegetation as designed						9. Maintenance access provided					
5. Bioretention filter media surface flat and free of clogging											
COMMENTS ON INSPECTION											
ACTIONS REQUIRED											
Inspection officer signature:											

BIORETENTION BASIN MAINTENANCE CHECKLIST			
Inspection Frequency:	1 to 6 monthly	Date of Visit:	
Location:			
Description:			
Asset I.D.			
Site Visit by:			
INSPECTION ITEMS:	Y	N	Action Required (details)
Sediment accumulation at inflow points?			
Litter within basin?			
Erosion at inlet or other key structures?			
Traffic damage present?			
Evidence of dumping (e.g. building waste)?			
Vegetation condition satisfactory (density, weeds etc)?			
Watering of vegetation required?			
Replanting required?			
Mowing/slashing required?			
Clogging of drainage points (sediment or debris)?			
Evidence of ponding?			
Damage/vandalism to structures present?			
Surface clogging visible?			
Drainage system inspected?			
Resetting of system required?			
COMMENTS			

BIORETENTION BASIN ASSET TRANSFER CHECKLIST		
Asset I.D.		
Asset Location:		
Construction by:		
'On-maintenance' Period:		
TREATMENT	Y	N
System appears to be working as designed visually?		
No obvious signs of under-performance?		
MAINTENANCE	Y	N
Maintenance plans and indicative maintenance costs provided for each asset?		
Vegetation establishment period completed (2 years)?		
Inspection and maintenance undertaken as per maintenance plan?		
Inspection and maintenance forms provided?		
ASSET INSPECTED FOR DEFECTS AND/OR MAINTENANCE ISSUES AT TIME OF ASSET TRANSFER	Y	N
Sediment accumulation at inflow points?		
Litter within basin?		
Erosion at inlet or other key structures?		
Traffic damage present?		
Evidence of dumping (e.g. building waste)?		
Vegetation condition satisfactory (density, weeds etc)?		
Watering of vegetation required?		
Replanting required?		
Mowing/slashing required?		
Clogging of drainage points (sediment or debris)?		
Evidence of ponding?		
Damage/vandalism to structures present?		
Surface clogging visible?		
Drainage system inspected?		
COMMENTS/ACTIONS REQUIRED FOR ASSET TRANSFER		
ASSET INFORMATION	Y	N
Design Assessment Checklist provided?		
As constructed plans provided?		
Copies of all required permits (both construction and operational) submitted?		
Proprietary information provided (if applicable)?		
Digital files (e.g. drawings, survey, models) provided?		
Asset listed on asset register or database?		

APPENDIX E

GROSS POLLUTANT TRAP PRODUCT INFORMATION

CDS® UNIT TECHNICAL SUMMARY

CAPABILITIES

The CDS® Unit is the most awarded stormwater treatment device. CDS® pioneered the first gross pollutant trap in Australia in 1995 and since then the vast amount of validation and testing performed in Australia and overseas has led to both local and international leadership. Rocla Water Quality has a highly skilled design team devoted to improving stormwater quality. This dedication has made the CDS® Gross Pollutant Trap (GPT) the most efficient, cost effective and easy to clean GPT on the market.

Some the key parameters of the CDS® Units are summarised below;

Features	Benefits
<i>Continuously Deflective Screen</i>	- This insures the screen does not block. - Screens don't require cleaning or maintenance.
<i>Vortex force</i>	- The vortex aids the screen cleaning and draws the waste into the centre and down to the storage sump away from the treatment area.
<i>Screening Chamber</i>	- The sheer plane created by the screen between the vortex flow action keeps the screen clear of trapped pollution to ensure continuous and max treatment performance. - The flow regime in the screening chamber avoids re-suspension and wash-outs of stored pollutants.
<i>Optional Maintenance Procedures</i>	- Can be fully isolated from flow. - Doesn't require confined space entry. - Choice of the most effective cleaning process for the application.
<i>Fixed weir</i>	- Guarantees maximum treatment flow is diverted into screening chamber including all neutrally buoyant material.
<i>Design Service</i>	- Life cycle cost analysis. - Installation supervision. - Stormwater quality assessment. - Complete hydraulic assessment.
<i>Continuous field validation.</i>	- Provide design information for industry on the ability of CDS® Units to meet the latest developments and future demands in stormwater quality.
<i>Design Flexibility</i>	- Can customise designs to suit most applications.
<i>Off-line storage</i>	- Does not allow stored waste to be re-suspended. - Keeps the storage area isolated from the screening area, allowing for continuous and maximum treatment.

TECHNOLOGY

The CDS® Unit utilises the energy of the inflow to create a vortex flow regime within the CDS® screening chamber.

The stormwater inflow is introduced tangentially to the screening chamber via a customised inlet chute. The vortex motion within the screen chamber provides a continuous circular flow that directs the pollutants away from the screen towards the centre. This low energy zone is where most of the pollutants lose buoyancy and sink into the storage sump below.

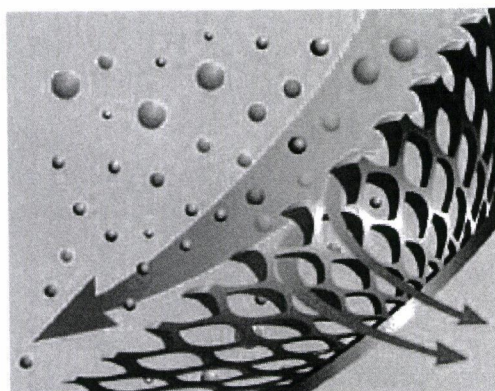


Figure 1: CDS® Unit deflective screen operation

The specially designed deflective screen shields the apertures from the pollution in rotational flow, which improves treatment operation and performance efficiency (as shown in Figure 1). The screen design along with the tangential flow and vortex forces provides all the benefits of a vortex separator and a physical filter without their limitations.

The CDS® Unit simply creates a whirlpool that draws all the deflected and settling pollutants to the centre of the screening chamber where they fall out into the storage sump below.

The pollutant storage sump located below the screening chamber allows pollutants to be removed from the flow path and away from the screens, thus maintaining a reliable treatment efficiency.

The unique CDS® technology is the most reliable way to effectively and efficiently treat gross pollutants in stormwater drainage systems.

FEATURES

The standard CDS® Unit design incorporates the key features shown in Figure 2.

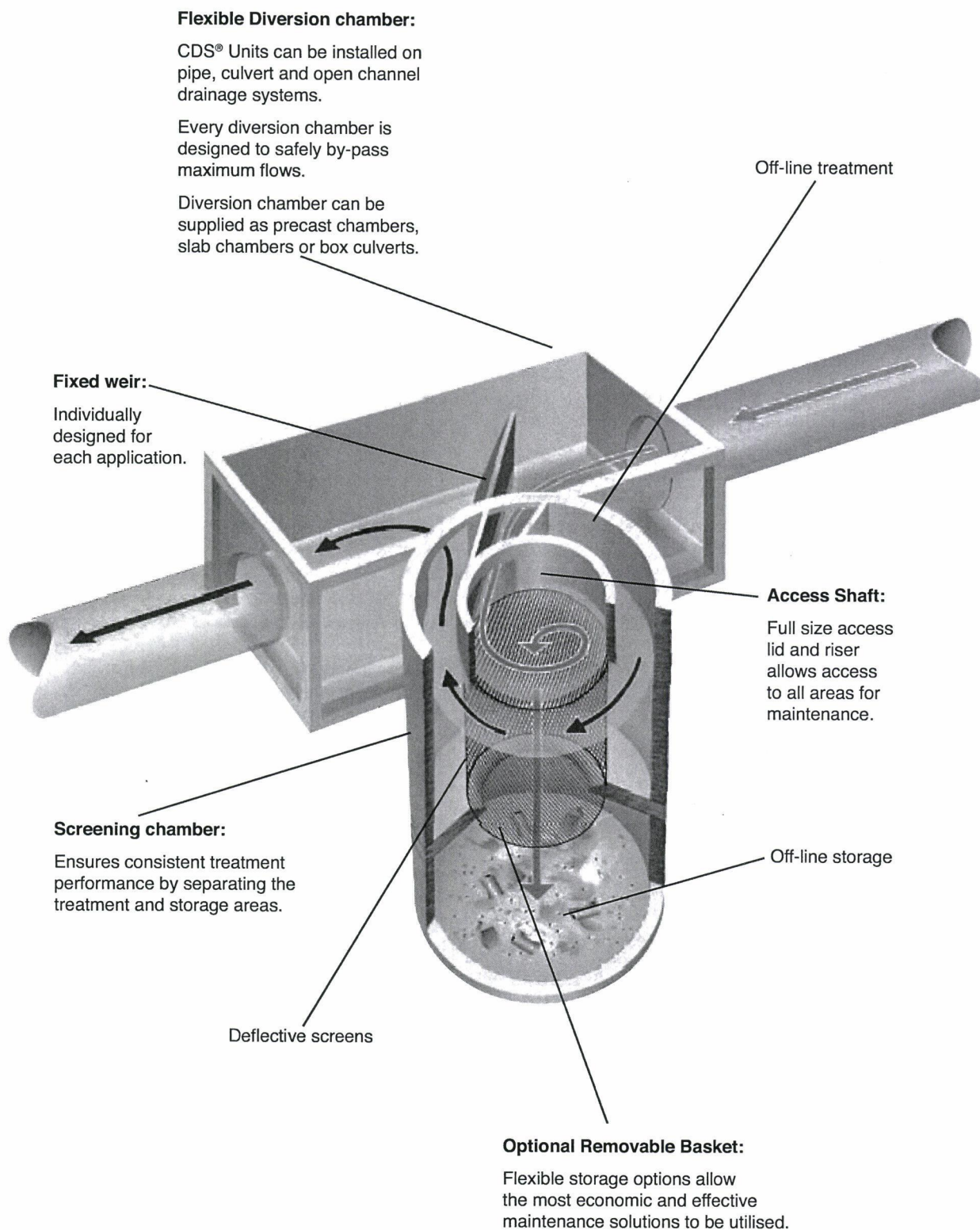


Figure 2: Key features of CDS® Units

CDS® UNIT PERFORMANCE

Since the inception of CDS® Units, performance has been the highest design imperative. The performance of CDS® Units has been an integral part of shaping stormwater quality standards worldwide. CDS® Units confidently achieve stormwater quality benchmarks even when markets can be focused on less important aspects of stormwater treatment. CDS® Units provide asset owners a high level of trust in stormwater treatment effectiveness and reliability. They can consistently achieve the following stormwater quality parameters:

CAPTURE EFFICIENCY

The screens in a standard CDS® Unit have a 4.7mm aperture, however, due to the deflection nature plus the vortex motion, 95% of material down to 1mm is captured. Although CDS® Units are designed as GPTs it is common to capture high volumes of particles less than 1mm as well. The specific pollutant groups targeted by a CDS® Unit are described following:

Gross pollutants (>5mm)

As per Allison 1996, "Field monitoring suggests that CDS® Units are efficient gross pollutant traps. During the 12 months of monitoring, practically all gross pollutants transported by the stormwater were trapped by the CDS® device".

As per CRCCH 1999 "The CDS® Unit can remove nearly all gross pollutants and a significant proportion of finer pollutants, particularly during storms".

As per CSIRO 1999: Circular Screens (CDS®) were the only category (device) to rate a Very High performance of over 90%. All other devices failed to meet this standard.

Fine particles

As per Portland State University 2002: "the experimental results show that the CDS® Unit generally removed over 95% of particles greater than 215 microns with screen apertures of both 2400microns and 4700 microns."

As per Sansalone Summary 2004: "the CDS® Unit was trapping over 90% of particles down to 75 microns." Also, capture of this particle size range was noted to contain approximately 80% of the heavy metals.

Suspended solids (excluding everything >1mm)

The common definition of Total Suspended Solids (TSS) excludes particles greater than 1mm. In accordance with this, TSS removal rates of CDS® Units exclude gross pollutants, organics, coarse sediment and any particles greater than 1mm. But most importantly the TSS removal rates of CDS® Units have been consistently field validated.

As per Sansalone Summary 2004: there was a notable net removal of particles less than

75 microns by the CDS® Unit. NJCAT removal of 49% TSS (better than any other GPT).

As per CRCCH 1999: "The CDS® trap removes a considerable amount of TSS above background concentrations during storm events, with a mean removal efficiency of approximately 70%".

As per Brevard County 1997: "Monitoring has shown the CDS® Unit has provided an average 52% removal efficiency for total suspended solids".

It is worth noting that devices which store Total Suspended Solids (TSS) in the treatment chamber are highly susceptible to re-suspension and loss.

Nutrients (Phosphorus)

Nutrient removal rates of CDS® Units show a correlation with sediment removal. Independent validation shows insoluble nutrient forms such as Phosphorous (P) are also reliably captured.

As per Brevard County 1997: "Monitoring has shown the CDS® Unit has provided.... 31% removal efficiency for phosphorus".

CRCCH 1999: "The CDS®... consistently retains TP, thought to be because P is in particulate form, with a mean removal efficiency of approximately 30%".

Sansalone Summary 2004: "There was a nett positive removal for TP for all events, with an averaged removal of over 30%".

Oil grease retention

As with nutrient capture there is also a high correlation of oils and grease removal with sediment capture in CDS® Units.

UCLA have reported 50-80% of oil and grease may be attached to sediments.

Hoffman 1982: "Our data confirm the observations of the workers in that hydrocarbons are primarily associated with particulate material (83 – 93%)".

CRCCH 1999: "Colwill found 70% of oil and approximately 85% PAH to be associated with solids in stormwater. That study subsequently demonstrated that over a period of dry weather conditions, increasing concentrations of oil become associated with particulates with the highest oil content found in the sediment range of 200µm to 400µm.

CSIRO 1999: In the category of "attached pollutants" CDS® Units were the only GPT device to even be considered capable of capturing anything.

CDS® Units can also capture free floating oil spills. However, when most of the oil is associated with fine particulates and sediments, CDS® Units remove very high levels of oils and greases due to their very high capture rate of those fine particles. Further information on oil removal can be provided upon request.

CAPTURE PERFORMANCE SUMMARY

A summary of the CDS® Unit performance parameters is outlined in Table 1 below;

Pollutant / Items	Removal Efficiency	Independent Reference Source
Suspended Solids (TSS)	70 %	CRCCH Report 99/2 Feb 1999
Total Phosphorous (TP)	30 %	CRCCH Report 99/2 Feb 1999
Total Nitrogen (TN)	0 %	Scattered results
Gross Pollutants (>5mm)	98 %	CRCCH Report 98/3 Apr 1998
Sediments>0.215mm	95 %	Portland State Uni, Oregon Oct 02
Fine sediment> 75 microns	90 %	Louisiana State University 2004
Heavy Metals	80 %	Louisiana State University 2004
Hydrocarbons, Oils & Grease	82-94 %	UCLA Report 1998

Table 1: CDS® Unit performance summary

ENVIRONMENTAL IMPACT

Anaerobic breakdown is a natural process involving the decay of organic material in drainage pipe systems. However, conventional treatment design practice prefers this process to occur in the CDS® Unit rather than the downstream drainage system. This way the decaying pollution can be more cost effectively controlled and removed from the stormwater system.

Dry sump treatment options do not remove the silts and finer sediments that contain higher stormwater contaminant loads. Therefore these treatment options do not contain the decaying process of these more volatile stormwater contaminants resulting in a less cost effective pollution removal and less environmental benefits.

The ability of the CDS® Unit to remove both coarse and fine organic material results in much better environmental and more cost-effective pollution removal gains.

The volume of a wet sump GPT is very minor in comparison to the volume of water in any one storm event. This means that together with the dilution and aeration of water in the GPT during a storm event the impact of water on a receiving stream would typically not even be measurable. Furthermore the odour generating potential of stormwater is minimal and no odour can be detected outside the CDS® Unit under normal conditions. More information on this subject can be provided upon request.

HYDRAULIC IMPEDANCE (HEAD LOSS)

Rocla Water Quality can provide hydraulic assessment for each project in order to ensure the hydraulic grade line (HGL) remains below ground level for the design storm event. If the HGL is determined to be approaching surface level, multiple options to avoid or minimise this situation are available. The worst case headloss condition is always used in hydraulic assessments of CDS® Units. The worst case K factor of a CDS® Unit is 1.3, which is equally the lowest validated K factor for a stormwater treatment device.

INDEPENDENT (MOSTLY UNSOLICITED) TESTING AND VALIDATION STUDIES OF CDS® UNITS HAVE BEEN PERFORMED BY:

- Allison, 1996
- Wong, 1997
- Brevard County, 1997
- Water Resources Management, 2003
- Cooperative Research Centre for Catchment Hydrology, 1999
- Monash University,
- Portland University, 2002
- Louisiana State University, 2004
- University of California LA
- University of NSW
- NSW Environment Protection Authority, 1997
- Willoughby Council
- Brisbane City Council
- Thiess Environmental Services

Full copies of any of the reports mentioned above are available upon request.

CDS® DESIGN

DESIGN PRINCIPLE

The design of a CDS® Unit for a specific catchment involves numerous parameters and is generally divided into two main steps. The first step in determining the suitability of a specific CDS® model is to consider the catchment and pollution load and the second is a hydraulic assessment.

STEP 1: Catchment Parameters and pollution load

The first step includes considering the following parameters:

- Catchment area;
- Site location and depth to invert;
- Tidal influence or other backwater influence;
- Treatable flow and its relation to the volumetric treatment efficiency;
- Target pollutants and land use;
- Treatment performance;
- Expected pollution loads; and
- Storage volume to minimise lifecycle costs.

Sometimes these parameters have competing project priorities and compromises are required. The CDS® Unit design can account for these and still provide high quality quantifiable treatment outcomes.

However, the CDS® Unit is generally sized on a flow volume basis, therefore the design aim is to treat a sufficient volume of the annual flow and remove a sufficient amount of pollution to meet a project's requirements.

The flow volume is based on the CDS® Unit having a reliable treatment flowrate which in turn means that the CDS® Unit will treat this flowrate in all events. The flowrate can be relied upon because of the Non-blocking functionality of the CDS® screen and the separate treatment/storage zones which provides the ability to treat runoff continuously. Thereby ensuring the stated pollution load is removed from the drainage system.

The patented CDS® Unit offers the most reliable treatable flowrate of any GPT because of these two unique design features. Very high volumetric treatment efficiencies are maintained consistently by lowering the likelihood of blockages as well as treating and storing stormwater pollutants in separate zones.

When using MUSIC modeling the treatment efficiencies of the CDS® Unit provides the highest integrity and most reliable design for stormwater quality treatment. Therefore no safety factors need to be applied to CDS® Unit treatment performance data shown in Table 1.

STEP 2: Hydraulic Analysis

Once a suitable CDS® model has been chosen for the catchment, step two is undertaken, the hydraulic analysis. This step determines whether the CDS® model chosen based on catchment and pollution characteristics will suit the hydraulic capacity of the drainage system. This step will also determine the most suitable position of the CDS® Unit.

Due to the headlosses involved with treating stormwater through any GPT, a weir needs to be installed in the drainage system to divert flow and maintain an energy level difference between the upstream and downstream side of the treatment device. Hydraulic weirs and floating weirs do not provide reliable flow diversion, therefore Rocla Water Quality prefer fixed weirs as best practice.

The hydraulic analysis takes the following important hydraulic parameters into consideration:

- The existing capacity of the drainage system (either closed or open system);
- Physical parameters of existing drainage system such as pipe or channel size and grade etc;
- Tidal influence or other backwater influence;
- Design flow of the system (Q20 or similar);
- Flow velocity;
- Flooding at the site; and
- Other site constraints or opportunities such as multiple pipes, drops, bends or multiple outlets for stormwater harvesting.

Rocla Water Quality uses a variety of design tools to determine the impact on the chosen site of any proposed CDS® Unit. The tool chosen will depend on the drainage system characteristics such as whether or not the system is open or closed and the geometry of the system.

Generally, Manning's equation is used to determine the capacity of the system if sufficient information on drainage geometry and grade is available. In open channel systems, HEC-RAS can be used to determine hydraulic capacity if sufficient information is available to create a reliable model.

The CDS® Unit diversion weir chamber and weir can function in three general ways, these are:

1. Free weir
2. Submerged weir
3. Orifice

It should be noted that Rocla Water Quality utilises the most conservative approach when calculating the depth of water flow over a weir. Sound hydraulic theory and analysis is used to assess proposed CDS® Unit installations on drainage systems. This ensures that it has been designed with sufficient bypass for the capacity or other nominated design events at the location of the weir.

Rocla Water Quality also has the option of using a lower weir with a twin unit arrangement, drop weirs, collapsible weirs, super collapsible weirs, and flume weirs. Where possible the use of moving parts such as a collapsible weir is avoided. Rocla Water Quality do not use hydraulic weirs or weirs incorporating assumptions on kinetic energy since these have proved false and unreliable in the field.

The diversion chamber design assumes that the CDS® Unit has not been maintained and that all flow must divert over the weir. This is the worst case design condition and this K factor of 1.3 for the CDS® Unit is one of the lowest available.

CONSTRAINTS

For any given site, the opportunity to treat the stormwater could be limited by a number of factors, these include:

- Site hydraulics
- Velocity impact
- Tidal or backwater levels
- Access for construction, and/or ongoing maintenance
- Geotechnical considerations such as rock, water or acid sulphate soils
- Physical obstacles such as property boundaries, roads, services, etc
- Budgetary limitations

When any of these factors are prevalent, Rocla Water Quality has more options and solutions than any other proprietor, and always consults with the Designer to find a solution. This can commonly require some compromises, but ultimately it will offer the most cost effective solution for any given site. It is often recommended to visit proposed GPT sites to canvas all available options in consultation with clients.

Following is a list of the more common CDS® Unit design options available;

- Multiple pipe configurations
- Bends and drops
- Various weir options (as per above)
- Extended inlets
- Tidal units with dual inlets
- Stormwater harvesting units with dual outlets
- Pump-down units (dry trap)
- Ex-filtration units (dry trap)
- Sump options (width and depth)
- Baskets
- Screen sizes
- Oil baffle volumes
- Multiple lid options
- Low flow polishing device (upflow media filter at CDS® Unit outlet)
- Multiple cleaning options

- Incorporation of penstocks and drop boards
- Exclusion bars
- Multiple CDS® Unit arrangements

DESIGN CERTIFICATION

CDS® Units have no moving parts, and are manufactured from tough corrosion resistant materials.

A operational life of 50 years for the 316 grade stainless steel and 80 years for the concrete could be expected under standard operating conditions.

The pre-cast concrete components of CDS® Units comply generally with the following Australian Standards, where relevant:

- **AS3600-2001** Concrete structures
- **AS3725-1989** Loads on buried pipes
- **AS3996-1992** Metal access covers, road grates and frames
- **AS4058-1992** Precast concrete pipes (pressure and non-pressure)
- **AS5100.2-2004** Bridge design, Part 2: Design Loads
- **AS5056-2005** Polyethylene and polypropylene pipes and fittings for drainage and sewer applications.

By following these Australian Standards requirements structural integrity is ensured. Additionally, CDS® Units are not affected by ground water buoyancy effects.

Rocla Water Quality have extensive technical resources supporting the CDS® Unit product range. Each model is supplied with a technical drawing including weights and dimensions, or a site specific design usually encompassing a set of drawings, and we provide a comprehensive installation instruction and maintenance manual for each unit. Standard CDS® Unit drawings are available upon request.

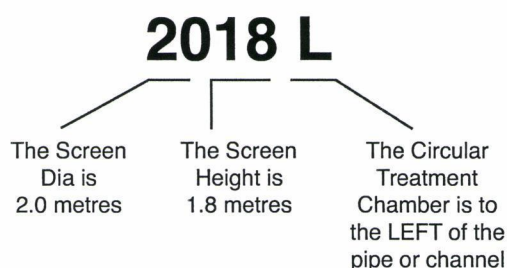
CDS® Units can be modified to suit applications. Sump storage sizes are listed on technical drawings. Penstocks, dewatering options, baskets and a variety of diversion options are available on request to suit virtually any application. These modifications are designed by the Rocla Water Quality design staff to ensure peak hydraulic performance, maximum maintenance and cleaning periods and flood risk elimination.

CDS® UNITS INSTALLATION

This information is provided as general guidance to assist with the installation of CDS® Unit Gross Pollutant Traps.

It is the purchaser's responsibility to ensure that installation work is carried out by competent tradespeople in accordance with all relevant drawings, codes of practise, legislation and regulations.

MODEL IDENTIFICATION



Check that the CDS® Unit model supplied is that which is specified on the project drawing and that the relevant Rocla Water Quality Operation and Maintenance manual has been provided.

INSTALLATION SUMMARY

CDS® Unit models generally consist of two main sections, the Diversion Chamber which is on line (in relation to the drainage system), and the treatment device which is off line and situated to one side of the diversion chamber.

However, for the P0506, P0708 and P0708 MAXI CDS® Unit models the diversion chamber is an integral part of the CDS® device. Hence there is only one section for these models.

When provided, the diversion chamber may be configured in several different ways for which there are separate guides. The customer should refer to the specific project drawings provided for detailed advice on these options.

The following is a general outline of the construction procedures and relevant reference literature;

ORDER	WORK PROCEDURE	REFERENCE
1	Site works and set out	CDS® Unit Model Operation & Maintenance manual
2	Excavate for CDS® Unit	
3	Construct CDS® Unit	
4	Fitting out	
5	Excavate for diversion chamber	Diversion Chamber Guide
6	Construct diversion chamber	
7	Backfilling and lids	Both Guides
8	Waste Removal Basket (if fitted)	Basket Guide

Ensure that all of the required reference manuals and guides are provided and understood before installation is commenced.

TYPICAL COMPONENTS

Diversion Chamber

The type of diversion chamber used will vary with the type of drainage system.

Typically a pre-cast diversion chamber is supplied. However slab chambers may be supplied or an in-situ option specified for the diversion chamber. Therefore refer to the specific project drawing to ensure that all the relevant manuals have been supplied.

Typical precast components for CDS® Unit models (not including diversion chamber) are as follows:

- Sump
- Shear Cone
- Lower Separation Chamber
- Upper Separation Chamber
- Top Hat
- "L" shaped Outlet Wall

Additional pre-cast concrete items that may be required include:

- Access shaft risers (One or more of varying length may be supplied depending on depth required)
- Prefabricated Screen cage

Assembly aids which also may be required and are delivered on a pallet include:

- Fibreglass Inlet Chute
- "H" brackets for assembling major components
- Right Angle Brackets for fixing the access riser
- Angle brackets for fixing screen cage to shear cone
- Bolts and Dynabolts for all the above
- Assorted sealants as required
- Fish plate brackets

CDS® UNITS MAINTENANCE

Whilst the frequency of cleaning will be dependant upon the pollutant loads of each catchment, there are three alternative methods of removing the collected waste from CDS® Units.

The following methods of cleaning can be used individually on any CDS® Unit, even well after installation.

This is a very significant feature that allows asset owners to choose the cheapest option available for ongoing maintenance given the required cleaning frequency and the respective cleaning services and resources available.

The three maintenance options available are described following:

1. MECHANICAL GRAB CLEANING

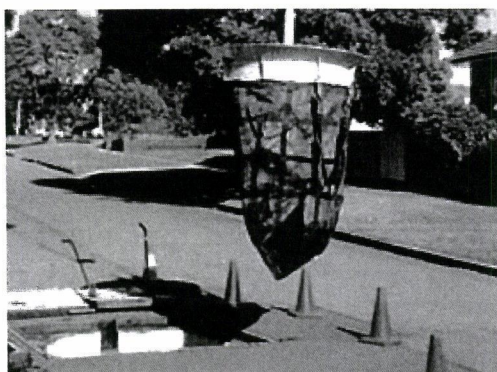
Cleaning by grab can be carried out without dewatering the unit and is a single person operation in most locations.

This results in a cleaning technique which is generally faster, cheaper and safer. It also allows a visible inspection of the pollution that was captured, as opposed to suction that doesn't. No physical entry is required.



2. BASKET REMOVAL CLEANING

If a waste removal basket is fitted, it can be lifted at any time, without the need for dewatering. Also it provides a safe and cost effective method of cleaning. The cost benefit of this option depends on the CDS® Unit design and on waste disposal requirements. No physical entry is required.



3. SUCTION CLEANING

Due to the dewatering time, costs and disposal of the water, suction cleaning is generally the most expensive cleaning option. However by taking advantage of the large sump volumes available in CDS® Units, it may still be a very cost effective maintenance option.



Suction cleaning is used for most proprietary GPT's. Even if a more cost effective method is used at shorter intervals, suction cleaning is recommended for CDS® Units at one to two year intervals so that a thorough inspection of the screen and lower chambers can be carried out. Physical entry may or may not be required.

Normally a CDS® Unit would be sized with an appropriate sump volume to allow cleaning 3 or 4 times per year. These maintenance cleans would be carried out either by using a basket or a grab, with a single comprehensive clean per year completed by suction.

The best option for any particular unit will depend on tidal or backwater impact, pollution load and cleaning frequency as well as access and disposal costs for pump-down water.

CDS® Units may sometimes be required to use penstocks to isolate the unit during maintenance operations. This would be essential where a unit is affected by backwater and/or high levels of tidal inundation.

The main benefit of removable baskets is their speed and ease of cleaning, particularly in tidal zones. But the storage basket must be smaller than the screen to allow its removal. As such, the volume in a basket will be less than that of a large sump CDS® Unit volume.

Consequently, whilst it may be cheaper, cleaning removable baskets might also be required 4 or 5 times more often.

For larger CDS® Units, the grab truck cleaning option offers the removal of 80 – 90% of the pollution stored in a sump and is subjected to similar constraints as the removable basket option.

When considering GPT maintenance costs and procedures, the three maintenance options of CDS® Units offer greater operational flexibility and low life-cycle cost considerations.

More general GPT maintenance decision methodology information is available in the CDS® Unit Operation and Maintenance manuals or upon request.

Project Information Inputs

Project Information

Project Name : Stapylton Gold Coast City Council - Jacobs Well Rd

Project Reference : RWQ12124.01

Project Type : Industrial

Project Description :

catchment area: 11.561Ha

Consultant / Company Information

Company Name : Rocla Water Quality

User Name : LT

Email : www.rocla.com.au

Phone : 131004

Fax :

Sizing Inputs and Flow Calculator

Project Name : Stapylton Gold Coast City Council - Jacobs Well Rd

Project Reference : RWQ12124.01

Sizing Inputs

Total Catchment Area : 11.561 (Ha)

Rainfall Duration : 20 1 0
(Mins.) (Hrs.)

Tc Calculated : 20 (Mins.)

1 Year ARI Rainfall : 69.7 (mm/hr)

5 Year ARI Rainfall : 108 (mm/hr)

10 Year Run off Coeff. : 0.7

Event Volumetric Treatment Efficiencies

ARI Type	Flow	Volumetric Treatment Efficiency
3 Months	0.486	97
	(m ³ / sec)	(%)

Maintenance Inputs & Pollutant Calculator

Project Name : .Stapylton Gold Coast City Council - Jacobs Well Rd .

Project Reference : .RWQ12124.01 .

Maintenance Inputs

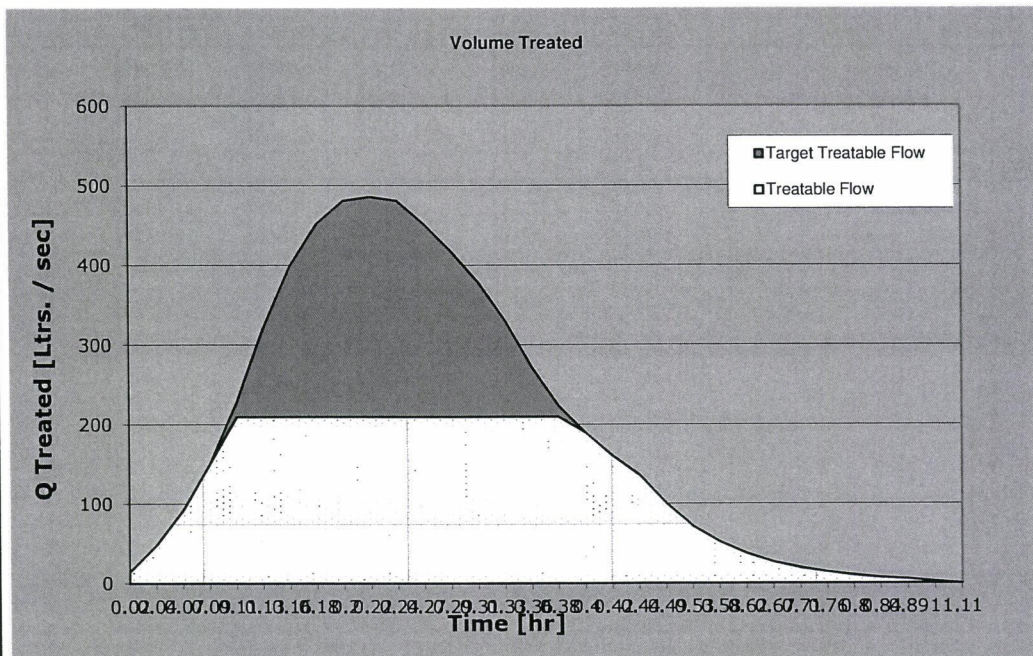
	Area (Ha)	Gr. Poll.	TSS	Ph	Ni	Total
Impervious Area (Totals)	9.249	924.9	5062.286	50.8695	533.359	6571.415
Roofs	3.083	308.3	397.707	4.0079	46.245	756.2599
Paving	3.083	308.3	1412.014	14.1818	147.984	1882.4798
Roads	3.083	308.3	3252.565	32.6798	339.13	3932.6748
Pervious Area (Totals)	2.312	231.2	1329.4	13.4096	154.5572	1728.567
Lawns	1.156	115.6	404.6	4.046	47.0492	571.2952
Open Space	1.156	115.6	924.8	9.3636	107.508	1157.2716
Totals (kg/annum)		1156.1	6,392	64	688	8300.1
Totals (m3/annum)		4.6244	2.41	0.04	0.85	7.9244
Total Area (Ha)	11.561					

Pollutant Runoff Estimates

Catchment runoff pollutant estimates	%	kg / annum	m ³ / annum
Total Gross Pollutant Load (> 5mm)	100	1156	4.62
Total TSS Load from Catchment	100	6392	2.41
Total Phosphorous (particulate)	100	64	0.04
Total Nitrogen (particulate)	100	688	0.85

Product Selection and Results

Project Name : Stapylton Gold Coast City Council - Jacobs Well Rd
Project Reference : RWQ12124.01
CDS Model Selected: 1015 **No. of Filternators Selected:** 0



SWATT Pollutant Removal Results	%	kg / annum	m ³ / annum
TSS (d50 = 106µm) by CDS:	40.9	2617	0.99
TSS (d50 = 20µm) by CDS:	36.1	2308	0.87
TSS (d50 = 20µm) by Filternator:	0	0	0
Total TSS (d50 = 20µm) removed:	36.1	2308	0.87
GP (>5mm) by CDS :	70.7	793	3.17
Total GP (>5mm) removed:	70.7	793	3.17
Phosphorous by CDS:	21.7	11	0.01
Phosphorous by Filternator:	0	0	0
Total Phosphorous removed:	21.7	11	0.01
Maintenance Requirements			
Estimated Cleans / year [CDS Unit]	1		
Estimated Cleans / year [Filternator]	0		

Project Information Inputs

Project Information	
Project Name :	Stapylton Gold Coast City Council - Debortoli Rd
Project Reference :	RWQ12124.01
Project Type :	Industrial
Project Description :	
catchment area: 0.812Ha	

Consultant / Company Information	
Company Name :	Rocla Water Quality
User Name :	LT
Email :	www.rocla.com.au
Phone :	131004
Fax :	

Sizing Inputs and Flow Calculator

Project Name : Stapylton Gold Coast City Council - Debortoli Rd

Project Reference : RWQ12124.01

Sizing Inputs

Total Catchment Area : 0.812 (Ha)

Rainfall Duration : 6 (Mins.) 1 (Hrs.) 0

Tc Calculated : 7 (Mins.)

1 Year ARI Rainfall : 116 (mm/hr)

5 Year ARI Rainfall : 179 (mm/hr)

10 Year Run off Coeff. : 0.7

Event Volumetric Treatment Efficiencies

ARI Type	Flow	Volumetric Treatment Efficiency
3 Months	0.073 (m ³ / sec.)	97 (%)

Maintenance Inputs & Pollutant Calculator

Project Name : .Stapylton Gold Coast City Council - Debortoli Rd .

Project Reference : .RWQ12124.01 .

Maintenance Inputs

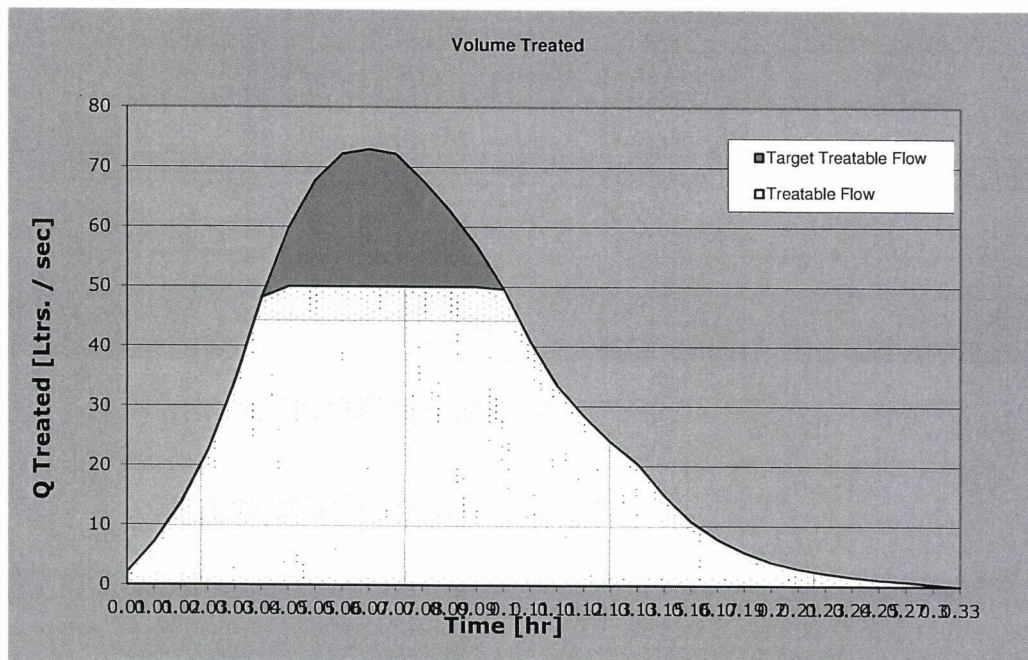
	Area (Ha)	Gr. Poll.	TSS	Ph	Ni	Total
Impervious Area (Totals)	0.5684	56.84	311.1461	3.12662	32.782	403.8947
Roofs	0.1894	18.94	24.4326	0.24622	2.841	46.45982
Paving	0.1895	18.95	86.791	0.8717	9.096	115.7087
Roads	0.1895	18.95	199.9225	2.0087	20.845	241.7262
Pervious Area (Totals)	0.2436	24.36	140.07	1.41288	16.28466	182.1275
Lawns	0.1218	12.18	42.63	0.4263	4.95726	60.19356
Open Space	0.1218	12.18	97.44	0.98658	11.3274	121.93398
Totals (kg/annum)		81.2	451	5	49	586.2
Totals (m3/annum)		0.3248	0.17	0	0.06	0.5548
Total Area (Ha)	0.812					

Pollutant Runoff Estimates

Catchment runoff pollutant estimates	%	kg / annum	m ³ / annum
Total Gross Pollutant Load (> 5mm)	100	81	0.32
Total TSS Load from Catchment	100	451	0.17
Total Phosphorous (particulate)	100	5	0
Total Nitrogen (particulate)	100	49	0.06

Product Selection and Results

Project Name : Stapylton Gold Coast City Council - Debortoli Rd
Project Reference : RWQ12124.01
CDS Model Selected: 0708 **No. of Filternators Selected:** 0



SWATT Pollutant Removal Results		%	kg / annum	m ³ / annum
TSS (d50 = 106µm) by CDS:		57	257	0.1
TSS (d50 = 20µm) by CDS:		50.3	227	0.09
TSS (d50 = 20µm) by Filternator:		0	0	0
Total TSS (d50 = 20µm) removed:		50.3	227	0.09
GP (>5mm) by CDS :		86.7	68	0.27
Total GP (>5mm) removed:		86.7	68	0.27
Phosphorous by CDS:		30	1	0
Phosphorous by Filternator:		0	0	0
Total Phosphorous removed:		30	1	0
Maintenance Requirements				
Estimated Cleans / year [CDS Unit]		0		
Estimated Cleans / year [Filternator]		0		

Attachment C

Regional Vegetation Management Code Assessment

Prepared by: Gassman Development Perspectives

Performance requirement	Acceptable solution	Proposed solution
PR P.1: Limits to clearing for public safety and infrastructure To regulate the clearing of vegetation in a way that conserves remnant vegetation that are regional ecosystems, does not cause land degradation, prevents the loss of biodiversity and maintains ecological processes—subject to the limitations required to meet PR P.2 to PR P.10—clearing is limited to the extent that is necessary— a) for establishing a necessary fence, firebreak, road or vehicular track, or for constructing necessary built infrastructure, if there is no suitable alternative site for the fence, firebreak, road, track or infrastructure; or b) as a natural and ordinary consequence of other assessable development for which a development approval as defined		PS P.1 Clearing of the majority of the site is required to facilitate the subdivision of the lots. A 50m ecological corridor will be retained and rehabilitated along the eastern boundary.

Performance requirement	Acceptable solution	Proposed solution
under the IPA was given, or a development application as defined under IPA was made, before 16 May 2003; or c) to ensure public safety.		
PR P.2: Wetlands To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes—<u>assessable vegetation</u> associated with any natural <u>significant wetland</u> and/or natural <u>wetland</u> is protected to maintain— a) water quality by filtering sediments, nutrients and other pollutants; and b) aquatic habitat; and c) terrestrial habitat.	AS P.2 P.2.1 Clearing does not occur— a) in any natural <u>wetland</u>; and b) within 100 metres from any natural <u>wetland</u>; and c) in any natural <u>significant wetland</u>; and d) within 200 metres from any natural <u>significant wetland</u>. AND P.2.2 Where clearing is for a <u>significant community project</u>, maintain the current extent of <u>assessable vegetation</u> associated with any natural <u>significant wetland</u> and/or natural <u>wetland</u> to provide— a) water quality by filtering sediments, nutrients and other pollutants; and b) aquatic habitat; and c) terrestrial habitat.	PS P.2 Clearing does not occur in any natural wetland. Clearing will occur no closer than 50m to Sandy Creek in the south of the subject site and stormwater management principles implemented in association with the proposed development will minimise the risk of compromised water quality or degradation of aquatic and terrestrial habitat. A 10m development-free zone will be added to the title at the rear of the lot to ensure that no further vegetation removal is required for fire management purposes. Only hardstand and car parking will be allowed in this area.
PR P.3: Watercourses To regulate the clearing of	AS P.3 P.3.1	PS P.3 Clearing will not occur within

Performance requirement	Acceptable solution	Proposed solution
vegetation in a way that does not cause land degradation, prevents the loss of biodiversity and maintains ecological processes—<u>assessable vegetation</u> associated with any <u>watercourse</u> is protected to maintain— a) bank stability by protecting against bank erosion; and b) water quality by filtering sediments, nutrients and other pollutants; and c) aquatic habitat; and d) terrestrial habitat.	Clearing does not occur— a) in any <u>watercourse</u>; and b) within 50 metres from each high bank of each <u>watercourse</u> with a <u>stream order</u> 5 or greater; and c) within 25 metres from each high bank of each <u>watercourse</u> with a <u>stream order</u> 3 or 4; and d) within 10 metres from each high bank of each <u>watercourse</u> with a <u>stream order</u> 1 or 2. AND P.3.2 Where clearing is for a <u>significant community project</u>, maintain the current extent of <u>assessable vegetation</u> associated with any <u>watercourse</u> to provide— a) bank stability by protecting against bank erosion; and b) water quality by filtering sediments, nutrients and other pollutants; and c) aquatic habitat; and d) terrestrial habitat.	10 metres of the high bank of Sandy Creek. A 50 metre buffer of vegetation measured from the centreline of Sandy Creek is being retained. The flows upstream of Sandy Creek are moderated by culverts underneath the Pacific Motorway and therefore the high bank of Sandy Creek is not liable to change.
PR P.4: Connectivity To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes—areas of <u>mapped remnant vegetation</u> are retained that are—	AS P.4 P.4.1 Where clearing is less than— a) 10 metres wide; or b) 2 hectares; clearing does not— i) reduce the width of <u>mapped remnant vegetation</u> to less than 100 metres; and	PS P.4 Proposed clearing will reduce the width of mapped remnant vegetation to less than 100m as the majority of vegetation currently on the subject site is proposed to be removed. However, the vegetation on

Performance requirement	Acceptable solution	Proposed solution
a) of sufficient size and configured in a way to maintain ecosystem functioning; and b) of sufficient size and configured in a way to remain in the landscape in spite of any threatening processes; and c) located on the lot(s) that are the subject of the application to maintain connectivity to <u>mapped remnant vegetation</u> on adjacent properties.	ii) occur where the width of <u>mapped remnant vegetation</u> is less than 100 metres; AND P.4.2 Clearing does not— a) reduce areas of contiguous <u>mapped remnant vegetation</u> to less than 10 hectares; and b) occur in areas of contiguous <u>mapped remnant vegetation</u> that are less than 10 hectares; and c) reduce the width of <u>mapped remnant vegetation</u> to less than 100 metres; and d) occur where the width of <u>mapped remnant vegetation</u> is less than 100 metres; and e) reduce the total extent of <u>mapped remnant vegetation</u> to less than 30%; and f) occur where the total extent of <u>mapped remnant vegetation</u> is less than 30%. AND P.4.3 Where clearing is for a <u>significant community project</u>, <u>maintain the current extent of mapped remnant vegetation</u> where the vegetation is— a) of sufficient size and configured in a way to maintain ecosystem functioning; and b) of sufficient size and configured in a way to	the subject site is currently largely disconnected from adjacent remnant vegetation and a 50m wide ecological corridor will be retained and rehabilitated along the western boundary. Clearing on land south of Christensen Road South will also reduce the width of mapped remnant vegetation to less than 100 metres and partially occurs in an area where remnant vegetation is less than 100 metres wide. Edge effects will be minimised by the use of native and endemic landscape plantings at the rear of the lot south of Christensen Road South.

Performance requirement	Acceptable solution	Proposed solution
	remain in the landscape in spite of any threatening processes; and c) located on the lot(s) that are the subject of the application to maintain connectivity to <u>mapped remnant vegetation</u> on adjacent properties.	
PR P.5: Soil erosion To regulate the clearing of vegetation in a way that does not cause land degradation and maintains ecological processes—the effect of clearing does not result in— a) <u>mass movement</u>, <u>gully erosion</u>, <u>rill erosion</u>, <u>sheet erosion</u>, tunnel erosion, stream bank erosion, <u>wind erosion</u>, or <u>scalding</u>; and b) any associated loss of chemical, physical or biological fertility—including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients, within and/or outside the lot(s) that are the subject of the application.	AS P.5 P.5.1 <u>Mechanical clearing</u> only occurs on— a) <u>very stable soils</u> on a <u>slope</u> less than 30%; and b) <u>stable soils</u> on a <u>slope</u> less than 20%; and c) <u>unstable soils</u> on a <u>slope</u> less than 15%; and d) <u>very unstable soils</u> on a <u>slope</u> less than 10%.	PS P.5 Mechanical clearing will only occur on slopes less than 20%, and the soils under the area of works are all described as stable.
PR P.6: Salinity To regulate the clearing of vegetation in a way that does not cause land degradation and maintains ecological	AS P.6 P.6.1 Where clearing is less than— a) 2 hectares; or b) 10 metres wide;	PS P.6 Clearing does not occur in any <u>discharge area</u>.

Performance requirement	Acceptable solution	Proposed solution
processes—clearing does not contribute to— a) waterlogging; or b) the <u>salinisation</u> of <u>groundwater</u>, surface water or soil.	clearing does not occur in any <u>discharge area</u>. AND P.6.2 Where clearing is less than— a) 5 hectares; or b) 50 metres wide— clearing does not occur— i) in any <u>discharge area</u>; and ii) within 200 metres of any <u>discharge area</u>. AND P.6.3 Clearing does not occur in areas greater than 5 hectares	
PR P.7: Conserving remnant vegetation that are <i>endangered</i> regional ecosystems and of <i>concern</i> regional ecosystems To regulate the clearing of vegetation in a way that conserves remnant vegetation that are <i>endangered</i> regional ecosystems and of <i>concern</i> regional ecosystems—<u>maintain the current extent</u> of <i>endangered</i> regional ecosystems and of <i>concern</i> regional ecosystems.	AS P.7 P.7.1 Clearing— a) does not occur in an <i>endangered</i> regional ecosystem or an <i>of concern</i> regional ecosystem that is listed in Table 1; and b) in an <i>endangered</i> regional ecosystem or an <i>of concern</i> regional ecosystem that is not listed in Table 1 only occurs where the clearing is less than 10 metres wide or 0.5 hectares.	PS P.7 Clearing does not occur in any <i>endangered</i> or of <i>concern</i> regional ecosystems. Whilst an <i>of concern</i> regional ecosystem occurs in the vicinity of the clearing, groundtruthing has indicated that this RE occurs on the southern bank of Sandy Creek and not on the subject site. Only <i>least concern</i> vegetation will be impacted upon by the proposed development.
PR P.8: Essential habitat To regulate the clearing of vegetation	AS P.8 P.8.1	PS P.8 Clearing will occur in

Performance requirement	Acceptable solution	Proposed solution
in a way that prevents the loss of biodiversity— <u>maintain the current extent of essential habitat</u> .	Clearing does not occur in an area shown as <u>essential habitat</u> on the <u>essential habitat map</u> .	essential habitat mapped as containing <i>Phascolarctos cinereus</i> (Koala). However, due to the disconnected nature of the subject site it is not anticipated that the site is an important linkage for this species.
PR P.9: Conservation status thresholds To regulate the clearing of vegetation in a way that conserves remnant vegetation that are regional ecosystems and prevents the loss of biodiversity— <u>maintain the current extent of regional ecosystems</u> listed in Table 2.	AS P.9 P.9.1 Clearing in a regional ecosystem listed in Table 2, does not occur unless the clearing is less than— a) 10 metres wide; or b) 2 hectares.	PS P.9 Clearing does not occur in a regional ecosystem listed in Table 2.
PR P.10: Acid sulfate soils To regulate the clearing of vegetation in a way that does not cause land degradation and maintains ecological processes—clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either— a) aerate horizons containing iron sulfides; or b) mobilise acid and/or metals.	AS P.10 P.10.1 Clearing in <u>land zone 1</u> , <u>land zone 2</u> or <u>land zone 3</u> in areas below 5 metre Australian Height Datum— a) is carried out in accordance with an acid sulfate soils environmental management plan as outlined in the <i>State Planning Policy 2/02 Guideline: Planning and Managing Development Involving Acid Sulfate Soils</i> ; and b) follows management principles in accordance with the Soil Management Guidelines in the <i>Queensland Acid Sulfate Soil Technical Manual</i> .	No clearing in Land Zones 1, 2 or 3 is proposed for the subject site. Notwithstanding this, some acid sulfate soils are mapped as occurring on the subject site, and as such an Acid Sulfate Soils Management Plan has been prepared by a suitably qualified consultant.

Attachment D

Generations Industrial Park Place Code

Prepared by: Gassman Development Perspectives

GENERATIONS INDUSTRIAL PARK PLACE CODE

A PRELIMINARY APPROVAL AFFECTING A LOCAL
PLANNING INSTRUMENT FOR A MATERIAL CHANGE
OF USE FOR INDUSTRIAL USES (S.242 OF THE
SUSTAINABLE PLANNING ACT 2009)

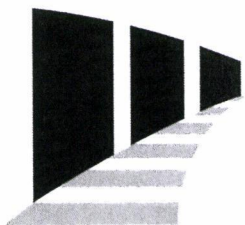
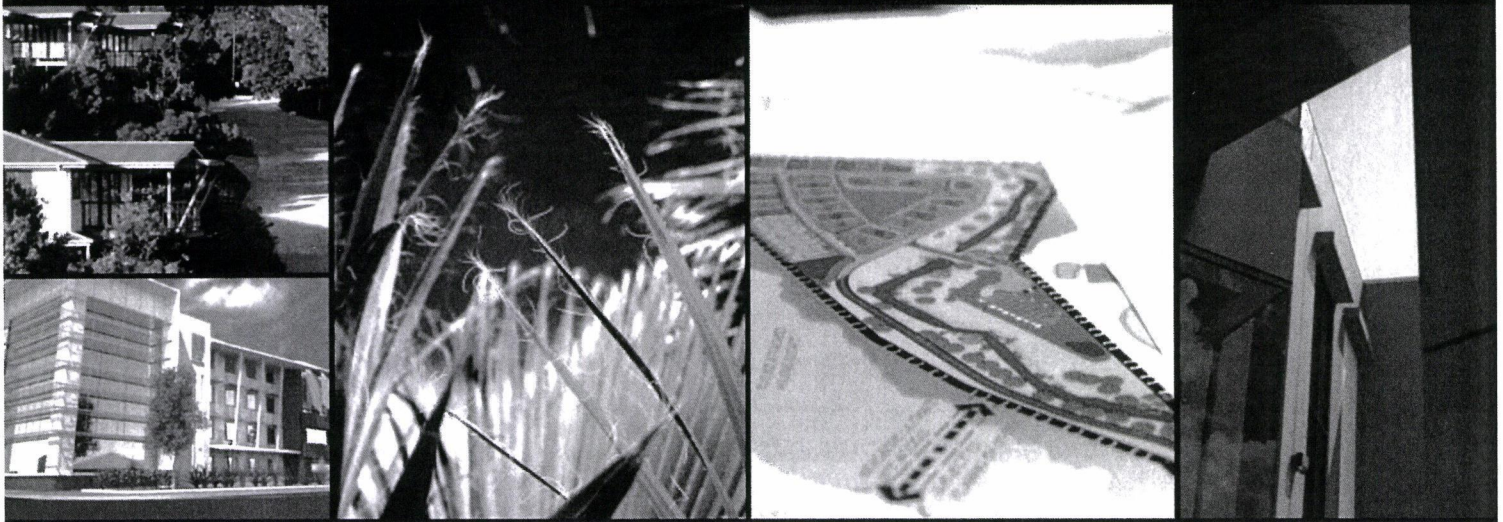
ADDRESS:

60 STAPYLTON-JACOBS WELL ROAD & 82 CHRISTENSEN ROAD,
STAPYLTON Q 4207 (LOTS 1 ON RP6882, 240 ON W31320 AND 4
ON RP6843)

PREPARED FOR:

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JUNE 2012



g a s s m a n
**development
perspectives**

project coordination
urban + regional planning
landscape + urban design
environmental management
visualisation + spatial services
surveying services
advisory services

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1.0 GENERATIONS INDUSTRIAL PARK PLACE CODE INTENT

1.1 PLACE CODE INTENT

The Generations Industrial Park Place Code shall provide opportunities for industrially-related development at a scale that has regional economic significance and shall offer long-term employment benefits to the northern Gold Coast area. Ideally, the Generations Industrial Park Place Code area ('the site') shall provide a location for the development of a variety of scales of general impact business and industry uses to complement and support the major industries that have, and will continue to, establish themselves in the ultimate precinct designation of the site which is General Business and Industry – Precinct 1 under the Yatala Enterprise Area Local Area Plan (YEA LAP).

The site is presently located in the 'Future Industry' precinct of the YEA LAP and the intention of the Place Code is to graduate the site in land-use priorities to underlying land-use designations that are reflective of the following:

1. Uses that are considered to be reflective of the ultimate intended land-use precinct designation for the site, being Precinct 1 – General Business and Industry under the existing YEA LAP;
2. The developments surrounding the site which have achieved Precinct 1 development outcomes to both the north and south; and
3. Complementary to underlying site constraints such as ecological corridors and road connectivity.

Accordingly, the Generations Industrial Park Place Code, in conjunction with the **enclosed** land-use classification plan creates the following Precincts:

- *Precinct A (Low Impact and Service Industry):* The land-uses promoted within this precinct are generally low impact industrial style uses responsive to the established nature of residential uses located nearby. Whilst more intensive levels of industry are not generally envisaged, they may be suitable subject to appropriate acoustic attenuation measures and strategies being implemented. The establishment of interim residential style uses within this precinct are also considered appropriate given the low impact industrial focus and nearby residential uses. The allotment sizes envisaged within this precinct are reflective of those that are promoted within Precinct 1 of the YEA LAP.
- *Precinct B (General Impact Business and Industry):* The majority of the land-uses promoted in this precinct, which covers the bulk of the developed site, are consistent with those itemized within the Precinct 1 land use designation of the YEA LAP. Those that are not, are industrially related and benefit the future development prospects of the site and the YEA LAP generally. The ultimate intent of this precinct is to promote the land uses and allotment sizes that would ordinarily be located within Precinct 1 land located within the YEA LAP. It is also noted that the proposed subdivision lot-size parameters from Precinct 1 of the YEA LAP have been adopted within this precinct.
- *Precinct C (Open Space/Reserve):* This precinct is reflective of the land-uses that would otherwise be promoted within the Precinct 6 – Open Space land-use designation of the YEA LAP. All areas within the site that are highlighted as Precinct C are either existing protected

vegetation or future rehabilitated buffer / ecological reserve consistent with ecological analyses and rehabilitation plans forming part of the overall development application.

The site area shall be easily accessible from the existing and proposed arterial road system, being Stapylton-Jacobs Well Road and Christensen Road – both of which link to the Pacific Motorway. The site design accommodates for north-south road linkages consistent with underlying connectivity requirements within the YEA LAP.

Proposals under the Generations Industrial Park Place Code area shall consider the relative proximity of the site to residential neighbours located to the south and the Stapylton landfill located to the east. Accordingly, a high level of screening is encouraged along the eastern portion of the site and relevant acoustic treatments along part of the southern section of the site. Further, attention is given to improving visual appearance and providing high landscape amenity along the Stapylton-Jacobs Well Road frontage. Buildings shall address the street, incorporate articulated exterior walls and rooflines, a mixture of building materials and exterior finishes, and other architectural details or features to enhance the appearance of any structures associated with a business/industry activity.

1.2 BACKGROUND

1.2.1 Strategic Considerations: The Generations Industrial Park Place Code seeks to activate the industrial land-use potential of 'future industry' land that is included within the YEA LAP. The site is strategically located within/near a cluster of developed industrial uses that are located within both the 'future industry' and 'general business and industry' precincts of the YEA LAP. Accordingly, the preliminary approval effectively brings forward several preferred land-uses of the site consistent with surrounding development and the ultimate intent of the YEA LAP.

1.2.2 The Site Context: The site is suitably located within the YEA LAP and shall enable the ordered growth of industrial development in the area. This Generations Industrial Park Place Code recognises the site's strategic position along major roads servicing the Yatala Enterprise Area, namely Stapylton Jacobs-Well Road. The plan accommodates for appropriate transport connectivity to the north and south, as intended under the YEA LAP. Satisfactory ecological linkages are also supplied within this Place Code to ensure the ecological priorities of the YEA LAP are also met.

1.2.3 The Land Use Classification Plan: Please refer to the attached plan **5093 P 00 10** (Schedule 1) specifying the part of the site that is affected by the Generations Industrial Park Place Code. It communicates the area of the site that will be developed after taking into account relevant amenity, ecological, stormwater, connectivity and constraint issues. This approach shall also provide an understanding that the purpose of the development is to enable an extension to the Yatala Enterprise Area rather than a land use area in conflict with the ultimate land uses intended for the local area plan.

2.0 APPLICATION OF THE GENERATIONS INDUSTRIAL PARK PLACE CODE

2.1 APPLICATION

- 2.1.1** The Generations Industrial Park Place Code applies to all proposed development located within the Place Code area, as indicated in the **Generations Industrial Park Land Use Classification Plan 5093 P 00 10**.
- 2.1.2** The Table of Development indicated in **Clause 4.0** identifies the levels of assessment for development occurring within this development area. These tables override all applicable material change of use overlay provisions as contained within the Gold Coast Planning Scheme 2003, as amended.
- 2.1.3** The codes that may be relevant to the assessment of development in this Place Code area are listed in **Clause 6.0**.
- 2.1.4** It should be noted that self assessable development is deemed to be development that is consistent with the intent of this Place Code, and therefore need only comply with the self assessable acceptable solutions of the **Generations Industrial Park Place Code** contained in **Clause 6.0** and any other acceptable solutions identified in the relevant codes explicitly referred to in **Subclauses 5.1 – 5.7**.
- 2.1.5.** The definitions of all relevant terms and land uses contained within this Place Code are to be found within **Part 4, Division 1, Chapters 1-3 of the Gold Coast City Planning Scheme 2003, as amended** except as separately defined within **Clause 3.0** of this document.
- 2.1.6.** The operation of this Place Code is guided, where necessary, by the protocols of **Part 6, Division 1, Chapters 2 of the Gold Coast City Planning Scheme 2003, as amended**.
- 2.1.7.** This Generations Industrial Park Place Code only applies to the specific forms of development outlined within the Table of Development in **Clause 4.0**. All other forms of development are subject to the relevant planning provisions of the Gold Coast City Council, which is currently the Gold Coast Planning Scheme 2003, as amended.

3.0 DICTIONARY

3.1 APPLICATION OF DEFINITIONS

The definitions outlined in Clause 3.2 have been compiled specifically for the Generations Industrial Park Place Code only. Where applicable, these specific use or development definitions override those contained within **Part 4 Division 1 Chapter 2 of the Gold Coast Planning Scheme 2003, as amended**. For any proposed use that does not comply with these specific definitions, the current use or development definitions contained within the Gold Coast Planning Scheme 2003, as amended apply.

3.2 USE OR DEVELOPMENT DEFINITIONS

Low impact industry

Premises used for industrial activities that include the manufacturing, producing, processing, repairing, altering, recycling, storing, distributing, transferring, treating of products and have one or more of the following attributes:

- negligible impacts on sensitive land uses due to offsite emissions including aerosol, fume, particle, smoke, odour and noise;
- minimal traffic generation and heavy-vehicle usage;
- demands imposed upon the local infrastructure network consistent with surrounding uses;
- the use generally operates during the day (e.g. 7am to 6pm);
- offsite impacts from storage of dangerous goods are negligible;
- the use is primarily undertaken indoors.

Service Industry

Premises used for industrial activities that have no external air, noise or odour emissions from the site and can be suitably located with other non-residential uses.

Industry

As defined in the Gold Coast Planning Scheme 2003 as amended, where not 'low impact industry' or 'service industry' as defined in the Generations Industrial Park Place Code.

3.3 SPECIFIC USE OR DEVELOPMENT DEFINITIONS EXAMPLES

The following table provides more specific examples of the specific use definitions applicable to the Generations Industrial Park Place Code .

Column 1 Use	Column 2 Examples include	Column 3 Does not include the following examples

Low impact industry	- Repairing and servicing motor vehicles, including mechanical components, radiators, electrical components, wheel alignments, exhausts, tyres, suspension or air conditioning, not including spray painting; - Repairing and servicing lawn mowers and outboard engines; - Fitting and turning workshop; - Assembling or fabricating products from sheet metal or welding steel, producing less than 10 tonnes a year and not including spray painting; - Assembling wood products not involving cutting, routing, sanding or spray painting; - Dismantling automotive or mechanical equipment, not including debonding brake or clutch components; - Service station, not including above ground tanks of class 2.1 (flammable gasses) or class 3 (flammable liquids) dangerous goods greater than 18kL (Note- class 2.1 and class 3 dangerous goods are defined in the Australian Dangerous Goods Code); - Dangerous goods location not including the storage of toxic gases.	Panel beating, spray painting or surface coating, tyre recycling, drum re-conditioning, wooden and laminated product manufacturing.
Service industry	Audio visual equipment repair, film processing, bicycle repairs, clock and watch repairs, computer repairs, dry cleaning, hand engraving, jewellery making, laundromat, locksmith, picture framing, shoe repairs, tailor	Small engineer mechanical repair workshop, cabinet making, shop fitting, sign writing, tyre depot

4.0 GENERATIONS INDUSTRIAL PARK PLACE CODE – TABLE OF DEVELOPMENT

4.1 TABLE OF DEVELOPMENT

Pursuant to s.242 of the *Sustainable Planning Act 2009*, the **Yatala Enterprise Area Local Area Plan Table of Development (as modified)** below, is nominated as the applicable Table of Development. It applies to the area specified within the Generations Industrial Park Land Use Classification Plan and the specific forms of development outlined. Precincts nominated in this plan and the following tables of development and Place Code are as follows:

- Precinct A (Low Impact and Service Industry)
- Precinct B (General Impact Business and Industry)
- Precinct C (Open Space/Reserve)

TABLE A – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – MATERIAL CHANGE OF USE

MATERIAL CHANGE OF USE incorporating or not incorporating BUILDING WORK			
Exempt	Self Assessable	Code Assessable	Impact Assessable
Precinct A (Low Impact and Service Industry)			
Agriculture Animal Husbandry Conservation (natural area management) Low-Impact Telecommunications Facility Minor Change in the scale or intensity of an existing lawful use Park Public Utility	Café Car Park Convenience Shop Food Industry Detached Dwelling Low Impact Industry Milk Depot Service Industry Take-Away Food Premises Temporary Use Warehouse	Bulk Supplies Caretakers Residence Estate Sales Office Family Accommodation Industry Manufacturer's Shop Outdoor Storage Area Rural Industry Service Industry Telecommunications Facilities n.e.i.	Salvage Yard Transport Terminal

MATERIAL CHANGE OF USE incorporating or not incorporating BUILDING WORK			
		Wholesale Nursery	
Precinct B (General Impact Business and Industry)			
Agriculture Animal Husbandry Conservation (natural area management) Low-Impact Telecommunications Facility Minor Change in the scale or intensity of an existing lawful use Park Public Utility	Café Car Park Convenience Shop Food Industry Industry Low Impact Industry Manufacturer's Shop Milk Depot Outdoor Storage Area Service Industry Take-Away Food Premises Temporary Use Warehouse	Bulk Supplies Caretakers Residence Industry Rural Industry Service Industry Telecommunications Facilities n.e.i. Transport Terminal Wholesale Nursery	Garden Salvage Yard
Precinct C (Open Space/Reserve)			
Conservation (natural area management) Low-Impact Telecommunications Facility Minor Change in the scale or intensity of an existing lawful use Park	Temporary Use	Telecommunications Facility n.e.i.	Agriculture

TABLE B – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – RECONFIGURING A LOT

RECONFIGURING A LOT			
Exempt	Self Assessable	Code Assessable	Impact Assessable
Precincts A & B (Low Impact and Service Industry & General Impact Business and Industry)			
		Results in no lots with an area less than 4,000m ² ; OR Entails only a Community Title Subdivision (including Standard Format Plans and/or Volumetric Lots), or a Volumetric Lot within a building, or a leasehold subdivision of an existing approved development	Results in one or more lots with an area less than 4,000m ²
Precinct C (Open Space/Reserve)			
		Results in no lots with an area less than 20 hectares; OR Entails only a Community Title Subdivision (including Standard Format Plans and/or Volumetric Lots), or a Volumetric Lot within a building, or a leasehold subdivision of an existing or approved development	Results in one or more lots with an area less than 20 hectares

TABLE C – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – OPERATIONAL WORK

OPERATIONAL WORK – CHANGES TO GROUND LEVEL			
Exempt	Self Assessable	Code Assessable	Impact Assessable
Operational Work that involves extraction, excavation or fill that:			
		exceeds a volume of	

OPERATIONAL WORK – CHANGES TO GROUND LEVEL			
		100 cubic metres of fill or excavation, or is closer than 20 metres from the allotment boundary and is within or adjoins an allotment containing places, sites, or landscapes of indigenous cultural heritage significance listed on the Queensland Heritage Register – Cultural Records (Landscapes Queensland and Queensland Estate) Act 1987; OR is located on land which is the subject of a native title claim; OR is located on land that is known to the owner and/or the developer to be of indigenous cultural heritage value	

TABLE D – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – OPERATIONAL WORK

OPERATIONAL WORK – ADVERTISING DEVICES			
Exempt	Self Assessable	Code Assessable	Impact Assessable
	Advertising Device that is: a) not illuminated, nor animated, and where the total area of signage per street frontage does not exceed the following for each precinct: Precinct A: 20m ² b) not on land with frontage to an arterial road or any State-controlled road	Advertising Devices n.e.i.	

TABLE E – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – OPERATIONAL WORK

OPERATIONAL WORK – INFRASTRUCTURE AND LANDSCAPE WORK			
Exempt	Self Assessable	Code Assessable	Impact Assessable
Minor Landscape Work		Landscape Work n.e.i. Works for Infrastructure	

TABLE F – YATALA ENTERPRISE AREA LOCAL AREA PLAN TABLE OF DEVELOPMENT (AS MODIFIED) – OPERATIONAL WORK

OPERATIONAL WORK – VEGETATION CLEARING			
Exempt	Self Assessable	Code Assessable	Impact Assessable
Vegetation Clearing that:			
	results in the removal of, or damage to, vegetation that is equal to, or in excess of, 40 centimetres in girth (circumference) measured at 1.3 metres above average ground level, and complies with the Acceptable Solutions of Specific Development Code 36 – Vegetation Management; OR results in the removal of, or damage to, vegetation that is equal to, or in excess of, four metres in height, and complies with the Acceptable Solutions of Specific Development Code 36 – Vegetation Management	results in the removal of, or damage to, vegetation that is equal to, or in excess of, 40 centimetres in girth (circumference) measured at 1.3 metres above average ground level, and alternate solutions to the Acceptable Solutions of Specific Development Code 36 – Vegetation Management are proposed; OR results in the removal of, or damage to, vegetation that is equal to, or in excess of, four metres in height, and alternate solutions to the Acceptable Solutions of Specific Development Code 36 – Vegetation Management	

5.0 GENERATIONS INDUSTRIAL PARK PLACE CODE – RELEVANT CODES FOR ASSESSMENT

5.1 RELEVANT CODES

References to Relevant Codes

The Codes relevant for development assessment in this Place Code area are listed and contained within **the Gold Coast Planning Scheme and are as follows:**

5.1.1 All proposed development within the site is subject to the **Generations Industrial Park Place Code**.

5.1.2 Self Assessable Development: The following codes apply to development that is self assessable under the Tables of Development herein (Section 3).

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	2 Advertising Devices 4 Animal Husbandry 10 Caretaker's Residence 13 Detached Dwelling 24 Office 25 Private Recreation 27 Retail and Related Establishments 34 Temporary Use 36 Vegetation Management 38 Working From Home	2 Bushfire Management Areas 3 Canals and Waterways 4 Car Parking, Access and Transport Integration 8 Flood Affected Areas 10 Nature Conservation 16 Steep Slopes or Unstable Soils

5.1.3 Material Change of Use: The following codes apply to development that is code or impact assessable under the Tables of Development herein (Section 3).

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	4 Animal Husbandry 10 Caretaker's Residence 12 Child Care Centres 13 Detached Dwellings 15 Ecotourism Facility 17 Farm Forestry 20 Kennels	2 Bushfire Management Areas 3 Canals and Waterways 4 Car Parking, Access and Transport Integration 5 Cultural Heritage (Historic) 6 Cultural Heritage (Indigenous) 8 Flood Affected Areas

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
	21 Landscape Work 23 Low Rise Commercial Tourist Accommodation 24 Office 25 Private Recreation 27 Retail and Related Establishments 29 Rural Industry 30 Salvage Yards 31 Service Stations 33 Telecommunications Facilities 38 Working From Home 39 Works for Infrastructure	9 Natural Wetland Areas and Natural Waterways 10 Nature Conservation 12 Rail Corridor Environs 13 Road Traffic Noise Management 14 Sediment and Erosion Control 15 Service Roads (Pacific Motorway) 16 Steep Slopes or Unstable Soils 17 Unsewered Land

5.1.4 Operational Work – Changes to Ground Level: The following codes apply to development that is self or code assessable Operational Work – Changes to Ground Level under the Tables of Development herein (Section 3).

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	11 Changes to Ground Level and Creation of New Water bodies	2 Bushfire Management Areas 3 Canals and Waterways 4 Car Parking, Access and Transport Integration 6 Cultural Heritage (Indigenous) 7 Flood Affected Areas 9 Natural Wetland Areas and Natural Waterways 10 Nature Conservation 14 Sediment and Erosion Control 16 Steep Slopes or Unstable Soils

5.1.5 Operational Work – Advertising Devices, Landscape Work and Infrastructure: The following codes apply to development that is code assessable Operational Work – Advertising Devices, Landscape Work or Infrastructure under the Tables of Development herein (Section 3)

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	2 Advertising Devices 21 Landscape Work 39 Works for Infrastructure	2 Bushfire Management Areas 3 Canals and Waterways 4 Car Parking, Access and Transport Integration 5 Cultural Heritage (Historic) 6 Cultural Heritage (Indigenous) 8 Flood Affected Areas 9 Natural Wetland Areas and Natural Waterways 10 Nature Conservation 14 Sediment and Erosion Control 15 Service Roads (Pacific Motorway) 16 Steep Slopes or Unstable Soils

5.1.6 Operational Work – Vegetation Clearing: The following codes apply to development that is code assessable Operational Work – Vegetation Clearing under the Tables of Development herein (Section 3).

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	36 Vegetation Management	2 Bushfire Management Areas 5 Cultural Heritage (Historic) 6 Cultural Heritage (Indigenous) 9 Natural Wetland Areas and Natural Waterways 10 Nature Conservation 14 Sediment and Erosion Control 16 Steep Slopes or Unstable Soils

5.1.7 Reconfiguring a Lot: The following codes apply to development that is code or impact assessable Reconfiguring a Lot under the Tables of Development herein (Section 3).

PLACE CODE	SPECIFIC DEVELOPMENT CODES	CONSTRAINT CODES
Generations Industrial Park Place Code	11 Changes to Ground Level and Creation of New Water bodies 21 Landscape work 28 Reconfiguring a Lot 36 Vegetation Management 39 Works for infrastructure	2 Bushfire Management Areas 3 Canals and Waterways 4 Car Parking, Access and Transport Integration 5 Cultural Heritage (Historic) 6 Cultural Heritage (Indigenous) 8 Flood Affected Areas 9 Natural Wetland Areas and Natural Waterways 10 Nature Conservation 12 Rail Corridor Environs 13 Road Traffic Noise Management 14 Sediment and Erosion Control 15 Service Roads (Pacific Motorway) 16 Steep Slopes or Unstable Soils 17 Unsewered Land

- Where a development proposal includes one or more types of development, all of the identified codes must be referred to for each of the components of development.
- Where a number is listed prior to the name of a Code, this Code shall be located in Part 7 of the Gold Coast Planning Scheme.
- Where a number is not listed before the name of a Code, this Code shall be located within this Place Code.

5.2 PERFORMANCE CRITERIA AND ACCEPTABLE SOLUTIONS

The relevant Acceptable Solutions must comply with self assessable acceptable solutions in order to retain self assessable development status. Acceptable solutions outlined in the applicable codes that are not identified as being relevant for self assessable development do not form part of this assessment.

It is desirable that code assessable development comply with the Acceptable Solutions to ensure that each Performance Criterion is met. However, code assessable development may comply with an alternative solution, provided that the alternative solution can be demonstrated to meet the relevant Performance Criterion to Council's satisfaction. Where no acceptable solution is provided for a

Performance Criterion in the code, the development must provide its own solution to meet that particular Performance Criterion.

It is desirable that impact assessable development comply with the Acceptable Solutions to ensure that each Performance Criterion is met. However, impact assessable development may comply with an alternative solution, provided that the alternative solution can be demonstrated to meet the relevant Performance Criterion, to Council's satisfaction. Note that impact assessable development must comply with all relevant planning measures of the whole Planning Scheme. Where no alternative solution is provided for a Performance Criterion in the code, the development must provide its own solution to meet that particular Performance Criterion.

5.3 CONFLICT BETWEEN PLACE CODE AND PLANNING SCHEME

In situations where the Performance Criteria and/or Acceptable Solutions contained in Codes within this Generations Industrial Park Place Code conflict with the Performance Criteria and/or Acceptable Solutions of a Council Code, the Performance Criteria and/or Acceptable Solution of the Code within the relevant Generations Industrial Park *Place* Code shall prevail.

In situations where this Code is silent on matters, the development shall be subject to the provisions contained within the 'Our Living City – Gold Coast Planning Scheme' and its associated policies.

6.0 GENERATIONS INDUSTRIAL PARK PLACE Code – DEVELOPMENT REQUIREMENTS

6.1 PURPOSE

The Generations Industrial Park Place Code seeks to ensure that the scale and intensity of development including the impact, design and appearance of industrial development for this land is consistent with the role of the site and the YEA as a regionally significant location for industrial development. These provisions also aim to ensure that the intent of the Place Code is followed and high standards of urban design and architecture are promoted.

6.2 APPLICATION

- This Code applies to all identified forms of development taking place within the Place Code area as nominated within the Generations Industrial Park Land Use Classification Plan.

6.3 DEVELOPMENT REQUIREMENTS

GENERATIONS INDUSTRIAL PARK PLACE CODE

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
DEVELOPMENT THAT IS SELF ASSESSABLE, CODE ASSESSABLE OR IMPACT ASSESSABLE	
BUILDING HEIGHT	
PC1 The height of buildings is to be consistent with the role of the site as a predominantly industrial use area. Buildings are to be constructed to a height that complements the surrounding built form and the local landscape character.	AS1 The building has a maximum of two storeys.
ACCOMMODATION DENSITY	
PC2 Accommodation density must be consistent with the predominant character of the YEA as an industrial location. Accordingly, very low residential densities are envisaged for the LAP area.	AS2 The maximum dwelling density does not exceed one dwelling per lot.
SITE COVERAGE	
PC3 The site coverage of development shall be in accordance with the open space landscape character of the YEA.	AS3 Precinct A & B: The maximum site coverage shall not exceed 70%

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	Precinct C: The maximum site coverage shall not exceed 10%
BUILDING SETBACK	
PC4 The layout of buildings, structures and activities achieves an attractive and orderly appearance where development is visible from the public domain. A good standard of visual amenity is achieved through generous building setbacks and high quality landscaping.	Precinct A AS4.1 Buildings are set back from frontages: a) 10 metres from the primary frontage; b) 7 metres from the secondary frontage; and c) 10 metres from the western boundary adjoining the existing residential uses. Precincts B & C AS4.2 Buildings are set back from frontages: a) 10 metres from the primary frontage; and c) 7 metres from the secondary frontage.
BOUNDARY FENCING	
PC5 The erection of boundary fencing is undertaken in a manner that promotes an attractive streetscape and is responsive to the intended purpose of the fencing.	AS5.1 The design of front boundary fencing is conducive to the establishment of an attractive streetscape and is general in accord with the design measures outlined in Figure 29-2 – Aspects of Fencing Design as contained within the YEA LAP. Generally speaking, design features or strategies such as transparency or landscape buffering should be utilised to soften the effect of front boundary fencing. Solid fencing exceeding 1.5 metres in height should only be established where required for acoustic attenuation purposes. AS5.2 The height of side and rear boundary fencing, where not required for acoustic attenuation purposes, does not exceed a height of two metres. Due to the general low visibility of this fencing, there is no requirement for this fencing to be transparent or landscaped.
DESIGN OF DEVELOPMENT NEAR MAJOR ROADS	
PC6 Those developments visible from, or facing Stapylton-Jacobs Well Road must exhibit a high standard of architectural presentation.	AS6 Facades visible from, or facing Stapylton-Jacobs Well Road are designed to incorporate: a) materials such as glass, brick and coloured/textured block work (standard concrete block should not be used). If metal

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	cladding is used, it should be pre-coated in an appropriate colour and have some form of relief; b) relatively unobtrusive, earth toned colours, such as subdued greens, blues, browns and greys (bright colours and/or materials which cause glare are avoided); c) horizontal/vertical articulation of walls at least at 15 metre intervals; d) 'humanising' elements, such as entry forecourts, porticos, verandahs, windows, awnings and fenestration; e) other features which contribute to an interesting and attractive appearance These design features are to be applied to the main facade facing the relevant road, as well as along a brief return or the full length of side walls.
VEHICULAR CROSSINGS	
PC7 Vehicular crossings associated with the development must be designed and constructed to ensure: a) A safe footpath environment; b) Safe vehicular access to the property; c) Appropriate hydraulic performance of the stormwater infrastructure; d) No damage to vehicle or road infrastructure; e) Minimal loss of on-street parking spaces; and f) Continued amenity of the neighbourhood.	AS7 Driveways are designed and constructed in accordance with relevant sections of Planning Scheme Policy 11 – Land Development Guidelines.
DEVELOPMENT THAT IS CODE ASSESSABLE OR IMPACT ASSESSABLE	
BUILDING HEIGHT	
PC8 The height of buildings is to be consistent with the role of the site as a predominantly industrial use area. Buildings are to be constructed to a height that complements the surrounding built form and the local landscape character.	AS8 The maximum height of buildings does not exceed three storeys.
SITING	
PC9 All buildings must be sited to complement the industrial character and the predominant built form of the surrounding area and to reduce potential conflicts between uses having regard to a site analysis, prepared in accordance with Planning Scheme Policy 17 - Site Analysis.	AS9 No acceptable solution provided.
PC10 The layout of the site must provide a clear separation between the public access areas and	AS10 No acceptable solution provided.

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the areas set aside for servicing the building.	
PC11 Industrial structures, storage or service areas, which are likely to appear visually dominating or unsightly, are located to the rear or sides of sites or are otherwise designed and screened to enhance their appearance, when viewed from the street.	AS11 No acceptable solution provided.
BUILDING AND LAYOUT DESIGN, SAFETY AND COMFORT	
PC12 Buildings are sited and designed such that suitable external spaces remain available for future expansion of buildings, and internal spaces are of a size and shape suited to variable internal layout, maximum vertical storage and addition of mezzanine floors.	AS12.1 Building shapes are regular so as to provide opportunities for future expansion in different directions, and for flexibility in internal location of activities and equipment. AS12.2 Internal column spacing and column heights are generous (for example, building spans of 18 metres and over, bay spacing of 12-18 metres, and column heights of at least eight metres).
PC13 Buildings are sited and designed to suit climatic conditions.	AS13.1 Wherever practicable, buildings are oriented to the north east to take advantage of summer breezes and winter sun. Western aspects are avoided, wherever possible. AS13.2 Where not air conditioned, buildings incorporate a maximum of openings (ie. louvring, windows, doorways) on eastern walls. AS13.3 Windows are minimised and trees are planted along west walls for protection from hot afternoon sun. AS13.4 Shading devices (ie: large roof overhangs, window hoods/blinds, awnings and verandahs) are attached to buildings on all sides, particularly eastern and western sides. Where possible, shading devices are retractable on northern sides during winter. AS13.5 Semi-enclosed workstations, where relatively strenuous manual labour takes place, are located in the cooler and more ventilated parts of the building.
PC14 All buildings must be designed and constructed to a high aesthetic standard and to complement or enhance the local character of the YEA.	AS14.1 The massing and proportions of new industrial buildings are consistent with those of adjoining industrial buildings. AS14.2 Building materials, patterns, textures and colours

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	used in new buildings are complementary to those of nearby buildings.
PC15 Building design and appearance must be conducive to the safety and comfort of all building users.	AS15.1 Glass which forms all or part of any external wall of a building does not exceed a maximum degree of reflection of both heat and light of 20%. The glass area does not exceed 60% of the total area of the external wall. AS15.2 Entrances to premises are clearly visible from the street, and are not obscured or dominated by car parking.
DESIGN OF CAR PARK AREAS	
PC16 All ground level parking is to be suitably landscaped to provide an attractive and pleasant outlook and shade for parked vehicles, and to contribute towards the quality presentation of new developments.	AS16.1 Significant trees are preserved and incorporated into car parking areas. AS16.2 Landscaped bays for the planting of shade trees are provided at regular intervals throughout car parking areas, at the rate of one landscaped bay per 40 vehicle parking bays or one large shade tree per ten parking spaces. Landscape bays have the same dimensions as a vehicle parking space. AS16.3 Large car parking areas and all heavy/service vehicle parking are situated to the side or rear of sites. Smaller car parking areas, particularly for short term and disabled parking, may be located to the front of sites. AS16.4 Car parking areas located in frontage setback areas are set back behind a minimum three metre landscaped buffer to the frontages. To reduce their visual impact, front car parking areas may be lowered and mounds incorporated in frontage landscaping.
ADVERTISING DEVICES	
PC17 Advertising signage does not dominate the visual amenity of the area.	AS17 No advertising, freestanding or otherwise, is erected which would be readily visible from the Pacific Motorway of the Gold Coast City Rail Line.
PC18 Signs and other forms of advertising on business/industry premises are kept to a minimum. Any advertising relates directly to the activity/process conducted on the premises, rather than general product advertisements.	AS18.1 There is one sign per premises. Multi-unit developments display a single index sign at the entrance to the development which details each occupant, its activity/process and respective unit number. AS18.2

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	The design and construction of signs meets the following parameters: a) signs are situated near site entries and are well placed for viewing by pedestrians and drivers; b) free-standing signs have a maximum area of 3m²; c) signs on facades have a maximum area of 5m²; d) signs utilise company logos or symbolic representations for quick and easy identification; e) wording on signs is limited to the name, location, business and products of the establishment; f) signs do not utilise fluorescent paints; g) signs do not rotate, flash or move; h) signs are integrated with the form of development and are not visually dominating. AS18.3 All signs are consistent with the provisions for the Industry 2 Domain set out in Specific Development Code 2 – Advertising Devices.
RESERVE AREA	
PC19 The area identified as Precinct C within the Land Use Classification Plan areas remain in a substantially undeveloped condition, with vegetation retained to the fullest extent possible and, where necessary, rehabilitated using local native species.	AS19.1 Areas identified as Precinct C (Open Space/Reserve) on the Land Use Classification Plan are reserved for conservation purposes, through: a) reservation of the area of Precinct C as open space which will be subject to the application of an open space management plan/statement that is suitable to Council. b) Eventual commitment of part of the land to Council as reserve in accordance with the requirements of an approved open space management plan/statement. AS19.2 Areas identified within the Precinct C area (ie., only those areas specifically identified for revegetation within an approved open space management plan) highlighted to require revegetation are managed in the following manner: a) the land remains largely undisturbed by any buildings, clearing and earthworks; b) Existing trees are retained, and additional trees planted within a 50 metre wide band; c) the areas may form part of the landscape open space areas, associated with individual

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	development proposals. If so, they should generally remain free of building and earthworks; additional tree planting utilises species similar to those existing naturally in the area; d) any parallel roads or services are grouped on one side of the designated areas, to minimise disturbance; e) any breaks in the vegetation canopy, necessary for roads or services, are minimised by cutting through perpendicular to the link at a point where damage and discontinuity are minimised, such as where the canopy is already broken or sparse.
LANDSCAPE DESIGN	
PC20 Landscape design is used to enhance the landscape character of the YEA.	AS20.1 Frontage setback areas are attractively landscaped, including: a) at least 25% of the frontage having a landscaped buffer of minimum five metres depth and the remainder, excluding access ways, a landscape buffer of minimum three metres depth; b) one metre landscaped area adjacent to building walls facing the street. AS19.2 Planting of shade trees occurs along pathways, throughout car parking areas and in any other exposed areas where relief from sun and glare would be beneficial. AS20.3 Dwarf walls prevent vehicles breaching landscaped areas along frontages. AS20.4 Screen planting, utilising an appropriate mix of tall trees and lower level shrubs, is used around outdoor parking, equipment, storage and other unsightly areas, particularly where visible from roads. AS20.5 Landscape Design includes: a) provision of pleasant, shaded areas with appropriate furniture for lunch/relaxation areas for workers and visitors; b) retention of existing mature vegetation, wherever possible; c) retention of existing natural drainage channels and planting to strengthen their resistance to erosion, especially where proposed development is expected to result in increased volume and velocity of stormwater runoff; d) use of garden edges, lines of trees and

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	mass planting to frame pathways and define site and building entries. AS20.6 A minimum ten metre wide landscape buffer is provided along the western boundary of the site adjoining the existing residential uses generally as outlined on the Landscape Intent Plan prepared by Gassman Development Perspectives and titled 5093 L LI 02.
PC21 Potentially obtrusive noise, odour and visual impacts are effectively buffered.	AS21.1.1 Development incorporates landscape buffers, earth mounds and acoustic fencing appropriate to the likely off-site impacts of particular developments. OR AS21.1.2 A landscape buffer of a 20 metre width, densely planted with shrubs and trees, is provided along the relevant frontage. A landscape buffer to a minimum width of ten metres may be acceptable, depending on the potential of proposed planting arrangements to effectively screen development behind. Species selection, use of mature or semi mature trees, and density of planting will be important in this respect.
PC22 The street side environment and other public spaces are developed to enhance their visual appeal and create a physical continuity and legibility throughout the YEA area and its component precincts.	AS22 Individual developments contribute to streetscape enhancement work (including street tree planting, paving, landscaping of traffic islands and provision of street lighting and furniture), in accordance with any adopted Council streetscape strategy.
PC23 Public open spaces are developed to enhance their recreational amenity for workers and visitors to the Yatala area and the wider community.	AS23 Individual developments contribute (through works or financial contribution) towards construction of footpaths and cycle ways, seating, picnic facilities, play areas and/or other facilities in existing public open spaces and additional spaces established as a result of the development.
PC24 Landscape design contributes to the creation of a distinctive, memorable and legible town centre, local centres and surrounding suburban areas for YEA.	AS24.1 Street design and plantings and major pedestrian paths are aligned to take advantage of attractive local and distant views (eg, views to the mountains or other important landscape elements). AS24.2 Footpath paving treatments and street furniture integrate with adjoining development, and setback areas are integrated with public footpaths.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS												
	AS24.3 Landscape plantings utilise local native species to promote a distinctive site character.												
PC25 Open space and pedestrian areas are to be designed to be both functional and safe.	AS25 Development is designed to ensure a high degree of casual surveillance from nearby residents, employees or passing traffic, public and semi-public spaces, pedestrian and cyclist paths, car parking areas and building entrances.												
PC26 All ground level car parking, open space and buffer areas must be landscaped and maintained to complement the character of the local area, and any adjoining residential or public open space areas.	AS26 The car park area, open space and buffer areas of the lot are landscaped with landscape design and use of plant species generally consistent with that of adjacent and nearby lots. The landscape design may incorporate extensive paved areas for pedestrian use.												
LOT SIZE (FOR SUBDIVISION ONLY)													
PC27 All lots are to be of sufficient size to comfortably accommodate the type of development envisaged in the LAP and the relevant precinct intent.	AS27 Any new lots created are sized in accordance with the following schedule: <table><tr><th>Precinct</th><th>Min Area</th><th>Ave Area</th></tr><tr><td>A</td><td>4000m²</td><td>1 hectare</td></tr><tr><td>B</td><td>4000m²</td><td>1 hectare</td></tr><tr><td>C</td><td>20 hectares</td><td>20 hectares</td></tr></table>	Precinct	Min Area	Ave Area	A	4000m ²	1 hectare	B	4000m ²	1 hectare	C	20 hectares	20 hectares
Precinct	Min Area	Ave Area											
A	4000m ²	1 hectare											
B	4000m ²	1 hectare											
C	20 hectares	20 hectares											
PC28 Allotments prior to development have suitable topography for industry.	AS28 Industrial allotments generally have a ground slope not greater than 10%, and access ways associated with battle axe allotments generally have a ground slope not greater than 16%.												
PC29 Allotments are of regular shapes suited to the intended uses, and allowing design flexibility, efficient development and access.	AS29.1 Development generally incorporates all of the following features: a) allotments that are rectangular shapes; b) allotments which have frontage to depth ratios between 1:2 and 1:4. OR AS29.2 Alternative allotment shapes are provided where warranted, due to: a) the special site requirements of particular industries; and/or b) exceptional physical constraints. OR AS29.3 The development incorporates a small proportion of battle axe allotments, where particular industries have special requirements for square												

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	or long and narrow sites. (Battle-axe allotments are useful for creating allotments of such shapes, as well as reducing road frontage construction costs and providing appropriate sites for visually offensive industries.).
PC30 Allotments are oriented to suit climatic conditions.	AS30 Allotments are arranged in a manner that maximizes the number of allotments oriented to the north east to take advantage of breezes and enable optimal building orientation for energy efficiency and use of natural lighting.
PC31 Reconfiguration of land incorporates open space provision in a way which takes account of the location and attributes of the site and its surrounds, and the need to set aside certain areas for purposes such as: a) conservation of vegetation/habitat; b) retention of creek corridors and natural drainage patterns; c) provision of pedestrian/cycle linkages and recreational facilities; and/or d) creation of landscaped entrances, focal points and streetscape.	AS31.1 Where reconfiguration takes place, an area of up to 10% of the site is provided as open space. This open space is set aside for public park or conservation purposes, developed with pathways and/or recreational facilities, landscaped and/or rehabilitated to its natural state. AS31.2 Reconfiguration proposals incorporate a plan showing street planting to be undertaken. Planting themes contribute to the overall streetscape character of the estate.
PC32 Reconfiguration may take place in the form of Community Title subdivision, allowing for sharing of space, facilities and services, while at the same time ensuring allotments created are suited to the intended businesses/industries.	AS32 Community Title subdivisions within Precinct A (Industrial) are provided, which: a) are consistent with the Acceptable Solutions for PCs 27-31 b) generally maintain a minimum lot size of 100-200m² within a minimum overall site area of 2,000m²; c) are not used for heavy manufacturing, metal/food processing, or noxious, offensive or hazardous industries.
ROAD DESIGN	
PC33 Roads are provided so as to form a road hierarchy, with each road serving a particular function according to the intended land use characteristics of the estate, expected traffic volumes and types, and external existing and future road linkages to anticipated development on adjoining lots.	AS33.1 Concept plans submitted with reconfiguration and/or development applications identify all roads proposed to be upgraded and/or newly constructed and their intended function within a road hierarchy. AS33.2 Concept plans submitted with reconfiguration and/or development applications identify road connections with adjacent allotments that will promote connectivity; and AS33.3 Proposed road hierarchies are generally consistent with the conceptual road hierarchy

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	identified on the Generations Industrial Park Land Use Classification Plan .
PC34 The width, pavement, curvature, sight distances, intersections, turning radii and design features of roads convey the particular function of each road with the hierarchy mentioned in AS33.3, and reflect the nature of traffic management. In particular, road design ensures the safe movement of heavy articulated vehicles.	AS34.1 Road design and construction is in accordance with Planning Scheme Policy 11 - Land Development Guidelines and the Table to this Acceptable Solution. AS34.2 Distances between intersections are not less than 60 metres. AS34.3 Streets intersect at right angles, or as near as topography or other limiting factors permit. AS34.4 Various vehicle control devices are used to regulate traffic speed and enhance pedestrian safety (such as traffic lights and illuminated pedestrian crossings). AS34.5 Paving surfaces, landscape treatment and signage are used to define entrances to the estate and joint use areas within the estate AS34.6 Road pavements are designed and constructed for long life, hard wearing and suitability to the load capacity of expected vehicles. AS34.7 Median strips, roundabouts and footpaths are to be aesthetically treated and planted and paved accordingly; and AS34.8 The design of road networks avoids the use of culs-de-sac.
PC35 The alignment of roads reflects the physical land characteristics, and provides adequate drainage and safety.	AS35.1 Road drainage is designed and situated along natural drainage courses. AS35.2 Road grades are established to avoid excessive grading, indiscriminate removal of ground cover and tree growth, and unnecessary topographical levelling.
PC36 A network of pedestrian paths and cycleways is provided which considers: a) expected levels of pedestrian and cyclist activity; b) linkages between public transport, major employment activities, and parks; c) recreation opportunities along open space	AS36.1 Footpaths are provided as follows: a) on both sides of all future major industrial roads. b) as specified in any relevant Council adopted strategy. AS36.2 Paths are designed and constructed in

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corridors; d) safe integration of users and vehicles, particularly at intersections; e) provision of bicycle end-of-trip facilities.	accordance with Council standards and AUSTROADS Part B. AS35.3 Features such as signs, road markings, lighting, paving, bollards and street furniture are provided to enhance the safety and amenity of foot/cycle paths. AS36.4 Bicycle end-of-trip facilities are provided in accordance with the requirements of the Queensland Development Code (QDC) Mandatory Part 4.1 – Sustainable Buildings (as amended from time to time)
PC37 The road network is designed to accommodate the extension and integration of the public transport system, with accessible linkages and routes and stops providing for passenger comfort without obstructing traffic flow.	AS37.1 For major industrial road, constructed to a Industrial Collector standard, a minimum 3.5m parking lane is to be line marked and maintained to allow for future bus routes/stops.
SITE ACCESS	
PC38 Site access is designed and constructed to provide for the safe ingress/egress of vehicles to the site.	AS38 Vehicular access to the site is designed and constructed in accordance with Council, Department of Main Roads and AUSTROAD standards, and/or the following minimum requirements: a) comprises a single vehicular driveway (entrance/exit), wherever possible; b) is not closer than ten metres to an intersecting street on the same side of the street; c) provides a minimum sight distance of 110 metres; d) shares adjoining property access driveways, wherever possible; e) always enters the street at right angles; f) where the site has frontage to two roads, access is taken off the secondary/minor road, if possible. g) where separate entry and exit driveways are used, the first driveway reached from the kerbside land is clearly delineated and sign posted.
PC39 Treatment of access points to the site maintains appropriate sight distances and visually enhances its identification.	AS39 Access points incorporate decorative paving treatment and landscaping which distinguishes the access point, but which does not obstruct the safe sight distance requirements outlined above.
PC40 Provision is made for safe pedestrian and	AS40.1 Pedestrian paths designed for disabled access are provided between building entrances, public

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disabled access.	footpaths and car parking areas. AS40.2 Pedestrian paths are separated from vehicular driveways.
AMENITY PROTECTION	
PC41 The proposed use must not detract from the amenity of the local area, having regard, but not limited, to the impact of: a) noise; b) hours of operation; c) traffic; d) lighting; e) signage; f) visual amenity; g) privacy; h) odour and emissions.	AS41 No acceptable solution provided.
PC42 The proposed development must take into account and seek to ameliorate any negative aspects of the existing amenity of the local area, having regard, but not limited, to the existing impact of: a) noise; b) hours of operation; c) traffic; d) lighting; e) signage; f) visual amenity; g) privacy; h) odour and emissions.	AS42 No acceptable solution provided.
URBAN/RURAL USE CONFLICTS	
PC43 Conflicts between urban and rural uses are to be avoided by effective development design.	AS43 The development of land adjacent to the agricultural character areas includes a suitable buffer.
EXTRACTIVE INDUSTRY	
PC44 Extractive industry operations are managed to make effective use of the extractive resource, while containing any impacts on the subject site.	AS44 The extractive industry is managed and developed consistent with the Extractive Industry Domain Place Code.
ON-SITE VEHICLE PARKING AND MOVEMENT	
PC45 Internal driveways are provided for safe and easy maneuvering of vehicles.	AS45.1 Internal driveways are designed and constructed to enable all vehicles to enter and exit the site in

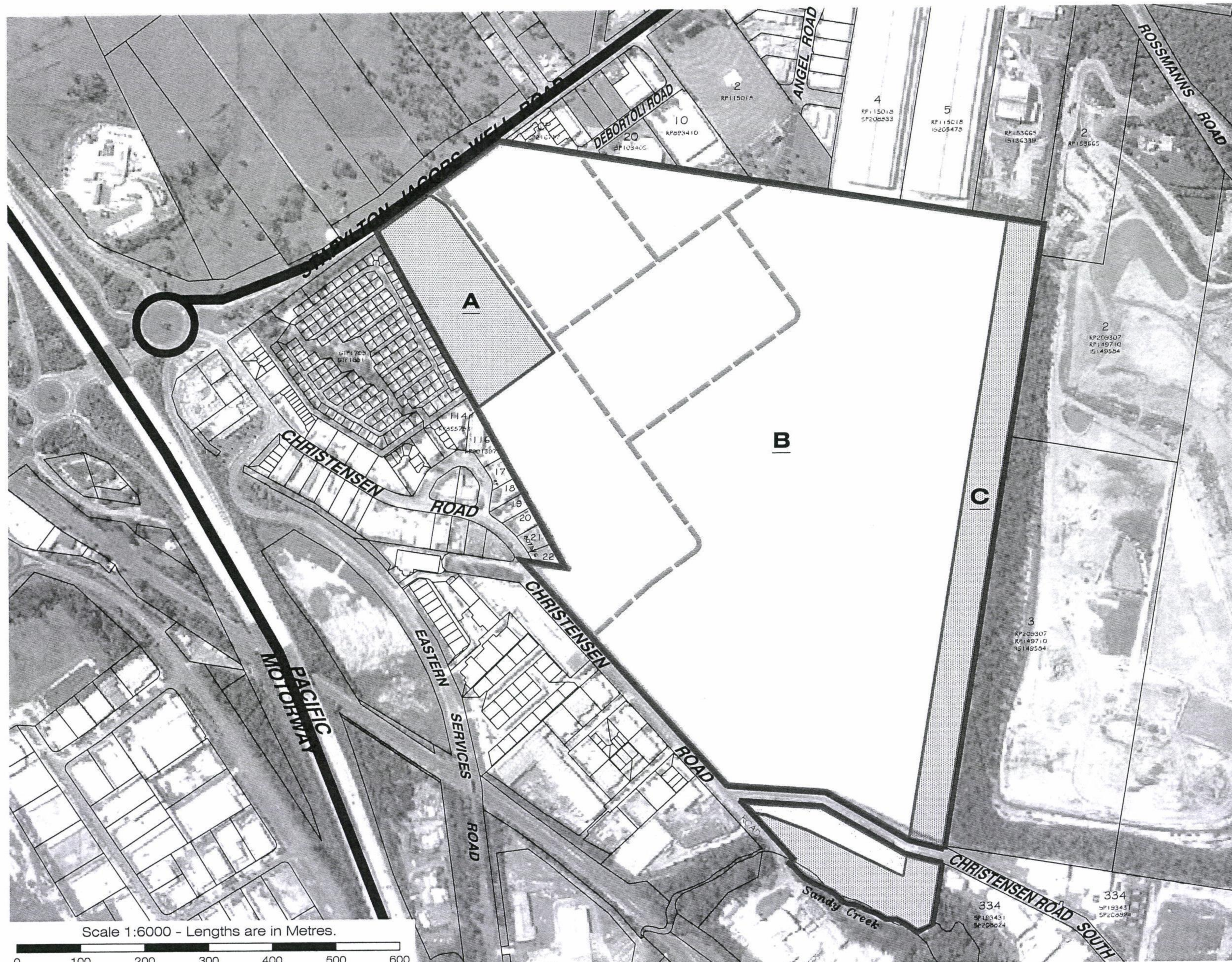
PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	a forward motion. AS45.2 Minimum driveway widths are as follows: a) eight metres to accommodate non articulated vehicles; b) ten metres to accommodate articulated vehicles; c) 4.5 metres for one-way driveways.
PC46 On-site vehicle parking is provided to meet expected demand, having regard to: a) The size of the proposed workforce; b) The likely number of visitors to the site; c) The likely size and number of service and transport vehicles to be on the site at any one time; d) On-site parking and loading/unloading activities within sites; e) The availability of conveniently located on-street parking; f) Any possible future expansion, redevelopment or change of use.	AS46.1 The number of car parking spaces provided on-site meets the standards set out in the Constraint Code 4 - Car Parking, Access and Transport Integration in the Gold Coast City Planning Scheme (version 1.2 Amended January 2007). AS46.2 For multi-unit or multi-use developments, the total car parking provided is an aggregate of the standard parking required for each individual unit and/or component use. AS46.3 A lesser provision may be acceptable where it can be demonstrated, to Council's satisfaction, that the parking needs of a particular development will be adequately met. Where less than the standard amount of parking is provided, the left over space is retained as landscaped open space and placed so as to be suited to ready conversion to additional parking, should the use of the site change and/or the actual car parking demand rise.
PC47 On-site vehicle parking is located: a) to allow easy access to building entrances; b) to provide visitor spaces for short term/high turnover use clearly visible from the street and signposted accordingly; c) to be adequately screened from the street; d) compatible with surrounding development and, where possible, facilitating shared use with adjacent land users.	AS47.1 In areas where visual amenity is important and/or where relatively large amounts of parking are provided, parking areas are generally situated to the rear or side of the site. In particular, employee parking is situated at the rear of the site, with staff entrances at the rear of the building. AS47.2 Some parking may be located toward the front of the site convenient to the street, provided it is behind landscaping strips and treated aesthetically. AS47.3 Short term/high turnover visitor parking and disabled parking spaces are located close to the main building entrance and clearly signposted. AS47.4

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	Driveways and parking areas may be constructed to property boundaries and linked to adjoining car parking areas. Similarly, loading areas may be located to facilitate shared turning areas across property boundaries.
LOADING AND UNLOADING	
PC48 All loading and unloading activities take place onsite.	AS48 Loading docks are located in the side or rear portions of the site, separate from public/visitor parking and access points, and screened by vegetation or walls to avoid public view.
PC49 Adequate provision is made for on-site manoeuvring of service vehicle/s.	AS49.1 On sites over 4,000m ² and/or where the uses thereon involve regular servicing by service vehicle/s, on-site service areas are provided. On-site service areas comprise an area of land with an appropriate hard surface to enable a service vehicle/s to turn around within the site (based on standard design turning templates given by AUSTROADS AS 2890.1, 2890.2), and space for additional service vehicle parking and storage requirements. AS49.2 It may be acceptable for two or more developments to share service vehicle/s turning areas.
SITE SERVICING	
PC50 The design and provision of water, stormwater drainage, sewerage, electricity, gas and communications networks meets the needs of industry and business, and provides an orderly and economic progression of service development in the region.	AS50.1 The design and supply of water, stormwater drainage, sewerage, electricity, gas and communication services is in accordance with the requirements of Planning Scheme Policy 11 – Land Development Guidelines and the responsible authority (eg. Telstra, Queensland Electricity Boards, and Queensland Emergency Services). AS50.2 Car park entrances and ramps, loading docks and access ways are minimised, suitably designed and treated to ensure that they do not adversely impact on the streetscape and adjoining development.
PC51 Conflicts between pedestrians and vehicles at entrance points to parking areas are to be minimised.	AS51.1 The number of vehicle entry points to a development site is minimised, particularly in areas which have high volumes of pedestrian traffic and on streets with a significant through road function. AS51.2 Entrance points to parking and loading areas have clear and unobstructed visibility of

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	pedestrian pathway areas, with pedestrian crossing points clearly identified which give priority to pedestrians.
PC52 Development is to be designed to support the functional operation of the cycle network.	AS52 Development is designed to support the functional operation of the local and regional cycleway system. (Local cycle ways will be determined at time of subdivision of each development.)
PUBLIC CONVENIENCE FACILITIES WITHIN BUILDINGS	
PC53 Commercial developments are to include public convenience facilities, where there is a need for their provision.	AS53 Where provided, public toilet facilities are open and readily accessible to the general public during retail trading hours or other trading hours relevant to the development.

SCHEDULE 1:

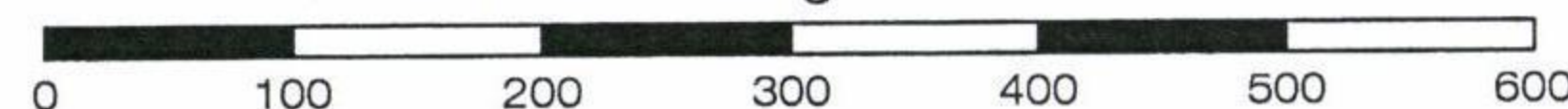
**GENERATIONS INDUSTRIAL PARK LAND USE
CLASSIFICATION PLAN**



LEGEND
 Site Area: 73.114 Ha
 — Limit of Application
 — Major State controlled Roads
 — Proposed northern link to site
 — Possible future industrial collector road

A	LOW IMPACT AND SERVICE INDUSTRY	62.593Ha
B	GENERAL IMPACT AND BUSINESS INDUSTRY	4.0Ha
C	OPEN SPACE / RESERVE	6.521Ha

Scale 1:6000 - Lengths are in Metres.



**development
perspectives**

planning
design
environment
surveying

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land-use stapylton-jacobs well road, stapylton
classification plan generations industrial park

date: 20-06-12
scale: 1:6000
design: GS/SJH
plan: 5093 P 00 10