



HCE Engineers

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Our Ref: 4912-CLS

11 May 2012

Pantex Pty Ltd
PO Box 959
North Lakes QLD 4509

Attention: nathan@pantex.com.au

STAGE 9 - VILLAGE ON BLAIN, BLACKWATER STORMWATER ANALYSIS

**PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 21 / 8 / 12**

Dear Sir,

HCE Engineers have been engaged to investigate stormwater runoff from proposed Stage 9 in regard to inclusion in previous stage design. Stage 9 is proposed within the Village of Blain and includes 7 buildings, a guest laundry linen store as well as additional carparks and hardstand areas. Refer to attached sketch for the proposed layout.

Non-Worsening

A review of the approved Stormwater Management Report prepared in conjunction with MCU approval reference 4045/09 indicates the area of proposed Stage 9 has been included in the stormwater calculations. The area is included within Catchment 2 of the model with a coefficient of runoff representing a developed site.

The report addressed non-worsening and indicated that through the proposed earthworks and channel modification a slight increase in runoff occurs, however there are no adverse impacts on properties external to the site. The previous approval is an explicit acknowledgement of acceptance of the minor flow increase. Accordingly there is no requirement for on-site detention for the Stage 9 development.

Capacity

A review of the previously prepared stormwater design for Stages 5 to 8 by HCE Engineers identifies the runoff from the proposed Stage 9 improvements has already been accounted for. Per the attached design drawings, the area of the proposed Stage 9 improvements has been included within Catchment 4 and within the proposed (now constructed) stormwater infrastructure including underground pipes and a swale.

Conclusion

It can therefore be said that the runoff from the proposed Stage 9 has already been accounted for in regard to demonstrating non-worsening and also in regard to the provision of a lawful point of discharge which has capacity to accept the additional flows.



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Should you have any questions or concerns regarding the above information, please feel free to contact myself.

Yours faithfully,
HCE Engineers

Casey Shea



Stage 9

Refer Drawing 6978-A002 for overall site layout

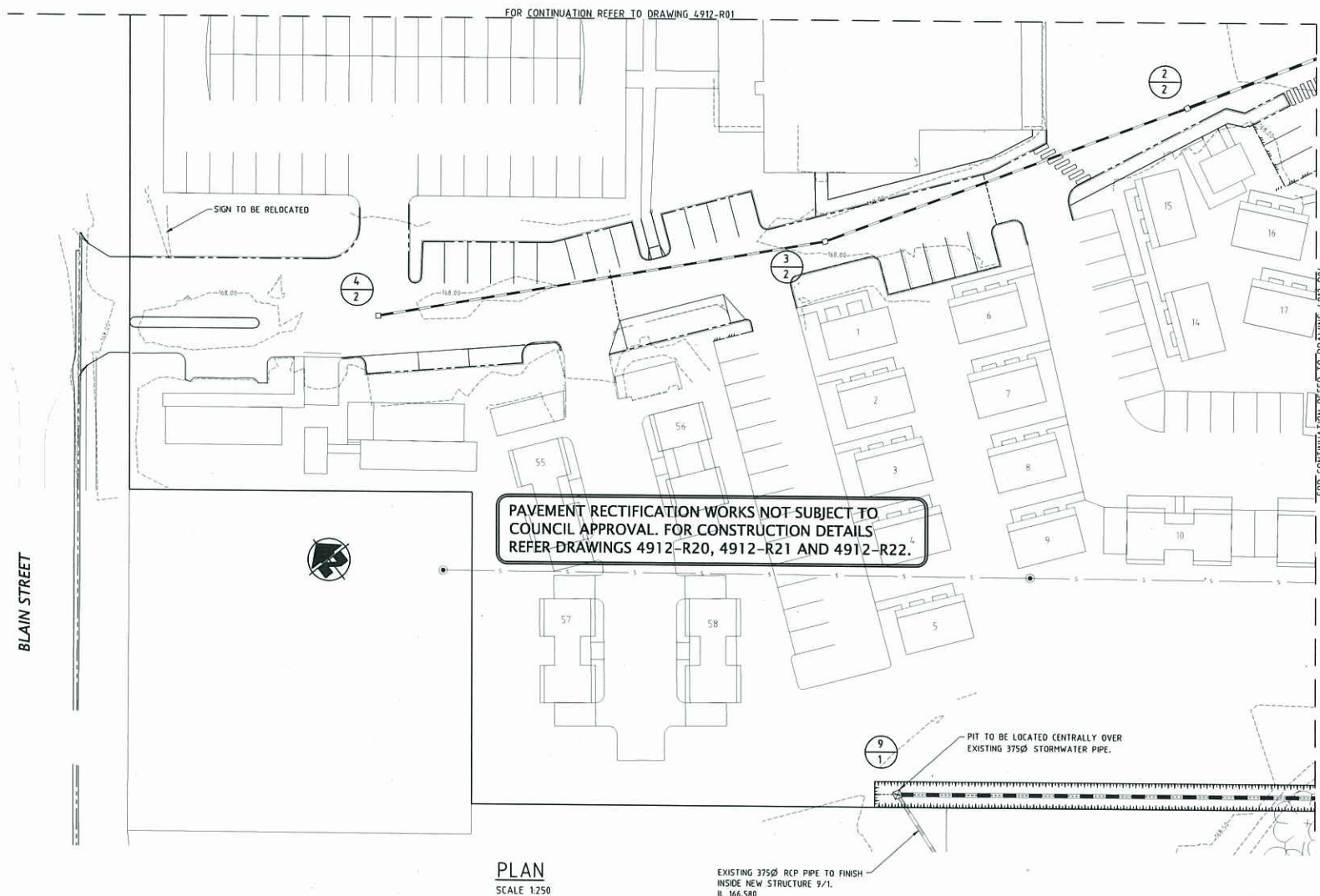
No.	Date	Revision Details	By	App.	Author	Client	Project
1	09.05.12	New layout with Villa rooms	WW			BAV Trust	The Village on Blain Stage 9
2	11.04.12	Layout added, unit orientation	WW				
3	12.05.12	Revised, detail added	WW				



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 NSW Builders License # 196749C

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Drawing Title					
Proposed Site Layout Stage 9	6978-A001	3	Author	Client	Project
NW	Mar 2012	1:200	A1		



THIS DESIGN HAS BEEN PREPARED BASED ON SERVICE AUTHORITY AS CONSTRUCTED INFORMATION. NO POT HOLING HAS BEEN UNDERTAKEN TO VERIFY EXISTING SERVICE LOCATIONS AND DEPTHS. IT IS THE CONTRACTORS RESPONSIBILITY TO UNDERTAKE POT HOLING TO VERIFY THE DESIGN.

SCALE 1:250 (A1)
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REAL PROPERTY DESCRIPTION
LOT 9 ON SP 191842

DO NOT SCALE.
CONFORM ALL DIMENSIONS ON SITE.

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ISSUE	AMENDMENT	DATE
A	ISSUED FOR COUNCIL APPROVAL	02.12.10

LEGEND

---	DESIGN SURFACE CONTOURS
---	BARRIER KERB ONLY

ASSOCIATED CONSULTANT

PROJECT
30 BLAIN STREET
BLACKWATER

CLIENT
PANTEX PTY LTD

TITLE
ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 2 OF 5



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Designed	BE	Drawn	KH	Scale	18.10.10
Approved	<i>[Signature]</i>	Check	AS SHOWN		
Drawing No.	4912-R02				Rev.
					A

FOR CONTINUATION REFER TO DRAWING 4912-R01

FOR CONTINUATION REFER TO DRAWING 4912-R05

EARTH BUND, REFER
DETAIL ON DRG 4912-R09

EMERGENCY ACCESS COMPACTED ROAD
BASE, REFER DETAIL ON DRG 4912-R05

REFER SWALE SECTION
5 ON DRG 4912-R10

FOR BRIDGE PATH DETAIL
REFER STRUCTURAL
DRAWINGS.

REFER SWALE
SECTION 4 ON
DRG 4912-R10

FOR CONTINUATION REFER TO DRAWING 4912-R04

PLAN
SCALE 1:250

• CONDUIT LOCATION SHOWN SCHEMATICALLY. CONDUIT
TO EXTEND 0.5m PAST EDGE OF CONCRETE/PAVEMENT.
REFER TO LANDSCAPE DRAWINGS FOR FURTHER DETAILS

SCALE 1:250 (A1)
10m
(SCALE BEFORE REDUCTION)

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LEGEND

- 0.0 --- PROPOSED SURFACE CONTOURS
- 0.0 --- EXISTING SURFACE CONTOURS
- S --- EXISTING SEWERAGE RETICULATION
- SWD --- EXISTING STORMWATER DRAINAGE
- PROPOSED PAVEMENT AREA, REFER
DETAIL ON R05.
- PROPOSED CONCRETE AREA, REFER
ARCHITECTURAL DRAWINGS.
- 100Ø ØPVC IRRIGATION
CONDUIT ---
- FALL → DIRECTION OF FALL
- RAINWATER TANK *
- RAINWATER TANK
- SS --- PROPOSED SUBSOL DRAIN
- CP CLEAN OUT POINT

ASSOCIATED CONSULTANT

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30 BLAIN STREET
BLACKWATER

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TITLE
ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 3 OF 5



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Designer	BE	Drawn	KH	Date	18.10.10
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Drawing No.	4912-R03				A

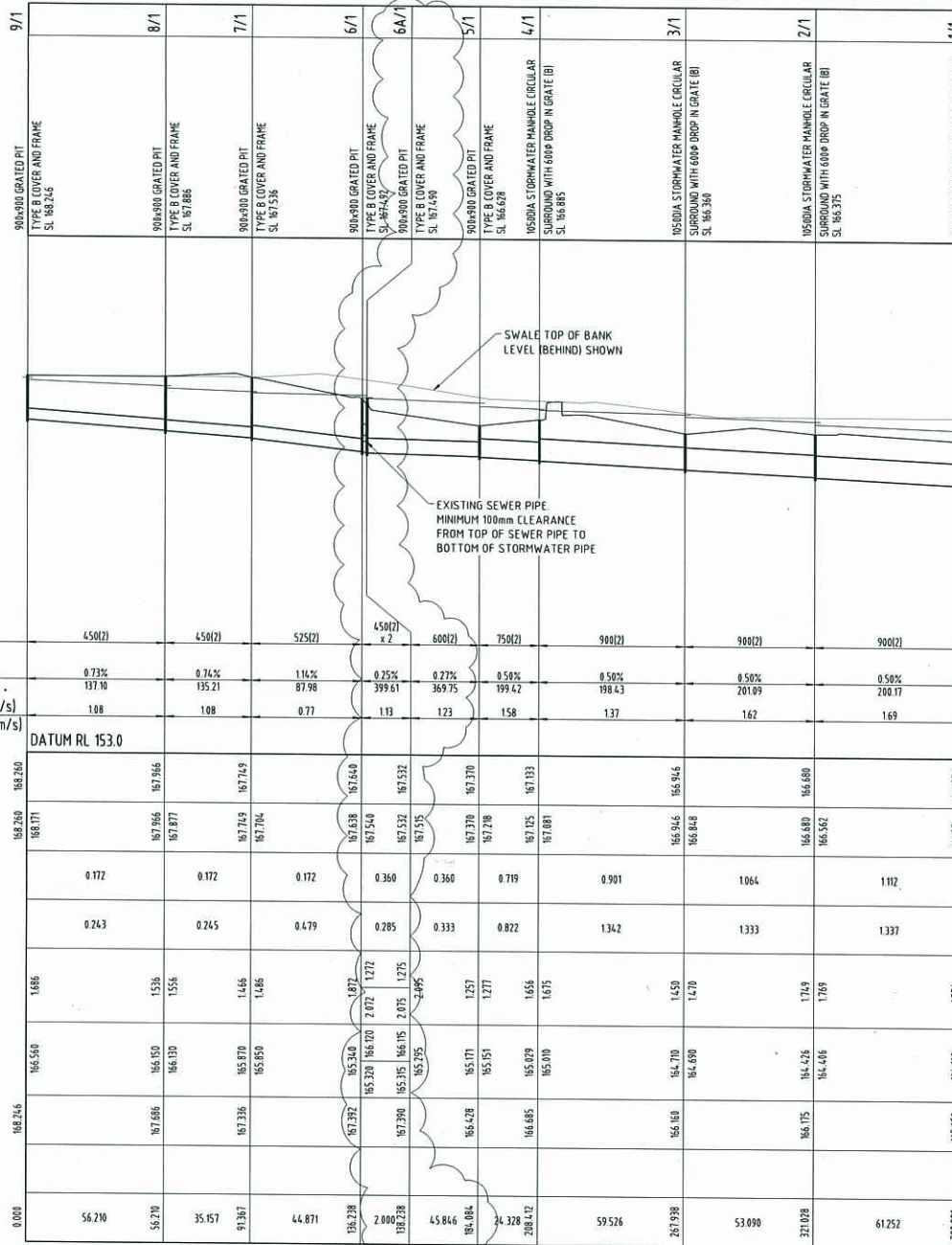
STRUCTURE NAME
STRUCTURE DESCRIPTION

PIPE SIZEmm (Class)
 PIPE GRADE %
 PIPE SLOPE 1 in X
 FULL PIPE FLOW VELOCITY (m/s)
 PART FULL FLOW VELOCITY (m/s)

WATER LEVEL IN STRUCTURE
HYDRAULIC GRADE LEVEL
PIPE FLOW (Cumecs)
PIPE CAPACITY AT GRADE (Cumecs)
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
DESIGN SURFACE LEVEL
ROAD CHAINAGE (Offset)
RUNNING CHAINAGE

LINE

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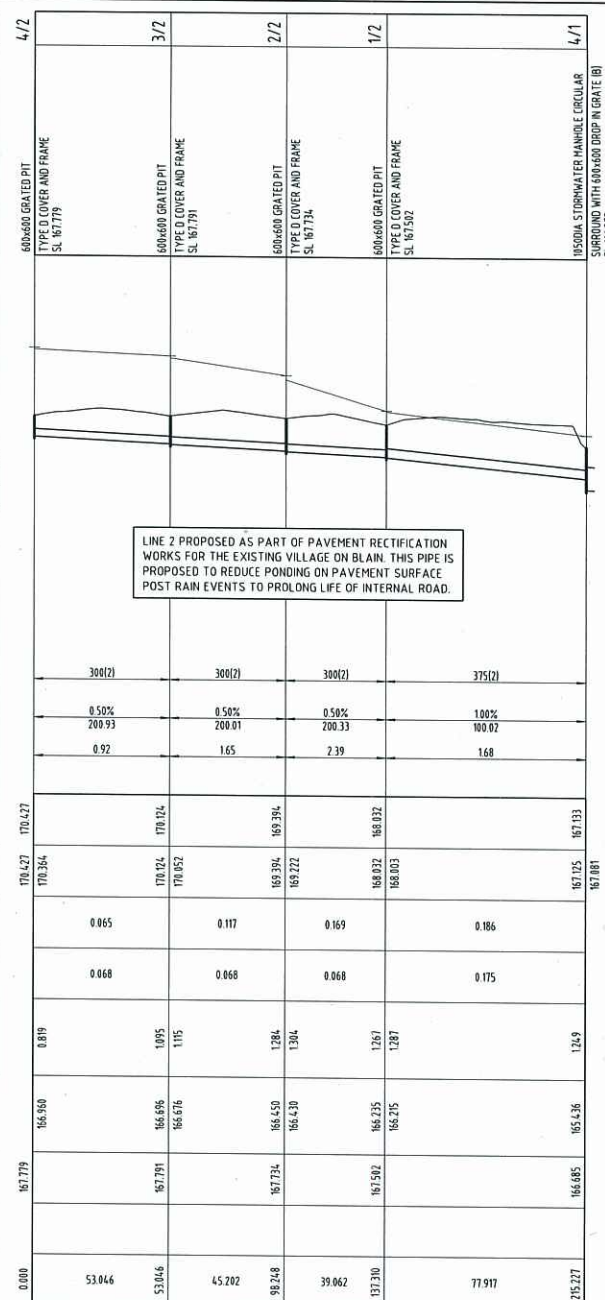
LONGITUDINAL SECTION

VERTICAL SCALE 1:100
 HORIZONTAL SCALE 1:1000

SCALE 1:100 (A1)
 (SCALE BEFORE REDUCTION)

SCALE 1:1000 (A1)
 (SCALE BEFORE REDUCTION)

REAL PROPERTY DESCRIPTION
 LOT 9 ON SP 191842



ISSUE	AMENDMENT	DATE
A	ISSUED FOR COUNCIL APPROVAL	02.12.10
B	PIPE GRADES AMENDED	27.01.11
C	SURFACE LEVELS AMENDED	28.01.11
D	STRUCTURE 8A/1 ADDED	15.02.11

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PROJECT
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 BLACKWATER

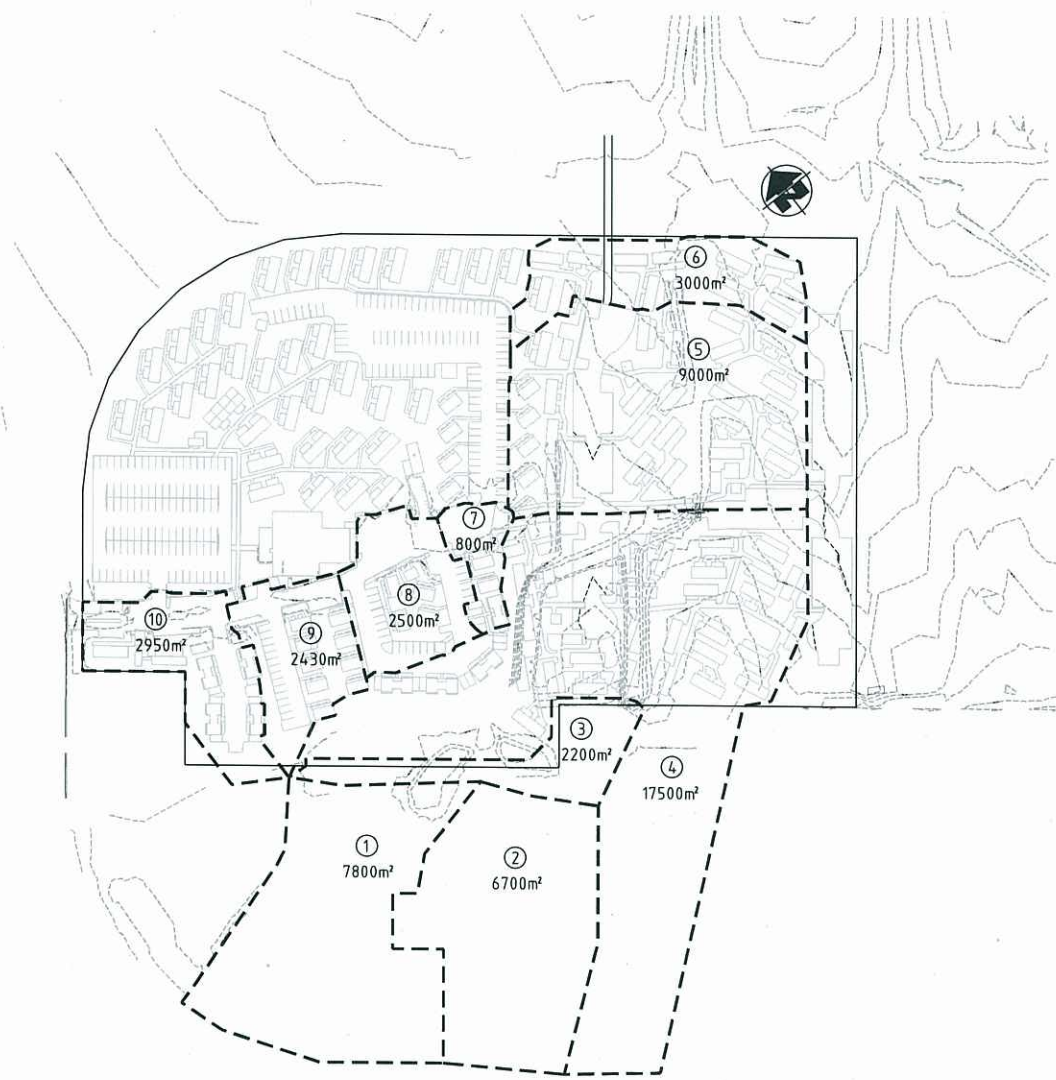
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TITLE
 STORMWATER LONGITUDINAL
 SECTION

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Designed: BE Drawn: KH
 Approved: [Signature] Scale: AS SHOWN
 Drawing No: 4912-R06 Rev: D



CATCHMENT PLAN
SCALE 1:1000

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

REAL PROPERTY DESCRIPTION
LOT 9 ON SP 191842

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PROJECT
30 BLAIN STREET
BLACKWATER

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TITLE
STORMWATER
CATCHMENT PLAN

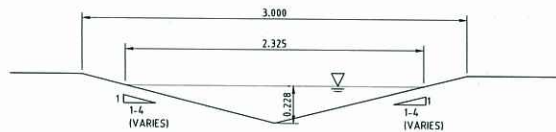


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Drawing No.	4912-R07				



TYPICAL SWALE SECTION 1
SCALE 1:20

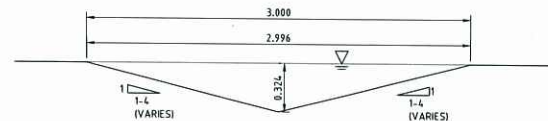
**OVERLAND FLOW SWALE 1
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	0.188
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.250
RH SIDE SLOPE (m/m)	0.000

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.228
TOP WIDTH (m)	2.325
VELOCITY (m/s)	0.586
VD PRODUCT (m ² /s)	0.134



TYPICAL SWALE SECTION 2
SCALE 1:20

**OVERLAND FLOW SWALE 2
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	0.389
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.250
RH SIDE SLOPE (m/m)	0.250

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.324
TOP WIDTH (m)	2.996
VELOCITY (m/s)	0.706
VD PRODUCT (m ² /s)	0.229

NOTE:
SWALE SECTIONS FROM CH
60.000-70.000 AND 140.000-150.000
TRANSITION BETWEEN PROFILES.

**OVERLAND FLOW SWALE 3
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	0.784
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.330
RH SIDE SLOPE (m/m)	0.330

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.530
TOP WIDTH (m)	3.972
VELOCITY (m/s)	0.888
VD PRODUCT (m ² /s)	0.471

**OVERLAND FLOW SWALE 4
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	0.949
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.160
RH SIDE SLOPE (m/m)	0.160

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.436
TOP WIDTH (m)	5.451
VELOCITY (m/s)	0.790
VD PRODUCT (m ² /s)	0.348

**OVERLAND FLOW SWALE 5
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	0.990
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.160
RH SIDE SLOPE (m/m)	0.160

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.373
TOP WIDTH (m)	5.663
VELOCITY (m/s)	0.803
VD PRODUCT (m ² /s)	0.300

**OVERLAND FLOW SWALE 5 (WORST CASE)
HYDRAULICS (MANNING'S EQUATION)**

Q₁₀₀ CHANNEL PROPERTIES

DESIGN Q (m ³ /s)	2.100
MANNING'S n	0.045
LONG. SLOPE (m/m)	0.010
BASE WIDTH (m)	0.000
LH SIDE SLOPE (m/m)	0.160
RH SIDE SLOPE (m/m)	0.160

CHANNEL FLOW CONDITIONS

DEPTH (m)	0.587
TOP WIDTH (m)	7.343
VELOCITY (m/s)	0.974
VD PRODUCT (m ² /s)	0.572

STORMWATER DRAINAGE NOTES

- LEVELS TO AHD.
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON-SITE BEFORE WORK COMMENCES.
- DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWING.
- DURING CONSTRUCTION BARRIERS, LIGHTS & SIGNS SHALL BE MAINTAINED TO ENSURE SAFE PASSAGE OF TRAFFIC AND PEDESTRIANS IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY.
- ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH LOCAL AUTHORITIES CURRENT SPECIFICATIONS AND STANDARDS.
- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH S.A.A. CODES & BY-LAWS AND ORDINANCES OF THE RELEVANT LOCAL AUTHORITY AND WORKPLACE HEALTH AND SAFETY REQUIREMENTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL RELEVANT AUTHORITIES AND PAYING ALL FEES NECESSARY BEFORE COMMENCING WORK, FOR LOCATING ALL EXISTING SERVICES AND FOR REPAIR OF ANY SERVICES DAMAGED AS A RESULT OF THE WORKS.
- FOOTPATHS AND PRIVATE PROPERTY SHALL BE REINSTATED TO THEIR ORIGINAL CONDITION.
- THE CONTRACTOR'S ATTENTION IS DRAWN TO THE REQUIREMENTS OF THE WORKPLACE HEALTH AND SAFETY ACT 1995. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THIS ACT AND IN PARTICULAR THE CONTRACTOR IS TO ENSURE THE REQUIREMENTS OF THIS SPECIFICATION WITH REGARD TO NOTIFICATION IN RELATION TO A NOTIFIABLE PROJECT, ARE FULFILLED.
- ALL GULLIES TO BE LIP IN LINE TYPE IN ACCORDANCE WITH BEC STANDARD DRAWING UMS 330.
- PIPES SHALL NOT BE LAID WITHIN THE ZONE OF INFLUENCE OF STRUCTURAL LOADINGS UNLESS BRIDGING OF THE LOAD IS PROVIDED. ANY BRIDGING IS TO BE DESIGNED BY A RPEO.
- BENCHING OF PIT STRUCTURES SHALL HAVE A SMOOTH FINISHED SURFACE, AND PIPES SHALL NOT PROJECT INSIDE THE SHAFT OF THE PIT.
- ALL ROOFWATER OUTLETS TO KERB TO BE MADE WITH FULL WEIGHT KERB ADAPTOR IN ACCORDANCE WITH BEC STD DRG. No. UMS 354.

NOTE:

- FOLLOWING STORMS, THE ROAD RESERVE AND SEDIMENT BARRIERS ARE TO BE INSPECTED AND ALL SEDIMENT RESIDUES ARE TO BE REMOVED.
- OPEN PIPES AND GULLY PITS DURING CONSTRUCTION ARE TO BE CAPPED OR PLUGGED (SOLID OR FILTER CLOTH) AT THE END OF EACH DAYS WORK.
- ROAD EFFECTED BY WORKS ARE TO BE KEPT CLEAN. MATERIAL IS TO BE SWEEPED FROM ROAD SURFACE.
- REPAIR ANY DAMAGE TO EXISTING KERB AND CHANNEL, FOOTPATH OR ROADWAY THAT MAY OCCUR DURING ANY WORKS CARRIED OUT WITH THE APPROVED DEVELOPMENT.

* SWALE 5 - WORST CASE SCENARIO DEMONSTRATED AND CALCULATED BASED ON Q₁₀₀ FLOWS AND USING THE ASSUMPTION THAT ALL PIPE DRAINAGE IS 100% FULL OR BLOCKED. THIS DEMONSTRATES THAT THE Q₁₀₀ OVERLAND FLOW UNDER EXTREME CIRCUMSTANCES IS STILL WHOLLY CONTAINED WITHIN THE SWALE.

SCALE 1:20 (A1)
SCALE BEFORE REDUCTION

REAL PROPERTY DESCRIPTION
LOT 9 ON SP 191842

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ISSUE	AMENDMENT	DATE
A	ISSUED FOR COUNCIL APPROVAL	02.12.10

ASSOCIATED CONSULTANT

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**30 BLAIN STREET
BLACKWATER**

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PANTEX PTY LTD

TITLE
**SWALE CROSS SECTIONS
CALCULATIONS AND NOTES**



HCE Engineers

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Approved	<i>[Signature]</i>	Checked	<i>[Signature]</i>	AS SHOWN	
Drawing No.	4912-R10				Rev. A