8 August 2024

[redacted]

Attention: [redacted]

Dear [redacted]

RE: PC24093 – Lot 25 Stirling Crescent, Hazelmere, WA
Stormwater Disposal Strategy & Management Plan

In response to DBCA's comments on the initial SMP submission made on the 30 May 2024, we have updated the SMP to address DBCA and council comments and provide a response schedule in **Appendix D.**

We can confirm that the stormwater retention and storage systems within the above development sites have been designed to accommodate the stormwater runoff from the site footprint being the entire lot area as noted (designed in accordance with AS/NZS3500.3) and as shown in **Figure 1** below and in accordance with the discussions with recent DWER as noted below.

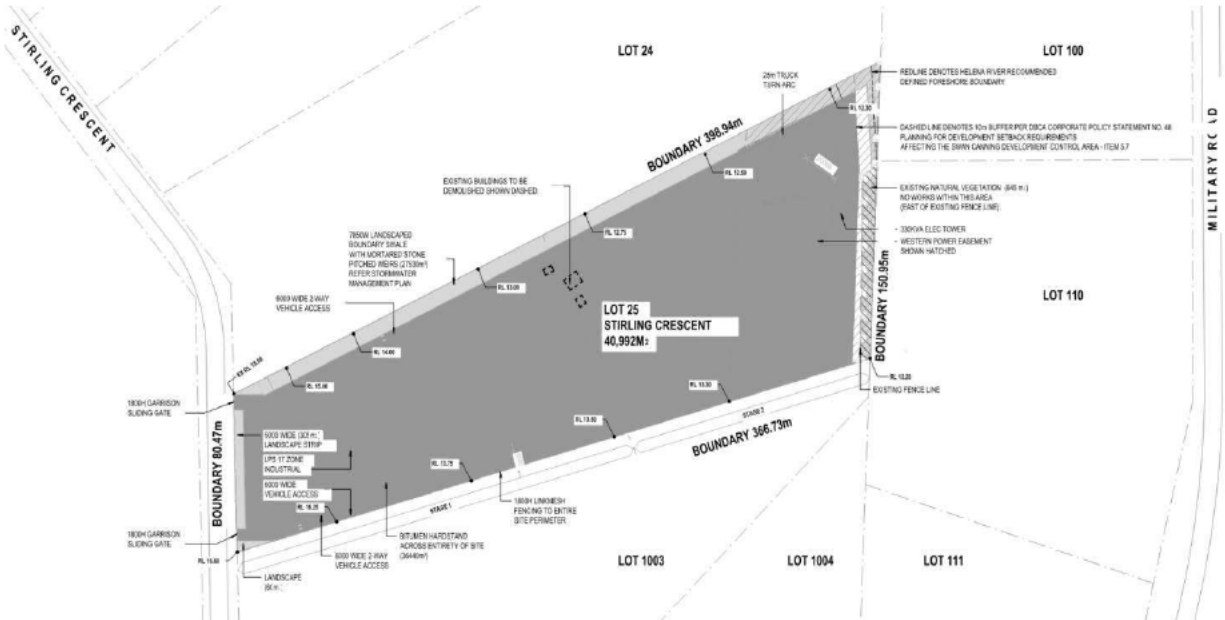
It is understood that DWER have advised to allow the follow discharge criteria:

- On site detention up to the 1 in 5 year event allowing for predevelopment discharge via the existing outlets from the site.
- Outflows for events above the 1 in 5 yr are allowed to discharge via existing outfalls to the external road network and utilising existing river foreshore outfalls.

In addition to the above, the following additional criteria has been applied to the Stormwater Strategy design :

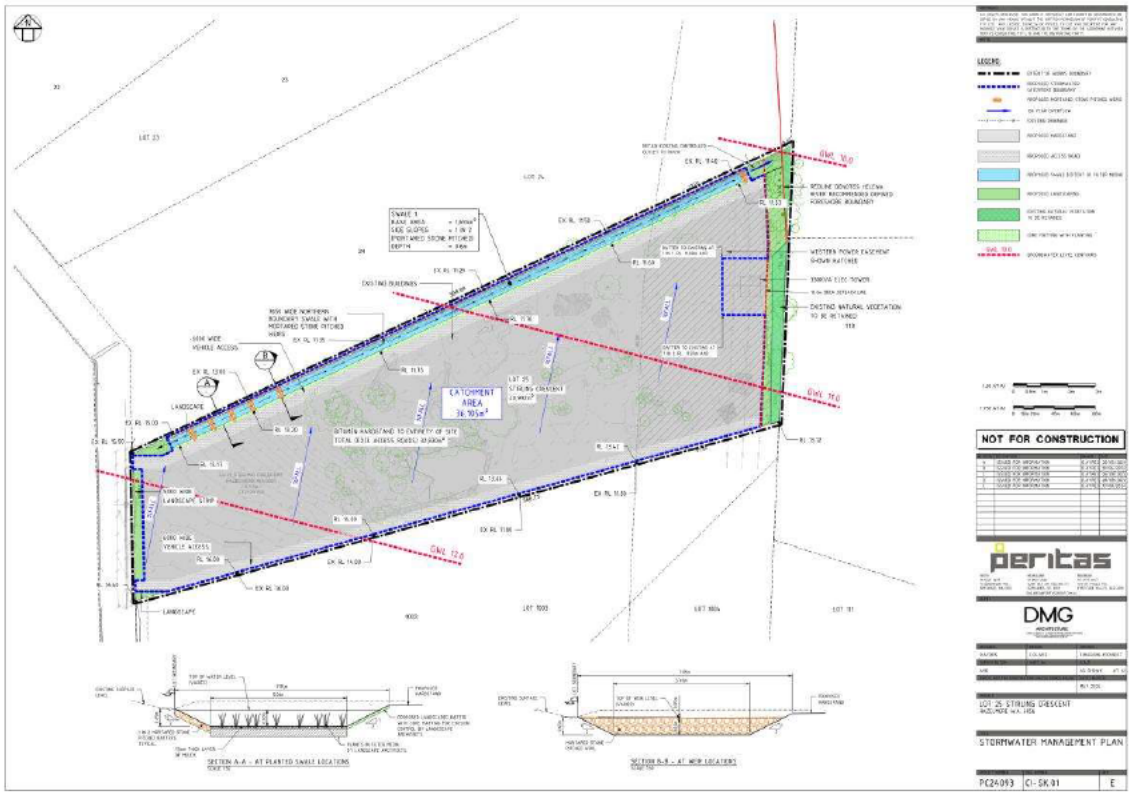
- Incorporated Water Quality Measures (15mm treatment for runoff from paved areas)

Figure 1 – Development Plan



PERTH
MELBOURNE
BRISBANE
74 Goodwood Parade, Burswood WA 6100
Suite 704 St Kilda Rd Towers - 1 Queens Rd Melbourne VIC 3004
Lv 38, 71 Eagle Street, Brisbane QLD 4000
T +61 8 6336 9299
T +61 3 8657 9292
T +61 7 3074 0157
www.peritasgroup.com.au
enquiries@peritasgroup.com.au

Figure 2 – Proposed SMP Catchment Area



1.0 BASIS OF DESIGN

- Proposed Stormwater Strategy requires Lot 25 to detain and treat the 20% AEP storm event.
- Soakage Rate available based on site fill: 2 m / day.
  gn: **No soakage** on site was allowed for the detention volumes calculations.

[redacted]

y providing for the first flush volume event within the detention
ardstand area and discharging to the landscaped swale and
ed in the stormwater system.
cteristics will apply to the design:

unoff Coefficient **C = 0.25**
Runoff **C = 0.889**

Based on AS/NZS 3500 the following catchments areas have been assessed and allocated to the design analysis.

2.0 PREDEVELOPMENT FLOWS

The basis of the calculation of the pre-development flows is based on the following criteria:

Site Area	= 40,992 m2
Site Area (Gross less accessible Power Easement)	= 36,440 m2
Rural Runoff coefficient	= 0.25 (Rural Catchment)

TOTAL IMPERMEABLE AREA = 9,890 m2

The outflow from the site is to be limited to a pre-development flow calculated below.

Q_5 = 2.78 x C x I x Aimp
using a time of concentration of 10 mins (Toc 10 mins = Intensity $_{5yr}$ 76.8 mm/hr)

$Q_{Allowable}$ Using 10 min Toc the Q_{20} = 2.78 x 0.25 x (36,440 / 10,000) x 76.8 mm/hr **= 194.5 litres /s**
(Say 195 L/s for site outflow)

The existing outfall to the river is via a DN 750 mm pipe culvert which will has a nominal outlet capacity of **350 litres per second.**

Therefore, we have **adopted a restricted allowable outflow of 195 Litres per second** for the allowable pre-development outflow.

3.0 POST DEVELOPMENT REGIME

The basis of the calculation of the post-development volumes is to consider the proposed hardstand pavements providing for pre-development flows as the allowable outlet discharge conditions based is based on the following catchment criteria:

Site Area (Gross)	= 40,992 m2
Site Area including swale	= 39,558 m2
Hardstand Pavement area	= 36,440 m2

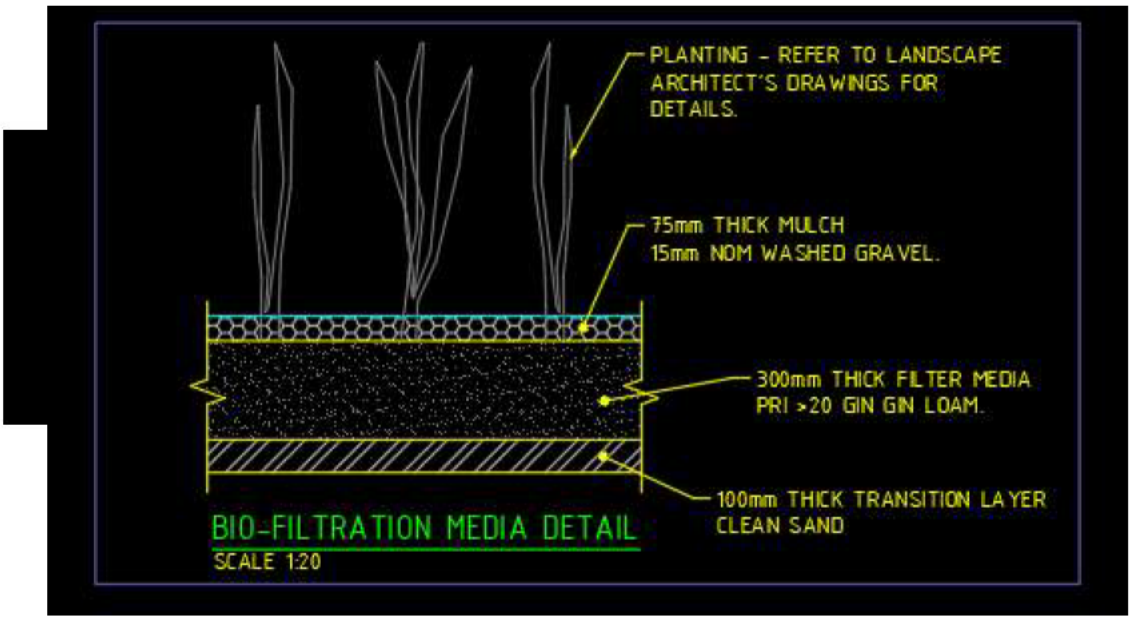
The minimum Impermeable Area (Gross less landscaping)= 36,440 m2
Indicative Post Development Runoff Coefficient **C = 0.889 (Based on unsealed hardstand).**

TOTAL IMPERMEABLE AREA = 40,992 x 0.89 = 36,440 m2
Use 36,440 m2.

For the purpose of maintaining water quality the swale will be planted with unirrigated littoral planting in the base (the area inundated in a 15mm or 1 EY event), surrounded by unirrigated tube stock. Shrubs are to be planted against sides directly adjacent to hardstand areas to assist in erosion control.

Soil amendment will be provided in the 1EY area of the swale to consist of higher PRI soils (>20 PRI) for phosphorus removal. The soil amendment/ filter layer will have a minimum depth of 0.3m.

Figure 3 – Typical Bio-retention soil amendment section at base of swale.



The minimum requirements would be to allow for the following:

Minimum area for treatment required (nominal 2% of impermeable pavement areas) = 0.02 x 36,440 m3 = **728.8 m2 (Area provided = 1,825 m2)**

Lot 25 is able to provide in excess of the above and has also the capacity to provide storage for the first flush 15 mm runoff within the swales.

Based on the above water quality & treatment criteria the minimum size of on-site storage is to be 36,440 m2 x 15 mm = **546.6 m3** (without freeboard)

The site has provided a total detention storage of 1,158.2 m3 including freeboard. (Refer to Appendix A for calculations).

Based on also accommodating the 1 in 20Yr (5% AEP) event with an allowable outflow from the site (195 litres/sec for the critical storm event), the on-site storage required in the swale is 1,048.5 m3. The provision of the first flush volume (547 m3) is more than accommodated in the provided the swale storage.

As the swale is 0.6m deep nominally, it has a freeboard of some 0.10m minimum to overtopping. A check of the 1% AEP event confirms that the swale freeboard can also accommodate storage and conveyance in the swale up to the 1% AEP event without flooding of the site.

A 1 in 100yr overflow path provision will be retained as exists now which overflow in the North-east corner of the site.

For Storage Calculations refer to Appendix A.

For sketches of storage locations refer to Appendix B.

4.0 DETENTION TIME CALCULATIONS

Swales should be wide enough to convey water flows at a velocity that does not cause erosion and facilitates infiltration and sedimentation (note that the width of a swale refers to the distance between the outer banks of the swale).
Some studies suggest a residence time of 5-6 minutes to enhance the trapping efficiency of a swale is recommended [Winston, RJ, Anderson, AR & Hunt, WF (January 2017), 'Modeling Sediment Reduction in Grass Swales and Vegetated Filter Strips Using Particle Settling Theory', Journal of Environmental Engineering. [online], vol. 143, no. 1, p. 04016075.]

Calculated detention times for the storage volumes and flows noted in the SMP system calculations are summarised in the **Table 4.1** below and conform to the above recommendations.

Table 4.1 - Retention Time Calculations

Retention Time = Volume / Qinflow - Qoutflow

Area (m2)= 40,992 Area Impervious (m2)= 36,440

Tc (mins)	Intensity (100yr)	Q m3 /sec (Inflow Rate)	Q m3 /sec (Outflow Rate)	Volume Stored m3 (100 yr)	Retention Time (mins) = Vol/(Qin - Qout)
6	200	2.03	0.195	714	6.50
9	165	1.67	0.195	873	9.85
10	154	1.56	0.195		-
12	144	1.46	0.195	993	13.10
15	129	1.31	0.195	1088	16.31
20	101	1.02	0.195	1213	24.41
30	77.4	0.78	0.195	1389	N/A
45	63	0.64	0.195	1564	N/A
60	48.3	0.49	0.195	1687	N/A
120	29.7	0.30	0.195	2111	N/A
180	22.3	0.23	0.195	2391	N/A
360	13.8	0.14	0.195	2952	N/A
600	10.4	0.11	0.195	3387	N/A
720	8.74	0.09	0.195	3657	N/A
1440	5.73	0.06	0.195	4876	N/A
2880	5.73	0.06	0.195	6352	N/A
3600	3.8	0.04	0.195	6839	N/A
4320	2.89	0.03	0.195	7226	N/A

Compliance Statement

We provide the following statement of design compliance for your review.

Criteria number	Description	Manner in which compliance is achieved
SW1	Retain the 20% AEP rainfall event on site with first 15mm first flush treatment.	Storage provided on site (1.158.2 m3 with freeboard) on site to accommodate 1 in 5 year (20% AEP) and the 1 in 100 yr (1% AEP) rainfall events for the critical storm with First Flush storage (15mm) of 547 m3 and utilising the existing outlet control to existing network. The swale provided can accommodate conveyance of the 1% AEP event without flooding the handstand.
SW2	Detain the 1% AEP rainfall event on site with first 15mm first flush treatment.	Storage provided on site (1.158.2 m3 with freeboard) on site to accommodate the 1 in 100 yr (1% AEP) rainfall events for the critical storm with First Flush storage (15mm) of 547 m3 and utilising the existing outlet control to existing network. The swale provided can accommodate conveyance of the 1% AEP event without flooding the handstand.

Should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully,

[redacted]

Encl: Appendices A to D (Drainage storage Calculations & Supporting Design Sketches & Response Schedule)

APPENDIX A - DRAINAGE CALCULATIONS & RELATED DATA

Calculations

Catchment areas (Refer to Sketches below further down in this Appendix)
1%AEP Calculation (1 in 100yr Storm Event)

Storage Soakage Calculator

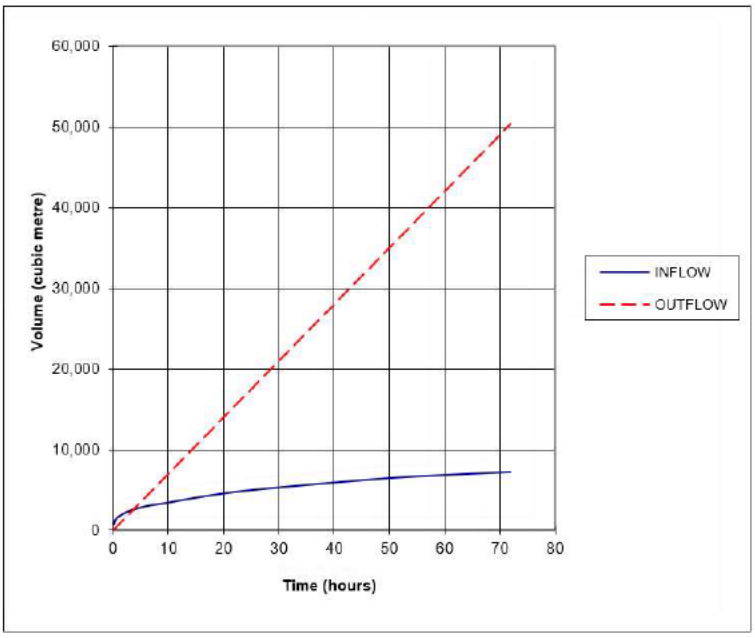
Catchment Area Description : North Hardstand Swale | Project Name : Lot 25 Stirling Crescent | Date : 8/08/2024

Location	Perth	Soil Type	No Soakage	Catchment Area	40,992 m²	Critical Time	37 min		
		Soakage Rate	0.0 m/s	Run-off Coeff	0.89	Soakage Area	2,035.8 m²		
Storm Event	100 year	Rate Override	0 m/s	Pavement Area (m2)	36,440 m²	Volume Required	1,048.5 m³	(Other than for treatment requirements)	
		→	0.0 m³/s	Vol at 350m3/ha	N/A	Sub - Total Volume	1,158.2 m³		
		Other Outlet	0.195 m³/s	Vol at 15mm (m3)	546.6	Difference	-109.8 m3		
				Depth at 15mm (m)	0.29951	Less Pavement Ponding	0.0 m³	300	Pipe Diam (mm)
				2% Area for Bio (m2)	728.8	Less Pipe Storage	0.0 m³	0	Pipe Length (m)
						Total Volume Provided	1,158.2 m³	268.4	

SOAKWELL	SIZE 1	SIZE 2	SIZE 3	SWALE 1	SWALE 2			STORMTECH	SC-310
Diameter	1.8 m	1.20 m	0.6 m	Base Area	1,825 m²	Base Area	0 m²	Units High	0	Rows	0
Depth	1.8 m	0.9 m	0.9 m	Side Slope (1 in _)	2.0	Side Slope (1 in _)	0.0	Units Wide	0	Units per Row	0
Number	0	0	0	Storage Depth	0.600 m	Storage Depth	0.000 m	Units Long	0	Stone Cover	0.15
Stone Wrap	0.00 m	0.00 m	0.00 m	Freeboard	-0.100 m					Stone Voids	0.40
Stone Voids	0.40	0.40	0.40								
Infiltration Area	0.0 m²	0.0 m²	0.0 m²	Infiltration Area	2035.8 m²	Infiltration Area	0.0 m²		0.0 m²	Infiltration Area	0.0
Storage Volume	0.0 m³	0.0 m³	0.0 m³	Storage Volume	1158.2 m³	Storage Volume	0.0 m³		0.0 m³	Storage Volume	0.0
										Footprint	0.6

CATCHMENT AREA: North Hardstand Swale

TIME	INFLOW	OUTFLOW		STORAGE
		Ground Infiltration	Allowable Outlet	
	m³	m³	m³	m³
6 min.	714	0	70	714
9 min.	873	0	105	768
12 min.	993	0	140	853
15 min.	1,088	0	175	913
20 min.	1,213	0	233	979
30 min.	1,389	0	350	1,039
45 min.	1,564	0	525	1,039
1 hour	1,687	0	700	986
2 hours	2,111	0	1,400	710
3 hours	2,391	0	2,101	291
6 hours	2,952	0	4,201	-1,249
10 hours	3,387	0	7,002	-3,615
12 hours	3,657	0	8,402	-4,745
24 hours	4,876	0	16,805	-11,929
48 hours	6,352	0	33,610	-27,258
60 hours	6,839	0	42,012	-35,173
72 hours	7,226	0	50,414	-43,189



Storage in swale 1%AEP Calculation (1 in 100yr Storm Event)
Storage Provided = 1,158.2 m3 plus freeboard storage.

Total Storage Volume Required (refer to above calculation sheets) = 1048.5 m3 (including First Flush Treatment)

Total Storage Volume Provided = 1,158,2 m3

Catchment areas (Refer to Sketches below further down in this Appendix)

20%AEP Calculation (1 in 5yr Storm Event)

Storage Soakage Calculator

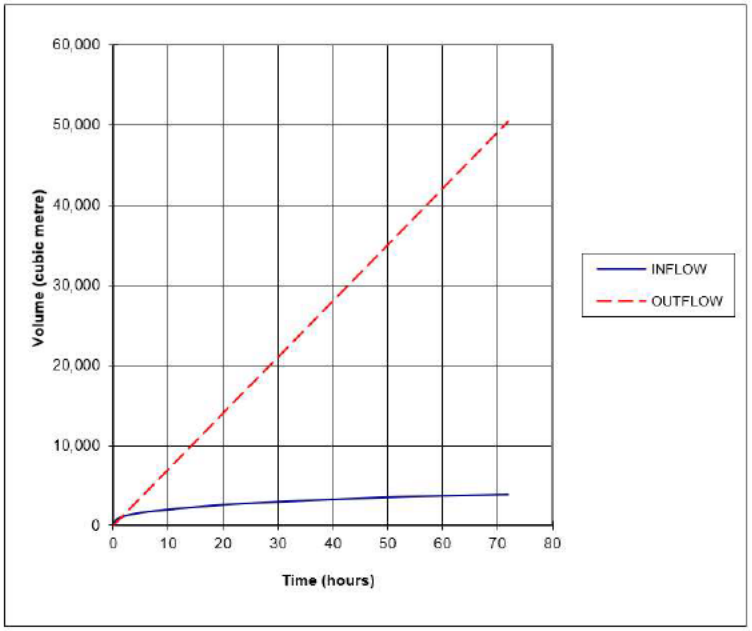
Catchment Area Description : North Hardstand Swale | Project Name : Lot 25 Stirling Crescent | Date : 8/08/2024

Location	Perth	Soil Type	No Soakage	Catchment Area	40,992	m²	Critical Time	22 min	
		Soakage Rate	0.0	m/s	Run-off Coeff	0.89		Soakage Area	2,035.8	m²	
Storm Event	5 year	Rate Override	0	m/s	Pavement Area (m2)	36,440	m²	Volume Required	392.2	m³	(Other than for treatment requirements)
		→	0.0	m³/s	Vol at 350m3/ha	N/A		Sub - Total Volume	1,158.2	m³	
		Other Outlet	0.195	m³/s	Vol at 15mm (m3)	546.6		Difference	-766.1	m3	
					Depth at 15mm (m)	0.29951		Less Pavement Ponding	0.0	m³	300 Pipe Diam (mm)
					2% Area for Bio (m2)	728.8		Less Pipe Storage	0.0	m³	0 Pipe Length (m)
								Total Volume Provided	1,158.2	m³	268.4

SOAKWELL	SIZE 1		SIZE 2		SIZE 3		SWALE 1		SWALE 2				STORMTECH	SC-310
Diameter	1.8	m	1.20	m	0.6	m	Base Area	1,825 m²	Base Area	0 m²	Units High	0	Rows	0
Depth	1.8	m	0.9	m	0.9	m	Side Slope (1 in _)	2.0	Side Slope (1 in _)	0.0	Units Wide	0	Units per Row	0
Number	0		0		0		Storage Depth	0.600 m	Storage Depth	0.000 m	Units Long	0	Stone Cover	0.15
Stone Wrap	0.00	m	0.00	m	0.00	m	Freeboard	-0.100 m					Stone Voids	0.40
Stone Voids	0.40		0.40		0.40									
Infiltration Area	0.0	m²	0.0	m²	0.0	m²	Infiltration Area	2035.8 m²	Infiltration Area	0.0 m²		0.0 m²	Infiltration Area	0.0
Storage Volume	0.0	m³	0.0	m³	0.0	m³	Storage Volume	1158.2 m³	Storage Volume	0.0 m³		0.0 m³	Storage Volume	0.0
													Footprint	0.5

CATCHMENT AREA: North Hardstand Swale

TIME	INFLOW	OUTFLOW		STORAGE
		Ground Infiltration	Allowable Outlet	
	m³	m³	m³	m³
6 min.	347	0	70	347
9 min.	431	0	105	326
12 min.	497	0	140	357
15 min.	551	0	175	376
20 min.	624	0	233	391
30 min.	731	0	350	381
45 min.	844	0	525	319
1 hour	926	0	700	226
2 hours	1,179	0	1,400	-222
3 hours	1,349	0	2,101	-752
6 hours	1,694	0	4,201	-2,507
10 hours	1,991	0	7,002	-5,011
12 hours	2,135	0	8,402	-6,268
24 hours	2,771	0	16,805	-14,033
48 hours	3,509	0	33,610	-30,100
60 hours	3,742	0	42,012	-38,270
72 hours	3,920	0	50,414	-46,494



20%AEP Calculation (1 in 5yr Storm Event)

Storage in swale

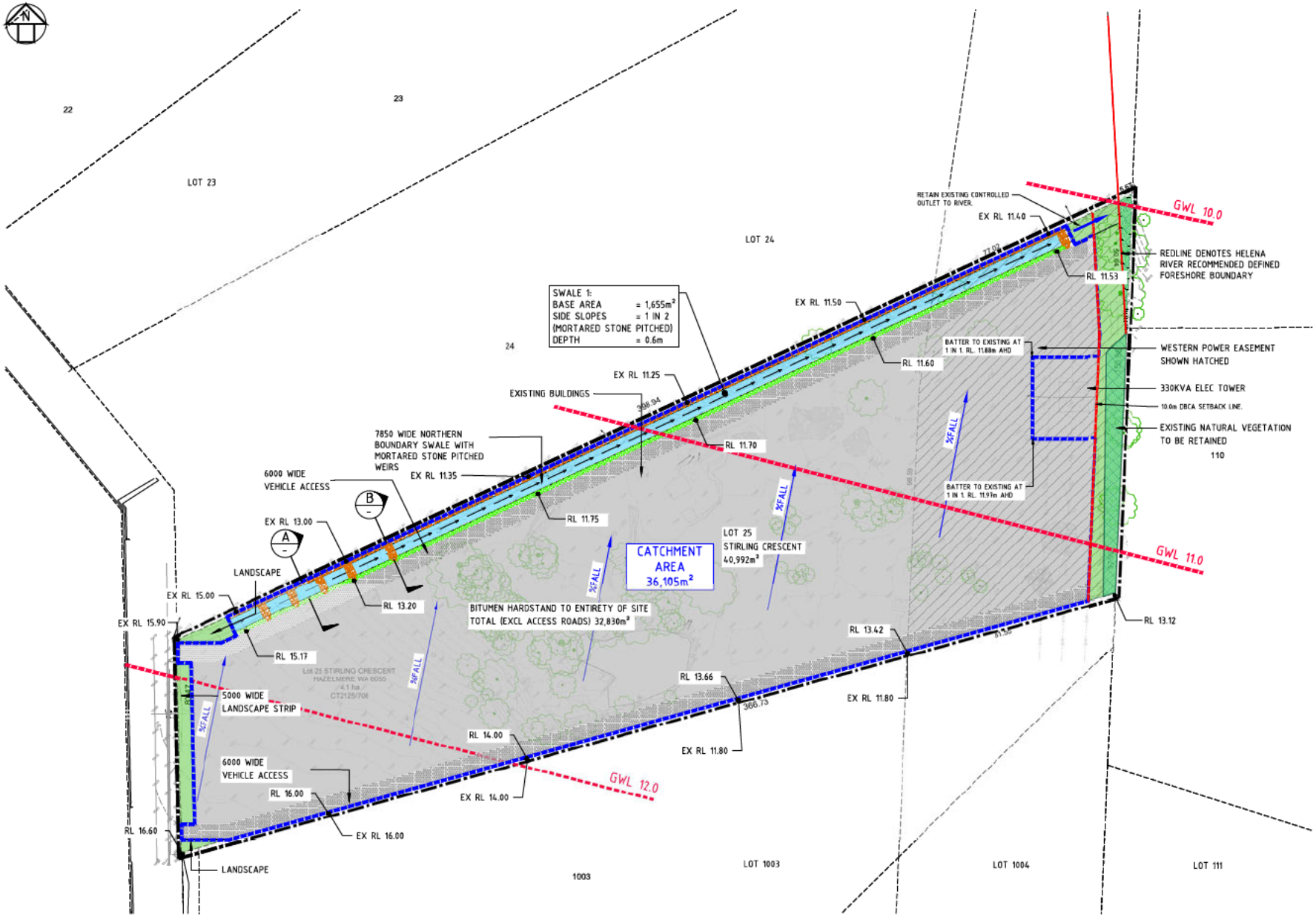
Storage Provided = 1,158.2 m3 plus freeboard.

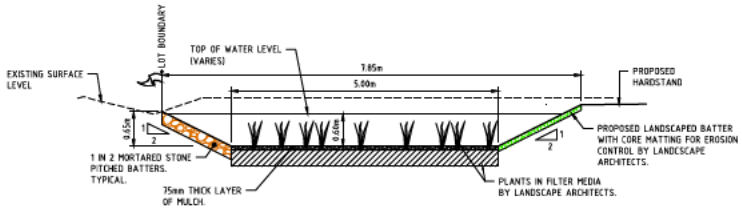
Total Storage Volume Required (refer to above calculation sheets) = 546.6 (First Flush Treatment)

Total Storage Volume Provided = 1,158.2 m3

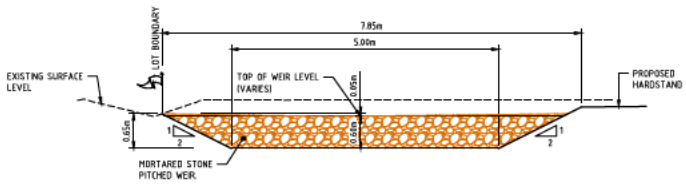
APPENDIX B - SUPPORTING DESIGN SKETCHES

(Refer to full size plans below)





SECTION A-A - AT PLANTED SWALE LOCATIONS
SCALE 1:50



SECTION B-B - AT WEIR LOCATIONS
SCALE 1:50

NOTES:

LEGEND:

- EXTENT OF WORKS BOUNDARY
- PROPOSED STORMWATER CATCHMENT BOUNDARY
- PROPOSED MORTARED STONE PITCHED WEIRS
- 100 YEAR OVERFLOW
- EXISTING DRAINAGE
- PROPOSED HARDSTAND
- PROPOSED ACCESS ROAD
- PROPOSED SWALE (EXTENT OF FILTER MEDIA)
- PROPOSED LANDSCAPING
- EXISTING NATURAL VEGETATION TO BE RETAINED
- CORE MATTING WITH PLANTING
- GWL 10.0 GROUNDWATER LEVEL CONTOURS

1:50 AT A1
0 0.5m 1m 2m 3m

1:750 AT A1
0 10m 20m 40m 60m 80m

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR INFORMATION	D.AYRES	30/05/2024
B	ISSUED FOR INFORMATION	D.AYRES	18/06/2024
C	ISSUED FOR INFORMATION	D.AYRES	06/08/2024
D	ISSUED FOR INFORMATION	D.AYRES	08/08/2024
E	ISSUED FOR INFORMATION	D.AYRES	13/08/2024

peritas
PERTH
08 6336 9291
14 ROSEWOOD PDE,
BURSWOOD, WA 6100
MELBOURNE
03 8657 9292
SUITE 307, 699 COLLINS ST,
DOCKLANDS, VIC 3008
BRISBANE
07 3174 8317
470 ST PAULS TCE,
FORTITUDE VALLEY, QLD 4006
ENQUIRIES@PERITASGROUP.COM.AU

CLIENT:
DMG ARCHITECTURE

DESIGNED:	DRAWN:	CHECKED:
D.AYRES	C.OLIVER	E.BIAGIONI-FROUDIST
SURVEY DATUM:	WAPC No:	SCALE:
AHD		AS SHOWN AT A1
DWG IS NOT FOR CONSTRUCTION UNLESS SIGNED BELOW:		DATE CREATED:
		MAY 2024

PROJECT:
LOT 25 STIRLING CRESCENT
HAZELMERE W.A. 6056

TITLE:
STORMWATER MANAGEMENT PLAN

PROJECT NUMBER:	DWG NUMBER:	REV:
PC24093	CI-SK.01	E

APPENDIX C - PERTH AIRPORT IFD DATA

LOCATION 31.950 S 115.975 E * NEAR.. Perth Airport

LIST OF COEFFICIENTS TO EQUATIONS OF THE FORM

$$ln(I) = A + B\,x\,(ln(T)) + C\,x\,(ln(T))^2 + D\,x\,(ln(T))^3 + E\,x\,(ln(T))^4 + F\,x\,(ln(T))^5 + G\,x\,(ln(T))^6$$

T = TIME IN HOURS AND I = INTENSITY IN MILLIMETRES PER HOUR

RETURN PERIOD	A	B	C	D	E	F	G
1	2.798146	-0.62093E+0	-0.14989E-1	0.79808E-2	-0.10644E-2	-0.16690E-3	0.14429E-4
2	3.053483	-0.62853E+0	-0.15237E-1	0.68948E-2	-0.76987E-3	0.10778E-4	-0.21006E-4
5	3.271230	-0.64838E+0	-0.14730E-1	0.60564E-2	-0.45694E-3	0.18608E-3	-0.56379E-4
10	3.397147	-0.66010E+0	-0.14431E-1	0.53964E-2	-0.24478E-3	0.31978E-3	-0.83974E-4
20	3.553377	-0.67024E+0	-0.14655E-1	0.47074E-2	0.61051E-4	0.44055E-3	-0.11373E-3
50	3.742681	-0.68300E+0	-0.14595E-1	0.41293E-2	0.32451E-3	0.55710E-3	-0.13969E-3
100	3.877020	-0.69256E+0	-0.14253E-1	0.38835E-2	0.43549E-3	0.62756E-3	-0.15357E-3

RAINFALL INTENSITY IN mm/h FOR VARIOUS DURATIONS AND RETURN PERIODS

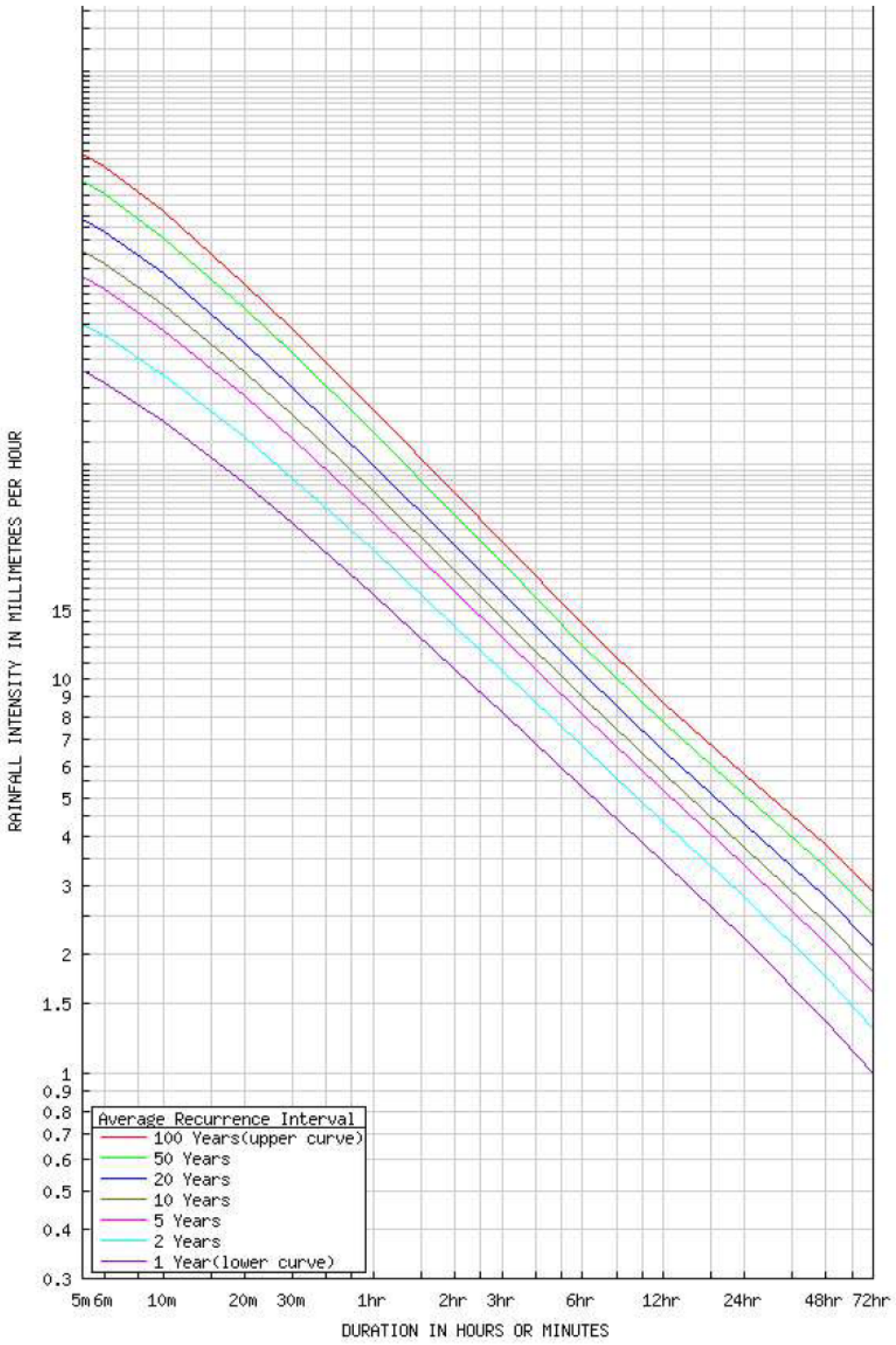
RETURN PERIOD (YEARS)

DURATION	1	2	5	10	20	50	100
5 mins	60.6	79.8	105.	122.	147.	184.	215.
6 mins	56.5	74.5	97.4	114.	137.	171.	200.
10 mins	45.1	59.3	76.8	89.2	107.	132.	154.
20 mins	31.5	41.1	52.3	60.1	71.2	87.3	101.
30 mins	25.0	32.4	40.9	46.8	55.1	67.2	77.4
1 hour	16.4	21.2	26.3	29.9	34.9	42.2	48.3
2 hours	10.6	13.6	16.7	18.8	21.8	26.1	29.7
3 hours	8.22	10.5	12.8	14.3	16.5	19.7	22.3
6 hours	5.31	6.75	8.12	9.02	10.4	12.2	13.8
12 hours	3.43	4.35	5.20	5.76	6.60	7.78	8.74
24 hours	2.19	2.79	3.36	3.74	4.30	5.09	5.73
48 hours	1.36	1.75	2.14	2.41	2.79	3.34	3.80
72 hours	1.00	1.29	1.60	1.81	2.10	2.53	2.89

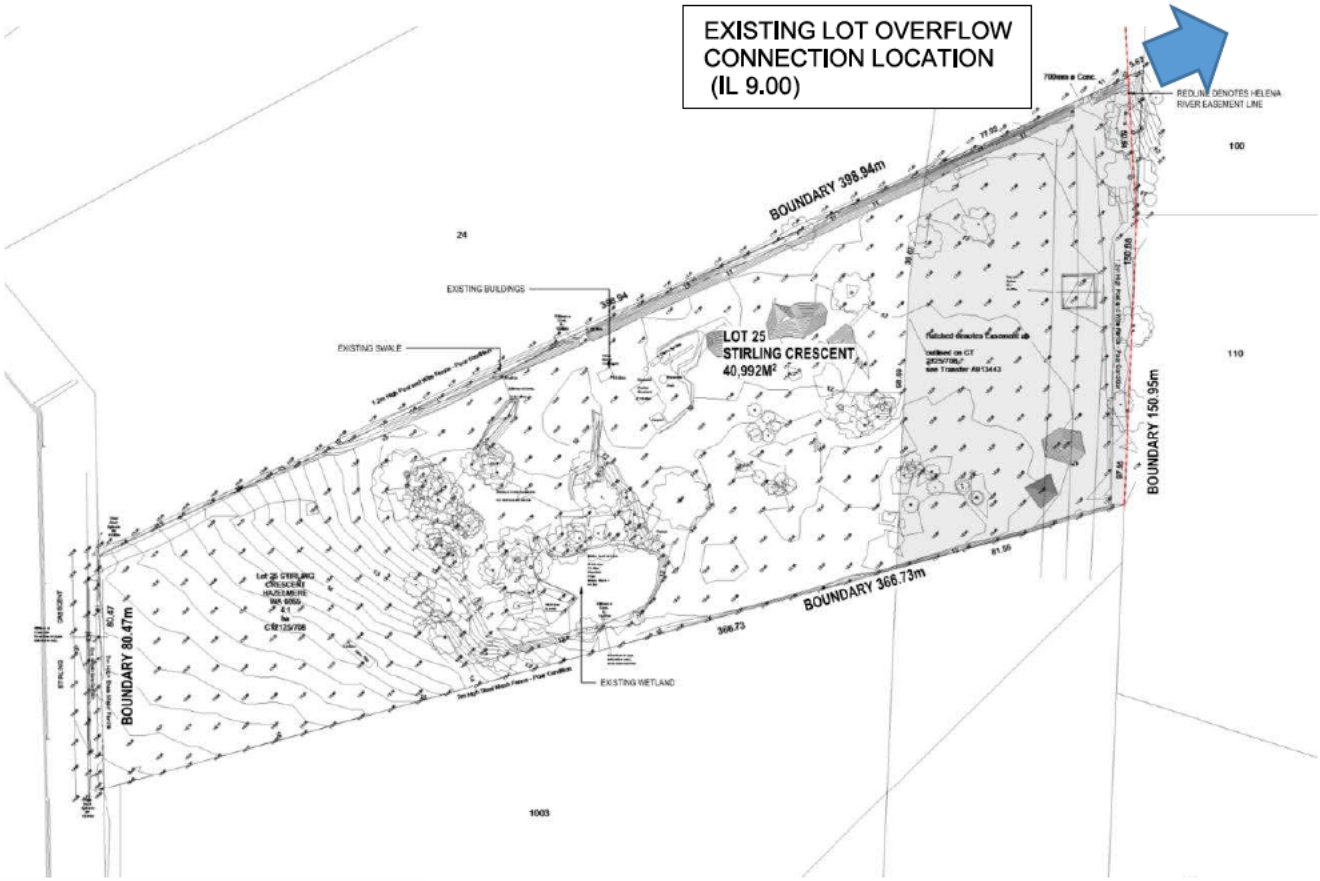
(Raw data: 21.80, 4.48, 1.34, 37.24, 6.98, 2.27 skew= 0.680)

HYDROMETEOROLOGICAL ADVISORY SERVICE

* ENSURE THE COORDINATES ARE THOSE REQUIRED SINCE DATA IS BASED ON THESE AND NOT LOCATION NAME.


RAINFALL INTENSITY IN MILLIMETRES PER HOUR
15
10
9
8
7
6
5
4
3
2
1.5
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
Average Recurrence Interval
100 Years(upper curve)
50 Years
20 Years
10 Years
5 Years
2 Years
1 Year(lower curve)
5m 6m 10m 20m 30m 1hr 2hr 3hr 6hr 12hr 24hr 48hr 72hr
DURATION IN HOURS OR MINUTES

SUBDIVISION STORMWATER & LOT CONNECTION LOCATION



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APPENDIX D – RESPONSE SCHEDULE TO COUNCIL & DBCA COMMENTS

DBCA comment	Required
A 10 metre setback to the Swan Canning DCA boundary in accordance with Policy No. 48 – Planning for development setback requirements affecting the Swan Canning DCA.	**SMP PLAN (Peritas Drg PC24093-CI-SK01) has been updated to show the 10m setback line.**
1. Pre-development flow rate for 20% AEP event is estimated to be 211 L/S and the post development flow rate for 20% AEP is designed to be no higher than 211L/S. It is also important to plan for the pre and post-development flow rates for the 1% AEP as it is understood that this will also be managed through the site and discharge to the river.	**Peritas confirm that the design of the stormwater system complies with the nominated criteria. Note that the allowance outflow has been reduced to 195 litres/sec (pre-development flow) due to the reduction in hardstand area and hence the calculated catchments contributing to the swale storage requirements.**
2. The storage calculations indicate that the site can provide a total storage volume of 890m^3, which is adequate to detain the first 15mm rainfall events for treatment (volume of 493m^3). Information is required regarding the detention times in the swale to ensure this period is sufficient to provide adequate water quality treatment.	**Peritas have noted the storage volume on the SMP drawing (PC24093-CI-SK01).** **Note that the storage volumes have changed to suit the new catchment area (As noted above a reduction in hardstand area).** **Detention times have been calculated for the proposed storage detention volumes and confirm that the accepted minimum detention times of 5-6 minutes have been achieved. Refer to Report for discussion.**
3. Provide detailed design of the drainage swale (including typical cross sections and outfall details), in addition:	**Peritas have reviewed the existing outfall to the river and can confirm that the outlet is stable and adequate for the purpose of an overflow path for the SMP network on Lot 25.** **Cross-sections are provided for the swale on Drg PC24093-CI-SK01.**
a. Plan indicates swale will have side slopes 1:1 and stone pitched. This is not supported. Vegetated slopes are recommended.	**PC24093-CI-SK01 – SMP has been updated to reflect 1 in 2 side slopes with vegetation as per TDL landscape concept plans.**
b. Provide planting list and densities. As the swale is designed to accommodate up to 1%AEP, swale planting should be separated into wet and dryland planting to increase survival rates of plants and to ensure that the swale is effective at providing water quality treatment.	**N/A for Peritas Scope**

c. The plan should provide outfall details/overland flow path to the river. Information is required regarding the existing condition and if any additional erosion/scour protection and planting will be required.	**The Peritas SMP plan shows the overland flow path to the river, predominantly via the northern swale.** **TDL to include erosion management details on landscape plan.**
2. Alternative design options have not been provided. Drainage swales are generally designed for stormwater conveyance as opposed to water quality treatment. As an alternative option, can biofilters be considered adjacent to the road (that runs parallel to the swale) to treat the first 15mm, with excess stormwater flows to discharge to the drainage swale.	**TDL has enhanced the plan to include swale filtration planting.** **The swale filtration planting extends the length of the northern drainage swale to act as a biofilter.**
3. Any proposal to mobilise groundwater will require treatment prior to discharge to the river or stormwater drains (that ultimately discharge to the river). A subsoil management plan is likely to be requested by DBCA as condition of approval.	**N/A** **Groundwater is not proposed to be mobilised.**

Advice notes	
The SMP plan should address: ***a. pre-development hydrology for 1 exceedance per year (1 EY) and 1% annual exceedance probability (1% AEP) events (including peak flow rates, run-off volumes, floodplain storage volumes and flood levels) has been maintained.***	**Peritas SMP Report and Drg PC24093-CI-SK01 reflects the proposed stormwater strategy that accommodates pre-development hydrology for 1 exceedance per year (1 EY) and 1% annual exceedance probability (1% AEP) events**
b. existing tributaries and surface water flow paths have been retained.	**Peritas can confirm that the existing flow paths and status quo of the existing outflows have been maintained in the proposed SMP.**
c. infiltration calculations and existing site conditions including soil profiles.	**Infiltration has been measured during in-field testing by Geotechnical consultants . Calculations for the onsite storage requirements and 1% AEP detention storage has ignored infiltration when calculating the storage requirements for the swales and associated systems. The calculations are based on no soakage. Refer to Appendix C.**
d. detailed design of swales and basins, including sediment and erosion control.	**As this request if for detailed design, this requirement should be a prescribed DA Approval condition.**
e. detail of overflow paths, which are to be revegetated with local native species.	**Peritas recommends to not disturb existing overflow outfalls as they are stable and operating efficiently.**

f. detail of species composition and densities for the swales, basins and overflow paths.	**Refer to Landscape Architects Concept Plans for details.**
g. detail of subsoil drains.	**Subsoil drainage is nit utilised in this design.**
h. wastewater management and treatment.	**There is no proposed wastewater treatment in this proposal.**
i. proposed water quality of discharge from the treatment systems prior to exiting the site.	**Surface Water Quality will be managed by the use of the biofiltration swale vegetated with appropriate wetland species as nominated by the landscape architect.** **The 1 year, 1 hour event (first 15 mm) will be treated in a bioretention treatment portion of the swale.** **The bioretention area will have soil amendment with a minimum PRI of 10 and nutrient stripping vegetation.** **In larger events, stormwater will overtop the weirs provided to control stormwater conveyance in the swales and overflow to the existing outfalls in the northwest corner of the site.**
j. monitoring and maintenance regime inclusive of water quality monitoring	**The proponent will monitor surface water quality via bi-annual water sampling and testing to ensure it meets accepted environmental & health discharge standards to natural waterways.**