

Karratha Apartments
Lot 30 Nairn Street Bulgarra
Stormwater Management Report

Issue Date: Friday, May 16, 2025
Revision: Shire Submission

1 PREAMBLE.

PJ Wright and Associates Pty Ltd (**PJWAA**) have been engaged by Developed Pty Ltd (**Project Managers**) to prepare a stormwater management plan for three proposed residential development sites in Bulgarra.

This Stormwater Management Plan outlines the requirements for Lot 30 Nairn Street Bulgarra.

2 SITE AND CONDITION.

The proposed site is Lot 30 Nairn Street, Bulgarra (**The Site**). Refer to Figure 1.

The proposed development consists of:

- 5,519 square metres site
- 48 residential units
- Zoning: R30



Figure 1: Location Plan

3 FLOOD DATA.

PJWAA have reviewed the City of Karratha *500 year Storm Surge Risk Policy* and confirm the proposed development within the Storm Surge Zone.

Refer to Figure 2 for the location of the site on Sheet 5 of 6 of the Policy.



Figure 2 : Sheet 5 of 6 of the Storm Surge Policy.

The site will need to be filled to ensure finished floor levels are above the storm surge level.

The Storm Surge mapping indicates that a 500mm depth of flooding could occur over the site with a small area along the southern boundary at or above the storm surge level

Based upon the site survey drawing, the area that is above the storm surge zone coincides with the 8.20 m AHD contour.

PJWAA have provided flood estimations based upon the areas adjacent to and abutting the apartments are set a 8.20m AHD.

3.1 RAINFALL DATA.

PJWAA have the 1%AEP storm events based upon current Bureau of Meteorology (**BOM**) rainfall data for Karratha (Refer to Figure 3).



Location

Label: Not provided

Latitude: -20.7337 [Nearest grid cell: 20.7375 (S)]

Longitude: 116.844 [Nearest grid cell: 116.8375 (E)]

IFD Design Rainfall Intensity (mm/h)

Issued: 12 May 2025

Rainfall intensity for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).

[FAQ for New ARR probability terminology](#)

Unit: **mm/h**

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50% #	20% *	10%	5%	2%	1%
1 min	80.5	93.8	137	167	197	238	271
2 min	63.9	74.2	107	129	152	182	206
3 min	60.8	70.8	102	124	146	176	200
4 min	59.1	68.9	99.9	122	144	173	197
5 min	57.5	67.0	97.6	119	141	170	193
10 min	49.5	57.8	84.4	103	122	147	168
15 min	42.9	49.9	72.8	88.9	105	127	144
20 min	37.7	43.9	63.9	77.9	91.9	111	126
25 min	33.6	39.1	56.9	69.4	81.8	98.8	112
30 min	30.4	35.4	51.4	62.6	73.9	89.2	101
45 min	23.7	27.6	40.2	49.0	57.9	69.9	79.4
1 hour	19.6	22.9	33.4	40.8	48.3	58.4	66.4
1.5 hour	14.8	17.4	25.6	31.4	37.3	45.3	51.7
2 hour	12.1	14.3	21.2	26.2	31.1	38.0	43.5
3 hour	9.11	10.8	16.4	20.4	24.4	30.1	34.6
4.5 hour	6.88	8.25	12.8	16.1	19.4	24.2	28.0
6 hour	5.67	6.85	10.8	13.7	16.7	20.9	24.3
9 hour	4.34	5.31	8.58	11.0	13.5	17.1	20.0
12 hour	3.61	4.45	7.31	9.43	11.7	14.8	17.4
18 hour	2.79	3.48	5.81	7.57	9.44	12.1	14.2
24 hour	2.32	2.91	4.91	6.42	8.03	10.3	12.1
30 hour	2.01	2.52	4.28	5.61	7.02	8.97	10.6
36 hour	1.78	2.24	3.80	4.99	6.25	7.96	9.36
48 hour	1.45	1.83	3.12	4.08	5.11	6.49	7.60
72 hour	1.07	1.35	2.28	2.98	3.71	4.67	5.44
96 hour	0.846	1.06	1.79	2.32	2.88	3.60	4.18
120 hour	0.694	0.870	1.46	1.89	2.34	2.91	3.37
144 hour	0.585	0.731	1.23	1.59	1.96	2.43	2.81
168 hour	0.503	0.627	1.05	1.36	1.68	2.09	2.41

Note:

The 50% AEP IFD does not correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.

* The 20% AEP IFD does not correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

Figure 3: BOM Annual Exceedance Period (AEP) data.

3.2 COEFFICIENT OF RUNOFF.

All catchments are based upon a Coefficient of Runoff (CoR) of 0.8.

3.3 TIME OF CONCENTRATION.

PJWAA have undertaken the *Time of Concentration (TOC)* calculation based upon travel distance for each off site catchment area.

The TOC was calculated using an *Empirical version of the Rational Method* as appropriate to the scale of the development being a single property based upon Table 9.6.3 Book 9 of the ARR.

4 FLOOD CALCULATIONS.

PJWAA have utilised the survey and architectural drawings to calculate the catchment areas for each stormwater travel path.

Refer to Drawings P.01 and P.02 which form part of proposed the stormwater management plan for the development

4.1 OFF SITE INFLOWS.

Based upon the Survey drawing no off site inflows would occur on the lot.

4.2 SITE FLOWS.

The site has been broken into 10 main catchment areas. Refer to Figure 4.

- a) Catchment A : Southwest driveway zone.
- b) Catchment B : Southeast driveway zone.
- c) Catchment C : Northeast driveway zone
- d) Catchment D : Northwest driveway zone.
- e) Catchment E : Northern rear carpark zone .
- f) Catchment F : Southern rear carpark zone.
- g) Catchment G :Narin Street apartment zone.
- h) Catchment H : Northern apartment zone.
- i) Catchment I : Central apartment zone
- j) Catchment J : Southern apartment zone.



Figure 4: Site Catchment Areas.

Lot 30 fall from south to north with low points located at the northwest and northeast corners.

It is proposed that in order to minimise the depths of stormwater flows along driveways , discharges from apartment roofs (Catchments H, I and J) are collected by stormwater swales. The swales have a spillway and pipe through to the rear of the site to discharge onto drainage reserve .

Catchments A, B, C, D, E, F are overland flows discharging to either:

- a) The drainage reserve at the rear of the site via rock lined spillway ,or
- b) Nairn street via driveway crossovers.

4.3 CATCHMENT A (SOUTHERN CROSSOVER)

Catchment A is 471 square meters in area. The storm flow path will run down the centre of the driveway towards Nairn Street via the southern driveway crossover.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 10.28 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100 year ARI) design stormwater flow has been calculated at 20.28 l/second and has been designed to the driveway width.

The flow characteristics at the crossover has been calculated as follows:

- a) 5% AEP
 - i. Volume:0.010 m3/sec
 - ii. Slope 1.048% (1:95)
 - iii. Depth of 5% AEP flow: 9 mm across driveway
 - iv. Velocity: 0.342 m/sec
- b) 1% AEP
 - i. Volume:0.023m3/sec
 - ii. Slope 1.048% (1:95)
 - iii. Depth of 1% AEP flow: 13 mm across driveway
 - iv. Velocity: 0.433m/sec

4.4 CATCHMENT B

Catchment B is 222 square meters in area. The storm flow path will run down the centre of the driveway to combine with discharge from Catchment F. Both areas discharge through a rock lined spillway onto the drainage reserve at the rear of the site.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 4.847 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 9.52 l/second and has been designed to the driveway width of 3.9m.

Refer to Southern Outfall for combined flow characteristics.

4.5 CATCHMENT C (NORTHERN CROSSOVER)

Catchment C is 451 square meters in area. The storm flow path will run down the centre of the driveway towards Nairn Street via the northern driveway crossover.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 9.85 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100 year ARI) design stormwater flow has been calculated at 19.44 l/second and has been designed to the driveway width.

The flow characteristics at the crossover has been calculated as follows:

- a) 5% AEP
 - i. Volume: 0.0099 m³/sec
 - ii. Slope 3.125% (1:32)
 - iii. Depth of 5% AEP flow: 7 mm across driveway
 - iv. Velocity: 0.473 m/sec
- b) 1% AEP
 - i. Volume: 0.0194 m³/sec
 - ii. Slope : 3.125% (1:32)
 - iii. Depth of 5% AEP flow: 19mm across driveway
 - iv. Velocity: 0.591m/sec

4.6 CATCHMENT D

Catchment D is 223 square meters in area. The storm flow path will run down the centre of the driveway to combine with discharge from Catchment E. Both areas discharge through a rock lined spillway onto the drainage reserve at the rear of the site.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 4.847 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 9.52 l/second and has been designed to the driveway width of 3.9m.

Refer to Northern Outfall for combined flow characteristics

4.7 CATCHMENT E

Catchment E is 1039 square meters in area. The storm flow path will run down the centre of the driveway to combine with discharge from Catchment D. Both areas discharge through a rock lined spillway onto the drainage reserve at the rear of the site.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 22.69. L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 44.78 l/second and has been designed to the driveway width of 3.9m.

Refer to Northern outfall for combined flow characteristics.

4.8 CATCHMENT F

Catchment F is 574 square meters in area. The storm flow path will run down the centre of the driveway to combine with discharge from Catchment B. Both areas discharge through a rock lined spillway onto the drainage reserve at the rear of the site.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 12.52. L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 24.72 l/second and has been designed to the driveway width of 3.9m.

Refer to Southern Outfall for combined flow characteristics

4.9 CATCHMENT G

Catchment G is the Eastern block of apartments along the Nairn street frontage and has a total catchment area of 658 square meters.

The catchment will be graded with fall from the building down to the roadway providing natural flow discharging onto Nairn Street as shown on drawing P.02

4.10 CATCHMENT H

Catchment H is 385 square meters in area.

The stormwater will be collected by a 1000 x 100mm gravel lined swale flows east to west with a collection pit and piped discharge to the drainage reserve.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 8.41. L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 16.60 l/second

4.11 CATCHMENT I

Catchment I is 522 square meters in area.

The stormwater will be collected by a 1000 x 100 mm deep gravel lined swale flows east to west with a collection pit and piped discharge to the drainage reserve.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 11.40. L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 22.5 l/second

4.12 CATCHMENT J

Catchment J is 546 square meters in area.

The stormwater will be collected by a 1000 x 100mm gravel lined swale flows east to west with a collection pit and piped discharge to the drainage reserve.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 11.91L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100year ARI) design stormwater flow has been calculated at 23.51 l/second

4.13 SOUTHERN OUTFALL

The southern outfall to the drainage reserve has a total catchment area of 921 square meters in area. The storm flow path will run down the centre of the driveways to flow through a 4.3m wide rock lined spillway.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 20.12 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100 year ARI) design stormwater flow has been calculated at 39.71 l/second and has been designed to the driveway width.

The flow characteristics at the discharge point has been calculated as follows:

- a) 5% AEP
 - i. Volume: 0.0201 m³/sec
 - ii. Slope 0.579% (1:172)
 - iii. Depth of 5% AEP flow: 29 mm across spillway
 - iv. Velocity: 0.176 m/sec
- b) 1% AEP
 - iii. Volume: 0.0398 m³/sec
 - iv. Slope 0.579% (1:172)
 - iii. Depth of 1% AEP flow: 41 mm across spillway
 - iv. Velocity: 0.225 m/sec

4.14 NORTHERN OUTFALL

The northern outfall to the drainage reserve has a total catchment area of 1497 square meters in area. The storm flow path will run down the centre of the driveways to flow through a 3.1m wide rock lined spillway.

The 20% AEP (5year ARI) design stormwater flow has been calculated at 32.70 L/second and the anticipated flow path has been indicated on drawing P.01.

The 1% AEP (100 year ARI) design stormwater flow has been calculated at 64.53 l/second and has been designed to the driveway width.

The flow characteristics at the discharge point has been calculated as follows:

- a) 5% AEP
 - i. Volume: 0.0327 m³/sec
 - ii. Slope 1.367% (1:73)
 - iii. Depth of 5% AEP flow: 35 mm across spillway
 - iv. Velocity: 0.309 m/sec
- b) 1% AEP
 - v. Volume: 0.0645 m³/sec
 - vi. Slope 1.367% (1:73)
 - iii. Depth of 1% AEP flow: 53 mm across spillway
 - iv. Velocity: 0.405 m/sec

5 BUILDING FINISHED FLOOR LEVELS

Final design verifications will be undertaken during the working drawing phase to allow for transitions between the three apartment blocks.

A retaining wall will be required along the rear boundary and along the north side of the apartments to ensure building levels are above the 8.20m AHD level. Refer to Figure 5.



At this stage, based upon the stormwater management plan, the Southernmost apartment blocks will need to be at 8.57m AHD to maintain falls to the southern crossover and southern outfall.

Floor levels will also need to be adjusted to ensure gravity connection to sewer.

This will be undertaken during the Working drawing/ design development stage when the designs will be coordinated further.

If you require further information or clarification, please do not hesitate to contact this office.



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6 APPENDIX A

References

- 1 Stormwater Management Manual of Western Australia, Department of Water; Chapter 9 Structural Controls. 2007.
- 2 Policy DP 19Karratha 500 year Storm Surge Risk Policy 2012, City of Karratha
- 3 Australian Rainfall and Runoff Book 9 – A Guide to Flood Estimation, Commonwealth of Australia (Geoscience Australia), 2016 ; Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M , Testoni I.

7 APPENDIX B. SHEETS AND CHARTS.

Flow Volume: 10.593L/s

Flow Velocity: 2.472m/s

Flow Depth: 16.9mm

Flow Depth: 13%

Maximum Flow Volume: 294.176L/s

Maximum Flow Velocity: 8.926m/s

 Input

Invert Width (mm)

0.01

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (m/m)

0.602

Design Flow Rate (L/s)

10.28

Submit

Chart 1: Catchment A 5% flow

Flow Volume: 21.674L/s

Flow Velocity: 3.288m/s

Flow Depth: 26mm

Flow Depth: 20%

Maximum Flow Volume: 294.176L/s

Maximum Flow Velocity: 8.926m/s

 Input

Invert Width (mm)

0.01

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (m/m)

0.602

Design Flow Rate (L/s)

20.28

Submit

Chart2 : Catchment A 1% flow

Flow Volume: 12.144L/s

Flow Velocity: 0.342m/s

Flow Depth: 9.1mm

Flow Depth: 7%

Maximum Flow Volume: 981.42L/s

Maximum Flow Velocity: 1.936m/s

 Input

Invert Width (mm)

3900

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

1.048

Design Flow Rate (L/s)

10.28

Submit

Chart 3: Southern Driveway 5% AEP flow depth.

Flow Volume: 21.976L/s

Flow Velocity: 0.433m/s

Flow Depth: 13mm

Flow Depth: 10%

Maximum Flow Volume: 981.42L/s

Maximum Flow Velocity: 1.936m/s

 Input

Invert Width (mm)

3900

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

1.048

Design Flow Rate (L/s)

20.28

Submit

Chart 4 : Southern Driveway 1% AEP depth

Flow Volume: 21.162L/s

Flow Velocity: 0.189m/s

Flow Depth: 26mm

Flow Depth: 20%

Maximum Flow Volume: 299.903L/s

Maximum Flow Velocity: 0.536m/s

 Input

Invert Width (mm)

4300

Width at top (mm)

4300

Depth of Channel (mm)

130

Surface Type (Manning's n)

Flood plain, mature crops

Roughness (n)

0.035

Slope of Invert (%)

0.579

Design Flow Rate (L/s)

20.21

Submit

Chart 5 : Southern Outfall 5% Catchments B / F

Flow Volume: 40.336L/s

Flow Velocity: 0.225m/s

Flow Depth: 41.6mm

Flow Depth: 32%

Maximum Flow Volume: 262.415L/s

Maximum Flow Velocity: 0.469m/s

 Input

Invert Width (mm)

4300

Width at top (mm)

4300

Depth of Channel (mm)

130

Surface Type (Manning's n)

Rock cut, jagged

Roughness (n)

0.040

Slope of Invert (%)

0.579

Design Flow Rate (L/s)

39.71

Submit

Chart 6 : Southern Outfall 1% Catchments B / F

Flow Volume: 10.14L/s

Flow Velocity: 0.708m/s

Flow Depth: 61.2mm

Flow Depth: 51%

Maximum Flow Volume: 29.457L/s

Maximum Flow Velocity: 1.049m/s

 Input

Invert Width (mm)

0.01

Width at top (mm)

3900

Depth of Channel (mm)

120

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

0.925

Design Flow Rate (L/s)

9.85

Submit

Chart 1: Catchment C 5% flow

Flow Volume: 19.626L/s

Flow Velocity: 0.908m/s

Flow Depth: 92.4mm

Flow Depth: 77%

Maximum Flow Volume: 29.457L/s

Maximum Flow Velocity: 1.049m/s

 Input

Invert Width (mm)

0.01

Width at top (mm)

3900

Depth of Channel (mm)

120

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

0.925

Design Flow Rate (L/s)

19.44

Submit

Chart2 : Catchment C 1% flow

Flow Volume: 11.979L/s

Flow Velocity: 0.473m/s

Flow Depth: 6.5mm

Flow Depth: 5%

Maximum Flow Volume: 1694.726L/s

Maximum Flow Velocity: 3.343m/s

 Input

Invert Width (mm)

3900

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

3.125

Design Flow Rate (L/s)

9.85

Submit

Chart 3: Northern Driveway 5% AEP flow depth.

Flow Volume: 20.97L/s

Flow Velocity: 0.591m/s

Flow Depth: 9.1mm

Flow Depth: 7%

Maximum Flow Volume: 1694.726L/s

Maximum Flow Velocity: 3.343m/s

 Input

Invert Width (mm)

3900

Width at top (mm)

3900

Depth of Channel (mm)

130

Surface Type (Manning's n)

Concrete, trowel finished

Roughness (n)

0.013

Slope of Invert (%)

3.125

Design Flow Rate (L/s)

19.44

Submit

Chart 4 : Northern Driveway 1% AEP depth

Flow Volume: 33.59L/s

Flow Velocity: 0.309m/s

Flow Depth: 35.1mm

Flow Depth: 27%

Maximum Flow Volume: 286.488L/s

Maximum Flow Velocity: 0.711m/s

 Input

Invert Width (mm)

3100

Width at top (mm)

3100

Depth of Channel (mm)

130

Surface Type (Manning's n)

Rock cut, jagged

Roughness (n)

0.040

Slope of Invert (%)

1.367

Design Flow Rate (L/s)

32.7

Submit

Chart 5 : Northern Outfall 5% Catchments D / E

Flow Volume: 66.877L/s

Flow Velocity: 0.405m/s

Flow Depth: 53.3mm

Flow Depth: 41%

Maximum Flow Volume: 286.488L/s

Maximum Flow Velocity: 0.711m/s

 Input

Invert Width (mm)

3100

Width at top (mm)

3100

Depth of Channel (mm)

130

Surface Type (Manning's n)

Rock cut, jagged

Roughness (n)

0.040

Slope of Invert (%)

1.367

Design Flow Rate (L/s)

64.53

Submit

Chart 6 : Northern Outfall 1% Catchments D / E

GENERAL NOTES:

THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH THE STORMWATER MANAGEMENT REPORT RELATED TO THE SITE.

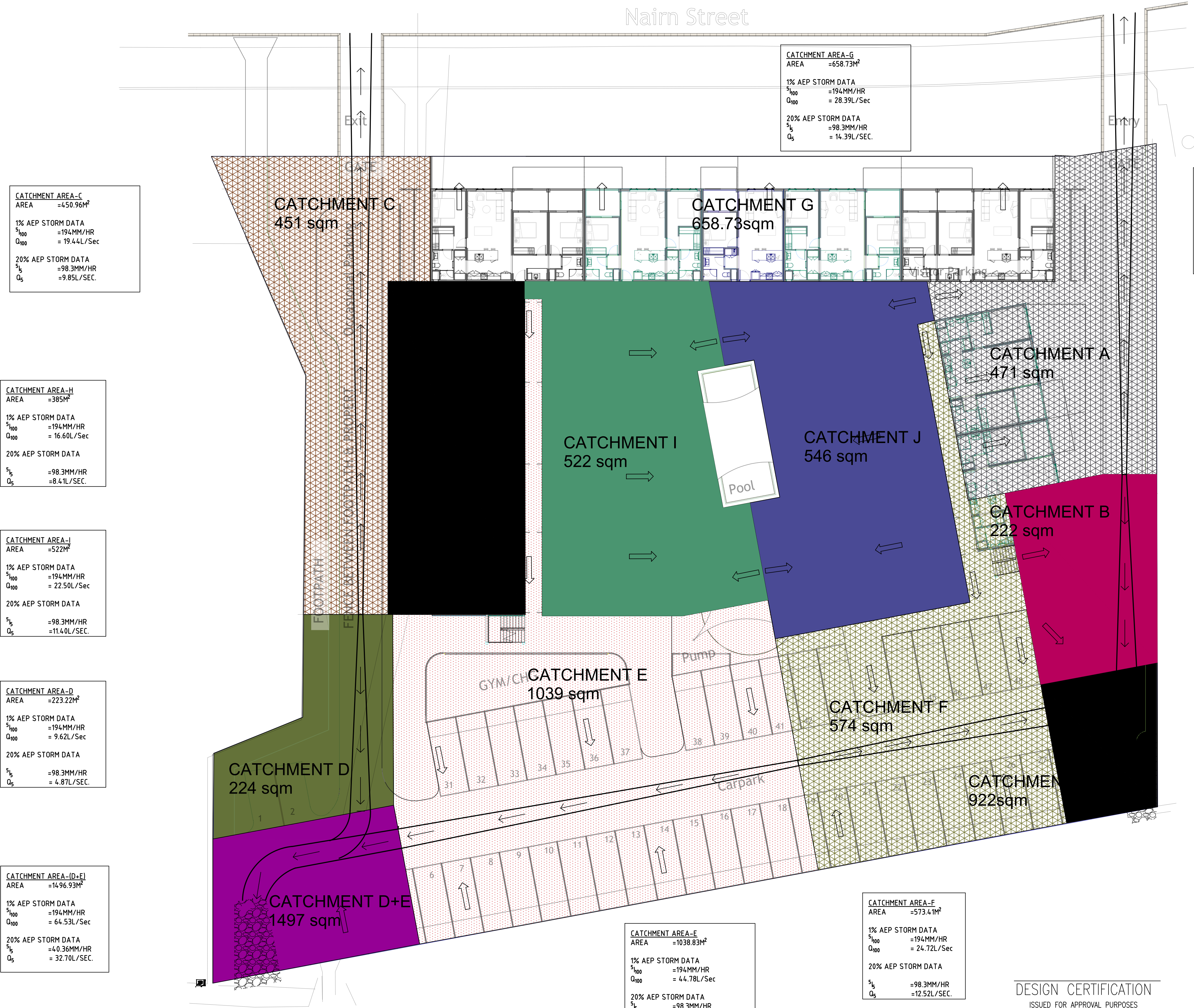
THE DESIGN INDICATED HAS BEEN PREPARED FOR PLANNING APPROVAL PURPOSES AND FURTHER DEVELOPMENT OF FINAL SITE LEVELS WILL BE REQUIRED PRIOR TO BUILDING PERMIT SUBMISSION.

DESIGN LEVELS HAVE BEEN BASED UPON EXISTING SITE CONTOURS AND LEVELS.

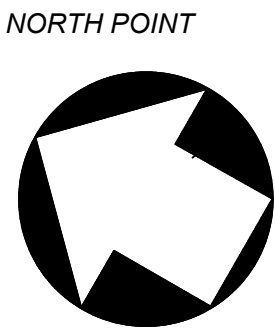
FLOWS AND DISCHARGE CHARACTERISTICS HAVE BEEN DEVELOPED BASED UPON CURRENT CITY OF KARRATHA DEVELOPMENT GUIDELINES AND CRITERIA.

SITE IS LOCATED WITHIN THE 500 YEAR STORM SURGE ZONE AND REQUIRES HABITABLE ROOMS TO BE ABOVE THE ESTIMATED FLOOD LEVEL.

THE STORM SURGE FLOOD LEVEL HAS BEE ESTIMATED AT 8.2 M AHD BASE UPON SURVEY INFORMATION.



DESIGN CERTIFICATION
ISSUED FOR APPROVAL PURPOSES



DESIGN CERTIFICATION
This drawing the referenced copy and issue as noted in the Technical Design Certification as issued in compliance with the Building Act 2011.
Refer to Design Certificate dated same for reference design standards
Subsequent revisions after the date of certification must be referenced by the installing contractor when submitting final certification.

00	16.05.25	ISSUED FOR SUBMISSION TO SHIRE
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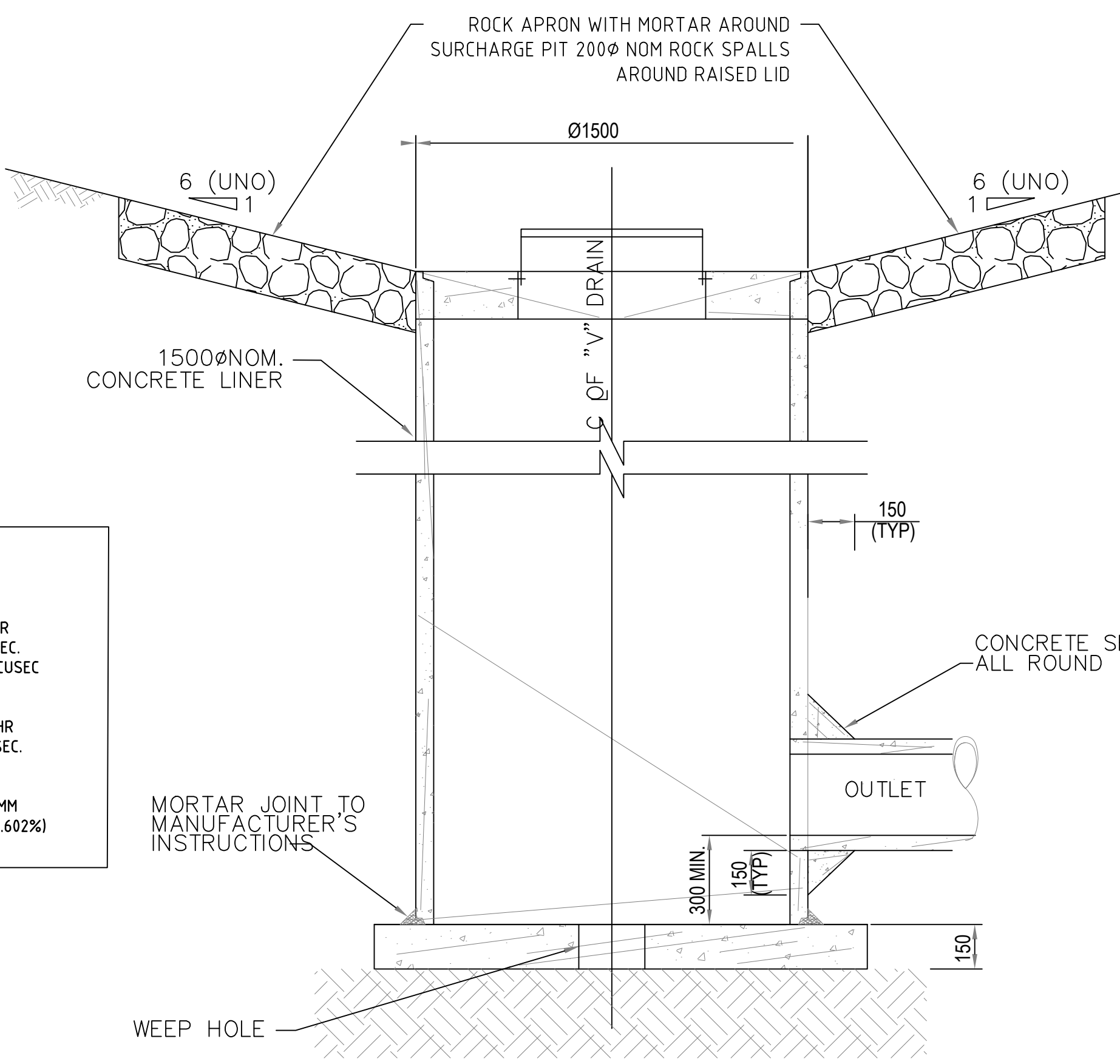
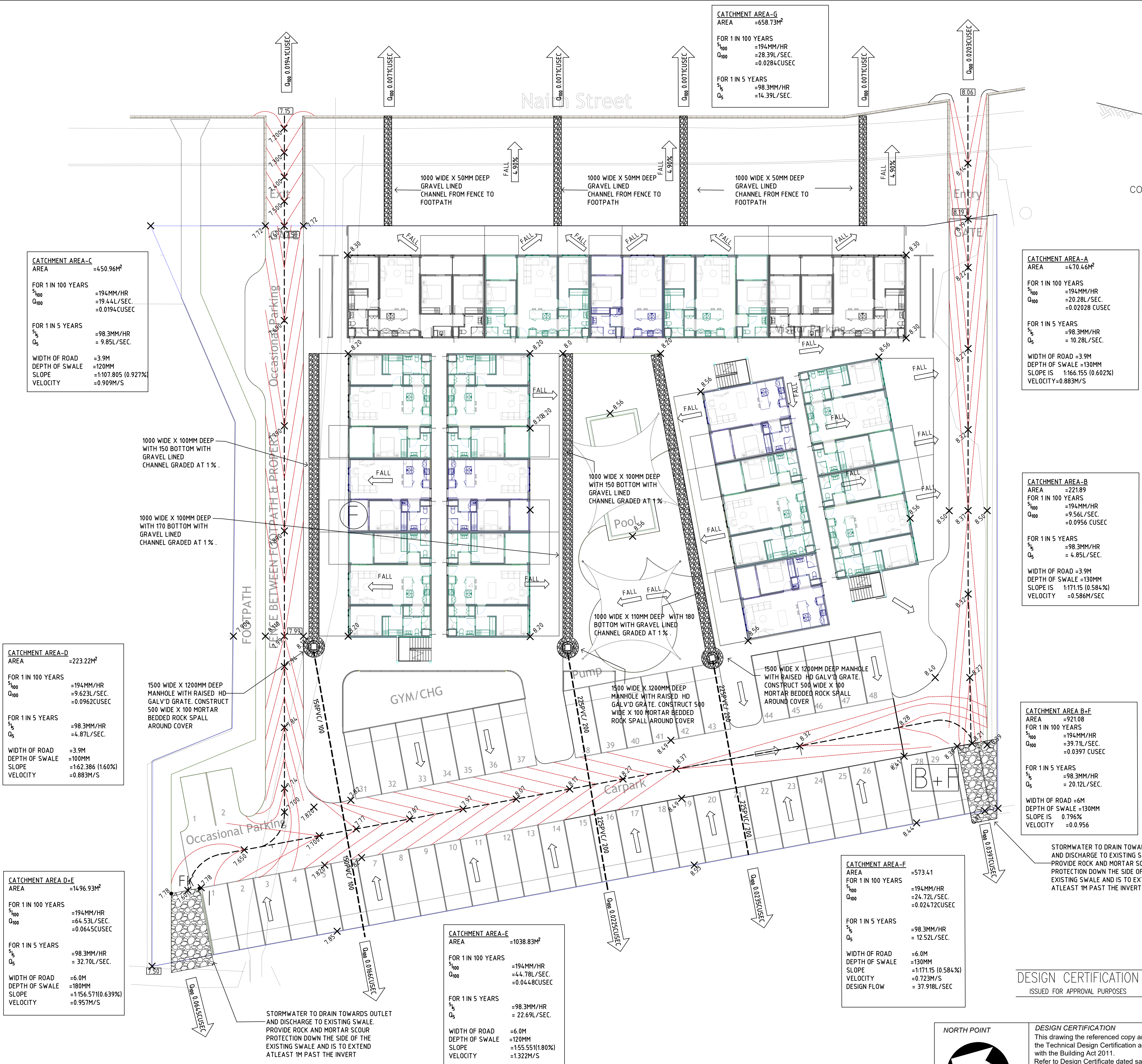
Project
KARRATHA APARTMENTS
LOT 30 NAIRN STREET
BULGARRA WA 6714

Drawing Title
HYDRAULIC SERVICES
STORMWTER CATCHMENT PLAN

Date MAY 2025
Scale 1:200 @ A1
Drawn TRS/JGT

Drawing Number P.01
Revision 00

AHSCA
THE ASSOCIATION OF
HYDRAULIC SERVICES
CONSULTANTS AUSTRALIA
INCORPORATED



2 STORMWATER MANHOLE
P.02 NTS

GENERAL NOTES:

THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH THE STORMWATER MANAGEMENT REPORT RELATED TO THE SITE.

THE DESIGN INDICATED HAS BEEN PREPARED FOR PLANNING APPROVAL PURPOSES AND FURTHER DEVELOPMENT OF FINAL SITE LEVELS WILL BE REQUIRED PRIOR TO BUILDING PERMIT SUBMISSION.

DESIGN LEVELS HAVE BEEN BASED UPON EXISTING SITE CONTOURS AND LEVELS.

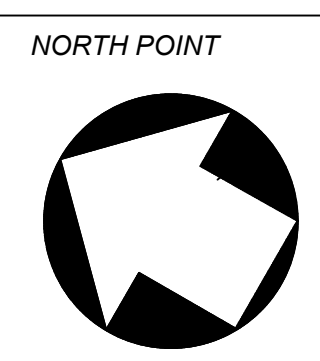
FLows AND DISCHARGE CHARACTERISTICS HAVE BEEN DEVELOPED BASED UPON CURRENT CITY OF KARRATHA DEVELOPMENT GUIDELINES AND CRITERIA.

SITE IS LOCATED WITHIN THE 500 YEAR STORM SURGE ZONE AND REQUIRES HABITABLE ROOMS TO BE ABOVE THE ESTIMATED FLOOD LEVEL.

THE STORM SURGE FLOOD LEVEL HAS BEE ESTIMATED AT 8.2 M AHD BASE UPON SURVEY INFORMATION.

STORMWATER TO DRAIN TOWARDS OUTLET AND DISCHARGE TO EXISTING SWALE. PROVIDE ROCK AND MORTAR SCOUR PROTECTION DOWN THE SIDE OF THE EXISTING SWALE AND IS TO EXTEND ATLEAST 1M PAST THE INVERT

DESIGN CERTIFICATION
ISSUED FOR APPROVAL PURPOSES



DESIGN CERTIFICATION
This drawing the referenced copy and issue as noted in the Technical Design Certification as issued in compliance with the Building Act 2011.
Refer to Design Certificate dated same for reference design standards
Subsequent revisions after the date of certification must be referenced by the installing contractor when submitting final certification.

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16.05.25

ISSUED FOR SUBMISSION TO SHIRE

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AHSCA
THE ASSOCIATION OF
HYDRAULIC SERVICES
CONSULTANTS AUSTRALIA
INCORPORATED

Project	KARRATHA APARTMENTS LOT 30 NAIRN STREET BULGARRA WA 6714		
Drawing Title	HYDRAULIC SERVICES STORMWATER DRAINAGE PLAN		
Date	MAY 2025	Drawing Number	P.02
Scale	1:200 @ A1	Revision	00
Drawn	TRS/JGT		

1 SITE PLAN - 1% AEP FLOOD PLAN
P.02 SCALE 1:200