APPENDIX D

GEOTECHNICAL INVESTIGATION RESULTS

ABN 81154555478
ACN 154555478

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Our Ref: JW:jw: GI 2039-a
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P1

Location	N: 6778265 E: 540560	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, grey brown 0.5 m (SP) SAND: Fine sand, dry, pale grey 2.2 m (SP) SAND: Fine sand, wet, pale grey T.D. 3 m	
Water Table (estimated based on drilling)	2.2 m BSL	
Field Test Results	K_{sat} = 13.7 m/day = 572 mm/hr	K = 1.6 x 10^{-4} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-b
2 June 2015

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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P2

Location	N: 6778474 E: 540581	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, grey brown 0.5 m (SP) SAND: Fine sand, moist, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, moist, dark brown 1.6 m (SP) SAND: Trace silt, fine sand, moist, dark grey T.D. 3 m	
Water Table (estimated based on drilling)	Not identified	
Field Test Results	K_{sat} = 89.5 m/day = 3728 mm/hr	K = 1 x 10^{-3} m/s
Test Hole Depth	0.6 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
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2 June 2015

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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P3

Location	N: 6778597 E: 540503	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: With silt, fine sand, moist, grey 0.3 m (SM) Silty SAND: Fine sand, moist, dark brown 0.6 m (SP) SAND: Trace silt, fine sand, wet, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.6 m BSL	
Field Test Results	K_{sat} = 16.8 m/day = 698 mm/hr	K = 1.9 x 10^{-4} m/s
Test Hole Depth	0.17 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
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2 June 2015

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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P4

Location	N: 6778425 E: 540493	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine to medium sand, moist, dark brown 0.7 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.7 m (SP) SAND: Trace silt, fine sand, wet, pale grey 2.0 m (SP) SAND: Trace silt, fine sand, wet, grey brown T.D. 3 m	
Water Table (estimated based on drilling)	1.7 m BSL	
Field Test Results	K_{sat} = 27.0 m/day = 1128 mm/hr	K = 3.1 x 10^{-4} m/s
Test Hole Depth	0.77 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

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Our Ref: JW:jw: GI 2039-e
2 June 2015

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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P5

Location	N: 6778333 E: 540483	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, dark brown 0.6 m (SP) SAND: Trace silt, fine sand, dry, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, moist to wet, pale grey 2.4 m (SP) SAND: Trace silt, fine sand, wet, grey brown T.D. 3 m	
Water Table (estimated based on drilling)	1.5 m BSL	
Field Test Results	K_{sat} = 4.2 m/day = 176 mm/hr	K = 4.9 x 10^{-5} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

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Our Ref: JW:jw: GI 2039-f
2 June 2015

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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P6

Location	N: 6778091 E: 540285	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, dark grey 0.4 m (SP) SAND: Trace silt, fine sand, moist, pale grey 0.8 m (SM) Silty SAND: Fine sand, moist, dark orange brown 1.2 m (SM) Silty SAND: Fine sand, moist, grey brown mottled orange brown 2.7 m (SM) Silty SAND: Fine sand, wet, grey brown mottled orange brown T.D. 3 m	
Water Table	2.7 m BSL	
Field Test Results	K_{sat} = 2.2 m/day = 91 mm/hr	K = 2.5 x 10^{-5} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'well drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

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Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-g
2 June 2015

Gold Coral Pty Ltd
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Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P7

Location	N: 6778447 E: 540402	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: With silt, fine to medium sand, moist, grey brown 0.2 m (SP) SAND: Trace silt, fine sand, moist, pale grey 0.7 m (SM) Silty SAND: Trace clay, fine sand, wet, orange brown 1.1 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.7 m BSL	
Field Test Results	K_{sat} = 7.2 m/day = 300 mm/hr	K = 8.3 x 10^{-5} m/s
Test Hole Depth	0.87 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
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Our Ref: JW:jw: GI 2039-h
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P8

Location	N: 6778560 E: 540397	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: Trace silt, fine sand, moist, brown 0.4 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.2 m (SP) SAND: Trace silt, fine sand, wet, pale grey 1.4 m (SM) Silty SAND: Fine sand, wet, dark brown 1.9 m (SP) SAND: Trace silt, fine sand, wet, dark grey / brown T.D. 3 m	
Water Table (estimated based on drilling)	0.6 m BSL	
Field Test Results	K_{sat} = 2.6 m/day = 109 mm/hr	K = 3.0 x 10^{-5} m/s
Test Hole Depth	0.07 m BSL	
Indicative Drainage Class	'well drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
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Our Ref: JW:jw: GI 2039-i
2 June 2015

Gold Coral Pty Ltd
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REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P9

Location	N: 6778502 E: 540329	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine to medium sand, moist, dark grey 0.5 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.8 m (SM) Silty SAND: With clay, fine sand, wet, dark brown 2.0 m (SM) Silty SAND: Fine sand, wet, dark brown mottled orange brown 2.5 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.5 m BSL	
Field Test Results	K_{sat} = 18.6 m/day = 775 mm/hr	K = 2.2 x 10^{-4} m/s
Test Hole Depth	0.07 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

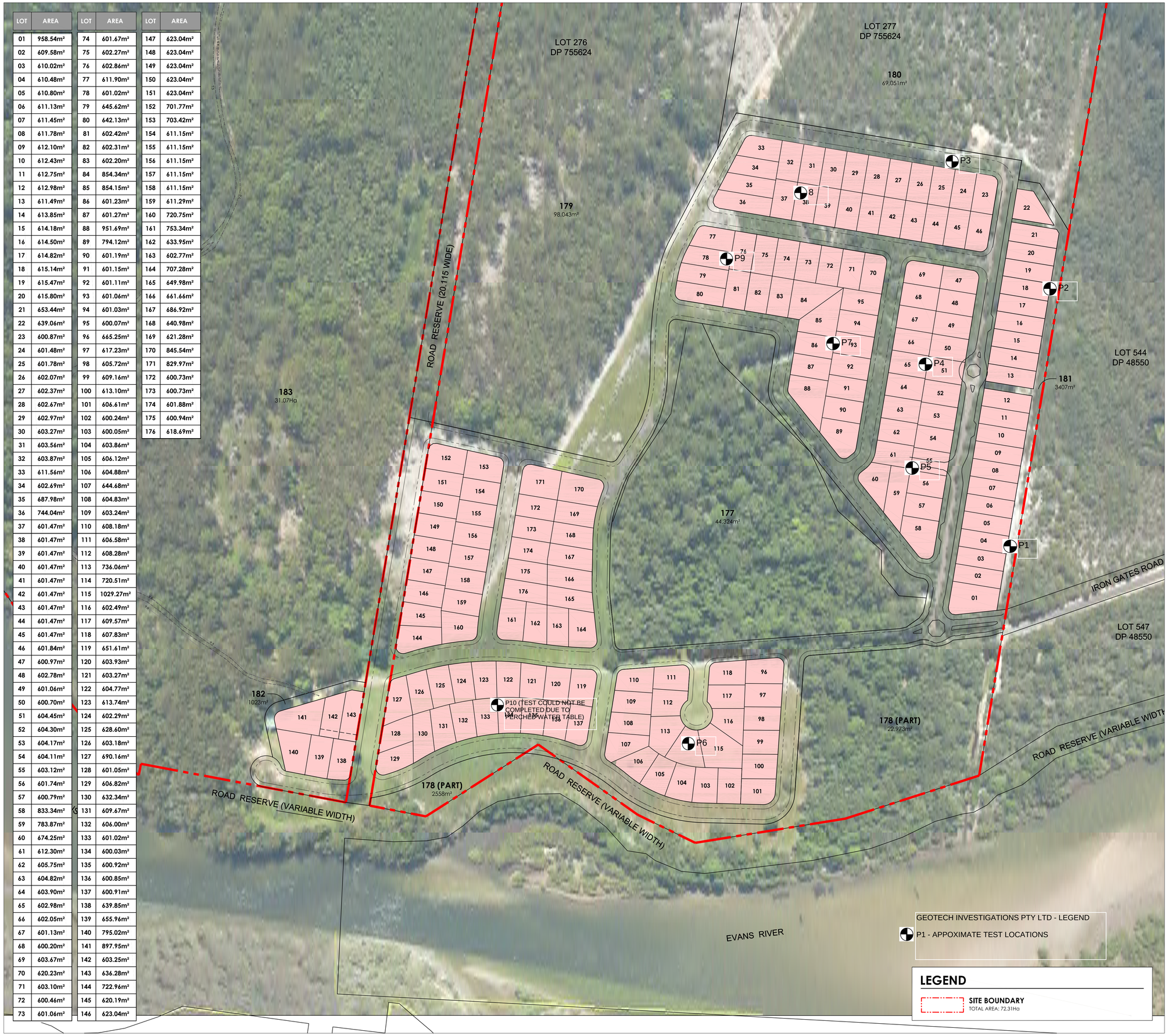
PLAN OF SUBDIVISION

IRON GATES, EVANS HEAD

LOT	AREA
01	958.54m²
02	609.58m²
03	610.02m²
04	610.48m²
05	610.80m²
06	611.13m²
07	611.45m²
08	611.78m²
09	612.10m²
10	612.43m²
11	612.75m²
12	612.98m²
13	611.49m²
14	613.85m²
15	614.18m²
16	614.50m²
17	614.82m²
18	615.14m²
19	615.47m²
20	615.80m²
21	653.44m²
22	639.06m²
23	600.87m²
24	601.48m²
25	601.78m²
26	602.07m²
27	602.37m²
28	602.67m²
29	602.97m²
30	603.27m²
31	603.56m²
32	603.87m²
33	611.56m²
34	602.69m²
35	687.98m²
36	744.04m²
37	601.47m²
38	601.47m²
39	601.47m²
40	601.47m²
41	601.47m²
42	601.47m²
43	601.47m²
44	601.47m²
45	601.47m²
46	601.84m²
47	600.97m²
48	602.78m²
49	601.06m²
50	600.70m²
51	604.45m²
52	604.30m²
53	604.17m²
54	604.11m²
55	603.12m²
56	601.74m²
57	600.79m²
58	833.34m²
59	783.87m²
60	674.25m²
61	612.30m²
62	605.75m²
63	604.82m²
64	603.90m²
65	602.98m²
66	602.05m²
67	601.13m²
68	600.20m²
69	603.67m²
70	620.23m²
71	603.10m²
72	600.46m²
73	601.06m²

LOT	AREA
74	601.67m²
75	602.27m²
76	602.86m²
77	611.90m²
78	601.02m²
79	645.62m²
80	642.13m²
81	602.42m²
82	602.31m²
83	602.20m²
84	854.34m²
85	854.15m²
86	601.23m²
87	601.27m²
88	951.69m²
89	794.12m²
90	601.19m²
91	601.15m²
92	601.11m²
93	601.06m²
94	601.03m²
95	600.07m²
96	665.25m²
97	617.23m²
98	605.72m²
99	609.16m²
100	613.10m²
101	606.61m²
102	600.24m²
103	600.05m²
104	603.86m²
105	606.12m²
106	604.88m²
107	644.68m²
108	604.83m²
109	603.24m²
110	608.18m²
111	606.58m²
112	608.28m²
113	736.06m²
114	720.51m²
115	1029.27m²
116	602.49m²
117	609.57m²
118	607.83m²
119	651.61m²
120	603.93m²
121	603.27m²
122	604.77m²
123	613.74m²
124	602.29m²
125	628.60m²
126	603.18m²
127	690.16m²
128	601.05m²
129	606.82m²
130	632.34m²
131	609.67m²
132	606.00m²
133	601.02m²
134	600.03m²
135	600.92m²
136	600.85m²
137	600.91m²
138	639.85m²
139	655.96m²
140	795.02m²
141	897.95m²
142	603.25m²
143	636.28m²
144	722.96m²
145	620.19m²
146	623.04m²

LOT	AREA
147	623.04m²
148	623.04m²
149	623.04m²
150	623.04m²
151	623.04m²
152	701.77m²
153	703.42m²
154	611.15m²
155	611.15m²
156	611.15m²
157	611.15m²
158	611.15m²
159	611.29m²
160	720.75m²
161	753.34m²
162	633.95m²
163	602.77m²
164	707.28m²
165	649.98m²
166	661.66m²
167	686.92m²
168	640.98m²
169	621.28m²
170	845.54m²
171	829.97m²
172	600.73m²
173	600.73m²
174	601.88m²
175	600.94m²
176	618.69m²



PLANIT CONSULTING

PROJECT TITLE:
IRON GATES DEVELOPMENT, EVANS HEAD

DRAWING TITLE:
PLAN OF SUBDIVISION - OPTION 7

BASE PROVIDED BY:
N/A

CLIENT:
GOLD CORAL

NO	DATE	REVISION	BY
-	-	-	-

SCALE:
1/1500 @ A1

DESIGN:
PLANIT CONSULTING

DRAWN:
ZP

DATE:
03/2015

CHECKED:
AS

DRAWING NO:
IRONGATES_PLNOFSUB_01

NORTH POINT:

SHEET NO:
01 OF 01

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Nobby Beach
PO Box 206 QLD 4218

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Email: admin@planitconsulting.com.au

APPENDIX E

ADDITIONAL RFI – RESPONSE 11/05/2016

ARCADIS Design & Consultancy for natural and built assets

Graeme Ingles
Gold Coral c/- Ingles Group Pty Ltd
Po Box 558
Surfers Paradise QLD 4271

11/05/2016

Arcadis Australia Pacific Pty Ltd
Level 7, Premion Place
Cnr Queen & High Streets
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SOUTHPORT QLD 4215
Tel No: +61 7 5532 3933
Fax No: +61 7 5591 4778
arcadis.com

Iron Gates Residential Subdivision – Response to Richmond Valley Council Request for Further Information

A0002-AA007094-AAL-01

Dear Graeme

We refer to the Information Request issued by Richmond Valley Council and the Office of Environment & Heritage for the abovementioned development on 1st of March 2016 reference DA2015/096 –SMc:SL and our subsequent fee. In accordance with our approved scope of works, this is our response (in orange font) to the request for information items (in black font) for your inclusion in the collated response to Council.

1. Section 3.2; The 6.25 metre retaining wall is considered visually excessive. Council requires a stepped embankment be provided. Please provide a revised design detail for this request.

   Arcadis understands that the proposed wall could be considered visually excessive however in order to minimize the visual impact and use the wall as a feature, the development is proposing to create a green wall.

   Figure 1 to 3 below show an example of the proposed treatment.

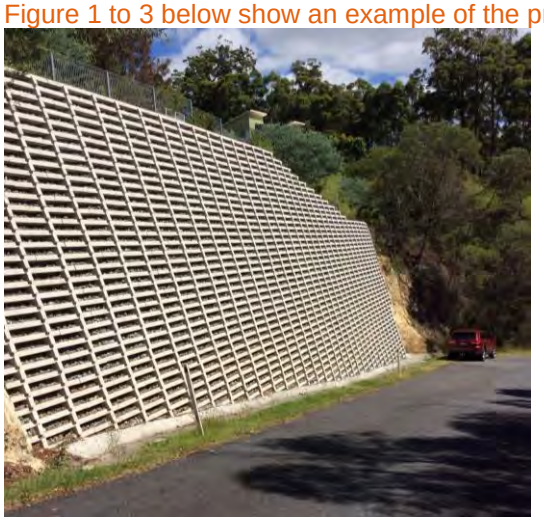


Figure 1- Retaining Wall without Vegetation

Figure 2- Example 1 of Green Wall

Figure 3- Example 2 of Green Wall

The open web construction and use of free draining material eliminates two common causes of failure in retaining walls — namely build-up of hydrostatic pressure and the destructive pressure of tree root systems.

The high quality precast concrete components provide for long-term durability and will not rot or warp.

Concrete crib walls are specifically designed to allow speed and ease of construction for minimum cost and require little or no maintenance. The standard, quality components allow for the most economical solutions for various wall heights.

A Concrib crib wall can be planted with flowers, shrubs, or creepers, using the spaces in the face of the wall. This allows the wall to blend in with any existing or proposed environment. Is it possible that we could "green" the wall with a variety of plants suitable for the Richmond Birdwing Butterfly.

To promote the Richmond Birdwing Butterfly the following plants are suggested:

> *Adult Richmond Birdwing butterflies will feed on nectar from flowers of many native plants, including native frangipani (Hymenosporum flavum), pavetta (Pavetta australiensis), black bean (Castanospermum australe) and lilly pillies (Syzygium species), as well as several exotic flowers, e.g. buddleia, pentas, honeysuckle, bougainvillea, impatiens and hibiscus. They prefer white and red blooms to other colours.*
>
> *The caterpillars (or larvae) only feed naturally on two species of vines – the lowland Richmond birdwing vine (Pararistolochia praevenosa) and the mountain aristolochia (Pararistolochia laheyana).*

These plants are proposed to be cultivated across the wall facing in order to assist in recovery of the breeding habitats for the butterfly.

Refer to Planit Drawing Iron Gates Cribb Wall Landscape Details. (attached).

2. To be noted: Plan C140 Rev 04. Ch 0 to 110 - MC1004 has a narrowing of the pavement to lessen the impact on environmental grounds with barriers and an elevated pedestrian platform. Plan C122 indicates retaining walls up to 1.5m with a pedestrian walkway on the side. -The width will need to be 2.5m wide to comply with cycleway standards and suitable balustrading to elevated walkways.

   Arcadis has amended Plan C140 to show a 2.5m wide pedestrian walkway to comply with Council's cycleway standards. Suitable balustrading will be provided with details provided during Construction Certificate Application.

3. Section 4.2.6 At the latter stages of the development, where traffic volumes may exceed 500 AADT". Council has assessed the following traffic movements; 176 lots x say 6 movements per day = 1.056 vpd. The 1,056 is much greater than the standard that the road has been assessed at which is only 500vpd. Council request the road designs be reassessed to account for 1,056 vpd.

   The report entitled Iron Gates Residential Development Engineering Services and Civil Infrastructure Rev 06 dated 10/05/2016 has been amended to include discussion about Iron Gates Road estimated traffic volumes, proposed upgrade and timing. The existing road profile, which include a 6m and 1m shoulder, is able to support Stage 1 and a large portion of Stage 2 traffic when an upgrade is proposed to widen the pavement to an 8m full width seal. Refer Section 4.2.6 of the report for further details.

4. Section 9.2.2; please explain what is the comparison between the original ET loading that was the input for the dual rising main, and the proposed ET loading now by the proposed subdivision. Council needs to ensure the existing infrastructure is suitably sized for the proposed development.

The report entitled Iron Gates Residential Development Engineering Services and Civil Infrastructure Rev 06 dated 10/05/2016 has been amended to make allowance for the existing lots, currently connected to the DN150 gravity sewer in Mangrove Street upstream of the existing EHPS-02 pump station. Please refer to attached sewer calculations and Section 9 of the report.

5. Section 7.2.3 Infiltration pits are 1m deep and almost 5m^2 . Council has concerns;
   - What are the risks to a saturated sub base for the roads?

To avoid any risks of saturating road sub-base, all roads will be provided with subsurface drainage in accordance with The Northern River Council Specs.

   - Impact to/from driveways?

Driveways will be coordinated during detailed design to avoid clashes with drainage system.

   - How is overflow from the pits to be managed without causing nuisance stormwater flows to adjoining land owners. Council preference is for the overflow to be discharged to street kerb or via Internal Allotment Drainage (IAD).

Flows will be captured and conveyed to the infiltration system, with overflow being directed to the street kerb system. Refer figures 4 and 5 below shows a typical infiltration system details. It should also be noted that all proposed lots typically fall to the road with no inter allotment needed.

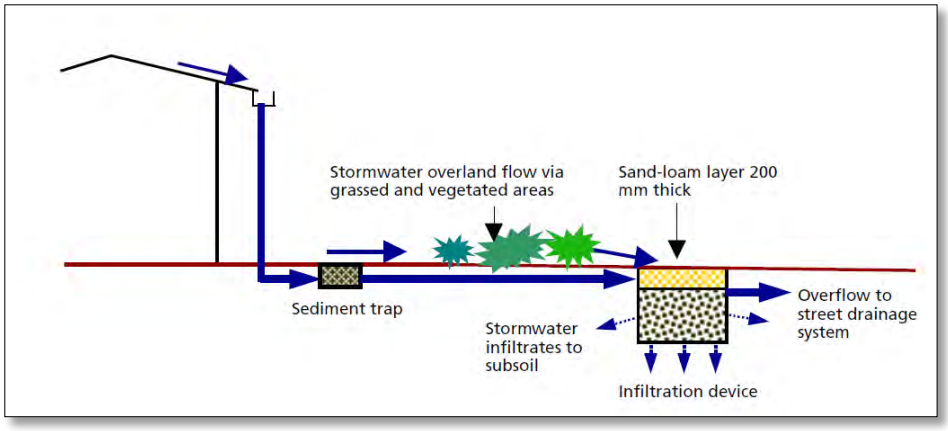


Figure 4- Typical Infiltration Strategy

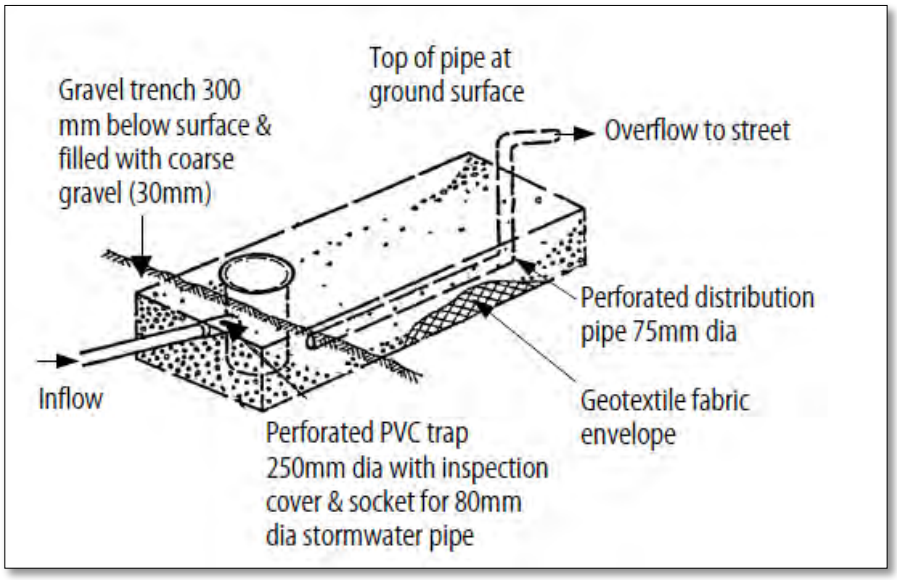


Figure 5- Infiltration System Details

- How are the pits be protected from future owners constructing over the pits or reducing the effectiveness of the pit. An easement on tittle may be an appropriate method to protect this infrastructure.

An easement for Stormwater will be provided over each device. This will be detailed during the detailed design phase of the project.

Yours sincerely

Darlan Castro
Senior Engineers
(07) 5503 4822

Enc. Planit Cribb Wall Landscape Details
Sewer Calculations
Iron Gates Residential Development Engineering Services and Civil Infrastructure Rev 06 dated 10/05/2016

CC. Gold Coral Pty Ltd
CC. Planit Consulting

APPENDIX F

AMENDED SUBDIVSION PLANS

Lot Table	
Lot	Area
1	969 m^2
2	612 m^2
3	612 m^2
4	612 m^2
5	612 m^2
6	612 m^2
7	612 m^2
8	612 m^2
9	612 m^2
10	612 m^2
11	612 m^2
12	612 m^2
13	612 m^2
14	612 m^2
15	612 m^2
16	612 m^2
17	612 m^2
18	612 m^2
19	612 m^2
20	612 m^2
21	649 m^2
22	615 m^2
23	600 m^2
24	600 m^2
25	600 m^2
26	600 m^2
27	600 m^2
28	600 m^2
29	627 m^2
30	600 m^2
31	600 m^2
32	600 m^2
33	600 m^2
34	600 m^2
35	600 m^2
36	788 m^2
37	674 m^2
38	775 m^2
39	612 m^2
40	604 m^2
41	604 m^2
42	604 m^2
43	604 m^2
44	604 m^2
45	604 m^2
46	604 m^2
47	609 m^2
48	605 m^2
49	600 m^2
50	600 m^2
51	600 m^2
52	600 m^2
53	600 m^2
54	600 m^2
55	600 m^2
56	600 m^2
57	623 m^2
58	623 m^2
59	633 m^2
60	632 m^2
61	618 m^2
62	604 m^2
63	604 m^2
64	605 m^2
65	606 m^2
66	606 m^2
67	607 m^2
68	607 m^2
69	608 m^2
70	609 m^2

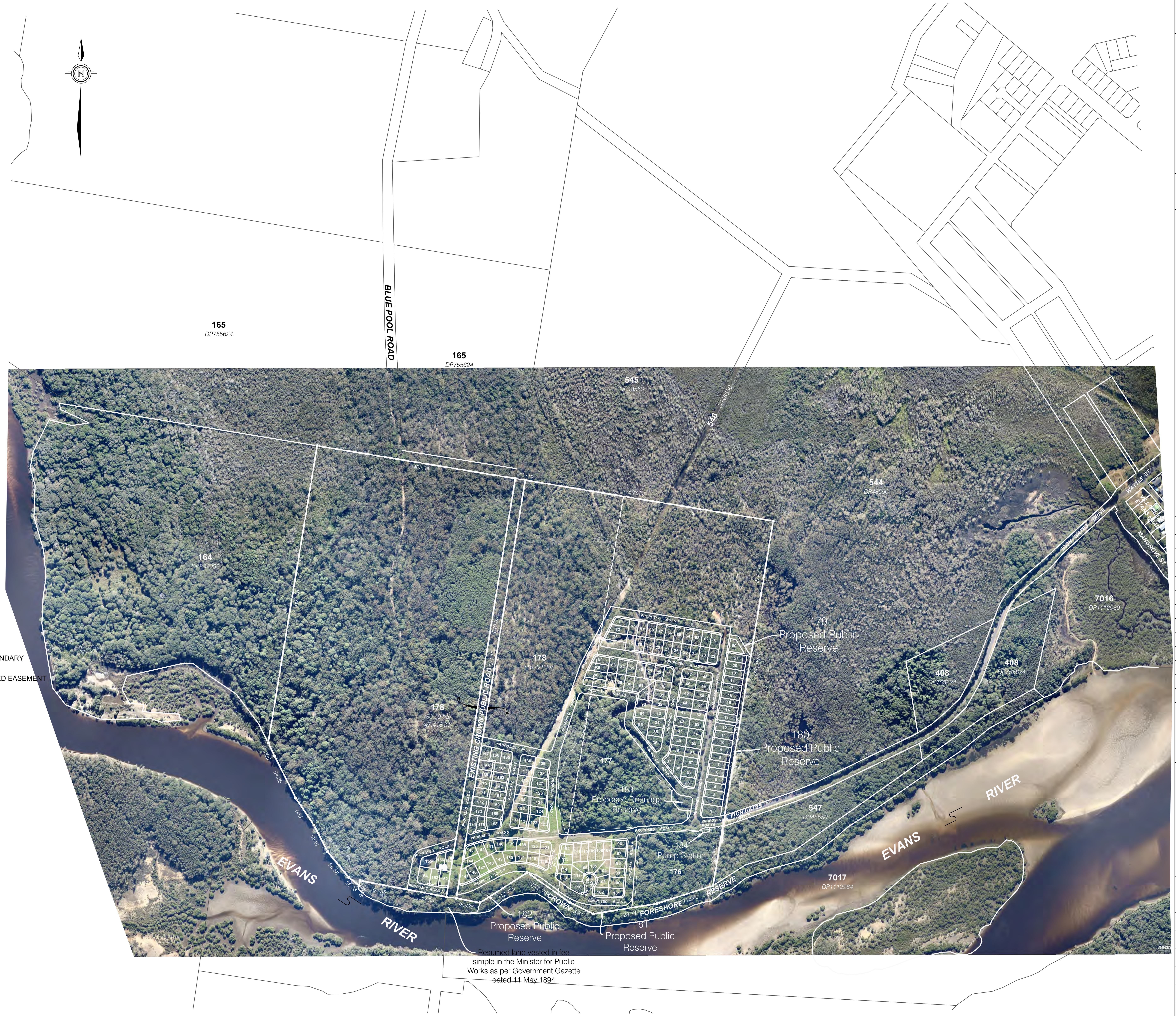
Lot Table	
Lot	Area
71	607 m^2
72	608 m^2
73	682 m^2
74	766 m^2
75	600 m^2
76	600 m^2
77	600 m^2
78	600 m^2
79	600 m^2
80	601 m^2
81	601 m^2
82	601 m^2
83	601 m^2
84	608 m^2
85	614 m^2
86	634 m^2
87	696 m^2
88	602 m^2
89	602 m^2
90	602 m^2
91	859 m^2
92	856 m^2
93	603 m^2
94	603 m^2
95	954 m^2
96	616 m^2
97	663 m^2
98	657 m^2
99	602 m^2
100	723 m^2
101	605 m^2
102	609 m^2
103	620 m^2
104	714 m^2
105	602 m^2
106	604 m^2
107	602 m^2
108	602 m^2
109	602 m^2
110	602 m^2
111	601 m^2
112	600 m^2
113	600 m^2
114	600 m^2
115	608 m^2
116	601 m^2
117	602 m^2
118	600 m^2
119	601 m^2
120	600 m^2
121	600 m^2
122	647 m^2
123	619 m^2
124	603 m^2
125	600 m^2
126	646 m^2
127	661 m^2
128	626 m^2
129	600 m^2
130	639 m^2
131	602 m^2
132	602 m^2
133	600 m^2
134	618 m^2
135	623 m^2
136	604 m^2
137	602 m^2
138	600 m^2
139	600 m^2
140	600 m^2

Lot Table	
Lot	Area
141	600 m^2
142	600 m^2
143	605 m^2
144	600 m^2
145	600 m^2
146	601 m^2
147	600 m^2
148	600 m^2
149	601 m^2
150	601 m^2
151	600 m^2
152	665 m^2
153	629 m^2
154	834 m^2
155	765 m^2
156	603 m^2
157	627 m^2
158	644 m^2
159	601 m^2
160	601 m^2
161	601 m^2
162	601 m^2
163	601 m^2
164	601 m^2
165	600 m^2
166	601 m^2
167	602 m^2
168	602 m^2
169	602 m^2
170	602 m^2
171	602 m^2
172	602 m^2
173	602 m^2
174	614 m^2
175	600 m^2
176	2.188ha
177	4.857ha
178	47.418ha

LEGEND:

SITE BOUNDARY

PROPOSED EASEMENT



NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE NSW LAND REGISTRY SERVICES

CLIENT

GOLDCORAL PTY LTD

PROJECT

PROPOSED SUBDIVISION OF LOTS 276 & 277 ON DP755624, LOT 163 ON DP831052, CROWN PUBLIC ROAD RESERVE (BETWEEN LOT 163 DP831052 AND LOT 276 DP755624) AND CROWN FORESHORE RESERVE (ADJACENT TO EVANS RIVER)

LOCAL AUTHORITY

RICHMOND VALLEY

NOTES

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Aerial Photography sourced from Nearmap 13-3-2019.
Date of photography - 03/07/2012

LOTS	TOTAL AREA
Residential Lots (175)	16.884ha
Residue Lots (3)	54.463ha
Public Reserves (4)	0.8366ha
Drainage Reserve (1)	0.1124ha
Pump station lot (1)	0.0127ha
TOTAL	72.309ha

ADDITIONAL NOTES

SCALE BAR
40m 0 80 200m
SCALE 1:4000 @ A1

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f: (07) 3842 1001
e: info@landpartners.com.au
w: www.landpartners.com.au

LEVEL DATUM	AHD
LEVEL ORIGIN	-
CONTOUR INTERVAL	-
COMPUTER FILE	BRJD6396-100-33-16-COPY
DRAWN CGW	DATE 27/06/2019
CHECKED CMJ	DATE 27/06/2019
APPROVED CGW	DATE 27/06/2019
PLAN NUMBER BRJD6396.100-013 SHEET 1 OF 2	REV H

CGW

Lot Table	
Lot	Area
1	969 m²
2	612 m²
3	612 m²
4	612 m²
5	612 m²
6	612 m²
7	612 m²
8	612 m²
9	612 m²
10	612 m²
11	612 m²
12	612 m²
13	612 m²
14	612 m²
15	612 m²
16	612 m²
17	612 m²
18	612 m²
19	612 m²
20	612 m²
21	649 m²
22	615 m²
23	600 m²
24	600 m²
25	600 m²
26	600 m²
27	600 m²
28	600 m²
29	627 m²
30	600 m²
31	600 m²
32	600 m²
33	600 m²
34	600 m²
35	600 m²
36	788 m²
37	674 m²
38	775 m²
39	612 m²
40	604 m²
41	604 m²
42	604 m²
43	604 m²
44	604 m²
45	604 m²
46	604 m²
47	609 m²
48	605 m²
49	600 m²
50	600 m²
51	600 m²
52	600 m²
53	600 m²
54	600 m²
55	600 m²
56	600 m²
57	623 m²
58	623 m²
59	633 m²
60	632 m²
61	618 m²
62	604 m²
63	604 m²
64	605 m²
65	606 m²
66	606 m²
67	607 m²
68	607 m²
69	608 m²
70	609 m²

Lot Table	
Lot	Area
71	607 m²
72	608 m²
73	682 m²
74	766 m²
75	600 m²
76	600 m²
77	600 m²
78	600 m²
79	600 m²
80	601 m²
81	601 m²
82	601 m²
83	601 m²
84	608 m²
85	614 m²
86	634 m²
87	696 m²
88	602 m²
89	602 m²
90	602 m²
91	859 m²
92	856 m²
93	603 m²
94	603 m²
95	954 m²
96	616 m²
97	663 m²
98	657 m²
99	602 m²
100	723 m²
101	605 m²
102	609 m²
103	620 m²
104	714 m²
105	602 m²
106	604 m²
107	602 m²
108	602 m²
109	602 m²
110	602 m²
111	601 m²
112	600 m²
113	600 m²
114	608 m²
115	601 m²
116	601 m²
117	602 m²
118	600 m²
119	601 m²
120	600 m²
121	600 m²
122	647 m²
123	619 m²
124	603 m²
125	600 m²
126	646 m²
127	661 m²
128	626 m²
129	600 m²
130	639 m²
131	602 m²
132	602 m²
133	600 m²
134	618 m²
135	623 m²
136	604 m²
137	602 m²
138	600 m²
139	600 m²
140	600 m²

Lot Table	
Lot	Area
141	600 m²
142	600 m²
143	605 m²
144	600 m²
145	600 m²
146	601 m²
147	600 m²
148	600 m²
149	601 m²
150	601 m²
151	600 m²
152	665 m²
153	629 m²
154	834 m²
155	765 m²
156	603 m²
157	627 m²
158	644 m²
159	601 m²
160	601 m²
161	601 m²
162	601 m²
163	629 m²
164	834 m²
165	600 m²
166	601 m²
167	602 m²
168	602 m²
169	602 m²
170	602 m²
171	602 m²
172	602 m²
173	602 m²
174	614 m²
175	600 m²
176	2.188ha
177	4.857ha
178	47.418ha

LEGEND:

SITE BOUNDARY

PROPOSED EASEMENT

CLIENT

GOLDCORAL PTY LTD

PROJECT

PROPOSED SUBDIVISION OF LOTS 276 & 277 ON DP755624, LOT 163 ON DP831052, CROWN PUBLIC ROAD RESERVE (BETWEEN LOT 163 DP831052 AND LOT 276 DP755624) AND CROWN FORESHORE RESERVE (ADJACENT TO EVANS RIVER)

LOCAL AUTHORITY

RICHMOND VALLEY

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Drainage Reserve (1)	0.1124ha
Pump station lot (1)	0.0127ha
TOTAL	72.309ha
ADDITIONAL NOTES	

SCALE BAR
0 5 10 20 30 50 80m
SCALE 1:1250 @ A1

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ISO 9001 Quality Management

LEVEL DATUM	AHD		
LEVEL ORIGIN	-		
CONTOUR INTERVAL	-		
COMPUTER FILE	BRJD6396-100-33-16-COPY		
DRAWN	CGW	DATE	27/06/2019
CHECKED	CMJ	DATE	27/06/2019
APPROVED	CGW	DATE	27/06/2019
PLAN NUMBER	BRJD6396.100-013	SHEET 2 OF 2	REV H

CGW

NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE NSW LAND REGISTRY SERVICES

Lot Table	
Lot	Area
1	969 m²
2	612 m²
3	612 m²
4	612 m²
5	612 m²
6	612 m²
7	612 m²
8	612 m²
9	612 m²
10	612 m²
11	612 m²
12	612 m²
13	612 m²
14	612 m²
15	612 m²
16	612 m²
17	612 m²
18	612 m²
19	612 m²
20	612 m²
21	649 m²
22	615 m²
23	600 m²
24	600 m²
25	600 m²
26	600 m²
27	600 m²
28	600 m²
29	627 m²
30	600 m²
31	600 m²
32	600 m²
33	600 m²
34	600 m²
35	600 m²
36	788 m²
37	674 m²
38	775 m²
39	612 m²
40	604 m²
41	604 m²
42	604 m²
43	604 m²
44	604 m²
45	604 m²
46	604 m²
47	609 m²
48	605 m²
49	600 m²
50	600 m²
51	600 m²
52	600 m²
53	600 m²
54	600 m²
55	600 m²
56	600 m²
57	623 m²
58	623 m²
59	633 m²
60	632 m²
61	618 m²
62	604 m²
63	604 m²
64	605 m²
65	606 m²
66	606 m²
67	607 m²
68	607 m²
69	608 m²
70	609 m²

Lot Table	
Lot	Area
71	607 m²
72	608 m²
73	682 m²
74	766 m²
75	600 m²
76	600 m²
77	600 m²
78	600 m²
79	600 m²
80	601 m²
81	601 m²
82	601 m²
83	601 m²
84	608 m²
85	614 m²
86	634 m²
87	696 m²
88	602 m²
89	602 m²
90	602 m²
91	859 m²
92	856 m²
93	603 m²
94	603 m²
95	954 m²
96	616 m²
97	663 m²
98	657 m²
99	602 m²
100	723 m²
101	605 m²
102	609 m²
103	620 m²
104	714 m²
105	602 m²
106	604 m²
107	602 m²
108	602 m²
109	602 m²
110	602 m²
111	601 m²
112	600 m²
113	600 m²
114	600 m²
115	608 m²
116	601 m²
117	602 m²
118	600 m²
119	601 m²
120	600 m²
121	600 m²
122	647 m²
123	619 m²
124	603 m²
125	600 m²
126	646 m²
127	661 m²
128	626 m²
129	600 m²
130	639 m²
131	602 m²
132	602 m²
133	600 m²
134	618 m²
135	623 m²
136	604 m²
137	602 m²
138	600 m²
139	600 m²
140	600 m²

Lot Table	
Lot	Area
141	600 m²
142	600 m²
143	605 m²
144	600 m²
145	600 m²
146	601 m²
147	600 m²
148	600 m²
149	601 m²
150	665 m²
151	629 m²
152	834 m²
153	765 m²
154	603 m²
155	627 m²
156	644 m²
157	601 m²
158	601 m²
159	601 m²
160	601 m²
161	601 m²
162	601 m²
163	601 m²
164	601 m²
165	600 m²
166	601 m²
167	602 m²
168	602 m²
169	602 m²
170	602 m²
171	602 m²
172	602 m²
173	602 m²
174	614 m²
175	600 m²
176	2.188ha
177	4.857ha
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LEGEND:

- SITE BOUNDARY
- PROPOSED EASEMENT
- ZONE - E1 - National Parks and Nature Reserves
- ZONE - E2 - Environmental Conservation
- ZONE - E3 - Environmental Management
- ZONE - RU1 - Primary Production
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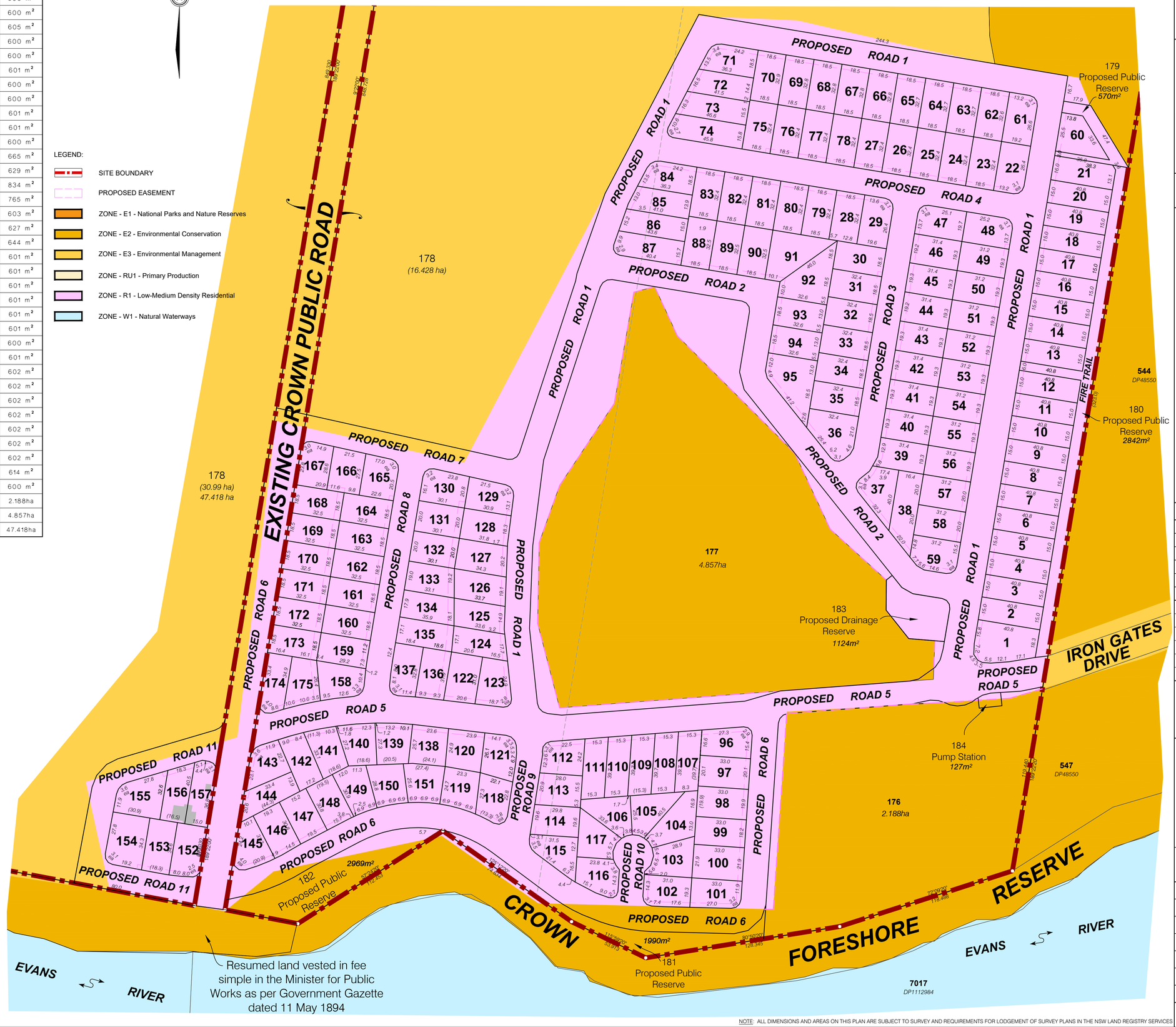

CLIENT

GOLDCORAL PTY LTD

PROJECT

PROPOSED SUBDIVISION OF LOTS 276 & 277 ON DP755624, LOT 163 ON DP831052, CROWN PUBLIC ROAD RESERVE (BETWEEN LOT 163 DP831052 AND LOT 276 DP755624) AND CROWN FORESHORE RESERVE (ADJACENT TO EVANS RIVER)

LOCAL AUTHORITY

RICHMOND VALLEY

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0 5 10 20 30 50 80m

SCALE 1:1250 @ A1

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ISO 9001 Quality Management
SAI Global No. 31 5260

LEVEL DATUM	AHD		
LEVEL ORIGIN	-		
CONTOUR INTERVAL	-		
COMPUTER FILE	BRJD6396-100-33-16		
DRAWN	CGW	DATE	27/06/2019
CHECKED	CMJ	DATE	27/06/2019
APPROVED	CGW	DATE	27/06/2019
PLAN NUMBER	SHEET 2 OF 2 BRJD6396.100-014	REV	O

CGW

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Lot Table	
Lot	Area
1	969 m²
2	612 m²
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4	612 m²
5	612 m²
6	612 m²
7	612 m²
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9	612 m²
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12	612 m²
13	612 m²
14	612 m²
15	612 m²
16	612 m²
17	612 m²
18	612 m²
19	612 m²
20	612 m²
21	649 m²
22	615 m²
23	600 m²
24	600 m²
25	600 m²
26	600 m²
27	600 m²
28	600 m²
29	627 m²
30	600 m²
31	600 m²
32	600 m²
33	600 m²
34	600 m²
35	600 m²
36	788 m²
37	674 m²
38	775 m²
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41	604 m²
42	604 m²
43	604 m²
44	604 m²
45	604 m²
46	604 m²
47	609 m²
48	605 m²
49	600 m²
50	600 m²
51	600 m²
52	600 m²
53	600 m²
54	600 m²
55	600 m²
56	600 m²
57	623 m²
58	623 m²
59	633 m²
60	632 m²
61	618 m²
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63	604 m²
64	605 m²
65	606 m²
66	606 m²
67	607 m²
68	607 m²
69	608 m²
70	609 m²

Lot Table	
Lot	Area
71	607 m²
72	608 m²
73	682 m²
74	766 m²
75	600 m²
76	600 m²
77	600 m²
78	600 m²
79	600 m²
80	601 m²
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84	608 m²
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86	634 m²
87	696 m²
88	602 m²
89	602 m²
90	602 m²
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94	603 m²
95	954 m²
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103	620 m²
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105	602 m²
106	604 m²
107	602 m²
108	602 m²
109	602 m²
110	602 m²
111	601 m²
112	600 m²
113	600 m²
114	600 m²
115	608 m²
116	601 m²
117	602 m²
118	600 m²
119	601 m²
120	600 m²
121	600 m²
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126	646 m²
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133	600 m²
134	618 m²
135	623 m²
136	604 m²
137	602 m²
138	600 m²
139	600 m²
140	600 m²

Lot Table	
Lot	Area
141	600 m²
142	600 m²
143	605 m²
144	600 m²
145	600 m²
146	601 m²
147	600 m²
148	600 m²
149	601 m²
150	601 m²
151	600 m²
152	665 m²
153	629 m²
154	834 m²
155	765 m²
156	603 m²
157	627 m²
158	644 m²
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162	601 m²
163	601 m²
164	601 m²
165	600 m²
166	601 m²
167	602 m²
168	602 m²
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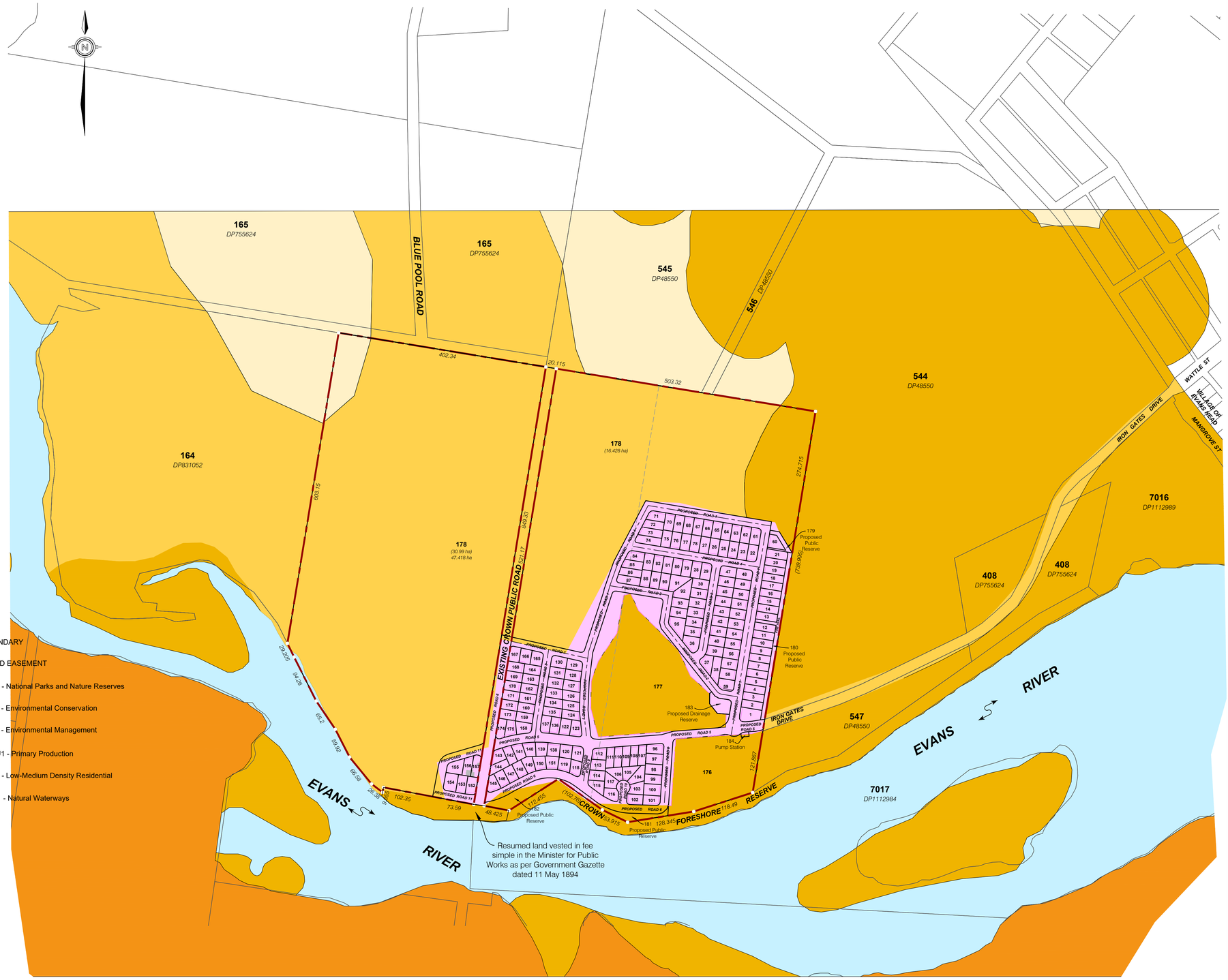

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PROJECT

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Drainage Reserve (1)	0.1124ha
Pump station lot (1)	0.0127ha
TOTAL	72.309ha

ADDITIONAL NOTES

SCALE BAR

40m 0 80 200m

SCALE 1:4000 @ A1

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2	612 m²
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10	612 m²
11	612 m²
12	612 m²
13	612 m²
14	612 m²
15	612 m²
16	612 m²
17	612 m²
18	612 m²
19	612 m²
20	612 m²
21	649 m²
22	615 m²
23	600 m²
24	600 m²
25	600 m²
26	600 m²
27	600 m²
28	600 m²
29	627 m²
30	600 m²
31	600 m²
32	600 m²
33	600 m²
34	600 m²
35	600 m²
36	788 m²
37	674 m²
38	775 m²
39	612 m²
40	604 m²
41	604 m²
42	604 m²
43	604 m²
44	604 m²
45	604 m²
46	604 m²
47	609 m²
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69	608 m²
70	609 m²

Lot Table	
Lot	Area
71	607 m²
72	608 m²
73	682 m²
74	766 m²
75	600 m²
76	600 m²
77	600 m²
78	600 m²
79	600 m²
80	601 m²
81	601 m²
82	601 m²
83	601 m²
84	608 m²
85	614 m²
86	634 m²
87	696 m²
88	602 m²
89	602 m²
90	602 m²
91	859 m²
92	856 m²
93	603 m²
94	603 m²
95	954 m²
96	616 m²
97	663 m²
98	657 m²
99	602 m²
100	723 m²
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Lot Table	
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141	600 m²
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149	601 m²
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152	665 m²
153	629 m²
154	834 m²
155	765 m²
156	603 m²
157	627 m²
158	644 m²
159	601 m²
160	601 m²
161	601 m²
162	601 m²
163	601 m²
164	601 m²
165	600 m²
166	601 m²
167	602 m²
168	602 m²
169	602 m²
170	602 m²
171	602 m²
172	602 m²
173	602 m²
174	614 m²
175	600 m²
176	2.188ha
177	4.857ha
178	47.418ha

LEGEND:

SITE BOUNDARY

PROPOSED EASEMENT

CLIENT

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PROJECT

PROPOSED SUBDIVISION OF LOTS 276 & 277 ON DP755624, LOT 163 ON DP831052, CROWN PUBLIC ROAD RESERVE (BETWEEN LOT 163 DP831052 AND LOT 276 DP755624) AND CROWN FORESHORE RESERVE (ADJACENT TO EVANS RIVER)

LOCAL AUTHORITY

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SCALE 1:4000 @ A1

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ISO 9001 Quality Management

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173	602 m²
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175	602 m²
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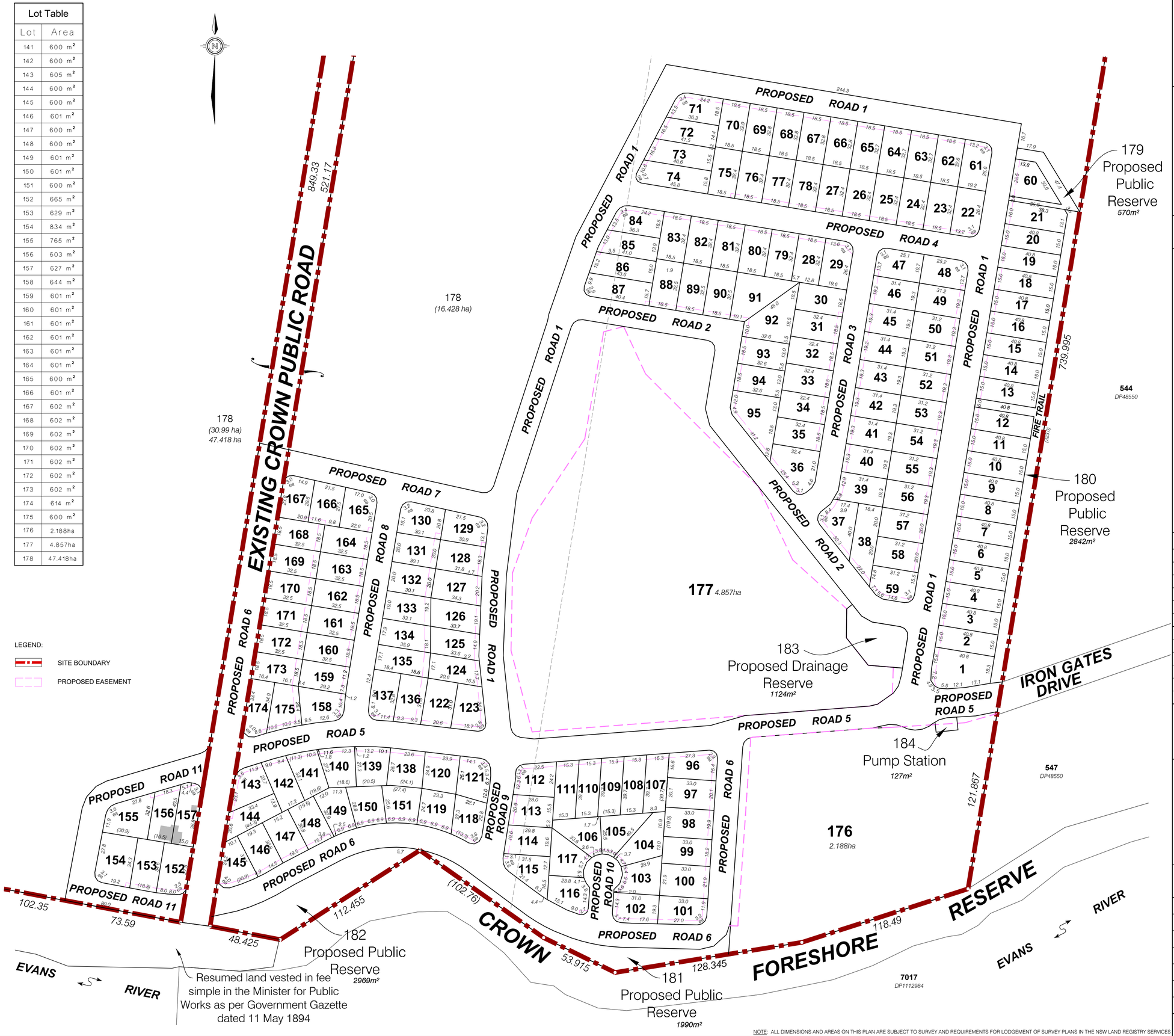

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SCALE BAR

0 5 10 20 30 50 80m

SCALE 1:1250 @ A1

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PLAN NUMBER	SHEET 2 OF 2 BRJD6396.100-015	REV	M

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N

178

177

176

544
DP48550

547
DP48550

179

180

183
PROPOSED DRAINAGE RESERVE

184
PUMP STATION

PROPOSED ROAD

FIRE TRAIL

IRON GATE DRIVE

Building Area 200m²

Resumed land vested in fee simple in the Minister for Public Works as per Government Gazette dated 11 May 1894

CROWN FORESHORE RESERVE

EVANS RIVER

Building Envelope 10m x 15m

NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE DEPARTMENT.

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STAGE	No. OF LOTS	NEW ROAD	AREA OF PARK	TOTAL AREA
-	-	-	-	-
TOTAL				

SCALE BAR

50m 0 50 100m

SCALE 1:2500 @ A3

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ISO 9001: FS 530063

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CONTOUR INTERVAL	NA		
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APPROVED	CGW	DATE	27/06/2019

UDN BRJD6396-100-38-4

SHEET 1 OF 1

CGW

APPENDIX G

WATER NETWORK CAPACITY ASSESSMENT

MEMO

ARCADIS Design & Consultancy for natural and built assets

Date	18/04/2019
To	Richmond Valley Council
From	Arcadis
Author	Oliver Purton
Reviewer	Lachlan Prizeman
Reference	F0002-10027302-AAR-01 - Water Network Memo
Subject	Evans Heads Water Network Capacity Assessment – Iron Gates Development

EXECUTIVE SUMMARY

The purpose of this memorandum to undertake an investigation into how the proposed Iron Gates development affects the surrounding Evan's Head potable water network, utilising the H2OMap water network models supplied by Richmond Valley Council. The proposed development's internal potable water network was not assessed and will be the subject of future detailed design to ensure minimum servicing to all allotments.

This Water Network Assessment Memorandum shows that the proposed development can be serviced by the existing potable water network. The model analysis indicates that the Iron Gates development, once fully developed and in-use, will have no additional impact on the Evans Head potable water network. This is true for both standard 'Peak Day Demand' and during a Fire Flow event. Issues within the Evans Head network are current and not exaggerated in any aspect from the proposed development.

SITE LOCATION AND REFERENCE PLAN

The following reference plan is provided:

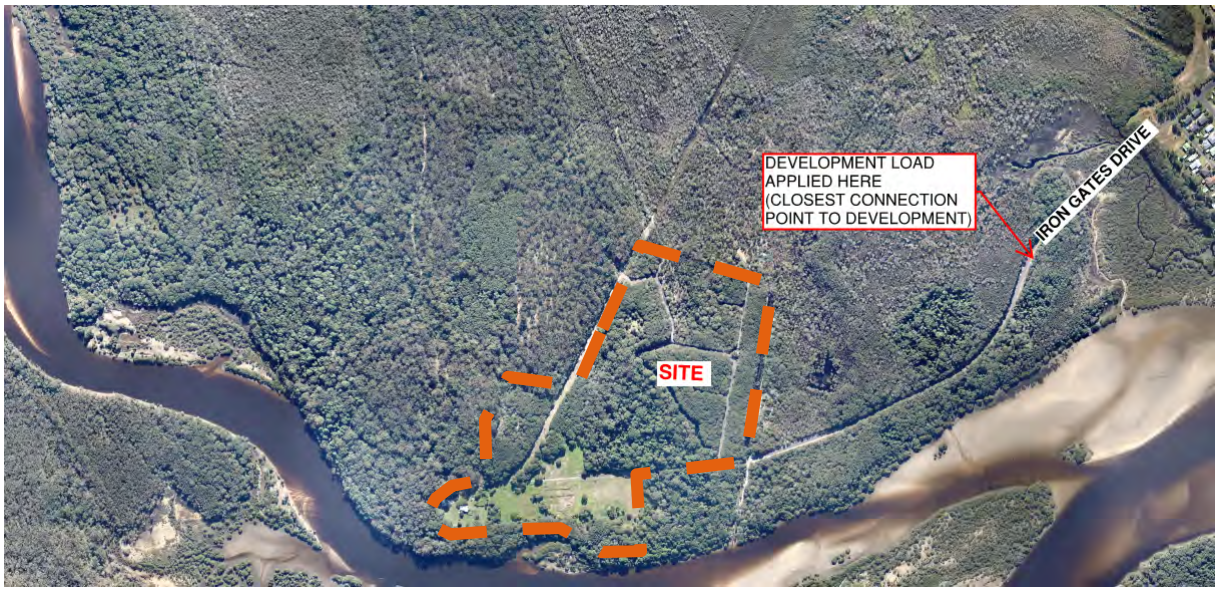

Figure 1 – Reference Plan (Image courtesy of Nearmap)

PROPOSED DEVELOPMENT LOADING

For the purposes of this report, the development has been assessed under two loading cases to better determine the anticipated impact to be had on the surrounding network. These cases are as follows:

- **Existing Case** – The existing potable water network, excluding loads from the proposed development. The 'GHD, PDD with Rising Main' scenario was assessed, which analyses the 'Peak Day Demand' for the entire Evans Head network.
- **Developed Case** – The calculated demand for the Iron Gates development based on the latest development plans, applied to the network at Iron Gates Road. The 'GHD, PDD with Rising Main' scenario was again assessed to determine the impact on the network during the 'Peak Day Demand'.

The proposed development's load was applied to the model via 'RSF, Residential Single Family' loading pattern. This loading pattern was chosen as it best represents the proposed development and complies with the assumptions made in the model for the Evans Head network.

Table 1 below shows the proposed development's calculated Equivalent Tenements (ET).

Table 1 Proposed Development Loadings

Category	Number of Lots	Conversion Rate	Proposed ET Loading
Single Detached Dwelling Lot	**105**	1ET/lot	105
Duplex Dwelling Lot	**70**	2ET/lot	140
		Total:	**245**

MODELLING ASSUMPTIONS & METHODOLOGY

ASSUMPTIONS

Richmond Valley Council supplied three H2OMap Water network models – 'High level zone ADD', 'New Zoning' and 'High level zone PDD' in March 2019. Upon inspection of the models, it was decided that the 'High level zone PDD' model would be used for the investigation, as it had generally lower minimum pressures which typically indicate the network is under greater loads. Therefore, the potable water supply network surrounding the proposed development site was modelled using the 'High level zone PDD' H2OMap Water model. These models each had four scenarios – 'BASE, Base Network Scenario', '2009_AD, Average Day Demand', '2009_PD, Peak Day Demand' and 'GHD, PDD with Rising Main'. The development demand has been applied in the 'GHD, PDD with Rising Main' scenario, as it was determined to be the most conservative scenario. The analysis was undertaken considering the following assumptions and design criteria (Note: All design criteria are in accordance with the 'New South Wales Development Design Specification D11 – Water Supply', the 'Water Services Association of Australia – Water Supply Code of Australia – Part 1: Planning and Design' and the 'AS3500.1:2018 Plumbing and Drainage Part 1: Water Services'):

- The site is located within the Evans Head zone;
- 3-day standard flow simulation with a minimum design pressure of 20m and a maximum design pressure of 78m.
- 3-day standard flow simulation with a maximum design velocity of 3m/s.
- 1-day fire flow simulation with a minimum design pressure of 11.8m and a maximum design pressure of 78m. Fire flow was applied from 5:30am to 9:30am, as this was determined to be when the peak demand in the network occurred.
- The development will be serviced from one connection point – junction 'MWH2142', and feeder pipe '51524', being the potable water main on Iron Gates Road.

- Demand has been applied using the 'RSF, Residential Single Family' loading pattern.
- Adopted the *North Coast Regional Plan 2036* target plan of 40% of dwellings to be duel occupancies for development site.

METHODOLOGY

The proposed development was incorporated into the H2OMap Water model by applying the anticipated loads at the specified connection point of the model as per Table . The impact on the existing water supply network was assessed by verifying and comparing the standard flow pressure, fire flow pressure and pipe velocity against the abovementioned design criteria.

Summary tables are included below which specify the applied loadings in each of the modelled scenarios as a result of the development.

Table 2 Load Application Table at Connection Junction MWH2142

Scenario	Existing Scenario (ET)	Loads to be Removed (ET)	Proposed Development Load (ET)	Load Net Increase (ET)
GHD, PDD with Rising Main	0	0	245	245

STANDARD FLOW PRESSURE

The standard flow scenario was assessed for the 'GHD, PDD with Rising Main' scenario in the existing and developed cases. In the developed case the development loads were applied to the specified connection point and the results were then compared to the results modelled in the existing case. The minimum and maximum pressures in the previously specified vicinity to the proposed development were assessed over a 72-hour period using a steady state simulation.

PIPE VELOCITY

The standard flow scenario was assessed for the 'GHD, PDD with Rising Main' scenario for both the existing and developed cases to determine pipe velocities. In the developed case the additional loads were applied to the specified connection point and the results were then compared to the results modelled in the existing case. The minimum and maximum velocities domain in the proposed development were assessed over a 72-hour period using a steady state simulation.

FIRE FLOW VELOCITY

The fire flow scenario was modelled using a fire flow simulation of 1 day by applying 11L/s fire flow demand for residential uses at the proposed connection point over a period of 4 hours. A duration of 4 hours is adopted to ensure the peak in the system is adequately captured when modelling. It is noted that site will likely only be approved for 11L/s for 2 hours unless another flow and duration is approved by Richmond Valley Council. The minimum fire flow pressures in the specified vicinity of the site were then assessed against the previously mentioned design criteria.

RESULTS AND DISCUSSION

EXISTING SYSTEM PERFORMANCE

STANDARD FLOW PRESSURES

The H2OMap Water simulation results are displayed in Table . The minimum and maximum pressures at the connection point and within the modelled domain are presented.

Table 3 Existing Standard Flow Pressures within Modelled Domain

Scenario	Connection Node (MWH2142)		Min Pressure within Domain Pressure (m): Node	Max Pressure within Domain Pressure (m): Node	Number of Non-Compliant Min Pressures in Domain	Number of Non-Compliant Excess Pressures in Domain
	Min Pressure (m):	Max Pressure (m):				
GHD, PDD with Rising Main	33.57	43.24	3.50 (MWH2044)	58.84 (MWH4156)	61	0

The above existing case results indicate that the minimum pressures within the modelled domain are not in accordance with the DSS requirements. There are 61 minimum pressure non-compliances within the existing network. The minimum pressure found in the network was 3.50m at junction 'MWH2044'. These results will be the basis of which the developed case is assessed against.

The maximum pressures within the existing network are in accordance with the DSS requirements.

It must be noted that these minimum pressure non-compliances were seen across all models and scenarios.

STANDARD FLOW VELOCITIES

The H2OMap Water simulation results are displayed in Table 4. The maximum velocities within the modelled domain and the connecting pipe are presented below.

Table 4 Existing Standard Flow Velocities within the Modelled Domain

Scenario	51524	Max Velocity within Domain Velocity (m/s): Node	DSS Compliant (YES/NO)	Number of Max Velocity Non-Compliances
	Max Velocity: (m/s)			
GHD, PDD with Rising Main	0.01	3.12 (MWH149)	NO	5

The above existing case results indicate maximum velocities within the modelled domain do not demonstrate compliance with the DSS. There are 5 max velocity non-compliances within the existing network.

The maximum velocity found in the network is 3.12m/s at 'MWH149'. These results will be the basis of which the developed case is assessed against.

It must be noted that these max velocity non-compliances were seen across all models and scenarios.

FIRE FLOW PRESSURE/ VELOCITY

The existing case fire flow simulations were run at the proposed development connection with a fire flow demand of 11L/s. The fire flow pressure and pipe velocity results are presented in Table 5 below.

Table 5 Existing Fire Flow Pressure & Velocity within Modelled Domain

Scenario	Fire Flow Demand (L/s)	Connection Node (MWH2142) Min Residual Pressure (m):	Min Residual Pressure in Domain (m): Node	Max Velocity within Domain Velocity (m/s): Pipe	Number of Minimum Pressure Non-Compliances	Number of Max Velocity Non-Compliances
GHD, PDD with Rising Main	11	33.40	3.52 (MWH2044)	3.12 (MWH161)	11	5

The fire flow simulations show the DSS of a minimum of 11.8m pressure is not achieved within the network for the assessed scenario with the specified fire loading.

The above existing fire flow case results indicate maximum velocities within the modelled domain do not demonstrate full compliance with DSS requirements for the assessed planning horizon.

The maximum velocity found in the assessed domain is 3.12m/s at ‘MWH161’. The minimum residual pressure found in the assessed domain is 3.52m at ‘MWH2044’.

These results will be the basis of which the developed case is assessed against.

DEVELOPED SYSTEM PERFORMANCE

DEVELOPED SYSTEM PERFORMANCE

STANDARD FLOW PRESSURES

The H2OMap Water simulation results are displayed in Table 6. The minimum and maximum pressures within the modelled domain are presented.

Table 6 Developed Standard Flow Pressures within Modelled Domain

Scenario	Connection Node (MWH2142)		Min Pressure within Domain Pressure (m): Node (+/-)	Max Pressure within Domain Pressure (m): Node (+/-)	Number of Non-Compliant Min Pressures in Domain (+/-)	Number of Non-Compliant Excess Pressures in Domain (+/-)
	Min Pressure (m): (+/-)	Max Pressure (m): (+/-)				
GHD, PDD with Rising Main	31.38 (-2.19)	42.79 (-0.45)	3.50 (0) (MWH2044)	58.84 (0) (MWH4156)	61 (0)	0 (0)

The above developed case results indicate that the minimum pressures within the modelled domain are not in accordance with the DSS requirements. There are 61 minimum pressure non-compliances within the network. The minimum pressure found in the network was 3.50m at junction 'MWH2044'.

The maximum pressures within the network are in accordance with the DSS requirements.

However, it must be noted that the proposed development does not cause any additional non-compliances and only causes a minor diminishment in the surrounding water network.

STANDARD FLOW VELOCITIES

The H2OMap Water simulation results are displayed in Table 7. The maximum velocities within the modelled domain and the connecting pipe are presented below.

Table 7 Developed Standard Flow Velocities within the Modelled Domain

Scenario	51524	Max Velocity within Domain Velocity (m/s): Node	DSS Compliant (YES/NO)	Number of Additional Max Velocity Non-Compliances
	Max Velocity: (m/s)			
GHD, PDD with Rising Main	0.01 (0)	3.12 (MWH149)	NO	5 (0)

The above developed case results indicate maximum velocities within the modelled domain do not demonstrate compliance with the DSS.

The maximum velocity found in the assessed domain is 3.12m/s at 'MWH149'.

However, it must be noted that the proposed development does not cause any additional non-compliances within the network.

FIRE FLOW PRESSURE/ VELOCITY

The existing case fire flow simulations were run at the proposed development connection with a fire flow demand of 11L/s. The fire flow pressure and pipe velocity results are presented in Table 8 below.

Table 8 Developed Fire Flow Pressure & Velocity within Modelled Domain

Scenario	Fire Flow Demand (L/s)	Connection Node (MWH2142) Min Residual Pressure (m): (+/-)	Min Residual Pressure in Domain (m): Node (+/-)	Max Velocity within Domain Velocity (m/s): Pipe (+/-)	Number of Minimum Pressure Non-Compliances (+/-)	Number of Additional Max Velocity Non-Compliances (+/-)
GHD, PDD with Rising Main	11	31.21 (-2.19)	3.52 (0) (MWH2044)	3.12 (0) (MWH149)	11 (0)	5 (0)

The fire flow simulations show the DSS of a minimum of 11.8m pressure is not achieved within the network for the assessed scenario with the specified fire loading.

The above developed fire flow case results indicate maximum velocities within the modelled domain do not demonstrate compliance with the DSS for the assessed scenario.

The maximum velocity found in the assessed domain is 3.12m/s at ‘MWH149’.

The minimum residual pressure found in the assessed domain is 3.52m at ‘MWH2044’.

It must be noted that the proposed development does not cause any additional non-compliances within the network.

CONCLUSION

This Water Network Assessment Memorandum shows that the proposed development can be serviced by the existing potable water network.

Upon the inclusion of the development, the assessment resulted in the following conclusions:

- **Standard Flow Pressure –** Some minimum pressures for both the existing and developed case do not comply with the DSS requirements for the assessed scenario. The proposed development does not cause any additional minimum pressure non-compliances within the network, any non-compliances are current and existing according to the model. The maximum pressure for both the existing and developed case comply with the DSS requirements for the assessed scenario.
- **Standard Flow Velocity –** There are max velocity non-compliances in both the existing and developed scenario. However, the proposed development does not cause any additional non-compliances.
- **Fire Flow –** For both the existing and developed cases, the DSS minimum of 11.8m pressure was not achieved for particular areas in the assessed scenario. There was multiple max velocity non-compliance in both the existing and developed scenarios. However, the proposed development does not cause any additional non-compliances in either low pressure or high velocity.

The above discussion and model analysis indicate that the Iron Gates development, once fully developed and in-use, will have no additional impact on the Evans Head potable water network. This is true for both standard ‘Peak Day Demand’ and during a Fire Flow event. Issues within the Evans Head network are current and not exaggerated in any aspect from the proposed development.

APPENDIX H

SEWER NETWORK CAPACITY ASSESMENT

MEMO

ARCADIS Design & Consultancy for natural and built assets

Date	18/04/2019
To	Richmond Valley Council
From	Arcadis
Author	Ashley Shepherd
Reviewer	Lachlan Prizeman
Reference	F0002-10027302-AAR-01 - Sewer Network Memo
Subject	Evans Heads Sewer Network Capacity Assessment – Iron Gates Development

EXECUTIVE SUMMARY

The purpose of this memorandum is to undertake an investigation into how the proposed Iron Gates development affects the surrounding Evan's Head sewer network, utilising the information supplied by Richmond Valley Council (RVC). Based on the information supplied in this document, council engineers will be able to satisfy themselves the DA achieves the relevant considerations of cl 6.2 of the RVLEP 2012.

This memorandum has found that the development flows (9.29L/s) are not exceeding the planned flows (9.4L/s). This is based off the investigation of Richmond Valley Council (RVC) sewerage planning report for Evans Head(*Evans Head Sewerage Augmentation Strategy* (22/153537/78398 R3), undertaken by GHD) and discussion with council regarding their system performance.

SITE LOCATION AND REFERENCE PLAN

The following reference plan is provided:

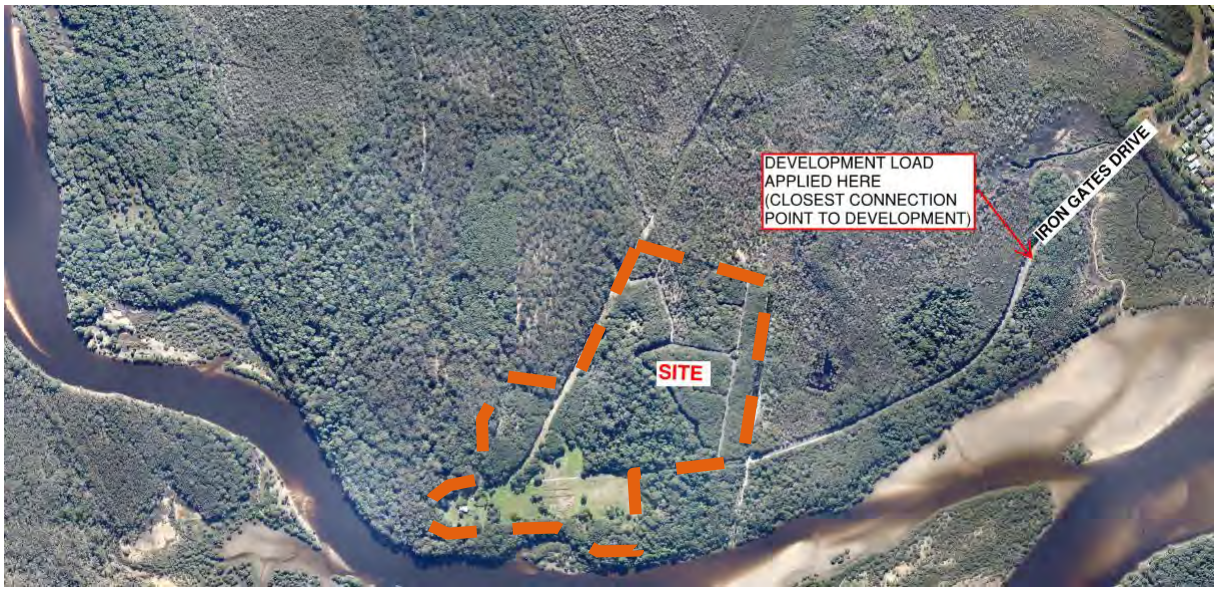

Figure 1 – Reference Plan (Image courtesy of Nearmap)

SEWER NETWORK INFROMATION PROVIDED BY COUNCIL & ASSESSMENT ASSUMPTIONS

RVC's sewer planning strategy for the greater Evans Head Township is summarised in a report, *Review of Evans Head Sewerage Augmentation Strategy* (22/153537/78398 R3), undertaken by GHD in May 2010. This report summaries the existing network performance, future network performance and network augmentations to rectify any network non-compliances. GHD have put forward a number of options that council can utilise to augment their network to rectify these said non-compliances. Arcadis has used this report as a guide to assess the developments impact on the surrounding network. Some key points from this report are summarised below with advice from council;

- RVC confirmed that council has adopted the strategy summarised in Figure 7-7 of the GHD report for the Evans Head sewer network;
- Council have indicated that only the 2008 network upgrades have been undertaken in accordance with the GHD report. No further upgrades in the network have been undertaken.
- RVC strategy is based on an existing population of 3,659 persons for Evans Head;
- RVC strategy is based on an ultimate population forecast in 2050 of 6,101 persons for Evans Head;
- RVC strategy estimates 123ET (11.4L/s) for catchment 2 (Iron Gates connection catchment) in the ultimate;
- RVC strategy has allowed for 100ET (9.4L/s) from the Iron Gates Development;
- Proposed 2008 pump upgrade to pump station EHPS-02 has been completed which provides a flow of 20.8L/s; and
- 2.3 EP/ ET (Based of GHD Report).

Correspondence with RVC has provided the following input and assumptions to assist in the calculations for this memorandum;

- ADWF – 468 L/ET/day (Based on Draft Evans Head Sewer model and confirmed by council officer);
- PWWF – Design Standard stipulates 5 x ADWF, however, Council has noted that their sewer system is more like 7 x ADWF for a PWWF. Therefore, for this assessment 7 x ADWF has been adopted as PWWF; and

General assumptions made for the assessment are summarised below:

- Adopted the *North Coast Regional Plan 2036* target plan of 40% of dwellings to be duel occupancies for development site.

PROPOSED DEVELOPMENT LOADING

For the purposes of this report, the development has been assessed under two loading cases to better determine the anticipated impact to be had on the surrounding network. These cases are as follows:

- **Existing Case** –Planned loads GHD and council Strategy Report;
- **Developed Case** – The calculated demand for the Iron Gates development based on the latest development plans.

Table 1 below shows the proposed development's calculated Equivalent Tenements (ET).

Table 1 Existing/ Planned Load for the Site

Loading Type	Loading
Planned Load	100ET

Table 2 below shows the proposed development's calculated Equivalent Tenements (ET).

Table 2 Proposed Development Loadings

Category	Number of Lots	Conversion Rate	Proposed ET Loading
Single Detached Dwelling Lot	**105**	1ET/lot	105
Duplex Dwelling Lot	**70**	2ET/lot	140
		Total:	**245**

PROPSOED DEVELOPMENT FLOW CALCULAITON

Table 3 demonstrates the calculation of the average dry weather flow and peak wet weather flow from the development.

Table 3 Proposed Development Flows

Parameter	Result
Proposed Development Load	245ET
Average Dry Weather Flow (ADWF)	1.33 L/s
Peak Wet Weather Flow (PWWF)	9.29 L/s

PUMP STATION PS2 CATCHMENT

The above mentioned GHD report has estimated the catchment flows that enter PS2 are made up of two portions. The first portion is the existing development flows which have been estimated at 11.4L/s for PWWF. The secondary flow is from the proposed Iron Gates development which the report estimated to be 9.4L/s. This gives the pump station a total inflow of 20.8L/s. The pump upgrade to cater for this 20.8L/s has confirmed to have been implemented by council.

As seen in the above Table 3 the PWWF from the proposed development is lower than planned loading that GHD and Council have stipulated.

WIDER SEWER NETWORK IMPLICATIONS

If the general strategy that council has adopted, Figure 7-7, of the GHD report is maintained and followed in its augmentation process, then the proposed development should not cause impact any impacts on the network. If the strategy is not followed, PS2 will still have capacity, however, downstream pump stations might begin to demonstrate non-compliances in the future if the estimated population grows as expected or at a higher rate. If the population remains stagnant there may be opportunity for council to delay augmentation which appears to what is happening as none of the 2014 upgrades have been undertaken. This will however require further studies.

APPENDIX I

TRAFFIC REPORT

17 July 2019
Our Ref: 19GCT0119
Council Reference: MCU/2019/127

Attention: Mr Graeme Ingles

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport 4215

Dear Graeme,

RE: Iron Gates Development, Evans Heads – Residential Subdivision

TTM Consulting Pty Ltd (TTM) has been engaged, as requested by Gold Coral Pty Ltd, to respond to Section 16.13 and 18.3 of the Richmond Valley Council's Information Request (ref: No.2015/0096, dated 2 February 2019).

TTM has undertaken a traffic study for the proposed 175 residential lot subdivision and prepared a traffic engineering assessment to form part of the revised Iron Gates residential subdivision development application in Evans Heads.

The aim of this assessment is to discuss the proposed access road capacity and impact on the local network.

Introduction

The site is located along Iron Gates Drive, located approximately 2km west of Evans Head NSW. The property description of the development is Lot 163 DP 831052, Lots 276 and 277 DP 755624, Crown Road Reserve between Lots 163 DP 831052 and Lot 276 DP 755724, Crown Foreshore Reserve and Iron Gates Drive, Evans Head NSW.

The site is currently zoned for General Residential and Environmental Conservation uses according to the Richmond Valley Local Environmental Pan 2012 and is currently provided access from Iron Gates Drive.

Development Description

The proposed development involves a One Hundred and Eighty Four (184) Lot Subdivision including:

- One Hundred and Seventy Five (175) Residential Lots;
- Three (3) Residue Lots
- Four (4) Public Reserves
- One (1) Drainage Reserve
- One (1) Sewer Pump Station Lot
- Upgrading of Iron Gates Drive
- Demolition of Existing Structures Onsite
- Subdivision Work including road works, drainage, water supply, sewerage, landscaping and embellishment work and street tree planting

Section 16.13 – Roads and Traffic (Item 1)

The traffic generating volumes of up to 500AADT represents 91 dwellings. The DA is for 175 residential allotments. The capacity of the existing road, classified as a rural or rural residential road, will be below standard after the construction of the 91st dwelling.

Response

TTM has estimated the expected peak hour trip generation for the proposed development.

Roads and Maritime Services (RMS) 'Guide to Traffic Generating Developments Updated traffic surveys' (2013) recommends using specific generation rates, for planning purposes, for different development types. Application of these rates to the proposed development, results in the estimate of development site traffic generation, as shown in Table 1.

An in:out split of 20:80 for the morning peak period and 70:30 for the evening peak period has been assumed for the proposed residential dwellings.

TTM has been informed that the proposed development would consist of a mix of 105 residential lots and a maximum of 70 duplex allotments (140 total dwellings). TTM has undertaken the peak hour trip generation estimation based on the maximum dwelling yield across the site.

Table 1: Peak Hour Trip Generation

Land Use	RMS / RTA Trip Rate	Extent	Trip Generation	In : Out Split	In : Out Trips
Morning Peak Hour					
Regional Area Dwelling	0.78 trips per dwelling	105 dwellings	82	20 : 80	16 : 66
Duplex (Medium Density)	0.6 trips per dwelling	70 duplexes (140 dwellings)	84	20 : 80	17 : 67
Total					33 : 133
Evening Peak Hour					
Regional Area Dwelling	0.71 trips per dwelling	105 dwellings	75	70 : 30	53 : 22
Duplex (Medium Density)	0.6 trips per dwelling	70 duplexes (140 dwellings)	84	70 : 30	59 : 25
Total					112 : 47

Generally, the daily trips generated by residential developments is 10 times the peak hour trip generation. Based on the above, the proposed development is expected to generate 1,685 daily vehicle trips. All vehicular trips would access the site via Iron Gates Drive.

TTM have estimated the development traffic distribution and subsequent turning volumes through the Woodburn Street / Wattle Street intersection, as shown in Figure 1 and Figure 2. TTM notes that the estimated traffic would represent the worst case scenario through the Woodburn Street / Wattle Street intersection, as it is likely that some traffic would turn off onto Cypress Street or Cedar Street.

Figure 1: Estimated Development Traffic Distribution

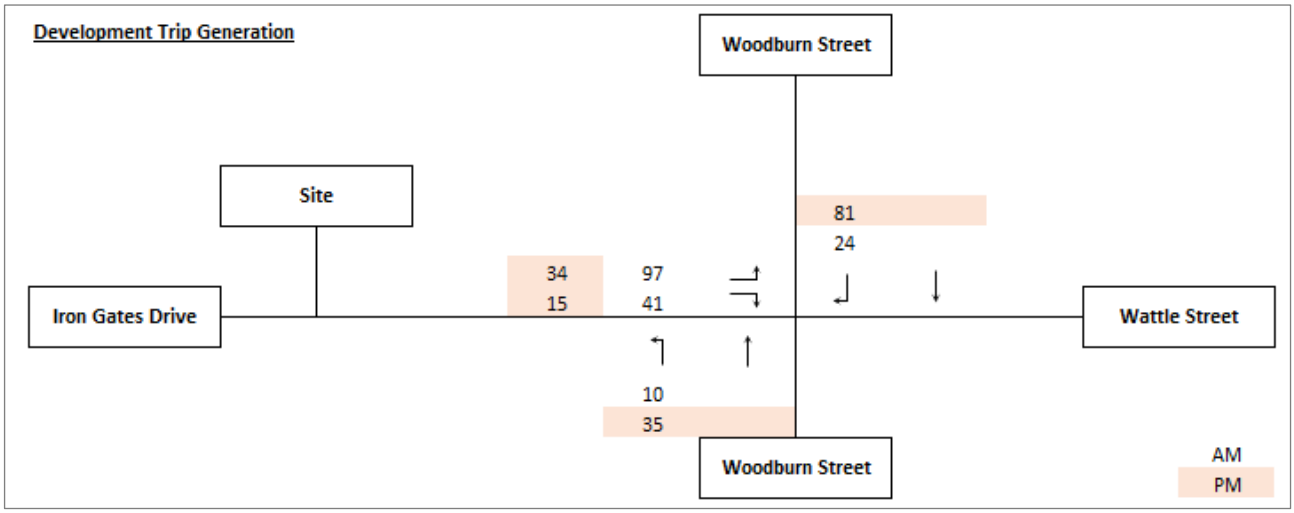

Figure 2: Estimated Turning Volumes – Woodburn Street / Wattle Street

The traffic generated by the proposed development would exceed the threshold of a minor up to 1,000 AADT (for rural roads), as per the NSW Development Design Specification – D1 Geometric Road Design. Table T 1.27 – Carriageway and seal width for rural roads outlines that 'major roads over 1,000 AADT' should be designed with a 7.5m seal and 1.5m shoulders. TTM notes that this design is for all rural roads with an AADT over 1,000 trips.

Table D.1.5 outlines that collector streets (ie maximum AADT 3,000) within a residential subdivision road network should be designed with a carriageway width of 11m. TTM understands that the 11m carriageway includes two 3.5m wide traffic lanes and two 2.0m wide parking lanes. TTM note that there is no demand for parking along Iron Gates Drive, therefore, parking lanes would not be required.

The proposed development is to be an urban subdivision in nature and is to form part of the Evans Head township. Iron Gates Drive is the road connecting the subdivision to the township and is between 1.0-1.5km long.

The nature of Iron Gates Drive is solely to provide connection to the subdivision, would not have a parking demand and does not direct provide vehicle accesses to new single dwellings, as shown in Figure 8. TTM would not consider the road to be solely rural or urban in nature.

It is proposed that improvements be made to Iron Gates Drive, to provide an 8.0m wide two-way carriageway including two 3.5m wide traffic lanes and a 0.5m wide sealed shoulders on either side.

TTM consider that the proposed carriageway is suitable. The use of Iron Gates Drive is to be for both urban and rural purposes; and, the proposed carriageway is to be a medium between the two standard designs. There is suitable carriageway width to accommodate the two-way traffic and there would be suitable area within the verge for broken down vehicles to pull over. Iron Gates Drive would also be a low speed environment with a low volume of heavy vehicle traffic.

Section 16.13 – Roads and Traffic (Item 2)

The weight of loads on the bridge is unknown and should be to ensure bushfire tenders can safely cross it and that it has the capacity to provide for the traffic generated by the DA, in particular the impact of transport haulage associated with the bulk earthworks.

Response

TTM is unaware of any load limits associated with the bridge and there is no signage on the approach to identify limits below the national standard. It is assumed that the bridge was designed and constructed to the relevant design standards at the time of construction. TTM's experience would indicate that the load limit in this case would generally be 42.5t.

The bridge is currently constructed with a 6.2m wide carriageway and a 2.5m walkway (to be retained), including two 3m wide through lanes. 3m wide lanes are in accordance with Austroads Guide to Road Design.

The proposed Iron Gates Road would narrow from an 8m wide carriageway to the 6.2m wide bridge ie by reducing the through lane width and removing the shoulder. TTM considers that the existing bridge width to be suitable, as the provision would provide through lanes that are suitably wide to cater for two-way traffic movements and the pinch point (bridge) only is 18m long (ie 3 car lengths).

TTM recommends that Narrow Bridge (W4-1) signage be installed on both approaches to the bridge.

Section 16.13 – Roads and Traffic (Item 3)

The DA does not make any traffic impact assessment relating to the bulk earthworks, which are substantive, given the constraints and condition of Iron Gates Dr.

A traffic impact assessment in accordance with RMS guidelines is required to clearly:

• Establish the classification of the only link road between an existing township and a proposed 175 residential lot subdivision

• Identify the existing condition of Wattle St to and including the intersection of Woodburn St, there existing capacities and when and how these roads should be up-graded (if required) to relevant RVC standards

• Identify the existing condition of Iron Gates Dr, its existing capacity and when and how that should be up-graded to relevant RVC and regional standards, and

• Identify the existing condition of Iron Gates Dr, is existing capacity and when and how that should be up-graded to the relevant standards required by the NSW RFS.

Knowing what are and satisfying the relevant standards required by the NSW RFS for Iron Gates Dr is a key important issue and needs to be clearly documented in both the traffic impact assessment and bushfire threat assessment for the DA.

Response

As outlined above, the proposed development would generate approximately 1,685 vpd and the proposed design of Iron Gates Road would be effectively to a Collector Standard (without parking lanes). The expected daily traffic along Iron Gates Road would be much lower than 3,000vpd, which is generally the threshold for a Collector Street. Therefore, TTM considers that Iron Gates Road should be classified as a collector street, which in turn would be classified as a Minor Road.

Development Traffic Impact Assessment

TTM have been provided AADT data from the Richmond Valley Council along Woodburn Street, as follows:

- 2007 – 3505 AADT
- 2017 – 4570 AADT

This increase in AADT between 2007 and 2017 corresponds to an average background traffic increase of 2.7% per annum.

TTM has then estimated the base traffic for a 2019 base year scenario to be an AADT of 4,820 vpd. It is estimated that this would correspond to volumes of 240 vehicles in each direction on Woodburn Street during peak hours (ie 10% of daily traffic during peak hours and a 50:50 split).

TTM have estimated the 2032 base case through traffic along Woodburn Street, by applying a compounding growth factor of 2.7% over 15 years), as shown in Figure 3.

The 2032 project case has then been derived from the addition of the development generated traffic, Figure 2, and the 2032 base case scenario, Figure 3. This is shown in Figure 4.

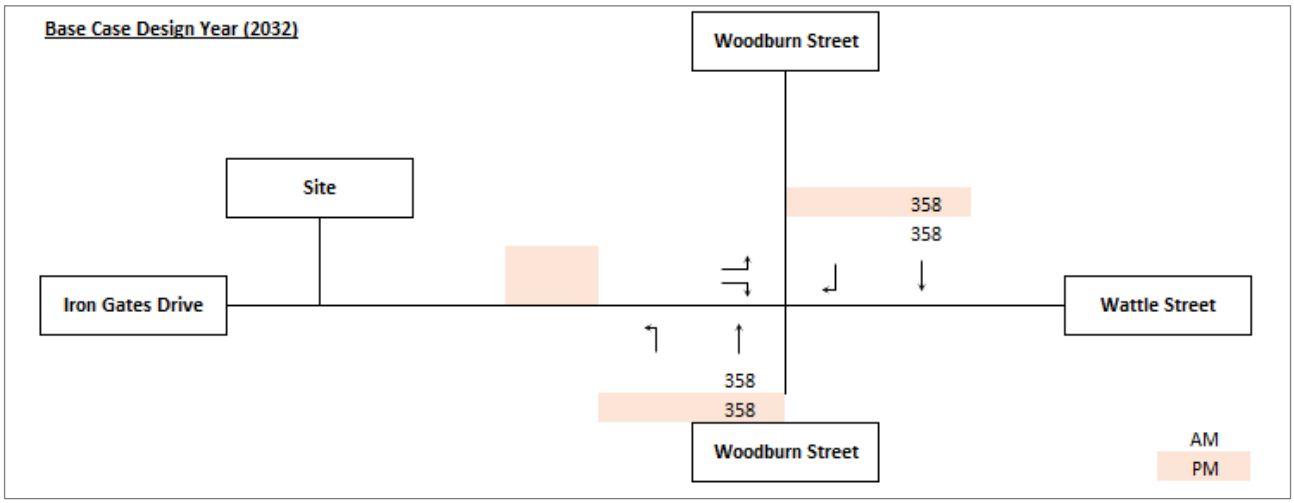

Figure 3: Estimated Local Traffic Movements for Development Generated Traffic 2032 Design Year

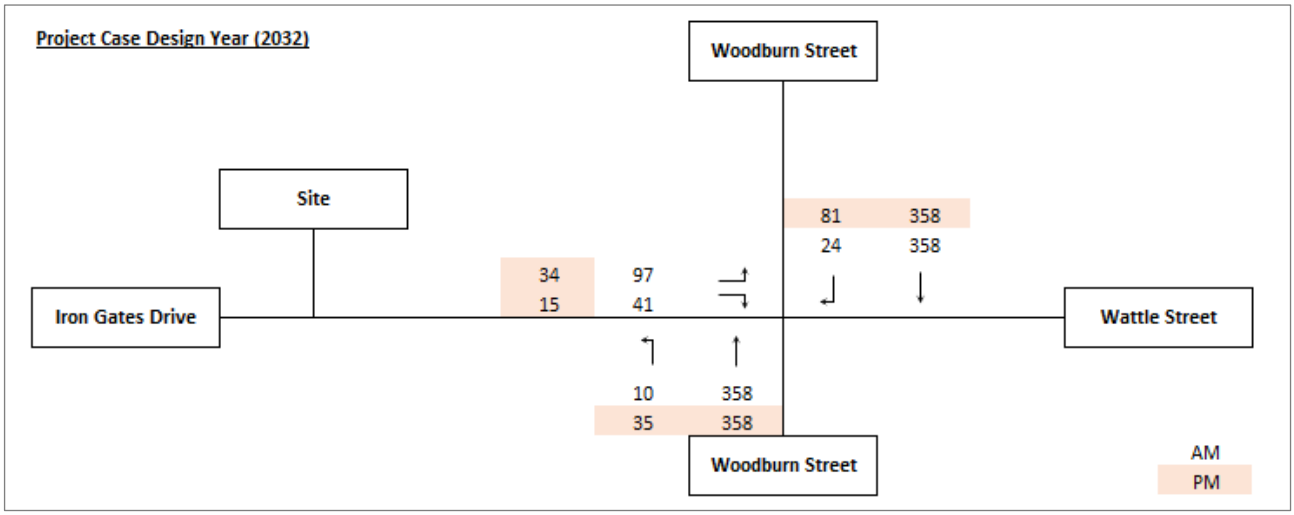

Figure 4: Estimated Local Traffic Movements for Development Generated Traffic 2032 Design Year

TTM have undertaken a turn warrant assessment for the future 2032 project case design year.

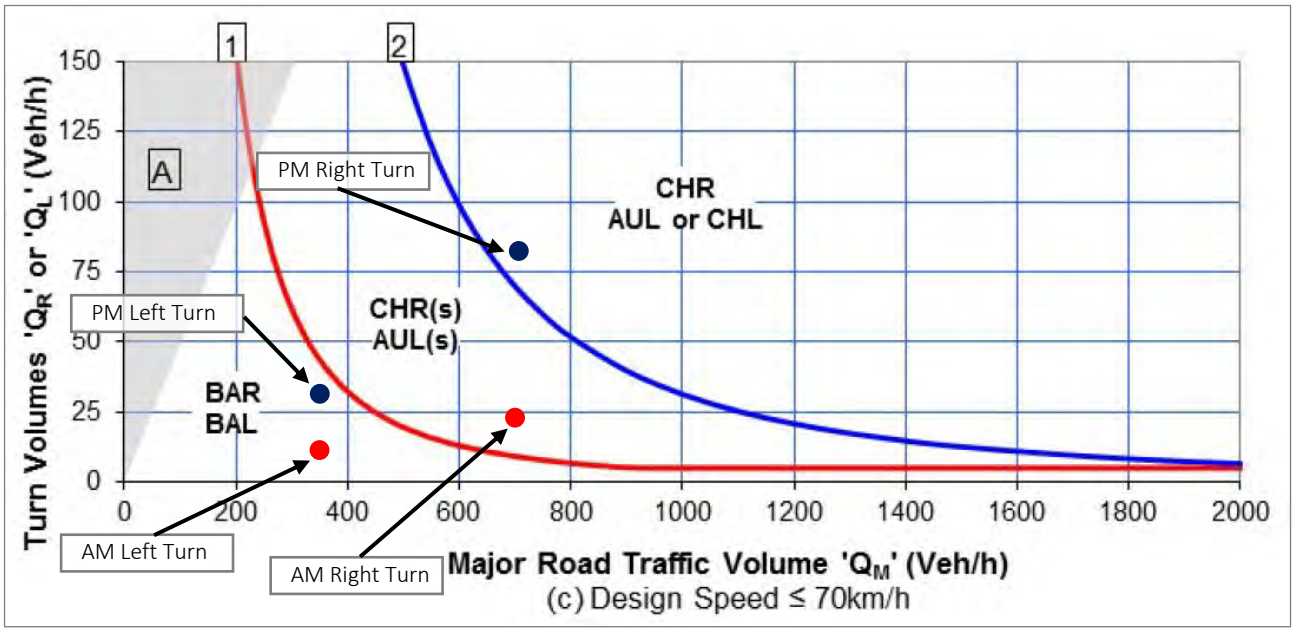

Figure 5: Woodburn Street / Wattle Street Intersection

As it is likely that there would be additional right turning traffic due to existing surrounding uses. TTM considers that a suitable right turn treatment would be a Channelised Right Turn (CHR).

TTM expect that there would be some additional left turning traffic, and a Short Auxiliary Left turn lane (AUL(S)) may be warranted. However, there are no left turning treatments around the Evans Head area, so the provision of such a turning treatment would not be consistent with the surrounding road network and

would not meet driver's expectation. Therefore, TTM considers that a Basic Left turn (BAL) turning treatment would be suitable at the Woodburn Street / Wattle Street intersection.

TTM recommends that a CHR and a BAL turning treatment be incorporated into the design of the Woodburn Street / Wattle Street intersection. TTM has prepared a functional layout plan which demonstrates the recommended turning treatments, as shown enclosed. TTM expects that the turning treatments should be able to be completed with linemarking and recommends that it is implemented before the completion of the development.

Bulk Earthworks Traffic Impact Assessment

TTM has been informed by Arcadis that the bulk earthworks would have a duration of 16 weeks of import, 6 days per week for 9 hours per day, expecting 36 truck trips each way per day. This corresponds to a maximum average rate of 4 trucks in per hour and 4 trucks out.

TTM have also been informed that the deliveries would be made by Truck & Dogs (19m) using the Doonbah Quarry 5km west of Evans Head and utilise following route: Evans Head – Woodburn Road then via Wattle Street. So, all delivery traffic would be utilising the Woodburn Street / Wattle Street intersection.

TTM have estimated the turning movements associated with the bulk earthworks, as shown in Figure 6; and, TTM have conducted a turn warrant assessment as shown in Figure 7.

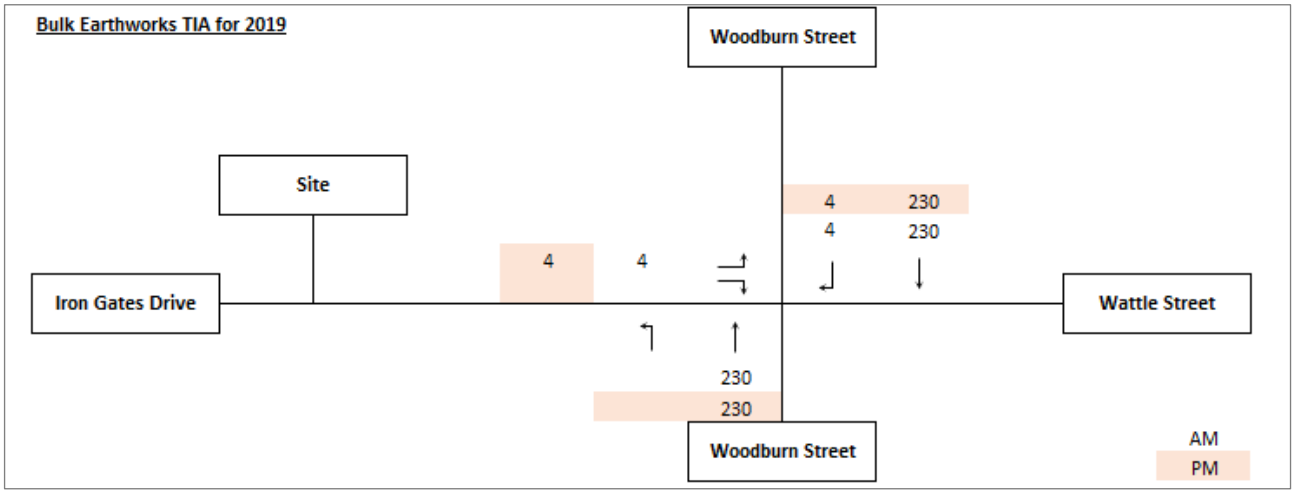

Figure 6: Woodburn Street / Wattle Street Intersection

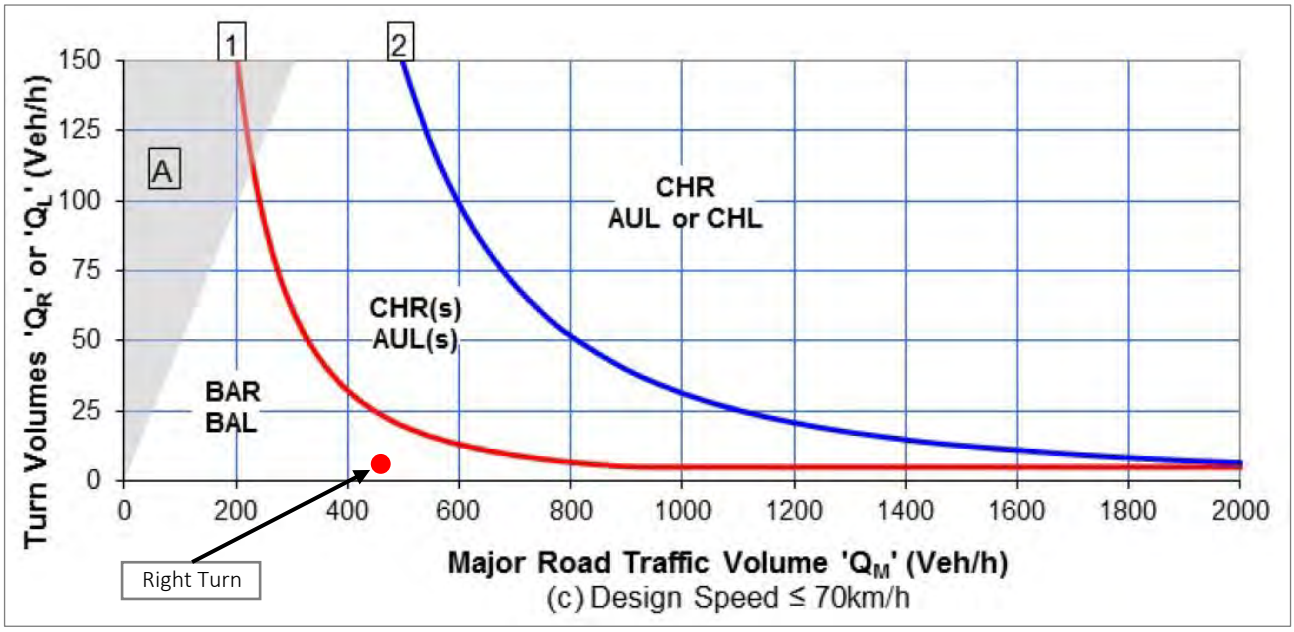

Figure 7: Woodburn Street / Wattle Street Intersection Bulk Earthworks Turn Warrant Assessment

TTM understands that there would be some additional right turning movements considering the surrounding area. However, considering temporary nature of the works and TTM considers that a basic right (BAR) turning treatment would be suitable to cater for the truck and dog delivery vehicles, as there would be no residential activity at this time.

TTM notes that Woodburn Street currently has a 22m wide carriageway, including two 11m wide through lanes (which include informal carparking). There is sufficient width for a through vehicle to pass a waiting right turning vehicle, which would effectively operate as a BAR treatment. Therefore, TTM consider the existing intersection design sufficient to cater for the traffic associated with the proposed bulk earthworks.

TTM have conducted a swept path assessment, which demonstrates that a 19m truck and dog can perform a right turn manoeuvre from Woodburn Street to Wattle Street and a left turn manoeuvre from Wattle Street to Woodburn Street, as shown enclosed. The two manoeuvres are clear of one-another, therefore, TTM consider the proposed intersection layout to be suitable.

NSW RFS

TTM has undertaken a swept path assessment of a firetruck negotiating the Woodburn Street / Wattle Street intersection, as shown enclosed. TTM understands that a firetruck would be able to access all required areas of the proposed development.

Section 16.13 – Roads (Item 4)

The report does not seem to have considered the design requirements for buses within the development and indicates that footpaths within the collector and local roads will not be constructed until the majority of houses are built and occupied.

Response

TTM understands that there is currently a bus stop at Evans Head on Woodburn Street between Elm Street and School Lane, which is located over 1.5km from the proposed development.

TTM understand that there is currently no proposed bus route to the proposed development, however, in the future there is potential for a bus route to the development.

It is proposed that space for a future bus stop be provided along the proposed bus route through the site, as shown in Figure 8, along with the 3 options for bus stops to service the development. This would provide the development access to the future public transport network.

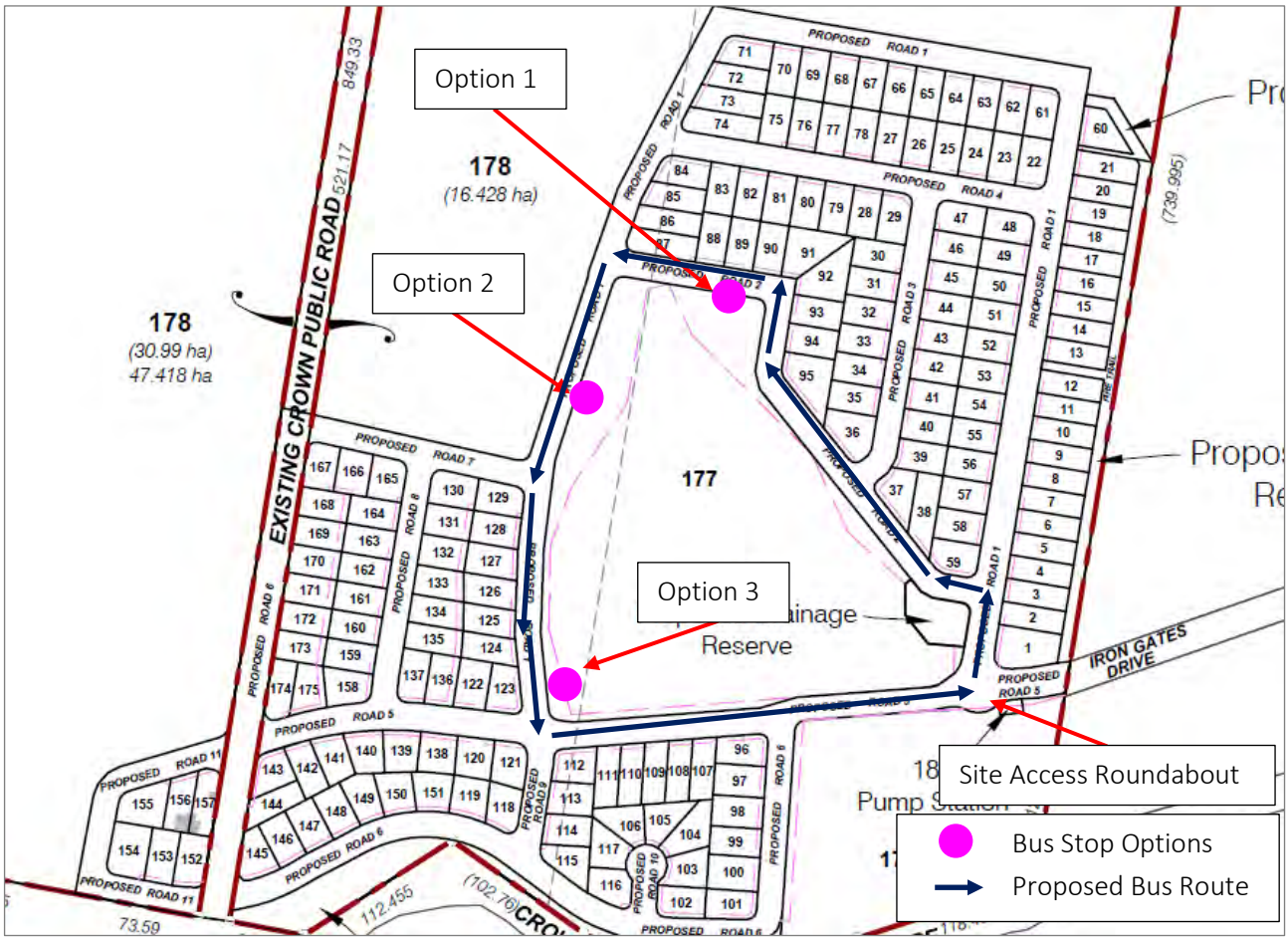

Figure 8: Development Plan – Proposed Bus Route

The site access roundabout (as shown in Figure 8) has been designed with a 34m diameter of road reserve. Assuming 4.25m wide verges, this would allow for a roundabout with a total diameter of 25.5m. This is a sufficient amount of space to design a roundabout that would be able to accommodate a 12.5m long rigid bus, in accordance with Austroads Guide to Road Design Part 4B: Roundabouts.

An example design of such a roundabout would be 6m central island radius, 2m wide mountable surface on the outer edge of the central island and 4.7m wide circulating carriageway widths, which would total to a total radius of 25.4m.

TTM also understand that bus swept paths have been undertaken by the project team that demonstrate that a bus can suitably negotiate the sites internal road network.

Therefore, TTM considers the proposed bus stop arrangements to be suitable to cater for the needs of the development.

Section 16.13 – Iron Gates Drive Bridge (Item 5)

The weight of loads limits on the bridge in Iron Gates Drive is unknown and should be, to ensure bushfire tenders can safely cross it and that it has the capacity to provide for the traffic generated by the DA, in particular the impact of transport haulage with the bulk earthworks.

Response

This has been responded to in TTM's response in Item 2.

Section 18.3 – SEPP – Infrastructure 2007 (Item 6)

Access and infrastructure not resolved - insufficient information issues and considerations not resolved.

Response

TTMs discussion in Item 1 indicates that the proposed Iron Gates Road cross-section is suitable to cater for the proposed development.

Conclusions

Based on the assessment contained within this letter, it is considered that the proposed local road suitably designed to cater for the expected development traffic and there is to be suitable public transport infrastructure to cater for the needs of the local area.

Yours sincerely,

Brendan Baker

Project Consultant

TTM Consulting Pty Ltd

Enclosed: *Development Plans, Functional Layout Plan, Swept Path Assessment*

Lot Table	
Lot	Area
1	969 m²
2	612 m²
3	612 m²
4	612 m²
5	612 m²
6	612 m²
7	612 m²
8	612 m²
9	612 m²
10	612 m²
11	612 m²
12	612 m²
13	612 m²
14	612 m²
15	612 m²
16	612 m²
17	612 m²
18	612 m²
19	612 m²
20	612 m²
21	649 m²
22	615 m²
23	600 m²
24	600 m²
25	600 m²
26	600 m²
27	600 m²
28	600 m²
29	627 m²
30	600 m²
31	600 m²
32	600 m²
33	600 m²
34	600 m²
35	600 m²
36	788 m²
37	674 m²
38	775 m²
39	612 m²
40	604 m²
41	604 m²
42	604 m²
43	604 m²
44	604 m²
45	604 m²
46	604 m²
47	609 m²
48	605 m²
49	600 m²
50	600 m²
51	600 m²
52	600 m²
53	600 m²
54	600 m²
55	600 m²
56	600 m²
57	623 m²
58	623 m²
59	633 m²
60	632 m²
61	618 m²
62	604 m²
63	604 m²
64	605 m²
65	606 m²
66	606 m²
67	607 m²
68	607 m²
69	608 m²
70	609 m²

Lot Table	
Lot	Area
71	607 m²
72	608 m²
73	682 m²
74	766 m²
75	600 m²
76	600 m²
77	600 m²
78	600 m²
79	600 m²
80	601 m²
81	601 m²
82	601 m²
83	601 m²
84	608 m²
85	614 m²
86	634 m²
87	696 m²
88	602 m²
89	602 m²
90	602 m²
91	859 m²
92	856 m²
93	603 m²
94	603 m²
95	954 m²
96	616 m²
97	663 m²
98	657 m²
99	602 m²
100	723 m²
101	605 m²
102	609 m²
103	620 m²
104	714 m²
105	602 m²
106	604 m²
107	602 m²
108	602 m²
109	602 m²
110	602 m²
111	601 m²
112	600 m²
113	600 m²
114	600 m²
115	608 m²
116	601 m²
117	602 m²
118	600 m²
119	601 m²
120	600 m²
121	600 m²
122	647 m²
123	619 m²
124	603 m²
125	600 m²
126	646 m²
127	661 m²
128	626 m²
129	600 m²
130	639 m²
131	602 m²
132	602 m²
133	600 m²
134	618 m²
135	623 m²
136	604 m²
137	602 m²
138	600 m²
139	600 m²
140	600 m²

Lot Table	
Lot	Area
141	600 m²
142	600 m²
143	605 m²
144	600 m²
145	600 m²
146	601 m²
147	600 m²
148	600 m²
149	601 m²
150	601 m²
151	600 m²
152	665 m²
153	629 m²
154	834 m²
155	765 m²
156	603 m²
157	627 m²
158	644 m²
159	601 m²
160	601 m²
161	601 m²
162	601 m²
163	601 m²
164	601 m²
165	600 m²
166	601 m²
167	602 m²
168	602 m²
169	602 m²
170	602 m²
171	602 m²
172	602 m²
173	602 m²
174	614 m²
175	600 m²
176	2.188ha
177	4.857ha
178	47.418ha

LEGEND:

SITE BOUNDARY

PROPOSED EASEMENT

CLIENT

GOLDCORAL PTY LTD

PROJECT

PROPOSED SUBDIVISION OF LOTS 276 & 277 ON DP755624, LOT 163 ON DP831052, CROWN PUBLIC ROAD RESERVE (BETWEEN LOT 163 DP831052 AND LOT 276 DP755624) AND CROWN FORESHORE RESERVE (ADJACENT TO EVANS RIVER)

LOCAL AUTHORITY

RICHMOND VALLEY

NOTES

(i) This plan was prepared for the purpose and exclusive use of THE INGLES GROUP to accompany an application to RICHMOND VALLEY for approval to reconfigure the land described in this plan and is not to be used for any other purpose or by any other person or corporation. LandPartners Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or clauses (ii) or (iii) hereof.

(ii) The dimensions, areas, number of lots, size and location of improvements & flood information (if shown) are approximate only and may vary.

(iii) This plan may not be copied unless these notes are included.

LOTS	TOTAL AREA
Residential Lots (175)	16.884ha
Residue Lots (3)	54.463ha
Public Reserves (4)	0.8366ha
Drainage Reserve (1)	0.1124ha
Pump station lot (1)	0.0127ha
TOTAL	72.309ha

ADDITIONAL NOTES

SCALE BAR

40m 0 80 200m

SCALE 1:4000 @ A1

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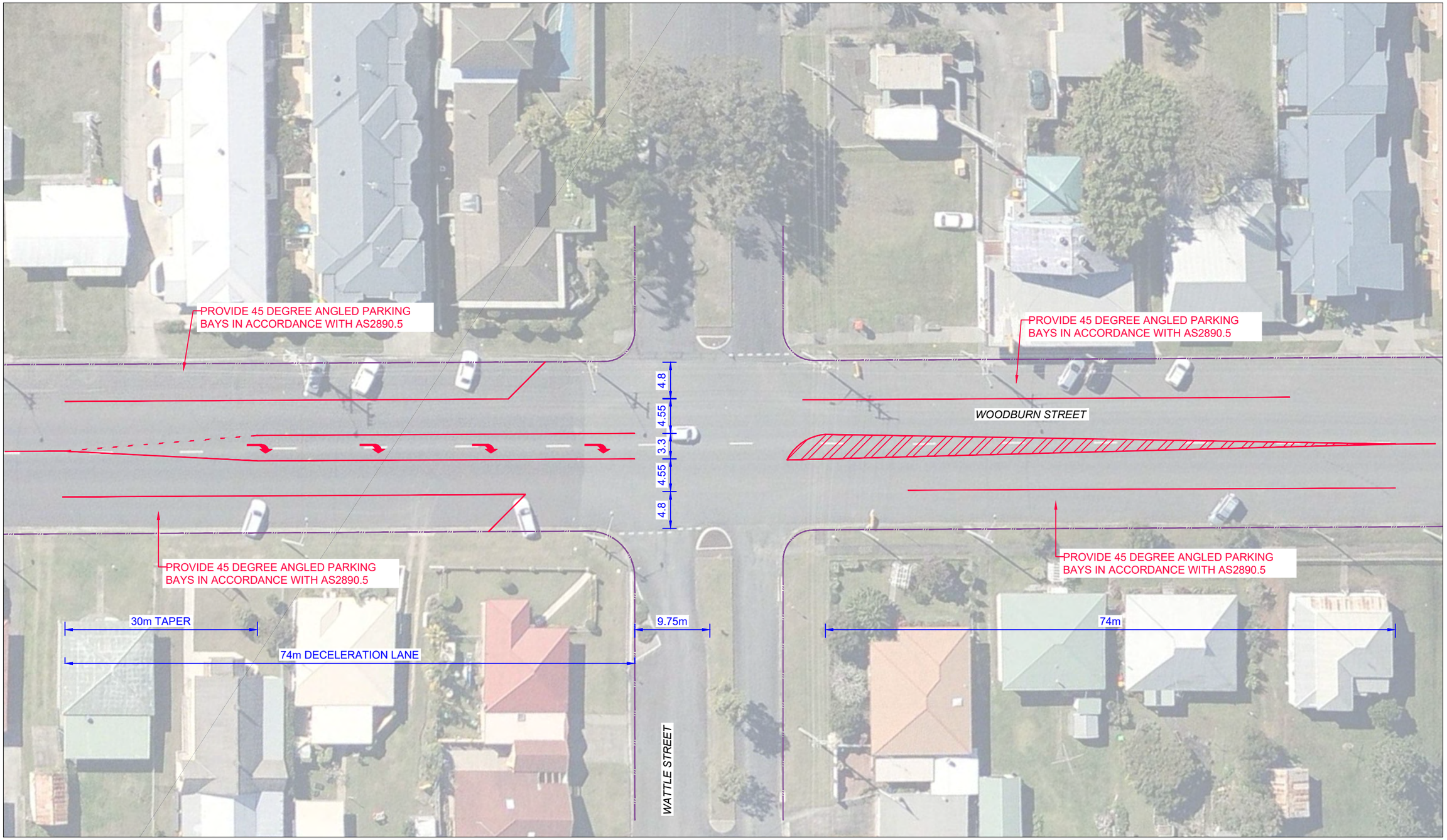
ISO 9001 Quality Management

LEVEL DATUM	AHD		
LEVEL ORIGIN	-		
CONTOUR INTERVAL	-		
COMPUTER FILE	BRJD6396-100-33-16		
DRAWN	CGW	DATE	27/06/2019
CHECKED	CMJ	DATE	27/06/2019
APPROVED	CGW	DATE	27/06/2019

PLAN NUMBER BRJD6396.100-015 SHEET 1 OF 2 REV M

CGW

NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE NSW LAND REGISTRY SERVICES



PRELIMINARY

ISSUED FOR COMMENT ONLY

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	05-07-19	ORIGINAL ISSUE	LD	BB	BB

SCALE 0 2.5 5 7.5 10 12.5m

SCALE 1:250 AT ORIGINAL SIZE

NORTH

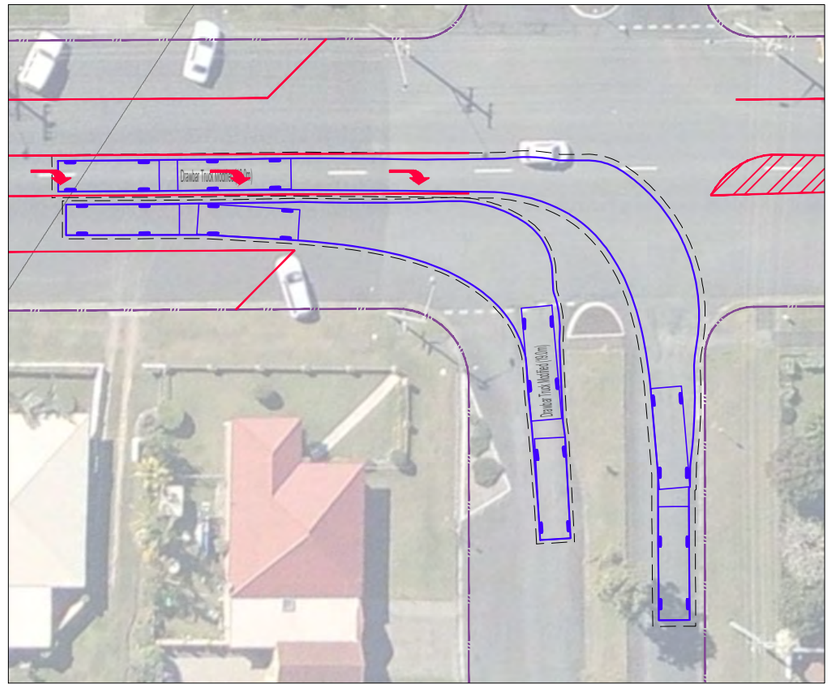
CLIENT: ARCADIS

TTM CONSULTING PTY LTD
ABN 65 010 868 621
41A Quay Street, Sanctuary Cove, QLD, 4212
P.O. BOX 930, Sanctuary Cove, QLD, 4212
T: (07) 5514 8000 F: (07) 5514 8144
E: ttmgc@ttmgroup.com.au W: www.ttmgroup.com.au

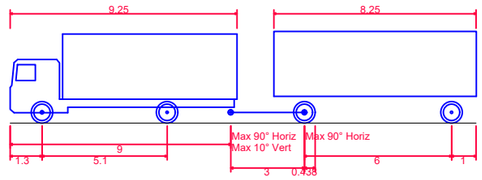
PROJECT: **IRON GATES DEVEPMENT**

DRAWING TITLE: **FUNCTIONAL LAYOUT WOODBURN STREET & WATTLE STREET**

PROJECT NUMBER	ORIGINAL SIZE
19GCT0119	A3
DRAWING NUMBER	REVISION
19GCT0119-01	A
DATE	SHEET
5 Jul 2019	1 OF 1

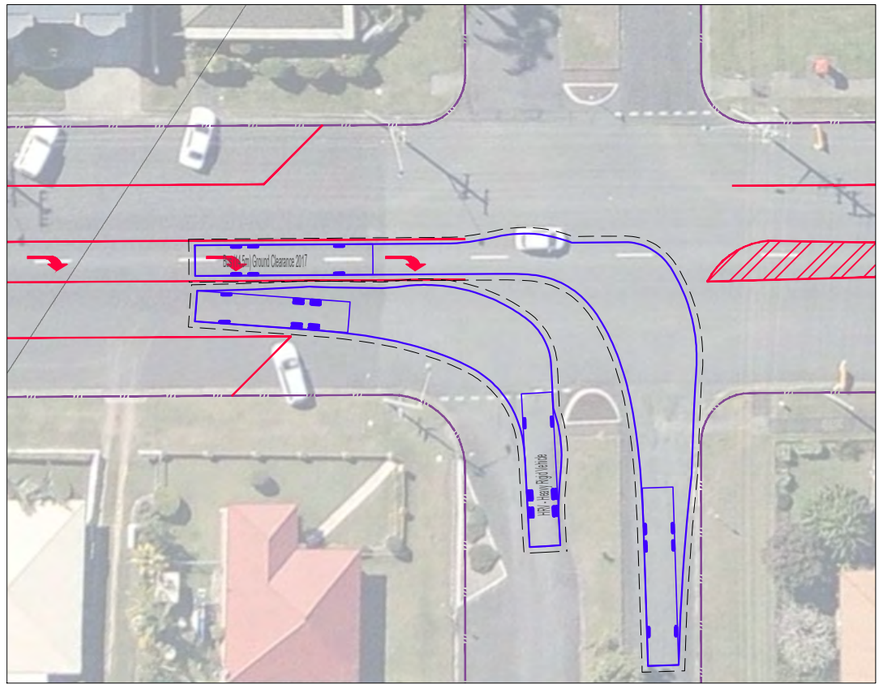


TRUCK AND DOG - ENTRY

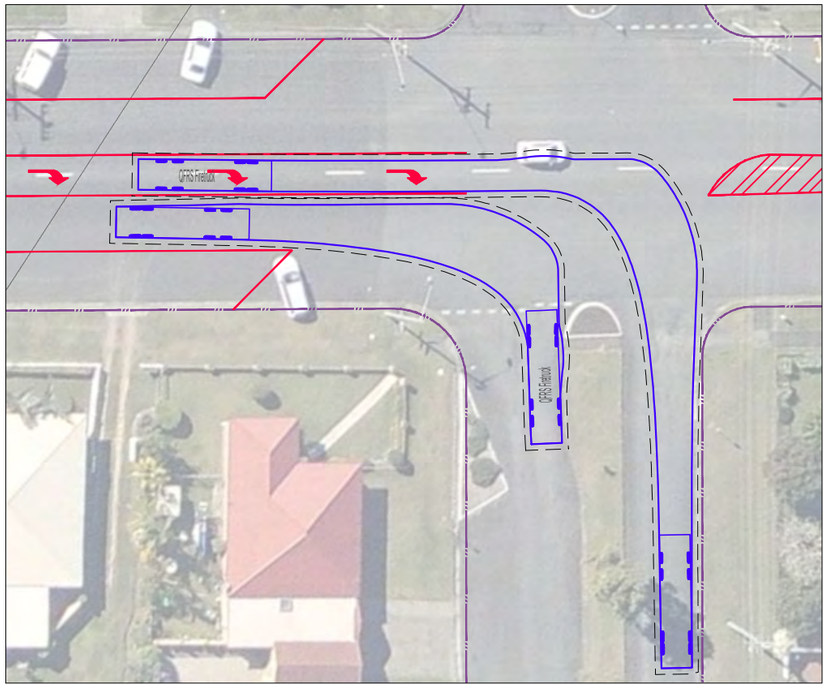


Drawbar Truck Modified (19.0m)

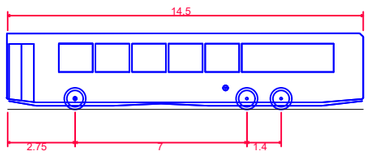
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	9.600m



14.5m BUS - ENTRY

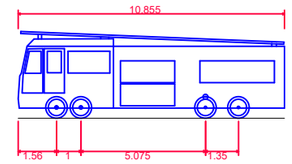


QFRS FIRE TRUCK - ENTRY



Bus (14.5m) Ground Clearance 2017

Overall Length	14.500m
Overall Width	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.150m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.135m



QFRS Firetruck

Overall Length	10.855m
Overall Width	2.500m
Overall Body Height	3.533m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	11.500m

PRELIMINARY

ISSUED FOR COMMENT ONLY

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	05-07-19	ORIGINAL ISSUE	LD	BB	BB

SCALE 0 2.5 5 7.5 10 12.5m

SCALE 1:250 AT ORIGINAL SIZE

NORTH

CLIENT: ARCADIS

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E: ttmgc@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **IRON GATES DEVEPMENT**

DRAWING TITLE: **SWEPT PATH ASSESSMENT WOODBURN STREET & WATTLE STREET**

PROJECT NUMBER: 19GCT0119	ORIGINAL SIZE: A3
DRAWING NUMBER: 19GCT0119-02	REVISION: A
DATE: 5 Jul 2019	SHEET: 1 OF 1