

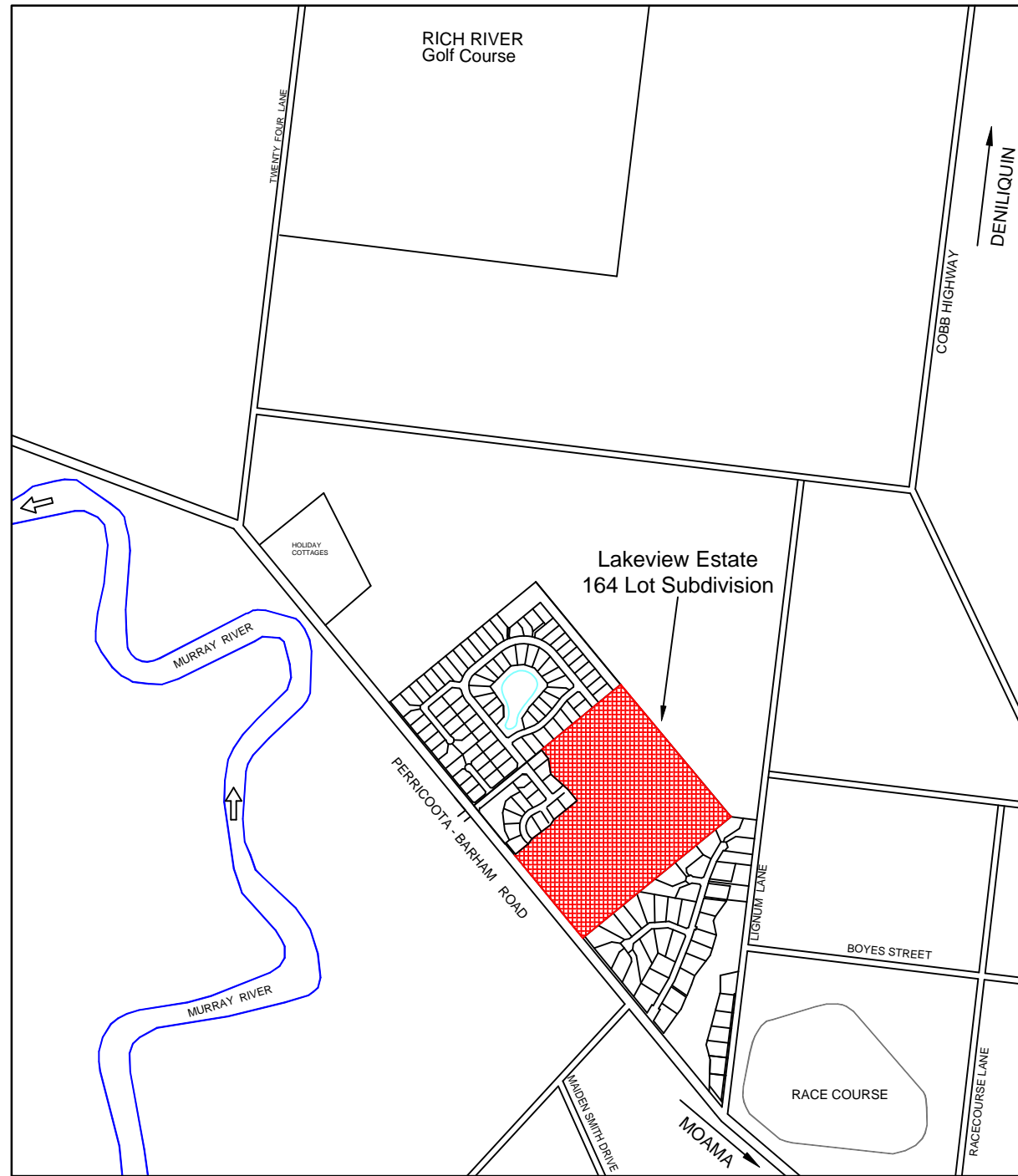


ORIGINAL DRAWINGS  
(These are the originals only if this text is RED)

# Villawood Properties Pty Ltd

## Lakeview Estate - Stage 4

Drawing file: 16004 FP.dwg	LTO Ref: -	Council Ref: DA 173/11	Ref: 16004	Version 3
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**Locality Plan - Ascot**

NOT TO SCALE

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4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016

Designed	Checked
G.McCoomb Mar 2016	A.Mertens Mar 2016
Approved	

Notes/Legend

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Project Managers  
Development Consultants

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(Original Sheet Size is A3)

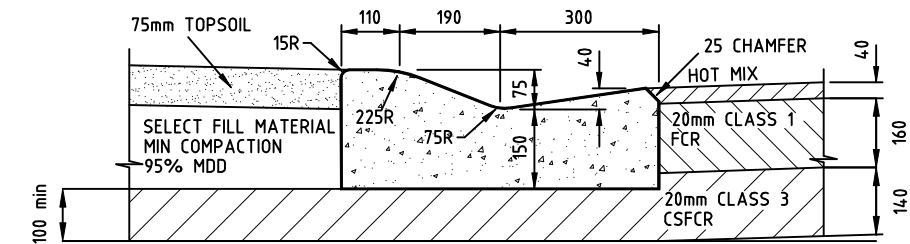
Drawing file: 16004 Notes.dwg	LTO Ref: -
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Murray Shire Council - Moama					
Villawood Properties Pty Ltd					
Lakeview Estate - Stage 4					
Index & Locality Plan					
Council Ref: DA 173/11	Our Ref: 16004	Version 3	Sheet 1 of 30		

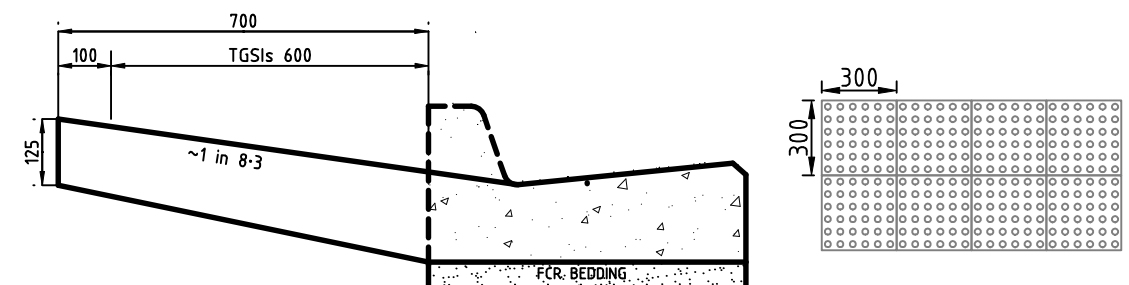
# GENERAL NOTES

1. Works are to comply with the current standards and specifications of the municipality. Contract is in accordance with AS2124-1992 including annexures.
2. This stage consists of lots 92 to 107.
3. The contractor must adhere to the code of practise for "Safety Precautions in Trenching Operations" under the "Work Health and Safety Act 2011". All workers on this site must have a current WH&S General Induction for Construction Working NSW Certificate (White Card).
4. The contractor must contact all servicing authorities to arrange service locations prior to commencement of excavation for this project.
5. Easements shown on these plans are 2.0m wide drainage easements, sewer easements shown on these plans are 3.0m wide, unless indicated otherwise.
6. Drainage pipes and pits are to be at 1.0m offset to property boundaries unless shown otherwise.
7. Drainage pipes 300mm diameter and greater are to be rubber ring joint class 2 reinforced concrete unless shown otherwise. Pipes 225mm diameter and less are to be rubber ring joint uPVC.
8. Pits (including lids) are to be constructed in accordance with the current standards of the Murray Shire Council. Side entry pits in rollover kerb & channel are to be constructed using Terra Firma pit lids.
9. Property drainage connections (150mm diameter) are to be provided in all easement pits, and in road drainage pits where shown. Property drainage connections are to be 150mm diameter uPVC SN8 and to have 600mm minimum cover. Connections to extend into properties by a minimum of 1.0m in length. 150mm PVC pipes shown in the road reserve are for house drain connections. Property connections shall be marked with a PVC riser pipe to 600mm above ground.
10. Step irons are not to be provided in any drainage pits.
11. Pipe stubs are to consist of one full pipe length unless shown otherwise.
12. Finished levels for Side Entry Pits must be determined from kerb levels, and lids should be sloped to suit nature strips etc. The FSL's indicated in the pit schedule are not kerb levels.
13. All trenches crossing pavement areas or beneath kerb or footpath are to be backfilled with 3% cement stabilised fine crushed rock.
14. Fill areas are to be cleared and stripped of all organic material and topsoil prior to placement of selected fill material. Fill areas are to be inspected by the supervising Engineer prior to any fill being placed. Fill is to be placed and compacted in layers, with a minimum compaction of 95% of the maximum dry density as determined by the standard compaction test being achieved. 98% of maximum dry density must be achieved within road pavement areas.
15. All concrete must have a minimum compressive strength of 25MPa at 28 days. Kerb & Channel concrete must have an equivalent strength using not less than 280kg of cement per m3 of concrete.
16. Maximum driveway grade for any allotment is 1 in 7.
17. Minimum finished grade on any allotment is 1 in 200.
18. Raw and treated water services crossing roads to be 32mm PN8 poly (if two properties being connected) or 25mm PN8 poly (if single property connected) sleeved in 50mm Class 12 uPVC service conduits.
19. Raw and treated water tapplings including saddles, 20mm Ø copper service connections, meter stop tap (treated) and ball valve (raw) to be provided 1m inside allotments. Tapping saddles are to be gunmetal style only.
20. All sewer manhole covers are to be solid ductile iron Class D covers and frame with concrete surround.
21. 50mm diameter Class 12 uPVC service conduits are to be provided for water and gas services at the locations indicated on the plans.
22. Electricity cable conduits are to be installed as shown on the Power cable reticulation plan, in accordance with the requirements and specifications of Essential Energy.
23. NBN conduits are to be installed as shown on the NBN cable plan.
24. The location of all service conduits is to be marked 5mm into the face of both kerbs, immediately above the conduit with a uniform 50mm high letter (W,G,E,T etc.). Where conduits cross footpaths, the location is to be marked in the path (near the edge) in the same fashion.
25. Nature strips are to be topsoiled to a depth of approximately 100mm using material stockpiled from stripping, or approved imported material.
26. Pavement Testing. Tests to be completed at a frequency of 1 test per 500m2 of pavement with test locations approximately 1 metre offset from the kerb & measured at 2/3 of the layer depth. Court bowls to be tested in 3 locations & intersections in 2. Pavement material to be placed and compacted in layers with minimum compaction of 100% of the maximum dry density as determined by the modified compaction test being achieved.
27. All drainage and sewer pipes are to be inspected via CCTV after installation with a copy to be provided to the Murray Shire Council.
28. Side entry pit throat clearance to be 100mm max.
29. All pit lids to be constructed by Terra Firma Industries.

# KERB DETAIL



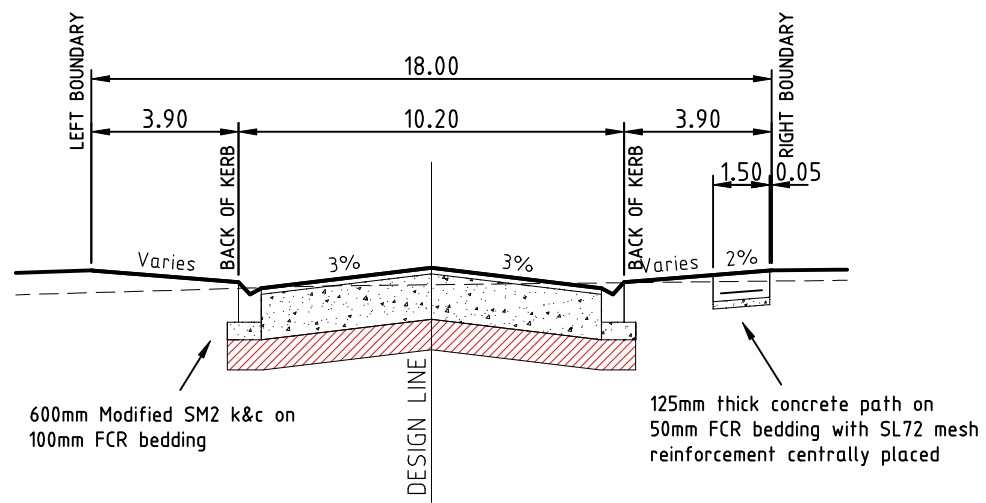
Modified SM2 kerb & channel details



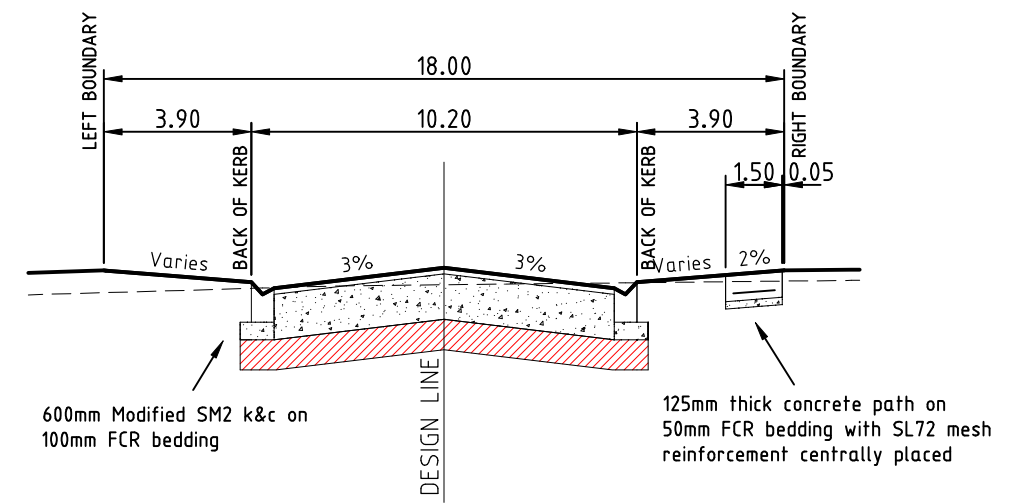
Pedestrian crossing & TGSi details

Refer to Infrastructure Design Manual SD120 for TGSi installation details

6			Designed	Checked	Notes/Legend	 <p>Civil Engineers Project Managers Development Consultants</p>	<p>Terraco P/L</p> <p>ABN 12 681 695 776</p> <p>Corner Jewell Court &amp; Rowena Street Bendigo Vic 3550</p> <p>Ph: 03 5442 5799 Fax: 03 5441 5506 E: info@terraco.com.au</p>	<p>No Scale</p> <p>All lengths are in metres and all levels are to Australian Height Datum (Original Sheet Size is A3)</p>	Murray Shire Council - Moama			
5		G.McCoomb	A.Mertens	Villawood Properties Pty Ltd								
4		Mar 2016	Mar 2016	Lakeview Estate - Stage 4								
3	Amend Sewer	22/08/2016	Approved		General Notes & Kerb Detail							
2	Construction Issue	29/07/2016			Drawing file:	LTO Ref:	Council Ref:	Our Ref:	Version	Sheet		
1	MSC Amendments	24/03/2016			16004_Notes.dwg	-	DA 173/11	16004	3	2 of 30		
0	Draft	08/03/2016										
Ver	Revision Description	Date										



**Durif Drive**  
**CH172.64-340**



**Apera Avenue**  
**CH13.16-80**

Pavement Composition & Notes

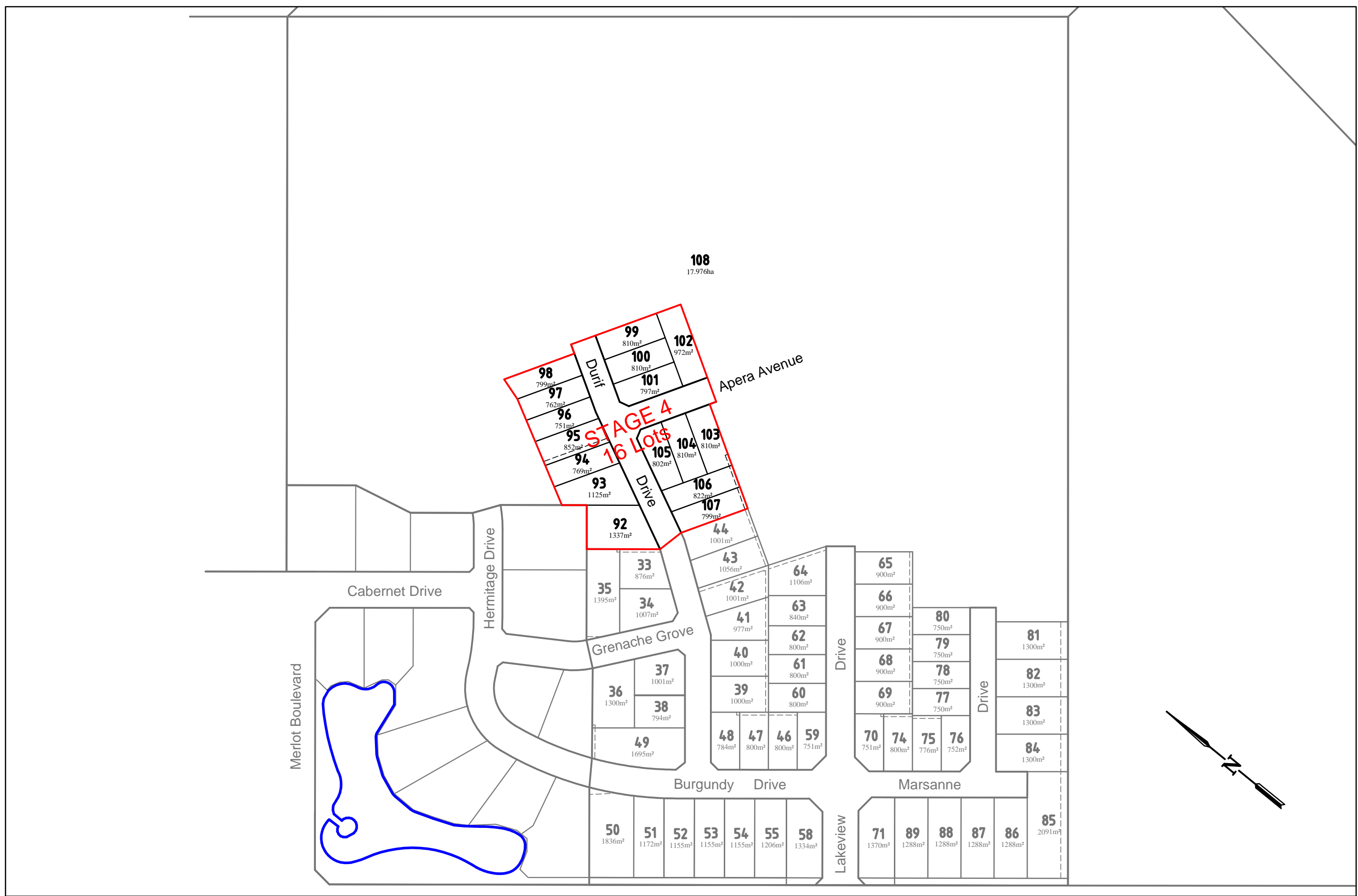
1. PAVEMENT COMPOSITION (DURIF DRIVE & APERA AVENUE):

- a) 40mm DEPTH HOT MIX ASPHALT
- b) 160mm DEPTH CONSOLIDATED 20mm CLASS 1 FCR (BASE COURSE)
- c) 140mm DEPTH CONSOLIDATED 20mm CLASS 3 FCR (SUBBASE)
- d) A14 BIDIM NONWOVEN GEOTEXTILE
- e) 200mm DEPTH IN SITU STABILISATION OF SUBGRADE MATERIAL (3% LIME & 1% CEMENT BY MASS)

2. The location of all service conduits is to be marked 5mm into the face of both kerbs, immediately above the conduit with a uniform 50mm high letter (W,G,E,T etc.). Where conduits cross footpaths, the location is to be marked in the path (near the edge) in the same fashion.

3. Nature strips are to be topsoiled to a depth of approximately 100mm using material stockpiled from stripping, or approved imported material.

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4		Mar 2016	Mar 2016	Lakeview Estate - Stage 4										
3	Amend Sewer	22/08/2016	Approved						Typical Cross Sections					
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0	Draft	08/03/2016							16004 Notes.dwg	-	DA 173/11	16004	3	3 of 30
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Notes/Legend

  
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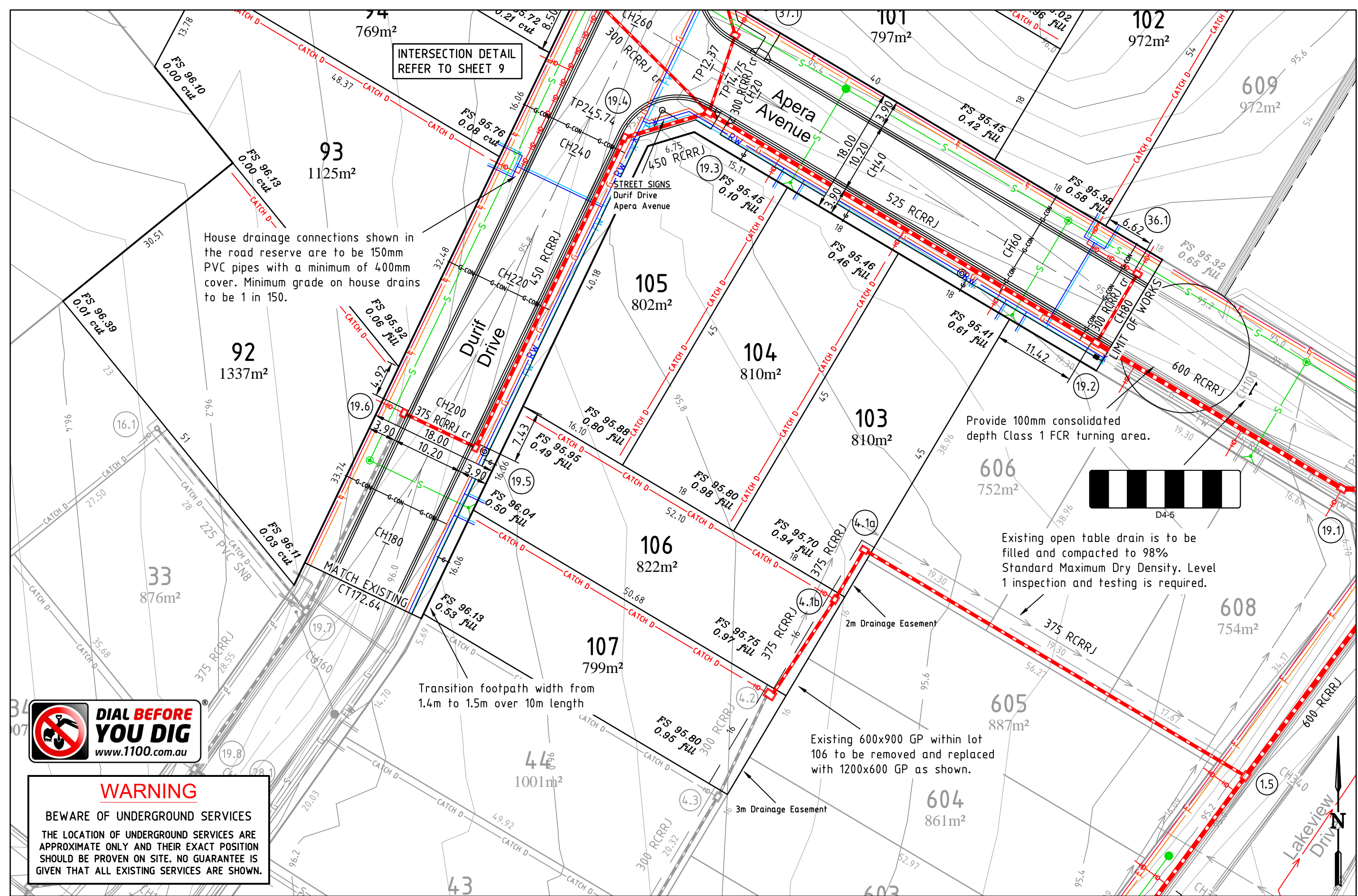
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 All lengths are in metres  
 and all levels are to Australian Height Datum  
 (Original Sheet Size is A3)

Drawing file: 16004 Overall.dwg	LTO Ref: -
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Murray Shire Council - Moama  
**Villawood Properties Pty Ltd**  
 Lakeview Estate - Stage 4  
**Overall Layout Plan**

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House drainage connections shown in the road reserve are to be 150mm PVC pipes with a minimum of 400mm cover. Minimum grade on house drains to be 1 in 150.

Provide 100mm consolidated depth Class 1 FCR turning area.

Existing open table drain is to be filled and compacted to 98% Standard Maximum Dry Density. Level 1 inspection and testing is required.

Transition footpath width from 1.4m to 1.5m over 10m length

Existing 600x900 GP within lot 106 to be removed and replaced with 1200x600 GP as shown.



**WARNING**  
BEWARE OF UNDERGROUND SERVICES  
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

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Approved	

Notes/Legend  
Please note that contours shown on plan indicate the approximate finished surface. Contour interval 0.1m.

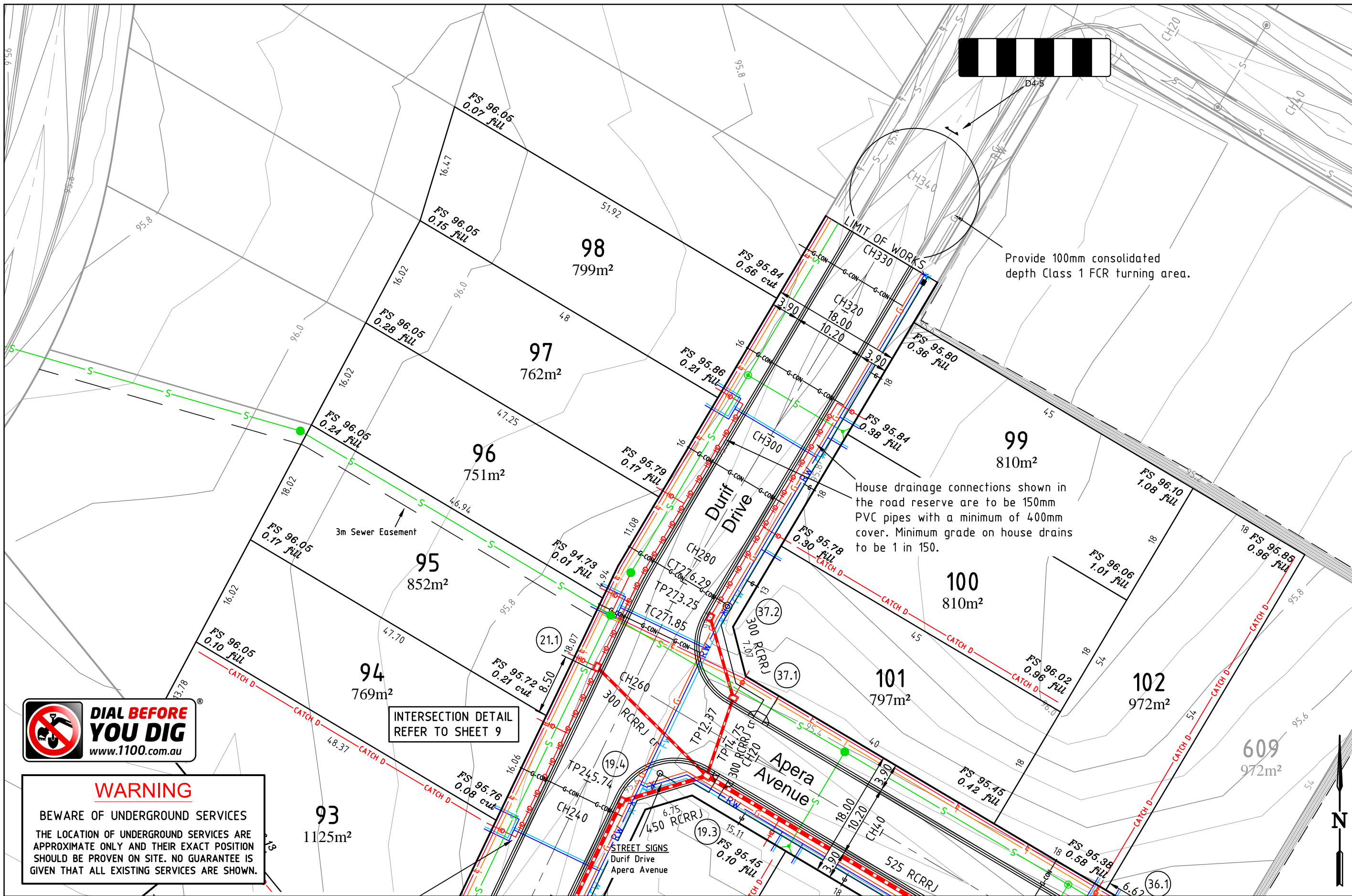
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Scale (m)	1:500	0	5	10
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Drawing file:	LTO Ref:	Council Ref:	Our Ref:	Version
16004 Layout.dwg	-	DA 173/11	16004	3

Murray Shire Council - Moama				
Villawood Properties Pty Ltd Lakeview Estate - Stage 4				
Layout Plan				
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INTERSECTION DETAIL REFER TO SHEET 9

Provide 100mm consolidated depth Class 1 FCR turning area.

House drainage connections shown in the road reserve are to be 150mm PVC pipes with a minimum of 400mm cover. Minimum grade on house drains to be 1 in 150.

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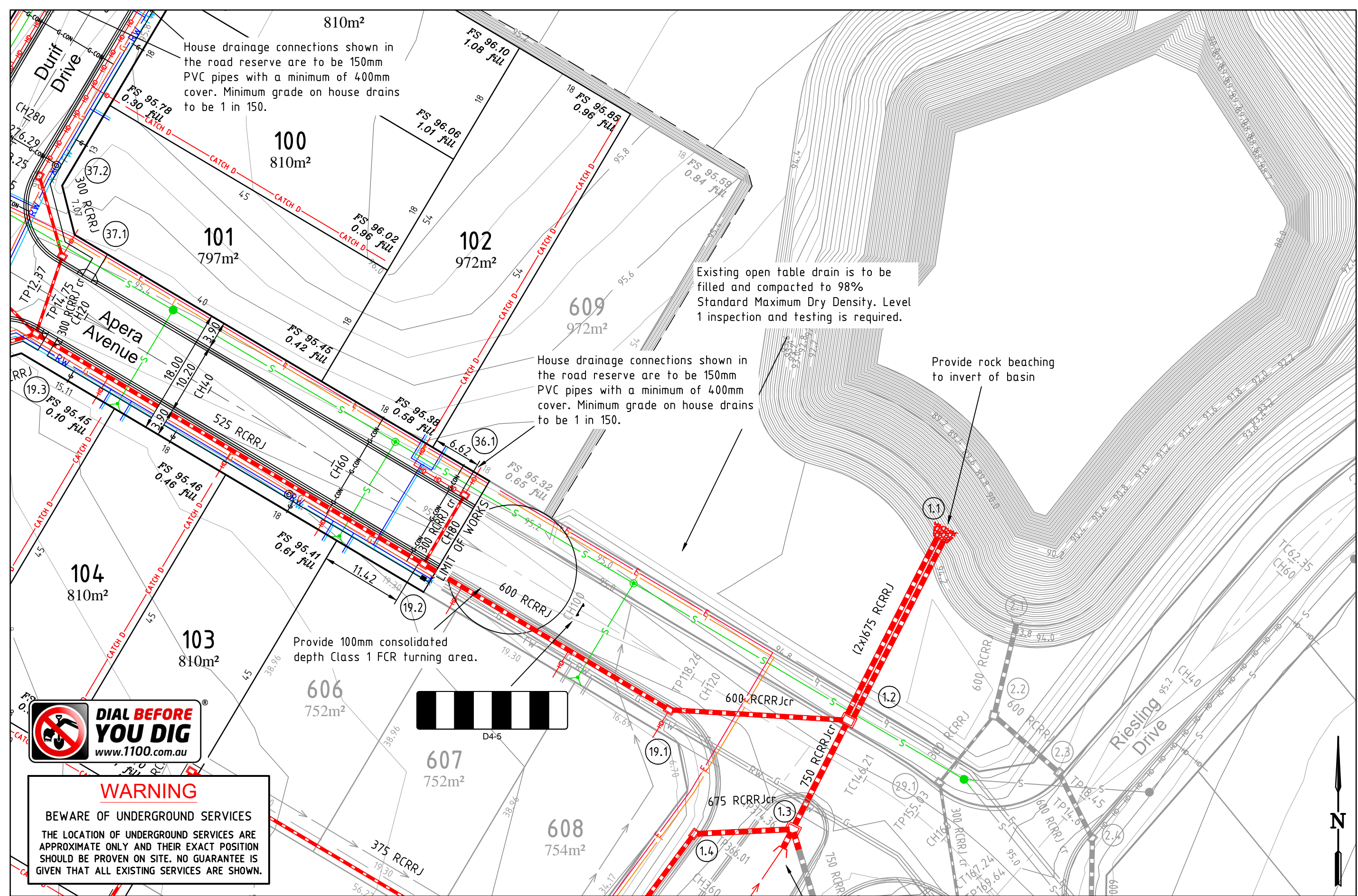
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16004 Layout.dwg	-	DA 173/11	16004	3

Murray Shire Council - Moama				
Villawood Properties Pty Ltd Lakeview Estate - Stage 4				
Layout Plan 2				
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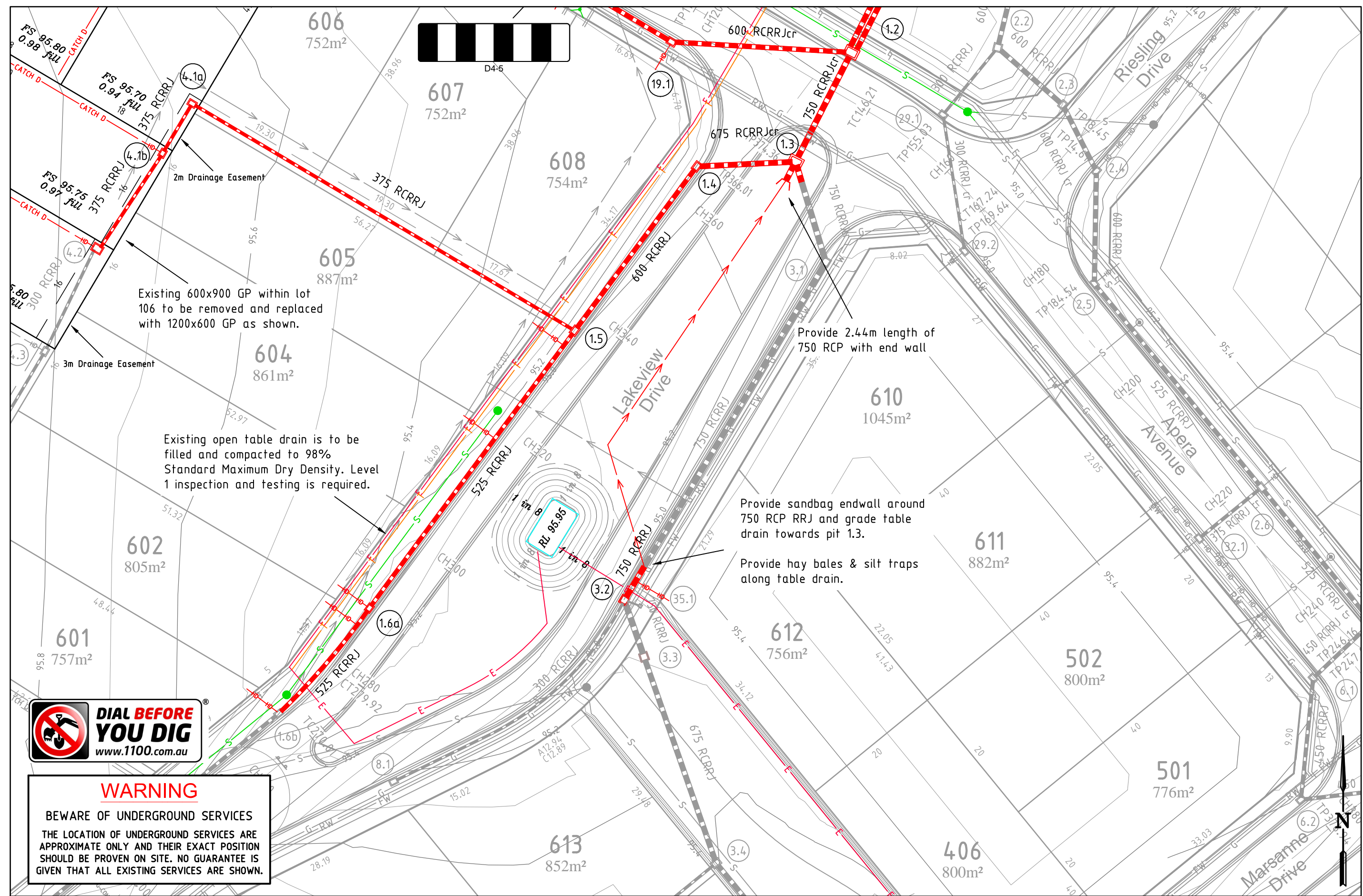
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16004 Layout.dwg	-	DA 173/11	16004	3

Murray Shire Council - Moama				
Villawood Properties Pty Ltd Lakeview Estate - Stage 4				
Layout Plan 3				
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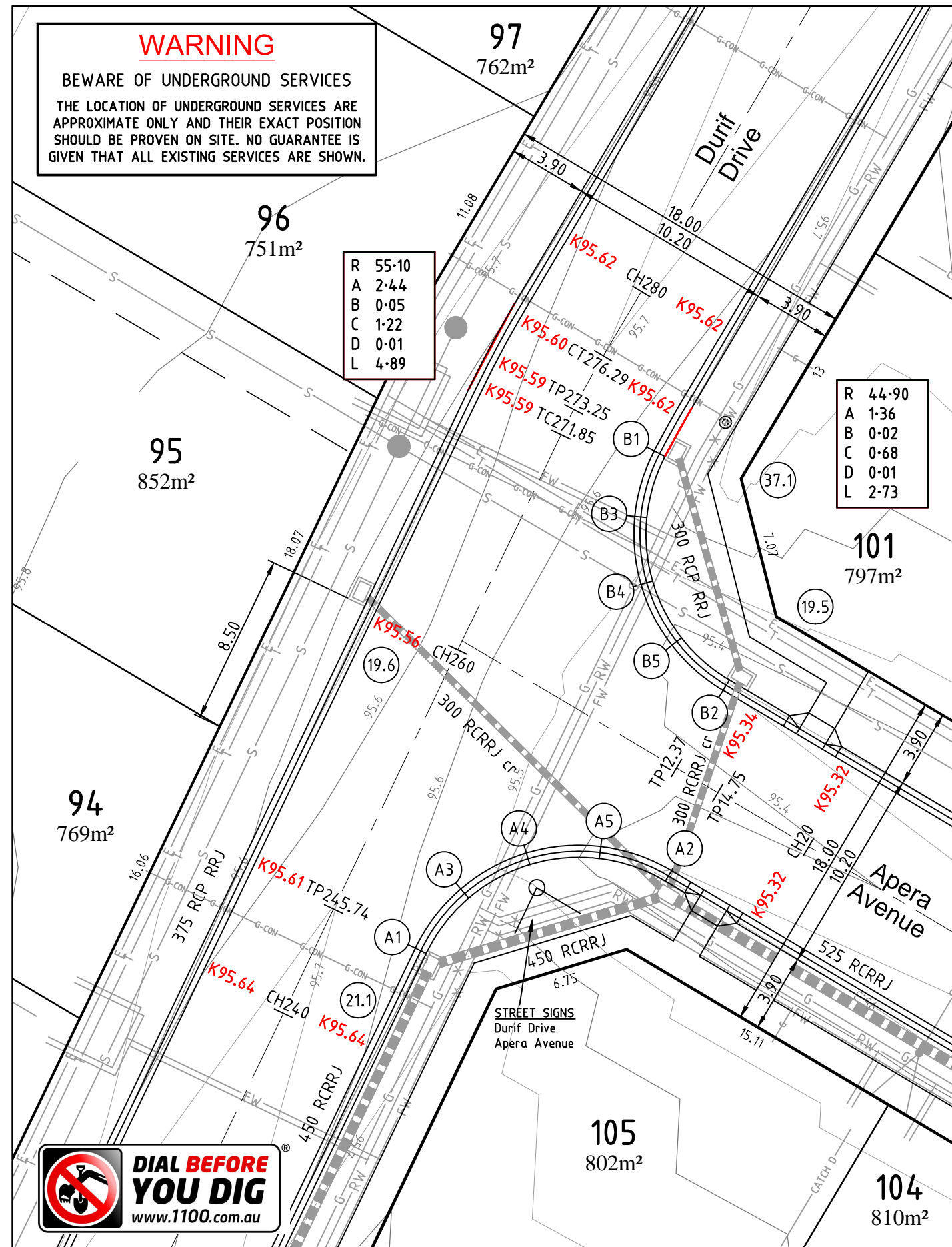
Murray Shire Council - Moama					
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Layout Plan 4					
Council Ref:	DA 173/11	Our Ref:	16004	Version	3
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- R 55.10
- A 2.44
- B 0.05
- C 1.22
- D 0.01
- L 4.89

- R 44.90
- A 1.36
- B 0.02
- C 0.68
- D 0.01
- L 2.73



Alignment A (Back of Kerb)

Point no	Easting	Northing	RL
A 1	296245.457	6003195.882	95.608
A 2	296257.319	6003199.473	95.336
A 3	296247.563	6003198.626	95.563
A 4	296250.597	6003200.290	95.468
A 5	296254.044	6003200.588	95.375

Curve no	I	Radius	Arc	Mid Ord	Qtr Ord	X	Y	I	Mid Ord RL
A 1 2	95.083	8.400	13.940	2.730	2.017	2.811	3.386	3.485	95.468

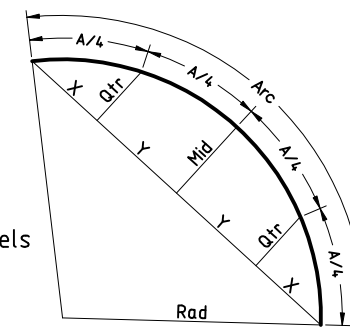
Alignment B (Back of Kerb)

Point no	Easting	Northing	RL
B 1	296257.325	6003220.542	95.592
B 2	296260.493	6003209.451	95.344
B 3	296256.423	6003217.514	95.554
B 4	296256.704	6003214.367	95.467
B 5	296258.128	6003211.546	95.380

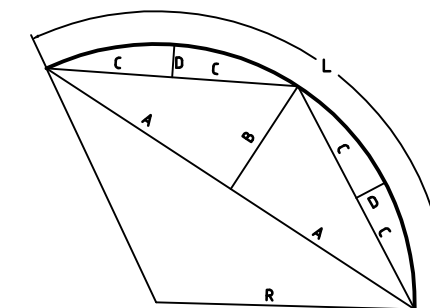
Curve no	I	Radius	Arc	Mid Ord	Qtr Ord	X	Y	I	Mid Ord RL
B 1 2	-86.722	-8.400	12.714	2.293	1.699	2.664	3.103	3.179	95.467



K95.56 denotes back of kerb levels



Curve Setout Detail



Curve Setout Detail

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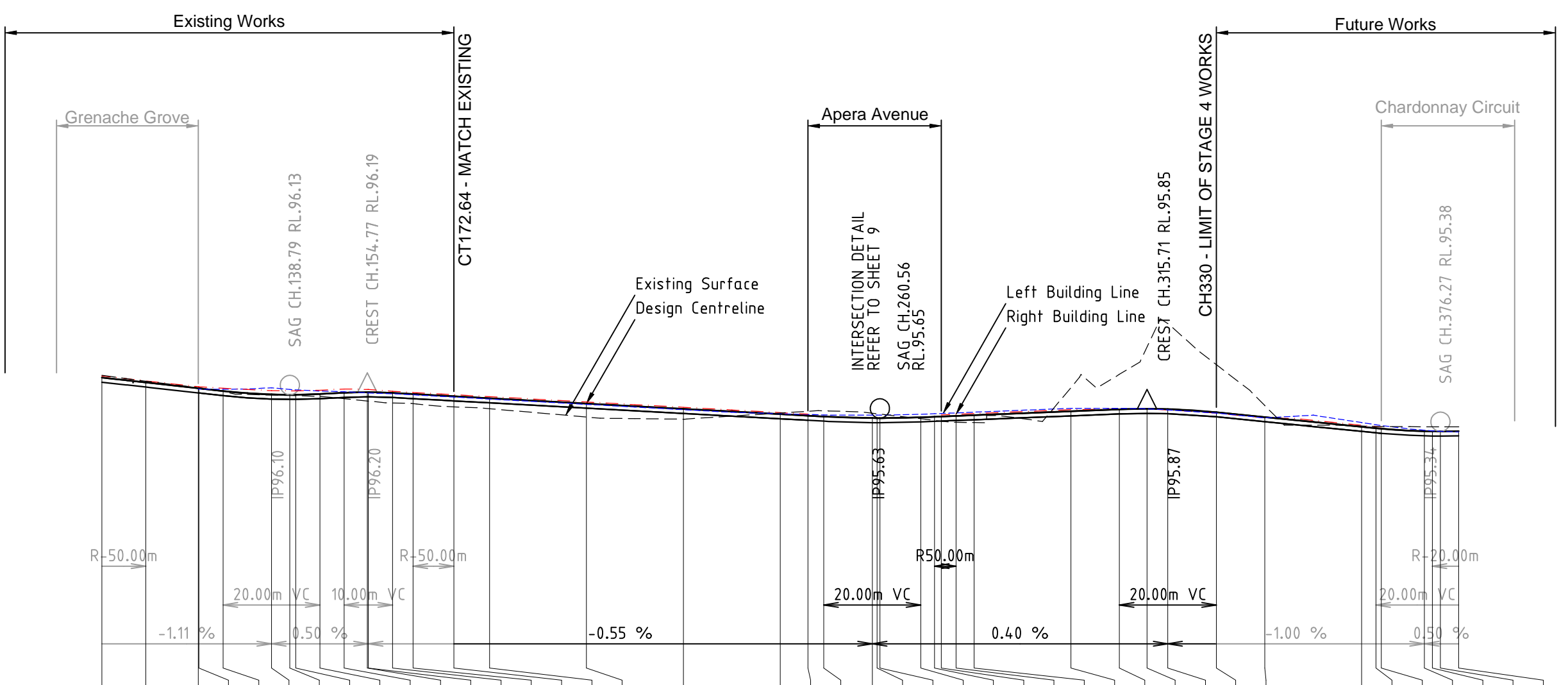
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Scale (m) 1:250 0 2.5 5  
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 Drawing file: 16004 Detail.dwg  
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Murray Shire Council - Moama  
 Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Intersection Detail Plan  
 Council Ref: DA 173/11  
 Our Ref: 16004  
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 Sheet: 9 of 30





Horiz Curve Data  
 V.C. Length (m)  
 Design Cline Grade (%)  
 DATUM R.L.90

Chainage	Existing Surface	Design Surface Right Building Line	Design Surface Left Building Line	Back of Kerb Right Design Level	Back of Kerb Left Design Level	Centreline Levels	Design Surface
100.00	96.54	96.52		96.39		96.49	
109.05	96.42	96.42		96.29		96.39	
119.87	96.28	96.30	96.25	96.17	96.17	96.27	
120.00	96.28	96.30	96.25	96.17	96.17	96.27	
125.00	96.20	96.27	96.25	96.12	96.12	96.21	
135.00	96.13	96.22	96.28	96.05	96.05	96.14	
138.79	96.12	96.21	96.24	96.04	96.04	96.13	
140.00	96.12	96.21	96.24	96.04	96.04	96.14	
145.00	96.10	96.23	96.21	96.06	96.06	96.15	
150.00	96.05	96.25	96.20	96.08	96.08	96.17	
154.77	96.01	96.24	96.17	96.09	96.09	96.19	
155.00	96.00	96.24	96.17	96.09	96.09	96.19	
160.00	95.97	96.21	96.16	96.08	96.08	96.17	
164.23	95.95	96.18	96.13	96.05	96.05	96.15	
172.64	95.88	96.14	96.09	96.01	96.01	96.10	
180.00	95.85	96.09	96.05	95.97	95.97	96.06	
200.00	95.68	95.98	95.94	95.86	95.86	95.95	
220.00	95.63	95.87	95.83	95.75	95.75	95.84	
240.00	95.76	95.77	95.74	95.64	95.64	95.73	
245.74	95.79	95.73	95.73	95.61	95.61	95.70	
249.00	95.80		95.72	95.59	95.59	95.68	
259.00	95.75		95.71	95.56	95.56	95.65	
260.00	95.74		95.71	95.56	95.56	95.65	
260.56	95.74		95.71	95.56	95.56	95.65	
269.00	95.64		95.73	95.58	95.58	95.67	
271.85	95.61		95.74	95.59	95.59	95.68	
273.25	95.59		95.75	95.59	95.59	95.69	
276.29	95.57	95.73	95.76	95.60	95.60	95.70	
280.00	95.56	95.74	95.77	95.62	95.62	95.71	
300.00	96.28	95.82	95.86	95.70	95.70	95.79	
310.00	96.56	95.84	95.86	95.74	95.74	95.83	
315.71	97.12	95.84	95.85	95.75	95.75	95.85	
320.00	97.60	95.82	95.82	95.74	95.74	95.84	
330.00	96.75	95.76	95.76	95.68	95.68	95.77	
340.00	95.91	95.66	95.66	95.58	95.58	95.67	
360.00	95.49	95.51	95.56	95.38	95.38	95.47	
362.93	95.48	95.48	95.52	95.35	95.35	95.44	
364.04	95.48	95.47	95.50	95.34	95.34	95.43	
372.93	95.47		95.40	95.29	95.29	95.38	
374.58	95.47		95.39	95.28	95.28	95.38	
376.27	95.47		95.38	95.28	95.28	95.38	
380.00	95.47		95.37	95.29	95.29	95.38	

Scales Hor 1 : 1000  
 Ver 1 : 100  
 LONGITUDINAL SECTION - DURIF DRIVE

6		
5		
4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016
Ver	Revision Description	Date

Designed	Checked	Notes/Legend
G.McCoomb	A.Mertens	
Mar 2016	Mar 2016	
Approved		

**TERRACO**  
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 Project Managers  
 Development Consultants

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 Fax: 03 5441 5506  
 E: info@terraco.com.au

Scale (m)  
 H 1:1000 0 10 20  
 V 1:100 0 1 2

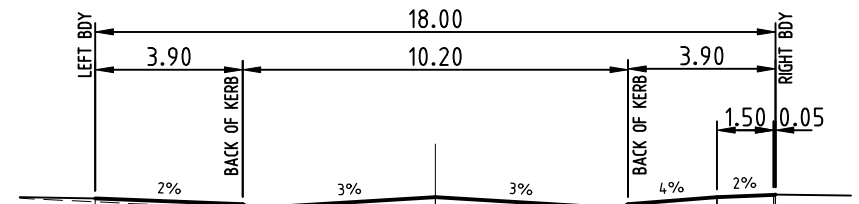
All lengths are in metres  
 and all levels are to Australian Height Datum  
 (Original Sheet Size is A3)

Drawing file: 16004 Durif.dwg  
 LTO Ref: -

Murray Shire Council - Moama  
 Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Durif Drive Longitudinal Section

Council Ref:	Our Ref:	Version	Sheet
DA 173/11	16004	3	10 of 30

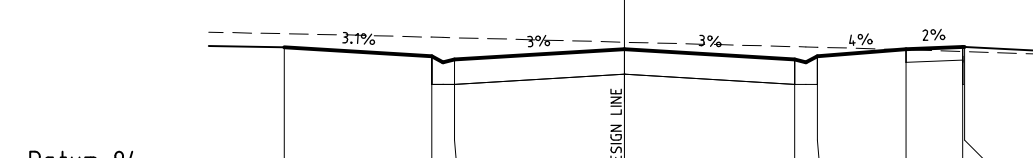




Datum 94

Offset	Existing Surface	Design Level
-9	95.89	95.936
-5.1	95.797	95.858
-4.5	95.783	95.818
0	95.675	95.953
4.5	95.568	95.818
5.1	95.554	95.858
7.45	95.507	95.952
8.95	95.478	95.982
9	95.477	95.984

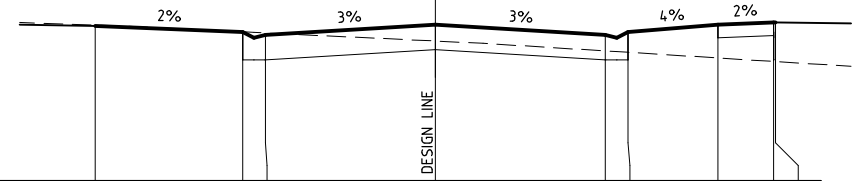
CH 200



Datum 94

Offset	Existing Surface	Design Level
-9	95.907	95.728
-5.1	95.861	95.608
-4.5	95.853	95.568
0	95.795	95.703
4.5	95.736	95.568
5.1	95.728	95.608
7.45	95.695	95.702
8.95	95.671	95.732
9	95.67	95.734

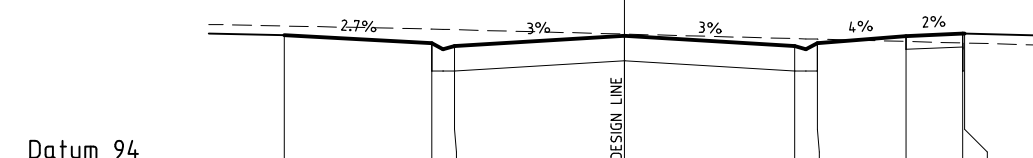
TP 245.74



Datum 94

Offset	Existing Surface	Design Level
-9	96.058	96.046
-5.1	95.969	95.968
-4.5	95.954	95.928
0	95.847	96.063
4.5	95.716	95.928
5.1	95.697	95.968
7.476	95.623	96.063
8.95	95.577	96.093
9	95.576	96.095

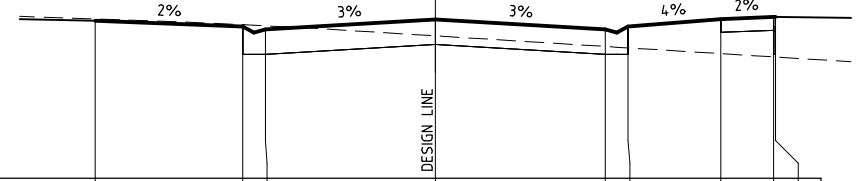
CH 180



Datum 94

Offset	Existing Surface	Design Level
-9	95.866	95.744
-5.1	95.825	95.639
-4.5	95.817	95.599
0	95.758	95.734
4.5	95.699	95.599
5.1	95.691	95.639
7.45	95.661	95.733
8.95	95.641	95.763
9	95.64	95.765

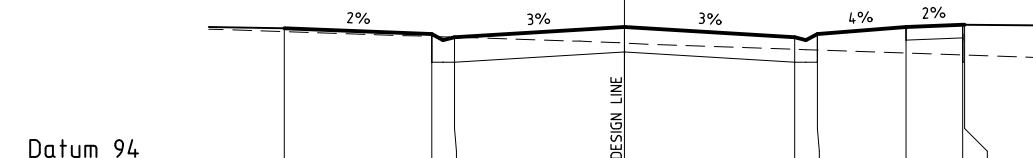
CH 240



Datum 94

Offset	Existing Surface	Design Level
-9	96.109	96.086
-5.1	96.032	96.008
-4.5	96.018	95.968
0	95.884	96.103
4.5	95.744	95.968
5.1	95.726	96.008
7.55	95.649	96.106
8.95	95.606	96.134
9	95.604	96.136

CT 172.644 - MATCH EXISTING



Datum 94

Offset	Existing Surface	Design Level
-9	95.782	95.827
-5.1	95.718	95.749
-4.5	95.709	95.709
0	95.631	95.844
4.5	95.55	95.709
5.1	95.539	95.749
7.45	95.499	95.843
8.95	95.474	95.873
9	95.473	95.875

CH 220

Ver	Revision Description	Date
6		
5		
4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016

Designed	Checked
G.McCoomb Mar 2016	A.Mertens Mar 2016
Approved	

Notes/Legend

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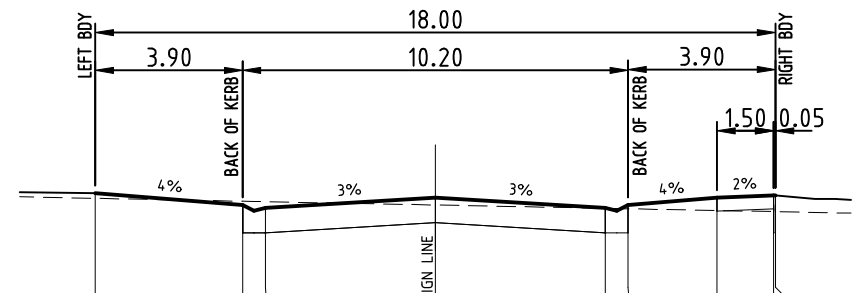
Scale (m)  
H 1:200 0 2 4  
V 1:100 0 1 2

All lengths are in metres  
and all levels are to Australian Height Datum  
(Original Sheet Size is A3)

Drawing file: 16004 Durif.dwg  
LTO Ref: -

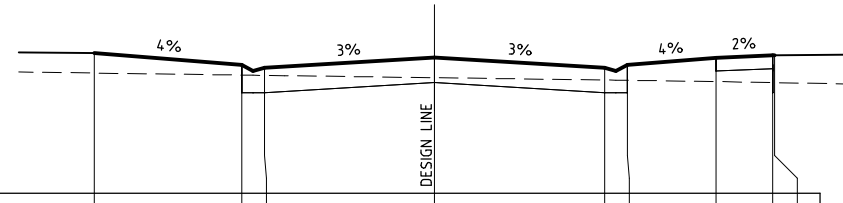
Murray Shire Council - Moama  
Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Durif Drive Cross Sections

Council Ref: DA 173/11	Our Ref: 16004	Version: 3	Sheet: 11 of 30
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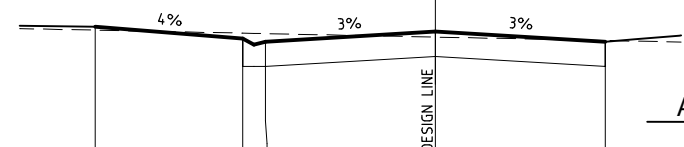
Datum 94	
Design Level	95.748
Existing Surface	95.678
Offset	-9
	95.592
	95.552
	95.687
	95.552
	95.592
	95.686
	95.716
	95.718

TP 273.252



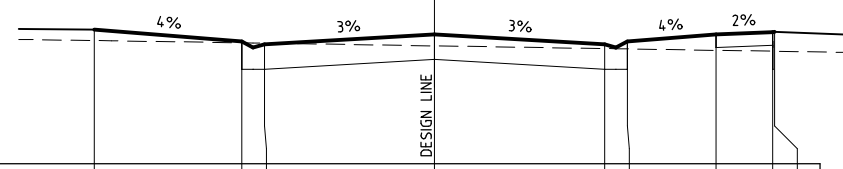
Datum 94	
Design Level	95.855
Existing Surface	95.59
Offset	-9
	95.699
	95.659
	95.794
	95.659
	95.699
	95.793
	95.823
	95.825

CH 300



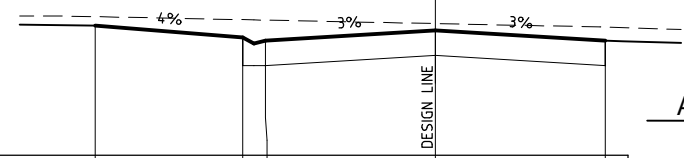
Datum 94	
Design Level	95.742
Existing Surface	95.698
Offset	-9
	95.586
	95.546
	95.681
	95.546
	95.561

TC 271.849



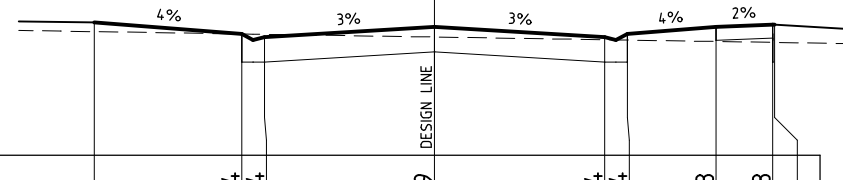
Datum 94	
Design Level	95.775
Existing Surface	95.632
Offset	-9
	95.619
	95.579
	95.714
	95.579
	95.619
	95.713
	95.743
	95.745

CH 280



Datum 94	
Design Level	95.714
Existing Surface	95.834
Offset	-9
	95.558
	95.518
	95.653
	95.518
	95.697

CH 260



Datum 94	
Design Level	95.76
Existing Surface	95.636
Offset	-9
	95.604
	95.564
	95.699
	95.604
	95.698
	95.728
	95.73

CT 276.286

Ver	Revision Description	Date
6		
5		
4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016

Designed	Checked
G.McCoomb	A.Mertens
Mar 2016	Mar 2016
Approved	

Notes/Legend

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Development Consultants

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Ph: 03 5442 5799  
Fax: 03 5441 5506  
E: info@terraco.com.au

Scale (m)  
H 1:200 0 2 4  
V 1:100 0 1 2

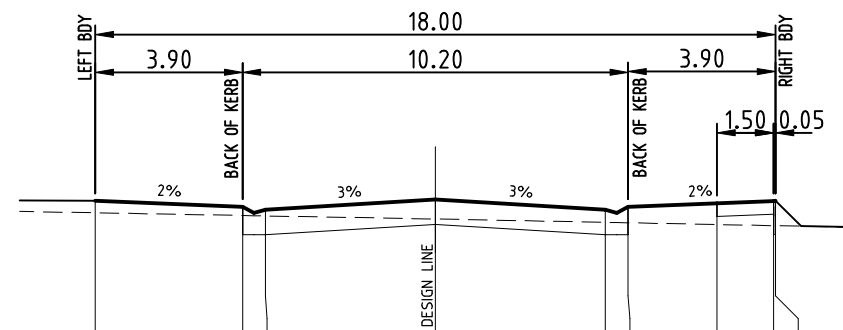
All lengths are in metres  
and all levels are to Australian Height Datum  
(Original Sheet Size is A3)

Drawing file: 16004 Durif.dwg  
LTO Ref: -

Murray Shire Council - Moama

**Villawood Properties Pty Ltd**  
Lakeview Estate - Stage 4  
Durif Drive Cross Sections 2

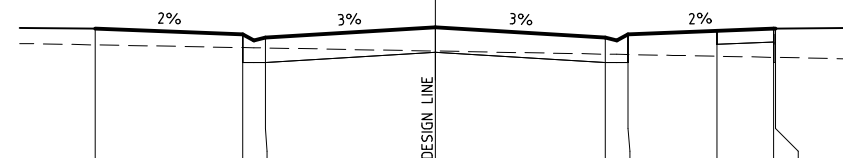
Council Ref:	Our Ref:	Version	Sheet
DA 173/11	16004	3	12 of 30



Datum 94

Design Level	95.757	95.679	95.639	95.774	95.639	95.679	95.726	95.756	95.757
Existing Surface	95.6	95.564	95.559	95.518	95.473	95.468	95.444	95.43	95.429
Offset	-9	-5.1	-4.5	0	4.5	5.1	7.45	8.95	9

CH 330 - LIMIT OF STAGE 4 WORKS



Datum 94

Design Level	95.822	95.744	95.704	95.839	95.704	95.744	95.791	95.821	95.822
Existing Surface	95.607	95.571	95.566	95.525	95.484	95.479	95.457	95.442	95.441
Offset	-9	-5.1	-4.5	0	4.5	5.1	7.45	8.95	9

CH 320

6		
5		
4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016
Ver	Revision Description	Date

Designed	G.McCoomb	Mar 2016
Checked	A.Mertens	Mar 2016
Approved		

Notes/Legend	
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Scale (m) H 1:200 0 2 4  
V 1:100 0 1 2

All lengths are in metres  
and all levels are to Australian Height Datum  
(Original Sheet Size is A3)

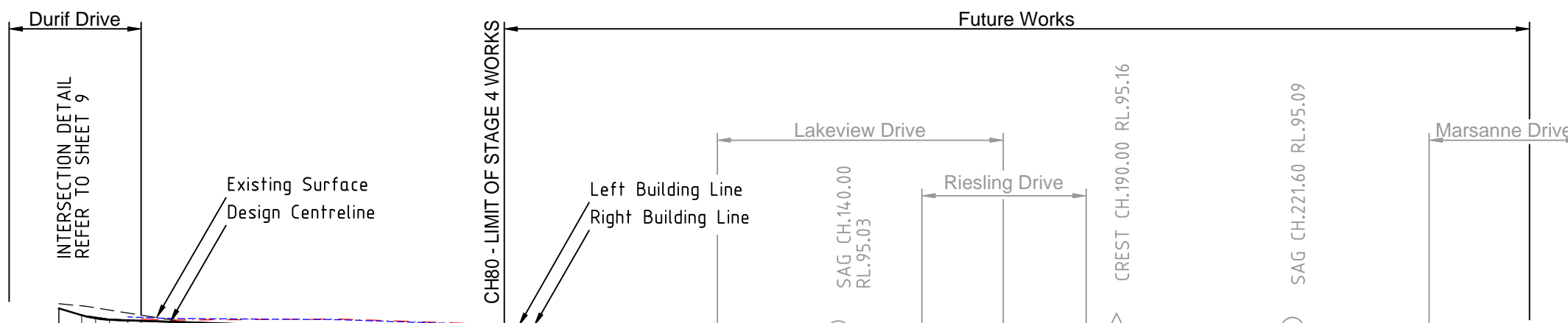
Drawing file:	LTO Ref:
16004 Durif.dwg	-

Murray Shire Council - Moama

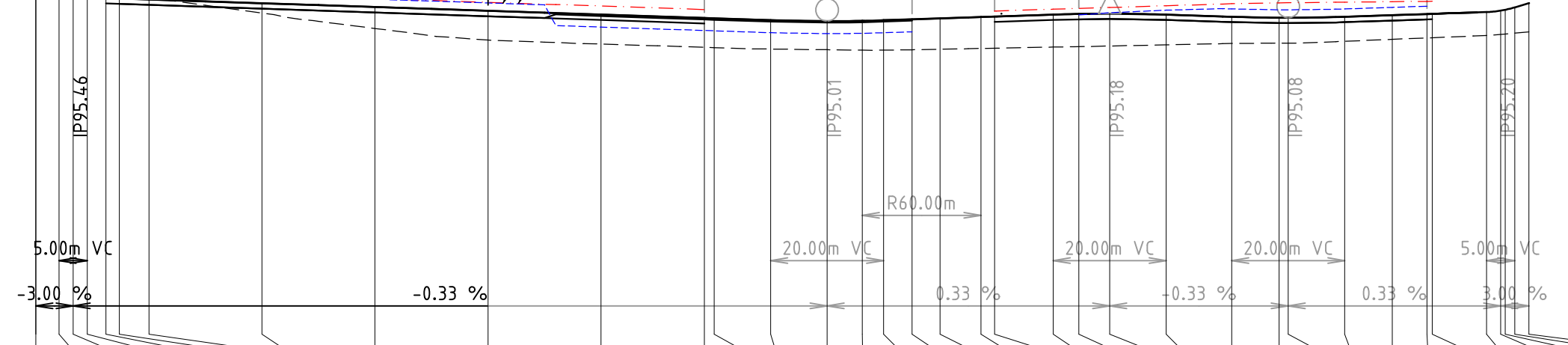
**Villawood Properties Pty Ltd**  
Lakeview Estate - Stage 4  
Durif Drive Cross Sections 3

Council Ref:	Our Ref:	Version	Sheet
DA 173/11	16004	3	13 of 30





Horiz Curve Data  
 V.C. Length (m)  
 Design Cline Grade (%)  
 DATUM R.L.89



Chainage	0.00	4.10	6.60	9.10	12.39	14.75	20.00	40.00	60.00	80.00	100.00	118.26	120.00	130.00	140.00	146.21	150.00	155.03	160.00	167.24	169.64	180.00	184.54	190.00	200.00	211.60	220.00	221.60	231.60	240.00	246.16	247.08	256.68	259.18	260.00	261.68	264.18																
Design Surface		95.66	95.53	95.48	95.45	95.44	95.43	95.41	95.35	95.28		95.21		95.15			95.09	95.08	95.08	95.05	95.03	95.04	95.05	95.06	95.08	95.10	95.11	95.15	95.16	95.16	95.15	95.11	95.09	95.09	95.09	95.11	95.14	95.16	95.16	95.16	95.19	95.22	95.23	95.28	95.35								
Centreline Levels																																																					
Left Design Level							95.34	95.32	95.25	95.19		95.12		95.12			95.06	95.06	95.02	95.01	95.01	95.02	95.04	95.04	95.08	95.10	95.11	95.15	95.16	95.16	95.15	95.11	95.09	95.09	95.09	95.11	95.14	95.16	95.16	95.16	95.19	95.22	95.23	95.28	95.35								
Back of Kerb																																																					
Right Design Level							95.32	95.25	95.19	95.12		95.05		95.05			95.01	95.01	95.02	95.04	95.04	95.05	95.06	95.06	95.07	95.07	95.07	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05	95.05			
Back of Kerb																																																					
Design Surface							95.49	95.47	95.46	95.42		95.35		94.93			94.87	94.86	94.83	94.81	94.82	94.83	94.84																														
Left Building Line																																																					
Design Surface							95.44	95.46	95.43	95.36		95.30		95.30			94.83	94.82	94.83	94.84	94.84	94.84																															
Right Building Line																																																					
Existing Surface	95.74	95.70	95.66	95.62	95.57	95.53	95.45	95.18	94.90	94.70	94.63	94.57	94.56	94.54	94.53	94.52	94.52	94.53	94.53	94.55	94.55	94.55	94.57	94.58	94.59	94.61	94.64	94.64	94.64	94.68	94.71	94.74	94.74	94.74	94.78	94.80	94.81	94.82	94.84														

Scales Hor 1 : 1000  
 Ver 1 : 100  
 LONGITUDINAL SECTION - APERA AVENUE

6			
5			
4			
3	Amend Sewer	22/08/2016	Designed G.McCoomb Mar 2016
2	Construction Issue	29/07/2016	Checked A.Mertens Mar 2016
1	MSC Amendments	24/03/2016	
0	Draft	08/03/2016	
Ver	Revision Description	Date	Approved

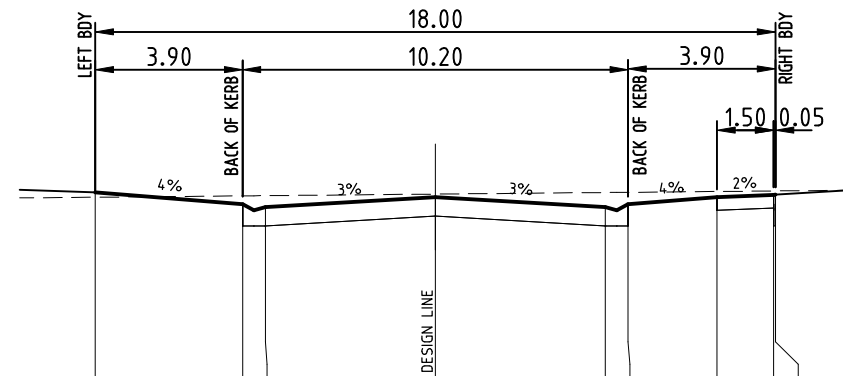
Notes/Legend	

**TERRACO** Civil Engineers  
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Scale (m)  
 H 1:1000 0 10 20  
 V 1:100 0 1 2  
 All lengths are in metres  
 and all levels are to Australian Height Datum  
 (Original Sheet Size is A3)

Drawing file: 16004 Apera.dwg  
 LTO Ref: -  
 Council Ref: DA 173/11  
 Our Ref: 16004  
 Version: 3  
 Sheet: 14 of 30

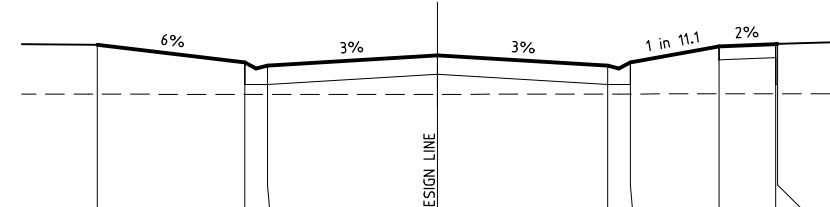
Murray Shire Council - Moama  
 Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Apera Avenue Longitudinal Section



Datum 93

Offset	Existing Surface	Design Level
-9	95.411	95.475
-5.1	95.429	95.319
-4.5	95.432	95.279
0	95.452	95.414
4.5	95.473	95.279
5.1	95.476	95.319
7.45	95.487	95.413
8.95	95.494	95.443
9	95.494	95.445

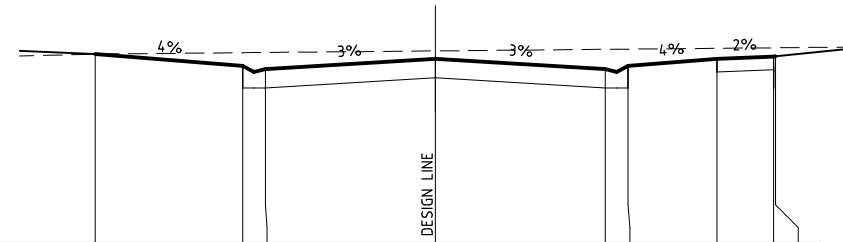
CH 20



Datum 93

Offset	Existing Surface	Design Level
-9	94.701	95.353
-5.1	94.697	95.119
-4.5	94.697	95.079
0	94.698	95.214
4.5	94.702	95.079
5.1	94.702	95.119
7.45	94.704	95.33
8.95	94.706	95.36
9	94.706	95.365

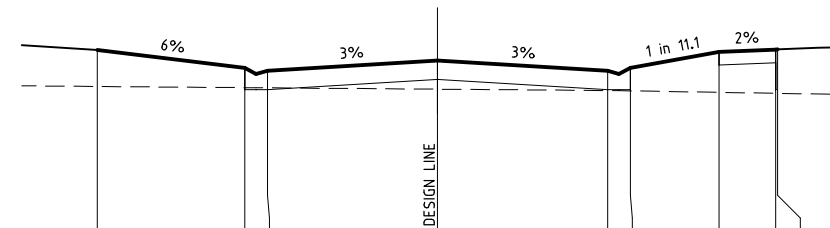
CH 80 - LIMIT OF STAGE 4 WORKS



Datum 93

Offset	Existing Surface	Design Level
-9	95.492	95.492
-5.1	95.511	95.336
-4.5	95.514	95.296
0	95.535	95.431
4.5	95.556	95.296
5.1	95.559	95.336
7.45	95.569	95.43
8.95	95.576	95.46
9	95.577	95.462

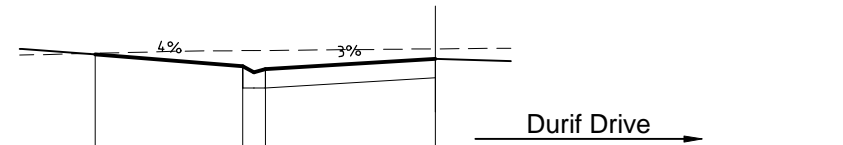
TP 14.754



Datum 93

Offset	Existing Surface	Design Level
-9	94.938	95.419
-5.1	94.923	95.185
-4.5	94.92	95.145
0	94.902	95.28
4.5	94.884	95.145
5.1	94.879	95.185
7.45	94.86	95.397
8.95	94.847	95.427
9	94.847	95.431

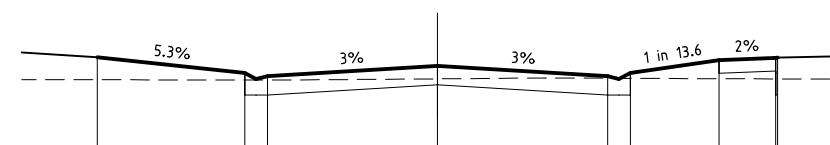
CH 60



Datum 93

Offset	Existing Surface	Design Level
-9	95.514	95.5
-5.1	95.549	95.344
-4.5	95.551	95.304
0	95.572	95.439

TP 12.388



Datum 93

Offset	Existing Surface	Design Level
-9	95.163	95.46
-5.1	95.161	95.252
-4.5	95.161	95.212
0	95.176	95.347
4.5	95.184	95.212
5.1	95.182	95.252
7.45	95.178	95.424
8.95	95.174	95.454
9	95.174	95.458

CH 40

Ver	Revision Description	Date
6		
5		
4		
3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016

Designed	Checked
G.McCoomb Mar 2016	A.Mertens Mar 2016
Approved	

Notes/Legend

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Project Managers  
Development Consultants

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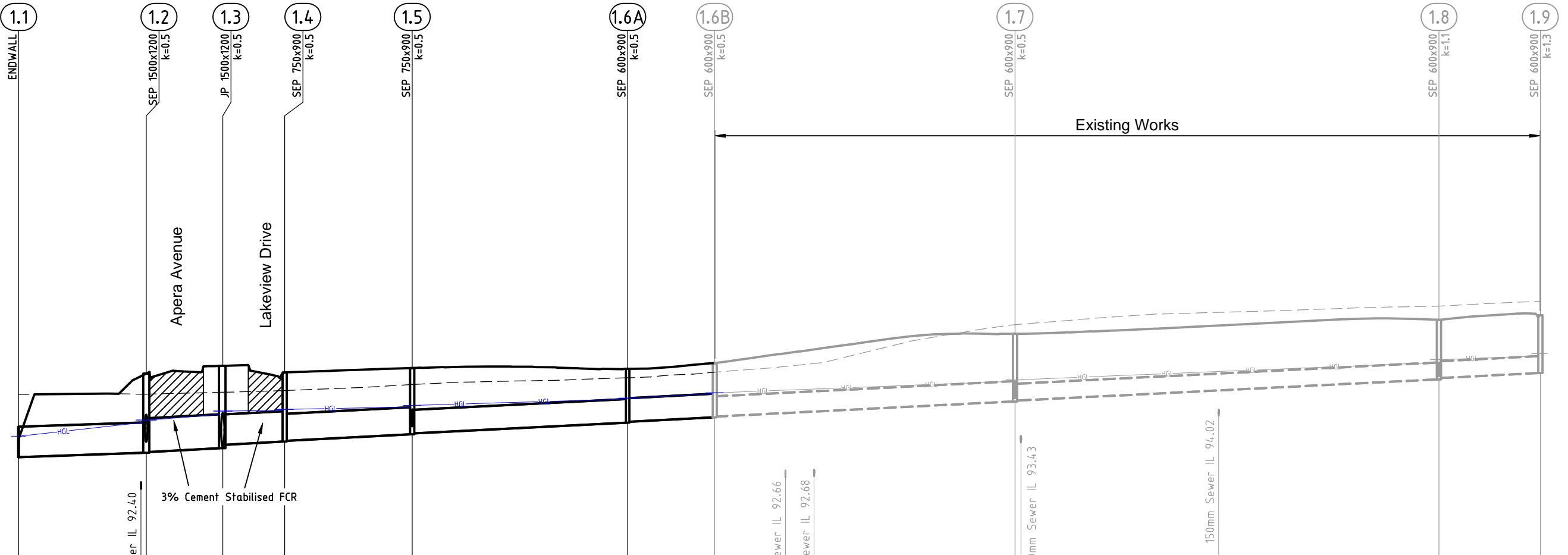
Scale (m) H 1:200 0 2 4  
V 1:100 0 1 2

All lengths are in metres  
and all levels are to Australian Height Datum  
(Original Sheet Size is A3)

Drawing file: 16004 Apera.dwg LTO Ref: -

Murray Shire Council - Moama  
**Villawood Properties Pty Ltd**  
Lakeview Estate - Stage 4  
Apera Avenue Cross Sections

Council Ref: DA 173/11	Our Ref: 16004	Version 3	Sheet 15 of 30
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Design Flow (L/s)	1062	757	314	309	202	197	178	117	102										
Pipe Capacity (L/s)	1082	872	661	485	342	342	228	141	141										
Actual Velocity (m/s)	1.70	2.21	1.82	1.81	1.64	1.63	1.58	1.42	1.39										
Full pipe vel (m/s)	1.48	1.71	0.88	1.09	0.93	0.91	1.12	1.06	0.93										
Pipe Size (mm)	(2x)675	750	675	600	525	525	450	375	375										
(Type)	RCP RRJ	RCRRJ CP	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ										
Pipe Grade (1 in)	300	200	200	200	200	200	200	200	200										
(%)	0.333	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500										
Datum R.L.	87.0																		
Invert	93.111	93.111	93.206	93.226	93.311	93.387	93.455	93.475	93.617	93.637	93.877	93.897	93.994	94.014	94.348	94.368	94.839	94.869	94.982
Depth to Inv. From FSL	0.40	0.40	1.76	1.74	1.83	1.75	1.54	1.52	1.48	1.46	1.20	1.18	1.21	1.19	1.50	1.48	1.32	1.29	1.28
H.G.L. Levels	93.58	93.58	93.88	93.94	94.06	94.14	94.15	94.17	94.23	94.26	94.40	94.42	94.52	94.54	94.80	94.83	95.21	95.28	95.36
Finished Surface	93.51		94.97		95.14		94.99		95.09		95.07		95.20		95.85		96.16		96.27
Existing Surface	94.51		94.51		94.55		94.59		94.73		94.88		95.00		96.06		96.47		96.58
Pipe length & Chainage	0.00	28.39	28.39	17.04	45.43	13.74	59.16	28.39	87.55	47.93	135.48	19.34	154.82	66.81	221.63	94.30	315.93	22.54	

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3	Amend Sewer	22/08/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016
Ver	Revision Description	Date

Designed	G.McCoomb	Mar 2016
Checked	A.Mertens	Mar 2016
Approved		

Notes/Legend

**TERRACO**  
Civil Engineers  
Project Managers  
Development Consultants

**Terraco P/L**  
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Scale (m)  
H 1:1000 0 10 20  
V 1:100 0 1 2

All lengths are in metres  
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(Original Sheet Size is A3)

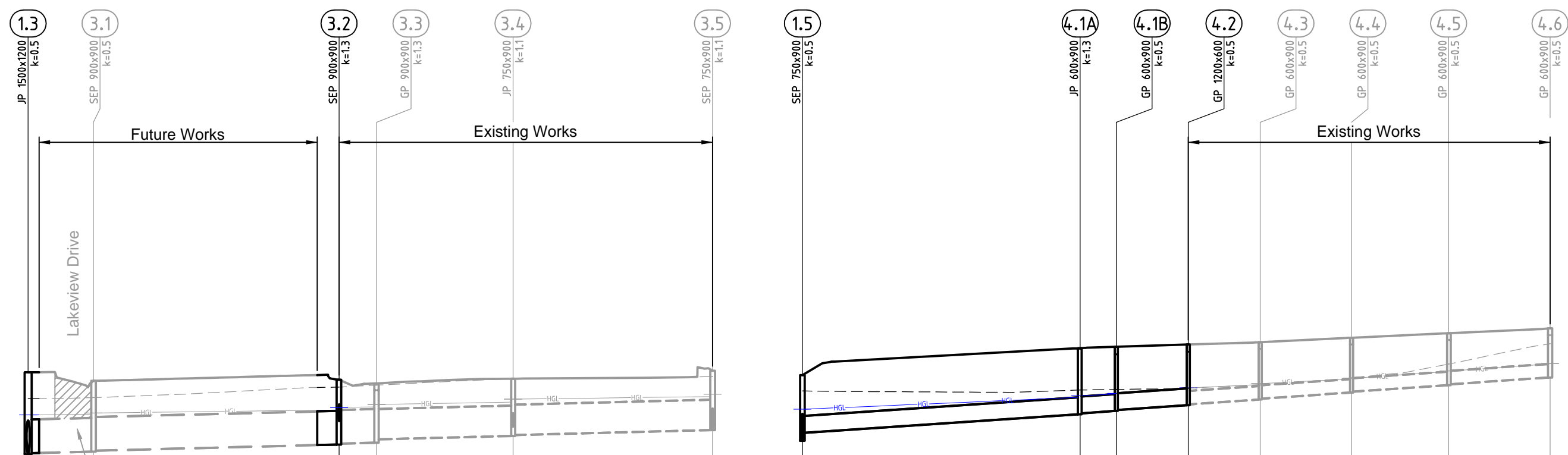
Drawing file: 16004 Drainage.dwg  
LTO Ref: -

Murray Shire Council - Moama

**Villawood Properties Pty Ltd**  
Lakeview Estate - Stage 4  
Drainage Longitudinal Sections

Council Ref:	Our Ref:	Version	Sheet
DA 173/11	16004	3	16 of 30





	1.3	3.1	3.2	3.3	3.4	3.5
Design Flow (L/s)	433		421	400	388	330
Pipe Capacity (L/s)	615		615	615	466	466
Actual Velocity (m/s)	1.50		1.49	1.48	1.45	1.41
Full pipe vel (m/s)	0.98		0.95	0.91	1.08	0.92
Pipe Size (mm)	750		750	750	675	675
(Type)	RCRRJ cr		RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ
Pipe Grade (1 in)	400		400	400	400	400
(%)	0.250		0.250	0.250	0.250	0.250
Datum R.L.	87.0					
Invert	93.321 93.341	93.377 93.397	93.534 93.554	93.575 93.650	93.72 93.726 93.746	93.857
Depth to Inv. From FSL	1.82 1.80	1.57 1.55	1.44 1.42	1.32 1.24	1.27 1.25	1.32
H.G.L. Levels	94.12 94.19	94.21 94.24	94.30 94.36	94.37 94.43	94.48 94.55	94.60
Finished Surface	95.14	94.95	94.98	94.89	95.00	95.18
Existing Surface	94.55	94.58	94.81	94.85	95.00	95.05
Pipe length & Chainage	0.00 14.53	14.53	69.17 8.33	77.50 30.35 25.96	103.46 107.85	44.37 152.22

	1.5	4.1A	4.1B	4.2	4.3	4.4	4.5	4.6
Design Flow (L/s)		86	86	79	73	65	56	47
Pipe Capacity (L/s)		163	163	163	90	90	90	90
Actual Velocity (m/s)		1.49	1.47	1.42	1.39	1.34	1.29	1.29
Full pipe vel (m/s)		0.78	0.72	1.03	0.91	0.79	0.67	0.67
Pipe Size (mm)		375	375	375	300	300	300	300
(Type)		RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ
Pipe Grade (1 in)		150	150	150	150	150	150	150
(%)		0.667	0.667	0.667	0.667	0.667	0.667	0.667
Datum R.L.		87.0						
Invert	93.617 93.797	94.209 94.229	94.282 94.302	94.409 94.429	94.536 94.556	94.691 94.711	94.855 94.875	95.025
Depth to Inv. From FSL	1.46 1.28	1.47 1.45	1.43 1.41	1.35 1.33	1.28 1.26	1.22 1.20	1.15 1.13	1.09
H.G.L. Levels	94.29 94.32	94.58 94.62	94.66 94.67	94.78 94.80	94.87 94.89	94.99 95.01	95.16 95.17	95.33
Finished Surface	95.08	95.67	95.71	95.76	95.81	95.91	96.01	96.12
Existing Surface	94.73	94.75	94.76	94.79	94.86	95.02	95.32	95.78
Pipe length & Chainage	0.00	61.77 8.04	69.81 16.00	85.81 16.00	101.81 20.32	122.13 21.60	143.73 22.57	166.30

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Designed G.McCoomb Mar 2016	Checked A.Mertens Mar 2016	Notes/Legend
Approved		

**TERRACO**  
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Project Managers  
Development Consultants

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Scale (m)  
H 1:1000 0 10 20  
V 1:100 0 1 2

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LTO Ref: -

Murray Shire Council - Moama  
Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Drainage Longitudinal Sections 2

Council Ref: DA 173/11  
Our Ref: 16004  
Version: 3  
Sheet: 17 of 30



	1.2	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	19.10	19.11	19.12			
Design Flow (L/s)	305	287	225	196	124	120	122	101	81	78	74	68				
Pipe Capacity (L/s)	434	434	305	203	203	126	126	126	90	90	90	90				
Actual Velocity (m/s)	1.65	1.63	1.54	1.45	1.34	1.29	1.29	1.26	1.44	1.43	1.42	1.40				
Full pipe vel (m/s)	1.08	1.01	1.04	1.23	0.78	1.09	1.10	0.92	1.14	1.10	1.05	0.97				
Pipe Size (mm)	600	600	525	450	450	375	375	375	300	300	300	300				
(Type)	RCRRJ cr	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCRRJ cr	RCP RRJ	RCP RRJ	RCP RRJ	RCP RRJ	RCRRJ cr	RCP RRJ				
Pipe Grade (1 in)	250	250	250	250	250	250	250	250	150	150	150	150				
(%)	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.667	0.667	0.667	0.667				
Datum R.L.	86.0															
Invert	93.206 93.453	93.553 93.573	93.732 93.752	94.003 94.023	94.072 94.092	94.284 94.304	94.348 94.368	94.491 94.511	94.619 94.639	94.761 94.791	94.874 94.904	94.975 94.995	95.065			
Depth to Inv. From FSL	1.76 1.52	1.49 1.47	1.44 1.42	1.35 1.33	1.56 1.54	1.61 1.59	1.53 1.51	1.56 1.54	1.44 1.42	1.42 1.39	1.48 1.45	1.36 1.34	1.43			
H.G.L. Levels	93.88 93.94	94.15 94.21	94.33 94.38	94.53 94.61	94.66 94.77	94.85 94.89	94.93 95.02	95.14 95.23	95.30 95.34	95.44 95.51	95.57 95.63	95.68 95.73	95.78			
Finished Surface	94.97	95.04	95.17	95.36	95.63	95.89	95.88	96.05	96.06	96.18	96.35	96.33	96.50			
Existing Surface	94.51	94.57	94.72	95.55	95.72	95.56	95.83	96.08	96.20	96.31	96.50	96.61	96.65			
Pipe length & Chainage	0.00 24.98	24.98 39.79	64.77	62.82	127.59 128.28	139.87	47.84 187.71	198.81	30.77	229.59	26.89	256.48 18.29	274.77 12.59	287.37 10.51	297.88 10.61	308.48

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Project Managers  
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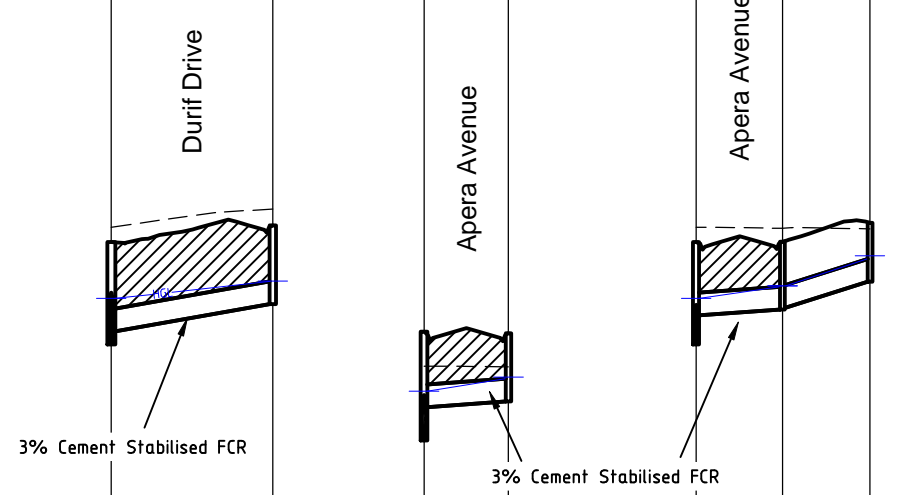
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LTO Ref: -

Murray Shire Council - Moama  
Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Drainage Longitudinal Sections 3

Council Ref: DA 173/11  
Our Ref: 16004  
Version: 3  
Sheet: 18 of 30

19.3 SEP 750x900 k=1.5  
 21.1 SEP 600x900 k=10.0  
 19.2 SEP 750x900 k=1.0  
 36.1 SEP 600x900 k=2.0  
 19.3 SEP 750x900 k=1.5  
 37.1 SEP 600x900 k=2.1  
 37.2 SEP 600x900 k=10.0



Design Flow (L/s)  
 Pipe Capacity (L/s)  
 Actual Velocity (m/s)  
 Full pipe vel (m/s)

Pipe Size (mm)  
 (Type)  
 Pipe Grade (1 in)  
 (%)  
 Datum R.L.

	19.3	21.1	19.2	36.1	19.3	37.1	37.2
Design Flow (L/s)	7	44	33	90	23	20	20
Pipe Capacity (L/s)	144	105	1.18	1.18	90	193	193
Actual Velocity (m/s)	1.05	0.47	0.47	0.47	1.08	1.78	1.78
Full pipe vel (m/s)	0.10	0.10	0.47	0.47	0.33	0.28	0.28
Pipe Size (mm)	300	300	300	300	300	300	300
(Type)	RCRRJ cr	RCRRJ cr	RCRRJ cr	RCRRJ cr	RCRRJ cr	RCP RRJ	RCP RRJ
Pipe Grade (1 in)	60.0	150	150	150	150	33.3	33.3
(%)	1.667	0.667	0.667	0.667	0.667	3.000	3.000
Datum R.L.	86.0	86.0	87.0	87.0	86.0	86.0	86.0
Invert	94.003	94.178	93.732	94.174	94.389	94.465	94.833
Depth to Inv. From FSL	1.35	1.18	1.44	1.00	0.97	0.90	0.78
H.G.L. Levels	94.53	94.61	94.33	94.38	94.61	94.77	95.13
Finished Surface	95.36		95.17	95.15	95.36	95.36	95.61
Existing Surface	95.55	95.79	94.72	94.71	95.54	95.53	95.53
Pipe length & Chainage	0.00 21.38	0.00 11.18	0.00 11.18	0.00 11.18	0.00 11.42	11.42 11.59	23.01

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Designed  
G.McCoomb  
Mar 2016

Checked  
A.Mertens  
Mar 2016

Approved

Notes/Legend

**TERRACO**  
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Murray Shire Council - Moama

Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Drainage Longitudinal Sections 4

Council Ref:	Our Ref:	Version	Sheet
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PIT SCHEDULE

Pit Name	TYPE	EASTING	NORTHING	INTERNAL WD	INLET LEN	INLET DIA	OUTLET INV LEV	OUTLET DIA	PIT INV LEV	SETOUT RL	DEPTH	REMARKS
1.6a	Side Entry Pit	296303.708	6003067.791	0.600	0.900	525	93.897	525	93.877	95.073	1.196	
1.5	Side Entry Pit	296332.219	6003106.315	0.750	0.900	525	93.637	600	93.617	95.093	1.476	
1.5	Side Entry Pit	296332.219	6003106.315	0.750	0.900	375	93.797		95.093		1.476	
1.4	Side Entry Pit	296349.141	6003129.106	0.750	0.900	600	93.475	675	93.455	94.995	1.540	
1.3	Junction Pit	296362.861	6003129.763	1.500	1.200	675	93.387	750	93.311	95.141	1.830	
1.3	Junction Pit	296362.861	6003129.763	1.500	1.200	750	93.341		95.141		1.830	
1.2	Side Entry Pit	296370.603	6003144.945	1.200	1.500	750	93.226	(2x)675	93.206	94.968	1.762	
1.2	Side Entry Pit	296370.603	6003144.945	1.200	1.500	600	93.453		94.968		1.762	
1.1	Concrete Endwall	296380.890	6003159.679	0.150	0.150	(2x)675	93.111		93.786		0.675	Provide rock beaching
3.2	Side Entry Pit	296339.084	6003068.908	0.900	0.900	750	93.554	750	93.534	94.977	1.443	
4.2	Grated Pit	296266.829	6003117.185	0.600	0.900	300	94.429	375	94.409	95.758	1.350	
4.1b	Grated Pit	296274.998	6003130.943	0.600	0.900	375	94.302	375	94.282	95.708	1.426	
4.1a	Junction Pit	296279.102	6003137.854	0.600	0.900	375	94.229	375	94.209	95.676	1.467	
19.6	Junction Pit	296214.956	6003156.902	0.600	0.900	375	94.368	375	94.348	95.882	1.534	
19.5	Side Entry Pit	296224.984	6003152.142	0.600	0.900	375	94.304	450	94.284	95.890	1.607	
19.4	Side Entry Pit	296245.668	6003195.281	0.600	0.900	450	94.092	450	94.072	95.628	1.556	
19.3	Side Entry Pit	296257.438	6003198.791	0.750	0.900	450	94.023	525	94.003	95.356	1.353	
19.3	Side Entry Pit	296257.438	6003198.791	0.750	0.900	300	94.178		95.356		1.353	
19.3	Side Entry Pit	296257.438	6003198.791	0.750	0.900	300	94.389		95.356		1.353	
19.2	Side Entry Pit	296311.451	6003166.721	0.750	0.900	525	93.752	600	93.732	95.173	1.441	
19.2	Side Entry Pit	296311.451	6003166.721	0.750	0.900	300	94.174		95.173		1.441	
19.1	Side Entry Pit	296345.667	6003146.405	0.750	0.900	600	93.573	600	93.553	95.040	1.487	
21.1	Side Entry Pit	296242.261	6003213.851	0.600	0.900			300	94.535	95.576	1.042	
36.1	Side Entry Pit	296317.156	6003176.330	0.600	0.900			300	94.248	95.152	0.904	
37.2	Side Entry Pit	296257.913	6003220.746	0.600	0.900			300	94.833	95.612	0.779	
37.1	Side Entry Pit	296261.109	6003209.608	0.600	0.900	300	94.485	300	94.465	95.361	0.895	

NOTE:

1. xy setout to pit centre
2. setout level to pit cover level

NOTE: GRATED PIT COVER LEVELS ARE TO BE SET 150MM BELOW FINISHED SURFACE LEVEL

6			Designed	Checked	Notes/Legend	 <b>TERRACO</b> Civil Engineers Project Managers Development Consultants	Terraco P/L ABN 12 681 695 776 Corner Jewell Court & Rowena Street Bendigo Vic 3550 Ph: 03 5442 5799 Fax: 03 5441 5506 E: info@terraco.com.au	All lengths are in metres and all levels are to Australian Height Datum (Original Sheet Size is A3)		Murray Shire Council - Moama			
5		G.McCoomb	A.Mertens	Villawood Properties Pty Ltd									
4		Mar 2016	Mar 2016	Lakeview Estate - Stage 4									
3	Amend Sewer	22/08/2016	Approved							Pit Schedule			
2	Construction Issue	29/07/2016											
1	MSC Amendments	24/03/2016											
0	Draft	08/03/2016											
Ver	Revision Description	Date					Drawing file:	LTO Ref:	Council Ref:	Our Ref:	Version	Sheet	
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## GENERAL NOTES

1. All works are to be carried out in accordance with Murray Shire Council and current Water Services Association of Australia standards and specifications.
2. Contract is in accordance with AS2124-1992.
3. The contractor must locate all services prior to commencement of any works.
4. Sewers are to be 150mm Ø uPVC RRJ class SN8 (SEH grade) unless shown otherwise.
5. Sewer Jump Up levels shown refer to the required level at the property connection point 1.0m inside the property boundary. All Jump Ups to be brought up a minimum of 1.0m above the surface.
6. All sewer manhole covers to be solid ductile iron Class D cover and frame with concrete surround.
7. The level of all existing outfall sewers must be checked by the contractor prior to work commencing.
8. The contractor must adhere to the code of practise as "Excavation Work Code of Practice" under section 274 of the Work Health and Safety Act 2011. All workers on this site must have a current WH&S General Induction for Construction Work in NSW Certificate (White Card).
9. The contractor is not permitted to break into an existing live pipeline, enter a live manhole, or remove the cover of an existing live manhole unless given permission by the Supervising Engineer.
10. All properties are to be fully reinstated to the satisfaction of the Supervising Engineer.
11. All new sewers must be pressure tested. Where the contractor does not have a Quality Assurance system in place, all pipes must be inspected by the Supervising Engineer.
12. Confined Space Entry must be in accordance with Work Health and Safety requirements. Contractor must not enter a Confined Space until all required information has been submitted to Terraco.
13. All hatched areas on longitudinal sections indicate 20mm Class 3 FCR backfill.
14. All future stub end to be capped.
15. All sewer pipes are to be inspected by CCTV after installation, with a copy to be provided to the Murray Shire Council.

### Asset Recording Requirements

The contractor must record all construction details including invert levels and locations of manholes, sewer ends and oblique branches, and testing details, using appropriate "line sheets".

The information is to be provided to the supervising engineer in a suitable form to enable detailed "as constructed" plans to be produced. Line sheets are available from Terraco, or the contractor may use their own if approved by Terraco prior to works commencing. The information is to be provided within 1 week of the completion of the works. Claims for payment for construction may be delayed until the line sheets have been received by the supervising engineer.

The following standard backfill requirements apply to all trenching works.

For PVC pipes:

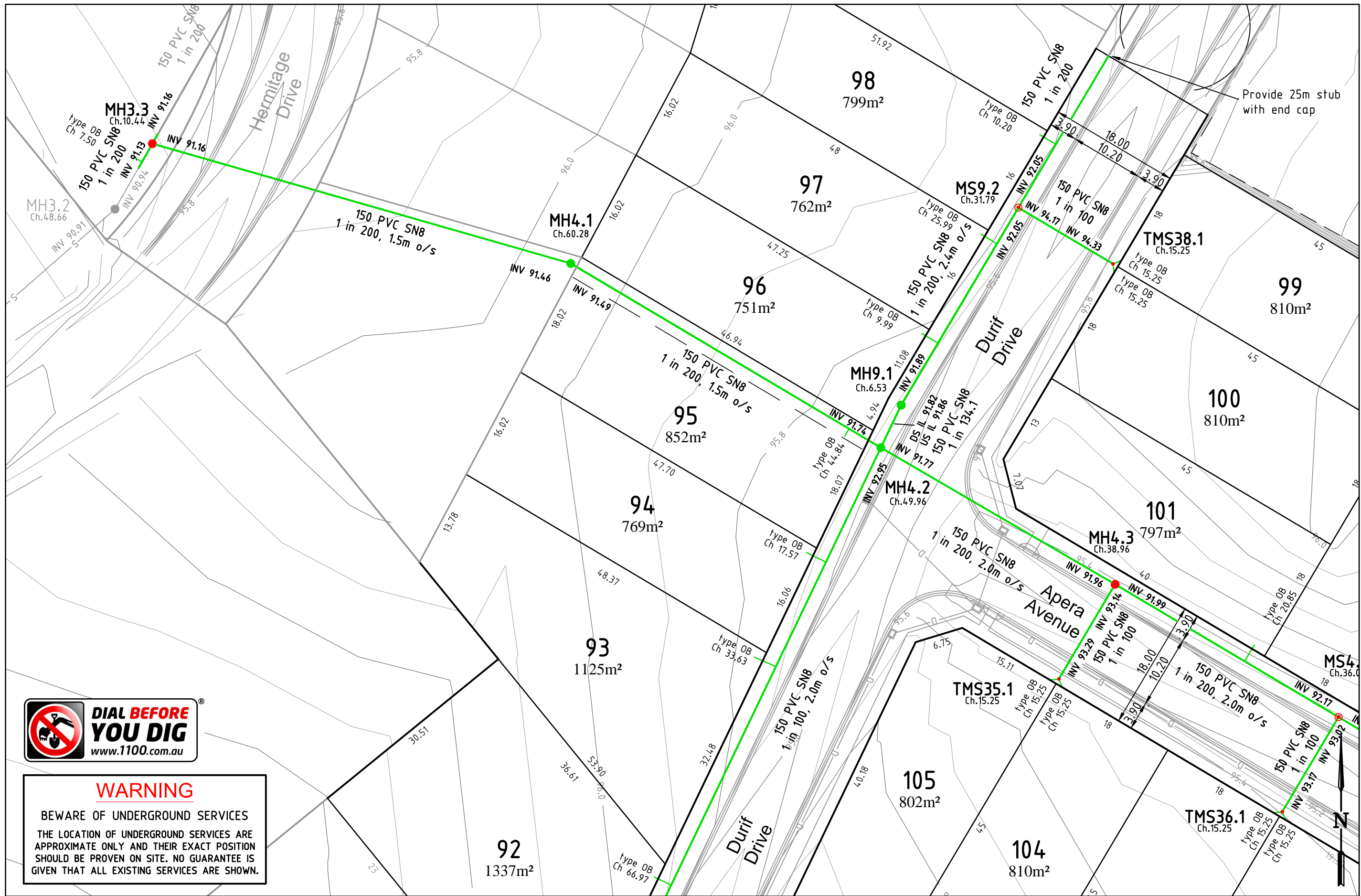
- a) Minimum bedding sand under pipe - 75mm
- b) Minimum sand backfill above pipe - 100mm
- c) Minimum sand backfill either side of pipe - 100mm

For concrete pipes:

- a) Minimum bedding sand under pipe - 75mm
- b) Minimum sand backfill to string line.
- c) Minimum sand backfill either side of pipe - 100mm

Select backfill to 100mm above the pipe. Should the excavated material be unsuitable, sand backfill to be provided a minimum 100mm above the pipe.

6			Designed G.McCoomb Sep 2016	Checked A.Mertens Sep 2016	Notes/Legend	 <p><b>TERRACO</b> Civil Engineers Project Managers Development Consultants</p>	<p><b>Terraco P/L</b> ABN 12 681 695 776 Corner Jewell Court &amp; Rowena Street Bendigo Vic 3550 Ph: 03 5442 5799 Fax: 03 5441 5506 E: info@terraco.com.au</p>	<p>No Scale</p> <p>All lengths are in metres and all levels are to Australian Height Datum (Original Sheet Size is A3)</p>	<p>Murray Shire Council - Moama <b>Villawood Properties Pty Ltd</b> Lakeview Estate - Stage 4 <b>Sewer Notes</b></p>				
5			Approved										
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Ver	Revision Description	Date						Drawing file: 16004 Sewer.dwg	LTO Ref: -	Council Ref: DA 173/11	Our Ref: 16004	Version 3	Sheet 21 of 30



**WARNING**  
 BEWARE OF UNDERGROUND SERVICES  
 THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

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	Sep 2016		Sep 2016
Approved			

**Notes/Legend**  
 Please note that contours shown on plan indicate the approximate finished surface. Countour interval 0.1m.  
 Manholes shown in red have class D lids.

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 Project Managers  
 Development Consultants

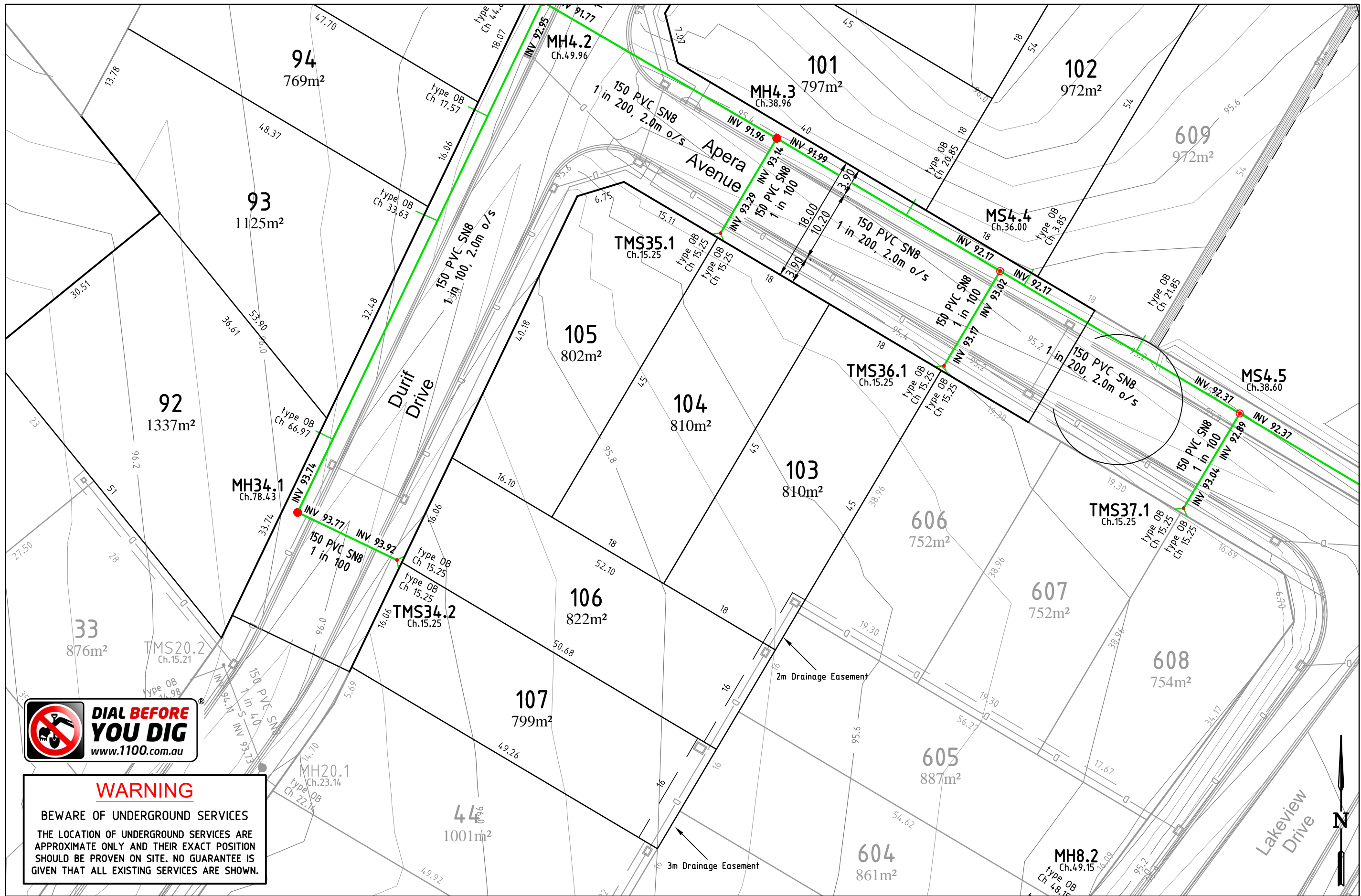
**Terraco P/L**  
 ABN 12 681 695 776  
 Corner Jewell Court  
 & Rowena Street  
 Bendigo Vic 3550  
 Ph: 03 5442 5799  
 Fax: 03 5441 5506  
 E: info@terraco.com.au

Scale (m) 1:500 0 5 10  
 All lengths are in metres  
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 (Original Sheet Size is A3)

Drawing file:	LTO Ref:	Council Ref:	Our Ref:	Version	Sheet
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Murray Shire Council - Moama  
 Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Sewer Layout Plan





**WARNING**  
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3	Amend Sewer	13/9/2016
2	Construction Issue	29/07/2016
1	MSC Amendments	24/03/2016
0	Draft	08/03/2016
Ver	Revision Description	Date

Designed	G.McCoomb	Checked	A.Mertens
	Sep 2016		Sep 2016
Approved			

**Notes/Legend**  
 Please note that contours shown on plan indicate the approximate finished surface. Countour interval 0.1m.  
 Manholes shown in red have class D lids.

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 Project Managers  
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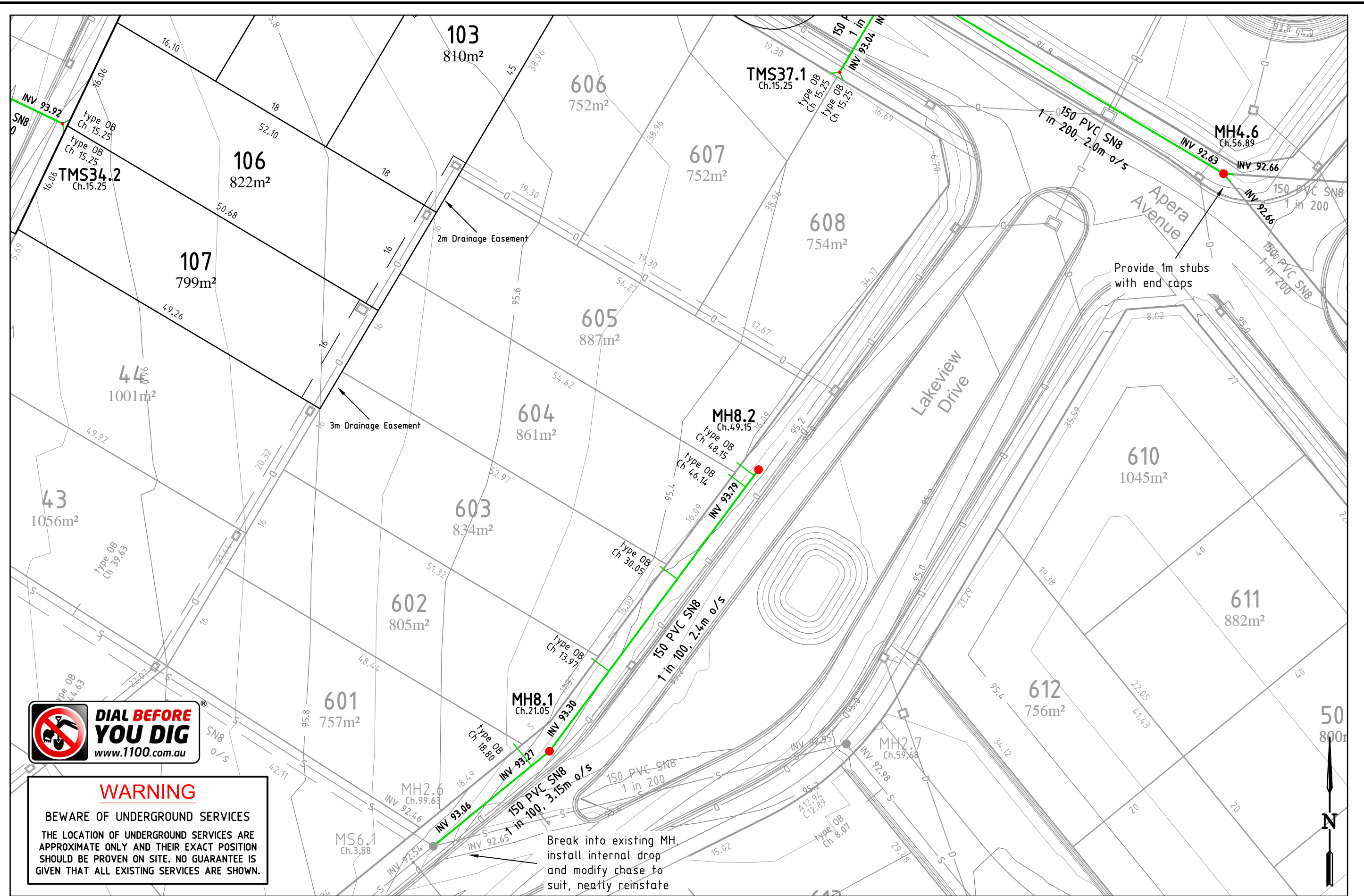
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16004 Sewer.dwg	-

Murray Shire Council - Moama  
**Villawood Properties Pty Ltd**  
 Lakeview Estate - Stage 4  
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Break into existing MH, install internal drop and modify chase to suit, neatly reinstate

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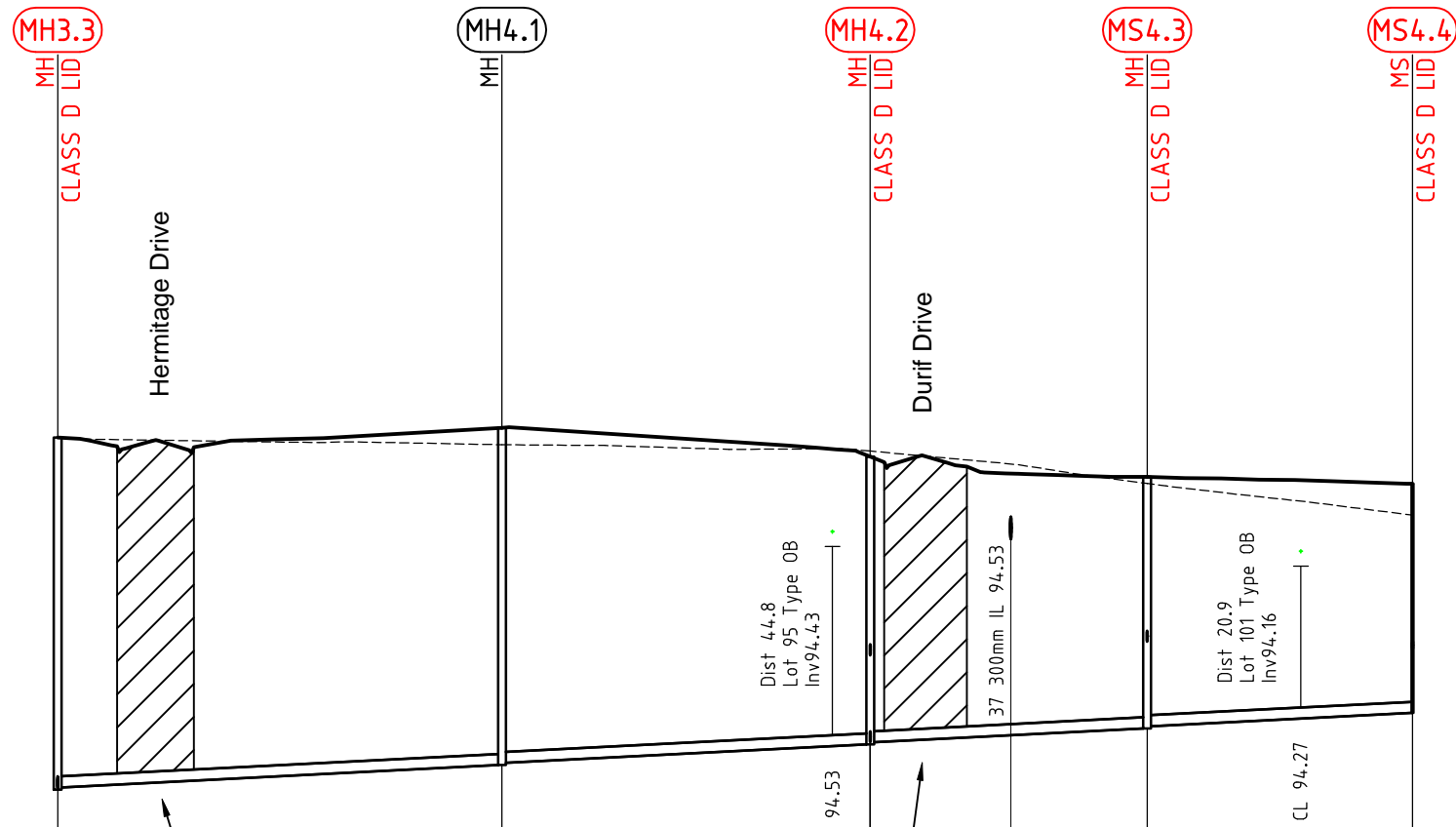
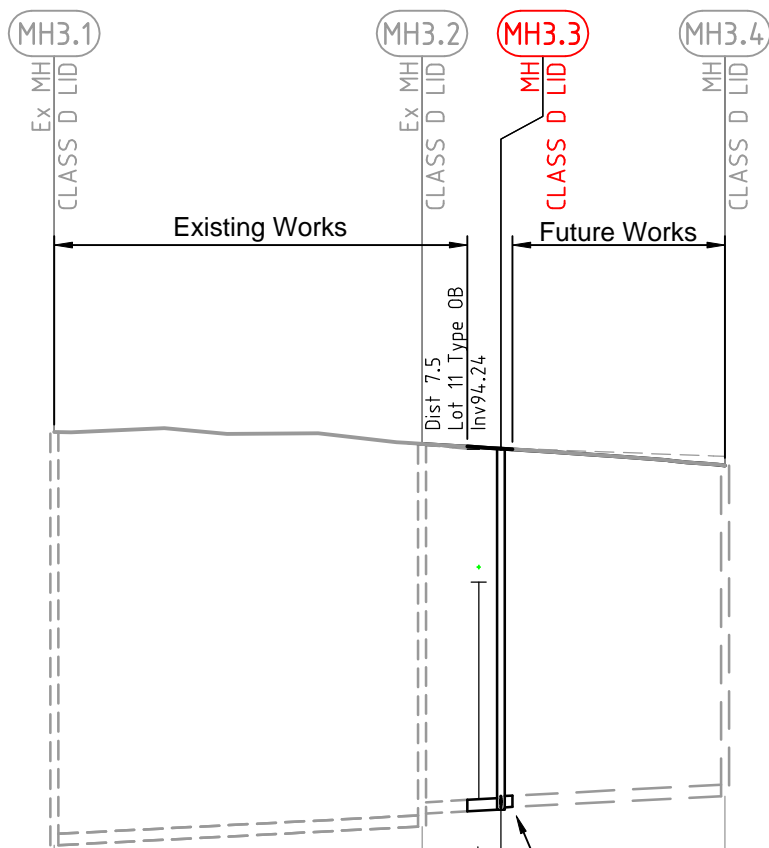
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Murray Shire Council - Moama  
**Villawood Properties Pty Ltd**  
 Lakeview Estate - Stage 4  
 Sewer Layout Plan 3

Council Ref:	DA 173/11	Our Ref:	16004	Version	3	Sheet	24 of 30
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Pipe Size (mm)	150	150	150
Type	PVC SN8	PVC SN8	PVC SN8
Pipe Grade (1 in)	200	200	200
(%)	0.500%	0.500%	0.500%
Datum R.L.	84.0		

Pipe Size (mm)	150	150	150	150
Type	PVC SN8	PVC SN8	PVC SN8	PVC SN8
Pipe Grade (1 in)	200	200	200	200
(%)	0.500%	0.500%	0.500%	0.500%
Datum R.L.	84.0			

Invert	90.663	90.663	91.051	91.081	91.133	91.163	91.311
Depth to Invert From FSL	5.46	5.46	5.06	4.89	4.77	4.74	4.37
Finished Surface	96.126		95.971		95.908		95.683
Existing Surface	96.126		95.954		95.900		95.806
Chainage	0.00	48.66	48.66	10.44	59.10	29.65	88.75

Invert	91.133	91.163	91.464	91.494	91.744	91.774	91.962	91.992	92.172
Depth to Invert From FSL	4.77	4.74	4.58	4.55	3.90	3.87	3.41	3.38	3.11
Finished Surface	95.908		96.040		95.649		95.374		95.280
Existing Surface	95.900		95.810		95.724		95.284		94.855
Chainage	0.00	60.28	60.28	49.96	110.23	37.57	147.80	36.00	183.80

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	Sep 2016		Sep 2016
Approved			

Notes/Legend

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Scale (m)  
H 1:1000 0 10 20  
V 1:100 0 1 2

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LTO Ref: -

Murray Shire Council - Moama  
Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Sewer Longitudinal Sections

Council Ref:	Our Ref:	Version	Sheet
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Pipe Size (mm)  
 Pipe Grade (1 in)  
 (%)  
 Datum R.L.

Invert	92.172	92.172	92.365	92.365	92.54	92.55	92.62	92.633	92.663	92.80	92.851
Depth to Invert From FSL	3.11	3.11	2.65	2.65				2.29	2.26		2.29
Finished Surface	95.280		95.012				94.922			95.137	
Existing Surface	94.855		94.624				94.508			94.588	
Chainage	183.80	38.60	222.40		53.53	34.99	257.40	258.17	51.13	273.53	275.93
										37.75	27.90
										303.83	
											313.68

Invert	93.060	93.270	93.300	93.792
Depth to Invert From FSL	2.46	1.98	1.95	1.46
Finished Surface		95.247		95.255
Existing Surface	94.973			94.782
Chainage	0.00	21.05	21.05	49.15
				70.20

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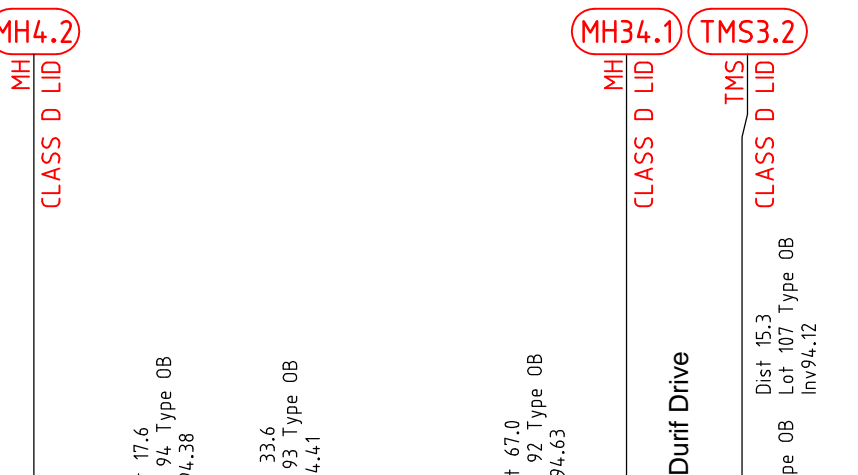
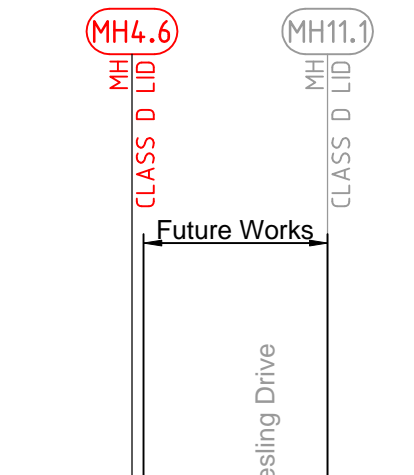
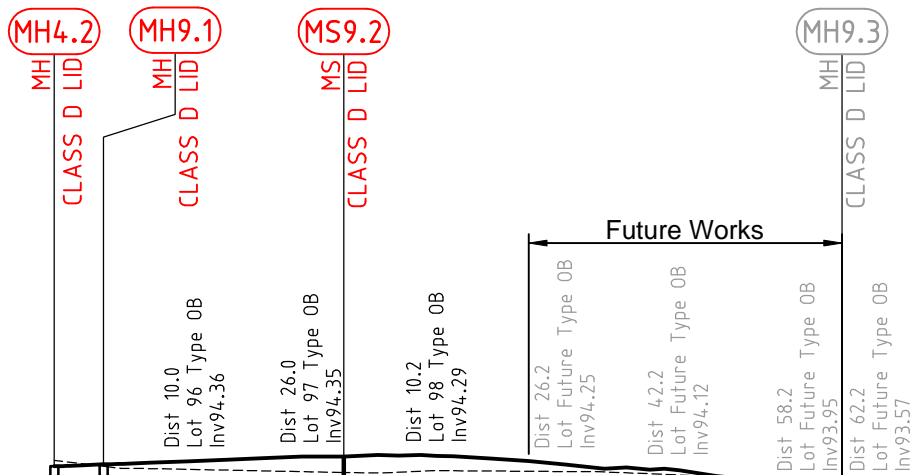
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 LTO Ref: -

Murray Shire Council - Moama

Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Sewer Longitudinal Sections 2

Council Ref:	Our Ref:	Version	Sheet
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Pipe Size (mm)  
Type  
Pipe Grade (1 in)  
Datum R.L.

Invert	91.744	91.824	91.857	91.887	92.046	92.046	92.35	92.375
Depth to Invert From FSL	3.90	3.82	3.82	3.79	3.73	3.73	2.97	2.97
Finished Surface	95.649		95.674		95.778		95.349	
Existing Surface	95.724		95.648		95.566		95.457	
Chainage	0.00	6.53	6.53	31.79	38.32		60.20	98.53
								104.23

Pipe Size (mm)  
Type  
Pipe Grade (1 in)  
Datum R.L.

Invert	92.487	92.517	92.653
Depth to Invert From FSL	2.43	2.40	2.53
Finished Surface	94.922		95.184
Existing Surface	94.508		94.593
Chainage	0.00	25.89	25.89

Pipe Size (mm)  
Type  
Pipe Grade (1 in)  
Datum R.L.

Invert	91.744	92.953	93.738	93.768	93.920
Depth to Invert From FSL	3.90	2.70	2.22	2.19	2.11
Finished Surface	95.649		95.954		96.026
Existing Surface	95.724		95.933		95.563
Chainage	0.00	78.43	78.43	79.78	93.68
				15.25	

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Designed G.McCoomb Sep 2016	Checked A.Mertens Sep 2016
Approved	

Notes/Legend	
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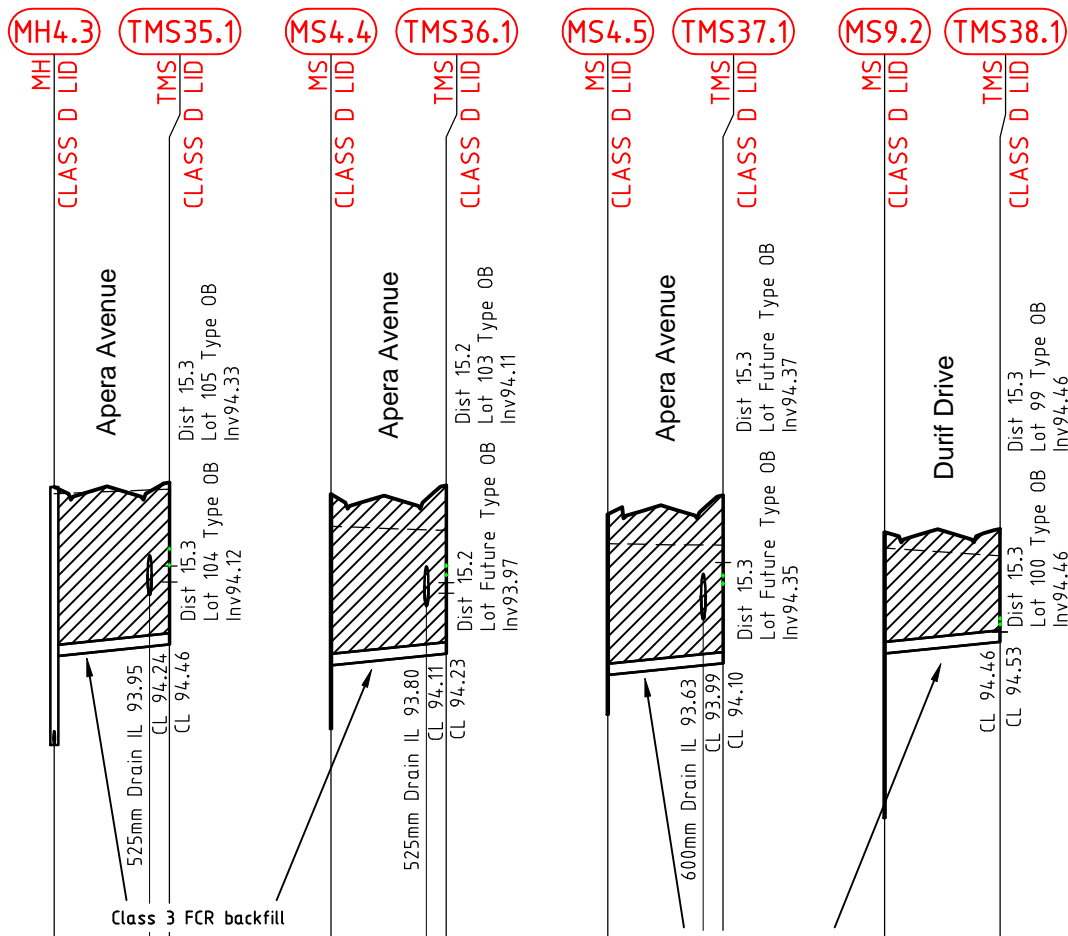
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Murray Shire Council - Moama  
Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Sewer Longitudinal Sections 3

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Pipe Size (mm)	150		
Type	PVC SN8		
Pipe Grade (1 in)	100.0		
(%)	1.000%		
Datum R.L.	84.0		
Invert	91.962	93.138	93.291
Depth to Invert From FSL	3.41	2.24	2.14
Finished Surface	95.374	95.435	
Existing Surface	95.284	95.344	
Chainage	0.00	15.25	15.25

	94.855	95.280	92.172
			3.11
			93.017
			2.26
			93.170
			2.22
	94.800	95.393	
			2.22
			93.170
			2.22
	94.624	95.012	92.365
			2.65
			92.889
			2.12
			93.041
			2.22
	94.605	95.264	
			2.22
			93.041
			2.22
	95.566	95.778	91.996
			3.78
			94.173
			1.61
			94.325
			1.49
	95.463	95.818	
			1.49
			94.325
			1.49

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	Sep 2016		Sep 2016
Approved			

Notes/Legend

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Murray Shire Council - Moama

Villawood Properties Pty Ltd  
Lakeview Estate - Stage 4  
Sewer Longitudinal Sections 4

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# WATER MAIN NOTES

1. Water Main offset to be 1.65m (Filtered) and 2.10m (Raw) unless shown otherwise.
2. All works are to be carried out in accordance with the current standard's of Murray Shire Council.
3. Contract is in accordance with AS2124-1992.
4. The Contractor must locate all services prior to works commencing.
5. All water service road crossings to be 32mm PN8 poly (if two properties being connected) or 25mm PN8 poly (if single property connected). Each service to be sleeved in 50mm Class 12 uPVC.
6. The Contractor must supply all assemblies, cast iron covers, surrounds and indicator posts for stop valves (SV) and hydrants (HYD).
7. All water mains to be RRJ PVC-M Series 1 Class 9 except under road pavement where Series 1 Class 12 is to be used.
8. Water tappings (Treated and Raw) including tapping saddles and 20mm dia. copper service connections, meter stop tap (treated) and ball valve quick action (raw) to be provided 1.0m within each lot. Tapping saddles are to be gunmetal style only. See Standard Drawing.
9. Water meter stop taps are to be installed on filtered water connections.
10. Ball valves quick action are to be installed on raw water connections
11. All stop valves are to be Anti Clockwise Closing (ACC).
12. All services to be installed to provide minimum cover to finished surface.
13. All road crossing trenches to be compacted to a minimum of 95% standard compaction ratio.
14. All road crossings for services to be backfilled with 3% stabilised FCR.

## Asset Recording Requirements

The contractor must record all construction details including offsets of mains and locations of fittings such as valves, tees fire plugs etc, and testing details, using appropriate "line sheets".

The information is to be provided to the supervising engineer in a suitable form to enable detailed "as constructed" plans to be produced. Line sheets are available from Terraco, or the contractor may use their own if approved by Terraco prior to works commencing.

The information is to be provided within 1 week of the completion of the works. Claims for payment for construction may be delayed until the line sheets have been received by the supervising engineer.

The following standard backfill requirements apply to all trenching works.

For PVC pipes:

- a) Minimum bedding sand under pipe - 75mm
- b) Minimum sand backfill above pipe - 100mm
- c) Minimum sand backfill either side of pipe - 100mm

For concrete pipes:

- a) Minimum bedding sand under pipe - 75mm
- b) Minimum sand backfill to string line.
- c) Minimum sand backfill either side of pipe - 100mm

Select backfill to 100mm above the pipe. Should the excavated material be unsuitable, sand backfill to be provided a minimum 100mm above the pipe.

## TOTAL WORK

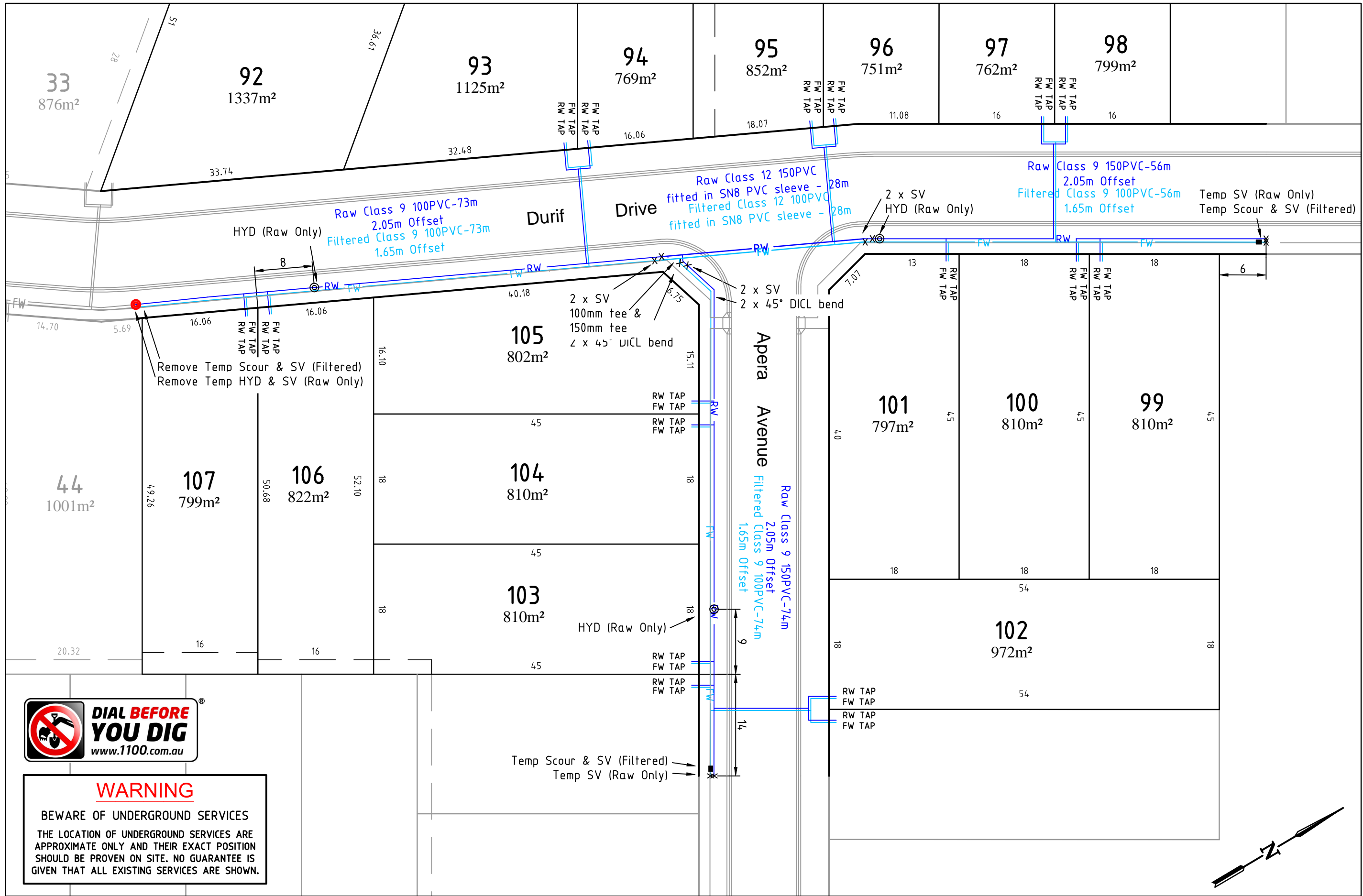
SIZE	TYPE	CLASS	LENGTH (m)
150mm	PVC-M	9	130
150mm	PVC-M	12	28
100mm	PVC-M	9	276
100mm	PVC-M	12	28

Street	Back of Kerb	Filt. Water	Raw Water	Gas	Power	Telstra	Sewer
Durif Drive	3.90	1.65 E	2.10 E	2.50 E	0.40 W	0.90 W	2.00 W
Apera Avenue	3.90	1.65 S	2.10 S	2.50 S	0.40 N	0.90 N	2.00 N
Lakeview Drive	4.90	2.90 E	3.30 E	3.80 E	0.40 W	0.90 W	2.40 W

## Service Offsets

6			Designed	Checked	Notes/Legend	 <b>TERRACO</b> Civil Engineers Project Managers Development Consultants	Terraco P/L ABN 12 681 695 776 Corner Jewell Court & Rowena Street Bendigo Vic 3550 Ph: 03 5442 5799 Fax: 03 5441 5506 E: info@terraco.com.au	No Scale  All lengths are in metres and all levels are to Australian Height Datum (Original Sheet Size is A3)	Murray Shire Council - Moama					
5			G.McCoomb	A.Mertens					Villawood Properties Pty Ltd					
4			Mar 2016	Mar 2016					Lakeview Estate - Stage 4					
3	Amend Sewer	22/08/2016	Approved						Water Notes					
2	Construction Issue	29/07/2016							Drawing file:	LTO Ref:	Council Ref:	Our Ref:	Version	Sheet
0	Draft	08/03/2016							16004 Water.dwg	-	DA 173/11	16004	3	29 of 30
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Designed G.McCoomb Mar 2016	Checked A.Mertens Mar 2016
Approved	

Notes/Legend	
:FILTERED	—
:RAW	—
:S.V.	X
:F.P.	•
:FERRULE	—
:SCOUR	—

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Murray Shire Council - Moama  
 Villawood Properties Pty Ltd  
 Lakeview Estate - Stage 4  
 Water Plan

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