Barrenjoey Consulting Engineers pty ltd
Stormwater Structural Civil
abn 13124694917 acn 124694917

OVERLAND FLOW INVESTIGATION & REPORT PROPOSED MIXED USE DEVELOPMENT 1010 – 1014 PITTWATER RD COLLAROY

Image - Gartner Trovato Architects

Job No 240403
April 2024
Prepared by
Lucas Molloy
MIEAust / CPEng / NER /

CONTENTS

1. INTRODUCTION

In association with the proposed shop top housing development at Nos 1010 – 1014 Pittwater Rd Collaroy (DA 2023 / 1395), Barrenjoey Consulting Engineers pty ltd have been commissioned to investigate the possible effects of overland flow (along Pittwater Rd) from localised stormwater runoff on the development.

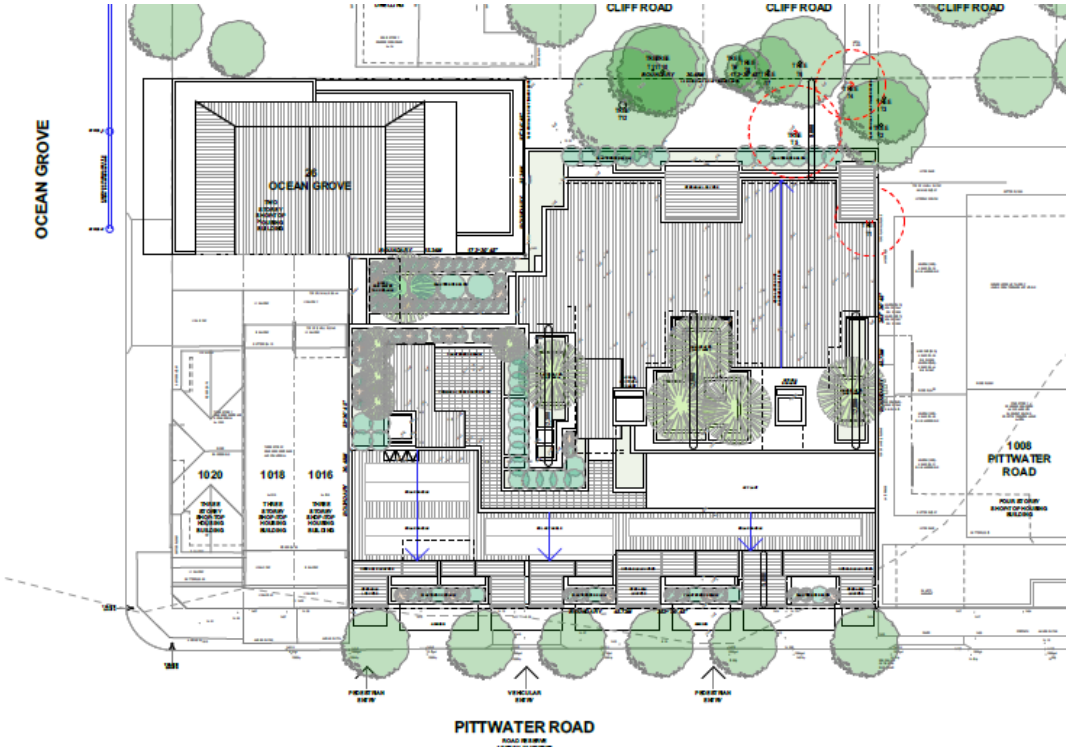
Barrenjoey Consulting Engineers pty ltd inspected the site and surrounding stormwater management infrastructure on Friday 5th April 2024.

This investigation and report has been prepared in respect to Northern Beaches Councils Engineering Referral Response Officer comments (dated 28/11/2023) –

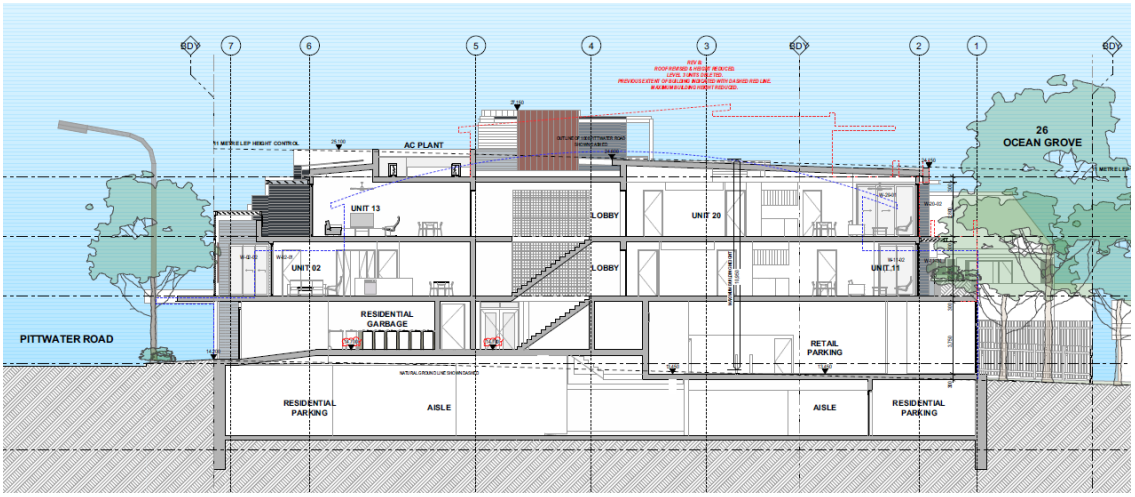
"The subject site may be affected by overland flows along Pittwater Road in the 1% AEP storm event, which may enter the basement via the proposed driveway. In this regard, the applicant's Engineer is to provide an overland flow report for all storms in excess of the 5% AEP, up to and including the 1% AEP storm event to determine if the subject site is affected by any overland flows. The report is to include measures to protect the site from flooding in accordance with the requirements of the Flood Prone Land clause of the DCP."

Aerial Image of No 1010 - 1014 Pittwater Rd Collaroy
(Northern Beaches Council web site)

The proposed development (refer architectural plans by Gartner Trovato Architects) consists of basement car parking, ground / street level commercial premises and two storeys of residential units.



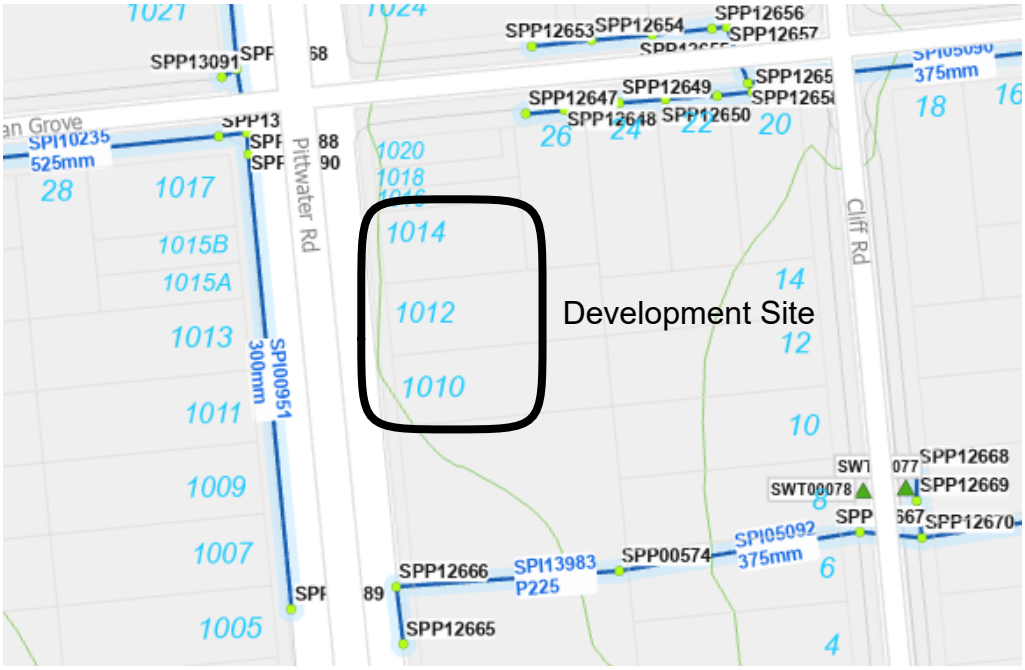
Development Site Plan
(Gartner Trovato Architects)



Development Section
(Gartner Trovato Architects)

2. INVESTIGATION

The development site is located on the eastern side of Pittwater Rd Collaroy, conventional stormwater management systems (road kerb / gutter, inlet pits and pipes) collect and direct runoff adjacent to the site.



Local stormwater infrastructure
(Northern Beaches Council web site)

Stormwater runoff generated on the eastern lanes (south bound) of Pittwater Rd will be collected by the kerb / gutter, flow to the inlet pits SPP12665 / SPP12666 (and the pipe system through to Cliff Rd). Runoff surcharging the pits SPP12665 / SPP12666 will continue along Pittwater Rd past the site, these flows are those to be quantified and addressed within this Report. Noting conservative analysis has excluded the expected “leakage’ of overland flows through Nos 1000- 1008 (ie driveway / basement / lobby areas).

Pittwater Rd eastern lanes kerb / gutter (Barrenjoey Consulting Engineers pty ltd)

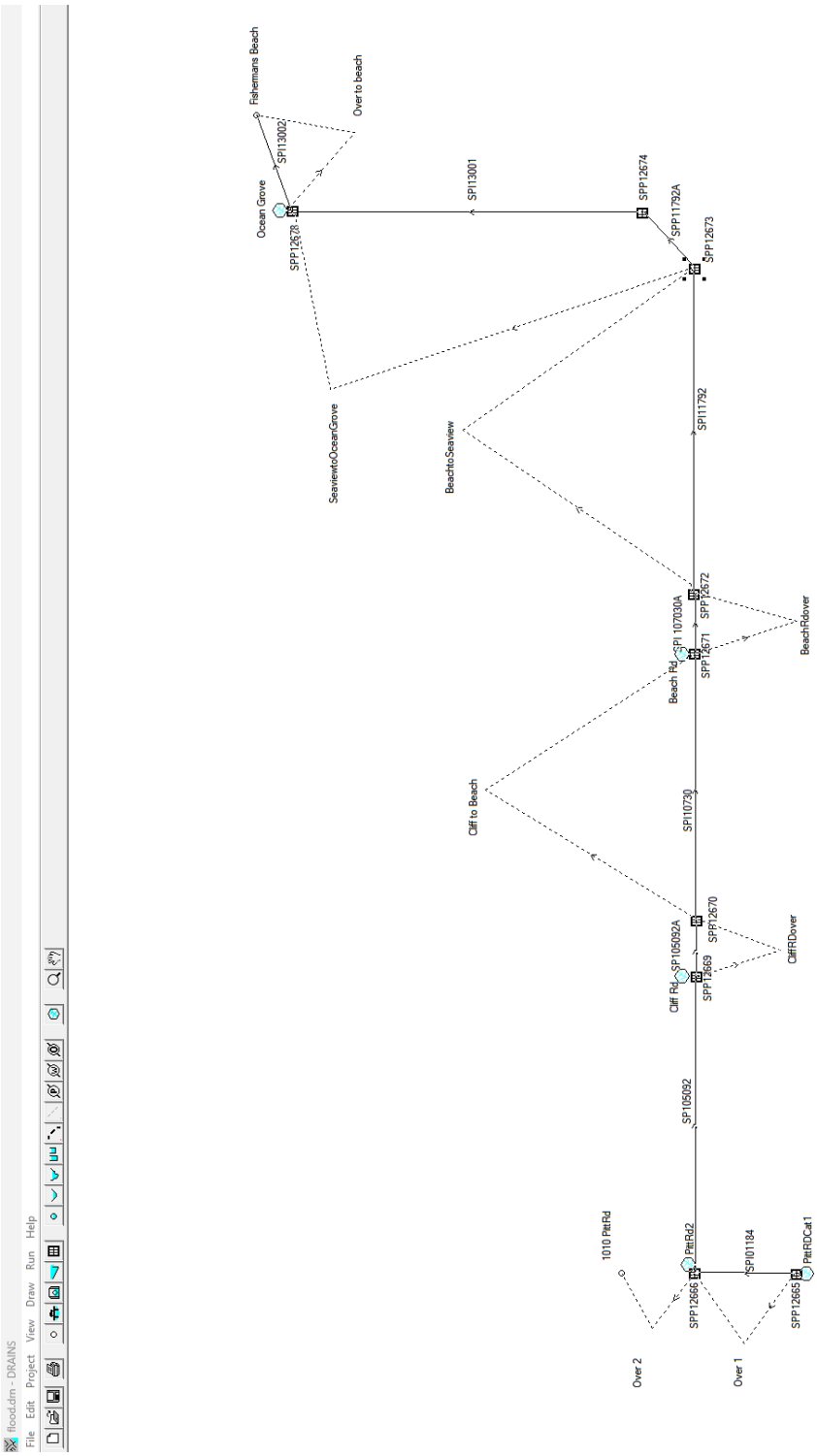
Noting runoff and overland flows generated by the larger surrounding / uphill catchments will be directed along the western side of Pittwater Rd, down Ocean Grove (to the north) and Anzac Ave (to the south), as observed during a significant rain event on 5th April 2024.

Surrounding / uphill catchment + associated indicative overland flow paths
(Northern Beaches Council web site / Barrenjoey Consulting Engineers pty ltd)

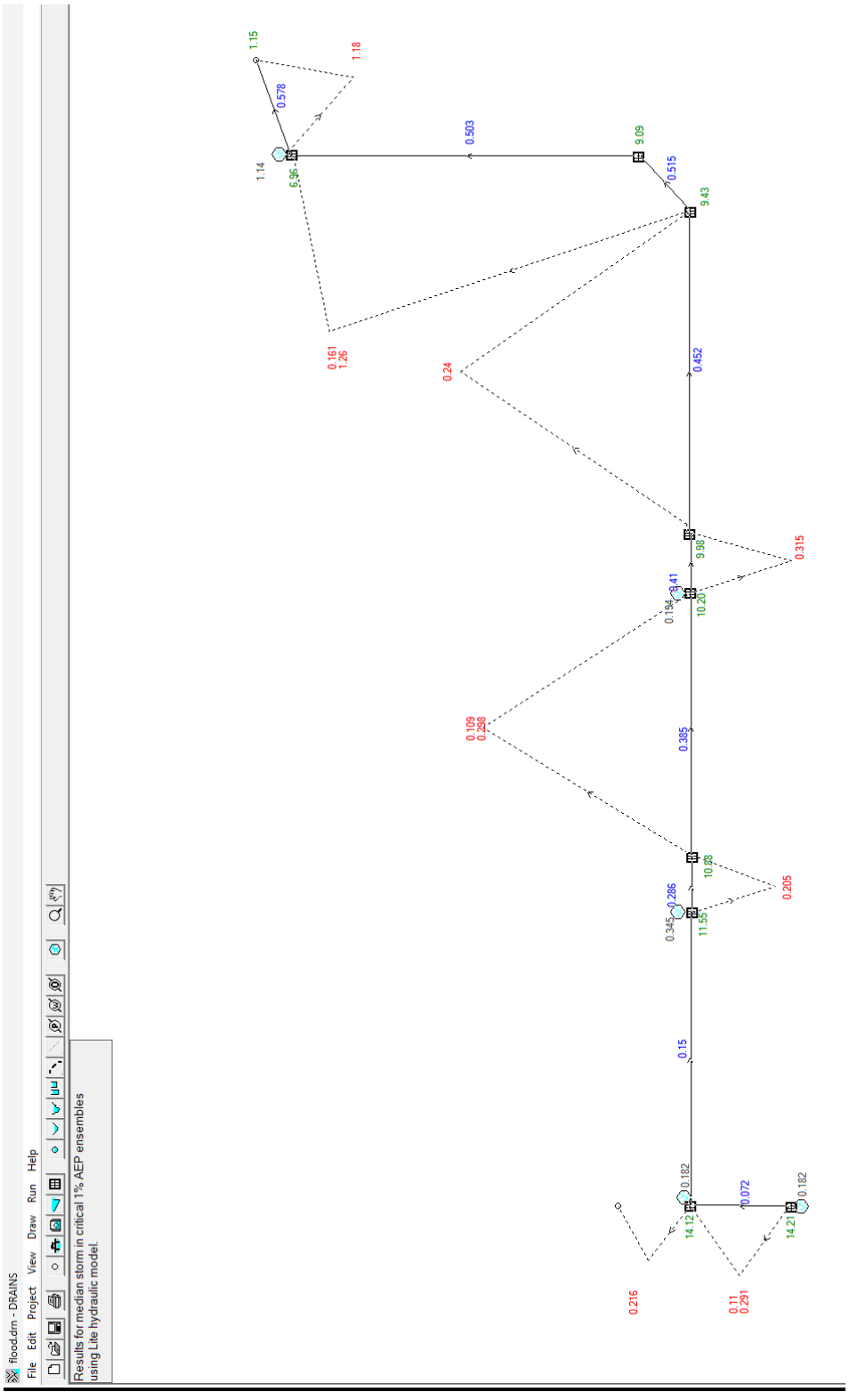
Pittwater Rd western lanes, note median strip directing uphill catchment overland flows to Ocean Grove
(Barrenjoey Consulting Engineers pty ltd)

3. CALCULATIONS

DRAINS model of catchment and infrastructure -



DRAINS 1% AEP event analysis of catchment and infrastructure -



Note – 1% AEP event overflow adjacent to development site **<u>216 l/s</u>**

MANNINGs analysis of Pittwater Rd adjacent to development site –

Sheet1

MANNINGS CROSS - SECTION ANALYSIS

Site Address 1010 Pittwater Rd Collaroy
Job No 240403
Section location 1010 Pittwater Rd
Design Flowrate Road Capacity to Boundary

SECTION 1 - gutter

Floodpath slope	0.002	Edge slopes		Datum	13.960	TWL 14.100
Mannings No	0.015	s'	0.05			
Breadth	0.30	s"	1000			
Increments	0.01					

Depth	b'	z'	b"	z"	Area	Perimeter	Radius	Q	V	LSV
0.130	2.600	2.603	0.000	0.130	0.208	3.033	0.069	0.104	0.500	0.065
0.140	2.800	2.803	0.000	0.140	0.238	3.243	0.073	0.124	0.523	0.073
0.150	3.000	3.004	0.000	0.150	0.270	3.454	0.078	0.147	0.545	0.082

SECTION 2 - above kerb to boundary

Floodpath slope	0.002	Edge slopes		Datum	14.100	TWL 14.140
Mannings No	0.015	s'	0.05			
Breadth	6.3	s"	1000			
Increments	0.01					

Depth	b'	z'	b"	z"	Area	Perimeter	Radius	Q	V	LSV
0.030	0.600	0.601	0.000	0.030	0.198	6.931	0.029	0.055	0.279	0.008
0.040	0.800	0.801	0.000	0.040	0.268	7.141	0.038	0.090	0.334	0.013
0.050	1.000	1.001	0.000	0.050	0.340	7.351	0.046	0.131	0.384	0.019

SECTION 3 - above section 2

Floodpath slope	0.002	Edge slopes		Datum	14.140	TWL 14.150
Mannings No	0.015	s'	0.05			
Breadth	7	s"	1000			
Increments	0.01					

Depth	b'	z'	b"	z"	Area	Perimeter	Radius	Q	V	LSV
0.000	0.000	0.000	0.000	0.000	0.000	7.000	0.000	0.000	#DIV/0!	#DIV/0!
0.010	0.200	0.200	0.000	0.010	0.071	7.210	0.010	0.010	0.137	0.001
0.020	0.400	0.400	0.000	0.020	0.144	7.420	0.019	0.031	0.215	0.004

1% AEP event flow	224	l/s
Depth of Flow	0.190	m
TWL	14.150	

Page 1

Note - 1% AEP event predicted TWL **14.150m** AHD

4. CONCLUSION

1% AEP event overland flow adjacent to the development site-

Catchment	**5000m²** (Eastern lanes of Pittwater Rd + Nos 996 – 1014 Pittwater Rd)
Flowrate	**216 l/s**
Depth of Flow	**190mm**
TWL	**14.150m AHD**
FPL	**14.650m AHD (inc 500mm freeboard)**
Warringah Development Control Plan Part E The Natural Environment E11 Flood Prone Land Section D6 Carparking	**All enclosed car parks (including basement carparks) must be protected from inundation up to the Flood Planning Level. All access, ventilation, driveway crests and any other potential water entry points to any enclosed car parking shall be above the Flood Planning Level (ie 14.650m AHD).**

5. SUMMARY

The development is to ensure the following areas are at or above RL 14.650m AHD -

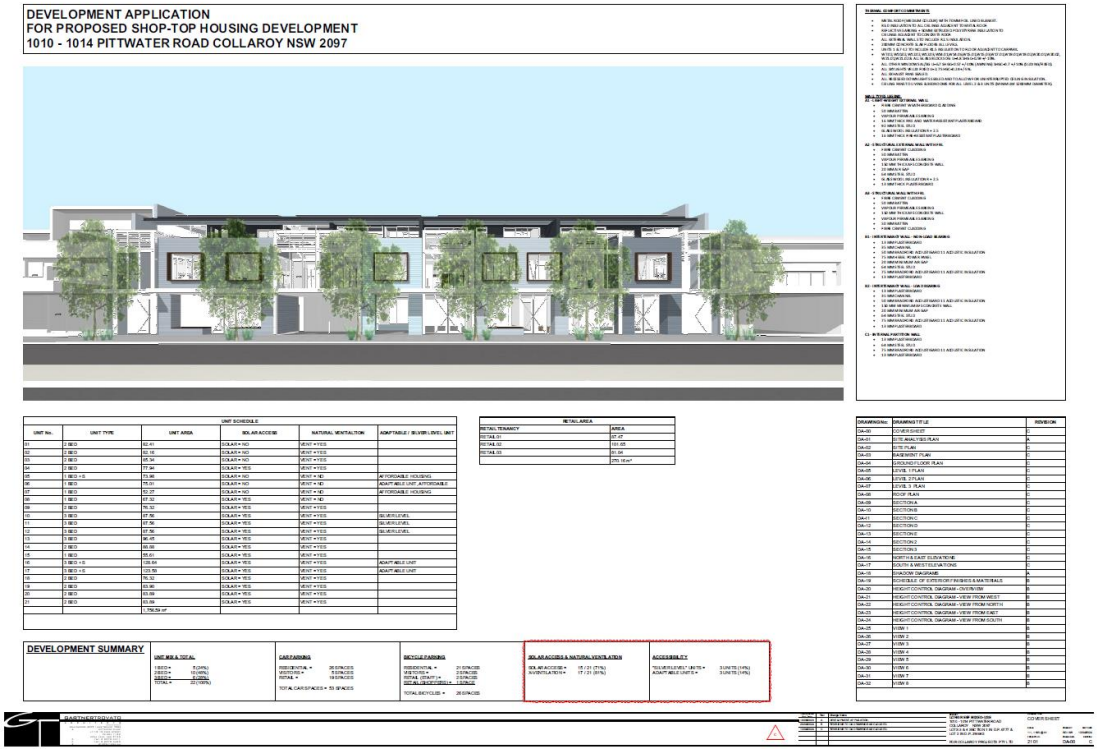
Entry driveway
Lobby area adjacent to Lifts
Basement access stair
Ventilation grills or such that front Pittwater Rd
Any other potential water entry points that front Pittwater Rd

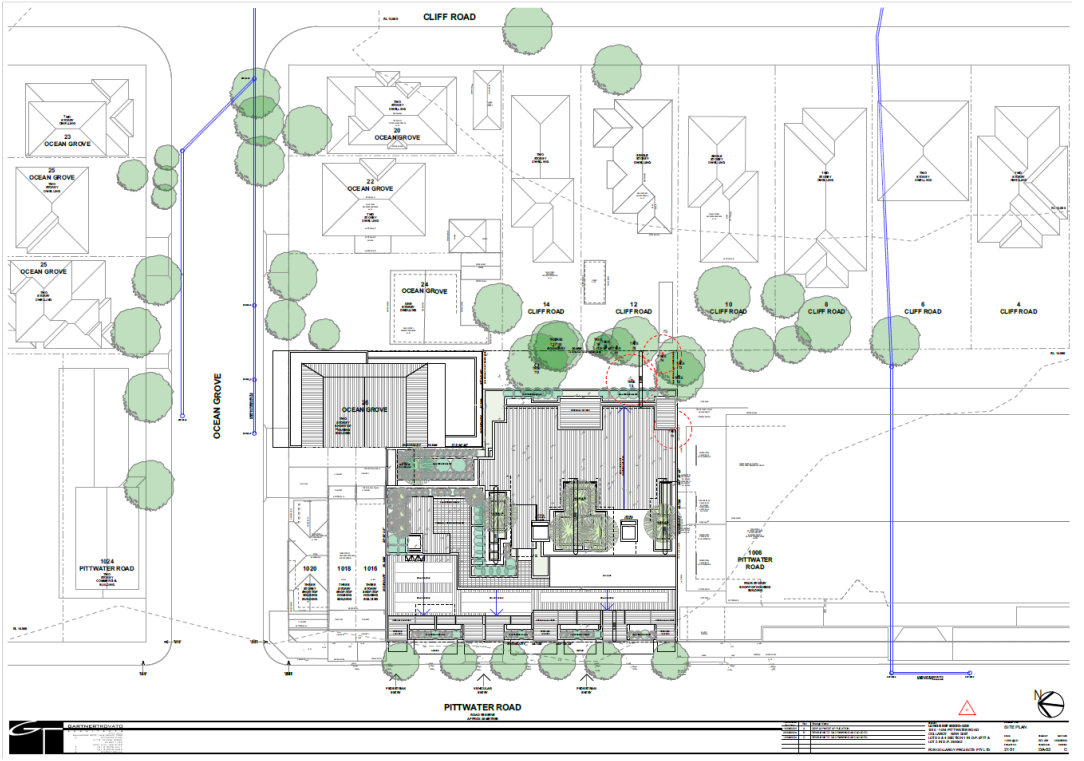
The development is to adhere to the recommendations within this Report and will therefore satisfy Northern Beaches Councils Engineering Referral Response Officer comments (dated 28/11/2023) in that the overland flows (in the 1% AEP storm event) long Pittwater Rd have been identified and adequate freeboard (500mm) is to be incorporated into the development to ensure these flows will not enter the basement via the proposed driveway.
It is to be noted that, due to the many complex factors that can affect a site, the subjective nature of a risk analysis, and the imprecise nature of the science of flood analysis, the risk of persons being injured, to life and property cannot be completely removed. The recommendations within this Report do not remove the risk associated with the predicted flooding event, though lower those risks to an acceptable level reasonably anticipated by the community in everyday life.

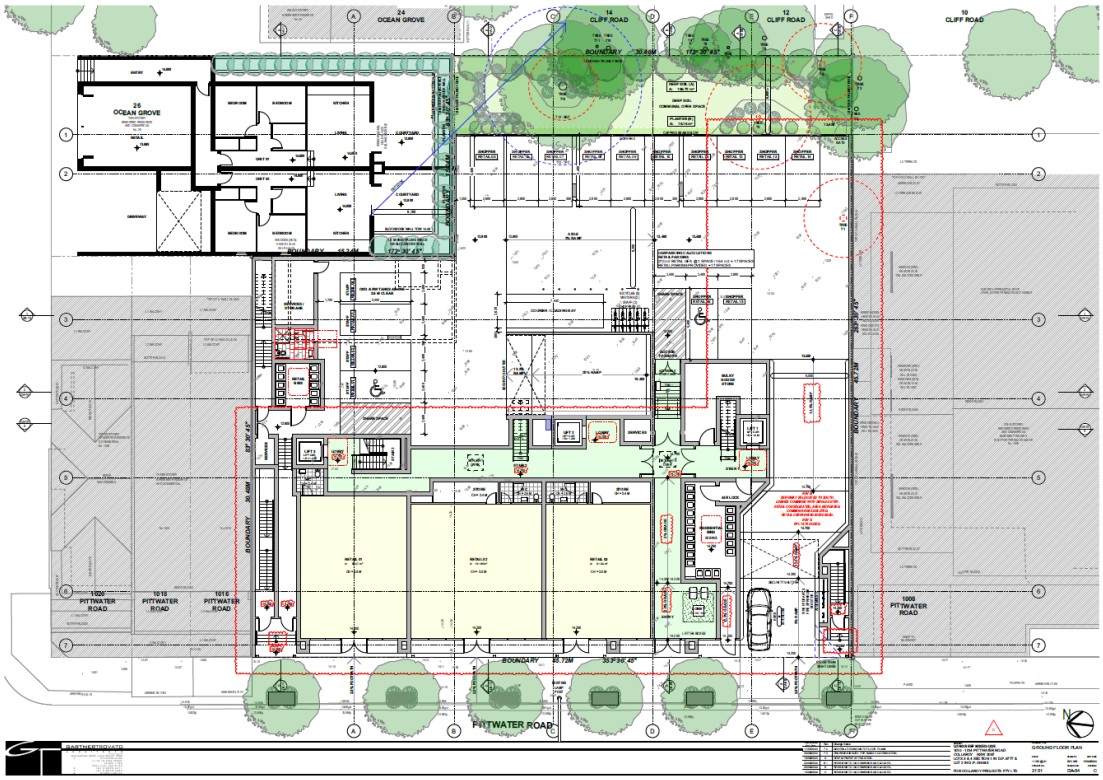
Regards
BARRENJOEY CONSULTING ENGINEERS pty ltd
Per Lucas Molloy (Director)
MIEAust / CPEng / NER /APEC / Engineer / IntPE(Aus)

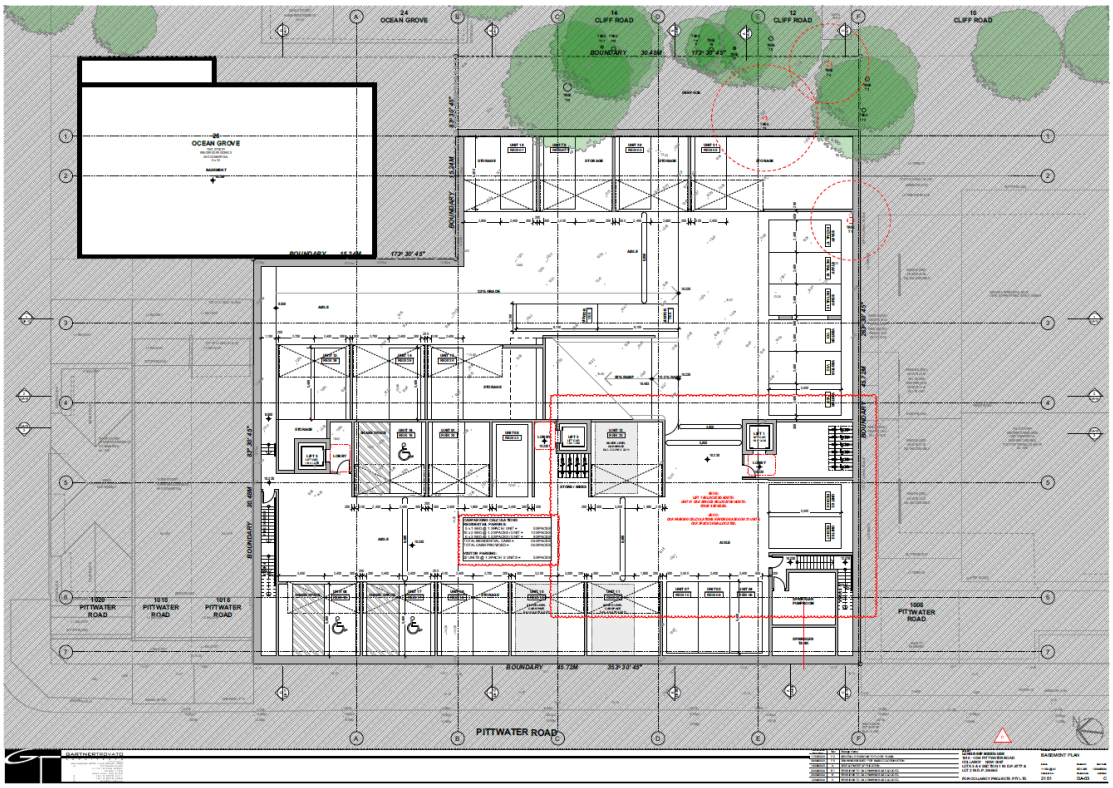
Appendix A

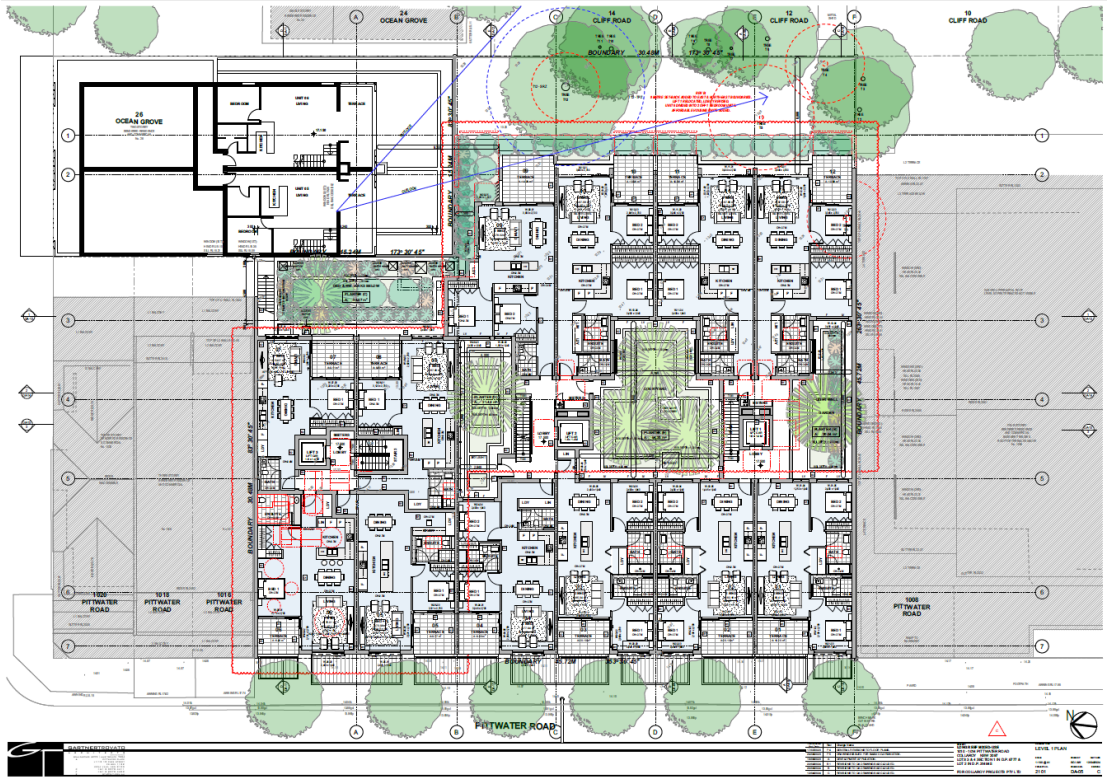
Architectural plans
Gartner Trovato Architects

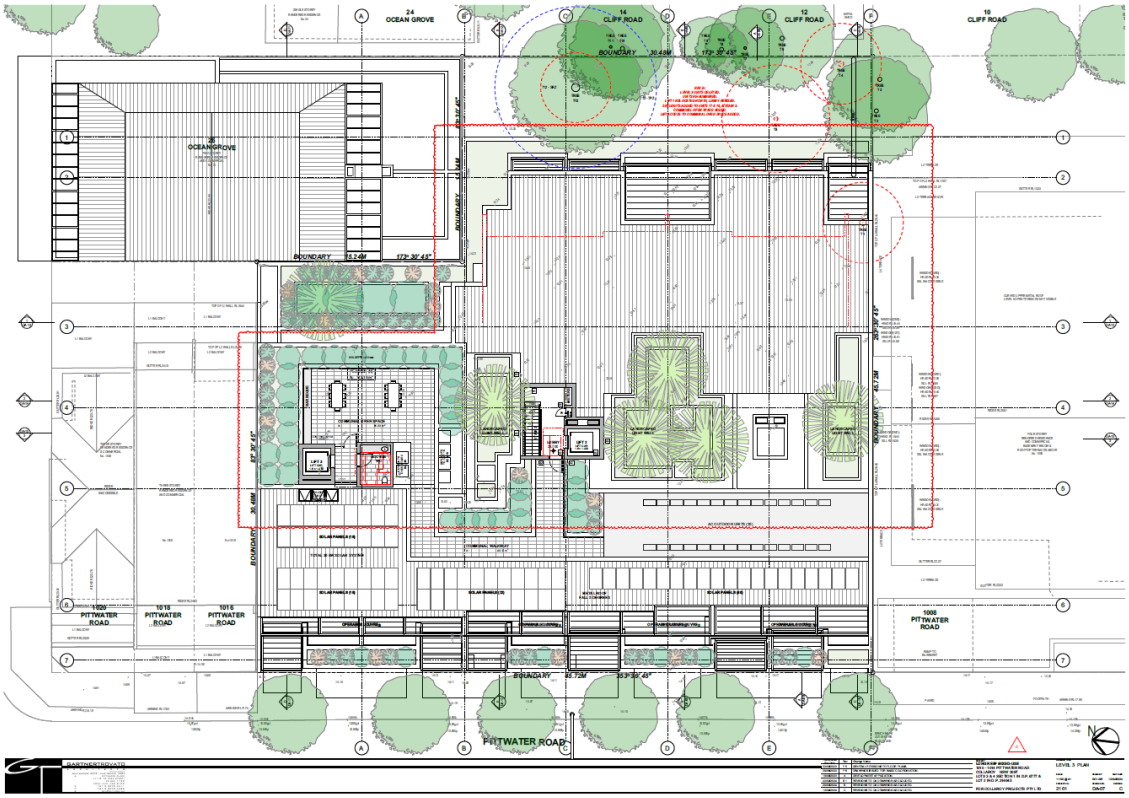

DEVELOPMENT APPLICATION
FOR PROPOSED SHOP-TOP HOUSING DEVELOPMENT
1010 - 1014 PITTWATER ROAD COLLAROY NSW 2097
UNIT SCHEDULE
RETAIL AREA
DEVELOPMENT SUMMARY


CLIFF ROAD
OCEAN GROVE
PITTWATER ROAD
1006 PITTWATER ROAD
1024 PITTWATER ROAD


24 OCEAN GROVE
14 CLIFF ROAD
12 CLIFF ROAD
10 CLIFF ROAD
26 OCEAN GROVE
1020 PITTWATER ROAD
1018 PITTWATER ROAD
1016 PITTWATER ROAD
1006 PITTWATER ROAD
PITTWATER ROAD
BOUNDARY


24 OCEAN GROVE
14 CLIFF ROAD
12 CLIFF ROAD
10 CLIFF ROAD
26 OCEAN GROVE
1020 PITTWATER ROAD
1018 PITTWATER ROAD
1016 PITTWATER ROAD
1006 PITTWATER ROAD
PITTWATER ROAD
BOUNDARY


24 OCEAN GROVE
14 CLIFF ROAD
12 CLIFF ROAD
10 CLIFF ROAD
26 OCEAN GROVE
1020 PITTWATER ROAD
1018 PITTWATER ROAD
1016 PITTWATER ROAD
1008 PITTWATER ROAD
PITTWATER ROAD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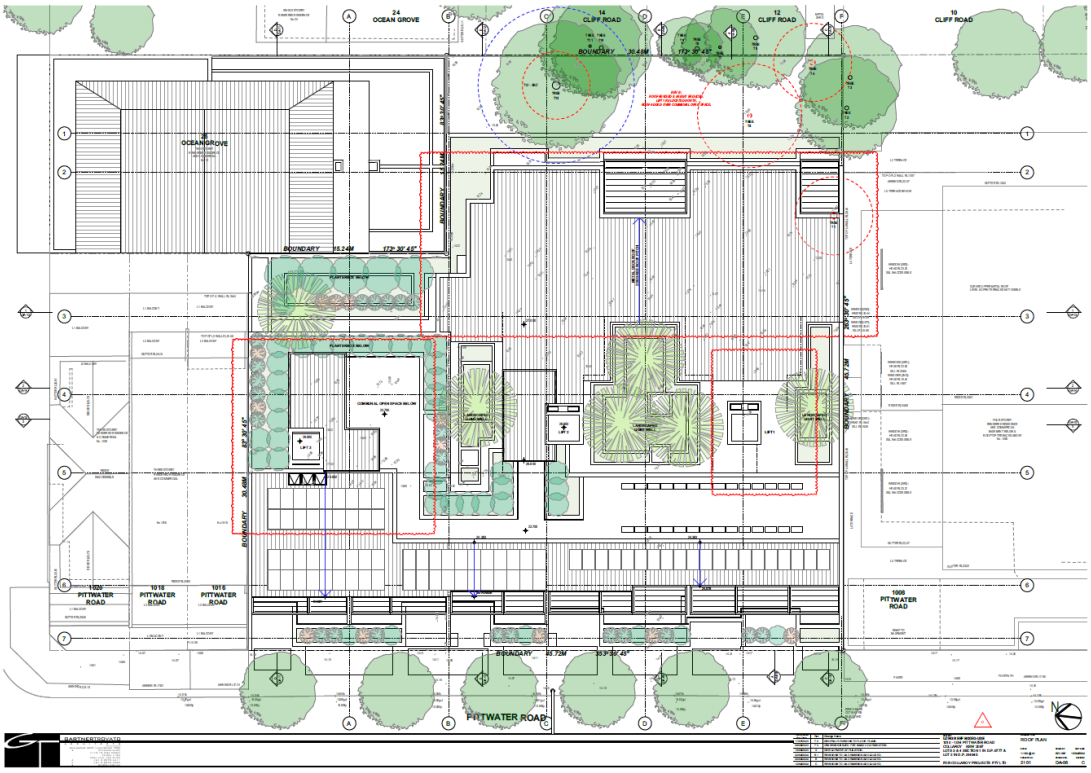
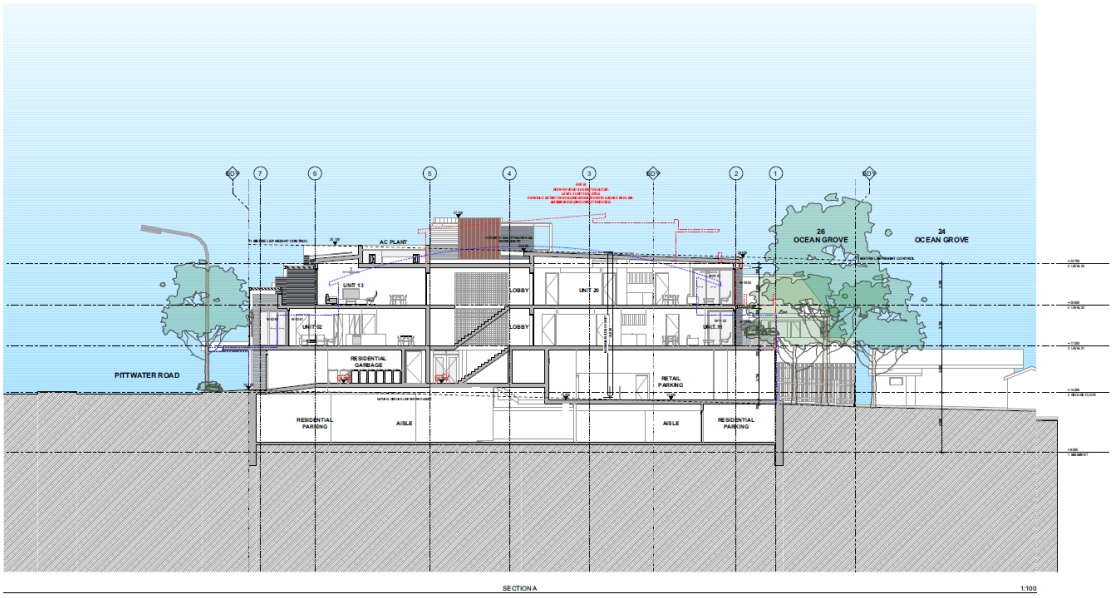
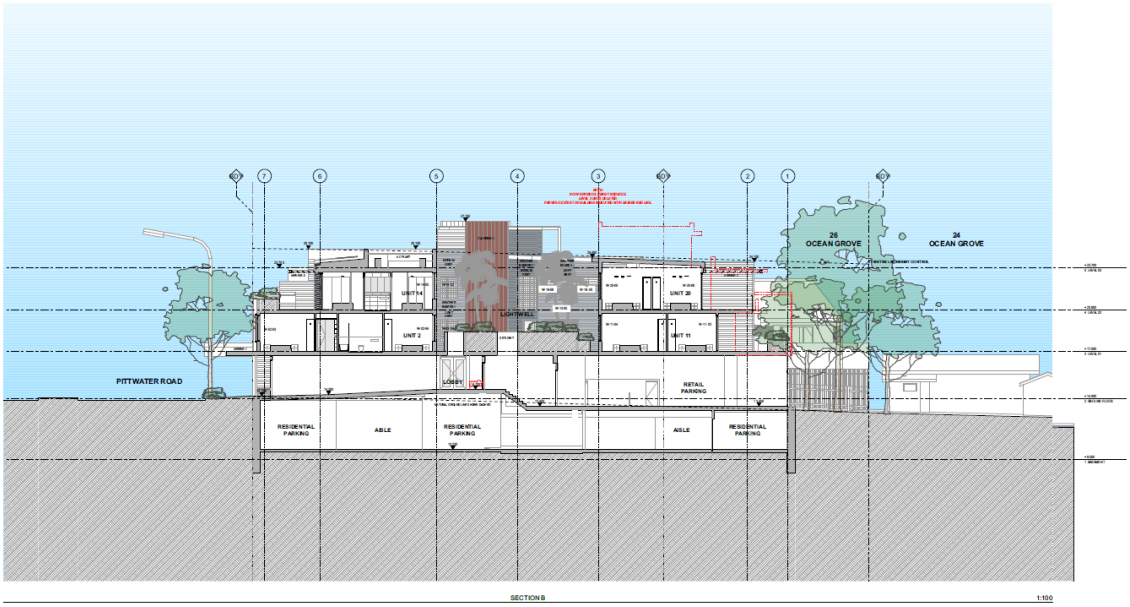
14 CLIFF ROAD
12 CLIFF ROAD
10 CLIFF ROAD
OCEANGROVE
1020 PITTWATER ROAD
1018 PITTWATER ROAD
1016 PITTWATER ROAD
1008 PITTWATER ROAD
PITTWATER ROAD





SECTION A 1:100



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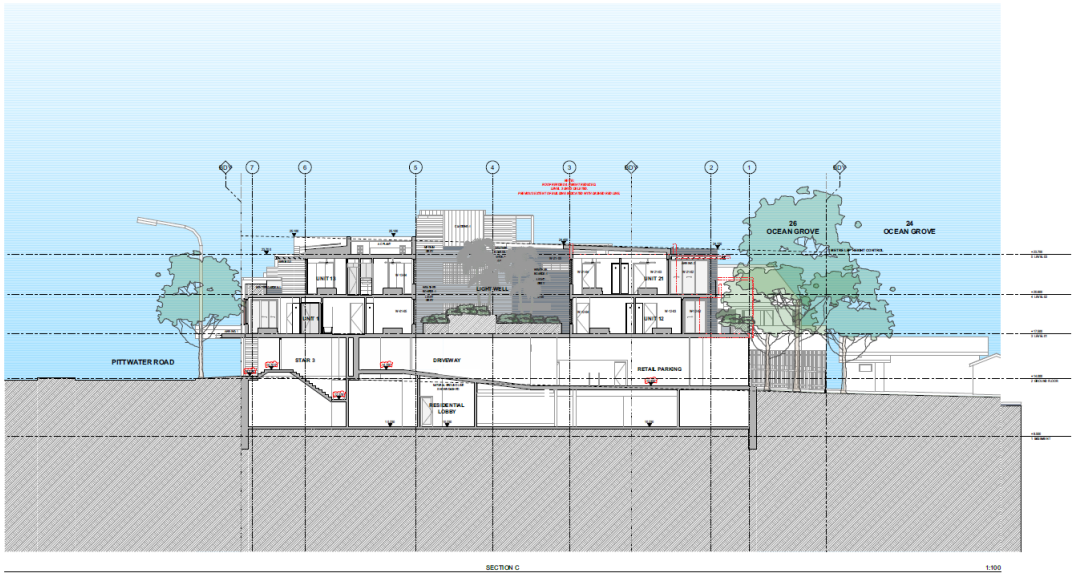

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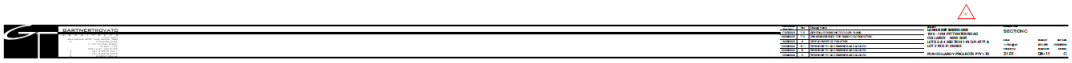
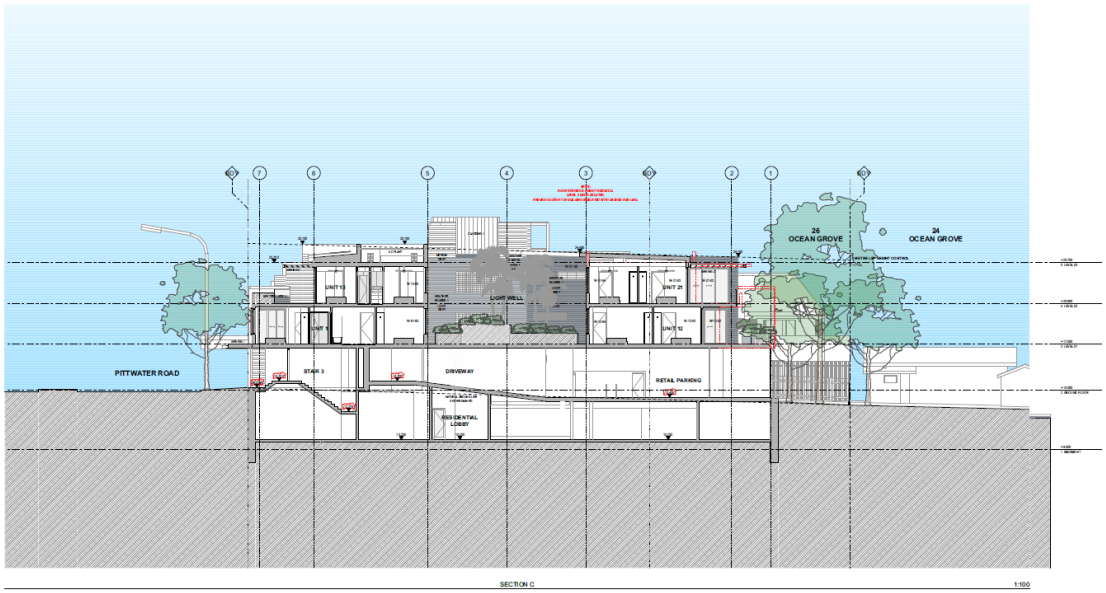
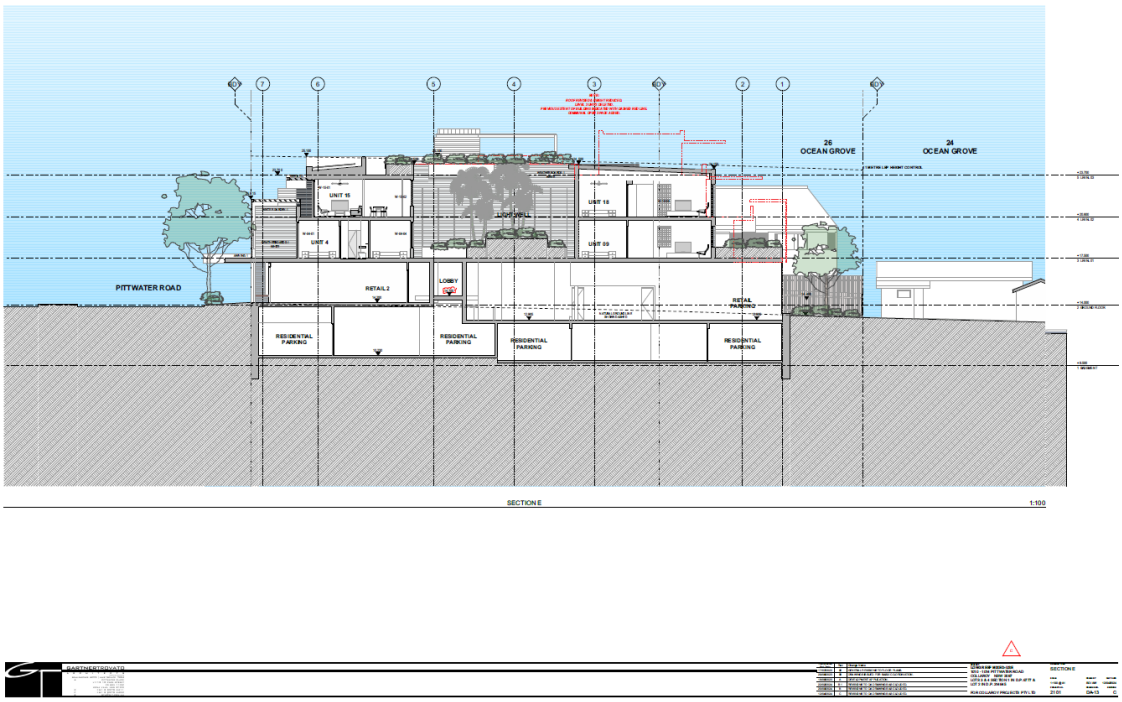



26
OCEAN GROVE
24
OCEAN GROVE
PITTWATER ROAD
STAIR 3
DRIVEWAY
RESIDENTIAL LOBBY
RETAIL PARKING
SECTION C
1:100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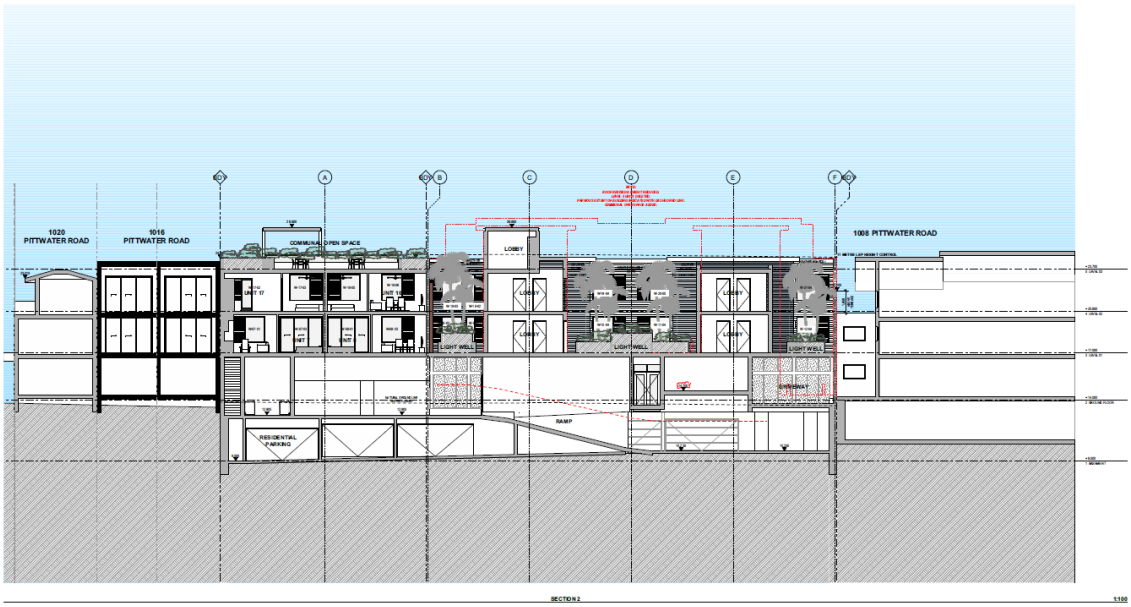
OCEAN GROVE
24
OCEAN GROVE
PITTWATER ROAD
RETAIL 2
LOBBY
RESIDENTIAL PARKING
RETAIL PARKING
SECTION E
1:100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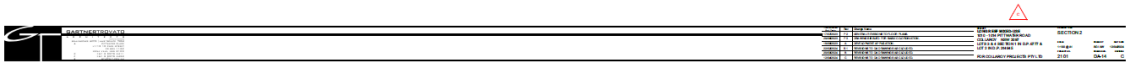
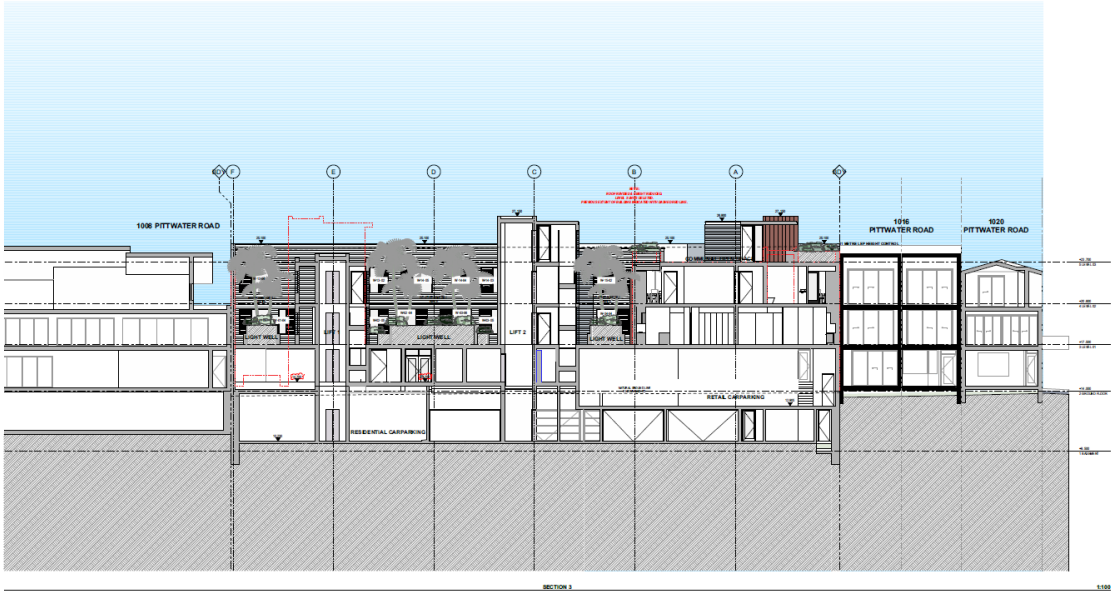
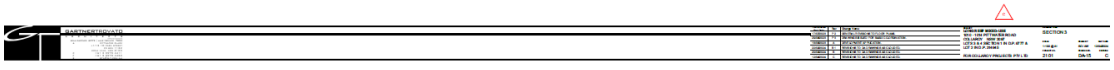
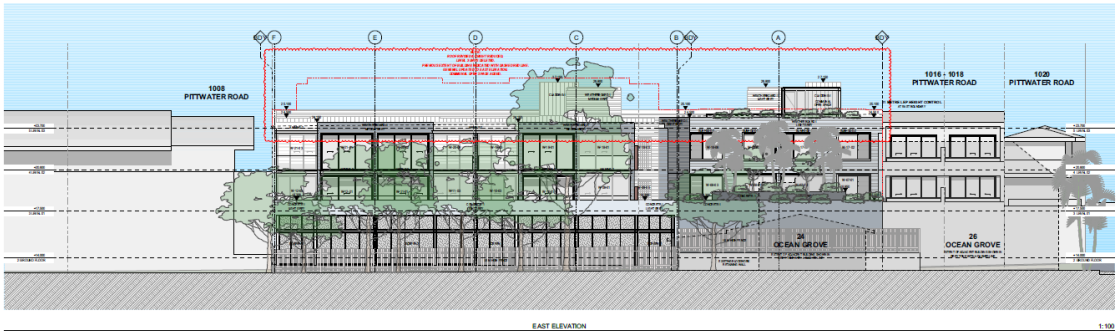
PITTWATER ROAD
1016
PITTWATER ROAD
1008 PITTWATER ROAD
COMMUNAL OPEN SPACE
LOBBY
LIGHT WELL
RAMP
RESIDENTIAL
PARKING
SECTION 2

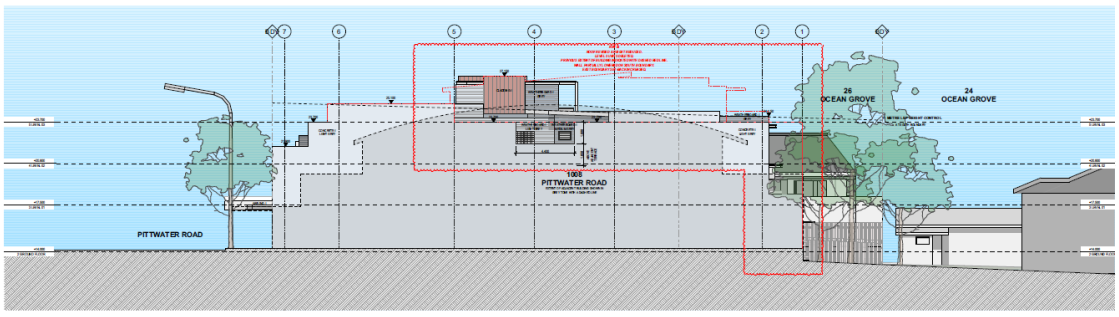



1008 PITTWATER ROAD
1016
PITTWATER ROAD
1020
PITTWATER ROAD
LIGHT WELL
LIFT 2
RETAIL CARPARKING
RESIDENTIAL CARPARKING
SECTION 3

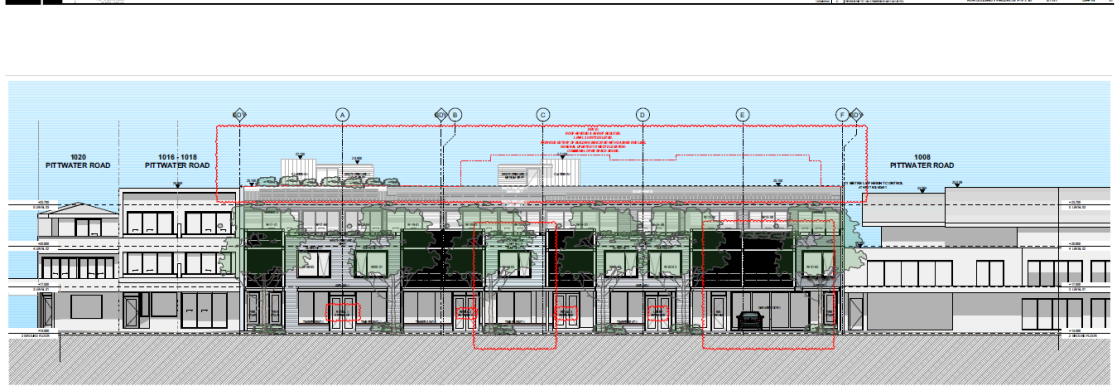




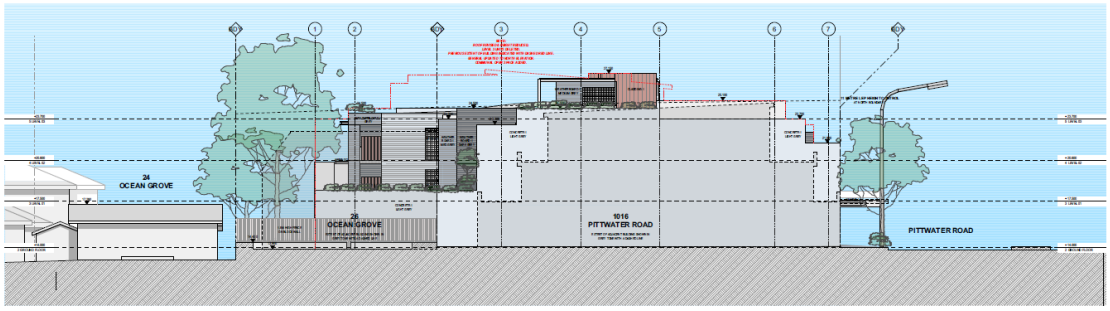
EAST ELEVATION 1:100



SOUTH ELEVATION 1:100



WEST ELEVATION 1:100



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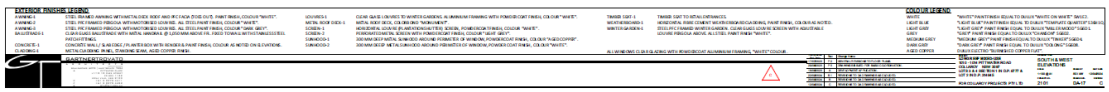
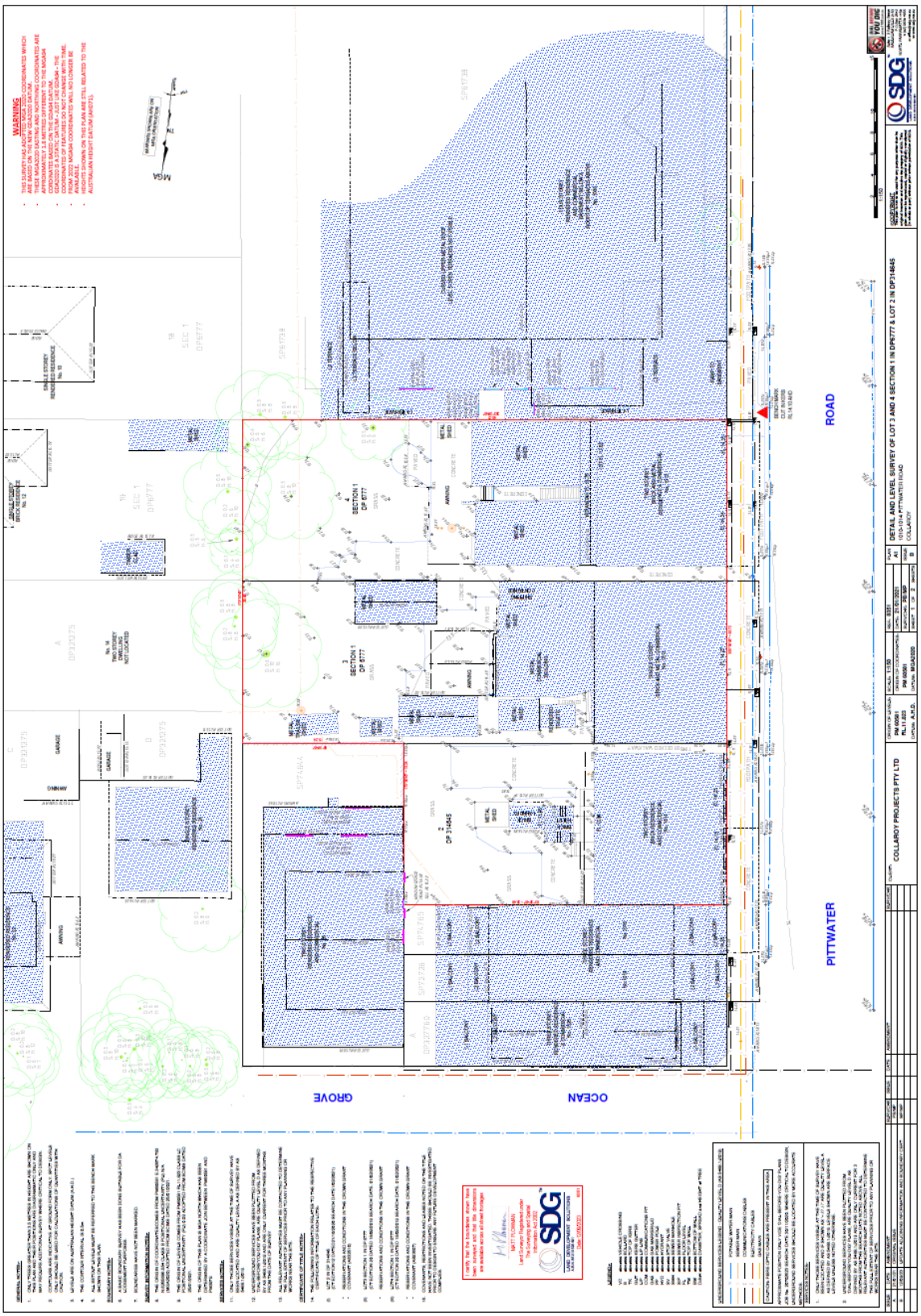
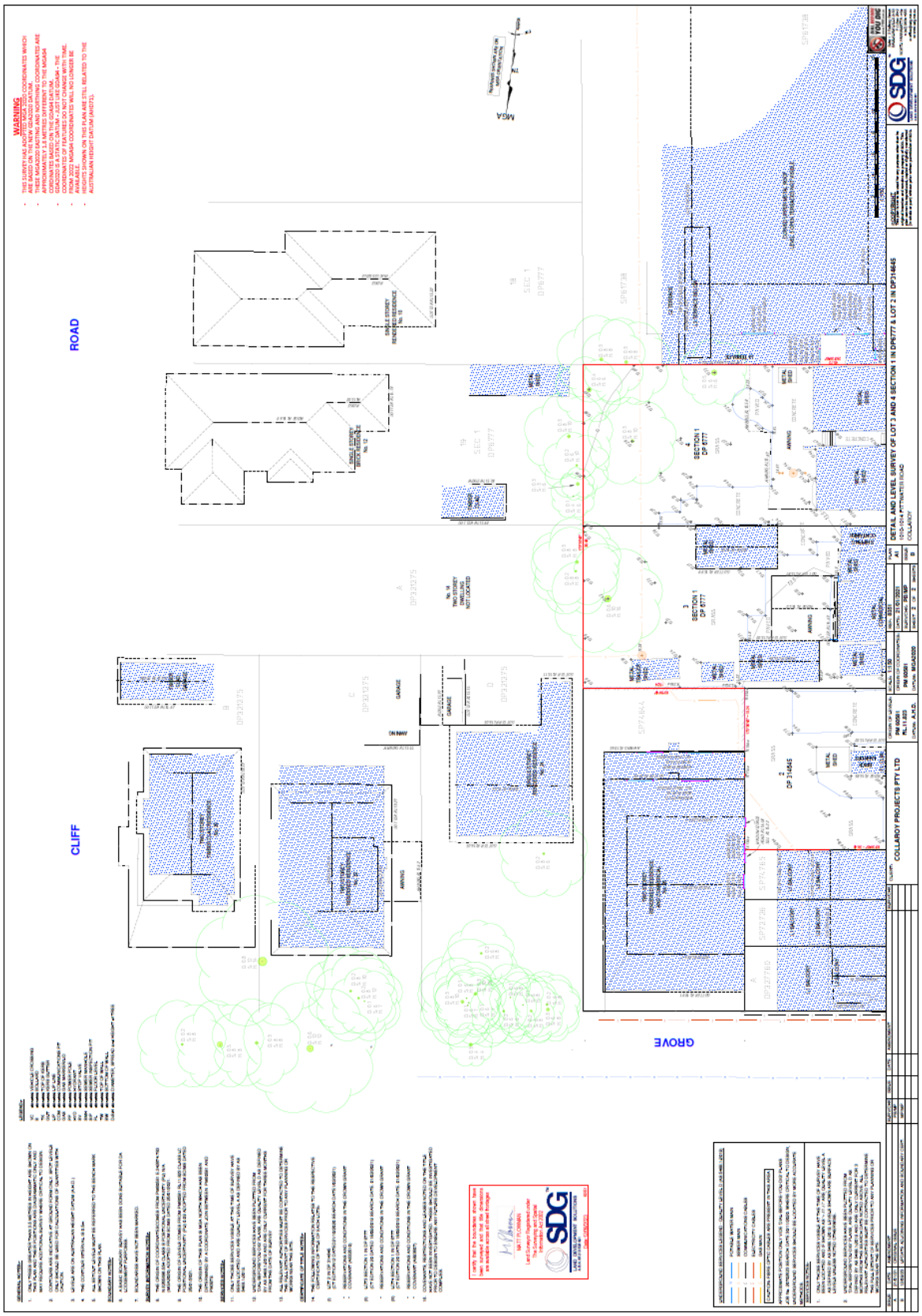


Appendix B

Site Survey
SDG Land Development Solutions
REF 8351


WARNING
ROAD
PITTWATER
OCEAN
GROVE
COLLAROY PROJECTS PTY LTD
DETAIL AND LEVEL SURVEY OF LOT 3 AND 4 SECTION 1 IN DP6777 & LOT 2 IN DP314645
SDG


ROAD
CLIFF
GROVE
DETAIL AND LEVEL SURVEY OF LOT 3 AND 4 SECTION 1 IN DP5777 & LOT 2 IN DP314645
COLLAROY PROJECTS PTY LTD

Appendix C

***DRAINS* data**

Barrenjoey Consulting Engineer pty ltd

PIT / NODE DETAILS Version 15

Name	Type	Family	Size	Ponding	Pressure	Surface	Max Pond	Base	Blocking	x	y	Bolt-down	id
	Part Full	Inflow	Pit is	Internal	Inflow is	Minor Safe	Major Safe						
				Volume	Change	Elev (m)	Depth (m)	Inflow	Factor			lid	
	Shock Loss	Hydrograph		Width	Misaligned	Pond Depth	Pond Depth						
				(cu.m)	Coeff. Ku			(cu.m/s)					
			(mm)		(m)	(m)							
SPP12665	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	14.4		0	0.5	17.544	-28.834
	No	36717357	1 x Ku	No	New								
SPP12666	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	14.35		0	0.5	17.669	-20.770
	No	36717358	1 x Ku	No	New								
SPP12669	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	11.7		0	0	41.201	-20.853
	No	36717359	1 x Ku	No	New								
SPP12670	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	11.6		0	0	45.646	-20.853
	No	36717360	1 x Ku	No	New								
SPP12671	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	10.20		0	0.5	66.871	-20.710
	No	37524143	1 x Ku	No	New								
SPP12672	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	10.00		0	0.5	71.603	-20.638
	No	37524144	1 x Ku	No	New								
SPP12673	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	9.80		0	0.5	97.488	-20.710
	No	37524169	1 x Ku	No	New								
SPP12674	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	9.8		0	0.5	101.934	-16.551
	No	37524170	1 x Ku	No	New								
SPP12678	OnGrade	NSW RTA Pits - 1% slope		SA1 (Type 2) - 1%	longitudinal slope		1.5	8		0	0.5	102.077	11.270
	No	37524171	1 x Ku	No	New								
Fishermans Beach	Node					1		0		109.677	14.138		36717373
	No												
1010 PittRd	Node					14.1		0		17.627	-14.919		36717439
	No												

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL
	Crest Length(m)	id											

SUB-CATCHMENT DETAILS

Name	Pit or	Total	Paved	Grass	Supp	Paved	Grass	Supp	Paved	Grass	Supp	Paved	Grass
	Supp	Paved	Grass	Supp	Lag Time	Gutter	Gutter	Gutter	Rainfall				
	Node	Area	Area	Area	Area	Time	Time	Time	Length	Length	Length	Slope(%)	Slope
	Slope	Rough	Rough	Rough	or Factor	Length	Slope	FlowFactor	Multiplier				
		(ha)	%	%	%	(min)	(min)	(min)	(m)	(m)	(m)	%	%
	%					(m)	%						
PittRDCat1	SPP12665	0.2500	100.0	0.0	0.0	1	0	0					
				0				1					
PittRd2	SPP12666	0.2500	100.0	0.0	0.0	1	0	0					
				0				1					
Cliff Rd	SPP12669	0.8000	50.0	50.0	0.0	5	15	0					
				0				1					
Beach Rd	SPP12671	0.4500	50.0	50.0	0.0	5	15	0					
				0				1					
Ocean Grove	SPP12678	3.6000	50.0	50.0	0.0	10	60	2					
				0				1					

PIPE DETAILS

Name	From	To	Length	U/S IL	D/S IL	Slope	Type	Dia	I.D.	Rough	Pipe ls	No. Pipes	Chg From
	At Chg	Chg	Rl	Chg	RL	etc							
			(m)	(m)	(m)	(%)		(mm)	(mm)				
	(m)	(m)	(m)	(m)	(m)								
SPI01184	SPP12665	SPP12666	3	13.900	13.850	1.67	Concrete, under roads		300	300	0.3	New	1
	SPP12665	0											
SP105092	SPP12666	SPP12669	80	13.800	11.000	3.50	Concrete, not under roads		375	375	0.3	New	1
	SPP12666	0											
SP105092A	SPP12669	SPP12670	10	11.000	10.600	4.00	Concrete, not under roads		375	375	0.3	New	1
	SPP12669	0											
SPI10730	SPP12670	SPP12671	66	10.000	9.200	1.21	Concrete, not under roads		525	525	0.3	New	1
	SPP12670	0											
SPI 107030A	SPP12671	SPP12672	10	9.200	9.000	2.00	Concrete, under roads		525	525	0.3	New	1
	SPP12671	0											
SPI11792	SPP12672	SPP12673	102	9.000	8.800	0.20	Concrete, not under roads		600	600	0.3	New	1
	SPP12672	0											
SPP11792A	SPP12673	SPP12674	20	8.800	8.600	1.00	Concrete, not under roads		600	600	0.3	New	1
	SPP12673	0											
SPI13001	SPP12674	SPP12678	100	8.600	7.000	1.60	Concrete, not under roads		750	750	0.3	New	1
	SPP12674	0											
SPI13002	SPP12678	Fishermans Beach	25	6.500	1.000	22.00	Concrete, not under roads		750	750	0.3	New	1
	SPP12678	0											

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg	Bottom	Height of Service	Chg	Bottom	Height of Service	Chg	Bottom	Height of Service	etc
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc

CHANNEL DETAILS

Name	From	To	Type	Length	U/S IL	D/S IL	Slope	Base Width	L.B. Slope	R.B. Slope	Manning	Depth	Roofed
				(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)	

OVERFLOW ROUTE DETAILS

Name	From	To	Travel	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe	Bed	D/S Area	
	id												
			Time	Level	Length	Coeff. C	Section	Major Storms	Minor Storms	DxV	Slope	Contributing	
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%	
Over 1	SPP12665	SPP12666	0.1				Dummy1	0.3	0.3	0.4	1	100	
	37116793			3									
Over 2	SPP12666	1010 PittRd	0.2				Dummy1	0.3	0.3	0.4	1	100	
	36717441			20									
CliffRDover	SPP12669	SPP12670	0.1				Dummy1	0.3	0.3	0.4	1	100	
	38944153			15									
Cliff to Beach	SPP12670	SPP12671	0.5				Dummy1	0.3	0.3	0.4	1	100	
	39471064			66									
BeachRdover	SPP12671	SPP12672	0.1				Dummy1	0.3	0.3	0.4	1	100	
	39471062			15									
BeachtoSeaview	SPP12672	SPP12673	0.8				Dummy1	0.3	0.3	0.4	1	100	
	40002987			102									
SeaviewtoOceanGrove		SPP12673	SPP12678	0.8				Dummy1	0.3	0.3	0.4	1	100
	40002991			100									
Over to beach	SPP12678	Fishermans Beach	0.2				Dummy1	0.3	0.3	0.4	1	100	
	38462639			25									

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)	
SPI01184	Concrete, under roads	300	0.6	0.17	Unsafe
SP105092	Concrete, not under roads	375	0.6	0.14	Unsafe
SP105092A	Concrete, not under roads	375	0.6	0.29	Unsafe
SPI10730	Concrete, not under roads	525	0.6	0.43	Unsafe
SPI 107030A	Concrete, under roads	525	0.6	0.43	Unsafe
SPI11792	Concrete, not under roads	600	0.6	0.35	Unsafe
SPP11792A	Concrete, not under roads	600	0.6	0.35	Unsafe
SPI13001	Concrete, not under roads	750	0.6	0.19	Unsafe
SPI13002	Concrete, not under roads	750	0.6	-0.81	Unsafe

This model has no pipes with non-return valves

DRAINS results prepared from Version 2021.02

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
SPP12665	14.21		0.214		0.19	0.110	Inlet Capacity
SPP12666	14.12		0.351		0.23	0.216	Inlet Capacity
SPP12669	11.55		0.476		0.15	0.205	Inlet Capacity
SPP12670	10.88		0.332		0.72	0.109	Inlet Capacity
SPP12671	10.20		0.455		0.00	0.315	Outlet System
SPP12672	9.98		0.505		0.02	0.240	Inlet Capacity
SPP12673	9.43		0.430		0.37	0.161	Inlet Capacity
SPP12674	9.09		0.000		0.71		None
SPP12678	6.96		1.492		1.04	1.184	Inlet Capacity
Fishermans Beach	1.15		1.371				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
PittRDCat1	0.182	0.182	0.000	1.00	0.00	0.00	1% AEP, 5 min burst, Storm 1
PittRd2	0.182	0.182	0.000	1.00	0.00	0.00	1% AEP, 5 min burst, Storm 1
Cliff Rd	0.345	0.234	0.111	5.00	15.00	0.00	1% AEP, 10 min burst, Storm 7
Beach Rd	0.194	0.132	0.062	5.00	15.00	0.00	1% AEP, 10 min burst, Storm 7
Ocean Grove	1.138	1.014	0.124	10.00	60.00	2.00	1% AEP, 10 min burst, Storm 8

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
SPI01184	0.072	1.23	14.131	14.120	1% AEP, 5 min burst, Storm 1
SP105092	0.150	1.67	14.084	11.550	1% AEP, 5 min burst, Storm 1
SP105092A	0.286	3.29	11.355	10.875	1% AEP, 5 min burst, Storm 1
SPI10730	0.385	1.78	10.605	10.200	1% AEP, 5 min burst, Storm 1
SPI 107030A	0.410	1.89	10.022	9.981	1% AEP, 5 min burst, Storm 1
SPI11792	0.452	1.60	9.796	9.432	1% AEP, 5 min burst, Storm 1
SPP11792A	0.515	2.18	9.268	9.089	1% AEP, 5 min burst, Storm 1
SPI13001	0.503	3.28	9.035	7.284	1% AEP, 10 min burst, Storm 10
SPI13002	0.578	8.89	6.964	1.154	1% AEP, 10 min burst, Storm 10

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Over 1	0.110	0.291	2.953	0.046	0.04	7.40	0.86	1% AEP, 5 min burst, Storm 1
Over 2	0.216	0.216	2.953	0.038	0.03	7.40	0.76	1% AEP, 5 min burst, Storm 1
CliffRDover	0.205	0.205	2.953	0.038	0.03	7.40	0.74	1% AEP, 10 min burst, Storm 7
Cliff to Beach	0.109	0.298	2.953	0.047	0.04	7.40	0.86	1% AEP, 10 min burst, Storm 7
BeachRdover	0.315	0.315	2.953	0.049	0.04	7.41	0.87	1% AEP, 10 min burst, Storm 7
BeachtoSeaview	0.240	0.240	2.953	0.041	0.03	7.40	0.78	1% AEP, 10 min burst, Storm 7
SeaviewtoOceanGrove		0.161	1.261	2.953	0.112	0.17	7.41	1.52 1% AEP, 10 min burst, Storm 7
Over to beach	1.184	1.184	2.953	0.108	0.16	7.41	1.48	1% AEP, 10 min burst, Storm 4

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level

Run Log for flood.drn run at 13:47:51 on 11/4/2024 using version 2021.02
Upwelling occurred at: SPP12671
Freeboard was less than 0.15m at SPP12672
Flows were safe in all overflow routes.

Appendix D

Curriculum Vitae 2024
Lucas Molloy

Curriculum Vitae 2024

Lucas Molloy

MIEAust / CPEng / NER / APEC / Engineer / IntPE(Aus)

Education -

- 1988 Higher School Certificate
  Pittwater High School NSW Australia
- 1995 Bachelor of Engineering (Civil)
  University of Wollongong NSW Australia

Employment -

- May 2007 to date
  Barrenjoey Consulting Engineers pty ltd
  Director / Engineer / Draftsman
- April 2003 to April 2007
  Northern Beaches Consulting Engineers pty ltd
  Director / Engineer
- Feb 1997 to April 2003
  Northern Beaches Consulting Engineers pty ltd
  Engineer
- Dec 1988 to Dec 1993
  Jack Hodgson Consulting Engineers
  Undergraduate trainee / Engineer

For last sixteen years Director / Engineer / Draftsman of the structural and civil engineering practice Barrenjoey Consulting Engineers pty ltd (est 2007). I am responsible for the structural and civil (including stormwater management) design, documentation, investigation and construction supervision of predominately residential developments.
The spectrum of projects I have consulted on, vary from a 6 square meter timber framed deck extension of a residential house (budget ~ $1,500) to 8 storey commercial development (budget of ~ $10,000,000).

During my career I have been active in the preparation and issuing of –

- 250+ stormwater management plans inc on site detention
- 50+ overflow / flood analysis using DRAINS / HECRAS / AR+R
- 25+ flood inundation & risk assessment reports

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