

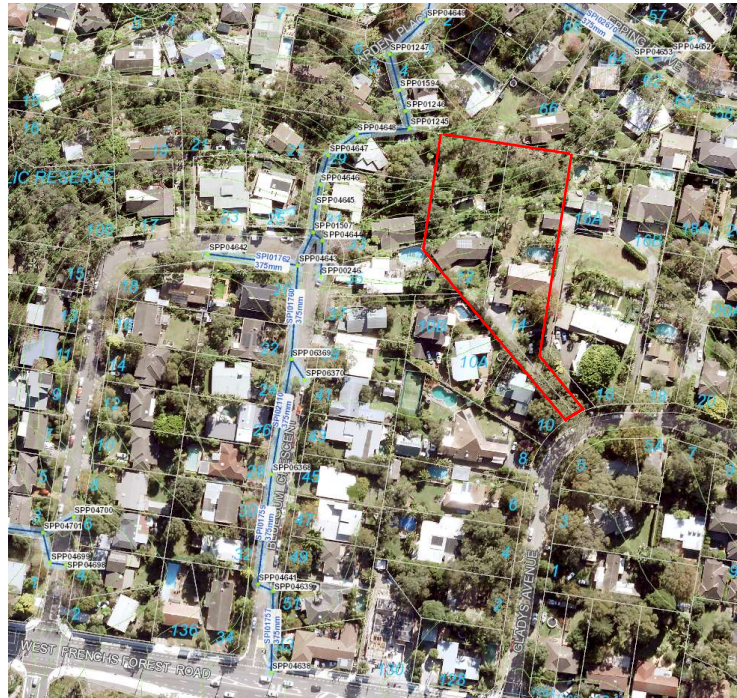


## STORMWATER SYSTEM ASSESSMENT REPORT

For Existing Council Stormwater Drainage System

To assist with development at

**12 – 14 Gladys Avenue, Frenchs Forest**



**REF:** 21498 - Revision A

**DATE:** 18<sup>th</sup> May 2022

**SIGNED**

**SAM NASTASI – B.E M.I.E AUST CpEng Nper-3**  
**Accredited Certifier (Structural & Civil) No BPB0289**



**TABLE OF CONTENTS**

LIST OF FIGURES .....2  
 GLOSSARY .....3  
 1 INTRODUCTION AND LIMITATIONS .....4  
 2 EXISTING SITE CONDITIONS .....4  
 3 STORMWATER SYSTEM ASSESSMENT .....7  
   3.1 Methodology .....7  
   3.2 Catchment Analysis and Modelling Assumptions .....8  
   3.3 Hydrological .....9  
   3.4 DRAINS Model .....9  
   3.4 DRAINS Model Results .....12  
 4 CONCLUSION AND RECOMMENDATION .....14

**LIST OF FIGURES**

Figure 1: Site location/study area .....4  
 Figure 2: Existing stormwater system from council map .....5  
 Figure 3: Entry to No. 29 Bluegum Avenue (pit SPP04644) .....5  
 Figure 4: Existing stormwater pit SSP01245 (Solid lid) .....6  
 Figure 5: Existing stormwater pit SSP01245 .....6  
 Figure 6: Existing stormwater pit SSP01246 .....7  
 Figure 7: Catchment Plan .....8  
 Figure 7: Existing drainage system DRAINS model layout .....10  
 Figure 8: Proposed drainage system DRAINS model layout .....11  
 Figure 9: Existing drainage system DRAINS model results .....12  
 Figure 10: Proposed drainage system DRAINS model results .....13

**LIST OF TABLES**

Table 1: Existing stormwater drainage system summary table .....9  
 Table 2: Proposed stormwater drainage system summary table .....9  
 Table 3: 12-14 Gladys Avenue Catchment Summary .....9

**APPENDIX**

Appendix A: Existing system Drains model Results – 100 Year .....15  
 Appendix B: Proposed system Drains model Results – 100 Year .....18  
 Appendix C: Survey For 29 Bluegum Crest, Frenchs Forest .....21  
 Appendix D: Softcopy of Existing drainage system DRAINS model .....23  
 Appendix E: Softcopy of Proposed drainage system DRAINS model .....23



## GLOSSARY

### **Annual Exceedance Probability (AEP)**

The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

### **Australian Height Datum (AHD)**

A common national surface level datum approximately corresponding to mean sea level.

### **Average Recurrence Interval (ARI)**

The long-term average number of years between the occurrence of a flood as big as or larger than the selected event.

### **Catchment**

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

### **Peak Discharge**

The maximum discharge occurring during a flood event.

### **Probable Maximum Precipitation**

PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year.

### **Runoff**

The amount of rainfall which actually ends up as stream flow.



## 1 INTRODUCTION AND LIMITATIONS

Nastasi & Associate has been engaged to prepare an Assessment Report for the existing stormwater system capacity along 29 Bluegum Cres and 4 Arden Place and address the proposed drainage connection from No. 12-14 Gladys Avenue. The following documents pertaining to the proposed development and applicable Council requirements:

- Northern Beach Council Stormwater System Online Maps
- Survey Plan for No. 29 Bluegum Crescent, Frenchs Forest by C & A Surveyors NSW Pty Ltd (dated 27-09-2017, reference 6696-17 Det)
- Survey Plan for No. 12-14 Gladys Avenue, Frenchs Forest by NCEO Surveys (dated 05-12-2016, ref: 161205D1-REV J)
- WSA assessment report by Interflow (dated 06-07-2020, ref GLA003-001)

This report is limited to visual observations and to the information including the referenced documents made available at the time when this report was written. Nastasi & Associate and no liability will be accepted for use of the information contained in this report.

## 2 EXISTING SITE CONDITIONS

From council online maps, there is an existing drainage system started from corner of Frenchs Forest Road and Bluegum Avenue and transfer through No. 29 Bluegum Avenue and No. 4 Arden Place to downstream area.

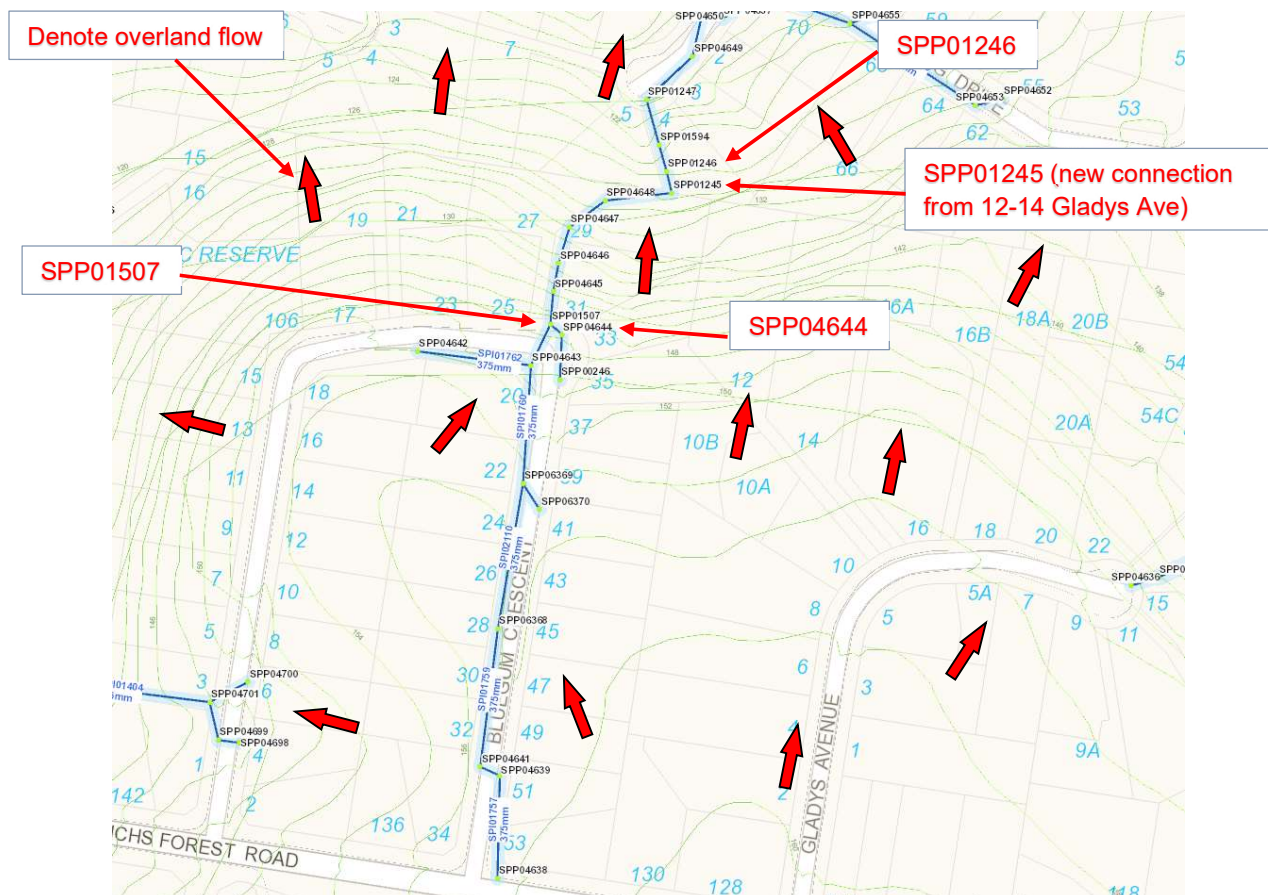
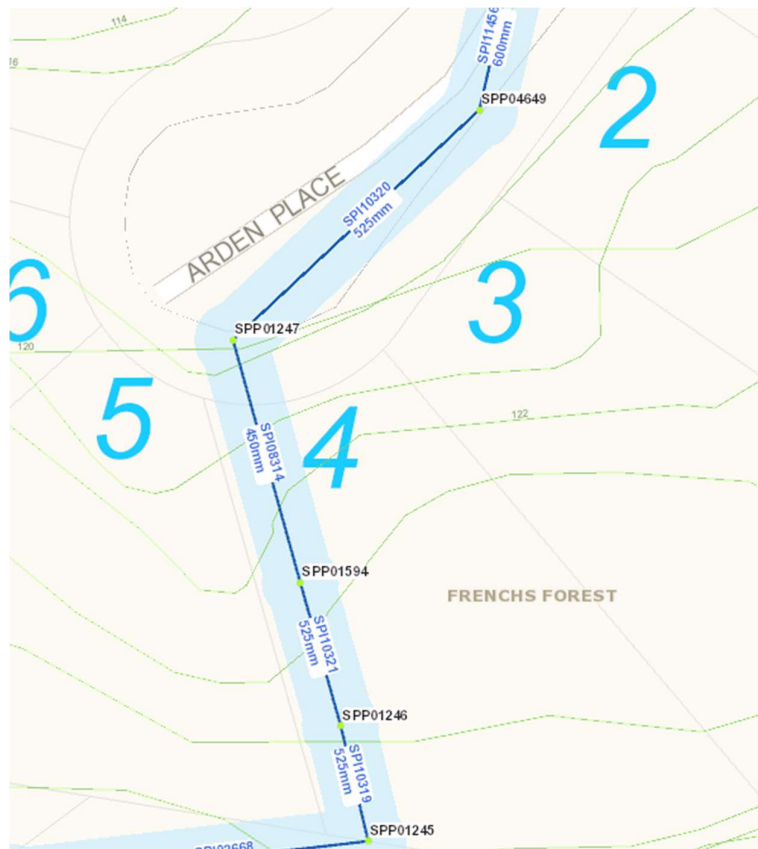
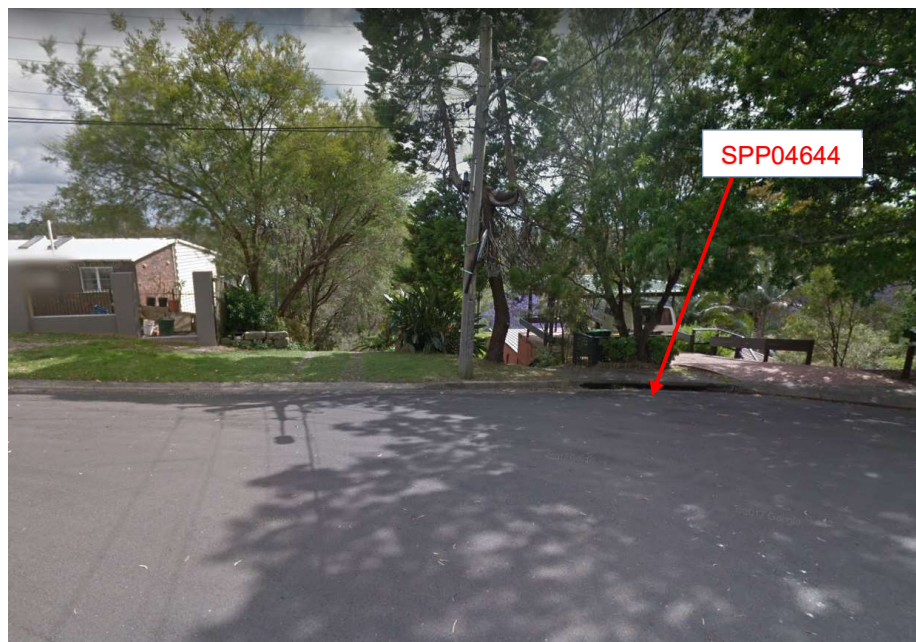


Figure 1: Site location/study area



**Figure 2: Existing stormwater system from council map**



**Figure 3: Entry to No. 29 Bluegum Avenue (pit SPP04644)**



**Figure 4: Existing stormwater pit SSP01245 (Solid lid)**



**Figure 5: Existing stormwater pit SSP01245**



**Figure 6: Existing stormwater pit SSP01246**

### **3 STORMWATER SYSTEM ASSESSMENT**

#### **3.1 Methodology**

The following methodology has been adopted to undertake the stormwater system assessment:

- Utilise available stormwater drainage plan and site inspection information to model existing drainage network by DRAINS model.
- Run the DRAINS network model and establish overland flow for the 1:100yr ARI storm event across the existing stormwater system (mainly from SPP01245 to SPP01246) for **Existing Condition**.
- Run the DRAINS network model and establish overland flow for the 1:100yr ARI storm event across the existing stormwater system with **the extra drainage connection from 12-14 Gladys Avenue into pit SPP01245**.
- Provide comparison table between pre and post developments for the overland flow.



Figure 7: Catchment Plan

### 3.2 Catchment Analysis and Modelling Assumptions

Refer to Appendix A for catchment plan between pre and post development scenarios. From the site topography, the model assumptions are listed as below:

1. All pits will be modeled with 50% blockage.
2. **SPP01594** can't be found on site inspection by Interflow (dated 06<sup>th</sup> July 2020) hence will be modeled as junction/sealed pit.
3. No. 29,31 & 33 Bluegum Avenue stormwater system connected into pit **SPP01245** by pipework.
4. SPP06369 and SPP01507 will be modelled as sag pit with 0.3m spill depth to ensure overland run-off collected into underground pipeline.





Pit	SPP06369	SPP01507	SPP01245	SPP01246	SPP01594	Pit 1 *
Catchment (Ha)	1.27	0.5148				0.2759
Impervious (%)	70	70				60
Pit size/type (mm)	Kerb Inlet Pit	Kerb Inlet Pit	900sqr	900sqr	Junction/sealed pit	900sqr
Inlet 1 (mm)		375 (P1)	375 (P2-3)	100 (P4-1)	525 (P5)	
Inlet 2 (mm)				525 (P4)		
Outlet (mm)	375 (P1)	375 (P2-1)	525 (P4)	525 (P5)	450 (P6)	150 (P2-2)

- **Pit 1\***: Dummy pit to allow No. 29, 31 and 33 Bluegum Cr connected to **SPP01245** by pipe work

**Table 1: Existing stormwater drainage system summary table**

Pit	SPP06369	SPP01507	SPP01245	SPP01246	SPP01594	Pit 1 *
Catchment (Ha)	1.27	0.5148				0.2759
Impervious (%)	70	70				60
Pit size/type (mm)	Kerb Inlet Pit	Kerb Inlet Pit	900sqr	900sqr	Junction/sealed pit	900sqr
Inlet 1 (mm)		375 (P1)	375 (P2-3)	100 (P4-1)	525 (P5)	
Inlet 2 (mm)			<b>225* (P7)</b>	525 (P4)		
Outlet (mm)	375 (P1)	375 (P2-1)	525 (P4)	525 (P5)	450(P6)	150 (P2-2)

- **225\***: New connection from 12-14 Gladys Ave
- **Pit 1\***: Dummy pit to allow No. 29, 31 and 33 Bluegum Cr connected to **SPP01245** by pipe work

**Table 2: Proposed stormwater drainage system summary table**

Pit	OSD catchment connect to SPP01245	Bypass OSD area overflow to downstream
Catchment (Ha)	0.2823 (60% of site)	0.1881 (40% of site)
Impervious (%)	100 (assumed)	0 (assumed)
Outlet (mm)	225 to pit SPP01245	Natural fall to downstream

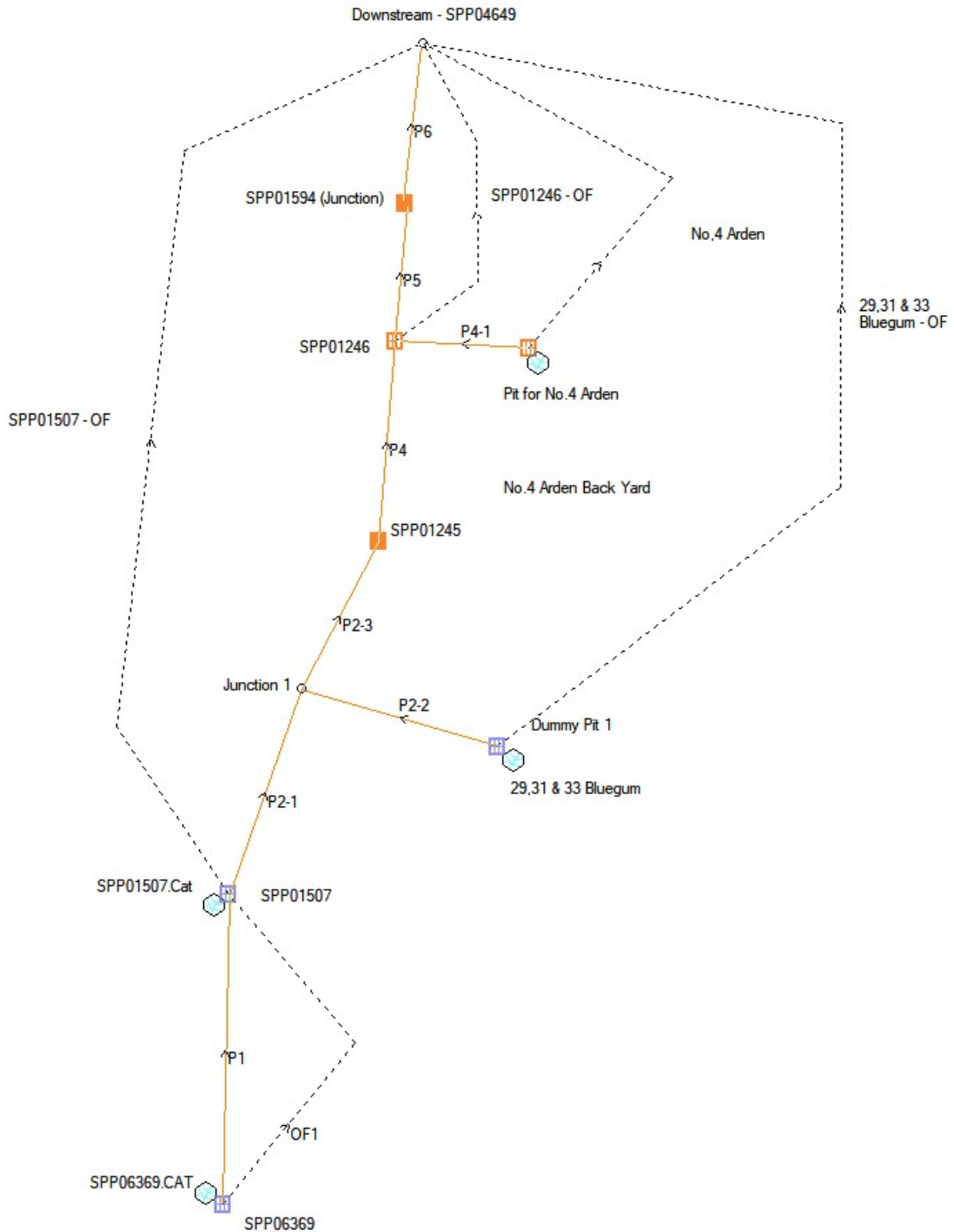
**Table 3: 12-14 Gladys Avenue Catchment Summary**

### 3.3 Hydrological

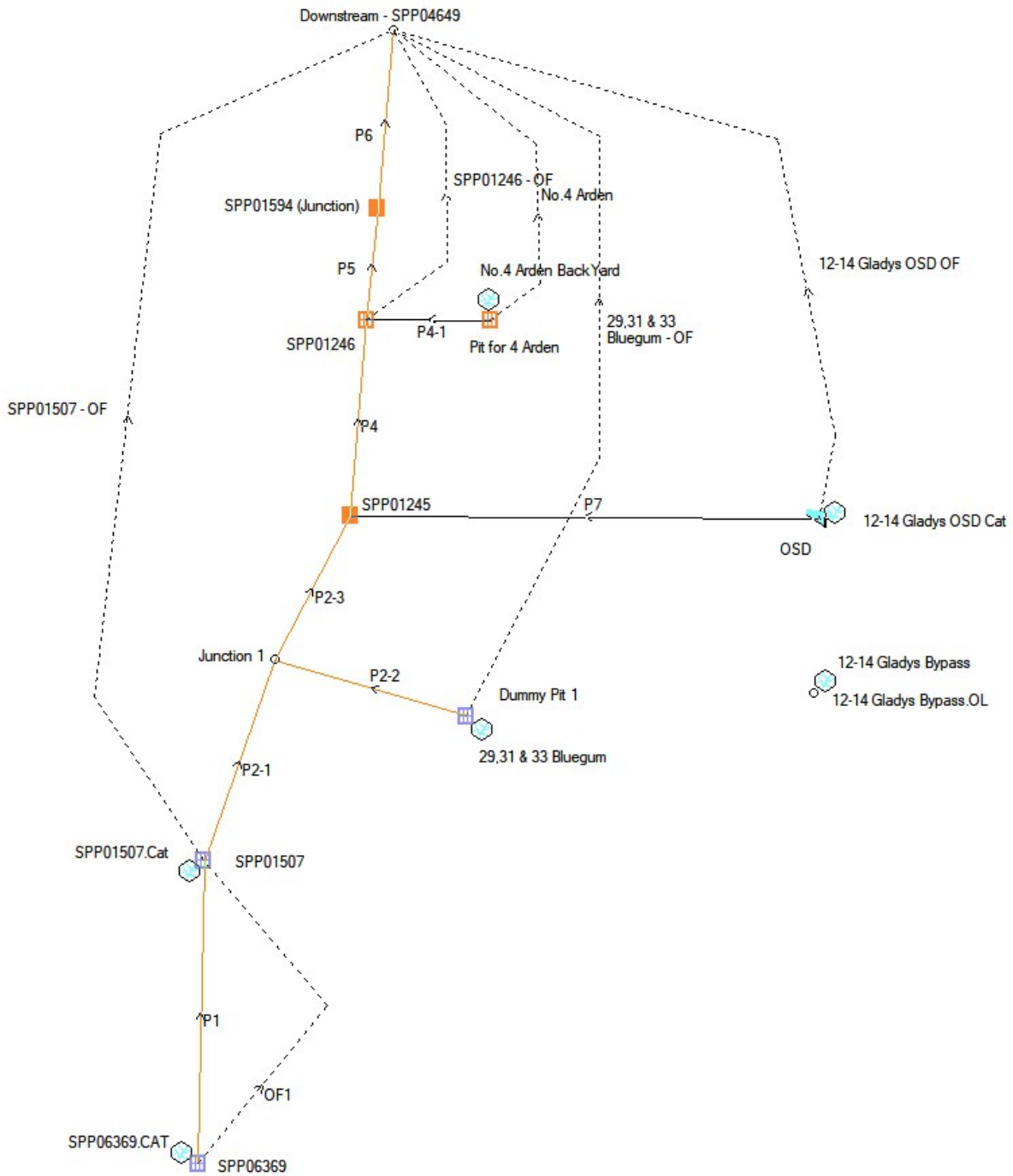
The hydrological assumptions for the model have been based on the Australian Rainfall and Runoff file supplied by ARR Data Hub for the rainfall intensities. Times of concentration is minimum 5min.

### 3.4 DRAINS Model

DRAINS software will be used to model both the existing and proposed development for 100-year ARI rainfall event.



**Figure 8: Existing drainage system DRAINS model layout**

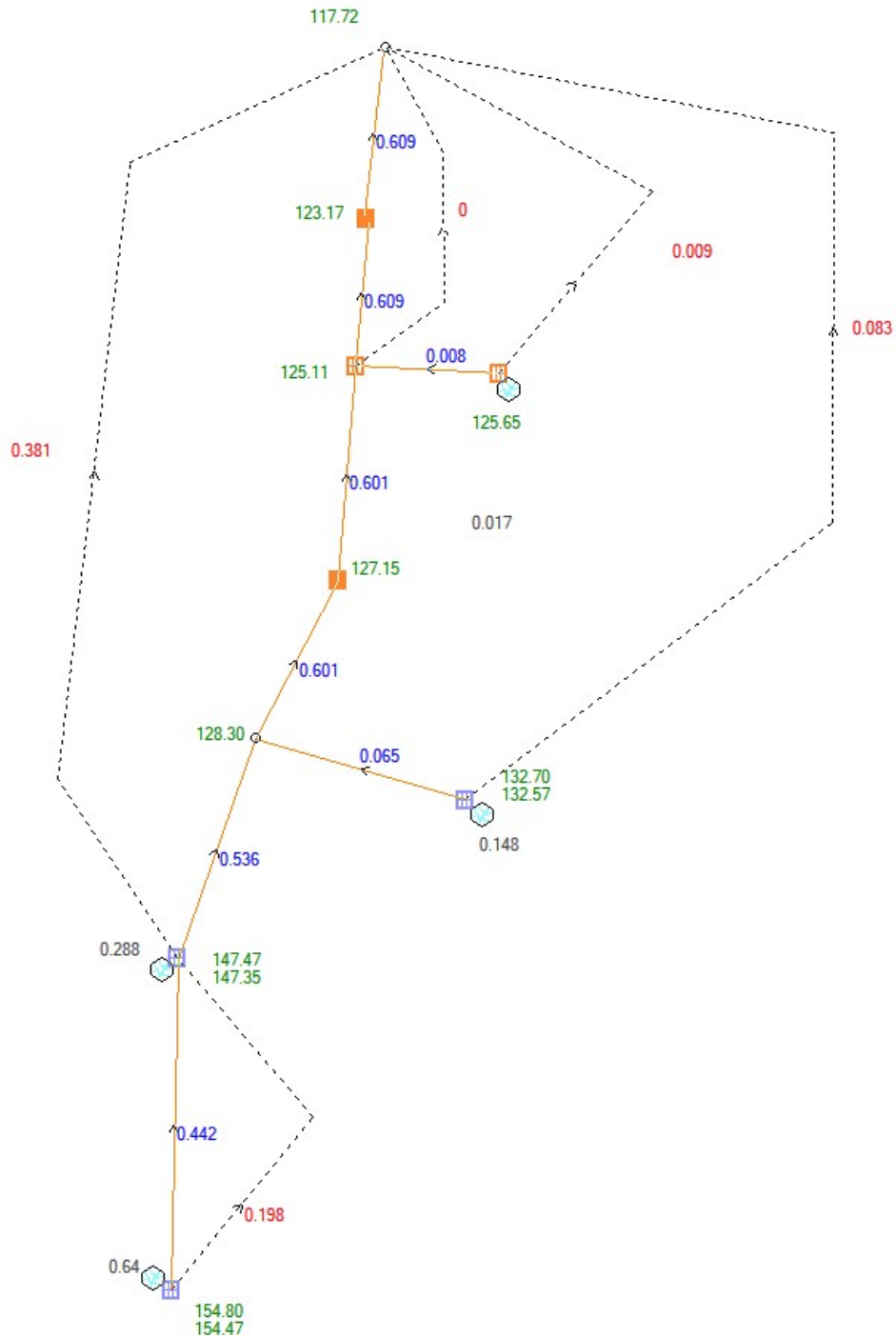


**Figure 9: Proposed drainage system DRAINS model layout**

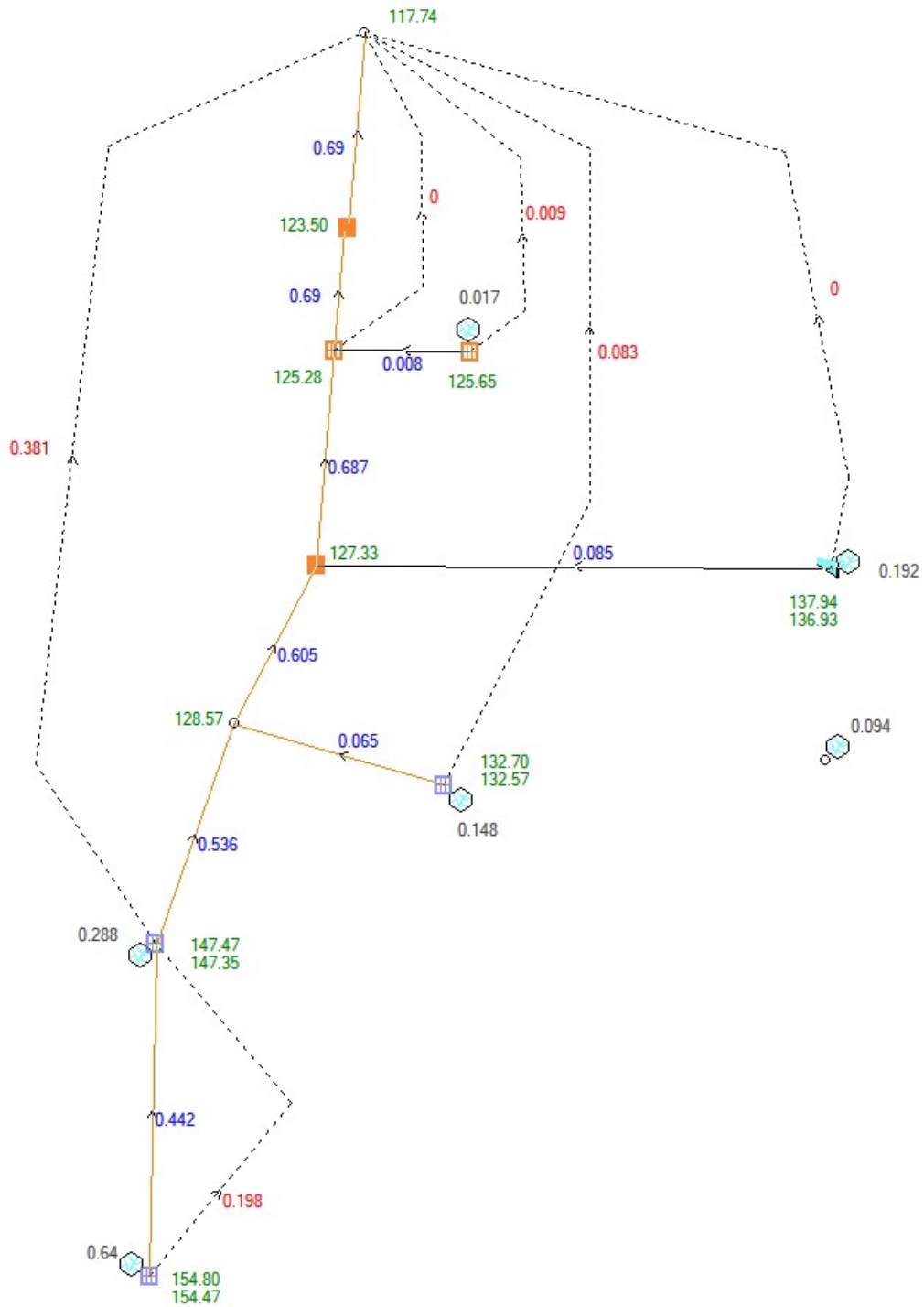


### 3.4 DRAINS Model Results

The proposed of DRAINS model is to compare the existing stormwater system in 100year ARI event rainfall.



**Figure 10: Existing drainage system DRAINS model results**



**Figure 11: Proposed drainage system DRAINS model results**



The Drains models results have indicated that:

1. There are surface overland flows from existing council pipeline, the series of surface pit's capacity is not sufficient to capture the entire upstream run-off (overflow from pit SPP01507).
2. Existing stormwater system (pit and pipe) travels through No. 29 Bluegum Cres and 4 Arden Place didn't take extra surface drainage due to: steep site topography and surface pit doesn't design to capture surface runoff (Figure 4 and 6).
3. The estimated maximum discharge rate from 12-14 Gladys Ave to pit **SPP01245** shall be 85 l/s for 100-year ARI event.

#### **4 CONCLUSION AND RECOMMENTDATION**

Permitted site discharge rate from 12-14 Gladys Ave into existing stormwater system shall be limited to 85l/s for 100-year ARI event to ensure no negative impact on existing stormwater system and downstream properties.



## APPENDIX

### Appendix A: Existing system Drains model Results – 100 Year

DRAINS results prepared from Version 2021.031

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
SPP06369	154.47	154.8	0.678	4.3	0.03	0.198	Inlet Capacity
SPP01507	147.35	147.47	0.567	4.3	0	0.381	Outlet System
Junction 1	128.3		0				
SPP01245	127.15		0		0.36		None
SPP01246	125.11		0		0.39	0	None
SPP01594 (Downstrea	123.17		0		0		Outlet System
Pit 1	132.57	132.7	0.177	4.3	0	0.083	Outlet System
Pit for No.4	125.65		0.025		0.35	0.009	Inlet Capacity

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
SPP06369.1	0.64	0.535	0.105	10	15		2 1% AEP, 10 min burst, Storm 3
SPP01507.1	0.288	0.224	0.064	7	10		2 1% AEP, 10 min burst, Storm 4
29,31 & 33	0.148	0.103	0.046	7	10		2 1% AEP, 10 min burst, Storm 7
No.4 Arder	0.017	0	0.017	5	5		2 1% AEP, 10 min burst, Storm 1

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
P1	0.442	4	153.575	147.354	1% AEP, 15 min burst, Storm 10
P2-1	0.536	5.72	145.875	128.297	1% AEP, 10 min burst, Storm 3
P2-3	0.601	6.42	128.297	127.152	1% AEP, 10 min burst, Storm 4
P4	0.601	2.89	126.993	125.107	1% AEP, 10 min burst, Storm 5
P5	0.609	2.92	124.934	123.174	1% AEP, 10 min burst, Storm 1



P6	0.609	7.95	122.45	117.718	1% AEP, 10 min burst, Storm 1
P2-2	0.065	3.52	131.754	128.297	1% AEP, 5 min burst, Storm 1
P4-1	0.008	0.99	125.637	125.107	1% AEP, 10 min burst, Storm 1

#### 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
OF1	0.198	0.198	0.814	0.086	0.2	2.99	2.32	1% AEP, 10 min burst, Storm 3
SPP01507 -	0.381	0.381	3.259	0.113	0.04	11.05	0.32	1% AEP, 10 min burst, Storm 7
SPP01246 -	0	0	0.716	0	0	0	0	
29,31 & 33	0.083	0.083	2.607	0.054	0.01	11.02	0.15	1% AEP, 10 min burst, Storm 7
No,4 Arder	0.009	0.009	2.707	0.017	0	11	0.07	1% AEP, 10 min burst, Storm 1

#### DETENTION BASIN DETAILS

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

Run Log for 21498 run at 09:01:00 on 18/5/2022 using version 2021.031

No water upwelling from any pit.

Freeboard was less than 0.15m at Pit 1, SPP01507, SPP06369

Flows were safe in all overflow routes.



**NASTASI & ASSOCIATES**  
Consulting Engineers

**Sydney – Gold Coast - Brisbane**  
Residential, Commercial, Industrial, Infrastructure  
Structural, Civil, Stormwater, Geotechnical, Survey, Site Services

## Appendix B: Proposed system Drains model Results – 100 Year

DRAINS results prepared from Version 2021.031

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
SPP06369	154.47	154.8	0.678	4.3	0.03	0.198	Inlet Capacity
SPP01507	147.35	147.47	0.567	4.3	0	0.381	Outlet System
Junction 1	128.57		0				
SPP01245	127.33		0		0.18		None
SPP01246	125.28		0		0.22	0	None
SPP01594 (	123.5		0		0		Outlet System
Downstrea	117.74		0.587				
Dummy Pit	132.57	132.7	0.177	4.3	0	0.083	Outlet System
Pit for 4 Ar	125.65		0.025		0.35	0.009	Inlet Capacity

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
SPP06369.1	0.64	0	0	10	15		2 1% AEP, 10 min burst, Storm 3
SPP01507.1	0.288	0	0	7	10		2 1% AEP, 10 min burst, Storm 4
29,31 & 33	0.148	0	0	7	10		2 1% AEP, 10 min burst, Storm 7
12-14 Glad	0.192	0	0	6	8		5 1% AEP, 10 min burst, Storm 8
12-14 Glad	0.094	0	0	5	8		2 1% AEP, 10 min burst, Storm 7
No.4 Arder	0.017	0	0	5	5		2 1% AEP, 10 min burst, Storm 1

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
P1	0.442	4	153.575	147.354	1% AEP, 10 min burst, Storm 9
P2-1	0.536	4.85	145.875	128.565	1% AEP, 15 min burst, Storm 6
P2-3	0.605	5.48	128.565	127.334	1% AEP, 20 min burst, Storm 6

P4	0.687	3.22	127.011	125.282	1% AEP, 20 min burst, Storm 2
P5	0.69	3.24	124.952	123.496	1% AEP, 20 min burst, Storm 6
P6	0.69	8.21	122.45	117.735	1% AEP, 20 min burst, Storm 6
P2-2	0.065	3.52	131.754	128.587	1% AEP, 25 min burst, Storm 9
P7	0.085	1.86	137.173	127.334	1% AEP, 20 min burst, Storm 2
P4-1	0.008	0.99	125.637	125.285	1% AEP, 10 min burst, Storm 1

#### 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
OF1	0.198	0.198	0.814	0.086	0.2	2.99	2.32	1% AEP, 10 min burst, Storm 3
SPP01507 -	0.381	0.381	3.259	0.113	0.04	11.05	0.32	1% AEP, 10 min burst, Storm 7
SPP01246 -	0	0	0.716	0	0	0	0	
29,31 & 33	0.083	0.083	2.607	0.054	0.01	11.02	0.15	1% AEP, 10 min burst, Storm 7
12-14 Glad	0	0	1.159	0	0	0	0	
No.4 Arder	0.009	0.009	2.707	0.017	0	11	0.07	1% AEP, 10 min burst, Storm 1

#### DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD	137.94	0	0.085	0.085	0

Run Log for 21498 run at 12:34:25 on 17/5/2022 using version 2021.031

No water upwelling from any pit.

Freeboard was less than 0.15m at Dummy Pit 1, SPP01507, SPP06369

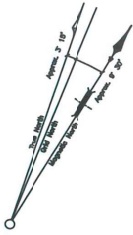
Flows were safe in all overflow routes.



**NASTASI & ASSOCIATES**  
Consulting Engineers

**Sydney – Gold Coast - Brisbane**  
Residential, Commercial, Industrial, Infrastructure  
Structural, Civil, Stormwater, Geotechnical, Survey, Site Services

## Appendix C: Survey For 29 Bluegum Crest, Frenchs Forest



**LEGEND:**

ADJ	ADJOINING BUILDING
AHD	AUSTRALIAN HEIGHT DATUM
AWN	AWNING
BM	BENCH MARK
BRW	BOTTOM OF RETAINING WALL
CS	CONCRETE SURFACE
EC	EDGE OF CONCRETE
E-G	EAVE & GUTTER
FL	FLOOR LEVEL
GB	GARDEN
RL	REDUCED LEVEL
S	STAIRS
SILL	WINDOW SILL
NS	NATURAL SURFACE
TRW	TOP OF RETAINING WALL
TK	TOP OF KERB
TOP	TOP OF WINDOW
TW	TOP OF WALL
PP	POWER POLE
VC	VEHICLE CROSSING
W	WINDOW
WM	WATER METER

*[Signature]*  
 DANIEL KURZAWA  
 (REGISTERED SURVEYOR)  
 SURVEYOR I.D. No. 8678

**NOTES:**

A) SERVICES SHOWN HAVE BEEN DERIVED FROM VISUAL EVIDENCE APPARENT AT THE TIME OF SURVEY. SERVICES MAY EXIST WHICH ARE NOT SHOWN. THE RELEVANT SERVICE AUTHORITY SHOULD BE CONTACTED TO VERIFY THE EXISTENCE AND POSITION OF SERVICES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION OR EXCAVATION.

B) DIAMETER, HEIGHT & SPREAD OF TREES ARE APPROXIMATE ONLY.

C) LEVELS SHOWN ARE OF AUSTRALIAN HEIGHT DATUM.  
 ORIGIN OF LEVELS: S5 88673, RL 104.844 (AHD), CLASS LC, ORDER L3.

D) USE STATED DIMENSIONS. DO NOT SCALE.

E) THESE NOTES FORM PART OF THIS PLAN AND CANNOT BE REMOVED.

F) NO COVENANTS AND/OR RESTRICTIONS HAVE BEEN INVESTIGATED BY C & A SURVEYORS PTY LTD.

(A) BASEMENT FOR DRAINAGE 1.83 WIDE (VCE 102379)  
 (B) RIGHT OF CARRIAGEWAY 4.57 WIDE (VCE 187656)

© THIS PLAN AND THE INFORMATION CONTAINED HEREIN REMAINS THE PROPERTY OF C & A SURVEYORS NSW PTY LTD. IT MUST NOT BE COPIED IN WHOLE OR PART, AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN FOR THAT WHICH IT HAS BEEN PREPARED, WITHOUT THE WRITTEN CONSENT OF C & A SURVEYORS NSW PTY LTD. THIS PLAN HAS BEEN PREPARED FOR THE SOLE USE OF THE INSTRUCTING PARTY.

**C & A SURVEYORS NSW P/L**  
 Ph:9638 4136 Fax:9638 1199  
 Suite 3, Level 4, 460 CHURCH STREET,  
 NORTH PARRAMATTA NSW 2151  
 P.O. Box 5203 GREYSTANES NSW 2145  
 info@candasurey.com.au  
 www.candasurey.com.au

**DETAIL & IDENT SURVEY OF  
 LOT 92 IN DP 30700, LOCATED AT  
 No. 29 BLUEGUM CRESCENT, FRENCHS FOREST**

<b>INSTRUCTING PARTY:</b>	AS PER REQUEST	<b>DATUM:</b>	A.H.D.	<b>SURVEYED BY:</b>	HH
		<b>SURVEY DATE:</b>	13-09-2017	<b>DRAWN BY:</b>	AZ
		<b>DATE DRAWN:</b>	27-09-2017	<b>SCALE:</b>	1:200
		<b>REFERENCE:</b>	6696-17 DET	<b>SHEET:</b>	2 OF 2



**Appendix D: Softcopy of Existing drainage system DRAINS model**

**Appendix E: Softcopy of Proposed drainage system DRAINS model**