



civil engineering

Friends

15 Tannah Court, Broadbeach Waters

Stormwater Management Plan

For: Mr Scott Barrett


March 2024

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Document Control

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Report Title	R001-FE24015 – Stormwater Management Plan		
Revision	3	Date	24/11/25

Revision History

Revision	Date	Author	Approver	Description
1	15/03/24	RR	RR	For Council Submission
2	05/06/24	RR	RR	Information Response
3	24/11/25	RR	RR	Amended Design

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1. Introduction

This report has been prepared to support the lodgement of a development application to approve the construction of a new residential development. The development is proposed to take place over the following parcels of land:

Property Address:	15 Tannah Court, Broadbeach Waters, 4218
Property Description:	33 on RP216472
Council:	City of Gold Coast
Registered Site Area:	803m ²

The purpose of this report is to address the management of stormwater quantity and quality to ensure that the proposed development complies with all necessary state and local government policies.

This report shows the likely impact of the proposed development in relation to stormwater quantity and quality, with proposed treatment measures documented in this report to achieve all relevant objectives.

1.1 Report Abstract

This report describes the following treatment systems that are recommended for inclusion in the design for the development:

- Best practice methods for water quality treatment; including runoff to grass buffer zones, suitable pervious infiltration areas, and drought tolerant gardens;
- Outlet of stormwater at allowable flow rates to the adjoining kerb and channel;
- No requirement for stormwater detention;

Based on the analysis presented in this report, this system will achieve compliance with the relevant State and Local Council standards and support the approval of the proposed development.

1.2 Relevant Approvals and Reports

This report is intended to be read in conjunction with the associated development submission documents, current as of the date of this report.

1.3 Conceptual Only

This report is intended to be conceptual for the purposes of achieving Development Approval from the Council.

The final design details are to be determined following the Council approval and prior to construction.

2. Property Description

2.1 Site Locality

The proposed development is situated at 15 Tannah Court, Broadbeach Waters, which is registered as a single freehold allotments (Lot 33 on RP216472).

The zoning of the land is “Low Density Residential” in accordance with the current City of Gold Coast City Plan. The site has frontages to Tannah Court to the east and Villa Court to the south.

Full details of the site topography and existing features are shown on the detailed site survey included in Appendix A. A general locality plan is presented in Figure 2.1 below:



Figure 2.1 - Site Locality (Courtesy of City of Gold Coast City Plan – Accessed March 2024)

2.2 Regional Flooding

The site is not affected by regional flooding.

The Designated Flood Level (DFL) in the region is assigned by Council’s Flood Search Report service. The DFL near the site is 3.79m AHD. The DFL relates to a flood with a 1% Annual Exceedance Probability (sometimes referred to as a 1 in 100 year return interval).

Referring to the survey plan in Appendix A, there are no site levels that are below the DFL and the is therefore not affected.

Figure 2.2 below shows the extents of flooding surrounding the site in the DFL.



Figure 2.2 – DFL Flood Extents (Courtesy City of Gold Coast City Flood Mapping – Accessed March 2024)

2.3 Land Usage

The site is presently occupied by a single storey residential dwelling, with associated carparking and landscaped areas.

Drawing DA01 in Appendix C shows the existing site footprint with calculated areas of imperviousness over the site.

2.4 Topography and Drainage

The site generally grades the existing allotment towards both the street frontage kerb and channel. Flows within both are captured via the existing gully pit and underground pipework to the south of the development site. Runoff is then directed to the nearby canal to the north of the development site.

3. Proposed Development

The proposed development involves a 3 level 3 villa residential development with associated driveway and landscape areas. Separate driveways will provide access to ground level parking.

Figure 3.1 below provides an extract of the architectural perspective of the development. Refer also to the Architectural drawings in Appendix B.

Drawing DA02 in Appendix C shows the development footprint with calculated areas of imperviousness over the site.

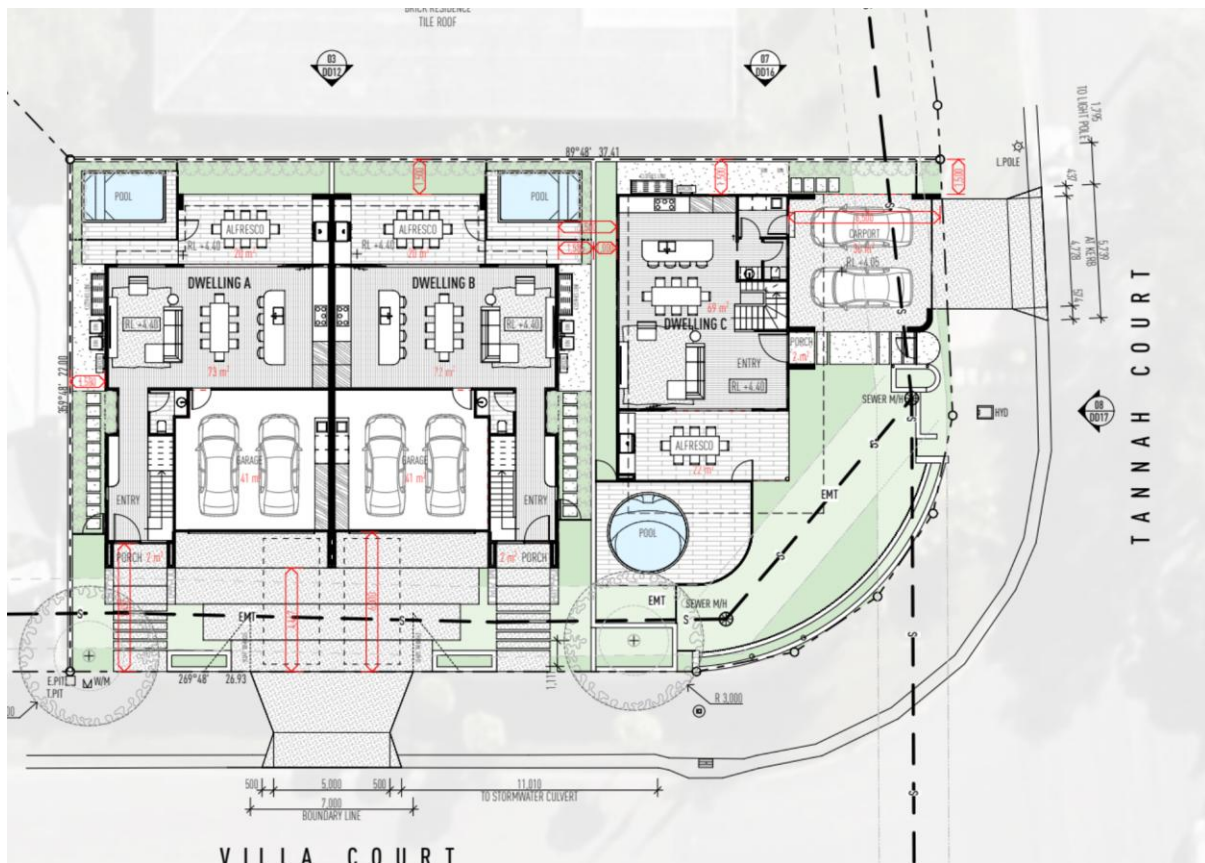


Figure 3.1 – Proposed Development – Courtesy of Impact Design

4. Lawful Point of Discharge

In the existing case, the site grades the existing allotment to the street frontage kerb and channel of Tannah Court and Villa Court. Flows are captured via the existing gully pit and underground pipework to the south of the development site. Runoff is then directed to the nearby canal to the north of the development site.

In the developed case it is proposed to maintain the existing case scenario and direct all site runoff to the kerb and channel, following the treatment of water quality, to be discussed in following sections.

The proposed discharge arrangement is considered to comply with the requirements of a lawful point of discharge and will be maintained following the development of the site.

The Queensland Urban Drainage Manual (QUDM) (2017) provides a three-part framework for the identification of a lawful point of discharge for a development site. The first assessment item is to consider if the proposed development will alter the site's stormwater discharge characteristics in a manner that may substantially damage a third-party property. As the proposed development is not considered likely to worsen the flows received by the adjacent land, the proposed point of discharge is considered to satisfy the requirements set out in Section 3.9.1 – Lawful Point of Discharge Test.

5. Site Specific Hydrology

This section of the report addresses peak stormwater discharge resulting from the site, and identifies whether attenuation measures are necessary to ensure “no-worsening” of the peak flows from the site.

5.1 Methodology

The methodology of the hydrologic analysis involves the use the Rational Method for peak flow calculations.

The Rational Method, as described by the Queensland Urban Drainage Manual (QUDM 2017), provides a simple means for the assessment of the peak discharge rate for design storms.

5.2 Catchment Definition

In both the existing and design cases of development, the site has been assessed as a single catchment, in alignment with the drainage regime.

The site is fully developed in both the existing and developed case scenarios, with dwellings, hardstand and landscape areas on the allotment that are connected to the stormwater drainage system.

A summary of the catchment imperviousness for both the existing and design case scenarios is provided on drawings DA01 and DA02 in Appendix C. Table 5.1 below summarises the catchment imperviousness.

Table 5.1: Catchment Parameters

Catchment	Catchment Area	Fraction Impervious
Pre-Development	803m ²	0.735
Post-Development	803m ²	0.707

5.3 Site Specific Rational Method Calculations

Time of Concentration

In both pre and post development conditions the time of concentration is 5 minutes, based upon the recommendations of QUDM Section 4.6.4 for standard inlet times.

C₁₀ Value

In this instance the development site is zoned as Low Density Residential in both pre- and post-development conditions. In accordance with the City of Gold Coast’s Land Development Guidelines Section SC6.11.4 Table 4.4: Runoff Coefficient vs. Development Category, the C₁₀ value would not change. Using this method of C₁₀ value estimation, there would be zero impact on peak runoff.

In reality however, the sites imperviousness is changing from 73.5% to 70.7%, which would result in a reduction in site runoff.

The Queensland Urban Drainage Manual (QUDM, 2017) Table 4.5.3 has therefore been referenced as a second source to estimate the sites C_{10} values based on the sites imperviousness. The adopted C_{10} values for the site are presented in Table 5.2 below.

Table 5.2: C_{10} Values

	Development Category	C_{10}
Pre-development	Medium Density Residential	0.847
Post-development	Medium Density Residential	0.841

Rainfall Intensity

Rainfall intensity data has been obtained from the Australian Bureau of Meteorology's Design Rainfall Data System, using the nearest grid cell coordinates: 27.9875 and 153.4125 (E). Table 5.3 below provides the Intensity Frequency Distribution (IFD) chart.

Table 5.3: Rainfall Intensity Chart (depths in mm)

Duration	Duration in min	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	2.82	3.18	4.32	5.08	5.83	6.82	7.58
2 min	2	4.85	5.46	7.42	8.79	10.1	12.2	13.9
3 min	3	6.77	7.63	10.4	12.3	14.2	17	19.3
4 min	4	8.52	9.62	13.1	15.5	17.8	21.2	23.9
5 min	5	10.1	11.4	15.5	18.3	21.1	24.9	27.9
10 min	10	16.3	18.4	24.9	29.3	33.6	39.1	43.2
15 min	15	20.7	23.4	31.6	37.1	42.4	49.2	54.2
20 min	20	24.1	27.2	36.7	43.1	49.3	57.2	63.2
25 min	25	26.9	30.3	40.9	48.1	55	64.1	70.9
30 min	30	29.2	32.9	44.5	52.3	60	70.1	77.8
45 min	45	34.7	39.1	53.1	62.7	72.2	85.1	95.2
1 hour	60	38.8	43.8	59.8	70.9	82	97.5	110
1.5 hour	90	45.2	51.1	70.3	84.1	98	118	134
2 hour	120	50.2	56.9	78.9	94.9	111	135	155
3 hour	180	58.2	66.2	93.1	113	134	164	189
4.5 hour	270	67.8	77.5	110	135	161	199	230
6 hour	360	75.8	86.9	125	154	185	228	264
9 hour	540	89.1	103	149	185	222	275	318
12 hour	720	100	116	169	210	253	312	360
18 hour	1080	118	137	202	249	300	368	423
24 hour	1440	133	155	227	280	335	409	469
30 hour	1800	145	169	248	304	362	441	503
36 hour	2160	156	182	265	324	384	466	531
48 hour	2880	173	201	292	355	417	504	572
72 hour	4320	196	228	327	394	459	553	626
96 hour	5760	210	243	348	418	485	584	661
120 hour	7200	218	253	361	434	504	608	689
144 hour	8640	223	258	369	445	519	628	713
168 hour	10080	225	261	375	454	533	646	736

Results

The results of the Rational Method calculations are presented in Table 5.4.

Table 5.4: Rational Method Results

AEP	63%	39%	18%	10%	5%	2%	1%
Q Pre-developed (m3/s)	0.018	0.022	0.033	0.041	0.050	0.065	0.075
Q Post-developed (m3/s)	0.018	0.022	0.033	0.041	0.050	0.064	0.075
Impact (m3/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000

5.4 Impact Assessment

Table 5.4 confirms the overall development will have zero impact on the runoff of stormwater to the downstream system.

No stormwater detention is required for this project.

5.5 Outlet Capacity

The development is designed with two separate outlets to the kerb and channel.

Villa A will have its own stormwater quality treatment and outlet to the kerb. The area of Villa A contributing to the kerb outlet is 247m².

Villas B and C will have a combined stormwater quality treatment and outlet to the kerb. The combined area of Villas B and C contributing to the kerb outlet is 556m².

Table 5.5 provides the peak flow rates being directed to the kerb from each of the kerb adaptors.

Table 5.5: Kerb Discharge Flow Rates

AEP	63%	39%	18%	10%	5%	2%	1%
Villa A (m3/s)	0.006	0.007	0.010	0.013	0.015	0.020	0.023
Villas B & C (m3/s)	0.013	0.015	0.023	0.029	0.035	0.045	0.052

Table 5.5 confirms that the outlet flow rate to the kerb is less than 25L/s in the 2 year (18% AEP) storm event, in compliance with IPWEAQ Standard Drawing RS-081.

6. Stormwater Quality

6.1 Introduction

This section of the report aims to identify the requirements for stormwater quality management resulting from the proposed development and identify suitable stormwater treatment principles to comply with relevant requirements of the State Planning Policy and the City of Gold Coast City Plan Policy – Land Development Guidelines.

6.2 State Planning Policy Assessment

An assessment has been undertaken to determine whether the development proposal necessitates compliance with the State Planning Policy (SPP) objectives. The following trigger questions are used to determine whether SPP compliance is required.

Table 6.1- State Planning Policy Trigger Questions

Trigger Question	Development Response
Material Change of Use for Urban Purposes with a land area greater than 2,500m² and:	No
a) <i>Will result in an impervious area greater than 25% of the net developable area; or</i>	N/A
b) <i>Will result in 6 or more dwellings.</i>	N/A
Reconfiguration of Lot for Urban Purposes that involves a land area greater than 2,500m², and will result in 6 or more lots	No

The above table indicates that the development does not trigger compliance with the SPP.

6.3 Local Authority Assessment

Further to the requirement to comply with the SPP objectives, an assessment has been undertaken to determine whether the development proposal necessitates compliance with City of Gold Coast (CoGC) objectives. The following trigger questions are used to determine whether CoGC compliance is required.

Table 6.2- City of Gold Coast Trigger Questions

Trigger Question	Development Response
Greater than 850m² of land and results in an increased number of allotments	No
3 or more dwellings (attached or detached)	Yes
Includes newly constructed road (previously unformed road) exceeding 30m in total length	No
Includes 200m² or more uncovered new or refurbished car park area including parking bays and circulation driveway	No

The development includes three new residential dwellings, which is the only minor trigger for water quality management. Following the development of the land, the lot

size, imperviousness and density will be aligned with all of the surrounding neighbouring lots in the medium density residential area, and less than the triggers for water quality assessment.

As the new development will be small and private without any new public land being created, any dedicated water quality treatment devices (i.e. bio-retention basins) would be required to be installed within the private allotment and maintained privately by the lot owners. This is known to be a poor solution for water quality that is inefficient and ineffective.

It is therefore considered reasonable that the development comply with State Planning Policy Assessment only and not create any new small lot-scale bio-retention systems. Best practices for water quality treatment shall however be implemented to ensure that the intentions of the Council's Land Development Guidelines are achieved.

6.4 Recommended Best Practice for Water Quality Treatment

The Water by Design fact sheet "The Water Wise House" provides a helpful and current guideline for lot scale management of water quality.

Principles from the Water by Design fact sheet that will be adopted by the development of the two new lots will include the following:

- **Grass Buffer Areas**
A grass buffer (also referred to as a grassed buffer strip, vegetated buffer strip, or simply a buffer strip) is a linear strip of dense, perennial grass or low vegetation designed to intercept and filter stormwater runoff before it enters a receiving water body, such as a stream, wetland, or drainage system. It acts as a natural or engineered transition zone that slows water flow, promotes infiltration, and traps pollutants. Grass buffers are a key element of Water Sensitive Urban Design (WSUD) in Queensland. They are particularly suited to urban, agricultural, or roadside contexts.
- **Maximise Pervious Infiltration Area**
The allotments will be developed with deep planting zones, vegetation at boundary and internal porous landscaped areas. Adjacent hardstand can be directed to these areas to encourage self-watering gardens, recharging of the natural groundwater and natural filtering of stormwater pollutants.
- **Low Water Use Gardens**
The allotment will be cleared of all existing land cover and landscape features as part of the current application. The current landscaping design is considerate of appropriate drought tolerant species and encourages the fall of surrounding hardstands to create self-watering gardens.

By complying with these best practice principles for water quality management, the development will achieve the requirements of the State Planning Policy and the intentions of the City of Gold Coast's Land Development Guidelines.

7. Conceptual Erosion and Sediment Control Plan

7.1 Introduction

During construction, it shall be the responsibility of the Principal Contractor to ensure that the development complies with the relevant erosion and sediment control objectives, as outlined in the State Planning Policy and the City of Gold Coast City Plan.

This section of the report provides suggested inclusions in an erosion and sediment control plan for the proposed development site. This plan includes recommendations for monitoring & reporting responsibilities and the construction of site-specific sedimentation and erosion control measures. Detailed drawings specifying the proposed erosion and sediment control measures are to be provided at the Operational Works stage of the development.

7.2 General Erosion and Sediment Control Measures

It shall be the responsibility of the Principal Contractor to ensure the following erosion and sediment control measures are implemented on site:

- Clean stormwater runoff from upstream allotments is to be directed away from the development site using earth bunds or cut-off drains, as deemed appropriate by a suitable supervisor;
- The prevention of sediment runoff towards other properties via the effective implementation of silt fences, sediment basins or other mitigation devices as deemed appropriate by a suitable supervisor;
- Sediment runoff shall also be prevented from entering the Council stormwater drainage system via the implementation of control measures such as gully pit sediment barriers;
- Erosion shakedown points shall be established at all vehicular access points, with shakedown areas regularly swept clean and sediment removed; and
- Erosion and sediment control measures are not to be removed from the development site until the site is completely rehabilitated and the surface is capable of resisting erosion.

7.3 Spoil and Stockpile Management Measures

It shall be the responsibility of the Principal Contractor to ensure the following spoil and stockpile management measures are implemented on site:

- Where the stockpiling of spoil and excess earthworks is necessary on the development site, stockpiles shall be established as far away as possible from stormwater inlets and pipelines to reduce the likelihood of sediment runoff; and
- Stockpiles are to be established within a designated zone of fill material and should be surrounded with appropriate erosion and sediment control measures.

7.4 Training Requirements

It shall be the responsibility of the Principal Contractor to ensure the following training protocols are implemented on the development site:

- Site induction courses shall include details of an environmental management reporting system, through which personnel will be able to report perceived erosion and sediment control issues on site.

8. Conclusion

This report has been prepared to support the lodgement of a development application to approve the construction of a new residential development at 15 Tannah Court, Broadbeach Waters.

This report describes the following treatment systems that are recommended for inclusion in the design for the development:

- Best practice methods for water quality treatment; including runoff to grass buffer zones, suitable pervious infiltration areas, and drought tolerant gardens;
- Outlet of stormwater at allowable flow rates to the adjoining kerb and channel;
- No requirement for stormwater detention;

Based on the analysis presented in this report, this system will achieve compliance with the relevant State and Local Council standards and support the approval of the proposed development.

This report recommends the approval of the development application with reference to the stormwater management systems that have been specified.



Appendix A

- Site Survey

Table of mm
 1400
 1380
 1360
 1340
 1320
 1300
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 360
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 320
 300
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 40
 20

NOTES

LOT AREAS AND BOUNDARY DIMENSIONS HAVE BEEN COMPILED FROM DEPOSITED PLANS AVAILABLE AT DEPARTMENT OF NATURAL RESOURCES, MINES AND ENERGY. NO BOUNDARY SURVEY OR INVESTIGATION HAS BEEN MADE AND NO BOUNDARIES HAVE BEEN MARKED. BOUNDARIES SHOWN HEREON ARE PROVISIONAL AND SUBJECT TO FURTHER SURVEY. POSITION OF IMPROVEMENTS RELATIVE TO BOUNDARIES SHOWN HEREON IS DIAGRAMMATIC ONLY.

BEARINGS SHOWN ON THIS PLAN ARE ORIENTATED TO NORTH VIDE RP216472. IF SHADOW DIAGRAMS ARE TO BE CALCULATED THEY MUST BE CALCULATED USING TRUE NORTH.

SERVICES & UTILITIES SHOWN ON THIS PLAN HAVE BEEN LOCATED BY COMBINATION OF FIELD SURVEY AND REFERENCE TO SERVICE PLANS FROM STATUTORY AUTHORITIES. ONLY VISIBLE AND APPARENT SERVICE COVERS AND POLES HAVE BEEN LOCATED BY FIELD SURVEY. SERVICE DETAILS AND LOCATIONS SHOULD BE CONFIRMED WITH THE RELEVANT SERVICE AUTHORITY DURING DESIGN & PRIOR TO ANY CONSTRUCTION. THE LOCATION OF UNDERGROUND SERVICES HAS NOT BEEN INVESTIGATED BY USHER & COMPANY PTY LTD.

WHERE THE EXACT LOCATION OF UNDERGROUND SERVICES IS CRITICAL TO THE DESIGN OR CONSTRUCTION THE RELEVANT PARTY SHOULD ARRANGE TO HAVE AN UNDERGROUND SERVICES TRACE CARRIED OUT TO CONFIRM THE SERVICES EXACT LOCATION. IN THIS REGARD ALL PARTIES SHOULD CONTACT THE 'DIAL BEFORE YOU DIG' SERVICE.

CONTOUR INTERVAL 1.0m MAJOR 0.25m MINOR

AHD HEIGHT DATUM HAS BEEN TRANSFERRED TO THE SUBJECT LOT VIA GPS. AHD LEVELS SHOWN HAVE AN ACCURACY OF 0.1m.

This plan has been prepared to satisfy the project specific brief provided by the client nominated in the title block and should not be relied upon by any third party.

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SEWER MAIN: THE POSITION AND LEVELS OF THE 150Ø & 225Ø SEWER MAIN RUNNING THROUGH THE SITE HAVE BEEN DETERMINED VIA TRACE METHODS BY SERVICE LOCATOR. THE POSITIONS MARKED BY THE SERVICE LOCATOR WERE SURVEYED WHILST ONSITE.

Cadastral Surveyor: *[Signature]*

Date: 28-05-2019

LEGEND

0.3 TRUNK DIAMETER/6m FOLIAGE SPREAD/8m HEIGHT TREE SIZES ARE ESTIMATES ONLY

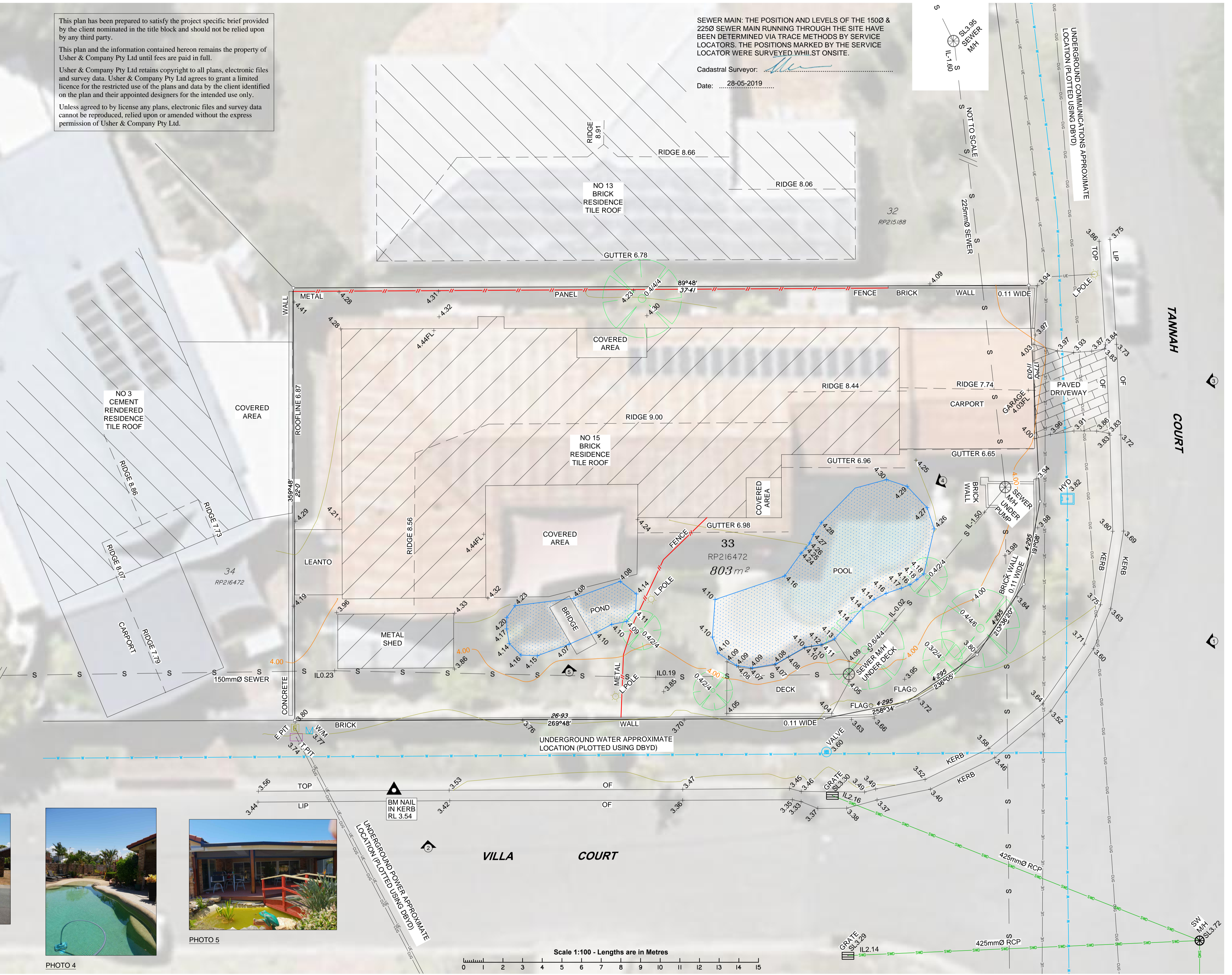
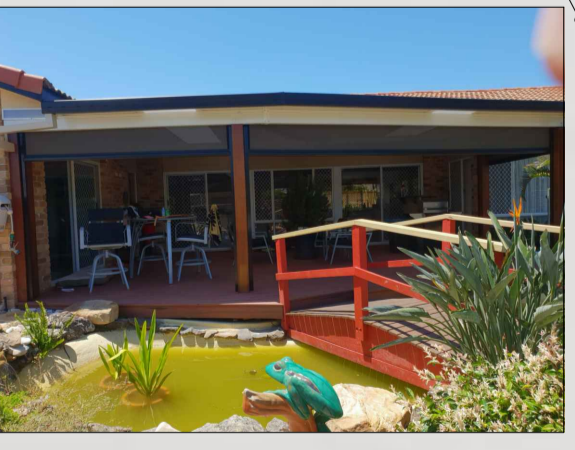
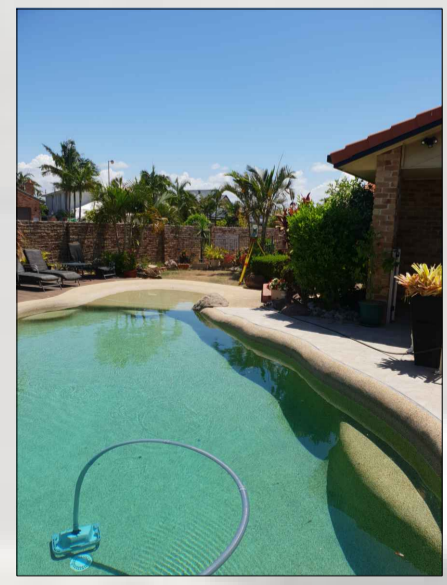
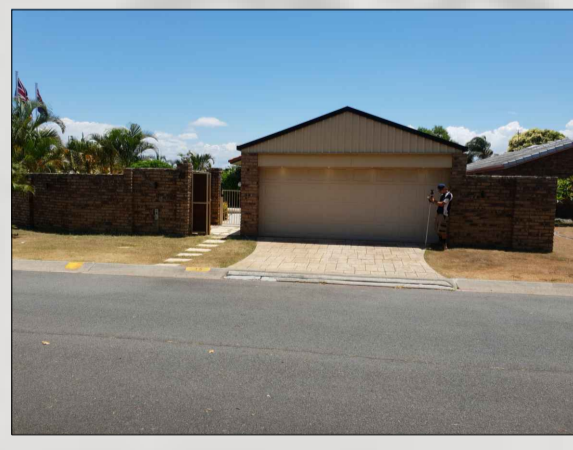
--- UNDERGROUND POWER (NOT SURVEYED)
 --- UNDERGROUND OPTUS (NOT SURVEYED)
 --- UNDERGROUND STORMWATER (NOT SURVEYED)
 --- UNDERGROUND WATER (NOT SURVEYED)
 --- UNDERGROUND SEWER (NOT SURVEYED)

--- FENCE

⊞ ELECTRICITY PIT
 ⊞ TELSTRA PIT
 ⊞ STORMWATER MANHOLE
 ⊞ STORMWATER GRATE
 ⊞ WATER METER
 ⊞ STOP VALVE
 ⊞ FIRE HYDRANT

⊙ LIGHT POLE
 ⊙ PHOTO LOCATION & DIRECTION
 ⊙ BENCHMARK
 ⊙ SPOT HEIGHTS

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APPROVED

Amendments		
ISSUE	DATE	DETAILS
A	31-01-2019	Original Issue
B	07-03-2019	Title block updated
C	28-05-2019	Sewer line located

PLAN:
 SHOWING DETAIL AND LEVELS
 AT 15 TANNAH COURT
 BEING LOT33 IN RP216472

LG: GOLD COAST CITY
 SUBURB: BROADBEACH WATERS
 ORIGIN: PSM 32754
 RL 2.865 AHD
 CLASS C, ORDER 3rd

REDUCTION RATIO: 1:100 (A1)
 DATUM: AHD
 DATE OF SURVEY: 25-01-2019
 SURVEYED BY: SD TC
 DRAWN BY: TM

THIS PLAN IS FOR THE EXCLUSIVE USE OF

PLAN REFERENCE
 10484

ISSUE
 C

A1



Appendix B

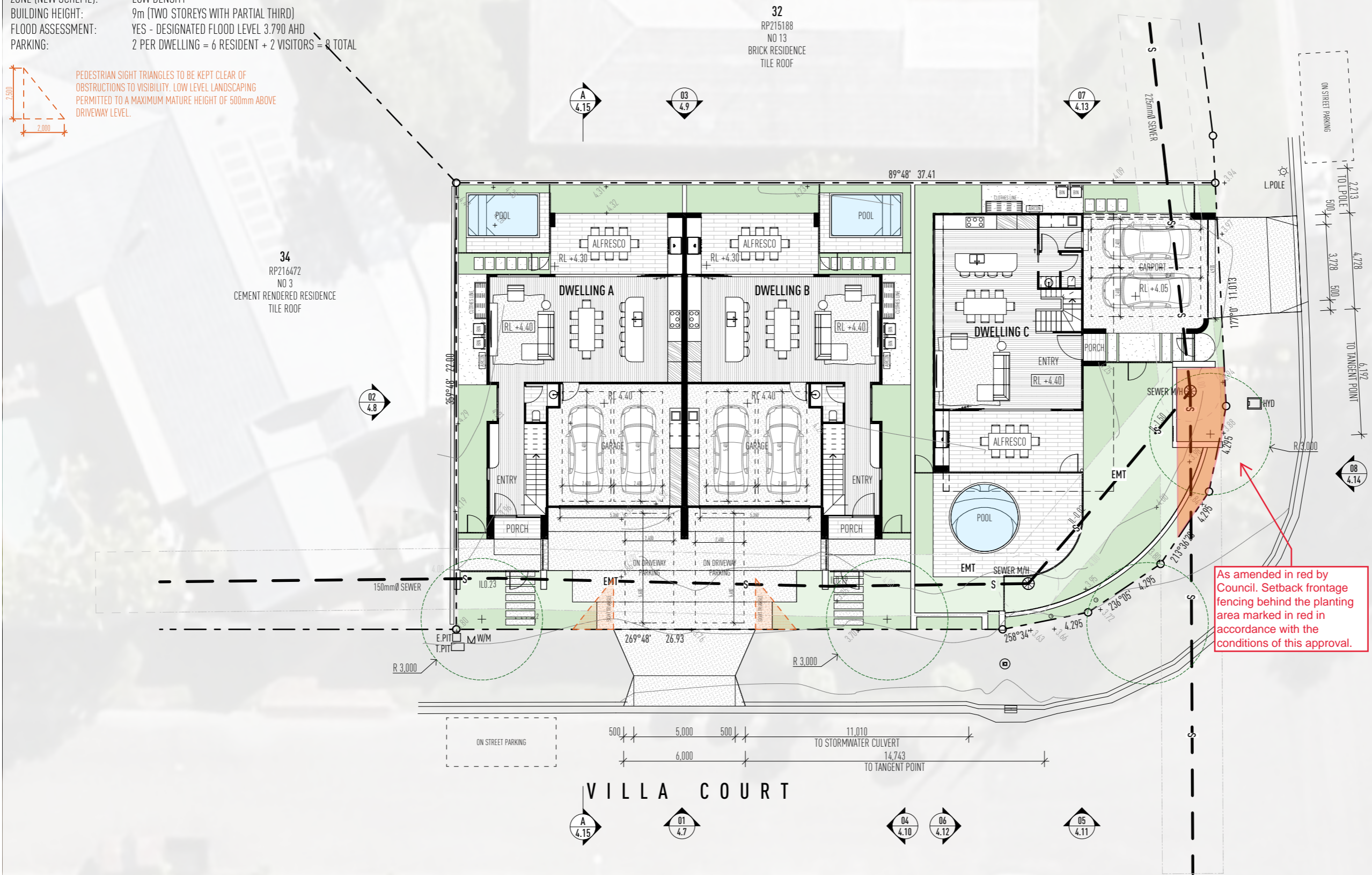
- Development Plans



Site Plan - Level 1 (Ground)

SITE SUMMARY

PROPERTY ADDRESS: 15 TANNAH COURT, BROADBEACH WATERS QLD 4218
 LOT & PLAN: LOT 33 ON RP216472
 SITE AREA: 803m²
 ZONE (NEW SCHEME): LOW DENSITY
 BUILDING HEIGHT: 9m (TWO STOREYS WITH PARTIAL THIRD)
 FLOOD ASSESSMENT: YES - DESIGNATED FLOOD LEVEL 3.790 AHD
 PARKING: 2 PER DWELLING = 6 RESIDENT + 2 VISITORS = 8 TOTAL



As amended in red by Council. Setback frontage fencing behind the planting area marked in red in accordance with the conditions of this approval.

PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: OTH/2024/19

Dated: 20 August 2024

Development shall comply with the conditions of approval as detailed in the Decision Notice and Council's Planning Scheme, Local Laws and Planning Policies



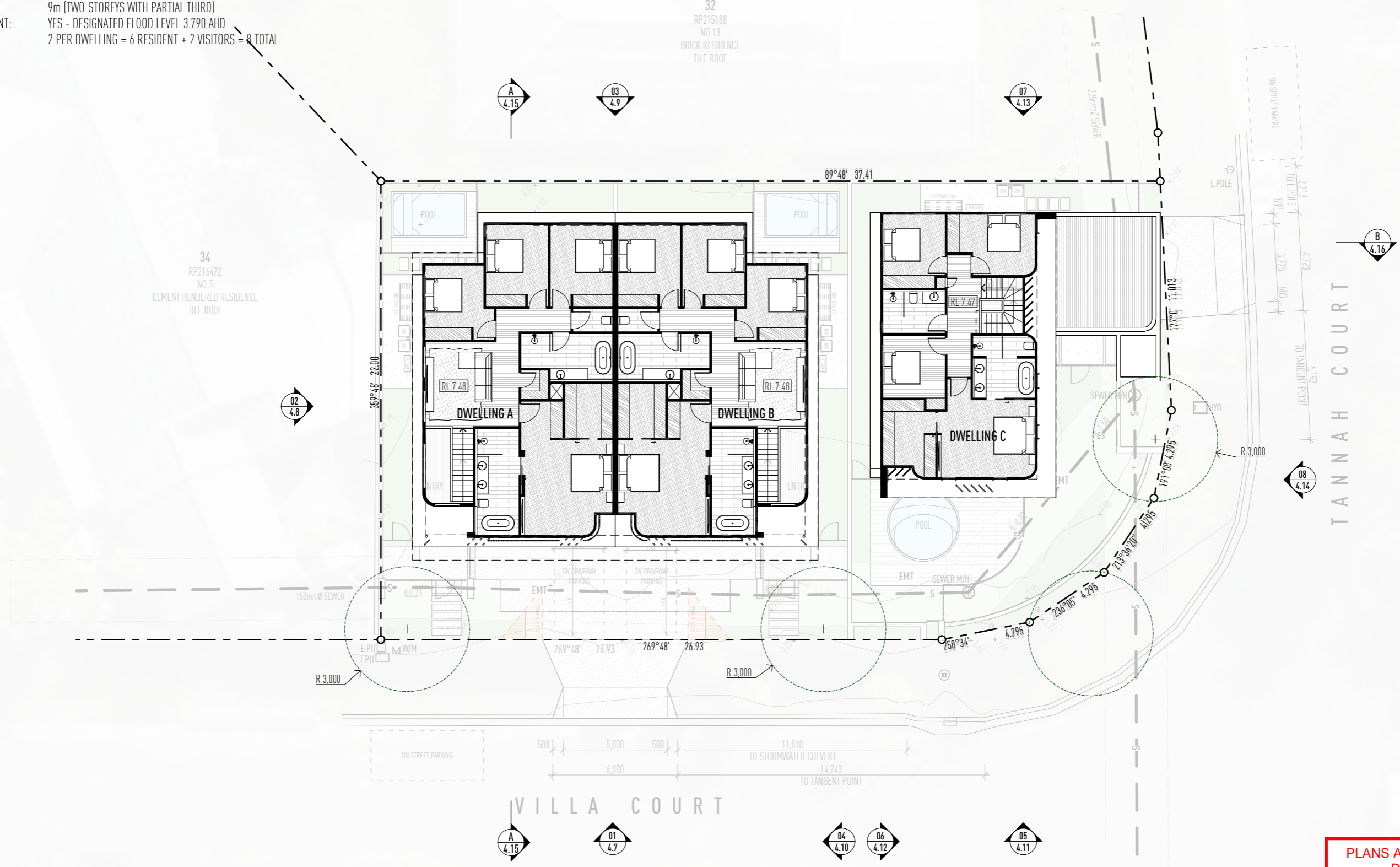
Site Plan - Level 2

SITE SUMMARY

PROPERTY ADDRESS: 15 TANNAH COURT, BROADBEACH WATERS QLD 4218
 LOT & PLAN: LOT 33 ON RP216472
 SITE AREA: 803m²
 ZONE (NEW SCHEME): LOW DENSITY
 BUILDING HEIGHT: 9m (TWO STOREYS WITH PARTIAL THIRD)
 FLOOD ASSESSMENT: YES - DESIGNATED FLOOD LEVEL 3.790 AHD
 PARKING: 2 PER DWELLING = 6 RESIDENT + 2 VISITORS = 8 TOTAL

34
 RP216472
 NO 3
 CEMENT RENDERED RESIDENCE
 TILE ROOF

32
 RP215188
 NO 13
 BRICK RESIDENCE
 TILE ROOF



PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: OTH/2024/19

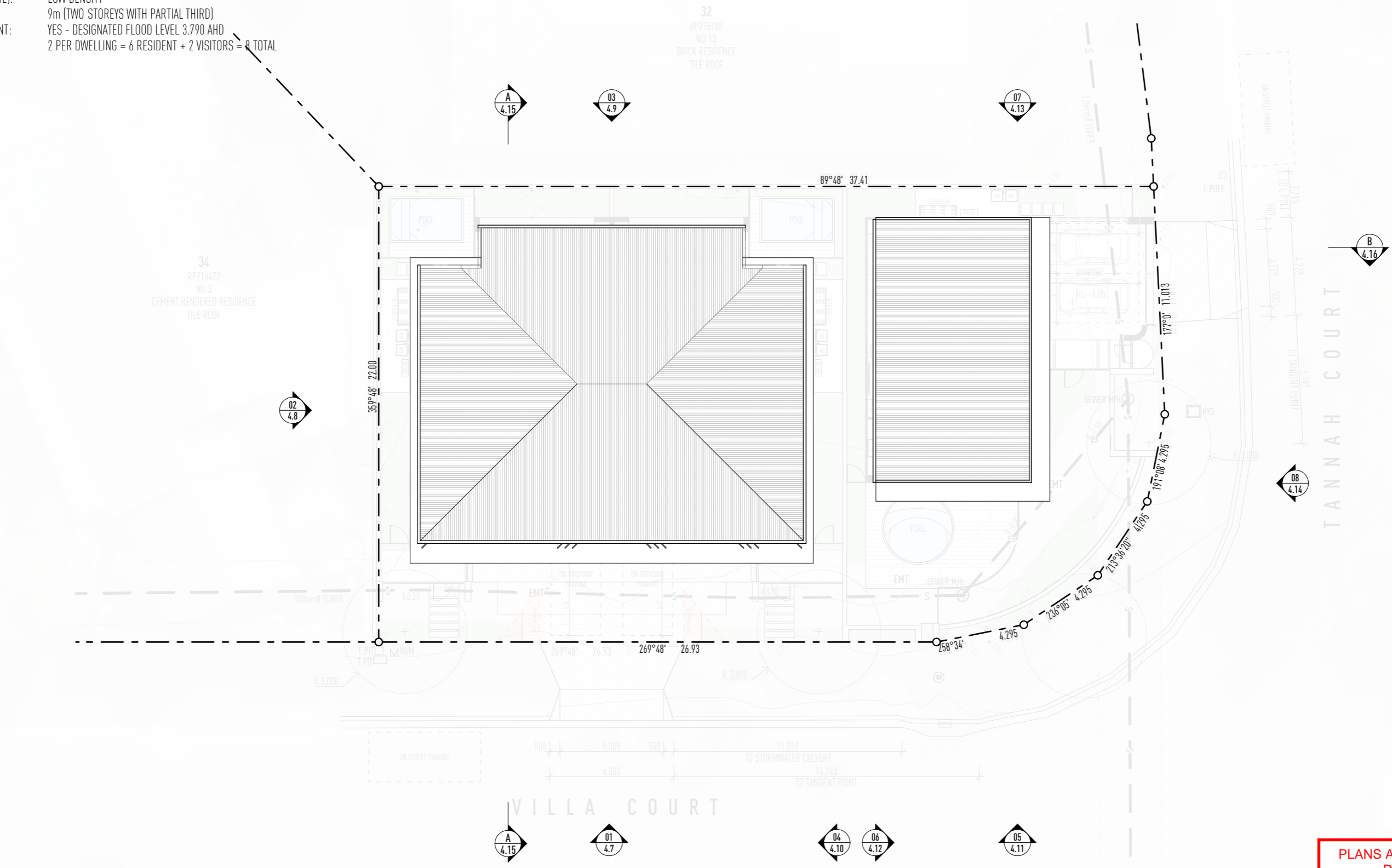
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PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Application No: OTH/2024/19

Dated: 20 August 2024

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Appendix C

- Civil Engineering Drawings

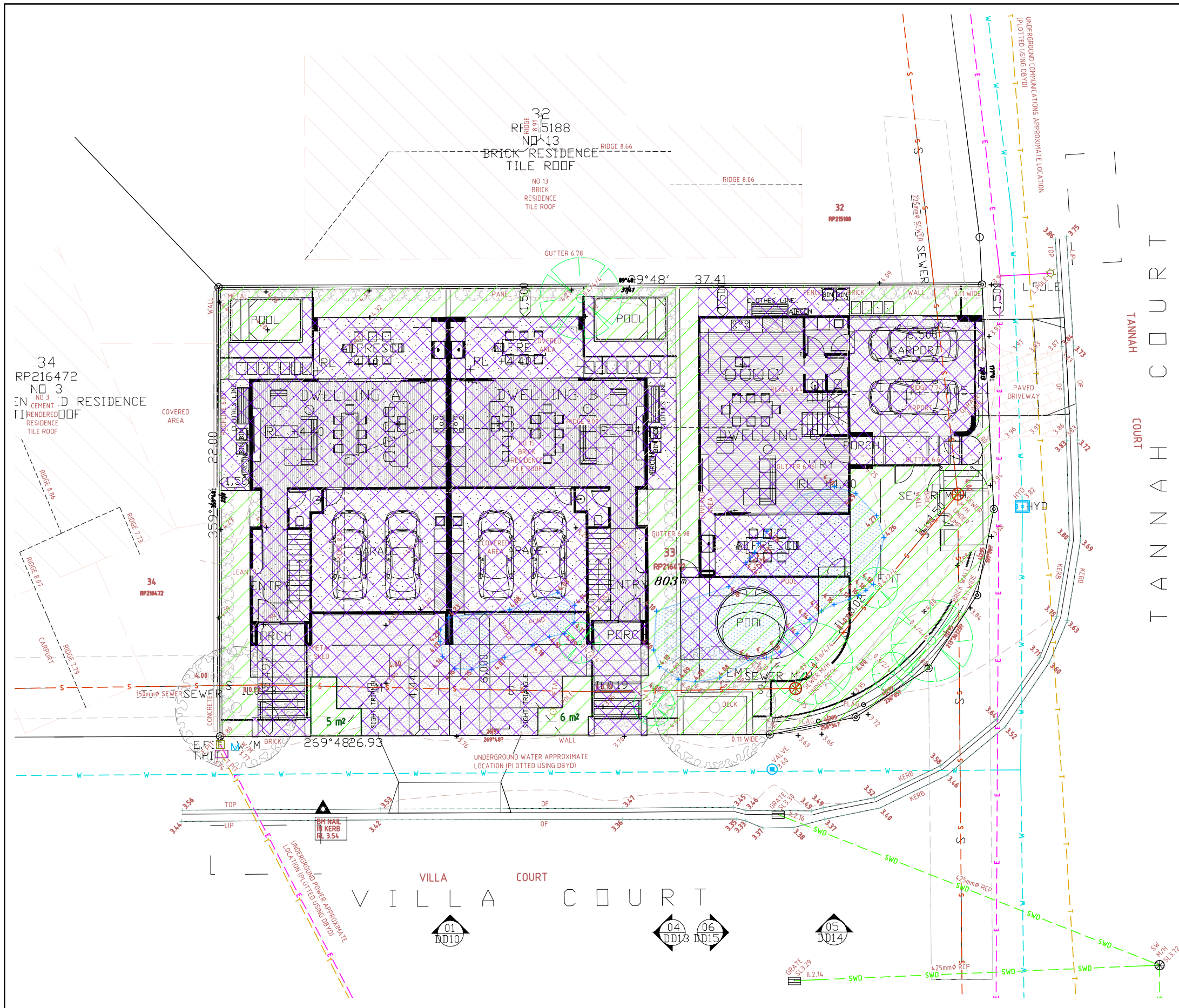


LEGEND - EXISTING	
	EXISTING EDGE OF BITUMEN
	EXISTING BUILDING
	EXISTING CONTOUR
	EXISTING CONCRETE PAVEMENT
	EXISTING DRIVEWAY
	EXISTING FENCE
	EXISTING KERB
	EXISTING RETAINING WALL
	EXISTING SEWER LINE
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING UNDERGROUND ELECTRICAL
	EXISTING OVERHEAD ELECTRICAL
	EXISTING TELSTRA
	EXISTING GAS

CATCHMENT AREAS		
LEGEND	AREA (M ²)	DESCRIPTION
	213	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	590	ROOF & LANDSCAPE HARDSTAND (IMPERVIOUS)

- NOTES / WARNINGS**
1. THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION.
 2. TOTAL SITE AREA = 803m² OBTAINED FROM LGA CoGC PROPERTY SUMMARY
 3. EXISTING SITE MEASURES AS 73.5% IMPERVIOUS.

ARCHITECT SCALE 		SURVEYOR USHER & COMPANY <small>Surveying & Land Development Consultants A.B.N. 70 128 414 802</small> 1 West Street, Burleigh Heads QLD 4220 PO Box 756 Burleigh Heads QLD 4220 Phone: (07) 5535 8346 Fax: (07) 5535 8155 Email: admin@usherandcompany.com.au		CLIENT: Mr. Scott Barrett PROJECT TITLE: 15 Tannah Court Broadbeach Waters		DISCUSSION PURPOSES ONLY NOT FOR CONSTRUCTION APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD		Fe Friends civil engineering Friends Civil Engineering Pty Ltd ABN 40 638 121 132 p. 0415 704 063 & 0422 024 440 e. contact@friendsengineer.com w. friendsengineer.com Gold Coast Mail PO Box 94 WEST BURLEIGH QLD 4219 Ballina Mail PO Box 7111 EAST BALLINA NSW 2478		DRAWING TITLE: EXISTING CASE SITE IMPERVIOUSNESS <table border="1"> <tr> <th>PROJECT No.</th> <th>DRAWING No.</th> <th>ISSUE</th> </tr> <tr> <td>FE24015</td> <td>DA01</td> <td>[01]</td> </tr> </table>			PROJECT No.	DRAWING No.	ISSUE	FE24015	DA01	[01]
PROJECT No.	DRAWING No.	ISSUE																
FE24015	DA01	[01]																
01 ORIGINAL ISSUE RR 03/24																		
ISSUE DESCRIPTION BY DATE																		



LEGEND - EXISTING	
	EXISTING EDGE OF BITUMEN
	EXISTING BUILDING
	EXISTING CONTOUR
	EXISTING CONCRETE PAVEMENT
	EXISTING DRIVEWAY
	EXISTING FENCE
	EXISTING KERB
	EXISTING RETAINING WALL
	EXISTING SEWER LINE
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING UNDERGROUND ELECTRICAL
	EXISTING OVERHEAD ELECTRICAL
	EXISTING TELSTRA
	EXISTING GAS

CATCHMENT AREAS		
LEGEND	AREA (M ²)	DESCRIPTION
	235	LANDSCAPING GARDENS/LAWNS (PERVIOUS)
	568	ROOF & LANDSCAPE HARDSTAND (IMPERVIOUS)

- NOTES / WARNINGS**
- THESE DRAWINGS ARE FOR DA PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION.
 - TOTAL SITE AREA = 803m² OBTAINED FROM LGA CoGC PROPERTY SUMMARY
 - DESIGN SITE MEASURES AS 70.7% IMPERVIOUS.

ARCHITECT SCALE 		SURVEYOR USHER & COMPANY Surveying & Land Development Consultants A.B.N. 70 128 414 602 1 West Street, Burleigh Heads QLD 4220 PO Box 756 Burleigh Heads QLD 4220 Phone: (07) 5535 8346 Fax: (07) 5535 8155 Email: admin@usherandcompany.com.au		CLIENT: Mr. Scott Barrett PROJECT TITLE: 15 Tannah Court Broadbeach Waters		DISCUSSION PURPOSES ONLY NOT FOR CONSTRUCTION APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD		Fe Friends civil engineering Friends Civil Engineering Pty Ltd ABN 40 638 121 132 p. 0415 704 063 & 0422 024 440 e. contact@friendsengineer.com w. friendsengineer.com Gold Coast Mail PO Box 94 WEST BURLEIGH QLD 4219 Ballina Mail PO Box 7111 EAST BALLINA NSW 2478		DRAWING TITLE: DESIGN CASE SITE IMPERVIOUSNESS <table border="1"> <tr> <th>PROJECT No.</th> <th>DRAWING No.</th> <th>ISSUE</th> </tr> <tr> <td>FE24015</td> <td>DA02</td> <td>[01]</td> </tr> </table>		PROJECT No.	DRAWING No.	ISSUE	FE24015	DA02	[01]
PROJECT No.	DRAWING No.	ISSUE															
FE24015	DA02	[01]															
01 ORIGINAL ISSUE RR 03/24																	

NOTES / WARNINGS

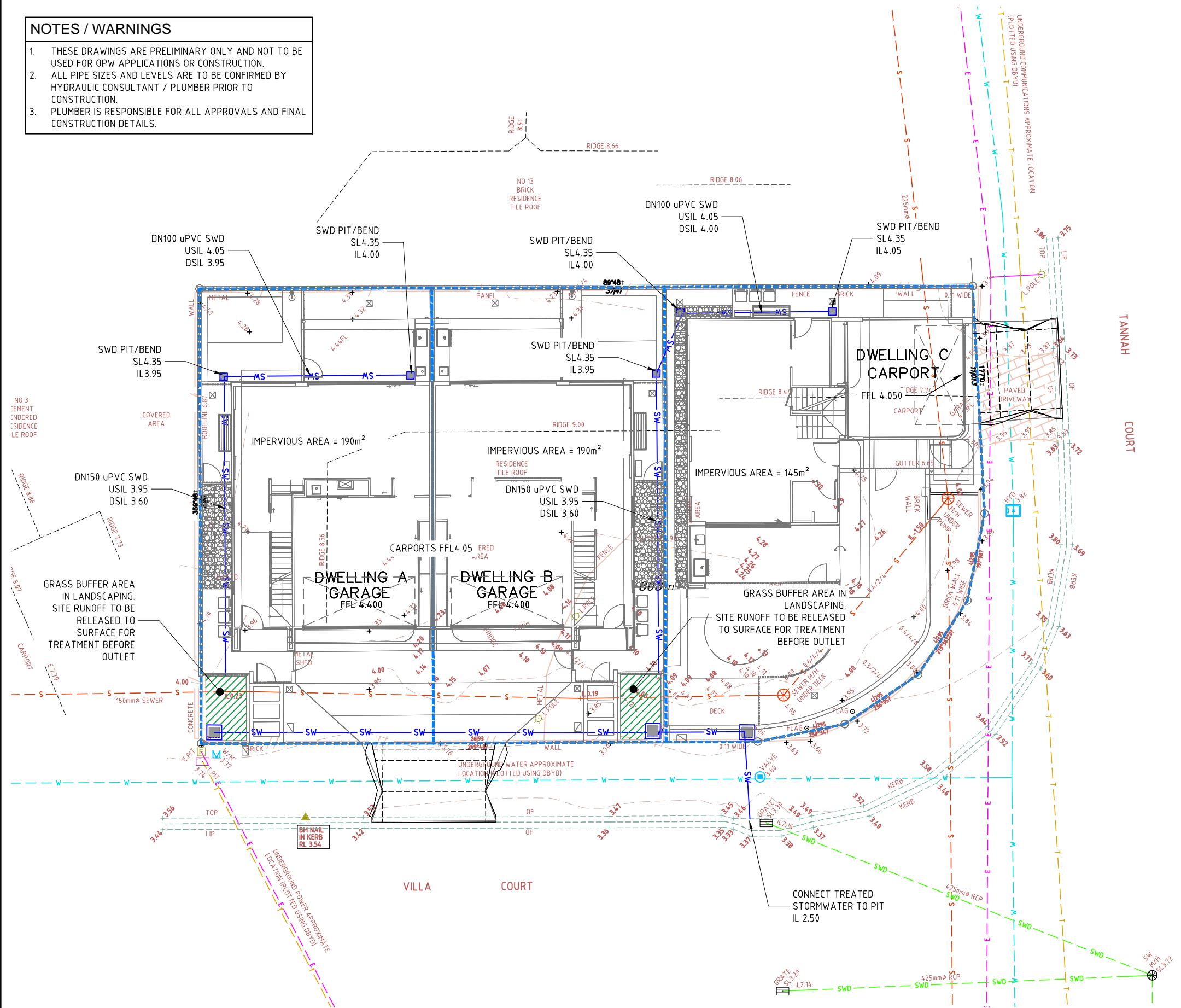
1. THESE DRAWINGS ARE PRELIMINARY ONLY AND NOT TO BE USED FOR OPW APPLICATIONS OR CONSTRUCTION.
2. ALL PIPE SIZES AND LEVELS ARE TO BE CONFIRMED BY HYDRAULIC CONSULTANT / PLUMBER PRIOR TO CONSTRUCTION.
3. PLUMBER IS RESPONSIBLE FOR ALL APPROVALS AND FINAL CONSTRUCTION DETAILS.

LEGEND - EXISTING

	EXISTING EDGE OF BITUMEN
	EXISTING BUILDING
	EXISTING CONTOUR
	EXISTING CONCRETE PAVEMENT
	EXISTING DRIVEWAY
	EXISTING FENCE
	EXISTING KERB
	EXISTING RETAINING WALL
	EXISTING SEWER LINE
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING UNDERGROUND ELECTRICAL
	EXISTING OVERHEAD ELECTRICAL
	EXISTING TELSTRA
	EXISTING GAS

LEGEND - DESIGN

	INDICATIVE STORMWATER LAYOUT
	STORMWATER CATCHMENT
	OVERLAND FLOW DIRECTION
	SUGGESTED BIO-RETENTION AREA



ISSUE	DESCRIPTION	BY	DATE
[04]	GRASS BUFFERS ADDED	RR	11/25
[03]	UPDATED ARCHS	BS	06/24
[02]	ADDITIONAL PIPE LEVELS ADDED	RR	06/24
[01]	ORIGINAL ISSUE	RR	03/24

ARCHITECT	
SURVEYOR	
SCALE	1:100

USHER & COMPANY
 Surveying & Land Development Consultants
 A.B.N. 70 128 414 602

1 West Street, Burleigh Heads QLD 4220
 PO Box 756 Burleigh Heads QLD 4220
 Phone: (07) 5535 8346
 Fax: (07) 5535 8155
 Email: admin@usherandcompany.com.au

CLIENT: Mr. Scott Barrett

PROJECT TITLE: 15 Tannah Court Broadbeach Waters

**DISCUSSION PURPOSES ONLY
NOT FOR CONSTRUCTION**

APPROVED FOR AND ON BEHALF OF FRIENDS CIVIL ENGINEERING PTY LTD

R.P.E.Q No:	PROJECT TEAM
HEIGHT DATUM: AHD	DESIGNER: RR
GRID: MGA	CHECKER: GH
ORIGINAL SHEET SIZE: A1	APPROVED: RR

Fe Friends civil engineering

Friends Civil Engineering Pty Ltd
 ABN 40 638 121 132
 p. 0415 704 063 & 0422 024 440
 e. contact@friendsengineer.com
 w. friendsengineer.com

Gold Coast Mail PO Box 94
 WEST BURLEIGH QLD 4219
 Ballina Mail PO Box 7111
 EAST BALLINA NSW 2478

DRAWING TITLE: STORMWATER MANAGEMENT PLAN

PROJECT No.	DRAWING No.	ISSUE
FE24015	DA03	[04]



Appendix D

- Healthy Waters Code

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

Note: In accordance with Section 2.1 of City Plan, an assessment against State interest - Water quality (policies 4 and 5) of the State Planning Policy 2017 is required as the Healthy water development code does not fully integrate this State interest. A response table for policies 4 and 5 have been included below.

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.5 Healthy waters code

9.4.5.1 Application

This code applies to assessing material change of use, reconfiguring a lot or operational work for development where indicated within:

- (1) Part 5 Tables of assessment; and
- (2) Table 9.4.5.1-1: Development triggers for applying the Healthy waters code.

Table 9.4.5.1-1: Development triggers for applying the Healthy waters code

Topic	Assessment triggers	Applicable assessment benchmarks
Erosion and sediment control	All development.	For accepted development subject to requirements: RO1, RO2
		For assessable development: PO1, PO2
Stormwater quality and waterway stability	For residential land uses involving one or more of the following: (a) 3 or more dwellings; or	For accepted development subject to requirements: RO3, RO5

Topic	Assessment triggers	Applicable assessment benchmarks
	(b) a land area greater than 1,200m ² ; or (c) a newly constructed road (previously unformed road) exceeding 30m in total length; or (d) 200m ² or more of uncovered new or refurbished car park area including parking bays and circulation driveways; or (e) the creation of high polluting outdoor activities (including Bulk landscape supplies, Garden centres, Tourist parks, Transport depots, Warehouses and Wholesale nurseries).	For assessable development: PO3, PO4, PO8 – PO13
	For non-residential land uses involving one or more of the following: (a) a land area greater than 1,200m ² ; or (b) a newly constructed road (previously unformed road) exceeding 30m in total length; or (c) 200m ² or more of uncovered new or refurbished car park area including parking bays and circulation driveways; or (d) the creation of high polluting outdoor activities (including Bulk landscape supplies, Garden centres, Tourist parks, Transport depots, Warehouses and Wholesale nurseries).	For accepted development subject to requirements: RO4, RO5 For assessable development: PO3, PO4, PO8 – PO14
Stormwater quantity	For residential activities, development associated with the creation of 3 or more dwellings, resulting in either: (a) an increase in the total impervious area; or (b) an alteration of upstream conveyance or change to existing discharge location or condition.	For accepted development subject to requirements: RO3, RO6, RO7 For assessable development: PO5 – PO14
	For all other land uses, development that results in either: (a) an increase in the total impervious area; or (b) an alteration of upstream conveyance or change to existing discharge location or condition.	For accepted development subject to requirements: RO4, RO6, RO7 For assessable development: PO5 – PO14
Woongoolba flood mitigation catchment area	Development that is code or impact assessable, on land within the 'Woongoolba flood mitigation catchment area' on the Water catchments and dual supply system area overlay map .	For assessable development: PO15

This code does not apply in the following instances:

- (1) where the development involves internal works or minor building works to a lawfully established building; or
- (2) a sales office.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.4.5.2 Purpose

- (1) The purpose of the Healthy waters code is to:
 - (a) protect the quality of the city's waters and watercourses by managing the impacts of development on quality and quantity of surface and ground water runoff; and
 - (b) ensure that development does not cause adverse impact on people and/or property.
- (2) The purpose of the code will be achieved through the following overall outcomes:
 - (a) Total water cycle management and water sensitive urban design (WSUD) principles are:
 - (i) implemented to contribute to biodiversity areas and green space values within the city and promote co-location of assets; and
 - (ii) integrated into the landscape so as to maintain watercourse health, biodiversity and ecosystems.
 - (b) Development avoids or minimises disturbance to existing landforms, surface drainage, watercourses and groundwater.
 - (c) Impacts to public health and safety hazards are minimised.
 - (d) Adverse impacts to people and/or property are prevented and stormwater is safely managed within urban areas.
 - (e) Development protects existing overland flow paths and watercourses of environmental value.
 - (f) Development limits the quantity of key pollutants discharged in stormwater to protect the quality of receiving waters.
 - (g) Development avoids adverse impacts to downstream properties or environmental value from stormwater peak discharge.
 - (h) Development avoids or minimises adverse impacts on the environmental values of receiving waters from the release and mobilisation of nutrients and sediments.
 - (i) The drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintained (contained within the Scheme drains within a 4 day period) and this capacity is not to be eroded due to cumulative impact of development.

9.4.5.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.5-3: Healthy waters code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
Erosion and sediment control			
PO1 Stormwater discharge from a development	AO1 No acceptable outcome provided.	PO1 COMPILES	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
<p>site achieves the construction phase water quality objectives of SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.</p>		<p>Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
<p>PO2 Erosion, sediment and dust is appropriately managed during the construction phase.</p>	<p>AO2 The level of risk for soil erosion and sediment pollution to the environment is determined by an erosion hazard assessment, completed by a suitably-qualified person in accordance with the criteria in Table 9.4.5-4: Erosion hazard assessment.</p> <p>Where the erosion hazard assessment has a risk score of: less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.</i></p> <p>greater than 10 or developments involving multiple stages of disturbance or more than 1.25 ha of land:</p> <p>(i) For material change of use or reconfiguring a lot, a conceptual erosion and sediment control plan (ESCP) is prepared by a suitably-qualified person for Council approval in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive</p>	<p>PO2 COMPILES</p> <p>Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
	<p>urban design standards, and the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008</i>.</p> <p>(ii) For operational work, a detailed ESCP is prepared by a suitably-qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, and <i>Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008</i>.</p> <p>The ESCP is to detail appropriate treatment measures for the construction phase of development, demonstrating how the minimum design objectives in Table 9.4.5-5: Stormwater design objectives are achieved, including:</p> <p>measures to ensure the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded;</p> <p>detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and manufacturer’s recommendations; and</p> <p>details of how the ESCP aligns with the approved development staging plan.</p>		
Stormwater quality			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
<p>PO3</p> <p>Development appropriately manages stormwater quality to:</p> <ul style="list-style-type: none"> protect natural ecosystems; protect water quality; reduce runoff and peak flows; and meet the water quality objectives and environmental values for Queensland waters. <p>Note: Water quality objectives and environmental values for Queensland waters are contained within <i>Schedule 1 of the Environmental Protection (Water) Policy 2009</i>. Water quality objectives are locally specific and vary between and within river catchments.</p> <p>Note: A stormwater quality management plan prepared by a suitably qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, is Council’s preferred method for addressing this performance outcome.</p>	<p>AO3.1</p> <p>For post developed sites, the following minimum pollutant reduction targets are achieved:</p> <ul style="list-style-type: none"> Gross pollutants (>5mm) – 90%; Total Suspended Solids (TSS) – 80%; Total Phosphorus (TP) – 60%; and Total Nitrogen (TN) – 45%. <p>AO3.2</p> <p>For development on land less than 1.25ha, a deemed to comply solution for stormwater quality is achieved in accordance with Table 9.4.5-6: Stormwater quality deemed to comply solutions.</p> <p>AO3.3</p> <p>For development on land greater than 1.25ha, a stormwater quality management plan is to be prepared by a suitably qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, is required.</p>	<p>PO3 COMPILES</p> <p>Refer to Section 6 of the Friends Civil Engineering Stormwater Management Plan.</p>	
Waterway stability			
<p>PO4</p> <p>In-stream erosion, downstream of urban development is prevented by controlling the rate (or magnitude) and duration of sediment transporting flows.</p>	<p>AO4</p> <p>Post-development peak 0.632 Annual Exceedance Probability (AEP) event discharge within receiving waterway is limited to pre-development peak 0.632 AEP event discharge and is in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.</p>		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
Stormwater quantity control			
<p>PO5 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.</p>	<p>AO5 The following is achieved external to the development site:</p> <ul style="list-style-type: none"> (a) no increase in peak flood flow rate from the development site for all events up to and including the 1% AEP; (b) no increase in peak flood velocities from the development site for all events up to and including the 1% AEP; (c) no increase in peak flood level from the development site for all events up to and including the 1% AEP; and (d) stormwater outfalls or discharge is located to avoid conflict with existing usage of downstream land or impacts on existing watercourse or drainage. 	<p>PO5 COMPILES</p> <p>Refer to Section 5 of the Friends Civil Engineering Stormwater Management Plan.</p>	
Lawful point of discharge			
<p>PO6 Development ensures the stormwater systems are designed to not cause actionable nuisance that would adversely affect adjoining (upstream or downstream) properties.</p>	<p>AO6 A lawful point of discharge must be identified and demonstrated that all discharge point/s from the development are in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.</p>	<p>PO6 COMPILES</p> <p>Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
Overland flow paths			
<p>PO7 Development must not obstruct free open surface flow of stormwater through a site.</p>	<p>AO7 Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear or sides of a property, in accordance with the provisions of the <i>Building Code of Australia</i>.</p>	<p>N/A</p>	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
Whole of life costs			
<p>PO8 Stormwater infrastructure is designed and constructed to: remain fit for purpose for the life of the development and maintains full functionality in the design flood event; be cost effective to maintain; and ensure no structural damage to existing stormwater infrastructure.</p>	<p>AO8 No acceptable outcome provided.</p>	<p>PO8 COMPILES Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
Landscape integration			
<p>PO9 Stormwater treatment devices and stormwater infrastructure are designed to: integrate with the urban design and landscape outcomes of the development; complement natural environments, wetlands and watercourses; protect environmental values; enhance visual amenity; and incorporate CPTED principles in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.</p>	<p>AO9.1 Where stormwater treatment devices and stormwater infrastructure are integrated into public open space, a Statement of Landscape Intent is to be prepared by a suitably qualified person, for approval by Council. The plan is to demonstrate that the operation of stormwater infrastructure does not compromise the function of any co-located uses and reflect the design principles within SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Note: A Statement of landscape intent is to be prepared in accordance with SC6.13 City Plan policy – Landscape work.</p>	<p>PO9 COMPILES Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
	<p>AO9.2 Stormwater treatment devices are located offline to any upstream catchment. Note: This provision relates to the integration of stormwater treatment devices and stormwater infrastructure into the landscape. Development identified on the Environmental significance –</p>		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
	<p>wetlands and watercourse overlay map will still require assessment against the Environmental significance overlay code.</p>		
	<p>AO9.3 All stormwater outlets that are located adjacent to watercourses, creeks and drainage paths are aligned at a maximum of 45 degrees to the downstream direction of flow, and energy dissipation measures installed to minimise scour.</p>		
Public safety			
<p>PO10 Stormwater treatment devices and stormwater infrastructure minimise impacts on public health and safety.</p>	<p>AO10 All stormwater quantity control measures are designed in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.</p>	<p>PO10 COMPILES Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
Maintenance access			
<p>PO11 Maintenance access is provided for all stormwater management systems and considers: the type of vehicle or machinery needed to service particular assets; and the need to ensure a safe working environment for maintenance personnel and the public.</p>	<p>AO11.1 All weather vehicle access is to be provided to inlet zones of the stormwater treatment systems in accordance with Table 9.4.5-7: Maintenance access requirements (slope).</p>	<p>PO11 COMPILES Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	
	<p>AO11.2 Maintenance access is to be provided around the perimeter of all stormwater treatment systems in accordance with Table 9.4.5-8: Maintenance access requirements (size).</p>		
	<p>AO11.3 A maintenance buffer is provided around the perimeter of all stormwater treatment</p>		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
	<p>devices and adjoining private property equal to: 1m in width; or the width of a perimeter maintenance access, as delivered in AO11.2, plus 0.5m.</p> <p>The maintenance buffer is measured from the adjacent allotment boundary to the top of batter around the treatment measure. The maximum slope on the maintenance buffer is 1 in 10.</p>		
Fauna movement			
<p>PO12 Stormwater conveyance structures and channels are designed to ensure the safe movement of native fauna and provide for terrestrial and aquatic passage.</p>	<p>AO12.1 Stormwater drainage structures and channels minimise impacts on aquatic fauna and associated habitats and provide opportunities for beneficial habitat uses of structures in accordance with the <i>Department of Primary Industries and Fisheries – Fisheries guidelines for Fish-friendly structures (2006)</i>.</p>	N/A	
	<p>AO12.2 Stormwater drainage structures allow for the safe movement of terrestrial fauna in accordance with: the Queensland Government Fauna Sensitive Road Design Manual Volume 2: Preferred Practices; and the Queensland Government Koala-Sensitive Design Guidelines.</p>		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
Wastewater management			
<p>PO13 Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration: the applicable water quality objectives for the receiving waters; and the potential adverse impact on ecosystem health of receiving waters.</p>	<p>AO13 Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: wastewater type; climatic conditions; water quality objectives; best-practice environmental management; waste management hierarchy; and the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to watercourses; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to watercourses is minimised through re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.</p>	<p>PO13 COMPILES Site is connected to CoGC sewer</p>	
Dewatering management			
<p>PO14 Dewatering occurs in accordance with an approved Dewatering management plan.</p>	<p>AO14 No acceptable outcome provided.</p>	<p>PO14 COMPILES Refer to the Friends Civil Engineering Stormwater Management Plan above.</p>	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
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Woongoolba flood mitigation catchment area

<p>PO15 In the Woongoolba flood mitigation catchment area, shown on the Water catchments and dual supply system area overlay map, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.</p>	<p>AO15 No acceptable outcome provided.</p>	N/A	
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State Planning Policy July 2017

Policies	Demonstrate how the proposal meets the policy?	Internal use
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State interest – water quality

<p>ASSESSMENT BENCHMARK 4 (POLICY 4): At the construction phase, development achieves the applicable stormwater management design objectives in table A (appendix 2) of the State Planning Policy.</p>	<p>COMPILES Refer to Section 7 of the Friends Civil Engineering Stormwater Management Plan above.</p>	
<p>ASSESSMENT BENCHMARK 5 (POLICY 5): (5) At the post-construction phase, development:</p> <ul style="list-style-type: none"> a) achieves the applicable stormwater management design objectives on-site, as identified in table B (appendix 2) of the State Planning Policy; or b) achieves an alternative locally appropriate solution off-site that achieves an equivalent or improved water quality outcome to the relevant stormwater management design objectives in table B (appendix 2) of 	<p>COMPILES Refer to Section 6 of the Friends Civil Engineering Stormwater Management Plan above.</p>	

Policies	Demonstrate how the proposal meets the policy?	Internal use
the State Planning Policy.		

Table 9.4.5-3: Erosion hazard assessment

Controlling factor	Points	Score
Average slope of the whole site prior to operational works		
Slope less than 2%	0	0
More than or equal to 2% but less than 5%	1	
More than or equal to 5% but less than 10%	2	
More than or equal to 10% but less than 15%	4	
More than or equal to 15%	5	High risk
Soil type (to be disturbed)		
Gravels and sandy soils	1	1
Sandy loam	2	
Clays on flood plains	3	
Shallow soils on slopes	4	
Clays on slopes greater than 5%/imported fill or untested fill	5	High risk
Anticipated duration of site disturbance		
Duration less than 2 weeks	0	
More than 2 weeks but less than 3 months	2	
More than 3 months but less than 6 months	4	4
More than 6 months	5	High risk
Anticipated erosive rainfall risk during site disturbance		
Low (monthly average rainfall less than 45 mm)	0	
Moderate (monthly average rainfall 46 - 100 mm)	1	
High (monthly average rainfall 101 - 225 mm)	2	
Very high (monthly average rainfall 226 - 1500 mm)	4	4
Extreme (monthly average rainfall more than 1500 mm)	5	High risk
Off-site sediment control (down-slope of the soil disturbance)		

Controlling factor	Points	Score
Score 1 point if there is no purpose-built sediment trap (e.g. sediment basin, gross pollutant trap or purpose-built wetland).	1	1
Run-off entering the site		
Score 1 point if stormwater run-off is not diverted from entering the site or away from soil disturbance.	1	0
Extent of site disturbance		
Score 2 points if the building works requires reshaping of the ground surface.	2	2
Total Score		12
Note: High erosion risk - if score 11 or greater, or five for any factor.		

This Erosion Hazard Assessment form is adapted from the *Best Practice Erosion and Sediment Control, International Erosion Control Association (Australasia), IECA 2008 Appendix H - Building Sites, the Brisbane City Council Erosion Hazard Assessment Form and Attachment 2 to the QDC Draft Part 16 Erosion and Sediment Control.*

Table 9.4.5-5: Stormwater design objectives

Construction phase stormwater design objectives	Notes
Drainage control	
<p>Design life and design storm of temporary drainage works:</p> <p>(1) Disturbed area open for less than 12 months - 1 in 2 ARI.</p> <p>(2) Disturbed area open for 12-24 months - 1 in 5 ARI.</p> <p>(3) Disturbed area open for more than 24 months - 1 in 10 ARI.</p>	<ul style="list-style-type: none"> • ARI = Average Recurrence Interval (see Engineers Australia document Australian Rainfall and Runoff). • Design capacity excludes minimum 150mm freeboard. • A higher drainage design objective may be required for temporary drainage structures upslope of occupied properties. • A revised drainage design storm may be required if these design objectives are found to be impracticable.
Erosion control	
<p>(1) Stage clearing and construction works to minimise the area of exposed soil at any one time.</p> <p>(2) Effectively cover or stabilise exposed soils prior to predicted rainfall.</p> <p>(3) Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised using methods which will achieve effective short-term stabilisation.</p> <p>(4) Avoid or minimise large construction activities in the 'wet season'.</p> <p>(5) Divert water run-off from undisturbed areas around disturbed areas.</p> <p>(6) Use erosion risk ratings to determine appropriate erosion control measures.</p>	<ul style="list-style-type: none"> • 'Wet season' means the high rainfall months, e.g. the four highest rainfall months. • For point 6, determine the erosion risk rating using local rainfall erosivity, rainfall depth, or soil loss rate or other acceptable method. A rating scale such as very low, low, moderate, high, extreme should be applied. Such ratings should reflect the local area. Example ratings may be shown in local council guidelines or detailed in best-practice guidelines.
Sediment control	
<p>(1) Use soil loss rates to determine appropriate sediment control measures.</p> <p>(2) Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk.</p> <p>(3) All exposed areas greater than 2500 metres must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated</p>	<ul style="list-style-type: none"> • For point 1, surrogate determinations may be used such as monthly erosion or average monthly rainfall. • A commonly used design storm for basin sizing is 80th percentile five-day event. Depending on the settling characteristics of local soils, a higher 'operational' design storm can be achieved with chemical dosing operated in flow-through mode in a large storm with rainfall-activated auto-flocculent dosing, and advanced hydraulic efficiency features such as floating off-takes, and a sediment forebay.

(i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).

- TSS = Total Suspended Solids. Turbidity measurements (e.g. 60 Nephelometric Turbidity Units (NTU)) could be used; however, for accuracy, a site-specific relationship should be developed between turbidity and TSS.
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Table 9.4.5-6: Stormwater quality deemed to comply solutions

The following deemed to comply solutions are to be documented within a Stormwater quality management plan prepared by a suitably-qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.**

Development type			Stormwater treatment train		Land ownership ²
Land use	Scenario	Scale			
Residential	>2 lots up to 20 lots	N/A	Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl Attached 3 kl 	Bio retention ³ @ 1.3% of impervious catchment area. ¹	Public and/or Private
			No Tanks	Bio retention ³ @ 1.8% of impervious catchment area. ¹	Public and/or Private
			Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl Attached 3 kl 	Wetland @ 5% of impervious catchment area.	Public and/or Private
			No Tanks	Wetland @ 7% of impervious catchment area. ¹	Public and/or Private
	> 2 dwellings (Townhouse style up to 2 storeys)	≤ 12,500m ²	Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl Attached 3 kl 	Bio retention ³ @ 1.3% of impervious catchment area. ¹	Private
			No Tanks	Bio retention ³ @ 1.8% of impervious catchment area. ¹	Private
			Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl Attached 3 kl 	Wetland @ 5% of impervious catchment area. ¹	Private
			No Tanks	Wetland @ 7% of impervious catchment area. ¹	Private
	High density multiple dwelling apartments (flats,	≤ 12,500m ²	Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl 	Bio retention ³ @ 1.8% of impervious catchment area. ¹	Private

	high-rise)*		<ul style="list-style-type: none"> Attached 3 kl 		
			No Tanks	Wetland @ 7% of impervious catchment area. ¹	Private
Commercial, Industrial and Retail (including retail at the bottom floors of high rise) ⁴	Commercial and/or Industrial uses	≤ 12,500m ²	Tank Volume per dwelling: <ul style="list-style-type: none"> Detached 5 kl Attached 3 kl 	Gross pollutant management (GPT) + Bio retention ³ @ 1.8% of impervious catchment area. ¹	Public and/or Private
			No Tanks	Gross pollutant management (GPT) + Wetland @ 8% of impervious catchment area. ¹	Public and/or Private

¹ For developments that results in an increase in less than 15% imperviousness (i.e. roof and ground level impervious), then stormwater management to focus on the impervious areas only.

² Ultimate owner of the device and responsible for maintenance.

³ For bioretention basins larger than 800m², an inlet pond will be required.

⁴ The City requires gross pollutant management for these land uses. It is preferred that these are located on private property, but in larger scale Reconfiguring a lot applications it is logical to have a single gross pollutant trap for the site. The City will not accept proprietary devices for nutrient management on public/City land.

Table 9.4.5-7: Maintenance access requirements (slope)

Treatment type	Access track slope	Material and width
Stormwater inflows where pipe is 450mm or greater (where there is no forebay or inlet pond)	1 in 4 or flatter	2.5m wide minimum Gravel or reinforced turf from inlet
Coarse sediment forebay	1 in 4 or flatter	2.5m minimum Reinforced concrete in accordance with <i>IPWEAQ standard drawing RS-051</i> Concrete paver (subject to City approval), cement treated gravel 250mm thick may be accepted by the City through negotiation.
Inlet pond (wet) for retention or	1 in 4 or flatter	3m wide

wetland Sediment basins		Reinforced concrete in accordance with Heavy Vehicle Crossing Industrial (refer IPWEAQ standard drawing RS-051). Where this access crosses perpendicular to pedestrian paths, the path must be 200mm thick, double reinforced and 42MPa.
Proprietary devices	1 in 4 or flatter	Reinforced concrete in accordance with Heavy Vehicle Crossing Industrial (refer IPWEAQ standard drawing RS-051).

Table 9.4.5-8: Maintenance access requirements (size)

Treatment type	Size	Maintenance access requirements (all paths 1 in 10 cross fall or less and maximum 1 in 4 longitudinal grade)
Bioretention	< 500m ²	Access path to > 40% of perimeter. ≥ 0.75m wide. Grass, mulch, gravel or concrete suitable for access on foot. ¹
	≥ 500m ²	Access path to > 40% of perimeter. ≥ 2.5m wide. Reinforced grass, gravel or concrete for light vehicles. ¹ Remainder of perimeter as per < 500m ² bioretention.
Wetland	<1000m ²	Access path to > 40% of perimeter. ≥ 0.75m wide. Grass, mulch, gravel or concrete suitable for access on foot.
	≥ 1000m ² to < 5000m ²	Access path minimum 40% of perimeter. ≥ 2.5m wide.

		Reinforced grass, gravel or concrete for light vehicles. ¹ Remainder of perimeter $\geq 0.75\text{m}$ wide.
	$\geq 5000\text{m}^2$	Access path 100% of perimeter. $\geq 2.5\text{m}$ wide. Cement treated gravel 200mm or concrete for large vehicles.

¹ Determine access path treatment based on slope, maintenance vehicle and the surrounding landscape. For example, turf is not appropriate where the treatment system is located against conservation open space, and where revegetation for the treatment system complements the surroundings, the use of gravel or concrete is preferred.