UMBRELLA GROUP
CONSULTING ENGINEERS

Stormwater Management Plan

Proposed Multi Unit Residential Development at 25 – 39 Abbotsford Road, Bowen Hills, Qld 4006

Prepared For
State Development Infrastructure and Planning

Client
Starhill Property Group

Issue 01 December 2014

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Document Information

UMB14241 –STORMWATER MANAGEMENT PLAN : 23 – 39 Abbotsford Road Bowen Hills, Qld 4006				
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Issue 01		**Position**	**Date**	**Comments**
Prepared By	Michael Bou Rada	Design Engineer	12/12/14	
Reviewed By	Joe Bacha	Design Engineer	12/12/14	

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Client	**Comments**
Starhill Property Group	Nil

Disclaimer

The advice and information contained within this report rely on the quality of the records and other data provided by the Client and obtained from Brisbane City Council along with the time and budgetary constraints imposed.

EXECUTIVE SUMMARY

This report describes the stormwater management strategy for both quantity and quality for the proposed development at:

Real Property Description	Street Address
Lot 3 on RP 10087	23 Abbotsford Road
Lot 17 on RP 47816	25 Abbotsford Road
Lots 2 & 6 on RP 10087	29 & 31 Abbotsford Road
Lot 1 on RP 10091	33 Abbotsford road
Lot 2 on RP 10092	35 Abbotsford Road
Lot 1 on RP 10092	39 Abbotsford Road

An assessment has been undertaken in accordance with the Queensland Urban Drainage Manual guidelines and a recommendation made to mitigate the increase in stormwater runoff for this proposed development by the installation of a detention basin with a storage capacity of 40m^3.

Stormwater quality treatment trains will be provided as part of the development, and it is designed to sufficiently remove stormwater pollutants from the proposed developed runoff to meet the Department of State Development, Infrastructure and Planning, State Planning Policy July 2014 and in accordance with South East Queensland Healthy Waterways Partnership's Water by Design WSUD Technical Design Guidelines for South East Queensland Version 1 (2006) and MUSIC Modelling Guidelines for South East Queensland Version 1.0 (2010).

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1 INTRODUCTION

The Umbrella Group has been engaged by Starhill Property Group to prepare this Stormwater Management Plan (SMP) for the proposed twin residential unit development at 23 – 39 Abbotsford road, Bowen Hills, Qld 4006. This plan specifically responds to the Compliance Assessment Approval – "*Condition 9a) – Submit to DSIP – PDADA for compliance assessment, a stormwater management plan, certified by an RPEQ, in accordance with QUDM and State Planning Policy Water Quality",* refer Appendix 1. Specifically, the aim of this stormwater management plan is to address:-

- *Brisbane City Council's "Stormwater Infrastructure Code",*
- Proposed development details,
- Existing site topography and features,
- Existing catchments and overland flow,
- Lawful point of discharge,
- Stormwater quantity management,
- Freeboard and habitable floor levels,
- Stormwater quality management,
- Assess erosion and sediment control.

The limitations of this report are:-

- Services locations are based on historical records,
- No field sampling or testing has been undertaken,
- No analysis or calculations as to the capacity of the existing services have been undertaken,
- No geotechnical investigations have been undertaken,
- Existing services location and size have been derived from Council and Statutory Authorities' search records which have been made available.
- The concept plans provided are not for construction purposes

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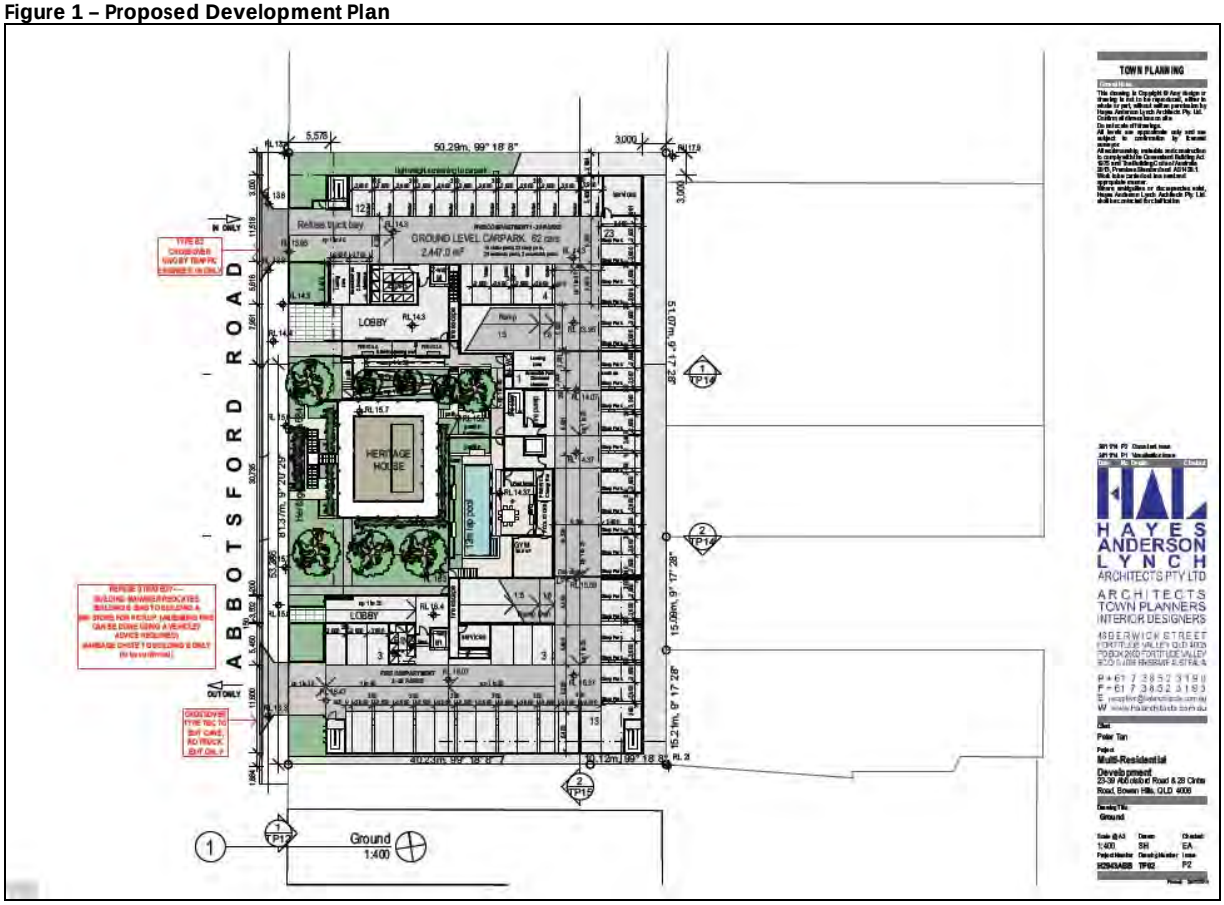
Figure 1 – Proposed Development Plan



1.1 Proposed Development Details

This proposed development consists of two below ground basement carparks and 8 stories above ground which are located in two buildings, A and B with each consisting of 71 units in building A and 92 units in building B, yielding a total of 155 residential units. In additional to the proposed development the existing house is to be retained because of its heritage character, refer Appendix 2. As can been seen from Figure 1 below, this proposed residential unit development is an infill site and can be described as:-

Table 1- Development Details

Site Address	23 – 29 Abbotsford Road
Suburb	Bowen Hills
Post Code	Qld 4006
Site Area	4095m²
Local Authority	Brisbane City Council
Real Property Description	Refer table below

1.2 Site Information

All site information has been derived from Brisbane City Council's *EBimap* services and *PDOnline*, refer Appendix 4.

1.3 Location

This site is abounded by Abbotsford and Cintra Roads with the main access from Abbotsford Road. Both of these roads are sealed with kerb and channelling. There is an existing 375mm diameter stormwater pipe located in Abbottsford Road, refer Appendix 4.

1.4 Topography

The proposed development site is free draining with an approximate fall across the site of 8%, refer Appendix 3.

1.5 Current Land Use and Zoning

The following table details the current use of each lot and the proposed use is in accordance within the Priority Development Area as described by The Minister for Economic Development Queensland pursuant to the Economic Development Act 2012.

Table 2- Current Land Use and Details

Real Property Description	Street Address	Area (m^2)	Current Use - Residential	Proposed Use
Lot 3 on RP 10087	23 Abbotsford Road	405	Existing 2 level house	House to be removed
Lot 17 on RP 47816	25 Abbotsford Road	1069	Existing 3 level house	House to be removed
Lots 2 & 6 on RP 10087	29 & 31 Abbotsford Road	810	Highset timber house	House to be retained
Lot 1 on RP 10091	33 Abbotsford road	506	Highset timber house	House to be removed
Lot 2 on RP 10092	35 Abbotsford Road	650	Highset timber house	House to be removed
Lot 1 on RP 10092	39 Abbotsford Road	650	Highset timber house	House to be removed

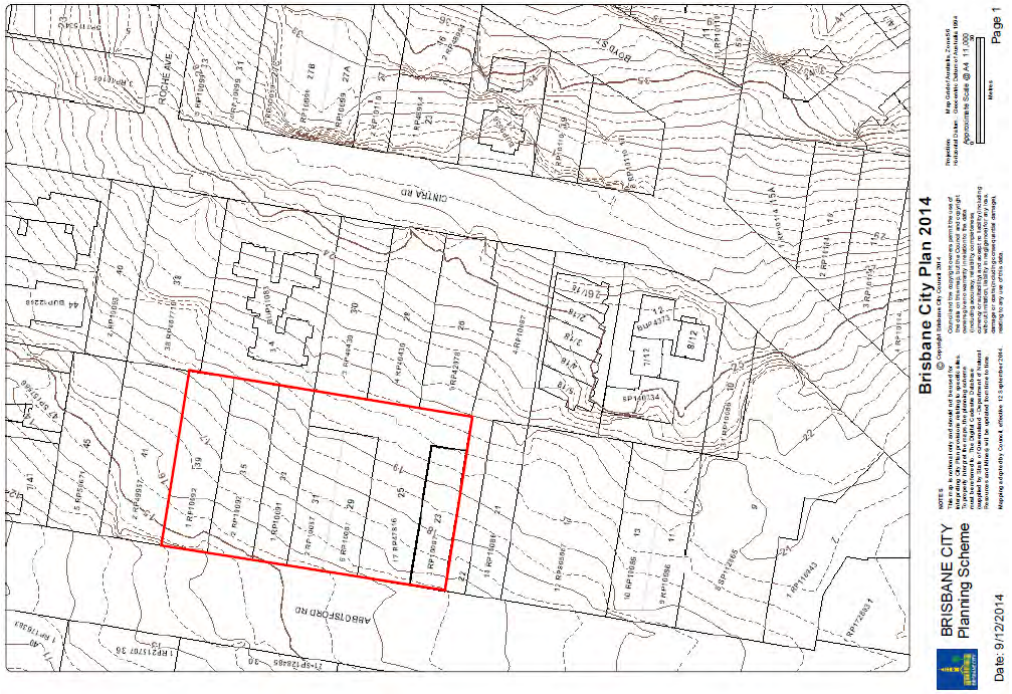
1.6 Existing Catchments & Overland Flow

There are no defined overland flow paths through this proposed development site. All flows are sheet flow from Cintra Road to the east. The ARI 50 year flows have been diverted around the proposed development by means of installing flow paths and channels which are directed to Abbotsford Road, refer Appendix 9, The following table details stormwater runoff from the upstream catchment and has been determined utilising the DRAINS Vs 6.0, Stormwater Drainage Design and Analysis programme in accordance with QUDM guidelines and parameters.

Table 3- Overland Flow

Catchment Details	Parameter
Catchments Area (ha)	2.23
Catchment Use	Urban
Catchment length (m)	460
Average Catchment Slope (%)	7.5
Impervious Flow Path Roughness	0.013
Pervious Flow Roughness	0.035
Time Of Concentration – Impervious (Min)	4.38
Time Of Concentration – Pervious (Min)	18.99
ARI $_2$ Year Flow (m³/s)	0.63
ARI $_{10}$ Year Flow (m³/s)	0.98
ARI $_{20}$ Year Flow (m³/s)	1.17
ARI $_{50}$ Year Flow (m³/s)	1.35

Figure 2 – Existing Upstream Plan (Courtesy of Brisbane City Council PDOnline)



1.7 Lawful Point of Discharge

All stormwater from this proposed development will be discharged to Abbotsford Road, refer Appendix 4. The pre and post developed flows will be balanced to ensure there is a "non-worsening" effect upstream or downstream. Prior to discharge, the stormwater quality from this site will be treated as outlined herein.

1.8 Flooding

A search of Brisbane City Councils Floodwise Property Report indicates the following regional flooding information for these properties, refer Appendix 13.

Table 4- BCC Floodwise Flags

BCC Floodwise Property Report	Flag (Yes/No)
Defined Flood Level (DFL)	No
Residential Flood Level (RFL)	No
Overland Flow	No
Flood Overlay	No
Coastal Overlay	No

2 Stormwater Quantity Assessment

2.1 Rainfall Data

Rainfall intensity-frequency-distribution (IFD) data for the site has been obtained from Brisbane City Council's guidelines.

2.2 Existing Catchments

The proposed building has been sited to allow the upstream drainage to be channelled around the building to discharge into Abbotsford Road. The overland flow will be intercepted and conveyed by an open channel system bypassing the proposed detention system before connecting to a proposed stormwater pit in Abbottsford Road. In addition, an allowance for the upstream development has been incorporated by the installation of stubs to the each property for future purposes, refer Appendix 6.

2.3 Pre Developed Flows

To evaluate the potential impacts of the proposed development downstream a hydrologic assessment has been undertaken for both existing and proposed developed scenarios for the development.

The stormwater runoff has been determined utilising the DRAINS Vs 6.0, Stormwater Drainage Design and Analysis programme in accordance with QUDM for the 1, 2, 5, 10, 20 and 50 year annual recurrence intervals (ARI) rainfall events . The following table below provides the peak flows which were determined using DRAINS (ILSAX) software obtained:

Table 5- Pre Developed Flows

Description	Value
ARI_1 (m^3/s)	0.098
ARI_2 (m^3/s)	0.139
ARI_5 (m^3/s)	0.185
ARI_{10} (m^3/s)	0.213
ARI_{20} (m^3/s)	0.250
ARI_{50} (m^3/s)	0.268
ARI_{100} (m^3/s)	0.303

2.4 Post Developed Flows

The proposed OSD tank is intended to mitigate peak flows from the site to be no greater than the existing peak flows. Discharges from the tank are to be controlled by a low flow orifice and a high flow outlet pipe (weir), both discharging to Abbotsford Road, as shown.

ILSAX hydrological model of DRAINS software has been used to model the post-developed scenario and has been calibrated as per Table 4 below to design the detention required for the tank. DRAINS model input data is included in Appendix 7.

2.5 Stormwater Detention Requirements

The entire site's roof and building drainage will be directed to the proposed tank located along the northern boundary, refer Appendix 8.

A low level control orifice (outlet pipe) at the tank outlet was designed to control the discharge flow rate for the more frequent storm events. A high level outlet pipe was also designed to discharge major flows at a rate equal or less than existing. In the rare event of blockage, the emergency outflow from the tank will be via the access chamber located directly above the orifice outlet. All emergency overflows will surcharge from the tank and seek relief within the overland flow swale, eventually draining onto Abbotsford Road and having no negative impact on surrounding habitable areas.

Table 6 below shows the design details of the proposed detention tank which is required to achieve the waterway stability objective of no post-development increase to pre-development flows for the catchment. The tank has been iteratively optimised to ensure peak performance.

Table 6- Detention Tank

ARI $_{100}$ Year Volume (m^3)	Primary Orifice Control or Eqiv Area (m)	Secondary Orifice Control or Eqiv - (m)	Max Depth ARI $_{100}$ Years (m)	Depth ARI $_{20}$ Years (m)	Freeboard ARI $_{100}$ Years (m)
1.40	200mm dia	225mm dia	1.20	1.13	0.3

Table 7 below summarises the pre and post-developed total peak flows obtained:

Table 7- Pre and Post Development Flow

ARI Storm Event Years	Existing Peak Flow m³/s	Proposed Peak Flow m³/s	Difference m³/s
1	0.10	0.10	0.00
2	0.14	0.13	-0.01
5	0.19	0.17	-0.01
10	0.21	0.20	-0.01
20	0.25	0.24	-0.01
50	0.27	0.26	-0.01
100	0.30	0.29	-0.01

2.6 Conceptual Stormwater Plan

The tank has been designed to fit the existing topography and blend into the proposed residential development. A minimum 350mm of soil & turf can be deposited above the roof slab to ensure the tank blends in with its surrounding. The tank shape, size, depth and volume (40 m^3 maximum storage) fits within the allocated area, refer Appendix 8.

A concept plan has been prepared which details the location of the underground drainage and roofwater proposal, refer Appendix 6.

3 STORMWATER QUALITY ASSESSMENT

Water quality parameters and the proposed limits applicable to this site have been selected in accordance with *South East Queensland Healthy Waterways Partnership's Water by Design*

WSUD Technical Design Guidelines for South East Queensland Version 1 (2006) and *MUSIC Modelling Guidelines for South East Queensland Version 1.0 (2010).*

3.1 Water Quality Objectives

Best Management Practices (BMP) are required to be demonstrated for all development applications within the South East Queensland area. The following load reduction targets must be achieved when assessing the post-developed sites treatment train (comparison of unmitigated developed case versus developed mitigated case):

- Total Suspended Solids (TSS) 80% reduction of average annual load
- Total Phosphorus (TP) 60% reduction of average annual load
- Total Nitrogen(TN) 45% reduction of average annual load
- Litter/gross pollutants 90% reduction of average annual load

In addition to the above, the following permanent stormwater quality best management practices have been identified for the operational phase of the development to assist in the protection of water quality which include:

- Rubbish Bins to be provided on site
- Street sweeping of ingress/egress pavement areas
- Maintenance of all stormwater quality improvement devices

3.2 MUSIC Modelling

3.2.1 Modelling Guidelines

MUSIC Version 6 was used to assess pollutant generation and the performance of stormwater treatment measures for the proposed residential development. Selection and testing of stormwater management options was undertaken in accordance with "*MUSIC Modeling Guidelines Version 1.0 - 2010", Water By Design (2010).*

3.2.2 Rainfall Data

MUSIC Modelling Guidelines provide advice on meteorological data for different climatic regions of South East Queensland. Rainfall data for Brisbane was obtained from the Bureau of Meteorology. Six-minute time step rainfall data was obtained for the period between 1980 to 1990.

Table 8 - Rainfall Runoff Data

METEOROLOGICAL and RAINFALL RUNOFF DATA Music Modelling Guidelines Version 1.0 2010 - Water By Design - Table B1	
INPUT	**DATA USED IN MODELLING**
Rainfall station	Brisbane
Time step	6 Minute
Modelling period	10 years
Rainfall runoff parameters	Residential
Pollutant export parameters	Residential

3.2.3 Model Selection, assumption and removal effectiveness

In accordance with the *Water By Design MUSIC Modelling Guidelines*, split catchment methods were used for the Source Nodes utilizing modified % impervious area. Also rainfall threshold, soil properties and pollutant concentration input values were sourced from the guidelines.

The *MUSIC* modelling inputs for the rainfall source nodes are shown below.

Table 9 - MUSIC Input - Source Parameters

RAINFALL RUNOFF PARAMETERS Music Modelling Guidelines Version 1.0 2010 - Water By Design - Table B4	
PARAMETER	**SOURCE NODE 1**
Land use	Urban
Rainfall threshold(mm)	1
Soil storage capacity (mm)	500
Initial storage(%)	10
Field capacity (mm)	200
Infiltration capacity coefficient a	211
Infiltration capacity coefficient b	5
Initial depth (mm)	50
Daily percentage rate (%)	28
Daily baseflow rate (%)	27
Daily deep seepage rate (%)	0

Base flow and Storm flow parameters for TSS, TP and TN for Roofs, roads and ground level were sourced from *Water by Design MUSIC Modelling Guidelines* (v1 Dated 2010). Refer Below.

Table 10 – MUSIC Source Pollutant Parameters

POLLUTANT EXPORT PARAMETERS - TABLE 3.8 Music Modelling Guidelines Version 1.0 2010 - Water By Design - Table A1.3								
	FLOW TYPE	POLLUTANT SOURCE	TSS log^{10} values		TP log^{10} values		TN log^{10} values	
			Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Lumped	Baseflow	Urban lumped	1.00	0.34	-0.97	0.31	0.31	0.20
	Stormflow		2.18	0.39	-0.47	0.32	0.32	0.23
		Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Baseflow	Roads	1.00	0.34	-0.97	0.31	0.20	0.20
Split		Ground level	1.00	0.34	-0.97	0.31	0.20	0.20
		Roof	1.30	0.39	-0.89	0.31	0.26	0.23
	Stormflow	Roads	2.43	0.39	-0.30	0.31	0.26	0.23
		Ground level	2.18	0.39	-0.47	0.31	0.26	0.23

3.2.4 Treatment Trains

The proposed stormwater treatment train shall include specific devices aimed at achieving the water quality objectives at each of the discharge locations.

The stormwater treatment train for each discharge location shall include a combination of the following treatment devices:

- Bio-Retention/Raingarden (x4)

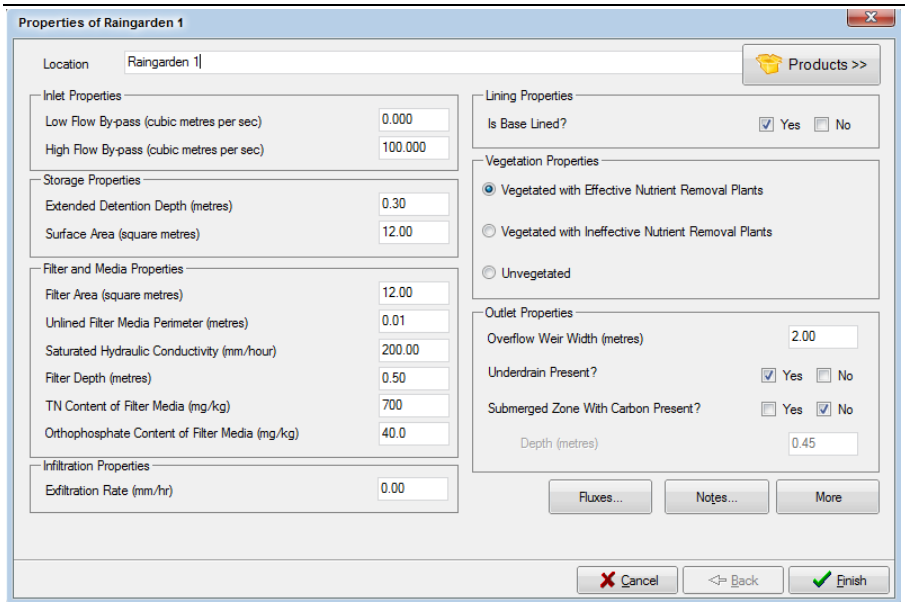
3.2.5 Bio-Retention Basin

4 Bio-retention systems have been incorporated to act as stormwater treatment devices for the site. The bio-retention basins are to be constructed and operated separate to any on-site detention systems, refer Appendix 9.

Rainfall runoff generated within the site is to be collected via a drainage pit/pipe system and discharged into the proposed basins located centrally at various discharge points within the site.

Apart from the filter area which varies between all 4 basins, the following parameters were adopted and in accordance with *The MUSIC Modelling Guidelines*. Below is the typical arrangement adopted for all 4 filtration systems:

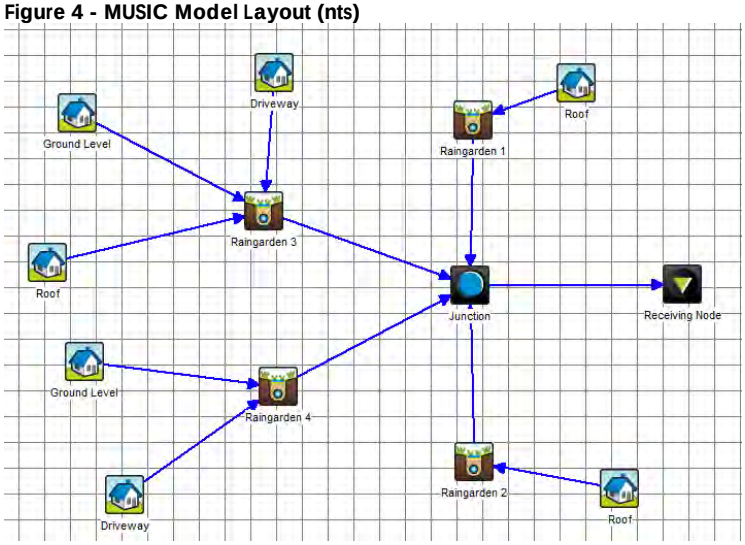
Figure 3 - Bio Basin Filter Parameters



3.2.6 MUSIC Model Layout

The layout of the site and the proposed drainage pattern were considered in the creation of the *MUSIC* model. The figure below presents the layout of source, treatment and receiving nodes used in the modelling.

Figure 4 - MUSIC Model Layout (nts)



3.2.7 Modelling Results, Comparisons and Compliance

The *MUSIC* modelling results are shown on the tables below. They are in the form of % reduction achieved with the proposed stormwater quality treatment train, refer Table 7.

Table 11 - MUSIC Modelling Results

Source Pollutants	Targeted Reduction	Treatment Train Reduction
Total suspended solid (kg/yr)	80.00%	83.30%
Total phosphorus (kg/yr)	60.00%	62.00%
Total nitrogen (kg/yr)	45.00%	54.20%
Gross pollutants (kg/yr)	90.00%	100.00%

As seen above, it is apparent that the proposed stormwater quality treatment device would be adequate to meet the Council's stormwater quality objectives.

3.2.8 Sensitivity Analysis

As per table 4.7 in "*MUSIC Modelling Guidelines Version 1.0 - 2010", Water By Design (2010*), the *MUSIC* model has been re-run with Saturated hydraulic conductivity of the bio-retention set to 50 mm/hr. Results are shown in Table 8.

Table 12 - MUSIC Sensitivity Modelling Results

Source Pollutants	Targeted Reduction	Treatment Train Reduction	%
Total suspended solid (kg/yr)	80.00%	75.60%	-6%
Total phosphorus (kg/yr)	60.00%	54.30%	-9%
Total nitrogen (kg/yr)	45.00%	42.10%	-6%
Gross pollutants (kg/yr)	90.00%	100.00%	11%

It is seen in the above table that the bio-retention basins will still achieve targeted removal rates for Gross Pollutants. The reduction efficiencies for total suspended solids, total nitrogen and total phosphorus is below the targeted reduction due to blockages in the system towards the end of the life span of the bio-retention basin. It was assessed that the reduction in pollutant removal efficiency towards the end of the life span of the bio-retention basin is not significant and was therefore assessed as satisfactory.

4 EROSION AND SEDIMENT

4.1 Site Establishment

Prior to any earthworks associated with site commencement, on site erosion and siltation control measures are to be put in place in accordance with Council's guidelines and best management practices for erosion and sediment control and as described herein. These measures include:

- The installation of a 1.8m high chain wire perimeter fence covered with shade cloth or solid A class hoarding, to the perimeter of the work site area,
- The construction of a silt fence on the low side of all site areas that are disturbed,
- All water leaving each site will be processed through a sediment control basin, where applicable,
- Swales and hay bales are to be used to assist with sediment control for overland flow paths leading into sedimentation control basins,
- The erosion and sediment control measures will be inspected at least once a week or after rainfall events to check their integrity.

The following information is provided to identify controls and procedures, and who is responsible for them, which will be incorporated into the Erosion and Sediment Control Program:

4.1.1 Pre-Construction

- Establish a single stabilised entry/exit point (vehicle shake down device) for each stage of construction. This point should also include a vehicle shakedown device to mitigate the transportation of dust and dirt,
- Sediment fences are to be placed along the low side of the site to slow flows, reduce scour and capture some sediment runoff,
- Sediment fences are to be constructed at the base of fill embankments,
- Divert up-slope water around the work site and appropriately stabilise any drainage channels,
- Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds,
- Diversion banks are to be created at the upstream boundary of construction activities to ensure upstream runoff is diverted around any areas to be exposed. Catch drains are to be created at the downstream boundary of construction activities,
- Construction of temporary sediment basins, where required,
- Site personnel are to be educated in the sediment and erosion control measures to be implemented on site.

4.1.2 During Construction

- Progressive re-vegetation of filled areas and fill batters, if applicable,
- Construction activities are to be confined to the necessary construction areas,
- The provision of a construction exit to prevent the tracking of debris from tyres of vehicles onto public roads. Only one construction exit will be nominated to limit the movement of construction equipment,
- The topsoil stockpile location will be nominated to coincide with areas previously disturbed. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile if required,
- Roof downpipes should be installed as soon as practicable after the roof is laid,
- Transport loads that are subject to loss through wind or spillage shall be covered or sealed to prevent entry of pollutants to the stormwater system,
- Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures. Following rainfall events greater than 50mm, inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged equipment should be undertaken immediately.

4.1.3 Post Construction

- The Contractor/Developer will be responsible for the maintenance of erosion and sediment control devices from the possession of the site until the site is accepted, or until stabilisation has occurred, to the satisfaction of the superintendent and developer,
- Key stormwater quality improvement devices requiring maintenance during the operational phase of the project following construction are the bio-retention areas and the gross pollutant traps,
- Maintenance requirements for these devices consist of:
    - Regular storm event inspection to ensure:
        - Sufficient vegetation within bio-retention areas; and

        - Ensuring no erosion has occurred
    - Regular mowing/harvesting to ensure vegetation is maintained at acceptable levels,
    - Removal of litter within verges, swales and bio-retention areas,
    - Regular trash removal,
    - The Sediment and Erosion Control Management Plans should be provided to all people involved with the site, including sub-contractors, private certifiers, home owners and regulators.

4.2 Erosion and Sediment Assessment Form

A general assessment of the site has been prepared and tabulated in the completed "*Erosion and Hazard Assessment – June 2014*", refer Appendix 10.

4.3 Stormwater Quality Checklist

To assist business/s and contractors in performing their tasks on the proposed site a check list has been prepared to assist the ongoing maintenance of the site and provide the basis of a system which may be followed, refer Appendix 11.

4.4 Water Quality Monitoring Program

The conservation process does propose the use of water sensitive practices and associated stormwater quality management at the outlet/discharge areas. The stormwater runoff will eventually discharge into waterways, but there is no proposal for water quality monitoring within the drainage infrastructure downstream of the site.

A form for release of sediment-laden stormwater from the site and an inspection record of stormwater quality improvement devices should be developed. It is intended each water release resulting from a storm event generating more than 100mm in a twenty-four hour period be recorded on the form to ensure ongoing monitoring, management and reporting of water releases from the site.

4.5 Maintenance

Particular care has been taken in the design of the proposed stormwater treatment train to reduce the maintenance requirements as much as possible.

It is strongly recommended that inspections are performed on the bio-retention areas upon completion of construction and at regular maintenance intervals of a maximum of 6 months. Regular maintenance of the bio-retention areas should be completed to ensure that the bio-retention media and under-drainage, outlet structures, landscaping and associated infrastructure is operating at full design specification. Any construction amendments that are required should be completed in accordance with the most recent guidelines.

5 BRISBANE CITY COUNCIL STORMWATER MANAGEMENT CODE

An assessment of *Brisbane City Councils Stormwater Management Code* has been completed and outcomes therein provide for acceptable solutions for flooding, water quality and drainage, refer Appendix 13.

6 CONCLUSION

This proposed Site Based Stormwater Management Plan has been prepared to manage both stormwater quantity and quality aspects of the site.

The proposed detention system has been assessed using the ILSAX module of DRAINS software, the most appropriate model approach for urban developments. The model shows that the peak discharges from the site in the post-developed scenario are mitigated to be not greater than the existing peak discharges from the site at legal point of discharge.

The proposed stormwater treatment devices have been assessed using MUSIC v6 software. This modelling shows that the proposed stormwater drainage and treatment strategy meet the Council's stormwater Quality Objectives in accordance with South East Queensland Healthy Waterways Partnership's Water by Design WSUD Technical Design Guidelines for South East Queensland Version 1 (2006) and MUSIC Modelling Guidelines for South East Queensland Version 1.0 (2010).

John Koek
RPEQ 3607

REFERENCES

- Subdivisional and Development Guidelines, Brisbane City Council
- DERM 2010 State Planning Policy 4/10 Healthy Waters
- DERM 2010 State Planning Policy 4/10 Guideline Healthy Waters
- Institution of Engineers – Australian Rainfall and Runoff
- Queensland Urban Drainage Manual, Queensland Government Natural Resources and Water, 2007
- Waterbydesign, Deemed To Comply Solutions – Stormwater Quality Management (South East Queensland) Version 1.0 – May 2010
- Waterbydesign, Water Sensitive Urban Design – Developing design objectives for urban developments in South East Queensland, Version 2 – 8 November 2007
- Department of State Development, Infrastructure and Planning, State Planning Policy July 2014

APPENDIX 1 – COMPLIANCE ASSESSMENT APPROVAL NOTICE

Queensland Government

Department of
State Development, Infrastructure and Planning

Our ref: DEV2012/397

2 June 2014

W, K, J, A & G Stammes
c/- Mr Adam Lockhart
Hayes Anderson Lynch Architects
PO Box 2680
FORTITUDE VALLEY BC QLD 4006

Dear Adam

SECTION 89(1)(a) PDA DEVELOPMENT APPROVAL FOR A PDA DEVELOPMENT APPLICATION FOR A PDA DEVELOPMENT PERMIT FOR A MATERIAL CHANGE OF USE FOR MULTIPLE RESIDENTIAL (171 DWELLING UNITS) AND A PDA PRELIMINARY APPROVAL FOR A MATERIAL CHANGE OF USE FOR COMMERCIAL AND RETAIL WITHIN A HERITAGE PLACE (208M²) AT 23, 25, 29, 31, 33, 35, 39 ABBOTSFORD ROAD AND 28 CINTRA ROAD, BOWEN HILLS DESCRIBED AS LOTS 2, 3 AND 6 ON RP10087, LOT 17 ON RP47816, LOT 1 ON RP10091, LOT 1 AND 2 ON RP10092 AND LOT 4 ON RP40430

On 30 May 2014 the Minister for Economic Development Queensland (MEDQ) approved the Priority Development Area (PDA) development application pursuant to s.85(4)(b) of the *Economic Development Act 2012*. MEDQ has decided to grant all of the PDA development approval applied for subject to PDA development conditions set out in the attached PDA Development Approval Package.

The PDA development application and the decision notice can also be viewed in the MEDQ Development Approvals Register via the MEDQ website http://www.dsdip.qld.gov.au/assessment-of-priority-development-areas/infrastructure-and-planning/development-applications/assessment-of-priority-development-areas.html

Should you have any queries in relation to the decision notice, please do not hesitate to contact Brianna Fyffe on 3452 7167.

Yours sincerely

Patrick Atkinson
Director – PDA Development Assessment

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MATERIAL CHANGE OF USE

PREAMBLE

For the purpose of interpreting this Decision Notice, including the conditions of approval, the following applies:-

1. **Relationship with the development scheme and other approvals**

   In relation to this Approval:

   a) Priority Development Area (PDA) exempt development or PDA self-assessable development on the site may be undertaken at any time in accordance with the development scheme and all applicable laws.

   b) Further approvals may be obtained in accordance with the development scheme.

2. **Compliance assessment by the nominated assessing authority**

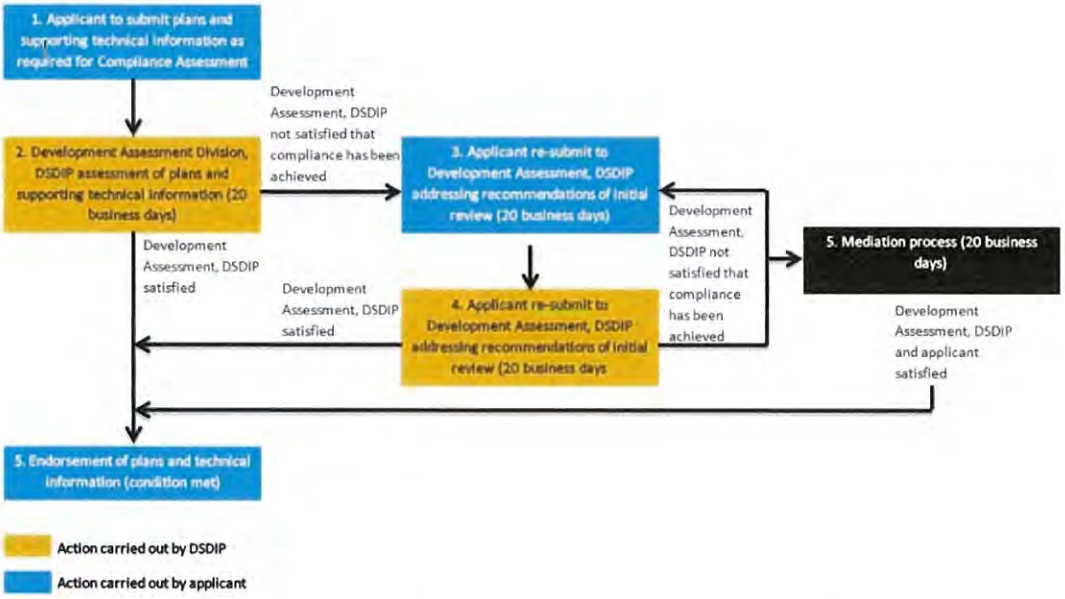
   a) Where a condition of this Approval requires compliance assessment, compliance assessment is required in accordance with the timings set out in the relevant condition.

   b) Before compliance assessment will commence, payment of the relevant fee must accompany any request for compliance assessment. The fee is to be confirmed by Department of State Development, Infrastructure and Planning (DSDIP) Priority Development Area Development Assessment.

   c) The process and timeframes that apply to compliance assessment are as follows:
      (i) the applicant submits plans and supporting information as required under the relevant condition for compliance assessment.
      (ii) **within 20 business days** – DSDIP Priority Development Area Development Assessment or it's Delegate assesses the plans and supporting information and:
         a. if satisfied with the information as submitted - endorses the information and the conditions of approval (or element of the condition) is determined to have been met; or
         b. if not satisfied with the information as submitted – notifies the applicant accordingly.
      (iii) if the applicant is notified under (ii)b. above, the information and plans addressing the concerns are to be resubmitted to DSDIP Priority Development Area Development Assessment **within 20 business days** from the date of the notice.
      (iv) **within 20 business days** – DSDIP Priority Development Area Development Assessment assesses the re-submitted plans and supporting information and:
         a. if satisfied with the re-submitted information lodged - endorses the plans and supporting information and the conditions of approval (or element of the condition) is determined to have been met or
         b. if not satisfied with the information as submitted – notifies the applicant accordingly.

(v) if DSDIP Priority Development Area Development Assessment is not satisfied that compliance has been achieved, within **20 business days** - repeat steps (iii) and (iv) above. If either party is not satisfied by the outcome of this process, that party can elect to enter into a mediation process with an independent mediator agreed to by both parties.

When DSDIP Priority Development Area Development Assessment and the applicant are both satisfied with the re-submitted information lodged - DSDIP Priority Development Area Development Assessment endorse the plans and supporting information and the condition of approval (or element of the condition) is determined to have been met.



d) The following generally outlines the information required to be submitted for compliance assessment which may be more specifically identified in a particular condition of approval:-
   (i) plans for each building (dimensioned architectural floor plans, elevations and sections)
   (ii) landscape plans
   (iii) specialist assessment reports as required that may include stormwater management and drainage and acoustics.

e) Compliance assessment may be undertaken using the DSDIP Certification Procedures Manual, when identified within this approval.

ABBREVIATIONS

The following identified abbreviations form part of the conditions package. Where the following abbreviation is annotated within the conditions it will be underlined.

1. **AILA** means:- Australian Institute Landscape Architect

2. **ASSMP** means:- Acid Sulphate Soils Management Plan

3. **BCC** means:- Brisbane City Council

4. **CDDM** means:- Centres Detailing Design Manual

5. **Compliance assessment** means:- the process of having plans, works, documents, reports, strategies or the like, as required by a condition of approval, endorsed by the nominated assessing authority.

6. **DSDIP** means:- Department of State Development, Infrastructure and Planning

7. **DSDIP – PDADA** means:- Department of State Development, Infrastructure and Planning – Priority Development Area Development Assessment

8. **EMP** means:- Earthworks Management Plan

9. **ESC** means:- Erosion and Sediment Control

10. **MEDQ** means:- The Minister of Economic Development Queensland

11. **Nominated assessing authority**, pursuant to section 88 of the *Economic Development Act 2012* (the Act), for the conditions of approval means:-

    a) for operational works:–
       a. the Minister of Economic Development Queensland (MEDQ) or their delegate;
       b. a Certifier as agreed to by the MEDQ; or
       c. if the site is no longer within a declared Priority Development Area under the Act, the local government or entity responsible for assessing and deciding planning and/or development applications in the area.

    b) for other matters:–
       b. the Minister of Economic Development Queensland (MEDQ) or their delegate; or
       c. if the site is no longer within a declared Priority Development Area under the Act, the local government or entity responsible for assessing and deciding planning and/or development applications in the area.

12. **PDA** means: - Priority Development Area.

13. **QUDM** means:- Queensland Urban Drainage Manual

14. **QUU** means:- Queensland Urban Utilities

15. **RPEQ** means:- Registered Professional Engineer of Queensland

PDA Decision Notice – Approval

Site information		
Name of urban development area (PDA)	Bowen Hills	
Site address	23, 25, 29, 31, 33, 35, 39 Abbotsford Road and 28 Cintra Road, Bowen Hills	
Lot on plan description	Lot number	Lot description
	Lots 2, 3 and 6	RP10087
	Lot 17	RP47816
	Lot 1	RP10091
	Lots 1 and 2	RP10092
	Lot 4	RP40430
PDA development application details		
MEDQ reference number	DEV2012/397	
Lodgement date	30 November 2012	
Type of application	☑New development involving:- ☑Material change of use ☑Preliminary approval ☑Development permit	
Description of proposal applied for	Development Permit for Material Change of Use – Multiple Residential (171 dwelling units) and Preliminary Approval for Material Change of Use for Commercial and Retail within a Heritage Place (208m²)	

PDA development approval details	
Decision of the MEDQ	The MEDQ has decided to grant all of the PDA development approval applied for, subject to PDA development conditions forming part of this decision notice
Decision date	30 May 2014
Currency period	4 years from Decision Date

Plans and specification

The plans and specifications approved by the MEDQ and referred to in the PDA development conditions concerning the PDA development approval are detailed below.

	Approved plans, reports and specifications	Number *(if applicable)*	Date *(if applicable)*
1.	Basement 1 and 2	DD01, Issue B	22/5/2014
2.	Ground	DD02, Issue B	22/5/2014, Amended in Red 26/05/2014
3.	Level 1	DD03, Issue B	22/5/2014, Amended in Red 26/05/2014
4.	Level 2	DD04, Issue B	22/5/2014, Amended in Red 26/05/2014
5.	Level 3	DD05, Issue B	22/5/2014, Amended in Red 26/05/2014
6.	Level 4	DD06, Issue B	22/5/2014, Amended in Red 26/05/2014
7.	Level 5	DD07, Issue B	22/5/2014
8.	Level 6	DD08, Issue B	22/5/2014
9.	Level 7	DD09, Issue B	22/5/2014
10.	Level 8	DD10, Issue B	22/5/2014
11.	West Elevation	DD11, Issue B	22/5/2014, Amended in Red 26/05/2014
12.	North Elevation	DD12, Issue B	22/5/2014, Amended in Red 26/05/2014
13.	East Elevation	DD13, Issue B	22/5/2014, Amended in Red 26/05/2014
14.	Building B South Elevation	DD14, Issue B	22/5/2014, Amended in Red 26/05/2014
15.	Section A	DD15, Issue B	22/5/2014

PDA Preliminary Approval Conditions		
General/ Planning Requirements		
1.	**Publically accessible easement** As part of a subsequent application for a development permit, submit to DSDIP – PDADA all documentation facilitating public access around the perimeter of the Heritage Place, as illustrated on the stamped approved plan, Level 1, DD03, Issue B, dated 22/5/2014, Amended in Red 26/05/2014.	Prior to survey plan endorsement
2.	**Heritage Drawings** As part of a subsequent application for a development permit, submit to DSDIP – PDADA, amended architectural drawings detailing: a) Detailed internal and external drawings; b) Reinstated front stairs; c) Landscape details surrounding the heritage place; d) Colours, materials and finishes; and e) Car parking and access arrangements.	Prior to approval for building works
PDA Development Permit Conditions		
General/ Planning Requirements		
3.	**Carry out the Approved Development** Carry out the development generally in accordance with the approved plan(s), drawing(s) and document(s).	Prior to commencement of use and to be maintained
4.	**Maintain the Approved Development** Maintain the approved development (including landscaping, parking, driveways and other external spaces) in accordance with the approved drawings and documents, and any relevant Council engineering or other approval required by the conditions.	As indicated
5.	**Titling arrangement** Development subject to this approval cannot straddle a common boundary.	At all times
6.	**Approval of 'as constructed' sustainable design** a) Ensure the development can achieve an average NatHERS rating of 7.5 stars. b) Submit to DSDIP – PDADA written confirmation, from a suitably qualified sustainability professional, certifying that the development has been constructed to meet part a) of this condition.	a) Prior to commencement of building works b) Prior to commencement of use

7.	**Affordable Housing** Submit to DSDIP – PDADA, evidence that the development delivers 5% of the housing stock as affordable units in accordance with EDQ Guideline no. 16 Housing.	Prior to commencement of use
8.	**Accessible Housing** Submit to DSDIP – PDADA, evidence that the development delivers 10% accessible units.	Prior to commencement of use
Compliance Assessment		
9.	**Compliance Assessment – Stormwater Drainage and Management System** a) Submit to DSDIP – PDADA for compliance assessment, a stormwater management plan, certified by an RPEQ, in accordance with QUDM and State Planning Policy Water Quality. b) Submit detailed stormwater engineering drainage plans and management plans, certified by an RPEQ, generally in accordance with part a) of this condition c) Construct the stormwater drainage and management works in accordance with the submitted stormwater drainage plans required in part (b) of this condition. d) Submit to DSDIP – PDADA, 'As Constructed' drawings and asset register, verified and signed by an RPEQ, confirming all works have been completed in accordance with the endorsed plans.	a) Prior to approval for building works
10.	**Compliance Assessment – Acoustic Report** a) Submit to DSDIP – PDADA for compliance assessment, an acoustic report, certified by an RPEQ, in accordance with BCC's *City Plan 2000 Noise Impact Assessment Planning Scheme Policy* and *AS 2107-2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.* b) Construct the works in accordance with the recommendations certified in the endorsed Acoustic Report required by part a) of this condition.	a) Prior to approval for building works b) Prior to commencement of use
11.	**Compliance Assessment – Elevations and Sections** Submit to DSDIP – PDADA for compliance assessment, detailed north, east and south elevations and sections illustrating the proposed development.	Prior to approval for building works
12.	**Compliance Assessment – Dimensioned Architectural Drawings** Submit to DSDIP – PDADA for compliance assessment, internal dimensioned architectural drawings illustrating the proposed development.	Prior to approval for building works

13.	**Compliance Assessment - Detailed Landscape Plan** Submit to DSDIP - PDADA for compliance assessment, a detailed landscape plan: a) Detailing landscape plans, certified by an AILA Landscape Architect or suitably qualified Landscape Contractor, illustrating the extent of landscaping for the development (including communal rooftop recreation areas) and the overall site interface with the streetscape. The plans must, where relevant: • include the location of existing street trees and verge landscaping treatments. If existing street trees are impacted by driveway locations, replacement trees are to be provided in an agreed location; • ensure landscaping maintains visibility along pathways and vehicle paths; • include species which are low maintenance and water-wise; • ensure the selection of species takes into account the location of overhead or underground services; • ensure proposed turfed areas are accessible externally by standard lawn mowing equipment and receive adequate sunlight; and • where possible, maximise opportunities for water infiltration on-site, through landscaped areas and permeable paving. b) Construct the works in accordance with the certified and endorsed plans required by part a) of this condition. c) On completion, submit to DSDIP - PDADA, written evidence from an AILA Landscape Architect or suitably qualified Landscape Contractor that the completed landscaping works complies with the endorsed detailed landscape plan.	a) Prior to commencement of landscape works b) Prior to commencement of use c) Prior to commencement of use
Architecture and Design		
14.	**Window sill treatments** Window sills on all ground floor and Shop tenancies are to be within 100-300mm above the corresponding footpath level. The use of reflective glass for all Shops on the Ground level is not appropriate.	Prior to approval for building works
15.	**Submit External Details** Submit to DSDIP - PDADA, further details of the building, facade treatment and external materials, colours and finishes generally consistent with the approved plans.	Prior to approval of building work
Engineering		
16.	**Construction Management Plan** a) Submit to DSDIP - PDADA, a site based construction management plan that includes, but is not limited to: • Prepare a construction monitoring programme during in-ground construction work.	a) Prior to commencement of site works

	• Provision for the management of traffic around and through the site during and outside of construction work hours. • Provision for parking and materials delivery during and outside of construction hours of work. • Management of noise and dust generated from the site during and outside construction work hours including the nomination of a complaint manager. • Management of sedimentation and erosion which complies with BCC's Erosion and Sediment Control Standard (Version 9 or later). • Management of groundwater and surface water collection, treatment and disposal. • That the construction does not pose a permanent or temporary obstruction or potential hazard to air craft movements in accordance with BCA, CASA and the Brisbane Airport Master Plan requirements. b) All work shall be undertaken in accordance with the construction management plan required in part a) of this condition, which must be current and available on site at all times during the construction period.	b) As indicated
17.	**Easements over infrastructure – water supply, sewerage, drainage** Where public utilities are located on private land, public utility easements must be provided in favour and at no cost to the relevant service provider entities. The terms of the easements must be to the satisfaction of the Chief Executive Officer of the entities.	Prior to commencement of use
18.	**Acid Sulphate** a) If Acid Sulphate Soils are found on the site, submit to DSDIP – PDADA an Acid Sulphate Soils Management Plan (ASSMP). The ASSMP shall be prepared by a suitably qualified professional approved by the principal consultant certifying the construction works. b) Excavation and removal of acid sulphate soils will be undertaken in accordance with the certified ASSMP.	a) Prior to commencement of works b) During the site works
19.	**Filling and Excavation** a) Submit to DSDIP – PDADA, an Earthworks Management Plan (EMP) certified by an RPEQ, generally in accordance with AS3798 – 1996 "Guidelines on Earthworks for Commercial and Residential Developments". The EMP shall: • link with and support the Erosion and Sediment Control plans; • provide full detail of areas where dispersive soils will be disturbed, treatment of dispersive soils and their rehabilitation; • provide full details of any areas where surplus soils are to be stockpiled	a) Prior to commencement of site works

	b) Carry out the filling and excavation in accordance with part a) of this condition. c) Submit to DSDIP – PDADA, written certification by an RPEQ that all filling and excavation works have been carried out generally accordance with the certified EMP and any unsuitable material encountered has been treated or replaced with suitable replacement material.	b) Prior to commencement of use c) Prior to commencement of use
20.	**Erosion & Sediment Management** a) Submit to DSDIP – PDADA, an Erosion and Sediment Control (ESC) Management Plan for the site in accordance with the Healthy Waterways document "Controlling Stormwater Pollution on Your Building Site" 2006 (or later version) and BCC's "Erosion and Sediment Control Standard" (Version 9 or later). b) Implement and maintain in accordance with part a) of this condition.	a) Prior to site works commencing b) At all times during site works
21.	**Traffic and Access** Submit to DSDIP – PDADA a detailed traffic and access plan certified by an RPEQ: a) Demonstrating that the car park is designed generally in accordance with Australian Standard 2890 Parking Facilities; b) B99 vehicle turning templates with clearances that two vehicles can pass travelling into and out of Basement 1 from the Ground Floor car park; c) Manoeuvring on site for a MRV, a RCV and for the loading and unloading of the vehicles(s); d) Dimensioned plans detailing: • Driveways; • Car spaces; • Parking aisles; • Ramp grades; • Minimum height clearance including pipe works and intrusions; • Column locations; and • Location of security gate(s). e) Documentation that demonstrates entries from and exits to Abbotsford Road are left-in, left-out only; f) Documentation that demonstrates a minimum of 176 car spaces and their location, including disability and visitor spaces, service and loading spaces for all residential buildings and 2 spaces for future needs to service the Heritage Place; g) Documentation that demonstrates the number of bicycle spaces and	Prior to approval for building works

	end of trip facilities in accordance with the Bowen Hills UDA Development Scheme; h) Plans which indicate a delineated and signed area for the storage and collection of refuse, including recyclables, in a position which is accessible to service vehicles on the site; i) The internal paved areas are to be signed and delineated in accordance with the approved plans, Manual of Uniform Traffic Control Devices and Austroads; j) Delineate and sign the designated vehicle entry points; k) Demonstrating that all service and waste collection vehicles can enter and leave the site in a forward motion by connecting the two car parks via an internal aisle, as amended in red on Ground, DD02, Issue B, dated 22/5/2014, Amended in Red 26/5/2014 l) Plans which indicate a minimum of 2.3 metres height clearance to all undercover parking areas and a minimum of 2.5 metres above parking spaces for people with disabilities; and m) Plans which indicate a height clearance sign located at the entrance(s) to undercover car parking areas, and a visitor direction parking sign clearly visible at the vehicle entrance to the site.	
22.	**Abbotsford Road Entries** The entry from and the exit to Abbotsford Road must be signed to be left-in, left-out only.	Prior to commencement of use and to be maintained
23.	**Refuse Collection** a) Submit to DSDIP – PDADA plans: • nominating the number and type of refuse bins. Demonstrate that the design is in accordance with *Brisbane City Council's Chapter 9 Refuse Collection, Subdivision and Development Guidelines.* b) Obtain refuse collection approval from BCC City Waste Services, or a private waste contractor.	a) Prior to approval for building works b) Prior to survey plan endorsement
24.	**Streetscape Works** a) Submit to DSDIP – PDADA, streetscape plans certified by an AILA Landscape Architect, detailing the proposed streetscape works in Abbotsford Road and Cintra Road are generally in accordance with BCC's *Subdivision and Development Guidelines* and *Centres Detailing Design Manual* (CDDM);	a) Prior to commencement of site works

	b) Construct the works in accordance with the certified streetscape plans required in part (a) of this condition.	b) Prior to commencement of use
	c) Submit to DSDIP – PDADA "As Constructed" plans and an asset register certified by an AILA Landscape Architect in a format acceptable to BCC demonstrating compliance with this condition.	c) Prior to commencement of use
25.	**Protecting Existing Infrastructure** Where there is existing infrastructure in the vicinity of the proposed work, then the new work must not damage or compromise the working ability of the existing infrastructure. Should alterations to public utility mains, existing mains, services or installations be required, then the developer must carry out the works in accordance with BCC's "Subdivision and Development Guidelines" and meet the costs of the alterations.	While site works are occurring, then to be maintained
26.	**Sewer – Queensland Urban Utilities Nominated Assessment Authority** a) Submit to DSDIP – PDADA a Sewer Network Analysis, certified by an RPEQ and endorsed by QUU, that the site can be serviced by sewer.	a) Prior to commencement of site works
	b) Submit to DSDIP – PDADA detailed engineering plans, certified by an RPEQ, to upgrade the existing sewer reticulation, in accordance with part a) of this condition.	b) Prior to commencement of sewer works
	c) Construct the upgraded sewer system and connections in accordance with the certified plans required in part (b) of this condition. Submit to DSDIP – PDADA 'As Constructed' drawings certified by an RPEQ confirming all works have been completed in accordance with the certified plans.	c) Prior to commencement of use
27.	**Water – Queensland Urban Utilities Nominated Assessment Authority** a) Submit to DSDIP – PDADA a Water Network Analysis, certified by an RPEQ and endorsed by QUU that the site can be serviced by water.	a) Prior to commencement of site works
	b) Submit to DSDIP – PDADA detailed engineering plans, certified by an RPEQ, to upgrade the existing water reticulation, in accordance with part a) of this condition.	b) Prior to commencement of water reticulation works
	c) Construct the upgraded water system and connections in accordance with the certified plans required in part (b) of this condition. Submit to DSDIP – PDADA 'As Constructed' drawings certified by an RPEQ confirming all works have been completed in accordance with the certified plans.	c) Prior to commencement of use

28.	**Electricity** Provide underground electricity services in accordance with an approved electricity reticulation plan and the BCC's *Subdivision and Development Guidelines.*	Prior to commencement of use
29.	**Telecommunications** a) Enter into an agreement with a telecommunication carrier to provide underground telecommunication services within and adjacent to the proposed development, in accordance with BCC's *Subdivision and Development Guidelines.* b) Construct services in accordance with the agreement.	a) Prior to commencement of use. b) Prior to commencement of use
30.	**Service Conduits & Mains** Supply and install all service conduits and meet the cost of any alterations to public utility mains, existing mains, services or installations required in association with the approved development in accordance with BCC's *Subdivision and Development Guidelines.*	Prior to commencement of use.
31.	**Broadband** Submit to DSDIP – PDADA, a written agreement from an authorised telecommunications service provider, in accordance with the Communications Alliance G645:2011 guideline, that infrastructure within the development as defined under the Telecommunications Act (Fibre Deployment Bill 2011) can be provided.	Prior to commencement of use.
32.	**Repair Damage to Kerb, Footpath or Road** Repair any damage to existing kerb and channel, footpath or roadway (including removal of concrete slurry from footpaths, roads, kerb and channel and stormwater gullies and drainage lines) that may occur during any works carried out in association with the approved development.	Prior to commencement of use
Certification Process		
33.	**Certification Agreement** Comply with all requirements and fulfil all responsibilities outlined in the *DSDIP Self Certification Procedure Manual.* No work shall commence until DSDIP – PDADA acknowledges, in writing, receipt of the certification documents submitted by the Project Coordinator.	Prior to commencement of site works
34.	**Pre-Construction Self Certification** No work shall commence until DSDIP – PDADA acknowledges, in writing, receipt of certification package(s) from the Project Coordinator in accordance with the *DSDIP Certification Procedures Manual.*	Prior to commencement of construction

35.	**Post-Construction Self Certification** Submit Post-Construction (Practical Completion) Certification approved forms and "As Constructed" plans, including an asset register, certified by an RPEQ, that the plans are a true record of the works "As Constructed" are in accordance with the certified plans.	Prior to the commencement of use
Pollution		
36.	**Lighting** External lighting is to be designed and installed in accordance with any relevant local government policy or standard or, where no relevant local government policy or standard exists, in accordance with AS4282-1997 Control of the Obtrusive Effects of Outdoor Lighting so as not to cause nuisance to nearby residents or passing motorists.	Prior to commencement of use
Monetary Contributions		
37.	**Infrastructure Contributions** Pay to MEDQ the infrastructure charges calculated in accordance with the Infrastructure Funding Framework, dated July 2013.	In accordance with the Infrastructure Funding Framework

STANDARD ADVICE

Please note that in order to lawfully undertake development, it may be necessary to obtain approvals other than this PDA development approval, some specific advices are outlined below. Other advices may include other approvals under the *Economic Development Act 2012* as well as the *Sustainable Planning Act 2009* (eg for building work), the *Plumbing and Drainage Act 2002* and the Commonwealth *Environmental Protection and Biodiversity Act 1999*. Carrying out development may also be subject to 'duty of care' legislation such as the *Aboriginal Cultural Heritage Act 2003*. For advice on other approvals that may be necessary in relation to your proposal, please seek professional advice.

**** End of Package ****

APPENDIX 2 – ARCHITECTURAL PLANS

TOTAL APARTMENTS= 155

BUILDING A - 71
BUILDING B - 92

APARTMENTS BELOW 60m2

BUILDING A - 33
BUILDING B - 8

APARTMENTS 60 - 100m2

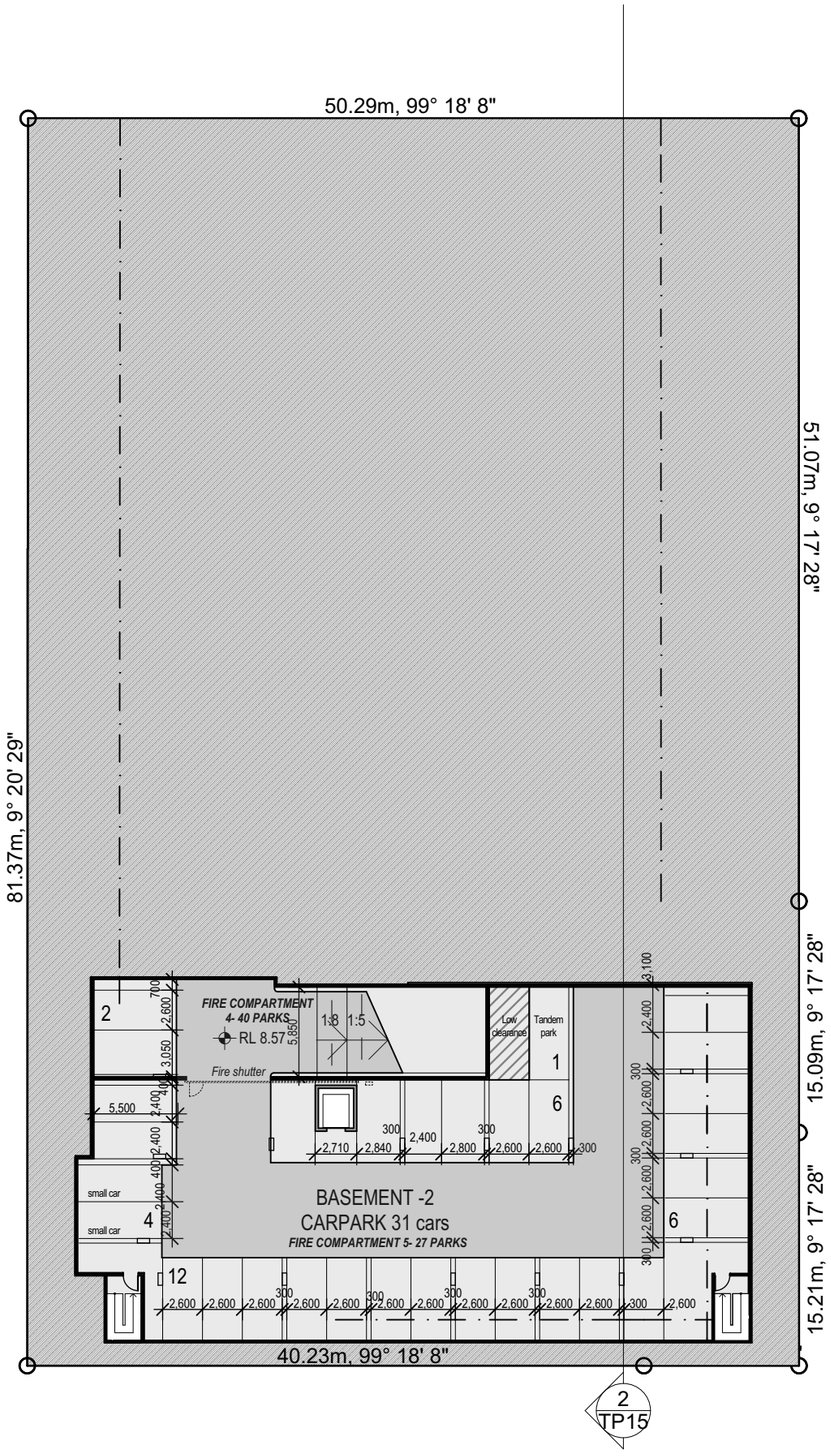
BUILDING A - 37
BUILDING B - 68

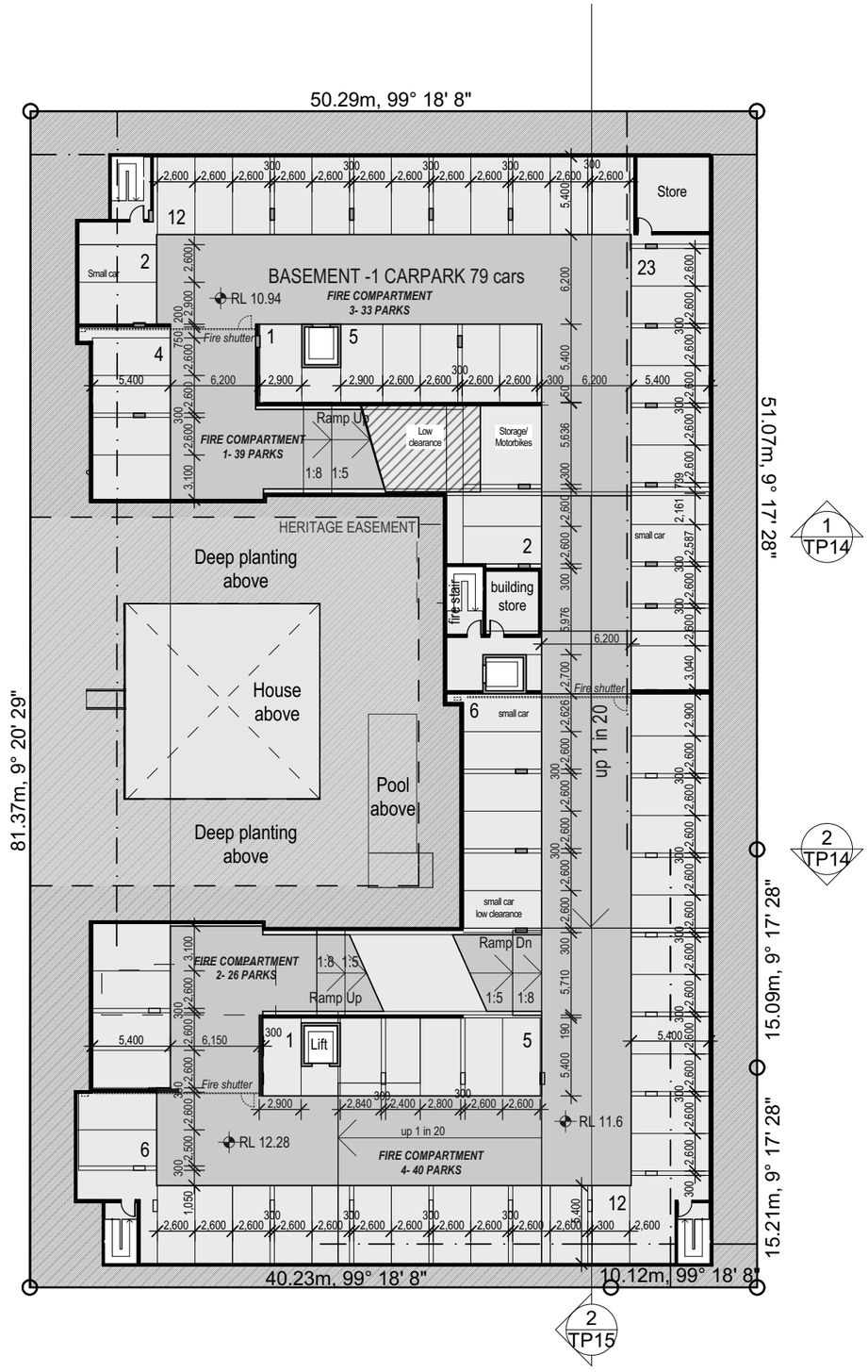
APARTMENTS ABOVE 100m2

BUILDING A - 2
BUILDING B - 7

TOTAL CARS= 172
(2.5 levels incl. ground floor)

GFA= 12,487m2
SITE AREA= 4094.7m2
PLOT RATIO= 3.05





1 TP12 — 1 — Basement -2 1:400

1 TP12 — 2 — Basement -1 1:400

TOWN PLANNING

General Notes

Confirm all dimensions on site.
Do not scale off drawings.
All levels are approximate only and are subject to confirmation by licensed surveyor.
All workmanship, materials and construction to comply with the Queensland Building Act 1975 and The Building Code of Australia 2013, Premises Standard and AS1428.1.
Work to be carried out in a neat and appropriate manner.
Where ambiguities or discrepancies exist, Hayes Anderson Lynch Architects Pty. Ltd. shall be contacted for clarification.

26/11/14 P2 Consultant Issue
24/11/14 P1 Visualisation Issue

Date	No.	Details	Checked

HAYES ANDERSON LYNCH ARCHITECTS PTY LTD
ARCHITECTS
TOWN PLANNERS
INTERIOR DESIGNERS
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Client
Peter Tan

Project
Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Basement Carparking

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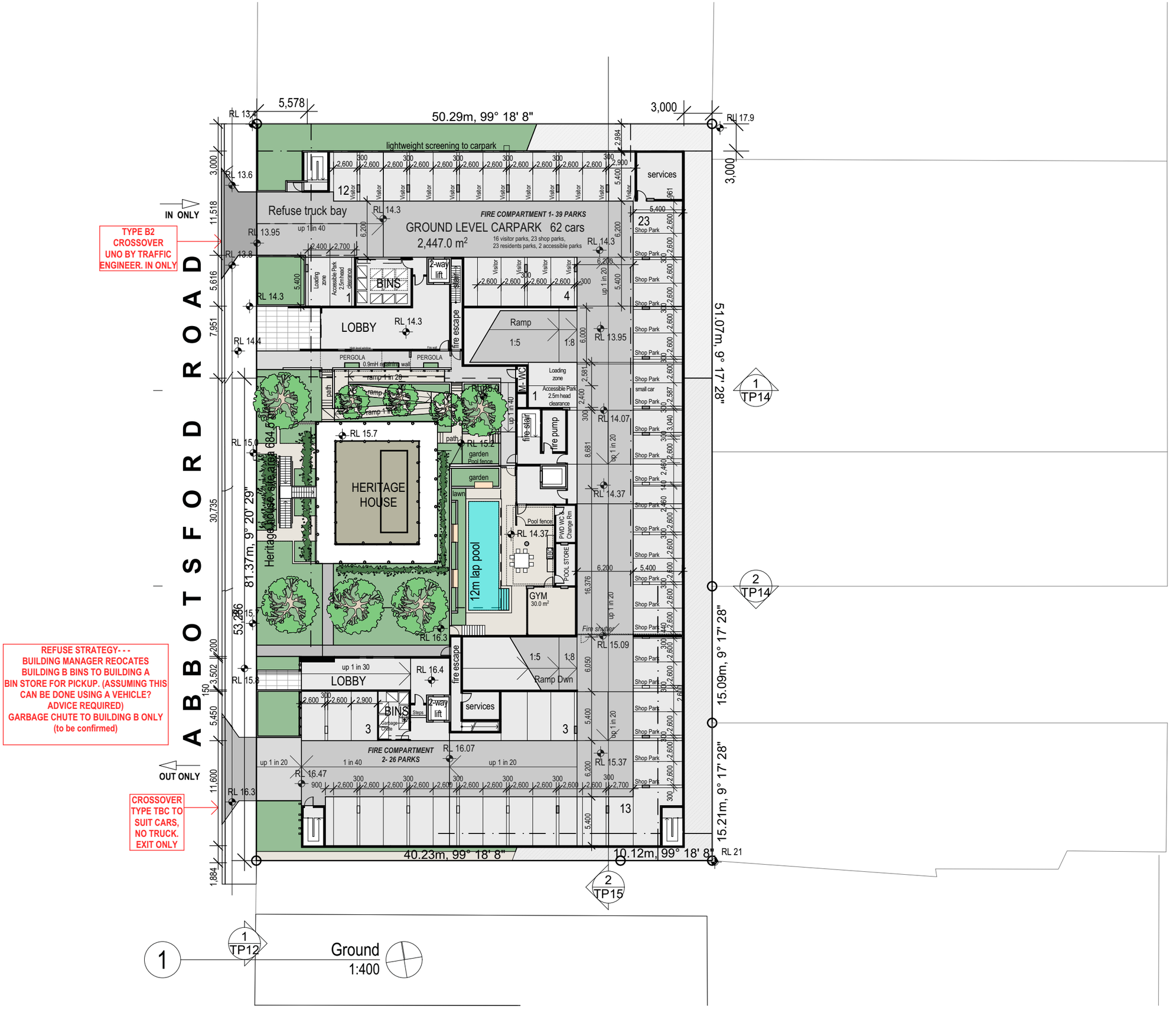
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP01**	P2

Printed:- 26/11/2014



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26/11/14	P2	Consultant Issue	
24/11/14	P1	Visualisation Issue	

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Client
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Project
Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Ground

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP02**	P2

Printed:- 26/11/2014

TOWN PLANNING

General Notes

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Date	No.	Details	Checked
26/11/14	P2	Consultant Issue	
24/11/14	P1	Visualisation Issue	

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Client
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Project
Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Level 1

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP03**	P2

Printed:- 26/11/2014

TOWN PLANNING

General Notes

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Date	No.	Details	Checked
26/11/14	P2	Consultant Issue	
24/11/14	P1	Visualisation Issue	

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Client
Peter Tan

Project
Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Level 2

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP04**	P2

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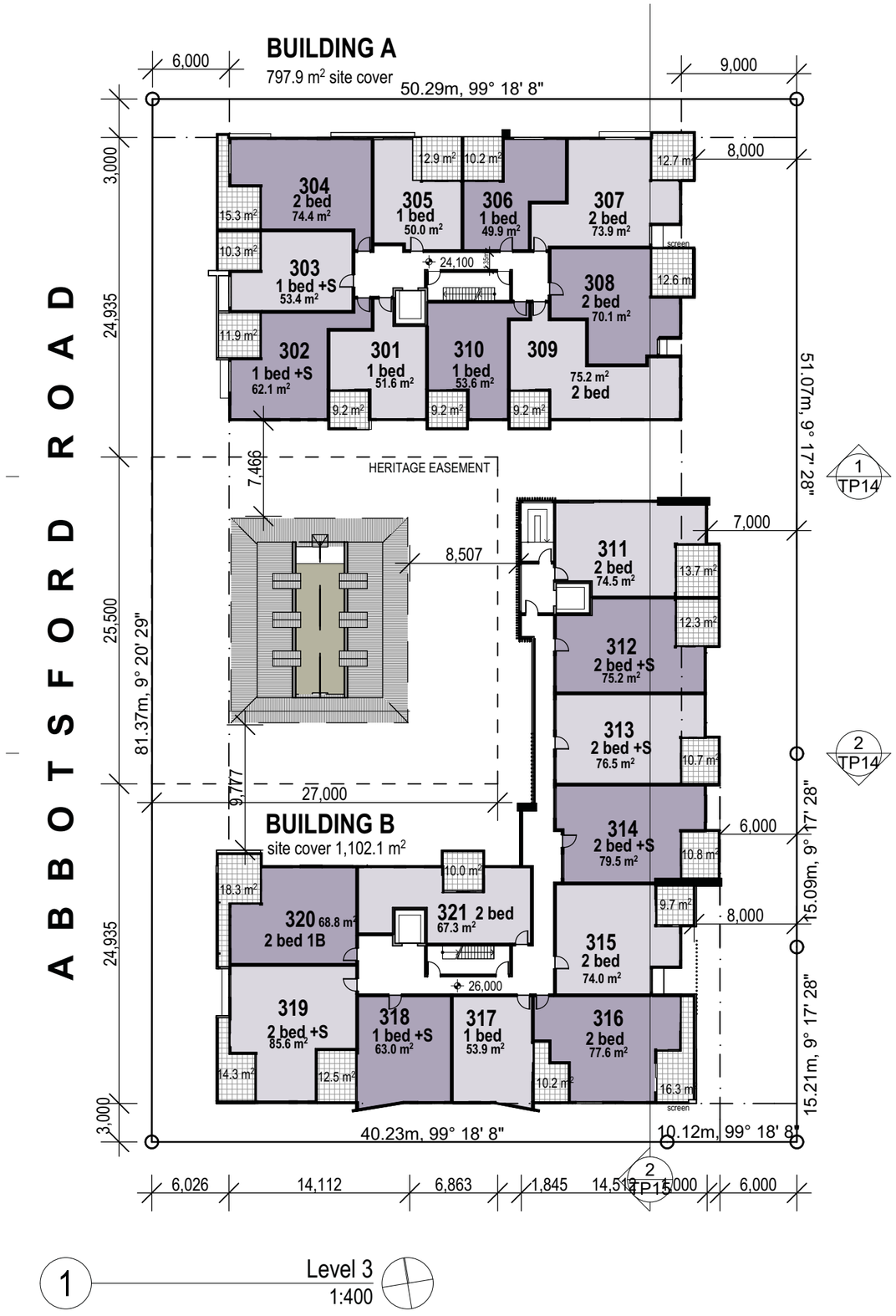

1 Level 3
1:400

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Drawing Title
Level 3

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP05**	P2

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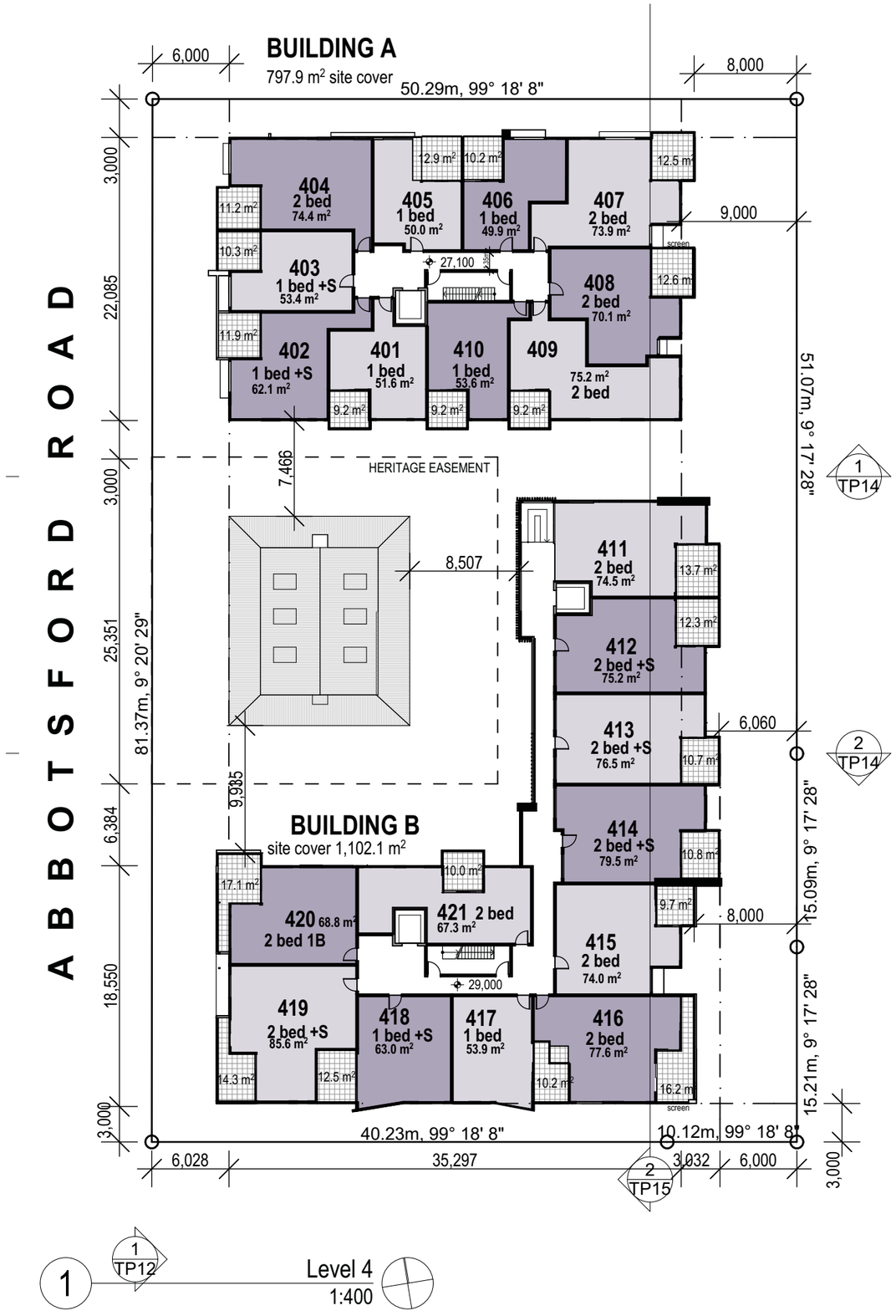

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Drawing Title
Level 4

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP06**	P2

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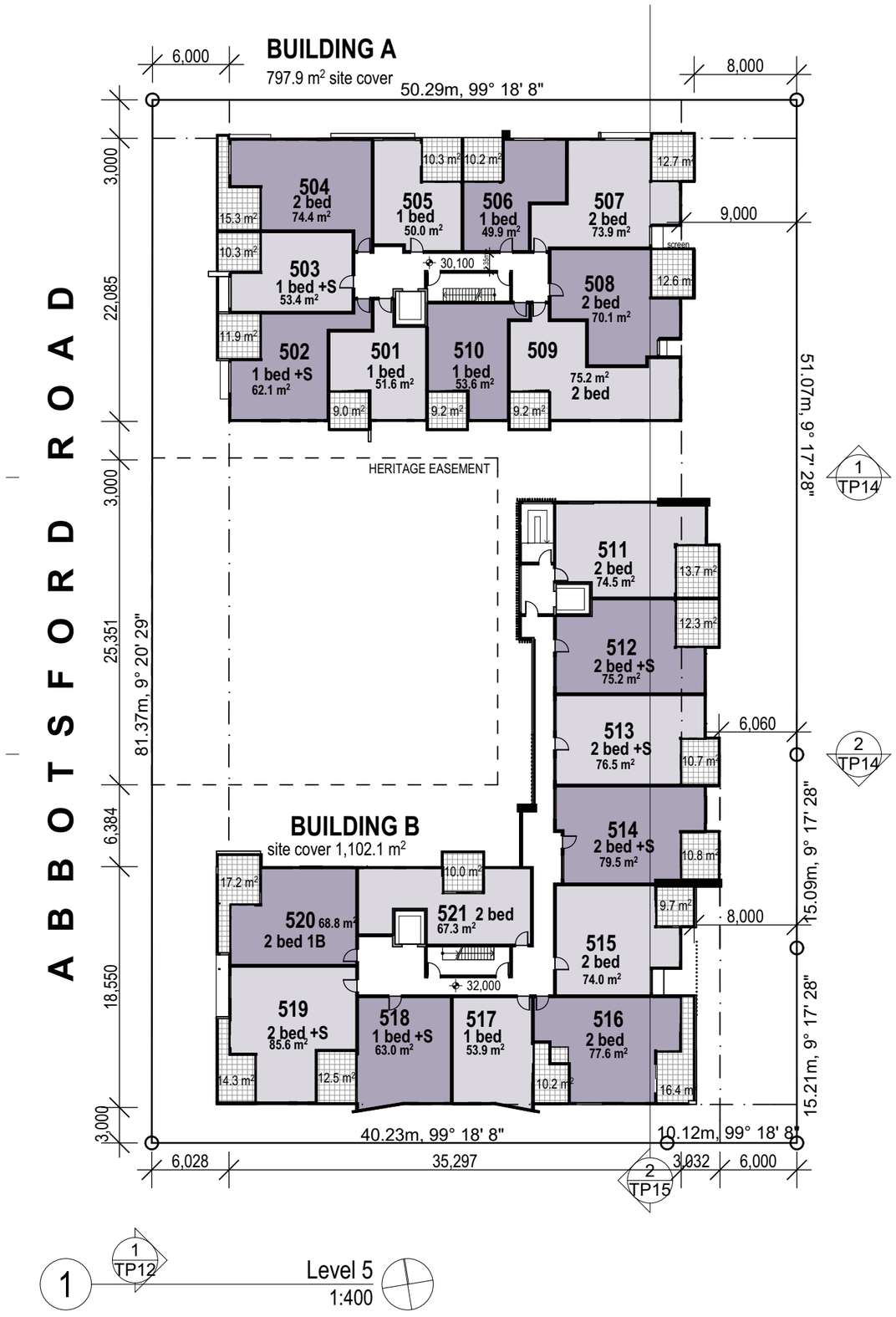

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Drawing Title
Level 5

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP07**	P2

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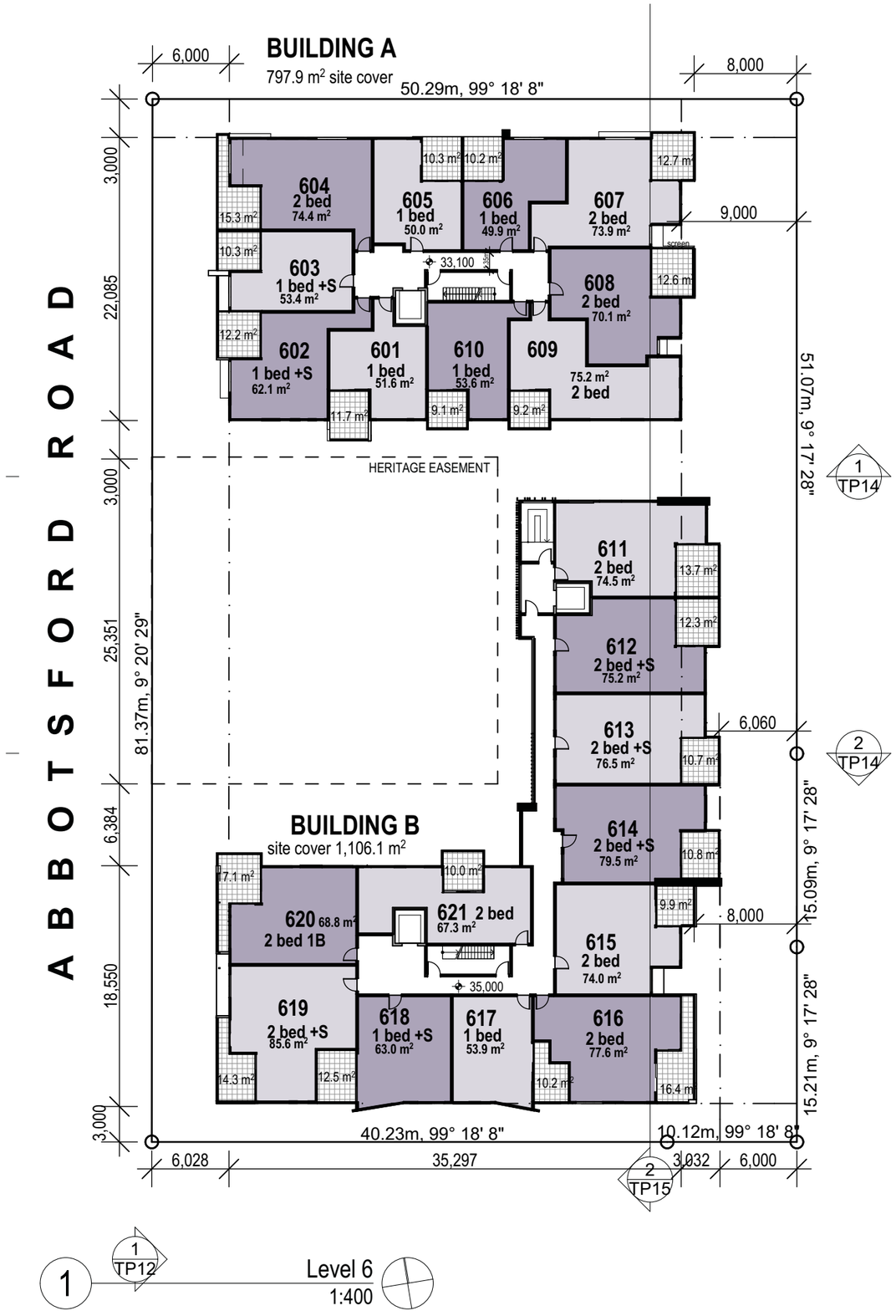

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Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Level 6

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP08**	P2

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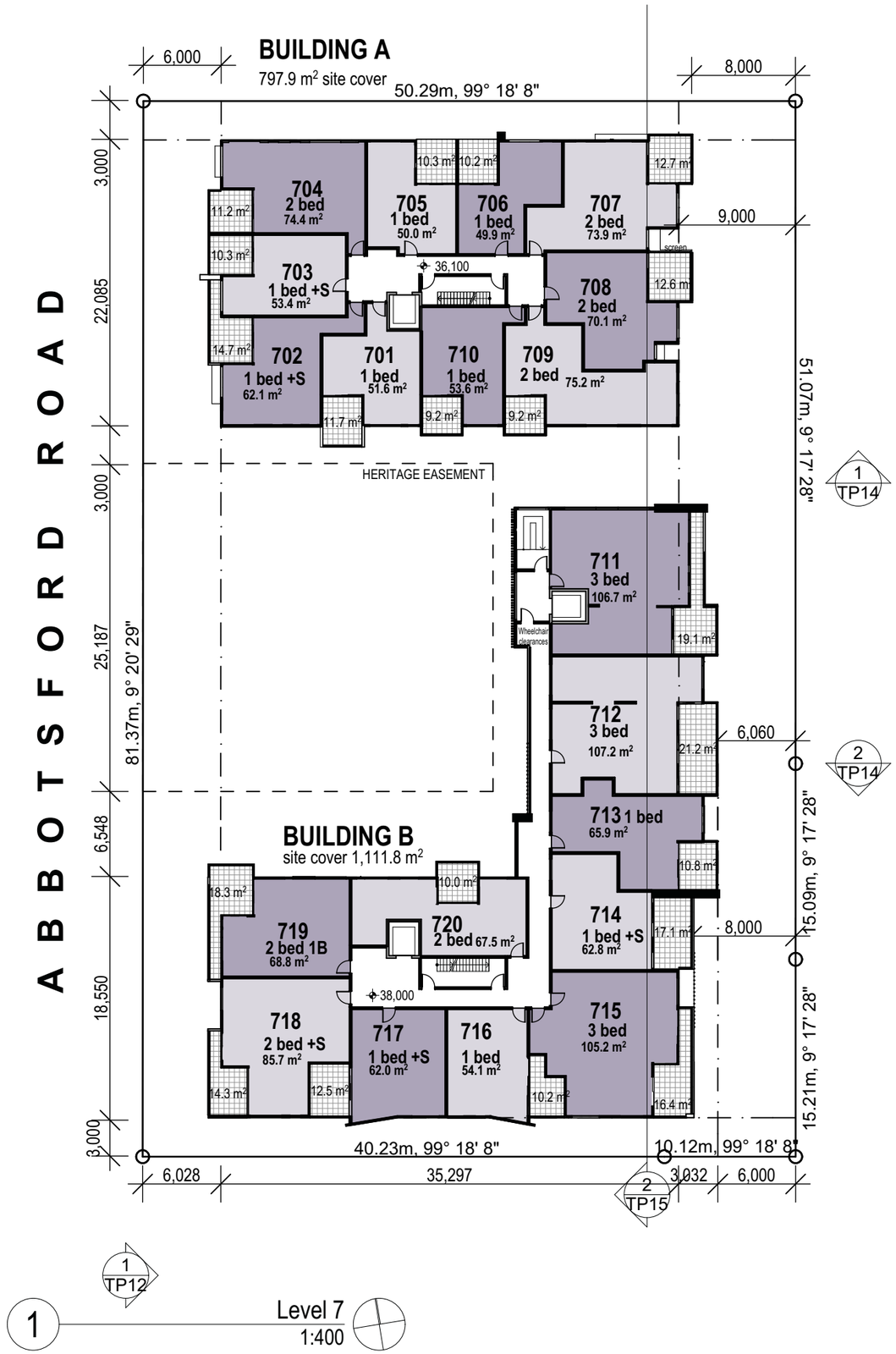

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Multi-Residential Development
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Drawing Title
Level 7

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP09**	P2

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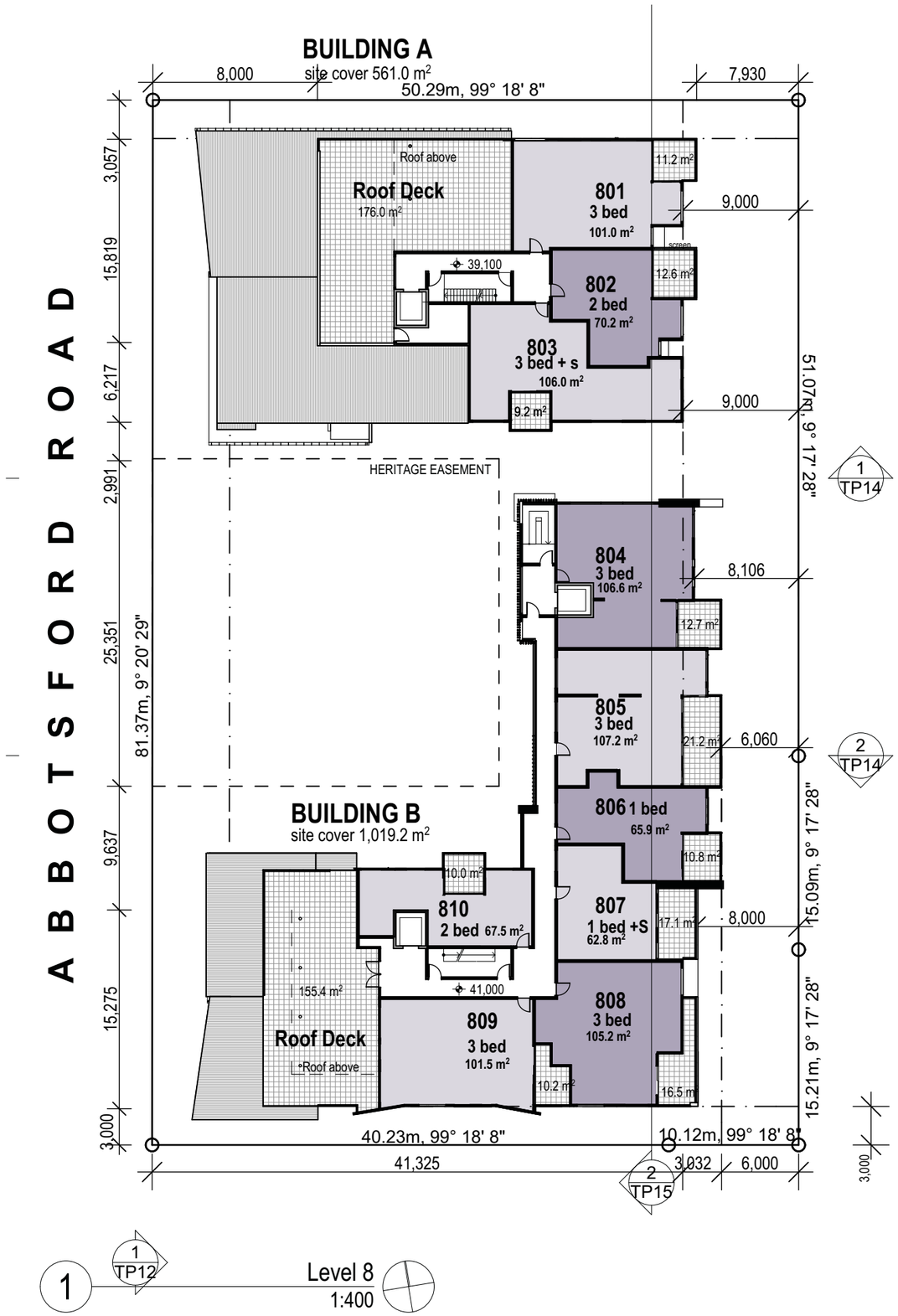

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Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
Level 8

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP10**	P2

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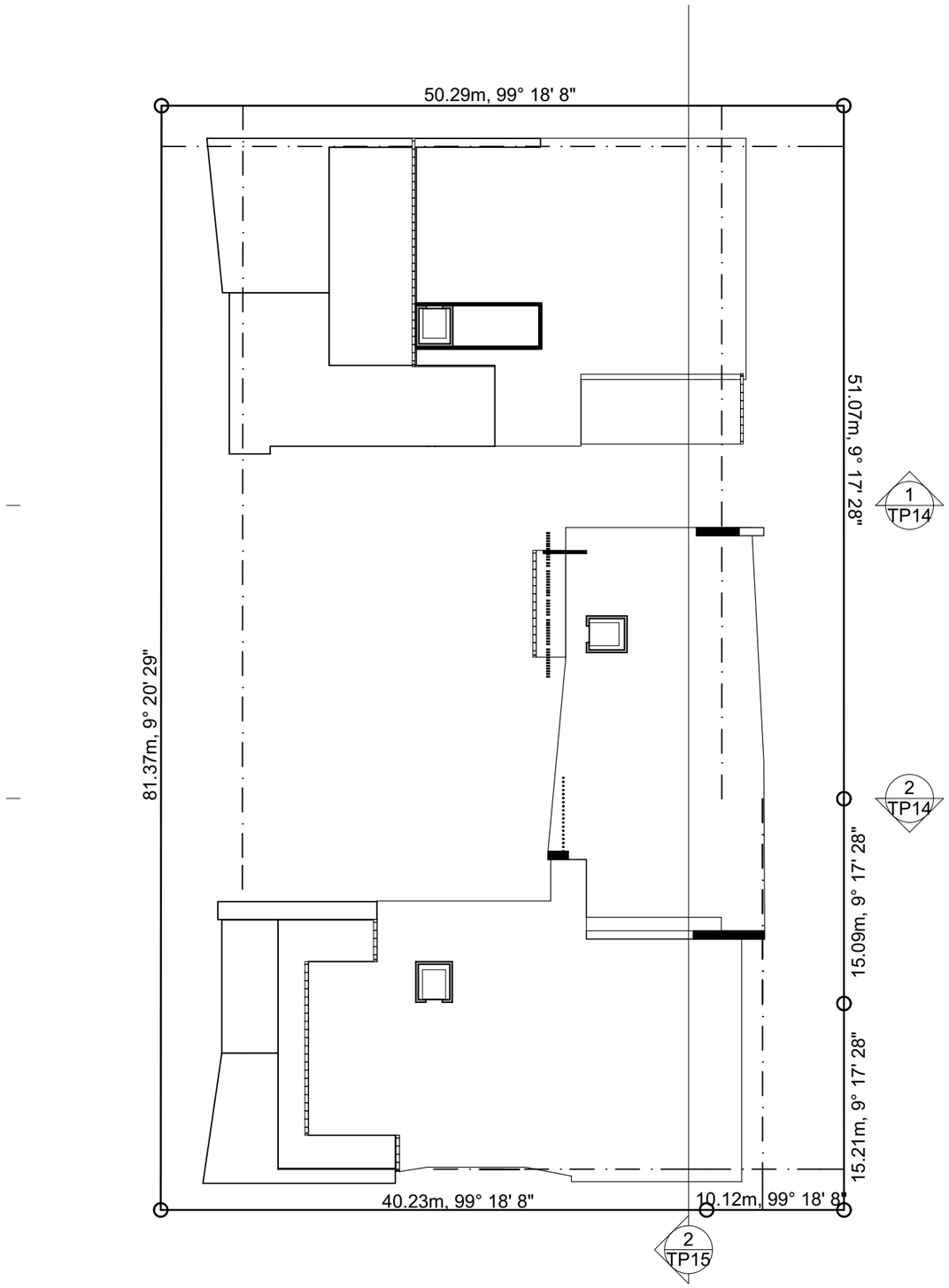

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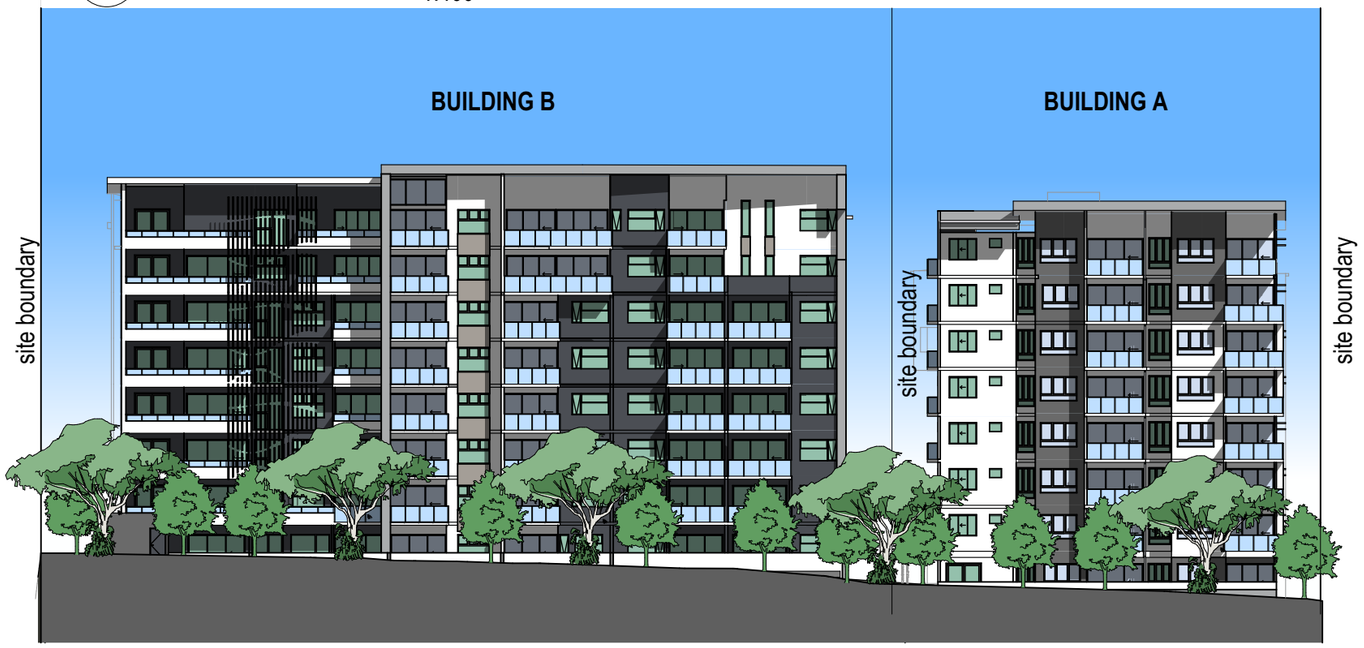
Drawing Title
Roof

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP11**	P2

Printed:- 26/11/2014

1 West Elevation
1:400



2 East Elevation
1:400

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Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
EAST & WEST ELEVATION

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP12**	P2

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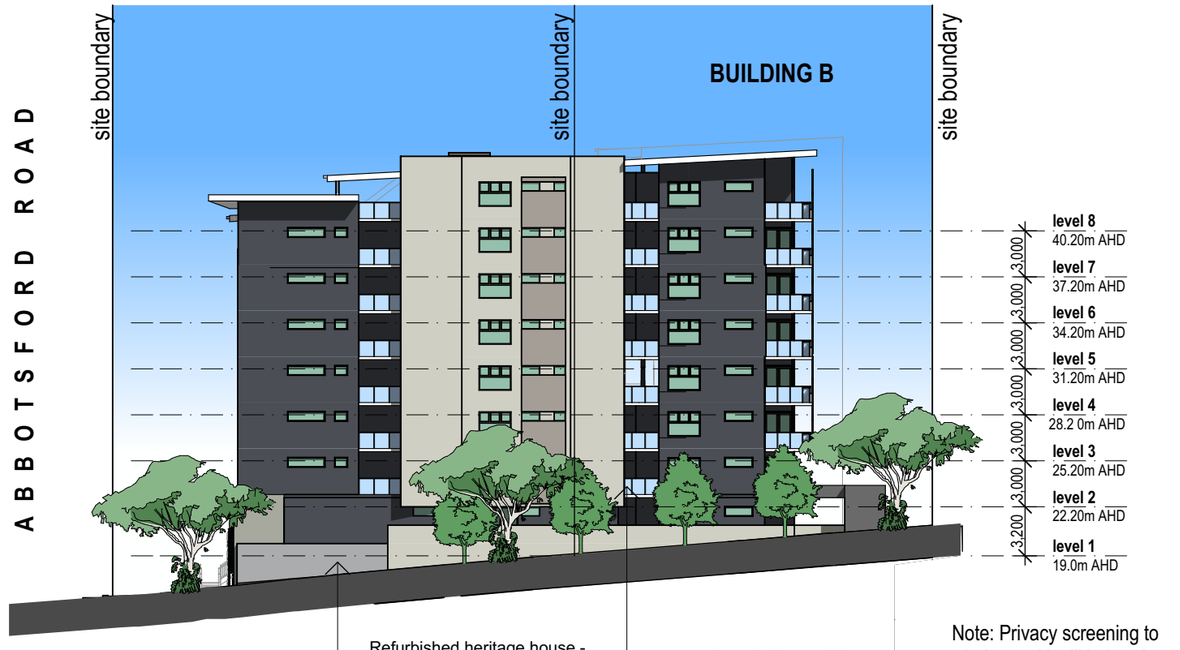
1 Building A - North Elevation
1:400

Note: Privacy screening to windows with sill below 1.5m



2 Building B South Elevation
1:400

Note: Privacy screening to windows with sill below 1.5m

TOWN PLANNING

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26/11/14 P2 Consultant Issue
24/11/14 P1 Visualisation Issue

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Drawing Title
NORTH & SOUTH ELEVATION

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP13**	P2

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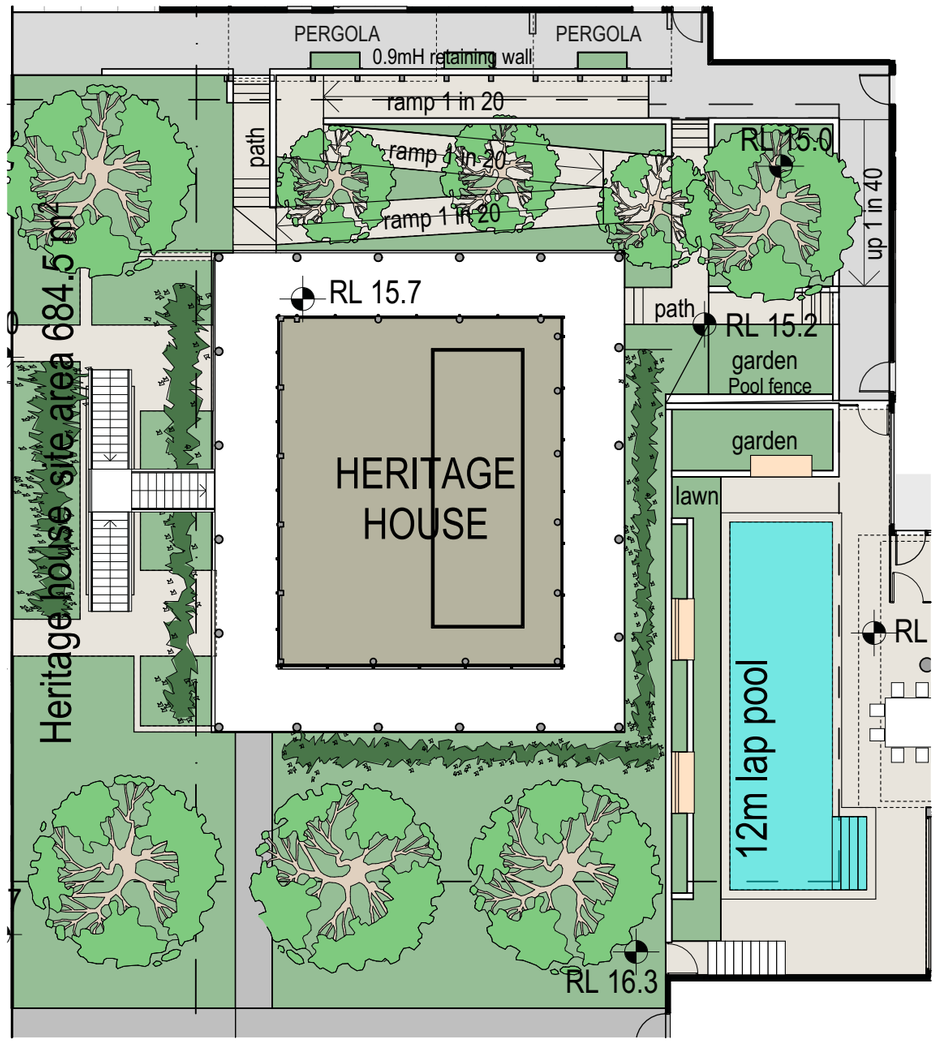
1 Elevation Towards House 1
1:400

2 Elevation Towards House 2
1:400



3 Courtyard Detail
1:200

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Drawing Title
COURTYARD ELEVATIONS

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP14**	P2

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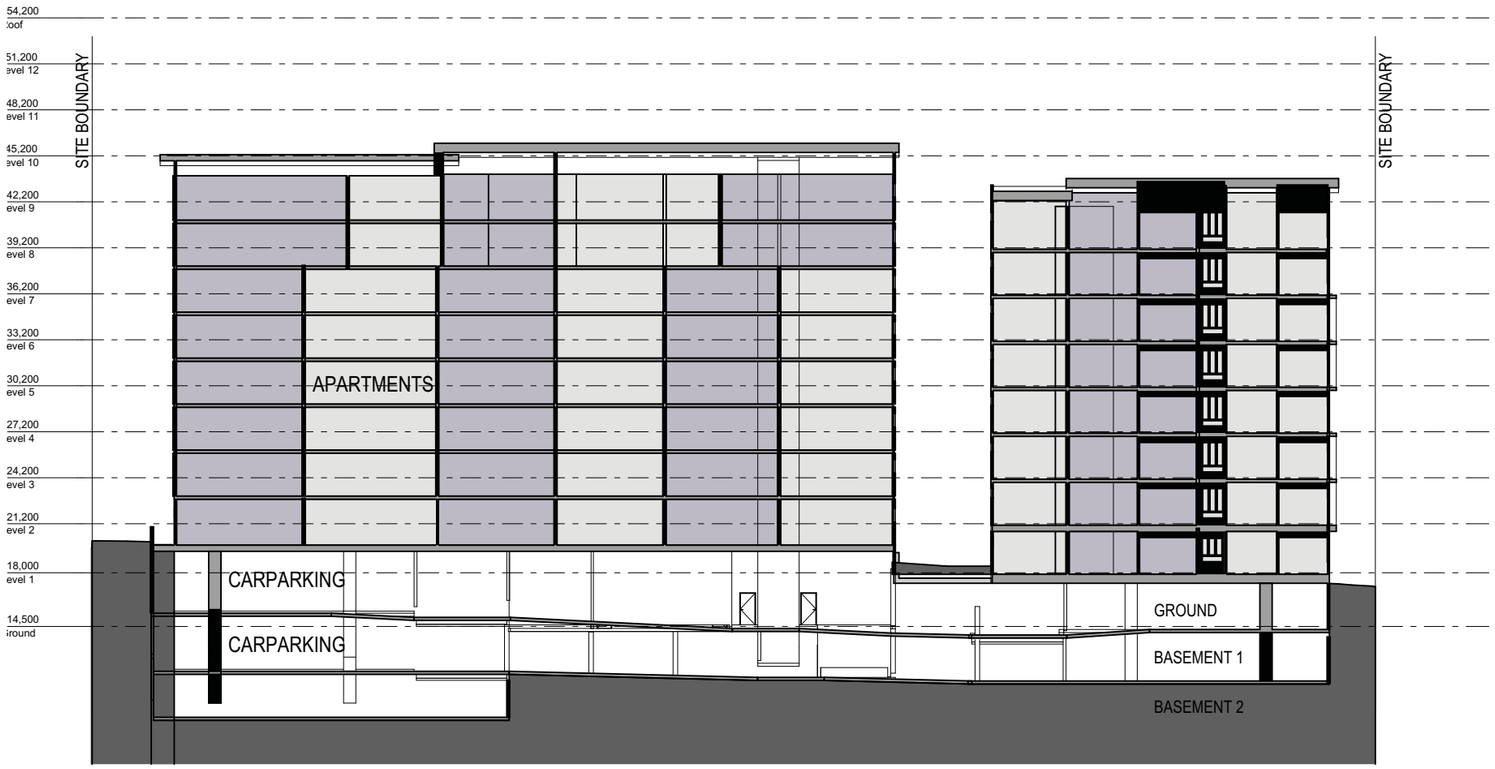

2 Section A
1:400

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Drawing Title
SECTION A

Scale @ A3	Drawn:	Checked:
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Project Number	Drawing Number	Issue
H2943ABB	**TP15**	P2

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1 House in Context 1
TREES NOT SHOWN FOR CLARITY

2 House in Context 2

3 House in Context 3
TREES NOT SHOWN FOR CLARITY

4 House in Context 4

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Drawing Title
HERITAGE HOUSE IN CONTEXT

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP16**	P2

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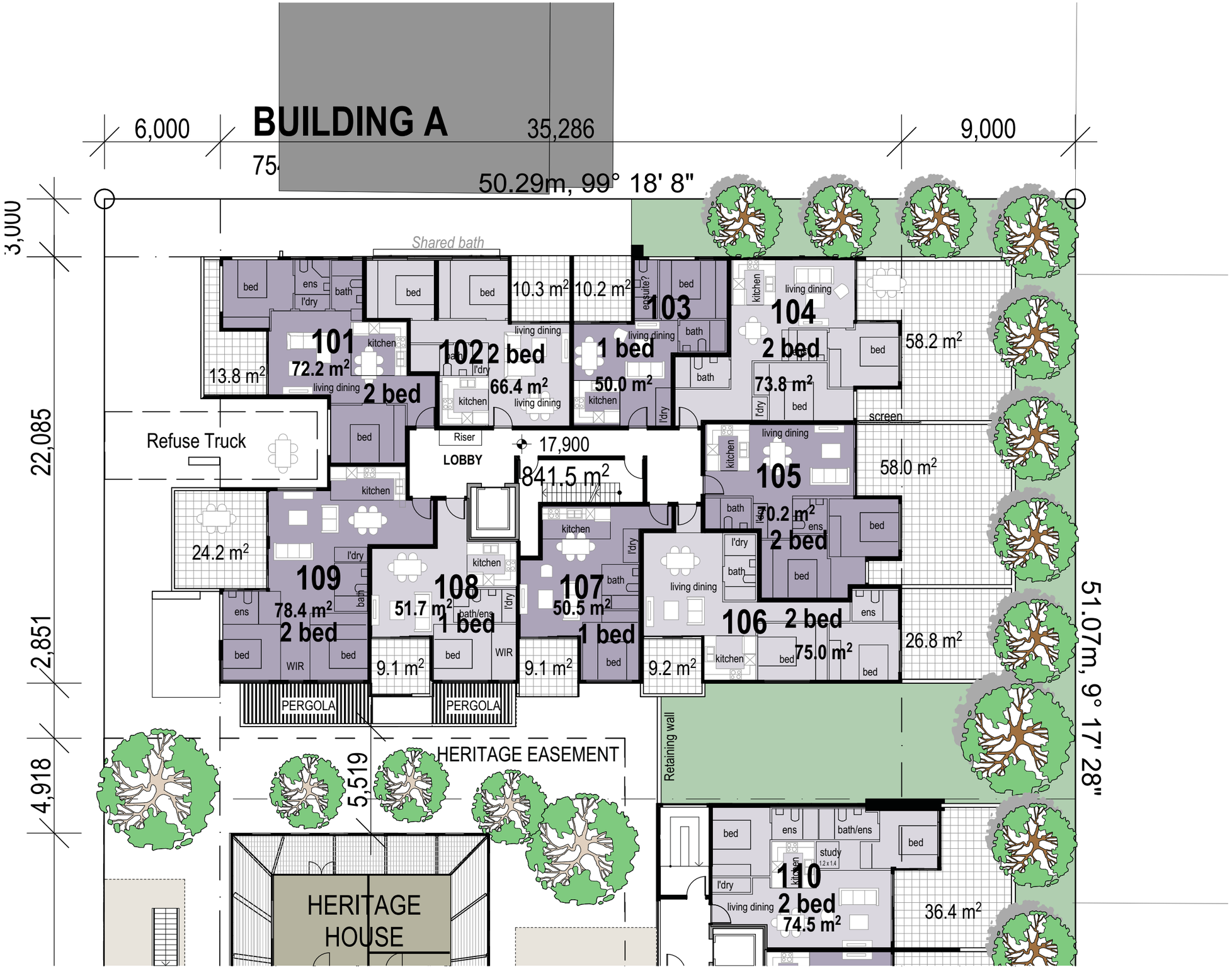

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Drawing Title
BUILDING A ROOM LAYOUTS-LEVEL 1

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP17**	P2

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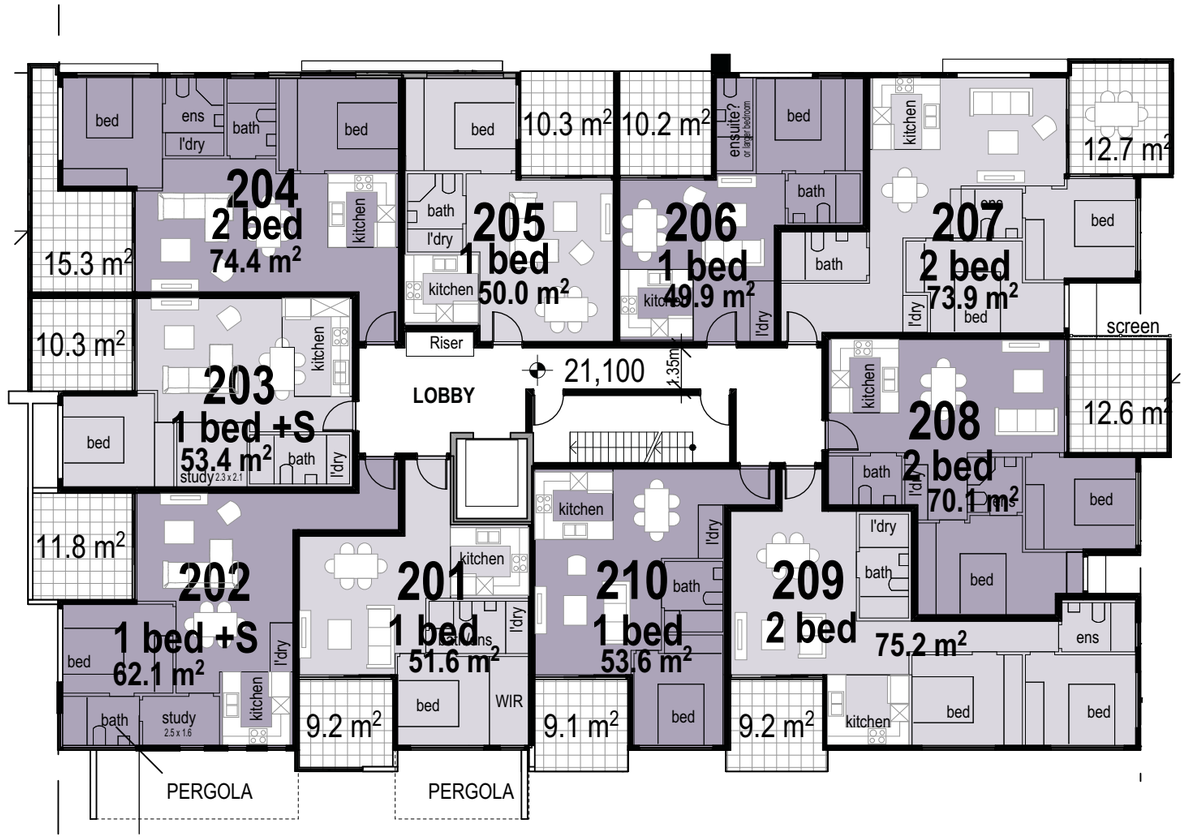

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Drawing Title
BUILDING A ROOM LAYOUTS- LEVEL 2-7 TYPICAL FLOOR

Scale @ A3	Drawn:	Checked:
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Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP18**	P2

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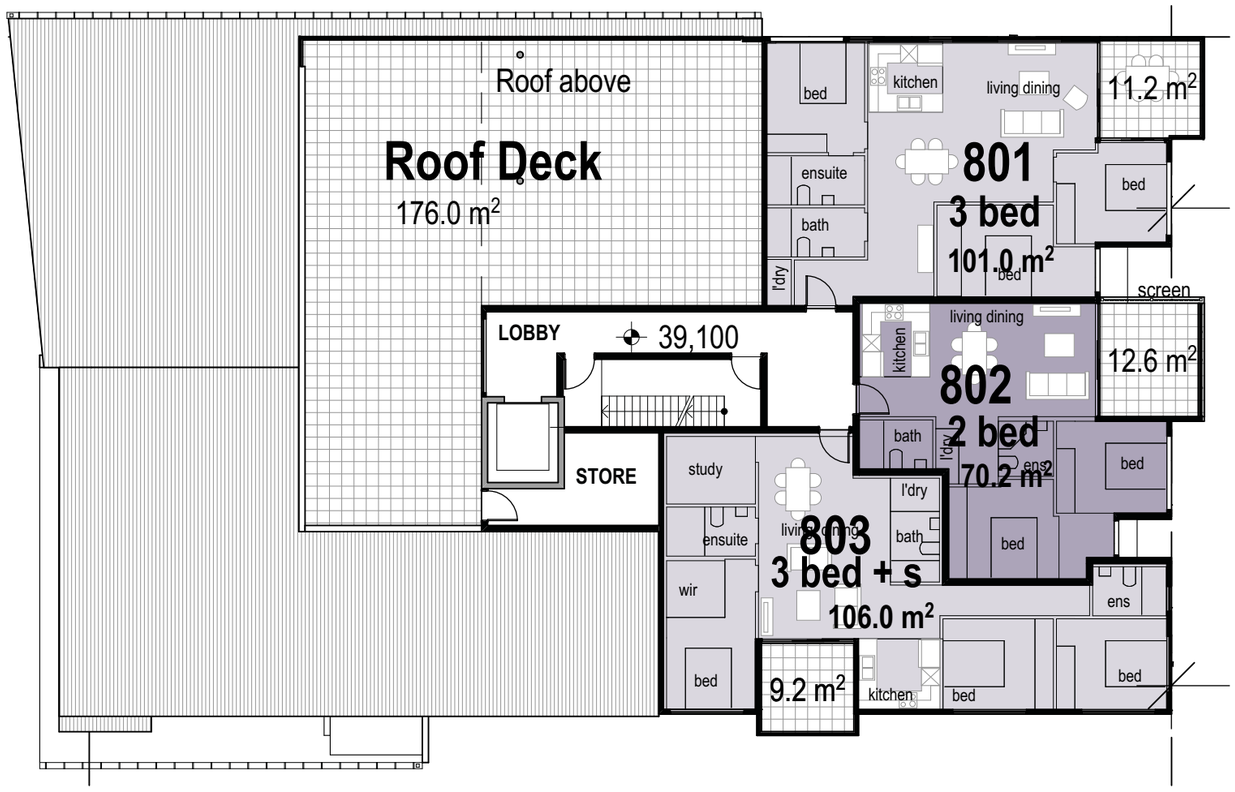

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26/11/14	P2	Consultant Issue	
24/11/14	P1	Visualisation Issue	

HAYES ANDERSON LYNCH ARCHITECTS PTY LTD
ARCHITECTS
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E reception@halarchitects.com.au
W www.halarchitects.com.au

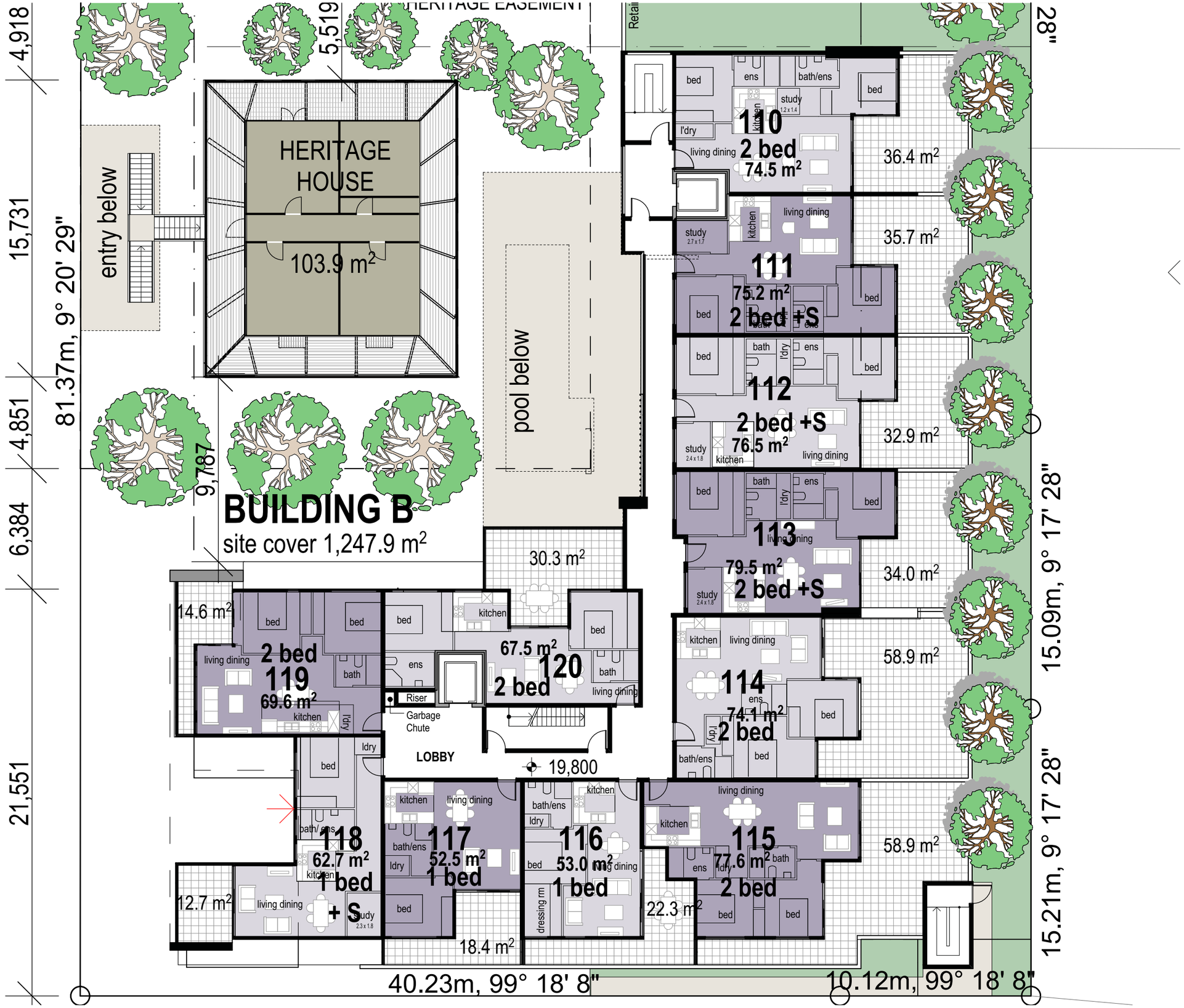
Client
Peter Tan

Project
Multi-Residential Development
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
BUILDING A ROOM LAYOUTS-LEVEL 8

Scale @ A3	Drawn:	Checked:
1:200	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP19**	P2

Printed:- 26/11/2014



TOWN PLANNING

General Notes

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Work to be carried out in a neat and appropriate manner.
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24/11/14	P1	Visualisation Issue	

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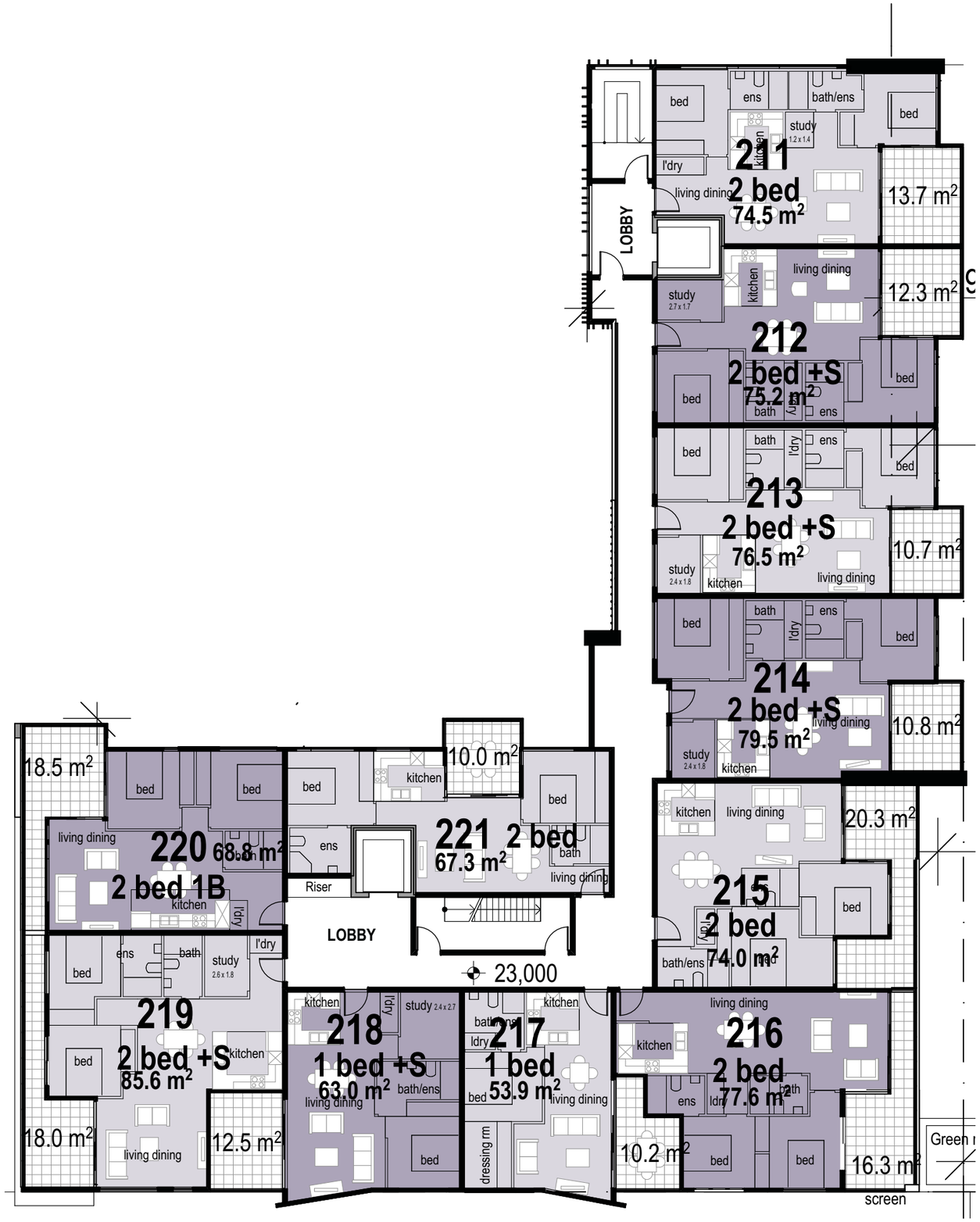
23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
BUILDING B ROOM LAYOUTS- LEVEL 1

Scale @ A3	Drawn:	Checked:
1:200	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP20**	P2

Printed:- 26/11/2014



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26/11/14 P2 Consultant Issue
24/11/14 P1 Visualisation Issue

Date	No.	Details	Checked

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23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills, QLD 4006

Drawing Title
BUILDING B ROOM LAYOUTS- LEVEL 2-5 TYPICAL FLOOR

Scale @ A3	Drawn:	Checked:
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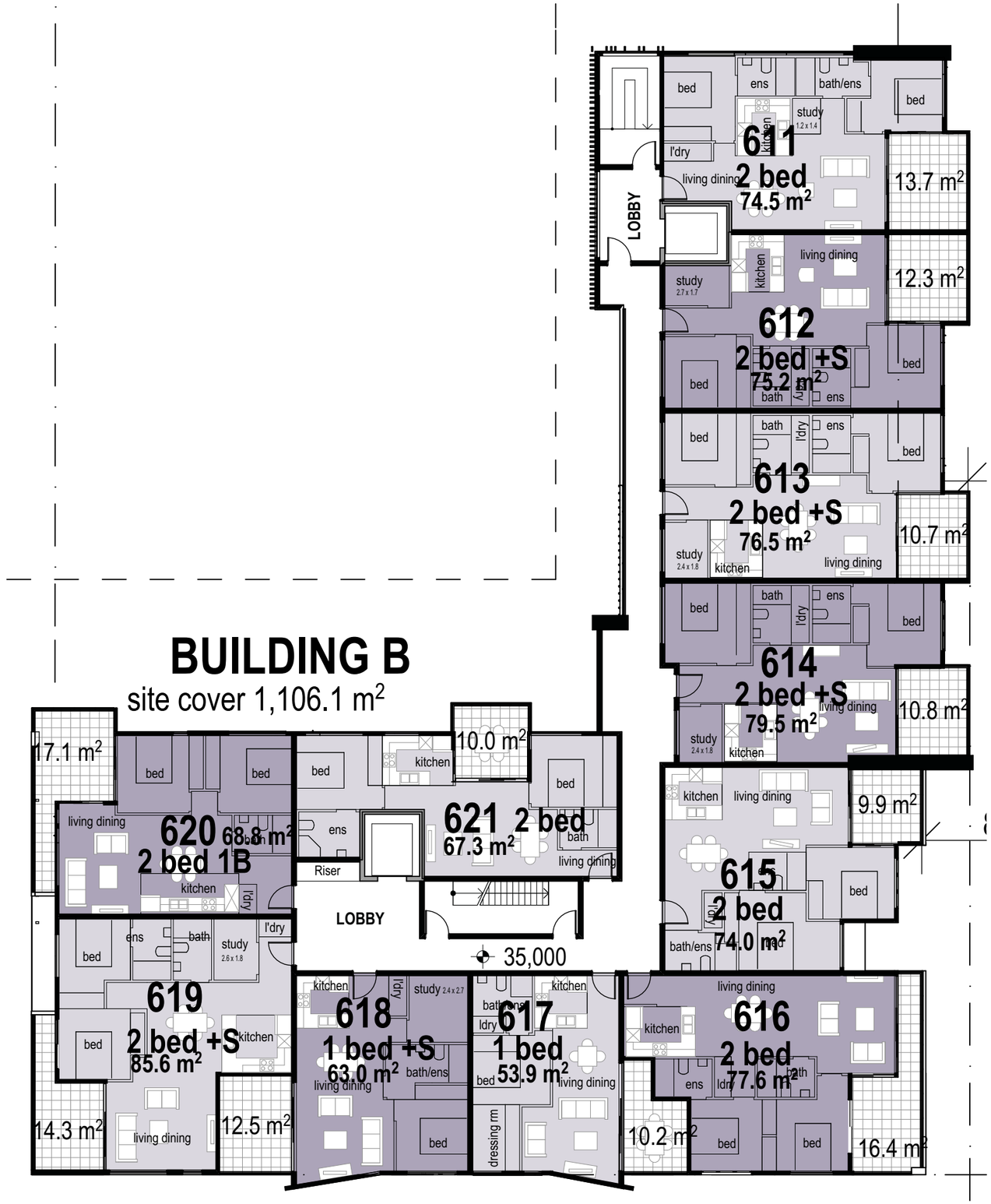
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP21**	P2

Printed:- 26/11/2014



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24/11/14 P1 Visualisation Issue

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Client
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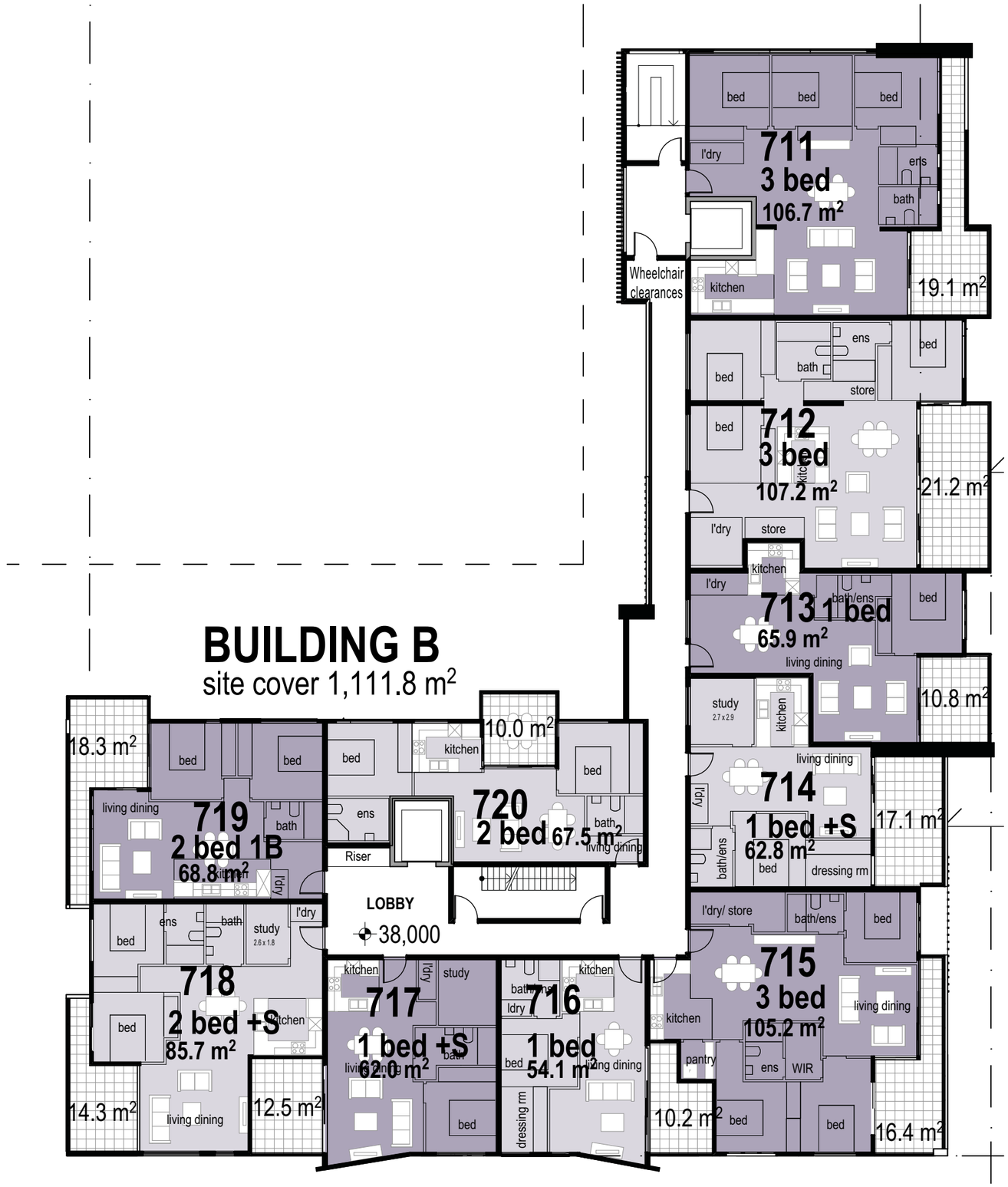
Drawing Title
BUILDING B ROOM LAYOUTS- LEVEL 6

Scale @ A3	Drawn:	Checked:
1:200	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP22**	P2

Printed:- 26/11/2014



TOWN PLANNING

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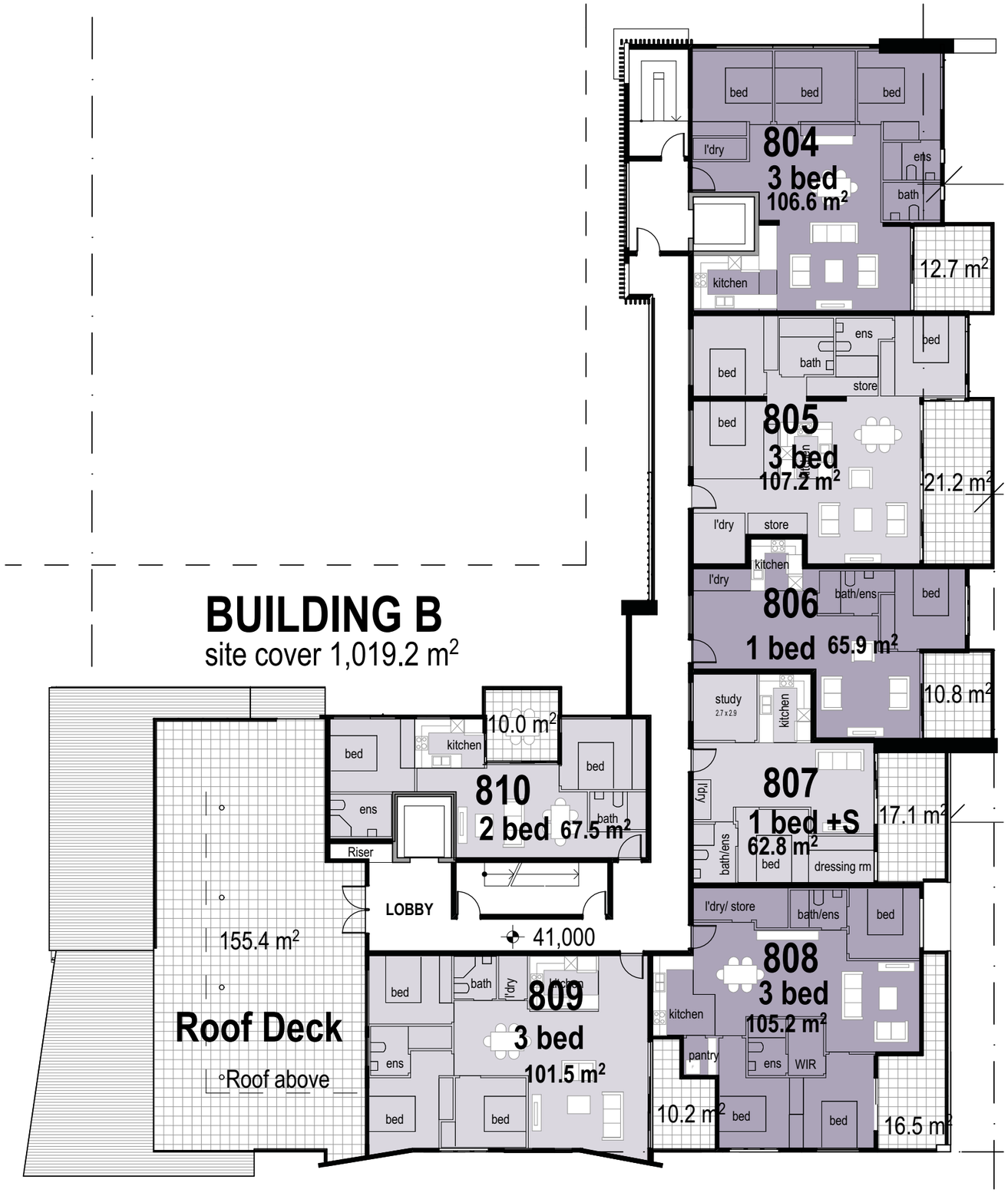
Drawing Title
BUILDING B ROOM LAYOUTS- LEVEL 7

Scale @ A3	Drawn:	Checked:
1:200	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP23**	P2

Printed:- 26/11/2014



TOWN PLANNING

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24/11/14	P1	Visualisation Issue	

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Drawing Title
BUILDING B ROOM LAYOUTS- LEVEL 8

Scale @ A3	Drawn:	Checked:
1:200	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP24**	P2

Printed:- 26/11/2014

APPENDIX 3 – SURVEY PLAN

VERTICAL DATUM

PM No. 46831
RL 20.129m AHD

HORIZONTAL DATUM

RP805887

Kerb Profile
NOT TO SCALE

LEGEND

- S — SEWER LINE
- SW — STORMWATER LINE
- \\ — FENCELINE
- E — OVERHEAD ELECTRICITY
- CTV — OVERHEAD CABLE TV
- (S) SEWERAGE MANHOLE
- (SW) STORMWATER MANHOLE
- POWER POLE
- BENCHMARK
- GULLY TRAP
- TREE
- ø H S DIAMETER HEIGHT SPREAD
- TELECOMMUNICATIONS PIT
- V WATER VALVE
- M WATER METER
- G GAS VALVE
- GM GAS METER
- TRAFFIC SIGN
- H FIRE HYDRANT
- SL SURFACE LEVEL
- IL INVERT LEVEL
- GATE
- CLOTHES HOIST

NOTES:

Contour interval is 0.5 m

Accurate location of all services to be obtained prior to any demolition, excavation or construction on or around the site.

Contours have been generated and plotted by computer program.

Only visible features of underground services located.

Position of underground Gas, Water, Telecommunications and Electricity mains have not been plotted. For alignment refer to Services Search supplied by the relevant Authority.

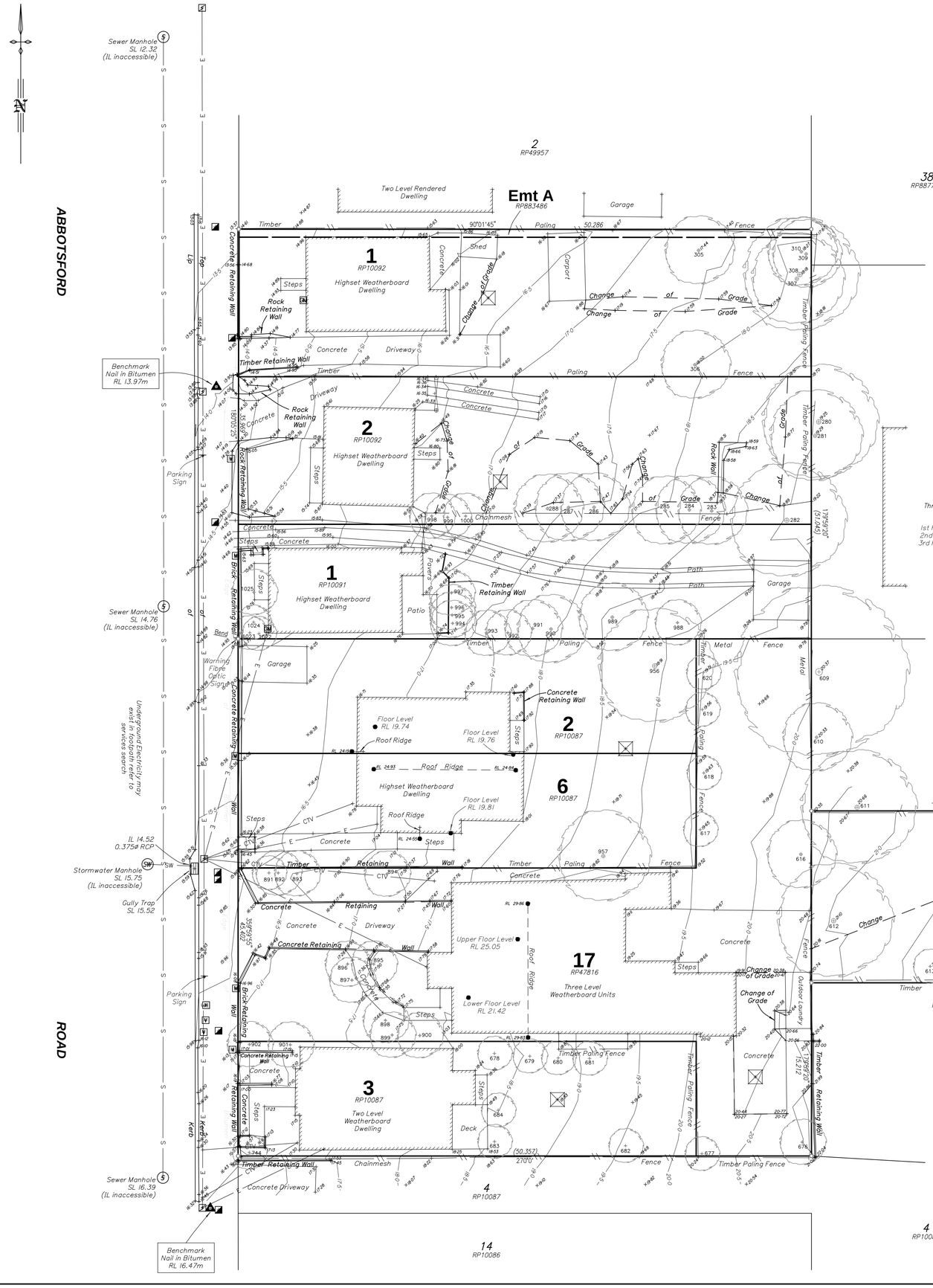
Position of Sewer & Stormwater mains have been plotted from records supplied by Brisbane City Council (B.C.C.) and may not be accurate.

Note that spot levels shown do not necessarily represent natural ground level as defined by the relevant Local Authority.

Only trees with trunk diameters greater than 0.25m have been located.

Property boundaries shown have been compiled from plans in the Department of Natural Resources and Mines. To accurately define the property boundaries, an Identification Survey will need to be undertaken.

#	Diameter	Height	Spread	Type
280	MULTI	8.0	10.0	TREE
281	0.400	8.0	8.0	TREE
282	MULTI	8.0	10.0	TREE
283	0.250	8.0	6.0	PALM
284	0.250	8.0	6.0	PALM
285	0.250	8.0	6.0	PALM
286	0.250	8.0	6.0	PALM
287	0.250	8.0	6.0	PALM
288	0.250	8.0	6.0	PALM
305	0.300	6.0	6.0	TREE
306	0.300	6.0	6.0	TREE
307	0.300	8.0	8.0	TREE
308	0.500	8.0	10.0	TREE
309	0.300	8.0	6.0	TREE
310	0.300	8.0	6.0	TREE
500	0.050	2.0	1.0	TREE
501	0.300	5.0	3.0	TREE
502	0.050	1.5	0.5	TREE
562	MULTI	8.0	8.0	TREE
609	1.000	15.0	15.0	TREE
610	MULTI	15.0	6.0	PALM
611	0.800	15.0	10.0	TREE
612	1.000	15.0	10.0	TREE
613	0.300	8.0	3.0	PALM
614	0.250	8.0	3.0	TREE
615	0.400	6.0	5.0	TREE
616	0.300	5.0	6.0	TREE
617	0.400	6.0	3.0	PALM
618	0.300	6.0	3.0	PALM
619	0.300	6.0	3.0	PALM
620	0.300	6.0	3.0	PALM
676	0.300	6.0	4.0	TREE
677	MULTI	6.0	6.0	PALM
678	0.300	6.0	3.0	PALM
679	0.300	6.0	3.0	PALM
680	0.300	6.0	3.0	PALM
681	0.300	6.0	3.0	PALM
682	MULTI	4.0	3.0	PALM
683	MULTI	5.0	3.0	PALM
684	MULTI	5.0	3.0	PALM
744	0.300	6.0	3.0	PALM
891	0.300	4.0	3.0	TREE
892	0.300	8.0	4.0	PALM
893	0.300	8.0	4.0	PALM
894	0.300	8.0	4.0	PALM
895	0.300	8.0	4.0	PALM
896	0.300	8.0	4.0	PALM
897	0.300	8.0	4.0	PALM
898	0.300	8.0	4.0	PALM
899	0.300	8.0	4.0	PALM
900	0.400	8.0	4.0	PALM
901	0.300	8.0	4.0	PALM
902	0.300	8.0	4.0	PALM
956	1.400	10.0	10.0	TREE
957	0.500	6.0	8.0	TREE
988	0.300	8.0	4.0	PALM
989	MULTI	8.0	6.0	PALM
990	MULTI	6.0	6.0	TREE
991	0.300	4.0	5.0	TREE
992	0.350	8.0	4.0	PALM
993	0.350	8.0	4.0	PALM
994	0.300	6.0	4.0	PALM
995	0.300	6.0	4.0	PALM
996	0.300	6.0	4.0	PALM
997	0.300	6.0	4.0	PALM
998	0.300	6.0	4.0	PALM
999	0.300	6.0	4.0	PALM
1000	0.300	6.0	4.0	PALM
1022	0.250	6.0	3.0	PALM
1023	0.250	6.0	3.0	PALM
1024	0.250	6.0	3.0	PALM
1025	MULTI	5.0	4.0	TREE



PROJECT	23-39 Abbotsford Road & 28 Cintra Road, Bowen Hills		
CLIENT	W, K, J, A & G Stammes		
JOB No	13007	DATE	11/03/2013
COMP	13007–1	LOCAL AUTHORITY	Brisbane C.C.
DWN	AK	CHK	AK & AW
SURV	AK	FIELD BK	227

SIMPSON RAYNER SURVEYS

SIMPSON RAYNER SURVEYS PTY LTD A.C.N. 078 818 167 A.B.N. 16 078 818 167

DETAIL AND LEVEL SURVEY

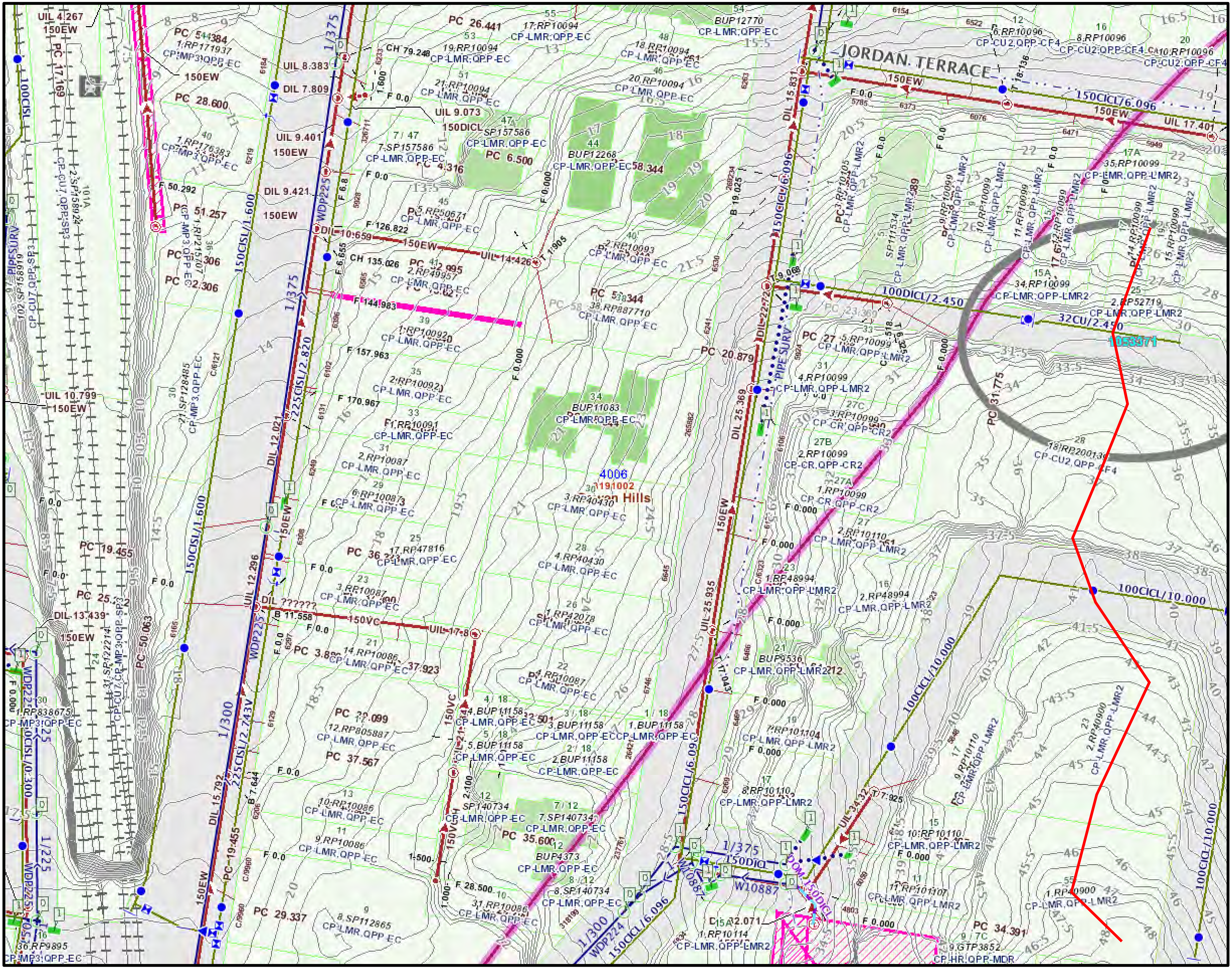
of Lots 1 & 2 on RP10092, Emt A on on RP883486 Lot 1 on RP10091, Lot 2, 3 & 6 on RP10087, Lot 17 on RP47816 and Lot 4 on RP40430

Parish of NORTH BRISBANE County of Stanley

SIMPSON RAYNER SURVEYS PTY LTD A.C.N. 078 818 167
LICENSED LAND SURVEYORS, PLANNERS AND LAND DEVELOPMENT CONSULTANTS
5/M53 Metroplex Avenue
MURARRIE 4172
PO Box 3458
TINGALPA BC QLD 4173
TELEPHONE (07) 3899 8105
FACSIMILE (07) 3899 8107
EMAIL info@srsurveys.com.au

Scale	Plan Reference
1 : 200	13007A1/1

APPENDIX 4 – BCC EBIMAP EXTRACT



JORDAN TERRACE
Raven Hills
4006
150EW
150CICL/6.096
100DICL/2.450
32CU/2.450
100CICL/10.000
150CISL/1.600
225CISL/2.820
225CISL/2.743V
150VC
1/375
1/300
WDP225
WDP224
PIPE SURV
UIL 4.267
UIL 8.383
UIL 9.073
UIL 9.401
UIL 10.799
UIL 14.426
UIL 17.401
UIL 17.8
UIL 25.935
DIL 7.809
DIL 9.421
DIL 12.021
DIL 12.296
DIL 13.439
DIL 15.792
DIL 15.831
DIL 22.72
DIL 25.369
CP-LMR,QPP-EC
CP-LMR,QPP-LMR2
CP-CR,QPP-CR2
CP-MP3,QPP-EC
CP-CU2,QPP-CF4
BUP12770
BUP12268
BUP11083
BUP9536
BUP4373

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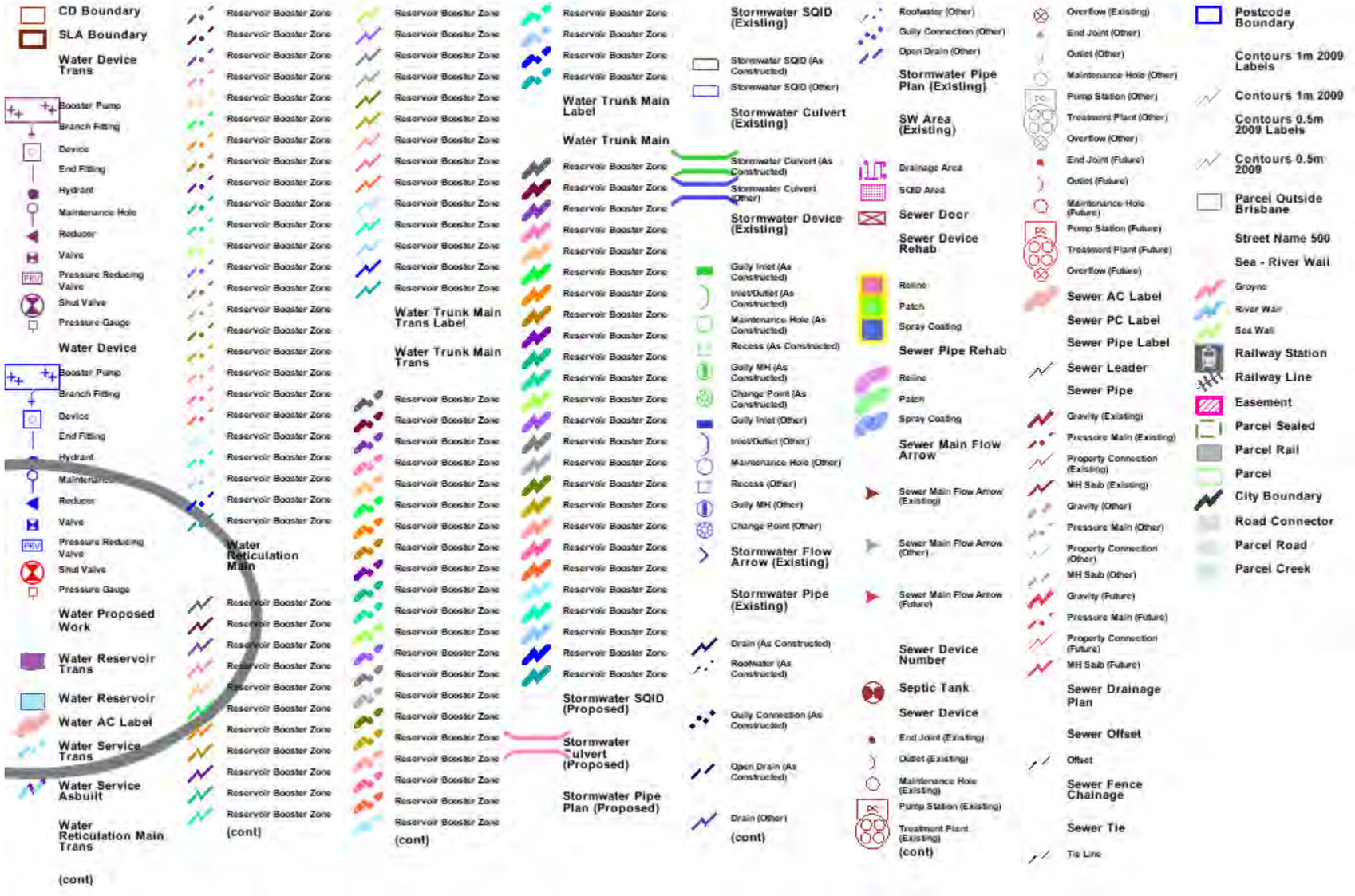
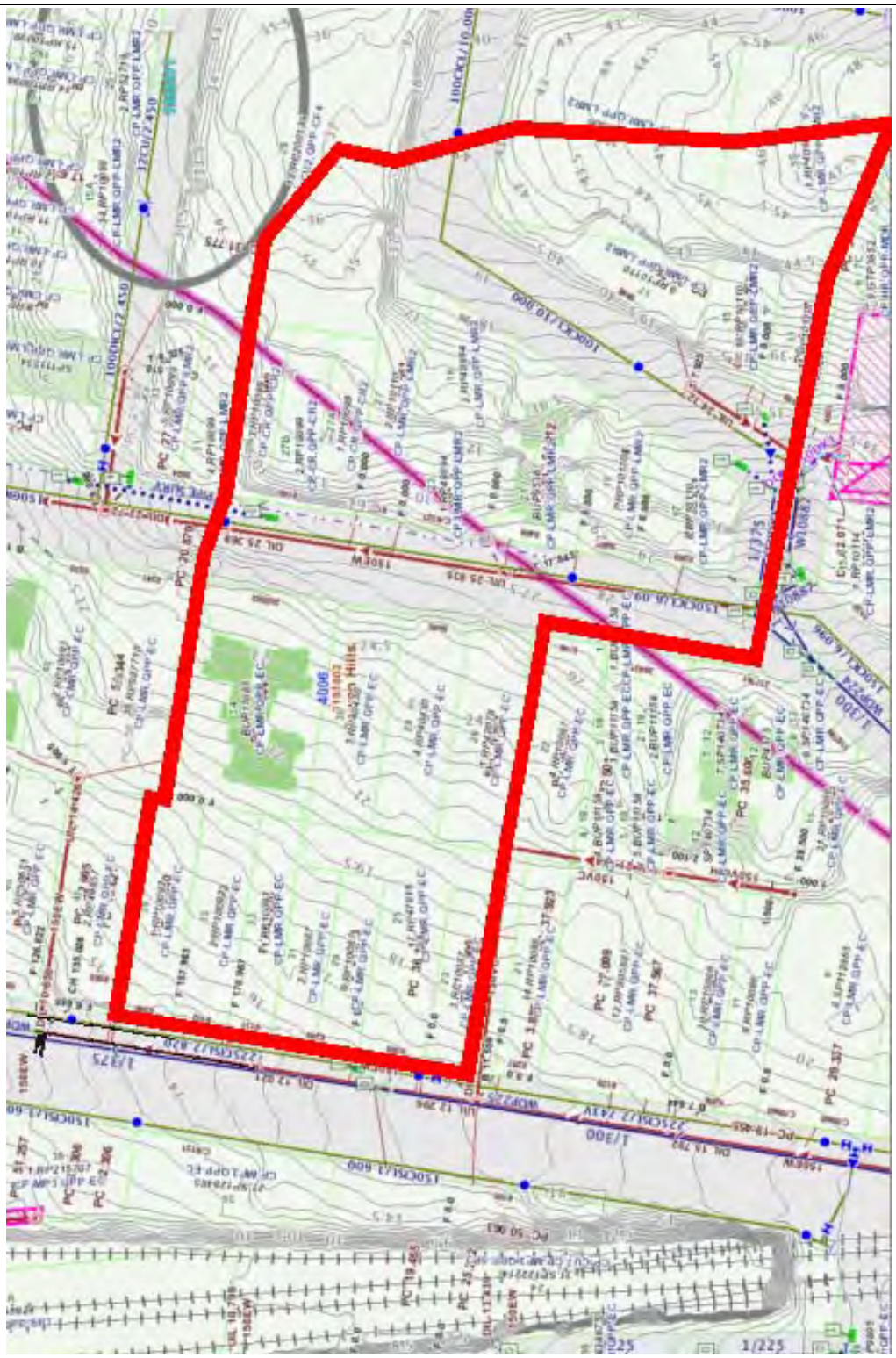

CD Boundary
SLA Boundary
Water Device Trans
Booster Pump
Branch Fitting
Device
End Fitting
Hydrant
Maintenance Hole
Reducer
Valve
Pressure Reducing Valve
Shut Valve
Pressure Gauge
Water Device
Booster Pump
Branch Fitting
Device
End Fitting
Hydrant
Maintenance Hole
Reducer
Valve
Pressure Reducing Valve
Shut Valve
Pressure Gauge
Water Proposed Work
Water Reservoir Trans
Water Reservoir
Water AC Label
Water Service Trans
Water Service Asbuilt
Water Reticulation Main Trans
(cont)
Reservoir Booster Zone
Water Reticulation Main
(cont)
Water Trunk Main Trans Label
Water Trunk Main Trans
(cont)
Water Trunk Main Label
Water Trunk Main
Stormwater SQID (Proposed)
Stormwater Culvert (Proposed)
Stormwater Pipe Plan (Proposed)
Stormwater SQID (Existing)
Stormwater SQID (As Constructed)
Stormwater SQID (Other)
Stormwater Culvert (Existing)
Stormwater Culvert (As Constructed)
Stormwater Culvert (Other)
Stormwater Device (Existing)
Gully Inlet (As Constructed)
Inlet/Outlet (As Constructed)
Maintenance Hole (As Constructed)
Recess (As Constructed)
Gully MH (As Constructed)
Change Point (As Constructed)
Gully Inlet (Other)
Inlet/Outlet (Other)
Maintenance Hole (Other)
Recess (Other)
Gully MH (Other)
Change Point (Other)
Stormwater Flow Arrow (Existing)
Stormwater Pipe (Existing)
Drain (As Constructed)
Roofwater (As Constructed)
Gully Connection (As Constructed)
Open Drain (As Constructed)
Drain (Other)
(cont)
Roofwater (Other)
Gully Connection (Other)
Open Drain (Other)
Stormwater Pipe Plan (Existing)
SW Area (Existing)
Drainage Area
SQID Area
Sewer Door
Sewer Device Rehab
Reline
Patch
Spray Coating
Sewer Pipe Rehab
Reline
Patch
Spray Coating
Sewer Main Flow Arrow
Sewer Main Flow Arrow (Existing)
Sewer Main Flow Arrow (Other)
Sewer Main Flow Arrow (Future)
Sewer Device Number
Septic Tank
Sewer Device
End Joint (Existing)
Outlet (Existing)
Maintenance Hole (Existing)
Pump Station (Existing)
Treatment Plant (Existing)
(cont)
Overflow (Existing)
End Joint (Other)
Outlet (Other)
Maintenance Hole (Other)
Pump Station (Other)
Treatment Plant (Other)
Overflow (Other)
End Joint (Future)
Outlet (Future)
Maintenance Hole (Future)
Pump Station (Future)
Treatment Plant (Future)
Overflow (Future)
Sewer AC Label
Sewer PC Label
Sewer Pipe Label
Sewer Leader
Sewer Pipe
Gravity (Existing)
Pressure Main (Existing)
Property Connection (Existing)
MH Sub (Existing)
Gravity (Other)
Pressure Main (Other)
Property Connection (Other)
MH Sub (Other)
Gravity (Future)
Pressure Main (Future)
Property Connection (Future)
MH Sub (Future)
Sewer Drainage Plan
Sewer Offset
Offset
Sewer Fence Chainage
Sewer Tie
Tie Line
Postcode Boundary
Contours 1m 2009 Labels
Contours 1m 2009
Contours 0.5m 2009 Labels
Contours 0.5m 2009
Parcel Outside Brisbane
Street Name 500
Sea - River Wall
Groyne
River Wall
Sea Wall
Railway Station
Railway Line
Easement
Parcel Sealed
Parcel Rail
Parcel
City Boundary
Road Connector
Parcel Road
Parcel Creek

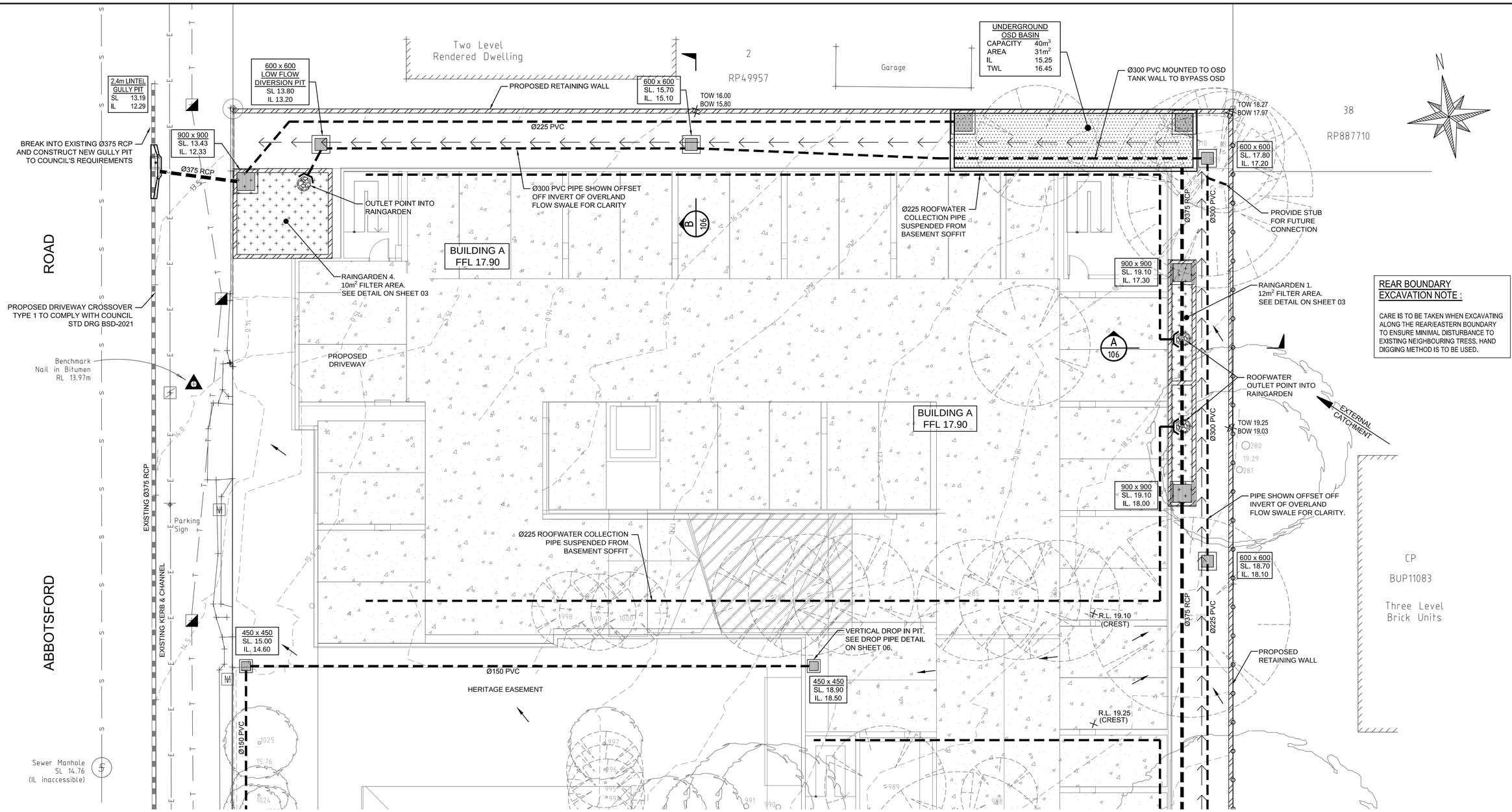
Themes List

BCC Region
CD Boundary
City Boundary
Contours 0.5m 2009
Contours 0.5m 2009 Labels
Contours 1m 2009
Contours 1m 2009 Labels
Default Imagery
Easement
Moreton Bay
Parcel
Parcel Labelling
Postcode Boundary
Rail Network
Sea − River Wall
Sewer Main Flow Arrow
Sewer Network
SLA Boundary
Stormwater Culvert (Existing)
Stormwater Culvert (Proposed)
Stormwater Network (Existing)
Stormwater Pipe Plan (Existing)
Stormwater Pipe Plan (Proposed)
Stormwater SQID (Existing)
Stormwater SQID (Proposed)
Suburb Boundary
Water Network
Water Network Trans

APPENDIX 5 – EXTERNAL CATCHMENT PLAN



APPENDIX 6 – STORMWATER CONCEPT PLAN



REAR BOUNDARY EXCAVATION NOTE :

CARE IS TO BE TAKEN WHEN EXCAVATING ALONG THE REAR/EASTERN BOUNDARY TO ENSURE MINIMAL DISTURBANCE TO EXISTING NEIGHBOURING TRESS. HAND DIGGING METHOD IS TO BE USED.

LEGEND

- PROPOSED STORMWATER
- EXISTING STORMWATER
- EXISTING SEWER MAIN (FROM RECORDS)
- EXISTING POWER (FROM RECORDS)
- EXISTING TELSTRA (FROM RECORDS)
- SURFACE FLOW ARROWS
- CLEAR PASSAGE & OPEN STYLE FENCING
- SUBSOIL DRAINAGE
- HERITAGE EASEMENT
- EXISTING SURFACE CONTOUR
- PROPOSED RETAINING WALL
- OVERLAND FLOW CHANNEL
- PROPOSED OSD STORAGE TANK
- PROPOSED BIO-RETENTION / RAINGARDEN AREA
- TREES TO BE RETAINED
- TREES TO BE REMOVED
- INDICATIVE PROPOSED TREES REFER TO ARCHITECT'S DETAILS

0 2 4 6 m
SCALE 1:100 @ A1

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR APPROVAL	13/12/2014	CAM	JAB

1cm at full size (0, 10cm, 20cm)

Architect
Hayes Anderson Lynch
PO Box 2680 FORTITUDE VALLEY
BC QLD 4006 AUSTRALIA
PHONE : (07) 3852 3190

Client
Starhill Property Group

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ENGINEERS | PROJECT MANAGERS | DEVELOPMENT CONSULTANTS

Project
23-39 ABBOTSFORD ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title
SITEWORKS AND
DRAINAGE CONCEPT PLAN
SHEET 1 OF 2

Scale	A3	Project No.	Dwg. No.	Issue
1:100		UMB14268.CIV.DA	101	A

CONTINUES ON SHEET 101

Sewer Manhole
SL 14.76
(IL inaccessible)

Underground
Electricity may exist
in footpath refer to
services search

2.4m LINTEL
GULLY PIT
SL 14.85
IL 13.95

BREAK INTO EXISTING Ø375 RCP
AND CONSTRUCT NEW GULLY PIT
TO COUNCIL'S REQUIREMENTS

OUTLET POINT
INTO
RAINGARDEN

Ø375 RCP

900 x 900
SL. 15.10
IL. 14.00

Ø150 PVC

RAINGARDEN 3.
13m² FILTER AREA.
SEE DETAIL ON SHEET 03

OUTLET POINT INTO
RAINGARDEN

450 x 450
SL. 15.60
IL. 15.20

EXISTING KERB & CHANNEL

Ø225 PVC

EXISTING
HERITAGE HOUSE

PROPOSED
POOL AREA

HERITAGE EASEMENT

BUILDING B
FFL 19.00m

450 x 450
SL. 19.50
IL.19.10

Ø375 RCP

Ø225 PVC

PROVIDE STUB FOR
FUTURE CONNECTION

900 x 900
SL. 20.10
IL. 19.00

TOW 20.37
BOW 20.22

OPEN STYLE FENCING
FOR OVERLAND FLOWS

B
106

ROOFWATER OUTLET
POINT INTO RAINGARDEN

ROOFWATER OUTLET
POINT INTO RAINGARDEN

Chainmesh

450 x 450
SL. 19.95
IL. 19.55

900 x 900
SL. 20.60
IL. 19.50

PROPOSED
RETAINING WALL

RAINGARDEN 2.
24m² FILTER AREA.
SEE DETAIL ON SHEET 03

Ø225 PVC

ROOFWATER
OUTLET POINT INTO
RAINGARDEN

TOW 20.50
BOW 20.42

900 x 900
SL. 20.90
IL. 19.80

PIPE SHOWN OFFSET OFF
INVERT OF OVERLAND FLOW
SWALE FOR CLARITY

450 x 450
SL. 20.20
IL. 19.80

EXTERNAL
CATCHMENT

PROVIDE STUB FOR
FUTURE CONNECTION

OPEN STYLE FENCING
FOR OVERLAND FLOWS

REAR BOUNDARY EXCAVATION NOTE :

CARE IS TO BE TAKEN WHEN EXCAVATING ALONG THE REAR/EASTERN BOUNDARY TO ENSURE MINIMAL DISTURBANCE TO EXISTING NEIGHBOURING TRESS. HAND DIGGING METHOD IS TO BE USED.

IL
14.52
0.375ø
RCP

Stormwater
Manhole
SL 15.75
(IL inaccessible)

GullyTrap
SL
15.52

HERITAGE EASEMENT

Ø225 ROOF WATER
COLLECTION PIPE

Ø225 ROOFWATER COLLECTION
PIPE SUSPENDED FROM
BASEMENT SOFFIT

BUILDING B
FFL 19.00m

BUILDING B
FFL 19.00m

ROAD

ABBOTSFORD

EXISTING Ø375 RCP

EXISTING Ø375 RCP

Parking
Sign

PROPOSED DRIVEWAY CROSSOVER
TYPE 1 TO COMPLY WITH COUNCIL
STD DRG BSD-2021

Ø225 PVC

PROPOSED
DRIVEWAY

450 x 450
SL. 17.00
IL. 16.60

Ø225 PVC SUSPENDED
FROM BASEMENT SOFFIT

OPEN STYLE FENCING
FOR OVERLAND FLOWS

SCALE 1:100 @ A1

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR APPROVAL	13/12/2014	CAM	JAB

1 0 1cm at full size 10cm 20cm

Architect
Hayes Anderson Lynch
PO Box 2680 FORTITUDE VALLEY
BC QLD 4006 AUSTRALIA
PHONE : (07) 3852 3190

Client
Starhill Property Group

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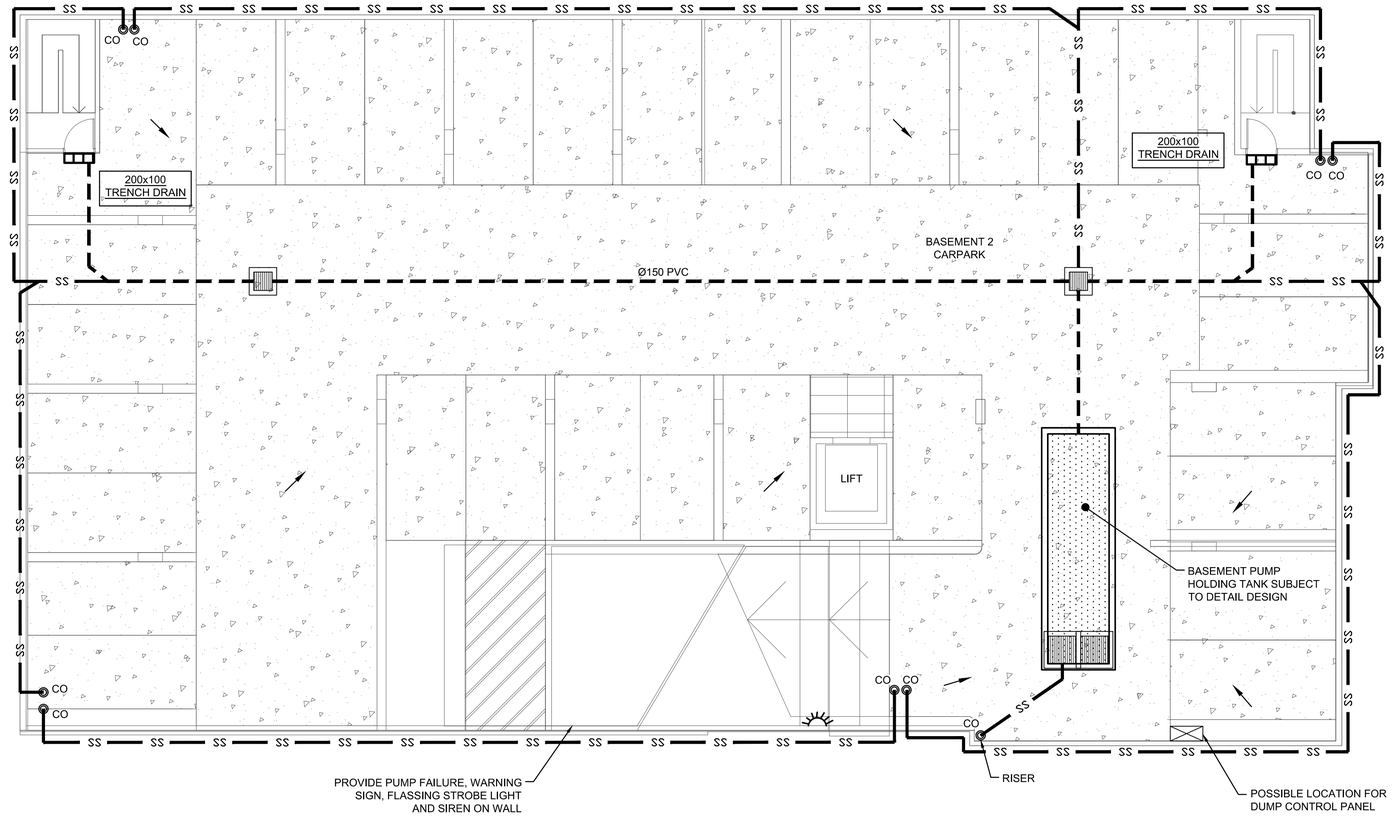
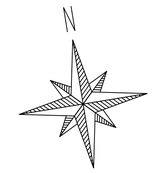
Project
23-39 ABBOTSFORD ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title
SITEWORKS AND
DRAINAGE CONCEPT PLAN
SHEET 2 OF 2

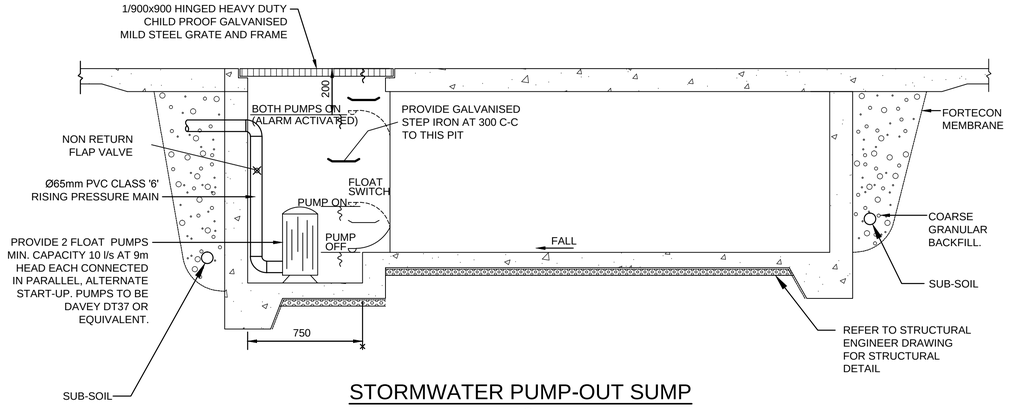
Scale	A3	Project No.	Dwg. No.	Issue
1:100		UMB14268.CIV.DA	102	A





LEGEND

- PROPOSED STORMWATER
- SURFACE FLOW ARROWS
- SUBSOIL DRAINAGE
- CLEANING EYE (OR INSPECTION EYE)
- PROPOSED STORAGE AREA
- GRATED DRAIN



STORMWATER PUMP-OUT SUMP

N.T.S

0 2 4 6 m

SCALE 1:100 @ A1

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR CONSTRUCTION	13/12/2014	CAM	JAB

1 0 1cm at full size 10cm 20cm

Architect

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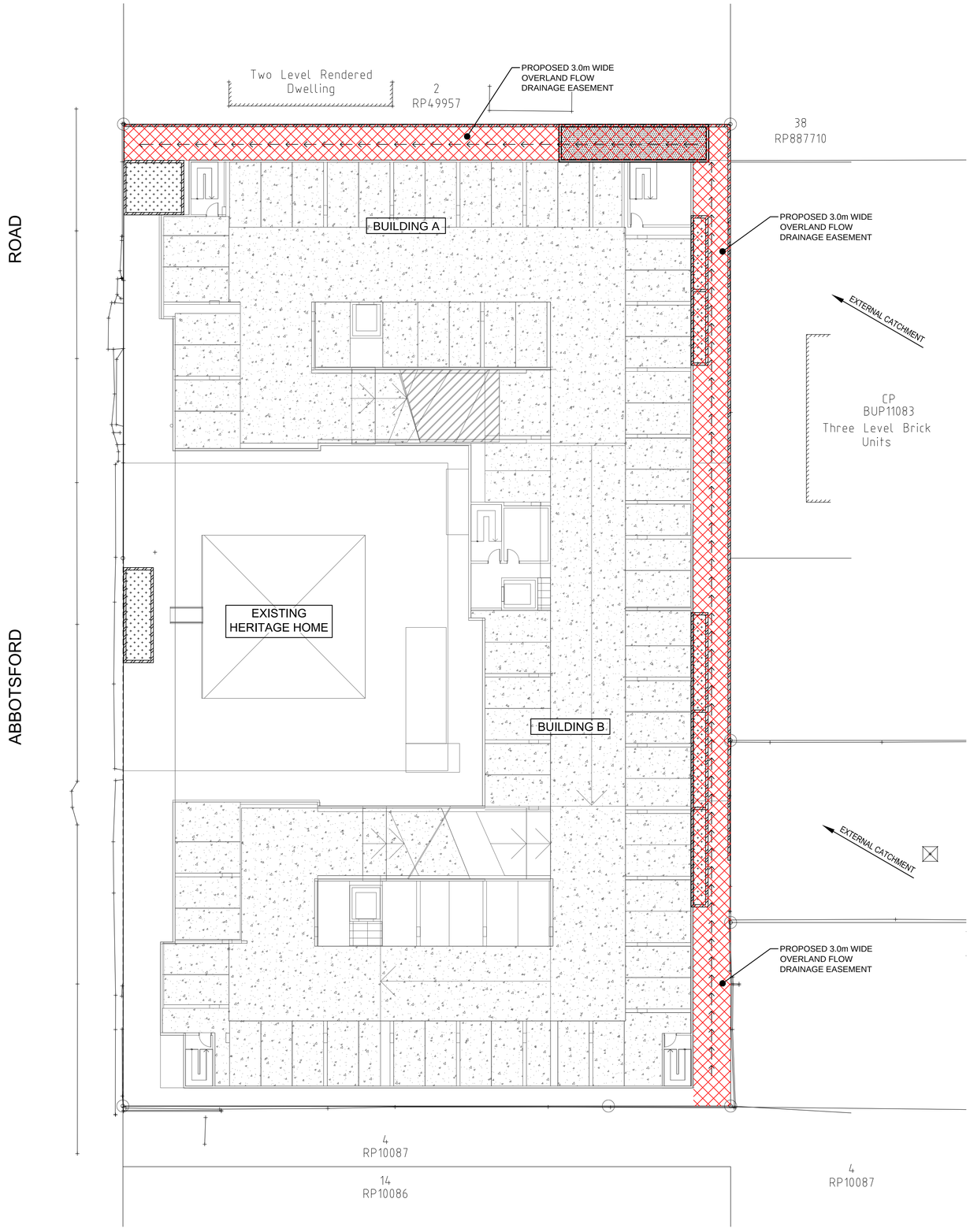
Project

23-39 ABBOTSFORD ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title

BASEMENT 2 CONCEPT DRAINAGE PLAN

Scale A3	Project No.	Dwg. No.	Issue
1:100	UMB14268.CIV.DA	103	A



N

LEGEND

PROPOSED 3.0m WIDE OVERLAND FLOW DRAINAGE EASEMENT

OVERLAND FLOW SWALE

NOTES:

FOR DETAILS OF UPSTREAM CATCHMENT, REFER TO SITE BASED STOMWATER MANAGEMENT PLAN PREPARED BY UMBRELLA CONSULTING DATED DECEMBER 2014

0 2 4 6 m

SCALE 1:100 @ A1

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR APPROVAL	13/12/2014	CAM	JAB

1cm at full size

Architect
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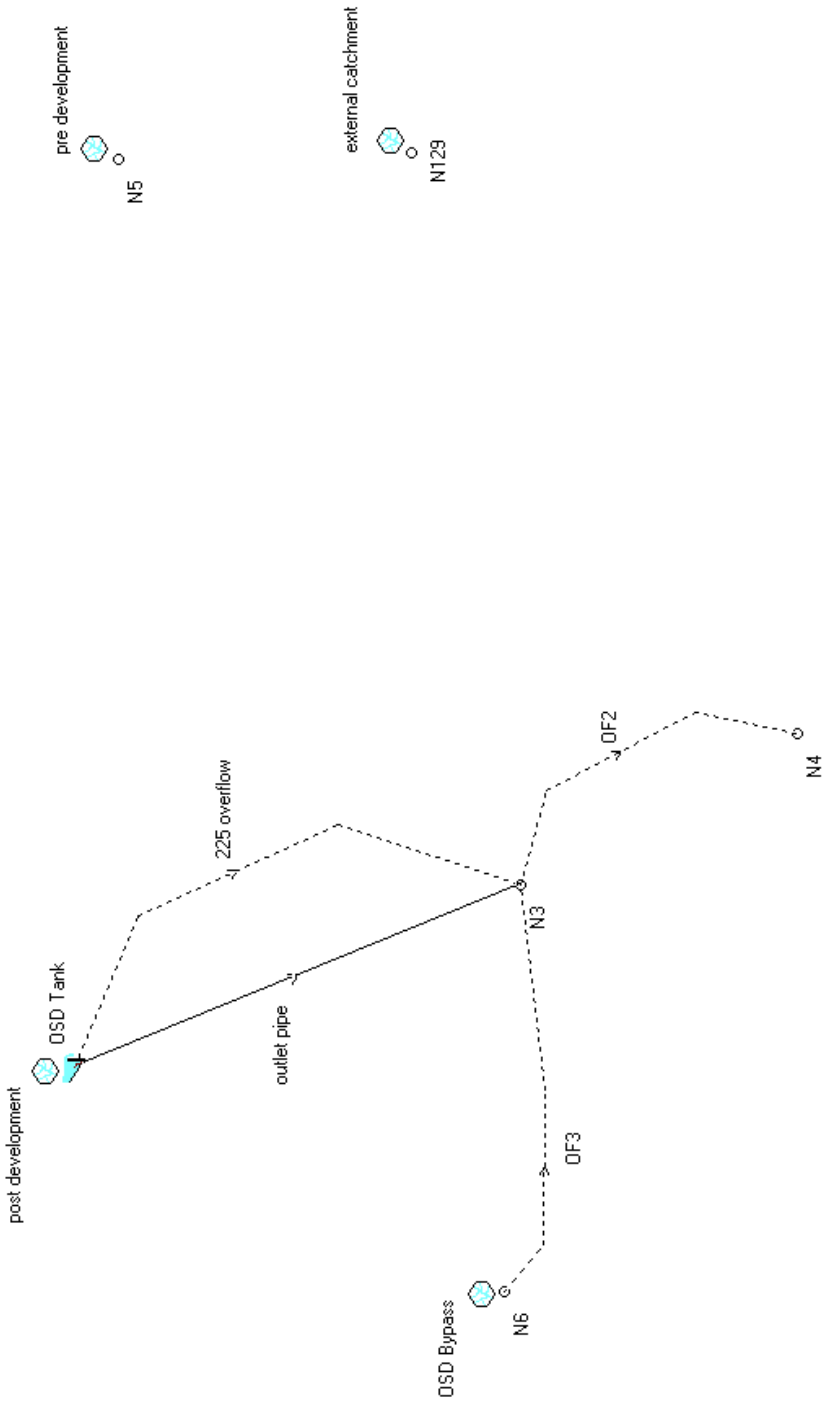
Project
23-39 ABBOTSFORD ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title
PROPOSED EASEMENT PLAN

Scale	A3	Project No.	Dwg. No.	Issue
1:100		UMB14268.CIV.DA	104	B

APPENDIX 7 – DRAINS OUTPUT


pre development
N5
external catchment
N129
OF2
N4
225 overflow
N3
OSD Tank
outlet pipe
post development
OF3
OSD Bypass
N6

DRAINS results prepared 12 December, 2014 from Version 2014.11

PIT / NODE DETAILS

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
N3	-0.2		0.045				

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
post development	0.073	0.073	0	5	7	0	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1
pre development	0.098	0.033	0.065	5	7	0	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1
OSD Bypass	0.045	0.021	0.025	5	7	0	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1
external catchment	0.469	0.442	0.028	8.61	37.36	0	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 1 year, 5 minutes storm, average 118 mm/h, Zone 1	300.2	178.83 (59.6%)	172.92 (89.9%)	5.91 (5.5%)
AR&R 1 year, 10 minutes storm, average 90.4 mm/h, Zone 1	458.62	302.68 (66.0%)	274.46 (93.4%)	28.21 (17.1%)
AR&R 1 year, 15 minutes storm, average 75.9 mm/h, Zone 1	577.59	401.67 (69.5%)	350.72 (94.7%)	50.95 (24.6%)
AR&R 1 year, 20 minutes storm, average 66.4 mm/h, Zone 1	673.76	484.37 (71.9%)	412.36 (95.5%)	72.01 (29.8%)
AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1	754.26	551.17 (73.1%)	463.96 (96.0%)	87.21 (32.2%)
AR&R 1 year, 30 minutes storm, average 54.1 mm/h, Zone 1	823.4	606.75 (73.7%)	508.28 (96.3%)	98.48 (33.3%)
AR&R 1 year, 45 minutes storm, average 43.2 mm/h, Zone 1	984.71	737.43 (74.9%)	611.67 (96.9%)	125.76 (35.6%)
AR&R 1 year, 1 hour storm, average 36.2 mm/h, Zone 1	1102.82	832.16 (75.5%)	687.37 (97.2%)	144.79 (36.6%)
AR&R 1 year, 1.5 hours storm, average 27.8 mm/h, Zone 1	1270.79	957.04 (75.3%)	795.04 (97.6%)	162.00 (35.5%)
AR&R 1 year, 2 hours storm, average 22.8 mm/h, Zone 1	1390.01	1042.17 (75.0%)	871.46 (97.8%)	170.72 (34.2%)
AR&R 1 year, 3 hours storm, average 17.1 mm/h, Zone 1	1560.55	1158.73 (74.3%)	980.81 (98.1%)	177.92 (31.8%)
AR&R 1 year, 4.5 hours storm, average 12.7 mm/h, Zone 1	1743.03	1261.86 (72.4%)	1097.73 (98.3%)	164.13 (26.2%)

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
outlet pipe	0.053	2.91	0.101	-0.198	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 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
225 overflow	0	0	0	0	0	0	0	
OF2	0.096	0.096	0	0.023	0.02	7.85	0.85	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1
OF3	0.045	0.045	0	0.016	0.01	6.56	0.69	AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	0.49	14.6	0.053	0.053	0

CONTINUITY CHECK for AR&R 1 year, 25 minutes storm, average 59.5 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	54.17	54.13	0.04	0
N3	80.3	80.3	0	0
N4	80.3	80.3	0	0
N5	53.04	53.04	0	0
N6	26.17	26.17	0	0
N129	417.79	417.79	0	0

Run Log for UMB14268 run at 23:37:09 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2

DRAINS results prepared 12 December, 2014 from Version 2014.11

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
N3	-0.17		0.125				

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
post development	0.138	0.138	0	5	7	0	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1
pre development	0.213	0.062	0.15	5	7	0	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1
OSD Bypass	0.097	0.039	0.058	5	7	0	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1
external catchment	0.984	0.879	0.12	6.68	28.98	0	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 10 year, 5 minutes storm, average 216 mm/h, Zone 1	546.45	410.09 (75.0%)	330.76 (94.4%)	79.33 (40.4%)
AR&R 10 year, 10 minutes storm, average 167 mm/h, Zone 1	844.98	686.47 (81.2%)	522.11 (96.4%)	164.37 (54.2%)
AR&R 10 year, 15 minutes storm, average 141 mm/h, Zone 1	1075.46	900.06 (83.7%)	669.84 (97.2%)	230.22 (59.6%)
AR&R 10 year, 20 minutes storm, average 125 mm/h, Zone 1	1263.92	1074.05 (85.0%)	790.64 (97.6%)	283.41 (62.5%)
AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1	1423.05	1218.30 (85.6%)	892.63 (97.9%)	325.67 (63.7%)
AR&R 10 year, 30 minutes storm, average 103 mm/h, Zone 1	1560.45	1340.09 (85.9%)	980.70 (98.1%)	359.38 (64.1%)
AR&R 10 year, 45 minutes storm, average 82.6 mm/h, Zone 1	1884.56	1629.68 (86.5%)	1188.45 (98.4%)	441.23 (65.2%)
AR&R 10 year, 1 hour storm, average 69.9 mm/h, Zone 1	2125.33	1844.98 (86.8%)	1342.78 (98.6%)	502.20 (65.8%)
AR&R 10 year, 1.5 hours storm, average 54.2 mm/h, Zone 1	2473.41	2149.32 (86.9%)	1565.89 (98.8%)	583.44 (65.7%)
AR&R 10 year, 2 hours storm, average 44.8 mm/h, Zone 1	2725.23	2364.26 (86.8%)	1727.29 (98.9%)	636.96 (65.1%)
AR&R 10 year, 3 hours storm, average 33.9 mm/h, Zone 1	3091.89	2671.54 (86.4%)	1962.30 (99.0%)	709.24 (63.9%)
AR&R 10 year, 4.5 hours storm, average 25.5 mm/h, Zone 1	3488.34	2979.55 (85.4%)	2216.49 (99.1%)	763.05 (60.9%)

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
outlet pipe	0.08	3.23	0.128	-0.171	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 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
225 overflow	0.034	0.034	0	0.02	0.01	7.26	0.38	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1
OF2	0.204	0.204	0	0.032	0.03	9.72	1.05	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1
OF3	0.097	0.097	0	0.023	0.02	7.85	0.86	AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	1.01	30	0.114	0.08	0.034

CONTINUITY CHECK for AR&R 10 year, 25 minutes storm, average 112 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	104.22	104.18	0.04	0
N3	169.78	169.78	0	0
N4	169.78	169.78	0	0
N5	141.68	141.68	0	0
N6	65.61	65.61	0	0
N129	906.8	906.8	0	0

Run Log for UMB14268 run at 23:42:48 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2, 225 overflow

DRAINS results prepared 12 December, 2014 from Version 2014.11

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
N3	-0.16		0.202				

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
post development	0.197	0.197	0	5	7	0	AR&R 100 year, 5 minutes storm, average 323 mm/h, Zone 1
pre development	0.303	0.086	0.217	5	7	0	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1
OSD Bypass	0.137	0.053	0.084	5	7	0	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1
external catchment	1.509	1.396	0.113	4.38	18.99	0	AR&R 100 year, 5 minutes storm, average 323 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 100 year, 5 minutes storm, average 323 mm/h, Zone 1	818.51	684.57 (83.6%)	505.14 (96.3%)	179.43 (61.1%)
AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 1	1276.6	1119.72 (87.7%)	798.76 (97.6%)	320.96 (70.0%)
AR&R 100 year, 15 minutes storm, average 215 mm/h, Zone 1	1636.69	1461.35 (89.3%)	1029.57 (98.1%)	431.78 (73.5%)
AR&R 100 year, 20 minutes storm, average 191 mm/h, Zone 1	1933.5	1742.64 (90.1%)	1219.82 (98.4%)	522.82 (75.3%)
AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1	2185.42	1977.50 (90.5%)	1381.30 (98.6%)	596.20 (76.0%)
AR&R 100 year, 30 minutes storm, average 158 mm/h, Zone 1	2403.86	2182.01 (90.8%)	1521.31 (98.7%)	660.70 (76.6%)
AR&R 100 year, 45 minutes storm, average 128 mm/h, Zone 1	2922.54	2666.77 (91.2%)	1853.77 (99.0%)	813.01 (77.5%)
AR&R 100 year, 1 hour storm, average 109 mm/h, Zone 1	3311.41	3028.78 (91.5%)	2103.02 (99.1%)	925.76 (77.9%)
AR&R 100 year, 1.5 hours storm, average 85.0 mm/h, Zone 1	3879.8	3553.42 (91.6%)	2467.35 (99.2%)	1086.08 (78.0%)
AR&R 100 year, 2 hours storm, average 70.6 mm/h, Zone 1	4295.82	3931.75 (91.5%)	2734.01 (99.3%)	1197.74 (77.7%)
AR&R 100 year, 3 hours storm, average 53.8 mm/h, Zone 1	4908.09	4478.69 (91.3%)	3126.39 (99.4%)	1352.29 (76.7%)
AR&R 100 year, 4.5 hours storm, average 40.7 mm/h, Zone 1	5575.72	5057.78 (90.7%)	3554.57 (99.5%)	1503.22 (75.1%)

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
outlet pipe	0.092	3.34	0.14	-0.159	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 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
225 overflow	0.069	0.069	0	0.027	0.01	8.67	0.47	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1
OF2	0.293	0.293	0	0.037	0.04	10.39	1.18	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1
OF3	0.137	0.137	0	0.027	0.02	8.67	0.94	AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	1.32	39.1	0.161	0.092	0.069

CONTINUITY CHECK for AR&R 100 year, 25 minutes storm, average 172 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	161.27	161.23	0.05	0
N3	272.09	272.09	0	0
N4	272.09	272.09	0	0
N5	243.52	243.52	0	0
N6	110.86	110.86	0	0
N129	1461.84	1461.84	0	0

Run Log for UMB14268 run at 23:44:27 on 12/12/2014
Flows were safe in all overflow routes.

DRAINS results prepared 12 December, 2014 from Version 2014.11

PIT / NODE DETAILS

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
N3	-0.19			0.064			

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
post development	0.095	0.095	0	5	7	0	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1
pre development	0.139	0.043	0.096	5	7	0	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1
OSD Bypass	0.064	0.027	0.037	5	7	0	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1
external catchment	0.632	0.583	0.055	7.77	33.71	0	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 2 year, 5 minutes storm, average 152 mm/h, Zone 1	384.99	251.94 (65.4%)	227.27 (92.1%)	24.68 (17.9%)
AR&R 2 year, 10 minutes storm, average 116 mm/h, Zone 1	589.63	430.35 (73.0%)	358.44 (94.8%)	71.92 (34.0%)
AR&R 2 year, 15 minutes storm, average 97.9 mm/h, Zone 1	744.42	568.49 (76.4%)	457.65 (95.9%)	110.84 (41.5%)
AR&R 2 year, 20 minutes storm, average 85.8 mm/h, Zone 1	869.83	680.04 (78.2%)	538.03 (96.5%)	142.00 (45.5%)
AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1	975.08	771.37 (79.1%)	605.50 (96.9%)	165.87 (47.4%)
AR&R 2 year, 30 minutes storm, average 70.0 mm/h, Zone 1	1065.39	846.77 (79.5%)	663.39 (97.1%)	183.38 (47.9%)
AR&R 2 year, 45 minutes storm, average 55.9 mm/h, Zone 1	1276.75	1025.87 (80.3%)	798.86 (97.6%)	227.01 (49.5%)
AR&R 2 year, 1 hour storm, average 47.1 mm/h, Zone 1	1431.85	1156.83 (80.8%)	898.27 (97.9%)	258.56 (50.3%)
AR&R 2 year, 1.5 hours storm, average 36.2 mm/h, Zone 1	1652.87	1334.05 (80.7%)	1039.94 (98.2%)	294.11 (49.6%)
AR&R 2 year, 2 hours storm, average 29.7 mm/h, Zone 1	1810.35	1455.11 (80.4%)	1140.88 (98.3%)	314.23 (48.3%)
AR&R 2 year, 3 hours storm, average 22.3 mm/h, Zone 1	2036.41	1626.68 (79.9%)	1285.79 (98.5%)	340.90 (46.6%)
AR&R 2 year, 4.5 hours storm, average 16.6 mm/h, Zone 1	2278.68	1785.49 (78.4%)	1441.08 (98.7%)	344.41 (42.1%)

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
outlet pipe	0.065	3.07	0.114	-0.185	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 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
225 overflow	0	0	0	0	0	0	0	
OF2	0.125	0.125	0	0.025	0.02	8.44	0.92	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1
OF3	0.064	0.064	0	0.019	0.01	7.15	0.74	AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	0.7	20.8	0.065	0.065	0

CONTINUITY CHECK for AR&R 2 year, 25 minutes storm, average 76.9 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	70.7	70.65	0.04	0
N3	109.76	109.76	0	0
N4	109.76	109.76	0	0
N5	82.09	82.09	0	0
N6	39.11	39.11	0	0
N129	579.48	579.48	0	0

Run Log for UMB14268 run at 23:41:41 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2

DRAINS results prepared 12 December, 2014 from Version 2014.11

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
N3	-0.17		0.159				

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
post development	0.16	0.16	0	5	7	0	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1
pre development	0.25	0.072	0.178	5	7	0	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1
OSD Bypass	0.113	0.045	0.068	5	7	0	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1
external catchment	1.169	1.033	0.158	6.3	27.32	0	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 20 year, 5 minutes storm, average 247 mm/h, Zone 1	627.28	491.68 (78.4%)	382.57 (95.1%)	109.12 (48.5%)
AR&R 20 year, 10 minutes storm, average 192 mm/h, Zone 1	973.45	815.52 (83.8%)	604.46 (96.9%)	211.07 (60.4%)
AR&R 20 year, 15 minutes storm, average 163 mm/h, Zone 1	1242.17	1066.97 (85.9%)	776.69 (97.6%)	290.27 (65.1%)
AR&R 20 year, 20 minutes storm, average 144 mm/h, Zone 1	1462.48	1272.68 (87.0%)	917.91 (97.9%)	354.77 (67.6%)
AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1	1648.86	1443.47 (87.5%)	1037.37 (98.2%)	406.10 (68.6%)
AR&R 20 year, 30 minutes storm, average 119 mm/h, Zone 1	1809.97	1589.46 (87.8%)	1140.64 (98.3%)	448.82 (69.1%)
AR&R 20 year, 45 minutes storm, average 96.0 mm/h, Zone 1	2190.98	1935.90 (88.4%)	1384.85 (98.6%)	551.05 (70.1%)
AR&R 20 year, 1 hour storm, average 81.3 mm/h, Zone 1	2474.85	2193.82 (88.6%)	1566.81 (98.8%)	627.02 (70.6%)
AR&R 20 year, 1.5 hours storm, average 63.2 mm/h, Zone 1	2886.54	2561.59 (88.7%)	1830.69 (98.9%)	730.90 (70.5%)
AR&R 20 year, 2 hours storm, average 52.3 mm/h, Zone 1	3185.32	2822.77 (88.6%)	2022.21 (99.0%)	800.57 (70.0%)
AR&R 20 year, 3 hours storm, average 39.7 mm/h, Zone 1	3621.76	3197.71 (88.3%)	2301.97 (99.2%)	895.74 (68.9%)
AR&R 20 year, 4.5 hours storm, average 29.9 mm/h, Zone 1	4095.11	3582.74 (87.5%)	2605.34 (99.3%)	977.39 (66.5%)

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
outlet pipe	0.085	3.27	0.133	-0.166	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 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
225 overflow	0.05	0.05	0	0.023	0.01	7.97	0.43	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1
OF2	0.243	0.243	0	0.034	0.04	10.1	1.11	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1
OF3	0.113	0.113	0	0.024	0.02	8.2	0.9	AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	1.13	33.4	0.135	0.085	0.05

CONTINUITY CHECK for AR&R 20 year, 25 minutes storm, average 130 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	121.12	121.07	0.04	0
N3	200.1	200.1	0	0
N4	200.1	200.1	0	0
N5	171.87	171.87	0	0
N6	79.02	79.02	0	0
N129	1071.46	1071.46	0	0

Run Log for UMB14268 run at 23:43:16 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2, 225 overflow

DRAINS results prepared 12 December, 2014 from Version 2014.11

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
N3	-0.17		0.096				

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
post development	0.122	0.122	0	5	7	0	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1
pre development	0.185	0.055	0.13	5	7	0	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1
OSD Bypass	0.084	0.034	0.05	5	7	0	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1
external catchment	0.849	0.766	0.094	7.03	30.48	0	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 5 year, 5 minutes storm, average 192 mm/h, Zone 1	486.28	349.40 (71.9%)	292.19 (93.7%)	57.21 (32.8%)
AR&R 5 year, 10 minutes storm, average 148 mm/h, Zone 1	749.67	590.81 (78.8%)	461.02 (95.9%)	129.80 (48.2%)
AR&R 5 year, 15 minutes storm, average 125 mm/h, Zone 1	951.47	775.91 (81.5%)	590.36 (96.8%)	185.54 (54.3%)
AR&R 5 year, 20 minutes storm, average 110 mm/h, Zone 1	1115.9	925.91 (83.0%)	695.76 (97.3%)	230.15 (57.4%)
AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1	1254.41	1050.11 (83.7%)	784.54 (97.6%)	265.57 (59.0%)
AR&R 5 year, 30 minutes storm, average 90.3 mm/h, Zone 1	1373.73	1153.61 (84.0%)	861.03 (97.8%)	292.59 (59.3%)
AR&R 5 year, 45 minutes storm, average 72.5 mm/h, Zone 1	1654.29	1399.88 (84.6%)	1040.85 (98.2%)	359.02 (60.4%)
AR&R 5 year, 1 hour storm, average 61.2 mm/h, Zone 1	1861.92	1583.10 (85.0%)	1173.94 (98.4%)	409.16 (61.2%)
AR&R 5 year, 1.5 hours storm, average 47.3 mm/h, Zone 1	2160.8	1838.29 (85.1%)	1365.51 (98.6%)	472.78 (60.9%)
AR&R 5 year, 2 hours storm, average 39.0 mm/h, Zone 1	2376.04	2016.43 (84.9%)	1503.48 (98.7%)	512.95 (60.1%)
AR&R 5 year, 3 hours storm, average 29.4 mm/h, Zone 1	2688.21	2271.52 (84.5%)	1703.60 (98.9%)	567.91 (58.8%)
AR&R 5 year, 4.5 hours storm, average 22.1 mm/h, Zone 1	3024.65	2520.73 (83.3%)	1919.29 (99.0%)	601.44 (55.4%)

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
outlet pipe	0.076	3.19	0.124	-0.175	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 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
225 overflow	0.02	0.02	0	0.016	0	6.44	0.32	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1
OF2	0.171	0.171	0	0.03	0.03	9.26	0.99	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1
OF3	0.084	0.084	0	0.021	0.02	7.62	0.81	AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	0.92	27.3	0.095	0.076	0.02

CONTINUITY CHECK for AR&R 5 year, 25 minutes storm, average 98.9 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	91.6	91.56	0.04	0
N3	147.16	147.16	0	0
N4	147.16	147.16	0	0
N5	119.18	119.18	0	0
N6	55.61	55.61	0	0
N129	783.72	783.72	0	0

Run Log for UMB14268 run at 23:42:16 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2, 225 overflow

DRAINS results prepared 12 December, 2014 from Version 2014.11

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
N3	-0.16		0.176				

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
post development	0.176	0.176	0	5	7	0	AR&R 50 year, 5 minutes storm, average 290 mm/h, Zone 1
pre development	0.268	0.077	0.192	5	7	0	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1
OSD Bypass	0.121	0.048	0.074	5	7	0	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1
external catchment	1.346	1.254	0.092	4.57	19.82	0	AR&R 50 year, 5 minutes storm, average 290 mm/h, Zone 1

Outflow Volumes for Total Catchment (1.95 impervious + 1.09 pervious = 3.04 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 50 year, 5 minutes storm, average 290 mm/h, Zone 1	735.22	600.55 (81.7%)	451.75 (95.9%)	148.80 (56.4%)
AR&R 50 year, 10 minutes storm, average 226 mm/h, Zone 1	1144.17	986.67 (86.2%)	713.88 (97.3%)	272.79 (66.4%)
AR&R 50 year, 15 minutes storm, average 192 mm/h, Zone 1	1464.18	1288.56 (88.0%)	918.99 (97.9%)	369.57 (70.3%)
AR&R 50 year, 20 minutes storm, average 170 mm/h, Zone 1	1727.44	1536.49 (88.9%)	1087.74 (98.2%)	448.75 (72.4%)
AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1	1950.64	1742.59 (89.3%)	1230.80 (98.4%)	511.79 (73.1%)
AR&R 50 year, 30 minutes storm, average 141 mm/h, Zone 1	2143.84	1921.85 (89.6%)	1354.64 (98.6%)	567.21 (73.7%)
AR&R 50 year, 45 minutes storm, average 114 mm/h, Zone 1	2601.96	2346.12 (90.2%)	1648.28 (98.8%)	697.83 (74.7%)
AR&R 50 year, 1 hour storm, average 96.8 mm/h, Zone 1	2944.55	2662.02 (90.4%)	1867.88 (99.0%)	794.14 (75.1%)
AR&R 50 year, 1.5 hours storm, average 75.5 mm/h, Zone 1	3443.54	3117.36 (90.5%)	2187.72 (99.1%)	929.64 (75.2%)
AR&R 50 year, 2 hours storm, average 62.6 mm/h, Zone 1	3807.56	3443.58 (90.4%)	2421.05 (99.2%)	1022.53 (74.8%)
AR&R 50 year, 3 hours storm, average 47.6 mm/h, Zone 1	4341.79	3912.96 (90.1%)	2763.51 (99.3%)	1149.46 (73.7%)
AR&R 50 year, 4.5 hours storm, average 36.0 mm/h, Zone 1	4922.85	4406.27 (89.5%)	3135.91 (99.4%)	1270.37 (71.9%)

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
outlet pipe	0.088	3.3	0.136	-0.163	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 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
225 overflow	0.058	0.058	0	0.025	0.01	8.32	0.44	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1
OF2	0.262	0.262	0	0.035	0.04	10.21	1.14	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1
OF3	0.121	0.121	0	0.025	0.02	8.44	0.89	AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1

DETENTION BASIN DETAILS

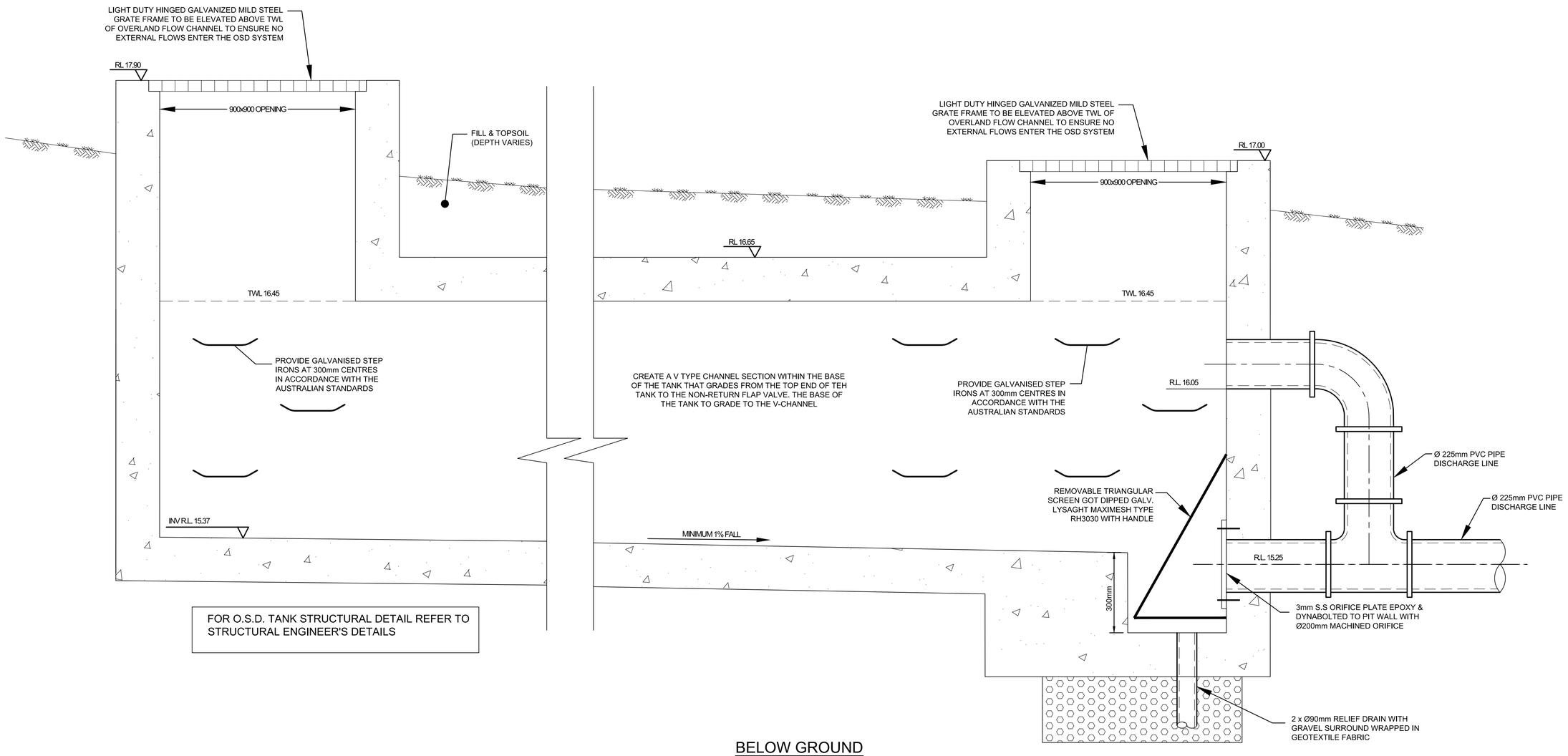
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD Tank	1.2	35.6	0.145	0.088	0.058

CONTINUITY CHECK for AR&R 50 year, 25 minutes storm, average 154 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
OSD Tank	143.7	143.66	0.05	0
N3	240.52	240.52	0	0
N4	240.52	240.52	0	0
N5	211.99	211.99	0	0
N6	96.86	96.86	0	0
N129	1290.03	1290.03	0	0

Run Log for UMB14268 run at 23:43:49 on 12/12/2014
The maximum flow exceeded the safe value in the following overflow routes: OF3, OF2, 225 overflow

APPENDIX 8 – CONCEPT STORMWATER DETENTION TANK



BELOW GROUND
ON-SITE DETENTION TANK DETAIL
1:10

0 200 400 600mm

SCALE 1:10 @ A1

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR APPROVAL	13/12/2014	CAM	JAB

1cm at full size

Architect
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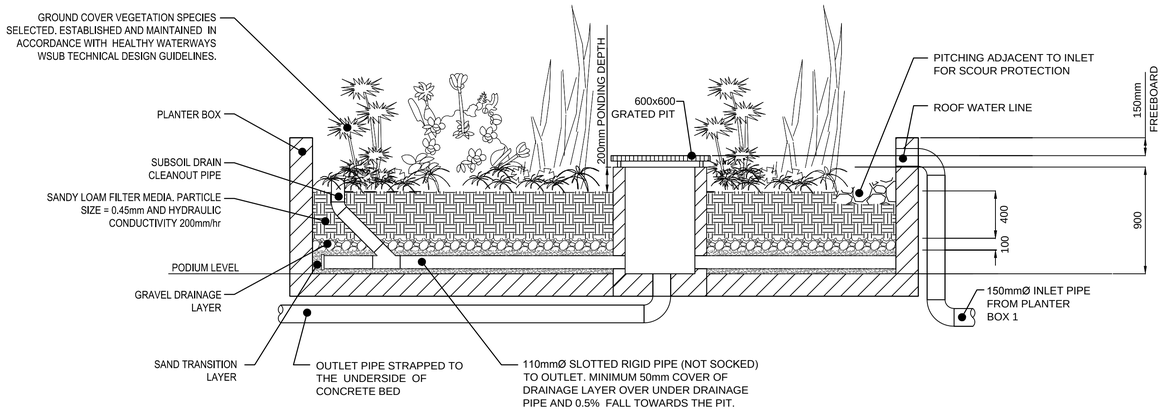
Project
23-39 ABBOTSFORD ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title
ON-SITE DETENTION TANK DETAILS

Scale	Project No.	Dwg. No.	Issue
1:10 A3	UMB14268.CIV.DA	105	A

APPENDIX 9 – CONCEPT BIO TREATMENT PLAN



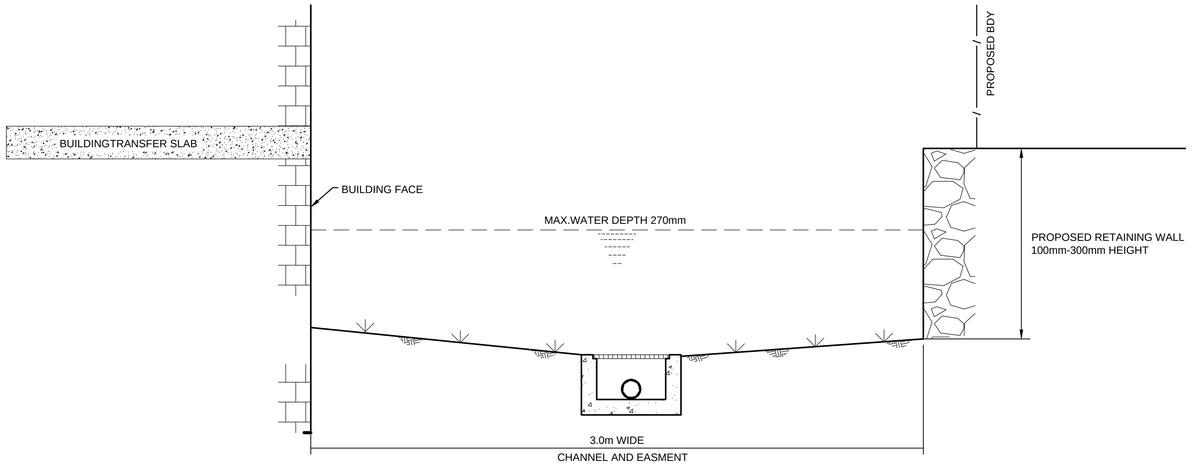
RAINGARDEN / BIO-RETENTION TYPICAL DETAIL

RAINGARDEN NOTES

1. ALL PROPOSED BIO-RETENTION BASINS TO BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH HEALTHY WATERWAYS WSUD TECHNICAL DESIGN GUIDELINES AND WSUD STANDARDS DRAWINGS.
2. BIO-RETENTION MEDIA SPECIFICATION SHALL BE IN ACCORDANCE WITH THE FACILITY FOR ADVANCING BIO-FILTRATION "GUIDELINES FOR SOILFILTER MEDIA IN BIORETENTION SYSTEM". BIORETENTION HYDRAULIC CONDUCTIVITY SHALL BE IN ACCORDANCE WITH THE FACILITY FOR ADVANCED BIOFILTRATION "PRACTICE NOTE 1 : IN SITU MEASUREMENTS OF HYDRAULIC CONDUCTIVITY". THE NUMBER OF SAMPLES TO BE TESTED SHALL BE IN ACCORDANCE WITH THE " WATER SENSITIVE URBAN DESIGN CONSTRUCTION AND WETLANDS" (WATER BY DESIGN)
3. UNDER- DRAIN : SLOTTED RIGID PIPE (UPVC OR SIMILAR TO AS 2439.1) OR APPROVED EQUIVALENT. PIPE JOINS SHOULD BE GLUED USING PLUMBING CEMENT. PIPE SHOULD NOT BE INSTALLED WITH A FILTER SOCK SURROUNDING PIPE. UNDER-DRAINAGE PIPES SHALL BE SEALED INTO PITS USING GROUT OR OTHER APPROVED WATERTIGHT SEAL.
4. FILTER CLOTH - PROPRIETARY PRODUCT , BIDUM A24 OR EQUIVALENT NON-WOVEN GEOTEXTILE. FILTER CLOTH NOT TO BE PLACED BETWEEN ANY FILTER LAYERS.
5. BASIN FINISH SURFACE LEVEL IS TOP OF FILTER MEDIA. SURFACE TO BE MULCHED AND PLANTED IN ACCORDANCE WITH HEALTHY WATERWAYS WSUD TECHNICAL DESIGN GUIDELINES.
6. CONSTRUCTION TOLERANCE AS DOCUMENTED IN THE "WATER SENSITIVE URBAN DESIGN CONSTRUCTION AND ESTABLISHMENT GUIDELINES - SWALES , BIORETENTION SYSTEMS AND WETLANDS". (WATER BY DESIGN) MUST BE ACHIEVED. ENSURE THE BASE OF THE FILTRATION TRENCH AND SURFACE OF THE THE BIORETENTION IN FILTER MEDIA IS FREE FROM LOCALIZED DEPRESSIONS RESULTING FROM THE CONSTRUCTION TO ACHIEVE EVEN DISTRIBUTION OF STORMWATER FLOWS ACROSS THE SURFACE AND TO PROVEN LOCALIZED PONDING ON THE SURFACE. AN EARTHWORKS TOLERANCE OF PLUS OR MINUS IS ACCEPTABLE .
7. MINIMUM PLANT DENSITY IS 10-12 PLANTS PER SQUARE METER. A MINIMUM OF 3 TO 5 PLANTS SPECIES ARE REQUIRED WITHIN THE BASIN FOR TARGETED POLLUTANT REMOVAL. PLANT SPECIFICATIONS AND DENSITY SHALL BE IN ACCORDANCE WITH THE 'WATER SENSITIVE URBAN DESIGN TECHNICAL DESIGN GUIDELINES' WATER BY DESIGN.
8. REFER TO RELEVANT SECTION OF THE ' WATER SENSITIVE URBAN DESIGN TECHNICAL DESIGN GUIDELINES ' (WATER BY DESIGN) FOR SIZING OF COARSE SEDIMENT FOREBAY.
9. IMPERMEABLE LINER - HDPE, BENTONITE , COMPACTED CLAY OR APPROVED EQUIVALENT ON SIDES, INSTALLED AS PER MANUFACTURER'S AND / OR GEOTECHNICAL ENGINEER'S SPECIFICATION. WHERE COMPACTED CLAY LINER IS ADOPTED, FILTER CLOTH IS TO BE USED AS PER ABOVE NOTE 4 . REFER TO THE ' WATER SENSITIVE URBAN DESIGN CONSTRUCTION AND ESTABLISHMENT GUIDELINES ' - SWALES, BIORETENTION SYSTEMS AND WETLANDS (WATER BY DESIGN) FOR DETAILS.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

Channel Caculations 1					
mannings n	=	0.042	Top width (m)	=	3.01
channel slope (%)	=	3.10	Flow area (m^2)	=	0.81
bse width (m)	=	3.00	Perimeter (m)	=	3.54
depth (m)	=	0.270	Hyd radius (m)	=	0.23
side slope (1 in x)	=	0.01	Velocity (m/s)	=	1.57
			Capacity (cumecs)	=	1.272
			Froude No	=	0.96
			VxD ratio	=	0.4

Pipe Capacity 1					
Pipe Dia (m)	=	0.3	Velocity (m/s)	=	2.614
Pipe Slope (%)	=	3.10	Capacity (m3/s)	=	0.185
n'	=	0.012	Capacity (L/s)	=	184.5
No parallel conduits	=	1	Multi Capacity (m3/s)	=	0.185
X-Sect Area	=	0.071			

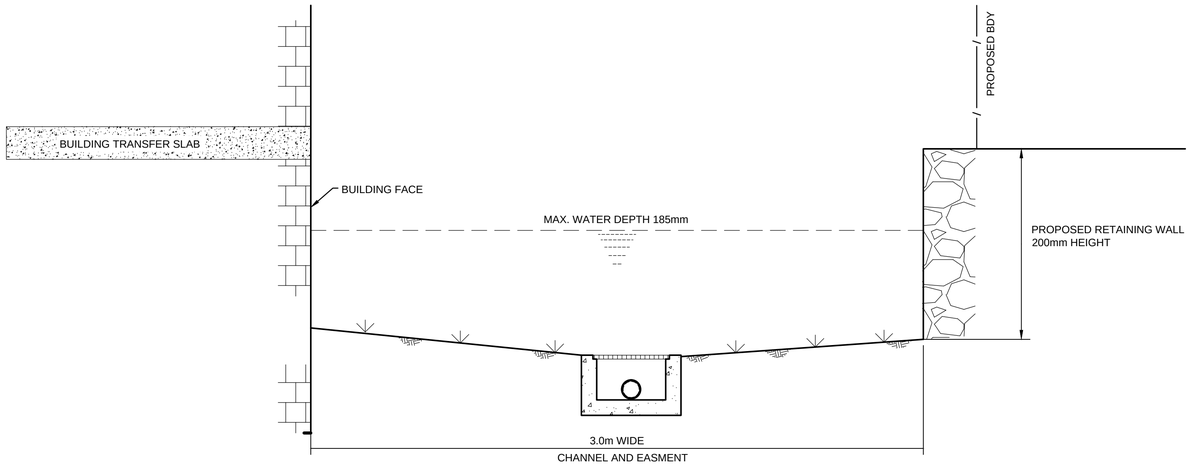


OVERLAND FLOW CHANNEL SECTION A

N.T.S.

Channel Caculations 2					
mannings n	=	0.042	Top width (m)	=	3.00
channel slope (%)	=	8.50	Flow area (m^2)	=	0.56
bse width (m)	=	3.00	Perimeter (m)	=	3.37
depth (m)	=	0.185	Hyd radius (m)	=	0.16
side slope (1 in x)	=	0.01	Velocity (m/s)	=	2.09
			Capacity (cumecs)	=	1.159
			Froude No	=	1.55
			VxD ratio	=	0.39

Pipe Capacity 2					
Pipe Dia (m)	=	0.3	Velocity (m/s)	=	4.328
Pipe Slope (%)	=	8.50	Capacity (m3/s)	=	0.306
n'	=	0.012	Capacity (L/s)	=	305.5
No parallel conduits	=	1	Multi Capacity (m3/s)	=	0.306
X-Sect Area	=	0.071			



OVERLAND FLOW CHANNEL SECTION B

N.T.S.

NOT FOR CONSTRUCTION

Issue	Description	Date	Drawn	Design
A	ISSUE FOR APPROVAL	13/12/2014	CAM	JAB

1 0 1cm at full size 10cm 20cm

Architect
Hayes Anderson Lynch
PO Box 2680 FORTITUDE VALLEY
BC QLD 4006 AUSTRALIA
PHONE : (07) 3852 3190

Client
Starhill Property Group

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Project
23-39 ABBOTSFORD ROAD AND
28 CINTRA ROAD, BOWEN HILLS
MULTI-UNIT RESIDENTIAL DEVELOPMENT
DEVELOPMENT APPLICATION

Drawing Title
MISCELLANEOUS DETAILS SHEET

Scale	Project No.	Dwg. No.	Issue
N.T.S A3	UMB14268.CIV.DA	106	A

APPENDIX 10 – BCC's EROSION AND SEDIMENT HAZARD – JUNE 2014

BRISBANE CITY COUNCIL ABN 72 002 765 795

Erosion Hazard Assessment - June 2014

Brisbane City Council (BCC), *Erosion Hazard Assessment* form must be read in conjunction with the *Erosion Hazard Assessment- Supporting Technical Notes* (June 2014 or later version) for explanatory terms and Certification information.

What is an Erosion Hazard Assessment?
Soil erosion and sediment from urban development, particularly during construction activities, is a significant source of sediment pollution in Brisbane's waterways. The Erosion Hazard Assessment determines whether the risk of soil erosion and sediment pollution to the environment is 'low' , 'medium' or 'high'.

When is the EHA required?
An *Erosion Hazard Assessment* form must be completed and lodged with BCC for any Development Application (ie MCU or ROL) that will result in soil disturbance OR Operational Works or Compliance Assessment Application for 'Filling' or Excavation.

Failure to submit this form during lodgement of an application may result in assessment delays or refusal of the application.

Privacy Statement
The personal information collected on this form will be used by Brisbane City Council for the purposes of fulfilling your request and undertaking associated Council functions and services. Your personal information will not be disclosed to any third party without your consent, unless this is required or permitted by law.

Assessment Details

1 Please turn over and complete the erosion hazard assessment.

2 Based on the erosion hazard assessment overleaf, is the site:

☐ ***A 'low' risk site***

Best practice erosion and sediment control (ESC) must be implemented but no erosion and sediment control plans need to be submitted with the development application. Factsheets outlining best practice ESC can be found at http://www.waterbydesign.com.au/factsheets

☒ ***A 'medium' risk site***

If the development is approved, the applicant will need to engage a Registered Professional Engineer (RPEQ) or Certified Professional in Erosion and Sediment Control (CPESC) to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy.

☐ ***A 'high' risk site***

If the development is approved, the applicant will need to engage a RPEQ and CPESC to prepare an ESC Program and Plan and supporting documentation — in accordance with the requirements of the Infrastructure Design Planning Scheme Policy. The plans and program will need to be certified by a CPESC.

3 Site Information and Certification

Application number (if known)

Site address

23 - 29 Abbotsford Road
Bowen Hills
Postcode 4006

I certify that:

☒ I have made all relevant enquiries and am satisfied no matters of significance have been withheld from the assessment manager.

☒ I am a person with suitable qualifications and/or experience in erosion and sediment control.

☒ The Erosion Hazard Assessment was completed in accordance with the Erosion Hazard Assessment Supporting Technical Notes and the BCC Infrastructure Design Planning Scheme Policy.

☒ The Erosion Hazard Assessment accurately reflects the site's overall risk of soil erosion and sediment pollution to the environment.

☒ I acknowledge and accept that the BCC, as assessment manager, relies, in good faith, on this certification as part of its development assessment process and the provision of false or misleading information to the BCC constitutes an offence for which BCC may take punitive steps/ action against me/ enforcement action against me.

Certified by *Print name*

P S Flitcroft

Certifier's signature

P S Flitcroft

Date

9 / 12 / 14

Assessment Table

Table 1: Low Risk Test

		Yes	*No*
1.1	is the area of land disturbance > 1000 m^2	X	
1.2	does any land disturbance occur in a BCC mapped waterway corridor		X
1.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 5%		X
1.4	does any land disturbance occur below 5 m AHD		X
1.5	does development involve endorsement of a staging plan		X
1.6	is there an upstream catchment passing through the site > 1 hectare	X	

Have you answered 'yes' to any of the questions in Table 1?	*Yes*	*No*	
	X		**If '*No*' then site is <u>low risk</u> with respect to erosion and sediment control**

If '*Yes*' then proceed to Table 2

Table 2: Medium Risk Test

		Yes	*No*	
2.1	is the area of land disturbance > 1 hectare	X		**If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control**

If '*Yes*' then proceed to Table 3

Table 3: High Risk Test

		Yes	*No*
3.1	is there an upstream catchment passing through the site > 1 hectare		
3.2	does any land disturbance occurs in a BCC mapped waterway corridor		
3.3	is there any slope on site (longer than three metres in length) before, during or after construction that is steeper than 15%		

Have you answered 'yes' to any of the questions in Table 3?	*Yes*	*No*	
			If '*No*' then site is <u>medium risk</u> with respect to erosion and sediment control

If '*Yes*' then site is <u>high risk</u> with respect to erosion and sediment control

APPENDIX 11 – STORMWATER QUALITY CHECKLIST

STORMWATER QUALITY CHECKLIST				
NUMBER	QUESTIONS	ANSWER-YES/N	IF YES GO TO	COMMENTS
A	Are paved areas ever cleaned ?		Section 1	
B	Are any materials stored outside ?		Section 2	
C	Is material/s delivered onto the site ?		Section 3	
D	Can packaging become litter ?		Section 4	
E	Does the site produce waste ?		Section 5	
1.0	**Pavement Cleaning/Wash Down Areas**	**ANSWER-YES/N**	**RESPONSE**	
1.1	Are wastes from paved areas (including footpath, entrance, loading dock and car park) swept and			
1.2	Are appropriate chemicals used for cleaning ?			
1.3	Are wastes prevented from entering gutters/drains/stormwater systems ?			
1.4	Is litter the only waste likely to be generated on pavements ?			
1.5	Do site personnel consider organic matter (fallen leafs, cut grass) not to be a pollutant ?			
1.6	Are there designated equipment wash downs areas ?			
1.7	Is all plant maintenance performed in contained areas ?			
2.0	**Material Storage and Spill Control**	**ANSWER-YES/N**	**RESPONSE**	
2.1	Are storage containers regularly checked for leaks and storage levels ?			
2.2	Are outside storage areas contained (eg bunding) to prevent any materials reaching the stormwater system ?			
2.3	Are the storage areas protected from vandals/pests/water ?			
2.4	Are there contingency plans for spills/escaped stored materials ?			
2.5	Are there sufficient supplies of clean-up and spill containment materials ?			
2.6	Are staff trained in spill procedures on a regular basis ?			
2.7	Are high-risk areas isolated from the drainage system ?			
3.0	**Delivery and Transfer**	**ANSWER-YES/N**	**RESPONSE**	
3.1	Are there designated delivery areas ?			
3.2	Are delivery areas under cover and protected from run-off ?			
3.3	Are delivery areas regularly inspected and cleaned ?			
3.4	Are capture boxes used to contain spills on-site ?			
3.5	Are loads covered when leaving premises ?			
3.6	Are there spill control procedures in place, and are staff trained ?			
3.7	Are there spill containment systems fully operational and readily available ?			
4.0	**Litter Management**	**ANSWER-YES/N**	**RESPONSE**	
4.1	Are areas that generate litter regularly cleaned ?			
4.2	Are bins provided for customers staff ?			
4.3	Are the areas surrounding the premises regularly cleaned and wastes collected and disposed of ?			
4.4	Have sources of litter been identified ?			
4.5	Have litter management measures been reviewed recently ?			
5.0	**Waste Storage and Disposal**	**ANSWER-YES/N**	**RESPONSE**	
5.1	**Waste Storage and Collection**			
5.2	Are stored wastes protected from escape during high winds and/or rain			
5.3	Is the storage area isolated from the stormwater system ?			
5.4	Should material escape the storage container, will it be contained on-site ?			
5.5	Are waste containers always emptied before reaching capacity ?			
5.6	Are waste collections regularly monitored to ensure no escape ?			
5.7	Is the waste collection contractor required to clean up after collection ?			
5.8	Are storage containers protected from vandals and pests ?			
5.9	**Waste Discharges**			
6.0	Are all wastes prevented from entering the stormwater system ?			
6.1	Are there diversion or containment systems to prevent stormwater contamination including in the event of a leak or spill ?			
6.2	Are systems regularly inspected or tested ?			
6.3	Are staff trained in their operation ?			
6.4	Is a trade waste agreement required for discharge to sewer ?			

APPENDIX 12 – BCC STORMWATER INFRASTRUCTURE CODE

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BRISBANE CITY COUNCIL – STORMWATER CODE

Performance outcomes	*Acceptable outcomes*	Response
PO1 *Development provides a stormwater management system which achieves the integrated management of stormwater to:* *(a) minimise flooding;* *(b) protect environmental values of receiving waters;* *(c) maximise the use of water sensitive urban design;* *(d) minimise safety risk to all persons;* *(e) maximise the use of natural waterway corridors and natural channel design principles.*	***AO1*** *Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.*	**AO1 - Complies**
PO2 *Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.*	***AO2.1*** *Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises.*	**AO2.1 - Complies**
	AO2.2 *Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO2.2 - Complies**
PO3 *Development ensures that the stormwater management system does not direct stormwater run-off through existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.*	***AO3.1*** *Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage reserve, public pathway, park or waterway corridor.*	**AO2.2 - Complies**

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	AO3.2 *Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO3.2 - Complies**
	AO3.3 *Development obtains a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO3.3 – Not applicable**
	AO3.4 *Where on private land, all underground stormwater infrastructure is secured by a drainage easement.*	**AO3.4 – Not applicable**
PO4 *Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.*	***AO4.1*** *Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO4.1 - Complies**
	AO4.2 *Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.*	**AO4.2 - Complies**
PO5 *Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.*	***AO5*** *Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.*	**AO5 – Not applicable**

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PO6 *Development ensures that location and design of stormwater detention and water quality treatment:* *(a) minimises risk to people and property;* *(b) provides for safe access and maintenance;* *(c) minimises ecological impacts to creeks and waterways.*	***AO6.1*** *Development locates stormwater detention and water quality treatment:* *(a) outside of a waterway corridor;* *(b) offline to any catchment not contained within the development.*	**AO6.1 – Complies**
	AO6.2 *Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO6.2 – Complies**
PO7 *Development is designed, including any car parking areas and channel works to:* *(a) reduce property damage;* *(b) provide safe access to the site during the defined flood event.*	***AO7.1*** *Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F.* *Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan).*	**AO7.1 – Not applicable**
	AO7.2 *Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.*	**AO7.1 – Not applicable**

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PO8 *Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.*	***AO8.1*** *Development ensures natural waterway corridors and drainage paths are retained.*	**AO8.1 – Complies.**
	AO8.2 *Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour.* *Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.*	**AO8.2 – Complies.**
	AO8.3 *Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO8.3 – Not applicable**
	AO8.4 *Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO8.4 – Not applicable**
PO9 *Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.*	***AO9*** *No acceptable outcome is prescribed.*	**AO9 – Complies**

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PO10 *Development ensures that there is sufficient site area to accommodate an effective stormwater management system.* *Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.*	***AO10*** *No acceptable outcome is prescribed.*	**AO10 – Complies**
PO11 *Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the:* *(a) existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades;* *(b) safe management of stormwater discharge from existing and future up-slope development;* *(c) implication for adjacent and down-slope development.*	***AO11.1*** *Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge.*	**AO11.1 – Complies**
	AO11.2 *Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Priority infrastructure plan and the standards in the Infrastructure design planning scheme policy.*	**AO11.2 – Not applicable**
PO12 *Development provides stormwater infrastructure which:* *(a) remains fit for purpose for the life of the development and maintains full functionality in the design flood event;* *(b) can be safely accessed and maintained cost effectively;* *(c) ensures no structural damage to existing stormwater infrastructure.*	***AO12.1*** *The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy.*	**AO12.1 - Complies**
	AO12.2 *Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.*	**AO12.1 - Complies**
PO13 *Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site*	***AO13*** *No acceptable outcome is prescribed.*	**AO13 – Complies, further requirements would be conditioned by Council**

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from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: *(a) the environmental values and water quality objectives of waters;* *(b) waterway hydrology;* *(c) the maintenance and serviceability of stormwater infrastructure.*		
PO14 *Development ensures that:* *(a) unnecessary disturbance to soil, waterways or drainage channels is avoided;* *(b) all soil surfaces remain effectively stabilised against erosion in the short and long term.*	***AO14*** *No acceptable outcome is prescribed.*	**AO14 – Complies**
PO15 *Development does not increase:* *(a) the concentration of total suspended solids or other contaminants in stormwater flows during site construction;* *(b) run-off which causes erosion either on site or off site.*	***AO15*** *No acceptable outcome is prescribed.*	**AO15 - Complies**
Section B—Additional criteria which apply to high-risk development, being one or more of the following: *(a) a material change of use for an urban purpose which involves greater than 2,500m^2 of land that:* *(i) will result in an impervious area greater than 25% of the net developable area; or* *(ii) will result in 6 or more dwellings.* *(b) reconfiguring a lot for an urban purpose that involves greater than 2,500m^2 of land and will result in 6 or more lots;* *(c) operational work for an urban purpose which involves disturbing greater than 2,500m^2 of land.*		**Section B Complies**

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PO16 *Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values.* *Note—Prescribed water contaminants are defined in the Environmental Protection Act 1994.* *Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.*	***AO16*** *Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.*	**AO16 - Complies**

APPENDIX 13 – BCC FLOODWISE PROPERTY REPORT

Brisbane City Council

FloodWise Property Report

Dedicated to a better Brisbane

Report Reference
3227264

09/12/2014 06:20:21

THIS REPORT IS FOR BUILDING AND DEVELOPMENT PURPOSES ONLY

The FloodWise Property Report provides property or lot-based flood information for building and development requirements. This report provides information on estimated flood levels, habitable floor level requirements and more technical information on the four sources of flooding: river, creek / waterway, storm tide and overland flow. Refer to the Useful Definitions section for a glossary of terms.

To find out more about how the contents of this report may affect building or development on this property, please visit www.brisbane.qld.gov.au/planning-building.For more general information about understanding your flood risk and how to prepare your property, family or business for potential flooding visit www.brisbane.qld.gov.au/beprepared

PROPERTY DETAILS:

Address: 39 ABBOTSFORD RD, BOWEN HILLS QLD 4006

Lot Details: L.1 RP.10092

This property has no flood levels or flags for building or development purposes

Brisbane City Council has not assigned flood level information for this property for building or development purposes.

For professional advice or a detailed assessment of a property contact a Registered Professional Engineer of Queensland.

For general information about your flood risk and how to prepare your home or business for potential flooding visit www.brisbane.qld.gov.au/beprepared.

Brisbane City Council

FloodWise Property Report

Dedicated to a better Brisbane

Report Reference
3227264
09/12/2014 06:20:21

TECHNICAL SUMMARY

This section of the FloodWise Property Report contains more detailed flood information for this property so surveyors, builders, certifiers, architects and engineers can plan and build in accordance with Council's planning scheme. For more information about building and development in Brisbane please visit www.brisbane.qld.gov.au/planning-building or talk to a Development Assessment Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

PROPERTY DETAILS:

Address: 39 ABBOTSFORD RD, BOWEN HILLS QLD 4006
Lot Details: L.1 RP.10092

No Defined Flood Levels (DFL), Residential Flood Level (RFL) or Overland Flow flags for this property

There are no Defined Flood Levels, Residential Flood Level, Overland Flow or other flood related flags associated with this property.

FLOOD PLANNING DEVELOPMENT INFORMATION

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

FLOOD OVERLAY CODE

There are currently no River, Creek/Waterway, or Overland Flow Flood Planning Areas that apply to this property.

COASTAL HAZARD OVERLAY CODE

There are currently no Coastal Hazard Overlays that apply to this property.

Brisbane City Council

FloodWise Property Report

Dedicated to a better Brisbane

Report Reference
3227264
09/12/2014 06:20:21

Useful Definitions

Australian Height Datum (AHD) - The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.

Annual Exceedance Probability (AEP) – The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

Defined Flood Level (DFL) - The DFL for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m^3/s.

Maximum and Minimum Ground Level – Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum Habitable Floor Level – The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family and rumpus rooms) must be constructed.

Council's Planning Scheme - The City Plan (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Residential Flood Level (RFL) – Residential flood level (RFL) for Brisbane River flooding equates to the flood level applicable to the extent of January 2011 floods as depicted by mapping on the Queensland Reconstruction Authority website or the Council's defined flood level (DFL) for the Brisbane River, whichever is higher.

Brisbane City Council's Online Flood Tools

Council provides a number of online flood tools:

- to guide planning and development
- to help residents and businesses understand their flood risk and prepare for flooding.

Planning and Development Online Flood Tools

Council's online flood tools for planning and development purposes include:

- FloodWise Property Report
- Flood Overlay Code

For more information on Council's planning scheme and online flood tools for planning and development:

- phone 07 3403 8888 to talk to a Development Assessment Customer Liaison Officer
- visit www.brisbane.qld.gov.au/planning-building
- visit a Regional Business Centre.

Helping residents and businesses be prepared for flooding

Council has a range of free tools and information to help residents and businesses understand potential flood risks and how to be prepared. This includes:

- Flood Awareness Maps
- Flooding in Brisbane – A Guide for Residents
- Flooding in Brisbane – A Guide for Business
- Early Warning Alert Service. Visit www.brisbane.qld.gov.au/earlywarning to register for email, home phone or SMS severe weather alert updates.

Note: The Flood Awareness Maps show four levels of flood risk from high risk (flooding is very likely to occur) through to very low risk (very rare and extreme flood events). Flooding in the low and very low risk areas has no planning and development requirements and is therefore not reflected in the FloodWise Property Report.

For more information on Council's online flood tools for residents and business:

- Visit www.brisbane.qld.gov.au/beprepared
- Phone (07) 3403 8888.

Brisbane City Council

FloodWise Property Report

Dedicated to a better Brisbane

Report Reference
3227264

09/12/2014 06:20:21

Disclaimer

1. Defined Flood Levels and Residential Flood Levels, and the Minimum Habitable Floor Levels are determined from the best available information to Council at the date of issue. These flood levels, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating flood levels.
2. Council makes no warranty or representation regarding the accuracy or completeness of a FloodWise Property report. Council disclaims any responsibility or liability in relation to the use or reliance by any person on a FloodWise Property Report.