Engineering Report

Church Estate - Kurrajong Street, Blackwater

Blades Project Services

June 2013

Prepared by:

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Appendices

1 Introduction

1.1 Background

Projex Partners (formerly known as Civil 72) has been engaged by Blades Project Services on behalf of BHP Billiton Mitsubishi Alliance to prepare an Engineering Report as part of a planning application for the proposed Church Estate on land described as Lot 114 on SP 206875, Kurrajong Street, Blackwater. The site, covering 3.045Ha is within the Blackwater Urban Development Area and is a declared Priority Development Area by the State Government. The site is located within the Central Highlands Regional Council area and the location is shown is shown in Figure 1.

It is proposed to create a 40+ lot residential subdivision at the site, in accordance with the layout shown in Appendix A.

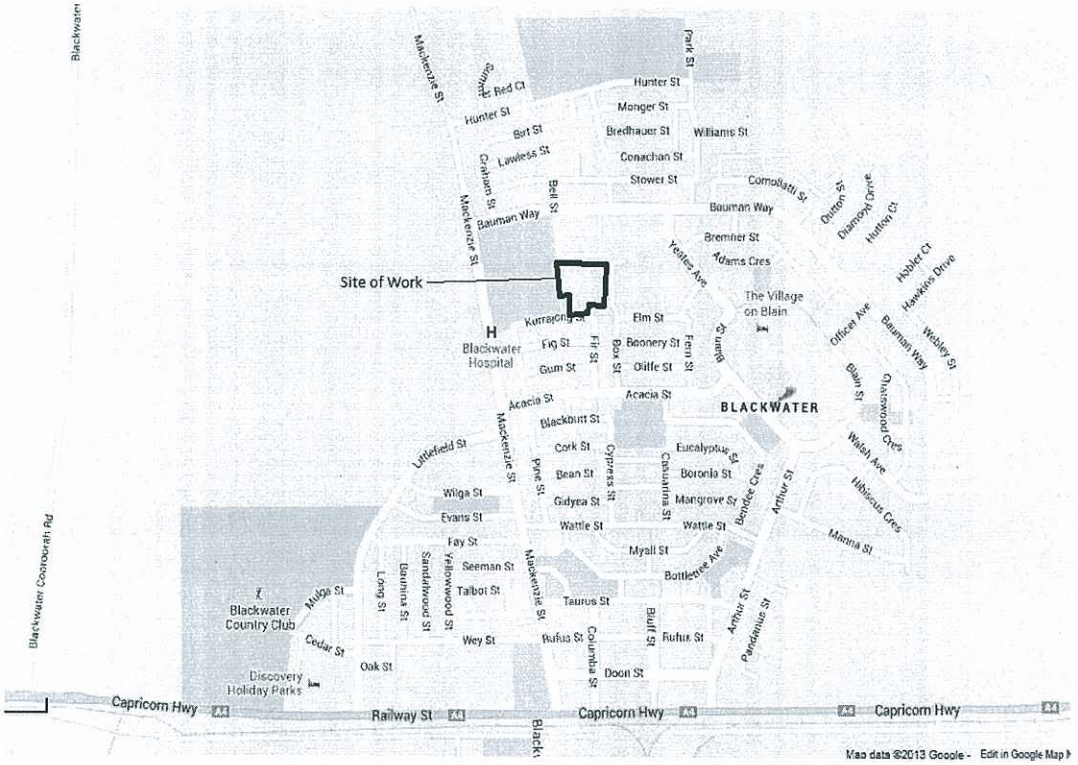


Figure 1: Site Location

1.2 Scope

The aim of this report is to identify if services are available and adequate to cater for the proposed development as well as provide comment on the proposed infrastructure, including the following:

- Stormwater Drainage;
- Potable Water Reticulation;
- Sewer Reticulation;
- Electricity Supply;
- Telecommunications.
- Roads and Pavements

The following investigations have been carried out:

- Investigating the existing site hydrology;
- Investigating a lawful points of discharge including checking the downstream drainage network;
- Investigating upstream catchments that will contribute to the development;
- Preliminary sizing and locating of any required stormwater treatment devices;
- Liaison with Council to ensure adequate pressures and capacities are available in the existing water reticulation and sewerage reticulation networks;

1.3 Location and Site Description

The site is on land described as Lot 114 SP 206875 and is 3.045Ha in size. The site is located between Kurrajong Street to the South and Deacon Drive to the North, in the township of Blackwater. The site in bound by a Council Reserve to the West and Blackwater Secondary School to the East. There are two existing developments along Kurrajong Street that truncate the site's frontage to Kurrajong Street. (i.e. Lots 14 on SP218084 and lot 15 on SP218084)The site is currently vacant land and is predominantly grassed with a few trees near the Kurrajong Street frontage.

2 Stormwater Drainage

2.1 Existing Site Hydrology

Figure 1 – The site looking South from Deacon Drive

The site generally slopes very gradually from South to North (at a grade of approximately 0.6%) with a slight ridge approximately 40m in from the Eastern boundary. There are two small open drains that drain from Lot 15 SP218084 to the south into the site. There are several small depressions within the property that would appear to hold water during rain events, in particular there is an area of excavation that appears to be in a similar location to the proposed Cul-de-Sac road.

As best as we can establish the entire site to the south of this depression (and lot 14 of SP218084 and lot 15 on SP218084) drains into this depression which overflows towards the north west corner of site and the land to the west. The small area of land to the north of this most likely also flows along the northern fence line and also ends up flowing to the north west corner of the site into the land to the west.

Figure 2 – The site looking north from Kurrajong Street

Refer to **Appendix B** for the site survey plan and the proposed lot reconfiguration layout.

2.2 Lawful Point of Discharge

Stormwater is an issue for the proposed development at Kurrajong Street, Blackwater. It appears as though there are 2 lawful points of discharge, one through a stormwater easement in the northwest corner of the property and the second is the road reserve in Deacon Drive. However we do not have enough information to know if the downstream drainage system has been designed to accept runoff from our site as a developed site.

We have attempted to check the capacity of the existing downstream drainage network with Council and EDQ, but both have advised that they have no information on this existing stormwater infrastructure.

2.3 Design Strategy

Discussions should be entered into with Council to gain acceptance of our proposed design strategy i.e. to use the lawful points of discharge and upgrade pipes and open drains as necessary between our site and Bauman Way. This will require an analysis of the existing drainage system between Baumann Way and our site. This analysis will enable us to determine the required works to meet the necessary stormwater quality and quantity objectives of the State Planning Policy. Additional survey will also be required to confirm surface levels, invert levels and pipe sizes for the downstream drainage system before our analysis can be undertaken.

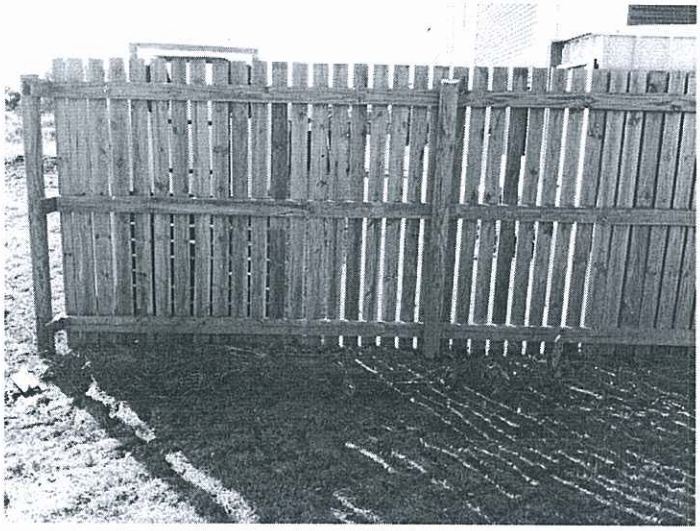


Figure 3 – Lawful Point of Discharge - Stormwater Drainage Easement

Figure 4 – Lawful Point of Discharge – Deacon Drive

2.4 Internal/Minor Drainage

A typical piped drainage system is proposed to collect rainfall from roofs, courtyards and roads and direct it to stormwater treatment facilities in the north-west corner of the site.

The minor drainage system (which will be developed during the detailed design) shall be designed to cater for Q2 flows.

2.5 Major Drainage

In accordance with the requirements of QUDM, the major drainage system, which incorporates overland flow along the street network, shall be designed for a recurrence interval of 100 years.

The overland flow generated within the site will be carried on the road carriageways and discharge to stormwater treatment devices (which will be developed during the detailed design) and connect to the downstream drainage network.

A 100 year ARI runoff analysis using the Rational Method was undertaken for the proposed development in accordance with the Queensland Urban Drainage Manual (QUDM).

The time of concentration has been calculated in accordance with ARR-1987 Section 14.5.5.

Rainfall intensities have been calculated using IFD information obtained from the Bureau of Meteorology website.

The capacity of the road has been determined using the Darcy Weislach equation.

The findings of our assessment are that the 100 year ARI flows can be contained within the proposed road reserves.

2.6 Water Quality

Water quality issues are associated with both the construction and operational phases of the development.

Potential pollutants associated with the construction phase are not readily modelled due to the site specific nature of construction pollutant sources. The major pollutant of concern during construction is suspended solids due to erosion associated with earthworks operations. Potential pollutant export is largely dependent on site management practices and varies throughout the construction phase depending on the particular activities being undertaken. Erosion and sedimentation control plans will be prepared during the detailed design phase.

The remaining components of this section focus on the operational phase of the development.

Potential pollutants of concern within the stormwater run-off due to increased urbanisation of this catchment (which are required to be modelled) are Gross Pollutants, Total Suspended Solids (TSS), Total Phosphorous (TP), and Total Nitrogen (TN).

Water quality objectives have been determined from the Pollutant Load Reduction Targets in accordance with State Planning Policy 4/10 Healthy Waters

Table 5.1 – Performance Criteria Set by State Planning Policy 4/10 Healthy Waters

Pollutant	Annual Load Reductions
TSS	85%
TP	70%
TN	45%
Gross Pollutants	90%

Whilst we understand that both Council and EDQ would prefer to avoid a bio-retention basin no comment was provided on how we could otherwise meet the required water quality objectives.

Whilst proprietary products are available for the purposes of water quality treatment, they are likely to be far more expensive than a bioretention device and require more regular maintenance.

Therefore it is proposed to provide a single bioretention basin in the north west corner of site which is capable of treating all site run-off. Preliminary sizing of the bioretention device has been undertaken using the water quality modelling software package "MUSIC". The estimated basin size is 600m^2. The location of this proposed basin is shown on the layout in Appendix B.

2.7 Water Quantity

Peak discharges from this site will increase as a result of this development due to the increase in impervious area. This will cause worsening and potential nuisance to downstream properties if not investigated. Detention basins are typically required to mitigate these effects.

We understand however that both Council and EDQ would prefer to avoid a detention basin. Therefore it is instead proposed to upgrade the existing downstream drainage system to Bauman Way if and as necessary to cater for the design flows from this development.

2.8 Council Flood Information

Central Highlands Regional Council was approached for details of flooding within the vicinity of site area. No information was available at the time of writing this report.

3 Water Supply

3.1 Potable Water Reticulation

A water main exists at the end of the built road on Deacon Drive and also along Kurrajong Street. We propose to provide a connection between the main on Deacon Drive and the Main on Kurrajong Street. A watermain will also be required along the proposed Cul-de-Sac road with a loop at the head of the Cul-de-Sac.

The water reticulation layout will be designed in accordance with the Water Services Association of Australia (WSAA) and the Capricorn Municipal Deign Manual.

Refer to the proposed water reticulation layout plan in **Appendix C**

Figure 5 – Fire Hydrant at end of Deacon Drive

Central Highlands Regional Council were contacted to find out if the existing water reticulation network had adequate capacity to cater for this development however, we are still awaiting a response.

3.2 Fire Fighting

Fire hydrants shall be located in accordance with Council requirements. i.e. underground hydrants at a maximum spacing of 80m.

4 Sewerage

4.1 Sewer Reticulation

A sewer main exists along the Northern and Western boundaries of the site. We were unable to obtain sewer levels of the main along the northern boundary however the sewer along the western boundary is sufficiently deep to provide a suitable connection point for this site. This land is owned by Council. Instead, the best location for a sewer connection to the site may be to the northern sewer from a new manhole constructed in the Deacon Drive road reserve. This would avoid having to obtain owners consent. However extra survey to identify the depth of the sewer main in this location would be required to ensure this solution is available.

The sewer reticulation system will be designed in accordance with the Water Services Association of Australia (WSAA) and the Capricorn Municipal Deign Manual.

Refer to the proposed sewer reticulation layout plan in **Appendix C**.

Figure 6 – Adjacent Sewer Manhole

Central Highlands Regional Council were contacted to find out if the existing sewer reticulation network had adequate capacity to cater for this development however we are still awaiting a response.

5 Electricity Supply

5.1 Electrical Supply

An underground electrical supply exists at the boundary to the site in the Deacon Drive road reserve. An overhead supply also exists in Kurrajong Street. It is envisaged that the electrical supply to site will come from the existing underground service in Deacon Drive. It is also expected that a transformer will be required to be installed somewhere in the site to provide additional low voltage supply. This may require a small land take from a corner of one of the proposed lots. The electrical design will be undertaken during the detailed design phase.

Figure 7 – Nearest electrical installation at Deacon Drive

6 Telecommunications

6.1 Communications Services

An underground telecommunication supply exists at the boundary to the site in the Deacon Drive road reserve. An underground supply also exists in Kurrajong Street. It is envisaged that the telecommunications supply to site will come from the existing underground service in Deacon Drive. The telecommunications reticulation will generally follow the same path (i.e. within same trench) as the electrical reticulation layout through the development, and will also be undertaken during the detailed design phase.

Figure 8 – Nearest telecommunication installation at Deacon Drive

7 Roads

7.1 Site Access

Proposed site access points are from the end of Deacon Drive and a proposed new intersection with Kurrajong Street. Refer to the proposed lot reconfiguration layout in **Appendix A**.

7.2 Carriageways

It is anticipated that Deacon Drive may become a popular short cut to and from the centre of town

The extension of Deacon Drive all the way through to Kurrajong Street is to be a 10m wide formation in an 18m wide road reserve. Mountable kerb and channel is proposed to match the existing kerb and channel in Deacon Drive.

The proposed Cul-de-Sac road is to be a 7.5m wide formation in a 15m wide road reserve. Mountable kerb and channel is also proposed for this road.

Refer to **Appendix D** for Typical road Cross Sections.

7.3 Intersections

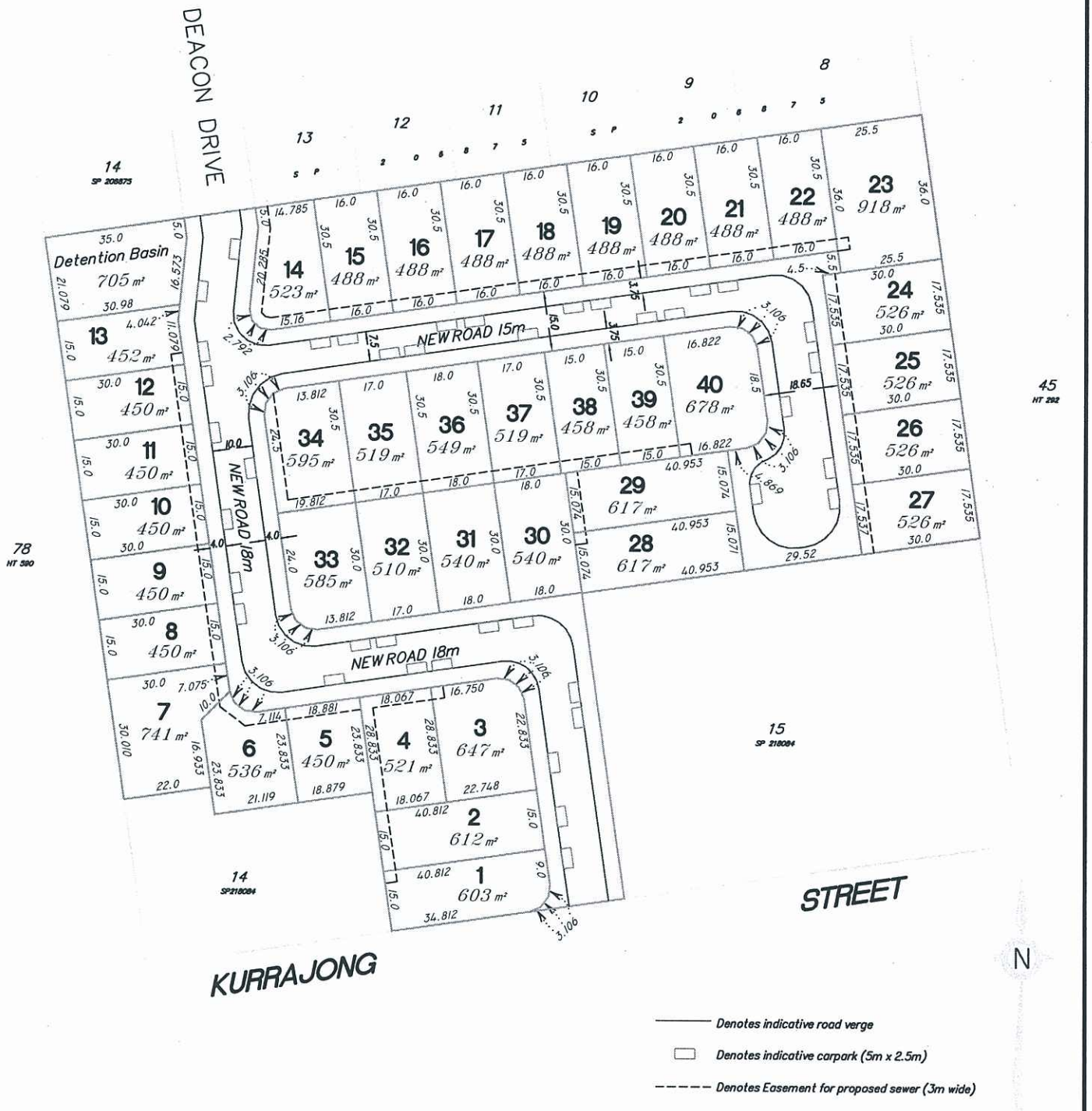
The intersections will be designed in accordance with Queensland Streets and the Capricorn Municipal Design Manual.

7.4 Traffic Issues

Central Highlands Regional Council (CHRC) have mentioned that the connection from Deacon Drive onto Bauman Way has been earmarked to include a turn lane directly off Bauman Way into Deacon Drive, in order to avoid people performing u-turns to get back to the Deacon Drive entrance.

Appendix A

Lot Reconfiguration Layout



SCALE 1:1000 at A3 - Lengths are in metres

0 20 40 60 80 100 120 140 160m

0 100 mm 200 mm

NOTES
1) DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND SUBJECT TO FINAL SURVEY.
2) TOTAL AREA OF SUBDIVISION – 3.045 Ha

PROPOSAL PLAN 4
Lots 1 - 40
Cancelling Lot 114 on SP 206875

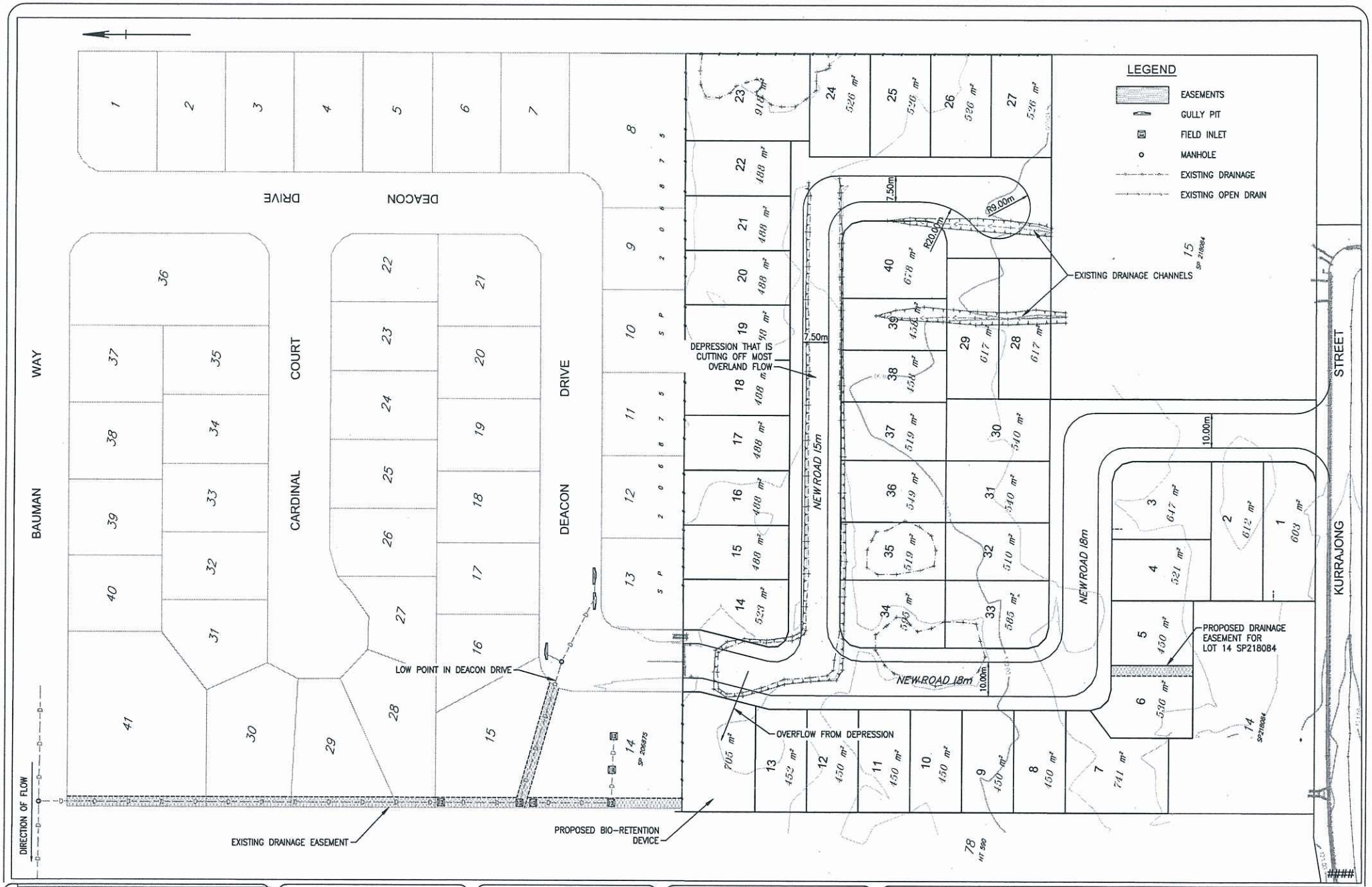
LOCATION: Lot 114 Kurrajong Street, Blackwater

LAWSON SURVEYS
A.B.N 89 847 381 644
CONSULTING LAND SURVEYORS
80 MACGREGOR TERRACE
BARDON - BRISBANE
PH 33681234 FAX 33681414
Email : mail@lawsonsurveys.com.au
www.lawsonsurveys.com.au

LEVEL DATUM	LOCAL AUTHORITY	MAP REF	DRAWN	DWG NAME	REFERENCE	DATE
N/A	CENTRAL HIGHLANDS REGIONAL	8650-11344	RLC	17569 Design 4	17569	20/06/2013
		PARISH BLACKWATER		COUNTY HUMBOLDT		

Appendix B

Site Survey Plan



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CLIENT: BLADES PROJECT SERVICES

SCALE: 1:500 10 5 0 10 20 A1 / 1:1000 A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

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PROJECT MANAGEMENT - ENGINEERING - PLANNING

DRAWN	RH	CHECKED	KP
DESIGNED	KP	CHECKED	PM
APPROVED			

DATE: 25/6/13 RPEQ: 6954

CHURCH ESTATE, BLACKWATER

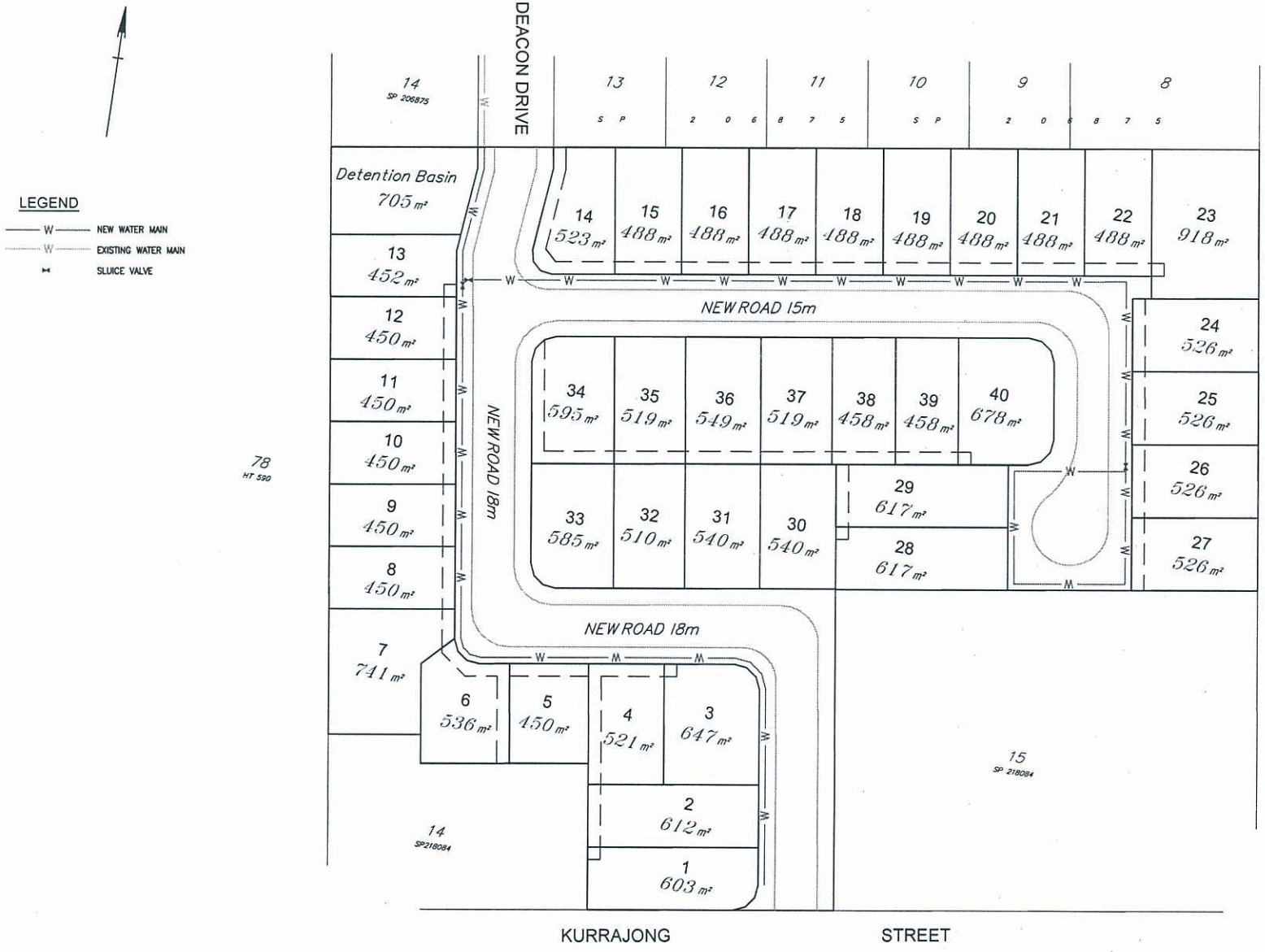
DRAINAGE FEATURES PLAN

DRAWING NO. 178-001-SK03

REVISION 1

Appendix C

Water Reticulation Layout Plan



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CHURCH ESTATE, BLACKWATER

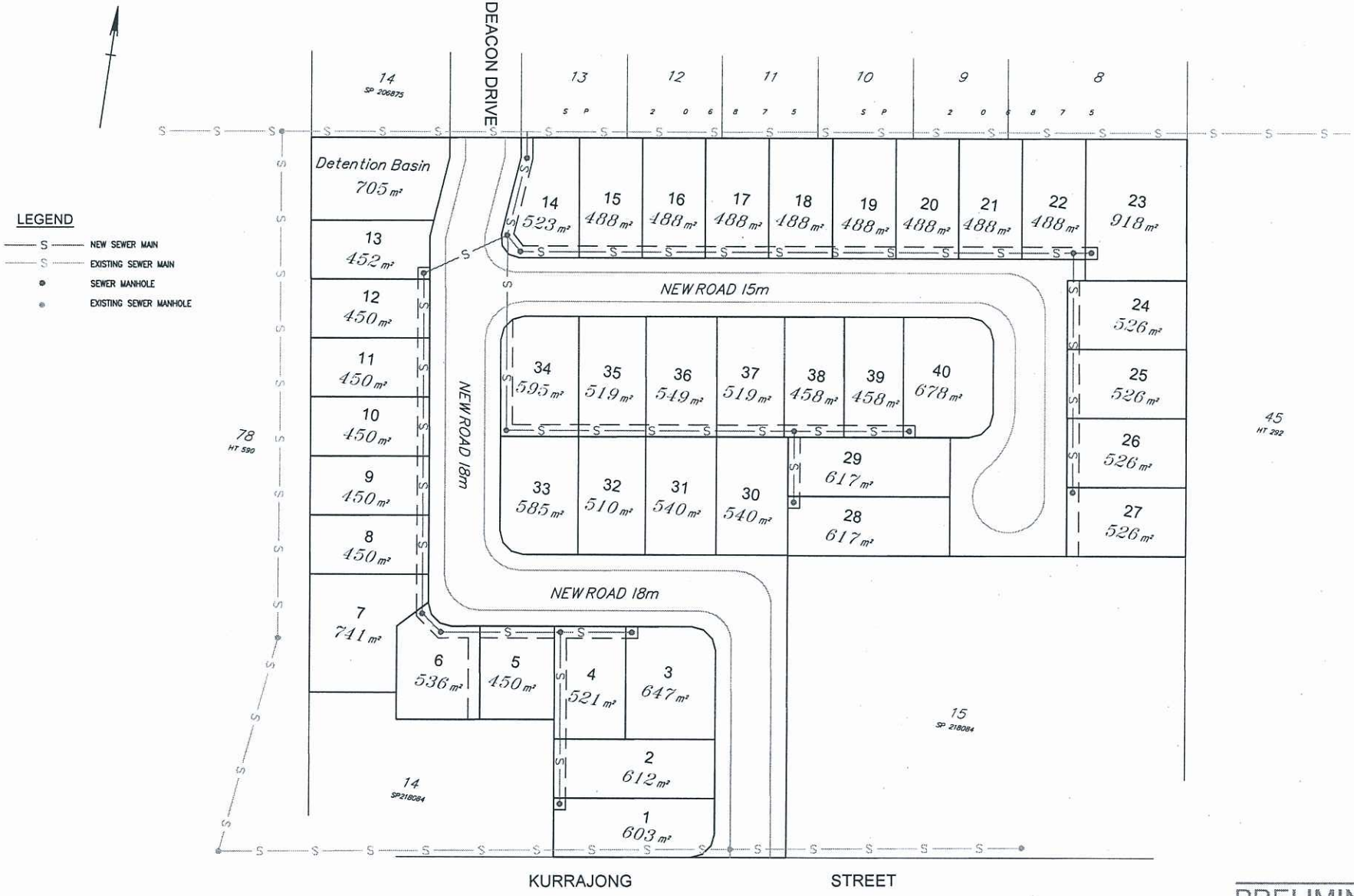
WATER RETICULATION

DRAWING NO. 178-001-SK02

REVISION 1

Appendix D

Sewer Reticulation Layout Plan



PRELIMINARY

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DATE: 25/6/13 RPEQ 8954

CHURCH ESTATE, BLACKWATER

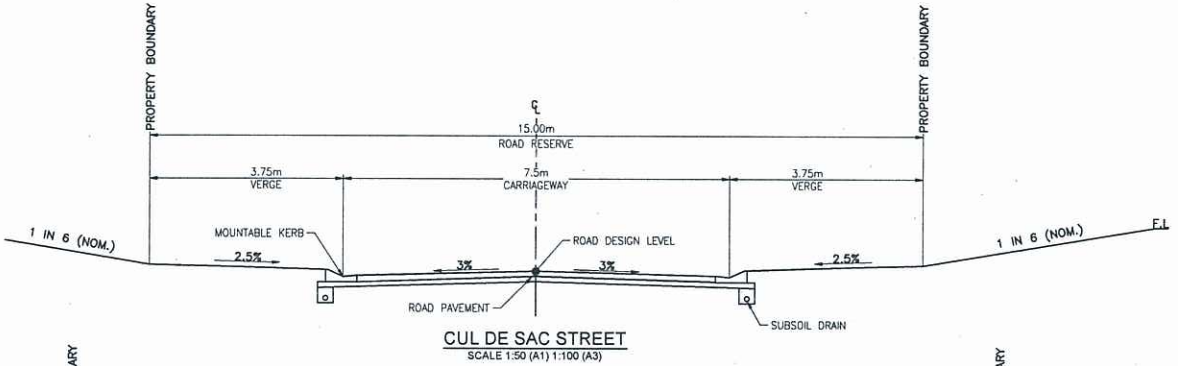
SEWER RETICULATION

DRAWING NO. 178-001-SK01

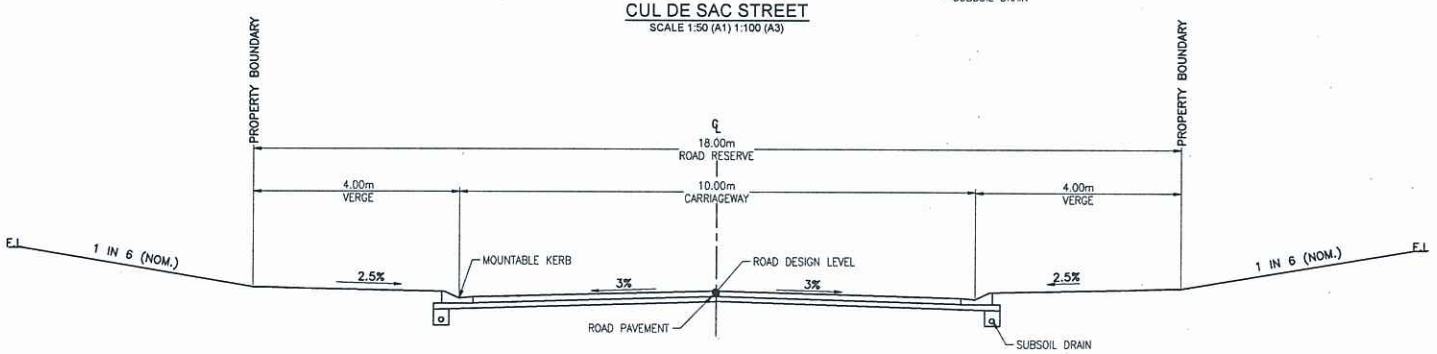
REVISION 1

Appendix E

Typical Road Cross Sections



CUL DE SAC STREET
SCALE 1:50 (A1) 1:100 (A3)



DEACON DRIVE
SCALE 1:50 (A1) 1:100 (A3)

PRELIMINARY

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1	24/06/13	PRELIMINARY ISSUE		

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PROJECT MANAGEMENT - ENGINEERING - PLANNING

DRAWN	RH	CHECKED	KP
DESIGNED	KP	CHECKED	PM
APPROVED			

DATE: 25/6/13 RPEQ: 8954

CHURCH ESTATE, BLACKWATER

TYPICAL CROSS SECTIONS

DRAWING NO. 178-001-SK04

REVISION 1

KEY PLAN
1:500 @ A1; 1:1000 @ A1;

SITE DEVELOPMENT TABLE	TRADITIONAL ALLOTMENTS	
	Ground Floor	First Floor
Front/Primary Frontage	4.0m	4.0m
Garage	4.0m	4.0m
Carport	1.0m	n/a
Rear	1.5m	1.5m
Side (General)		
Non built to boundary	1.5m	1.5m
Built to boundary	n/a	n/a
Corner lots - secondary frontage	2.5m	2.5m
Other		
Site cover (Maximum)	60%	

NOTES

General
- All development is to be undertaken in accordance with the Development Approval;
- The maximum height building height of buildings is not to exceed 2 storeys/ 8.5 metres above natural ground level;

Setbacks
- Setbacks are as per the Plan of Development Table unless specified otherwise (Refer to plan for front setbacks relating to Lots 7 and 23, noted in red);
- Boundary setbacks are measured from the outermost projection of the façade;

Parking
- A minimum of two (2) off street car parks per dwelling a minimum of one (1) which must be covered;

Site Cover and Amenity
- The maximum site cover for lots is 60%;
- The maximum width of a driveway at the lot boundary shall be 4.6 metres for a lot a with a double garage and 3.0 metres for a lot with a single garage;

Dwelling Orientation
- All buildings are to facilitate causal surveillance of the streets through the integration of porches, balconies or windows;
- Dwellings are to be sited to address the relevant primary street frontage;

Fencing
- Fences to all front boundaries must be no higher than 1.2m if solid, otherwise 1.5m if 50% transparent;
- Fences on corner lots should be designed as front fences addressing both streets;

Private Open Space
- Dwellings are to be provided with a minimum 16sqm of private open space with a minimum dimension of 2.4 m;

Dwelling Articulation/ Design
- Where habitable room windows look directly at habitable room windows in an adjacent dwelling within 2m at ground floor level or 9m at levels above ground floor, privacy is protected by:
  - · sill heights a minimum 1.5m above floor level
    OR
  - · fixed opaque glazing in any part of the window below 1.5m above floor level
    OR
  - · fixed external screens
- Any first floor deck/ balcony must be fitted with fixed screens along side boundaries;
- A distinction in building design is to be achieved through the following:
  - · A variation in building material/ finishes/ colours; and
  - · Varied roof forms and roof pitches.

urban strategies

Kurrajong Street, Blackwater PDA **Plan of Development**

Issue A: 28-06-2013