

**CIVIL ENGINEERING SERVICES**  
**SEARs Utility Impact Assessment**  
**Northside Private Hospital, Gosford**  
**(SSD-10159)**



## DOCUMENT CONTROL

01	28 <sup>th</sup> August 2019	Draft For Review	Superseded
02	6 <sup>th</sup> September 2019	For Information	Current
Rev #	Date	Description of Change	Status

## APPROVALS

01	David Barcal <i>Engineer – Civil &amp; Water Engineering</i>	Laura Shaughnessy <i>Project Manager – Civil &amp; Water Engineering</i>	Michael Cahalane <i>Director – Civil &amp; Water Engineering</i>
02	David Barcal <i>Engineer – Civil &amp; Water Engineering</i>	Laura Shaughnessy <i>Project Manager – Civil &amp; Water Engineering</i>	Michael Cahalane <i>Director – Civil &amp; Water Engineering</i>
Rev #	Author	Reviewer	Approver

### PREPARED BY:

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*Consulting Engineers*

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Warren  
Smith &  
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### PREPARED FOR:

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Level 10 Angel Place, 123 Pitt Street

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**DONALD  
CANT  
WATTS  
CORKE**

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## SCHEDULES

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# CIVIL ENGINEERING SERVICES

## 1. INTRODUCTION

Warren Smith & Partners (WS+P) has been engaged by Donald Cant Watts Corke (DCWC) to prepare a SEARs Utilities impact assessment for Northside Private Hospital in Gosford. This SEARs Utilities Impact Assessment plan aims to provide detailed information regarding the existing utilities capacity and the demands generated by the proposed development. It also aims to address the following SEARs condition 20. Utilities; Prepare an Infrastructure Management Plan in consultation with relevant agencies, detailing information on the existing capacity and any augmentation requirements of the development for the provision of utilities including staging of infrastructure. Prepare an Integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water. Please refer to Figure 1.1 for an aerial view of the existing site.

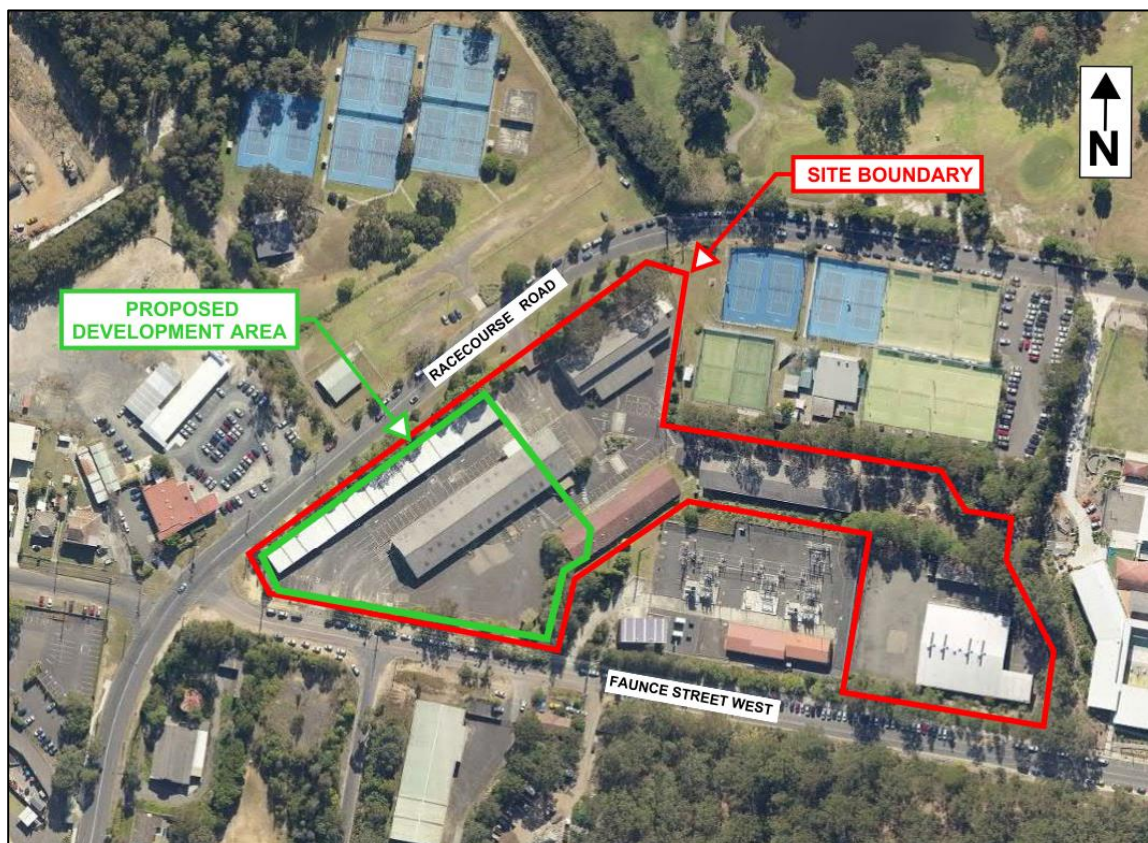


Figure 1.1: Aerial View of Proposed Development Site Area (Source: Six Maps)

Warren Smith & Partners Pty Ltd Consulting Engineers ABN 36 300 430 126

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■ Hydraulic Services ■ Fire Services ■ Civil Services ■ Sydney Water Accredited Water Servicing Co-ordinator and Designer

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## 2. ABBREVIATIONS AND DEFINITIONS

<b>AEP</b>	Annual Exceedance Probability
<b>AHD</b>	Australian Height Datum
<b>ARI</b>	Average Recurrence Interval
<b>ARR</b>	Australian Rainfall and Runoff
<b>CCC</b>	Central Coast Council
<b>DN</b>	Diameter Nominal (mm)
<b>EY</b>	Exceedances per Year
<b>GPT</b>	Gross Pollutant Trap
<b>IFD</b>	Intensity-Frequency-Duration
<b>IL</b>	Invert Level
<b>L/s</b>	Litres per second
<b>m/s</b>	Metres per second
<b>MUSIC</b>	Model for Urban Stormwater Improvement Conceptualisation
<b>OSD</b>	On-Site Detention
<b>PSD</b>	Permissible Site Discharge
<b>RCP</b>	Reinforced Concrete Pipe
<b>RPZD</b>	Reduced Pressure Zone Device
<b>RL</b>	Reduced Level
<b>RWT</b>	Rainwater Reuse Tank
<b>SEARs</b>	Secretary's Environmental Assessment Requirements
<b>WS+P</b>	Warren Smith and Partners
<b>WSUD</b>	Water Sensitive Urban Design

### The Use of Must, Shall & Should:

In accordance with the International Organisation for Standardisation (ISO) Directives, the word "shall" is used to state that a requirement is strictly to be followed in order to conform to a Performance Requirement. Consequently, there can be no deviation from that requirement, other than a specific tolerance.

It is noted that in legislation and specifications it is common to use the word "must" to express a requirement. The word "shall" in this document should be considered as equivalent to "must" in the legislation.

The word "should" introduces a suggestion or recommendation that is not a requirement. It is not necessary that such recommendations or suggestions be followed in order to comply with the Performance Requirement.

### 3. FLOOD RISK ASSESSMENT

In accordance with Section 9 of the SEARs, WS+P were required to assess the proposed development site in relation to flood risk.

The proposed development is located on the corner of Racecourse Road and Faunce Street, a flood assessment was undertaken for the development site in order to determine flood affectation and flood related development controls which apply to the site. The findings indicated that the development site is not flood affected, and as such, would not be subject to flood related development controls. However, it is noted that consideration to evacuation may need to be given. Please refer to Schedule 1 for the flood assessment undertaken by GRC Hydro, dated March 2019. Please refer to WS+P's Development Application Report Civil and Stormwater Design for the impact on existing stormwater facilities.

## 4. DEMAND CALCULATIONS

### 4.1 WATER SUPPLY DEMAND CALCULATIONS

The assumption taken in determining the average daily potable water demands for the proposed 224 beds were taken from the “Gosford City Centre Development Servicing Plan Water and Sewer” and is presented in Table 4.1 below.

**Table 4.1: Average Daily Water Demand**

Classification	Metric Unit	Average Demand (L/Day)
<b>Healthcare</b>		
Hospital Beds	Bed	605

Please refer to Table 4.2 below for the average daily water demand calculations.

**Table 4.2: Average Daily Water Demand Calculation**

Total Beds	Average Demand (L/Day)	Total Average Daily Water Demand (kL)
224	605	135.6

It is worth noting that the 605 L/day listed in the “Gosford City Centre Development Servicing Plan Water and Sewer” includes the cooling tower flow demand and the demand without the cooling tower is typically around 270 L/day for average day demand.

The following flows have also been calculated: -

- Fire flow for hydrants – 20 l/sec
- Fire flow for sprinklers – 6 l/sec
- Cooling tower flow – 4 l/sec

### 4.2 SEWER DISCHARGE CALCULATIONS

In order to determine the average daily sewer discharge for the proposed new development, the estimated equivalent tenements (ET) for the proposed new development is required. Please refer to Table 4.3 for the ET data adopted.

**Table 4.3: ET Data**

Classification	Unit	ET per Bed
Hospital	Bed	1



Please refer to Table 4.4 below for the ET calculation.

**Table 4.4: ET Calculation**

Beds	ET per Unit	Equivalent Tenements
224	1	224

The NSW Water Directorate states that standard equivalent tenement figures suggest that a 60% water to sewer discharge factor is appropriate. Assuming an average water demand of 605 L/ET/day as stated in Table 4.1, the 60% discharge factor and sewer discharge value for the development is 363 L/ET/day. The estimated total average daily sewer discharge is calculated to be 81.3 kL/day.

### 4.3 GAS LOAD CALCULATIONS

Please refer to Table 4.5 below for the gas loads associated with the proposed development.

**Table 4.5: Average Gas Loads (Source: DSA Consulting)**

Appliance	Total (M <sup>3</sup> /hr)
Mechanical Services	420
Hot Water Service, Including: -Domestic Hot Water -Kitchen & Laundry -Specialist Areas Hot Water	120
Kitchen Cooking	100
Laundry Facility	80
<b>Total</b>	<b>720</b>



## 5. UTILITY CONNECTIONS

### 5.1 CENTRAL COAST COUNCIL (CCC) – WATER MAIN CONNECTION

As part of the recent capital work project for Gosford CBD, a new DN150 water main has been installed along the Northern side of Racecourse Road. Refer to Figure 5.1 for an illustration of the new DN150 watermain alignment.

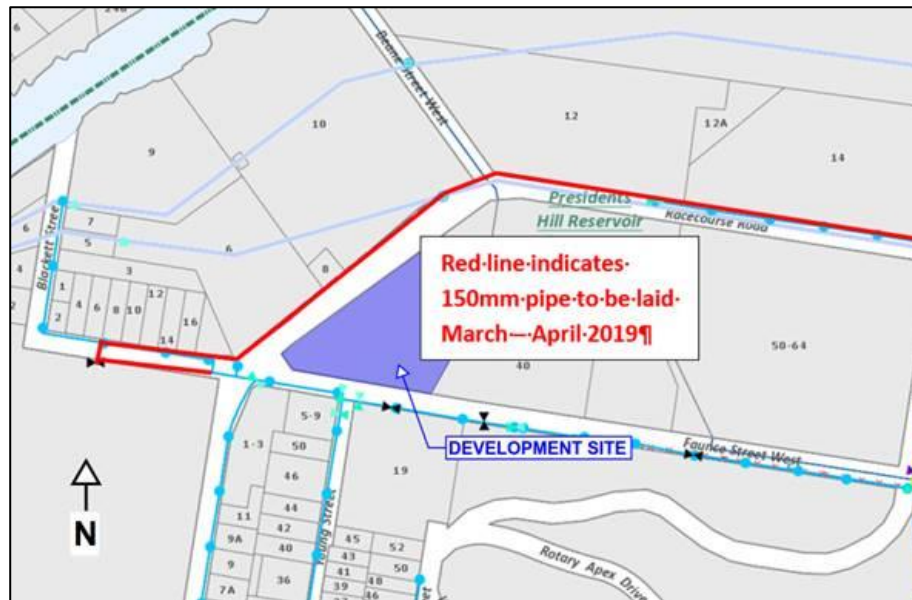


Figure 5.1: New Gosford CBD Capital Works DN150 Watermain (Source: CCC)

It is proposed that the new development will connect to this new DN150 watermain located in Racecourse Road. The water meter and RPZD location is to be coordinated during detailed design phase. Refer to Figure 5.2 for the location of the proposed water connection point in Racecourse Road.

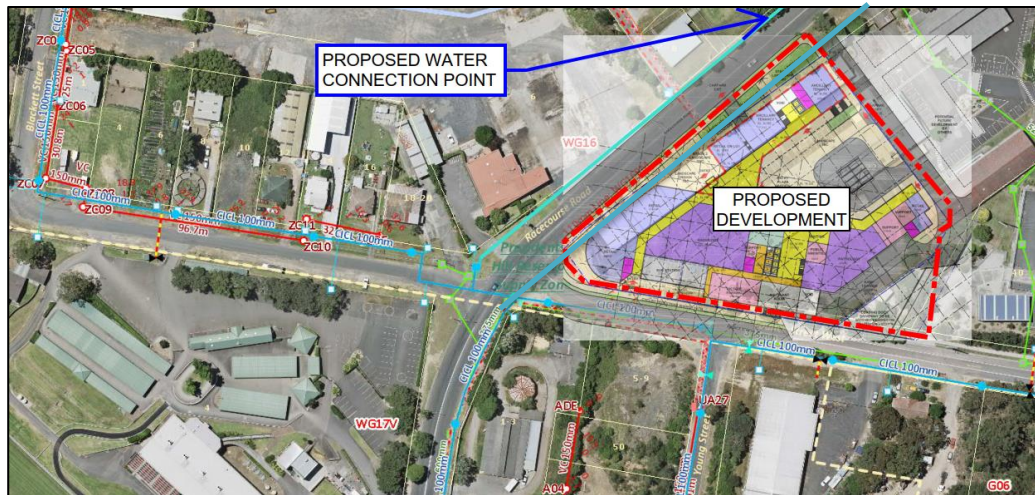


Figure 5.2: Proposed Water Connection Point

## 5.2 SEWER CONNECTION

It is proposed that the new development will connect to the existing DN150 sewer reticulation main located in Racecourse Road, north of the proposed site. Refer to Figure 5.3 for details on the proposed sewer connection point. A capacity analysis may need to be performed on the existing system network.

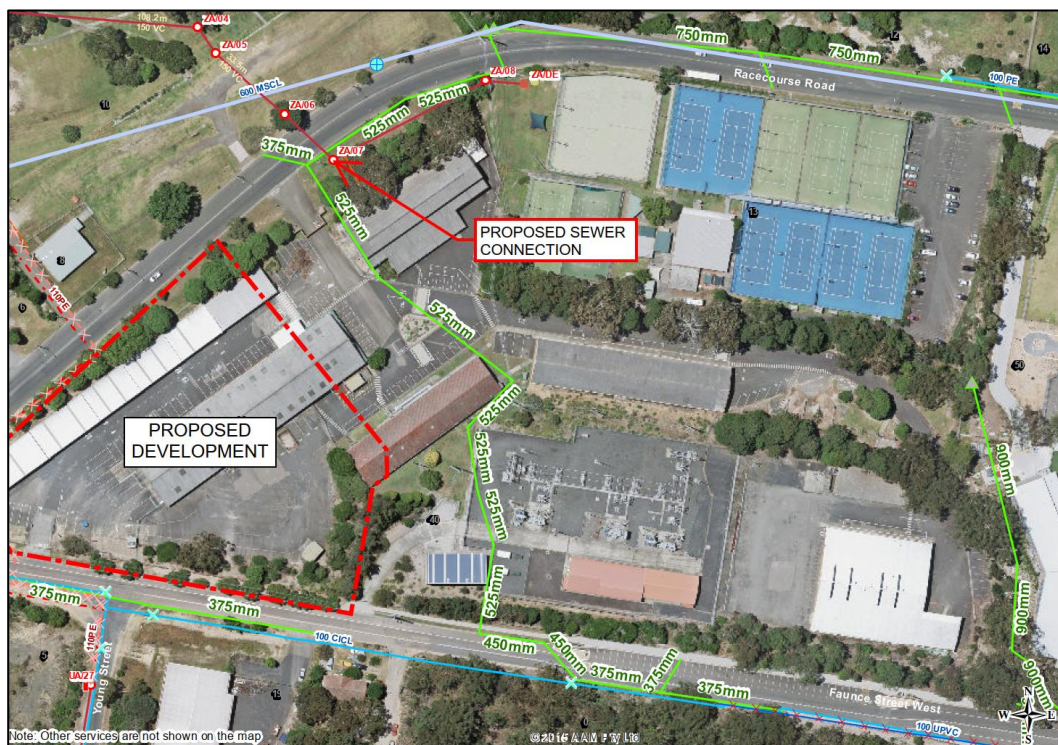


Figure 5.3: Proposed Sewer Connection Point

Warren Smith & Partners Pty Ltd Consulting Engineers ABN 36 300 430 126

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Hydraulic Services Fire Services Civil Services Sydney Water Accredited Water Servicing Co-ordinator and Designer

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### 5.3 JEMENA – GAS MAIN CONNECTION

It is proposed that the new development connect to the existing gas 210kPa Jemena gas main at the corner of Racecourse Road and Pacific Coast Highway south of the proposed project. Preliminary advice from Jemena has indicated the gas main would need to be extend approximately 700 metres, refer to Schedule 2 for correspondence with Jemena. Location of the Jemena gas meter and regulator are to be coordinated during the detailed design development phase. Refer to Figure 5.4 for detail on the proposed gas main connection.

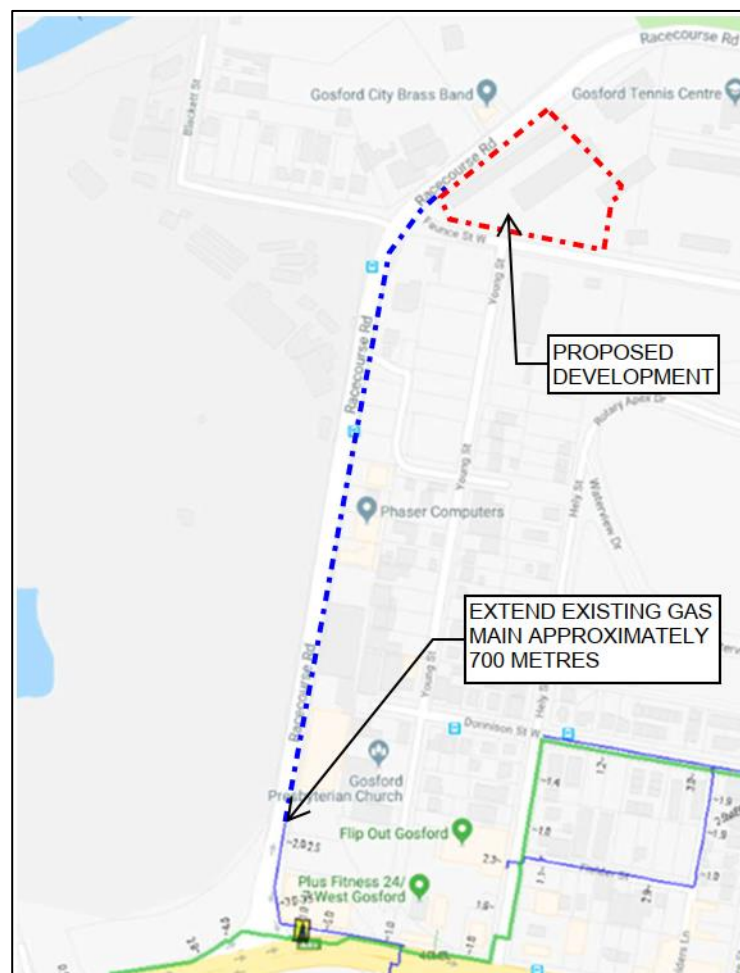


Figure 5.4: Proposed Jemena Gas Connection



## SCHEDULE 1 - FLOOD ASSESSMENT

David Barcal

**From:** Alex Raeside <alex.raeside@jemena.com.au>  
**Sent:** Friday, 23 August 2019 11:51 AM  
**To:** David Barcal  
**Cc:** Laura Shaughnessy; Stephen Angel  
**Subject:** RE: Northside Private Hospital- Cnr Racecourse Road & Faunce St West; West Gosford

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi David,

Thanks for your email.

Just to confirm the load you have provided would be a demand customer (18GJ/hr). Jemena would need to extend the main (likely high pressure steel) from the bottom of Racecourse Road to the site.

Unfortunately I am unable to provide a costing for this job as it would need to be model against the demand connection.

I will need to engage a retailer to request this connection on behalf of the customer, due to the financial arrangement with a demand connection – a retailer needs to be involve.

Please let me know if you need any further information.

Kind Regards

**Alex Raeside**  
Network Development Specialist I & C - Strategy & Commercial  
Gas Distribution  
**Jemena**  
Level 15, 99 Walker Street, North Sydney, NSW 2060  
02 9867 8443 0422 930 766  
[Alex.Raeside@jemena.com.au](mailto:Alex.Raeside@jemena.com.au) | [www.jemena.com.au](http://www.jemena.com.au)



**From:** David Barcal <DBarcal@warrensmith.com.au>  
**Sent:** Thursday, 22 August 2019 11:58 AM  
**To:** Stephen Angel <Stephen.Angel@jemena.com.au>  
**Cc:** Laura Shaughnessy <laura.s@warrensmith.com.au>; Alex Raeside <alex.raeside@jemena.com.au>  
**Subject:** RE: Northside Private Hospital- Cnr Racecourse Road & Faunce St West; West Gosford

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Hi Stephen,

As per the below correspondence, can we have an analysis on the existing gas main located on the corner of Racecourse Road and Pacific Hwy using the listed estimated peak gas loads to see if it is feasible to extend the gas main to service our proposed development?

**NORTHSIDE PRIVATE HOSPITAL-WEST GOSFORD**  
**PRELIMINARY GAS LOAD**

ITEM	DESCRIPTION/AREA	ESTIMATED GAS LOAD M3/HR
1	Mechanical Services	420
2	Hot Water Service, including :- -Domestic HW -Kitchen & Laundry -Specialist Areas HW	120
3	Kitchen Cooking	100
4	Laundry if required	80
Total		720

Let me know if you have any questions.

Thank you,

**David Barcal**  
Engineer - Civil & Water Engineering

Direct +61 2 8234 8622  
Mobile



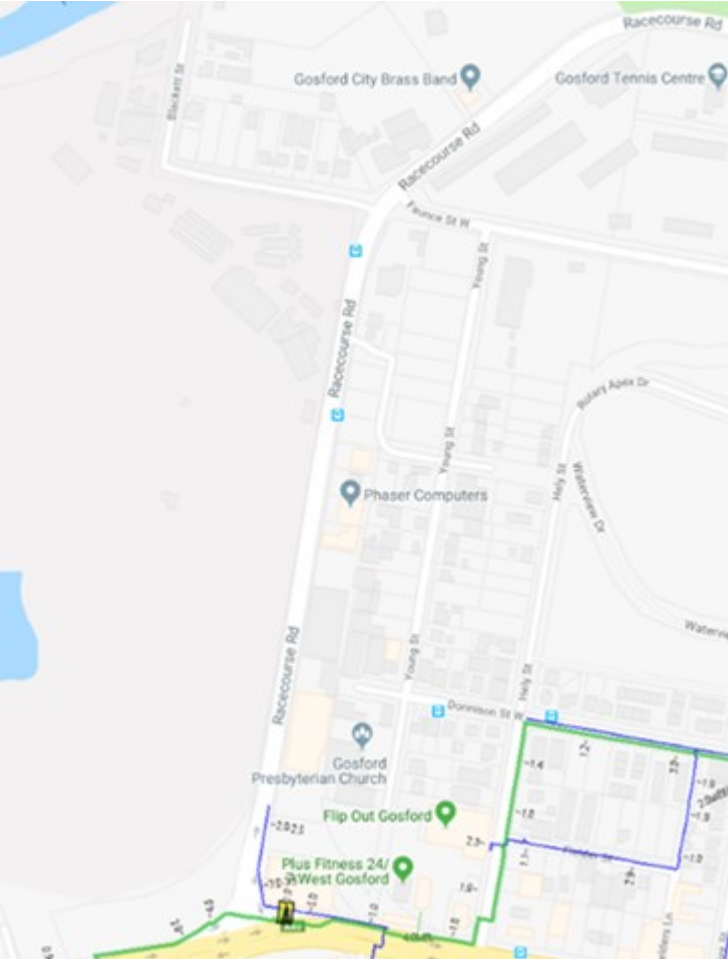
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Sydney 2000 NSW Australia  
T 61 2 9299 1312

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**From:** Stephen Angel <[Stephen.Angel@jemena.com.au](mailto:Stephen.Angel@jemena.com.au)>  
**Sent:** Tuesday, March 12, 2019 5:12 PM  
**To:** Ian Murray <[Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)>  
**Cc:** Alex Raeside <[alex.raeside@jemena.com.au](mailto:alex.raeside@jemena.com.au)>  
**Subject:** RE: Northside Private Hospital- Cnr Racecourse Road & Faunce St West; West Gosford

Ian,

Please find below as requested



**Stephen Angel**  
Network Development Manager  
**Jemena**  
Level 14, 99 Walker Street, North Sydney, NSW 2060  
PO Box 1220, North Sydney 2059  
(02) 9867 7034  
[stephen.angel@jemena.com.au](mailto:stephen.angel@jemena.com.au) | [www.jemena.com.au](http://www.jemena.com.au)



---

**From:** Ian Murray <[Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)>  
**Sent:** Tuesday, 12 March 2019 2:55 PM  
**To:** Stephen Angel <[Stephen.Angel@jemena.com.au](mailto:Stephen.Angel@jemena.com.au)>  
**Cc:** Alex Raeside <[alex.raeside@jemena.com.au](mailto:alex.raeside@jemena.com.au)>; Neale Hilton <[Neale.Hilton@jemena.com.au](mailto:Neale.Hilton@jemena.com.au)>; Steve Donnelly <[Steve.Donnelly@jemena.com.au](mailto:Steve.Donnelly@jemena.com.au)>  
**Subject:** RE: Northside Private Hospital- Cnr Racecourse Road & Faunce St West; West Gosford



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Thanks Stephen,

Can you send me a map showing the location of the 2 gas main options so I can submit the details to the Client?

Regards,

**Ian Murray**  
**Senior Hydraulic Engineer**



SCP Consulting Pty Ltd  
Level 2, Danchen House  
507 Kent Street  
SYDNEY NSW 2000

Mob: 61 (0) 438956662  
Ph: 61 2 9267 9312  
Fax: 61 2 9261 5871  
Email: [Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)

---

**From:** Stephen Angel <[Stephen.Angel@jemena.com.au](mailto:Stephen.Angel@jemena.com.au)>

**Sent:** Tuesday, March 12, 2019 9:34 AM

**To:** Ian Murray <[Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)>

**Cc:** Alex Raeside <[alex.raeside@jemena.com.au](mailto:alex.raeside@jemena.com.au)>; Neale Hilton <[Neale.Hilton@jemena.com.au](mailto:Neale.Hilton@jemena.com.au)>; Steve Donnelly <[Steve.Donnelly@jemena.com.au](mailto:Steve.Donnelly@jemena.com.au)>

**Subject:** FW: Northside Private Hospital- Cnr Racecourse Road & Faunce St West; West Gosford

Ian,

There is gas infrastructure located on the cnr of Racecourse Road and the Pacific Hwy. Depending upon the gas load required this main could be extended to cover the proposed development. Dial before you dig should not be used to determine gas availability for commercial connections as there is no guarantee that the existing main would have the required capacity to supply proposed developments.

Jemena is always prepared to extend gas infrastructure based on the individual commercial justification of each development.

Regards

**Stephen Angel**

Network Development Manager

**Jemena**

Level 14, 99 Walker Street, North Sydney, NSW 2060

PO Box 1220, North Sydney 2059

(02) 9867 7034

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**From:** [ian.murray@dsaconsulting.com.au](mailto:ian.murray@dsaconsulting.com.au) <[ian.murray@dsaconsulting.com.au](mailto:ian.murray@dsaconsulting.com.au)>  
**Sent:** Thursday, 11 July 2019 8:18 AM  
**To:** Lucy Guerin <[Lucy.Guerin@dcwc.com.au](mailto:Lucy.Guerin@dcwc.com.au)>  
**Cc:** 'David Shreeve' <[david.shreeve@dsaconsulting.com.au](mailto:david.shreeve@dsaconsulting.com.au)>  
**Subject:** FW: DBYD Racecourse Rd & Faunce St West

Hi Lucy,

Please find attached our correspondence with Central Coast Council

Regards,  
**Ian Murray**

**DSA**Consulting

Suite 10, 82-86 Pacific Highway  
St Leonards Sydney, NSW 2065  
PH +61 (02) 9436 3500  
FAX +61 (02) 9437 0890  
Mob 0438956662  
E-Mail [ian.murray@dsaconsulting.com.au](mailto:ian.murray@dsaconsulting.com.au)

---

**From:** Cathy Newton <[Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)>  
**Sent:** Wednesday, March 13, 2019 7:38 AM  
**To:** Ian Murray <[ian.Murray@scpconsult.com.au](mailto:ian.Murray@scpconsult.com.au)>  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West


Hi Ian,

Please find attached advice supplied by Council's Project Manager –Water Construction and Management responsible for the capital works upgrades within the Gosford CBD.

Kind regards

**Cathy Newton**  
Technical Officer Assessments  
Water Services and Design



 Please consider the environment before printing this email

**From:** Ian Murray [<mailto:Ian.Murray@scpconsult.com.au>]  
**Sent:** Monday, 11 March 2019 10:34 AM  
**To:** Cathy Newton  
**Cc:** Sepalee Mathmaluwe; Luke Drury  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West

Thanks Cathy,

Dear Sepalee,

Can you advise if the proposed watermain by 2018 to the Gosford hospital site are installed?

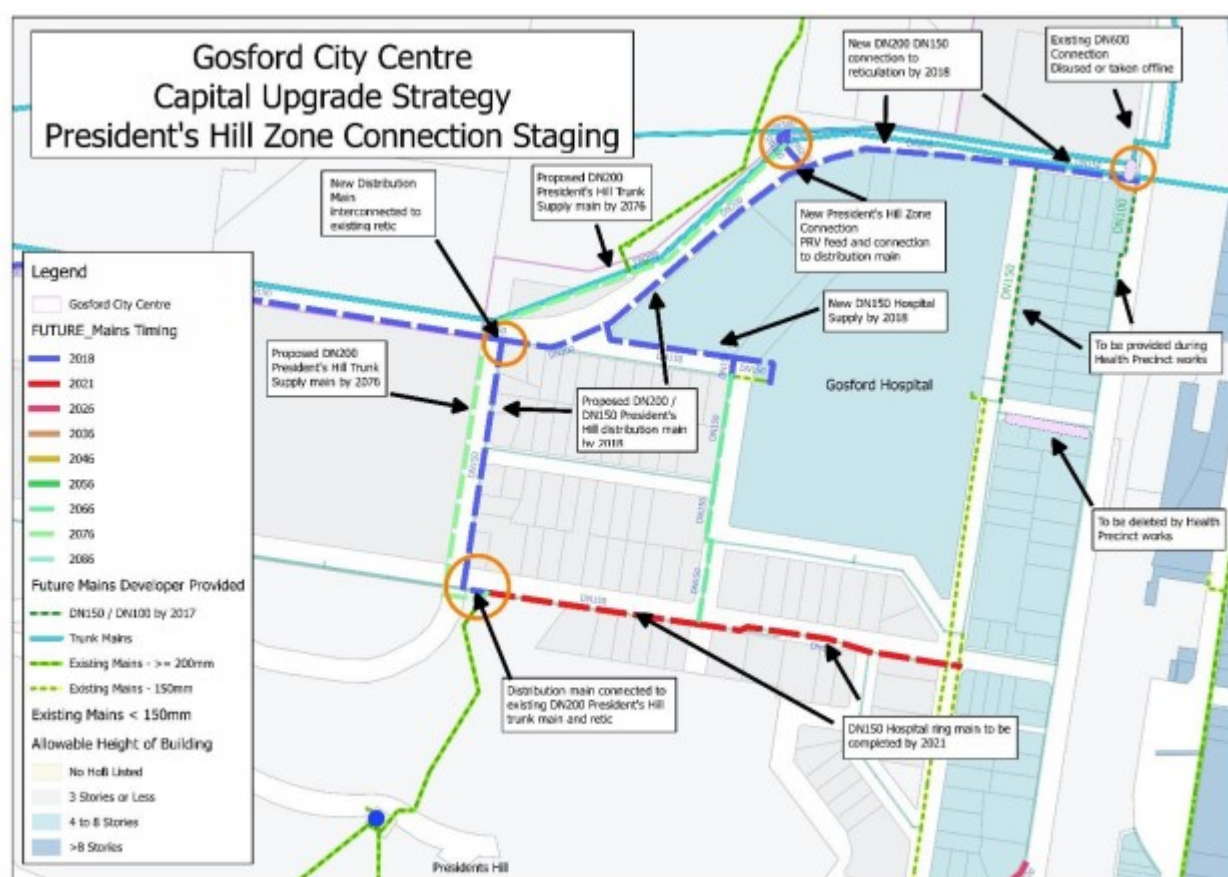


Figure 6 - Proposed President's Hill Zone New Supply Staging

Regards,  
**Ian Murray**  
**Senior Hydraulic Engineer**



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---

**From:** Cathy Newton <[Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)>  
**Sent:** Friday, March 8, 2019 9:19 AM  
**To:** Ian Murray <[Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)>  
**Cc:** Sepalee Mathmaluwe <[Sepalee.Mathmaluwe@centralcoast.nsw.gov.au](mailto:Sepalee.Mathmaluwe@centralcoast.nsw.gov.au)>; Luke Drury <[Luke.Drury@centralcoast.nsw.gov.au](mailto:Luke.Drury@centralcoast.nsw.gov.au)>  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West

Hi Ian,

All internal water supply systems including fire systems require the applicant to obtain the services of an appropriately qualified hydraulic engineer to design and ensure compliance with the respective codes and standards. As the hydraulic consultant responsibility falls with SCP Consulting.


I have received subsequent advice with regards Council's Gosford CBD Water Capital Works Strategy and have attached the document accordingly.

To discuss the timing of the proposed development in consideration to Council's construction of new assets within the CBD may I suggest you contact Sepalee Mathmaluwe Asset Engineer, Water Services and Design ph:4325 8463.

Kind regards

**Cathy Newton**  
Technical Officer Assessments  
Water Services and Design  
**Central Coast Council**  
P.O. Box 21 Gosford, NSW 2250  
t: 43258820  
e: [Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)



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---

**From:** Ian Murray [<mailto:Ian.Murray@scpconsult.com.au>]  
**Sent:** Thursday, 7 March 2019 3:55 PM  
**To:** Cathy Newton  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West

Thanks Cathy,

I'm also try to establish the Council's requirements water supply to the project.

Can your engineers advise on the need for on-site water storage and if break tanks are needed for the main supply to the hospital?

Regards,  
**Ian Murray**  
**Senior Hydraulic Engineer**



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Ph: 61 2 9267 9312  
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Email: [Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)

---

**From:** Cathy Newton <[Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)>  
**Sent:** Thursday, March 7, 2019 3:10 PM  
**To:** Ian Murray <[Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)>  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West

Hi Ian,


A 150mm water supply main is currently being constructed along Racecourse Rd (Northern Side) between Batley and Faunce St West intersections. Council's Project Manager Water Construction and Project Management has advised the connection of the main and update of Council's GIS data is anticipated in next two months.

The report to which I referred is not a public document so it cannot be issued.

Kind regards

**Cathy Newton**  
Technical Officer Assessments  
Water Services and Design  
**Central Coast Council**  
P.O. Box 21 Gosford, NSW 2250  
t: 43258820  
e: [Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)



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---

**From:** Ian Murray [<mailto:Ian.Murray@scpconsult.com.au>]  
**Sent:** Thursday, 7 March 2019 1:49 PM  
**To:** Cathy Newton  
**Subject:** RE: DBYD Racecourse Rd & Faunce St West

Hi Cathy,

Thank you for your response and information. Can you ask engineering to respond to my inquiry?

Regards,  
**Ian Murray**  
**Senior Hydraulic Engineer**



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Level 2, Danchen House  
507 Kent Street  
SYDNEY NSW 2000

Mob: 61 (0) 438956662  
Ph: 61 2 9267 9312  
Fax: 61 2 9261 5871  
Email: [Ian.Murray@scpconsult.com.au](mailto:Ian.Murray@scpconsult.com.au)

---

**From:** Cathy Newton <[Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)>  
**Sent:** Friday, February 22, 2019 12:57 PM

To: Ian Murray <[lan.Murray@scpconsult.com.au](mailto:lan.Murray@scpconsult.com.au)>  
Subject: FW: DBYD Racecourse Rd & Faunce St West

Hi Ian

Attached are DBYD which should assist with the existing sizing of mains. Please be aware Central Coast Council has developed a capital works strategy for the Gosford CBD to upgrade water and sewer systems. Water assets within the immediate vicinity of the development site(proposed private hospital Racecourse Rd / Faunce St West) are subject to upgrade. A 150mm main is proposed to be extended along Racecourse Rd from Faunce st West intersection to Batley St. If you can bear with me I will enquire as to the status of the construction of the proposed upgrades and of the report and forward accordingly.


The link provided is to the electronic form for a water pressure enquiry(should you require).

<https://www.centralcoast.nsw.gov.au/form/water-pressure-statement-form>

Kind regards


**Cathy Newton**  
Technical Officer Assessments  
Water Services and Design  
**Central Coast Council**  
P.O. Box 21 Gosford, NSW 2250  
t: 43258820  
e: [Cathy.Newton@centralcoast.nsw.gov.au](mailto:Cathy.Newton@centralcoast.nsw.gov.au)



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**Cathy Newton**  
Technical Officer Assessments  
Water Services and Design  
**Central Coast Council**  
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## SCHEDULE 2 - UTILITY CORRESPONDENCE

Job Number: 1800xx  
Date: 29 March 2019

Michael Cahalane  
Level 9, 233 Castlereagh St  
SYDNEY NSW 2000

GRC Hydro  
Level 9, 233 Castlereagh Street  
Sydney NSW 2000

Tel: +61 413 631 447  
[www.grchydro.com.au](http://www.grchydro.com.au)

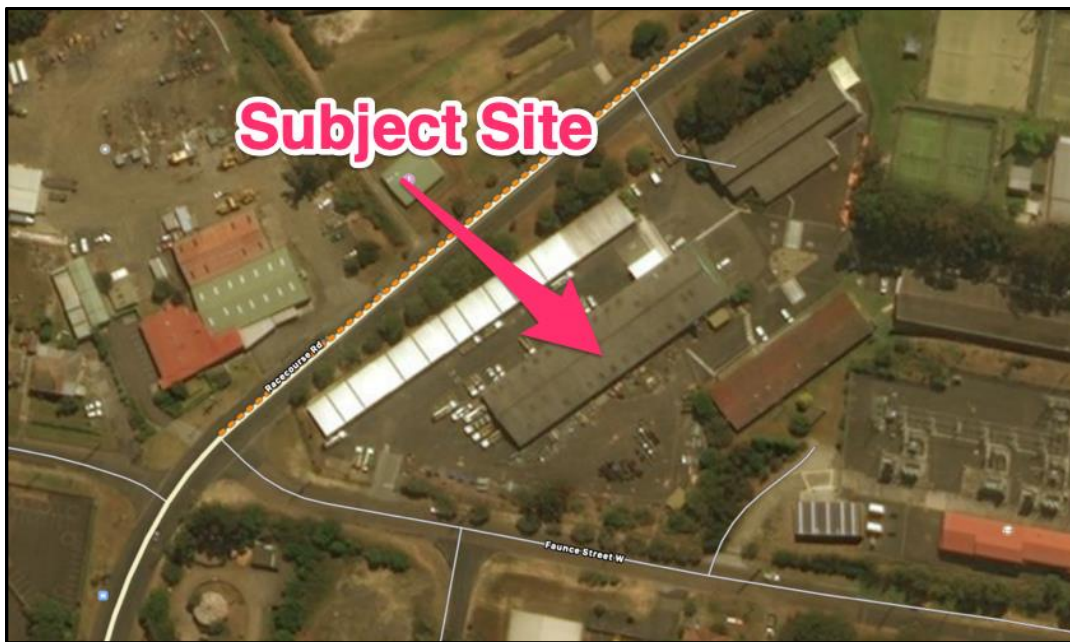
Dear Michael,

**Re: Proposed Gosford Private Hospital Development – Corner of Faunce St West and Racecourse Rd – Lot 2  
DP1226923**

## INTRODUCTION

Thank you for inviting GRC Hydro to provide a summary of flood affectation and flood related development controls for the above referenced subject site (see Figure 1).

*Figure 1: Subject Site*



300 m to the north west of the Site is Narrara Creek and areas to the south of the site are elevated relative to the site. Hence the flood liability of the subject site against both mainstream and overland flow flooding is required to be assessed.

The 1993 Kinhill Flood Study Review has been looked at in regard to Narrara Creek mainstream flooding and levels in the vicinity of the subject site. Note there is a FRMP for Narrara Creek and so this will be referred to in regard to flood controls for mainstream flood affectation (if any).



GOSFORD CBD Local Overland Flow Study (2013) was reviewed in order to define overland flow. Note no subsequent Floodplain Management Plan was carried out and as such the DCP will be referred to for flood related development controls pertinent to overland flow flood affectation at the site (if any).

Figures taken from the above referenced report and relied upon for statements below are shown in Appendix A.

### **SUBJECT SITE FLOOD LIABILITY**

Analysis shows that:

1. Narrara Creek flood level for 1% AEP event in approximately 4 mAHD, around 4 m below our site (which at its lowest is in the order of 8 mAHD);
2. Narrara Creek PMF level is approximately 6 mAHD and hence does not impact the subject site;
3. Given 1 and 2 above mainstream flooding does not impact the subject site;
4. A review of the overland flow study indicates no stormwater assets on the site nor any overland flow path. Isolated puddles are shown however these are not flooding but instead stormwater and will be dealt with by intra-lot drainage.

As such all indications are that the subject site is not flood affected and as such any works on the site would not be subject to flood related development controls . Note however that evacuation may require further consideration at a later time.

If you require any further information, please do not hesitate to contact me on 0413 631 447.

Yours Sincerely



**Steve Gray**  
Director



# APPENDIX A

Figure 2: Location of Narrara Creek Study Cross-sections

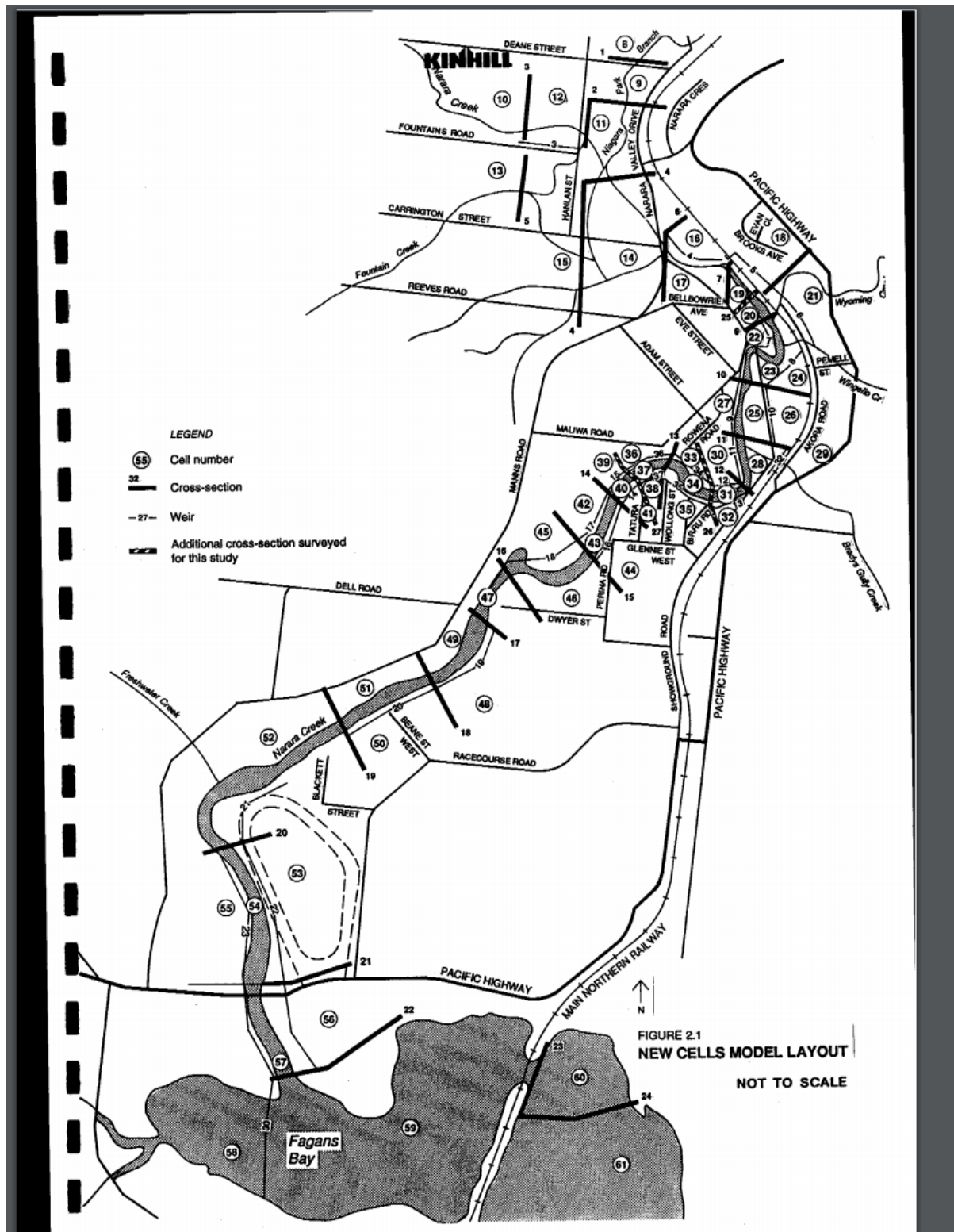


Figure 3: Narrara Creek 1% AEP Results

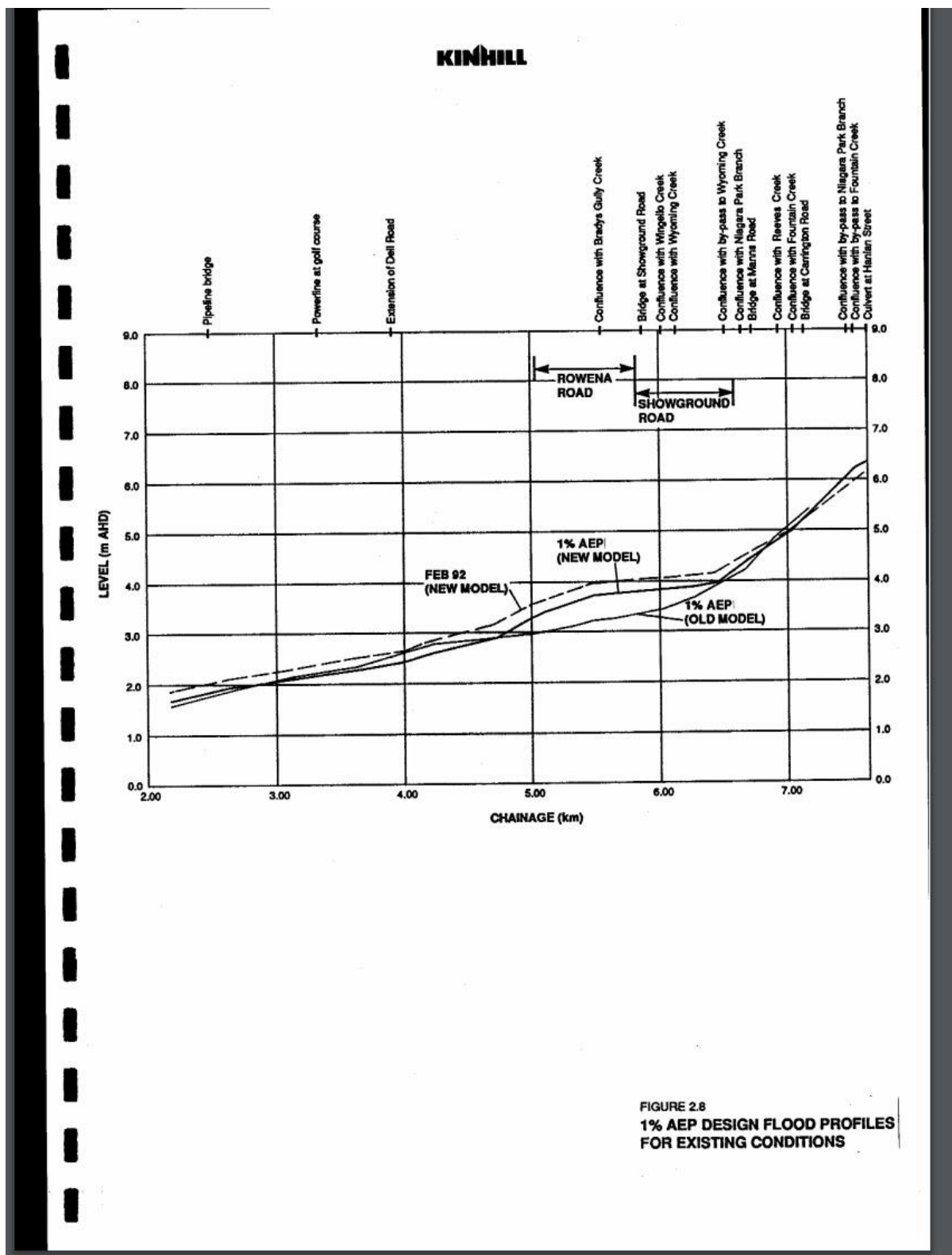


Figure 4: Narrara Creek PMF Results

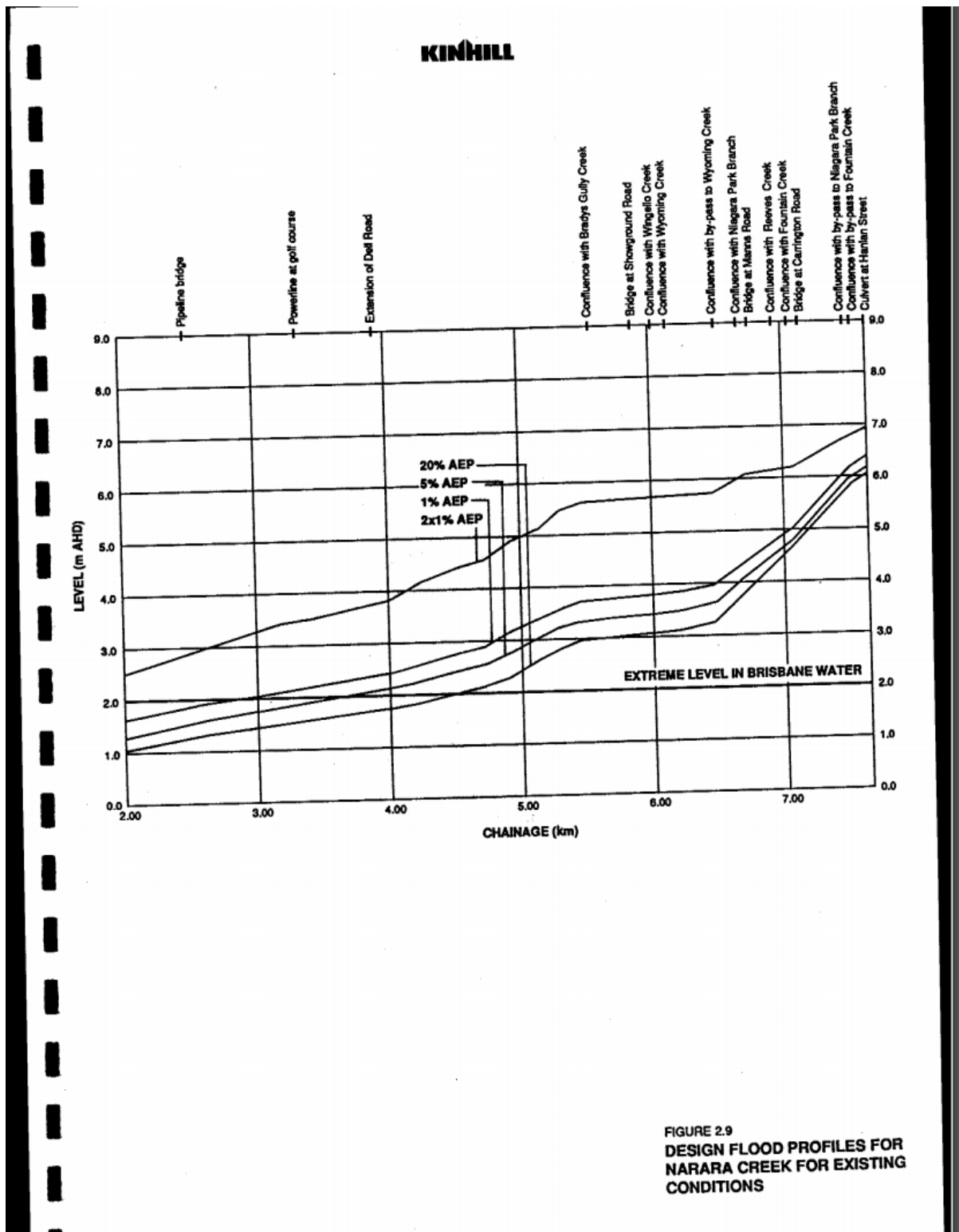






Figure 5: Typical Elevations at Subject Site

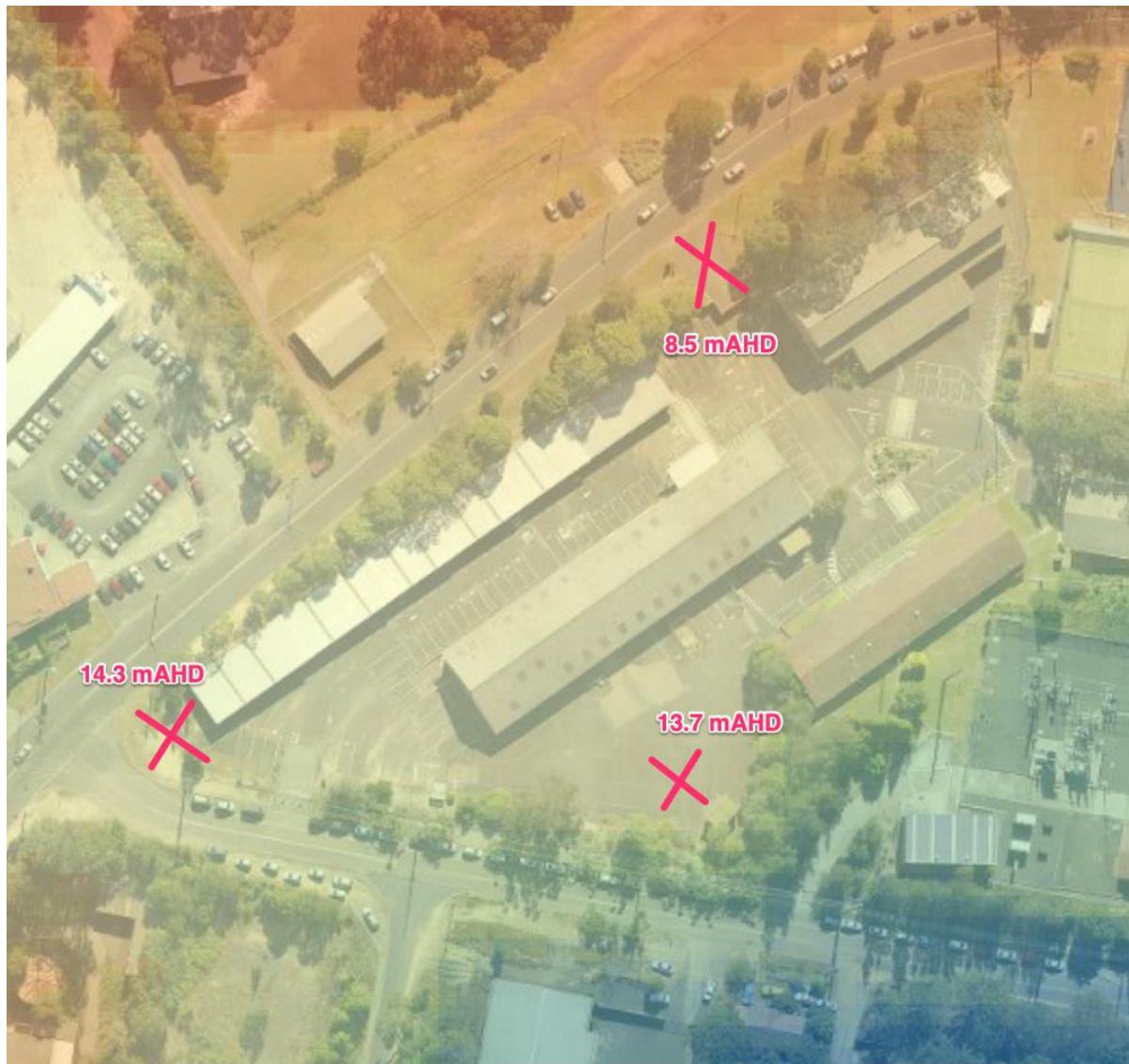
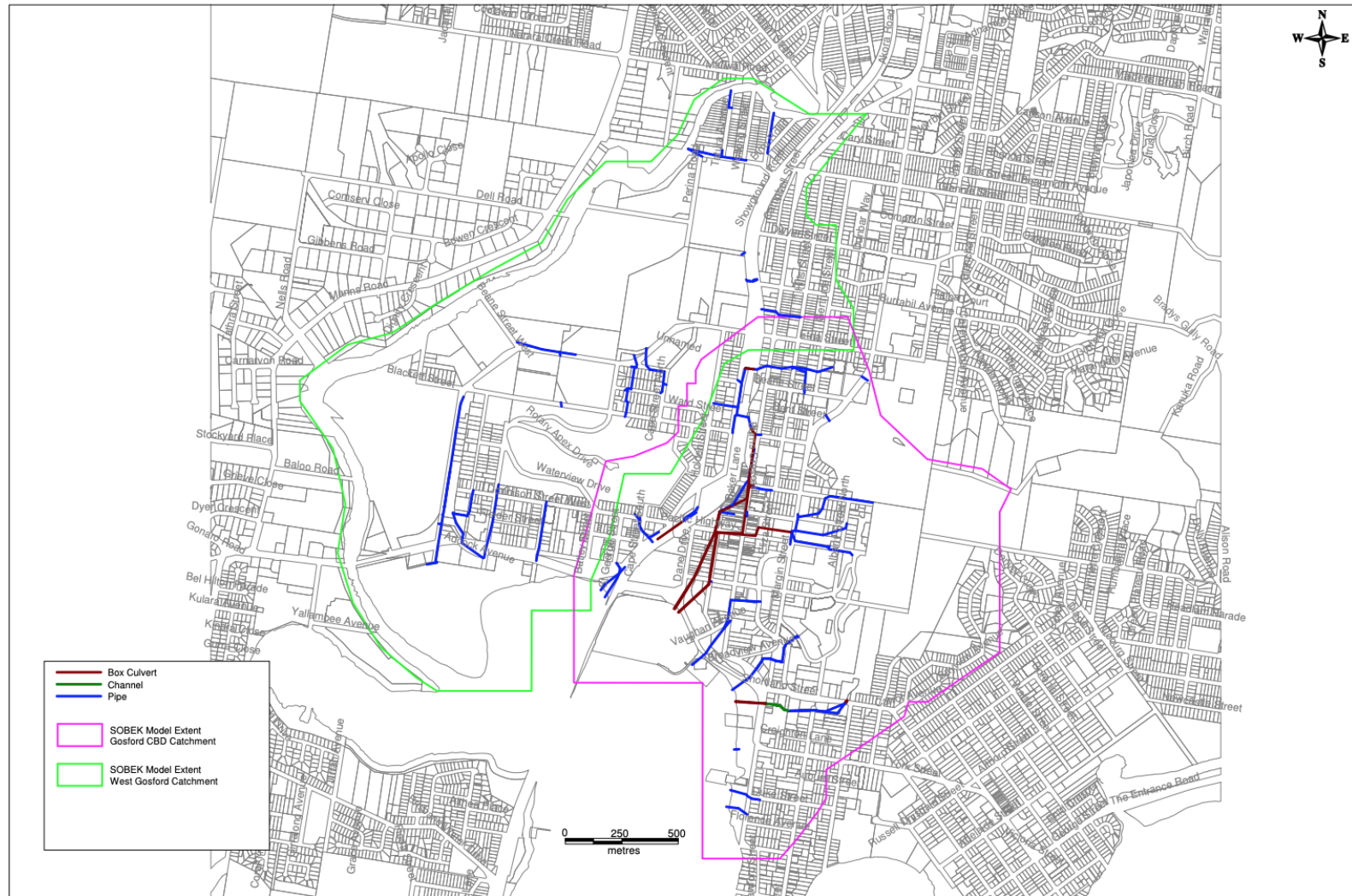




Figure 6: Stormwater Asset Diagram – None shown in Subject Site



 **Cardno**  
Lawson Treloar  
W4816/V4  
January 2011

Gosford CBD Local Overland Flow Flood Study

FIGURE 3.7  
SOBEK MODEL - 1D DRAINAGE SYSTEM





Figure 7: 1% AEP Overland Flow Flood Map





Figure 8: PMF Overland Flow Flood Map

