Our Ref: NA49913132-012:BCP/bcp
Contact: Dr Brett C. Phillips

5th November 2014

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The Manager
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Attention: Mr Jade Hudson

Dear Jade,

STORMWATER MANAGEMENT DEFERRED COMMENCEMENT CONDITION NO. 1 DA2008/1742 AT WARRINGAH MALL – SECTION 96 APPLICATION

One of the General Conditions of DA2008/1742 relates to a requirement to undertake a physical model study. This condition is worded as follows.

> *17. Physical Model Studies*
>
> *Physical model studies of the two large junction boxes, (B4 and B6 on drawing W4548- 101 by Cardno) to confirm the hydraulic losses which were assumed in the computer model studies are to be submitted to the Certifying Authority for approval. The studies are to provide advice on how the hydraulic losses in each junction box can be minimised.*
>
> *The details are to be prepared by a suitably qualified Civil Engineer, who has membership to the Institution of Engineers Australia, National Professional Engineers Register (NPER-3) and is an Accredited Certifier (Category C4).*
>
> *Details demonstrating compliance are to be submitted to the Certifying Authority for approval prior to the issue of the Construction Certificate.*

To assist in the scoping of the physical model study further modelling assessments were undertaken to optimise the layout of Chambers B4 and B6 on drawing W4548-101 taking into account planned future development and the likely location of columns and existing and/or relocated infrastructure. These modelling assessment were described in our letter report titled "Stormwater Management Deferred Commencement Condition No. 1 DA2008/1742 at Warringah Mall – Section 96 Application" and dated 28 October 2014.

The physical model study of the preferred configuration of Chambers B4 and B6 is described in the attached WRL Technical Report 13/30 dated July 2014.

The observed losses at Chambers B4 and B6 were compared with the losses calculated from the 1D/2D model. It was concluded from this comparison that:

- The culvert exit / entry losses at Chamber B6 are currently over-estimated and could be reduced by say 50%;
- The culvert exit / entry losses associated with the entry and exit of the existing culvert into/from Chamber B4 could be doubled;
- These changes are unlikely to change the level of agreement between the predicted and observed water levels/heads upstream of Chamber B4.

It was also noted that the observed heads just upstream of Chamber B4 are substantially lower than calculated by the 1D/2D model at upstream locations. Adjustments to adopted culvert exit / entry losses will not substantially reduce these differences. This suggests that the roughness value for the various culverts in the numerical model is higher than represented in the physical model.

It is concluded that the current numerical 1D/2D model results appear to be conservative in comparison with the physical model results (which may be due to differences in adopted conduit roughness values in the numerical model and the roughness of the conduits in the physical model) and that the flood levels estimated by the numerical model are likely to be conservative.

Re-configuration of the Stormwater DA Layout

Subsequent to the modelling assessments to optimise the layout of Chambers B4 and B6 further consideration was given to the interaction of the proposed works with other services, the feasibility of relocating services at the southern end of Green Street, traffic management during construction, construction sequencing and potential hydraulic impacts during construction.

This led to further consideration of the proposed construction of two additional culverts under Condamine Street and the merit of separating the alignment of the new stormwater culverts from the existing culverts realigning the additional stormwater culverts through the Bing Lee site. These are discussed as follows.

Green Street Inlet

The structural design of the Green Street inlet incorporates “360 UB 50” transverse beams at 960 mm centres to support the grated inlet. On the side facing Green Street this has created a 9.6 m wide and 0.36 m high side entry inlet with an invert level set at 8.86 m AHD. The underside of the grates are set at 9.22 m AHD while the top of the trafficable grate is set at 9.32 m AHD.

This configuration substantially lowers the level at which water ponded in the Green Street low point can spill into the new culverts. It also increases the complexity of inflows into the inlet. Consequently a rating curve was developed for the inlet which accounts for the initial weir flow through the side inlet which changes to orifice flow when the water level in Green Street rises above around 9.22 m AHD in combination with initial weir flow spilling across the grates which in turn changes regime if the water level rises to a level which covers the grated inlet.

The latest configuration has a substantial reserve capacity to deal with any blockage of the side inlet and/or the grates.

Re-alignment of Additional Culverts

In our letter of 21 February 2014 we concluded that the temporary closure of a main culvert to allow the re-construction of Chamber B4 would have a significant adverse impact on flood levels in a number of locations and that in events greater than a 10 yr ARI event the construction impacts are sufficient to initiate flows through entries into Warringah Mall sooner than would otherwise would be the case (and subject to the to the degree of debris blockage of key inlets).

Further consideration was also given to the interaction of the proposed works with other services and the feasibility of relocating services at the southern end of Green Street and traffic management during construction. This led to a decision to realign the additional stormwater culverts through the Bing Lee site.

The ramifications of this decision include:

- The hydraulic separation of the existing culverts and the additional culverts;
- The simplification of the proposed works due to the removal of the need to adjust culverts sizes to match existing culvert sizes and the removal of a limitation on pit invert levels due to the need to match existing pit invert levels;
- No need to reconstruct Chamber B4 thereby avoiding the adverse impacts on flood levels during construction;

At the same time it has been possible to retain the same inlet configuration at Chamber B6 as was assessed during the physical model study.

The re-aligned layout of the proposed stormwater culverts is given in Drawing W4548-401(3).

The modified Stormwater DA scheme which has been assessed is based on the re-alignment of the proposed stormwater culverts and the modified layouts of Chamber C6 described above.

Chamber C6

Currently there are 4 x 2.8 m (W) x 1.8 m (H) culverts which convey stormwater from the Warringah Mall under Condamine Street and into the Brookvale Creek GPT. The GPT in turn discharges into a rehabilitated reach of Brookvale Creek. Currently stormwater discharges from the culverts and across an apron before discharging into the pool created by the GPT and its trash rack. The primary features of the outfall of the existing culverts and of the downstream GPT are displayed in **Plates 1 – 6**.

Upstream of Condamine Street stormwater conveyed by 1 x 4.2 m (W) x 1.8 m (H) + 2 x 1350 mm diameter conduits + 1 x 1500 mm diameter conduit + 3 x 1.8 m diameter conduits + 1 x 900 mm diameter conduit discharges into a large chamber which in turn discharges into the Condamine Street culverts (refer **Attachment A**).

The approval of the Warringah Mall Stormwater DA (with Deferred Commencement Conditions) was based on a scheme which included the construction of two additional 3.3 m (W) x 1.8 m (H) culverts beside existing the 4 x 2.8 m (W) x 1.8 m (H) culverts.

The proposed construction of two additional culverts under Condamine Street poses major challenges both in terms of traffic management and construction sequencing.

Consequently consideration has been given to a modification of the proposed works in the vicinity of Condamine Street to allow the hydraulic capacity of the Condamine Street culverts to be increased without disrupting Condamine Street.

Numerical model has indicated that connecting the two new 3.3 m (W) x 1.8 m (H) culverts into the existing chamber (Chamber C6) and lowering the two central culverts under Condamine Street by 1.0 m gives comparable hydraulic performance to the approved scheme.

The concept works are sketched in **Attachments A** and **B**.

Further Refinements

Based on a review of the number of flood barriers required to achieve the required freeboard during Stage 1 which would not be required under Stage 2 further refinement of the Stage 1 works was undertaken. These refinements included:

- Raising the level of the parapet wall beside the access road on the upstream side of Warringah Mall by 0.4 m to confine overflows over the parapet wall to the east of the access road flood barrier;
- Including the access road flood barrier in Stage 1 rather than Stage 2 as previously proposed;
- Including the transfer beams which span the open chamber southeast of the Cross Street roundabout in the hydraulic model;
- Connecting the new Green Street culverts temporarily to the existing culvert at the southern end of Green Street by installing a temporary 1350 mm diameter RCP connection;
- Upgrading conduits which convey Myer roof runoff to the drainage system, namely replacing 525 mm diameter pipes with 750 mm diameter pipes, and replacing 450 mm diameter or smaller pipes with 525 mm diameter pipes.

These refinements are also reflected in the Stage 2 scheme.

DEFERRED COMMENCEMENT CONDITION NO. 1

In Council's letter dated 22 May 2012 in relation to Modification Application No: DA2008/1742, the proposed works were described as follows:

Construction of stormwater upgrade works for Warringah Mall and watercourse bank stabilisation works

Council's letter advised that the request to modify the above-mentioned Development Consent has been approved on 16 May 2012 as follows:

> ***1. Stormwater Management***
>
> *Evidence that the stormwater works will meet the objectives and requirements of Section 6.1 `Stormwater Management' of the Warringah Development Control Plan - Warringah Mall Shopping Centre (the DCP) is to be submitted to Council for written approval.*
>
> *The following information is to be submitted as a minimum:*
>
> *i) A ground floor plan of Warringah Mall (on land at Lot 100, DP 1015283, No 145 Old Pittwater Road) showing extent of works approved as part of DA1996/137 (Development Consent DA96/335) and DA1998/17 (Development Consent DA98/229). The plan must show critical*

finished floor levels for DA19961137 and DA1998117 and critical peak 100 year ARI flood levels as a result of the augmentation works.

This plan is given in the attached Drawing W4548-420 (5).pdf. The approach is outlined in W4548-401 (3).pdf and detailed in

- W4548-422 (3).pdf,
- W4548-423 (3).pdf,
- W4548-424 (3).pdf
- W4548-426 (3).pdf,
- W4548-428 (3).pdf,
- W4548-429 (3).pdf

ii) Details demonstrating how the flood protection measures will provide the required minimum 300rnm freeboard to the 100 year ARI flood event to the finished floor levels of the development approved under DA1996/137 and DA1998/17.

The details are given in Drawings W4548-422 (3).pdf, W4548-423 (3).pdf, W4548-424 (3).pdf, W4548-426 (3).pdf, W4548-428 (3).pdf and W4548-429 (3).pdf

iii) An update of Table A.5 in the 'Flood Impact Assessment Addendum Report' dated January 2010 prepared by Cardno showing the results of the latest flood modelling and as a result of complying with the above points.

Table A.5 from the 2010 Warringah Mall Flood Impact Assessment Addendum has been updated to include:

- The estimated 100 yr ARI flood levels for both 50% and 0% blockage of key stormwater inlets under Existing Conditions,
- Updated estimated 100 yr ARI flood levels under the Stormwater DA for both 50% and 0% blockage of key stormwater inlets;
- Updated estimated 100 yr ARI flood levels under the reconfigured Stormwater DA (Stage 2) for both 50% and 0% blockage of key stormwater inlets;
- Additional reference locations as follows:
  - Reference locations 221, 222 – DJ Loading Dock
  - Reference Locations 300 – 307 – Green St, Cross St and Dale St
  - Reference Locations 401 -404 – “Bus Deport” subcatchment east of Pittwater Road
  - Reference Locations 501-505 – Anchor Car Park / Coles Loading Dock

The updated Table A.5 is attached.

iv) A set of figures showing the impact the proposed development will have on peak 100 year ARI flood levels. The figures are to show the difference in peak flood levels between pre- and post developed conditions as a graded set of coloured regions. A separate figure is to be prepared for each of the development scenarios contained in the updated Table A.5. It is anticipated that the figures will be centred mainly on Warringah Mall (on land at Lot 100, DP 1015283, No 145 Old Pittwater Road) since it is understood that the impact of the proposed development is limited to the site and areas immediately adjacent to it. The figures are to be presented at a scale which renders the information legible to the naked eye. A legend clearly identifying the range of levels comprising the graded set of coloured regions is to be included on each figure.

Two sets of drawings each comprising two sheets are attached for the reconfigured Stormwater DA (Stage 2) 0% and 50% blocked scenarios.

POTENTIAL CONSTRUCTION IMPACTS ON FLOODING

The potential impacts of the reconstructing Chamber C6 and lowering the two central culvert under Condamine St were previously assessed by analysing the impact of temporarily blocking one (Scenario C6A) or two (Scenario C6B) of the existing 2.8 m (W) x 1.8 m (H) culverts under Condamine Street.

The construction scenario was based on the following assumptions:

- The Condamine Street culverts are lowered and Chamber C6 is reconstructed in the initial stages of construction ie. the upstream drainage system is equivalent to Existing Conditions;
- The best case scenario is that only one of the existing culverts under Condamine St is temporarily de-commissioned (Scenario A);
- The worst case scenario is that two of the existing culverts under Condamine St are temporarily de-commissioned (Scenario B);
- The reconstruction of Chamber C6 will be managed such that incoming flows in a 5 yr ARI or 10 yr ARI flood can be conveyed through the chamber to the active culverts under Condamine St.

The 5 yr ARI and 10 yr ARI 90 minute storms have been assessed under Existing Conditions and under the Chamber C6 construction scenarios A and B.

The impacts of the construction scenario are assessed against the same flood event under Existing Conditions. The construction scenario flood levels are also compared with the 100 yr ARI flood levels under Existing Conditions to assess if the construction scenario locally raises flood levels anywhere to around the 100 yr ARI flood levels.

The following conclusions are drawn from the tabulated results which are attached in separate tables:

- In a 5 yr ARI event the temporary de-commissioning one culvert under Condamine St would:
  - Locally increase the 5 yr ARI flood levels in Brookvale Creek upstream of Warringah Mall by up to 3 cm only;
  - Locally increase the 5 yr ARI flood levels in Green St by up to 2 cm but still be around 17 cm lower than the 100 yr ARI flood level under Existing Conditions;
  - Locally increase the 5 yr ARI flood level in the vicinity of the DJ Loading Dock by around 3 cm but still be around 90 cm lower than the 100 yr ARI flood level under Existing Conditions;

- In a 10 yr ARI event the temporary de-commissioning one culvert under Condamine St would:
  - Locally increase the 10 yr ARI flood levels in Brookvale Creek upstream of Warringah Mall by up to 3 cm but still be around 55 cm lower than the 100 yr ARI flood level under Existing Conditions;
  - Locally increase the 10 yr ARI flood levels in Green St by up to 2 cm (and to within 17 cm of the 100 yr ARI flood level under Existing Conditions);
  - Locally increase the 10 yr ARI flood level in the vicinity of the DJ Loading Dock by around 8 cm but still be around 80 cm lower than the 100 yr ARI flood level under Existing Conditions;

- In a 5 yr ARI event the temporary de-commissioning two culverts under Condamine St would:

- Locally increase the 5 yr ARI flood levels in Brookvale Creek upstream of Warringah Mall by up to 15 cm but still be around 60 cm lower than the 100 yr ARI flood level under Existing Conditions;
- Locally increase the 5 yr ARI flood levels in Green St by up to 4 cm but still be around 15 cm lower than the 100 yr ARI flood level under Existing Conditions;
- Locally increase the 5 yr ARI flood level in the vicinity of the DJ Loading Dock by around 8 cm but still be around 90 cm lower than the 100 yr ARI flood level under Existing Conditions; and
- Slightly reduce the 5 yr ARI flood levels downstream of Condamine St by up to 2 cm.

- In a 10 yr ARI event the temporary de-commissioning two culverts under Condamine St would:

  - Locally increase the 10 yr ARI flood levels in Brookvale Creek upstream of Warringah Mall by up to 14 cm but still be around 45 cm lower than the 100 yr ARI flood level under Existing Conditions;
  - Locally increase the 10 yr ARI flood levels in Green St by up to 4 cm but still be around 15 cm lower than the 100 yr ARI flood level under Existing Conditions;
  - Locally increase the 10 yr ARI flood level in the vicinity of the DJ Loading Dock by around 34 cm but still be around 55 cm lower than the 100 yr ARI flood level under Existing Conditions; and
  - Slightly reduce the 10 yr ARI flood levels downstream of Condamine St by up to 2 cm.

We would be pleased to respond to any queries regarding this information upon request.

Yours faithfully

……
Dr Brett C. Phillips
Director, Water Engineering
for **Cardno**

Plate 1 Condamine Street Culverts

This plate shows the existing 4 x 2.8 m (W) x 1.8 m (H) culverts located under Condamine Street. Also note the downstream apron.

Plate 2 Condamine Street Culverts

This is an oblique view of the existing culverts and apron. Note the step change in the level of the apron. The change in level is around 1.0 m.

Plate 3 Downstream Apron

This view shows the extent of the apron downstream of the culverts.

Plate 4 Downstream Apron /GPT Pool

This plate provides a view from above the culverts of the apron and the upper section of the pool created by the downstream GPT.

Plate 5 Brookvale Creek GPT

This is a view of the existing GPT including the trash rack. Note the pool of water impounded behind the wall of the GPT.

Plate 6 Brookvale Creek GPT

This is a closer view of the existing trash rack. If this trash was to fully block and to create a weir then the resulting backwater may impact on the discharge characteristics of the Condamine Street culverts.

Water Research Laboratory

Warringah Mall Box Culvert Physical Model Study

WRL Technical Report 2013/30
July 2014

by
N S Guerry and B M Miller

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Water Research Laboratory
University of New South Wales
School of Civil and Environmental Engineering

Warringah Mall Box Culvert Physical Model Study

WRL Technical Report 2013/30
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1. Introduction

The Water Research Laboratory (WRL) of the School of Civil and Environmental Engineering at The University of New South Wales was commissioned by Cardno (NSW/ACT) Pty Ltd to undertake a physical model study of two proposed stormwater junction boxes at Warringah Mall in Brookvale, Sydney. In particular hydraulic losses across the junction boxes were investigated.

The stormwater upgrade works are proposed as part of broader re-development and refurbishment works at the existing shopping complex at Warringah Mall. This study was undertaken in order to satisfy a condition of DA2008/1742, which states:

> *Physical model studies of the two large junction boxes, (B4 and B6 on drawing W4548-101 by Cardno) to confirm the hydraulic losses which were assumed in the computer model studies are to be submitted to the Certifying Authority for approval. The studies are to provide advice on how the hydraulic losses in each junction box can be minimised.*

Physical modelling was utilised to understand and optimise the complex hydraulic flows that may occur in these culverts. Physical modelling is an established and proven method for studying complex hydraulics, which are often difficult to assess using numerical modelling.

The two junction boxes were tested in a single physical model which extended from 12 m (prototype) upstream of junction box B4, to 12 m (prototype) downstream of junction Boxes B6. The model was constructed at a scale of 15:1. Testing was carried out under six different steady state boundary conditions, based on hydrograph and water level data provided by Cardno. These sets of tests were carried out for three different design configurations of junction box B4. This report presents the design of the physical model, the scaling laws, and the measurements and observations taken and a summary of model test results. Additional photographs and videos of model performance have been provided to Cardno.

The physical model study has provided essential information on the optimal layout of the junction boxes to ensure efficient hydraulic flow.

2. Physical Model

2.1 Model Scaling

A Froude scale of 15:1 was used for this model and Table 1 gives the ratios implied by this. The scale provided flow depths that could be accurately measured and ensured that head losses had suitable resolution. The culverts have a relatively flat grade and the scale ensured that frictional and surface tension effects did not become dominant. At this scale, the form losses and turbulence were accurately represented.

This scale ensured that maximum prototype flow rates were achievable, with total prototype flow of 33 m^3/s being represented by 39 L/s in the model. It also ensured that lower flow rates were resolvable, with, for example, flow through B6-1 of 3.5 m^3/s being represented by model flows of 4 L/s.

Table 1 - Model Scaling Ratios

Ratio	Symbol	Value
Length ratio	L_R	15
Velocity ratio	V_R	$(L_R)^{\frac{1}{2}}$
Flow ratio	Q_R	$(L_R)^{\frac{3}{2}}$

2.2 Model Construction

The model was constructed with a marine plywood base and acrylic walls and roofs. The model was constructed at a scale of 15:1 to the designs provided by Cardno as represented in Figure 5. The final design drawings are reproduced in Appendix B, and these include:

- 89914004-SK100, Rev 2, 19/08/2013
- 89914004-SK101, Rev 2, 16/08/2013
- 89914004-SK103, Rev 1, 19/08/2013
- 89914004-SK104, Rev 1, 19/08/2013
- 89914004-SK105, Rev 1 19/08/2013
- 89914004-SK106, Rev 1, 19/08/2013
- 89914004-SK2001, Rev 2, 21/08/2013
- 89914004-SK2002, Rev 2, 21/08/2013, amended 19/09/2013
- 89914004-SK2003, Rev 2, 21/08/2013, amended 19/09/2013

Six separate inflows were applied to the model as shown in Figure 5. Two head boxes were constructed to control the flow into the existing single culvert and into the proposed twin culverts upstream of junction box B4. The inflow pipe at the Green Street inlet was constructed using the closest available acrylic pipe diameter, having an internal diameter of 98 mm (a 2% variation from the precise model scale). Three separate screened inlets were constructed to model inflows at the grated inlets above each culvert in boxes B6-1 and B6-2.

The model invert levels were interpolated from invert level and grade data from the drawings supplied by Cardno. The model was installed on supports, which were surveyed with a dumpy level accurate to +/- 0.5 mm at the model scale (+/- 7.5 mm prototype).

Tailwater conditions were controlled by three separate, adjustable overshot weirs located 12 m (prototype) downstream of the B6 junction boxes.

Figures 1 to 4 present photographs of the physical model showing the key features.

Figure 1 - Box B4 and Inlets for Q1 and Q2

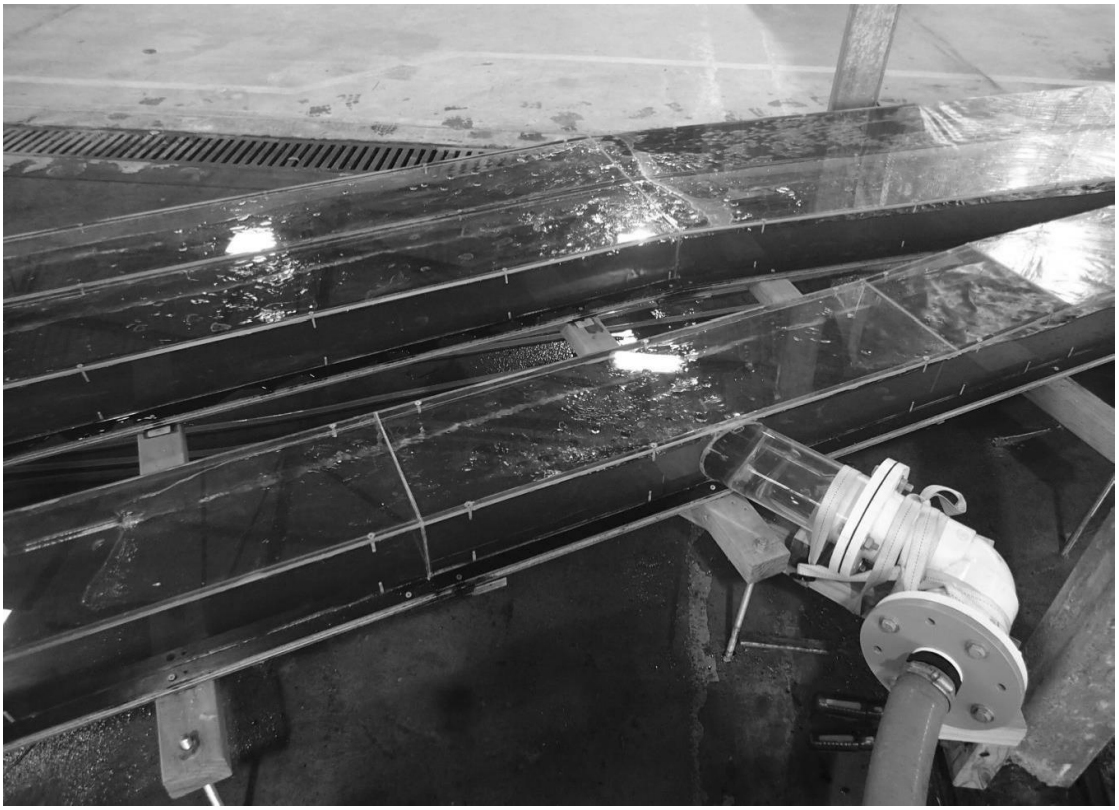


Figure 2 - Green Street Inlet

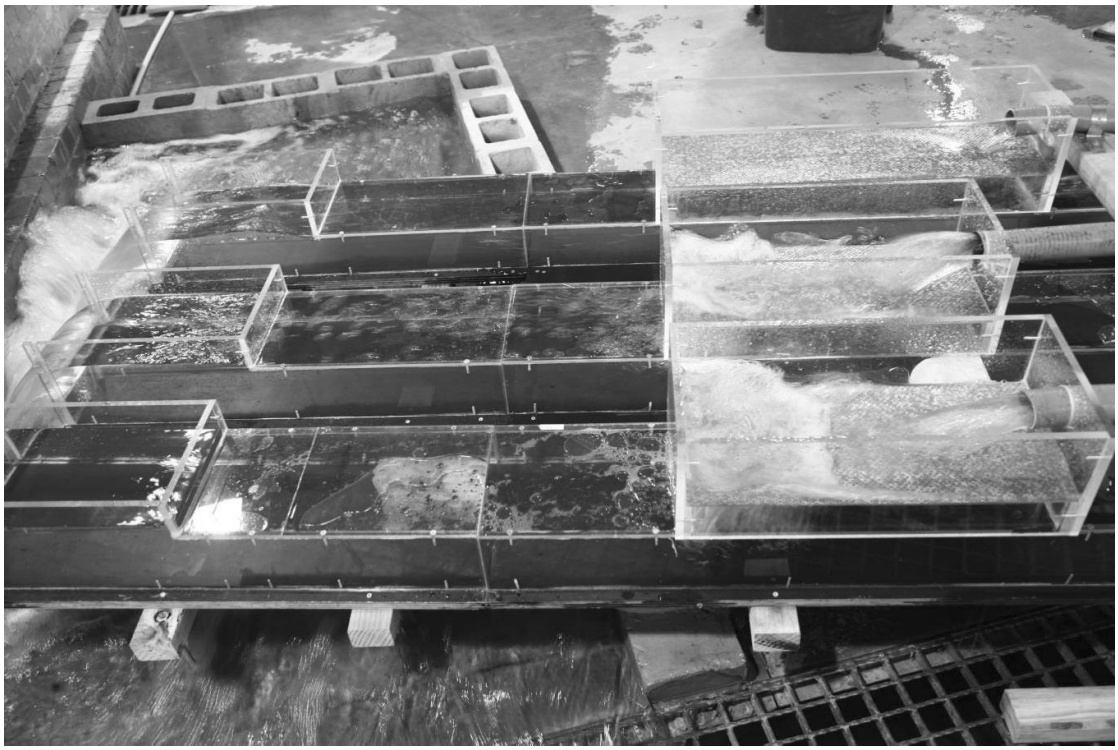


Figure 3 - Boxes B6 and Grated Inlets

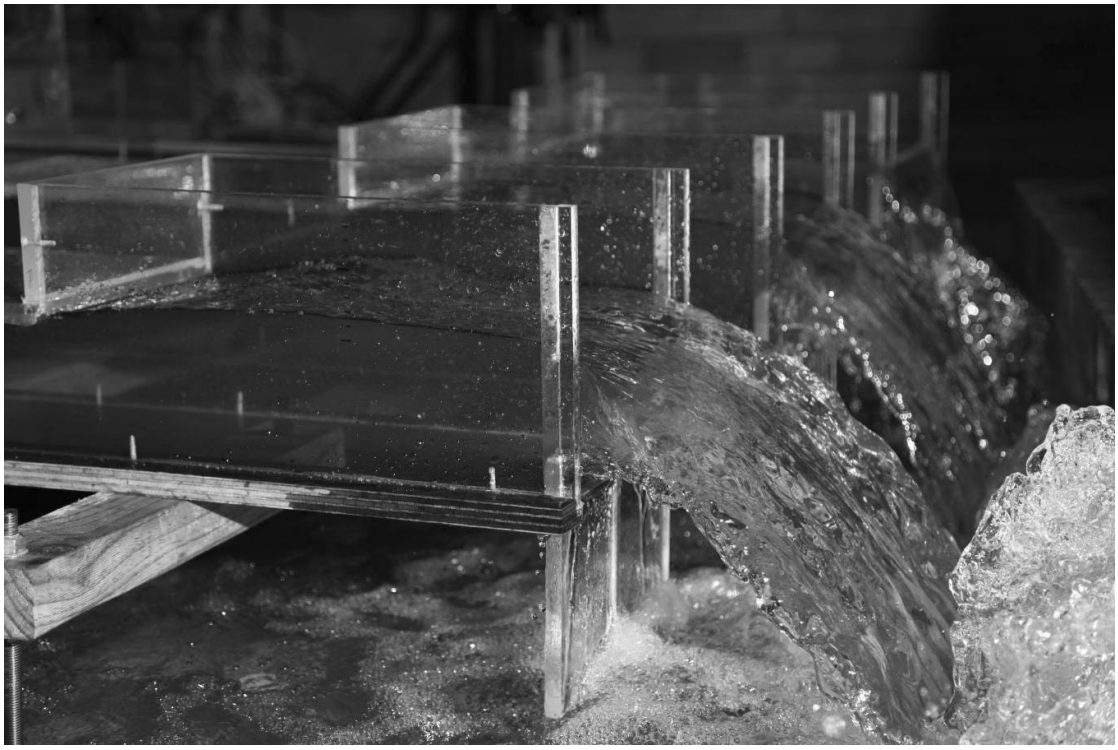


Figure 4 - Tailwater Weirs

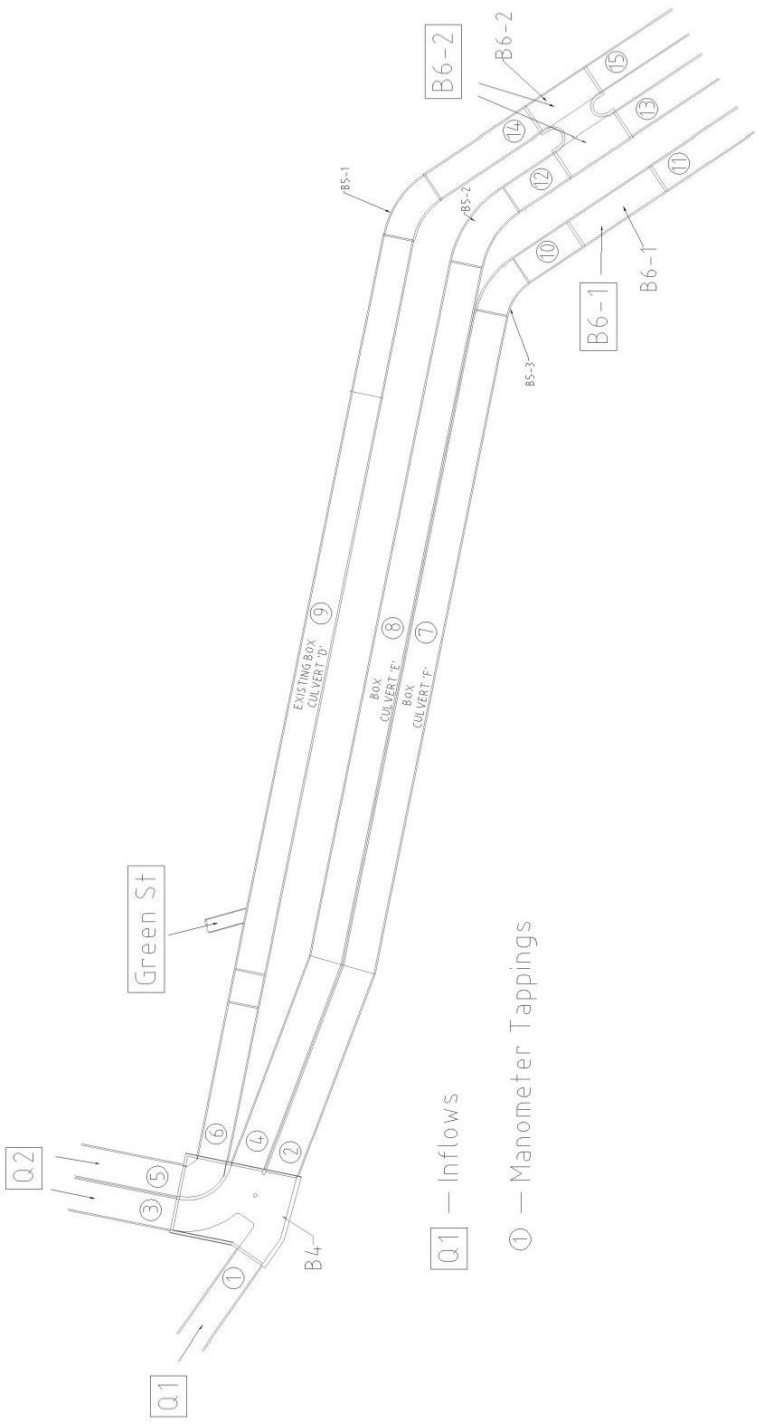


Figure 5 - Model Plan View

2.3 Model Testing

A testing regime of six steady state boundary conditions was undertaken for four different model configurations. An overview of the four design configurations is provided in Table 2.

Table 2 – Summary of Model Configurations Tested

Case	Description
Base	Base case for proposed design
1	Junction box B4 was modified by the addition of a turning vane
2	As per case 1 with the exception of subcritical flow at Q1
3	Major modifications were made to junction box B4

The six steady state tests were modelled on conditions at 15 minute intervals from the 1:100 Annual Exceedance Probability (AEP) hydrograph, as supplied by Cardno. Prototype and model inlet flow rates and tailwater levels are summarised in Table 3 and Table 4, respectively.

Table 3 - Prototype Boundary Conditions

Time	Minutes	T=15	T=30	T=45	T=60	T=75	T=90
Inflows							
Q1	m^3/s	9.64	14.82	15.60	16.37	15.93	14.39
Q2	m^3/s	1.67	7.51	9.52	12.66	15.42	15.45
Green St	m^3/s	2.47	1.53	0.68	-0.65	-1.42	-1.04
B6-1	m^3/s	0.68	3.54	0.50	0.97	1.13	1.58
B6-2	m^3/s	0.39	1.32	4.05	2.08	1.49	1.79
Tailwater							
WL1	m R.L.	7.222	8.081	7.997	8.089	8.142	8.117
WL2	m R.L.	7.548	8.244	8.415	8.433	8.467	8.423
WL3	m R.L.	7.695	8.37	8.534	8.55	8.582	8.533

Table 4 - Model Boundary Conditions

Time	Minutes	T=15	T=30	T=45	T=60	T=75	T=90
Inflows							
Q1	L/s	11.1	17.0	17.9	18.8	18.3	16.5
Q2	L/s	1.9	8.6	10.9	14.5	17.7	17.7
Green St	L/s	2.8	1.8	0.8	0.0	0.0	0.0
B6-1	L/s	0.8	4.1	0.6	1.1	1.3	1.8
B6-2	L/s	0.4	1.5	4.6	2.4	1.7	2.1
Tailwater							
WL1	mm above invert	62	119	114	120	123	122
WL2	mm above invert	84	130	142	143	145	142
WL3	mm above invert	94	139	150	151	153	150

Inflows from Q1 had larger velocities than inflows from Q2. As such, this inlet could run either supercritical or subcritical depending on the applied combination of flow boundary conditions. During testing of the Base Case and Case 1, the inflow was supercritical. Following some further consideration of inlet flow conditions later in the testing program, a method was determined to force this culvert to flow full (hydraulic grade line at approximately 8.94 m RL at maximum flow), creating subcritical flow. This was achieved in the model by increasing the head at the inlet head box and temporarily raising the tailwater until the inlet switched to subcritical flow. Except at the low flow condition for this inlet, at T=15 min, the inlet remained at subcritical flow once the tailwater was returned to the correct level. Case 2 is a repetition of the model design and boundary conditions of Case 1, with the exception of subcritical flow at Q1, thus allowing direct comparison of these two flow conditions. After discussions with Cardno, Case 3, being the final design, was tested with subcritical flow at Q1.

2.3.1 Base case

The Base Case model was constructed as per the initial designs provided by Cardno. Junction box B4 design can be seen in Figure 6.

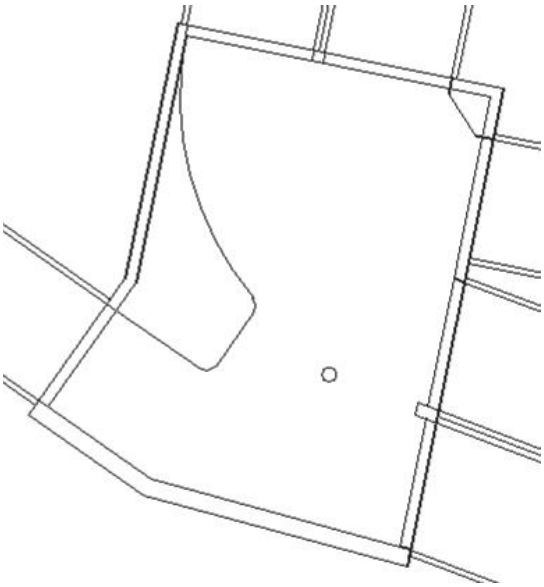


Figure 6 - Junction Box B4 - Base Case Design

2.3.2 Case 1

For Case 1 the design of junction box B4 was modified by the addition of a turning vane, separating flow from the proposed twin culverts. The modified design of B4 can be seen in Figure 7. No alterations were made to the B6 junction boxes.

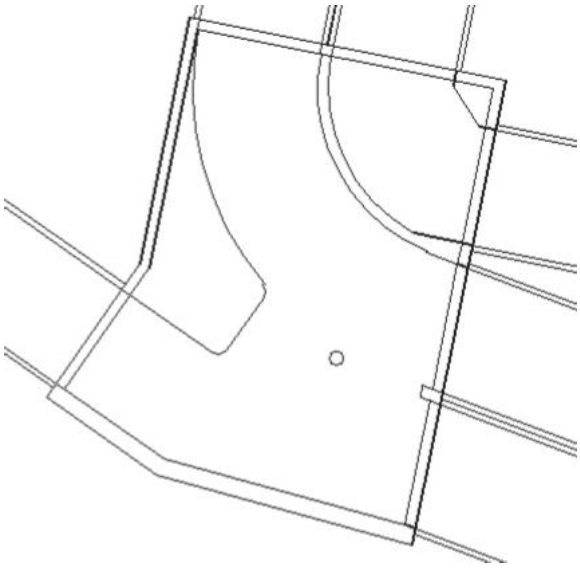


Figure 7 - Junction Box B4 - Case 1 and 2 Design

2.3.3 Case 2

Case 2 model design was identical to Case 1, except the inflow from the existing single culvert was flowing subcritically (as opposed to supercritical flow from this inlet as in Case 1).

2.3.4 Case 3

For Case 3, major modifications were made to junction box B4. These included realignment of the existing single culvert to more evenly partition the outflow from B4, moving the box walls to accommodate this realignment, and the addition of a blade column. The modified design of B4 can be seen in Figure 8. No alterations were made to the B6 junction boxes.

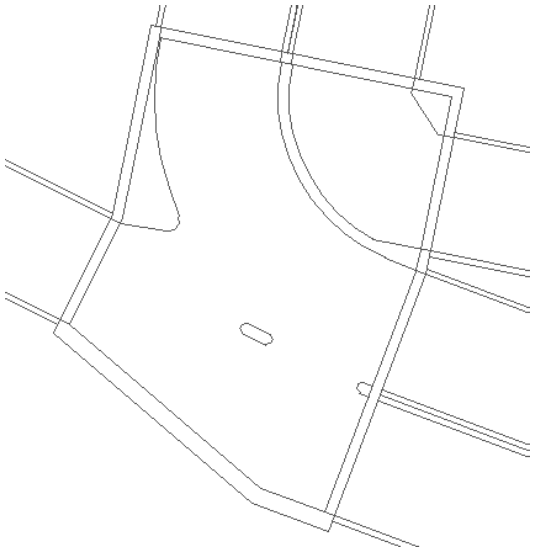


Figure 8 - Junction Box B4 - Case 3 Design

2.4 Measurements and Observations Recorded

Inflow rates were measured using a combination of electro-magnetic flow meters and rotameters. A 150 mm and a 100 mm electro-magnetic flow meter were used to measure the inflow to the existing single culvert and the proposed twin culverts, respectively. Inflows to the Green Street inlet and the grated inlets at B6 were measured using rotameters.

The tailwater weirs were adjusted to achieve the specified tailwater level. The height of the water level above the weirs was measured for the purpose of estimating the proportion of flow in each channel. Discharge proportions were estimated using the broad crested weir equation:

$$Q \approx C \cdot W \cdot H^{\frac{3}{2}}$$

Where:

C is a weir coefficient $[\mathrm{m}^{\frac{1}{2}}/\mathrm{s}]$
W is the width of the weir [m]
H is the height of the water level above the weir [m].

It was not deemed necessary to determine the weir coefficient in this case. Instead, the relation above was used to determine the proportion of flow over each weir, by comparing the height of the water levels above the weir.

Piezometric heads were measured with manometer tubes. Locations of manometer tappings can be seen in Figure 5.

Flow observations were recorded with photos and high definition videos. Visual observations were aided by the use of dye.

3. Model Results

Hydraulic losses across the junction boxes were measured as piezometric head upstream and downstream of the boxes. Summaries of the losses across the junction boxes are reported here, see Figure 9 and Figure 10 for locations. Full model results are presented in Appendix A.

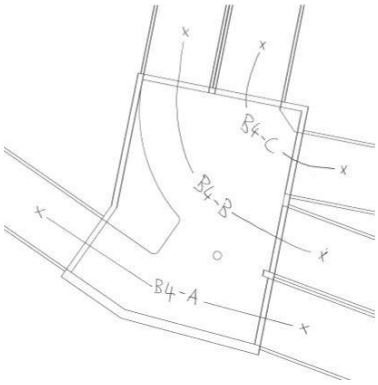


Figure 9 - Location of Losses Reported at B4

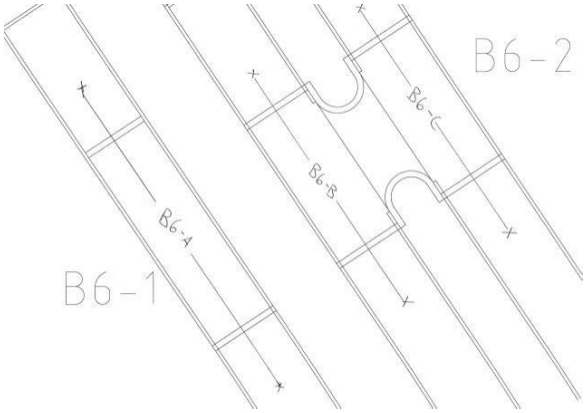


Figure 10 - Location of Losses Reported at B6

3.1 Base Case

Table 5 provides a summary of losses recorded in the Base Case.

Table 5 - Hydraulic Losses - Base Case

Location	T=15	T=30	T=45	T=60	T=75	T=90
	m	m	m	m	m	m
B4-A	-0.02	-1.13	-0.41	-0.48	-0.50	-0.47
B4-B	0.26	0.33	0.20	0.30	0.36	0.30
B4-C	0.02	0.05	0.09	0.09	0.15	0.15
B6-A	0.27	0.95	0.33	0.63	0.65	0.80
B6-B	0.09	0.12	0.18	0.17	0.18	0.18
B6-C	-0.03	-0.06	-0.02	-0.02	-0.02	0.02

Figure 13 shows the major features of the flow conditions for the Base Case. These features were generally consistent over the higher flow conditions (T=45 and later). Figure 11 shows a hydraulic jump and shockwave in B4. The addition of blue dye from Q1 illustrates that almost all of the flow from Q1 discharged from B4 into culvert F.

Negative losses observed at B4-A can be attributed to the hydraulic jump and the addition of extra flows coming from Q2. All culverts ran full except for:

- Culverts D and E for 15 – 30 m downstream of B4; and
- Culvert F running supercritical with hydraulic jump 0 – 30 m upstream of bend B5-3.

Figure 12 shows B6-1 behaving as an undershot weir under maximum flow conditions at this inlet at T=30. Figure 14 shows the generalised flow conditions around B6 junction boxes.

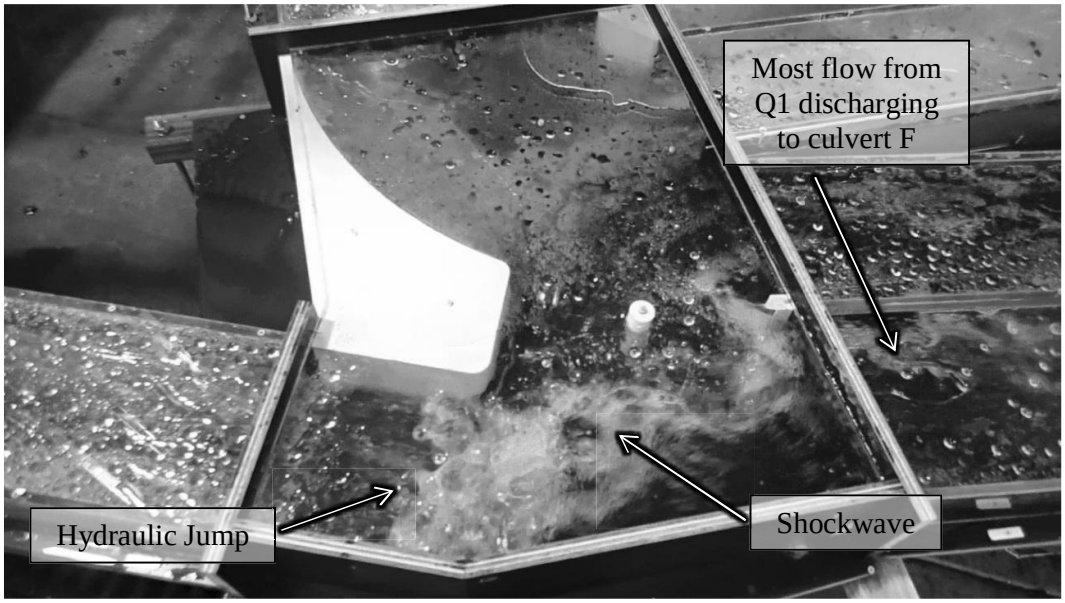


Figure 11 – Base Case Flow Conditions in B4

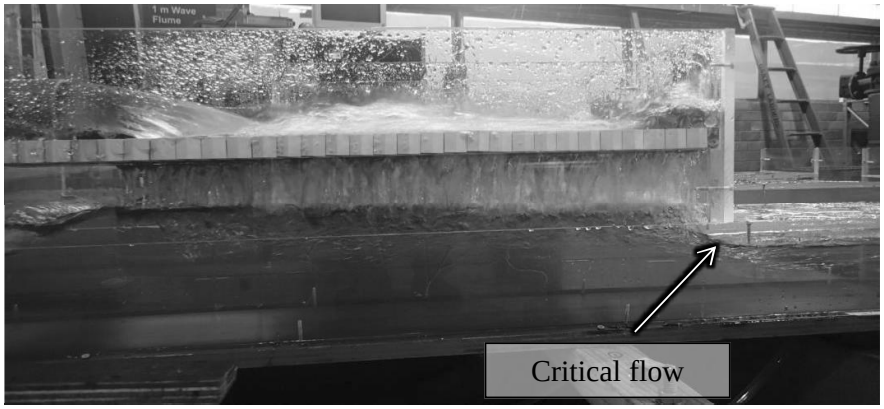


Figure 12 - B6-1 Behaving as an Undershot Weir

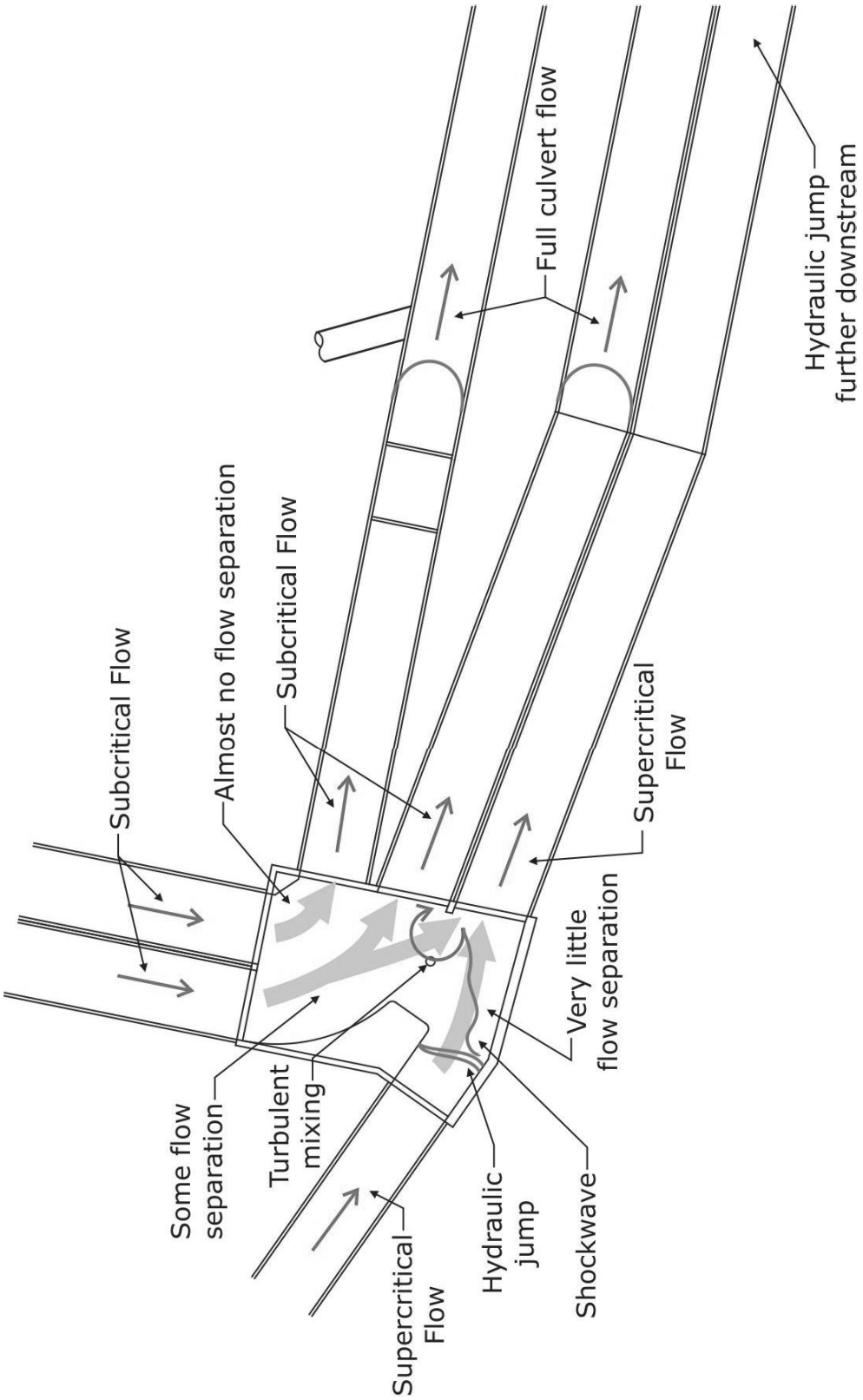


Figure 13 – Base Case Flow Conditions Sketch

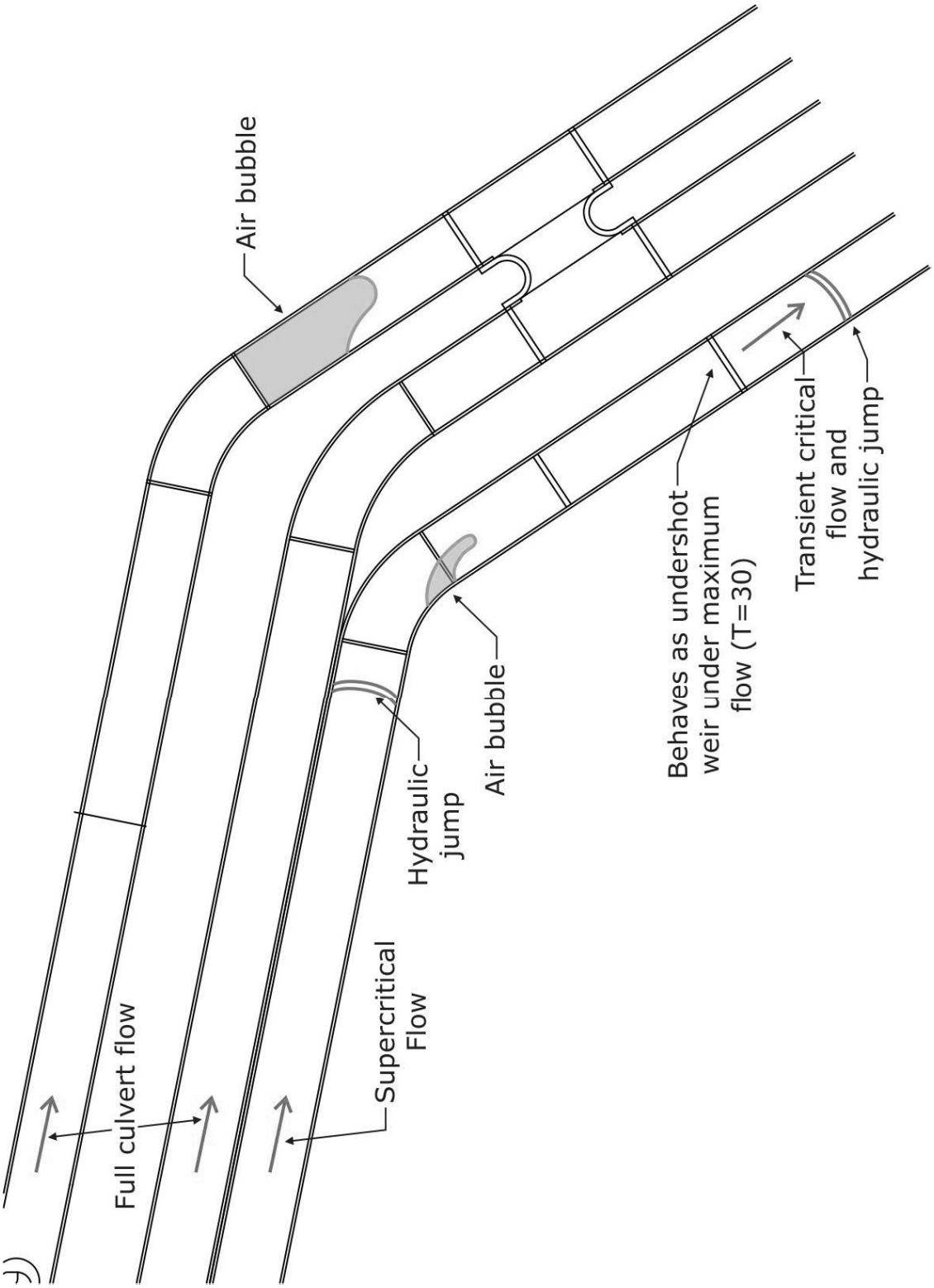


Figure 14 - Base Case Flow Conditions at B6

3.2 Case 1

Flow observations for Case 1 were similar to those observed in the Base Case, since most of the flow separated by the addition of the turning vane was already following that flow path in the base case.

Table 6 provides a summary of losses recorded in Case 1. Figure 16 shows the major features of the flow conditions for Case 1. These features were generally consistent over the higher flow conditions (T=45 and later). Figure 15 shows the hydraulic jump and shockwave in B4 and the lack of flow separation from Q1.

Again, negative losses observed at B4-A can be attributed to the hydraulic jump and the addition of extra flows coming from Q2.

Table 6 - Hydraulic Losses - Case 1

Location	T=15	T=30	T=45	T=60	T=75	T=90
	m	m	m	m	m	m
B4-A	0.02	-0.90	-0.35	-0.33	-0.14	-0.84
B4-B	0.27	0.20	0.18	0.21	0.12	0.11
B4-C	0.00	0.06	0.08	0.12	0.14	0.12
B6-A	0.30	0.98	0.20	0.30	0.33	0.35
B6-B	0.06	0.02	0.15	0.18	0.18	0.18
B6-C	-0.03	0.03	0.03	0.00	-0.03	-0.03

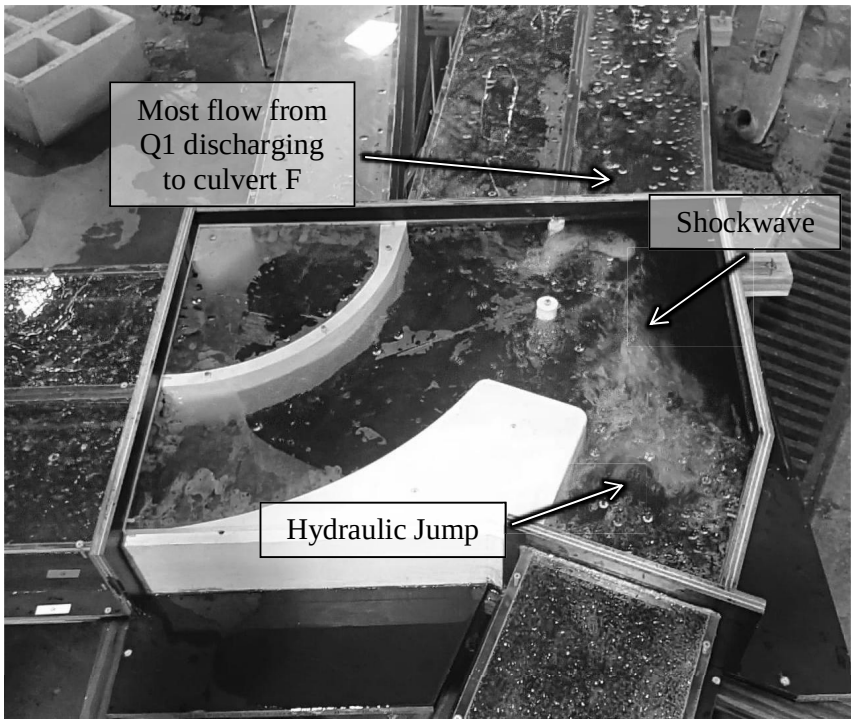


Figure 15 – Case 1 Flow Conditions in B4

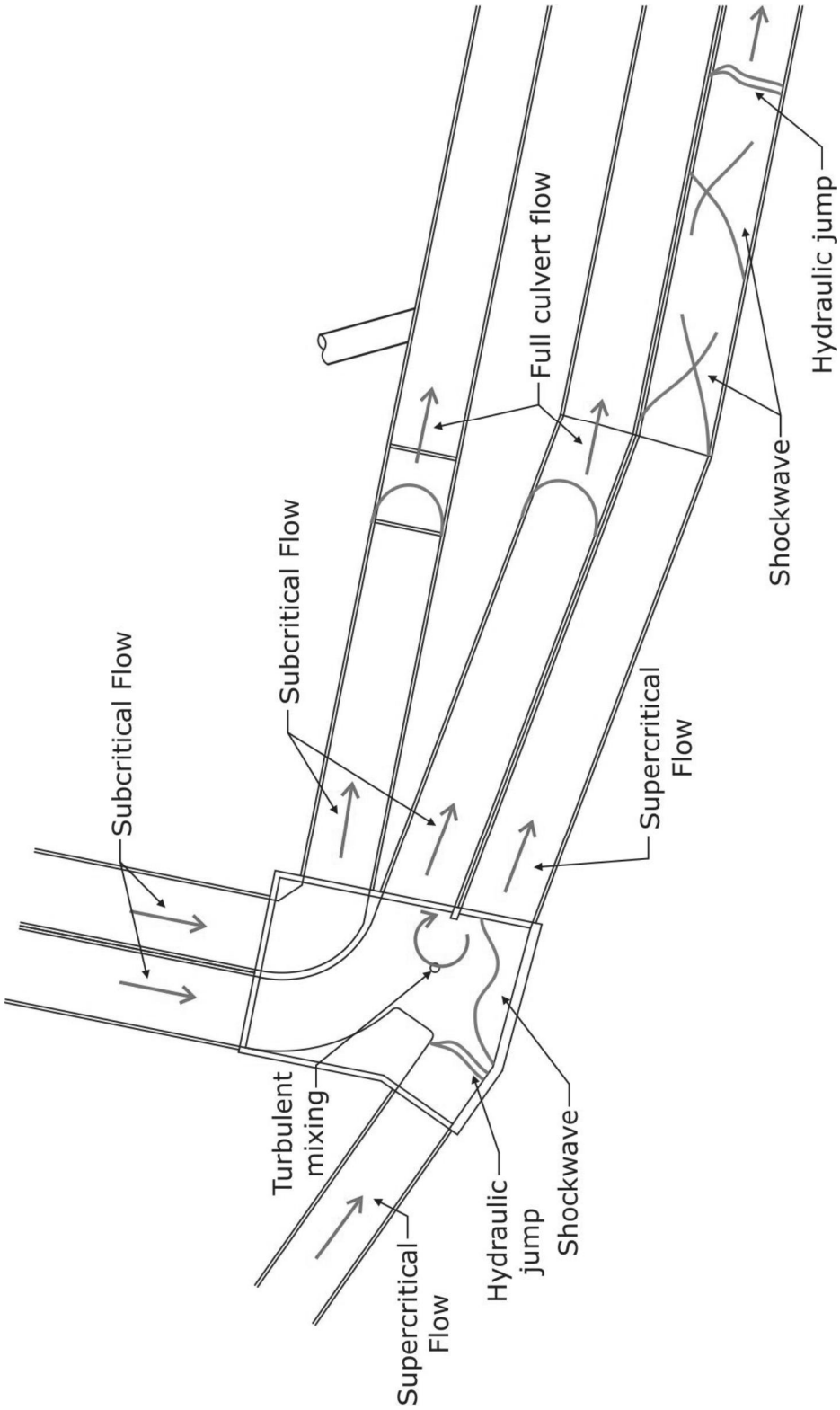


Figure 16 – Case 1 Flow Conditions Sketch

3.3 Case 2

Table 7 gives a summary of hydraulic losses for Case 2. Figure 17 shows the subcritical flow from Q1, smaller shockwave in B4, but still very little flow separation from Q1. Generalised flow conditions are shown in Figure 18. Flow conditions at B6 were similar to those observed in the Base Case.

Table 7 - Hydraulic Losses - Case 2

Location	T=15	T=30	T=45	T=60	T=75	T=90
	m	m	m	m	m	m
B4-A		0.17	0.62	0.27	0.38	0.59
B4-B		0.15	0.02	0.03	0.05	0.02
B4-C		0.06	0.05	0.09	0.18	0.17
B6-A		0.62	0.23	0.38	0.42	0.33
B6-B		0.12	0.17	0.17	0.15	0.15
B6-C		-0.03	-0.02	-0.03	-0.05	-0.03

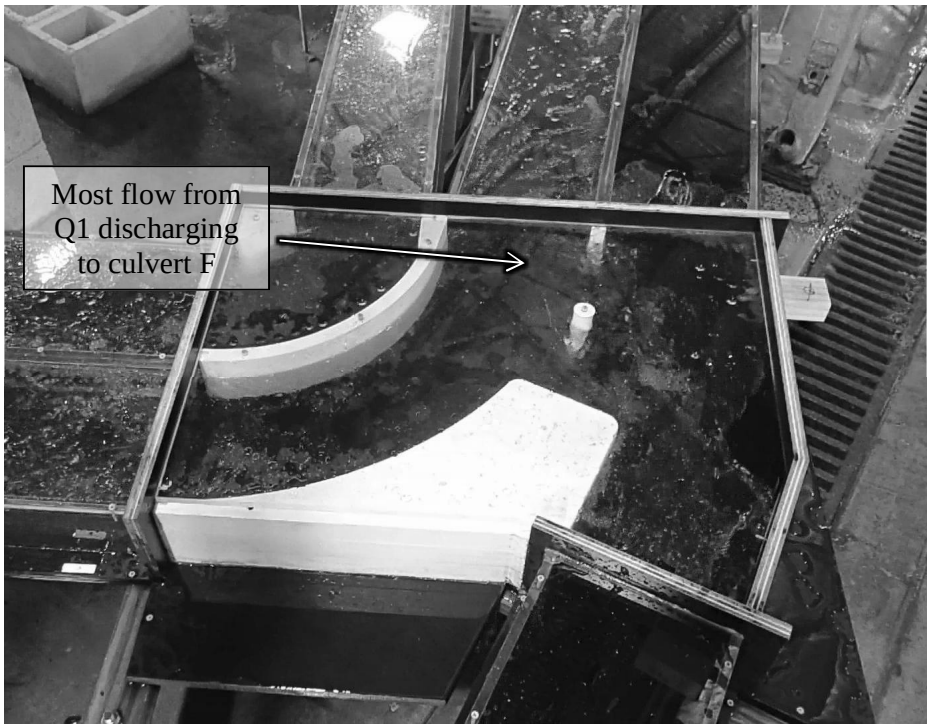


Figure 17 – Case 2 Flow Conditions in B4

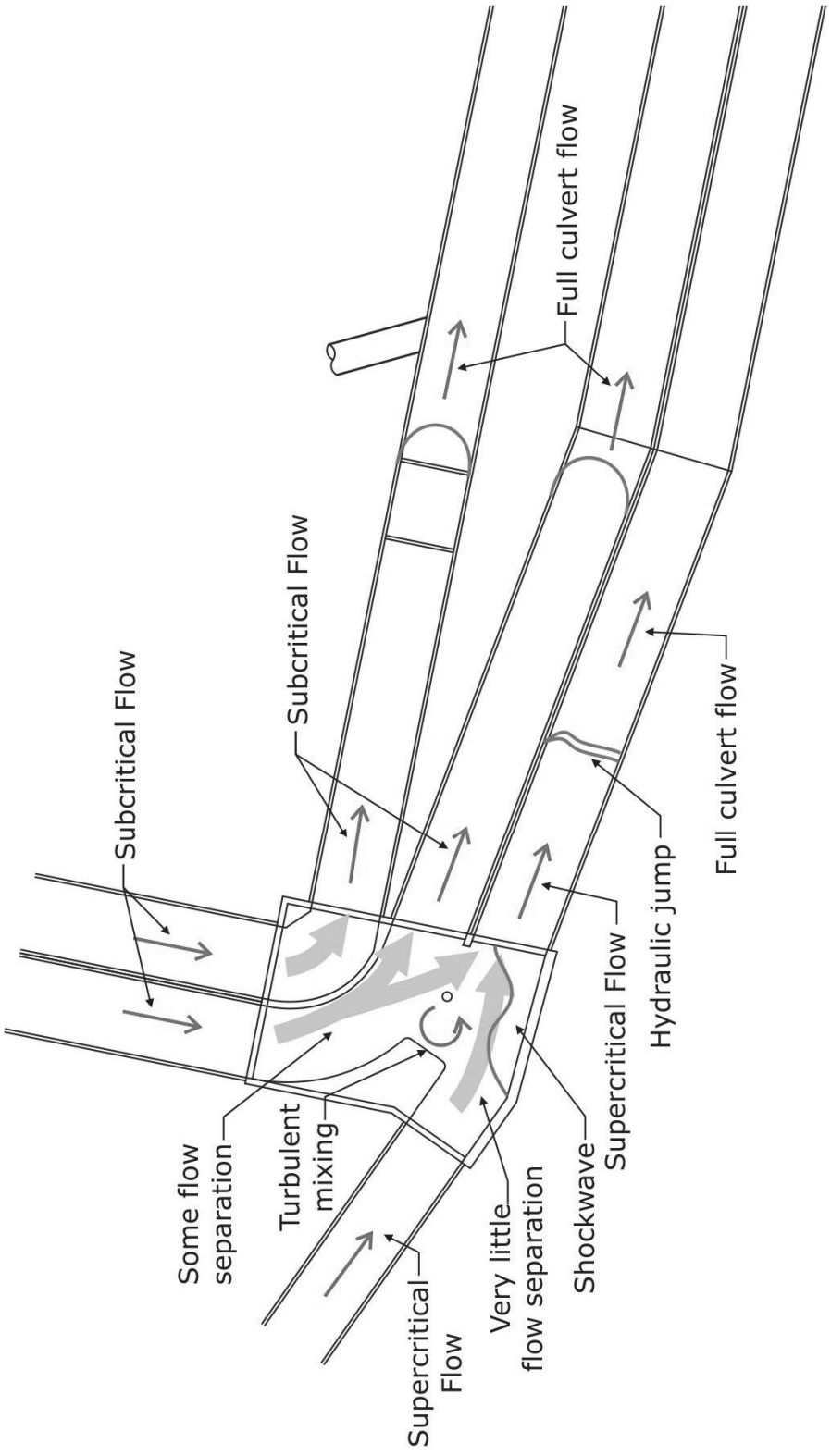


Figure 18 – Case 2 Flow Conditions Sketch

3.4 Case 3

Table 8 gives a summary of hydraulic losses for Case 3. Figure 19 shows that the realignment of the culvert carrying Q1 has successfully produced better separation of flow into culvert E and F. Generalised flow conditions are shown in Figure 20. Flow conditions at B6 were similar to those observed in the Base Case.

Table 8 - Hydraulic Losses - Case 3

Location	T=15	T=30	T=45	T=60	T=75	T=90
	m	m	m	m	m	m
B4-A	0.23	0.27	0.60	0.62	0.59	0.63
B4-B	0.2	0.03	0.00	0.06	0.12	0.06
B4-C	0.03	0.06	0.05	0.08	0.30	0.26
B6-A	0.18	0.75	0.15	0.26	0.24	0.29
B6-B	0.06	0.14	0.20	0.21	0.18	0.17
B6-C	-0.02	-0.02	0.00	-0.03	-0.02	-0.03

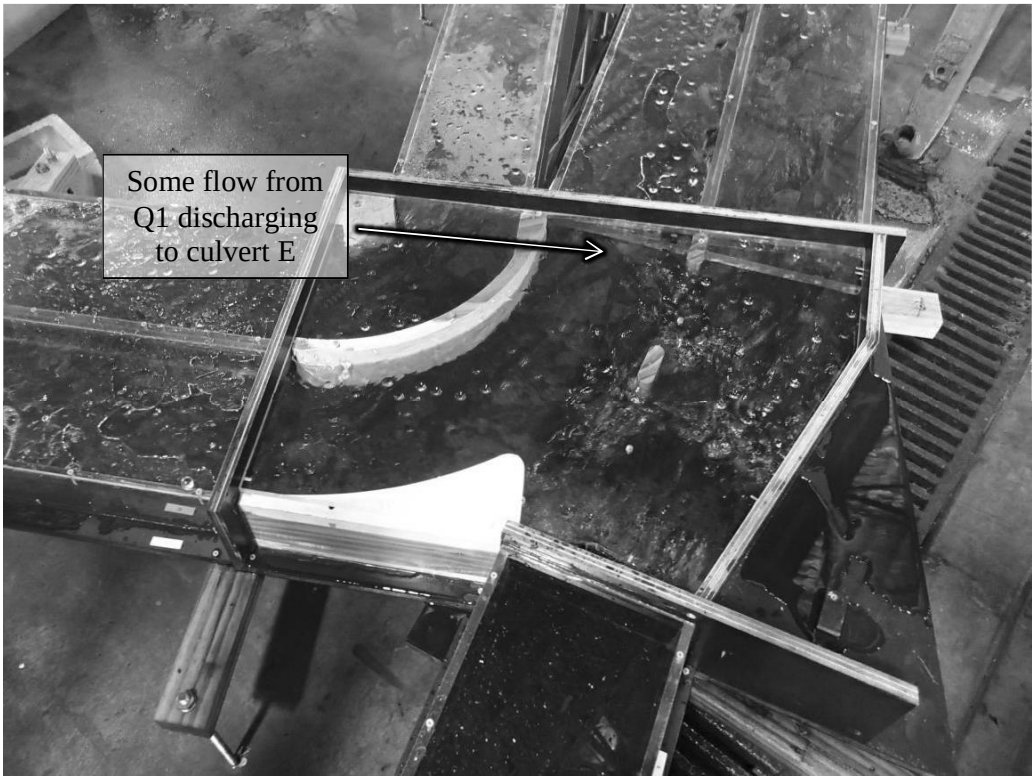


Figure 19 – Case 3 Flow Conditions in B4

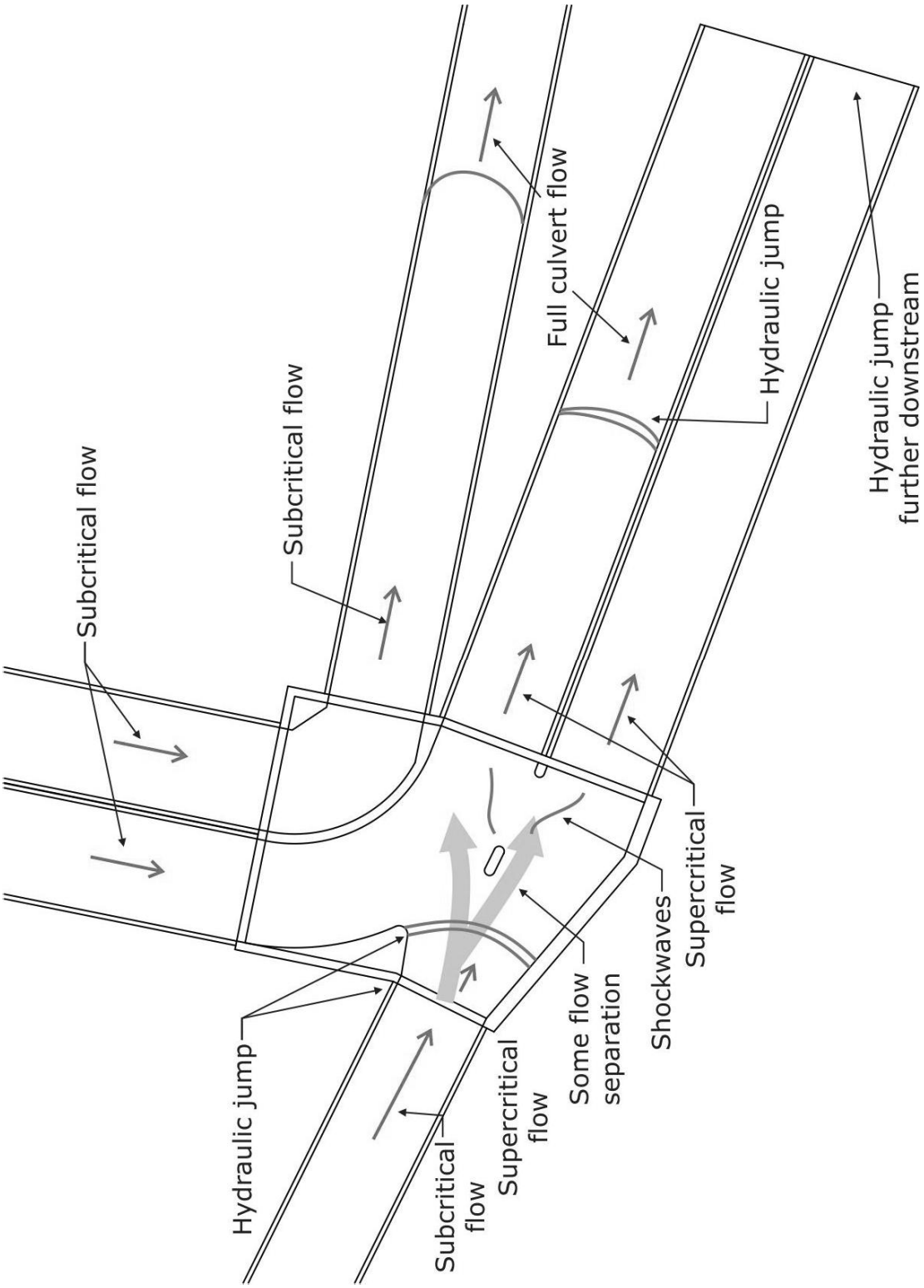


Figure 20 – Case 3 Flow Conditions Sketch

4. Conclusions

A physical model was constructed at a scale of 15:1 to undertake investigations of proposed stormwater culverts and junction boxes at Warringah Mall, NSW. The purpose of the testing was to determine hydraulic losses across the junction boxes.

Five steady state tests were carried out with flow rates and tailwater levels derived from 15 minute intervals in the 1:100 AEP hydrograph. One boundary condition modification and two design modifications to junction box B4 were made, and the steady state tests were repeated for each modification.

Physical modelling demonstrated that the flow conditions through culvert B4 are complex. The physical modelling has allowed for these flow conditions to be improved through changes to the culvert design. Physical modelling is a well-established engineering method for assessing complex hydraulics in an efficient manner. During model demonstrations with the client, options could be quickly trialled.

The original design of B4 did not allow inflows from Q1 to be distributed into the culverts D and E. Cardno advised that achieving this distribution was important to ensure that discharge out of B4 was similar for all three culverts, as assumed by the numerical model. The addition of the turning vane (Case 1) did not significantly change the flow conditions as most of the flow separated by this vane was already flowing in the desired manner. The realignment of the culvert carrying Q1 into B4 (Case 3) successfully achieved a better distribution of flow from B4.

5. Appendix A

5.1 Base Case

5.1.1 Base Case T = 15

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m3/s		
Existing single	11.1	9.64		
Proposed twin	1.9	1.67		
Green St	2.8	2.47		
B6-1	0.8	0.68		
B6-2	0.4	0.39		
Total	17.0	14.86		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	62	7.220	0.062	0.56
WL2	83	7.535	0.053	0.44
WL3	83	7.535	0	0.00
HEADS				
	Reading	**R.L**		
	mm	m		
1	178	7.755		
2	179	7.770		
3	172	7.665		
4	155	7.410		
5	171	7.650		
6	170	7.635		
7	151	7.350		
8	156	7.425		
9	148	7.305		
10	172	7.665		
11	154	7.395		
12	156	7.425		
13	150	7.335		
14	157	7.440		
15	159	7.470		

5.1.2 Base Case T = 30

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.0	14.82		
Proposed twin	8.6	7.51		
Green St	1.8	1.53		
B6-1	4.1	3.54		
B6-2	1.5	1.32		
Total	33.0	28.72		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	119	8.075	0.094	0.57
WL2	130	8.240	0.070	0.37
WL3	139	8.375	0.021	0.06
HEADS				
	Reading	**R.L**		
	mm	m		
1	185	7.860		
2	260 +/- 7	8.985		
3	221	8.400		
4	199 +/- 6	8.070		
5	217	8.340		
6	214	8.295		
7	213 +/- 5	8.280		
8	212 +/- 2	8.265		
9	214 +/- 1	8.295		
10	217 +/- 1	8.340		
11	154 +/- 1	7.395		
12	211	8.250		
13	203	8.130		
14	212	8.265		
15	216	8.325		

* Values reported with +/- value are due to oscillations about the reported mean.

5.1.3 Base Case T = 45

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.9	15.60		
Proposed twin	10.9	9.52		
Green St	0.8	0.68		
B6-1	0.6	0.50		
B6-2	4.6	4.05		
Total	34.8	30.35		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	114.0	8.00	0.089	0.47
WL2	142.0	8.42	0.082	0.42
WL3	150.0	8.54	0.035	0.12
HEADS				
	Reading	**R.L**		
	mm	m		
1	190 +/- 1	7.935		
2	217 +/- 4	8.340		
3	230 +/- 1	8.535		
4	217 +/- 3	8.340		
5	226 +/- 1	8.475		
6	220	8.385		
7	182 +/- 5	7.815		
8	223 +/- 1	8.430		
9	224 +/- 1	8.445		
10	192 +/- 3	7.965		
11	170 +/- 10	7.635		
12	222	8.415		
13	210	8.235		
14	223	8.430		
15	224	8.445		

5.1.4 Base Case T = 60

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.8	16.37		
Proposed twin	14.5	12.66		
Green St	0.0	0.00		
B6-1	1.1	0.97		
B6-2	2.4	2.08		
Total	36.8	32.07		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	120.0	8.090	0.095	0.49
WL2	143.0	8.435	0.083	0.40
WL3	151.0	8.555	0.036	0.11
HEADS				
	Reading	**R.L**		
	mm	m		
1	193 +/- 3	7.980		
2	225 +/- 6	8.460		
3	236 +/- 1	8.625		
4	216 +/- 4	8.325		
5	228 +/- 2	8.505		
6	222 +/- 2	8.415		
7	191 +/- 6	7.950		
8	225 +/- 3	8.460		
9	226 +/- 2	8.475		
10	200 +/- 2	8.085		
11	158 +/- 6	7.455		
12	224	8.445		
13	213	8.280		
14	225	8.460		
15	226	8.475		

5.1.5 Base Case T = 75

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.3	15.93		
Proposed twin	17.7	15.42		
Green St	0.0	0.00		
B6-1	1.3	1.13		
B6-2	1.7	1.49		
Total	39.0	33.97		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	124.0	8.150	0.099	0.46
WL2	145.0	8.465	0.087	0.38
WL3	153.0	8.585	0.048	0.16
HEADS				
	Reading	**R.L**		
	mm	m		
1	197 +/- 3	8.040		
2	230 +/- 8	8.535		
3	244 +/- 2	8.745		
4	220 +/- 7	8.385		
5	233 +/- 2	8.580		
6	223 +/- 3	8.430		
7	194 +/- 3	7.995		
8	230 +/- 1	8.535		
9	230 +/- 1	8.535		
10	202 +/- 2	8.115		
11	159 +/- 4	7.470		
12	226	8.475		
13	214	8.295		
14	228	8.505		
15	229	8.520		

5.1.6 Base Case T = 90

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	16.5	14.39		
Proposed twin	17.7	15.45		
Green St	0.0	0.00		
B6-1	1.8	1.58		
B6-2	2.1	1.79		
Total	38.1	33.20		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	122	8.12	0.097	0.46
WL2	142	8.42	0.084	0.37
WL3	150	8.54	0.050	0.17
HEADS				
	Reading	**R.L**		
	mm	m		
1	192 +/- 3	7.965		
2	223 +/- 7	8.430		
3	240 +/- 2	8.685		
4	220 +/- 5	8.385		
5	230 +/- 1	8.535		
6	220 +/- 2	8.385		
7	187 +/- 4	7.890		
8	226 +/- 4	8.475		
9	228 +/- 2	8.505		
10	205 +/- 3	8.160		
11	152 +/- 3	7.365		
12	224	8.445		
13	212	8.265		
14	226	8.475		
15	225	8.460		

5.2 Case 1

5.2.1 Case 1 T = 15

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m3/s		
Existing single	11.1	9.64		
Proposed twin	1.9	1.67		
Green St	2.8	2.47		
B6-1	0.8	0.68		
B6-2	0.4	0.39		
Total	17.0	14.86		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	62	7.220	0.047	0.49
WL2	83	7.535	0.048	0.51
WL3	85	7.565	0.000	0.00
HEADS				
	Reading	**R.L**		
	mm	m		
1	181	7.80		
2	180	7.785		
3	172	7.665		
4	154	7.395		
5	173	7.680		
6	173	7.680		
7	150	7.335		
8	160	7.485		
9	156	7.425		
10	166 +/- 1	7.575		
11	146	7.275		
12	160	7.485		
13	156	7.425		
14	162	7.515		
15	164	7.545		

5.2.2 Case 1 T = 30

BOUNDARY CONDITIONS				
Inflows	Model	Prototype		
	L/s	m^3/s		
Existing single	17.0	14.82		
Proposed twin	8.6	7.51		
Green St	1.8	1.53		
B6-1	4.1	3.54		
B6-2	1.5	1.32		
Total	33.0	28.72		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	119	8.075	0.089	0.50
WL2	130	8.240	0.052	0.22
WL3	139	8.375	0.061	0.28
HEADS				
	Reading	**R.L**		
	mm	m		
1	184	7.845		
2	244 +/- 7	8.745		
3	212 +/- 1	8.265		
4	199 +/- 4	8.070		
5	211	8.250		
6	207	8.190		
7	205 +/- 4	8.160		
8	207	8.190		
9	207	8.190		
10	223	8.430		
11	158	7.455		
12	205	8.160		
13	204	8.145		
14	207	8.190		
15	205	8.160		

5.2.3 Case 1 T = 45

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.9	15.60		
Proposed twin	10.9	9.52		
Green St	0.8	0.68		
B6-1	0.6	0.50		
B6-2	4.6	4.05		
Total	34.8	30.35		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	114.0	8.00	0.089	0.45
WL2	142.0	8.42	0.077	0.36
WL3	150.0	8.54	0.050	0.19
HEADS				
	Reading	**R.L**		
	mm	m		
1	187 +/- 3	7.890		
2	210 +/- 5	8.235		
3	224	8.445		
4	212 +/- 2	8.265		
5	225	8.460		
6	220	8.385		
7	177 +/- 5	7.740		
8	220 +/- 1	8.385		
9	220	8.385		
10	194 +/- 1	7.995		
11	181	7.800		
12	217	8.340		
13	207	8.190		
14	220	8.385		
15	218	8.355		

5.2.4 Case 1 T = 60

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.8	16.37		
Proposed twin	14.5	12.66		
Green St	0.0	0.00		
B6-1	1.1	0.97		
B6-2	2.4	2.08		
Total	36.8	32.07		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	120.0	8.090	0.095	0.46
WL2	143.0	8.435	0.083	0.38
WL3	151.0	8.555	0.046	0.16
HEADS				
	Reading	**R.L**		
	mm	m		
1	198 +/- 4	8.055		
2	220 +/- 4	8.385		
3	235 +/- 1	8.610		
4	221 +/- 3	8.400		
5	233	8.580		
6	225	8.460		
7	187 +/- 4	7.890		
8	227 +/- 1	8.490		
9	228 +/- 1	8.505		
10	205 +/- 1	8.160		
11	185	7.860		
12	225	8.460		
13	213	8.280		
14	226	8.475		
15	226	8.475		

5.2.5 Case 1 T = 75

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.3	15.93		
Proposed twin	17.7	15.42		
Green St	0.0	0.00		
B6-1	1.3	1.13		
B6-2	1.7	1.49		
Total	39.0	33.97		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	124.0	8.150	0.094	0.45
WL2	145.0	8.465	0.085	0.39
WL3	153.0	8.585	0.048	0.16
HEADS				
	Reading	**R.L**		
	mm	m		
1	197 +/- 3	8.040		
2	206 +/- 2	8.175		
3	235 +/- 2	8.610		
4	227 +/- 2	8.490		
5	236 +/- 1	8.625		
6	227 +/- 1	8.490		
7	232 +/- 2	8.565		
8	229 +/- 1	8.520		
9	229 +/- 1	8.520		
10	211 +/-1	8.250		
11	189	7.920		
12	225	8.460		
13	213	8.280		
14	228	8.505		
15	230	8.535		

5.2.6 Case 1 T = 90

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	16.5	14.39		
Proposed twin	17.7	15.45		
Green St	0.0	0.00		
B6-1	1.8	1.58		
B6-2	2.1	1.79		
Total	38.1	33.20		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	122	8.12	0.092	0.46
WL2	142	8.42	0.082	0.39
WL3	150	8.54	0.045	0.16
HEADS				
	Reading	**R.L**		
	mm	m		
1	194 +/- 1	7.995		
2	250 +/- 2	8.835		
3	236 +/- 1	8.625		
4	229 +/- 1	8.520		
5	236	8.625		
6	228	8.505		
7	207 +/- 2	8.190		
8	230 +/- 1	8.535		
9	231 +/- 1	8.550		
10	211 +/- 1	8.250		
11	188	7.905		
12	226	8.475		
13	214	8.295		
14	227	8.490		
15	229	8.520		

5.3 Case 2

5.3.1 Case 2 T = 30

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.0	14.82		
Proposed twin	8.6	7.51		
Green St	1.8	1.53		
B6-1	4.1	3.54		
B6-2	1.5	1.32		
Total	33.0	28.72		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	119	8.075	0.099	0.60
WL2	130	8.240	0.067	0.33
WL3	139	8.375	0.024	0.07
HEADS				
	Reading	**R.L**		
	mm	m		
1	253	8.880		
2	242	8.715		
3	216	8.325		
4	206	8.175		
5	220	8.385		
6	216	8.325		
7	234	8.595		
8	215	8.310		
9	216	8.325		
10	219	8.370		
11	178	7.755		
12	213	8.280		
13	205	8.160		
14	213	8.280		
15	215	8.310		

5.3.2 Case 2 T = 45

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.9	15.60		
Proposed twin	10.9	9.52		
Green St	0.8	0.68		
B6-1	0.6	0.50		
B6-2	4.6	4.05		
Total	34.8	30.35		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	114.0	8.00	0.094	0.51
WL2	142.0	8.42	0.079	0.39
WL3	150.0	8.54	0.032	0.10
HEADS				
	Reading	**R.L**		
	mm	m		
1	255	8.910		
2	214	8.295		
3	226	8.475		
4	225	8.460		
5	232	8.565		
6	229	8.520		
7	219	8.370		
8	226	8.475		
9	228	8.505		
10	197	8.040		
11	182	7.815		
12	225	8.460		
13	214	8.295		
14	226	8.475		
15	227	8.490		

5.3.3 Case 2 T = 60

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.8	16.37		
Proposed twin	14.5	12.66		
Green St	0.0	0.00		
B6-1	1.1	0.97		
B6-2	2.4	2.08		
Total	36.8	32.07		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	120.0	8.090	0.100	0.52
WL2	143.0	8.435	0.080	0.38
WL3	151.0	8.555	0.033	0.10
HEADS				
	Reading	**R.L**		
	mm	m		
1	257	8.940		
2	239	8.670		
3	230	8.535		
4	228	8.505		
5	234	8.595		
6	228	8.505		
7	228	8.505		
8	227	8.490		
9	229	8.520		
10	209 +/- 1	8.220		
11	184	7.845		
12	226	8.475		
13	215	8.310		
14	226	8.475		
15	228	8.505		

5.3.4 Case 2 T = 75

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.3	15.93		
Proposed twin	17.7	15.42		
Green St	0.0	0.00		
B6-1	1.3	1.13		
B6-2	1.7	1.49		
Total	39.0	33.97		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	124.0	8.150	0.104	0.49
WL2	145.0	8.465	0.082	0.34
WL3	153.0	8.585	0.050	0.16
HEADS				
	Reading	**R.L**		
	mm	m		
1	258	8.955		
2	233 +/- 1	8.580		
3	230	8.535		
4	227	8.490		
5	238	8.655		
6	226	8.475		
7	227	8.490		
8	227	8.490		
9	228	8.505		
10	209 +/- 1	8.220		
11	181	7.800		
12	225	8.460		
13	215	8.310		
14	226	8.475		
15	229	8.520		

5.3.5 Case 2 T = 90

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	16.5	14.39		
Proposed twin	17.7	15.45		
Green St	0.0	0.00		
B6-1	1.8	1.58		
B6-2	2.1	1.79		
Total	38.1	33.20		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	122	8.12	0.102	0.49
WL2	142	8.42	0.079	0.34
WL3	150	8.54	0.050	0.17
HEADS				
	Reading	**R.L**		
	mm	m		
1	256	8.925		
2	217	8.340		
3	226 +/- 1	8.475		
4	225	8.460		
5	235	8.610		
6	224	8.445		
7	224	8.445		
8	226	8.475		
9	227	8.490		
10	203	8.130		
11	181	7.800		
12	224	8.445		
13	214	8.295		
14	224	8.445		
15	226	8.475		

5.4 Case 3

5.4.1 Case 3 T = 15

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m3/s		
Existing single	11.1	9.64		
Proposed twin	1.9	1.67		
Green St	2.8	2.47		
B6-1	0.8	0.68		
B6-2	0.4	0.39		
Total	17.0	14.86		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	68	7.310	0.048	0.38
WL2	90	7.640	0.060	0.53
WL3	93	7.685	0.018	0.09
HEADS				
	Reading	**R.L**		
	mm	m		
1	187	7.890		
2	172	7.665		
3	177	7.740		
4	164	7.545		
5	175	7.710		
6	173	7.680		
7	143	7.230		
8	155	7.410		
9	162	7.515		
10	153	7.380		
11	141	7.200		
12	162	7.515		
13	158	7.455		
14	167	7.590		
15	168	7.605		

5.4.2 Case 3 T = 30

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.0	14.82		
Proposed twin	8.6	7.51		
Green St	1.8	1.53		
B6-1	4.1	3.54		
B6-2	1.5	1.32		
Total	33.0	28.72		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	119	8.075	0.082	0.47
WL2	130	8.240	0.078	0.43
WL3	139	8.375	0.029	0.10
HEADS				
	Reading	**R.L**		
	mm	m		
1	245	8.760		
2	227	8.490		
3	213	8.280		
4	211	8.250		
5	222	8.415		
6	218	8.355		
7	225	8.460		
8	219	8.370		
9	219	8.370		
10	212	8.265		
11	162	7.515		
12	215	8.310		
13	206	8.175		
14	217	8.340		
15	218	8.355		

5.4.3 Case 3 T = 45

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	17.9	15.60		
Proposed twin	10.9	9.52		
Green St	0.8	0.68		
B6-1	0.6	0.50		
B6-2	4.6	4.05		
Total	34.8	30.35		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	114.0	8.00	0.082	0.41
WL2	142.0	8.42	0.087	0.45
WL3	150.0	8.54	0.040	0.14
HEADS				
	Reading	**R.L**		
	mm	m		
1	244 +/- 3	8.745		
2	204 +/- 5	8.145		
3	228	8.505		
4	228 +/- 2	8.505		
5	234	8.595		
6	231	8.550		
7	200 +/- 5	8.085		
8	230 +/- 1	8.535		
9	230	8.535		
10	194 +/- 1	7.995		
11	184	7.845		
12	227	8.490		
13	214	8.295		
14	228	8.505		
15	228	8.505		

5.4.4 Case 3 T = 60

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.8	16.37		
Proposed twin	14.5	12.66		
Green St	0.0	0.00		
B6-1	1.1	0.97		
B6-2	2.4	2.08		
Total	36.8	32.07		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	120.0	8.090	0.085	0.42
WL2	143.0	8.435	0.091	0.46
WL3	151.0	8.555	0.037	0.12
HEADS				
	Reading	**R.L**		
	mm	m		
1	247	8.790		
2	206	8.175		
3	233	8.580		
4	229	8.520		
5	232	8.565		
6	227	8.490		
7	219	8.370		
8	230	8.535		
9	229	8.520		
10	204	8.145		
11	187	7.890		
12	227	8.490		
13	213	8.280		
14	227	8.490		
15	229	8.520		

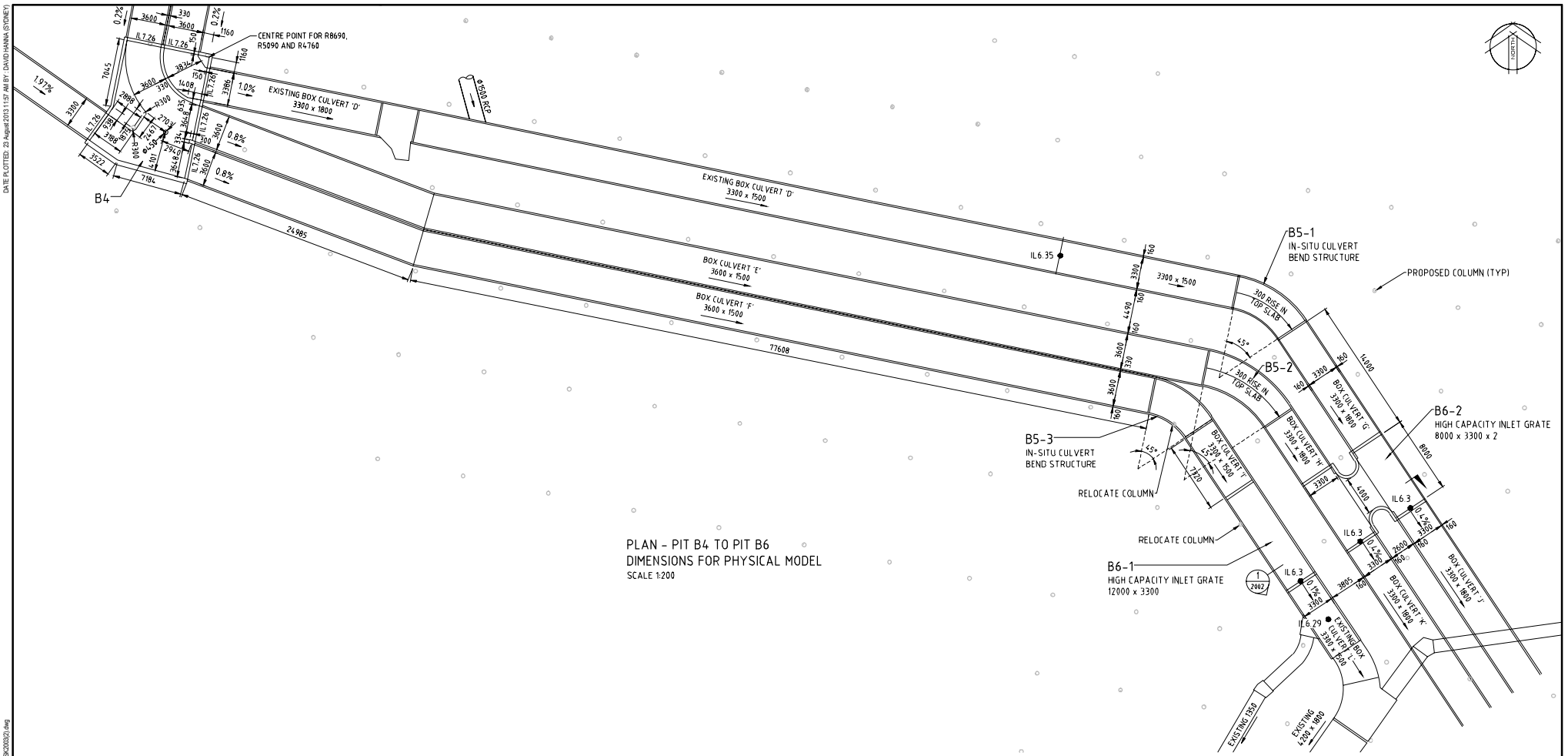
5.4.5 Case 3 T = 75

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	18.3	15.93		
Proposed twin	17.7	15.42		
Green St	0.0	0.00		
B6-1	1.3	1.13		
B6-2	1.7	1.49		
Total	39.0	33.97		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	124.0	8.150	0.087	0.38
WL2	145.0	8.465	0.093	0.42
WL3	153.0	8.585	0.058	0.21
HEADS				
	Reading	**R.L**		
	mm	m		
1	251	8.850		
2	212	8.265		
3	236	8.625		
4	228	8.505		
5	239	8.670		
6	219	8.370		
7	220	8.385		
8	230	8.535		
9	230	8.535		
10	206 +/- 1	8.175		
11	190	7.935		
12	226	8.475		
13	214	8.295		
14	226	8.475		
15	227	8.490		

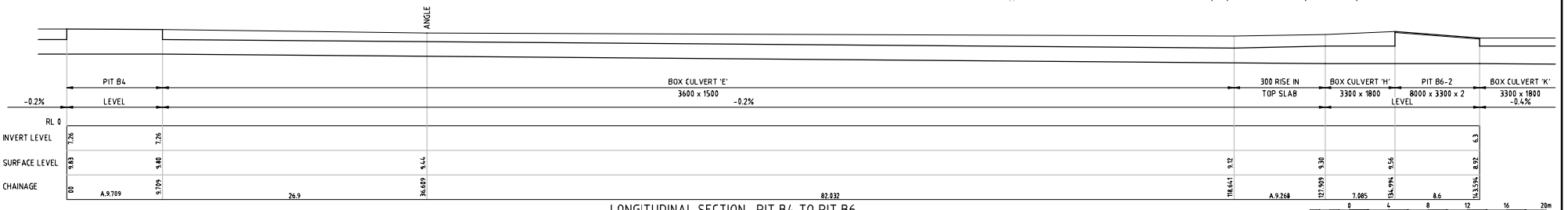
5.4.6 Case 3 T = 90

BOUNDARY CONDITIONS				
Inflows	**Model**	**Prototype**		
	L/s	m^3/s		
Existing single	16.5	14.39		
Proposed twin	17.7	15.45		
Green St	0.0	0.00		
B6-1	1.8	1.58		
B6-2	2.1	1.79		
Total	38.1	33.20		
Tailwater	**Model**	**Prototype**	**Height above weir**	**Estimated proportion of Q**
	mm above invert	R.L.	m	
WL1	122	8.12	0.085	0.38
WL2	142	8.42	0.090	0.42
WL3	150	8.54	0.055	0.20
HEADS				
	Reading	**R.L**		
	mm	m		
1	248	8.805		
2	206	8.175		
3	231	8.550		
4	227	8.490		
5	236	8.625		
6	219	8.370		
7	220	8.385		
8	229	8.520		
9	229	8.520		
10	209	8.220		
11	190	7.935		
12	224	8.445		
13	213	8.280		
14	225	8.460		
15	227	8.490		

6. Appendix B



PLAN - PIT B4 TO PIT B6
DIMENSIONS FOR PHYSICAL MODEL
SCALE 1:200



LONGITUDINAL SECTION -PIT B4 TO PIT B6
SCALE 1:200

Rev	Date	Description	Drawn	Appr.
2	23/08/2013	EXISTING CULVERT UPDATED	DH	DNA
1	19/08/2013	PRELIMINARY	DH	DNA

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Drawn	DH	Date 19/08/2013
Checked	DNA	Date 19/08/2013
Designed	DNA	Date 19/08/2013
Verified		Date
Approved		Date

Client: WESTFIELD
WARRINGAH MALL
TRUNK DRAINAGE

PIT B4 TO PIT B6
PLAN & LONGITUDINAL SECTION

Status: NOT FOR CONSTRUCTION

Date	Datum	Scale	Size
19/08/2013	AHD	1:200	A1

Drawing Number: 89914004-SK2003
Revision: 2

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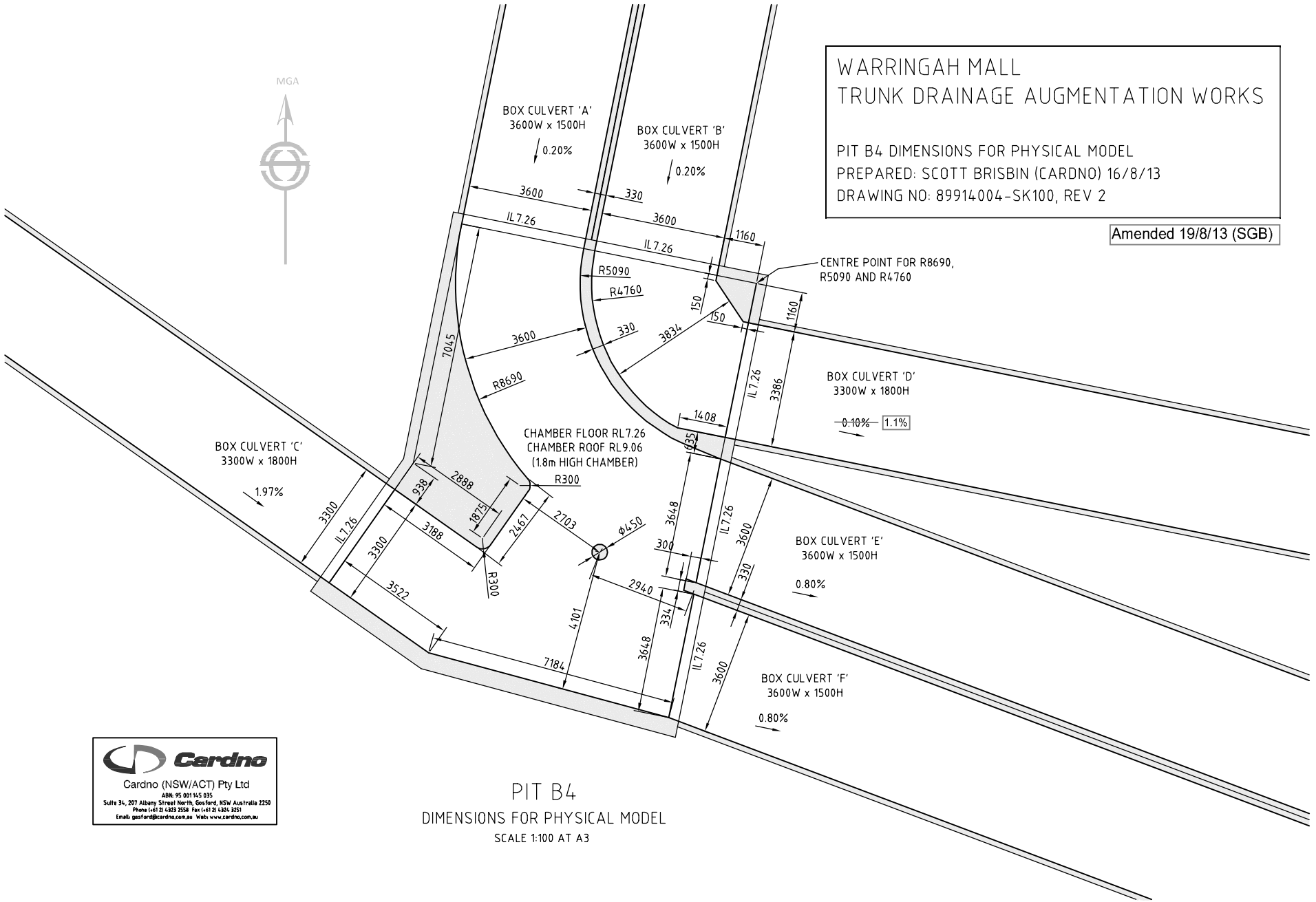
WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 16/8/13
DRAWING NO: 89914004-SK100, REV 2

Amended 19/8/13 (SGB)



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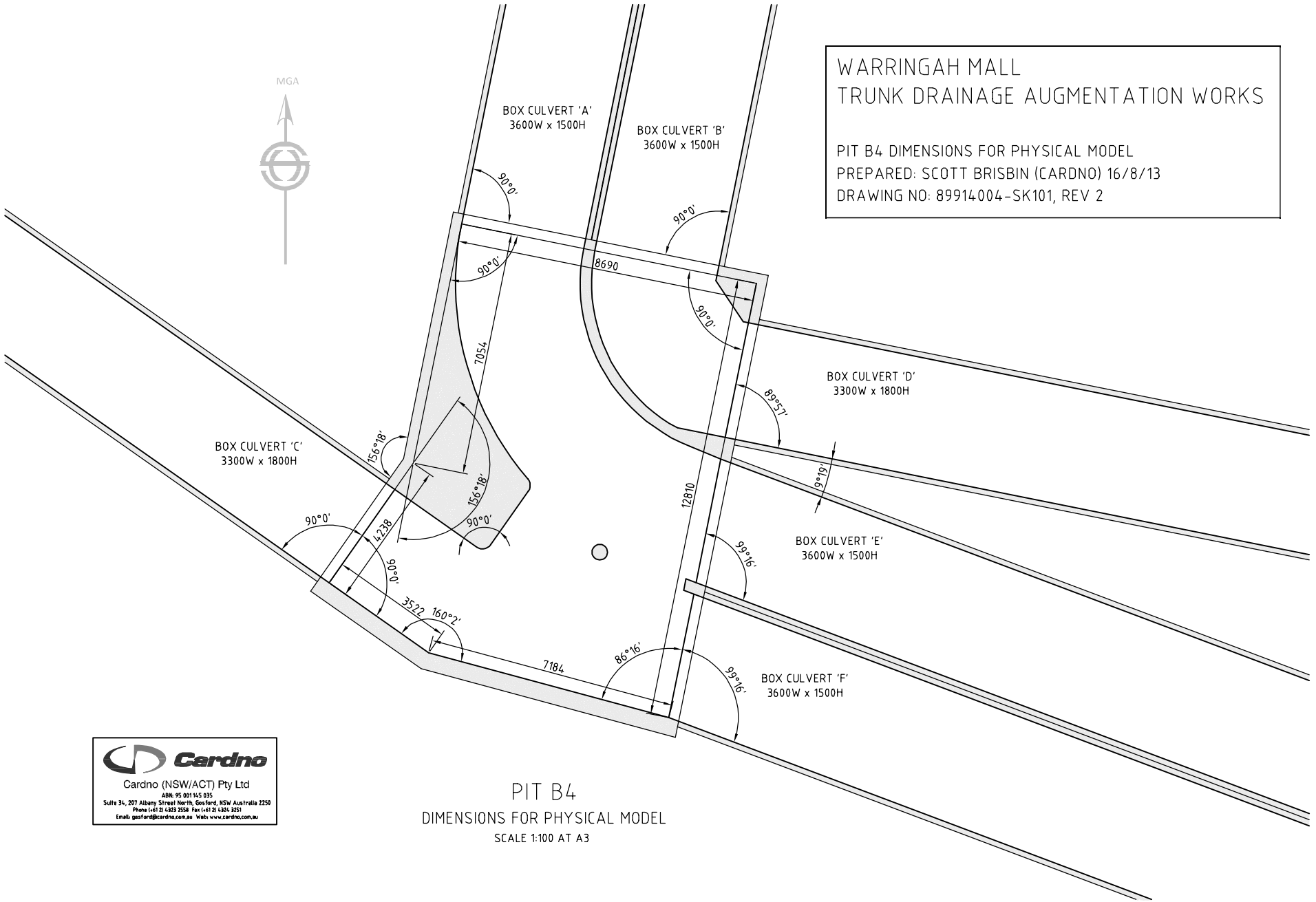
PIT B4
DIMENSIONS FOR PHYSICAL MODEL
SCALE 1:100 AT A3

N:\Projects\805\FY14\500_599 Other Cardno Business Units\89914004 Warringah Mall - Stage 1\Stage 1 Culverts\Drawings\Build\Civil\Sketches\Pit B4 Sketch v3 (SGB).dwg, 16/08/2013 6:34:12 PM, 1:100

WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 16/8/13
DRAWING NO: 89914004-SK101, REV 2



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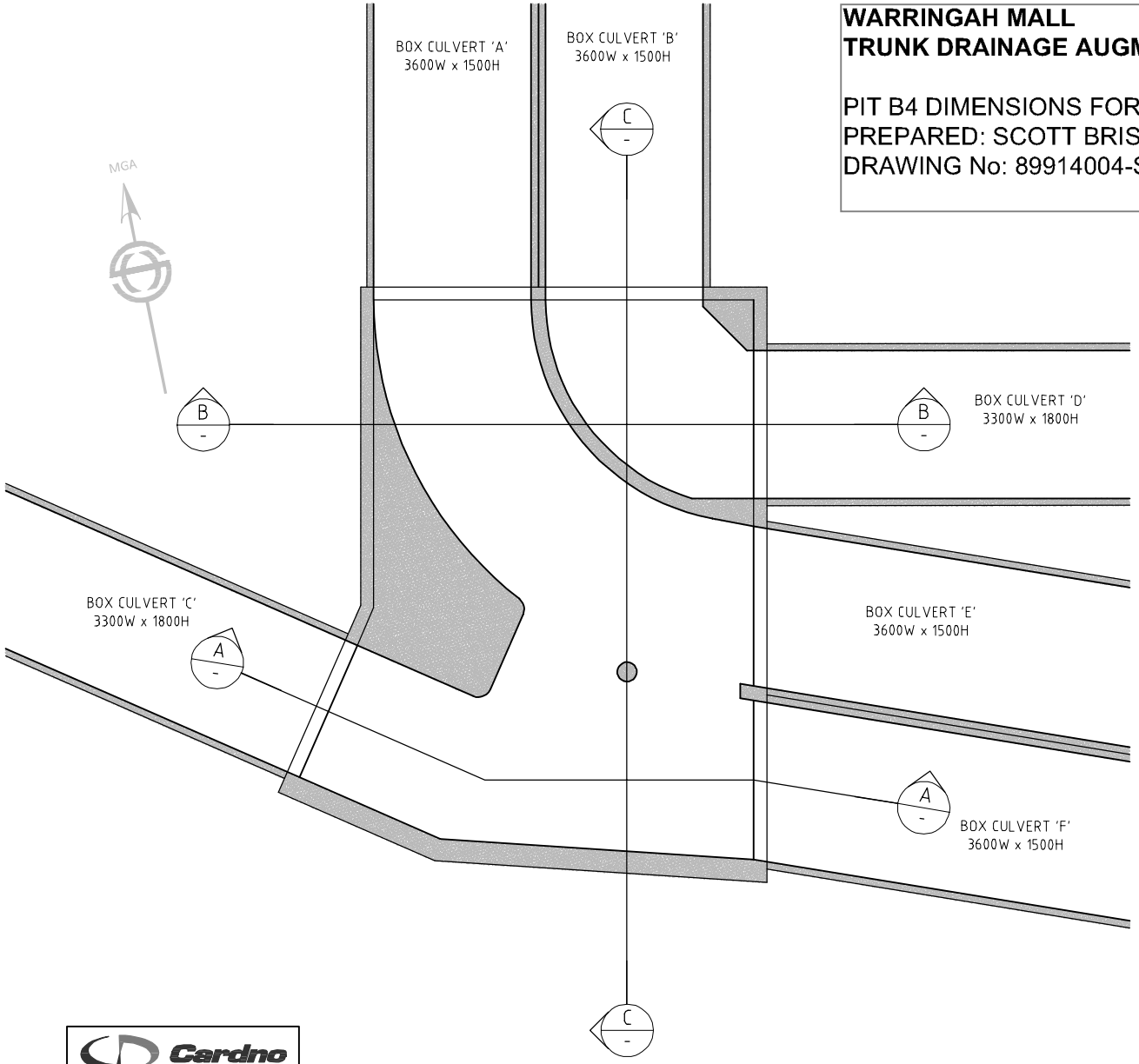
PIT B4
DIMENSIONS FOR PHYSICAL MODEL
SCALE 1:100 AT A3

WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 19/8/13
DRAWING No: 89914004-SK103, REV 1



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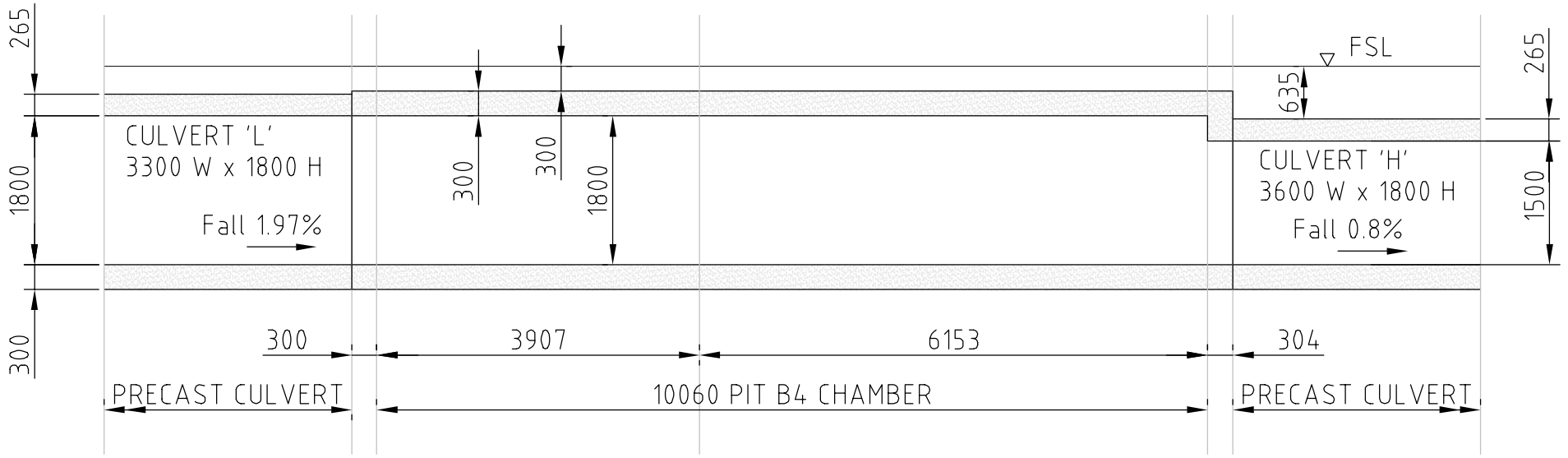
PIT B4
DIMENSIONS FOR PHYSICAL MODEL
SCALE 1:100 AT A3

WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

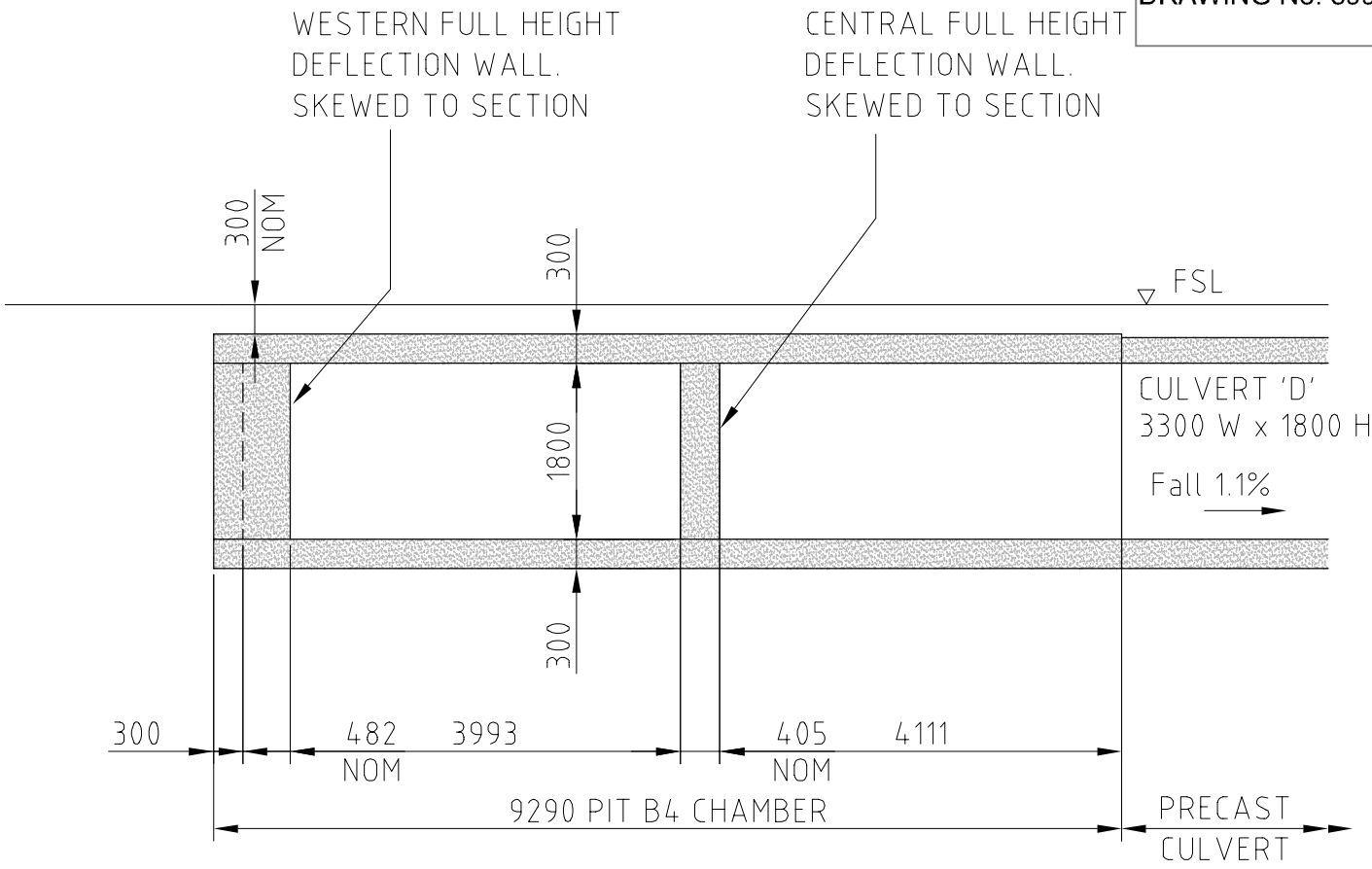
PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 19/8/13
DRAWING No: 89914004-SK104, REV 1



SECTION A
NTS -

WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

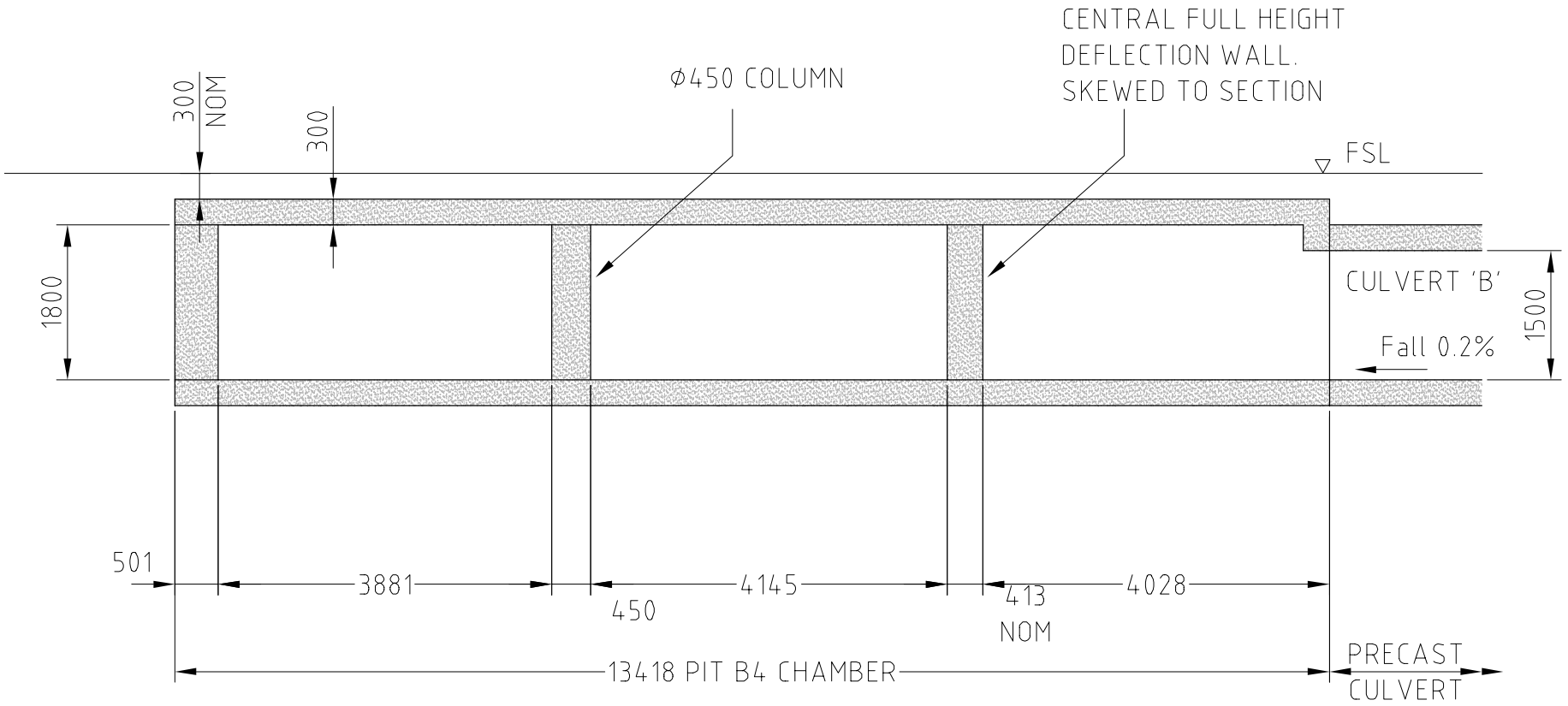
PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 19/8/13
DRAWING No: 89914004-SK105, REV 1



SECTION B
NTS -

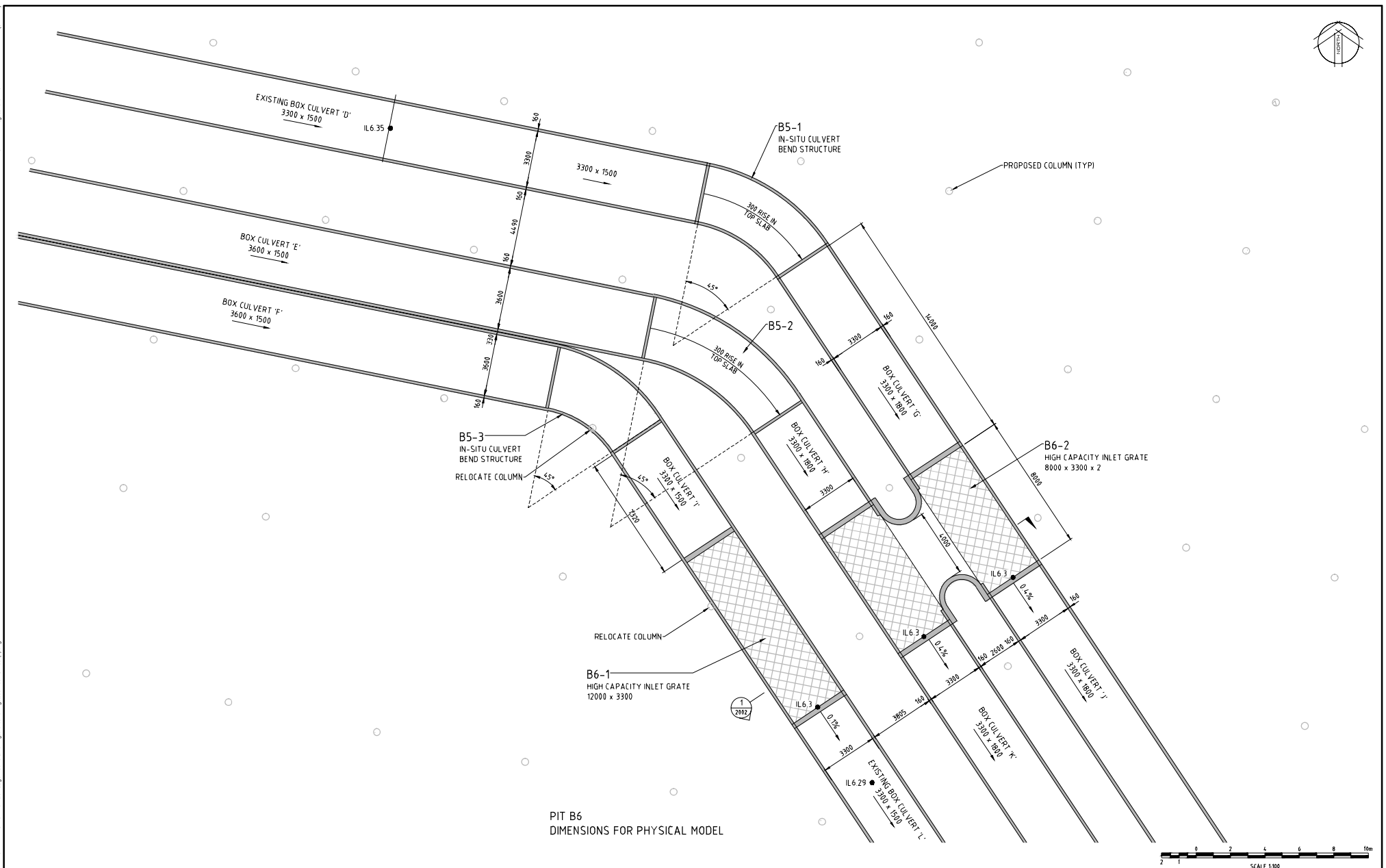
WARRINGAH MALL
TRUNK DRAINAGE AUGMENTATION WORKS

PIT B4 DIMENSIONS FOR PHYSICAL MODEL
PREPARED: SCOTT BRISBIN (CARDNO) 19/8/13
DRAWING No: 89914004-SK106, REV 1



SECTION C
NTS -

N:\Projects\805\FY14\500_599 Other Cardno Business Units\89914004 Warringah Mall - Stage 1\Stage 1 Culverts\Drawings\Build\Civil\Sketches\Pit B4 Sketch v3 (SGB).dwg, 19/08/2013 4:10:55 PM, 1:50



PIT B6
DIMENSIONS FOR PHYSICAL MODEL

Rev	Date	Description	Drawn	Appr.
2	21/08/2013	PRELIMINARY	DH	DNA
1	13/08/2013	PRELIMINARY	DH	DNA

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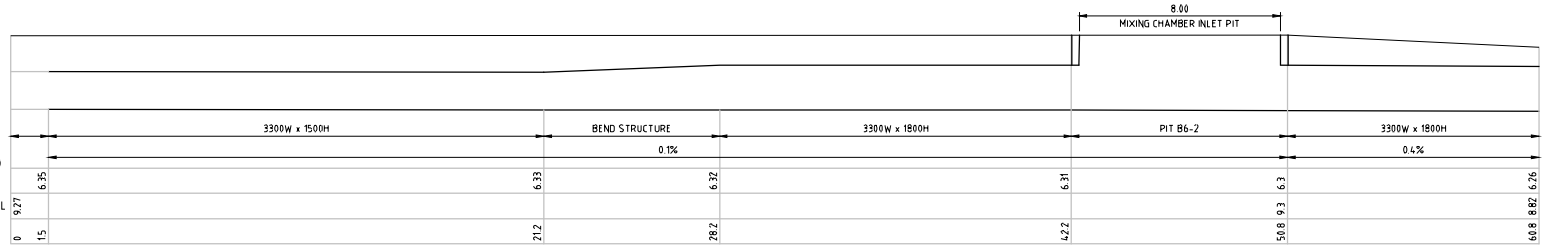
Drawn	DH	Date 13/08/2013
Checked	DNA	Date 13/08/2013
Designed	DNA	Date 13/08/2013
Verified		Date
Approved		Date

Client: WESTFIELD
WARRINGAH MALL
TRUNK DRAINAGE

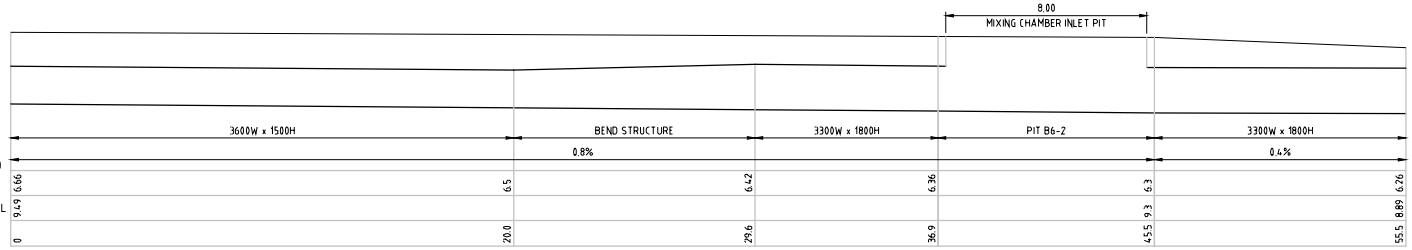
PIT B6 - DIMENSIONS FOR PHYSICAL MODEL

Status: NOT FOR CONSTRUCTION
Date: 13/08/2013 | Datum: AHD | Scale: 1:100 | Size: A1
Drawing Number: 89914004-SK2001 | Revision: 2

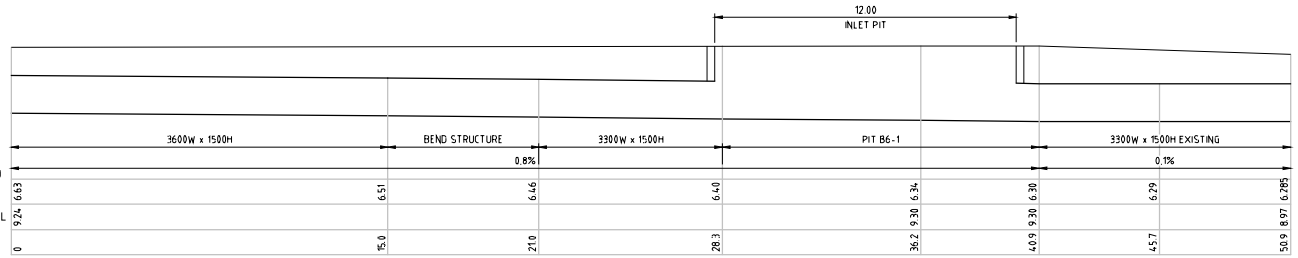
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL



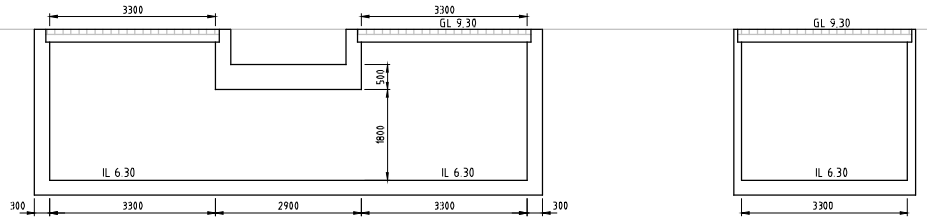
BOX CULVERT LONGSECTION 'D', 'G' & 'J'
SCALE 1:100



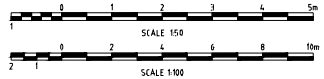
BOX CULVERT LONGSECTION 'E', 'H' & 'K'
SCALE 1:100



BOX CULVERT LONGSECTION 'F', 'I' & 'L'
SCALE 1:100



SECTION 1
SCALE 1:50 2001



Rev	Date	Description	Drawn	Appr.
2	21/08/2013	PRELIMINARY	DH	DNA
1	14/08/2013	PRELIMINARY	DH	DNA

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Drawn	DH	Date 13/08/2013
Checked	DNA	Date 13/08/2013
Designed	DNA	Date 13/08/2013
Verified		Date
Approved		Date

Client: WESTFIELD

WARRINGAH MALL
TRUNK DRAINAGE

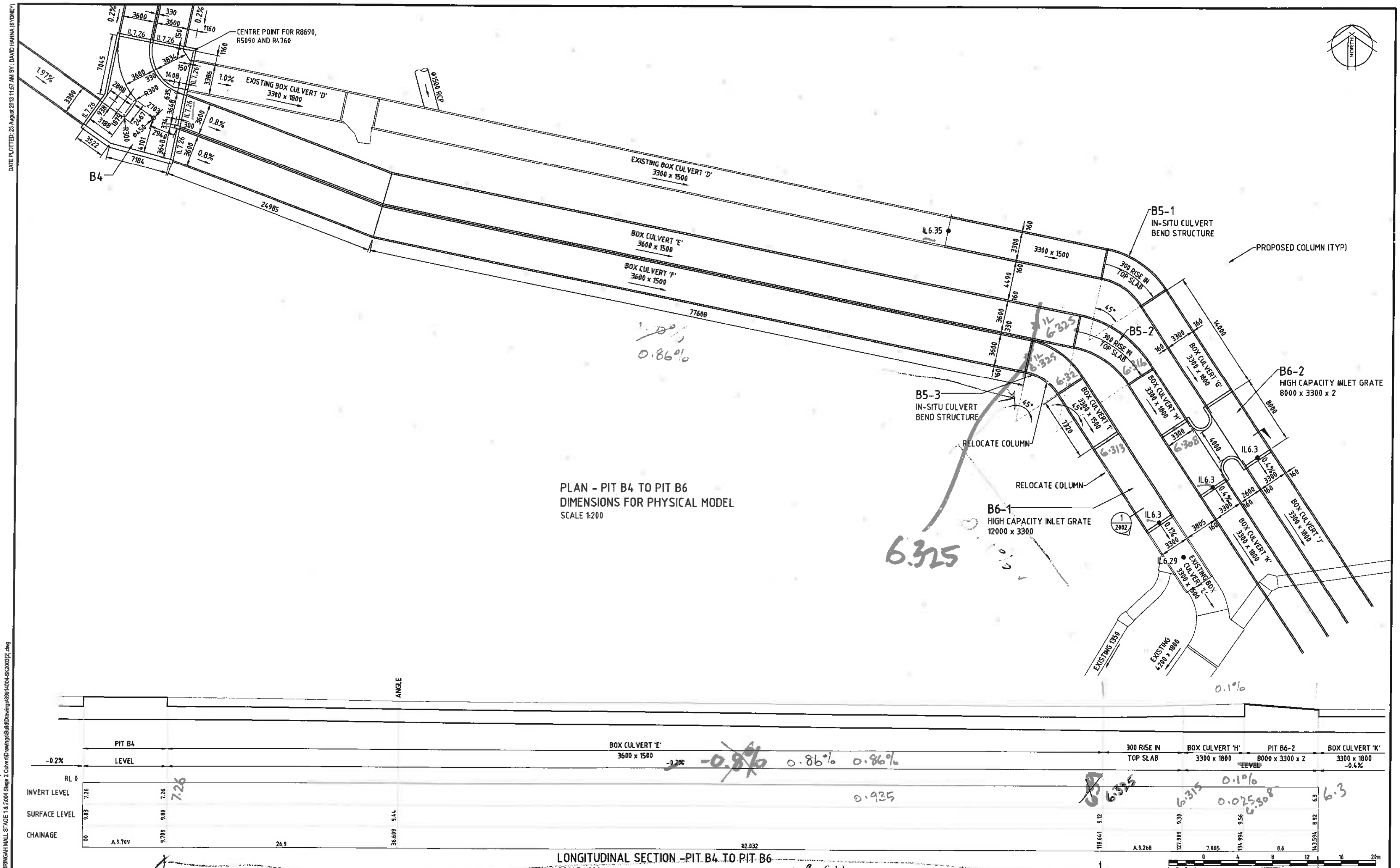
TYPICAL SECTIONS

Status: NOT FOR CONSTRUCTION

Date	Datum	Scale	Size
13/08/2013	AHD	AS SHOWN	A1

Drawing Number: 89914004-SK2002 Revision: 2

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL



Rev	Date	Description	Drawn	Appr.
2	23/08/2013	EXISTING CULVERT UPDATED	DH	DNA
1	19/08/2013	PRELIMINARY	DH	DNA

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		Date
Drawn	DH	19/08/2013
Checked	DNA	19/08/2013
Designed	DNA	19/08/2013
Verified		
Approved		

Client WESTFIELD

WARRINGAH MALL
TRUNK DRAINAGE

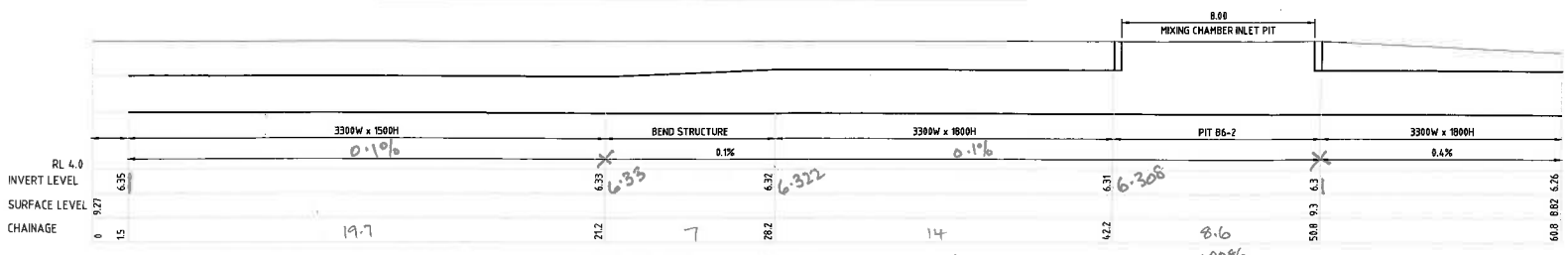
PIT B4 TO PIT B6
PLAN & LONGITUDINAL SECTION

Status NOT FOR CONSTRUCTION

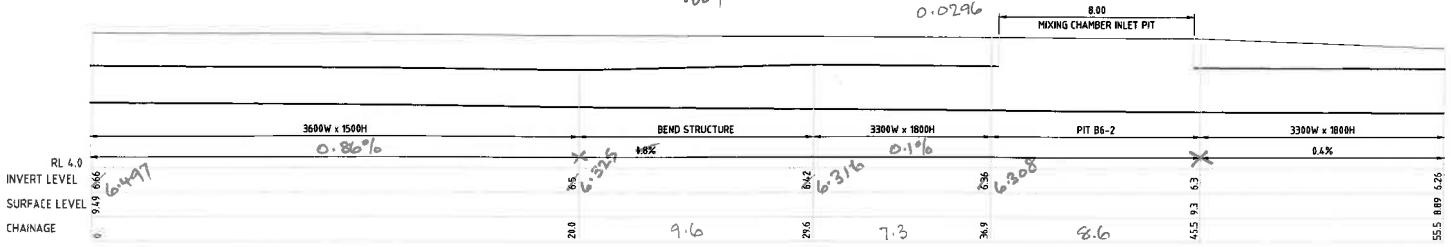
Date	Datum	Scale	Size
19/08/2013	AHD	1:200	A1

Drawing Number 89914004-SK2003 Revision 2

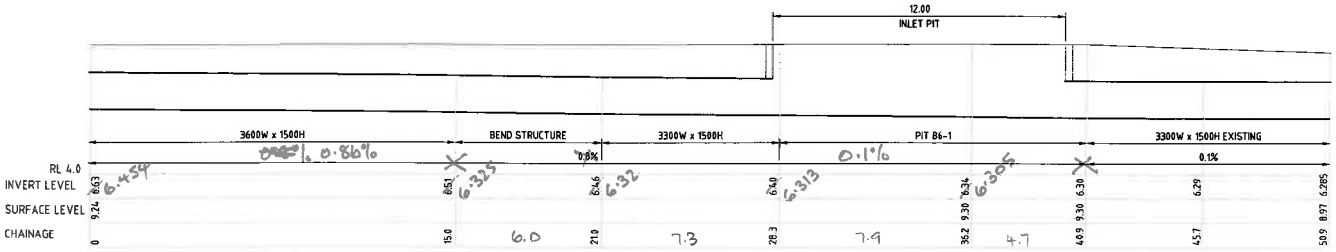
ON A1 ORIGINAL



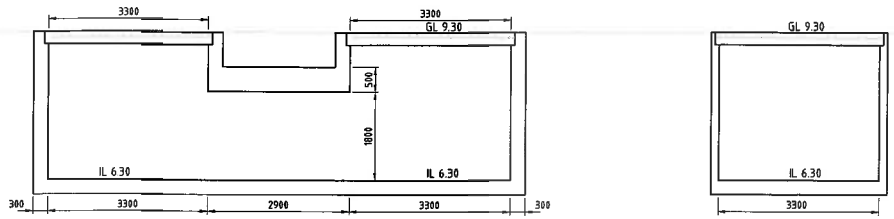
BOX CULVERT LONGSECTION 'D', 'G' & 'J'
SCALE 1:100



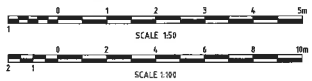
BOX CULVERT LONGSECTION 'E', 'H' & 'K'
SCALE 1:100



BOX CULVERT LONGSECTION 'F', 'I' & 'L'
SCALE 1:100



SECTION 1
SCALE 1:50 2001



Rev	Date	Description	Drawn	Appr.
2	21/08/2013	PRELIMINARY	DH	DNA
1	16/08/2013	PRELIMINARY	DH	DNA

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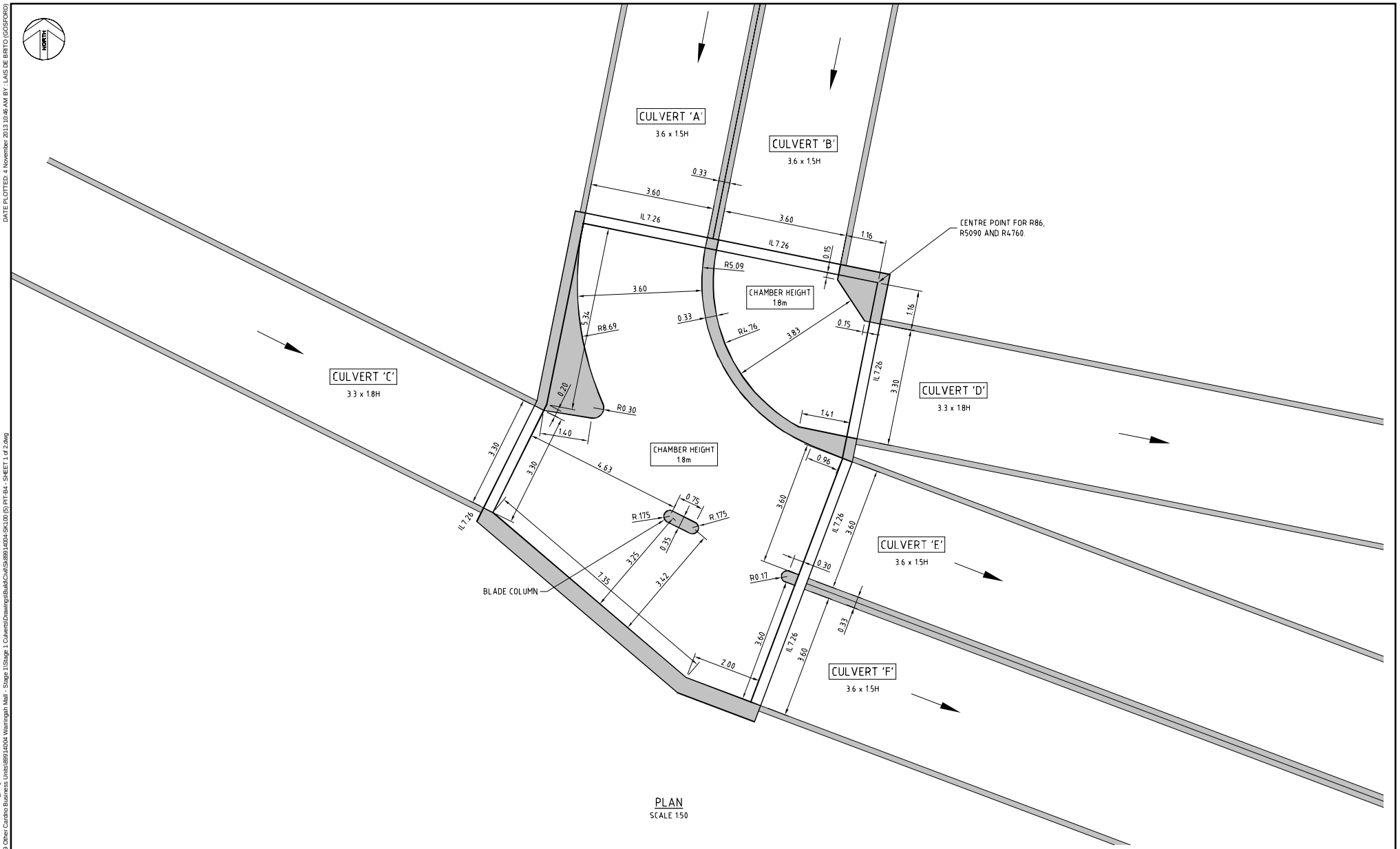
Drawn	DH	Date 13/08/2013
Checked	DNA	Date 13/08/2013
Designed	DNA	Date 13/08/2013
Verified		Date
Approved		Date

Client: WESTFIELD
WARRINGAH MALL
TRUNK DRAINAGE

TYPICAL SECTIONS

Status: NOT FOR CONSTRUCTION
Date 13/08/2013 | Datum AHD | Scale AS SHOWN | Size A1
Drawing Number 89914004-SK2002 | Revision 2

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL



PLAN
SCALE 1:50

Rev	Date	Description	Des.	Verif.	Appr.
5	04/11/13	BLADE COLUMN ADDED	SGB	-	-
4	31/10/13	DELETE BLADE COLUMN	SGB	-	-
3	29/10/13	REVISED DIMENSIONS FOLLOWING PRELIMINARY MODEL	SGB	-	-

0 1 2 3 4 5m
1 0.6 0.2
SCALE A1 1:50 / A3 1:100

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Drawn	LDB	Date 29/10/13
Checked	SGB	Date 29/10/13
Designed	SGB	Date 29/10/13
Verified	-	Date -
Approved	-	Date -

Client: WESTFIELD DESIGN & CONSTRUCTION PTY LTD

WARRINGAH MALL
STAGE1 TRUNK DRAINAGE AUGMENTATION WORKS

PIT B4 TO B6 - DIMENSIONS FOR PHYSICAL MODEL
SHEET 1 OF 2

Status: FOR PHYSICAL MODEL

Datum	Register	Scale	Size
A.H.D.	-	1:50	A1

Drawing Number: 89914004-SK100
Revision: 5

Attachment A

DATE PLOTTED: 6 September 2013 1:54 PM BY: DAVID HANNA (SYDNEY)

XREFs: X-GBP-A1-SHT; X-SYD-A1-logo; X-Boundary; X-Survey; X-SunEast; X-Design; X-Piers; X-Drainage; 20130902_WR SEWER DIVERSION SK10_CAD; PR116997_GPT Golf Course

CAD FILE: N:\Projects\899\FY14\004_WARRINGAH MALL STAGE 1 & 2\004 Stage 2 Culvert\Drawings\Build\Drawings\89914004-2022(1).dwg

LOWER BASE SLAB 1.0m

900 ϕ

1500 ϕ

1800 ϕ

1800 ϕ

1800 ϕ

1350 ϕ

4200W x 1800H

WESTFIELD WARRINGAH MALL

CH870

LE60

3300W x 1800H

3300W x 1800H

CH857

CH1115

CH1145

2800W x 1800H

2800W x 1800H

2800W x 1800H

2800W x 1800H

CONDAMINE STREET

NORTHBOUND

STREET

SOUTHBOUND

CH1145

LE551

CH1183 X5.33

RAMP

PITTWATER ROAD

PITTWATER ROAD

ROAD

MGA

JOINS SHEET 2021

SCALE 1:200

Rev	Date	Description	Drawn	Appr.
1	??	PRELIMINARY	DH	DNA

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Drawn	DH	Date 30/08/2013
Checked	DNA	Date 30/08/2013
Designed	DNA	Date 30/08/2013
Verified		Date
Approved		Date

Client: WESTFIELD DESIGN AND CONSTRUCTION

WARRINGAH MALL
TRUNK DRAINAGE

GENERAL ARRANGEMENT – SHEET 3 of 3

Status: NOT FOR CONSTRUCTION

Date	Datum	Scale	Size
30/08/2013	AHD	1:200	A1

Drawing Number: 89914004-2022 Revision: 1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

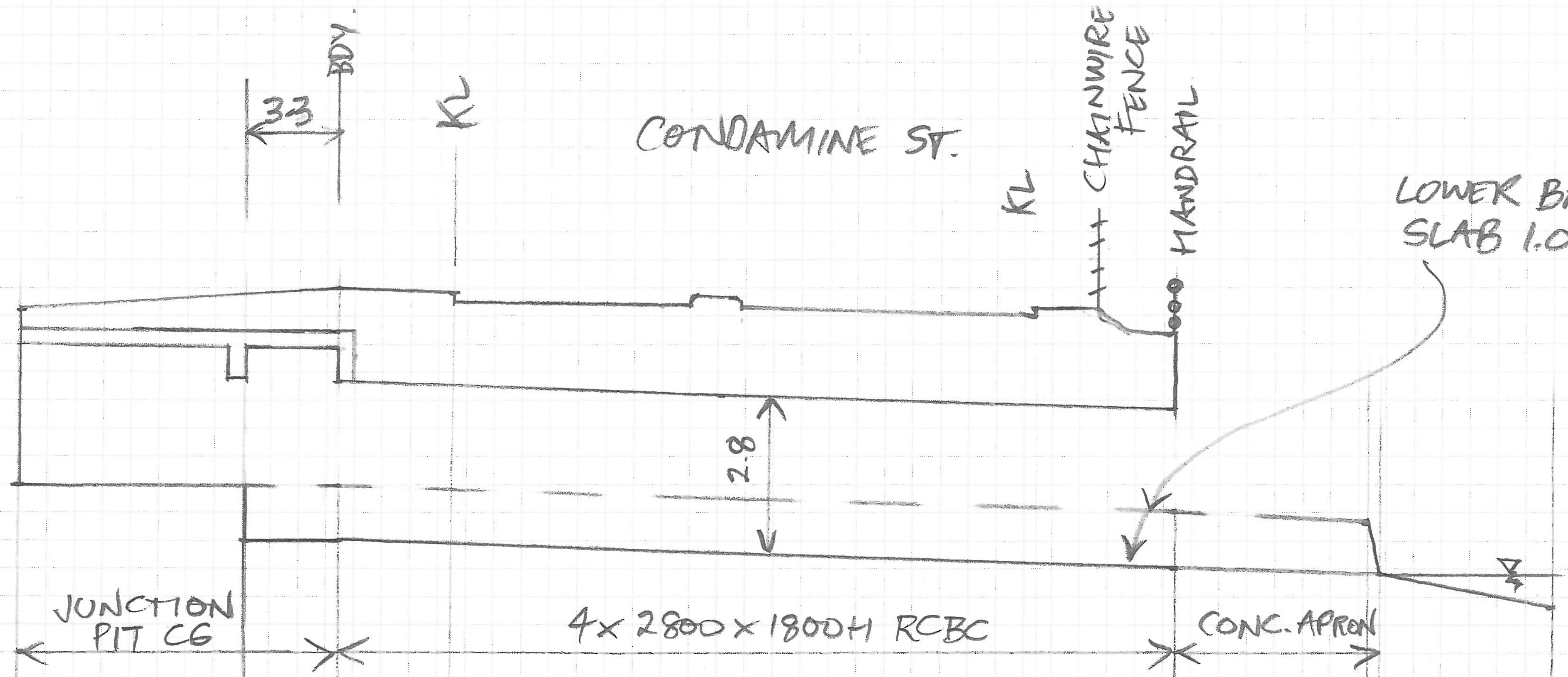
Cardno

Attachment B

WARRINGAH MALL, WESTFIELD

DATE: SEPT. 13

DOCUMENT NO.



PROPOSED INVERT LEVEL	DATUM 0.0	5.0	5.0			4.5		4.44	
EXISTING INVERT LEVEL	6.0	6.0	6.0			5.51	5.33	4.44	3.80
EXIST. LEVEL	9.10		9.49	9.41	9.17	8.70			
CHAINAGE	0.0	8.2	11.51	15.3	36.7	41.50	48.3	48.6	55.0

LONGITUDINAL SECTION
BOX CULVERTS CONDAMINE ST.

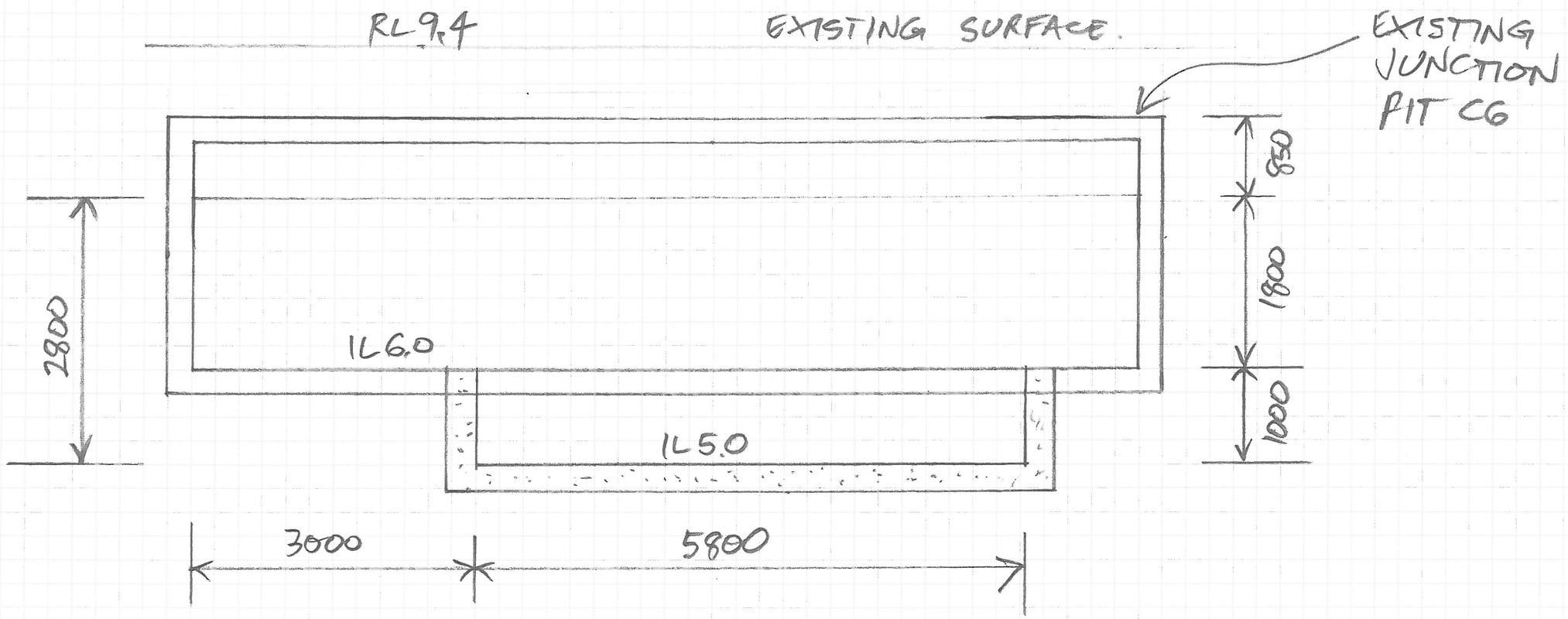
HORIZ. 1:200
VERT 1:100

SEPT. 13.

WARRINGAH MALL

89914004-SK 2100

	DATE	DOCUMENT NO.



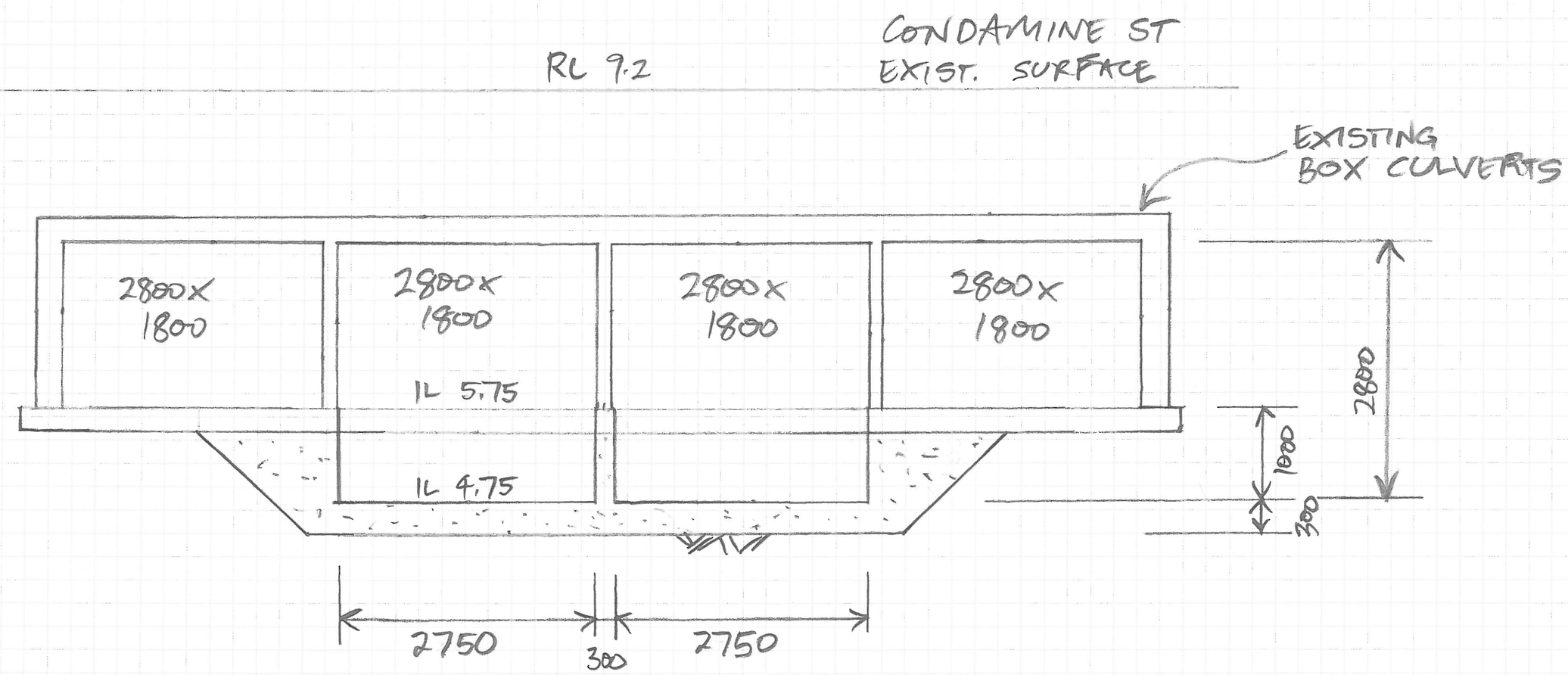
SECTION (1)

1:50

SEPT 13.
WARRINGAH MALL

89914004-SK 401

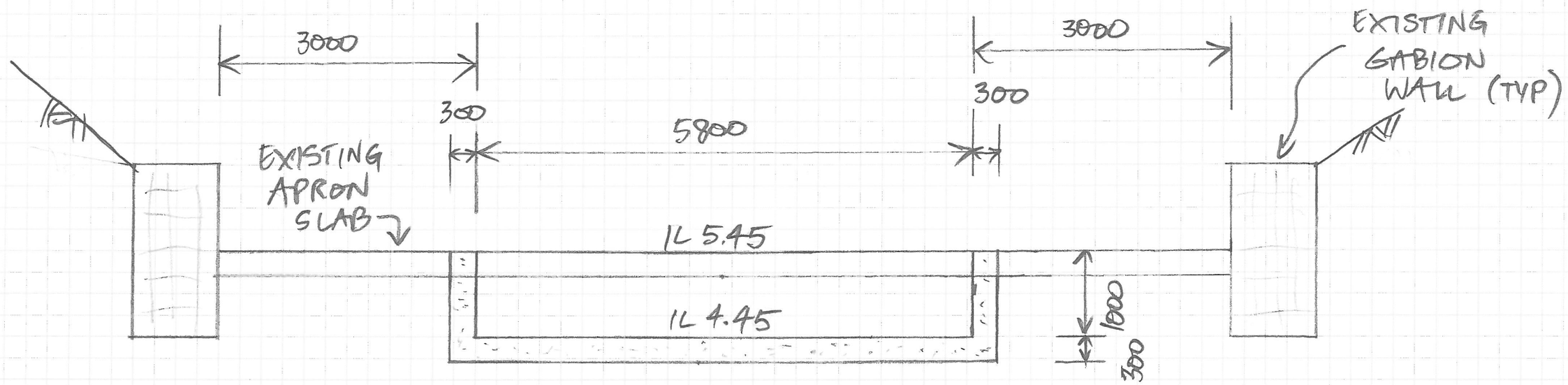
	DATE	DOCUMENT NO.



SECTION (2)
1:50

SEPT 13
WARRINGAH
MALL
89914004-SK
2102

	DATE	DOCUMENT NO.



SECTION (3)
1:50

SEPT 13.
WARRINGAH MALL
89914004-SK 2103

NORTH

FL 11.09

FL 10.88

FL 9.40

FL 9.40

FL 9.39

CROSS STREET

BROOKVALE CREEK

CROSS STREET

GREEN STREET

FL 9.25

DALE STREET

PITTWATER ROAD

FL 9.45

FL DRY

FL 10.06

FFL 10.69

FL 9.76

FFL 10.70

A1

A2

A3

5

Ø1350 RCP

FL 10.88

FL 9.67

FFL 9.94

FFL 10.34

FFL 10.50

FL 10.94

FFL 10.16

FL 9.27

FFL 9.99

FFL 10.10

FFL 10.02

FL 9.23

FL 9.18

FFL 10.01

FL 9.15

OLD PITTWATER ROAD

CONDAMINE STREET

PITTWATER ROAD

FFL 10.00

3

NOTE:
LOCATION AND LEVEL OF ALL SERVICES TO BE CONFIRMED ON SITE

LEGEND

- EXISTING STORMWATER TO REMAIN
- EXISTING STORMWATER TO BE REMOVED
- PROPOSED STORMWATER (RCP)
- PROPOSED STORMWATER (RCBC)
- PROPOSED HIGH CAPACITY INLET
- APPROXIMATE AREAS OF REGRADING
- APPROXIMATE AREA OF CHANNEL REGRADING
- PROPOSED STAGE 1 BUILDING WORKS
- FFL 10.50 FINISHED FLOOR LEVEL (m AHD)
- FL 10.17 100 YEAR ARI FLOOD LEVEL (m AHD)
- BOUNDARY
- E ELECTRICITY
- G GAS
- T OPTICAL FIBRE
- O OPTUS
- S SEWER
- T TELSTRA
- W WATER

20 10 0 20 40 60 80 100

SCALE OF METRES (1:1000 BEFORE REDUCTION)

Rev	Date	Description	Drawn	Appr.
5	5/11/2014	FLOOD BARRIERS UPDATED	LLC	DNA
4	15/10/2014	FLOOD LEVELS AMENDED	JT	DNA
3	13/08/2014	FLOOD LEVELS REVISED	GV	DNA
2	30/07/2014	CULVERT AMENDED THOUGH BING LEE	DH	DNA
1	20/11/2013	PRELIMINARY	DH	DNA

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		Date
Drawn	GV	13/08/2014
Checked	DNA	13/08/2014
Designed	DNA	18/11/2013
Verified		Date
Approved		Date

Client: WESTFIELD DESIGN & CONSTRUCTION

WARRINGAH MALL
CONCEPT DRAINAGE AUGMENTATION WORKS

DETAIL ARRANGEMENT PLAN
GENERAL ARRANGEMENT PLAN

Status: PRELIMINARY

Date	Datum	Scale	Size
12/08/2014	AHD	1:1000	A1

Drawing Number: W4548-420

Revision: 5

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

Table A.5 Updated Comparison of Updated Stormwater DA with Existing Conditions (xpswmmV10)

New Stormwater DA 1742 (Stage2) New Stormwater DA 1742 (Stage2)

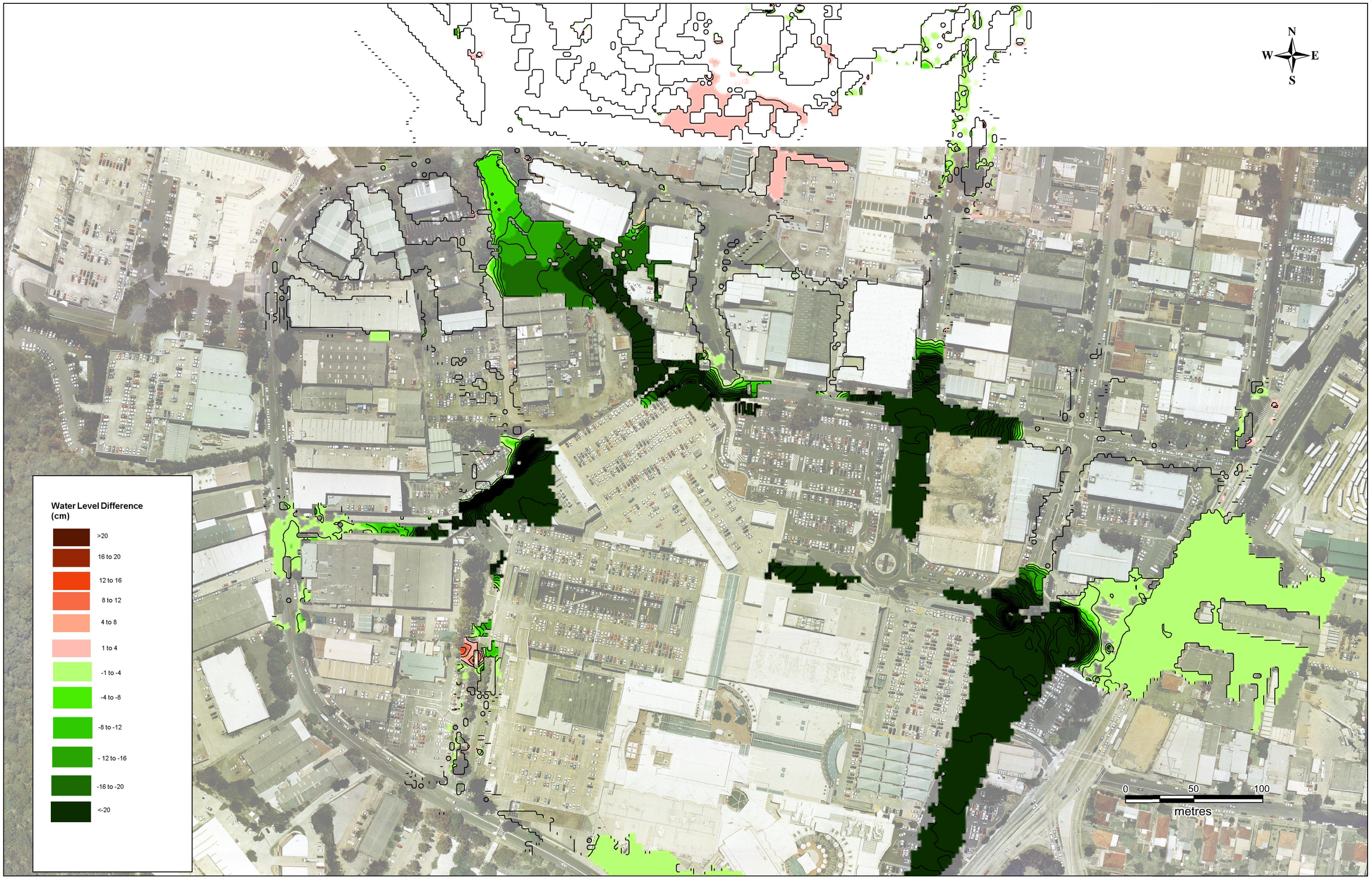
Existing Conditions — 100yr 1.5h ARI 50% Blockage; 100yr 1.5h ARI 0% Blockage

Updated Stormwater DA — 18 June 2013: 100yr 1.5h ARI DA 50% Blockage; 18 June 2013: 100yr 1.5h ARI DA 0% Blockage

Updated Stormwater DA with Brookvale Creek Design — 23 Sep 2014: 100yr 1.5h ARI DA 50% Blockage; 23 Sep 2014: 100yr 1.5h ARI DA 0% Blockage

Survey Point	Floor Level (mAHD)	Street Address	Existing 50% Blockage: Flood Level (mAHD) (a)	Depth over Ground (cm)	Depth over Floor (cm)	Existing 0% Blockage: Flood Level (mAHD) (b)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm) (b)-(a)	Max FL (m AHD)	DA 50% Blockage (18 June 2013): Flood Level (mAHD) (ba)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm) (ba)-(a)	Diff (cm) (ba)-(aa)	DA 0% Blockage (18 June 2013): Flood Level (mAHD) (bb)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm) (bb)-(b)	Diff (cm) (bb)-(ab)	Max FL (m AHD)	DA 50% Blockage (23 Sep 2014): Flood Level (mAHD) (bk)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm) (bk)-(a)	Diff (cm) (bk)-(aa)	DA 0% Blockage (23 Sep 2014): Flood Level (mAHD) (bl)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm) (bl)-(b)	Diff (cm) (bl)-(ab)	Max FL (m AHD)
P1	19.43	15 Clearview Place	20.46	109	103	20.46	109	103	0	20.46	20.46	109	103	0	0	20.46	109	103	0	0	20.46	20.46	109	103	0	0	20.45	108	102	-1	-1	20.46
P2	19.40	15 Clearview Place	20.35	115	95	20.35	115	95	0	20.35	20.35	115	95	0	0	20.35	115	95	0	0	20.35	20.35	115	95	0	0	20.35	115	95	0	0	20.35
P3	20.23	14 Clearview Place	19.88	69	0	19.88	69	0	0	19.88	19.88	69	0	0	0	19.88	69	0	0	0	19.88	19.88	69	0	0	0	19.88	69	0	0	0	19.88
P4	19.23	Unit 11/16-18 Clearview Place	19.10	9	0	19.10	9	0	0	19.10	19.10	9	0	0	0	19.09	8	0	-1	-1	19.10	19.10	9	0	0	0	19.10	9	0	0	0	19.10
P5	19.25	Unit 10B/16-18 Clearview Place	19.10	2	0	19.10	2	0	0	19.10	19.10	2	0	0	0	19.09	1	0	-1	-1	19.10	19.10	2	0	0	0	19.10	2	0	0	0	19.10
P6	19.30	Unit 10/16-18 Clearview Place	19.27	7	0	19.27	7	0	0	19.27	19.27	7	0	0	0	19.27	7	0	0	0	19.27	19.27	7	0	0	0	19.27	7	0	0	0	19.27
P7	19.30	Unit 9/16-18 Clearview Place	19.38	11	8	19.38	11	8	0	19.38	19.38	11	8	0	0	19.38	11	8	0	0	19.38	19.38	11	8	0	0	19.38	11	8	0	0	19.38
P8	19.30	Unit 8/16-18 Clearview Place	19.35	11	5	19.35	11	5	0	19.35	19.35	11	5	0	0	19.35	11	5	0	0	19.35	19.35	11	5	0	0	19.35	11	5	0	0	19.35
P9	19.26	Unit 7A/16-18 Clearview Place	19.33	10	7	19.33	10	7	0	19.33	19.33	10	7	0	0	19.33	10	7	0	0	19.33	19.33	10	7	0	0	19.33	10	7	0	0	19.33
P10	19.26	Unit 7/16-18 Clearview Place	19.31	10	5	19.31	10	5	0	19.31	19.31	10	5	0	0	19.31	10	5	0	0	19.31	19.31	10	5	0	0	19.31	10	5	0	0	19.31
P11	19.26	Unit 6/16-18 Clearview Place	19.30	4	4	19.30	4	4	0	19.30	19.30	4	4	0	0	19.30	4	4	0	0	19.30	19.30	4	4	0	0	19.30	4	4	0	0	19.30
P12	19.28	Unit 5/16-18 Clearview Place	19.30	12	2	19.30	12	2	0	19.30	19.30	12	2	0	0	19.30	12	2	0	0	19.30	19.30	12	2	0	0	19.30	12	2	0	0	19.30
P13	19.29	Unit 4/16-18 Clearview Place	19.29	10	0	19.29	10	0	0	19.29	19.29	10	0	0	0	19.29	10	0	0	0	19.29	19.29	10	0	0	0	19.29	10	0	0	0	19.29
P14	19.26	Unit 3/16-18 Clearview Place	19.29	43	3	19.29	43	3	0	19.29	19.29	43	3	0	0	19.29	43	3	0	0	19.29	19.29	43	3	0	0	19.29	43	3	0	0	19.29
P15	19.27	Unit 2/16-18 Clearview Place	19.27	68	0	19.27	68	0	0	19.27	19.27	68	0	0	0	19.27	68	0	0	0	19.27	19.27	68	0	0	0	19.27	68	0	0	0	19.27
P16	19.23	Unit 12/16-18 Clearview Place	19.31	18	8	19.31	18	8	0	19.31	19.31	18	8	0	0	19.31	18	8	0	0	19.31	19.31	18	8	0	0	19.31	18	8	0	0	19.31
P17	19.27	Unit 13/16-18 Clearview Place	19.30	6	3	19.30	6	3	0	19.30	19.30	6	3	0	0	19.30	6	3	0	0	19.30	19.30	6	3	0	0	19.30	6	3	0	0	19.30
P18	19.25	Unit 13/16-18 Clearview Place	19.08	8	0	19.08	8	0	0	19.08	19.08	8	0	0	0	19.08	8	0	0	0	19.08	19.08	8	0	0	0	19.08	8	0	0	0	19.08
P19	19.26	Unit 12/16-18 Clearview Place	19.16		0	19.16		0	0	19.16	19.16		0	0	0	19.16		0	0	0	19.16	19.16		0	0	0	19.16		0	0	0	19.16
P20	19.26	Unit 1 / 16-18 Clearview Place	19.02	18	0	19.02	18	0	0	19.02	19.02	18	0	0	0	19.02	18	0	0	0	19.02	19.02	18	0	0	0	19.02	18	0	0	0	19.02
P21	16.51	Unit 1 / 16-18 Clearview Place	18.92	251	241	18.92	251	241	0	18.92	18.92	251	241	0	0	18.92	251	241	0	0	18.92	18.92	251	241	0	0	18.92	251	241	0	0	18.92
P22	17.35	19 Clearview Place	18.25	106	90	18.25	106	90	0	18.25	18.25	106	90	0	0	18.24	105	89	-1	0	18.25	18.24	105	89	-1	-1	18.24	105	89	-1	0	18.24
P23	18.21	19 Clearview Place	18.25	137	4	18.25	137	4	0	18.25	18.25	137	4	0	0	18.24	136	3	-1	-1	18.25	18.24	136	3	-1	-1	18.24	136	3	-1	-1	18.24
P24	17.04	Unit 1/20 Clearview Place	18.25	124	121	18.24	123	120	-1	18.25	18.24	123	120	-1	-1	18.24	123	120	0	0	18.24	18.24	123	120	-1	-1	18.24	123	120	0	0	18.24
P25	16.69	21 Clearview Place	18.21	161	152	18.21	161	152	0	18.21	18.21	161	152	0	0	18.21	161	152	0	0	18.21	18.21	161	152	0	0	18.20	160	151	-1	-1	18.21
P26	17.06	Unit 2/20 Clearview Place	17.98	93	92	17.98	93	92	0	17.98	17.98	93	92	0	0	17.98	93	92	0	0	17.98	17.98	93	92	0	0	17.98	93	92	0	0	17.98
P27	18.21	19 Clearview Place	18.73	59	52	18.72	58	51	-1	18.73	18.73	59	52	0	0	18.72	58	51	0	0	18.73	18.73	59	52	0	0	18.73	59	52	1	1	18.73
P28	16.62	Unit 5/22 Clearview Place	17.60	108	98	17.60	108	98	0	17.60	17.60	108	98	0	0	17.60	108	98	0	0	17.60	17.60	108	98	0	0	17.60	108	98	0	0	17.60
P29	16.58	Unit 4/22 Clearview Place	17.58	104	100	17.58	104	100	0	17.58	17.58	104	100	0	0	17.58	104	100	0	0	17.58	17.58	104	100	0	0	17.58	104	100	0	0	17.58
P30	16.55	Unit 3/22 Clearview Place	17.58	108	103	17.57	107	102	-1	17.58	17.57	107	102	-1	0	17.57	107	102	0	0	17.57	17.57	107	102	-1	0	17.57	107	102	0	0	17.57
P31	16.63	21 Clearview Place	17.14	53	51	17.14	53	51	0	17.14	17.14	53	51	0	0	17.14	53	51	0	0	17.14	17.14	53	51	0	0	17.14	53	51	0	0	17.14
P33	16.30	21 Clearview Place	17.14	84	84	17.14	84	84	0	17.14	17.14	84	84	0	0	17.14	84	84	0	0	17.14	17.15	85	85	1	1	17.14	84	84	0	0	17.15
P34	19.04	21 Clearview Place	18.06	36	0	18.06	36	0	0	18.06	18.06	36	0	0	0	18.06	36	0	0	0	18.06	18.06	36	0	0	0	18.06	36	0	0	0	18.06
P35	16.67	close to 20 Clearview Place	17.13	93	46	17.13	93	46	0	17.13	17.13	93	46	0	0	17.13	93	46	0	0	17.13	17.14	94	47	1	1	17.14	94	47	1	1	17.14
P36	16.67	close to 20 Clearview Place	17.13	123	46	17.13	123	46	0	17.13	17.13	123	46	0	0	17.13	123	46	0	0	17.13	17.14	124	47	1	1	17.14	124	47	1	1	17.14
P37	15.83	close to 20 Clearview Place	17.13	140	130	17.13	140	130	0	17.13	17.13	140	130	0	0	17.13	140	130	0	0	17.13	17.14	141	131	1	1	17.14	141	131	1	1	17.14
P38	16.25	Unit 2 / 22 Clearview Place	17.40	120	115	17.40	120	115	0	17.40	17.40	120	115	0	0	17.40	120	115	0	0	17.40	17.40	120	115	0	0	17.39	119	114	-1	-1	17.40
P39	16.57	Unit 1 / 22 Clearview Place	17.17	69	60	17.16	68	59	-1	17.17	17.16	68	59	-1	-1	17.16	68	59	0	0	17.16	17.16	68	59	-1	-1	17.16	68	59	0	0	17.16
P40	16.81	Clearview Place	17.20	40	39	17.20	40	39	0	17.20	17.20	40	39	0	0	17.19	39	38	-1	-1	17.20	17.20	40	39	0	0	17.19	39	38	-1	-1	17.20
P41	16.90	Unit 1/84-85A Old Pittwater Road	16.83	8	0	16.83	8	0	0	16.83	16.83	8	0	0	0	16.83	8	0	0	0	16.83	16.83	8	0	0	0	16.83	8	0	0	0	16.83
P42	17.17	82B Old Pittwater Road	16.98	2	0	16.98	2	0	0	16.98	16.98	2	0	0	0	16.98	2	0	0	0	16.98	16.98	2	0	0	0	16.98	2	0	0	0	16.98
P43	16.65	Clearview Place	16.84	24	19	16.83	23	18	-1	16.84	16.83	23	18	-1	-1	16.83	23	18	0	0	16.83	16.83	23	18	-1	-1	16.83	23	18	0	0	16.83
P44	16.52	22A Clearview Place	17.02	60	50	17.02	60	50	0	17.02	17.02	60	50	0	0	17.02	60	50	0	0	17.02	17.02	60	50	0	0	17.02	60	50	0	0	17.02
P45	17.01	22 Clearview Place	16.88	15	0	16.88	15	0	0	16.88	16.88	15	0	0	0	16.87	14	0	-1	-1	16.88	16.88	15	0	0	0	16.87	14	0	-1	-1	16.88
P48	15.98	22B Clearview Place	16.84	102	86	16.84	102	86	0	16.84	16.84	102	86	0	0	16.84	102	86	0	0	16.84	16.84	102	86	0	0	16.84	102	86	0	0	16.84
P50	16.21	98 Clearview Place	16.84	81	63	16.84	81	63	0	16.84	16.84	81	63	0	0	16.83	80	62	-1	0	16.84	16.83	80	62	-1	-1	16.83	80	62	-1	0	16.83
P51	19.94	Old Pittwater Road	15.84	1	0	15.84	1	0	0	15.84	15.84	1	0	0	0	15.84	1	0	0	0	15.84	15.84	1	0	0	0	15.84	1	0	0	0	15.84
P52	16.5	Old Pittwater Road	15.80	4	0	15.80	4	0	0	15.80	15.80	4	0	0	0	15.80	4	0	0	0	15.80	15.80	4	0	0	0	15.80	4	0	0	0	15.80
P53	16.45	Old Pittwater Road	15.53		0	15.53		0	0	15.53	15.53		0	0	0	15.53		0	0	0	15.53	15.53		0	0	0	15.53		0	0	0	15.53
P54	14.97	Old Pittwater Road	15.52	77	55	15.52	77	55	0	15.52	15.52	77	55	0	0	15.52	77	55	0	0	15.52	15.52	77	55	0	0	15.52	77	55	0	0	15.52
P55	14.93	Old Pittwater Road	15.25	39	32	15.25	39	32	0	15.25	15.25	39	32	0	0	15.25	39	32	0	0	15.25	15.25	39	32	0	0	15.25	39	32	0	0	15.25
P56	14.94	Old Pittwater Road	15.14	35	20	15.14	35	20	0	15.14	15.14	35	20	0	0	15.14	35	20	0	0	15.14	15.14	35	20	0	0	15.14	35	20	0	0	15.14
P57	14.93	Old Pittwater Road	15.14	36	21	15.14	36	21	0	15.14	15.14	36	21	0	0	15.14	36	21	0	0	15.14	15.14	36	21	0	0	15.14	36	21	0	0	15.14
P58	14.93	Old Pittwater Road	15.14	29	21	15.14	29	21	0	15.14	15.14	29	21	0	0	15.14	29	21	0	0	15.14	15.14	29	21	0	0	15.14	29	21	0	0	15.14
P59	14.94	Old Pittwater Road	15.14	29	20	15.14	29	20	0	15.14	15.14	29	20	0	0	15.14	29	20	0	0	15.14	15.14	29	20	0	0	15.14	29	20	0	0	15.14
P60	14.94	Old Pittwater Road	15.14	36	20	15.14	36	20	0	15.14	15.14	36	20	0	0	15.14	36	20	0	0	15.14	15.14	36	20	0	0	15.14	36	20	0	0	15.14
P61	14.96	Old Pittwater Road	15.14	34	18	15.14	34	18	0	15.14	15.14	34	18	0	0	15.14	34	18	0	0	15.14	15.14	34	18	0	0	15.14	34	18	0	0	15.14
P62	14.94	Old Pittwater Road	15.14	32	20	15.14	32	20	0	15.14	15.14	32	20	0	0	15.14	32	20	0	0	15.14	15.14	32	20	0	0	15.14	32	20	0	0	15.14
P63	14.95	Old Pittwater Road	15.14	32	19	15.14	32	19	0	15.14	15.14	32	19	0	0	15.14	32	19	0	0	15.14	15.14	32	19	0	0	15.14	32	19	0	0	15.14
P64	14.89	Suit2/98 Old Pittwater Road	15.14	41	25	15.14	41	25	0	15.14	15.14	41	25	0	0	15.14	41	25	0	0	15.14	15.14	41	25	0	0	15.14	41	25	0	0	15.14
P65	14.89	Suit2/98 Old Pittwater Road	15.14	42	25	15.14	42	25	0	15.14	15.14	42	25	0	0	15.14	42	25	0	0	15.14	15.14	42	25	0	0	15.14	42	25	0	0	15.14
P66	14.91	Suit1/98 Old Pittwater Road	15.14	43	23	15.14	43	23	0	15.14	15.14	43	23	0	0	15.14	43	23	0	0	15.14	15.14	43	23	0	0	15.14	43	23	0	0	15.14
P67	14.91	Suit1/98 Old Pittwater Road	15.14	37	23	15.14	37	23	0	15.14	15.14	37	23	0	0	15.14	37	23	0	0	15.14	15.14	37	23	0	0	15.14	37	23	0	0	15.14
P69	16.45	Unit 2/100 Old Pittwater Road	15.08	0	0	15.08	0	0	0	15.08	15.08	0	0	0	0	15.08	0	0	0	0	15.08	15.08		0	0	0	15.08		0	0	0	15.08
P71	16.41	Unit 2/100 Old Pittwater Road	15.08	10	0	15.08	10	0	0	15.08	15.08	10	0	0	0	15.08	10	0	0	0	15.08	15.08	10	0	0	0	15.08	10	0	0	0	15.08
P72	17.48	Unit 1/100 Old Pittwater Road	15.05		0	15.05		0	0	15.05	15.04		0	-1	-1	15.04		0	-1	-1	15.04	15.04		0	-1	-1	15.04		0	-1	-1	15.04
P73	14.74	98 Old Pittwater Road	15.14	61	40	15.14	61	40	0	15.14	15.14	61	40	0	0	15.14	61	40	0	0	15.14	15.14	61	40	0	0	15.14	61	40	0	0	15.14
P74	14.72	98 Old Pittwater Road	15.14	51	42	15.14	51	42	0	15.14	15.14	51	42	0	0	15.14	51	42	0	0	15.14	15.14	51	42	0	0	15.14	51	42	0	0	15.14
P75	14.71	98 Old Pittwater Road	15.14	61	43	15.14	61	43	0	15.14	15.14	61	43	0	0	15.14	61	43	0	0	15.14	15.14	61	43	0	0	15.14	61	43	0	0	15.14
P76	14.73	98 Old Pittwater Road	15.14	57	41	15.14	57	41	0	15.14	15.14	57	41	0	0	15.14	57	41	0	0	15.14	15.14	57	41	0	0	15.14	57	41	0	0	15.14
P77	14.75	98 Old Pittwater Road	15.14	53	39	15.14	53	39	0	15.14	15.14	53	39	0	0	15.14	53	39	0	0	15.14	15.14	53	39	0	0	15.14	53	39	0	0	15.14
P78	14.75	98 Old Pittwater Road	15.14	58	39	15.14	58	39	0	15.14	15.14	58	39	0	0	15.14	58	39	0	0	15.14	15.14	58	39	0	0	15.14	58	39	0	0	15.14
P79	14.76	98 Old Pittwater Road	15.85	119	109	15.85	119	109	0	15.85	15.85	119	109	0	0	15.85	119	109	0	0	15.85	15.86	120	110	1	1	15.86	120	110	1	1	15.86
P80	14.75	98 Old Pittwater Road	15.74	109	99	15.74	109	99	0	15.74	15.74	109	99	0	0	15.74	109	99	0	0	15.74	15.73	108	98	-1	-1	15.73	108	98	-1	-1	15.73
P81	14.75	98 Old Pittwater Road	15.63	98	88	15.63	98	88	0	15.63	15.63	98	88	0	0	15.63	98	88	0	0	15.63	15.63	98	88	0	0	15.63	98	88	0	0	15.63
P82	14.74	98 Old Pittwater Road	15.41	77	67	15.41	77	67	0	15.41	15.41	77	67	0	-1	15.41	77	67	0	-1	15.41	15.42	78	68	1	0	15.42	78	68	1	0	15.42
P83	14.73	98 Old Pittwater Road	15.30	67	57	15.30	67	57	0	15.30	15.30	67	57	0	0	15.30	67	57	0	0	15.30	15.30	67	57	0	0	15.30	67	57	0	0	15.30
P85	14.72	Suite 8/98 Old Pittwater Road	14.97	35	24	14.97	35	24	0	14.97	14.97	35	25	0	0	14.97	35	25	0	0	14.97	14.97	35	25	0	0	14.97	35	25	0	0	14.97
P86	14.72	Suite 9/98 Old Pittwater Road	14.92	37	20	14.92	37	20	0	14.92	14.92	37	20	0	0	14.92	37	20	0	0	14.92	14.92	37	20	0	0	14.92	37	20	0	0	14.92
P87	14.68	Suite 10/98 Old Pittwater Road	14.91	30	23	14.91	30	23	0	14.91	14.91	30	23	0	0	14.91	30	23	0	0	14.91	14.91	30	23	0	0	14.91	30	23	0	0	14.91
P88	14.70	Suite 11/98 Old Pittwater Road	14.87	24	17	14.87	24	17	0	14.87	14.87	24	17	0	0	14.87	24	17	0	0	14.87	14.87	24	17	0	0	14.87	24	17	0	0	14.87
P89	14.71	Suite 12/98 Old Pittwater Road	14.85	33	14	14.85	33	14	0	14.85	14.85	33	14	0	0	14.85	33	14	0	0	14.85	14.86	34	15	1	1	14.86	34	15	1	1	14.86
P90	14.71	Suite 13/98 Old Pittwater Road	14.83	38	12	14.83	38	12	0	14.83	14.83	38	12	0	0	14.83	38	12	0	0	14.83	14.83	38	12	0	0	14.83	38	12	0	0	14.83
P91	14.71	Suite 14/98 Old Pittwater Road	14.82	32	11	14.82	32	11	0	14.82	14.82	32	11	0	0	14.82	32	11	0	0	14.82	14.82	32	11	0	0	14.82	32	11	0	0	14.82
P92	14.68	Suite 15/98 Old Pittwater Road	14.80	31	12	14.80	31	12	0	14.80	14.80	31	12	0	0	14.80	31	12	0	0	14.80	14.80	31	12	0	0	14.80	31	12	0	0	14.80
P93	14.68	Suite 16/98 Old Pittwater Road	14.80	34	12	14.80	34	12	0	14.80	14.80	34	12	0	0	14.80	34	12	0	0	14.80	14.80	34	12	0	0	14.80	34	12	0	0	14.80
P94	14.68	Suite 17/98 Old Pittwater Road	14.79	36	11	14.79	36	11	0	14.79	14.79	36	11	0	0	14.79	36	11	0	0	14.79	14.79	36	11	0	0	14.79	36	11	0	0	14.79
P95	14.69	Suite 18/98 Old Pittwater Road	14.79	34	10	14.79	34	10	0	14.79	14.79	34	10	0	0	14.79	34	10	0	0	14.79	14.79	34	10	0	0	14.79	34	10	0	0	14.79
P96	14.70	Suite 19/98 Old Pittwater Road	14.78	27	8	14.78	27	8	0	14.78	14.78	27	8	0	0	14.78	27	8	0	0	14.78	14.78	27	8	0	0	14.78	27	8	0	0	14.78
P97	16.63	65 Cross Street	15.09	44	0	15.09	44	0	0	15.09	15.09	44	0	0	0	15.09	44	0	0	0	15.09	15.09	44	0	0	0	15.09	44	0	0	0	15.09
P98	13.47	65 Cross Street	13.55	20	8	13.55	20	8	0	13.55	13.55	20	8	0	0	13.55	20	8	0	0	13.55	13.55	20	8	0	0	13.55	20	8	0	0	13.55
P99	14.10	38A Cross Street	13.54	38	0	13.54	38	0	0	13.54	13.54	38	0	0	0	13.54	38	0	0	0	13.54	13.54	38	0	0	0	13.54	38	0	0	0	13.54
P100	14.23	38B Cross Street	13.54	47	0	13.54	47	0	0	13.54	13.54	47	0	0	0	13.54	47	0	0	0	13.54	13.54	47	0	0	0	13.54	47	0	0	0	13.54
P101	14.16	38 Cross Street	13.54	34	0	13.54	34	0	0	13.54	13.54	34	0	0	0	13.53	33	0	-1	-1	13.54	13.54	34	0	0	0	13.53	33	0	-1	-1	13.54
P102	14.29	65 Cross Street	13.53	25	0	13.53	25	0	0	13.53	13.53	25	0	0	0	13.53	25	0	0	0	13.53	13.53	25	0	0	0	13.53	25	0	0	0	13.53
P103	13.9	34 Cross Street	13.50	16	0	13.50	16	0	0	13.50	13.50	16	0	0	0	13.49	15	0	-1	-1	13.50	13.50	16	0	0	0	13.50	16	0	0	0	13.50
P104	12.09	32 Cross Street	13.39	140	130	13.39	140	130	0	13.39	13.39	140	130	0	0	13.39	140	130	0	0	13.39	13.39	140	130	0	0	13.39	140	130	0	0	13.39
P105	13.69	32 Cross Street	13.24	29	0	13.24	29	0	0	13.24	13.24	29	0	0	0	13.24	29	0	0	0	13.24	13.24	29	0	0	0	13.24	29	0	0	0	13.24
P106	13.41	30 Cross Street	12.86	22	0	12.86	22	0	0	12.86	12.86	22	0	0	0	12.86	22	0	0	0	12.86	12.86	22	0	0	0	12.86	22	0	0	0	12.86
P107	13.35	28 Cross Street	12.67	10	0	12.67	10	0	0	12.67	12.67	10	0	0	0	12.67	10	0	0	0	12.67	12.67	10	0	0	0	12.67	10	0	0	0	12.67
P108	13.24	Cross Street	12.65	25	0	12.65	25	0	0	12.65	12.65	25	0	0	0	12.65	25	0	0	0	12.65	12.66	26	0	1	1	12.65	25	0	0	0	12.66
P109	13.09	26 Cross Street	12.66	9	0	12.66	9	0	0	12.66	12.66	9	0	0	0	12.65	8	0	-1	-1	12.66	12.66	9	0	0	0	12.66	9	0	0	0	12.66
P110	11.86	Unit 7 / 16-22 Cross Street	12.76	100	90	12.76	100	90	0	12.76	12.76	100	90	0	0	12.76	100	90	0	0	12.76	12.77	101	91	1	1	12.77	101	91	1	1	12.77
P112	11.87	Unit 1 / 16-22 Cross Street	12.56	79	69	12.56	79	69	0	12.56	12.56	79	69	0	0	12.55	78	68	-1	-1	12.56	12.56	79	69	0	0	12.56	79	69	0	0	12.56
P113	14.22	102 Old Pittwater Road	14.61	124	39	14.61	124	39	0	14.61	14.61	124	39	0	0	14.61	124	39	0	0	14.61	14.60	123	38	-1	-1	14.60	123	38	-1	-1	14.60
P114	14.23	102 Old Pittwater Road	14.61	49	38	14.61	49	38	0	14.61	14.61	49	38	0	0	14.61	49	38	0	0	14.61	14.61	49	38	0	0	14.60	48	37	-1	-1	14.61
P115	13.13	33 Cross Street	13.54	79	41	13.54	79	41	0	13.54	13.54	79	41	0	0	13.53	78	40	-1	-1	13.54	13.54	79	41	0	0	13.54	79	41	0	0	13.54
P116	13.01	33 Cross Street	13.32	41	31	13.32	41	31	0	13.32	13.32	41	31	0	0	13.32	41	31	0	0	13.32	13.32	41	31	0	0	13.32	41	31	0	0	13.32
P117	13.16	33 Cross Street	13.46	31	30	13.46	31	30	0	13.46	13.46	31	30	0	0	13.46	31	30	0	0	13.46	13.46	31	30	0	0	13.46	31	30	0	0	13.46
P118	13.24	31 Cross Street	12.97	2	0	12.97	2	0	0	12.97	12.97	2	0	0	0	12.97	2	0	0	0	12.97	12.97	2	0	0	0	12.97	2	0	0	0	12.97
P119	13.21	31 Cross Street	12.50	16	0	12.50	16	0	0	12.50	12.50	16	0	0	0	12.50	16	0	0	0	12.50	12.50	16	0	0	0	12.50	16	0	0	0	12.50
P120	12.54	29 Cross Street	12.38	26	0	12.38	26	0	0	12.38	12.38	26	0	0	0	12.38	26	0	0	0	12.38	12.38	26	0	0	0	12.38	26	0	0	0	12.38
P121	12.32	14 Cross Street	12.36	6	4	12.36	6	4	0	12.36	12.36	6	4	0	0	12.35	5	3	-1	-1	12.36	12.36	6	4	0	0	12.36	6	4	0	0	12.36
P122	12.01	12 Cross Street	12.16	25	15	12.16	25	15	0	12.16	12.16	25	15	0	0	12.16	25	15	0	0	12.16	12.16	25	15	0	0	12.16	25	15	0	0	12.16
P123	14.16	75 Old Pittwater Road	14.65	59	49	14.65	59	49	0	14.65	14.66	60	50	1	1	14.66	60	50	1	0	14.66	14.65	59	49	0	0	14.66	60	50	1	0	14.66
P124	13.11	33 Cross Street	12.67	13	0	12.67	13	0	0	12.67	12.67	13	0	0	0	12.66	12	0	-1	0	12.67	12.67	13	0	0	0	12.66	12	0	-1	0	12.67
P125	12.22	29 Cross Street	12.27	20	5	12.27	20	5	0	12.27	12.27	20	5	0	0	12.26	19	4	-1	-1	12.27	12.27	20	5	0	0	12.27	20	5	0	0	12.27
P126	12.15	10 Cross Street	12.02	9	0	12.02	9	0	0	12.02	12.02	9	0	0	0	12.02	9	0	0	0	12.02	12.02	9	0	0	0	12.02	9	0	0	0	12.02
P127	11.9	8 Cross Street	11.81	32	0	11.81	32	0	0	11.81	11.81	32	0	0	0	11.80	31	0	-1	-1	11.81	11.80	31	0	-1	-1	11.80	31	0	-1	-1	11.80
P128	12.53	25 Cross Street	12.59	53	6	12.49	43	0	-10	12.59	12.44	38	0	-15	-13	12.33	27	0	-16	-12	12.44	12.33	27	0	-26	-24	12.22	16	0	-27	-23	12.33
P129	12.13	29 Cross Street	12.61	58	48	12.52	49	39	-9	12.61	12.49	46	36	-12	-10	12.38	35	25	-14	-11	12.49	12.38	35	25	-23	-21	12.36	33	23	-16	-13	12.38
P130	12.16	25 Cross Street	12.54	43	38	12.46	35	30	-8	12.54	12.42	31	26	-12	-10	12.25	14	9	-21	-18	12.42	12.26	15	10	-28	-26	12.24	13	8	-22	-19	12.26
P131	12.18	25 Cross Street	12.03	11	0	12.02	10	0	-1	12.03	12.02	10	0	-1	0	12.02	10	0	0	0	12.02	12.03	11	0	0	1	12.03	11	0	1	1	12.03

			Existing Conditions							Updated Stormwater DA								Updated Stormwater DA with Brookvale Creek Design							
										18 June 2013								23 Sep 2014							
			100yr 1.5h ARI 50% Blockage			100yr 1.5h ARI 0% Blockage				100yr 1.5h ARI DA 50% Blockage					100yr 1.5h ARI DA 0% Blockage			100yr 1.5h ARI DA 50% Blockage					100yr 1.5h ARI DA 0% Blockage			
Survey Point	Floor Level (mAHD)	Street Address	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Max FL (m AHD)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Max FL (m AHD)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Max FL (m AHD)
			(a)			(b)			(b)-(a)		(ba)			(ba)-(a)	(ba)-(aa)				(bb)-(b)	(bb)-(ab)		(bk)			(bk)-(a)	(bk)-(aa)	(bl)			(bl)-(b)	(bl)-(ab)	
P132	12.04	23 Cross Street	12.04	13	0	12.03	12	0	-1	12.04	12.03	12	0	-1	-1	12.03	12	0	0	0	12.03	12.03	12	0	-1	-1	12.03	12	0	0	0	12.03
P133	12.12	21 Cross Street	11.94	24	0	11.93	23	0	-1	11.94	11.93	23	0	-1	0	11.93	23	0	0	0	11.93	11.93	23	0	-1	0	11.93	23	0	0	0	11.93
P134	9.95	19 Cross Street	11.36	151	141	11.21	136	126	-15	11.36	11.11	126	116	-25	-15	10.93	108	98	-28	-20	11.11	11.13	128	118	-23	-13	11.00	115	105	-21	-13	11.13
P137	14.61	Old Pittwater Road	12.79	19	0	12.72	12	0	-7	12.79	12.69	9	0	-10	-8	12.67	7	0	-5	-2	12.69	12.67	7	0	-12	-10	12.67	7	0	-5	-2	12.67
P138	12.99	Old Pittwater Road	12.91		0	12.91		0	0	12.91	12.91		0	0	0	12.91		0	0	0	12.91	12.91		0	0	0	12.91		0	0	0	12.91
P139	12.90	Old Pittwater Road	13.04	24	14	13.04	24	14	0	13.04	13.04	24	14	0	0	13.04	24	14	0	0	13.04	13.04	24	14	0	0	13.04	24	14	0	0	13.04
P140	13.12	Old Pittwater Road	13.14	12	2	13.14	12	2	0	13.14	13.14	12	2	0	0	13.14	12	2	0	0	13.14	13.14	12	2	0	0	13.14	12	2	0	0	13.14
P141	12.31	Old Pittwater Road	12.41	20	10	12.27	6	0	-14	12.41	12.20		0	-21	-19	11.99		0	-28	-23	12.20	12.19		0	-22	-20	12.02		0	-25	-20	12.19
P142		Brookvale Creek upstream of Mall	12.18	394		11.99	375		-19	12.18	11.86	362		-32	-29	11.44	320		-55	-46	11.86	11.91	367		-27	-24	11.59	335		-40	-31	11.91
P143			12.19	394		11.99	374		-20	12.19	11.86	361		-33	-29	11.45	320		-54	-46	11.86	11.92	367		-27	-23	11.59	334		-40	-32	11.92
P144			12.24	411		12.06	393		-18	12.24	11.94	381		-30	-27	11.57	344		-49	-41	11.94	11.93	380		-31	-28	11.62	349		-44	-36	11.93
P145			12.30	381		12.13	364		-17	12.30	12.04	355		-26	-23	11.76	327		-37	-30	12.04	12.07	358		-23	-20	11.84	335		-29	-22	12.07
P146			12.38	419		12.23	404		-15	12.38	12.15	396		-23	-20	11.92	373		-31	-25	12.15	12.17	398		-21	-18	11.99	380		-24	-18	12.17
P147			12.57	429		12.47	419		-10	12.57	12.42	414		-15	-13	12.29	401		-18	-14	12.42	12.27	399		-30	-28	12.13	385		-34	-30	12.27
P148			12.63	429		12.54	420		-9	12.63	12.50	416		-13	-11	12.39	405		-15	-12	12.50	12.39	405		-24	-22	12.29	395		-25	-22	12.39
P149			12.70	447		12.62	439		-8	12.70	12.59	436		-11	-9	12.50	427		-12	-9	12.59	12.50	427		-20	-18	12.42	419		-20	-17	12.50
P150			12.76	430		12.70	424		-6	12.76	12.67	421		-9	-8	12.60	414		-10	-8	12.67	12.60	414		-16	-15	12.54	408		-16	-14	12.60
P151			12.76	348		12.70	342		-6	12.76	12.67	339		-9	-8	12.61	333		-9	-7	12.67	12.61	333		-15	-14	12.54	326		-16	-14	12.61
P152			12.95	361		12.91	357		-4	12.95	12.90	356		-5	-4	12.86	352		-5	-4	12.90	12.86	352		-9	-8	12.83	349		-8	-7	12.86
P153			13.03	343		12.99	339		-4	13.03	12.98	338		-5	-4	12.95	335		-4	-3	12.98	12.95	335		-8	-7	12.92	332		-7	-6	12.95
P154			13.11	475		13.07	471		-4	13.11	13.06	470		-5	-4	13.03	467		-4	-3	13.06	13.03	467		-8	-7	13.01	465		-6	-5	13.03
P155		Harrison Property	12.20	33		12.01	14		-19	12.20	11.89	2		-31	-28	11.49			-52	-44	11.89	11.92	5		-28	-25	11.60			-41	-33	11.92
P156			12.26	14		12.08			-18	12.26	11.97			-29	-26	11.79			-29	-21	11.97	11.98			-28	-25	11.81			-27	-19	11.98
P157			12.51	3		12.39			-12	12.51	12.33			-18	-15	12.17			-22	-18	12.33	12.24			-27	-24	12.09			-30	-26	12.24
P158			12.66	60		12.58	52		-8	12.66	12.54	48		-12	-10	12.46	40		-12	-9	12.54	12.46	40		-20	-18	12.38	32		-20	-17	12.46
P159			12.71	48		12.64	41		-7	12.71	12.61	38		-10	-9	12.52	29		-12	-9	12.61	12.52	29		-19	-18	12.43	20		-21	-18	12.52
P160			12.80	99		12.73	92		-7	12.80	12.71	90		-9	-7	12.64	83		-9	-7	12.71	12.64	83		-16	-14	12.58	77		-15	-13	12.64
P161			12.96	11		12.96	11		0	12.96	12.96	11		0	0	12.96	11		0	0	12.96	12.96	11		0	0	12.96	11		0	0	12.96
P162			13.65	24		13.64	23		-1	13.65	13.64	23		-1	-1	13.64	23		0	0	13.64	13.64	23		-1	-1	13.64	23		0	0	13.64
P163			12.78	31		12.71	24		-7	12.78	12.68	21		-10	-8	12.61	14		-10	-8	12.68	12.61	14		-17	-15	12.54	7		-17	-15	12.61
P164		Driveway to Woolworth Loading Dock	10.96	109		10.84	97		-12	10.96	10.01	14		-95	-46				-81	-4	10.03	9.87			-109	-60	9.87			-97	-20	9.87
P165			11.01	82		10.86	67		-15	11.01	10.19			-82	-32	10.19			-67	-7	10.19	10.19			-82	-32	10.19			-67	-7	10.19
P166			11.11	57		10.92	38		-19	11.11	10.87	33		-24	15	10.77	23		-15	15	10.87	10.89	35		-22	17	10.83	29		-9	21	10.89
P167		Roundabout in Cross Street	11.34	68		11.21	55		-13	11.34	10.85	19		-49	-10	10.75	9		-46	-10	10.85	10.88	22		-46	-7	10.79	13		-42	-6	10.88
P168			11.19	26		11.13	20		-6	11.19	11.09	16		-10	0	11.09	16		-4	0	11.09	11.09	16		-10	0	11.09	16		-4	0	11.09
P169		Palm Tree Carpark	10.54	15		10.51	12		-3	10.54	10.43	4		-11	0	10.43	4		-8	0	10.43	10.43	4		-11	0	10.43	4		-8	0	10.43
P170			10.15	27		10.14	26		-1	10.15	9.85			-30	-31	9.85			-29	-32	9.85	9.85			-30	-31	9.85			-29	-32	9.85
P171			10.15	55		10.14	54		-1	10.15	9.57			-58	-59	9.59			-55	-58	9.59	9.49			-66	-67	9.49			-65	-68	9.49
P172			10.15	63		10.13	61		-2	10.15	9.47			-68	-69	9.62	10		-51	-55	9.62	9.47			-68	-69	9.47			-66	-70	9.47
P173			10.15	39		10.13	37		-2	10.15	9.77	1		-38	-39	9.77	1		-36	-40	9.77	9.77	1		-38	-39	9.77	1		-36	-40	9.77
P174			10.74	15		10.70	11		-4	10.74	10.55			-19	0				-15	0	10.55	10.55			-19	0	10.55			-15	0	10.55
P175			10.15	99		10.14	98		-1	10.15	9.59	43		-56	-58	9.61	45		-53	-57	9.61	9.39	23		-76	-78	9.39	23		-75	-79	9.39
P176			10.15	106		10.14	105		-1	10.15	9.59	50		-56	-58	9.61	52		-53	-57	9.61	9.33	24		-82	-84	9.33	24		-81	-85	9.33
P177			10.15	114		10.14	113		-1	10.15	9.58	57		-57	-59	9.60	59		-54	-58	9.60	9.26	25		-89	-91	9.26	25		-88	-92	9.26
P178		Green Street	10.15	120		10.14	119		-1	10.15	9.58	63		-57	-58	9.59	64		-55	-59	9.59	9.25	30		-90	-91	9.25	30		-89	-93	9.25
P179			10.15	130		10.14	129		-1	10.15	9.58	73		-57	-58	9.59	74		-55	-59	9.59	9.25	40		-90	-91	9.25	40		-89	-93	9.25
P180			10.15	132		10.13	130		-2	10.15	9.58	75		-57	-58	9.60	77		-53	-57	9.60	9.26	43		-89	-90	9.26	43		-87	-91	9.26
P181			10.15	80		10.13	78		-2	10.15	9.58	23		-57	-58	9.60	25		-53	-57	9.60	9.45	10		-70	-71	9.45	10		-68	-72	9.45
P182			10.08	11		10.10	13		2	10.10	9.93			-15	-15	9.93			-17	-18	9.93	9.93			-15	-15	9.93			-17	-18	9.93
P183			9.91	45		9.93	47		2	9.93	9.40			-51	-52	9.40			-53	-57	9.40	9.40			-51	-52	9.40			-53	-57	9.40
P184			9.83	58		9.86	61		3	9.86	9.24			-59	-49	9.24			-62	-52	9.24	9.24			-59	-49	9.24			-62	-52	9.24
P185			9.83	64		9.85	66		2	9.85	9.05			-78	-67	9.05			-80	-69	9.05	9.05			-78	-67	9.05			-80	-69	9.05
P186			9.83	88		9.85	90		2	9.85	9.00	5		-83	-70	9.00	5		-85	-73	9.00	8.93			-90	-77	8.94			-91	-79	8.94
P187			9.81	120		9.83	122		2	9.83	9.30	69		-51	-38	9.30	69		-53	-41	9.30	9.29	68		-52	-39	9.29	68		-54	-42	9.29
P188			9.77	138		9.79	140		2	9.79	9.29	90		-48	-37	9.29	90		-50	-39	9.29	9.28	89		-49	-38	9.28	89		-51	-40	9.28
P189			9.74	139		9.76	141		2	9.76	9.28	93		-46	-36	9.27	92		-49	-39	9.28	9.26	91		-48	-38	9.27	92		-49	-39	9.27
P190			9.63	64		9.64	65		1	9.64	9.24	25		-39	-30	9.23	24		-41	-33	9.24	9.23	24		-40	-31	9.23	24		-41	-33	9.23
P191			9.48	44		9.49	45		1	9.49	9.16	12		-32	-25	9.16	12		-33	-26	9.16	9.15	11		-33	-26	9.15	11		-34	-27	9.15
P192		Starfish Carpark Entrance	10.96	88		10.84	76		-12	10.96	10.17	9		-79	-29	10.17	9		-67	0	10.17	10.17	9		-79	-29	10.17	9		-67	0	10.17
P193			11.00	1		11.00	1		0	11.00	10.98			-2	0	10.98			-2	0	10.98	10.98			-2	0	10.98			-2	0	10.98
P194			11.07	1		11.07	1		0	11.07	11.01			-6	0	11.01			-6	0	11.01	11.01			-6	0	11.01			-6	0	11.01
P192_1			10.96	91		10.84	79		-12	10.96	10.06	1		-90	-40	10.06	1		-78	-2	10.06	10.06	1		-90	-40	10.06	1		-78	-2	10.06
P193_1			10.96	15		10.84	3		-12	10.96	10.88	7		-8	0	10.88	7		4	0	10.88	10.88	7		-8	0	10.88	7		4	0	10.88
P194_1			11.08	18		11.08	18		0	11.08	10.94	4		-14	0	10.94	4		-14	0	10.94	10.94	4		-14	0	10.94	4		-14	0	10.94
P217			10.96	146		10.84	134		-12	10.96	10.01	51		-95	-45	10.03	53		-81	-4	10.03	9.75	25		-121	-71	9.76	26		-108	-31	9.76
P195		Starfish Carpark	10.98	3		10.98	3		0	10.98	10.98	3		0	0	10.98	3		0	0	10.98	10.98	3		0	0	10.98	3		0	0	10.98
P196			10.80	16		10.79	15		-1	10.80	10.58			-22	0	10.58			-21	0	10.58	10.58			-22	0	10.58			-21	0	10.58
P197			10.80	58		10.78	56		-2	10.80	-					-					-	-					-					-
P198			10.80	29		10.78	27		-2	10.80	-					-					-	-					-					-
P199			10.80	27		10.79	26		-1	10.80	10.54	1		-26	0	10.54	1		-25	0	10.54	10.54	1		-26	0	10.54	1		-25	0	10.54
P200			10.86	10		10.86	10		0	10.86	10.76			-10	0	10.76			-10	0	10.76	10.76			-10	0	10.76			-10	0	10.76
P201			10.83	6		10.83	6		0	10.83	10.77			-6	0	10.77			-6	0	10.77	10.77			-6	0	10.77			-6	0	10.77
P202			10.80	35		10.79	34		-1	10.80	10.50	5		-30	0	10.50	5		-29	0	10.50	10.50	5		-30	0	10.50	5		-29	0	10.50
P203			10.80	37		10.78	35		-2	10.80	-					-					-	-					-					-
P204		Warringah Golf Course	5.78	71		5.80	73		2	5.80	5.79	72		1	6	5.80	73		0	5	5.80	5.78	71		0	5	5.80	73		0	5	5.80
P205			5.19	21		5.21	23		2	5.21	5.21	23		2	5	5.22	24		1	5	5.22	5.21	23		2	5	5.22	24		1	5	5.22
P206			4.18	76		4.20	78		2	4.20	4.20	78		2	5	4.22	80		2	5	4.22	4.21	79		3	6	4.22	80		2	5	4.22
P207			3.70	89		3.72	91		2	3.72	3.73	92		3	5	3.74	93		2	4	3.74	3.73	92		3	5	3.74	93		2	4	3.74
P208			3.38	225		3.39	226		1	3.39	3.40	227		2	4	3.41	228		2	4	3.41	3.40	227		2	4	3.41	228		2	4	3.41
P209			3.37	71		3.39	73		2	3.39	3.40	74		3	5	3.40	74		1	3	3.40	3.40	74		3	5	3.40	74		1	3	3.40
P210			3.34	82		3.35	83		1	3.35	3.36	84		2	4	3.37	85		2	4	3.37	3.36	84		2	4	3.37	85		2	4	3.37
P211			2.90	135		2.92	137		2	2.92	2.93	138		3	4	2.93	138		1	3	2.93	2.93	138		3	4	2.93	138		1	3	2.93
P212			2.74	229		2.74	229		0	2.74	2.75	230		1	1	2.75	230		1	1	2.75	2.75	230		1	1	2.75	230		1	1	2.75
P213			2.71	94		2.71	94		0	2.71	2.71	94		0	0	2.71	94		0	0	2.71	2.71	94		0	0	2.71	94		0	0	2.71
P214			2.71	91		2.71	91		0	2.71	2.71	91		0	0	2.71	91		0	0	2.71	2.71	91		0	0	2.71	91		0	0	2.71
P215			2.74	69		2.74	69		0	2.74	2.74	69		0	0	2.75	70		1	1	2.75	2.74	69		0	0	2.75	70		1	1	2.75
P216			2.71	108		2.71	108		0	2.71	2.71	108		0	0	2.71	108		0	0	2.71	2.71	108		0	0	2.71	108		0	0	2.71
P300	11.12	4 Cross St	10.78	10	0	10.75	7	0	-3	10.78	10.68		0	-10	0	10.68		0	-7	0	10.68	10.68		0	-10	0	10.68		0	-7	0	10.68
P301	10.12	2 Cross St	10.15	93	3	10.13	91	1	-2	10.15	9.60	38	0	-55	-57	9.62	40	0	-51	-57	9.62	9.40	18	0	-75	-77	9.40	18	0	-73	-79	9.40
P302	10.08	(Cross St)	10.15	86	7	10.13	84	5	-2	10.15	9.59	30	0	-56	-58	9.61	32	0	-52	-57	9.61	9.44	15	0	-71	-73	9.44	15	0	-69	-74	9.44
P303	10.45	Cross St	10.37	10	0	10.37	10	0	0	10.37	10.37	10	0	0	0	10.37	10	0	0	0	10.37	10.37	10	0	0	0	10.37	10	0	0	0	10.37
P304	10.87	2 Dale St	10.95	9	8	10.95	9	8	0	10.95	10.95	9	8	0	0	10.95	9	8	0	0	10.95	10.95	9	8	0	0	10.95	9	8	0	0	10.95
P305	10.08	26 Green St	10.15	91	7	10.13	89	5	-2	10.15	9.60	36	0	-55	-57	9.61	37	0	-52	-58	9.61	9.48	24	0	-67	-69	9.48	24	0	-65	-71	9.48
P306	10.65	24 Green St	10.15	50	0	10.13	48	0	-2	10.15	9.80	15	0	-35	-37	9.80	15	0	-33	-39	9.80	9.81	16	0	-34	-36	9.81	16	0	-32	-38	9.81
P307	11.55	20 Green St	10.27	14	0	10.27	14	0	0	10.27	10.27	14	0	0	0	10.27	14	0	0	0	10.27	10.27	14	0	0	0	10.27	14	0	0	0	10.27
221		DJ Loading Dock	10.24	*104*		10.28	*108*		4	10.28	9.71	*51*		-53	-22	9.73	*53*		-55	-51	9.73	9.67	*47*		-57	-26	9.67	*47*		-61	-57	9.67
222		DJ Loading Dock	10.21	*111*		10.23	*113*		2	10.23	9.71	*61*		-50	-22	9.73	*63*		-50	-49	9.73	9.67	*57*		-54	-26	9.67	*57*		-56	-55	9.67
401		Bus Depot Sucatchment east of Pittwater Ro	11.07			11.07			0	11.07	11.04			-3	-3	11.05			-2	-2	11.05	11.04			-3	-3	11.04			-3	-3	11.04
402		Bus Depot Sucatchment east of Pittwater Ro	11.06			11.06			0	11.06	11.04			-2	-2	11.04			-2	-2	11.04	11.03			-3	-3	11.03			-3	-3	11.03
403		Bus Depot Sucatchment east of Pittwater Ro	11.06			11.06			0	11.06	11.04			-2	-2	11.04			-2	-2	11.04	11.03			-3	-3	11.03			-3	-3	11.03
404		Bus Depot Sucatchment east of Pittwater Ro	11.06			11.06			0	11.06	11.04			-2	-2	11.04			-2	-2	11.04	11.03			-3	-3	11.03			-3	-3	11.03
501		Anchor Car Park	9.53	*62*		9.53	*62*		0	9.53	9.53	*62*		0	0	9.53	*62*		0	0	9.53	9.53	*62*		0	0	9.53	*62*		0	0	9.53
502		Anchor Car Park	9.53	*64*		9.53	*64*		0	9.53	9.53	*64*		0	0	9.53	*64*		0	0	9.53	9.53	*64*		0	0	9.53	*64*		0	0	9.53
503		Anchor Car Park	9.53	*66*		9.53	*66*		0	9.53	9.53	*66*		0	0	9.53	*66*		0	0	9.53	9.53	*66*		0	0	9.53	*66*		0	0	9.53
504		Anchor Car Park	9.53	*60*		9.53	*60*		0	9.53	9.53	*60*		0	0	9.53	*60*		0	0	9.53	9.53	*60*		0	0	9.53	*60*		0	0	9.53
505		Anchor Car Park / Coles Loading Dock	9.53	*71*		9.53	*71*		0	9.53	9.53	*71*		0	0	9.53	*71*		0	0	9.53	9.53	*71*		0	0	9.53	*71*		0	0	9.53



Cardno

89914004
October 2014

FIGURE 5 - SHEET 1
WATER LEVEL DIFFERENCES-100YR ARI
STAGE 2-DA1742-0% BLOCKAGE- LESS EXISTING -0% BLOCKAGE

Cardno

89914004
October 2014

FIGURE 5 - SHEET 2
WATER LEVEL DIFFERENCES-100YR ARI
STAGE 2- DA1742-0% BLOCKAGE- LESS EXISTING -0% BLOCKAGE

N
W E
S

Water Level Difference (cm)

- >20
- 16 to 20
- 12 to 16
- 8 to 12
- 4 to 8
- 1 to 4
- -1 to -4
- -4 to -8
- -8 to -12
- - 12 to -16
- -16 to -20
- <-20

0 50 100
metres

Cardno

89914004
October 2014

FIGURE 6 - SHEET 1
WATER LEVEL DIFFERENCES-100YR ARI
STAGE 2-DA1742-50% BLOCKAGE- LESS EXISTING -50% BLOCKAGE

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October 2014

FIGURE 6 - SHEET 2
WATER LEVEL DIFFERENCES-100YR ARI
STAGE 2- DA1742-50% BLOCKAGE- LESS EXISTING -50% BLOCKAGE

NA49913132 Construction Scenario A for Chamber C6

Existing Conditions — Run 2E

Model done 21Aug 2013 — 10 yr ARI Existing Conditions — 21 August 2013

Model done 3Dec 2013 — 10 yr ARI C6A — 3 December 2013

Model done 21Aug 2013 — 5 yr ARI Existing Conditions — 21 August 2013

Model done 3Dec 2013 — 5 yr ARI C6A — 3 December 2013

				100yr 1.5h ARI 50% Blockage			10yr 1.5h ARI Existing 50% Blockage			10yr 1.5h ARI C6A 50% Blockage				5 yr 1.5h ARI Existing 50% Blockage			5 yr 1.5h ARI C6A 50% Blockage			
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Flood Level (mAHD) (a)	Depth over Ground (cm)	Depth over Floor (m)	Flood Level (mAHD) (g)	Depth over Ground (cm)	Diff (cm) (g)-(a)	Flood Level (mAHD) (h)	Depth over Ground (cm)	Diff (cm) (h)-(g)	Diff (cm) (h)-(a)	Flood Level (mAHD) (i)	Depth over Ground (cm)	Diff (cm) (i)-(a)	Flood Level (mAHD) (j)	Depth over Ground (cm)	Diff (cm) (j)-(i)	Diff (cm) (j)-(a)
P1	19.37	19.43	15 Clearview Place	20.46	109	1.03	19.14		-132	19.14		0	-132	18.60		-186	18.60		0	-186
P2	19.20	19.40	15 Clearview Place	20.35	115	0.95	19.24	4	-111	19.24	4	0	-111	19.24	4	-111	19.24	4	0	-111
P3	19.19	20.23	14 Clearview Place	19.88	69	0.00	19.25	6	-63	19.25	6	0	-63	19.25	6	-63	19.25	6	0	-63
P4	19.01	19.23	Unit 11/16-18 Clearview Place	19.10	9	0.00	18.88		-22	18.88		0	-22	18.88		-22	18.88		0	-22
P5	19.08	19.25	Unit 10B/16-18 Clearview Place	19.10	2	0.00	18.96		-14	18.96		0	-14	18.96		-14	18.96		0	-14
P6	19.20	19.30	Unit 10/16-18 Clearview Place	19.27	7	0.00	19.27	7	0	19.27	7	0	0	19.27	7	0	19.27	7	0	0
P7	19.27	19.30	Unit 9/16-18 Clearview Place	19.38	11	0.08	19.38	11	0	19.38	11	0	0	19.38	11	0	19.38	11	0	0
P8	19.24	19.30	Unit 8/16-18 Clearview Place	19.35	11	0.05	19.35	11	0	19.35	11	0	0	19.35	11	0	19.35	11	0	0
P9	19.23	19.26	Unit 7A/16-18 Clearview Place	19.33	10	0.07	19.33	10	0	19.33	10	0	0	19.33	10	0	19.33	10	0	0
P10	19.21	19.26	Unit 7/16-18 Clearview Place	19.31	10	0.05	19.31	10	0	19.31	10	0	0	19.31	10	0	19.31	10	0	0
P11	19.26	19.26	Unit 6/16-18 Clearview Place	19.30	4	0.04	19.29	3	-1	19.29	3	0	-1	19.29	3	-1	19.29	3	0	-1
P12	19.18	19.28	Unit 5/16-18 Clearview Place	19.30	12	0.02	19.29	11	-1	19.29	11	0	-1	19.29	11	-1	19.29	11	0	-1
P13	19.19	19.29	Unit 4/16-18 Clearview Place	19.29	10	0.00	19.28	9	-1	19.28	9	0	-1	19.28	9	-1	19.28	9	0	-1
P14	18.86	19.26	Unit 3/16-18 Clearview Place	19.29	43	0.03	19.28	42	-1	19.28	42	0	-1	19.28	42	-1	19.28	42	0	-1
P15	18.59	19.27	Unit 2/16-18 Clearview Place	19.27	68	0.00	19.27	68	0	19.27	68	0	0	19.27	68	0	19.27	68	0	0
P16	19.13	19.23	Unit 12/16-18 Clearview Place	19.31	18	0.08	19.30	17	-1	19.30	17	0	-1	19.30	17	-1	19.30	17	0	-1
P17	19.24	19.27	Unit 13/16-18 Clearview Place	19.30	6	0.03	19.29	5	-1	19.29	5	0	-1	19.29	5	-1	19.29	5	0	-1
P18	19.00	19.25	Unit 13/16-18 Clearview Place	19.08	8	0.00	18.94		-14	18.94		0	-14	18.94		-14	18.94		0	-14
P19	19.19	19.26	Unit 12/16-18 Clearview Place	19.16		0.00	19.18		2	19.18		0	2	19.18		2	19.18		0	2
P20	18.84	19.26	Unit 1 / 16-18 Clearview Place	19.02	18	0.00	18.79		-23	18.79		0	-23	18.79		-23	18.79		0	-23
P21	16.41	16.51	Unit 1 / 16-18 Clearview Place	18.92	251	2.41	18.48	207	-44	18.48	207	0	-44	18.48	207	-44	18.48	207	0	-44
P22	17.19	17.35	19 Clearview Place	18.25	106	0.90	17.53	34	-72	17.53	34	0	-72	17.43	24	-82	17.43	24	0	-82
P23	16.88	18.21	19 Clearview Place	18.25	137	0.04	17.55	67	-70	17.55	67	0	-70	17.45	57	-80	17.45	57	0	-80
P24	17.01	17.04	Unit 1/20 Clearview Place	18.25	124	1.21	17.50	49	-75	17.50	49	0	-75	17.41	40	-84	17.41	40	0	-84
P25	16.60	16.69	21 Clearview Place	18.21	161	1.52	17.49	89	-72	17.49	89	0	-72	17.39	79	-82	17.39	79	0	-82
P26	17.05	17.06	Unit 2/20 Clearview Place	17.98	93	0.92	17.37	32	-61	17.37	32	0	-61	17.29	24	-69	17.29	24	0	-69
P27	18.14	18.21	19 Clearview Place	18.73	59	0.52	18.57	43	-16	18.57	43	0	-16	18.52	38	-21	18.52	38	0	-21
P28	16.52	16.62	Unit 5/22 Clearview Place	17.60	108	0.98	17.05	53	-55	17.05	53	0	-55	16.94	42	-66	16.94	42	0	-66
P29	16.54	16.58	Unit 4/22 Clearview Place	17.58	104	1.00	17.04	50	-54	17.04	50	0	-54	16.93	39	-65	16.93	39	0	-65
P30	16.50	16.55	Unit 3/22 Clearview Place	17.58	108	1.03	17.04	54	-54	17.04	54	0	-54	16.93	43	-65	16.93	43	0	-65
P31	16.61	16.63	21 Clearview Place	17.14	53	0.51	16.58		-56	16.58		0	-56	16.58		-56	16.58		0	-56
P33	16.30	16.30	21 Clearview Place	17.14	84	0.84	16.27		-87	16.27		0	-87	16.27		-87	16.27		0	-87
P34	17.70	19.04	21 Clearview Place	18.06	36	0.00	17.85	15	-21	17.85	15	0	-21	17.84	14	-22	17.84	14	0	-22
P35	16.20	16.67	close to 20 Clearview Place	17.13	93	0.46	16.01		-112	16.01		0	-112	16.01		-112	16.01		0	-112
P36	15.90	16.67	close to 20 Clearview Place	17.13	123	0.46	15.97	7	-116	15.97	7	0	-116	15.94	4	-119	15.94	4	0	-119
P37	15.73	15.83	close to 20 Clearview Place	17.13	140	1.30	15.96	23	-117	15.96	23	0	-117	15.80	7	-133	15.80	7	0	-133
P38	16.20	16.25	Unit 2 / 22 Clearview Place	17.40	120	1.15	16.93	73	-47	16.93	73	0	-47	16.83	63	-57	16.83	63	0	-57
P39	16.48	16.57	Unit 1 / 22 Clearview Place	17.17	69	0.60	16.73	25	-44	16.73	25	0	-44	16.61	13	-56	16.61	13	0	-56
P40	16.80	16.81	Clearview Place	17.20	40	0.39	16.86	6	-34	16.86	6	0	-34	16.82	2	-38	16.82	2	0	-38
P41	16.75	16.90	Unit 1/84-85A Old Pittwater Road	16.83	8	0.00	16.77	2	-6	16.77	2	0	-6	16.77	2	-6	16.77	2	0	-6
P42	16.96	17.17	82B Old Pittwater Road	16.98	2	0.00	16.98	2	0	16.98	2	0	0	16.95		-3	16.95		0	-3
P43	16.60	16.65	Clearview Place	16.84	24	0.19	16.50		-34	16.50		0	-34	16.44		-40	16.44		0	-40
P44	16.42	16.52	22A Clearview Place	17.02	60	0.50	16.63	21	-39	16.63	21	0	-39	16.53	11	-49	16.53	11	0	-49
P45	16.73	17.01	22 Clearview Place	16.88	15	0.00	16.59		-29	16.59		0	-29	16.59		-29	16.59		0	-29
P48	15.82	15.98	22B Clearview Place	16.84	102	0.86	16.46	64	-38	16.46	64	0	-38	16.38	56	-46	16.38	56	0	-46
P50	16.03	16.21	98 Clearview Place	16.84	81	0.63	16.47	44	-37	16.47	44	0	-37	16.38	35	-46	16.38	35	0	-46
P51	15.83	19.94	Old Pittwater Road	15.84	1	0.00	15.84	1	0	15.84	1	0	0	15.84	1	0	15.84	1	0	0
P52	15.76	16.5	Old Pittwater Road	15.80	4	0.00	15.80	4	0	15.80	4	0	0	15.80	4	0	15.80	4	0	0
P53	15.53	16.45	Old Pittwater Road	15.53		0.00	15.53	0	0	15.53	0	0	0	15.53	0	0	15.53	0	0	0
P54	14.75	14.97	Old Pittwater Road	15.52	77	0.55	15.10	35	-42	15.10	35	0	-42	15.01	26	-51	15.01	26	0	-51
P55	14.86	14.93	Old Pittwater Road	15.25	39	0.32	15.01	15	-24	15.01	15	0	-24	14.95	9	-30	14.95	9	0	-30
P56	14.79	14.94	Old Pittwater Road	15.14	35	0.20	14.84	5	-30	14.84	5	0	-30	14.81	2	-33	14.81	2	0	-33
P57	14.78	14.93	Old Pittwater Road	15.14	36	0.21	14.85	7	-29	14.85	7	0	-29	14.81	3	-33	14.81	3	0	-33
P58	14.85	14.93	Old Pittwater Road	15.14	29	0.21	14.85		-29	14.85		0	-29	14.80		-34	14.80		0	-34
P59	14.85	14.94	Old Pittwater Road	15.14	29	0.20	14.86	1	-28	14.86	1	0	-28	14.80		-34	14.80		0	-34
P60	14.78	14.94	Old Pittwater Road	15.14	36	0.20	14.84	6	-30	14.84	6	0	-30	14.80	2	-34	14.80	2	0	-34
P61	14.80	14.96	Old Pittwater Road	15.14	34	0.18	14.86	6	-28	14.86	6	0	-28	14.83	3	-31	14.84	4	1	-30
P62	14.82	14.94	Old Pittwater Road	15.14	32	0.20	14.86	4	-28	14.86	4	0	-28	14.82	0	-32	14.82	0	0	-32
P63	14.82	14.95	Old Pittwater Road	15.14	32	0.19	14.86	4	-28	14.86	4	0	-28	14.82	0	-32	14.82	0	0	-32
P64	14.73	14.89	Suit2/98 Old Pittwater Road	15.14	41	0.25	14.85	12	-29	14.85	12	0	-29	14.64		-50	14.64		0	-50
P65	14.72	14.89	Suit2/98 Old Pittwater Road	15.14	42	0.25	14.85	13	-29	14.85	13	0	-29	14.71		-43	14.71		0	-43
P66	14.71	14.91	Suit1/98 Old Pittwater Road	15.14	43	0.23	14.85	14	-29	14.85	14	0	-29	14.70		-44	14.70		0	-44
P67	14.77	14.91	Suit1/98 Old Pittwater Road	15.14	37	0.23	14.85	8	-29	14.85	8	0	-29	14.73		-41	14.73		0	-41
P69	15.08	16.45	Unit 2/100 Old Pittwater Road	15.08	0	0.00	15.12	4	4	15.12	4	0	4	15.12	4	4	15.12	4	0	4
P71	14.98	16.41	Unit 2/100 Old Pittwater Road	15.08	10	0.00	15.03	5	-5	15.03	5	0	-5	15.03	5	-5	15.03	5	0	-5
P72	15.05	17.48	Unit 1/100 Old Pittwater Road	15.05		0.00	15.01		-4	15.01		0	-4	15.01		-4	15.01		0	-4
P73	14.53	14.74	98 Old Pittwater Road	15.14	61	0.40	14.85	32	-29	14.85	32	0	-29	14.50		-64	14.50		0	-64
P74	14.63	14.72	98 Old Pittwater Road	15.14	51	0.42	14.85	22	-29	14.85	22	0	-29	14.61		-53	14.61		0	-53
P75	14.53	14.71	98 Old Pittwater Road	15.14	61	0.43	14.85	32	-29	14.85	32	0	-29	14.52		-62	14.52		0	-62
P76	14.57	14.73	98 Old Pittwater Road	15.14	57	0.41	14.85	28	-29	14.85	28	0	-29	14.54		-60	14.54		0	-60
P77	14.61	14.75	98 Old Pittwater Road	15.14	53	0.39	14.85	24	-29	14.85	24	0	-29	14.62	1	-52	14.62	1	0	-52
P78	14.56	14.75	98 Old Pittwater Road	15.14	58	0.39	14.85	29	-29	14.85	29	0	-29	14.63	7	-51	14.63	7	0	-51
P79	14.66	14.76	98 Old Pittwater Road	15.85	119	1.09	15.63	97	-22	15.63	97	0	-22	15.63	97	-22	15.63	97	0	-22
P80	14.65	14.75	98 Old Pittwater Road	15.74	109	0.99	15.65	100	-9	15.65	100	0	-9	15.65	100	-9	15.65	100	0	-9
P81	14.65	14.75	98 Old Pittwater Road	15.63	98	0.88	15.56	91	-7	15.56	91	0	-7	15.56	91	-7	15.56	91	0	-7
P82	14.64	14.74	98 Old Pittwater Road	15.41	77	0.67	15.26	62	-15	15.26	62	0	-15	15.26	62	-15	15.26	62	0	-15
P83	14.63	14.73	98 Old Pittwater Road	15.30	67	0.57	15.13	50	-17	15.13	50	0	-17	15.13	50	-17	15.13	50	0	-17
P85	14.62	14.72	Suite 8/98 Old Pittwater Road	14.97	35	0.24	14.82	20	-15	14.82	20	0	-15	14.78	16	-19	14.78	16	0	-19
P86	14.55	14.72	Suite 9/98 Old Pittwater Road	14.92	37	0.20	14.81	26	-11	14.81	26	0	-11	14.77	22	-15	14.77	22	0	-15
P87	14.61	14.68	Suite 10/98 Old Pittwater Road	14.91	30	0.23	14.80	19	-11	14.80	19	0	-11	14.77	16	-14	14.77	16	0	-14
P88	14.63	14.70	Suite 11/98 Old Pittwater Road	14.87	24	0.17	14.80	17	-7	14.80	17	0	-7	14.76	13	-11	14.76	13	0	-11
P89	14.52	14.71	Suite 12/98 Old Pittwater Road	14.85	33	0.14	14.79	27	-6	14.79	27	0	-6	14.76	24	-9	14.76	24	0	-9
P90	14.45	14.71	Suite 13/98 Old Pittwater Road	14.83	38	0.12	14.78	33	-5	14.78	33	0	-5	14.76	31	-7	14.76	31	0	-7
P91	14.50	14.71	Suite 14/98 Old Pittwater Road	14.82	32	0.11	14.78	28	-4	14.78	28	0	-4	14.75	25	-7	14.75	25	0	-7
P92	14.49	14.68	Suite 15/98 Old Pittwater Road	14.80	31	0.12	14.77	28	-3	14.77	28	0	-3	14.75	26	-5	14.75	26	0	-5
P93	14.46	14.68	Suite 16/98 Old Pittwater Road	14.80	34	0.12	14.77	31	-3	14.77	31	0	-3	14.75	29	-5	14.75	29	0	-5
P94	14.43	14.68	Suite 17/98 Old Pittwater Road	14.79	36	0.11	14.76	33	-3	14.76	33	0	-3	14.74	31	-5	14.74	31	0	-5
P95	14.45	14.69	Suite 18/98 Old Pittwater Road	14.79	34	0.10	14.76	31	-3	14.76	31	0	-3	14.74	29	-5	14.74	29	0	-5
P96	14.51	14.70	Suite 19/98 Old Pittwater Road	14.78	27	0.08	14.76	25	-2	14.76	25	0	-2	14.74	23	-4	14.74	23	0	-4
			Downstream of Old Pittwater Road																	
P97	14.65	16.63	65 Cross Street	15.09	44	0.00	14.94	29	-15	14.94	29	0	-15	14.94	29	-15	14.94	29	0	-15
P98	13.35	13.47	65 Cross Street	13.55	20	0.08	13.39	4	-16	13.39	4	0	-16	13.38	3	-17	13.38	3	0	-17
P99	13.16	14.10	38A Cross Street	13.54	38	0.00	13.21	5	-33	13.21	5	0	-33	13.15		-39	13.15		0	-39
P100	13.07	14.23	38B Cross Street	13.54	47	0.00	13.19	12	-35	13.19	12	0	-35	13.12	5	-42	13.12	5	0	-42
P101	13.20	14.16	38 Cross Street	13.54	34	0.00	13.26	6	-28	13.26	6	0	-28	13.21	1	-33	13.21	1	0	-33
P102	13.28	14.29	65 Cross Street	13.53	25	0.00	13.21		-32	13.21		0	-32	13.21		-32	13.21		0	-32
P103	13.34	13.9	34 Cross Street	13.50	16	0.00	13.24		-26	13.24		0	-26	13.24		-26	13.24		0	-26
P104	11.99	12.09	32 Cross Street	13.39	140	1.30	13.19	120	-20	13.19	120	0	-20	13.19	120	-20	13.19	120	0	-20
P105	12.95	13.69	32 Cross Street	13.24	29	0.00	13.09	14	-15	13.09	14	0	-15	13.09	14	-15	13.09	14	0	-15
P106	12.64	13.41	30 Cross Street	12.86	22	0.00	12.71	7	-15	12.71	7	0	-15	12.70	6	-16	12.70	6	0	-16
P107	12.57	13.35	28 Cross Street	12.67	10	0.00	12.61	4	-6	12.61	4	0	-6	12.61	4	-6	12.61	4	0	-6
P108	12.40	13.24	Cross Street	12.65	25	0.00	12.61	21	-4	12.61	21	0	-4	12.61	21	-4	12.61	21	0	-4
P109	12.57	13.09	26 Cross Street	12.66	9	0.00	12.62	5	-4	12.62	5	0	-4	12.62	5	-4	12.62	5	0	-4
P110	11.76	11.86	Unit 7 / 16-22 Cross Street	12.76	100	0.90	12.70	94	-6	12.70	94	0	-6	12.68	92	-8	12.68	92	0	-8
P112	11.77	11.87	Unit 1 / 16-22 Cross Street	12.56	79	0.69	12.50	73	-6	12.50	73	0	-6	12.50	73	-6	12.50	73	0	-6
P113	13.37	14.22	102 Old Pittwater Road	14.61	124	0.39	14.15	78	-46	14.14	77	-1	-47	13.55	18	-106	13.55	18	0	-106
P114	14.12	14.23	102 Old Pittwater Road	14.61	49	0.38	14.12	0	-49	14.12		0	-49	14.08		-53	14.08		0	-53
P115	12.75	13.13	33 Cross Street	13.54	79	0.41	13.19	44	-35	13.19	44	0	-35	13.12	37	-42	13.12	37	0	-42
P116	12.91	13.01	33 Cross Street	13.32	41	0.31	13.24	33	-8	13.24	33	0	-8	13.24	33	-8	13.24	33	0	-8
P117	13.15	13.16	33 Cross Street	13.46	31	0.30	13.29	14	-17	13.29	14	0	-17	13.29	14	-17	13.30	15	1	-16
P118	12.95	13.24	31 Cross Street	12.97	2	0.00	12.96	1	-1	12.96	1	0	-1	12.96	1	-1	12.96	1	0	-1
P119	12.34	13.21	31 Cross Street	12.50	16	0.00	12.40	6	-10	12.40	6	0	-10	12.39	5	-11	12.40	6	1	-10
P120	12.12	12.54	29 Cross Street	12.38	26	0.00	12.29	17	-9	12.29	17	0	-9	12.27	15	-11	12.27	15	0	-11
P121	12.30	12.32	14 Cross Street	12.36	6	0.04	12.33	3	-3	12.33	3	0	-3	12.32	2	-4	12.32	2	0	-4
P122	11.91	12.01	12 Cross Street	12.16	25	0.15	12.14	23	-2	12.16	25	2	0	12.14	23	-2	12.14	23	0	-2
P123	14.06	14.16	75 Old Pittwater Road	14.65	59	0.49	14.64	58	-1	14.64	58	0	-1	14.62	56	-3	14.62	56	0	-3
P124	12.54	13.11	33 Cross Street	12.67	13	0.00	12.59	5	-8	12.59	5	0	-8	12.59	5	-8	12.59	5	0	-8
P125	12.07	12.22	29 Cross Street	12.27	20	0.05	12.12	5	-15	12.12	5	0	-15	12.12	5	-15	12.12	5	0	-15
P126	11.93	12.15	10 Cross Street	12.02	9	0.00	11.92		-10	11.92		0	-10	11.92		-10	11.93	0	1	-9
P127	11.49	11.9	8 Cross Street	11.81	32	0.00	11.74	25	-7	11.74	25	0	-7	11.72	23	-9	11.72	23	0	-9
P128	12.06	12.53	25 Cross Street	12.59	53	0.06	12.08	2	-51	12.08	2	0	-51	12.08	2	-51	12.08	2	0	-51
P129	12.03	12.13	29 Cross Street	12.61	58	0.48	12.22	19	-39	12.22	19	0	-39	12.22	19	-39	12.22	19	0	-39
P130	12.11	12.16	25 Cross Street	12.54	43	0.38	12.32	21	-22	12.32	21	0	-22	12.32	21	-22	12.32	21	0	-22
P131	11.92	12.18	25 Cross Street	12.03	11	0.00	11.99	7	-4	11.99	7	0	-4	11.97	5	-6	11.97	5	0	-6
P132	11.91	12.04	23 Cross Street	12.04	13	0.00	11.98	7	-6	11.98	7	0	-6	11.94	3	-10	11.94	3	0	-10
P133	11.70	12.12	21 Cross Street	11.94	24	0.00	11.85	15	-9	11.85	15	0	-9	11.83	13	-11	11.83	13	0	-11
P134	9.85	9.95	19 Cross Street	11.36	151	1.41	10.96	111	-40	10.97	112	1	-39	10.43	58	-93	10.48	63	5	-88
P137	12.60	14.61	Old Pittwater Road	12.79	19	0.00	12.64	4	-15	12.64	4	0	-15	12.61	1	-18	12.64	4	3	-15
P138	12.96	12.99	Old Pittwater Road	12.91		0.00	12.76		-15	12.76		0	-15	12.73		-18	12.81		8	-10
P139	12.80	12.90	Old Pittwater Road	13.04	24	0.14	12.91	11	-13	12.91	11	0	-13	12.86	6	-18	12.86	6	0	-18
P140	13.02	13.12	Old Pittwater Road	13.14	12	0.02	13.01		-13	13.01		0	-13	12.95		-19	12.95		0	-19
P141	12.21	12.31	Old Pittwater Road	12.41	20	0.10	11.85		-56	11.87		2	-54	11.72		-69	11.74		2	-67
P142	8.242		Brookvale Creek upstream of Mall	12.18	394		11.59	335	-59	11.61	337	2	-57	11.42	318	-76	11.45	321	3	-73
P143	8.247			12.19	394		11.59	334	-60	11.62	337	3	-57	11.42	317	-77	11.45	320	3	-74
P144	8.129			12.24	411		11.64	351	-60	11.67	354	3	-57	11.48	335	-76	11.51	338	3	-73
P145	8.49			12.30	381		11.72	323	-58	11.74	325	2	-56	11.58	309	-72	11.59	310	1	-71
P146	8.192			12.38	419		11.81	362	-57	11.83	364	2	-55	11.68	349	-70	11.69	350	1	-69
P147	8.278			12.57	429		12.02	374	-55	12.03	375	1	-54	11.93	365	-64	11.94	366	1	-63
P148	8.342			12.63	429		12.11	377	-52	12.11	377	0	-52	12.04	370	-59	12.04	370	0	-59
P149	8.229			12.70	447		12.23	400	-47	12.23	400	0	-47	12.16	393	-54	12.16	393	0	-54
P150	8.464			12.76	430		12.35	389	-41	12.35	389	0	-41	12.28	382	-48	12.28	382	0	-48
P151	9.275			12.76	348		12.35	307	-41	12.35	307	0	-41	12.29	301	-47	12.29	301	0	-47
P152	9.34			12.95	361		12.62	328	-33	12.62	328	0	-33	12.57	323	-38	12.57	323	0	-38
P153	9.601			13.03	343		12.70	310	-33	12.70	310	0	-33	12.65	305	-38	12.65	305	0	-38
P154	8.362			13.11	475		12.79	443	-32	12.79	443	0	-32	12.74	438	-37	12.74	438	0	-37

				21 August 2013			3 December 2013				21 August 2013			3 December 2013			
				100yr 1.5h ARI 50% Blockage			**10yr 1.5h ARI Existing 50% Blockage**				**10yr 1.5h ARI C6A 50% Blockage**				**5 yr 1.5h ARI Existing 50% Blockage**				**5 yr 1.5h ARI C6A 50% Blockage**			
Survey Point	**Ground (mAHD)**	**Floor Level** (mAHD)	**Street Address**	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (m)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)		Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)		Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)
				(a)			**(g)**		**(g)-(a)**		**(h)**		**(h)-(g)**	**(h)-(a)**	**(i)**		**(i)-(a)**		**(j)**		**(j)-(i)**	**(j)-(a)**
P155	11.87		Harrison Property	12.20	33		11.61		-59		11.64		3	-56	11.44		-76		11.47		3	-73
P156	12.12			12.26	14		11.79		-47		11.80		1	-46	11.74		-52		11.75		1	-51
P157	12.48			12.51	3		11.95		-56		11.97		2	-54	11.85		-66		11.86		1	-65
P158	12.06			12.66	60		12.20	14	-46		12.20	14	0	-46	12.08	2	-58		12.08	2	0	-58
P159	12.23			12.71	48		12.21		-50		12.21		0	-50	12.09		-62		12.09		0	-62
P160	11.81			12.80	99		12.36	55	-44		12.37	56	1	-43	12.31	50	-49		12.31	50	0	-49
P161	12.85			12.96	11		12.95	10	-1		12.95	10	0	-1	12.95	10	-1		12.95	10	0	-1
P162	13.41			13.65	24		13.50	9	-15		13.50	9	0	-15	13.50	9	-15		13.50	9	0	-15
P163	12.47			12.78	31		12.29		-49		12.29		0	-49	12.23		-55		12.23		0	-55
P164	9.87		Driveway to Woolworth Loading Dock	10.96	109		9.98	11	-98		9.99	12	1	-97	9.92	5	-104		9.92	5	0	-104
P165	10.19			11.01	82		10.26	7	-75		10.28	9	2	-73	10.20	1	-81		10.20	1	0	-81
P166	10.54			11.11	57		10.63	9	-48		10.64	10	1	-47	10.58	4	-53		10.58	4	0	-53
P167	10.66		Roundabout in Cross Street	11.34	68		10.83	17	-51		10.84	18	1	-50	10.80	14	-54		10.80	14	0	-54
P168	10.93			11.19	26		11.04	11	-15		11.04	11	0	-15	11.02	9	-17		11.02	9	0	-17
P169	10.39		Palm Tree Carpark	10.54	15		10.46	7	-8		10.46	7	0	-8	10.45	6	-9		10.45	6	0	-9
P170	9.88			10.15	27		9.99	11	-16		9.99	11	0	-16	9.96	8	-19		9.97	9	1	-18
P171	9.60			10.15	55		9.98	38	-17		9.99	39	1	-16	9.96	36	-19		9.97	37	1	-18
P172	9.52			10.15	63		9.98	46	-17		9.99	47	1	-16	9.96	44	-19		9.97	45	1	-18
P173	9.76			10.15	39		9.98	22	-17		9.99	23	1	-16	9.96	20	-19		9.97	21	1	-18
P174	10.59			10.74	15		10.65	6	-9		10.65	6	0	-9	10.61	2	-13		10.61	2	0	-13
P175	9.16			10.15	99		9.99	83	-16		10.00	84	1	-15	9.96	80	-19		9.98	82	2	-17
P176	9.09			10.15	106		9.99	90	-16		9.99	90	0	-16	9.96	87	-19		9.97	88	1	-18
P177	9.01			10.15	114		9.98	97	-17		9.99	98	1	-16	9.96	95	-19		9.97	96	1	-18
P178	8.95		Green Street	10.15	120		9.98	103	-17		9.99	104	1	-16	9.96	101	-19		9.97	102	1	-18
P179	8.85			10.15	130		9.98	113	-17		9.99	114	1	-16	9.96	111	-19		9.97	112	1	-18
P180	8.83			10.15	132		9.98	115	-17		9.99	116	1	-16	9.96	113	-19		9.97	114	1	-18
P181	9.35			10.15	80		9.98	63	-17		9.99	64	1	-16	9.96	61	-19		9.97	62	1	-18
P182	9.97			10.08	11		9.93		-15		9.93		0	-15	9.93		-15		9.90		-3	-18
P183	9.46			9.91	45		9.71	25	-20		9.72	26	1	-19	9.67	21	-24		9.69	23	2	-22
P184	9.25			9.83	58		9.64	39	-19		9.66	41	2	-17	9.58	33	-25		9.59	34	1	-24
P185	9.19			9.83	64		9.64	45	-19		9.65	46	1	-18	9.57	38	-26		9.58	39	1	-25
P186	8.95			9.83	88		9.63	68	-20		9.65	70	2	-18	9.57	62	-26		9.58	63	1	-25
P187	8.61			9.81	120		9.62	101	-19		9.63	102	1	-18	9.56	95	-25		9.57	96	1	-24
P188	8.39			9.77	138		9.60	121	-17		9.61	122	1	-16	9.54	115	-23		9.55	116	1	-22
P189	8.35			9.74	139		9.58	123	-16		9.59	124	1	-15	9.52	117	-22		9.53	118	1	-21
P190	8.99			9.63	64		9.49	50	-14		9.50	51	1	-13	9.45	46	-18		9.46	47	1	-17
P191	9.04			9.48	44		9.37	33	-11		9.38	34	1	-10	9.33	29	-15		9.34	30	1	-14
P192	10.08		Starfish Carpark Entrance	10.96	88		10.17	9	-79		10.17	9	0	-79	10.17	9	-79		10.17	9	0	-79
P193	10.99			11.00	1		11.00	1	0		11.00	1	0	0	11.00	1	0		11.00	1	0	0
P194	11.06			11.07	1		11.07	1	0		11.07	1	0	0	11.07	1	0		11.07	1	0	0
P192_1	10.05			10.96	91		10.06	1	-90		10.06	1	0	-90	10.06	1	-90		10.06	1	0	-90
P193_1	10.81			10.96	15		10.80		-16		10.80		0	-16	10.80		-16		10.80		0	-16
P194_1	10.90			11.08	18		11.01	11	-7		11.01	11	0	-7	10.98	8	-10		10.98	8	0	-10
P217	9.50			10.96	146		9.80	30	-116		9.83	33	3	-113	9.53	3	-143		9.53	3	0	-143
P195	10.95		Starfish Carpark	10.98	3		10.98	3	0		10.98	3	0	0	10.98	3	0		10.98	3	0	0
P196	10.64			10.80	16		10.64		-16		10.64		0	-16	10.64		-16		10.64		0	-16
P197	10.22			10.80	-		10.22		-58		10.22				10.22		-58		10.22			
P198	10.51			10.80	-		10.51		-29		10.51				10.51		-29		10.51			
P199	10.53			10.80	27		10.60	7	-20		10.60	7	0	-20	10.57	4	-23		10.57	4	0	-23
P200	10.76			10.86	10		10.82	6	-4		10.82	6	0	-4	10.82	6	-4		10.82	6	0	-4
P201	10.77			10.83	6		10.78	1	-5		10.78	1	0	-5	10.78	1	-5		10.78	1	0	-5
P202	10.45			10.80	35		10.53	8	-27		10.53	8	0	-27	10.51	6	-29		10.51	6	0	-29
P203	10.43			10.80	-		10.39		-41		10.39				10.39		-41		10.39			
P204	5.07		Warringah Golf Course	5.78	71		5.66	59	-12		5.66	59	0	-12	5.63	56	-15		5.63	56	0	-15
P205	4.98			5.19	21		5.09	11	-10		5.09	11	0	-10	5.07	9	-12		5.07	9	0	-12
P206	3.42			4.18	76		4.07	65	-11		4.07	65	0	-11	4.04	62	-14		4.04	62	0	-14
P207	2.81			3.70	89		3.62	81	-8		3.62	81	0	-8	3.60	79	-10		3.60	79	0	-10
P208	1.13			3.38	225		3.31	218	-7		3.30	217	-1	-8	3.29	216	-9		3.28	215	-1	-10
P209	2.66			3.37	71		3.30	64	-7		3.30	64	0	-7	3.28	62	-9		3.27	61	-1	-10
P210	2.52			3.34	82		3.27	75	-7		3.27	75	0	-7	3.25	73	-9		3.25	73	0	-9
P211	1.55			2.90	135		2.85	130	-5		2.85	130	0	-5	2.84	129	-6		2.84	129	0	-6
P212	0.45			2.74	229		2.73	228	-1		2.73	228	0	-1	2.73	228	-1		2.72	227	-1	-2
P213	1.77			2.71	94		2.71	94	0		2.71	94	0	0	2.71	94	0		2.71	94	0	0
P214	1.80			2.71	91		2.71	91	0		2.71	91	0	0	2.71	91	0		2.71	91	0	0
P215	2.05			2.74	69		2.73	68	-1		2.73	68	0	-1	2.72	67	-2		2.72	67	0	-2
P216	1.63			2.71	108		2.71	108	0		2.71	108	0	0	2.71	108	0		2.71	108	0	0
P300	10.68	11.12	4 Cross St	10.78	10		10.68		-10		10.68		0	-10	10.68		-10		10.68		0	-10
P301	9.22	10.12	2 Cross St	10.15	93	3	9.99	77	-16		10.00	78	1	-15	9.96	74	-19		9.98	76	2	-17
P302	9.29	10.08	(Cross St)	10.15	86	7	9.99	70	-16		10.00	71	1	-15	9.96	67	-19		9.98	69	2	-17
P303	10.27	10.45	Cross St	10.37	10		10.36	9	-1		10.36	9	0	-1	10.34	7	-3		10.34	7	0	-3
P304	10.86	10.87	2 Dale St	10.95	9	8	10.90	4	-5		10.90	4	0	-5	10.89	3	-6		10.89	3	0	-6
P305	9.24	10.08	26 Green St	10.15	91	7	9.99	75	-16		10.00	76	1	-15	9.97	73	-18		9.98	74	1	-17
P306	9.65	10.65	24 Green St	10.15	50		9.99	34	-16		10.00	35	1	-15	9.97	32	-18		9.98	33	1	-17
P307	10.13	11.55	20 Green St	10.27	14		10.23	10	-4		10.23	10	0	-4	10.23	10	-4		10.23	10	0	-4
221	*9.2*		DJ Loading Dock	10.24	*104*		9.33	*13*	-91		9.41	21	8	-83	9.25	5	-99		9.30	10	5	-94
222	*9.1*		DJ Loading Dock	10.21	*111*		9.33	*23*	-88		9.41	31	8	-80	9.25	15	-96		9.30	20	5	-91
401			Bus Depot Sucatchment east of Pittwater Rd	11.07			10.96		-11		10.96		0	-11	10.92		-15		10.92		0	-15
402			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10		10.96		0	-10	10.92		-14		10.92		0	-14
403			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10		10.96		0	-10	10.92		-14		10.92		0	-14
404			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10		10.96		0	-10	10.92		-14		10.92		0	-14
501	*8.91*		Anchor Car Park	9.53	*62*		9.27	*36*	-26		9.27	*36*	0	-26	9.22	*31*	-31		9.22	*31*	0	-31
502	*8.89*		Anchor Car Park	9.53	*64*		9.27	*38*	-26		9.27	*38*	0	-26	9.20	*31*	-33		9.20	*31*	0	-33
503	*8.87*		Anchor Car Park	9.53	*66*		9.27	*40*	-26		9.27	*40*	0	-26	9.20	*33*	-33		9.20	*33*	0	-33
504	*8.93*		Anchor Car Park	9.53	*60*		9.27	*34*	-26		9.27	*34*	0	-26	9.19	*26*	-34		9.19	*26*	0	-34
505	*8.82*		Anchor Car Park / Coles Loading Dock	9.53	*71*		9.27	*45*	-26		9.27	*45*	0	-26	9.19	*37*	-34		9.19	*37*	0	-34

NA49913132 Construction Scenario B for Chamber C6

							Model done 21Aug 2013			Model done 3Dec 2013				Model done 21Aug 2013			Model done 3Dec 2013			
				Existing Conditions			10 yr ARI Existing Conditions			10 yr ARI C6B				5 yr ARI Existing Conditions			5 yr ARI C6B			
				Run 2E																
							21 August 2013			3 December 2013				21 August 2013			3 December 2013			
				100yr 1.5h ARI 50% Blockage			10yr 1.5h ARI Existing 50% Blockage			10yr 1.5h ARI C6B 50% Blockage				5 yr 1.5h ARI Existing 50% Blockage			5 yr 1.5h ARI C6B 50% Blockage			
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (m)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)
				(a)			(g)		(g)-(a)	(hh)		(hh)-(g)	(hh)-(a)	(i)		(i)-(a)	(jj)		(jj)-(i)	(jj)-(a)
P1	19.37	19.43	15 Clearview Place	20.46	109	1.03	19.14		-132	19.15		1	-131	18.60		-186	18.60		0	-186
P2	19.20	19.40	15 Clearview Place	20.35	115	0.95	19.24	4	-111	19.24	4	0	-111	19.24	4	-111	19.24	4	0	-111
P3	19.19	20.23	14 Clearview Place	19.88	69	0.00	19.25	6	-63	19.25	6	0	-63	19.25	6	-63	19.25	6	0	-63
P4	19.01	19.23	Unit 11/16-18 Clearview Place	19.10	9	0.00	18.88		-22	18.88		0	-22	18.88		-22	18.88		0	-22
P5	19.08	19.25	Unit 10B/16-18 Clearview Place	19.10	2	0.00	18.96		-14	18.96		0	-14	18.96		-14	18.96		0	-14
P6	19.20	19.30	Unit 10/16-18 Clearview Place	19.27	7	0.00	19.27	7	0	19.27	7	0	0	19.27	7	0	19.27	7	0	0
P7	19.27	19.30	Unit 9/16-18 Clearview Place	19.38	11	0.08	19.38	11	0	19.38	11	0	0	19.38	11	0	19.38	11	0	0
P8	19.24	19.30	Unit 8/16-18 Clearview Place	19.35	11	0.05	19.35	11	0	19.35	11	0	0	19.35	11	0	19.35	11	0	0
P9	19.23	19.26	Unit 7A/16-18 Clearview Place	19.33	10	0.07	19.33	10	0	19.33	10	0	0	19.33	10	0	19.33	10	0	0
P10	19.21	19.26	Unit 7/16-18 Clearview Place	19.31	10	0.05	19.31	10	0	19.31	10	0	0	19.31	10	0	19.31	10	0	0
P11	19.26	19.26	Unit 6/16-18 Clearview Place	19.30	4	0.04	19.29	3	-1	19.29	3	0	-1	19.29	3	-1	19.29	3	0	-1
P12	19.18	19.28	Unit 5/16-18 Clearview Place	19.30	12	0.02	19.29	11	-1	19.29	11	0	-1	19.29	11	-1	19.29	11	0	-1
P13	19.19	19.29	Unit 4/16-18 Clearview Place	19.29	10	0.00	19.28	9	-1	19.28	9	0	-1	19.28	9	-1	19.28	9	0	-1
P14	18.86	19.26	Unit 3/16-18 Clearview Place	19.29	43	0.03	19.28	42	-1	19.28	42	0	-1	19.28	42	-1	19.28	42	0	-1
P15	18.59	19.27	Unit 2/16-18 Clearview Place	19.27	68	0.00	19.27	68	0	19.27	68	0	0	19.27	68	0	19.27	68	0	0
P16	19.13	19.23	Unit 12/16-18 Clearview Place	19.31	18	0.08	19.30	17	-1	19.30	17	0	-1	19.30	17	-1	19.30	17	0	-1
P17	19.24	19.27	Unit 13/16-18 Clearview Place	19.30	6	0.03	19.29	5	-1	19.29	5	0	-1	19.29	5	-1	19.29	5	0	-1
P18	19.00	19.25	Unit 13/16-18 Clearview Place	19.08	8	0.00	18.94		-14	18.94		0	-14	18.94		-14	18.94		0	-14
P19	19.19	19.26	Unit 12/16-18 Clearview Place	19.16		0.00	19.18		2	19.18		0	2	19.18		2	19.18		0	2
P20	18.84	19.26	Unit 1 / 16-18 Clearview Place	19.02	18	0.00	18.79		-23	18.79		0	-23	18.79		-23	18.79		0	-23
P21	16.41	16.51	Unit 1 / 16-18 Clearview Place	18.92	251	2.41	18.48	207	-44	18.48	207	0	-44	18.48	207	-44	18.48	207	0	-44
P22	17.19	17.35	19 Clearview Place	18.25	106	0.90	17.53	34	-72	17.53	34	0	-72	17.43	24	-82	17.43	24	0	-82
P23	16.88	18.21	19 Clearview Place	18.25	137	0.04	17.55	67	-70	17.55	67	0	-70	17.45	57	-80	17.45	57	0	-80
P24	17.01	17.04	Unit 1/20 Clearview Place	18.25	124	1.21	17.50	49	-75	17.50	49	0	-75	17.41	40	-84	17.41	40	0	-84
P25	16.60	16.69	21 Clearview Place	18.21	161	1.52	17.49	89	-72	17.49	89	0	-72	17.39	79	-82	17.39	79	0	-82
P26	17.05	17.06	Unit 2/20 Clearview Place	17.98	93	0.92	17.37	32	-61	17.37	32	0	-61	17.29	24	-69	17.29	24	0	-69
P27	18.14	18.21	19 Clearview Place	18.73	59	0.52	18.57	43	-16	18.57	43	0	-16	18.52	38	-21	18.52	38	0	-21
P28	16.52	16.62	Unit 5/22 Clearview Place	17.60	108	0.98	17.05	53	-55	17.05	53	0	-55	16.94	42	-66	16.94	42	0	-66
P29	16.54	16.58	Unit 4/22 Clearview Place	17.58	104	1.00	17.04	50	-54	17.04	50	0	-54	16.93	39	-65	16.93	39	0	-65
P30	16.50	16.55	Unit 3/22 Clearview Place	17.58	108	1.03	17.04	54	-54	17.04	54	0	-54	16.93	43	-65	16.93	43	0	-65
P31	16.61	16.63	21 Clearview Place	17.14	53	0.51	16.58		-56	16.58		0	-56	16.58		-56	16.58		0	-56
P33	16.30	16.30	21 Clearview Place	17.14	84	0.84	16.27		-87	16.27		0	-87	16.27		-87	16.27		0	-87
P34	17.70	19.04	21 Clearview Place	18.06	36	0.00	17.85	15	-21	17.85	15	0	-21	17.84	14	-22	17.84	14	0	-22
P35	16.20	16.67	close to 20 Clearview Place	17.13	93	0.46	16.01		-112	16.01		0	-112	16.01		-112	16.00		-1	-113
P36	15.90	16.67	close to 20 Clearview Place	17.13	123	0.46	15.97	7	-116	15.96	6	-1	-117	15.94	4	-119	15.94	4	0	-119
P37	15.73	15.83	close to 20 Clearview Place	17.13	140	1.30	15.96	23	-117	15.95	22	-1	-118	15.80	7	-133	15.81	8	1	-132
P38	16.20	16.25	Unit 2 / 22 Clearview Place	17.40	120	1.15	16.93	73	-47	16.93	73	0	-47	16.83	63	-57	16.83	63	0	-57
P39	16.48	16.57	Unit 1 / 22 Clearview Place	17.17	69	0.60	16.73	25	-44	16.73	25	0	-44	16.61	13	-56	16.61	13	0	-56
P40	16.80	16.81	Clearview Place	17.20	40	0.39	16.86	6	-34	16.87	7	1	-33	16.82	2	-38	16.82	2	0	-38
P41	16.75	16.90	Unit 1/84-85A Old Pittwater Road	16.83	8	0.00	16.77	2	-6	16.77	2	0	-6	16.77	2	-6	16.77	2	0	-6
P42	16.96	17.17	82B Old Pittwater Road	16.98	2	0.00	16.98	2	0	16.98	2	0	0	16.95		-3	16.95		0	-3
P43	16.60	16.65	Clearview Place	16.84	24	0.19	16.50		-34	16.50		0	-34	16.44		-40	16.44		0	-40
P44	16.42	16.52	22A Clearview Place	17.02	60	0.50	16.63	21	-39	16.63	21	0	-39	16.53	11	-49	16.53	11	0	-49
P45	16.73	17.01	22 Clearview Place	16.88	15	0.00	16.59		-29	16.59		0	-29	16.59		-29	16.59		0	-29
P48	15.82	15.98	22B Clearview Place	16.84	102	0.86	16.46	64	-38	16.46	64	0	-38	16.38	56	-46	16.38	56	0	-46
P50	16.03	16.21	98 Clearview Place	16.84	81	0.63	16.47	44	-37	16.47	44	0	-37	16.38	35	-46	16.38	35	0	-46
P51	15.83	19.94	Old Pittwater Road	15.84	1	0.00	15.84	1	0	15.84	1	0	0	15.84	1	0	15.84	1	0	0
P52	15.76	16.5	Old Pittwater Road	15.80	4	0.00	15.80	4	0	15.80	4	0	0	15.80	4	0	15.80	4	0	0
P53	15.53	16.45	Old Pittwater Road	15.53		0.00	15.53	0	0	15.53	0	0	0	15.53	0	0	15.53	0	0	0
P54	14.75	14.97	Old Pittwater Road	15.52	77	0.55	15.10	35	-42	15.10	35	0	-42	15.01	26	-51	15.01	26	0	-51
P55	14.86	14.93	Old Pittwater Road	15.25	39	0.32	15.01	15	-24	15.01	15	0	-24	14.95	9	-30	14.95	9	0	-30
P56	14.79	14.94	Old Pittwater Road	15.14	35	0.20	14.84	5	-30	14.84	5	0	-30	14.81	2	-33	14.81	2	0	-33
P57	14.78	14.93	Old Pittwater Road	15.14	36	0.21	14.85	7	-29	14.85	7	0	-29	14.81	3	-33	14.81	3	0	-33
P58	14.85	14.93	Old Pittwater Road	15.14	29	0.21	14.85		-29	14.85		0	-29	14.80		-34	14.80		0	-34
P59	14.85	14.94	Old Pittwater Road	15.14	29	0.20	14.86	1	-28	14.86	1	0	-28	14.80		-34	14.80		0	-34
P60	14.78	14.94	Old Pittwater Road	15.14	36	0.20	14.84	6	-30	14.84	6	0	-30	14.80	2	-34	14.80	2	0	-34
P61	14.80	14.96	Old Pittwater Road	15.14	34	0.18	14.86	6	-28	14.86	6	0	-28	14.83	3	-31	14.84	4	1	-30
P62	14.82	14.94	Old Pittwater Road	15.14	32	0.20	14.86	4	-28	14.86	4	0	-28	14.82	0	-32	14.82	0	0	-32
P63	14.82	14.95	Old Pittwater Road	15.14	32	0.19	14.86	4	-28	14.86	4	0	-28	14.82	0	-32	14.82	0	0	-32
P64	14.73	14.89	Suit2/98 Old Pittwater Road	15.14	41	0.25	14.85	12	-29	14.85	12	0	-29	14.64		-50	14.64		0	-50
P65	14.72	14.89	Suit2/98 Old Pittwater Road	15.14	42	0.25	14.85	13	-29	14.85	13	0	-29	14.71		-43	14.71		0	-43
P66	14.71	14.91	Suit1/98 Old Pittwater Road	15.14	43	0.23	14.85	14	-29	14.85	14	0	-29	14.70		-44	14.70		0	-44
P67	14.77	14.91	Suit1/98 Old Pittwater Road	15.14	37	0.23	14.85	8	-29	14.85	8	0	-29	14.73		-41	14.73		0	-41
P69	15.08	16.45	Unit 2/100 Old Pittwater Road	15.08	0	0.00	15.12	4	4	15.12	4	0	4	15.12	4	4	15.12	4	0	4
P71	14.98	16.41	Unit 2/100 Old Pittwater Road	15.08	10	0.00	15.03	5	-5	15.03	5	0	-5	15.03	5	-5	15.03	5	0	-5
P72	15.05	17.48	Unit 1/100 Old Pittwater Road	15.05		0.00	15.01		-4	15.01		0	-4	15.01		-4	15.01		0	-4
P73	14.53	14.74	98 Old Pittwater Road	15.14	61	0.40	14.85	32	-29	14.85	32	0	-29	14.50		-64	14.50		0	-64
P74	14.63	14.72	98 Old Pittwater Road	15.14	51	0.42	14.85	22	-29	14.85	22	0	-29	14.61		-53	14.61		0	-53
P75	14.53	14.71	98 Old Pittwater Road	15.14	61	0.43	14.85	32	-29	14.85	32	0	-29	14.52		-62	14.52		0	-62
P76	14.57	14.73	98 Old Pittwater Road	15.14	57	0.41	14.85	28	-29	14.85	28	0	-29	14.54		-60	14.54		0	-60
P77	14.61	14.75	98 Old Pittwater Road	15.14	53	0.39	14.85	24	-29	14.85	24	0	-29	14.62	1	-52	14.62	1	0	-52
P78	14.56	14.75	98 Old Pittwater Road	15.14	58	0.39	14.85	29	-29	14.85	29	0	-29	14.63	7	-51	14.63	7	0	-51
P79	14.66	14.76	98 Old Pittwater Road	15.85	119	1.09	15.63	97	-22	15.63	97	0	-22	15.63	97	-22	15.63	97	0	-22
P80	14.65	14.75	98 Old Pittwater Road	15.74	109	0.99	15.65	100	-9	15.65	100	0	-9	15.65	100	-9	15.65	100	0	-9
P81	14.65	14.75	98 Old Pittwater Road	15.63	98	0.88	15.56	91	-7	15.56	91	0	-7	15.56	91	-7	15.56	91	0	-7
P82	14.64	14.74	98 Old Pittwater Road	15.41	77	0.67	15.26	62	-15	15.26	62	0	-15	15.26	62	-15	15.26	62	0	-15
P83	14.63	14.73	98 Old Pittwater Road	15.30	67	0.57	15.13	50	-17	15.13	50	0	-17	15.13	50	-17	15.13	50	0	-17
P85	14.62	14.72	Suite 8/98 Old Pittwater Road	14.97	35	0.24	14.82	20	-15	14.82	20	0	-15	14.78	16	-19	14.78	16	0	-19
P86	14.55	14.72	Suite 9/98 Old Pittwater Road	14.92	37	0.20	14.81	26	-11	14.81	26	0	-11	14.77	22	-15	14.77	22	0	-15
P87	14.61	14.68	Suite 10/98 Old Pittwater Road	14.91	30	0.23	14.80	19	-11	14.80	19	0	-11	14.77	16	-14	14.77	16	0	-14
P88	14.63	14.70	Suite 11/98 Old Pittwater Road	14.87	24	0.17	14.80	17	-7	14.80	17	0	-7	14.76	13	-11	14.76	13	0	-11
P89	14.52	14.71	Suite 12/98 Old Pittwater Road	14.85	33	0.14	14.79	27	-6	14.79	27	0	-6	14.76	24	-9	14.76	24	0	-9
P90	14.45	14.71	Suite 13/98 Old Pittwater Road	14.83	38	0.12	14.78	33	-5	14.78	33	0	-5	14.76	31	-7	14.76	31	0	-7
P91	14.50	14.71	Suite 14/98 Old Pittwater Road	14.82	32	0.11	14.78	28	-4	14.78	28	0	-4	14.75	25	-7	14.75	25	0	-7
P92	14.49	14.68	Suite 15/98 Old Pittwater Road	14.80	31	0.12	14.77	28	-3	14.77	28	0	-3	14.75	26	-5	14.75	26	0	-5
P93	14.46	14.68	Suite 16/98 Old Pittwater Road	14.80	34	0.12	14.77	31	-3	14.77	31	0	-3	14.75	29	-5	14.75	29	0	-5
P94	14.43	14.68	Suite 17/98 Old Pittwater Road	14.79	36	0.11	14.76	33	-3	14.76	33	0	-3	14.74	31	-5	14.74	31	0	-5
P95	14.45	14.69	Suite 18/98 Old Pittwater Road	14.79	34	0.10	14.76	31	-3	14.76	31	0	-3	14.74	29	-5	14.74	29	0	-5
P96	14.51	14.70	Suite 19/98 Old Pittwater Road	14.78	27	0.08	14.76	25	-2	14.76	25	0	-2	14.74	23	-4	14.74	23	0	-4
			Downstream of Old Pittwater Road																	
P97	14.65	16.63	65 Cross Street	15.09	44	0.00	14.94	29	-15	14.94	29	0	-15	14.94	29	-15	14.94	29	0	-15
P98	13.35	13.47	65 Cross Street	13.55	20	0.08	13.39	4	-16	13.39	4	0	-16	13.38	3	-17	13.38	3	0	-17
P99	13.16	14.10	38A Cross Street	13.54	38	0.00	13.21	5	-33	13.21	5	0	-33	13.15		-39	13.15		0	-39
P100	13.07	14.23	38B Cross Street	13.54	47	0.00	13.19	12	-35	13.19	12	0	-35	13.12	5	-42	13.12	5	0	-42
P101	13.20	14.16	38 Cross Street	13.54	34	0.00	13.26	6	-28	13.26	6	0	-28	13.21	1	-33	13.21	1	0	-33
P102	13.28	14.29	65 Cross Street	13.53	25	0.00	13.21		-32	13.22		1	-31	13.21		-32	13.21		0	-32
P103	13.34	13.9	34 Cross Street	13.50	16	0.00	13.24		-26	13.24		0	-26	13.24		-26	13.24		0	-26
P104	11.99	12.09	32 Cross Street	13.39	140	1.30	13.19	120	-20	13.19	120	0	-20	13.19	120	-20	13.19	120	0	-20
P105	12.95	13.69	32 Cross Street	13.24	29	0.00	13.09	14	-15	13.09	14	0	-15	13.09	14	-15	13.09	14	0	-15
P106	12.64	13.41	30 Cross Street	12.86	22	0.00	12.71	7	-15	12.71	7	0	-15	12.70	6	-16	12.70	6	0	-16
P107	12.57	13.35	28 Cross Street	12.67	10	0.00	12.61	4	-6	12.61	4	0	-6	12.61	4	-6	12.61	4	0	-6
P108	12.40	13.24	Cross Street	12.65	25	0.00	12.61	21	-4	12.61	21	0	-4	12.61	21	-4	12.61	21	0	-4
P109	12.57	13.09	26 Cross Street	12.66	9	0.00	12.62	5	-4	12.62	5	0	-4	12.62	5	-4	12.62	5	0	-4
P110	11.76	11.86	Unit 7 / 16-22 Cross Street	12.76	100	0.90	12.70	94	-6	12.69	93	-1	-7	12.68	92	-8	12.68	92	0	-8
P112	11.77	11.87	Unit 1 / 16-22 Cross Street	12.56	79	0.69	12.50	73	-6	12.50	73	0	-6	12.50	73	-6	12.50	73	0	-6
P113	13.37	14.22	102 Old Pittwater Road	14.61	124	0.39	14.15	78	-46	14.15	78	0	-46	13.55	18	-106	13.55	18	0	-106
P114	14.12	14.23	102 Old Pittwater Road	14.61	49	0.38	14.12	0	-49	14.12	0	0	-49	14.08		-53	14.08		0	-53
P115	12.75	13.13	33 Cross Street	13.54	79	0.41	13.19	44	-35	13.19	44	0	-35	13.12	37	-42	13.12	37	0	-42
P116	12.91	13.01	33 Cross Street	13.32	41	0.31	13.24	33	-8	13.24	33	0	-8	13.24	33	-8	13.24	33	0	-8
P117	13.15	13.16	33 Cross Street	13.46	31	0.30	13.29	14	-17	13.29	14	0	-17	13.29	14	-17	13.30	15	1	-16
P118	12.95	13.24	31 Cross Street	12.97	2	0.00	12.96	1	-1	12.96	1	0	-1	12.96	1	-1	12.96	1	0	-1
P119	12.34	13.21	31 Cross Street	12.50	16	0.00	12.40	6	-10	12.40	6	0	-10	12.39	5	-11	12.39	5	0	-11
P120	12.12	12.54	29 Cross Street	12.38	26	0.00	12.29	17	-9	12.29	17	0	-9	12.27	15	-11	12.27	15	0	-11
P121	12.30	12.32	14 Cross Street	12.36	6	0.04	12.33	3	-3	12.33	3	0	-3	12.32	2	-4	12.32	2	0	-4
P122	11.91	12.01	12 Cross Street	12.16	25	0.15	12.14	23	-2	12.16	25	2	0	12.14	23	-2	12.14	23	0	-2
P123	14.06	14.16	75 Old Pittwater Road	14.65	59	0.49	14.64	58	-1	14.64	58	0	-1	14.62	56	-3	14.62	56	0	-3
P124	12.54	13.11	33 Cross Street	12.67	13	0.00	12.59	5	-8	12.59	5	0	-8	12.59	5	-8	12.59	5	0	-8
P125	12.07	12.22	29 Cross Street	12.27	20	0.05	12.12	5	-15	12.12	5	0	-15	12.12	5	-15	12.12	5	0	-15
P126	11.93	12.15	10 Cross Street	12.02	9	0.00	11.92		-10	11.92		0	-10	11.92		-10	11.94	1	2	-8
P127	11.49	11.9	8 Cross Street	11.81	32	0.00	11.74	25	-7	11.74	25	0	-7	11.72	23	-9	11.72	23	0	-9
P128	12.06	12.53	25 Cross Street	12.59	53	0.06	12.08	2	-51	12.08	2	0	-51	12.08	2	-51	12.08	2	0	-51
P129	12.03	12.13	29 Cross Street	12.61	58	0.48	12.22	19	-39	12.22	19	0	-39	12.22	19	-39	12.22	19	0	-39
P130	12.11	12.16	25 Cross Street	12.54	43	0.38	12.32	21	-22	12.32	21	0	-22	12.32	21	-22	12.32	21	0	-22
P131	11.92	12.18	25 Cross Street	12.03	11	0.00	11.99	7	-4	11.99	7	0	-4	11.97	5	-6	11.97	5	0	-6
P132	11.91	12.04	23 Cross Street	12.04	13	0.00	11.98	7	-6	11.97	6	-1	-7	11.94	3	-10	11.94	3	0	-10
P133	11.70	12.12	21 Cross Street	11.94	24	0.00	11.85	15	-9	11.85	15	0	-9	11.83	13	-11	11.83	13	0	-11
P134	9.85	9.95	19 Cross Street	11.36	151	1.41	10.96	111	-40	11.03	118	7	-33	10.43	58	-93	10.58	73	15	-78
P137	12.60	14.61	Old Pittwater Road	12.79	19	0.00	12.64	4	-15	12.64	4	0	-15	12.61	1	-18	12.61	1	0	-18
P138	12.96	12.99	Old Pittwater Road	12.91		0.00	12.76		-15	12.76		0	-15	12.73		-18	12.81		8	-10
P139	12.80	12.90	Old Pittwater Road	13.04	24	0.14	12.91	11	-13	12.91	11	0	-13	12.86	6	-18	12.86	6	0	-18
P140	13.02	13.12	Old Pittwater Road	13.14	12	0.02	13.01		-13	13.01		0	-13	12.95		-19	12.95		0	-19
P141	12.21	12.31	Old Pittwater Road	12.41	20	0.10	11.85		-56	11.94		9	-47	11.72		-69	11.80		8	-61
P142	8.242		Brookvale Creek upstream of Mall	12.18	394		11.59	335	-59	11.73	349	14	-45	11.42	318	-76	11.57	333	15	-61
P143	8.247			12.19	394		11.59	334	-60	11.73	348	14	-46	11.42	317	-77	11.57	332	15	-62
P144	8.129			12.24	411		11.64	351	-60	11.78	365	14	-46	11.48	335	-76	11.62	349	14	-62
P145	8.49			12.30	381		11.72	323	-58	11.84	335	12	-46	11.58	309	-72	11.69	320	11	-61
P146	8.192			12.38	419		11.81	362	-57	11.91	372	10	-47	11.68	349	-70	11.77	358	9	-61
P147	8.278			12.57	429		12.02	374	-55	12.10	382	8	-47	11.93	365	-64	11.97	369	4	-60
P148	8.342			12.63	429		12.11	377	-52	12.16	382	5	-47	12.04	370	-59	12.05	371	1	-58
P149	8.229			12.70	447		12.23	400	-47	12.24	401	1	-46	12.16	393	-54	12.17	394	1	-53
P150	8.464			12.76	430		12.35	389	-41	12.36	390	1	-40	12.28	382	-48	12.29	383	1	-47
P151	9.275			12.76	348		12.35	307	-41	12.36	308	1	-40	12.29	301	-47	12.30	302	1	-46
P152	9.34			12.95	361		12.62	328	-33	12.63	329	1	-32	12.57	323	-38	12.57	323	0	-38
P153	9.601			13.03	343		12.70	310	-33	12.71	311	1	-32	12.65	305	-38	12.65	305	0	-38
P154	8.362			13.11	475		12.79	443	-32	12.79	443	0	-32	12.74	438	-37	12.74	438	0	-37

							21 August 2013			3 December 2013			21 August 2013			3 December 2013			
				100yr 1.5h ARI 50% Blockage			10yr 1.5h ARI Existing 50% Blockage			10yr 1.5h ARI C6B 50% Blockage			5 yr 1.5h ARI Existing 50% Blockage			5 yr 1.5h ARI C6B 50% Blockage			
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (m)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Diff (cm)	Diff (cm)
				(a)			(g)		(g)-(a)	(hh)		(hh)-(g)	(hh)-(a)	(i)		(i)-(a)	(jj)		(jj)-(i)	(jj)-(a)
P155	11.87		Harrison Property	12.20	33		11.61		-59	11.75		14	-45	11.44		-76	11.58		14	-62
P156	12.12			12.26	14		11.79		-47	11.83		4	-43	11.74		-52	11.78		4	-48
P157	12.48			12.51	3		11.95		-56	12.04		9	-47	11.85		-66	11.90		5	-61
P158	12.06			12.66	60		12.20	14	-46	12.21	15	1	-45	12.08	2	-58	12.08	2	0	-58
P159	12.23			12.71	48		12.21		-50	12.23		2	-48	12.09		-62	12.09		0	-62
P160	11.81			12.80	99		12.36	55	-44	12.38	57	2	-42	12.31	50	-49	12.31	50	0	-49
P161	12.85			12.96	11		12.95	10	-1	12.95	10	0	-1	12.95	10	-1	12.95	10	0	-1
P162	13.41			13.65	24		13.50	9	-15	13.50	9	0	-15	13.50	9	-15	13.50	9	0	-15
P163	12.47			12.78	31		12.29		-49	12.30		1	-48	12.23		-55	12.23		0	-55
P164	9.87		Driveway to Woolworth Loading Dock	10.96	109		9.98	11	-98	10.09	22	11	-87	9.92	5	-104	9.95	8	3	-101
P165	10.19			11.01	82		10.26	7	-75	10.33	14	7	-68	10.20	1	-81	10.25	6	5	-76
P166	10.54			11.11	57		10.63	9	-48	10.70	16	7	-41	10.58	4	-53	10.60	6	2	-51
P167	10.66		Roundabout in Cross Street	11.34	68		10.83	17	-51	10.93	27	10	-41	10.80	14	-54	10.81	15	1	-53
P168	10.93			11.19	26		11.04	11	-15	11.04	11	0	-15	11.02	9	-17	11.02	9	0	-17
P169	10.39		Palm Tree Carpark	10.54	15		10.46	7	-8	10.46	7	0	-8	10.45	6	-9	10.45	6	0	-9
P170	9.88			10.15	27		9.99	11	-16	10.02	14	3	-13	9.96	8	-19	10.00	12	4	-15
P171	9.60			10.15	55		9.98	38	-17	10.01	41	3	-14	9.96	36	-19	10.00	40	4	-15
P172	9.52			10.15	63		9.98	46	-17	10.01	49	3	-14	9.96	44	-19	10.00	48	4	-15
P173	9.76			10.15	39		9.98	22	-17	10.01	25	3	-14	9.96	20	-19	10.00	24	4	-15
P174	10.59			10.74	15		10.65	6	-9	10.65	6	0	-9	10.61	2	-13	10.61	2	0	-13
P175	9.16			10.15	99		9.99	83	-16	10.01	85	2	-14	9.96	80	-19	10.00	84	4	-15
P176	9.09			10.15	106		9.99	90	-16	10.01	92	2	-14	9.96	87	-19	10.00	91	4	-15
P177	9.01			10.15	114		9.98	97	-17	10.01	100	3	-14	9.96	95	-19	10.00	99	4	-15
P178	8.95		Green Street	10.15	120		9.98	103	-17	10.01	106	3	-14	9.96	101	-19	10.00	105	4	-15
P179	8.85			10.15	130		9.98	113	-17	10.01	116	3	-14	9.96	111	-19	10.00	115	4	-15
P180	8.83			10.15	132		9.98	115	-17	10.01	118	3	-14	9.96	113	-19	10.00	117	4	-15
P181	9.35			10.15	80		9.98	63	-17	10.01	66	3	-14	9.96	61	-19	10.00	65	4	-15
P182	9.97			10.08	11		9.93		-15	9.93		0	-15	9.93		-15	9.93		0	-15
P183	9.46			9.91	45		9.71	25	-20	9.74	28	3	-17	9.67	21	-24	9.72	26	5	-19
P184	9.25			9.83	58		9.64	39	-19	9.68	43	4	-15	9.58	33	-25	9.62	37	4	-21
P185	9.19			9.83	64		9.64	45	-19	9.68	49	4	-15	9.57	38	-26	9.62	43	5	-21
P186	8.95			9.83	88		9.63	68	-20	9.67	72	4	-16	9.57	62	-26	9.61	66	4	-22
P187	8.61			9.81	120		9.62	101	-19	9.66	105	4	-15	9.56	95	-25	9.60	99	4	-21
P188	8.39			9.77	138		9.60	121	-17	9.63	124	3	-14	9.54	115	-23	9.58	119	4	-19
P189	8.35			9.74	139		9.58	123	-16	9.61	126	3	-13	9.52	117	-22	9.56	121	4	-18
P190	8.99			9.63	64		9.49	50	-14	9.52	53	3	-11	9.45	46	-18	9.48	49	3	-15
P191	9.04			9.48	44		9.37	33	-11	9.39	35	2	-9	9.33	29	-15	9.36	32	3	-12
P192	10.08		Starfish Carpark Entrance	10.96	88		10.17	9	-79	10.17	9	0	-79	10.17	9	-79	10.17	9	0	-79
P193	10.99			11.00	1		11.00	1	0	11.00	1	0	0	11.00	1	0	11.00	1	0	0
P194	11.06			11.07	1		11.07	1	0	11.07	1	0	0	11.07	1	0	11.07	1	0	0
P192_1	10.05			10.96	91		10.06	1	-90	10.08	3	2	-88	10.06	1	-90	10.06	1	0	-90
P193_1	10.81			10.96	15		10.80		-16	10.80		0	-16	10.80		-16	10.80		0	-16
P194_1	10.90			11.08	18		11.01	11	-7	11.01	11	0	-7	10.98	8	-10	10.98	8	0	-10
P217	9.50			10.96	146		9.80	30	-116	9.83	33	3	-113	9.53	3	-143	9.65	15	12	-131
P195	10.95		Starfish Carpark	10.98	3		10.98	3	0	10.98	3	0	0	10.98	3	0	10.98	3	0	0
P196	10.64			10.80	16		10.64		-16	10.64		0	-16	10.64		-16	10.64		0	-16
P197	10.22			10.80	-		10.22		-58	10.22				10.22		-58	10.22			
P198	10.51			10.80	-		10.51		-29	10.51				10.51		-29	10.51			
P199	10.53			10.80	27		10.60	7	-20	10.60	7	0	-20	10.57	4	-23	10.58	5	1	-22
P200	10.76			10.86	10		10.82	6	-4	10.82	6	0	-4	10.82	6	-4	10.82	6	0	-4
P201	10.77			10.83	6		10.78	1	-5	10.78	1	0	-5	10.78	1	-5	10.78	1	0	-5
P202	10.45			10.80	35		10.53	8	-27	10.52	7	-1	-28	10.51	6	-29	10.50	5	-1	-30
P203	10.43			10.80	-		10.39		-41	10.39				10.39		-41	10.39			
P204	5.07		Warringah Golf Course	5.78	71		5.66	59	-12	5.64	57	-2	-14	5.63	56	-15	5.62	55	-1	-16
P205	4.98			5.19	21		5.09	11	-10	5.08	10	-1	-11	5.07	9	-12	5.06	8	-1	-13
P206	3.42			4.18	76		4.07	65	-11	4.05	63	-2	-13	4.04	62	-14	4.02	60	-2	-16
P207	2.81			3.70	89		3.62	81	-8	3.61	80	-1	-9	3.60	79	-10	3.58	77	-2	-12
P208	1.13			3.38	225		3.31	218	-7	3.29	216	-2	-9	3.29	216	-9	3.27	214	-2	-11
P209	2.66			3.37	71		3.30	64	-7	3.28	62	-2	-9	3.28	62	-9	3.26	60	-2	-11
P210	2.52			3.34	82		3.27	75	-7	3.25	73	-2	-9	3.25	73	-9	3.24	72	-1	-10
P211	1.55			2.90	135		2.85	130	-5	2.84	129	-1	-6	2.84	129	-6	2.83	128	-1	-7
P212	0.45			2.74	229		2.73	228	-1	2.73	228	0	-1	2.73	228	-1	2.72	227	-1	-2
P213	1.77			2.71	94		2.71	94	0	2.71	94	0	0	2.71	94	0	2.71	94	0	0
P214	1.80			2.71	91		2.71	91	0	2.71	91	0	0	2.71	91	0	2.71	91	0	0
P215	2.05			2.74	69		2.73	68	-1	2.72	67	-1	-2	2.72	67	-2	2.72	67	0	-2
P216	1.63			2.71	108		2.71	108	0	2.71	108	0	0	2.71	108	0	2.71	108	0	0
P300	10.68	11.12	4 Cross St	10.78	10		10.68		-10	10.68		0	-10	10.68		-10	10.68		0	-10
P301	9.22	10.12	2 Cross St	10.15	93	3	9.99	77	-16	10.01	79	2	-14	9.96	74	-19	10.00	78	4	-15
P302	9.29	10.08	(Cross St)	10.15	86	7	9.99	70	-16	10.01	72	2	-14	9.96	67	-19	10.00	71	4	-15
P303	10.27	10.45	Cross St	10.37	10		10.36	9	-1	10.36	9	0	-1	10.34	7	-3	10.34	7	0	-3
P304	10.86	10.87	2 Dale St	10.95	9	8	10.90	4	-5	10.90	4	0	-5	10.89	3	-6	10.89	3	0	-6
P305	9.24	10.08	26 Green St	10.15	91	7	9.99	75	-16	10.01	77	2	-14	9.97	73	-18	10.00	76	3	-15
P306	9.65	10.65	24 Green St	10.15	50		9.99	34	-16	10.01	36	2	-14	9.97	32	-18	10.00	35	3	-15
P307	10.13	11.55	20 Green St	10.27	14		10.23	10	-4	10.23	10	0	-4	10.23	10	-4	10.23	10	0	-4
221	*9.2*		DJ Loading Dock	10.24	*104*		9.33	*13*	-91	9.67	47	34	-57	9.25	5	-99	9.33	13	8	-91
222	*9.1*		DJ Loading Dock	10.21	*111*		9.33	*23*	-88	9.67	57	34	-54	9.25	15	-96	9.33	23	8	-88
401			Bus Depot Sucatchment east of Pittwater Rd	11.07			10.96		-11	10.96		0	-11	10.92		-15	10.92		0	-15
402			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10	10.96		0	-10	10.92		-14	10.92		0	-14
403			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10	10.96		0	-10	10.92		-14	10.92		0	-14
404			Bus Depot Sucatchment east of Pittwater Rd	11.06			10.96		-10	10.96		0	-10	10.92		-14	10.93		1	-13
501	*8.91*		Anchor Car Park	9.53	*62*		9.27	*36*	-26	9.27	*36*	0	-26	9.22	*31*	-31	9.22	*31*	0	-31
502	*8.89*		Anchor Car Park	9.53	*64*		9.27	*38*	-26	9.27	*38*	0	-26	9.20	*31*	-33	9.20	*31*	0	-33
503	*8.87*		Anchor Car Park	9.53	*66*		9.27	*40*	-26	9.27	*40*	0	-26	9.20	*33*	-33	9.20	*33*	0	-33
504	*8.93*		Anchor Car Park	9.53	*60*		9.27	*34*	-26	9.27	*34*	0	-26	9.19	*26*	-34	9.19	*26*	0	-34
505	*8.82*		Anchor Car Park / Coles Loading Dock	9.53	*71*		9.27	*45*	-26	9.27	*45*	0	-26	9.19	*37*	-34	9.19	*37*	0	-34