WOOD & GRIEVE ENGINEERS

Gracewood Village Stage 3

34-36 Memorial Ave, Kellyville

Stormwater Management Report

Prepared for:

Client name
Baptist Care c/o Impact
Property Consultancy

Date:
9th April 2018

Prepared by:

Ian Harris
Project No. 33363-SYD-C
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Revision

Site Address:	34 -36 Memorial Ave, Kellyville
Real Property Description:	Lot 100 in DP 1163410
Proposed Development:	Residential Development
Client:	Baptist Care c/o Impact Property Consultancy
Local Authority	The Hills Shire Council
Authority Reference #:	N/A
Wood & Grieve Reference:	33363-SYD-C-R-SMP

Ian Harris BEng (Hons)
For and on behalf of
Wood & Grieve Engineers

REVISION	DATE	COMMENT	APPROVED BY
A	10/11/17	DA Issue	**IH**
B	08/12/17	DA Issue	**IH**
C	15/12/17	DA Issue	**IH**
D	21/12/17	DA Issue	**IH**
E	05/04/18	DA Issue	IH
F	09/04/18	DA Issue	IH

Contents

1. Introduction

Wood & Grieve Engineers have been commissioned by Baptist Care c/o Impact Property Consultancy to prepare this Stormwater Management Plan (SMP) in support of the Development Application for stage 3 and the seniors housing development at 34 -36 Memorial Ave, Kellyville. The sites real address is Lot 100 in DP 1163410.

This SMP outlines the conceptual DA level stormwater design for stage 3 of the proposed development for three residential towers with 5 levels and single storey basement.

This SMP demonstrates the application of stormwater drainage principles and illustrates that the proposed development complies with The Hills Shire Council Standards and Guidelines for stormwater, Australian Rainfall and Runoff, Australian Standards and best engineering practise.

The purpose of this SMP is to evaluate the quantity and quality of stormwater associated with the proposed development plan so as to demonstrate to Council that an appropriate stormwater management strategy has been adopted.

The SMP specifically addresses the following items for both the construction and operational phases of the development:

- Stormwater runoff volumes and detention (Stormwater Quantity);
- Stormwater quality treatment measures (Stormwater Quality);
- Erosion and Sedimentation Control.

The following will be achieved with the correct application of this SMP report:

- Appropriate standards to be maintained on all aspects of stormwater within the site,
- Pollution control to be maintained,
- Establishment of a unified, clear and concise stormwater management strategy.

2. Existing Site Characteristics

2.1 Property Detail

Address:	34 -36 Memorial Ave, Kellyville
Real Property Description:	Lot 100 in DP 1163410
Total Site Area:	7,132.2m² (0.71Ha)

The proposed stage 3 development is situated between the existing residential care facility building and recently completed residential buildings (cluster 1 & 5). The subject development site is currently greenfield and thus is approximately 100% pervious area. The site forms part of Balmoral Road release area within The Hills Shire Council.

The site is bounded by:

- Memorial Avenue to the north
- Rutherford Avenue to the east
- Hodges Road to the south,
- Free Settles Drive to west

Refer to locality plan in figure 1.

The proposed development can be seen on the concept design drawings in Appendix A of this report.

Figure 1: Site Location Plan (Source: Nearmaps 2015)

Existing Site Characteristics

2.2 Topography

The subject site falls from Rutherford Road towards Free Settlers Drive. Boundary levels along Rutherford Avenue are approximately RL65.00 whilst levels on Free Settlers Drive have an approximate RL58.50.

2.3 Stormwater Catchments

The surrounding area has been investigated to determine the likely impact of existing external stormwater catchments on the proposed site. Figure 2 below illustrates the subject development positioning within the catchment.

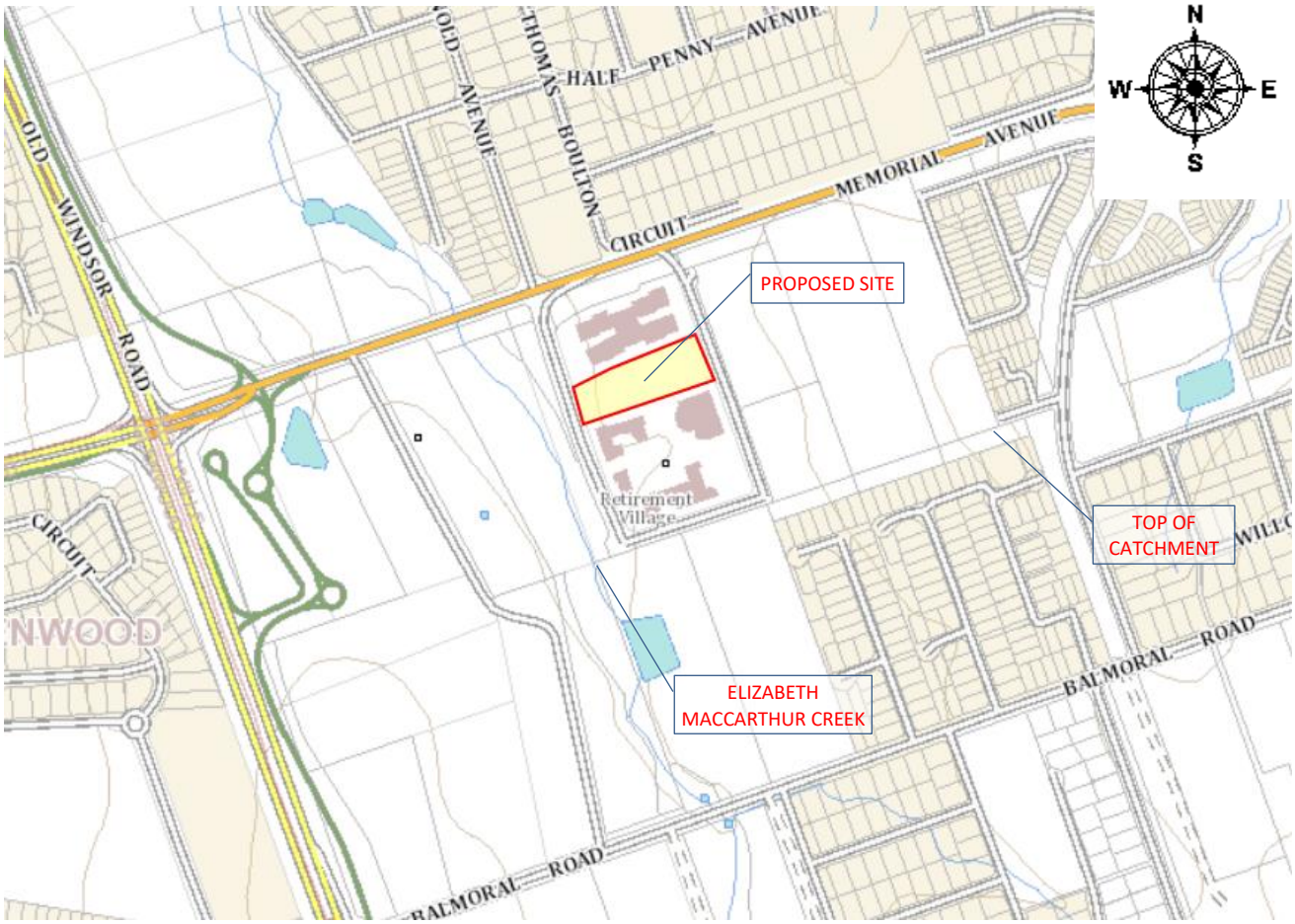

Figure 2: Upstream Catchment Plan(Source: SIX VIEWER 2017 – Department of Land and Property Information NSW)

The development site situated towards the bottom of the catchment. Overland flows from the upstream catchment are conveyed through the existing road infrastructure. In the event that the overland flow is unable to be obtained within the road infrastructure, an overland flow path has been maintain to convey the upstream catchment of 3.7Ha adjacent to the development. Characteristics of the overland flow path and details have been documented in section 4 of the report.

2.4 Existing Stormwater Discharge

The existing stormwater discharge through the council drainages assets into Elizabeth Macarthur Creek. The flows generated by the pre-developed site are captured through a series of pits and pipes and discharged into Elizabeth Macarthur Creek.

3. Local Authority Requirements

The Hills Shire Council set the design requirements for any new stormwater systems associated with new development in their DCP. A summary of the key requirements of the Stormwater management system for this development are summarized below.

3.1 Stormwater Conveyance Requirements

Council's Design Guidelines Subdivision/Developments states that the following design storm Average Recurrence Intervals ARI's should be allowed for when designing the Stormwater runoff conveyance systems for the development.

Design Parameter	Design Storm ARI (Years)	Conveyance Method
Minor Drainage System	10	In Ground (Piped)
Major Drainage System	100	Overland

Table 1: Stormwater Drainage Serviceability

3.2 On Site Detention Requirements

As mentioned previously in the report, the development situates itself within Balmoral Road Release Area of The Hills Shire Council. The Development Control Plan stipulates that On-site detention is not required for this development. Council have implemented a downstream stormwater management procedures for all sites within the Balmoral Road Release Area.

3.3 Water Quality Requirements

Water quality requirements for the Balmoral Road area have also been taken into consideration. All sites within Balmoral Road Release Area have downstream stormwater quality procedures which have been implemented by council. Therefore, water quality practices are not required for the subject development.

In addition to this, rainwater tanks have been provided to ensure compliance to The Hills Shire DCP. Conditions of consent outline the implementation of 7 x 20,000L rainwater tanks across all stages of the development. 35,000L of rainwater tank capacity has been installed for stages 1 & 2. To comply with the conditions of consent, 105,000L of rainwater tanks is to be installed to stage 3 of the subject development. Refer to appendix A for further details.

4. Flood Impact Assessment

When considering a new development, it is important to assess the impact of existing flooding on the proposed development and also the impact of the proposed development on existing or potential flooding both upstream and downstream of the development.

Wood and Grieve have reviewed Council's documentation and site constraints of the subject development. Following the assessment, it has been determined that the site is not subjected to flooding and the site is not restricted by existing stormwater drainage capacity.

Flood planning levels from the Hills Shire Council has been obtained to ensure minimum habitable floor levels are provided. This is to ensure the subject development is not affected by the flood extent suitated on the opposing verge of Free Settles Drive. Council has stated that a minimum floor level of RL56.59 plus 500mm freeboard is to be maintained along the northern end of the site. Southern end of the site to achieve RL 58.46 plus 500mm freeboard. Refer to appendix B for council correspondence.

To ensure the localized flooding it kept to a minimal, the proposed development site has been designed to ensure all runoff is directed to the existing road infrastructure. Another critical design aspect which has been incorporated into the stormwater drainage plans are overland flow paths.

Overland flow paths must be unobstructed to ensure sufficient capacity to contain the required flow paths in the event of the storm over topping the kerb. A DRAINS model has been used to assess the critical width of the overland flow path from Rutherford Ave to Free Settlers Drive.

The assessment is to ensure that the overland flow path has sufficient capacity to drain 3.7Ha of upstream catchment in addition to the flows generated by the development site. Freeboard level has been assessed to ensure that the overland flow depths are compliant with the proposed finished floor levels. The figures below illustrate the results from the DRAINS model.

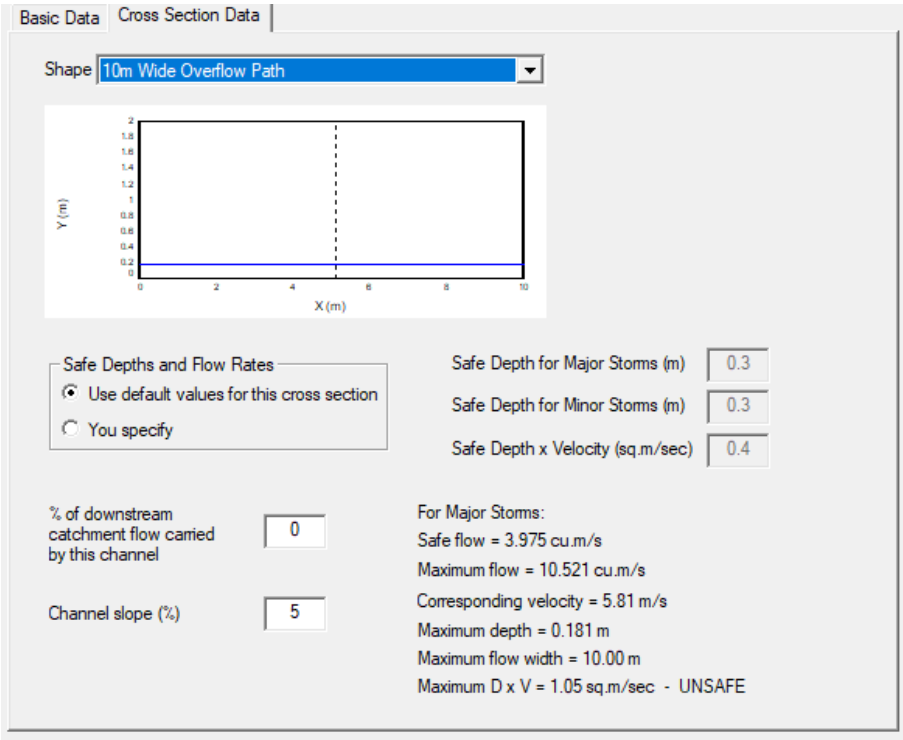

Figure 3: PMF Storm Event – Overland DRAINS Model

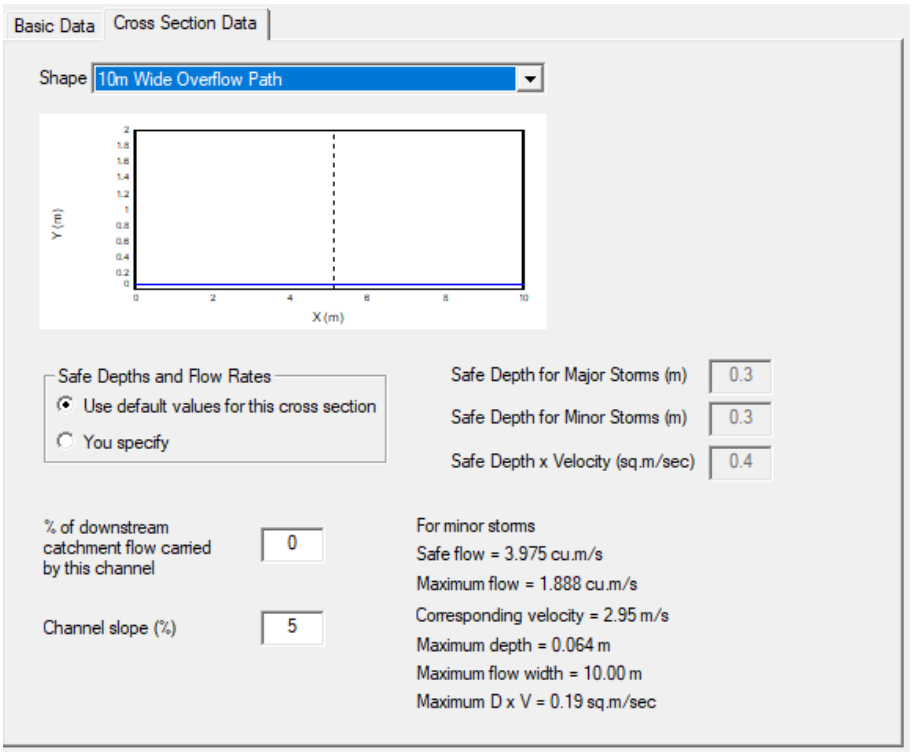

Figure 4: 100 Years Storm Event – Overland DRAINS Model

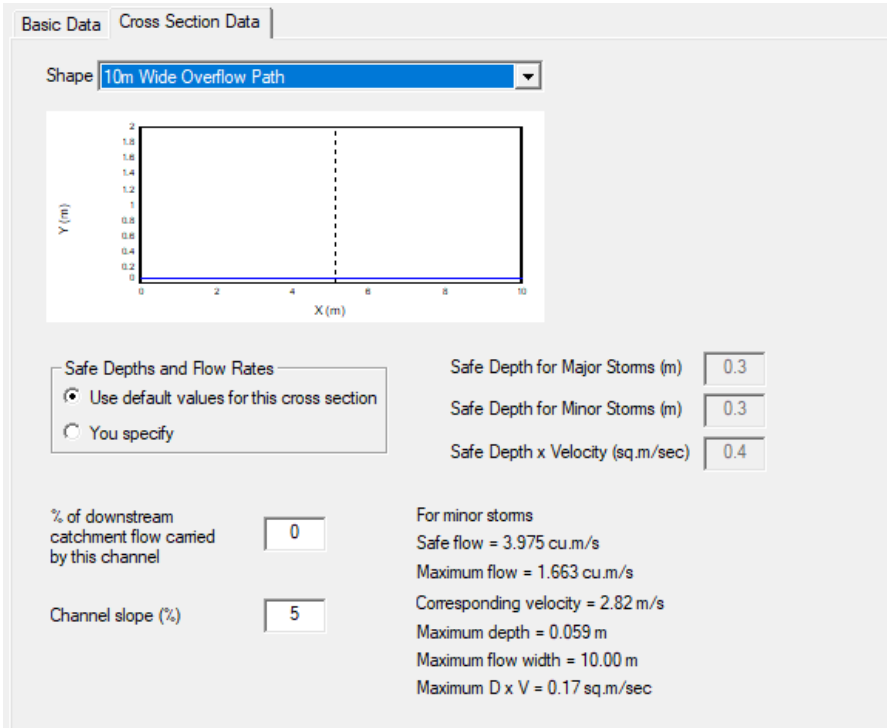

Figure 5: 50 Years Storm Event – Overland DRAINS Model

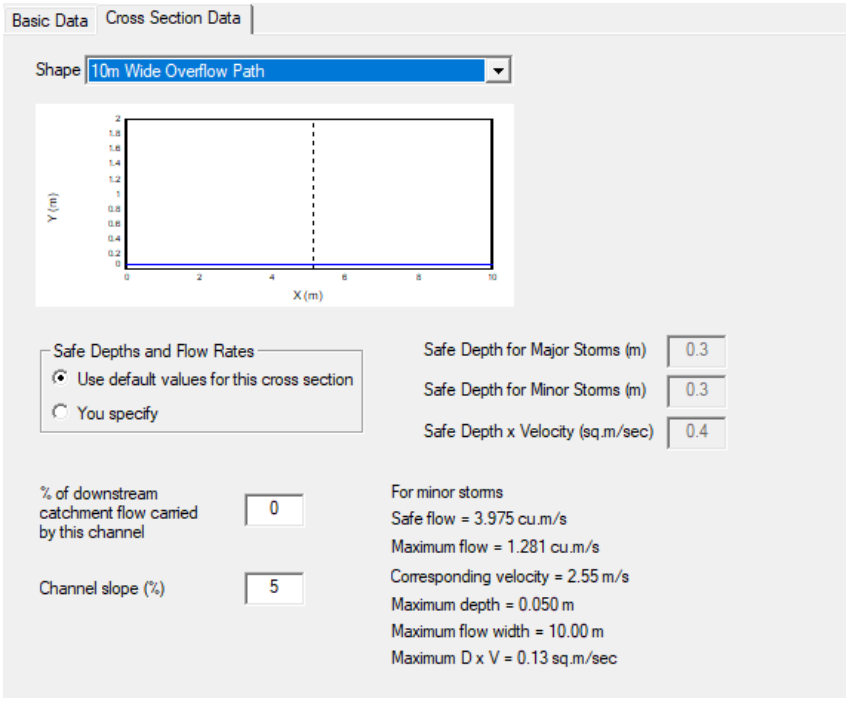

Figure 6: 10 Years Storm Event – Overland DRAINS Model

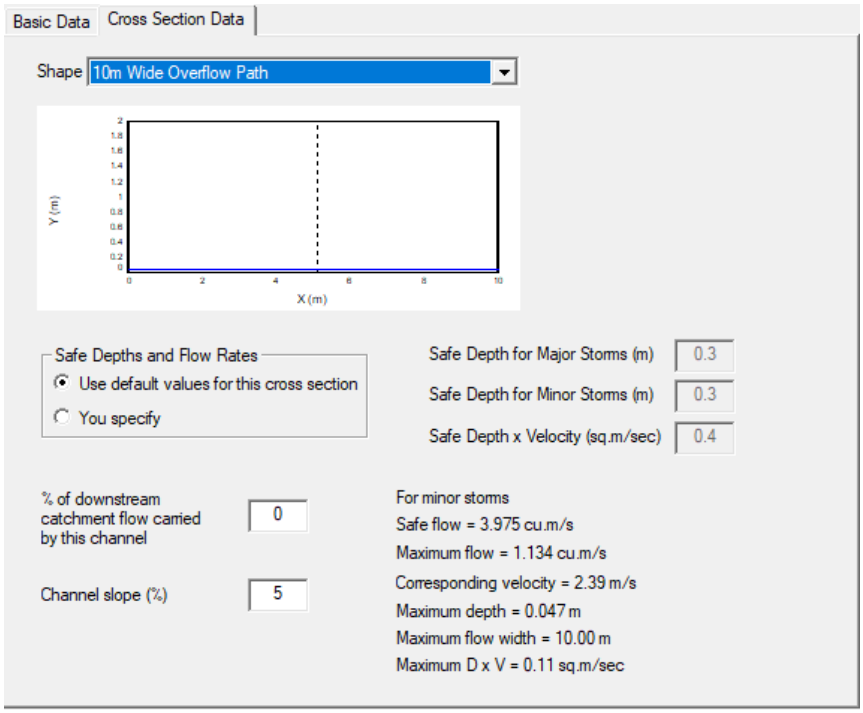

Figure 7: 5 Years Storm Event – Overland DRAINS Model

5. Stormwater Conveyance

As discussed in section 3.1 of this report council have set minimum design parameters for the flows they require to be conveyed through the in ground drainage system and what they will allow to be conveyed in a controlled manner overland across the site.

5.1 External Catchments

As discussed in section 2.3 the site is towards the discharge point of the catchment and existing roads to convey residual flow. No upstream surface runoff enters the development site as the residual flow is captured by the existing road infrastructure.

5.2 Roof Drainage

All roof areas will be drained through a traditional Gutters and downpipe system. The drainage system will be designed in accordance with AS3500.3:2003 to convey the minor design storm runoff from the roof to the in ground drainage system. Flows in excess of the design flows will surcharge the roof drainage system and discharge onto the surrounding ground where it will then be conveyed overland to the surrounding in ground drainage network within the roads.

5.3 Surface Drainage

The surface areas will be drained through a variety of methods, discussed below, in accordance with AS3500.3:2003 and council's stormwater drainage guidelines.

5.3.1 In Ground Drainage

The in ground drainage has been designed to meet the following criteria:

- In the minor design storm event (10 year) there will be no surcharging of the in ground drainage system and;
- In the major design storm event (100 year) there will be no uncontrolled discharge from the site onto the residential properties surrounding the site.

Surface runoff from the roads, podium and landscaped areas will be directed to stormwater inlet structures using the design topography of these elements. The inlet structures have been designed to adequately convey the surface runoff into the in ground drainage network.

The runoff will then be conveyed underground across the site to the legal point of discharge using gravity and the geometric falls of the pipe system.

5.4 Legal Point of Discharge

The stormwater generated from the proposed development will be discharged into the existing drainage infrastructure of the site. The legal point of discharge from the site will be the existing kerb inlet pit in Free Settlers Drive. The kerb inlet pit conveys the stormwater runoff through council's drainage network into Elizabeth Macarthur Creek.

6. Erosion & Sedimentation Control

Landcom have published a design guide entitled "Managing Urban Stormwater - Soils and Construction" which is regarded as the standard to which erosion and sedimentation control should be designed to within NSW. The subject development will be compliant with the Landcom design guide in there Design Guidelines Subdivision/Developments.

The control of erosion and sedimentation describes the measures incorporated during and following construction of a new development to prevent the pollution and degradation of the downstream watercourse.

An Erosion and Sediment Control Plan and Details has prepared as part of the development application documentation and is included in Appendix A of this report.

Common control measures adopted are:

- Sedimentation fences;
- Sedimentation basins;
- Stormwater drainage inlet protection;
- Overland flow diversion swales;
- Shaker Grids and wash downs for vehicles leaving the construction site;
- Dust control measures.

The maintenance of these control measures throughout their intended lifespan will ensure that the risk of erosion and sedimentation pollution of the downstream watercourse will be minimized.

Appendix A – Civil Drawings

CIVIL ENGINEERING WORKS

Sheet List Table

Sheet Number	Sheet Title
CI-000-01	COVER SHEET
CI-060-01	GENERAL ARRANGEMENT PLAN
CI-070-01	EROSION & SEDIMENT CONTROL PLAN
CI-076-01	EROSION & SEDIMENT CONTROL DETAILS
CI-520-01	STORMWATER DRAINAGE PLAN - GROUND FLOOR
CI-520-02	STORMWATER DRAINAGE PLAN - BASEMENT
CI-526-01	STORMWATER DRAINAGE DETAILS

BaptistCare

BAPTISTCARE NSW & ACT	GRACEWOOD VILLAGE KELLYVILLE, NSW 2155	33363	CI-000-01	A
CLIENT	PROJECT	PROJECT No	DRAWING No	REV

WOOD & GRIEVE ENGINEERS

REFER CI-520-01

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BUILDING
- PROPOSED BASEMENT EXTENT
- PROPOSED STORMWATER PIPE
- EXISTING STORMWATER PIPE
- PROPOSED GRATED PIT
- EXISTING GRATED PIT
- PROPOSED GRATED DRAIN
- RM — PROPOSED RISING MAIN
- IO — PROPOSED INSPECTION OPENING
- RWO — PROPOSED RAINWATER OUTLET
- RW —— RW — PROPOSED Ø150 RAINWATER PIPE

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GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

GENERAL ARRANGEMENT PLAN

TITLE

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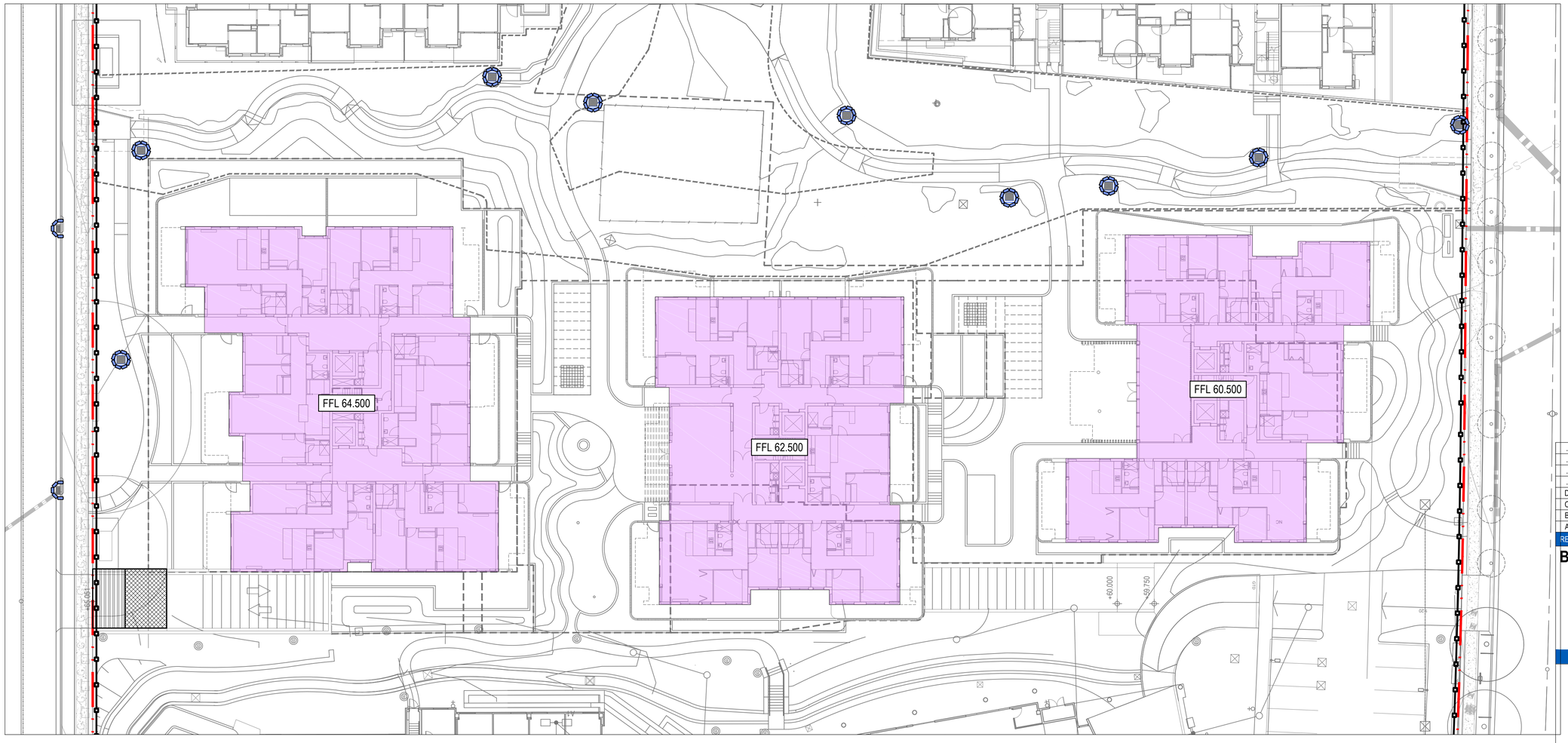

LEGEND

- PROPOSED SITE BOUNDARY
- VEHICLE SHAKEDOWN DEVICE
- PROPOSED SILT FENCE
- SANDBAG PIT PROTECTION

NOTE:

REFER DRAWING CI-076-01 FOR EROSION AND SEDIMENT CONTROL DETAILS

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GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

EROSION & SEDIMENT CONTROL PLAN

TITLE

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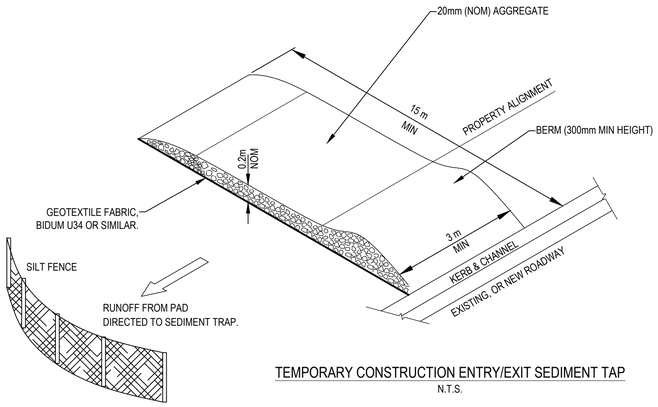

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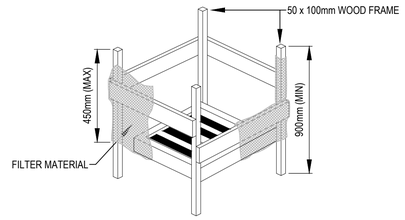

FABRIC DROP INLET PROTECTION WITH
SPILL-THROUGH WEIR

FIELD INLET PROTECTION
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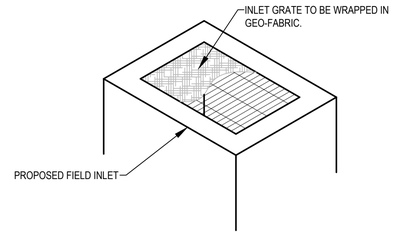

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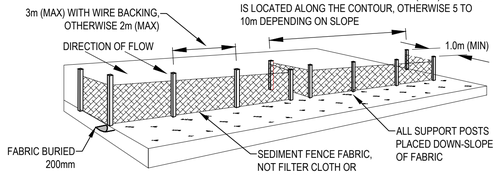

INSTALLATION OF SEDIMENT FENCE
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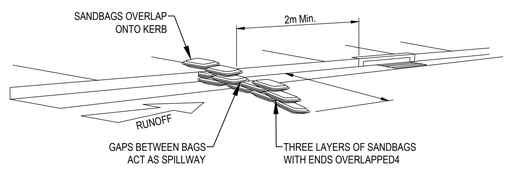

SANDBAG KERB INLET SEDIMENT TRAP
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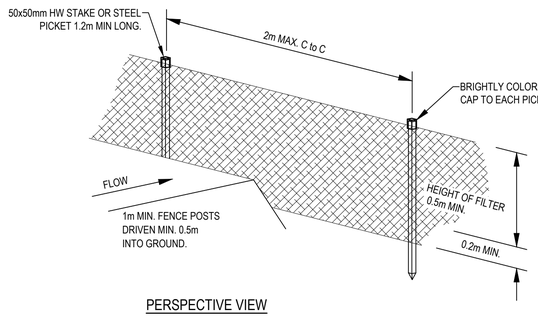

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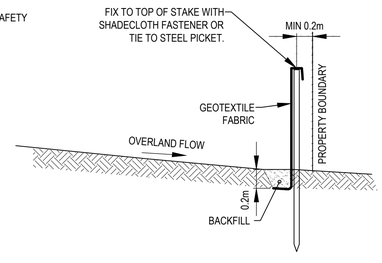

TYPICAL SECTION

SEDIMENT FENCE DETAIL
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GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

EROSION & SEDIMENT CONTROL DETAILS

TITLE

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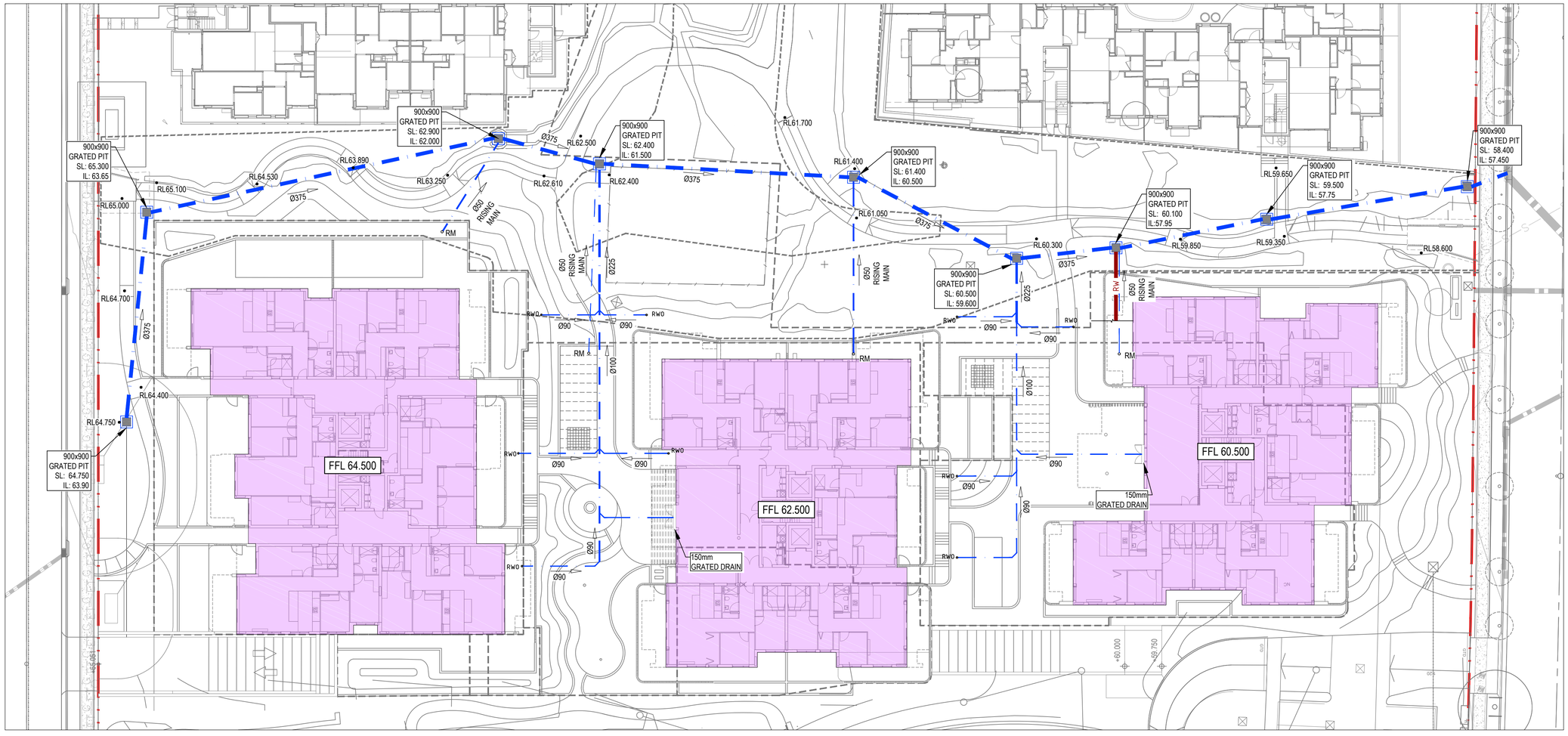

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BUILDING
- PROPOSED BASEMENT EXTENT
- PROPOSED STORMWATER PIPE
- EXISTING STORMWATER PIPE
- PROPOSED GRATED PIT
- EXISTING GRATED PIT
- PROPOSED GRATED DRAIN
- RM — PROPOSED RISING MAIN
- IO — PROPOSED INSPECTION OPENING
- RWO — PROPOSED RAINWATER OUTLET
- RW — RW — PROPOSED Ø150 RAINWATER PIPE

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GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

STORMWATER DRAINAGE PLAN - GROUND FLOOR

TITLE

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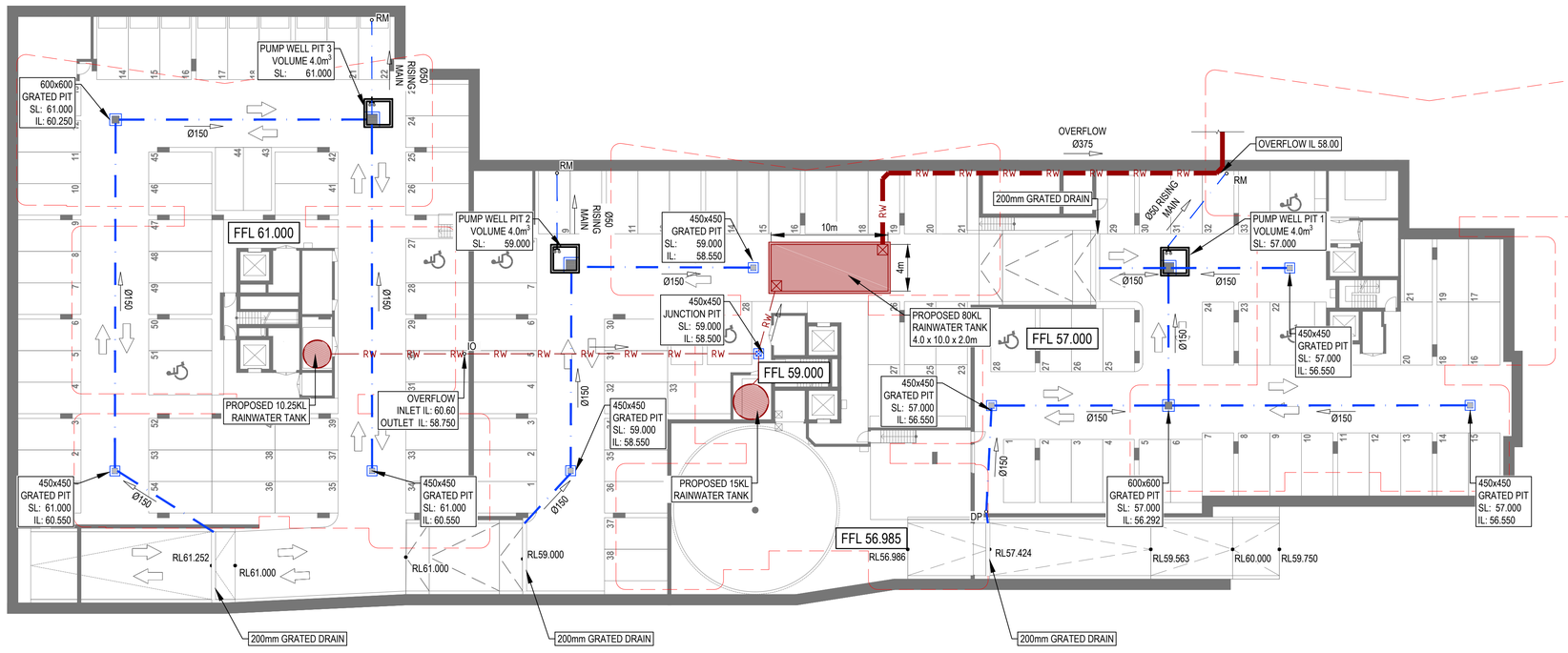

LEGEND

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- PROPOSED GROUND FLOOR EXTENT
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- PROPOSED STORMWATER PIPE
- PROPOSED GRATED PIT
- PROPOSED GRATED DRAIN
- RM — PROPOSED RISING MAIN
- DP — PROPOSED DOWNPIPE
- PROPOSED RAINWATER TANK

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GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

STORMWATER DRAINAGE PLAN - BASEMENT

TITLE

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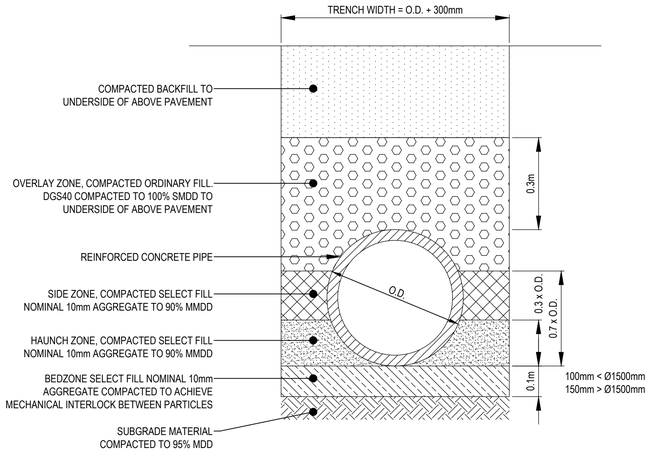

TYPICAL PIPE TRENCH DETAIL

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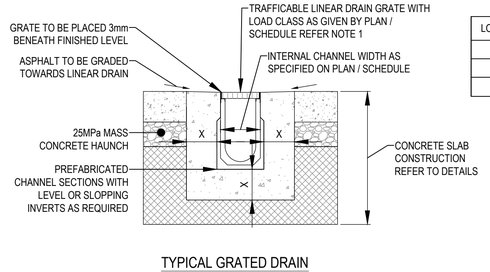
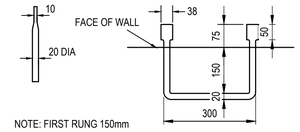


LOAD CLASS	X(mm)
A-B	100
C-D	150
E-F	200

SURROUND

TYPICAL GRATED DRAIN

SCALE 1:10

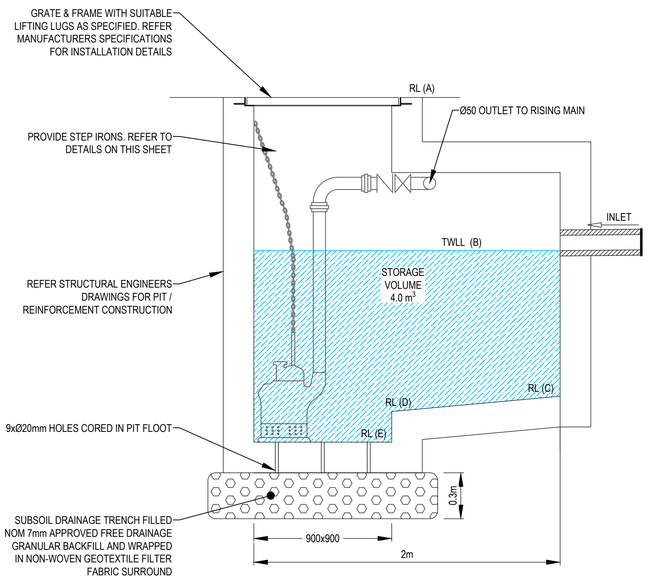


NOTE: FIRST RUNG 150mm DOWN FROM TOP, THEN SPACED AT 300 CENTRES.

MATERIAL : 20mm DIA MILD STEEL HEAVY GALVANIZED

STEP IRONS FOR DRAINAGE PITS

STEP IRONS TO BE INSTALLED ON ALL PITS >1.2m DEEP
N.T.S.



	PUMP WELL 1	PUMP WELL 2	PUMP WELL 3
AREA (m^2)	4.0	4.0	4.0
DEPTH (m)	1.0	1.0	1.0
A	RL57.00	RL59.00	RL61.00
B	RL56.70	RL58.70	RL60.70
C	RL55.75	RL57.75	RL59.75
D	RL55.65	RL57.65	RL59.65
E	RL55.45	RL57.45	RL59.45

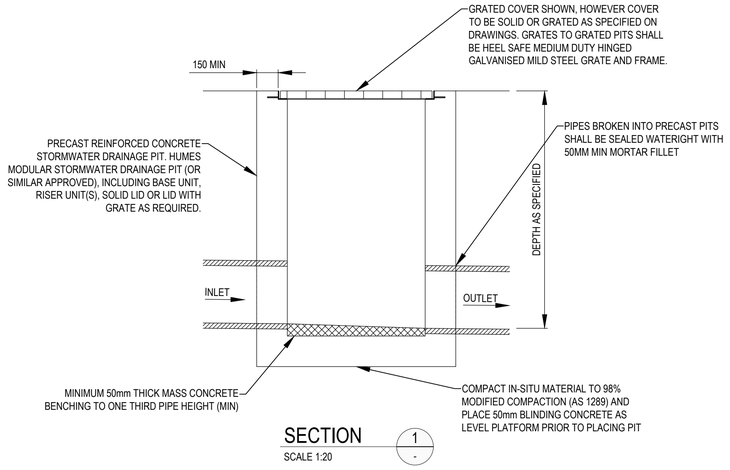
PUMP OUT PIT DETAILS

PUMP-OUT PIT STRUCTURE

- STORAGE VOLUME = 4.0 m^3
- DUAL SUBMERSIBLE DE-WATERING PUMPS
- CONNECT TO MAINS POWER
- PUMP DUTY 5l/s
- HIGH LEVEL CUT-OFF (WITH ALARM)
- LOW LEVEL CUT-OFF (WITH ALARM)
- PUMP 'ON' AND 'OFF' SWITCH
- GALVANISED LIFTING CHAIN
- PUMP INSTALLATION TO MANUFACTURERS SPECS

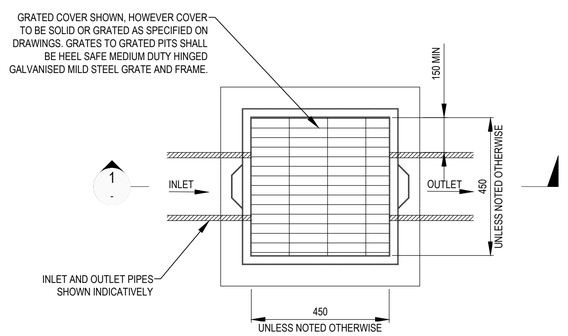
TYPICAL PUMP-OUT PIT SECTION - DRIVEWAY DRAINAGE

SCALE 1:20



SECTION 1 / -

SCALE 1:20



TYPICAL DRAINAGE PIT DETAIL

SCALE 1:20

1:10 0.1 0 0.1 0.2 0.3 0.4 0.5 A1
1:20 A3

1:20 0.2 0 0.2 0.4 0.6 0.8 1 A1
1:40 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
B	ISSUED FOR DA APPROVAL	JCL	IAH	15.12.17
A	ISSUED FOR DA APPROVAL	JDL	IAH	10.11.17

BAPTISTCARE NSW & ACT

ARCHITECT/CLIENT

WOOD & GRIEVE ENGINEERS

DRAWN:	JDL
DESIGNED:	JCL
VERIFIED:	DMCG ../../..
APPROVED FOR TENDER:	... ../../..
APPROVED FOR CONSTRUCTION:	... ../../..

GRACEWOOD VILLAGE KELLYVILLE, NSW 2155

PROJECT

STORMWATER DRAINAGE DETAILS

TITLE

FOR APPROVAL

NOT FOR CONSTRUCTION

AS SHOWN	33363	CI-526-01	B
SCALE @ A1	PROJECT No	DRAWING No	REV

33363-CI-526-01.dwg

18/12/2017 11:15:30 AM

Appendix B – Council Correspondence

Jacky Lee

From: Benjamin Hawkins <bhawkins@thehills.nsw.gov.au>
Sent: Monday, 5 June 2017 2:29 PM
To: Ellen Robertshaw
Subject: RE: 2 Free Settlers Drive Kellyville

Hi Ellen

At the northern end of the site the 100 year flood level is RL 56.59.

At the southern end of the site the 100 year flood level is RL 58.46.

In the middle of the site the 100 year flood level is RL 57.20.

Habitable floor levels and any basement car park entrances need to be 500mm above.

Thanks

Ben H

From: Ellen Robertshaw [mailto:erobertshaw@dfpplanning.com.au]
Sent: Friday, 2 June 2017 8:53 AM
To: Benjamin Hawkins
Subject: Clusters 2, 3 and 4 Baptistcare seniors housing development 34-36 Memorial Avenue Kellyville

Ben
As discussed yesterday, Baptistcare is proposing a redesign of the last stage of the Gracewood development at Kellyville.
This will be the buildings known as Clusters 2, 3 and 4.
Just wondering if you've had a chance to look into the flood levels and required minimum habitable floor level for Cluster 2 being the building closest to Free Settlers Drive.
Ellen

Sent from my Samsung Galaxy smartphone.
