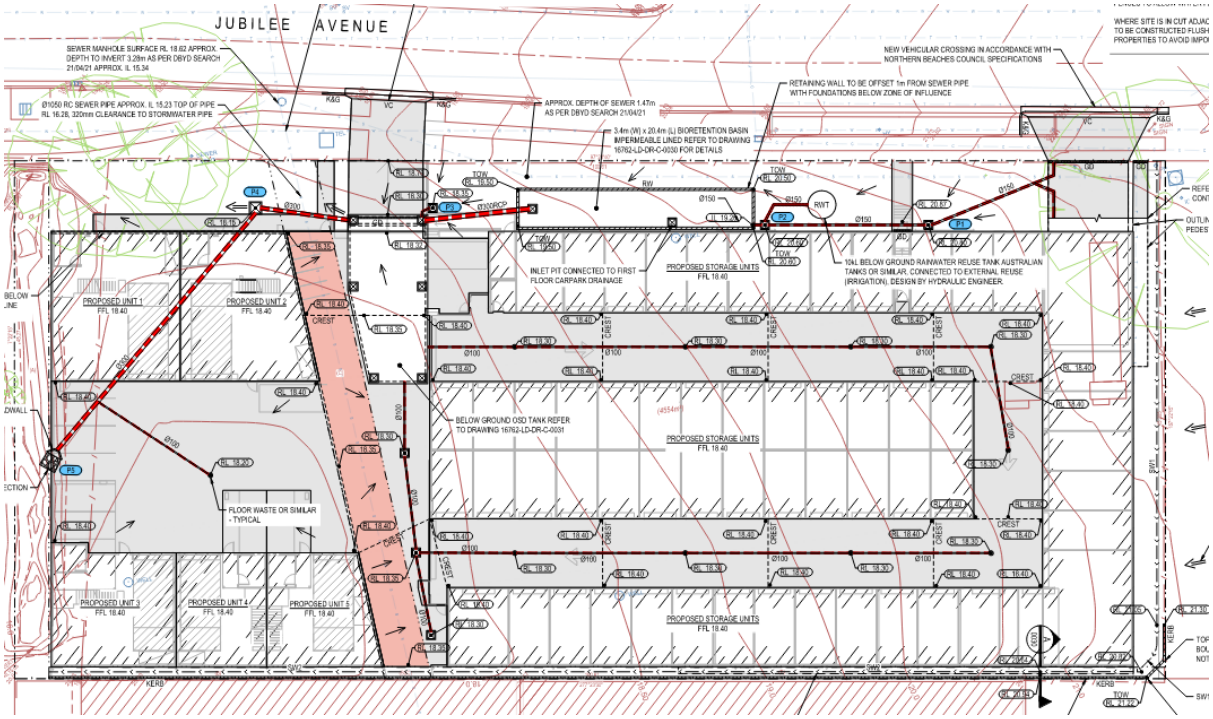
WATER MANAGEMENT REPORT:
15 JUBILEE AVENUE, WARRIEWOOD

Project No.00016762

Date: 7th May 2021



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Client: Trend Living Pty Ltd
Project: 15 Jubilee Avenue, Warriewood
Project No: 00016762

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Contents

1. Introduction

1.1. Background Information

This Water Management Report accompanies the DA Civil Documents developed by Lindsay Dynan Consulting Engineers Pty Ltd (LD), namely:

- 16762-LD-DR-C-0000_P01
- 16762-LD-DR-C-0001_P01
- 16762-LD-DR-C-0010_P01
- 16762-LD-DR-C-0011_P01
- 16762-LD-DR-C-0020_P01
- 16762-LD-DR-C-0021_P01
- 16762-LD-DR-C-0030_P01
- 16762-LD-DR-C-0031_P01
- 16762-LD-SK-C-0001_P01
- 16762-LD-SK-C-0002_P01
- Flood Risk Management & Evacuation Strategy Report

1.2. Site Context

The proposed development address is 15 Jubilee Avenue, Warriewood (the Site) also known as Lot 202 DP1019363. The existing greenfield site covers an area of approximately 4550m^2 bordered by Jubilee avenue along the northern boundary, industrial units along the western and southern boundaries, and a single residential dwelling along the eastern boundary. A generalised slope runs from northeast to southwest across the site, consisting mostly of short grass with some mild to dense vegetation in the southwest corner. Easements are located along the southern boundary, over an existing channel along the western boundary and over a sewer pipe that runs in a north-south direction through the site. The existing site is accessed via a single driveway access point along Jubilee Avenue. The location of the site is shown in Figure 1.

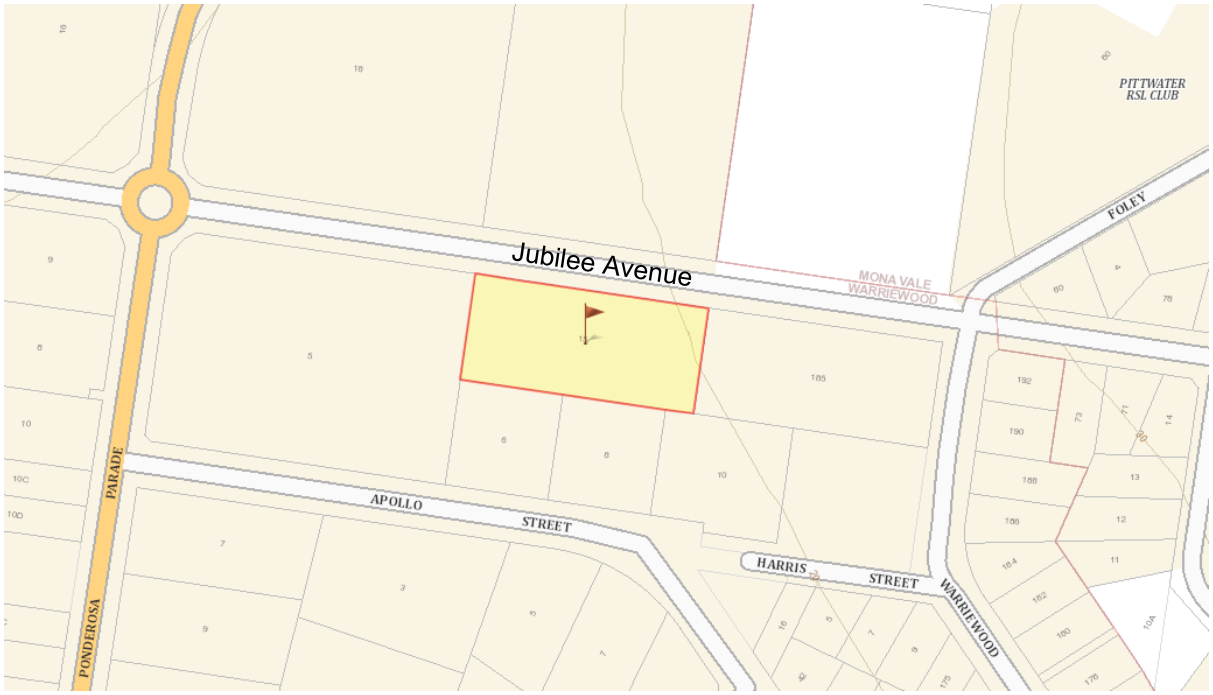

Figure 1 – Locality map (Source: https://maps.six.nsw.gov.au/, accessed 12/02/21).

1.3. Proposed Development

The proposed development upon completion of all works will consist of new warehouse units, storage units and hardstand pavement with associated parking spaces, landscaped areas, a bioretention basin, and a below ground on-site detention (OSD) tank.

1.4. Guidelines/Specifications

The design complies with the following guidelines/specifications:

- Pittwater 21 Development Control Plan
- Council Water Management for Development Policy
- Relevant Australian Standards

1.5. Design Software

The following design software was used:

- Drainage Design: DRAINS Version 2020.043 – 11 Sep 2020
- CAD Drawings: AutoCAD 2020

2. Stormwater Quantity

In accordance with the Pittwater Council DCP controls, OSD is required for the proposed development to limit post development peak flows to that of the pre-development condition. As mentioned above, the western portion of the site is affected by flooding in events from the 20% AEP up to the 1% AEP and

PMF. The OSD facility is proposed to be located outside the 1% AEP flood extent to ensure that area above the 1% AEP flood extent is collected and conveyed through a controlled outlet, in accordance with section *A7 – Considerations for Area Affected by the 1% AEP Flood* - Warriewood Valley Urban Land Release Water Management Specification (WMS).

Given first floor warehouse and carpark area is suspended above the 1% AEP flood extent, there is an opportunity to capture surface flows into the OSD that were previously within the flood effected portion of land. As such, the OSD has been sized to limit post development flows to the pre-developed condition for areas that in the existing state would have been considered bypass due to being located below the 1% AEP flood extent. This design strategy has created a desirable outcome for the local catchment stormwater runoff regime.

An ILSAX DRAINS model was developed to assess the pre-development and post-development run-off and storage requirements for the 20% AEP up to the 1% AEP rainfall event. A summary of the pre and post development flows have been provided in Table 1.

Table 1 - DRAINS model results, comparison of pre and post development peak flows and OSD volume.

AEP (%)	Pre-development flow (L/s)	Post development flow (L/s)	OSD volume (m^3)
20	81	81	21.8
10	110	84	40.9
5	142	91	54.7
2	180	141	75.5
1	215	181	79.5

Drains outputs for each AEP have been provided in Appendix A. An upstream catchment exists along the eastern site boundary with a peak 1% AEP flow of 282L/s. Flows and will be diverted along the eastern and southern boundaries via drainage channels, discharging to the southwest corner of the site, refer to drawing 16762-LD-DR-C-0020_P01.

As mentioned previously there is an existing Easement for Drainage located along the Southern boundary. Lindsay Dynan have undertaken an analysis of the future easement pipe to determine pipe size and potential depth of the future easement pipe that may be required in the future. This is particularly important with regard for the construction of the basement wall.

It has been proposed that shoring piles below the southern 1m wide easement as part of the structural design with allowance for a future easement pipe. The top of the piles have been designed 800mm below the channel invert (300mm easement pipe, 400mm cover and 100mm clearance to top of pile), refer to drawing 16762-LD-DR-C-0030 for detail. The future easement pipe has been designed to cater the total upstream catchment (0.585ha) peak flows for the 5% AEP storm event with a 20% impervious fraction (existing conditions). An upstream catchment node and future easement pipe has been included in the DRAINS model supplied with the DA submission.

3. Stormwater Quality

In accordance with objectives of the WMS and Water Management for Development Policy, preference has been given to natural filtration systems for the proposed treatment measures to reduce pollutant loads, refer to Appendix B for MUSIC Model treatment train.

All new roof area will be directed to a 10kL rainwater harvesting tank located adjacent the ground floor access driveway. Runoff from all hardstand areas and overflow from the rainwater harvesting tank to drain via a 55m^2 bioretention basin and into an OSD tank. The rainwater tank is to be connected for external reuse and has been sized based on reuse estimates to be confirmed at detailed desig stage by a hydraulic engineer outlined below:

- External irrigation
  = 0.4kL/year/m^2 x 500m^2
  = 200 kL/year

A MUSIC model was developed to determine the efficiency of the proposed water quality treatment train, a summary of the pollutant reductions is shown in Table 2.

Table 2 - MUSIC model results, target reductions based on Table 5 from Northern Beaches Council Water Management for Development Policy.

	Sources	Residual load	% Reduction	Target reduction %
Flow (mL/y)	5.46	5.04	7.7	-
Total suspended solids (kg/y)	811	119	85.4	85
Total phosphorus (kg/y)	1.68	0.386	77	65
Total nitrogen (kg/y)	12.2	5	59.1	45
Gross pollutants (kg/y)	127	3.86	97	90

4. Existing Flood Regime

This section should be read in conjunction with Lindsay Dynan's Flood Risk Management & Evacuation Strategy Report prepared for the proposed development.

Extracts taken the Ingleside, Elanora and Warriewood Overland Flow Flood Study depict the extent of flooding for the development site and surrounding areas for the events of 20% (Annual Exceedance Probability) up to the 1% AEP and Probable Maximum Flood (PMF) are presented below.

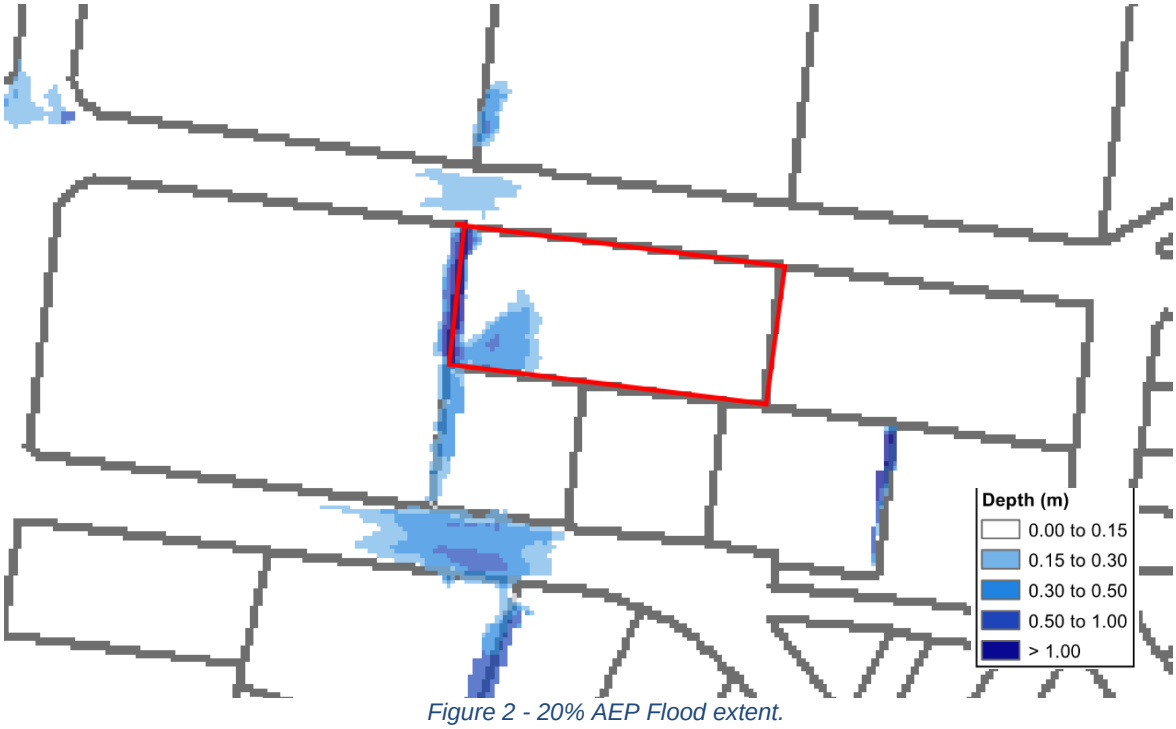

Figure 2 - 20% AEP Flood extent.

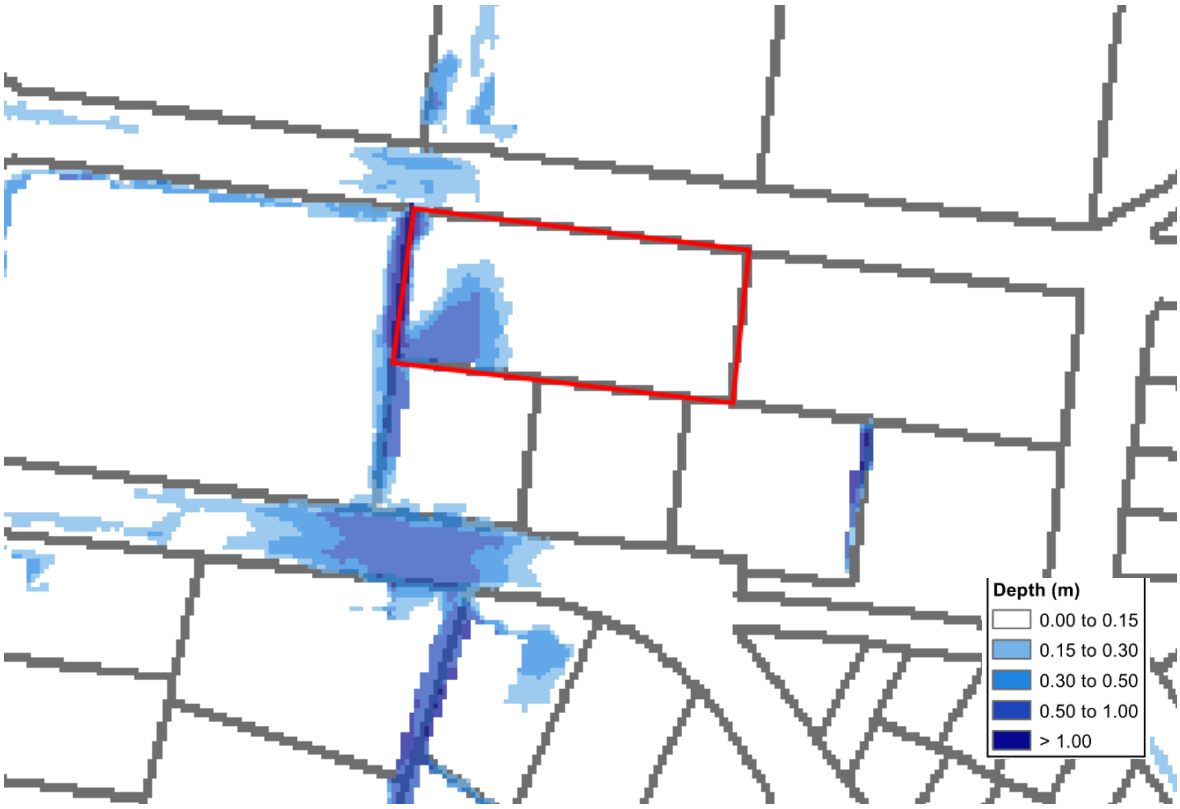

Figure 3 - 1% AEP Flood extent.

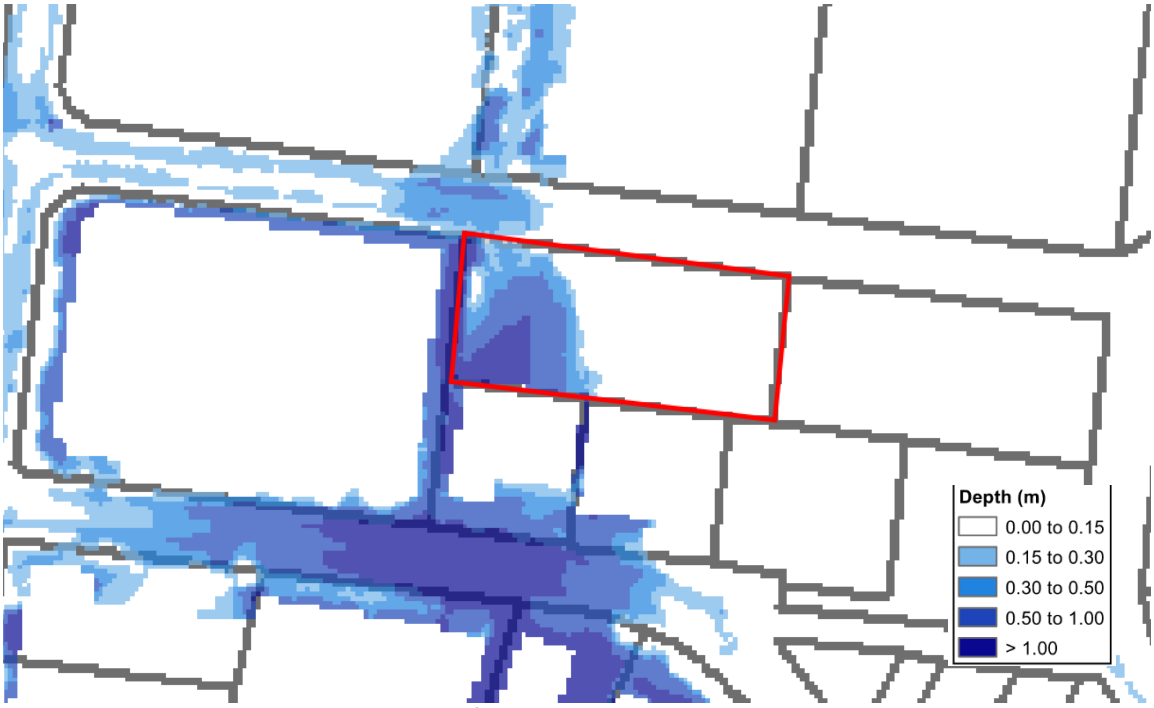

Figure 4 - PMF extent.

It should be noted that the existing flood regime that exists on the site provides constraints when implementing both Water Sensitive Urban Design (WSUD) and On-site Detention (OSD) measures.

Further to the available information from Council's resources, Council have provided further advice on the flood specific levels identified for the site reported below.

- % Annual Exceedance Probability (AEP) existing flood levels applicable to the site are approximately:
  - North Western corner of the site RL 17.86m AHD
  - South Western corner of the site RL 17.90m AHD
- Probable Maximum Flood level RL 18.7m AHD

In review of the above information, we have considered that the Flood Planning Level (FPL) to be the 1% AEP flood level + 0.5m freeboard. Therefore, an appropriate FPL is RL 18.4m AHD.

The 1% AEP flood extent is depicted on the Flood Volume Assessment (16762-LD-SK-C-0001_P01) as part of the Flood Risk Management Report prepared by Lindsay Dynan. Proposed building area within the 1% AEP flood extent will be suspended at the FPL via piers to ensure there is no net loss of site flood storage in a 1% AEP flood event. Additional excavation is also proposed in the southwest corner of the site to offset any flood storage loss from proposed retaining walls (refer to Flood Risk Management Report for further description of existing flood regime and mitigation measures).

Should you require any further advice or clarification of any of the above, please do not hesitate to contact us.

Yours faithfully
LINDSAY DYNAN
CONSULTING ENGINEERS PTY LIMITED

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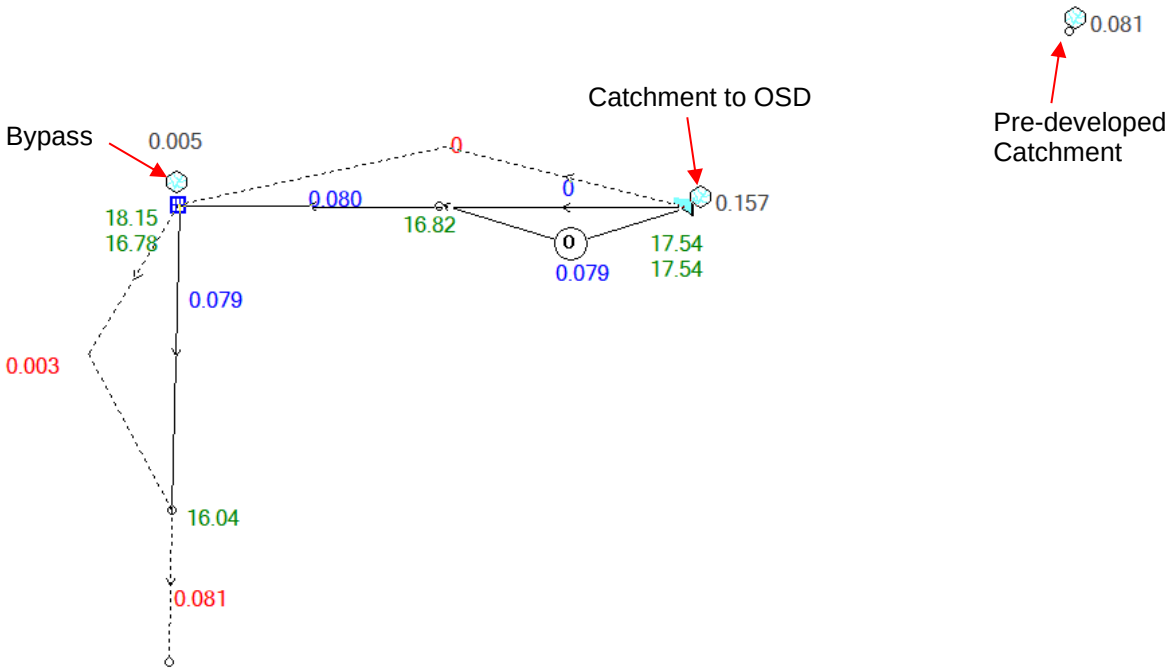
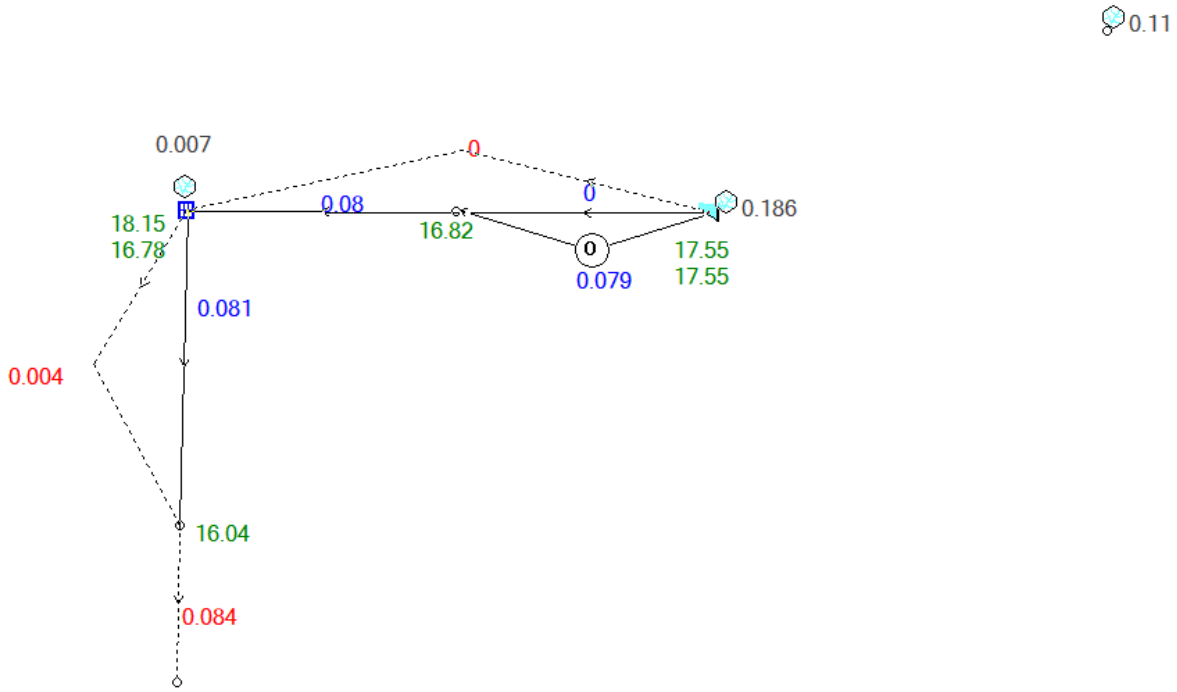
Appendix A – DRAINS Results

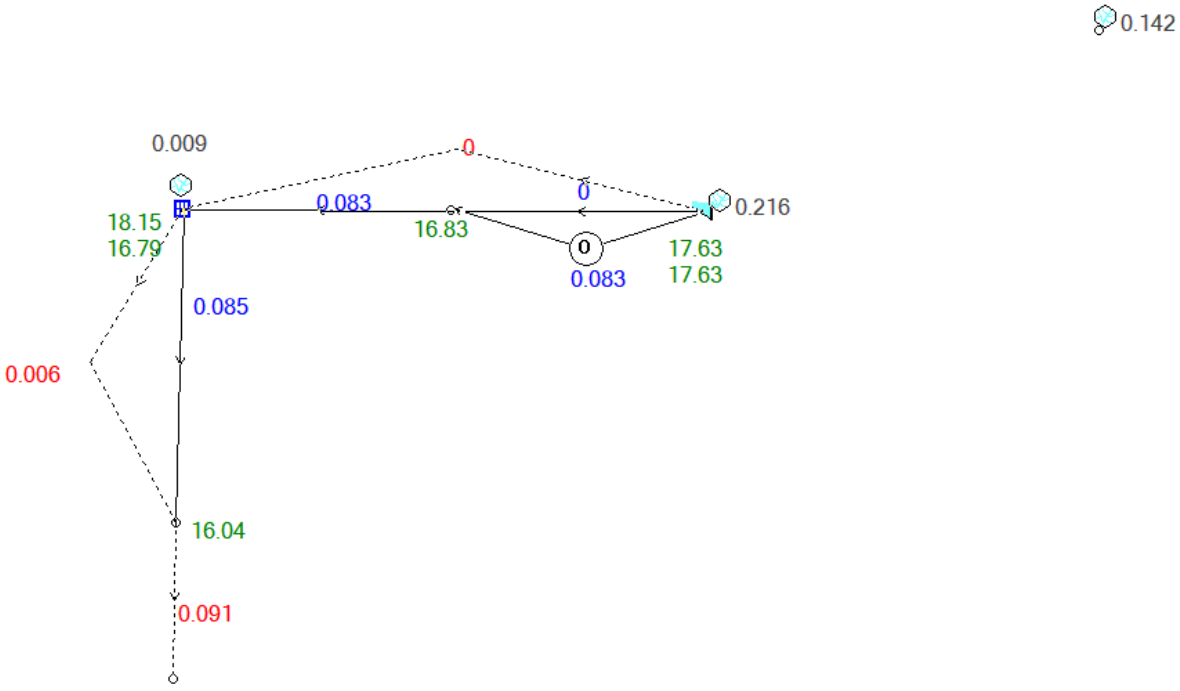
20% AEP



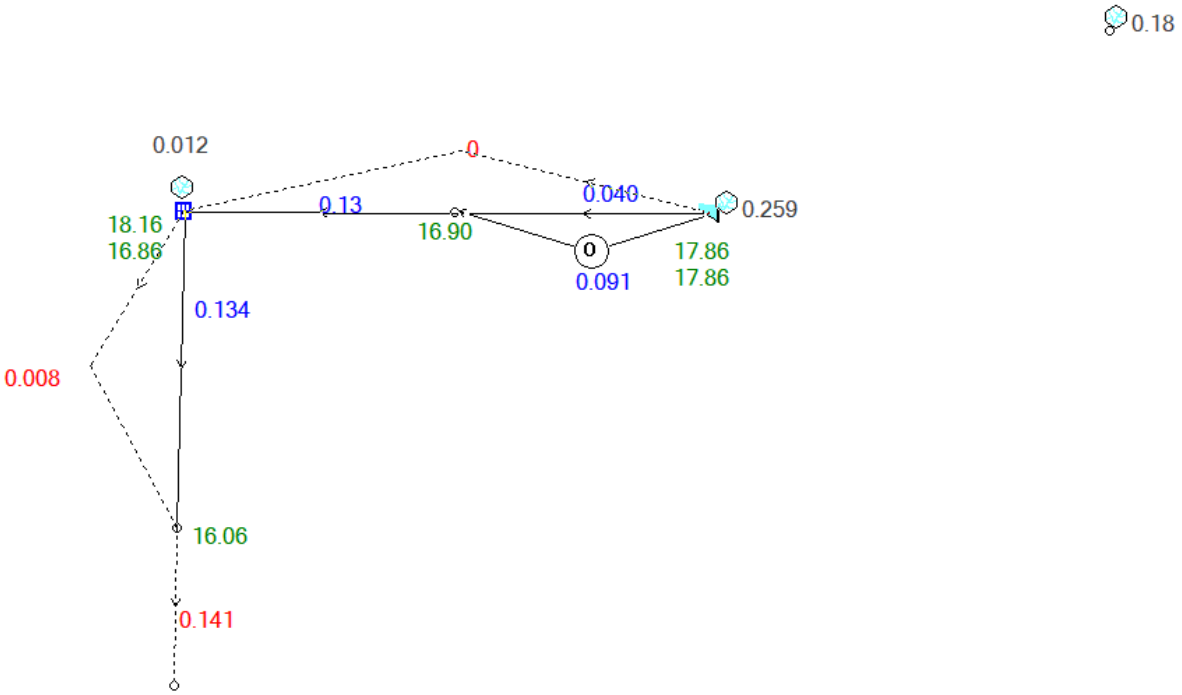
10% AEP


0.11
0.007
0
0.08
0
0.186
18.15
16.78
16.82
0
17.55
17.55
0.079
0.081
0.004
16.04
0.084

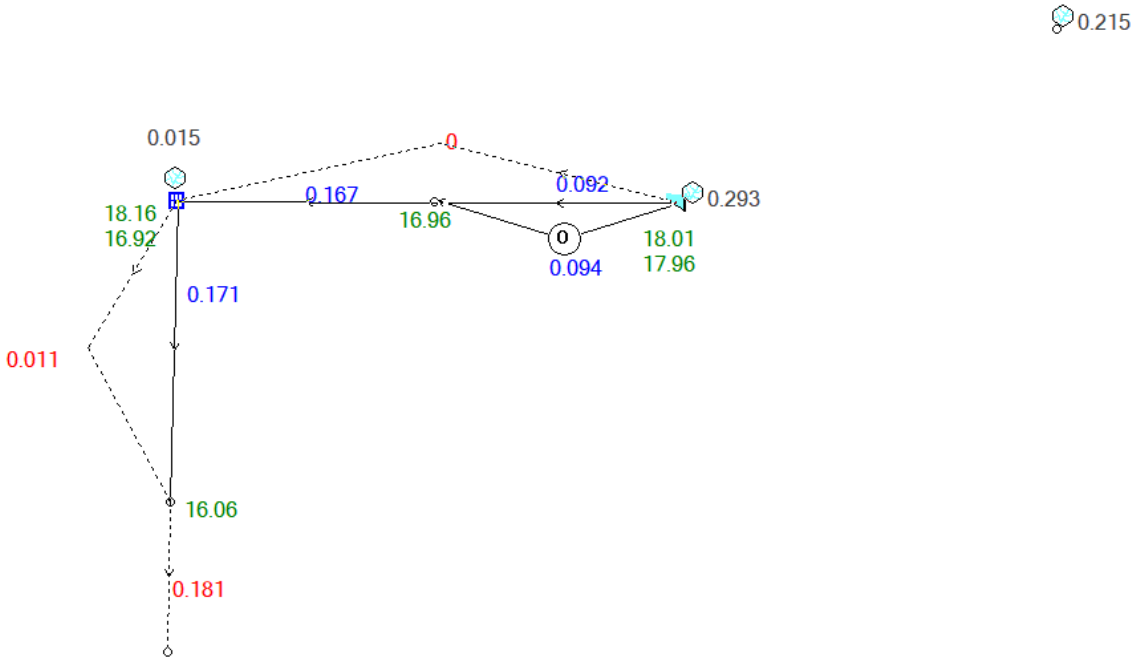
5% AEP


0.142
0.009
0
0.083
0
0.216
18.15
16.79
16.83
0
17.63
17.63
0.083
0.085
0.006
16.04
0.091

2% AEP


0.18
0.012
0
0.040
0.13
0.259
18.16
16.86
16.90
0
17.86
17.86
0.091
0.134
0.008
16.06
0.141

1% AEP


0.215
0.015
0
0.092
0.167
0.293
18.16
16.92
16.96
0
18.01
17.96
0.094
0.171
0.011
16.06
0.181

Appendix B – MUSIC Model Layout