

STORMWATER MANAGEMENT PLAN

Submission to: Lismore City Council

1 Walker Street, 2 Caldwell Avenue, 3 Walker Street, 4 Caldwell Avenue
East Lismore, NSW 2480

Lot 1 DP121500, Lot 2 DP121500, Lot 2 DP38118, Lot 25 DP38118

For:

Land and Housing Commission

Level 4, 4 Parramatta Square, Parramatta, NSW 2150

May 2023



Document Control Sheet


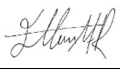
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1. Introduction

Ardill Payne and Partners (APP) has been commissioned to develop a Stormwater Management Plan (SMP) for the proposed development at Lot 1 DP121500, Lot 2 DP121500, Lot 2 DP38118, Lot 25 DP38118, 1 Walker Street, 2 Caldwell Avenue, 3 Walker Street, 4 Caldwell Avenue, East Lismore. The development includes the construction of two residential flat buildings and associated car parking area.

A site locality is included as figure 1 below.



Figure 1: Site Locality

The SMP employs the principles of Water Sensitive Urban Design, which focuses on reducing pollutant export as well as improving visual aesthetics of the urban landscape as a part of the greater concept of Ecologically Sustainable Design (ESD).

This SMP outlines the design of the proposed stormwater management systems to comply with Northern Rivers Local Government (NRLG) and Lismore City Council's (LCC) plans, requirements, and policies below:

- Chapters 5A and 22 of LCC's Development Control Plan (DCP).
- NRLG Specification D5 – Stormwater Drainage Design.
- NRLG Specification D10 – Handbook of Stormwater Drainage Design.

In particular:

- Stormwater quality to meet the criteria of Lismore City Council's DCP Chapter 22.4 Table 1: Water Sensitive Design Performance Criteria for the treatment of key pollutants.
- Onsite stormwater detention to meet the criteria of NRLG Specification D5 for peak flows of the required stormwater event.

2. Existing Site Conditions

The subject site occupies four individual lots each with single dwellings and a combined area of approximately 2451m². The site has a constant grade from SE to NW of approximately 5.6% fall. The site is bordered by table drains running parallel with the site boundaries and the associated road formation in the road reserve to the North, West, South. The site's Eastern boundary is bordered by a timber paling fence and existing dwellings, as such the site is not expected to receive runoff from neighbouring properties and therefore external flows have not been included in catchment calculations.

The entire site will undergo proposed development works and so the total area of the site has been adopted for stormwater treatment modelling purposes.

The characteristics of the existing site catchment are summarised below in **Table 1**.

Table 1: Existing Site Catchment Characteristics

Existing Catchment	Impervious Area (m ²)	Pervious Area (m ²)	% Impervious
Roof	505	0	100%
Ground Level Area	132	1814	6.8 %
Total Area	2451	Total % Impervious	26.0 %

3. Proposed Site Conditions

The proposed site will accommodate two new double story residential flat buildings with surrounding concrete hardstand areas. Due to the existing site topography and the sites proposed levels and layout, majority of the development will drain to the North-western corner of the block. Except for the Eastern side of the lot, which will be directed to the site's frontage and the existing SW table drain in Walker Street.

The characteristics of the proposed site catchment are summarised below in **Table 2**.

Table 2: Proposed Catchment Characteristics

Proposed Catchment	Impervious Area (m ²)	Pervious Area (m ²)	% Impervious
Roof	968	0	100 %
Ground Level Area	569	914	38.4 %
Total Area	2451	Total % Impervious	62.7 %

4. Proposed Stormwater Management

It is proposed to implement several stormwater treatment measurements to meet the quality requirements and onsite peak flow attenuation to meet quantity requirements for the proposed site.

The proposed elements of the SMP include:

- Majority of the site's ground water area to pass through a proposed underground SW tank for flow mitigation.
- All the site's roof water area to pass through a proposed underground SW tank for flow mitigation.
- Open Bio-retention area to treat the site's attenuated SW discharge.
- Controlled discharge to open channel in site's North-western table drain.

Stormwater management layout plans are provided within **Attachment 1**.

5. Water Sensitive Urban Design (WSUD)

The stormwater quality targets have been modelled using MUSIC to ensure compliance with LCC's DCP Chapter 22.4 Performance Criteria and NRLG Specification D5 – Stormwater Drainage Design. A summary of the key pollutant reduction targets and the post development reductions as determined by MUSIC are provided below:

Table 3: Pollutant reductions required and achieved.

Pollutant	% Reduction Required	% Reduction Achieved
Total Suspended Solids (TSS):	75%	93.0%
Total Phosphorus (TP):	65%	66.7%
Total Nitrogen (TN):	40%	57.6%
Gross Pollutants:	90%	100%

5.1 Proposed WSUD elements.

It is proposed that the pollutant reductions be achieved through the use a bio-retention system in the north-western corner of the site, as well as underground storm water tanks.

The Bio-retention has an area of 50.88 m² (approximately 4.35m x 11.70m) and an extended detention depth of 100mm. It is proposed that the area to be planted out with suitable plants nominated in Table 28 of 'Water by Designs' 2019, Bioretention Technical Design Guidelines. MUSIC modelling layout and parameters are provided in **Attachment 2**.

6. Stormwater Quantity Mitigation

The NRLG Specification D10 – Handbook of Stormwater Drainage Design specifies that the “post-development peak flows leaving the development are not to exceed the predevelopment peak flow rates for the required design storm event”.

As such, the DRAINS computer software was used to model the site internal and external catchments, quantify the generated flows, and assess the stormwater management requirements. Intensity Frequency Duration (IFD) data and rainfall temporal patterns used in the modelling are based on ARR 2016, extracted for the location of the site.

The DRAINS modelling indicates approximately 33m³ of onsite detention is required to mitigate the increase in runoff generated by the proposed development and maintain pre-development runoff rates from the site in events up to the 1:100-year ARI.

It is proposed to split the detention across two OSD systems, one for the driveway catchment and another for the roof water. Overland discharge will enter the proposed 10m³ underground SW tank (Tank 1). Similarly, roof water discharge will enter the proposed 23m³ underground SW tank (Tank 2). Tank 1 will discharge via a 117 mm diameter choke pipe outlet and Tank 2 will discharge via a 108 mm diameter choke pipe outlet.

Both Tanks will discharge into the proposed vegetated Bio-retention area through the Stormwater pipe system and associated headwall, where the site's Stormwater will then outlet into the existing council drainage system.

Below is a summary of the runoff rates generated by the site Pre and Post development including the runoff for the site with mitigation measures.

Table 3: Development Runoff Rates

AEP Event	Pre-Development (L/s)	Post-Development without Mitigation (L/s)	Post-Development with Mitigation (L/s)
18.13%	0.043	0.068	0.043
10%	0.061	0.088	0.053
5%	0.071	0.102	0.071
2%	0.097	0.114	0.094
1%	0.108	0.128	0.107

DRAINS modelling details and results have been provided within **Attachment 3**.

7. Conclusion

The SMP developed by APP outlines the methods used to comply with Council's requirements with respect to stormwater quality and quantity, and conveyance.

WSUD measures including vegetated Bio-retention, Underground SW tanks and surrounding buffer implemented within the site drainage design to provide a treatment train for the site.

The site's post stormwater runoff peak flows are increased and therefore mitigated using detention tanks and choke pipe as appropriate to suit the peak flow discharge.

8. Scope of Engagement

This report has been prepared by Ardill Payne & Partners (APP) at the request of Land and Housing Commission (LAHC) for the purpose of a Stormwater Management Plan and is not to be used for any other purpose or by any other person or corporation.

This report has been prepared from the information provided to us and from other information obtained as a result of enquiries made by us. APP accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this document for a purpose other than that described above.

No part of this report may be reproduced, stored, or transmitted in any form without the prior consent of APP.

APP declares that it does not have, nor expects to have, a beneficial interest in the subject project.

To avoid this advice being used inappropriately it is recommended that you consult with APP before conveying the information to another who may not fully understand the objectives of the report. This report is meant only for the subject site/project and should not be applied to any other.

9. Attachments

Attachment 1	Proposed SMP
Attachment 2	MUSIC Model and Output
Attachment 3	DRAINS Model and Mitigated Flow Outputs

ATTACHMENT 1

Attachment 1: Proposed Stormwater Management Plan

B	22/05/2023	Amended to suit LAHC comments	EMR
A	24/04/2023	Original Issue	RB
Issue	Date	Description	App'd



Level 4, 4 Parramatta Square,
Parramatta, NSW, 2150

1-3 Walker Street & 2-4 Caldwell Avenue

East Lismore, NSW 2480

Title: Stormwater Management Plan
Site Layout & Vegetated
Bio-Retention Detail

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ARDILL PAYNE

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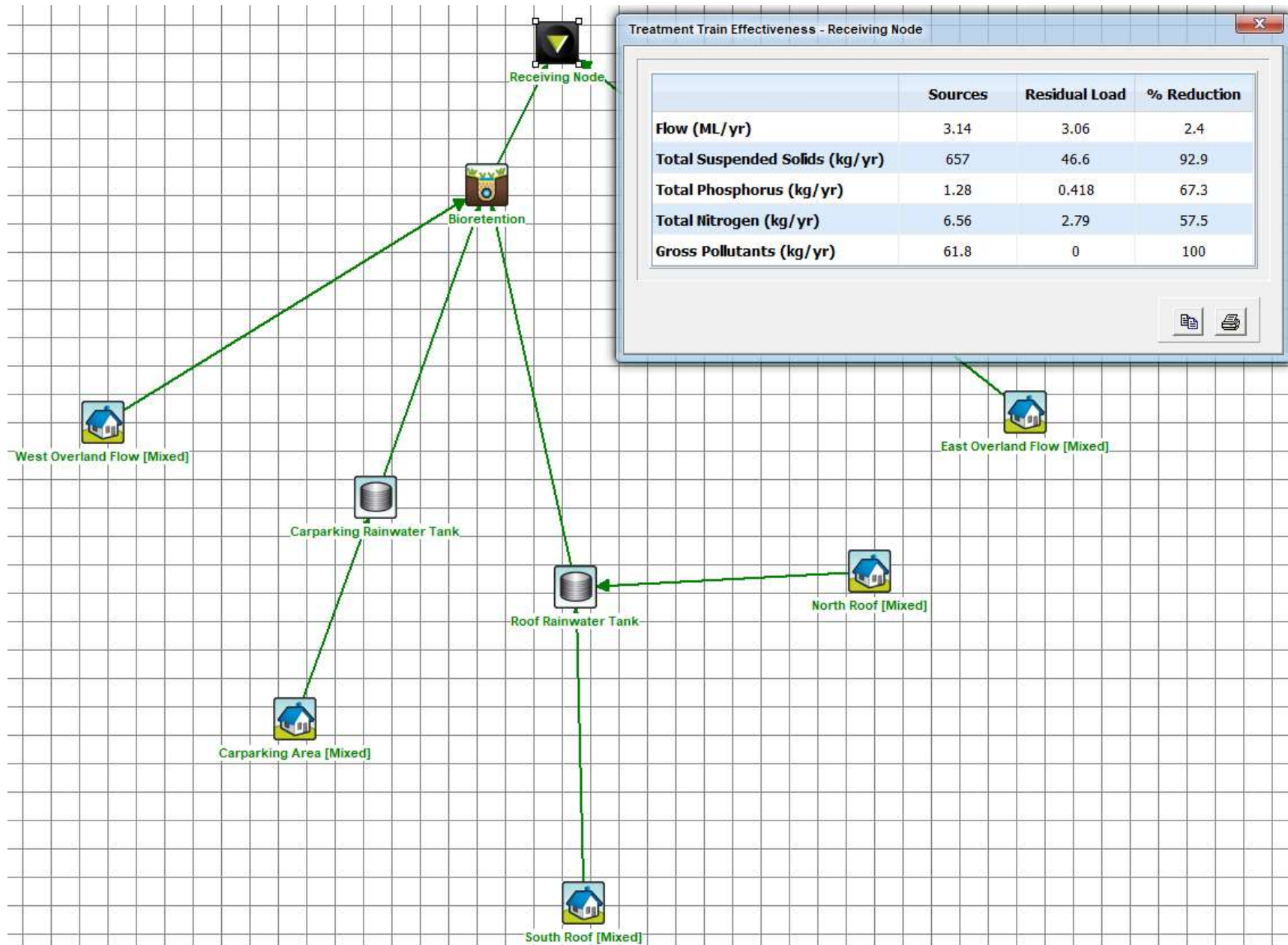
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Checked	RB	Datum	
Approved	RB	Drafting File	11467_SMP_2023-05-22.dwg
Date	24/04/2023	Design File	
Job No.	11467	Dwg No.	SMP01
		Issue	B

ATTACHMENT 2

Attachment 2: MUSIC Model Details



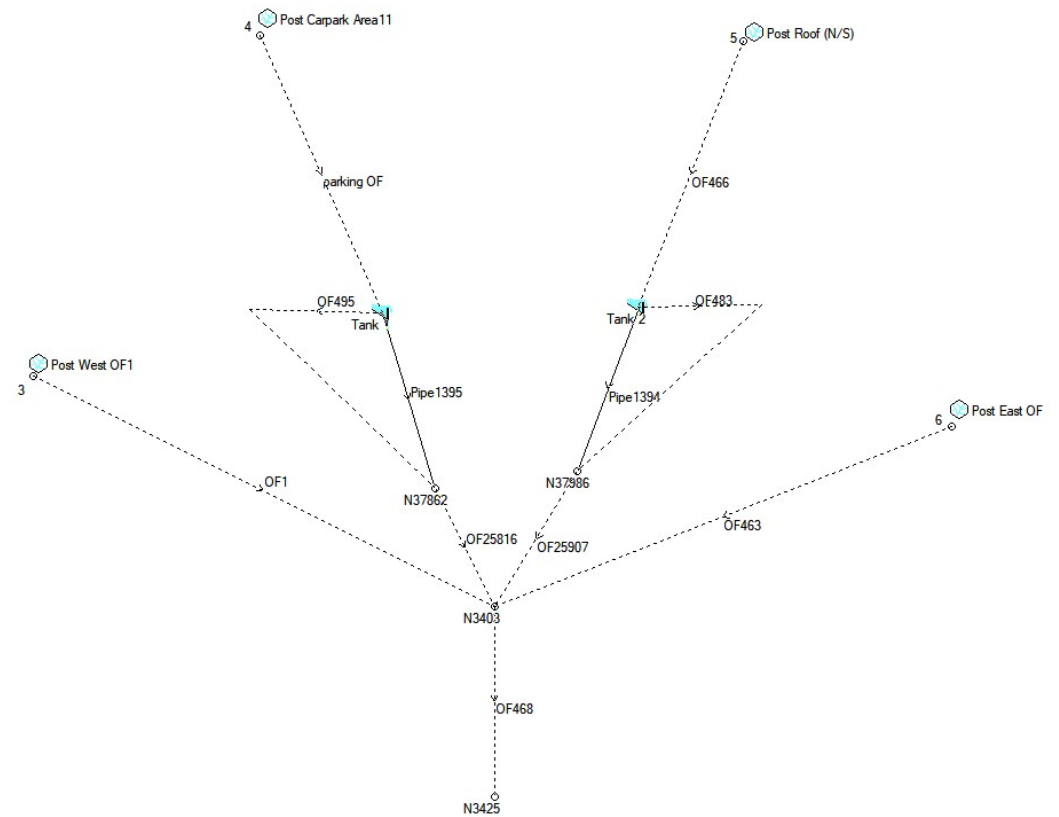
ATTACHMENT 3

Attachment 3: DRAINS Model and Mitigated Flow Outputs

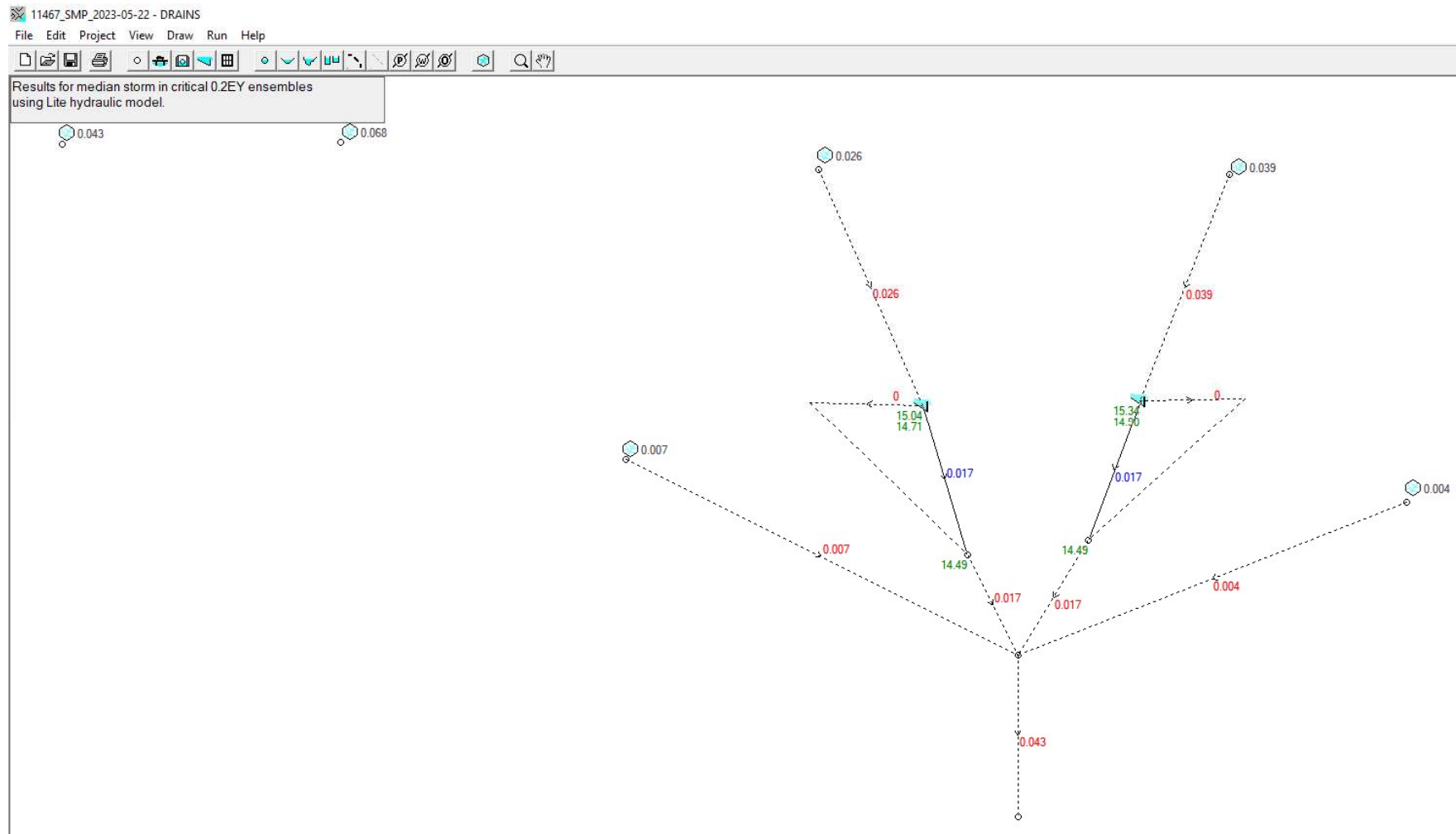


N1 Existing

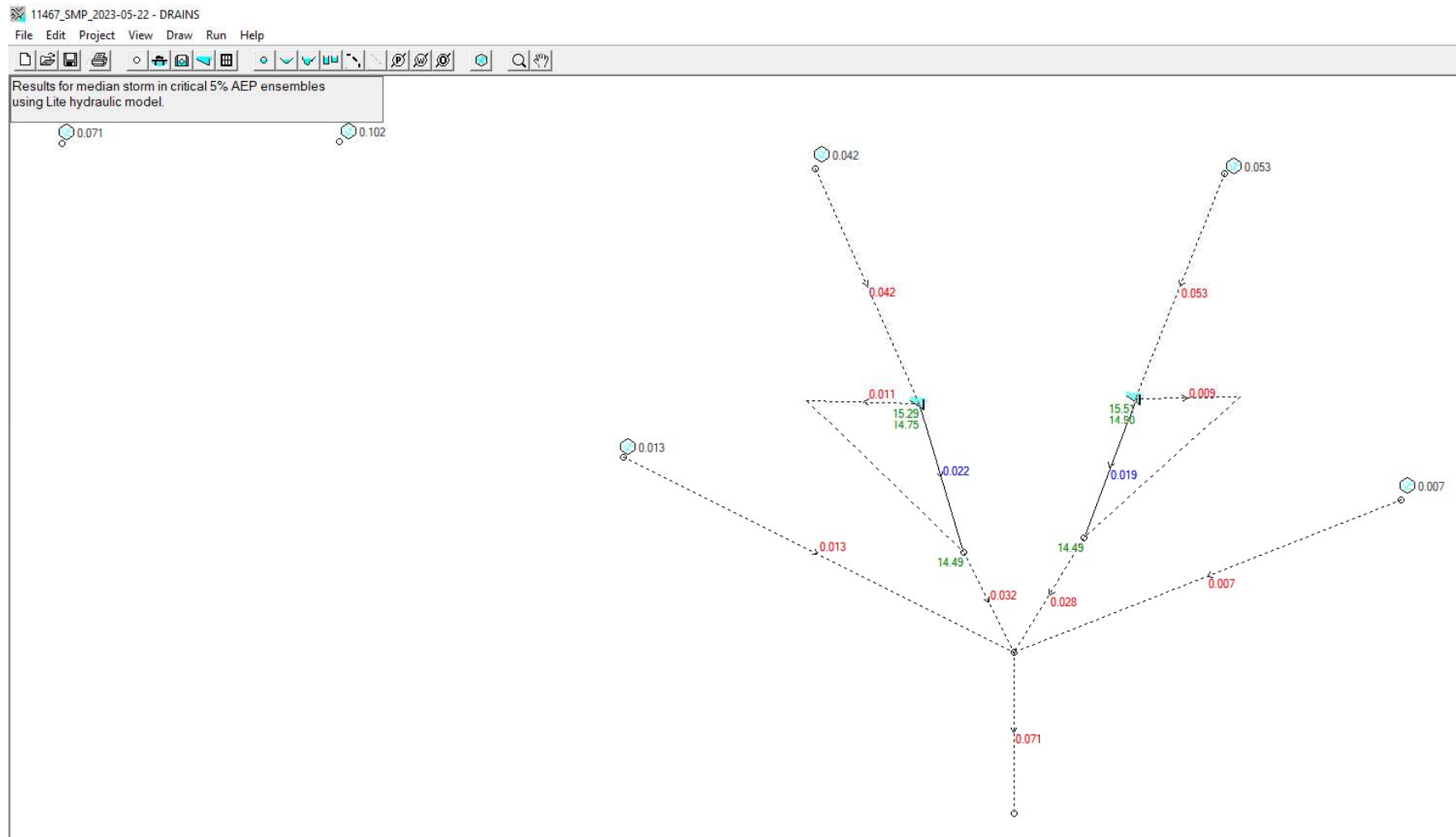
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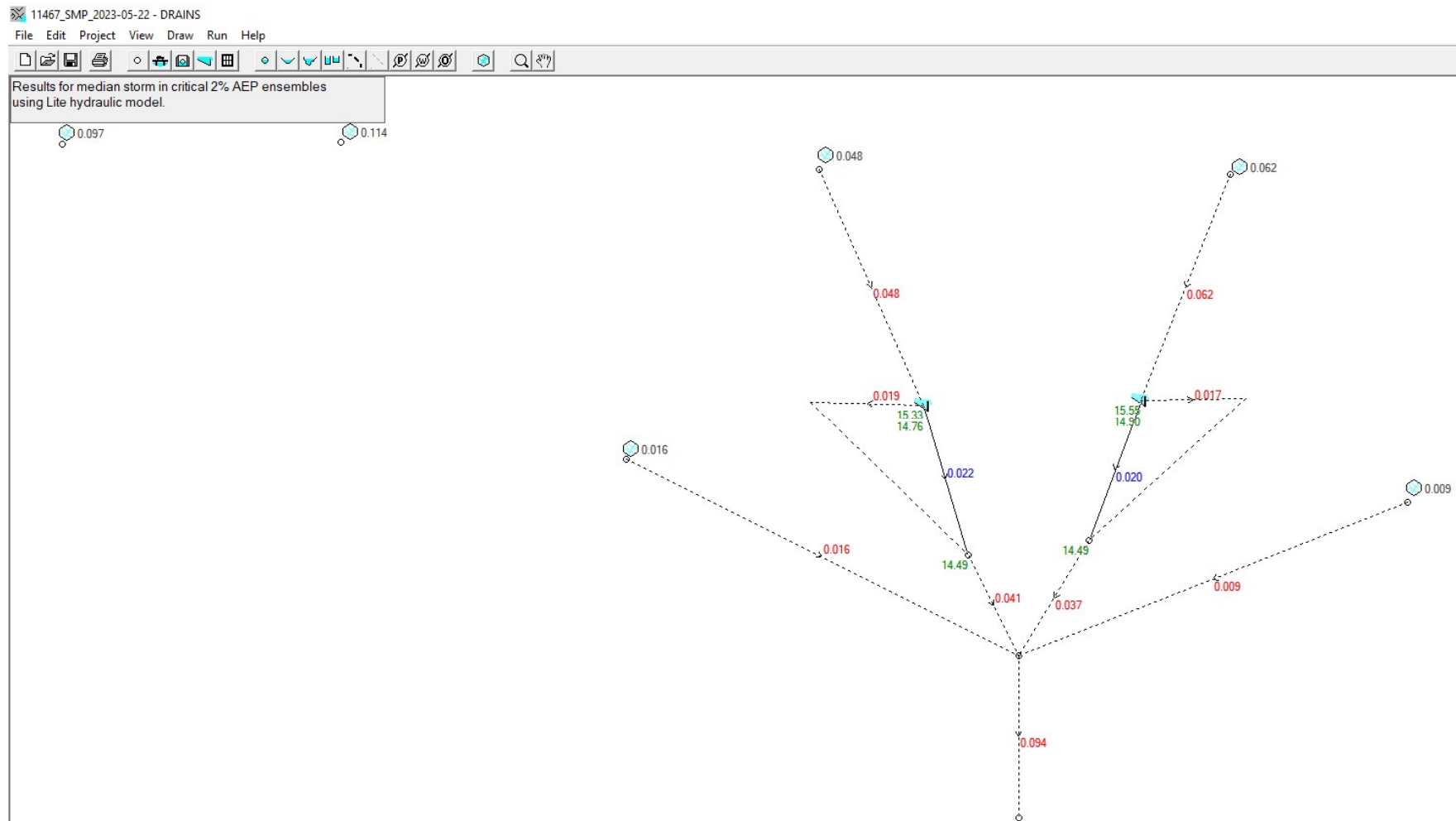
DRAINS Layout Plan



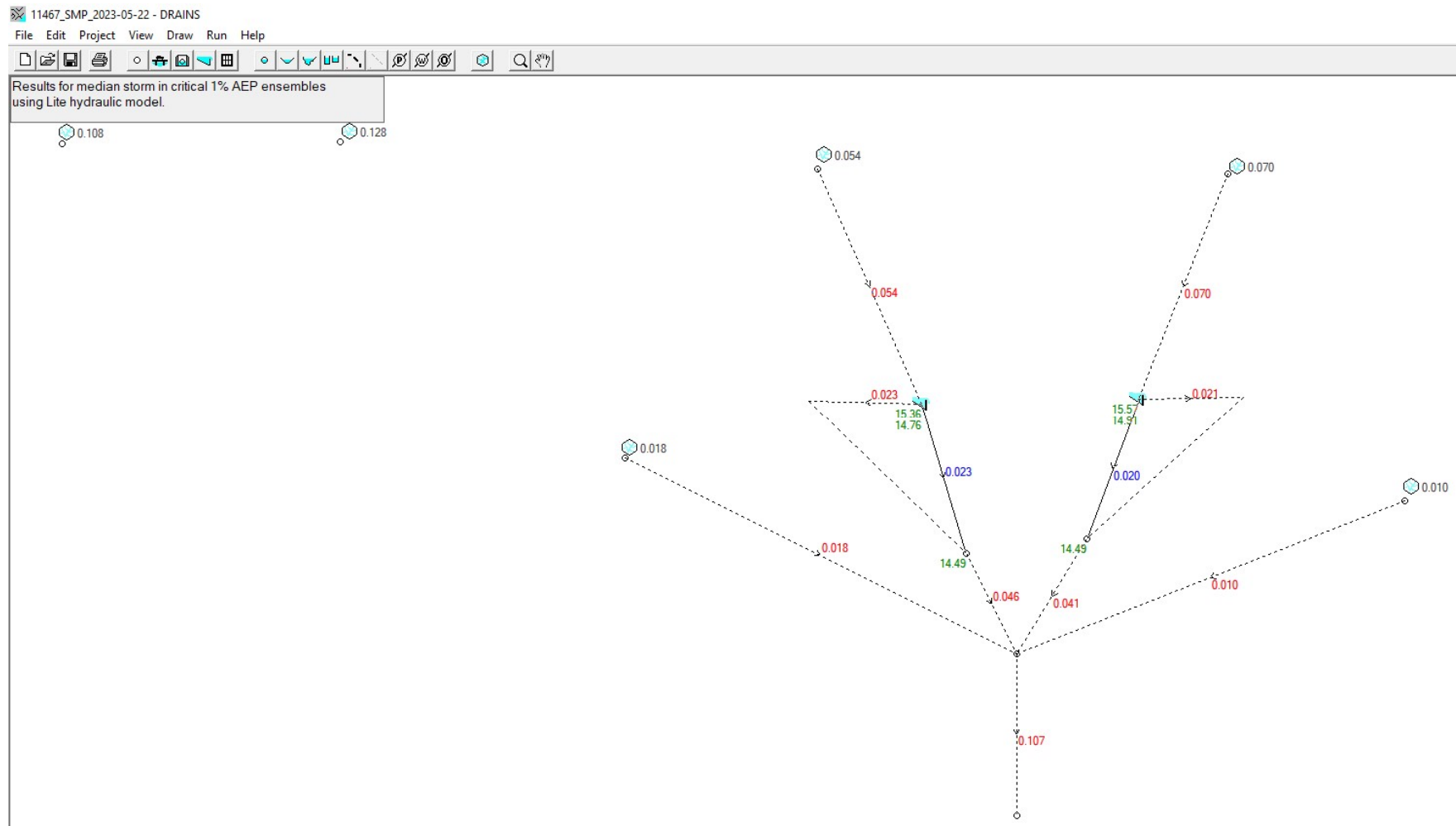
0.2EY - Mitigated Flow Outputs



5% - Mitigated Flow Outputs



2% - Mitigated Flow Outputs



1% - Mitigated Flow Outputs