

# FLOOD STUDY ASSESSMENT REPORT

For Proposed Residential Development

at

10 Talgarra Place, Beacon Hill

Prepared for:

ZSArchitects

Prepared By:	Frank Ieroianni
Date:	April, 2020
Issue:	Development Application
Reference:	19731-003-r
Revision:	A
L.G.A.	Northern Beaches Council



## Table of Contents

Introduction .....	3
Objectives .....	3
Existing Site Condition .....	5
Proposed Development .....	6
Flood Modelling .....	7
DRAINS Modelling.....	7
HEC-RAS Modelling .....	7
Pre-Development Flood Behaviour.....	8
CONCLUSION .....	8
APPENDIX A.....	9
Existing Site Survey .....	9
APPENDIX B .....	10
Architectural Plans.....	10
APPENDIX C.....	11
Hec-Ras Print Out.....	11

## Introduction

As part of the Development Application for the proposed residence at 10 Talgarra Place, Beacon Hill; Northern Beaches Council has requested a Flood Study Assessment Report to determine any impacts the proposed development will have on the existing drainage paths and to ensure that the alterations & additions is safeguarded against potential flooding.

Engineering Studio has been commissioned by ZS Architects to complete the flood study assessment and report for the proposed alterations & additions.

The flood impact assessment has been prepared in conjunction with architectural, landscaping & engineering documentation prepared in the submission of Development Application.

## **Objectives**

This report identifies the flood risks and management procedures necessary for the proposed residential development.

The objectives of this report are listed below:

- Guidelines to minimise the impact of flooding on the proposed development and the surrounding residential properties.
- Ensure no loss of flood storage as a result of the proposed development.
- Ensure no changes to flood levels, flows and hazards cause by altering the flood flows
- To determine a 1 in 100 year ARI flood level and set proposed floor levels above the required free board.
- A review of flood hazards for the site & proposes suitable construction methods to accommodate them.

In order to achieve the above, the following has been undertaken:

- Liaison with Local Council officers regarding the proposed development and implementation of suitable development controls to ensure adequate performance of the proposed development during flood events.
- A review of existing topography maps, catchment plans, etc.
- Visual observations of surface features of the existing site and surrounding areas by a walk over conducted by an experienced civil engineer.
- Engineering assessment and reporting of the proposed development and its impact on the existing residences.

Flood risk management will be achieved by imposing the following guidelines:

- Provide minimum floor levels for proposed development, including minimum freeboard requirements.
- Recommendations for structural design of the proposed development to resist additional loadings due to flooding, including the effects of impact loading from floating debris, etc.
- Recommendations in the use of flood proof materials in the building's construction in accordance with Council's policy.

## Existing Site Condition

The site, shown in Figure 1, is located on the southern side of Talgarra Place. The overall ground surface slopes from north to south with an average slope of approximately 35%. Existing on the site is a single residential dwelling situated towards the front of the property.

An existing 300mm diameter stormwater drainage pipe is located within the subject property along the northern boundary, connected from a kerb inlet pit within the roadway of Talgarra Place to a pit at the rear boundary of the property. The pipe drains the upstream catchment including properties on Beacon Hill Road, Kalianna Crescent and Talgarra Place.

Overland flow from the upstream catchment is conveyed to the low point of Talgarra Place. Several kerb inlet pits are located within this low point, capturing flow which is conveyed to the aforementioned 300mm pipe. When the capacity of the pit & pipe network is exceeded, the flow overtops the kerb at the low point of the verge located at the driveway of 9 Talgarra Place (RL = 113.94). These flows travel around the existing houses further downstream.

The property is approximately 44.6m long and 16.8m wide; the total site area is 734 square metres. A full copy of the site survey plan has been provided in Appendix A of this report.



Figure 1 - Site Location

### Proposed Development

The proposed development includes the demolition of the existing planter boxes and front fence, and subsequent alterations/ additions to the existing building, including extensions to the lower ground, ground floor and first floor. The existing concrete driveway is also proposed to be removed and a new driveway is proposed.

In order to ensure flood levels and extents are maintained/ reduced, it is proposed to maintain the boundary level of the new driveway crossover. This will ensure the existing drainage flow path into the neighbouring property is maintained and water is not diverted into the subject property.

A detailed copy of the proposed development architectural plans has been provided in Appendix B of this report.

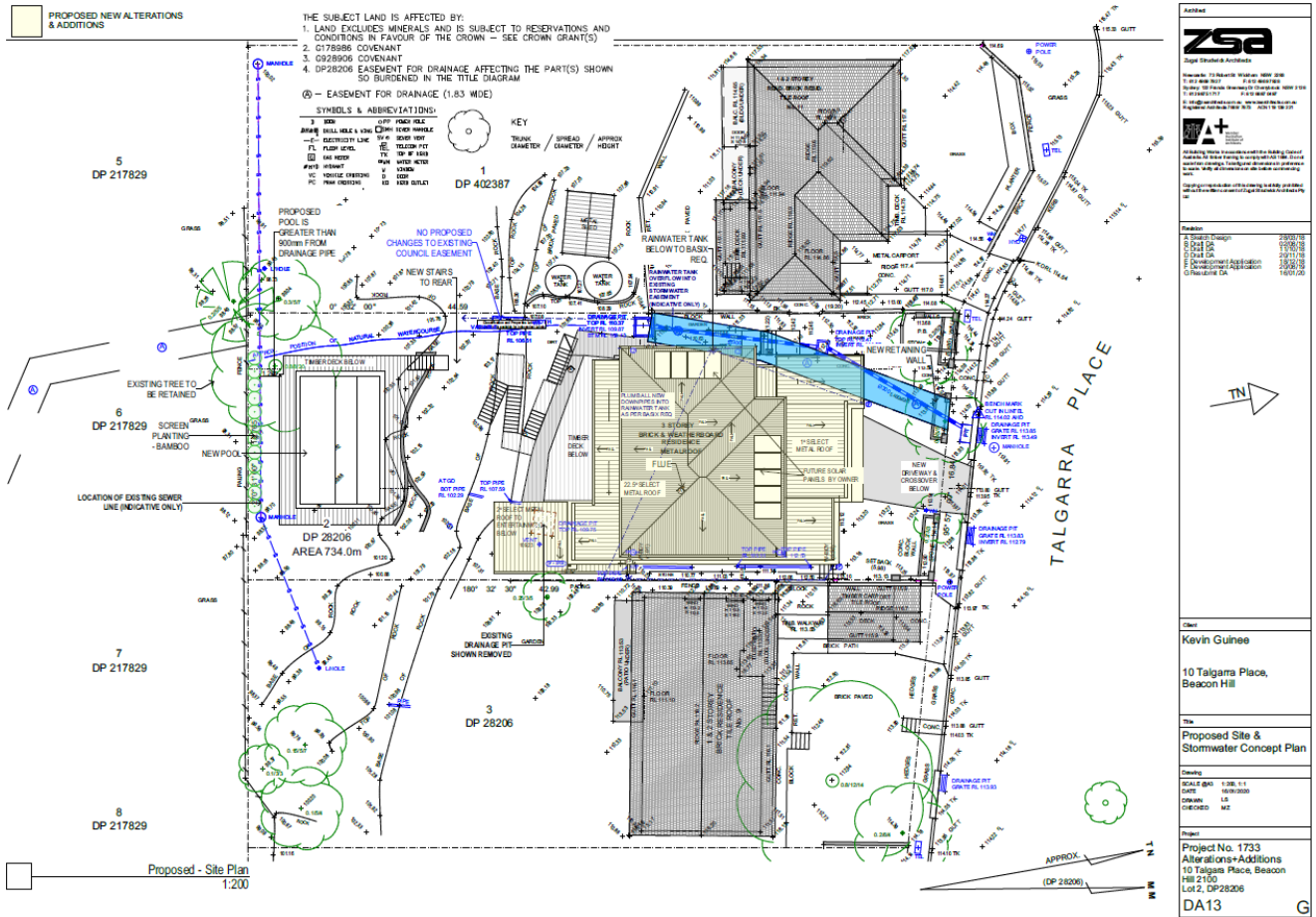


Figure 2 - Proposed Development Site

## Flood Modelling

### **DRAINS Modelling**

Using information obtained from Northern Beaches Council, survey data and site observations, a 'DRAINS' model was prepared to determine the 1 in 100 year ARI flowrate traversing over the site. The following properties were used in the DRAINS model:

- Soil type – Normal 2.5
- Impervious Area Depression Storage – 1.0mm
- Pervious Area Depression Storage – 5.0mm
- Antecedent Moisture Condition (100 Yr ARI) – 3.0
- Grated Sag Pit Blocking Factor – 100% grate blockage, 0% lintel blockage
- Sag Pit Blocking Factor – 0.2 (20%)
- On Grade Pit Blocking Factor – 0.2 (20%)
- Maximum length for Kinematic Wave Equation – 50m
- Residential area impervious area – 75%
- Road reserve impervious area – 95%

Upon completion of the pre-development DRAINS model, a piped flow rate of 223l/s through the existing 300mm pipe and an overland flow rate of 273 l/s was calculated. An electronic copy of the DRAINS models can be provided upon request.

### **HEC-RAS Modelling**

A HEC-RAS model was prepared for the subject site in order to determine the pre development flood levels and flood extents.

The upstream and downstream boundary conditions were calculated using a normal depth with an approximate slope as calculated by the site survey. An upstream slope of 1% and a downstream slope of 10% were adopted.

The Manning's 'n' value adopted in the HEC-RAS model has a significant effect on the capacity of the proposed channels. A Manning's 'n' of 0.05 was adopted for landscaped areas and a Manning's 'n' of 0.015 was adopted for paved surface areas.



### Pre-Development Flood Behaviour

The overland flow overtops at the sag point of Talgarra Place along the frontage of 9 & 10 Talgarra Place. Although the council verge generally falls towards the road, the driveway crossover to 9 Talgarra Place falls away from the kerb. This results in all overland flow to be directed into 9 Talgarra Place through the driveway. A blockwork wall located on the boundary between the two properties adjacent the driveway contains flow wholly within 9 Talgarra Place, preventing any flow through the subject property. As the flow continues downstream, the obstruction of the existing building causes water to be directed east, between the setback of 8 & 9 Talgarra Place.

An output summary of the pre development HEC-RAS model can be found in the appendices of this report. A full electronic copy of the pre-development HEC-RAS model can be provided upon request.

### CONCLUSION

It is apparent from the design review that the subject site is not currently affected by overland flows during the 1% AEP storm event. Overland flows from upstream catchments generate a total maximum 1% AEP flow rate of 491 l/s.

The existing ground levels on the subject site and neighbouring properties capture all of the overland flow from the upstream catchment with nil overland flows entering the subject property.

Based on the Flood Impact Assessment Report undertaken, it has been shown that the alterations & additions can be constructed on the site with nil impact to surrounding properties and within the guidelines imposed by the regulatory authorities.

We trust the above and attached clarify the situation, if you have any further queries please contact the undersigned at your convenience.

Report Prepared by:

Frank Ieroianni  
BE (Civil) Hons  
DESIGN ENGINEER

Report Reviewed by:

Ben Carruthers  
BE (Civil) MIEAust CPEng NPER  
DIRECTOR



APPENDIX A

**Existing Site Survey**

**APPENDIX B**

**Architectural Plans**

APPENDIX C

**Hec-Ras Print Out**