FLOOD STUDY REPORT

FOR

A PROPOSED DEVELOPMENT

84 Percival Road, Smithfield

July 2019

Report Description

Report Name	**Flood Study Report for a Proposed Development**
Address	**84 Percival Road, Smithfield**
Client	**Linda Zanotto <LZanotto@benbowenviro.com.au>**
Prepared By	**Muna Pradhan** **Flood and Drainage Engineer** **MIE Aust CPEng NER**

Revision History

Date	Version	Author	Comments
22.07.2019	V_0	MP	First Edition

Contents

List of Figures

1 Introduction

BMB Engineers was commissioned to prepare a flood study report in regard to the proposed development at 84 Percival Road, Smithfield. In this study, the impacts on flooding behaviour due to the proposed development have been assessed. The flood study report covers the followings analysis and assessments;

- Catchment hydrology analysis for 1% AEP storm event using DRAINS software;
- Analysis of overland flow for 1% AEP storm event using HEC RAS software;
- Analysis of overland flow for the pre and post development scenarios;
- Assessment of the flooding impacts due to the proposed development at the site and vicinity;
- Estimation of depth, velocity and flood water level for 1% AEP storm events;
- Analysis of hydraulic hazard for 1% AEP storm event and carry out risk assessment;
- Preparation of flood extent map for pre and post development conditions;
- Recommendation of minimum finished floor level;

This report has been prepared to accompany a Development Application for the proposed development that will address Fairfield City Council's requirements for a flood controlled lot. This report describes the existing characteristics of the area, proposed development and quantifies the impact of flooding due to the proposed development.

2 Site Description

The site is located to the western side of Percival Road, near the junction of Woodpark Road and Percival Road. A locality plan of the site is as shown in Figure 1 below.

Figure 1 Location of Site (Source: SIX Maps)

The site is currently developed with a brick/metal warehouse, a metal/brick outbuilding, and a concrete driveway. The current use of the existing facilities is a commercial and residential building supply. The survey plan of the development site is as given in Figure 2. The general trend of the site slopes towards the rear boundary.

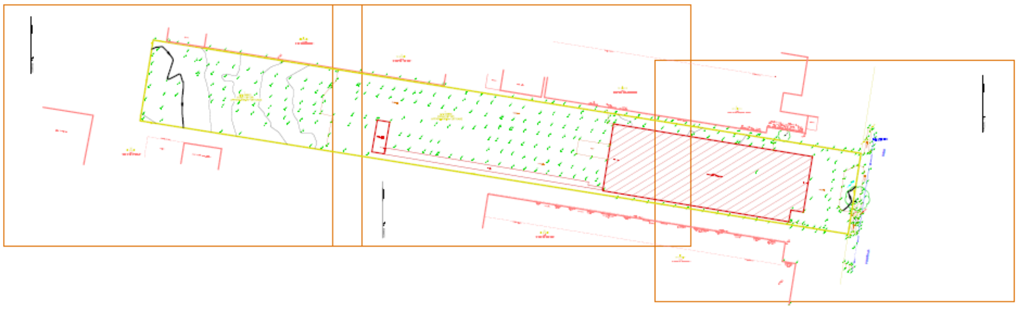


Figure 2 Survey Plan of Development Site

3 Proposed Development

The proposed development comprises demolition of existing outbuilding at the rear of the site, construction of a weight bridge, providing car parking area in the front and change of use of the existing structures and land into a scrap metal recycling warehouse as shown in Figure 3.

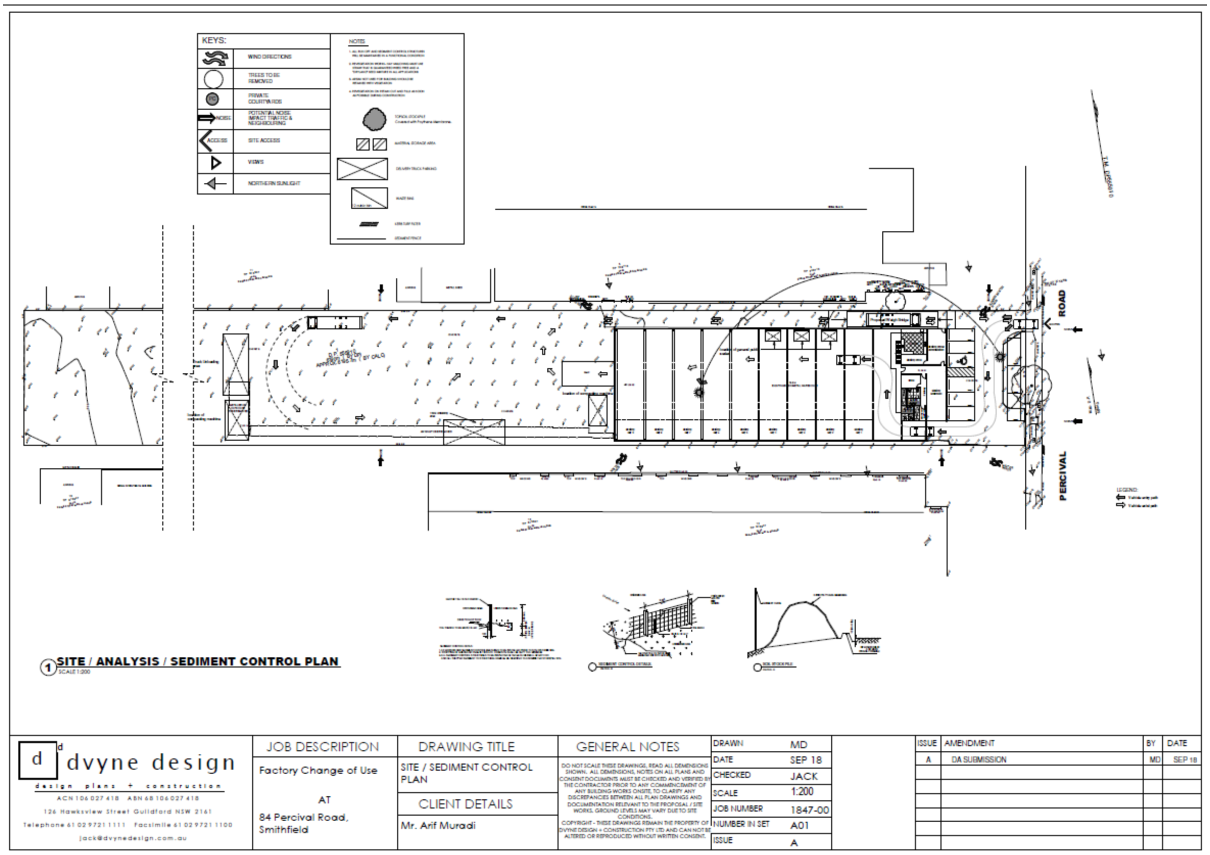


Figure 3 Proposed Development

4 Hydrological Analysis

4.1 Catchment Area

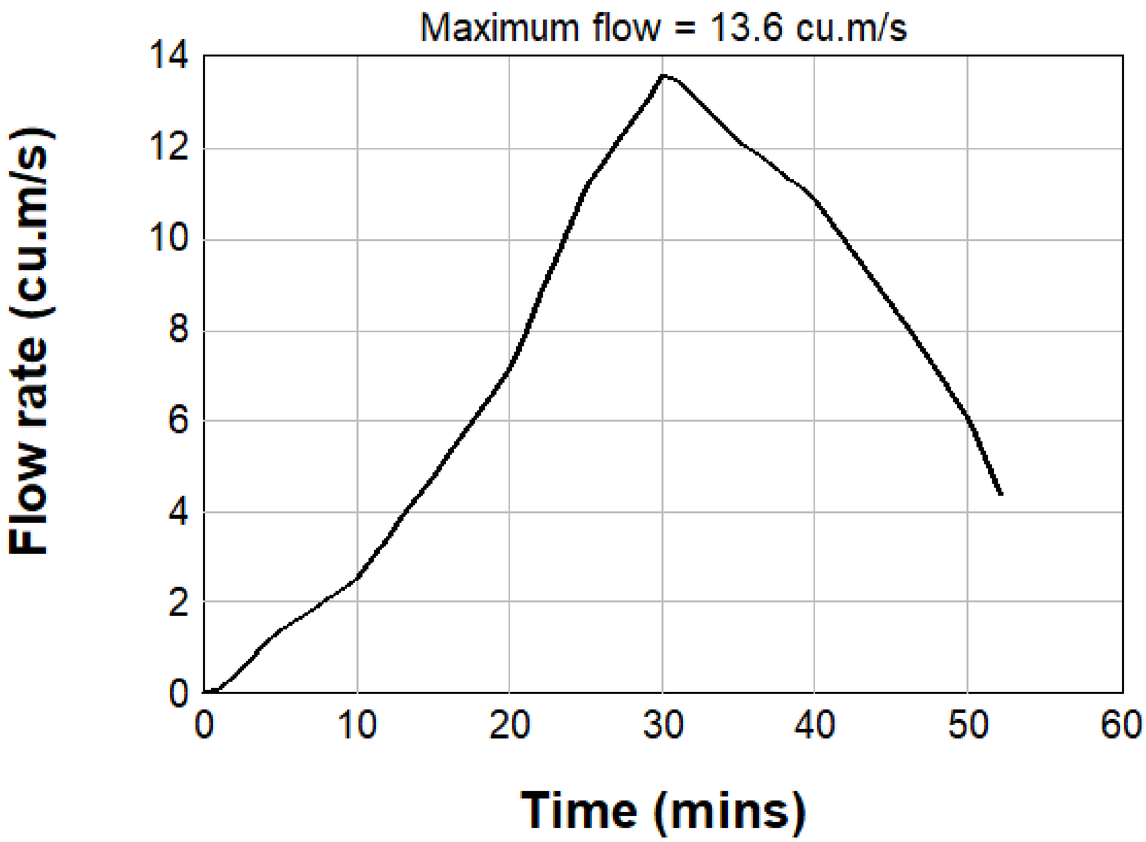
The most probable extent of the catchment area (Figure 4) contributing to the overland flow near the proposed development site has been estimated from the available LiDAR data. The area of catchment has been estimated to be approximately 57.8 ha.

Figure 4 Catchment Area of the Development Site (Image: Google Earth)

4.2 Rainfall Data and Design Flow

The rainfall data have been obtained from Intensity Frequency Duration Chart of the proposed development site provided by the Bureau of Meteorology. ILSAX model was used for hydrological modelling with multiple ARR2016 storm events for a range of storm duration ranging from 5 minutes to 3 hours. The impervious area for the catchment was estimated around 70% within urban development. DRAINS software was used to run the model and the most critical overland flow through the proposed development site for 1% AEP storm event was determined.

The results of the model show that the most severe storm duration for both the catchment is half an hour for 1% AEP storm event. The relevant hydrograph is shown in Figure 6.



(a) Catchment 1

Figure 5 Hydrographs in 1% AEP Storm

5 Hydraulic Modelling and Analysis

5.1 Pipe Capacity and Overland Flow

The amount of water carried out by the stormwater drainage network has not been considered in calculating the overland flow. Therefore, the overland flow through the development site has been taken same as the most severe flow from the catchment as calculated in Section 4. The result of this study represents the worst case scenario.

5.2 Overland Flow Model

An 1.0 m Digital Elevation Model has been used to develop a terrain model of the study area. The terrain model around the development site is shown in Figure 7.

Figure 6 Terrain Model around the Study Area

The area defined as a 2D flow area in the HEC RAS model has been generated into 2m grids. The downstream boundary of the 2D flow area has been assigned as a normal depth. The flood hydrographs from the upstream catchments have been assigned as inflow along the upstream boundary of the 2D flow area in the hydraulic model. Manning's roughness coefficient has been chosen as 0.05 for the general urban environment and 0.015 for road reserves. Obstructions caused to the flow due to the existing dwellings around the flood extent have been taken into account in the model.

5.3 Model Results for Existing Condition

Figure 7 present the flood extent map of the overland flow in existing condition in 1% AEP storm event. This figure shows that the development site is just touched by the overland flooding in 1% AEP Storm event around the south-west corner of the lot. Figure 8 shows the flood depth around the site in existing condition in 1% AEP storm. Figure 9 shows the flood velocity around the site in existing condition in 1% AEP storm event.

Figure 7 Flood Extent Map for Existing Condition in 1% AEP Storm

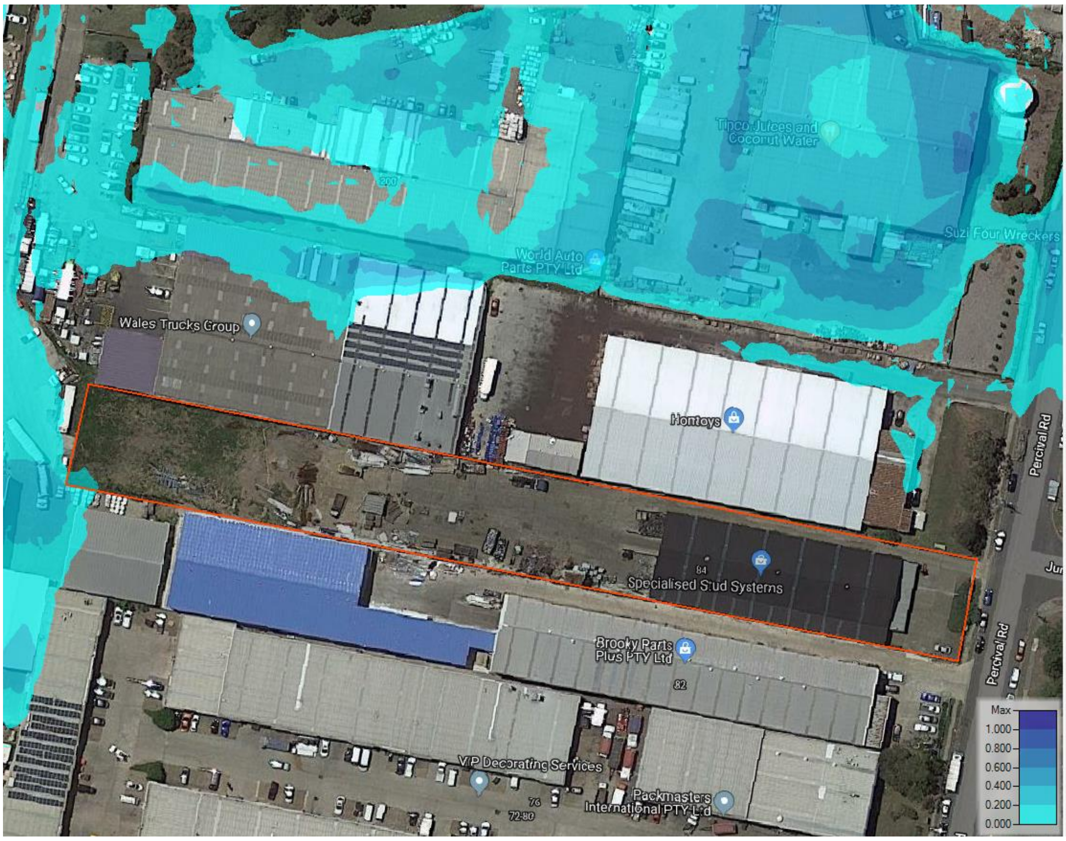


Figure 8 Flood Depth for Existing Condition in 1% AEP Storm

Figure 9 Flood Velocity for Existing Condition in 1% AEP Storm

5.4 Model Results for Developed Condition

As the footprint of the proposed development does not encroach the 1% AEP flood extent, there will not be any changes in the existing 1% AEP flood behaviours in the post development scenario.

5.5 Flood Hazard Category

Flood hazard category is a function of flood depth and flow velocity. A method specified in NSW Government Floodplain Development Manual 2005 has been used to determine the hydraulic hazard category of the development site. According to this manual, relationship between the depth of flood and velocity for the provisional hydraulic hazard category is as shown in Figure 10.

The modelling result shows that the overland flood extent in 1% AEP is not encroached by the foot print of the proposed development. In the higher event storm, the floodwater water may enter the site. Based on these values, the site is located in low flood risk zone. This condition will not be altered even after the completion of the proposed development.

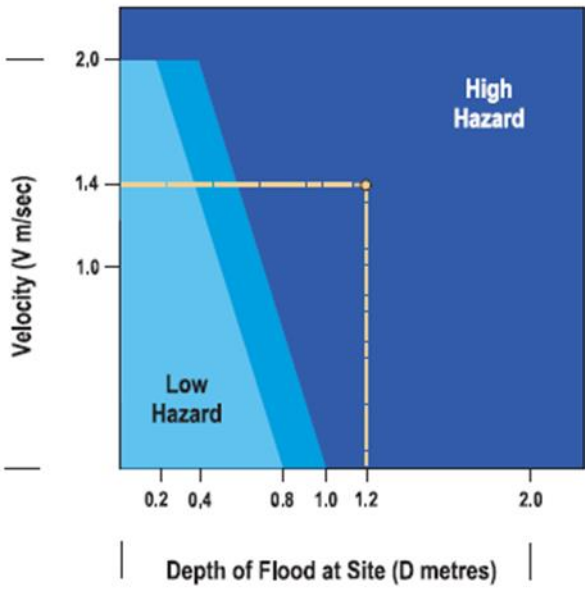


Figure 10 Provisional Hazard Category

6 Development Control

The proposed new dwelling has been assessed against requirements of Fairfield Citywide Development Control Plan 2013 for flood control lot. The assessments for flood controls are presented below.

6.1 Floor Level

The footprint of the proposed development is not affected in 1% AEP storm event. However, in the higher storm event, the site may be subjected to flooding. The most relevant 1% AEP flood level nearest to the site is estimated as 34.7 m AHD. The habitable floor level (36.91 m AHD) of the existing warehouse is located above the minimum requirement for a flood control lot.

6.2 Building Component and Method

All structures are to be flood compatible building materials below the 1% AEP flood level plus 0.5 m.

6.3 Structural Soundness

All structures must be designed and constructed in order to ensure structural integrity up to the minimum habitable floor level. Structural certification shall be provided confirming that the structure can withstand the forces of floodwater debris, wave action, buoyancy and immersion up to the 1% AEP flood level plus 0.5 m.

6.4 Flood Affection

The footprint of the proposed development does not encroach the 1% AEP flood extent area. Therefore, there will not be any significant impact on the existing flooding characteristics in the post development scenario.

6.5 Car Parking and Driveway Access

The proposed open car parking level is located above the 1% AEP flood level.

6.6 Evacuation

Evacuation will not be required for the proposed development up to 1% AEP storm. In larger storms, staying inside the home seems relatively a safer option.

7 Conclusions & Recommendations

The impact of proposed development at the subject site on the existing flooding characteristics has been considered in this study.

This study has shown that only a small part of the subject site around the south-west corner is affected in 1% AEP flooding. The footprint of the existing warehouse and most of the other areas of the site are located above the 1% AEP overland flooding. The proposed development will not cause any significant impacts on the existing 1% AEP flooding characteristics at the site and surroundings.