

30 November 2023

Adrian McGregor
50 Condoever Street,
North Balgowlah, NSW 2093

<adrian.mcgregor@mcgregorcoxall.com>

Overland flow assessment for 50 Condoever Street, North Balgowlah

Dear Adrian

1. Introduction

Stellen Consulting was engaged to assess the proposed development at 50 Condoever Street, North Balgowlah in reference to potential risks connected with overland flow. This report provides assessment of overland flow of Lot 2 coming from the onsite detention tank of Lot 1 on the basis of 100% pipe blockage. The subject site consists of three lots: Lot 1, Lot 2, and Lot 3 referred to as Community Lot as shown in Figure 1.

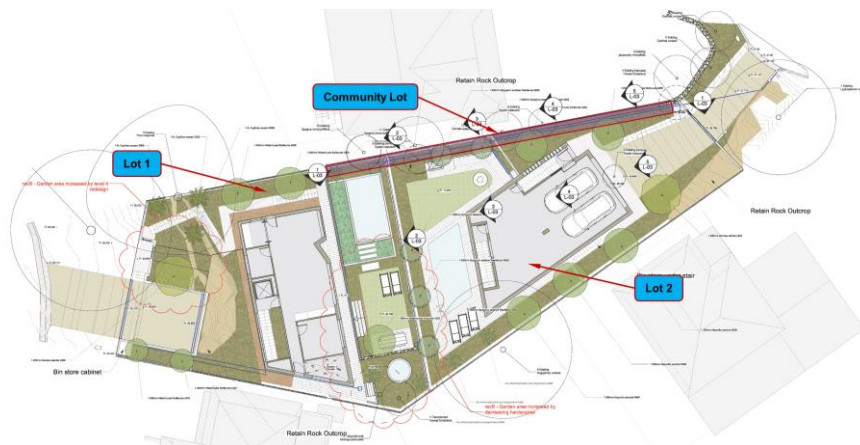


Figure 1: Site Plan of the Subject Site

This letter presents the findings of overland flow assessment carried out to check the impact of the overland flow from the onsite detention of Lot 1 assuming 100% pipe blockage during the 1% AEP storm event to ensure the conveyance of overland flow during critical storm event is safe and has no impact on Lot 1 habitable floor area.

The flow from the OSD tank is 27 L/s during the 1% AEP event and is not significant. However, at the request of Council, a model was developed to assess the impacts as described in the following sections.

2. Overland Flow Assessment

The potential of the overland flow entering Lot 2 through the community lot was investigated. The following steps were taken to estimate the overland flow:

1. Estimate the contributing flows from Lot 1 during 1% AEP storm event.
2. Modify terrain to suit site conditions.
3. Setup 1D HEC-RAS model.
4. Model the overland flow through community lot.

In the modelling, an overage of 1% slope was adopted to represent the worst-case scenario (the highest depth) and avoid cascading affect which causes convergence problem during the analysis, which is common for both 1D and 2D hydraulic models. Additionally, the following features as shown in Figure 2 were incorporated into the developed 1D HEC-RAS model:

- An overland flow path of the proposed channel through the community lot
- Modified terrain for the surrounding landscape area

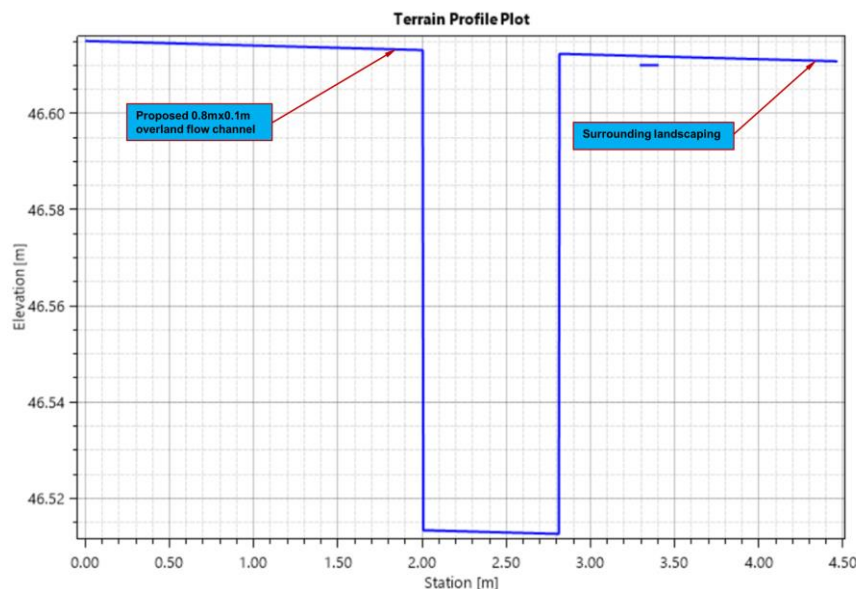


Figure 2: Cross section of the modified terrain profile for the proposed channel

Drain model was also developed to verify the findings of the 1D HEC-RAS model. Design storms were derived from Australian Rainfall and Runoff (ARR), 2016 and then applied to the DRAINS model to generate discharge hydrographs for Lot 1. The following input was used to develop the drain model and estimate the overland flow depth throughout the channel:

1. Define the catchment area of Lot 1.
2. Build 0.8mx0.1m overland flow channel through the community lot.
3. Adopt average slope of 1% throughout the channel to calibrate the 1D HER-RAS model.
4. Set manning coefficient to 0.035.

3. Estimating the overland flow depth

A 1D HEC-RAS model was developed to assess the impact of the overland flow coming from Lot 1 on the proposed development at Lot 2 during the 1% AEP storm event. The finding of HEC-RAS in Figure 3 shows that the depth of the overland flow through the proposed channel varies from 60mm to 90mm. Figure 4 shows the maximum depth of overland flow is approximately 90mm and the flow is fully contained within the proposed channel during the 1% AEP storm event. Additionally, the finding of the drain model shows the maximum overland flow depth through the channel is 80mm which is in line with the findings of the 1D HEC-RAS model.

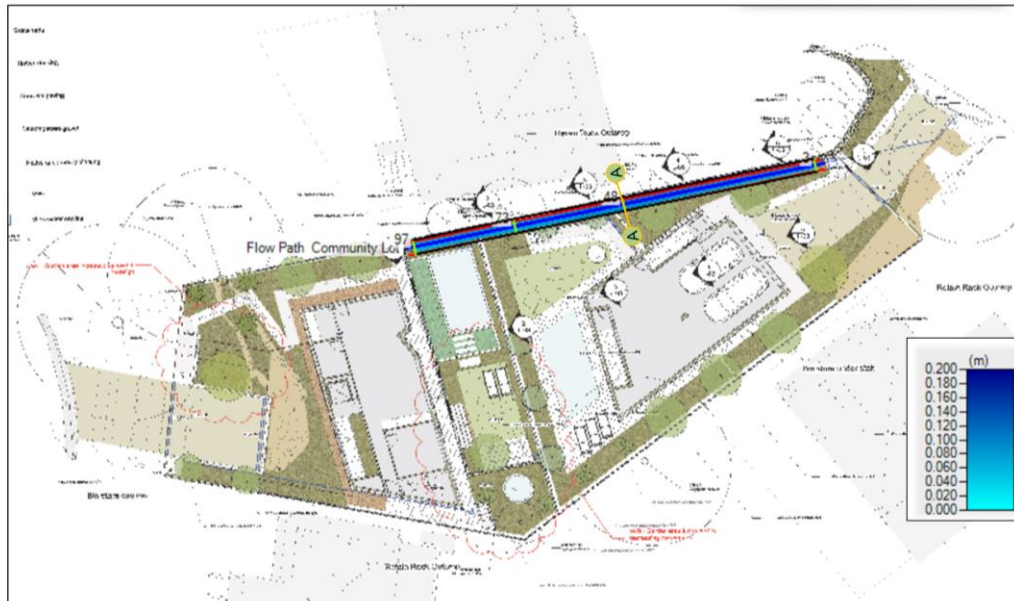


Figure 3: Overland flow depth during 1% AEP storm event

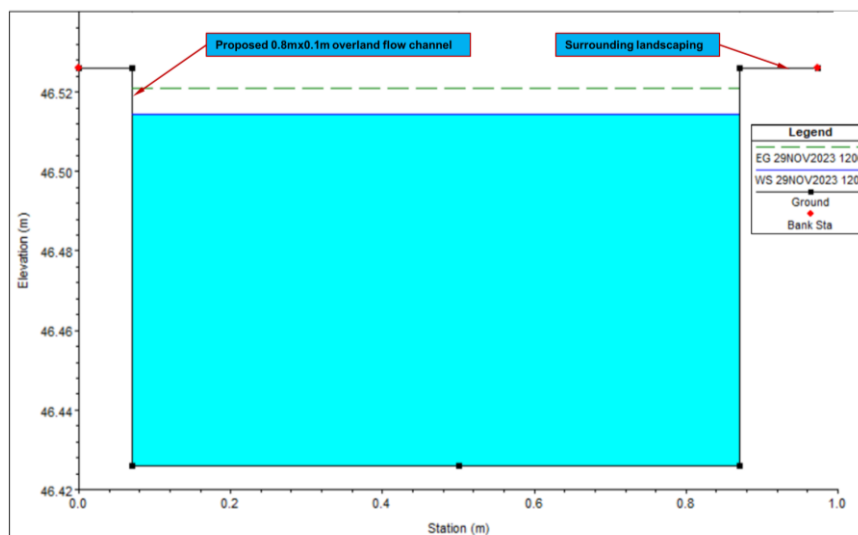


Figure 4: Section A-A of the proposed channel through the community lot

4. Design Recommendations

Based on the estimated overland flow depth, an overland flow channel through the community lot (0.8m x 0.1m) with 300mm high wall at both side as a freeboard is proposed to capture and convey the flows from Lot 1 to protect the potential flow entry points to the proposed development at Lot 2. The proposed channel is described in the stormwater design by Stellen Consulting, refer to drawing No: P170945-DR-SW-002, and P170945-DR-SW-004.

5. Conclusion

This technical letter provides overland flow assessment for the proposed development at Lot 2. Based on the findings in Section 3 of this letter, the proposed development is expected to be affected by the overland flow coming from Lot 1 during the 1% AEP storm event. The following can be concluded from the analysis:

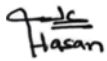
1. When the pipe fully blocked, the overland flow depth is estimated to vary between 60mm to 90mm through the proposed channel.
2. A 0.8m x 0.1m overland flow channel with 300mm high wall at both side as a freeboard is proposed to intercept and convey flows through the community lot.

3. All recommendations in this report and drawing No: P170945-DR-SW-002, and P170945-DR-SW-004 shall be incorporated into the design.

Based on the information, as noted in this report, we recommend the proposed overland flow management measures as a safe and practical solution for the proposed development at Lot 2 if carried out in accordance with the recommendations within this report.

Please contact me if you have any questions.

Kind regards,



Mousa Hasan
Civil Engineer

Stellen Consulting
Level 1, 27 Belgrave Street, Manly, NSW 2095
E. mousa.hasan@stellenconsulting.com.au



Quality Information

Revision: 0
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Prepared by: Mousa Hasan
Checked by: Mohamud Ibrahim
Senior Engineer
E. mohamud.ibrahim@stellenconsulting.com.au

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