

Flood Investigation — Basin D Removal

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1. Executive Summary

Meinhardt – Bonacci has prepared this flood investigation letter for the development of Engineering Precinct of the University of Sydney Camperdown Campus.

This flood investigation letter demonstrates that no adverse change in flood behaviour in post-development scenario with the removal of flood storage previously proposed to the south of the existing Electrical Engineering building referred to as “Basin D”. The flood modelling result indicates that the development does not result in an increase in flood affectation of the existing Electrical Engineering building as the flood levels are lowered in developed scenario than in existing conditions adjacent the building during 1% AEP flood event. The flood modelling result also indicates that there is no adverse impact on downstream properties due to the development. Additionally, as there is no change in use of the existing building, there is no adverse risk to life or property.

2. Introduction

The existing J03 Electrical Engineering Building is located within the Engineering Precinct of the University of Sydney Camperdown Campus, at the South-Eastern side of the campus. The existing Electrical Engineering Building is approximately 50 x 50m and is bordered by Maze crescent to the west, PNR Building to the South, Engineering Link Building and Aeronautical/Mechanical Engineering Building to the East and Blackwattle Creek Lane to the North. Refer to Figure 1 for aerial and locality map.

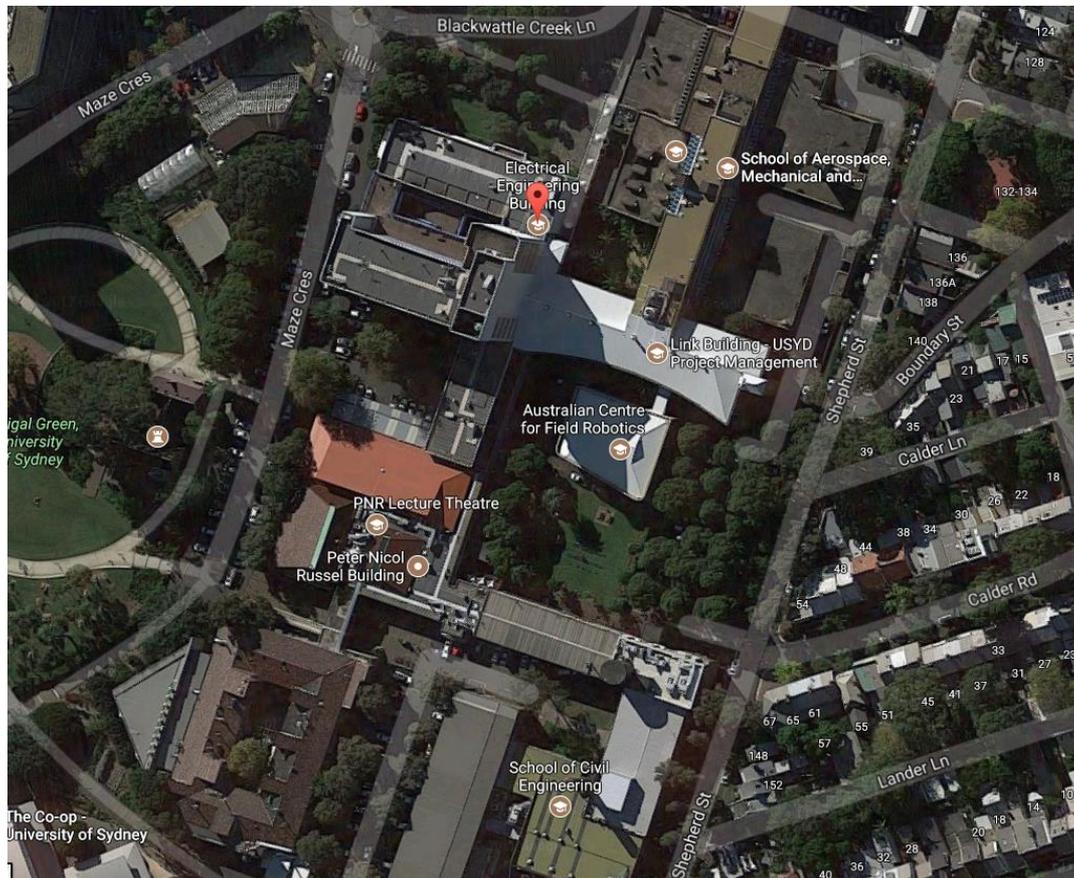


Figure 1 Aerial and Locality Map (Source: Google Map)

The proposed re-development involves refurbishment of the existing Electrical Engineering Building, demolition of the adjacent carpark to the south and constructing an on-site detention (OSD) combined with bio-retention features for water quality treatment purpose (also referred to as “southern basin” in this report), reconstruction of the public domain areas adjacent to Blackwattle Creek Lane to the north (referred as “northern landscape” in this report) and demolition of the courtyard to the east (referred as “eastern courtyard” in this report).

3. Flood Modelling

3.1. Previous Assessment

The site lies within the City of Sydney (CoS) local government area and is located within the upstream portion of the Blackwattle Bay catchment. The catchment is approximately 315 hectares and has been extensively developed for urban usage. The site is impacted by overland flooding, primarily from rain falling on the campus itself rather than from upstream areas of the catchment.

In previous assessment and model runs, a flood mitigation storage basin with volume of 300 m³ (Basin D) was proposed at south of the existing Electrical Engineering Building (where the existing carpark is). A bio-retention with filter area of 50 m² was incorporated with Basin D to provide water quality treatment to meet CoS Council’s pollutant removal targets. The design of Basin D and associated retaining wall structures was disguised in QGIS using nodes, region polygons and other QGIS grading functions.

The flood results demonstrate that all building entrances have been protected to the requirements stated in Minister of Planning Development Consent dated 14th February 2019. Results also indicate there is no adverse impact on downstream properties which comply with *City of Sydney Interim Floodplain Management Policy*.

3.2. GRC Hydro Model

A flood study and modelling has been undertaken by GRC Hydro, their model was built based on the scenario of removing the flood mitigation storage basin from the design, adopting existing surface levels where the existing carpark is. The flood afflux mapping shown in Figure 2 has been produced to demonstrate no adverse impact on downstream properties which complies with *City of Sydney Interim Floodplain Management Policy*: Existing development will not be adversely flood affected through increased damage or hazard as a result of any new development.



Figure 2 1% AEP Afflux Map Produced by GRC Hydro (February 2020)

3.3. Model Updates

GRC Hydro has demonstrated that removal of the 300 m³ flood mitigation storage basin has no adverse impact on downstream properties. Therefore, Bonacci has adjusted the design and updated TUFLOW model to reflect the current design. The adjustments include the following:

- Removal of the 300 m³ flood mitigation storage basin (Basin D);
- Replace the flood storage basin with a 30 m³ on-site detention (OSD) basin to meet Sydney Water’s pre-determined detention storage requirement in order to limit site discharge flow rate.
- Incorporate bio-retention into OSD basin to provide water quality treatment as per CoS Council’s water quality pollutant removal rates.
- Update northern landscape surface levels.

Figure 3 shows the proposed OSD basin with bio-retention zone and associated landscape in the southern landscape area.

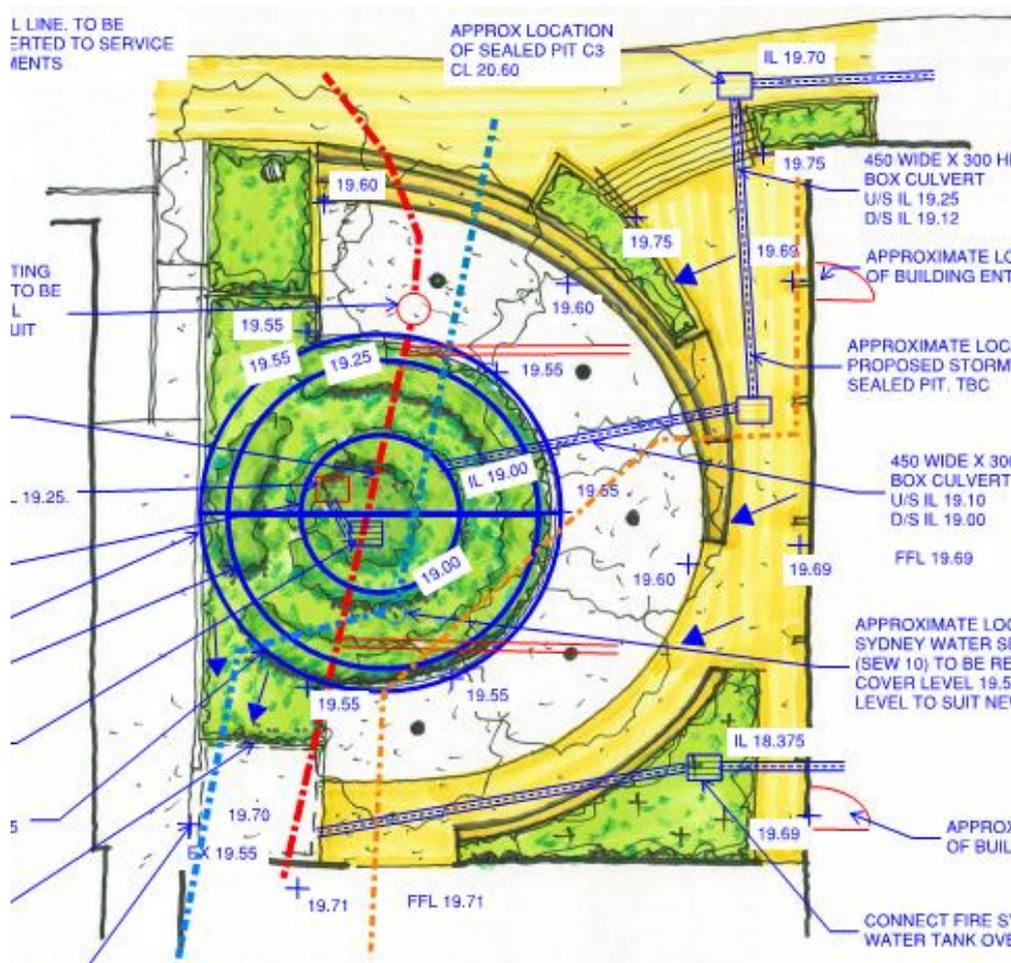


Figure 3 Proposed Southern Landscape Ground Levels

The TUFLOW flood has been updated as per above detailed design scenario. New ground levels at northern landscape have been modelled and exported from 12D software. The southern landscape basin ground surfaces have been modelled in QGIS software (version 3.10) using nodes, regions and other QGIS grading functions instead of using 12D to keep consistency with previous model runs.

3.4. Result Discussion

3.4.1. Flood Depths and Levels

Previous model results indicate the existing carpark inundated to approximately RL20.085 and northern landscape to RL19.79. The existing Electrical Engineering Building (existing floor level RL19.69) is expected to be inundated in the 100 year in the existing case.

Flood map in Figure 4 shows the design 1% AEP (2hr critical duration in accordance with WMA 2015 Blackwattle Bay Flood Study) flood depths and levels based on model updated detailed in Section 2.3. Flood levels in the southern basin area is approximated at RL20.07. Northern landscape area in design scenario shows minimum sheet flow (not flood water) expected from direct rainfall which is an improvement compared to the existing condition. It can be concluded that the developed southern basin area (where the existing carpark is) and northern landscape area have lower water levels compared to the existing conditions, the flood affectation is improved in developed case.

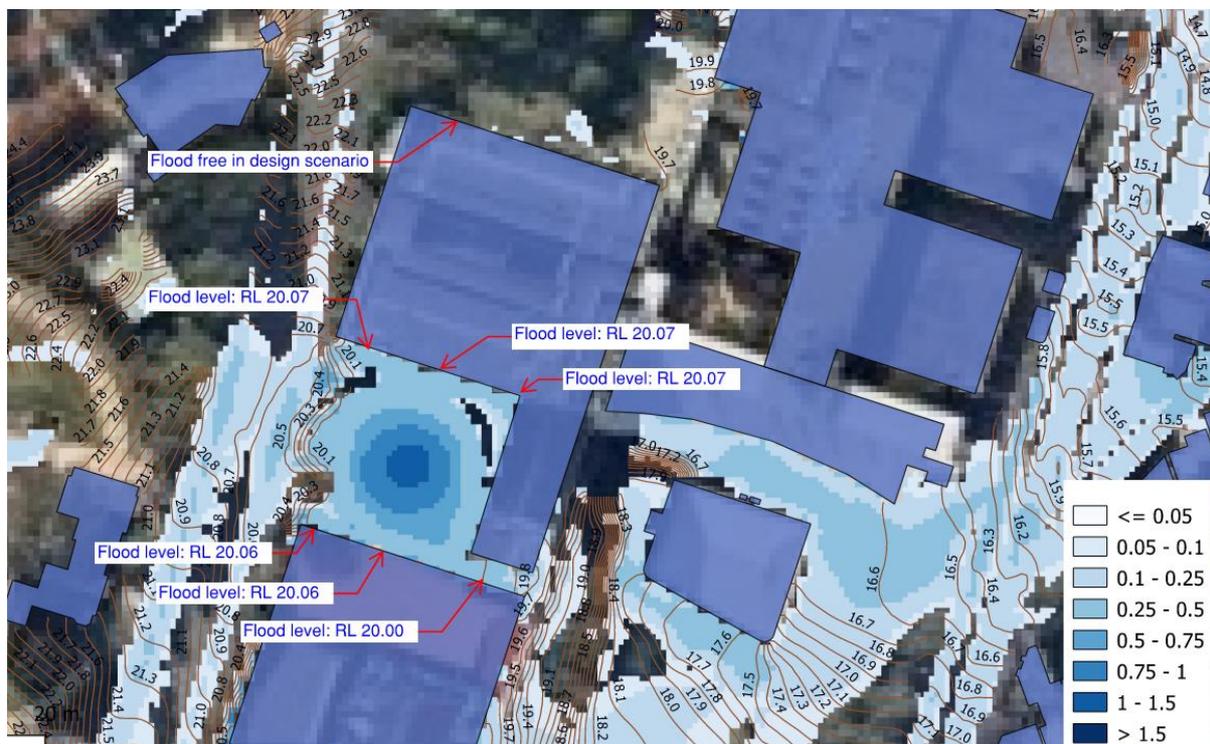


Figure 4 1% AEP Flood Depths and Flood Levels

3.4.2. Flood Impacts

Figure 5 shows the 1% AEP depth afflux which is the difference in flood depths as a result of the development. Majority of the map shows grey/nil impact. A significant portion at the northern landscape is shown green which indicates a previously flooded area however now flood free due to the development as it has been captured by the proposed pit and pipe system.

Some small isolated yellow blips (10 – 50 mm) occurs well away from the subject site which are related to model instability issues and will not produce any real material effects.

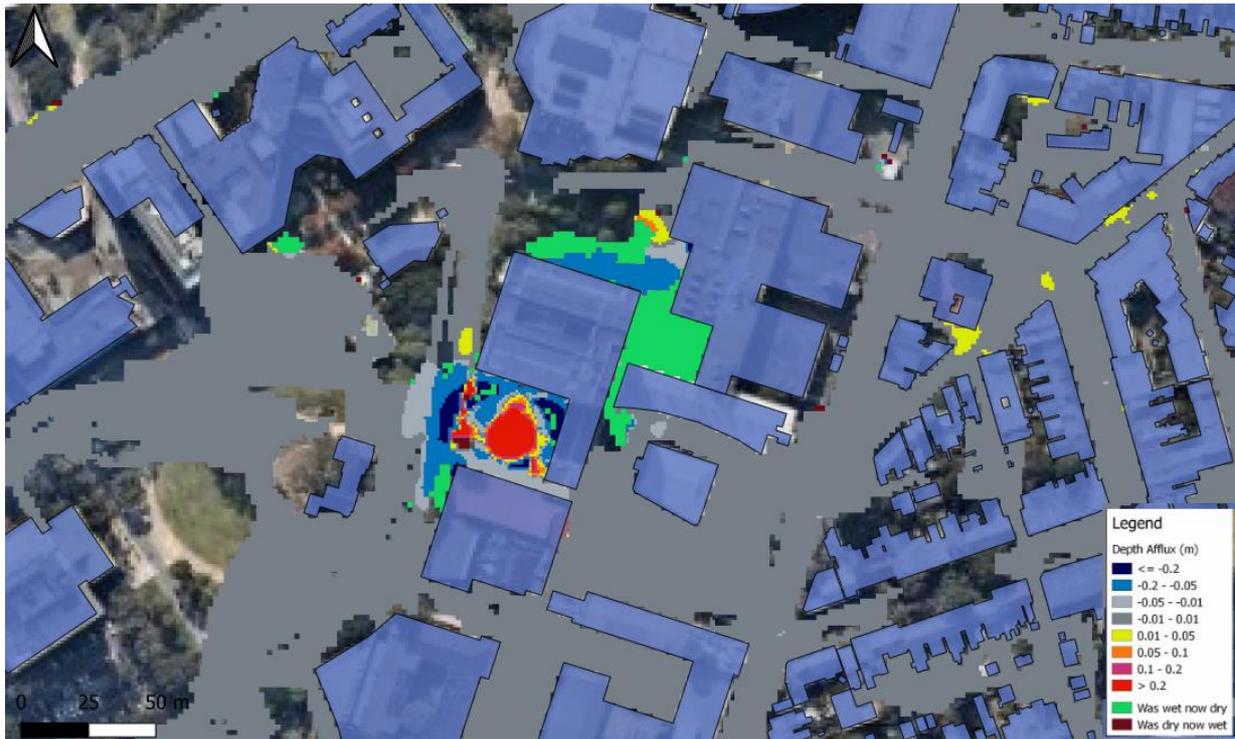


Figure 5 1% AEP Flood Depth Afflux (Proposed - Existing)

The flood afflux map demonstrates there is no adverse impact on downstream properties which is consistent with GRC Hydro's result shown in Figure 2.

Discussions in Section 2.3 and this section demonstrate that the flood mitigation basin (Basin D) is not required, which removes any Consent Conditions related to flood basin outlined in the Development Consent to Application No. DDS 8636 by Department of Planning dated 14th February 2019, including the following:

- B37 - The structural integrity for the proposed wall around Basin D shall be designed to withstand the impact of hydraulic forces of floodwaters and debris up to the 1% AEP flood event. A copy of the certification is to be submitted to the Certifying Authority prior to the commencement of construction.
- B38 - A fence shall be designed and constructed around Basin D to restrict access. The fence shall have a gate for access for maintenance purposes only. This requirement shall be reflected on the construction plans and shall be submitted to and approved by the Certifying Authority prior to the commencement of construction.

It can be confirmed that with the removal of Basin D, the above Consent Conditions are now redundant and should be removed from the State Significant Development Application (SSDA) approval.

Appendix A

Flood Maps

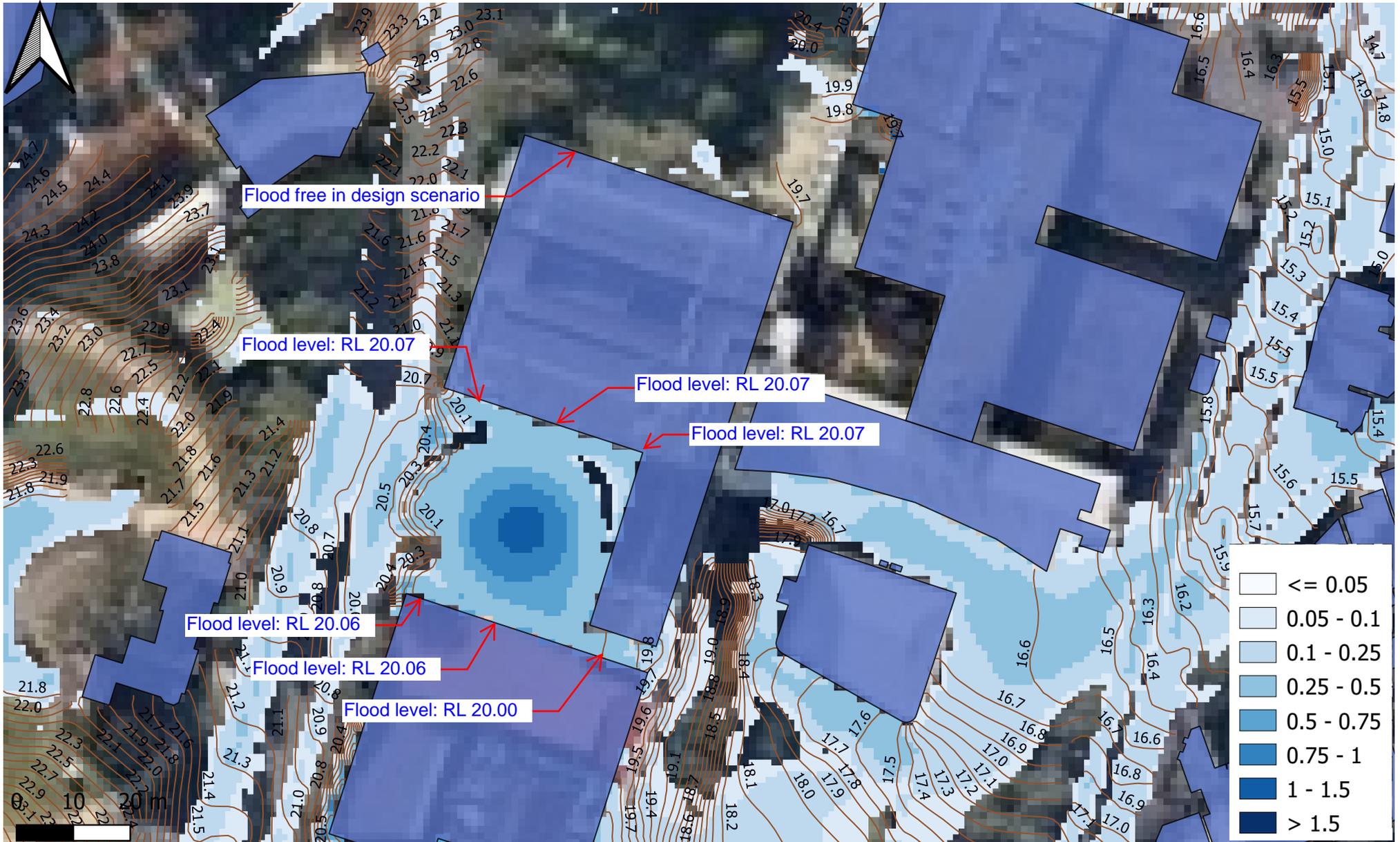


FIGURE 50 1% AEP FLOOD DEPTH - PROPOSED DEVELOPMENT

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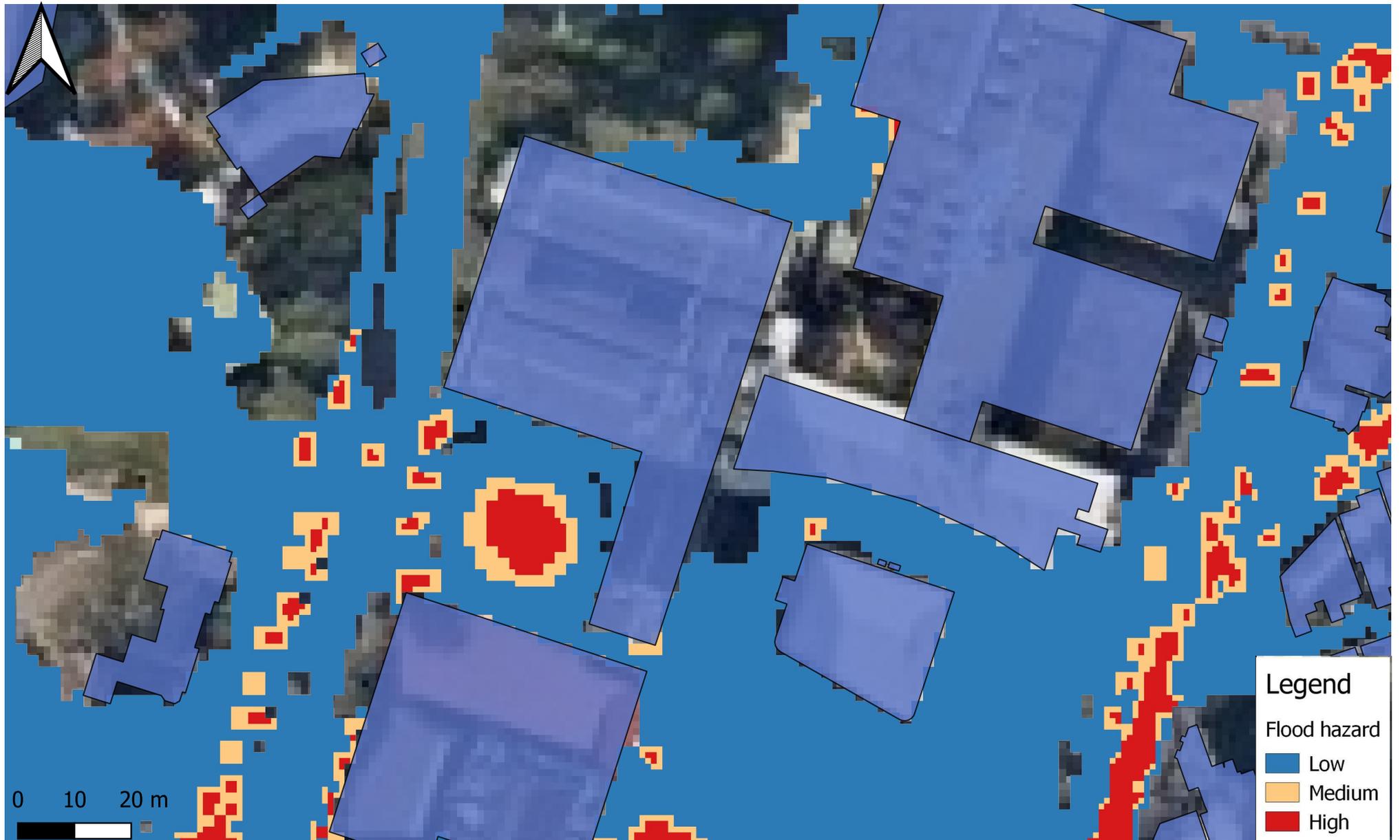


FIGURE 51 1% AEP HAZARD MAP_ PROPOSED DEVELOPMENT

DATE: 11/05/2020

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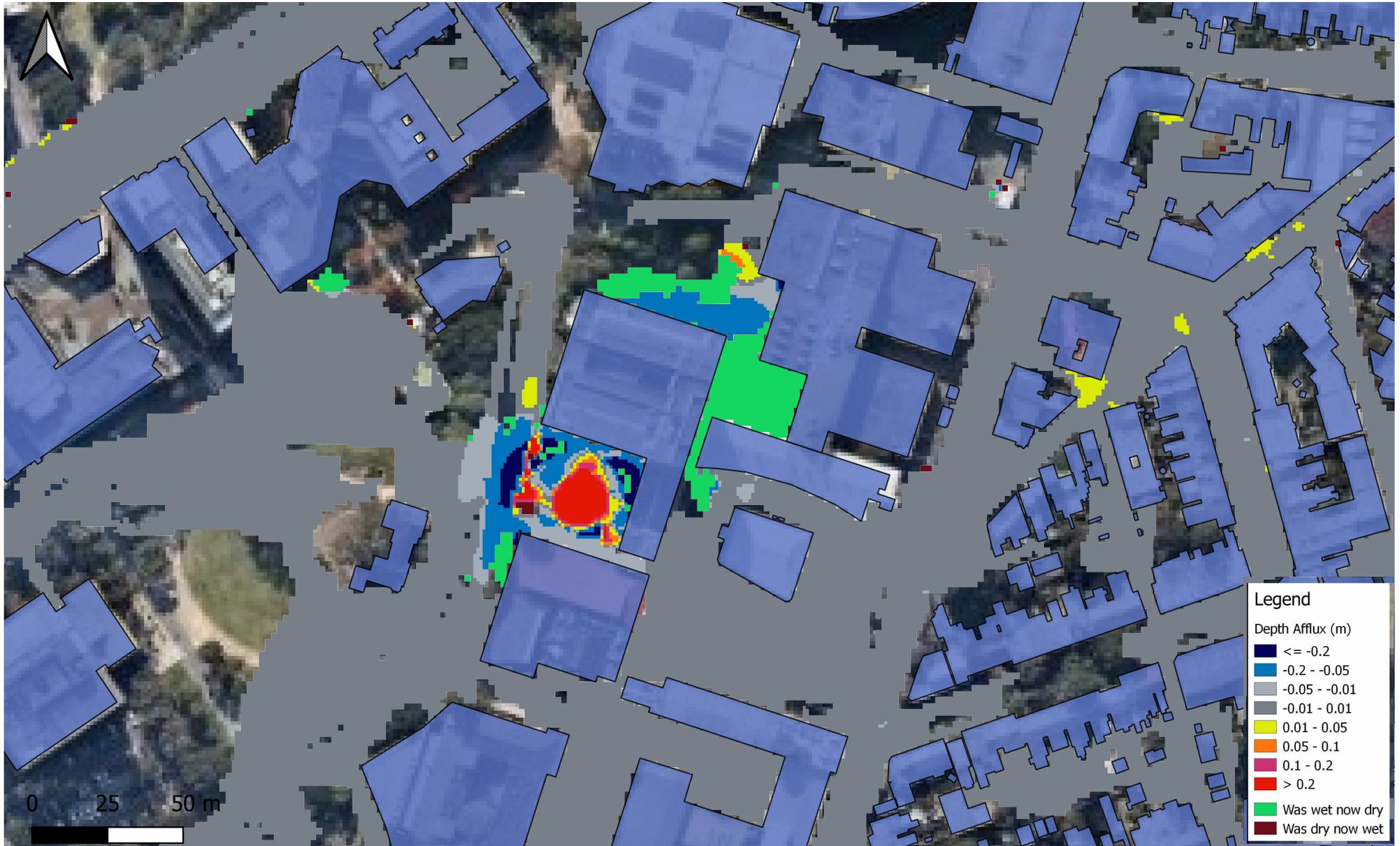


FIGURE 52 1% AEP WATER DEPTH AFFLUX BETWEEN PROPOSED DEVELOPMENT - EXISTING CONDITION

DATE: 11/05/2020