



JONES NICHOLSON PTY LTD
CONSULTING ENGINEERS

FLOODING & DRAINAGE REPORT

for

**157-163 Cleveland Street,
CHIPPENDALE NSW**

**Lot 1 DP 449699
Lot 11 DP 531788
Lot 50 DP 826153**

**Our Ref: 20100005
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1.0 INTRODUCTION

Jones Nicholson has been appointed to undertake a flooding and drainage analysis for the proposed development at 157-163 Cleveland Street, Chippendale.

All data, observations and opinions contained in this report pertain to the hydrologic and hydraulic assessment of flood flows at or in the vicinity of the site.

This report is not an investigation into any other aspect of flooding within the site or surrounding catchment/s. This report must be read in conjunction with the drawings prepared by Fortey & Grant Architects.

2.0 FLOODING ANALYSIS

The site under discussion is located at the corner of Cleveland Street and Abercombe Street, Chippendale.

Both streets function as overland flow paths during storm events. The Cleveland Street catchment upstream of the development consists of two areas, approximately 1.4 ha and 2.1 ha in extent.

The Abercrombie Street catchment is approximately 7.9 ha in extent and joins the Cleveland Street flow path down-stream of the subject site.



Figure 1 – Catchment Extents

The catchment area immediately east of the site is located next to the north-south railway line, borders and drains into Hart Street and Cleveland Street. For the purpose of analysis it was assumed that 50% of the storm water generated within this catchment was to collect in Hart Street and the remainder into Cleveland Street.

The catchment area immediately north of the subject site is also located next to the north-south railway line and drains predominately into Cleveland Street midway past the subject site.

The southern catchment mainly drains into Abercombe Street which joins the Cleveland Street flow path down-stream of the subject site. A part of its overland storm water flow path however would access Abercombe Street via Hudson Street.

Using the survey information provided by Lawrence group surveyors, a trapped low point at the Hart Street, Hudson Street intersection has been identified, with the lowest RL being 16.67 and an overland escape at RL 17.21 in Hudson Street. This means that in the event of the pits on the corner of Hart Street and Hudson Street being inoperative, storm water would build up in the intersection before discharging along Hudson Street.

Flooding analysis was conducted using the rainfall-runoff model DRAINS.

Results for the 100-yr ARI storms are summarised below:

* Eastern catchment:	Q 100-yr ARI max = 0.894 m ³ /s
* Northern catchment:	Q 100-yr ARI max = 1.37 m ³ /s
* Southern catchment	Q 100-yr ARI max = 5.16 m ³ /s

EASTERN CATCHMENT

The eastern catchment was analyzed using the assumption that the two pits at the Hart Street/Hudson Street intersection were inoperative and only 50% of the total catchment run-off would be directed this way. The resultant upwelling would allow the flood to rise to RL 17.37 which is 160 mm above the escape route level of 17.21.

Should the subject site be developed, it would be suggested that a free board of 300mm be added to this level. The result is that a minimum FFL of RL 17.67 (say 17.7) would be required for the developed site.

NORTHERN CATCHMENT

The overland runoff from the northern catchment as well as the remainder of the eastern catchment would meet the Cleveland Street flow path approximately 15 m to the east of the discharge point of the subject site. For the purpose of analysis we conservatively ignored the impacts or effects of the underground pipe drainage systems in the area.

Hydraulic analysis was then conducted on Cleveland Street using Manning's formula with an assumed n value of 0.12 and a longitudinal grade of Cleveland Street of 3.27% for the relevant section of road. It was also assumed that the road operates with a cross fall of 2.5%. This assessment reflects that the flow depth for the 100-yr ARI event for these two catchments 15 m from the Abercombe Street

and the Cleveland Road intersection (also the discharge point for the subject site) would be 80mm. This would therefore not impact negatively on the subject site.

SOUTHERN CATCHMENT

The overland run-off from the southern catchment intersects Cleveland Street at the Abercombe Street/Cleveland Street intersection.

Abercombe Street appears to have little cross fall and a longitudinal grade of 2.9%. Hydraulic analysis on Abercombe Street resulted in an overland flow depth of 77mm. This suggests that the overland flow from Abercombe Street would not have a negative impact on the subject site.

The combined flood water from all three the catchments collated in the intersection of Cleveland Street and Abercombe Street has the potential to rise to a depth of 188 mm during the 100-yr ARI thus having little impact on the subject site.

3.0 OSD & SITE DRAINAGE ANALYSIS

Council generally requires that onsite detention (OSD) be provided in new developments larger than 250 m². The subject site will discharge into an existing Council drainage pit within Cleveland St, and as per Council's "Stormwater Drainage Connection Information" (Rev02, July 2006) the 100-yr ARI post-development flowrate must be restricted to the 5-yr ARI pre-development flowrate.

OSD analysis was performed using DRAINS as used in the flooding analysis described in Section 2 above.

A summary of the results is provided below:

- * Q 5-yr ARI (20 minute storm) = 0.012 m³/s
- * Permissible Site Discharge 100-yr ARI = 0.011 m³/s
- * Storage volume required to achieve PSD = 10 m³
- * Orifice plate diameter required = 100 mm diameter

A Stormwater Detention Storage Tank is proposed on the basement level of the development as shown on architects drawing no

The plan area of the tank is approximately 8 m² with the base of the tank sitting on the floor slab on Basement Level 1.

Given that the OSD tank must discharge into the stormwater pit in Cleveland St (Approximate Invert Level of 15.00 mAHD), the orifice outlet level of the tank should not be below RL15.50 mAHD.

Water requirements for re-use are calculated at 47,000l/day. The total OSD requirement does not meet the re-use need. It is therefore suggested that the OSD be designed as a combined re-use tank and OSD.

4.0 SUMMARY

Three catchments adjoin the subject site being 157-161 Cleveland Street, Chippendale.

Cleveland Street, Hudson Street and Abercombie Street serve as overland flow paths.

All storm water from the three identified catchments eventually finds its way to the Cleveland Street/Abercombe Street intersection from where it continues to the northbound drainage system of Buckland Street.

A portion of the eastern catchment (50%) will drain into Hart Street where the storm water will be trapped at a low point at the intersection of Hudson Street. The overflow from this low point is at RL 17.37. A freeboard of 300mm is suggested above this level.

Due to the Hart Street/Hudson Street trapped low, a FFL of RL 17.67 is recommended for the building.

The total OSD requirement does not meet the re-use need of the building and it is therefore suggested that the OSD be designed as a combined re-use tank and OSD.

In accordance with Director-General's Requirements Item 10, Jones Nicholson has addressed the drainage/flood issues associated with the development and designed the required stormwater infrastructure and Water Sensitive Urban measures. Please refer to the stormwater drawings for details.