Flood Impact Assessment

for

Development Application

at

101-109 Parramatta Road, Homebush
Report Details

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101-109 Parramatta Road, Homebush

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Revision History

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1 Introduction

Northrop Consulting Engineers have been engaged to undertake a flood impact assessment for the proposed development at 101-109 Parramatta Road, Homebush (the site).

The objective of this flood impact assessment is to accompany the Development Application submission to Strathfield Council to provide evidence of the consideration of flooding impact as a result of the proposed development of the site.

Consideration has been given to the following documents throughout the course of this investigation.

- Strathfield Council Development Control Plan (2005);
- Powells Creek and Saleyards Creek Revised Flood Study (WMA Water, 2016);
- NSW Government Floodplain Development Manual (NSW Government, 2005);

The following correspondence outlines the methodology used and presents the results of the flood impact assessment.
2 Locality Description

2.1 Subject Site

The subject site is located within the Powells Creek catchment at Homebush and is known as Lot 200 DP1117827. It is bounded by Parramatta Road to the south, Underwood Road to the west, Powell Street to the north and a Sydney Water channel and "Teachers Mutual Bank" to the east.

The site is currently used as an ancillary vehicle service centre with a small office, outdoor paved car display area, as well an unsealed gravel car parking area to the rear (north) of the site. Vehicular access is gained via Powell Street (directly south of the M4 Motorway) which forms the property boundary to the north.

The site location is shown in Figure 1 as shaded in orange with the Sydney Water box culvert and open channel sections shown dashed and solid blue respectively.

![Figure 1 – Site Locality](image)

The elevations through the subject site range from approximately 7.3m AHD adjacent to Parramatta Road to the south to 5.3m adjacent to Powell Street to the north.

A Sydney Water owned stormwater channel/box culvert passes through the site (contained within a 3.66m wide easement) that is partly covered prior to passing under Powell Street and the M4 further downstream.

Vegetation is sparse throughout the subject site due to the current land use being a car yard/vehicle service centre. A small portion of grass and trees is observed in the north-eastern corner as well as a series of trees in the road reserve adjacent to the eastern boundary.
2.2 Proposed Development

The proposed development includes the construction of a new car showroom, as well as various outdoor car display areas. These display areas retain some form and function of the original site, however, will require regrading in order to better service the new car showroom.

It is proposed that the existing Sydney Water stormwater channel be retained in its current form (cross-section/capacity) and alignment.
3 Methodology

The assessment was undertaken using the following procedure:

• Desktop review of the Strathfield Council Development Control Plan (2005) and the Powells Creek and Saleyards Creek Revised Flood Study (WMA Water, 2016);

• Site visit to determine hydraulic roughness of the existing vegetation and ground truth survey information;

• Preparation of an “Existing case” XP-STORM hydraulic model based on data provided by Council from the Powells Creek and Saleyards Creek Revised Flood Study (WMA Water, 2016) and further refined based on observations made during a site investigation;

• Inclusion of the development into the XP-STORM hydraulic model to assess the impacts of the development on the flood levels on-site and in the adjacent properties;

A description of the hydrological and hydraulic modelling including the parameters and assumptions used are included overleaf.
4 Hydrological Model Parameters

The TUFLOW Models developed by WMA Water as part of the Powells Creek and Saleyards Creek Revised Flood Study (WMA Water, 2016), herein known as the “Powells Creek Flood Study”, were acquired from Strathfield City Council and were used for this study. The model was imported into XP-STORM and trimmed to reduce run times. All inflow boundaries upstream and downstream of the site were included as delineated and modelled in the Powells Creek Flood Study.

Hydrologic inflows were derived from the same DRAINS hydrologic models as developed by WMA Water using the 1987 IFD Data. Flows where applied directly to the two-dimensional grid at the same inflow locations using “flow areas” and one-dimensional nodes.
5 Hydraulic Model Parameters

The hydraulic assessment was undertaken using the XP-STORM computer software, featuring the TUFLOW hydrodynamic engine. The parameters used are described below.

5.1 Two Dimension Grid Extents and Size

The upstream extent of the two-dimensional grid runs parallel with the southern side of the railway tracks located adjacent to Loftus Crescent. The grid then extends downstream of the subject site running parallel with the northern side of the M4 Western Motorway.

A two-dimensional grid has been used to cover the site and the reduced study area. A fine grid of 1m with a 0.25 second timestep has been used to cover the site and surrounding area, while a coarse grid of 2m with a 0.5 second timestep has been used for the broader catchment area. This balances run time of the models with the need to represent complex flow behaviour around the development site.

5.2 Terrain

Terrain data used for the model was a combination of LIDAR and detailed survey. The LiDAR data was extracted from the Powells Creek Flood Study and clipped to suit the reduced study area.

5.3 Boundary Conditions

The Subway Lane rail underpass, located upstream of the subject site, provided the primary control for overland flow from the upstream catchment while the Underwood Road M4 underpass, located downstream of the subject site, provided the primary downstream control for overland flow from the catchment.

Surface flow from upstream of the railway tracks was extracted from the Powells Creek Flood Study and entered into the model as a flow area. Sub-surface flow was also extracted from the Powells Creek Flood Study and entered into pit and pipe network as an inflow hydrograph linked to the one-dimensional network.

An outlet head boundary has been placed at the Underwood Road M4 underpass to control flows leaving the model. The elevation-time relationship was extracted from the Powells Creek Flood Study and entered as a head boundary. An elevation-time outflow relationship, extracted from the Powells Creek Flood Study has also been entered for the downstream pit and pipe network to control outfall from the one-dimensional network.

Additional runoff derived from within the reduced study area was extracted from the Powells Creek Flood Study and applied directly to the two-dimensional grid using a combination of flow areas and one-dimensional nodes.

5.4 Catchment Roughness and Building Representation

Catchment roughness was based on values adopted from the Powells Creek Flood Study and further refined in the catchment within the general vicinity of the subject site. The additional roughness values used have been based on observations made on site, aerial photography and review of hydraulic literature. The values are outlined below in
### Table 1 – Manning’s Roughness

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Manning’s Roughness</th>
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<tbody>
<tr>
<td>Residential/Commercial Areas</td>
<td>0.030</td>
</tr>
<tr>
<td>Roads</td>
<td>0.020</td>
</tr>
<tr>
<td>Medium Density Vegetation</td>
<td>0.080</td>
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<tr>
<td>Green Space</td>
<td>0.040</td>
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Buildings within the study area were modelled as “inactive areas” for both existing and post development scenarios.

### 5.5 Stormwater Infrastructure

The upstream Strathfield Council and Sydney Water below ground pit and pipe network has been extracted from the Powells Creek Flood Study and entered into the model as a one-dimensional network linked to the two-dimensional grid.

A Sydney Water owned stormwater channel runs through the proposed development site. The channel enters the site part way along the eastern property boundary, prior to exiting part way along the northern property boundary.

Immediately upstream of the site boundary, the stormwater channel exits from a culvert under Parramatta Road. The photo to the left in Figure 2 below shows the open channel downstream of this culvert, taken from the northern footpath on Parramatta Road, looking in a northerly direction. The metal cladding/steel frame structure which runs adjacent the edge of the open channel forms the east property boundary of the development site. The channel diverts to the north-west and bisects the site prior to passing under Powell Street downstream.

The photo to the right in Figure 2 below shows the open stormwater channel within the property. At present a 1.8m high sheet metal & barbed wire fence prevents access to the channel from within the site.
The photos shown in Figure 2 demonstrate that the channel may be considered to be in a relatively ‘good’ condition – with no significant damage, blockage, or inconsistency. Part way through the site, the channel transitions from ‘open’ to ‘covered’.

At present, an unsealed gravel carpark is positioned directly above of the ‘covered’ section of the channel. Figure 3 below shows the northern extent of the site including the covered culvert, unsealed gravel carpark and remnant head wall.
A blockage factor of 0% has been used for the site channel as well as all one-dimensional elements throughout the greater catchment. Observations made on site suggest it is unlikely for significant debris to enter the channel and impede flow. Debris with the potential to block the channel is expected to have been removed further upstream, with only small floating debris likely to enter the channel from the upstream box culvert.

Figure 3 – Powel Street Culvert (identified by existing headwall handrails). Gravel carpark above covered channel.
6 Results

6.1 Critical Storm Duration
The model was run for the 1% Annual Exceedance Probability, 120 minute storm event. The Powells Creek Flood Study found that the either the 60 minute or 120 minute storms were critical where overland flow depths exceed 300mm. This is relevant to the site as the majority of the surrounding roads are flowing approximately 300mm deep.

6.2 Existing Flood Behaviour and Levels
Figures 1, 2 and 3, in Appendix A show the elevation, depth and hazard results for the existing scenario respectively.

The results show that during the 1% AEP event, runoff that exceeds the capacity of the below ground stormwater network is observed to flow in a northerly direction, down Subway Lane, diverting briefly to the west along Parramatta Road before returning to a northerly direction down Underwood Road and continuing beneath the M4 motorway underpass.

The results show approximately 600mm of water ponds within Parramatta Road adjacent to the southern boundary of the subject site. A steel panel fence and façade exists along the front of the site that runs east west offset, approximately 5 meters from the Parramatta Road street frontage. An additional steel panel fence is located across the southern boundary of the Sydney Water channel easement. It has been assumed, based on observations made onsite that this height of water will not have the capability to force the fence and façade over.

The eastern edge of the Sydney Water channel is partly bound by the neighbouring building at 26-38 Powell St that prevents flood waters breaking out of the channel. On the opposite side of the channel, a steel panel fence runs along the eastern site boundary and western edge of the open channel, extending around the northern side of the channel. This was modelled as an impervious barrier by raising the landscaping in this area by 1.8m.

A portion of overflow from Underwood Road are observed to flow over the north-western corner of the site during the existing case.

6.3 Development Impact on Flood Behaviour
Figures 1, 2 and 3, in Appendix A show the elevation, depth and hazard results for the developed scenario respectively. Figure 4 shows a comparison between the pre and post developed scenario’s for the flood depth.

As part of the development, we propose to remove the impermeable fence located at both the northern and southern ends of the existing channel. Removal of the fence on the southern end is shown to encourage flows from Parramatta Road to enter the channel, reducing the flood level upstream of the site and improving access across Parramatta Road. A small outcropping/void is proposed in the south-eastern corner of the site, adjacent to the western side of the existing channel. The purpose of the void is to increase the available flow width around the top of the channel, encouraging greater flows to spill into the open channel. Figure 4 shows a reduction in the order of 70-150mm in Parramatta road with localised reductions of up to 260mm. A reduction in the hazard category is also observed in Figure 3 with a large section changing from H4 to H2.

Removal of the fence and the reduction in the finished surface levels in the proposed open carpark at the northern end of the channel is shown to reduce the tail water level at the downstream end, increasing the flow capacity of the channel and reducing the water level. An increase in depth is observed in the proposed exposed carpark due to the reduction in the finished surface levels in this area.
A localised increase in flood depth of up to 50mm is observed downstream of the subject site in Powells Street. An increase is also observed in Underwood Road that is generally less than 50mm. This increase is expected to be the result of the reduction in flow capacity down Underwood road due to the development of the north-western corner of the lot.

These localised increases in flood level are considered acceptable due to the reduction in area of flow greater than 300mm deep and reduction in hazard categories both in Parramatta and Underwood Roads.
7 Conclusion

A flood impact assessment has been undertaken for the proposed development of 101-109 Parramatta Road, Homebush.

It was found that the proposed development has no significant impacts on flood behaviour and affectation in the vicinity of the subject site.

We commend our findings to Council for their review. Should you have any queries regarding this correspondence, please feel free to contact the undersigned on (02) 9241 4188.

Prepared by:

Stephen Fryer
Principal, Civil Engineer
APPENDIX A
1% AEP Water Elevation

Elavation (m AHD) | 6.01 - 6.50 | 7.51 - 8.00 | 100mm Contour
--- | --- | --- | ---
5.16 - 5.50 | 6.51 - 7.00 | 8.01 - 8.50 | Cadastre
5.51 - 6.00 | 7.01 - 7.50 | 8.51 - 9.00

Block out representing proposed building

NO LONGER REQUIRED AS BRIDGE REMOVED FROM S96 DOCUMENTATION

Block out for bridge support
1% AEP Water Depth

Depth (m)
- 0.000 - 0.050
- 0.051 - 0.100
- 0.101 - 0.150
- 0.151 - 0.300
- 0.301 - 2.518

Cadastre

Existing

Developed

NORTHROP
1% AEP Water Depth Comparison

**Depth Comparison**

-0.781 - -0.300
-0.299 - -0.050
-0.049 - -0.010
-0.009 - 0.010
0.011 - 0.050
0.051 - 0.300
0.301 - 1.515

-Cadastre Clip

**Increase in depth (max 430mm) due to spill from channel into open carpark**

**Increase in depth from water spill into channel where fence used to be**

**Increase generally 30mm up to 80mm locally**

**Decrease due to proposed building**

**Decrease approx 30mm**

**Decrease approx 80mm**