



Our Ref: W4884:BCP/bcp
Contact: Dr Brett C. Phillips

5th July 2011

The Manager
Sincorp Properties Pty. Ltd.
PO Box 1089
HUNTERS HILL NSW 2110

Attention: Mr Craig Sinclair

Dear Craig,

**SUPPLEMENTARY FLOOD RISK ASSESSMENT FOR 449 VICTORIA STREET,
WETHERILL PARK**

Further to our discussion, we are pleased to provide the findings of our supplementary Flood Investigation of planned development at 449 Victoria Street, Wetherill Park.

1. BACKGROUND

On 21 February 2011 Cardno submitted a letter report on the assessment of flood risk at 449 Victoria Street, Wetherill Park. The report confirmed advice provided to Fairfield City Council at a meeting held on 16 February 2011.

The letter report described the assembly of a TUFLOW model of site and its surrounds and the assessment of 20 yr ARI and 100 yr ARI flooding under Existing Conditions and under Future Conditions for concept development of the site

In a further letter report dated 14 March 2011 two concept development scenarios were assessed. These scenarios were as follows:

Development Option A was based on filling the total site, less the stormwater channel easement, to 500 mm above the 100 year flood level. The assessment of this option indicated that the 100 year flood levels would increase locally by up to 0.12m in the vicinity of the Victoria Street – Newton road intersection and would adversely affect existing building development in the area. Consequently Development Option A was not progressed any further.

Development Option B was modelled on the following basis:

- The area covered by the building footprints only are filled to 500 mm above the estimated post-development 100 year flood level;
- The remainder of the development site was assumed to be filled to the post-development 20 year flood level and

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- A nominal 5 m minimum set back from the top of the stormwater channel concrete lining was applied and compared favourably with upstream development, which on the basis of an aerial photographic inspection, in some instances has included land fill to the edge of the concrete channel

It was concluded from the assessment of Development Option B that it would not be possible to fully develop the site unless Council permitted the internal access driveways and car parking to be constructed at or close to the post-development 20 yr ARI flood level. It was understood that Council's flood risk management policy allows car parking to be constructed at the 20 year ARI flood level in order to avoid unnecessary sterilisation of an otherwise viable development site.

It was concluded that if Council's preferred criteria, as stated at the meeting of the 16th February 2011, was to be met i.e. the 100 year flood depth across car park areas should be not more than approximately 250 mm the finished surface levels on the site would need to be raised above the estimated 20 yr ARI flood level. Consequently a third development option (Development Option C) was proposed prepared but was not assessed.

Development Option C differed from Development Option B by:

- Re-shaping of the footprint of the office block located in the north eastern area (the "triangular" building),
- Increasing the set back of the triangular building from the stormwater channel to 8 metres,
- Relocating part of the car park and driveways,
- Excavation of the landscaped areas adjacent to the stormwater channel to create a flood storage volume below the 20 yr ARI flood level that is at least equal to the estimated existing 20 yr ARI flood storage volume of 828 m³.

Development Option C thus provided for development of a building density consistent with nearby developments while maintaining at least the same estimated 20 yr ARI flood storage volume across the site.

All development options considered in February and March 2011 were based on no blockage of the Victoria Street culvert.

Subsequently a further development option was prepared by Bongiorno Hawkins & Associates based on preliminary flood storage volumes as advised by Cardno. This option was submitted to Council for its consideration on 29 March 2011.

2. OBJECTIVE

The objective was to prepare a supplementary Flood Risk Assessment of the development option was prepared by Bongiorno Hawkins & Associates.

3. OUR APPROACH

The approach adopted was to modify the floodplain model to represent the latest development option prepared by Bongiorno Hawkins & Associates as submitted to Council for its consideration on 29 March 2011 and to re-run the 20 yr ARI and 100 yr ARI events.

The floodplain model was also re-run to estimate the impacts of 50% blockage of the Victoria Street culverts during a 100 yr ARI event.

3.1 Floodplain Model

The floodplain model is as described previously in our letter reports of 21 February 2011 and 14 March 2011.

The development option prepared by Bongiorno Hawkins & Associates is given in Figures 1 and 2.

3.2 Pedestrian and Vehicular Stability

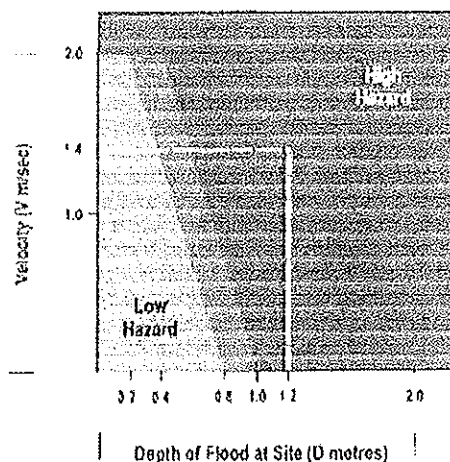
When considering pedestrian and vehicular stability, three velocity x depth criteria were identified as follows:

Velocity x Depth	Comment
$\leq 0.4 \text{ m}^2/\text{s}$	This is typically adopted by Councils as a limit of stability for pedestrians
$0.4 - 0.6 \text{ m}^2/\text{s}$	Unsafe for pedestrians but safe for vehicles if overland flood depths do not exceed around 0.3 m
$> 0.6 \text{ m}^2/\text{s}$	This is typically adopted by Councils as a limit of stability for vehicles

3.3 Flood Hazards

Experience from studies of floods throughout NSW and elsewhere has allowed authorities to develop methods of assessing the hazard to life and property on floodplains. This experience has been used in developing the NSW Floodplain Development Manual to provide guidelines for managing this hazard. These guidelines are shown schematically below.

To use the diagram, it is necessary to know the average depth and velocity of floodwaters at a given location. If the product of depth and velocity exceeds a critical value (as shown below), the flood flow will create a high hazard to life and property. There will probably be danger to persons caught in the floodwaters, and possible structural damage. Evacuation of persons would be difficult.



Provisional Hazard Categories
(after Figure L2, NSW Government, 2005)

By contrast, in low hazard areas people and their possessions can be evacuated safely by trucks. Between the two categories a transition zone is defined in which the degree of hazard is dependent on site conditions and the nature of the proposed development.

This calculation leads to a provisional hazard rating. The provisional hazard rating may be modified by consideration of effective flood warning times, the rate of rise of floodwaters, duration of flooding and ease or otherwise of evacuation in times of flood.

4. FLOOD IMPACT ASSESSMENT

4.1 Current Conditions

The estimated 100 yr ARI depths, velocities, velocity x depth and hazards under existing conditions with no blockage of the of the Victoria Street culvert are plotted in Figures 3, 4, 5 and 6 respectively.

The estimated 100 yr ARI depths, velocities, velocity x depth and hazards under existing conditions with 50% blockage of the of the Victoria Street culvert are plotted in Figures 13, 14, 15 and 16 respectively.

The estimated 20 yr ARI depths, velocities, velocity x depth and hazards under existing conditions with no blockage of the of the Victoria Street culvert are plotted in Figures 23, 24, 25 and 26 respectively.

4.2 Post-Development Conditions

The estimated 100 yr ARI levels, depths, velocities, velocity x depth and hazards under post-development conditions with no blockage of the of the Victoria Street culvert are plotted in Figures 7, 8, 9, 10 and 11 respectively.

The estimated 100 yr ARI level differences under post-development conditions with no blockage of the Victoria Street culvert in comparison with existing conditions are plotted in Figure 12.

The estimated 100 yr ARI depths, velocities, velocity x depth and hazards under post-development conditions with 50% blockage of the of the Victoria Street culvert are plotted in Figures 17, 18, 19 and 20 respectively.

The estimated 100 yr ARI level differences under post-development conditions with 50% blockage of the Victoria Street culvert in comparison with existing conditions with 50% blockage of the Victoria Street culvert are plotted in Figure 21.

The estimated 100 yr ARI level differences under post-development conditions with 50% blockage of the Victoria Street culvert in comparison with existing conditions with no blockage of the Victoria Street culvert are plotted in Figure 22.

The estimated 20 yr ARI levels, depths, velocities, velocity x depth and hazards under post-development conditions with no blockage of the of the Victoria Street culvert are plotted in Figures 27, 28, 29, 30 and 31 respectively.

The estimated 20 yr ARI level differences under post-development conditions with no blockage of the Victoria Street culvert in comparison with existing conditions are plotted in Figure 32.

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4.3 Flood Impact Assessment

From Figure 12 it was determined that the local impacts in a 100 yr ARI event on the downstream overland flowpath along Victoria Street with no blockage of the Victoria Street culvert are no more than around 0.02 – 0.03 m.

From Figure 32 it was determined that the local impacts in a 20 yr ARI event with no blockage of the Victoria Street culvert is no more than around 0.01 m.

It was found that the incremental impact of the concept development in a 100 yr ARI event with 50% blockage of the Victoria Street culvert (in comparison with Existing Conditions with 50% Blockage) is typically around 0.04 m except beside the planned northwest building where the impact is nearer 0.14 m (refer Figure 21)

The incremental impact (in comparison with Future Conditions with no blockage) was found to be generally local increases of up to 0.32 m around buildings (refer Figure 22). This indicates that a freeboard of 500 mm should ensure that the floor levels of the new building would not be inundated by 50% blockage of the culvert during a 100 yr ARI event

5. CONCLUSIONS

Based on the above assessments it was concluded that the planned redevelopment of 449 Victoria Street, Wetherill Park will have:

- (i) Minimal impacts on the 100 yr ARI flood levels on the downstream overland flowpath along Victoria Street with no blockage of the Victoria Street culvert with local increases of no more than around 0.02 – 0.03 m.
- (ii) Negligible impacts on the 20 yr ARI flood levels with no blockage of the Victoria Street culvert with local increases of no more than 0.01 m.

It was also concluded that 50% blockage of the Victoria Street culvert will:

- (i) Locally increase 100 yr ARI flood levels (in comparison with Existing Conditions with 50% blockage) within the site by around 0.04 m except beside the planned northwest building where the impact is nearer 0.14 m.
- (ii) Locally increase 100 yr ARI flood levels (in comparison with Future Conditions no blockage) by up to 0.32 m around buildings; which indicates that
- (iii) A freeboard of 500 mm should ensure that the floor levels of the new building would not be inundated by 50% blockage of the culvert during a 100 yr ARI event.

We would be pleased to further discuss our findings with you upon your request.

Yours faithfully

Dr Brett C. Phillips
Director, Water Engineering
for Cardno