

Our Ref: 110099\_Rpt1B.docx

DG:nt

15 April 2015

Tulich Project Management Pty Ltd  
C/- NooShere  
GPO Box 3214  
Sydney NSW 2001

**Attn: Mr John Lewis**

**Subject: Nepean Seniors Living @ Panthers  
Flood Impact Assessment**

Dear John

As requested, a flood impact assessment has been undertaken in support of the development application to Penrith City Council for the Nepean Seniors Living @ Panthers development within the Panthers Precinct. A separate flood assessment for the entire Panthers Precinct was completed by J. Wyndham Prince in 2013<sup>1</sup>. The flood assessment requirements detailed in Penrith City Council's Development Control Plan (DCP) 2010 – "Part C3 Water Management Section 3.5 – Flood Liable Land" and DCP 2010 Appendix E6 – Panthers Precinct" form part of this report.

The assessment undertaken for the Nepean Seniors Living @ Panthers development is a modification to the Panthers site flood model that was prepared to assess the impact of the entire proposed Panthers redevelopment. An assessment has been undertaken to determine the potential impacts on local flood levels in both the local and regional 1 % AEP and 0.5 % AEP flood events. The following events have been assessed for the Nepean Seniors Living @ Panthers development:

- Scenario 1 – 1% AEP Regional Event;
- Scenario 2 – 0.5% AEP Regional Event;
- Scenario 3 – Regional 1% AEP + Local 5% AEP Event; and
- Scenario 4 – Local 1% AEP + Regional 5% AEP Event.

The flood model extents, parameters and assumptions for this assessment are generally consistent with those adopted in the J. Wyndham Prince 2014 study.

The Nepean Seniors Living @ Panthers development consists of the following works, which have been incorporated in the flood model:

- Construction of the Nepean Seniors Living @ Panthers development, including filling above the "combination" 1% AEP flood level.
- Road work to facilitate access to the Nepean Seniors Living @ Panthers development.
- Provision of a box culvert within the southern extents of the site to convey flows from the upstream catchment (culvert to be extended in the future).

<sup>1</sup> J. Wyndham Prince (2014) – Panthers Precinct Master Plan – Flood Assessment Report



- A temporary channel on the eastern boundary to collect and convey overland flows to the proposed culvert.

The existing site is shown on the attached Figure 1. The proposed development is shown on Figure 2. It is noted that the approved adjacent NRL Academy and Western Sydney Community and Sports Centre developments are included in the developed case scenario modelling.

### **DCP Requirements**

The Penrith DCP 2010 Appendix E6 – Panthers Precinct, lists the flooding and drainage controls applicable to the site, which are addressed in Table 1 below.

**Table 1 – Penrith DCP Flooding and Drainage Controls Applicable to the Panthers Site**

<b>DCP Control</b>	<b>Comment</b>
All applications are to address the relevant sub-sections of Penrith Development Control Plan 2010 Part C3 Water Management.	See section below.
<p>A Stormwater Management Strategy (SMS) is to be prepared for the whole Precinct and be submitted with the first major development application and should identify and address:</p> <ul style="list-style-type: none"> <li>• Impacts of stormwater generated both on and off the site</li> <li>• Stormwater easements and overland flow paths</li> <li>• Opportunities to maximise the reuse of stormwater runoff</li> <li>• Means to reduce the demand on potable water supplies</li> <li>• Reductions in pollutants entering the water system</li> </ul>	A draft Stormwater Management Strategy has previously been prepared and issued to Penrith City Council (J. Wyndham Prince Report dated November 2014).
Any development west of the Central Link Road and within the flood flow conveyance corridor is to develop a strategy to ensure that the 200-year regional flood runner is maintained without causing adverse impact to adjoining lands in accordance with the principles of Scenario 4 modelling under Panthers Planning Proposal – Appendix H. The strategy will identify the timing, staging and detailing of necessary works to be undertaken.	The proposed Nepean Seniors Living @ Panthers development is located within the flood conveyance corridor for the 200-year (0.5% AEP) regional event. A flood impact assessment has been undertaken for the 200-year regional event and the results discussed in this statement. In summary, there are no adverse impacts to adjoining properties as a result of the proposed development.
Development of a comprehensive flood evacuation and emergency response plan as part of the Infrastructure Master Plan.	A flood evacuation and emergency response plan for the Panthers development has been prepared by Molino Stewart and previously provided to Penrith City Council.

**Penrith City Council, DCP 2010 – C3 Water Management Section 3.5 – Flood Liable Land**

**Flood Hazard Classification**

The flood hazard mapping for the regional 1% AEP is included on the attached Figure 11 (reproduced from Worley Parsons regional flood modelling<sup>2</sup>). The mapping shows that the majority of the proposed Nepean Seniors Living @ Panthers development is not affected by the 1% AEP regional event. The portion that is affected is primarily low hazard, with only a very small area impacted by medium and high hazard.

**Residential – New Developments – Single Dwelling**

Not applicable to this development.

**Residential – Minor Extensions**

Not applicable to this development.

**Non-Habitable Extensions or Alterations, Outbuildings and Swimming Pools**

Not applicable to this development.

**Industrial/Commercial – New Development**

Not applicable to this development.

**Industrial/Commercial – Extensions and Infill Development**

Not applicable to this development.

**Change of Use of Existing Buildings**

Not applicable to this development.

**Rural Uses**

Not applicable to this development.

**Subdivision**

Not applicable to this development.

**Multi-Unit Housing**

The floor level of the Nepean Seniors Living @ Panthers development is to be located at RL 26.5, being 0.5 metres above the “combination” 1% AEP flood level of RL 26.0. A flood evacuation and emergency response plan for the Panthers development has been prepared by Molino Stewart and previously provided to Penrith City Council.

The basement carpark level is below the 1% AEP flood level of RL 26.0. However, the entrance to the carpark is RL 26.1, i.e. 100 mm above the 1% AEP flood level. It is not considered necessary to locate the carpark above RL 26.0 as it is a non-inhabitable area of the building. There will be adequate warning time for evacuation in the regional flood events.

---

<sup>2</sup> Nepean River RMA2 Flood Model – Worley Parsons model supplied by Penrith City Council in September 2008.

The impacts of the development on existing flood levels are discussed in this report. The proposed development does not result in unacceptable impacts on properties beyond the Panthers Precinct. The flood impacts for the various events assessed are shown on Figure 3 to Figure 6.

Water quality is addressed through provision of a bioretention basin in the site (designed by others).

### **Other land uses which may attract large numbers of people**

The proposed Nepean Seniors Living @ Panthers development is to be located at RL 26.5, which provides 0.5 metres freeboard above the “combination” 1% AEP flood level of RL 26.0. A flood evacuation and emergency response plan for the Panthers development has been prepared by Molino Stewart and provided to Penrith City Council.

### **Storage of Potential Pollutants above 1:100 ARI Flood**

Not applicable to this development.

### **Overland Flow Flooding**

A flood impact assessment has been undertaken for the proposed development. The assessment demonstrates that there are no adverse impacts on flood levels beyond the Panthers Precinct boundary as a result of the proposed development for all four (4) flood scenarios assessed.

### **Filling of Land Below the Flood Planning Level**

The land is to be filled to the flood planning level. A flood impact assessment has been undertaken for the proposed development. The assessment demonstrates that there are no adverse impacts on flood levels beyond the Panthers Precinct boundary as a result of the proposed development for the four (4) flood scenarios assessed.

a) *Flood levels are not increased by more than 0.1 metre by the proposed filling.*

Flood levels do not increase by more than 0.1 m outside the precinct (refer to flood differenced maps).

b) *Downstream velocities are not increased by more than 10% by proposed filling.*

Downstream velocities do not increase by more than 10% (see velocity difference mapping).

c) *Proposed filling does not redistribute flows more than 15%.*

The proposed filling is not expected to redistribute flows by more than 15%, particularly beyond the extents of the proposed development.

d) *The potential for cumulative effects of possible filling proposals in that area is minimal.*

The total cumulative impact of the entire Panthers development is minimal (as demonstrated in the Panthers Flood Assessment Report).

e) *There are alternative opportunities for flood storage.*

There are alternative opportunities for flood storage without adverse impacts beyond the precinct boundary.

f) *The development potential of surrounding properties is not adversely affected by the filling proposal.*

The development potential of surrounding properties is not adversely affected by the filling proposal.

g) *The flood liability of buildings on surrounding properties is not increased.*

The flood liability of buildings surrounding properties is not increased as a result of the proposed development.

h) *No local drainage flow/runoff problems are created by the filling.*

No local drainage flow/runoff problems result from the filling at the site.

i) *The filling does not occur within the drip line of existing trees.*

No filling is proposed within the drip line of existing trees.

## **Rezoning of Land**

Not applicable to this development.

## **Flood Modelling Results**

Flood modelling of the proposed development was undertaken to determine the impact on flood behaviour within Peachtree Creek in the aforementioned scenarios. Flood level difference maps are included in Figures 3 – 6 showing the impact of the proposed development in comparison to existing conditions.

The flood level difference mapping indicates that flood levels do not increase outside the Panthers site boundary. The flood level differences for each Scenario are as follows:

Scenario 1 – Generally no changes (Figure 3);

- Scenario 2 – Localised increases of generally less than 60 mm adjacent to the Nepean Seniors Living @ Panthers development (contained within the Panthers Precinct) (Figure 4);
- Scenario 3 – Localised increases of generally less than 100 mm adjacent to the Nepean Seniors Living @ Panthers development (contained within the Panthers Precinct) (Figure 5); and
- Scenario 4 – Localised increases of up to 105 mm adjacent to the Nepean Seniors Living @ Panthers development (contained within the Panthers Precinct) (Figure 6).

The majority of flood increases adjacent to the Nepean Seniors Living @ Panthers development will be reduced when the final channel and culvert are constructed that collect and convey overland flows from upstream of Mulgoa Road.

The flood velocity difference mapping indicates that flood velocities do not increase outside the Panthers site boundary. The flood velocity differences for each Scenario are as follows:

- Scenario 1 – Generally no changes except localised increases immediately downstream of the proposed culvert of approximately 0.6 m/s (Figure 7);
- Scenario 2 – There are localised increases at various locations within the Panthers Precinct. Apart from minor increases at the NRL Academy building the increases are located outside the Peachtree Creek riparian zone and are generally less than 0.6 m/s (Figure 8);
- Scenario 3 – There are minor localised increases generally less than 1 m/s, primarily adjacent to the Nepean Seniors Living @ Panthers development. There are generally no changes elsewhere (Figure 9); and
- Scenario 4 – There are localised increases of generally less than 1 m/s adjacent to and downstream of the Nepean Seniors Living @ Panthers development (Figure 10).

### **Conclusion and Summary**

The flood modelling assessment for the Nepean Seniors Living @ Panthers development demonstrates that the proposed development will not result in any adverse impacts on adjacent properties outside the Panthers Precinct for the modelled flood events. The previous flood assessment demonstrated that there are no adverse impacts on adjacent properties when the full development of the Panthers Precinct is complete, for the regional and local 1% AEP events.

Should you have any queries regarding this matter please do not hesitate to contact me.

Yours faithfully

**J. WYNDHAM PRINCE**



**DANIEL GARDINER**

Senior Water Resources Engineer

## FIGURES





**PANTHERSGROUP**  
**J. WYNDHAM PRINCE**  
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS  
& PROJECT MANAGERS  
PO Box 4366 PENRITH WESTFIELD NSW 2750  
P 02 4720 3300 W [www.jwprince.com.au](http://www.jwprince.com.au)  
F 02 4721 7638 E [jwp@jwprince.com.au](mailto:jwp@jwprince.com.au)

**LEGEND**  
  
— PANTHERS PRECINCT  
BOUNDARY  
  
— NEPEAN SENIORS LIVING  
@ PANTHERS BUILDING  
EXTENTS

N  
W E  
S

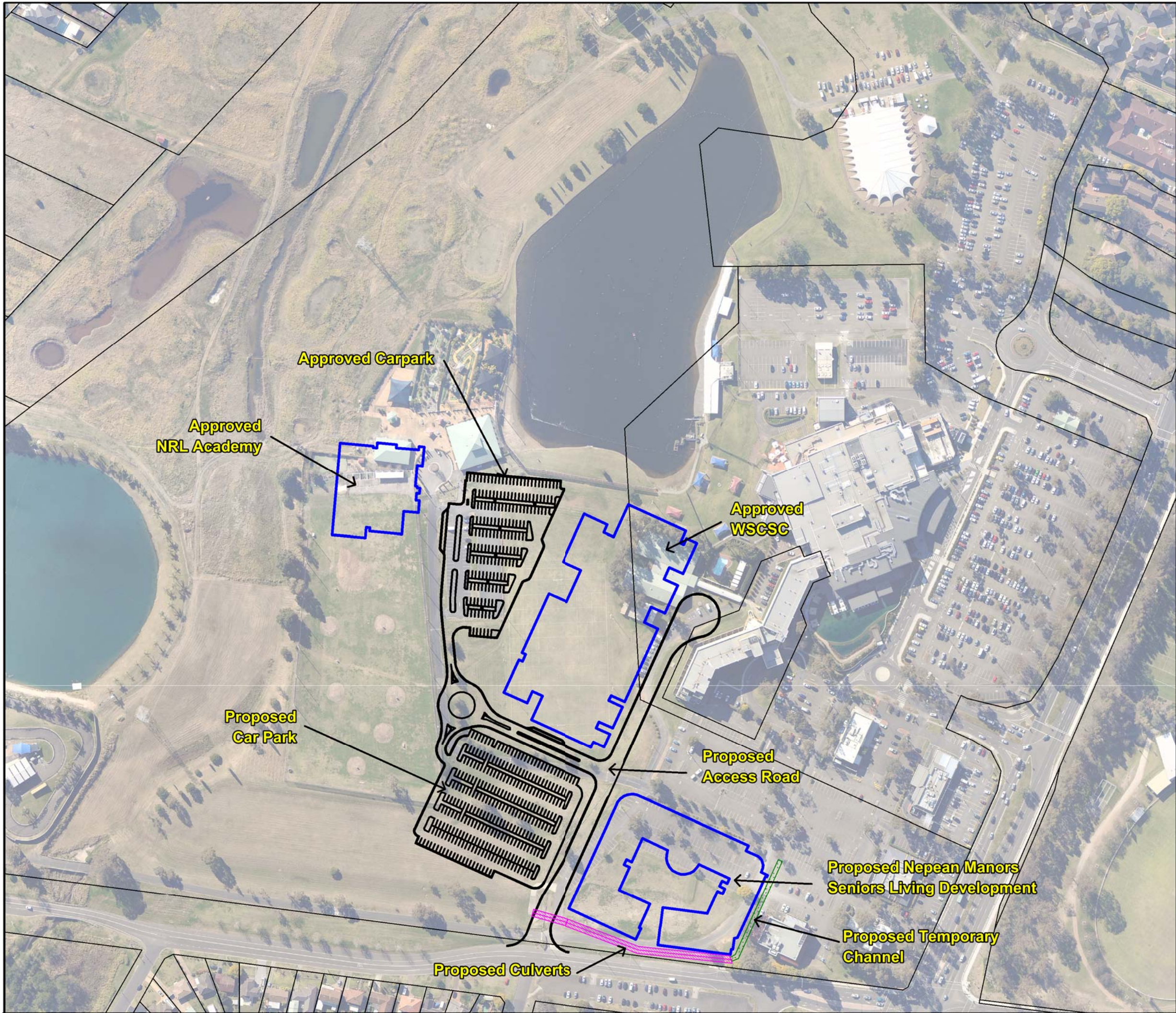
Scale 1: 2,500 @ A3

100 0 m

**Figure 1**  
**Nepean Seniors Living  
@ Panthers Development**  
**Existing Site Layout**

File Name: 110099 - Figure 1 - Exi  
Date : 30/03/15 Issue : A





**PANTHERSGROUP**  
**J. WYNDHAM PRINCE**  
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS  
& PROJECT MANAGERS  
PO Box 4366 PENRITH WESTFIELD NSW 2750  
P 02 4720 3300 W www.jwprince.com.au  
F 02 4721 7638 E jwp@jwprince.com.au

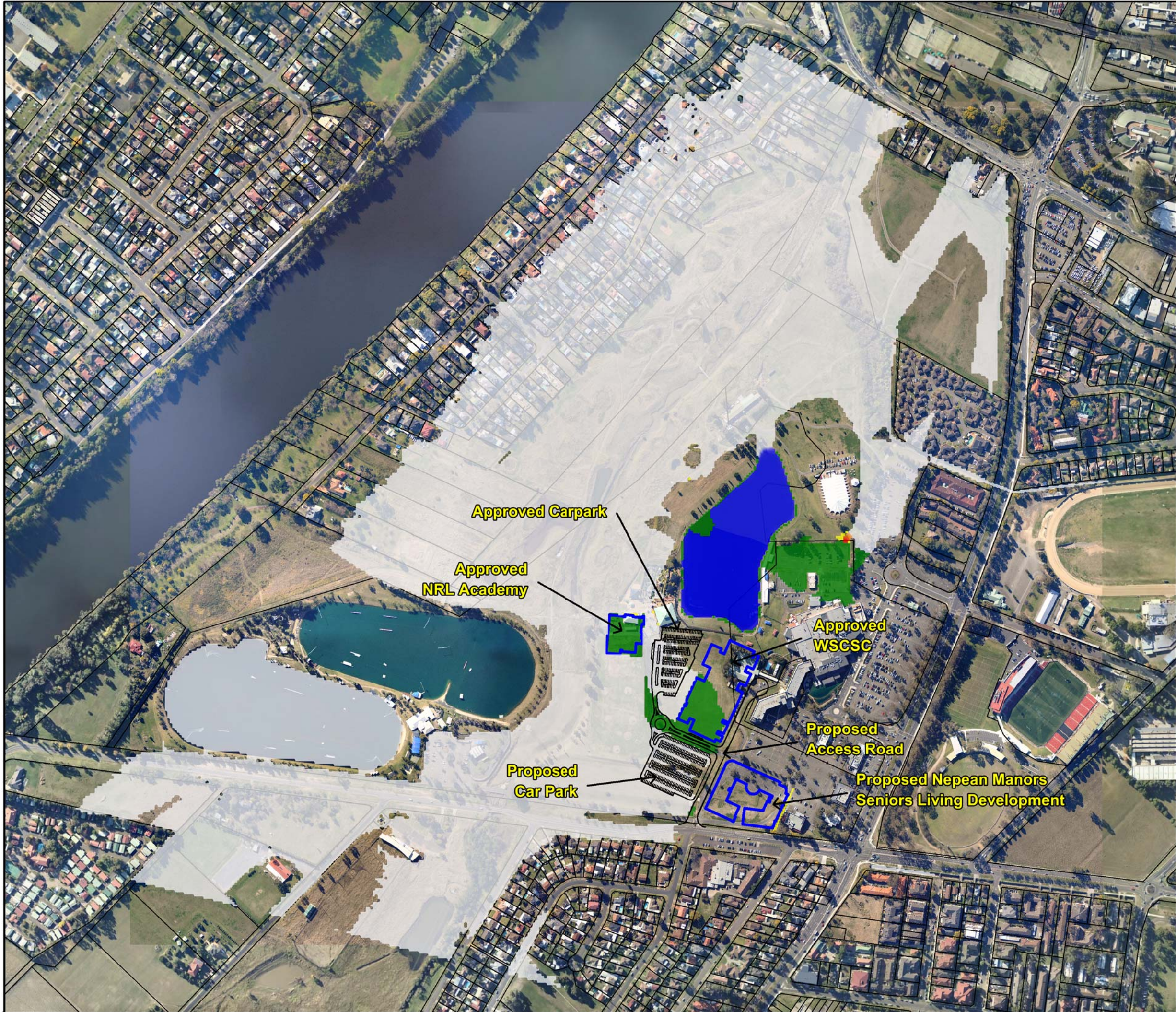
**LEGEND**

Scale 1: 2,500 @ A3

**Figure 2**  
**Nepean Seniors Living @ Panthers Development**  
**Developed Site Layout**

File Name: 110099 - Figure 2 - Dev  
Date : 30/03/15  
Issue : B





**LEGEND**

INCREASE IN FLOOD LEVELS (m)

Blue	-0.2+
Dark Blue	-0.18
Medium Blue	-0.16
Light Blue	-0.14
Very Light Blue	-0.12
Lightest Blue	-0.10
White	-0.08
Lightest Blue	-0.06
White	-0.04
White	-0.02
White	-0.02 to 0.02
Orange	0.02
Light Orange	0.04
Yellow-Orange	0.06
Yellow	0.08
Light Yellow	0.10
Yellow	0.12
Orange	0.14
Red-Orange	0.16
Red	0.18
Dark Red	0.2+

■ AREA FLOOD FREE IN MODELLED EVENT  
■ AREA FLOOD AFFECTED IN MODELLED EVENT

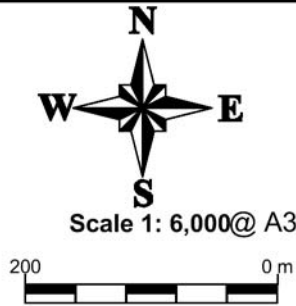
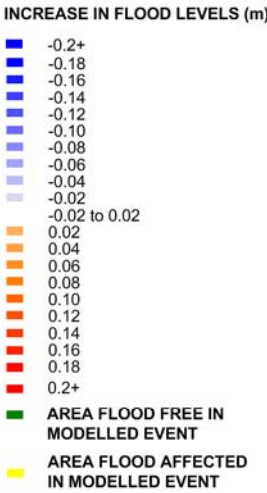
N  
W E  
S  
Scale 1: 6,000@ A3  
200 0 m

**Figure 3**  
**Nepean Seniors Living @ Panthers Development**  
**Flood Difference Map**  
**1% AEP Regional**  
**Developed - Existing**





**LEGEND**



**Figure 4**  
**Nepean Seniors Living @ Panthers Development**  
**Flood Difference Map**  
**0.5% AEP Regional**  
**Developed - Existing**





**LEGEND**

INCREASE IN FLOOD LEVELS (m)

Blue	-0.2+
Dark Blue	-0.18
Medium Blue	-0.16
Light Blue	-0.14
Very Light Blue	-0.12
Lightest Blue	-0.10
White	-0.08
Lightest Blue	-0.06
White	-0.04
White	-0.02
White	-0.02 to 0.02
Orange	0.02
Light Orange	0.04
Yellow-Orange	0.06
Yellow	0.08
Light Yellow	0.10
Yellow	0.12
Orange	0.14
Red-Orange	0.16
Red	0.18
Dark Red	0.2+

■ AREA FLOOD FREE IN MODELLED EVENT  
■ AREA FLOOD AFFECTED IN MODELLED EVENT

N  
W E  
S

Scale 1: 6,000@ A3

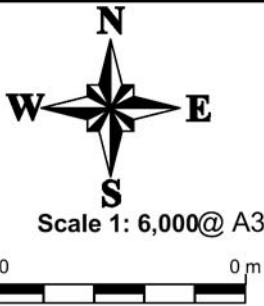
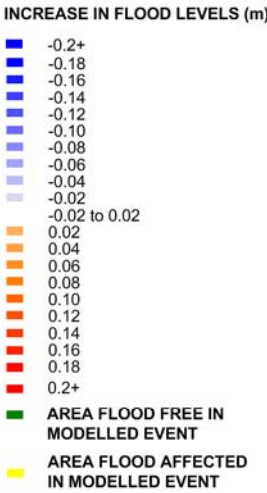
200 0 m

**Figure 5**  
**Nepean Seniors Living @ Panthers Development**  
**Flood Difference Map**  
**1% AEP Regional +**  
**5 % AEP Local**  
**Developed - Existing**  
File Name: 110099 - Figure 5 - Scen 28  
Date : 30/03/15 Issue : B





**LEGEND**

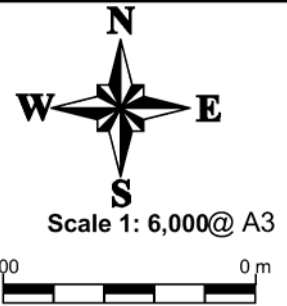
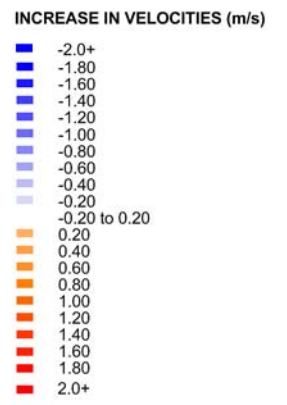


**Figure 6**  
**Nepean Seniors Living @ Panthers Development**  
**Flood Difference Map**  
**1% AEP Local +**  
**5 % AEP Regional**  
**Developed - Existing**  
File Name: 110099 - Figure 6 - Diff 1&L20%L  
Date : 30/03/15 Issue : B





**LEGEND**

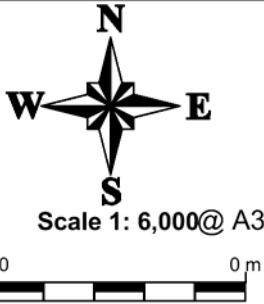
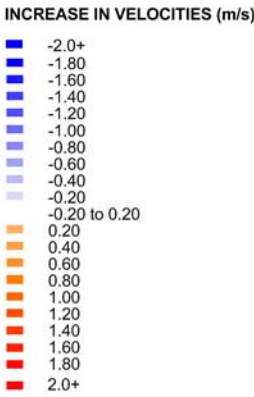


**Figure 7**  
**Nepean Seniors Living**  
**@ Panthers Development**  
**Flood Velocity Difference Map**  
**1% AEP Regional**  
**Developed - Existing**





**LEGEND**

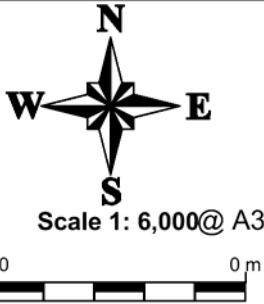
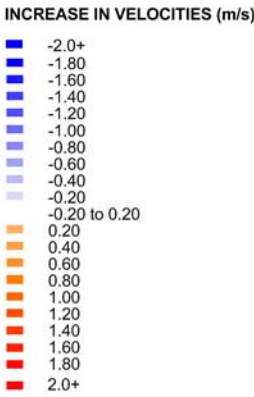


**Figure 8**  
**Nepean Seniors Living**  
**@ Panthers Development**  
**Flood Velocity Difference Map**  
**0.5% AEP Regional**  
**Developed - Existing**



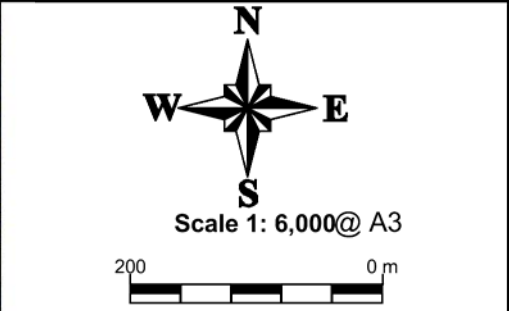
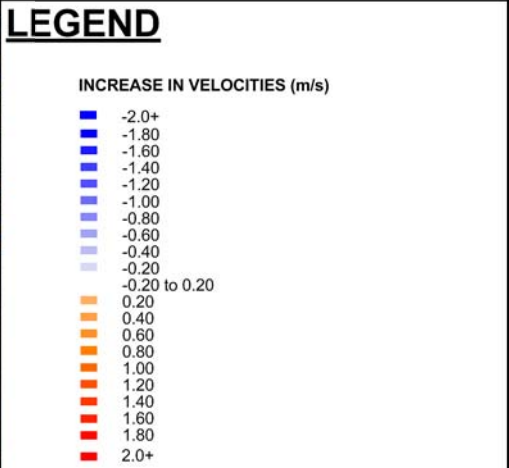


**LEGEND**



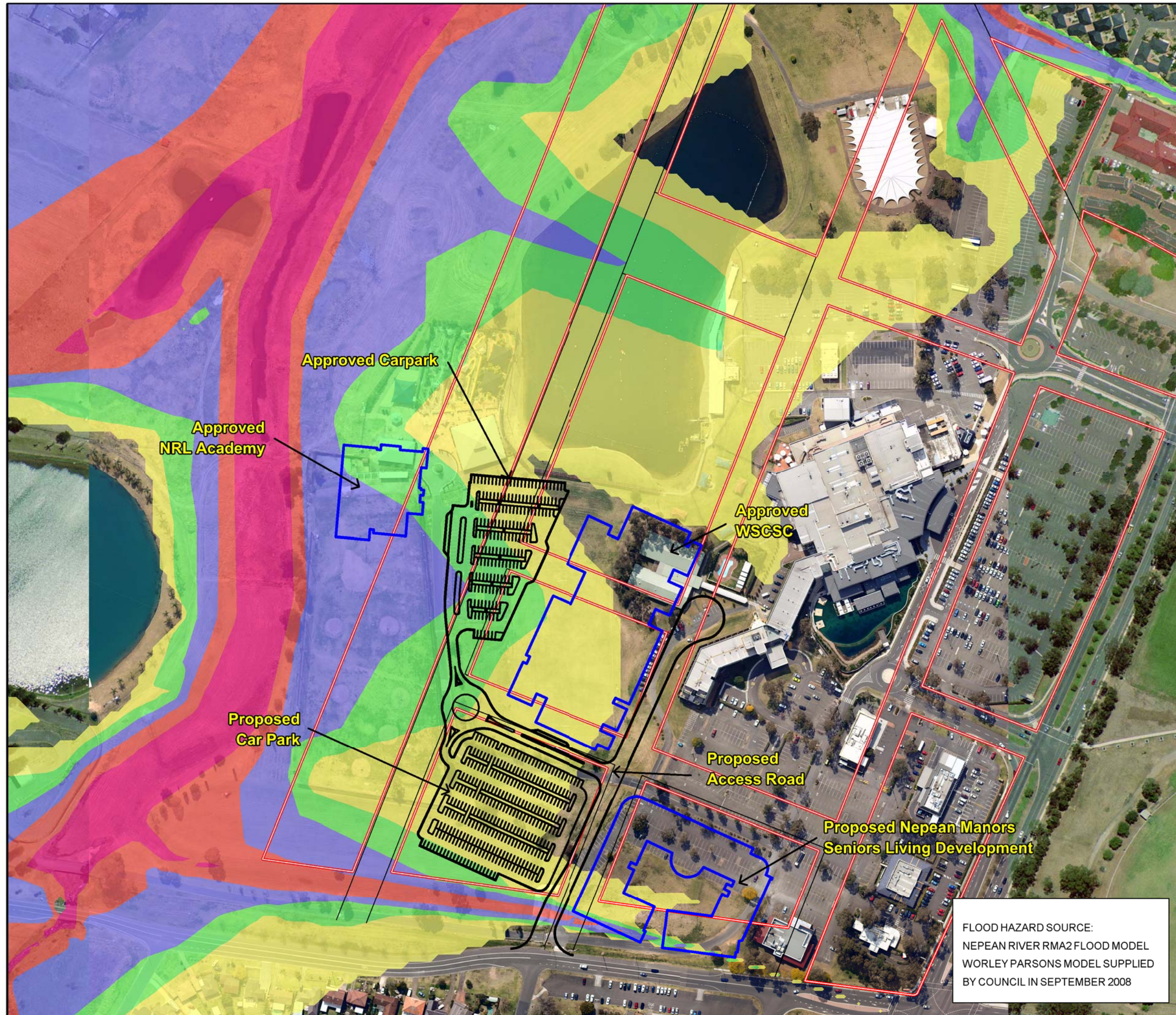
**Figure 9**  
**Nepean Seniors Living**  
**@ Panthers Development**  
**Flood Velocity Difference Map**  
**1% AEP Regional +**  
**5 % AEP Local**  
**Developed - Existing**





**Figure 10**  
**Nepean Seniors Living**  
**@ Panthers Development**  
**Flood Velocity Difference Map**  
**1% AEP Local +**  
**5 % AEP Regional**  
**Developed - Existing**  
File Name: 110099 - Figure 10 - V Diff 1%L20%R  
Date : 30/03/15 Issue : B





**PANTHERSGROUP**  
**J. WYNDHAM PRINCE**  
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS  
& PROJECT MANAGERS  
PO Box 4366 PENRITH WESTFIELD NSW 2750  
P 02 4720 3300 W www.jwprince.com.au  
F 02 4721 7638 E jwp@jwprince.com.au

**LEGEND**  
  
Flood Hazard  

- LOW
- MEDIUM
- HIGH
- VERY HIGH
- EXTREME

  
SCENARIO 4  
DEVELOPMENT EXTENTS

Scale 1: 2,500 @ A3

**Figure 11**  
**Nepean Seniors Living  
@ Panthers Development**  
**100 Year Regional  
Flood Hazard Mapping  
(Source: Worley Parsons)**  
  
FLOOD HAZARD SOURCE:  
NEPEAN RIVER RMA2 FLOOD MODEL  
WORLEY PARSONS MODEL SUPPLIED  
BY COUNCIL IN SEPTEMBER 2008  
  
File Name: 9593 - Fig 11 - Hazards  
Date : 30/03/15  
Issue B