



DH/BC
Our Ref: 14253
Your Ref: S113124.001
21 August 2015

Graham Jahn AM
Director
City of Sydney Council
456 Kent Street
SYDNEY NSW 2000

Attention: Ben Pechey

Dear Ben

**PLANNING PROPOSAL
2-32 JUNCTION STREET, FOREST LODGE**

I refer to recent correspondence and the meeting held on 23rd June in relation to the Planning Proposal for land at 2-32 Junction Street, and the flooding constraints associated with the site. During this meeting the design solution for the proposed Indicative Scheme was discussed, with a particular focus on the car park and its relationship with the site specific flood levels.

Council advised at this meeting that the at grade car park as proposed was not an acceptable design outcome as it fails to comply with Council's current Interim Flood Management Policy (IFMP). Concern was specifically raised about the potential for the at grade car park to result in an unacceptable risk to life and property.

Given Council's position an alternative solution was discussed that involved raising the car park level to RL13.1m, being the 5% AEP level (1 in 20 year flood). In response Mr Terry Keffalinas of the City of Sydney Council advised that it is preferential for the proposal to meet the prescriptive requirements of the IFMP, he did however note that given the circumstances surrounding the site Council would be willing to consider a merit based argument to use 5% AEP level subject to sufficient justification.

This letter has been prepared in response to the points raised by Council and should be read in conjunction with the accompanying technical documentation including a supplementary statement provided by WMA and updated plans prepared by Bates Smart Architects.

The Revised Car Park Design

As illustrated in **Figures 1 and 2** below and in the accompanying Architectural Drawings prepared by Bates Smart, the design of the car park for the Indicative Scheme has undergone a number of significant amendments, these being:

- The car park has been elevated to a new height of RL13.1m and now sits on a suspended slab thus allowing flood waters to inundate the site both under and over the car park level.
- The vehicular access point has been relocated from Larkin Street to Junction Street. The revised access allows for a direct vehicular egress from the car park to higher ground during a flood event, thus providing a far safer outcome.
- Three pedestrian 'flood evacuation points' are now included in the car park. Each evacuation point facilities safe access from the car park to higher flood free ground. All car spaces are

within 30m of an evacuation point, with 80% of spaces being within 20m of an evacuation point.

- The car park façade is designed to be permeable to allow for the inflow and outflow of water in the event that it is inundated by flood water. Indicative images of a possible design solution are provided in the accompanying material prepared by Bates Smart Architects. The final detailed design will however be determined through future detailed work carried out as part of any development application process. Key focus will be given to achieving an outcome that allows for flood waters to inundate the site whilst still providing an effective screening and urban design outcome.

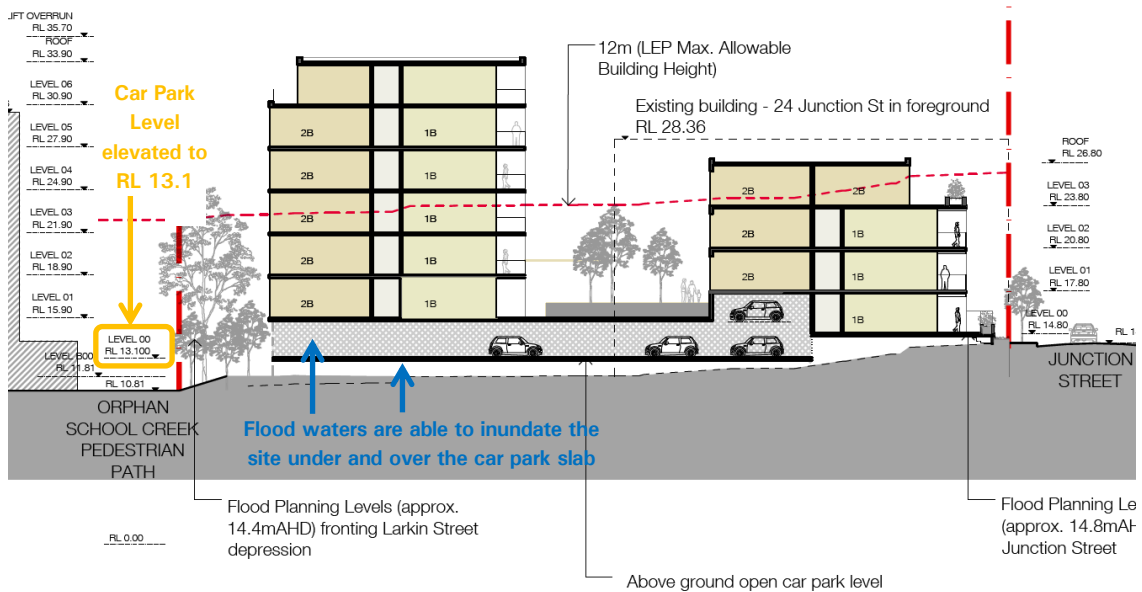


Figure 1 – Section A-A of Indicative Scheme
Source: Bates Smart Architects

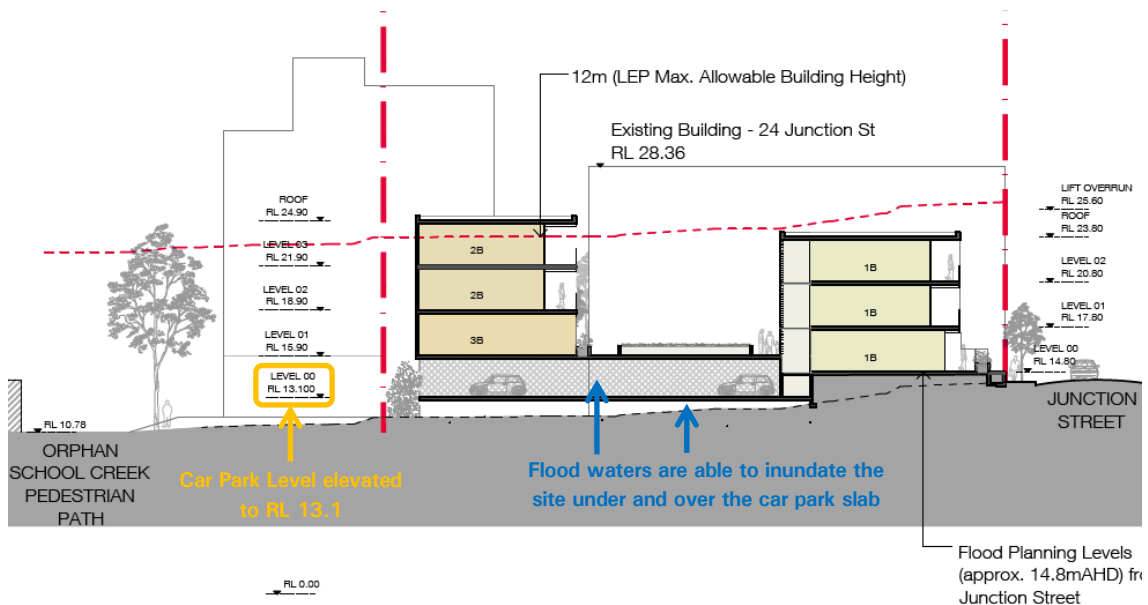


Figure 2 – Section B-B of Indicative Scheme
Source: Bates Smart Architects

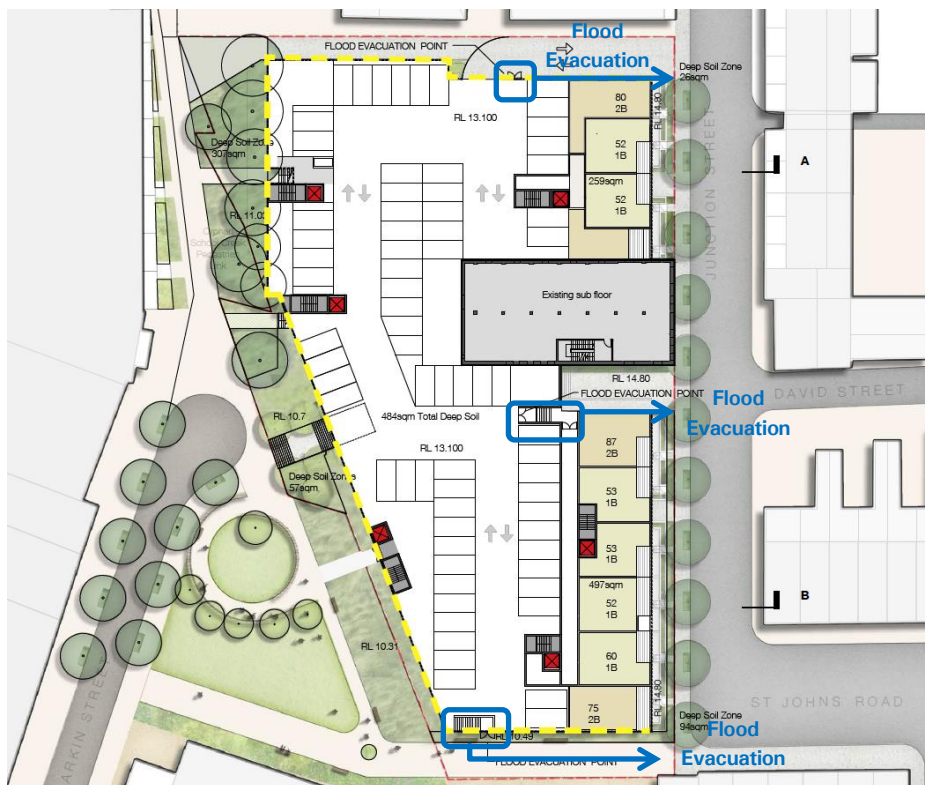


Figure 3 – Car park plan and flood evacuation points

Source: Bates Smart Architects

Nature of Flooding and Flood Impact

In considering whether the proposal represents an appropriate design solution, it is important to understand the nature and behaviour of flooding within the Larkin Street Depression and the extent of the potential impact during a flood event. The accompanying statement by WMA notes that flooding of the site occurs as a result of flood waters building up behind Pymont Bridge Road resulting in a ponding effect at the bottom of Larkin Street. The ponding of water in this location is principally due to the trunk drain beneath Pymont Bridge Road having insufficient capacity to cater for storm events greater than 20% AEP, which results in the site experiencing flood inundation during heavier storm events. **Table 1** below sets out the peak flood levels for different events. In reviewing the table below it is important to note that:

- a) site levels vary from RL10.16m down near Larkin Street to RL14.03m along Junction Street;
- b) the proposed level of the car park is RL13.1m; and
- c) the PMF level represents a flood event that is 1,000-10,000 times less likely to occur than the 1% AEP event. For this reason whilst it requires consideration, it is unreasonable to require proposals to be designed according to this level.

Table 1 – Larkin Street Depression Flood Levels

Event	Peak Flood Level (mAHD)	Rate of Rise
5% AEP	13.1	20mm / minute (1.2m / hour)
1% AEP	13.9	20mm minute (1.2m / hour)
PMF	18.5	5.0m / hour

From **Table 1** it is evident that during a flood event up and including the 5% AEP, flood waters would not inundate the car park. During a 1% AEP event the peak flood level would be RL13.9m, which represents a maximum water depth of 80cm above the car park.

While the site is subject to flooding, WMA highlight that the nature of the flood waters does not involve flash flooding, overland flow paths or high velocity flood waters. In contrast flooding of the site occurs in a slow gradual manner with stormwater accumulating and ponding behind Pyrmont Bridge Road (which acts as an embankment) which then gradually inundates the site. Given these characteristics WMA conclude that the velocity depth product of flood waters in a 1% AEP event is low and as such the floodwaters represent a 'low hazard' under the NSW Floodplain Development Manual (NSW, 2005).

Risks to life and property

Where flood waters have the potential to affect a proposed development, risks to life and property are justifiably key matters in determining the appropriateness of the proposed design solution. A number of factors need to be taken into account to understand the risk profile of a proposal so that an informed and appropriate decision can be made. These include:

- the nature and characteristics of the flood waters;
- the part of the proposal that is subject to potential inundation and flood impact;
- the purpose of the area that is subject to potential flood inundation and how that area is used;
- the level of advance warning during a flood event;
- the probability that an individual will try and access the area during a flood event;
- the ability to safely and effectively evacuate a flood inundated area during a flood event; and
- any other management and mitigation measures that assist in reducing risks to life and property.

As highlighted earlier the nature and characteristics of the flood waters affecting the site are slow rising and low velocity, and as a result are defined as having a 'low hazard' value under the NSW Floodplain Development Manual.

With regard to people having advance warning of flood inundation, we note that the slow rising nature of flood water, the level of the proposed car park (RL13.1m) and the base level of the site (RL10.18m) mean that it will take a minimum of two hours and twenty-six minutes for floodwaters to reach the car park level during 1% flood event. A further 40 minutes is then required for the flood waters to reach the maximum peak depth of RL13.9m, at which point the flood waters will be 80cm deep in the car park. In light of this it is evident that residents will be afforded ample opportunity to remove vehicles from the car park during a flood event. If necessary a flood detection and warning system could also be incorporated to provide further advance warning.

In addition to the above we note that consideration must also be given to the significant warnings that would naturally be provided by the Bureau of Meteorology and various media sources advising of impending storm and flood events. All of these factors combined together will ensure that residents are afforded substantial advance warning of a potential flood event.

Given the above it is unlikely that an individual will need to access the car park once it has been inundated by flood waters, principally as they will have already removed their vehicle and no longer have a reason to access the car park. Whilst this is the case in the unlikely event that someone chooses to access the car park while inundated, provision has been made for three clearly signed and readily accessible flood evacuation points, all of which are within a maximum 30m from any point within the car park and that provide a point of escape to higher flood free ground.

These evacuation points coupled with the fact that the flood waters have little to no velocity and a maximum depth of 80cm within the car park (during a 1% AEP peak event), confirm that flooding of the car park will pose a very minimal risk to human life. Indeed at the peak of a 1% AEP event an average height person will still be able to easily stand and wade through the 'still' water and the majority of cars are still likely to be grounded (i.e. not floating).

With regard to risks to property (other than vehicles) we note that this can be easily overcome through the drafting of strata by-laws that require residents to store goods and personal belongings at a minimum of 80cm above the car park floor level (i.e. the 1% AEP flood level). Storage cages can be specifically designed to respond to this constraint and can be provided as part of the development. In doing so residents will have no option but to use the facilities already provided, thus preventing them from constructing or providing their own facilities that don't comply with strata by-laws.

Implementation of the above measures is able to be ensured through imposition of conditions on any future development consent, with the ongoing responsibility of enforcement then handed over to the elected Body Corporate. To further reinforce this point it could also be made a requirement that notices be placed at car park entrances (e.g. lift entrances) and on storage devices (provided as part of the development) which highlight that storage of personal belongings below 80cm is strictly not permitted, or is done so at the risk of the resident (i.e. it is not be covered by insurance in the event of a flood event). Through the implementation of these measures we believe there is a clear workable solution to manage and significantly reduce risks to resident's personal property during a flood event.

Assessment against Interim Floodplain Management Policy

For the benefit of Council an assessment of the Indicative Scheme has been carried against the provisions of the Interim Flood Management Policy (IFMP) and is provided in **Tables 2 and 3** below.

Table 2 – Assessment against IFMP General and Prescriptive Requirements

Objective	Requirement	Response
General Requirements		
Residential Properties		
▪ To minimise the damage to residential properties from flooding; and ▪ To minimise risk to human life from the inundation of residential properties and to minimise economic cost to the community resulting from flooding.	▪ The proposed residential building or dwelling must be free from flooding up to and including the 1% AEP flood and must meet the Flood Planning Level Requirements detailed in Section 5; and ▪ The proposed residential building or dwelling should not increase the likelihood of flooding on other developments, properties or infrastructure.	▪ The proposed residential levels of the Indicative Scheme have all been designed to exceed the necessary flood freeboard. Apartments achieve a minimum floor level of RL 14.8m, being 0.90m above the 1% AEP level of RL13.9m. ▪ The proposed Indicative Scheme will not increase the likelihood of flooding of other development, properties or infrastructure. The building has been designed to allow flood waters to inundate the site during a flood event, and then recede back out of the site when flood waters dissipate.
Car Parking		
▪ To minimise the damage to motor vehicles from flooding; ▪ To ensure that motor vehicles do not become moving debris during floods, which threaten the integrity or blockage of	▪ The proposed car park should not increase the risk of vehicle damage by flooding inundation; ▪ The proposed garage or car park should not increase the likelihood of flooding on other developments, properties or	▪ The proposed car park has been designed to RL13.1, being the 5% AEP flood level. The level of the car park complies with the level requirement for 'open car parks' but does not achieve the 1% AEP requirement for closed car parks. Whilst this is the case the proposed

structures or the safety of people, or damage other property; and ■ To minimise risk to human life from the inundation of basement and other car park or driveway areas.	infrastructure; ■ The proposed garage or car park must meet the Flood Planning Level Requirements detailed in Section 5; and ■ Open car parking - The minimum surface level of open space car parking subject to inundation should be designed giving regard to vehicle stability in terms of depths and velocity during inundation by flood waters. Where this is not possible, it shall be demonstrated how the objectives will be met	design solution is considered to be acceptable in this instance as: - Appropriate measures have been put in place that will ensure that clear, direct and easy accessible evacuation points are available, all of which lead to higher flood free ground. - Vehicular access/egress is now provided to Junction Street, enabling vehicles to egress from the car park to higher ground that exceeds the 1% AEP. - The building has been designed to let floodwaters inundate and then recede from the site. - Residents will be provided with ample advance warning to remove vehicles from the car park. - Appropriate management and mitigation measures can be easily be put in place and effectively implemented to restrict the way that residents store personal belongings and goods in the car park (other than vehicles). - The maximum peak depth of water over the car park during a 1% AEP event is 80cm, which given the ponding nature of the floodwaters and the availability of highly accessible evacuation points, is considered to represent little threat to life. - The low velocity of water means that even in the unlikely event that vehicles are left in the car park during a 1% AEP event, there will be very little risk to human life or property as a result of moving debris. Furthermore the fact that the car park will be encased in a permeable façade, means that any potential floating objects will be contained within the car park itself and will be unable to exit the building.
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The Council's Interim Floodplain Management Policy states that where a proposal does not meet the requirements of the relevant Prescriptive Provisions, consent must not be granted to development unless the consent authority is satisfied that the proposal satisfies the relevant performance criteria. While the proposal is considered to satisfy the large majority of prescriptive measures, it is noted that Council may form the view that the car park should be designed to the 1% AEP event. Given this an assessment of the proposal against the performance criteria is therefore provided below in **Table 3**:

Table 3 – Assessment against IFMP Performance Criteria

Performance Criteria	Response
a. The development is compatible with the established flood hazard of the land. In areas where flood hazard has not been established through previous studies or reports, the flood hazard must be established in accordance with the Floodplain Development Manual considering the following: i. Impact of flooding and flood liability is to be managed ensuring the development does not divert floodwaters or interfere with flood storage or the natural function of the waterway; ii. Flood behaviour (for example, flood depths reached, flood flow velocities, flood hazard, rate of rise of floodwater); iii. Duration of flooding for a full range of events; iv. Appropriate flood mitigation works; v. Freeboard; vi. Council's duty of care – Proposals to address or limit; and vii. Depth and velocity of flood waters for relevant flood events.	■ As outlined in the WMA statement the site is considered to have a low flood hazard as defined in the Floodplain Development Manual. The proposal is considered to be consistent with performance criteria as: a. The impacts of flooding will be appropriately managed by virtue of the fact that the proposed Indicative Scheme has been designed so as not to interfere with the site's flood storage capacity or influence behavioural characteristics of localised flood waters. b. In determining the 'low' nature of the flood hazard, WMA have given consideration to flood behaviour of flood waters in the Larkin Street Depression, which is characterised by gradual rising flood waters with little to no velocity. c. Appropriate freeboard has been achieved for all residential apartments within the concept scheme, while the car park has been designed to the 5% AEP level. This is considered to be acceptable subject to implementation of appropriate management and mitigation measures as outlined within this letter and attached documentation. d. The proposal takes into consideration Council's duty of care, the design outcome proposed in this instance does not increase risk to life. There may be some increase in the risk of damage to personal property but this is considered to be limited and acceptable as appropriate measures can be put in place within any DA conditions and then reflected in Strata by-laws. In doing so the storage of goods within the basement can be easily regulated and managed.
b. The development will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affection of other development or properties;	■ The Indicative Scheme will not adversely affect flood behaviour and will not result in detrimental increases in flood affection of other properties. The building has been designed to allow flood waters to inundate the site during a flood event, and then recede back out of the site when the flooding event dissipates. Minor excavation works combined with the design car park structure will ensure that the site retains the same flood storage capacity compared to the existing situation.
c. The development incorporates appropriate measures to manage risk to life from flood considering the followings: i. The proposed development should not result in any increased risk to human life ii. Controls for risk to life for floods up to the Flood Planning Level iii. Controls for risk to life for floods greater than the Flood Planning Level iv. Existing floor levels of development in relation to the Flood Planning Level and floods greater than the Flood Planning level v. Council's duty of care – Proposals to address and limit vi. What level of flooding should apply to the development e.g. 1 in 100 year, etc vii. Effective flood access and evacuation issues viii. Flood readiness – Methods to ensure relative flood information is available to current and future	■ There are a number of measures that have and will be incorporated and implemented to mitigate and manage risk to life in the event of a flood event. Specifically we note: a. The levels of the proposed residential apartments have all been designed to exceed the necessary flood freeboard with apartments having a minimum floor level of RL 14.8m, being 0.90m above the 1% AEP level of RL 13.9m. b. The proposed car park level has been designed to the 5% AEP level of RL 13.1m. The car park will therefore remain free from any flood impacts during a flood event up to and including the 1 in 20 year flood. Beyond that if a 1% AEP flood event was to occur the maximum flood inundation level of the car park would be RL 13.9m, resulting in a flood depth of 80cm within the car park. c. If a 1% AEP flood event was to occur it would take approximately 2 hour 26 minutes for flood waters reach the car park level, thus providing sufficient time for any person to evacuate to higher ground. Once waters inundated the car park it would then take, at

occupants and visitors;	worst case, a further 40 minutes to reach the peak level of RL13.9m, at which point the depth of water in the car park would be 80cm. d. Three flood evacuation points are provided within the car park, providing readily accessible, safe and direct pedestrian exits from the car park to higher ground. It is noted that 80% of all parking spaces provided are within 20m of a flood evacuation point, with no parking space being more than 30m from a flood evacuation point. e. Vehicular access/egress is now provided to Junction Street, enabling vehicles egress from the car park to higher ground that exceeds the 1% AEP. The change to access now provides a safer outcome. f. Clear signage will be displayed in the car park that informs residents of the potential flood impacts on the site. In addition to this appropriate management measures can be put in place for the development, which would include a warning and alarm system that advises residents of the impending flood danger in the event that flood waters begin to rise within the Larkin Street depression. Such a system would provide people with ample notification of a flood event and ensure that are well informed of the impending hazard and danger. The site and any future building can therefore easily be designed to ensure that an appropriate level of 'flood rediness' is provided for future occupants.
d. The development will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of creek or channel banks or watercourses;	■ The proposed development will not result in any adverse impacts on erosion, siltation, vegetation or the stability and integrity of any existing banks or water courses.
e. The development is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding;	■ The proposal and future redevelopment of the site in accordance with the indicative scheme will not result in any unsustainable social or economic costs to the community as a consequence of flooding, particularly as the flooding characteristics of the Larkin Street depression will remain unchanged as a result of the proposal.
f. The development is consistent with the principles of Ecologically Sustainable Development; and	■ The proposed development will provide an outcome that is consistent with ESD principles. Apartments will be designed in accordance with BASIX requirements and SEPP65.
g. The development adequately considers the impact of climate change.	■ The levels of the residential apartments are proposed approximately 0.9m above the 1% AEP flood event and will provide sufficient freeboard taking into account sea level rises with climate change.

Conclusion

In summary the proposed updated design solution for the car park is considered to represent an appropriate design and development outcome as:

- The proposed Indicative Scheme will not increase the likelihood of flooding of other development, properties or infrastructure. The building has been designed to allow flood waters to inundate the site during a flood event, and then recede back out of the site when the flooding event dissipates. Minor excavation works combined with the design car park structure will ensure that the site retains the same flood storage capacity compared to the existing situation.
- The vehicular access point has been relocated from Larkin Street to Junction Street. The revised access allows for a direct vehicular egress from the car park at the 5% AEP level to higher ground that exceeds the 1% AEP. This change has been made as the revised access point is considered to represent a safer and more acceptable outcome.
- The nature and characteristics of the flood waters are such that they represent a 'low hazard' under the NSW Floodplain Development Manual (NSW, 2005).
- It is only the car affected by flood inundation, which will be used solely for the storage of vehicles and some limited personal belongings within bespoke pre-designed storage cages. Such measures will be subject to implementation of DA conditions and reflected in subsequent strata by-laws. No residential living or recreational areas will be affected by the flooding.
- Given the slow rising nature of the flood waters and the fact that the car park is designed to the 5% AEP level, residents will have significant advance warning of a flood event and therefore be given ample time to relocate their vehicle. The combination of a site specific flood warning system and present day media and technology will also ensure people are always kept informed about the potential for any imminent flood events.
- Given the level of advance warning and the fact that the area in question is a car park, it is considered unlikely that an individual will try and access the area once flood waters have inundated the car park.
- Even in the event that people are within the car park when flood waters begin to inundate the site, three signed and readily accessible flood evacuation points have been included, all of which are within a maximum 30m from any point within the car park and provide a point of escape to higher flood free ground.
- Even in the event that someone does enter the car park when flood waters are at the 1% AEP peak there is still very little risk to human life given the water depth at this point in the car park would be 80cm, thus ensuring that an average height person will still be able to easily stand and wade through the 'still' water.

I trust this information is what you require at this stage, however should you have any queries about this matter, please do not hesitate to contact me on 9956 6962 or bcraig@jbaurban.com.au.

Yours faithfully



Benjamin Craig
Associate