

Department of Planning, Industry and Environment
Level 18, 12 Darcy Street
PARRAMATTA NSW 2150

Job No. FN517

Attn: Mr Robert Drew

24 November 2020

Re: Independent Peer Review of Flood Related Aspects of Planning Proposal for No. 7 Concord Avenue, Concord West

Dear Sir,

This letter sets out the findings of an independent peer review (**the Review**) which has been undertaken of flood related documentation that has been submitted in support of a proposed rezoning of land at No. 7 Concord Avenue, Concord West (**the site**) from *IN1 General Industrial* to *R3 Medium Density Residential* (**the planning proposal**).

1. Background

On 2 July 2020, the Sydney Eastern Planning Panel (**the Panel**) considered a submissions report prepared by the Department of Planning, Industry and Environment (**the Department**) for the site.

The submissions report outlined the exhibited planning proposal, as well as agency and community feedback. The Department raised concerns regarding flooding and the Applicant's proposed flood mitigation measures. The Applicant acknowledged the planning proposal is inconsistent with Direction 4.3 of Section 9.1 of the *Environmental Planning and Assessment Act 1979* for Flood Prone Land (**Direction 4.3**) but considered this inconsistency to be of minor significance.

At the request of the Applicant, the Panel deferred its decision on the proposal to afford the Applicant the opportunity to respond to various unresolved issues but particularly flooding concerns.

The Panel's recommendation of 2 July 2020 requested the Department to engage an independent flood expert with the agreement of the Applicant, at the Applicant's expense, and in accordance with terms of reference approved by the Panel.

2. Objectives

The objective of the Review is to prepare a report which assists the Panel to arrive at a decision as to whether the planning proposal is consistent with Direction 4.3, or whether inconsistency with the Direction is of minor significance and could proceed. This includes providing expert advice as to whether the proposed flood mitigation measures are suitable for the site and the wider context including whether the solution can be readily implemented and is a similar outcome to other sites which will not cause undue impact on the occupants of the proposed development and the surrounding residents.

3. Scope of the Review

The Review is to assess and outline in a report, as a minimum, the following:

- Review the existing flood reports and model, and provide a peer review based on the documents that were issued with the Terms of Reference.
- Assess the consistency of the planning proposal with Direction 4.3. That is, determine whether:
 - the site is or is not in a floodway area;
 - the planning proposal will or will not result in significant flood impacts to other properties;
 - the planning proposal will or will not result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services;
 - any inconsistencies with Direction 4.3 are of minor significance; and
 - the proposed mitigation and response measures are acceptable with regard to the considerations of Direction 4.3.
- Assess the consistency of the planning proposal with Clause 6.8 of *Canada Bay Local Environmental Plan 2013 (Canada Bay LEP 2013)* titled *Flood Planning (Clause 6.8)*.
- In the assessment of the impacts on other properties, consideration is to be given to the impact of run off and water quality from the flood mitigation solution to ensure monitoring and no future environmental impact on the adjoining Powells Creek.
- Meetings:
 - Meeting at project inception for data hand over and briefing by the Applicant.
 - Meeting at end of peer review to outline and discuss findings with the Applicant and with the Department.
 - Meeting with the Panel at the time of the determination of this matter to provide advice as required to Panel members.

4. Key Findings of the Review

4.1 Existing Flood Reports and Model¹

The key findings of the Review as they relate to the existing flood reports and model are as follows:

- 4.1.1 While the reports are generally comprehensive in nature, the flood impact assessments that have been undertaken in support of the planning proposal do not include an assessment of the impact that the proposed development would have on flood behaviour for storms that are more frequent than 1% (1 in 100) annual exceedance probability (**AEP**). The flood impact assessments also haven't assessed the impact that the proposed connection of the new stormwater drainage system to the existing drainage line which runs parallel with the southern boundary of the site would have on flood behaviour.
- 4.1.2 A review of the hydraulic model that was developed as part of Hydro Spatial et al, 2018 identified an issue whereby the ability for floodwater to enter the existing building on the site was removed from the model, whereas in previous versions of the model this ability had been included at the direction of City of Canada Bay Council (**Council**). The change in the structure of the model in our view has had the effect of giving the impression that the proposed development would result in a greater reduction in peak flood levels than we believe would be the case.

¹ **Annexure A** of this letter contains a list of reports that formed part of the Review.

- 4.1.3 A review of the hydraulic model also identified that the elevation of the flood void area is higher than is shown on the architectural plans. For example, the architectural drawings show the flood void area grading from an elevation of RL 1.7 metres AHD along the eastern side of the site to an elevation of RL 1.2 metres AHD along its western side, whereas the flood model has the flood void area grading to a minimum elevation of RL 1.4 metres AHD at this location. Following enquiries, the Applicant's consultants advised that in response to the Submissions Report the flood void area would be graded to a minimum elevation of RL 1.6 metres AHD along the western side of the site as per the amended architectural plan contained in **Annexure B** of this letter.
- 4.1.4 Based on our review of the hydraulic model, we consider that the approach to modelling the flood void area for floods where the water level does not reach the underside of the podium level is overly simplified and could be improved.
- 4.1.5 Notwithstanding the above, we have concluded that provided runoff from the site is controlled by an appropriately sized on-site detention and retention system which limits both the rate and volume of runoff generated by the site to no greater than present day conditions and that this flow is piped to the existing transverse drainage of Homebush Bay Drive, then further more detailed flood modelling would demonstrate that the proposed development would not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties for all storms up to 1% AEP in intensity.²

4.2 Consistency of the Planning Proposal with Direction 4.3

The key findings of the Review as they relate to Direction 4.3 are as follows:

- 4.2.1 **Clause 4** - We consider that the planning proposal includes provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005. The reasons supporting this conclusion are:
- a) The planning proposal would reduce the impact that flooding has on development that is located on the site as the proposed podium level dwellings would only be impacted by floodwater during extremely rare storm events and even then to a relatively shallow depth.
 - b) The planning proposal would reduce the flood risk to occupiers of the site by:
 - removing the large low lying industrial building from the site and the positioning of the new dwellings well above the residential flood planning level;
 - adopting an effective shelter-in-place strategy to managing the residual flood risk on the site; and
 - preventing the ingress of floodwater to the basement carpark for all floods up to the Probable Maximum Flood (**PMF**).
 - c) The planning proposal would maintain the flood function of the site.
 - d) The planning proposal would not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.

Based on the above reasoning, the planning proposal is considered to be consistent with clause 4 of Direction 4.3.

² While reference is made to the implementation of an appropriately sized on-site detention system in Elton Consulting, 2018 and a culvert/pipe is identified on the architectural plans connecting to the existing transverse drainage structure that is located adjacent to the south-west corner of the site, there is limited technical information on the performance of the system and how its direct connection would impact the hydraulic capacity of the existing drainage system.

4.2.2 **Clause 5** – The planning proposal does not seek to rezone land within the flood planning area from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to Residential and is therefore consistent with Clause 5 of Direction 4.3.

4.2.3 **Sub-clause 6(a)** - While an analysis that was undertaken as part of the Review identified the presence of floodway areas on the site (refer red shaded areas in the illustration below), the planning proposal seeks to maintain these flow paths, albeit in a modified form where they run through the site.³ The planning proposal also locates the development outside the affected areas (i.e. by way of elevating the development well above the floodway areas). As a result, the inconsistency with sub-clause 6(a) of Direction 4.3 is considered to be of minor significance.



4.2.4 **Sub-clause 6(b)** - As stated in 4.1.5 above, we have concluded that more detailed flood modelling would demonstrate that the proposed development would not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties. Based on this finding, the planning proposal is considered to be consistent with sub-clause 6(b) of Direction 4.3.

4.2.5 **Sub-clause 6(c)** - In discussions with Mr Neil Kennan of Nexus Environmental Planning we have concluded that while the planning proposal represents a significant increase in the development of the site, the inconsistency in regards sub-clause 6(c) of Direction 4.3 is of minor significance for the reason that it involves the removal of the large low lying industrial building and replaces it with medium density residential type development whereby the elevation of privately owned areas and the majority of publically accessible areas have been set well above the residential flood planning level where they would only be inundated during an extremely rare storm event and only then to a relatively shallow depth.

4.2.6 **Sub-clause 6(d)** - Provided runoff generated by the proposed development is piped to the existing transverse drainage of Homebush Bay Drive and that appropriate measures are incorporated on the site for the control and disposal of sediment during the wash down of the flood void area, then it has been concluded that the planning proposal would not result

³ The presence of floodway areas on the site was identified by reducing the product of velocity and depth in the Howells et al, 2004 approach to a threshold value of 0.1 m²/s.

in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services.

The extremely rare nature of a storm event which would result in the inundation of the podium level of the development coupled with the adoption of an effective shelter-in-place strategy would mean that occupiers of the site would not need to rely on the assistance of NSW State Emergency Services (**NSW SES**) during a flood event. Even if NSW SES was required to assist in the clean-up of the podium level following a storm event which resulted in its inundation, the extremely low probability of such an occurrence in the service life of the development would not constitute a significant increased requirement for government spending.

Based on the above, the planning proposal is considered to be consistent with sub-clause 6(d) of Direction 4.3.

4.2.7 **Clause 7** - We note that the planning proposal incorporates controls above the residential flood planning level, namely the flood proofing of the basement carpark and the adoption of a shelter-in-place strategy. These controls would need to be enforced by Council as part of any future development application.

4.2.8 We consider that the proposed mitigation and response measures are acceptable with regard to the considerations of Direction 4.3 as they:

- a) maintain the existing flood function on the site;
- b) prevent significant adverse flooding conditions from being experienced in adjacent development and properties;
- c) prevent the inundation of habitable floor levels and the majority of public space areas for all but during extremely rare storm events;
- d) include provision for occupiers of the site to shelter in areas which lie above the PMF;
- e) prevent the ingress of floodwater to the basement carpark for all floods up to the PMF;
- f) include provision for the preparation and implementation of a *Flood Emergency Response Plan* for the development; and
- g) do not rely on the assistance of NSW SES during a flood event.

4.3 Consistency of the Planning Proposal with Clause 6.8 of *Canada Bay LEP 2013*

The key findings of the Review as they relate to Clause 6.8 of *Canada Bay LEP 2013* are as follows:

4.3.1 **Sub-clause 3(a)** - The planning proposal is considered to be consistent with the flood hazard of the land as the proposed dwellings and the majority of public space areas would be positioned well above the residential flood planning level and would not be subject to flooding in all but an extremely rare storm event.

4.3.2 **Sub-clause 3(b)** - As stated in 4.1.5 above, provided runoff from the site is controlled by an appropriately sized on-site detention and retention system which limits both the rate and volume of runoff generated by the site to no greater than present day conditions and that this flow is piped to the existing transverse drainage of Homebush Bay Drive, then we have concluded that further more detailed flood modelling would demonstrate that the proposed development would not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.

4.3.3 **Sub-clause 3(c)** – The planning proposal is considered to incorporate appropriate measures to manage risk to life from flood for the following reasons:

- a) The habitable portion of the site would be raised well above the residential flood planning level and would only be inundated by floodwater during an extremely rare storm event, and even then to a relatively shallow depth and over a relatively short period of time.
- b) Provision would be incorporated in the development for occupiers of the site to shelter in areas which lie above the PMF for the relatively short period of time that the surrounding area is inundated by floodwater.
- c) The basement carpark would be flood proofed to prevent the ingress of floodwater for all floods up to the PMF.
- d) A *Flood Emergency Response Plan* would be prepared for the development, which based on Hydro Spatial et al, 2018 would incorporate the following:⁴
 - a description of flood behaviour;
 - emergency services contact details;
 - nominated “flood warden(s)” who are responsible for maintaining and activating the plan;
 - a heads up warning to ensure the site is prepared for flooding, usually a severe weather warning or flood watch or flood warning issued by the Bureau of Meteorology;
 - a clear “trigger” for action, such as a depth of rainfall over a designated time period, or the presence of water on the site;
 - a clear list of actions, roles and responsibilities, including those for the flood warden and residents (before, during and after a flood); and
 - systems to ensure that the plan is regularly exercised (at least annually) and that a review is undertaken by an appropriately qualified person following a flood event.

4.3.4 **Sub-clause 3(d)** - In our opinion the planning proposal would not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses provided it incorporates:

- a) an appropriately sized on-site detention and retention system which limits both the rate and volume of runoff generated by the site to no greater than present day conditions and that this flow is piped to the existing transverse drainage of Homebush Bay Drive; and
- b) measures which facilitate the control and disposal of sediment during the wash down of the flood void area.

4.3.5 **Sub-clause 3(e)** - In our opinion the planning proposal would not result in unsustainable social and economic costs to the community as a consequence of flooding as:

- a) it would not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties;
- b) it would reduce flood damages on the site through the demolition of the large low lying industrial building and the setting of new development well above the

⁴ Note that the *Flood Emergency Response Plan* should include a layout plan of the site, as well as clear signage directing occupiers to the elevated refuge areas.

residential flood planning level where it would only be inundated by floodwater during extremely rare storm events, and only then to a relatively shallow depth; and

- c) the basement carpark would be flood proofed to prevent the ingress of floodwater for all floods up to the PMF, thereby preventing damage to motor vehicles and other items stored in this area.

4.4 Environmental Considerations

The key findings of the Review as they relate to environmental considerations are as follows:

- 4.4.1 Provided runoff from the site is controlled by an appropriately sized on-site detention and retention system which limits both the rate and volume of runoff generated by the site to no greater than present day conditions and that this flow is piped to the existing transverse drainage of Homebush Bay Drive, then the planning proposal in our opinion would not result in a significant detrimental impact on the receiving drainage lines on either side of Homebush Bay Drive.
- 4.4.2 The quality of the flow discharging to the receiving drainage lines would generally be improved because:
 - a) the amount of sediment generated as a result of floodwater discharging across the surface of the site would be reduced by virtue of the concrete lining of the flood void area;
 - b) flow generated internal to the site would largely be from roof areas which would be relatively free of pollutants;
 - c) runoff controlled by an appropriately configured retention system would be relatively free of pollutants due to the filtering of the flow; and
 - d) runoff generated from the majority of the site would pass through an appropriately configured on-site detention system, the outlet of which would typically incorporate a debris control screen.
- 4.4.3 It is assumed that Council would require a Positive Covenant to be enacted which places legal protection on the property title requiring the Body Corporate to repair and maintain the on-site detention and retention system. Council could also include a requirement to wash down the flood void area following a storm event which results in its inundation, noting that measures would need to be incorporated in the development for the control and disposal of sediment contained in the wash-down water.

4.5 Concluding Remarks

4.5.1 Frequency of Inundation of the Flood Void Area

While the proposed flood mitigation measures are generally suitable for the site and can be readily implemented, they are dis-similar to other sites that we are aware of in that the relatively large and flat flood void area, which functions as a drainage structure and over which development would be located, would be inundated on a frequent basis by uncontrolled overland flow originating from upslope areas. It is therefore considered to be inconsistent with Council's minor/major system design requirements which generally require flow which is generated by storms up to 10% AEP in intensity to be controlled by a piped drainage system.⁵

⁵ Note that the nominate hydrologic standard assumes that the control of the overland flow which enters the site from upslope areas would be classified as a "public system", while the control of runoff from the proposed podium area would be classified as a "private system", as per the definitions contained in Council's Engineering Specifications.

In order to reduce the frequency of inundation of the flood void area and its immediate surrounds it would be necessary to upgrade the existing trunk drainage line which runs along Station Avenue between the rail corridor and Homebush Bay Drive in combination with the minor stormwater drainage line which runs along the eastern boundary of the site, noting that the existing transverse drainage structure under Homebush Bay Drive has a waterway area which is significantly larger than Council's existing trunk drainage line at this location.

If the trunk drainage line could be upgraded to a minimum hydrologic standard of 10% AEP, then it would comply with Council's minor/major system design requirements. It would also reduce the frequency that overland flow is experienced in the road leading into the site.

4.5.2 Increased Maintenance Requirements

In addition to the increased clean-up costs associated with the frequent inundation of the flood void area, it is our view that the vertical space which is available beneath the podium level (which we understand is between 1.0-1.1 metres) would hinder maintenance of the area given its large size, thereby further adding to the cost of such maintenance by the Body Corporate. We note that Transport for NSW requires a minimum height of 1.5 metres be adopted when designing bridge-sized culverts (i.e. culverts greater than 6 metres in width) to facilitate ease of maintenance of its drainage infrastructure. Provision of such a clearance would require the podium level of the proposed development to be raised to a minimum elevation of RL 3.7 metres AHD, noting that raising it a further 0.1 metres to RL 3.8 metres AHD would result in the podium level being flood free.

We trust that the findings of the Review will assist the Panel in completing its assessment of the planning proposal. However, please do not hesitate to contact the undersigned should you wish to discuss any aspect of this letter.

Yours faithfully

Lyll & Associates Consulting Water Engineers

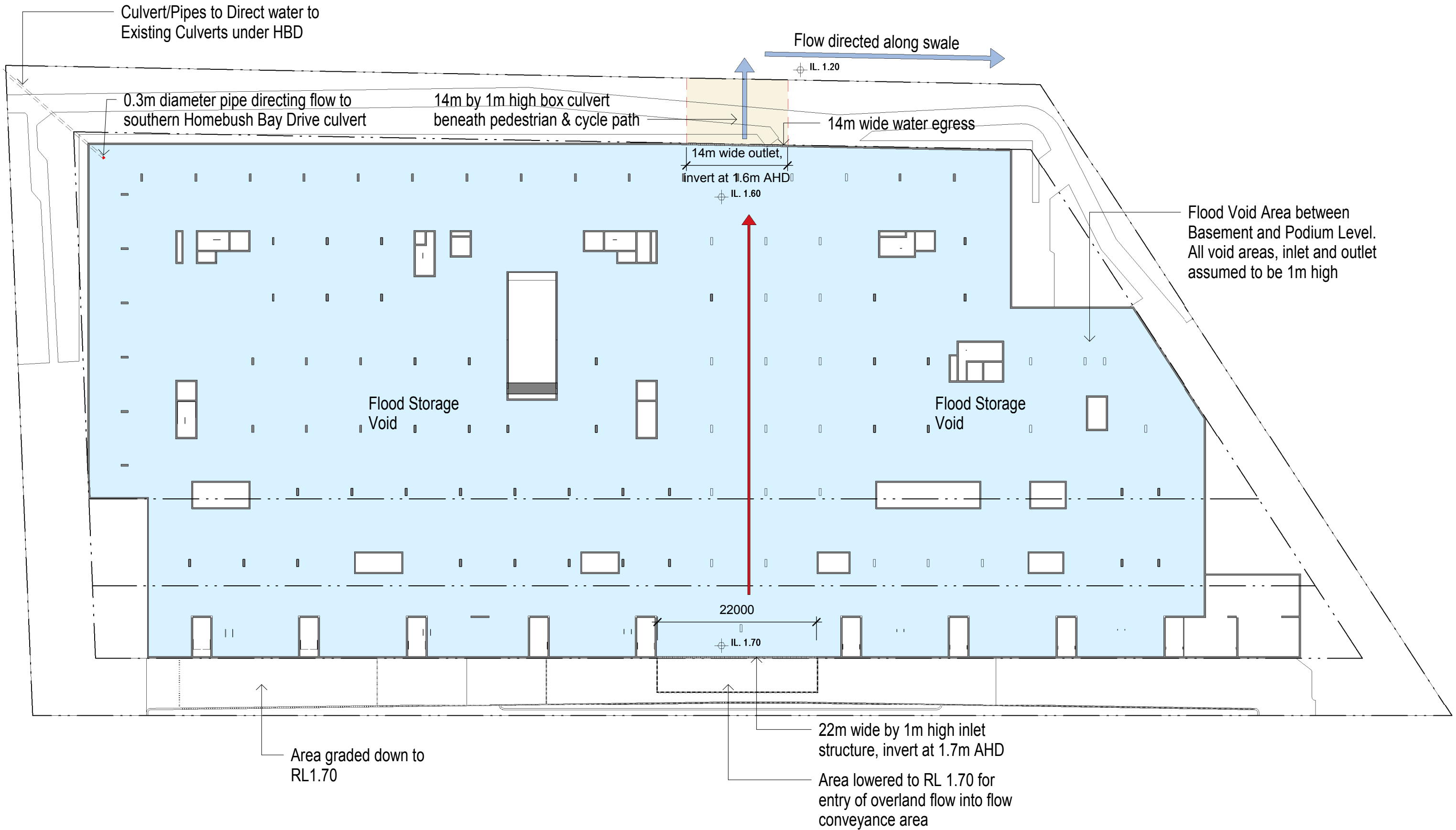


Scott Button
Principal

ANNEXURE A

Title	Author	Date
<i>Draft Concord West Flood Study</i>	Jacobs	August 2015
<i>Lot 1 DP 219742, Concord West – Flood Impact Assessment</i>	IGS	September 2016
<i>Peer Review of Flooding and Flood Impact for the Proposed Development of Lot 1 DP 219742 Concord West</i>	Cardno	September 2016
<i>Lot 1 DP 219742, Concord West – Flood Impact Assessment – Addendum 1</i>	IGS	April 2017
<i>Lot 1 DP 219742, Concord West – Flood Impact Assessment – Responses to Councils [sic] Contentions</i>	IGS	June 2017
<i>Lot 1 DP219742 Concord West – Revised Flood Impact and Flood Risk Assessment</i>	Hydro Spatial and Catchment Simulation Solutions	June 2018
<i>Concept Master Plan – 7 Concord Ave, Concord West</i>	Antoniades Architects	July 2018
<i>Planning Proposal – 7 Concord Avenue, Concord West</i>	Elton Consulting	August 2018

ANNEXURE B



REV	DESCRIPTION	CHK	APR	DATE	PHASE	CLIENT
					SKETCH DESIGN	FTD Holding
					PRELIMINARY	DEVELOPER

