Reference: **20210067-L04_response letter_RFI.docx**

Date: December 5, 2022

Northern Beaches Council
725 Pittwater Road
Dee Why NSW 2099

Dear Sir,

RE: DELMAR PARADE, DEE WHY – DA2022/0145
REQUEST FOR FURTHER INFORMATION (FLOODING)

Further to Council's referral response on flooding and our meeting to discuss the comments raised by Council, we provide our responses in GREEN to the flooding comments.

The proposed mixed-use development is currently affected by overland flow emanating from the Botanic Garden to the south of the site. The overland flow enters the site on the south and south-eastern side. From the south it then travels in the northwest direction to Pittwater Road, whilst on the southeast it travels along the eastern boundary to Delmar Parade. The site is currently burden by a council's drainage easement carrying a 1050 diameter trunk drainage line.

To facilitate the development, the applicant's engineer has proposed to amplify and relocate Council's trunk drainage line to the eastern boundary and also collect both overland flow as they enter the site at the south and south-eastern boundary and convey them to Delmar Parade via an underground drainage system and a dedicated overland flow channel located adjacent to the eastern boundary.

The proposal, in principle could be supported, if all existing flood characteristics are not to be exacerbated in both 1% AEP and PMF events and that the development proposal will comply with Section B3.11 of DCP.

The submitted flood impact assessment report did not appear to have address the requirements as tabulated under section B3.11 of DCP, furthermore the flood maps provided are lacking in detail and clarity, especially adjacent to neighbouring and downstream properties for accurate assessment.

Irrespective of this, it is clear from the results provided, that by collecting and conveying the entire overland flow to a single discharge point in Delmar Parade has exacerbated existing flood behaviour at various locations, e.g flood depths increased by at least 0.1m and velocity x depth now has increased to above 0.4 etc See figures below. This resulted increased flood risks to existing properties and road users in Delmar Parade, Accordingly, does not comply with item A1 of section B3.11 of DCP.

In view of the above, the application is not supported in its current form and the following information is to be provided for further assessment:

- *Submit sufficient information in quantity and clarity that will enable accurate, detailed assessment of the likely flood impacts to upstream, neighbouring and downstream properties.*

It is suggested that flood maps should show information on the differences between pre and post development conditions for a range of flood behaviour characteristics, including life hazards parameters etc.

- *Amended flood report must assess and demonstrate clearly the proposal will satisfy all criteria as specified under section B3.11 of DCP.*
- *Revised architectural plans are to be submitted, clearly showing in plan view, long and cross-sections of proposed flood path, including design invert and top of retaining walls levels etc.*

The response to council's comments is included in this section of the letter. We have attempted to provide a response to all the queries raised and address council's engineer's concerns with regards to flood affectation on downstream properties.

Because the proposed building is raised above the 1% AEP flood levels, the building is considered within a MEDIUM Flood Risk Precinct for the purposes of the DCP. The following table matrix controls apply.

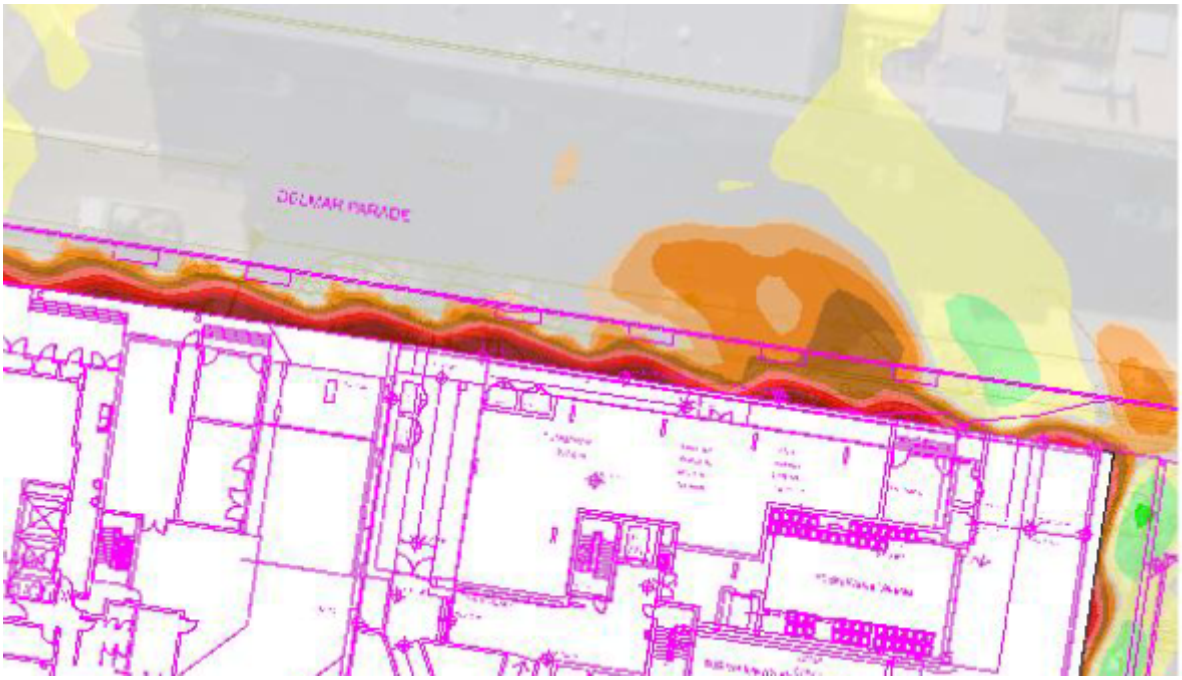
		Medium Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	Flood effects caused by Development	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	Floor Levels	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	Car Parking	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	Emergency Response	E1 E2	E1	E1	E1	E3
F	Fencing	F1	F1	F1	F1	F1
G	Storage of Goods	G1	G1	G1	G1	
H	Pools	H1	H1	H1	H1	H1

We understand from the council comments that the main issue of concern is the flood effects under item A. The requirements A1 & A2 are included below for reference.

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT	
A1	Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event: (a) There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and (b) There are no adverse impacts on surrounding properties; and (c) It is sited to minimise exposure to flood hazard. Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.
A2	Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage. Consideration may be given for exempting the volume of standard piers from flood storage calculations. If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.

With regard to the increase in flood levels caused by the proposed trunk main upgrade and as per our meeting with council, we note that the increase is caused by the surcharge from the infrastructure at the connecting pit between the upgraded trunk main through the site and the existing 900mm DIA pipe under Delmar Parade.

The afflux caused by the surcharge is evident on the flood impact map (scenario s3), extract of which is shown below.



This afflux is understandable and expected because the proposed infrastructure through the site can carry much more water than the existing 900mm DIA pipe. The modelling shows that the proposed trunk main which is increased from 1050mm DIA to 1200m DIA at the high end of the site and to 1350mm DIA at the lower end of the site is carrying 4.8cums which is reduced to 1.8cums in the existing downstream trunk main under Delmar Pde. This causes a surcharge at the junction pit which is localised on top of the pit in the road and does not impact private properties.

This impact can only be eliminated completely when the 900mm DIA pipe under Delmar Pde and subsequent downstream infrastructure is upgraded to currently acceptable standards (ie 10% AEP or similar as council will see fit in the future).

Because of the localised nature of the impact which is confined to a small area on Delmar Pde and because it does not affect private properties, we are of the opinion that it should be considered by Council on its merit.

With regards to the impacts caused by the development to downstream and upstream properties, we provide the following information that show the 1% AEP level, velocity and VD impacts. We have provided an explanation of each map included in this letter.

P: 02 8883 4239 W: www.sgce.com.au

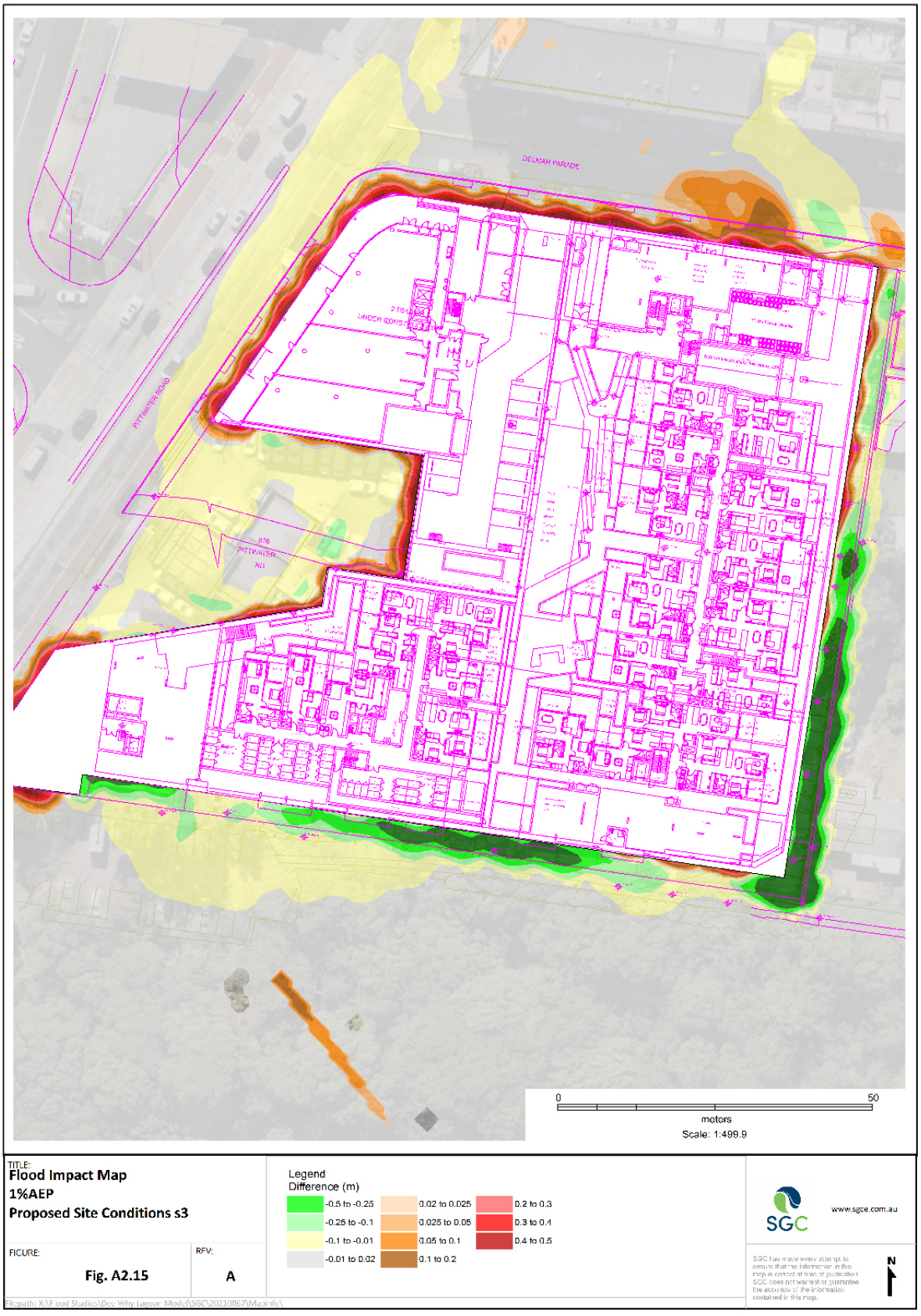
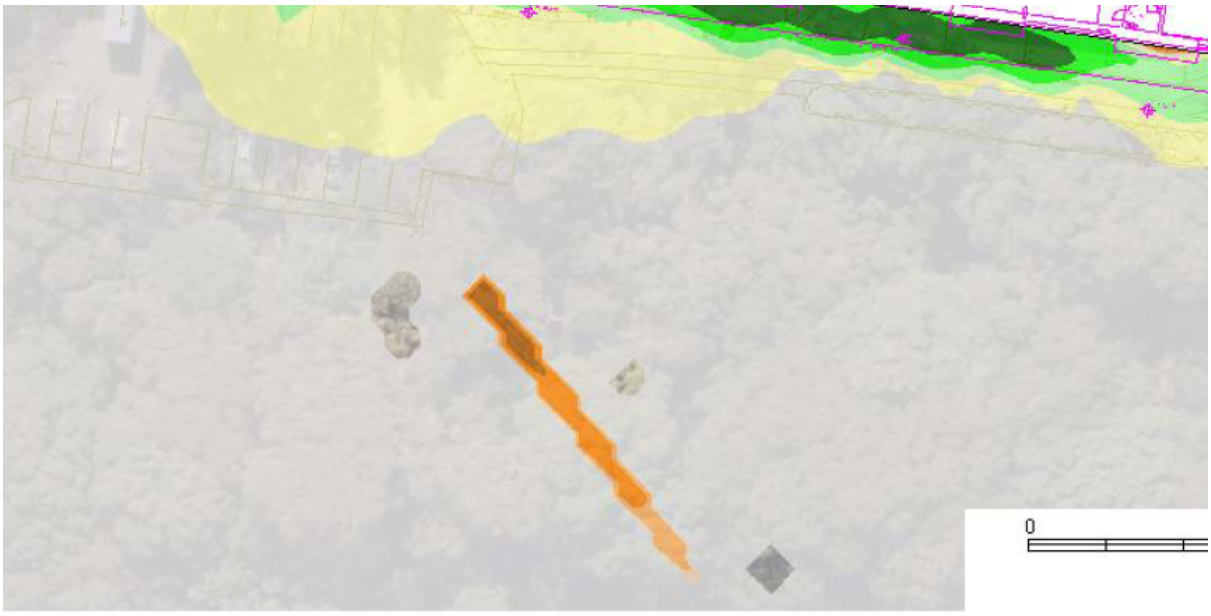


Fig A2.15 extracted from the flood study report shows the levels impact upstream and downstream of the site. As previously explained and demonstrated, the increase in levels beyond the accepted

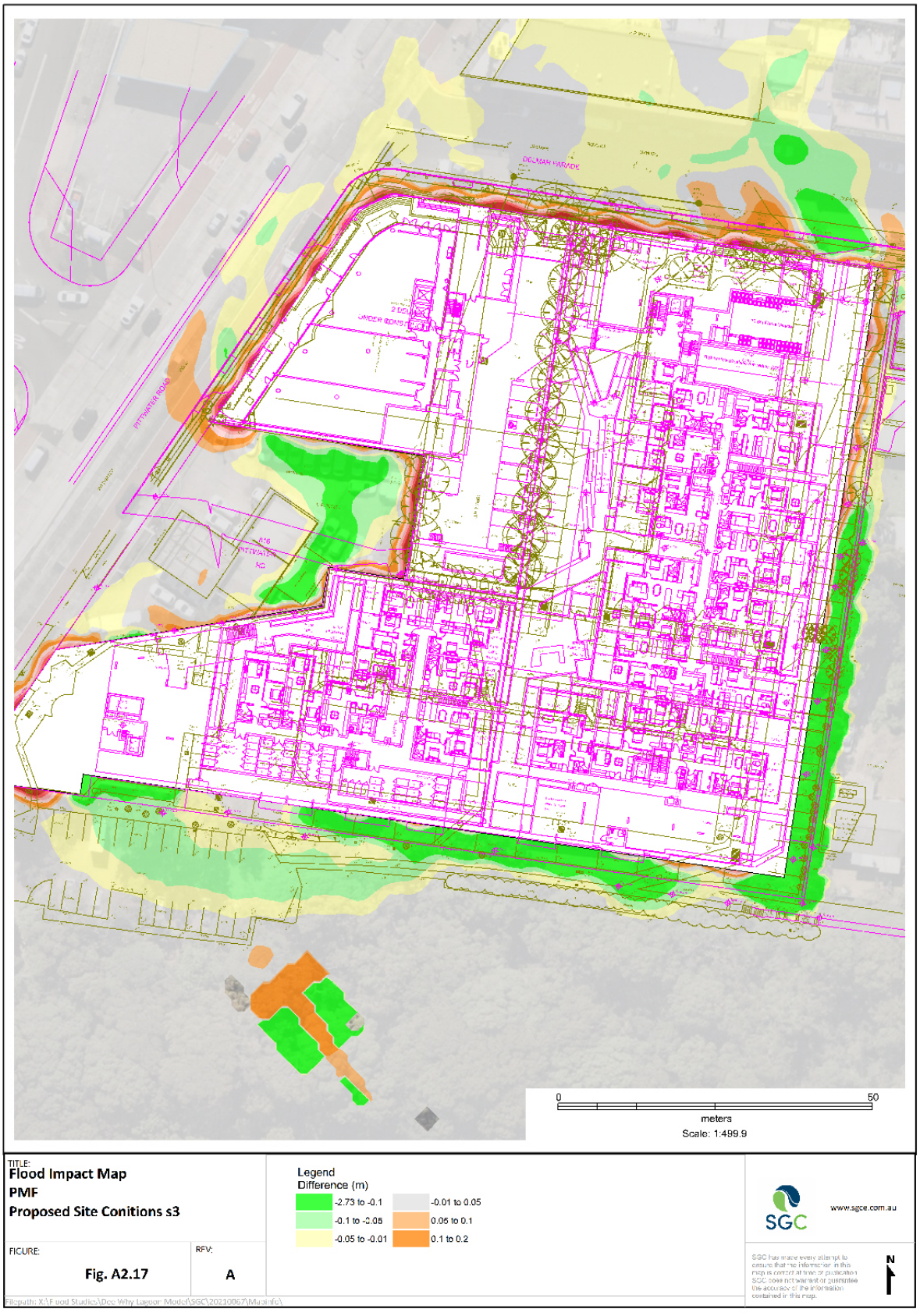
values are confined to a localised section in Delmar Pde downstream of the site, otherwise a significant reduction in flood water is expected in all other areas.

Upstream of the site, there is an afflux inside the open gully in the reserve which is confined to the gully itself and does not spill onto the reserve and anywhere else. This is also a confined spill that has no adverse impacts elsewhere in the floodplain. Extract from Fig A2.15 showing the upstream afflux in the open gully is included below.



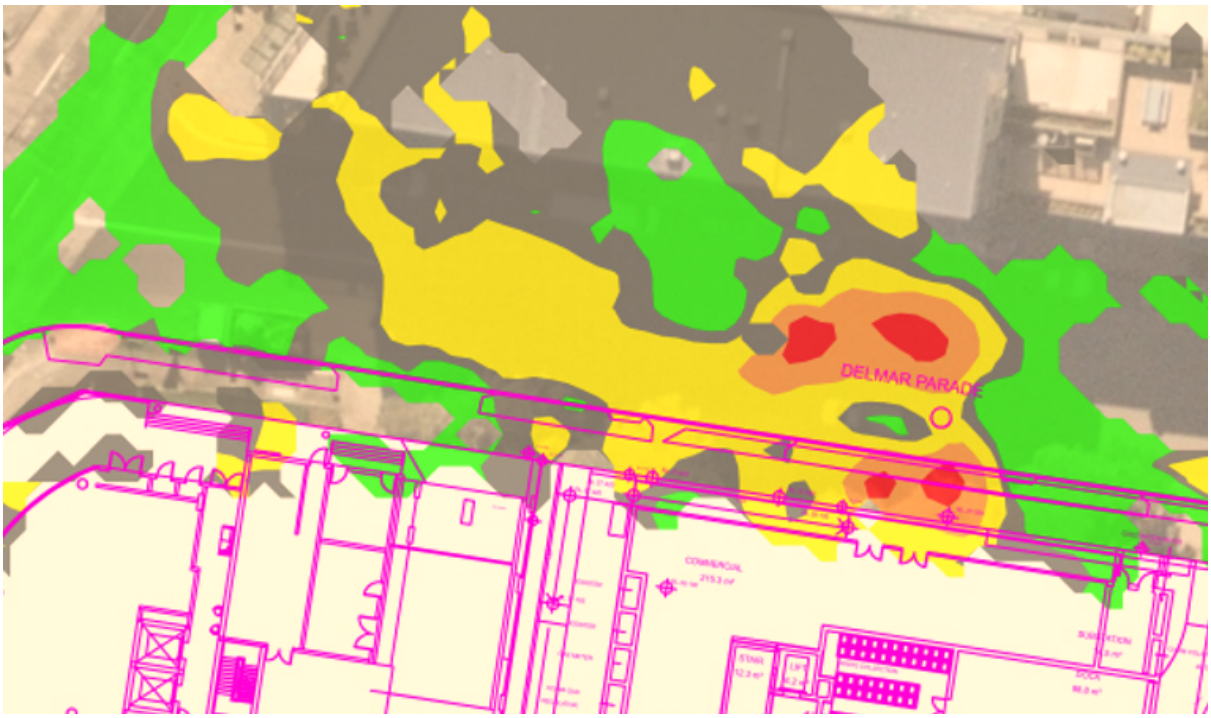
The above discussion on flooding downstream and upstream of the site is also true for the PMF event which is shown in Fig A2.17 below, with the exception of a small spill in Pittwater Rd up to 100mm that is also localised and has no adverse impacts on private properties (see extract below).

A significant reduction in flood levels can be expected in all other areas.


0
50
meters
Scale: 1:499.9
TITLE:
Flood Impact Map
PMF
Proposed Site Conitions s3
FIGURE:
Fig. A2.17
REV:
A
Legend
Difference (m)
-2.73 to -0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.05
0.05 to 0.1
0.1 to 0.2
SGC
www.sgce.com.au
N

The increase in hazard in Delmar Pde is also minimal as can be seen in the VD maps. The increase where the surcharge occurs is only one level between intervals 0.3-0.4m2/s to 0.4-0.5m2/s. This increase is still less than 0.6m2/s. Council should consider that this minor increase is acceptable.

The increase in flow velocity is less than 2m/s which is confined to a small area in Delmar Pde with the majority of the increase less than 0.5m/s. Refer flood velocity impact map included below (extract shown here).



Compliance with the requirements of Section B3.11 of the DCP is demonstrated in the following section of this report.

A. Flood Effects caused by Development

As demonstrated in the previous sections of this report, the proposed development does not cause detrimental impacts on the flooding behaviour or characteristics in its vicinity. In fact, substantially improved flood levels in all other locations.

B. Building Components and Structural

The requirements of this component are achieved because the development is raised to the FPL. The building structure will be certified by a practising structural engineer that it can withstand the forces of floodwaters.

C. Floor Levels

All habitable floor levels are raised to the FPL levels or protected against flooding up to the FPL with solid walls.

D. Car Parking

The basement car park is protected from flooding up to the FPL. A crest is provided at the entry into the car park that complies with the requirements of clause D6 at 150mm above the relative flood level.

E. Emergency Response

A shelter in place strategy is adequate to this type of development which offers floor levels above the PMF flood level. A detailed flood risk management and response plan will be prepared at CC stage that details the evacuation procedure relative to the proposed development in compliance with clause E1.

F. Fencing

The fencing along the rear (south) and side (east) boundaries of the site will open style to allow the overland flows to enter the site and get captured by the overland flowpath provided.

G. Storage of Goods

This component is not applicable based on the proposed use of the site.

H. Pools

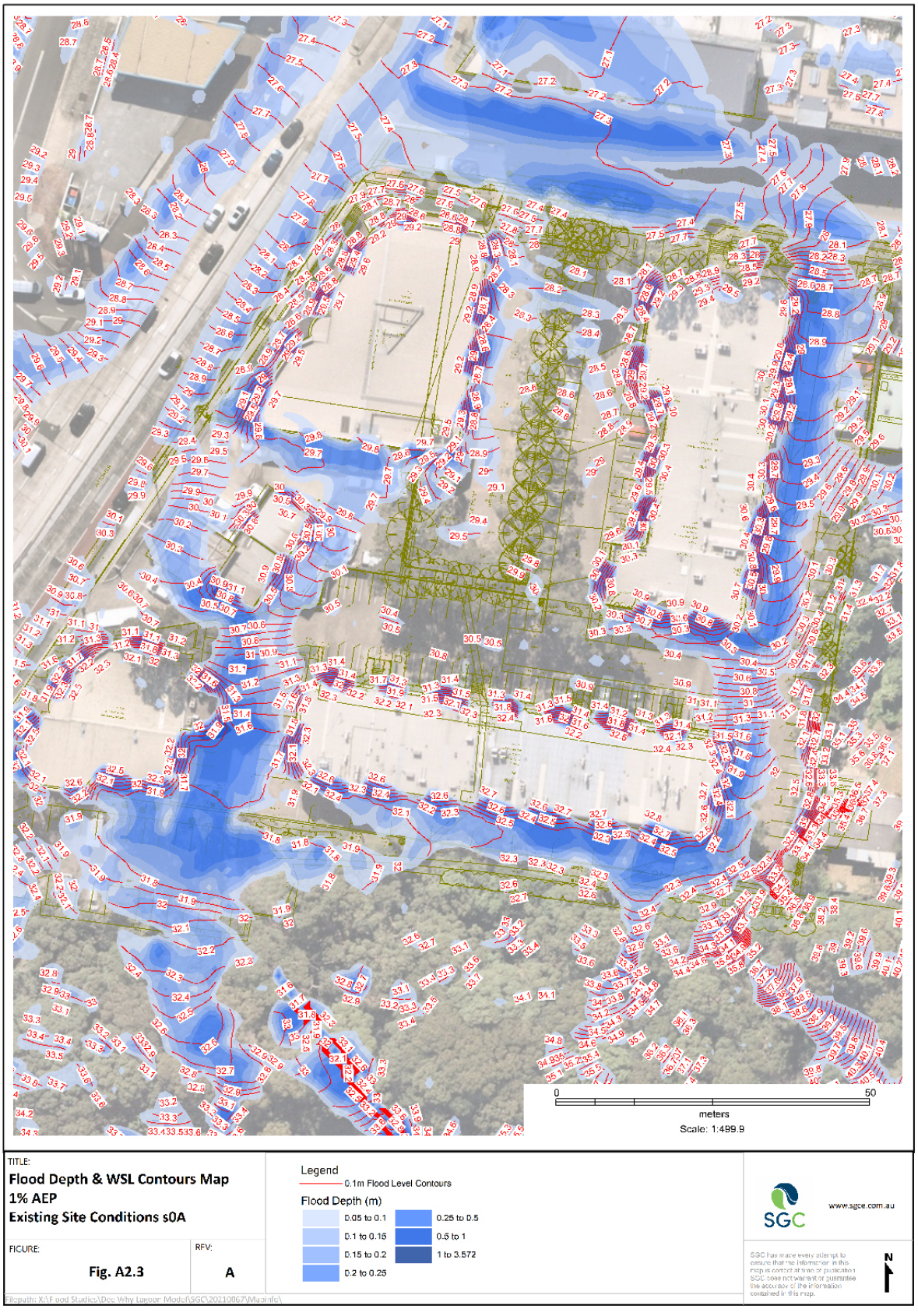
Not applicable.

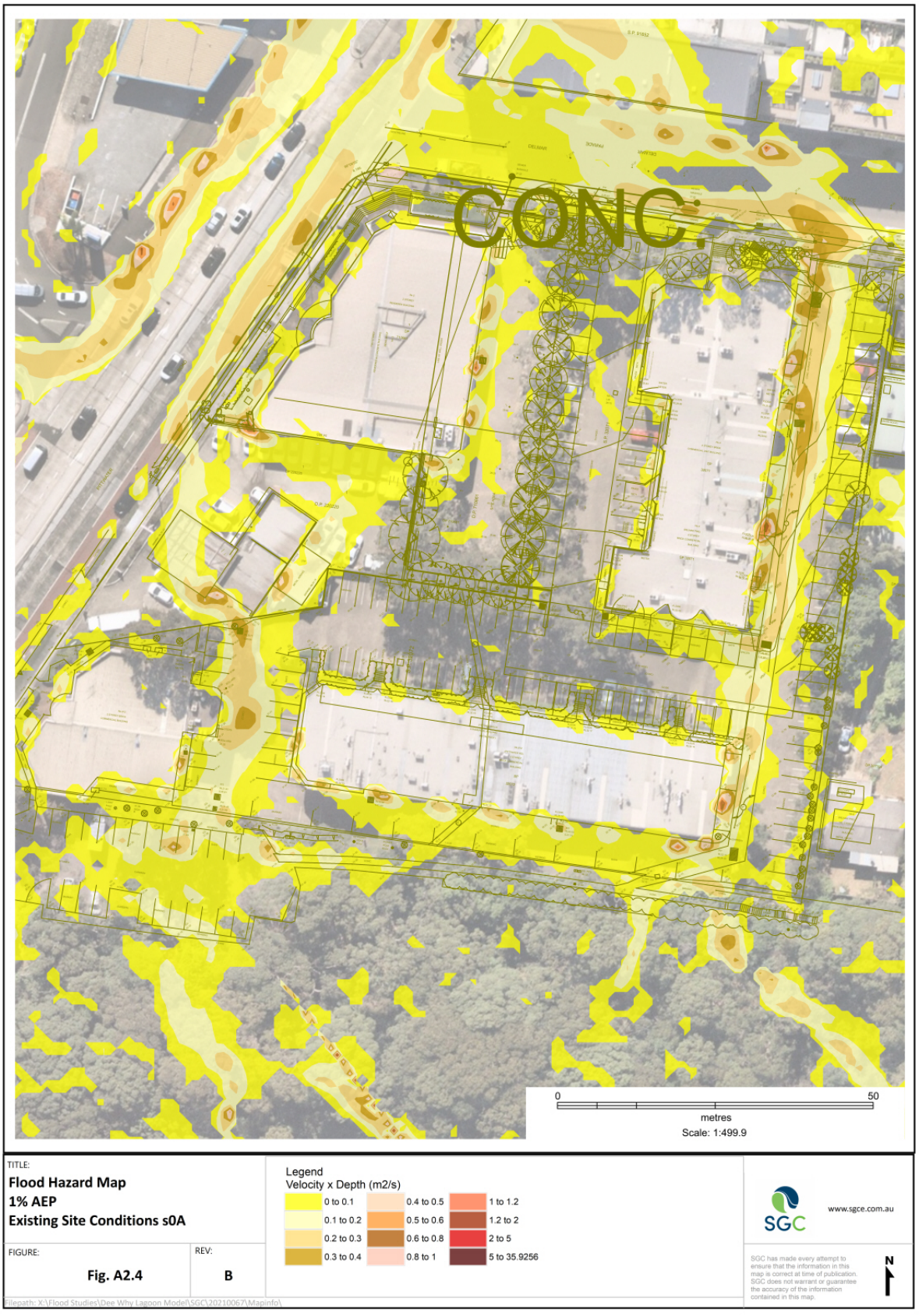
The amended flood maps are included below for reference. It should be noted that these reflect scenario s3 which does not include the potential future development at 816 Pittwater Road. This is considered to be the more conservative approach as with any future DA on 816 Pittwater Rd, additional flood management measures can be introduced to retain or improve the flooding characteristics.

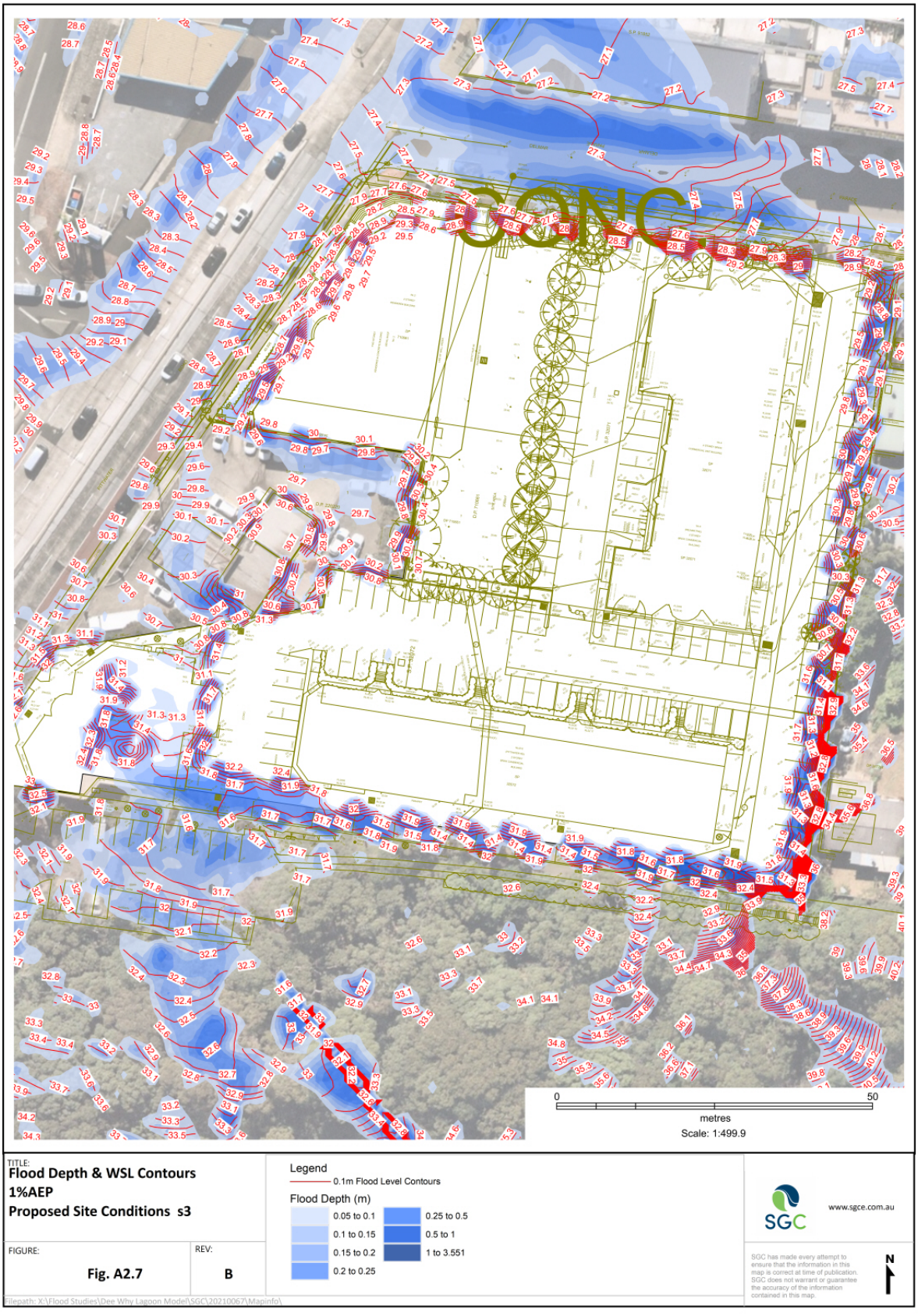
Hope the above responses clarify council's concerns. Should you have any queries, please contact the undersigned.

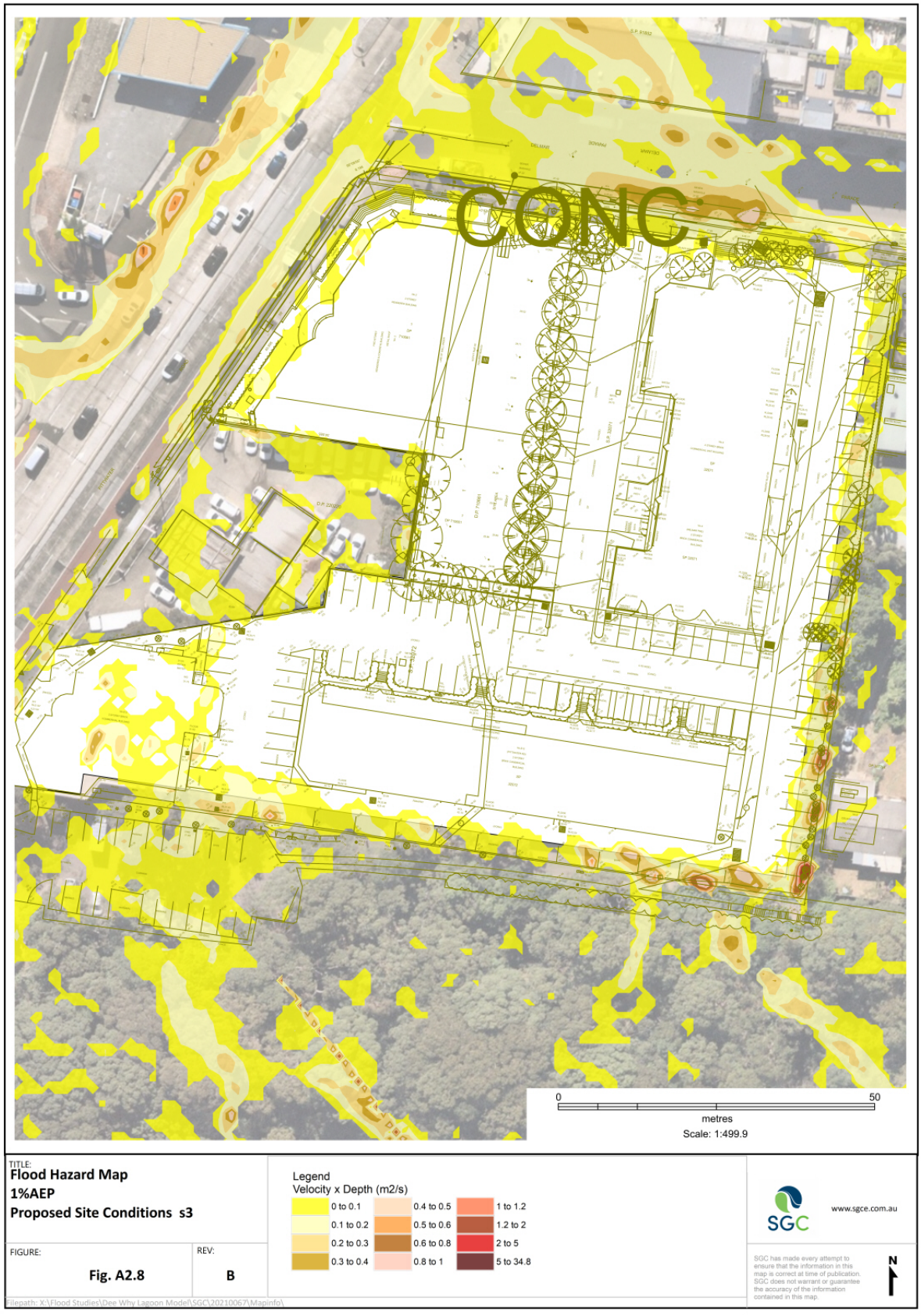
Yours faithfully,
For & on behalf of S&G Consultants Pty Ltd

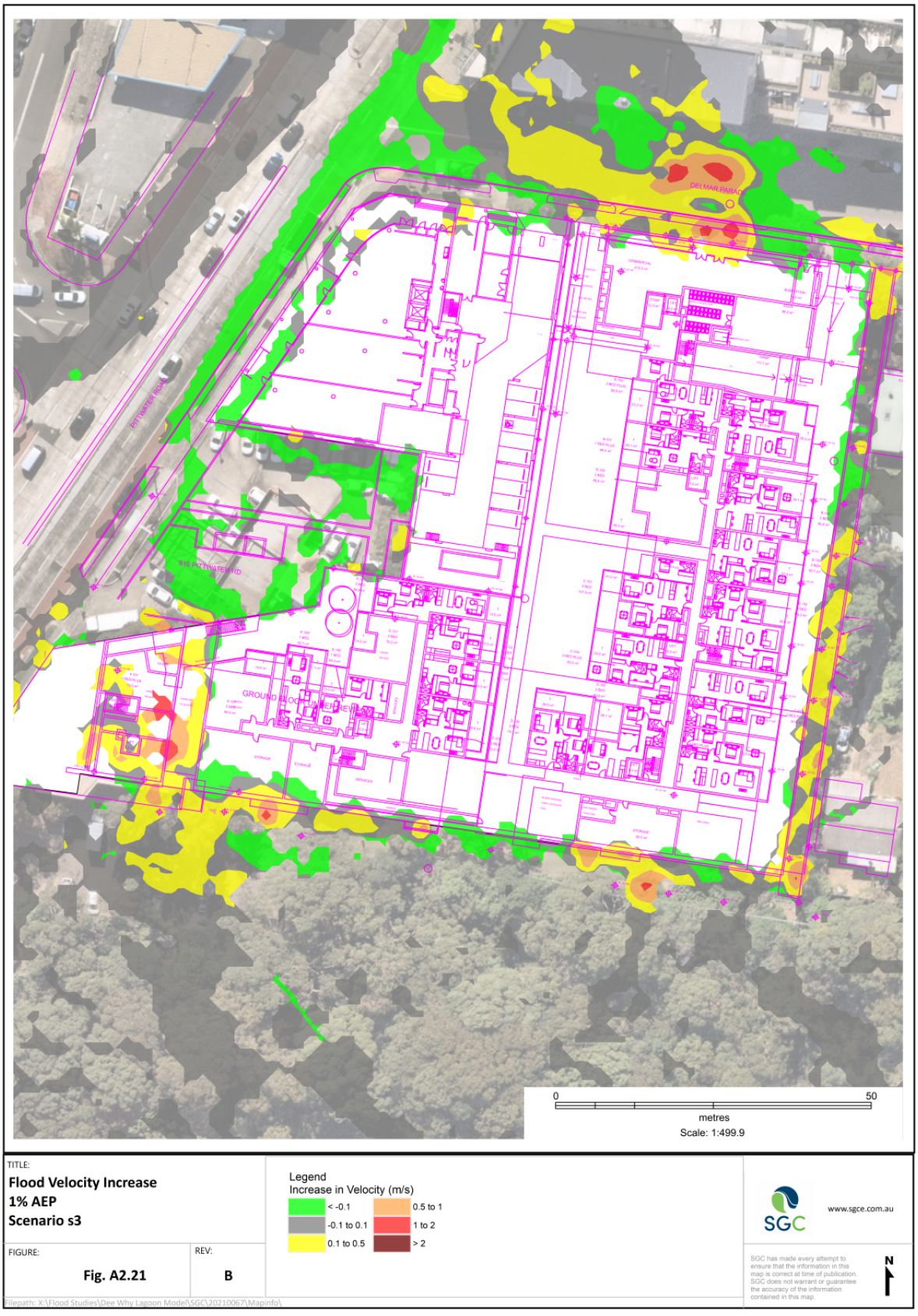
Sam Haddad
Director (Civil)
MIEAust CPEng NER


0
50
meters
Scale: 1:499.9
TITLE:
Flood Depth & WSL Contours Map
1% AEP
Existing Site Conditions s0A
FIGURE:
Fig. A2.3
REV:
A
Legend
0.1m Flood Level Contours
Flood Depth (m)
0.05 to 0.1
0.1 to 0.15
0.15 to 0.2
0.2 to 0.25
0.25 to 0.5
0.5 to 1
1 to 3.572
SGC
www.sgce.com.au
N


CONC
0
50
metres
Scale: 1:499.9
TITLE:
Flood Hazard Map
1% AEP
Existing Site Conditions s0A
FIGURE:
Fig. A2.4
REV:
B
Legend
Velocity x Depth (m2/s)
0 to 0.1
0.1 to 0.2
0.2 to 0.3
0.3 to 0.4
0.4 to 0.5
0.5 to 0.6
0.6 to 0.8
0.8 to 1
1 to 1.2
1.2 to 2
2 to 5
5 to 35.9256
SGC
www.sgce.com.au
SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this map.
N


0
50
metres
Scale: 1:499.9
TITLE:
Flood Depth & WSL Contours
1%AEP
Proposed Site Conditions s3
FIGURE:
Fig. A2.7
REV:
B
Legend
0.1m Flood Level Contours
Flood Depth (m)
0.05 to 0.1
0.1 to 0.15
0.15 to 0.2
0.2 to 0.25
0.25 to 0.5
0.5 to 1
1 to 3.551
SGC
www.sgce.com.au
SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this map.
N


CONC
0
50
metres
Scale: 1:499.9
TITLE:
Flood Hazard Map
1%AEP
Proposed Site Conditions s3
FIGURE:
Fig. A2.8
REV:
B
Legend
Velocity x Depth (m2/s)
0 to 0.1
0.1 to 0.2
0.2 to 0.3
0.3 to 0.4
0.4 to 0.5
0.5 to 0.6
0.6 to 0.8
0.8 to 1
1 to 1.2
1.2 to 2
2 to 5
5 to 34.8
SGC
www.sgce.com.au
SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this map.
N
Filepath: X:\Flood Studies\Dee Why Lagoon Model\SGC\20210067\MapInfo\


0
50
metres
Scale: 1:499.9
TITLE:
Flood Velocity Increase
1% AEP
Scenario s3
FIGURE:
Fig. A2.21
REV:
B
Legend
Increase in Velocity (m/s)
< -0.1
-0.1 to 0.1
0.1 to 0.5
0.5 to 1
1 to 2
> 2
SGC
www.sgce.com.au
SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this map.
N