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4/06/2021

Allen Jack and Cottier
79 Myrtle Street
Chippendale SYDNEY NSW 2008

Job Number: 6011

For the attention of : - Anthony Di Cristo

Dear Anthony,

Sydney Grammar School Weigall Fields Sports Complex (SSD-10421)
Response to DPIE RFI 19/05/2021

This letter has been prepared to respond to a request for information from Aditi Coomar of DPIE dated 19/05/2021. Part of the RFI relates to flooding:

1. Options analysis
   b) Provide greater detail of the potential impact of flooding on the development in case it is proposed to be located adjacent to the railway corridor, including the effect of, or ability to provide, any mitigation.

enstruct provided input to the options analysis, and this letter provides the additional detail with respect to flooding below.

Flood Requirements

The following key requirements have been extracted from the Part E of the Woollahra DCP 2015:

Floor Levels:
Flood planning levels are shown in the below extract:

Development type	Flood (and estuary) planning level
Habitable floor areas	100 Year ARI flood level plus 0.5m freeboard
Non-habitable floor areas	100 Year ARI flood level plus 0.3m freeboard
Habitable floor areas for foreshore developments subject to coastal inundation	The highest RL, calculated from the following: ▶ 100 Year ARI flood level plus 0.5m freeboard; or ▶ still water level plus 100 Year ARI wave run-up plus 0.3m freeboard
Ground level, open car parking spaces	20 Year ARI flood level plus 0.3m freeboard
Enclosed car parking spaces, three or fewer vehicles	20 Year ARI flood level plus 0.3m freeboard
Enclosed car parking spaces, more than three vehicles	100 Year ARI flood level plus 0.3m freeboard

Critical and sensitive developments
The DCP definition of "critical and sensitive developments" applies to educational establishments; child care facilities; and schools among other uses.

C27 For critical and sensitive developments in low flood risk precincts, all habitable and non-habitable floor levels are no lower than the PMF flood level.

The proposed development is classified as a "critical and sensitive development", and therefore the finished floor levels of the development will need to be at or above the PMF level. Further to this, building components below the PMF level must be flood compatible and able to withstand the forces of floodwater, debris and buoyancy.

Filling
Filling of the floodplain can displace flood waters, forcing it on to nearby areas. The DCP does not allow any impact on surrounding properties.

O2 To ensure that development does not cause flood levels to rise or exacerbate flooding on the surrounding floodplain.

Evacuation
For evacuation planning, the DCP considers the Probable Maximum Flood (PMF).

C5 Reliable evacuation access for pedestrians is provided from the lowest habitable floor area to a refuge area above the PMF level and designed to withstand PMF water forces.

Development Adjacent to the Railway Corridor

Any development at the site adjacent to the railway corridor would be very challenging with respect to flooding. Flood levels at the site are presented in Table 1, with a map showing extent and depth of flooding in a PMF in Figure 1.

Table 1 Flood Levels

Flood levels adjacent to the railway corridor	
Existing ground levels	2.4 to 3.1 mAHD
1% Annual exceedance probability (1% AEP)	3.3 mAHD
Probable Maximum Flood (PMF)	6.1 mAHD

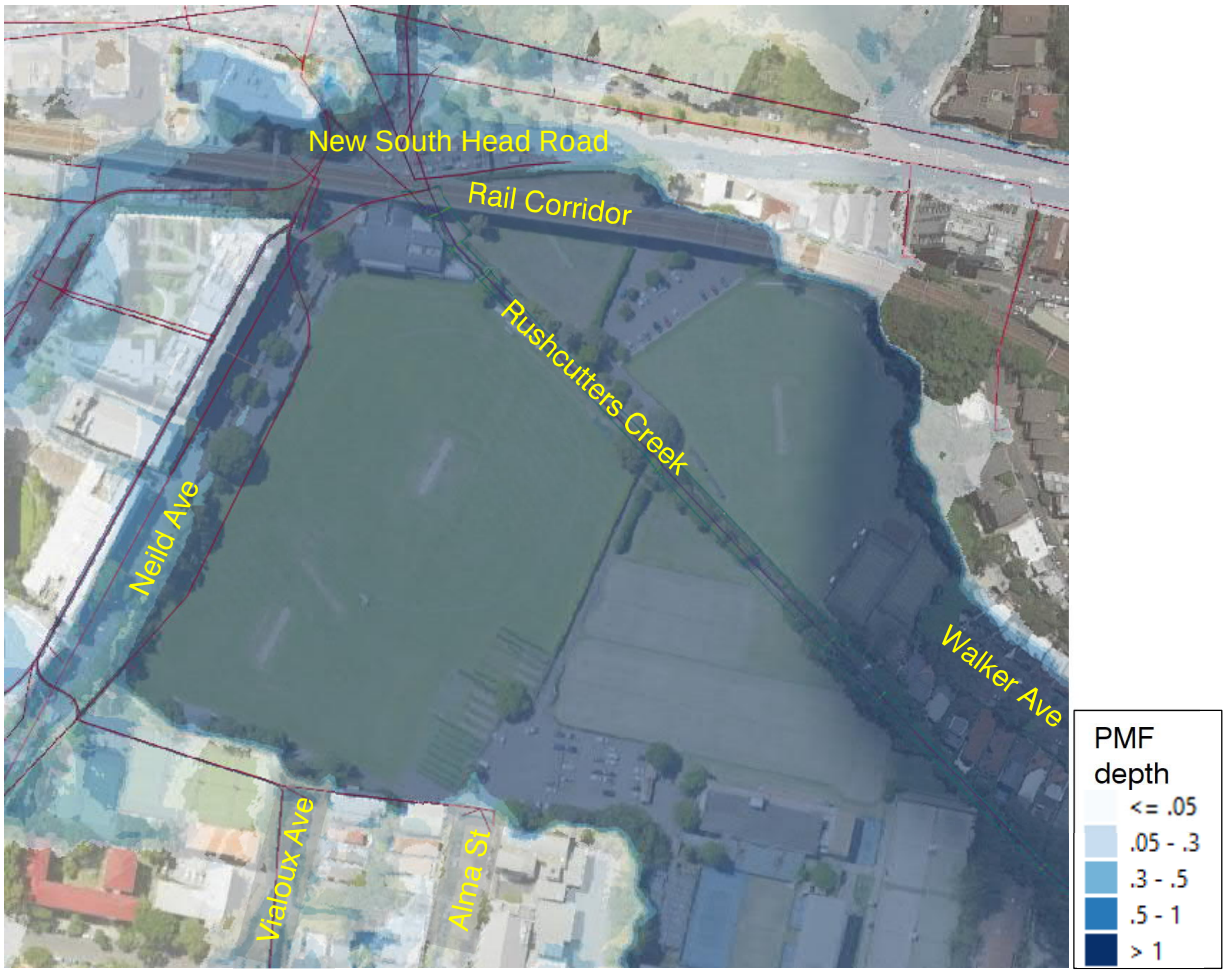

Figure 1 Probable Maximum Flood

Impact on Building

As per the DCP requirements, the minimum floor level should be no lower than the PMF at 6.10 mAHD. Filling of the floodplain would result in raising flood levels for neighbouring properties which is not acceptable.

A building with an open undercroft may be possible, with a minimum floor level of 6.10 mAHD suspended over the existing ground. The undercroft area cannot be used for car parking or storage, as non-habitable floors must also be above the PMF level. These requirements severely impact any development at the site.

Flood Evacuation

Flood evacuation from a site adjacent the rail corridor would be near impossible, as all access points to the building are flood affected in a 1% AEP flood event. A shelter in place policy could be a valid option for the site but is not recommended due to the depth of flooding in a PMF (3.0m to 3.7m flood depth). The access via Walker Avenue has a flood depth in the order of 2m during a PMF event.

Options analysis

Allen Jack and Cottier's design report includes a section on siting options.
The following gives an analysis of the options with respect to flooding. Options have been given a score out of 10 for the response to flooding at the site, with 1 being the lowest score and 10 being the highest. Scores provide some ranking to the options for this project. The scores should be used for the purpose of comparing options only.

Siting Option 1

Figure 2 Siting Option 1 (source: AJ+C)

Option 1 has a PMF level of 6.2 mAHD facing the oval, and 6.8 mAHD on the southern side of the building. The proposed building can be adapted to meet flooding requirements. This option includes some displacement of flood water on the floodplain, however this is limited with a large portion of the proposed building sited on a higher level outside of the floodplain.
Neild Avenue, Vialoux Avenue and the Weigall Fields are all subject to flooding. A shelter-in-place flood response is considered as the best course of action in the event of a flood at the site. The critical duration storm is 60 minutes at the site. During a flood event, site users will remain in place for a matter of hours before they can safely evacuate the premises.

Response to flooding score: 8

Siting Option 2

Figure 3 Siting Option 2 (source: AJ+C)

Option 2 has a PMF level of 6.2 mAHD on all sides. The existing site is on a localised high point, so the impact of filling on flooding here is expected to be minimal.
Neild Avenue, Vialoux Avenue and the Weigall Fields are all subject to flooding. A shelter-in-place flood response is considered as the best course of action in the event of a flood at the site. The critical duration storm is 60 minutes at the site. During a flood event, site users will remain in place for a matter of hours before they can safely evacuate the premises.

Response to flooding score: 7

Siting Option 3

Figure 4 Siting Option 3 (source: AJ+C)

Option 3 has a PMF level of 6.2 mAHD facing the field, and 6.8 mAHD on the southern side of the building. Due the extents of the building into the floodplain, the northern section of the building should be on piers to reduce the impact the building has on flooding. No parking or storage is possible in this undercroft as non-habitable floors must also be above the PMF level. The ground level at the field is approximately 4.20 mAHD, and a minimum floor level to meet flood planning levels of 6.2 mAHD

Trunk drainage infrastructure running parallel to Neild Avenue may be impacted by this option.

Neild Avenue, Vialoux Avenue and the Weigall Fields are all subject to flooding. A shelter-in-place flood response is considered as the best course of action in the event of a flood at the site. The critical duration storm is 60 minutes at the site. During a flood event, site users will remain in place for a matter of hours before they can safely evacuate the premises.

Response to flooding score: 5

Siting Option 4

Figure 5 Siting Option 4 (source: AJ+C)

Option 4 locates the proposed building adjacent to the rail corridor. As noted earlier, any development at the site adjacent to the railway line would be very challenging with respect to flooding. Critical to this are the flood planning levels being more than 3m above the existing ground surface, and extreme difficulty with flood evacuation

Response to flooding score: 1

Siting Option 5

Figure 6 Siting Option 5 (source: AJ+C)

Option 5 is similar to Option 3, but extends the building further north and removes the connection with Vialoux Street. PMF level of 6.2 mAHD facing the field, and 6.8 mAHD on the southern side of the building. Due the extents of the building into the floodplain, the northern section of the building should be on piers to reduce the impact the building has on flooding. No parking or storage is possible in this undercroft as non-habitable floors must also be above the PMF level. The ground level at the field is approximately 4.20 mAHD, and a minimum floor level to meet flood planning levels of 6.2 mAHD

Trunk drainage infrastructure running parallel to Neild Avenue may be impacted by this option.

Neild Avenue, and the Weigall Fields are subject to flooding. A shelter-in-place flood response is considered as the best course of action in the event of a flood at the site. The critical duration storm is 60 minutes at the site. During a flood event, site users will remain in place for a matter of hours before they can safely evacuate the premises. The site has less evacuation routes than Option 3 due to the disconnection from Vialoux Street

Response to flooding score: 4

Conclusions

Any development adjacent to the rail corridor would be very challenging with respect to flooding. flood planning levels being more than 3m above the existing ground surface, and extreme difficulty with flood evacuation.
Siting options have been analysed with respect to flooding. Table 2 presents a summary of the findings.

Table 2 Summary of options analysis

Siting Option	Response to Flooding Score	Key Challenges
Option 1	8	• Floodplain filling (demonstrated as acceptable in SSDA report) • Flood planning levels
Option 2	7	• Floodplain filling (work required to determine the impact on flooding) • Flood planning levels
Option 3	5	• Large portion of the building to be suspended • Possible clash with trunk drainage
Option 4	1	• Flood planning levels 3m above existing ground • Site access and evacuation. There is no access to/from the site during a 1% AEP storm event
Option 5	4	• Large portion of the building to be suspended • Possible clash with trunk drainage • Reduced flood emergency egress routes

Yours Sincerely,

for
enstruct group pty ltd

Tim Henderson
Associate