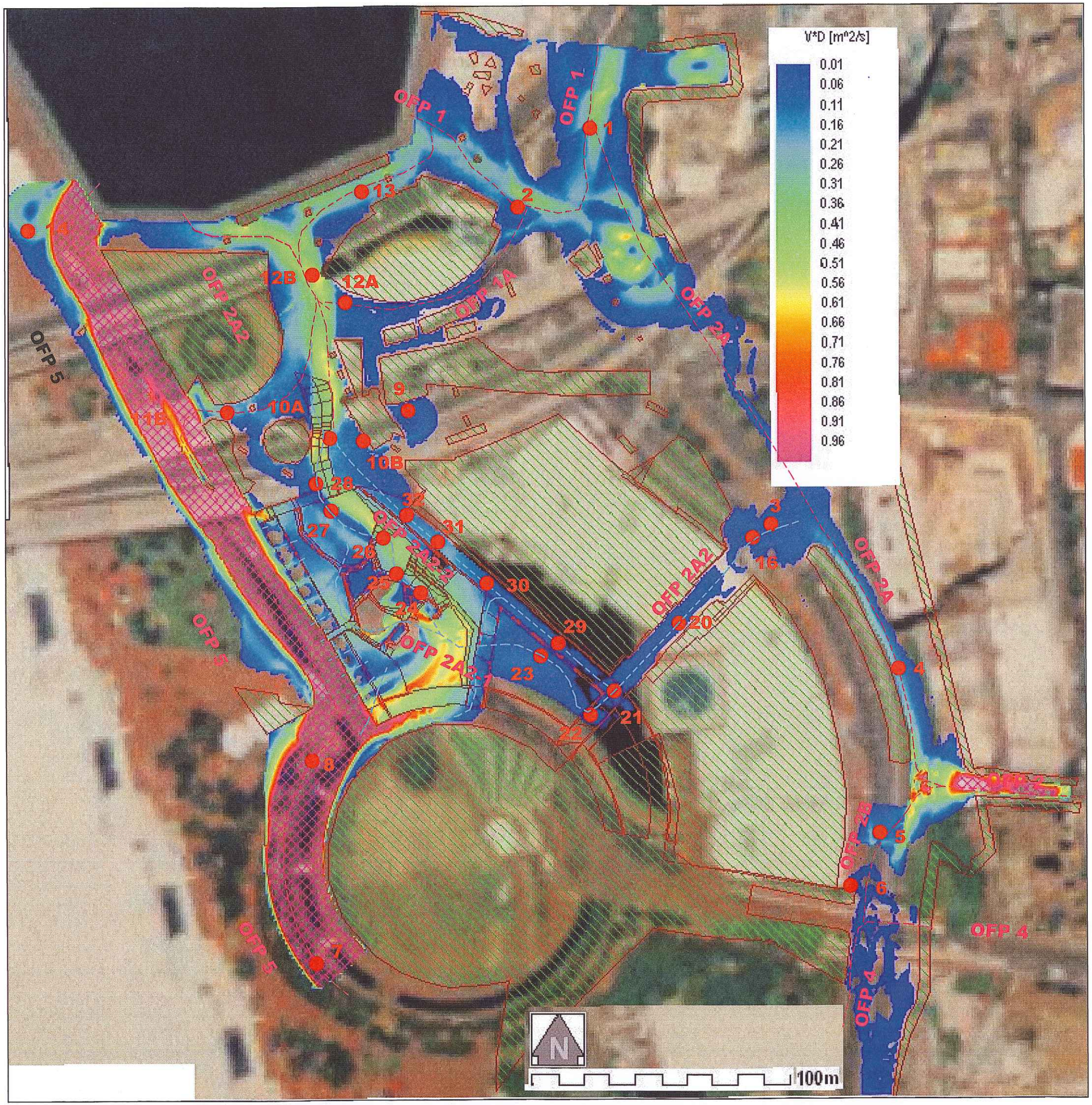

FIGURE 9 PART 2.1
OPTION 5

THEMATIC MAP OF VELOCITY - DEPTH PRODUCT

POST DEVELOPMENT CONDITIONS

100 ARI 60 MINUTE STORM

DARLING WALK FLOOD STUDY

DATE 18/11/2008

LEGEND

- 7 REFERENCE POINT
- FLOW POINT
- OVERLAND FLOW PATH
- PRE DEVELOPMENT OVERLAND FLOW PATH
- POST DEVELOPMENT OVERLAND FLOW PATH

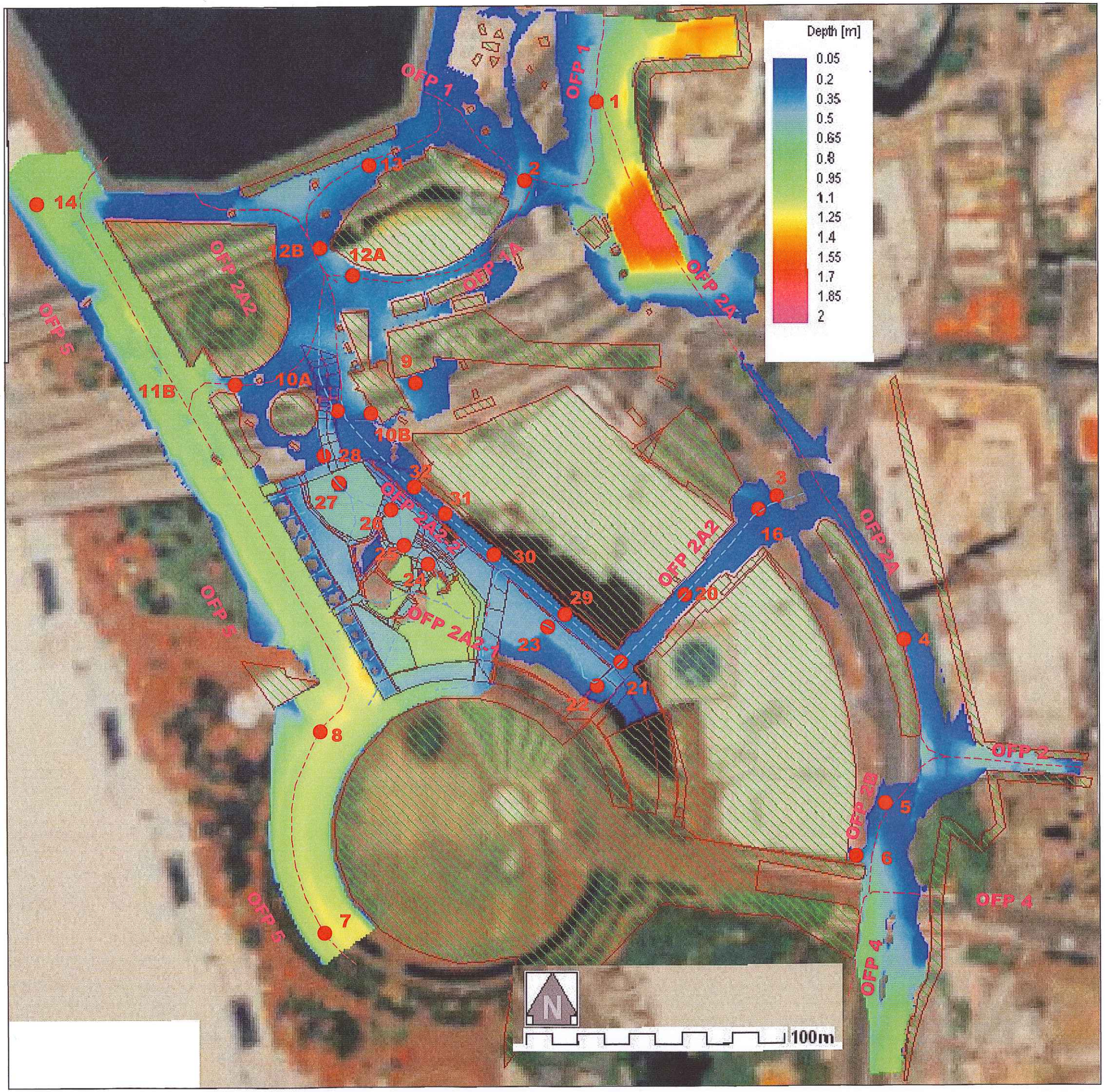

FIGURE 10 PART 2.1
OPTION 5

THEMATIC MAP OF FLOOD DEPTH

POST DEVELOPMENT CONDITIONS

100 ARI 60 MINUTE STORM

DARLING WALK FLOOD STUDY

DATE 18/11/2008

LEGEND

- 7 REFERENCE POINT
- FLOW POINT
- OVERLAND FLOW PATH
- PRE DEVELOPMENT OVERLAND FLOW PATH
- POST DEVELOPMENT OVERLAND FLOW PATH

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Wednesday, 26 June 2009
Bovis Lend Lease
The Bond
30 Hickson Road
Millers Pont, Sydney, NSW, 2000

Attention: Ms Abbey Johnson

Dear Abbey,

DARLING WALK FLOOD STUDY ADDENDUM NO. 3

As requested we provide the following ***Addendum 3*** prepared to assess a revised configuration for the open space component of the Darling Walk project which achieves the aesthetic goals of the development and satisfies the freeboard requirements for the proposed buildings of the development with respect to flooding. All information presented in ***Addendum 3*** is to be read in conjunction with ***Addendum 1***, ***Addendum 2*** and the original Flood Study Report of July 2008; referred to as the ***Darling Walk Redevelopment Flood Study Report***.

The latest flood modelling has been undertaken utilising information from Bovis Lend Lease (*BLL*), Francis-Jones Morehen Thorp (*fjmt*), Hyder Consulting (*Hyder*) and ASPECT Studios (*ASPECT*).

This letter has been broken into several sections in order to clearly convey the process undertaken to assess the post development flooding conditions based on the latest design information.

1. Objective

The key objective of the assessment has been to establish the minimum building ground floor levels permitted for the proposed development using the most up-to-date design information (*ie. open space design of Tumbalong Park from ASPECT, Civic Connector grading from Hyder and details of the proposed buildings from fjmt*).

2. Site Geometry

In order to assess the latest proposed flood conditions, the geometry for flood modelling has utilised information from the following documents:

- *AD200111-14 (North Building – Level 00 – Zone 1 Floor Plan), fjmt, 02/09/08;*
- *AD200211-10 (North Building – Level 00 – Zone 2 Floor Plan), fjmt, 02/09/08;*
- *AD300311-10 (South Building – Level 00 – Zone 3 Floor Plan), fjmt 11/09/08;*
- *AD300411-09 (South Building – Level 00 – Zone 4 Floor Plan), fjmt 11/09/08;*
- *Project Web Correspondence No. 19986, Landscape Playground, ASPECT, 09/06/09; and*
- *SKC007-NS03788-NSK-00-Civic Connector Grading, Hyder, 27/04/09*

The modifications to the geometry of the model have been constrained to the specific area around the children's playground in Tumbalong Park and the civic connector (***refer to the polygon in Figure 2 and Figure 4***). The changes to the open space design from previous designs include:

- the introduction of a raised seating/picnic area at the southern end of the children's playground which will function effectively as a wall at RL 3.7m AHD;
- the children's playground layout has been modified significantly;
- the civic connector grading has been modified; and
- the building footprint has been modified in areas that will influence the floodplain.

3. Boundary Conditions

Upstream and downstream boundary conditions used in ***Addendum 3*** remain unchanged to those used in ***Addendum 2***.

4. Limitations

Addendum 3 modelling is subject to the same limitations as those of ***Addendum 2***. The analysis has not included the assessment of increased flood impact/hazard to downstream properties.

5. Results

For consistency the same reference points (*RPs*) used in previous reporting have been adopted for this report, a table of results with respect to each RP is available in ***Table 1*** attached to this letter.

Flood levels (*refer to **Figure 3***) in the Urban Stream vary from RL 3.80m AHD upstream near the existing oval in Tumbalong Park (RP 8) to RL 3.29m AHD downstream at the nearest reference point to the harbour discharge area (RP 14).

Flood levels along the civic connector vary from RL 3.78m AHD at the upstream end at the bottom of the stairs (RP 16) to RL 3.69m AHD at the southern end of the proposed buildings (RP 21) through to RL 3.60m AHD at the downstream end of Tumbalong Park along the western side of the proposed northern building (RP 32).

Generally, velocities are less than 0.5m/s with some localised areas of flow velocity up to 2.0m/s. High velocities (*ie greater than 1.5m/s*) are generally contained within the urban stream (*refer to **Figure 6** and **Figure 10** for details*).

The majority of flood depth is shallow, with an average depth of less than 0.3m. However, there are some localised areas where significant ponding of flood waters occurs in particular at the southern end of the children's playground.

The velocity depth product is generally less than $0.3m^2/s$ for most of the study area however it exceeds $2.0m^2/s$ along the Urban Stream (*refer to **Figure 7** and **Figure 11** for details*).

6. Impact

The flood waters that flow adjacent to the proposed North Building through the Civic Connector are at a maximum level of RL 3.70m AHD which allows for an adequate freeboard of 0.3m to the floor levels which are set at a minimum of RL 4.0m AHD.

The playground generally contains low to medium hazard flood waters however there are some areas of high hazard in particular the "water feature play area" where flood waters are expected to pond with significant depths.

The velocity depth product (*used as an indicator of flood hazard*) is generally less than 0.3m^2/s for most of the study area which is a low to medium level of hazard. The flow path through the Urban Stream which had a velocity depth product exceeding 2.0m^2/s is considered an area of high to very high flood hazard however the flood hazard along the civic connector is considered low. This potentially allows for the civic connector to be used as part of a public evacuation route during extreme flooding events such as the 100 year Average Recurrence Interval.

7. Conclusion

Addendum 3 presents an assessment of flood behaviour due to the latest design changes and provides advice on the minimum ground floor RLs of the proposed buildings. The current open space design provides mitigation of flood damage to buildings and is compliant with previously recommended flood freeboard requirements.

It should be noted that a critical element of the design is the setting of the correct wall level at the southern end of the playground. This provides protection from the flood flows propagating from the Urban Stream.

We trust this information is satisfactory. Should you have any further enquiries, please do not hesitate to contact Andrew Williams on (02) 8456 7000.

Yours faithfully,
WorleyParsons

Michael Shaw
BE (Civil) MIEAust NPER CPEng
Manager, Urban Infrastructure
Environment Group

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Table 1 - Post Development Water Surface Levels at Key Locations (100 Year ARI)

Reference Point	Finished Surface Level (m AHD)	Water Surface Level (m AHD)	Depth (m)	Velocity (m/s)	Velocity Depth Product (m^2/s)
1	2.67	3.27	0.6	0.51	0.23
2	2.76	3.14	0.38	0.23	0.08
3	3.81	3.86	0.05	1.24	0.05
4	4.71	4.83	0.12	0.59	0.08
5	4	4.04	0.04	1.3	0.05
6	3.6	3.99	0.39	0.12	0.03
7	2.65	3.83	1.18	1.51	1.55
8	2.6	3.8	1.2	1.42	1.67
9	2.86	3.08	0.22	0.24	0.04
10	3.16	3.26	0.1	1.33	0.12
11B	3.15	3.46	0.31	0.89	0.28
12	2.71	2.96	0.25	0.57	0.13
13	2.29	2.54	0.25	0.64	0.16
14	2.36	3.29	0.93	0.41	0.28
16	3.67	3.78	0.11	0.29	0.03
20	3.54	3.71	0.17	0.31	0.03
21	3.49	3.69	0.2	0.45	0.03
22	3.52	3.68	0.16	0.16	0.01
23	3.32	3.66	0.34	0.72	0.16
24	3.25	3.64	0.39	0.78	0.3
25	3.39	3.59	0.2	1.52	0.29
26	2.95	3.6	0.65	0.25	0.16
27	3.17	3.6	0.43	0.21	0.07
28	3.47	3.57	0.1	0.9	0.09
29	3.48	3.67	0.19	0.26	0.05
30	3.47	3.7	0.23	0.5	0.11
31	3.48	3.63	0.15	0.9	0.13
32	3.47	3.6	0.13	0.19	0.02

FIGURE 1

NORTH

RAINWATER TANK

LEGEND

+ EX 4.05	EXISTING SURFACE LEVEL
+ RL 4.05	PROPOSED SURFACE LEVEL
+ TOW 4.05	TOP OF WALL
+ TOS 4.05	TOP OF SEAT
+ FFL 4.05	FINISHED FLOOR LEVEL

NOTE:

ARCHITECTURAL LAYOUT AND LEVELS FROM ASPECT STUDIOS PTY LTD 09/05/09

0 5 10 15 20 25m

1 : 250

DARLING WALK FLOOD STUDY ADDENDUM 3
TERRAIN LEVELS APPLIED TO MODEL

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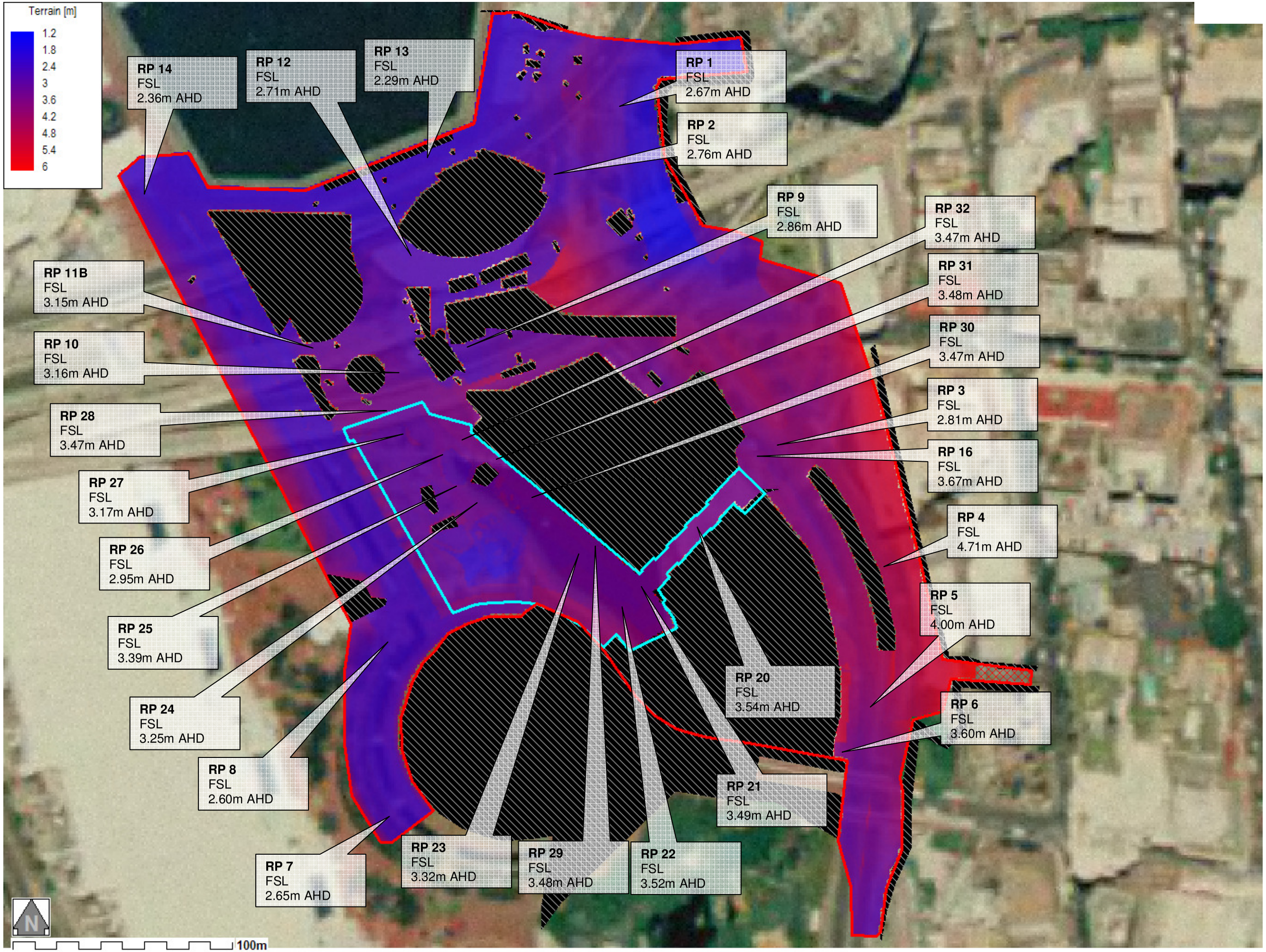
DATE & TIME: 17/06/2009 01:34:36 PM USER NAME: garnonures LOCATION: LA1790 - Darling Walk Preliminary Flooding Assessment\May 2009\Report\Figures\Figure 1.dwg

FIGURE 2



LEGEND

- EXTENT OF MODELLING
- EXTENT OF CHANGES TO OPEN SPACE DESIGN (09/06/09)
- NON-FLOW PERMITTING AREA

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fg7190-FIG 1 RUN26 TER 090715.doc

FLOOD STUDY ADDENUM 3
DARLING WALK SURFACE LEVELS
PROPOSED FLOOD MODEL

FIGURE 3

Level [m]
2.3
2.7
3.1
3.5
3.9
4.3
4.7
5.1

RP 14 WSL 3.29m AHD
RP 12 WSL 2.96m AHD
RP 13 WSL 2.54m AHD
RP 1 WSL 3.27m AHD
RP 2 WSL 3.14m AHD
RP 9 WSL 3.08m AHD
RP 32 WSL 3.60m AHD
RP 31 WSL 3.63m AHD
RP 30 WSL 3.70m AHD
RP 3 WSL 3.86m AHD
RP 16 WSL 3.78m AHD
RP 4 WSL 4.83m AHD
RP 5 WSL 4.04m AHD
RP 6 WSL 3.99m AHD
RP 11B WSL 3.46m AHD
RP 10 WSL 3.26m AHD
RP 28 WSL 3.57m AHD
RP 27 WSL 3.60m AHD
RP 26 WSL 3.60m AHD
RP 25 WSL 3.59m AHD
RP 24 WSL 3.64m AHD
RP 8 WSL 3.80m AHD
RP 7 WSL 3.83m AHD
RP 23 WSL 3.66m AHD
RP 29 WSL 3.67m AHD
RP 22 WSL 3.68m AHD
RP 20 WSL 3.71m AHD
RP 21 WSL 3.69m AHD

N

100m

LEGEND

EXTENT OF MODELLING

NON-FLOW PERMITTING AREA

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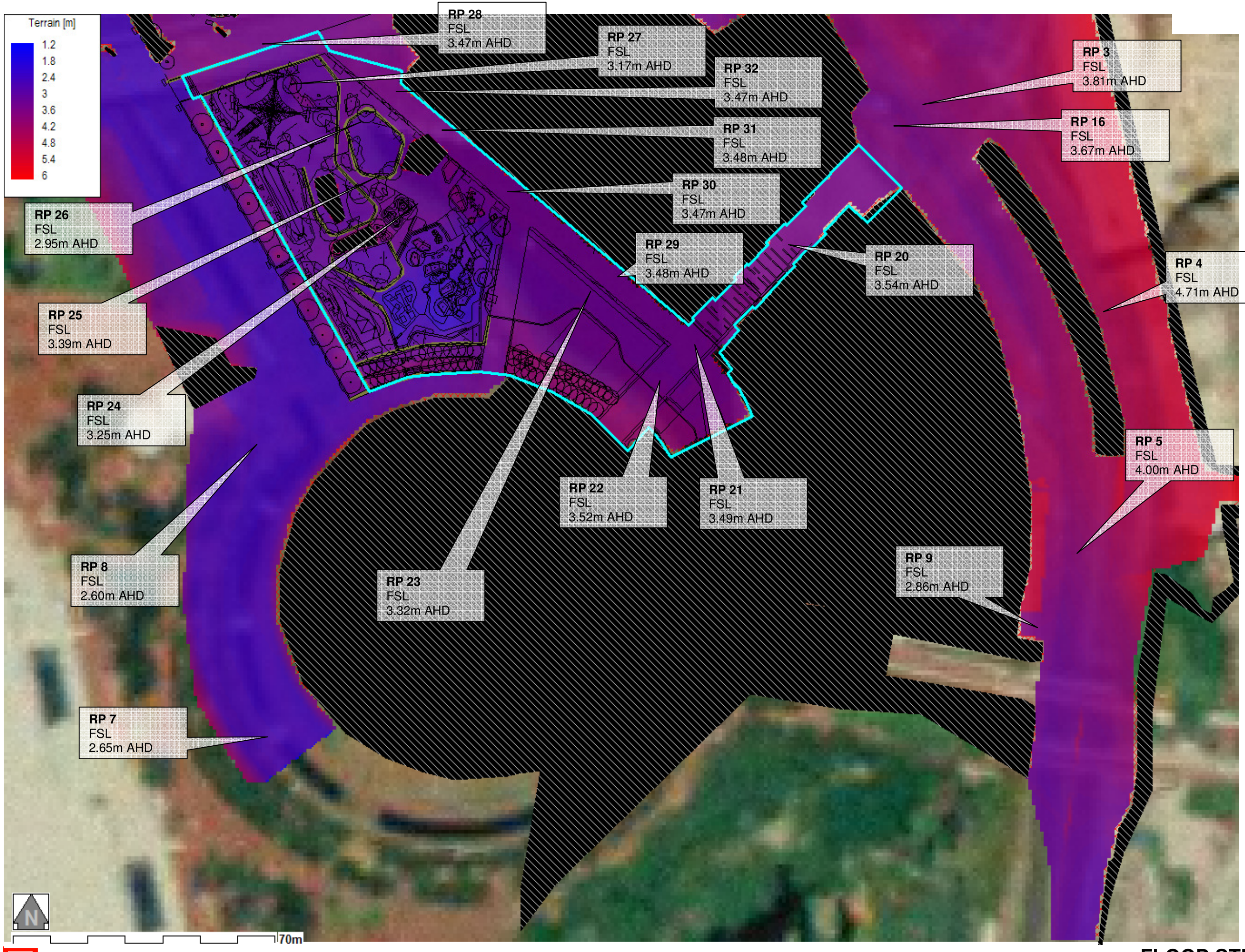
fg7190-FIG 2 RUN26 WSL 090715.doc

FLOOD STUDY ADDENUM 3
DARLING WALK WATER SURFACE LEVELS
PROPOSED 100 YEAR ARI 60 MIN STORM

FIGURE 4



LEGEND

NON-FLOW PERMITTING AREA

EXTENT OF CHANGES TO OPEN SPACE DESIGN (09/06/09)

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fg7190-FIG 3 RUN26 TER 090715.doc

FLOOD STUDY ADDENUM 3
TUMBALONG PARK FINISHED SURFACE LEVELS
PROPOSED MODEL