Table 4.5: Water Levels – Extracted vs. Modelled

Site Locations	Water Level (m AHD) basic interpolation of LPR-FRMS	'Proposed' Modelled Water Level (m AHD)	'Proposed' Modelled Water Level (m AHD) with 50% blockage factor
South eastern corner (facing Parkes Street)	8.32	8.31	8.36
South western corner (facing Parkes Street)	8.33	8.42	8.46

Source: *LPR-FRMS* (SKM, 2005)

It can be seen that the flood level increases range from 40mm to 50mm due to the 50% blockage scenario. This was then compared to the finished floor levels to review against the minimum freeboard requirements.

Table 4.6: Water Levels Analysis with 50% Blocked Scenario

Building Element	Proposed Floor Level (RL. AHD)	Proposed Modelled Water Level (m AHD) with 50% blockage factor	Distance Above 50% Blocked scenario (m)
Lowest habitable floor level	16.10	8.46	7.64

The above table shows that, even with the Clay Cliff Creek Culvert 50% blocked, minimum freeboard levels have been maintained to the proposed finished floor levels. It is therefore considered that the finished floor levels comply with the requirements of the NSW Floodplain Development Manual.

Figure 4.17: Water surface level with 50% blockage factor to the Proposed Development

4.6 Summary and Recommendations

Two dimensional flood modelling of the site and the wider catchment provides valuable information about the existing and proposed flow regimes impacting the site. *TUFLOW* modelling indicated that during large storm events (i.e. 1% AEP event) flows enter the existing site via the overtopping of the Clay Cliff Creek channel until inundation of the site occurs to the extents shown in the attached flood maps located in Appendix D.

A similar flow regime occurs in the post-development scenario. Flows will approach the site along the southern, eastern and western boundaries (from the Clay Cliff Creek channel and the Parkes Street site frontage, and from neighbouring lots), as they did in the pre-developed scenario. Due to the sensitivity of the Parkes Street flow regime, the building footprint at the southern boundary matches the existing conditions. This ensures no major change to the localised flood regime is incurred and the proposed development has minimal effect on the flooding of surrounding properties.

Flood map results are located in Appendix D and include the following;

- Flood Extent and Depth Maps (pre-development & post development);
- Flood Levels (pre-development & post development);
- Flood Velocities (pre-development & post development); and
- Flood Depth Difference Maps.

An additional model run was undertaken to assess the scenario in which the site across Parkes St (currently under construction) will be fully developed, indicating the flooding situation in the future. Flood map results for this scenario can also be found located in Appendix D.

5 Floodplain Risk Management Controls

5.1 Council Requirements – Floodplain Planning Matrix

Parramatta City Council has indicated in the '*Local Floodplain Risk Management Policy*' that floodplain risk management shall be addressed by the use of the *Planning Matrix* provided within the policy. In lieu of a planning matrix control for High Flood Risk precincts (High Flood Risk precincts deemed 'unsuitable land use'), the medium - i.e. less hazardous - flood risk precinct planning controls will be adopted to accompany the detailed flood modelling presented above and form the basis of the assessment.

5.1.1 Floor Level

5.1.1.1 Habitable floor levels to be equal to or greater than the 100 year ARI flood level plus freeboard.

A minimum freeboard of 500mm is indicated in the policy. The habitable ground floor will be protected from the 100 year ARI (1% AEP) plus 500mm freeboard.

The mixed use development proposed for 11 Hassall Street comprises only commercial/retail and car parking on levels with potential flood effects. The entry crest level of the car park ramp and commercial/retail floor levels is set at 10.00m, 1.08m above the flood planning level (8.42m + 500mm freeboard) for the development based on the highest 1%AEP levels indicated by the model.

5.1.1.2 A restriction is to be placed on the title of the land, pursuant to S.88B of the Conveyancing Act, where the lowest habitable floor area is elevated more than 1.5m above finished ground level, confirming that the subfloor space is not to be enclosed.

Upon the completion of works a Deposited Plan will be registered and the required restriction will be placed by a registered surveyor.

5.1.2 Building Components & Method

5.1.2.1 All structures to have flood compatible building components below the 100 year ARI flood level plus freeboard

Compatible building components below the 1% AEP flood level plus freeboard are to be confirmed by the project structural engineer during the detailed design stage of this development.

5.1.3 Structural Soundness

5.1.3.1 Engineers report to certify that the structure can withstand forces of floodwater, debris and buoyancy up to and including a 100 year ARI flood plus freeboard

This is to be certified by the project structural engineer during the detailed design stage of this development.

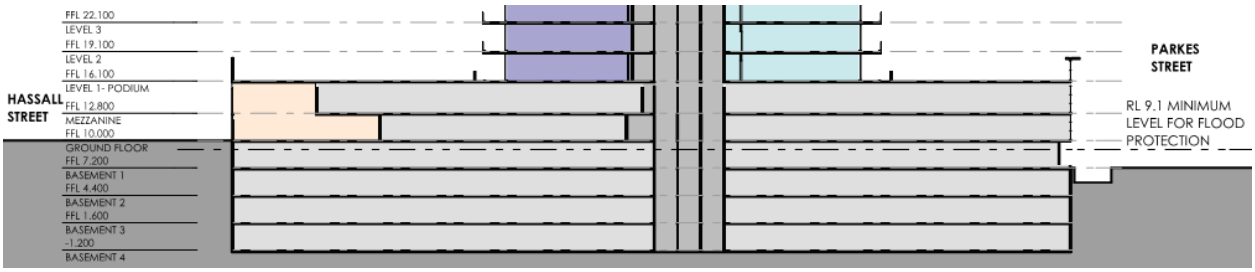
5.1.4 Flood Affectation

5.1.4.1 The development will not increase flood affectation elsewhere, having regard to the three factors: (i) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulative impact of the subject site and the nearby 20-24 Kendall Street development currently under construction.

With respect to the three factors the following observations have been made:

- There has been no significant net loss in flood storage due to the proposed development. Flood storage within the site in the existing case was very limited and the prevention of flow into the site in the proposed case does not introduce significant flooding affects. The ground floor level has been designed to accommodate the minimum 0.5m freeboard above the 1% AEP flood level.
- There are minimal expected changes in flood levels due to the proposed development. The sub-floor void within the post-developed scenario is designed to maintain flood levels as well as the existing flows and velocities from the pre-developed scenario. As such, the development is expected to have minimal impact on downstream properties downstream areas (as discussed in the detailed flood modelling section of this report).
- The proposed development avoids creating obstructions in the Parkes Street flow regime by matching building footprint to the existing building line. This approach aims to minimise the cumulative impact the proposed development will have on other developments within the vicinity.
- Further to the above, we have undertaken a cursory review of the Probable Maximum Flood (PMF) flood impacts on site. Given the PMF flood level of RL 9.70m AHD, we believe that the building footprint in the extended PMF flood zone will have a negligible effect on flood behaviour in extreme events. Building footprints: 1707m^2 (Proposed) compared with 1056m^2 (Existing) deemed negligible over such a large flood extent (the majority of the Parramatta CBD and its surrounds will be inundated in a PMF storm event).

Figure 5.1: Proposed development option showing allowance for Parkes St flow path (footprint reduction)



Source: *Project Tourism International Architecture Pty Ltd* Conceptual Design

5.1.5 Car Parking & Driveway Access

5.1.5.1 The minimum surface level of open spaces or carports shall be as high as practical, but no lower than 0.1m below the 100 year ARI flood level. In the case of garages, the minimum surface level shall be as high as practical, but no lower than the 100 year ARI flood level.

The proposed site incorporates below ground car parking to satisfy the parking requirements of the development. This condition is not applicable to this development.

5.1.5.2 Garages capable of accommodating more than 3 motor vehicles on land zones for urban purposes, or enclosed car parking, must be protected from inundation by floods equal to or greater than the 100 year ARI flood. Ramp levels to be no lower than 0.5m above the 100 year ARI flood level.

The proposed site incorporates below ground car parking to satisfy the parking requirements of the development. The basement carpark entrance is protected by a crest which is set at the 100 year flood level plus 0.5 metre freeboard (RL 8.92m AHD). This condition has been satisfied.

5.1.5.3 The level of the driveway providing access between the road and parking spaces shall be no lower than 0.2m below the 100 year ARI flood level.

The proposed driveway entry between the road and parking spaces incorporates a crest which is set above the 100 year ARI flood level. This condition has been satisfied.

5.1.5.4 Enclosed car parking and car parking areas accommodating more than 3 vehicles, with a floor below the 100 year ARI flood level, shall have adequate warning systems, signage, exits and evacuation routes.

Adequate warning systems will need to be provided to ensure the safety of residents and visitors within the belowground parking areas for flood events greater than the 1% AEP event.

An evacuation strategy is outlined in the Flood Management Plan provided and attached to this report (refer to Appendix E).

Signage will be provided in the below ground carparks alerting residents and visitors to the possible flood risk during storm events greater than the 1% AEP and will direct people to safe exits and evacuation routes.

Signage will be included at ground floor and basement levels, namely:

- “Basement levels may flood during events greater than 1 in 100 years. In extreme events, evacuate the basement via marked exits and proceed to Level 1. See Site Flood Management Plan”
- Laminated copies of the Site Flood Management Plan are to be secured at each exit.

5.1.5.5 Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a site during a 100 year ARI flood.

The basement carpark is protected from flooding in a 1% AEP event due to the crest level of the access driveway being set at a minimum 0.5m above the 1% AEP flood level in accordance with Parramatta Councils Floodplain Risk Management Policy.

5.1.6 Evacuation

5.1.6.1 Reliable access for pedestrians and vehicles is required from the site to an area of refuge above the PMF level, either on-site (e.g. second storey) or off-site.

Safe points have been identified above the PMF which include:

- Ground Floor of the building (RL 10.00m AHD) and all other levels above the Ground Floor of the development.

Stair access to Ground Floor and above (which are above the PMF) is provided from the basement levels.

An evacuation procedure is subsequently proposed for the safe and reliable access of residents and visitors above the PMF. This includes the following steps:

- Depth gauge signage shall be placed along the carpark entrance and at the Hassall Street stair access of the proposed development.
- During large storm events, the safest evacuation option is to remain within the building on Ground Floor or higher. Due to the fast rising nature of flood waters in the precinct, the surrounding road network will flood quickly and can become unsafe for both cars and pedestrians. It is recommended that residents and visitors do not leave the site unless it is absolutely necessary.
- If residents and visitors should need to evacuate the site, they should leave to the Hassall Street frontage. It is also recommended that residents and visitors avoid the Parkes Street frontage as flood waters will be considerably deeper on the southern side of the development.
- Once the flood levels in the development site exceed a depth 0.3m below the driveway crest (RL 10.00m AHD) a siren will sound with flashing lights and the Security Entry Gate will close on the basement carpark. Vehicles will no longer be allowed to leave the development.
- An alarm will sound throughout the buildings emergency management system, alerting residents of the hazards and instructing them to evacuate the basement and proceed to higher levels of the development.
- Residents and visitors are instructed by the Flood Management Plan to seek shelter within the Ground Floor of the building which is at RL 10.00m AHD and above the PMF level. Stair access is available for evacuation to Mezzanine Level and higher in the occurrence of extreme flood events until flooding alleviates.
- Residents and visitors are instructed by the Flood Management Plan not to evacuate the building at this time and wait until the flood recedes.

5.1.6.2 Applicant to demonstrate the development is consistent with any relevant flood evacuation strategy or similar plan.

An existing site specific flood evacuation plan in not available for the overall site. A site specific Flood Management Plan (FMP) is subsequently provided as part of this approval (See Appendix E). Here evacuation procedures are detailed above and within the attached Flood Management Plan.

5.1.6.3 Adequate flood warning is available to allow safe and orderly evacuation without increased reliance upon SES or other authorised emergency services personnel.

Refer attached Flood Management Plan for details.

5.1.7 Management and Design

5.1.7.1 Site Emergency Response Flood plan required where the site is affected by the 100 year ARI flood level, (except for single dwelling-houses).

A site specific “Flood Management Plan” has been prepared to be implemented within the site. This plan will be kept on site at all times and incorporated into the building safety management plan.

5.1.7.2 Applicant to demonstrate that area is available to store goods above the 100 year flood level plus freeboard.

All habitable and commercial floor levels in the proposed development are protected from the 1% AEP flood level + freeboard (500mm).

5.1.7.3 No storage of materials below the 100 year ARI flood level.

Storage of materials and goods associated with the proposed development will be on the above mentioned floors which are all protected from the 1% AEP flood level.

5.2 Summary

In lieu of planning matrix controls for High Flood Risk precincts (High Flood Risk precincts deemed 'unsuitable land use'), the medium - i.e. less hazardous - flood risk precinct planning controls have formed the basis of the assessment. Compliance with these controls, in accompaniment with the results of the detailed flood modelling presented in this report demonstrates the development fully addresses the objectives of Council's '*Local Floodplain Risk Management Policy*'.

It is considered that all flood related aspects of the development of the site have been thoroughly investigated and addressed in both the design and risk management procedures outlined in this report and based on merit, the site would now represent 'suitable land use'. We therefore respectfully request that Council provide the necessary approvals in relation to site flooding.

6 References

1. Cardno Willing (2007), *"Clay Cliff Creek Catchment Master Drainage Plan"*, for Parramatta City Council, July
2. Institution of Engineers, Australia (1999), *"Australian Rainfall and Runoff. A Guide to Flood Estimation"*, Volume 1, National Committee of Water Engineering.
3. NSW Governement (2005), *"Floodplain Development Manual"*, April
4. SKM (2005a), "*Lower Parramatta River Flood Study"*, for Parramatta City Council, March.
5. SKM (2005b), *"Lower Parramatta River Floodplain Risk Management Study",* for Parramatta City Council, August

Appendices

Appendix A. Flood Enquiry Application & Council Flood Study

Flood Enquiry Information Issued *(To be completed by Council Officer)*

Mainstream Flooding

Is this property affected by mainstream flooding? **11 Hassall St, Parramatta**	☒ Yes ☐ No

Flood Levels	Closest Cross Sections: *(Please refer to Flood Study):* **Refer to Flood Map**	
☒ 1:20 year ARI	m AHD	**Comments**: **See Note on Flood Map**
☒ 1:100 Year ARI	m AHD	
☒ PMF	m AHD	
☒ Refer to flood maps provided for detailed flood levels.		

The above flood level information is obtained from the following flood study report::

Lower Parramatta River Floodplain Risk Management Study, Flood Study Review, 2005 (SKM)

Council has adopted the Lower Parramatta River Floodplain Risk Management Plan informed by the abovementioned Flood Study Review.

Note: Flood inundation can be verified by detail survey to AHD undertaken by a Registered Surveyor.

Local Flooding *(Please tick)*

Is the property located within a Hatched Grey Area? *Properties located within a **Hatched Grey Area** are subjected to flooding from the local catchment.*	☐ Yes ☒ No
Is the property located within a Grey Area? *Properties located within a **Grey Area** are subjected to additional site drainage controls to manage flooding in the local catchment.*	☐ Yes ☒ No
Is the property affected by overland stormwater run-off from the local catchment?	☐ Yes ☐ No ☒ No Information Available
***Note:** You are required to contact Council's Development Service Engineer for any details and requirements relating to development that is affected by local flooding.*	

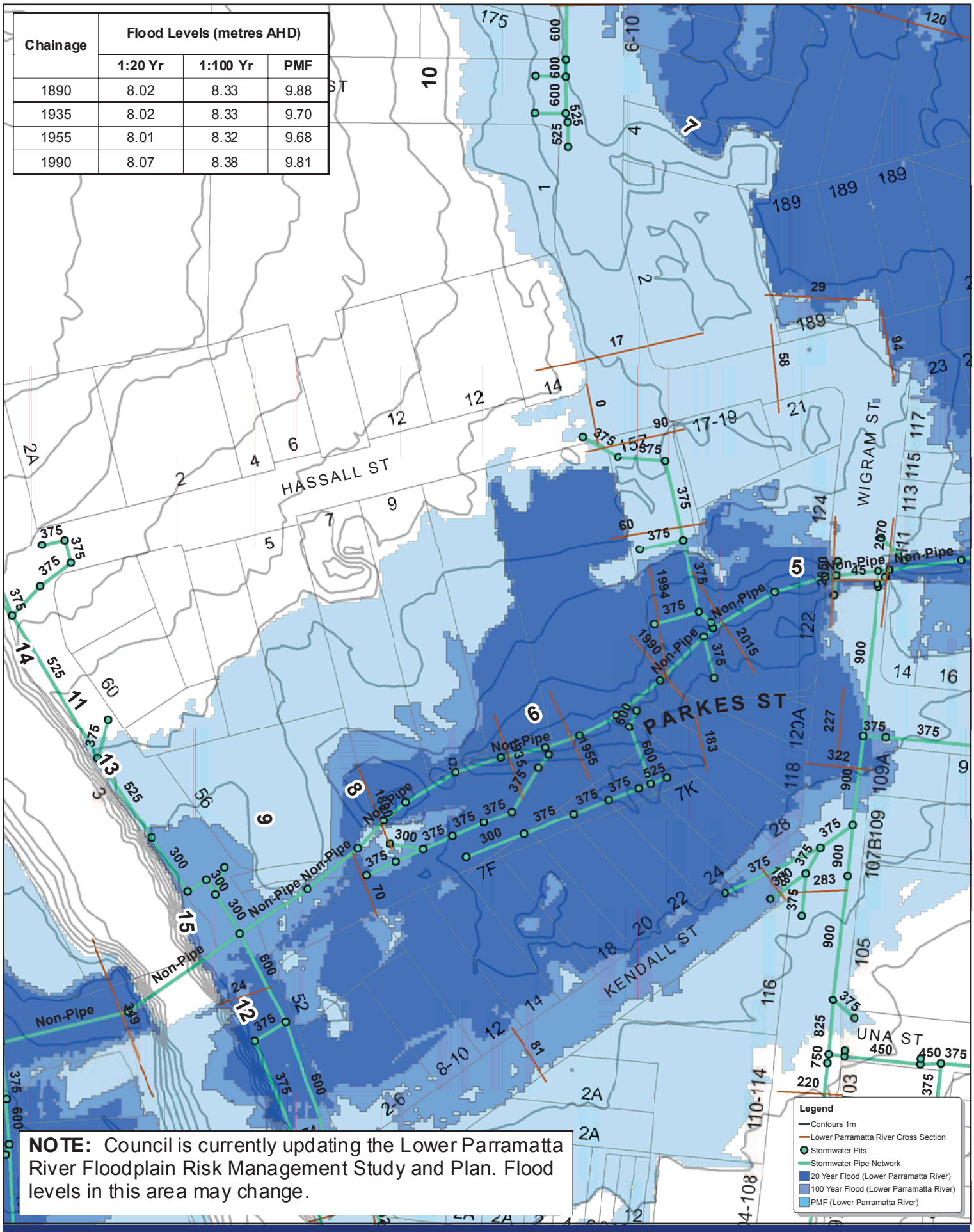
Additional Recommended Actions *(Please tick)*

☒	The Applicant needs to discuss the proposal to re-develop this site with Council's Town Planner and Development Services Engineer.
☒	The Applicant needs to contact Council's Town Planner and organise a pre-lodgement meeting to discuss any proposal to redevelop this property.
☒	The Applicant needs to refer to Council's Local Floodplain Risk Management policy for details relating to developing a land affected by flooding.

Definitions: (As per NSW Floodplain Development Manual dated April 2005)

1. **AHD** – a common national surface level datum approximately corresponding to mean sea level.
2. **ARI** – the long term average number of years between the occurrences of a flood as big as or larger than, the selected event.
3. **PMF** – is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation.
4. **PEA** – a small round green vegetable.

Chainage	Flood Levels (metres AHD)		
	1:20 Yr	1:100 Yr	PMF
1890	8.02	8.33	9.88
1935	8.02	8.33	9.70
1955	8.01	8.32	9.68
1990	8.07	8.38	9.81



NOTE: Council is currently updating the Lower Parramatta River Floodplain Risk Management Study and Plan. Flood levels in this area may change.

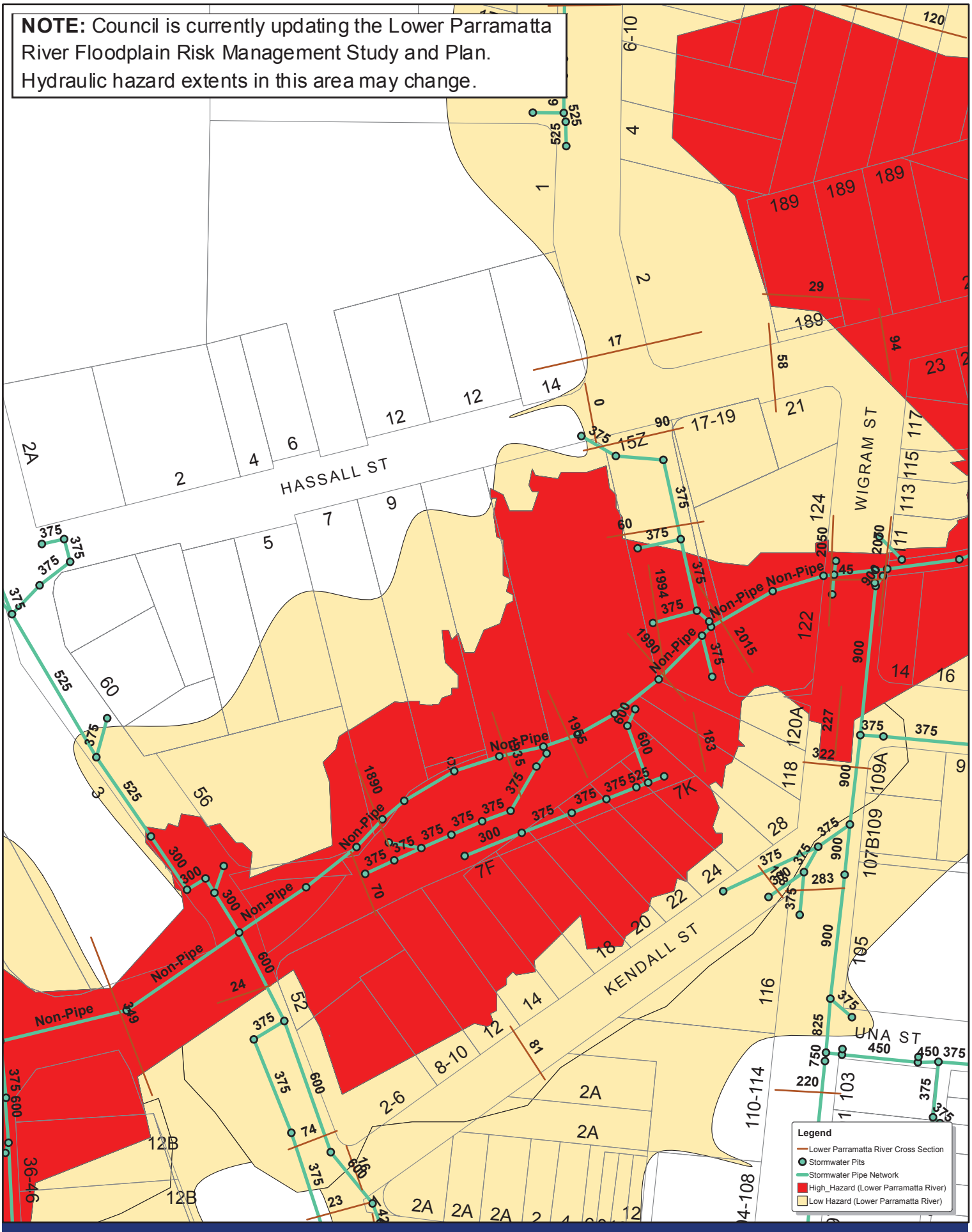
Parramatta City Council Flood Map

1:1,500

N

Printed 5/06/2014

NOTE: Council is currently updating the Lower Parramatta River Floodplain Risk Management Study and Plan. Hydraulic hazard extents in this area may change.



Parramatta City Council Flood Hazard Map

1:1,500

N

Printed 5/06/2014

Appendix B. Flood Storage Calculations

Figure B.1: Existing 100yr flood extents

Source: Insert source text here

Levels in red: 100yr flood levels, existing scenario
Contours: Existing surface profile from detailed survey

B.1 Volumetric Analysis of Flood Storage Existing vs. Proposed

Volumetric analyses using 12d civil design software (using the volume, tin to tin method) was undertaken on the digital terrain models of both the 'existing' site ground levels vs. 'existing' 1%AEP flood levels and the 'proposed' site ground levels vs. 'proposed' 1%AEP flood levels.

The abovementioned analysis indicates that the flood storage volume in the 'proposed' scenario of 12 m^3 is slightly lower than that of the 'existing' flood storage volume of 43 m^3.

Appendix C. TUFLOW Materials File Region

Mott MacDonald
Level 3, 90 Phillip Street
Parramatta, NSW 2150
Australia
PO Box 163, Parramatta
NSW 2124, Australia
T +61 (0)2 9891 5044
F +61 (0)2 9891 5386
W www.mottmac.com.au

Client: Cowper Constructions Pty Ltd

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	13.06.14	JM	Issued for Information	GL	CJA

Title: 11 Hassall Street, Parramatta
Flood Study
Tuflow mannings values
Figure 1

Drawn	JM
Checked	GL
Approved	CJA
Scale at A3	1:5000

Drawing Number: MMD-320754-C-DR-00-XX-FIG01

Status	Rev
PRE	P1

P:\Parramatta\Projects\32xxxx\320754\08 Hassall St Parramatta\06 CAD\6_4 Working drawings\Civil\Autocad\Sketches\MMD-320754-C-DR-00-XX-FIG01.dwg Jun 13, 2014 - 11:04AM mai57931

Appendix D. TUFLOW Modelling Results

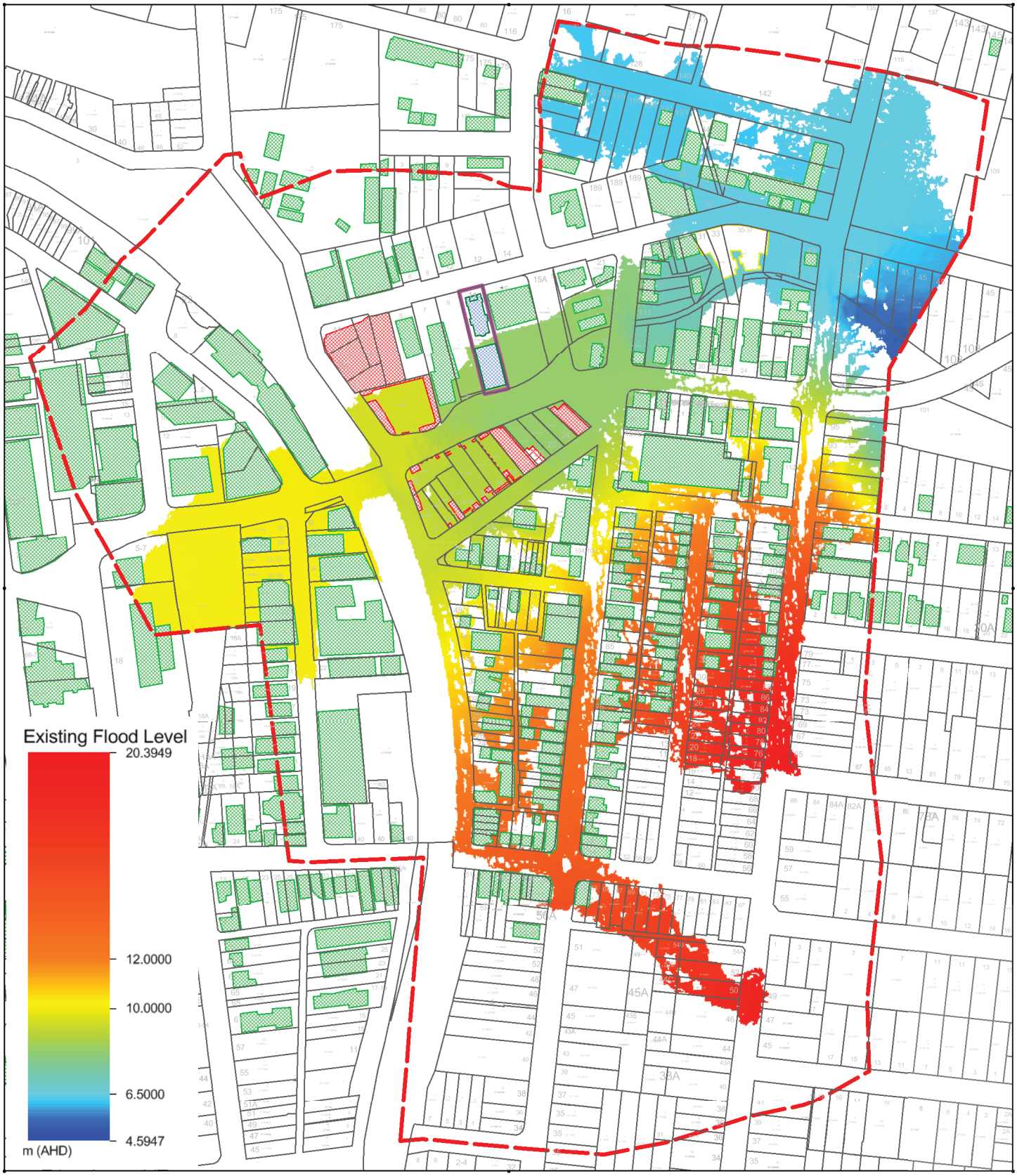
D.1 Existing Scenario – Flood Maps – 1% AEP

D.2 Proposed Scenario – Flood Maps – 1% AEP

D.3 Difference Maps – Existing vs. Proposed Scenario – 1 % AEP

D.4 Additional Modelling Scenario – Ultimate Condition – Flood Maps – 1% AEP

D.5 Difference Maps – Existing vs. Ultimate Scenario



Title

11 Hassall Street
100 year event
Flood Level

Mott MacDonald

N
W E
S

Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
28/05/2014	JM	GL	CA	NTS	MMD-Figure D.1	FI	A

Title

11 Hassall Street
100 year Event
Existing Flood Level

Mott MacDonald

25 0 m

N W E S

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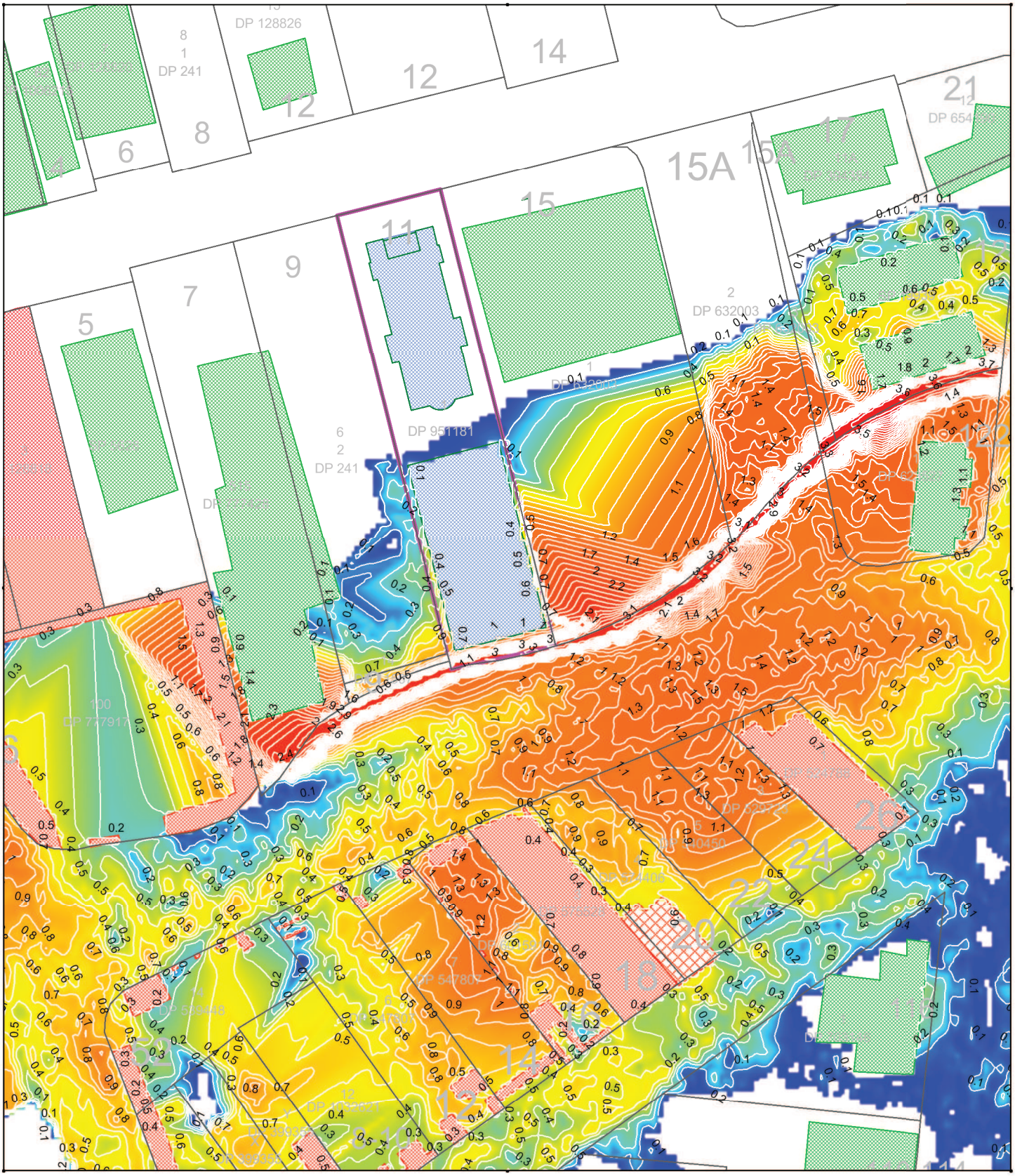

Title

11 Hassall Street
100 year Event
Existing Flood Depth (m)

Mott MacDonald

25 0 m

N W E S

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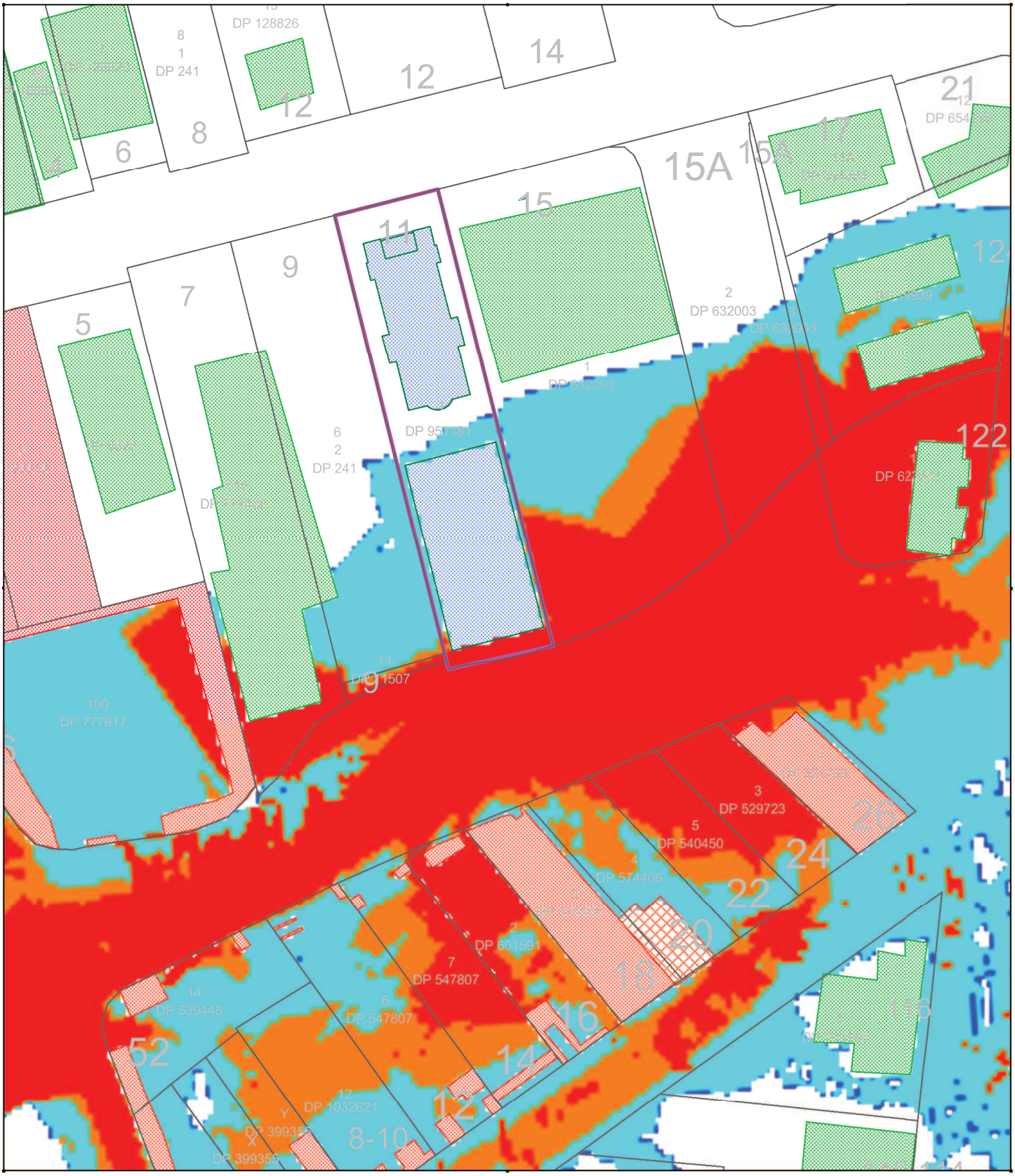

Title

11 Hassall Street
100 year Event
Existing Flood Hazard

Mott MacDonald

25 0 m

N W E S

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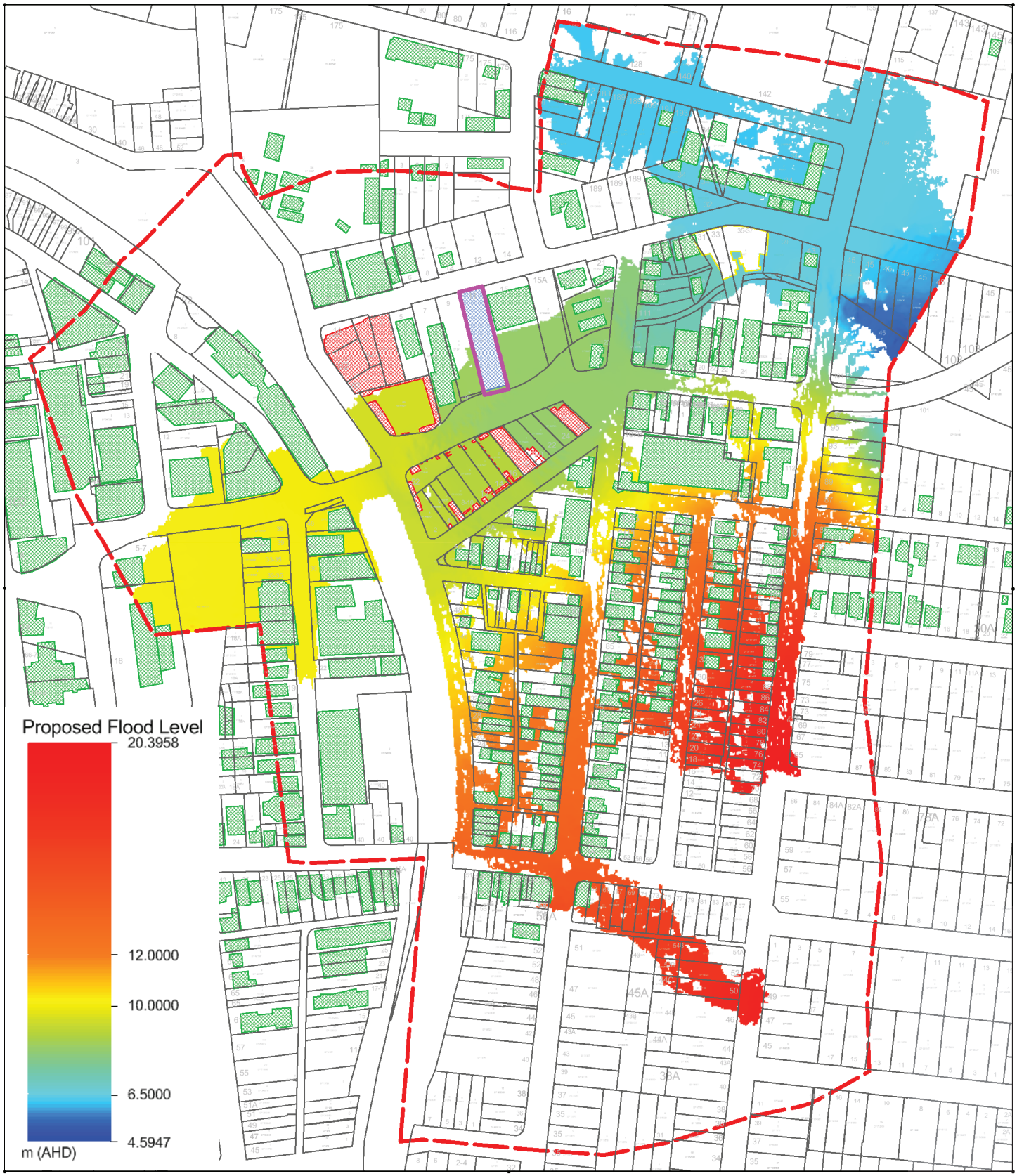

Title

11 Hassall Street
100 year Event
Proposed Flood Level

Mott MacDonald

N W E S

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28/05/2014	JM	GL	CA	NTS	MMD-Figure D.5	FI	A

Title

11 Hassall Street
100 year Event
Proposed Flood Level

Mott MacDonald

25 0 m

N W E S

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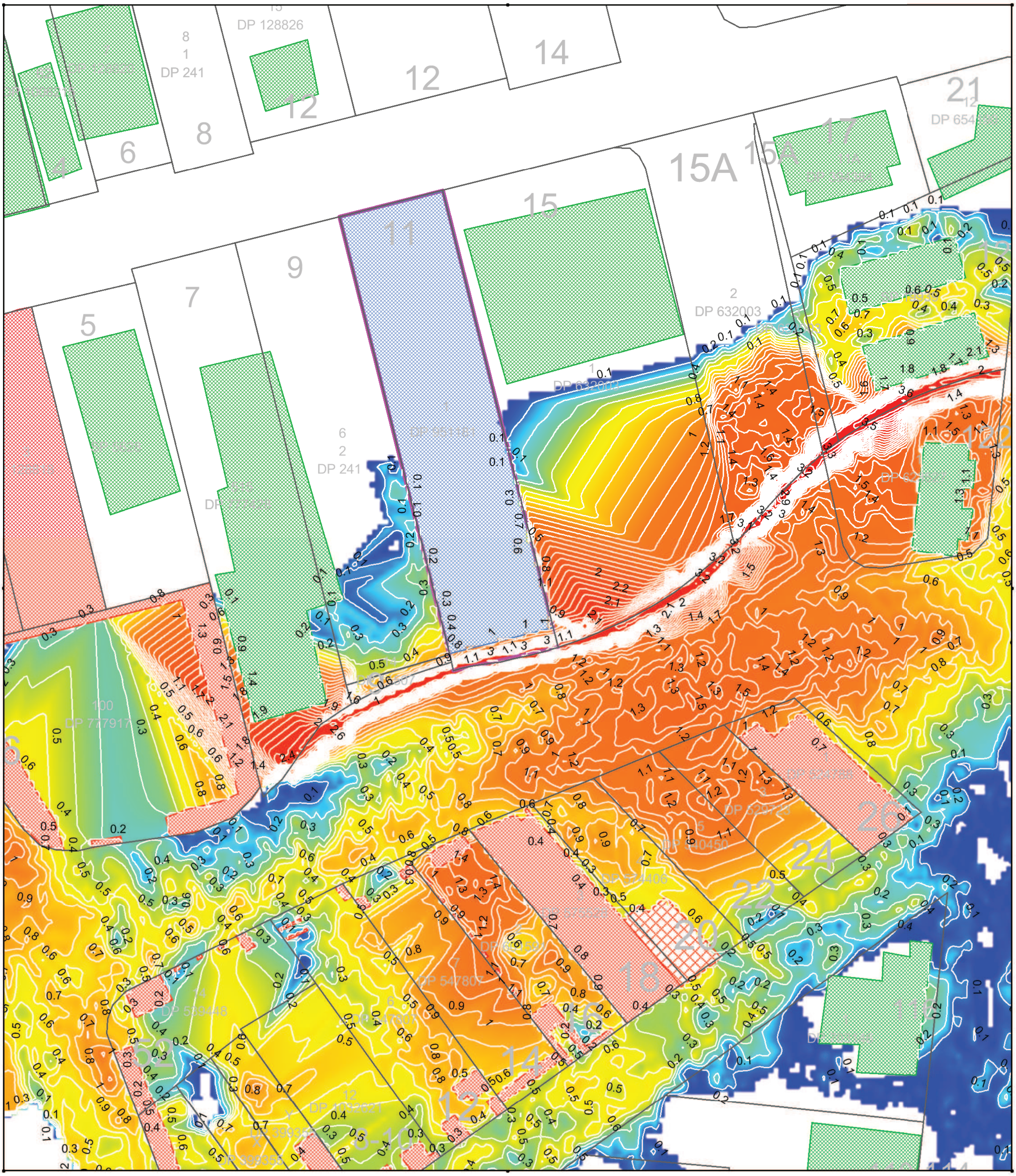


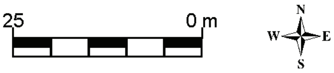
Title

11 Hassall Street

100 year Event

Proposed Flood Depth (m)

Mott MacDonald



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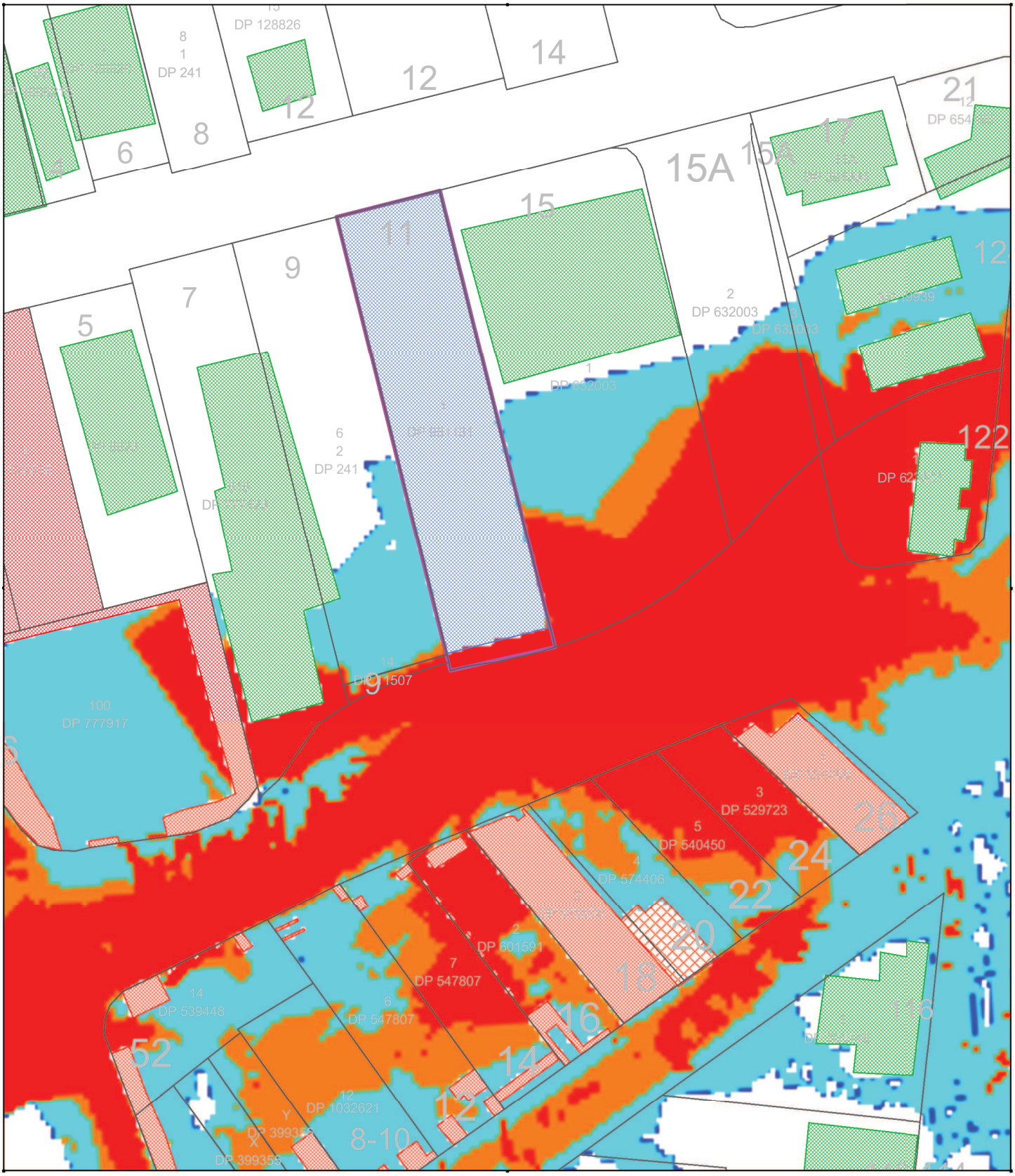

Title

11 Hassall Street
100 year Event
Proposed Flood Hazard

Mott MacDonald

25 0 m

N W E S

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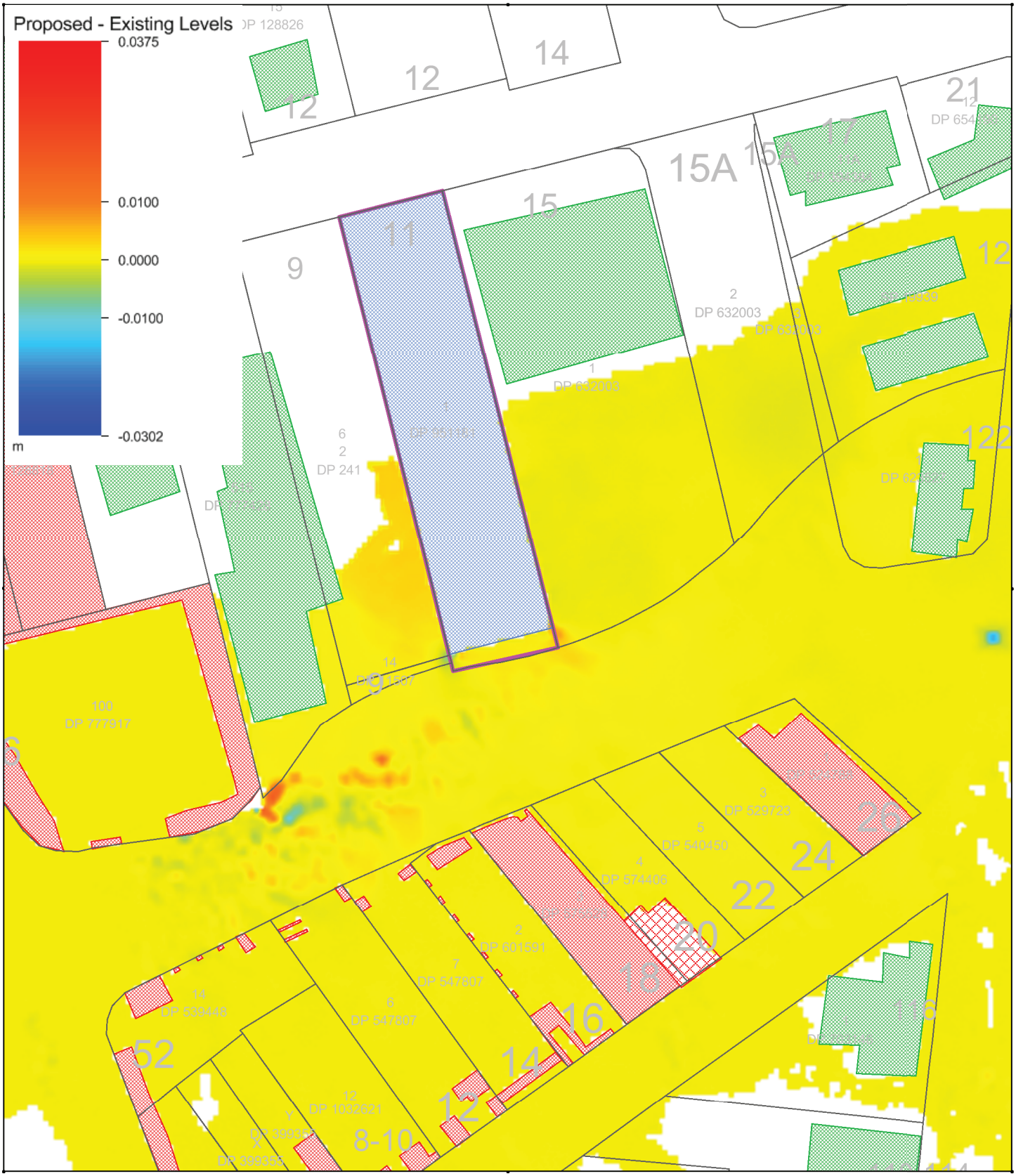

Title

11 Hassall Street
100 year Event
Proposed-Existing Level Difference

Mott MacDonald

25 0 m

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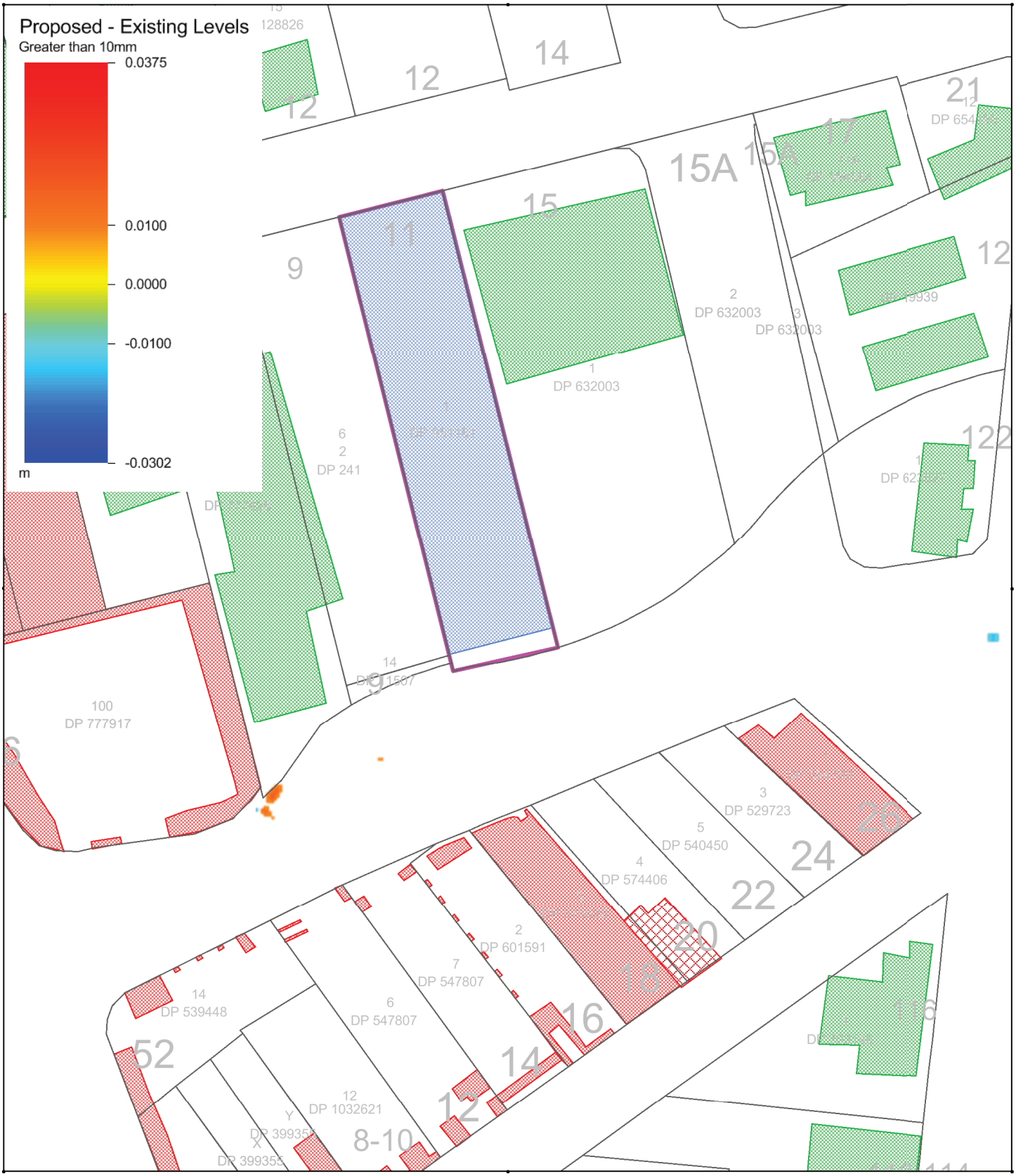

Title

11 Hassall Street
100 year Event
Proposed-Existing Level Difference

Mott MacDonald

25 0 m

N W E S

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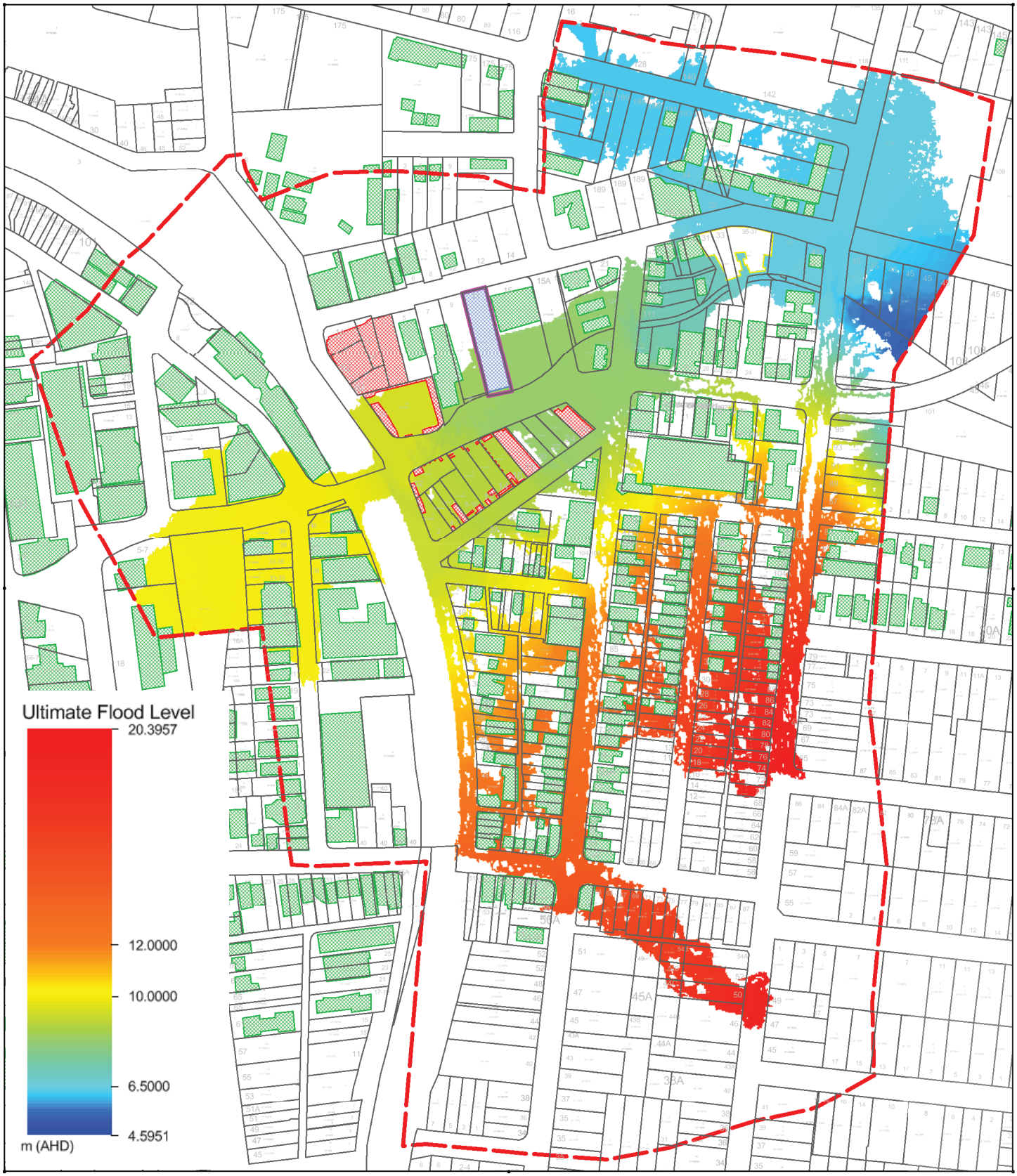

Title

11 Hassall Street
100 year Event
Ultimate conditions Flood Level

Mott MacDonald

N W E S

Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
28/05/2014	JM	GL	CA	NTS	MMD-Figure D.11	FI	A

Title

11 Hassall Street
100 year Event
Ultimate conditions Flood Level

Mott MacDonald

25 0 m

N W E S

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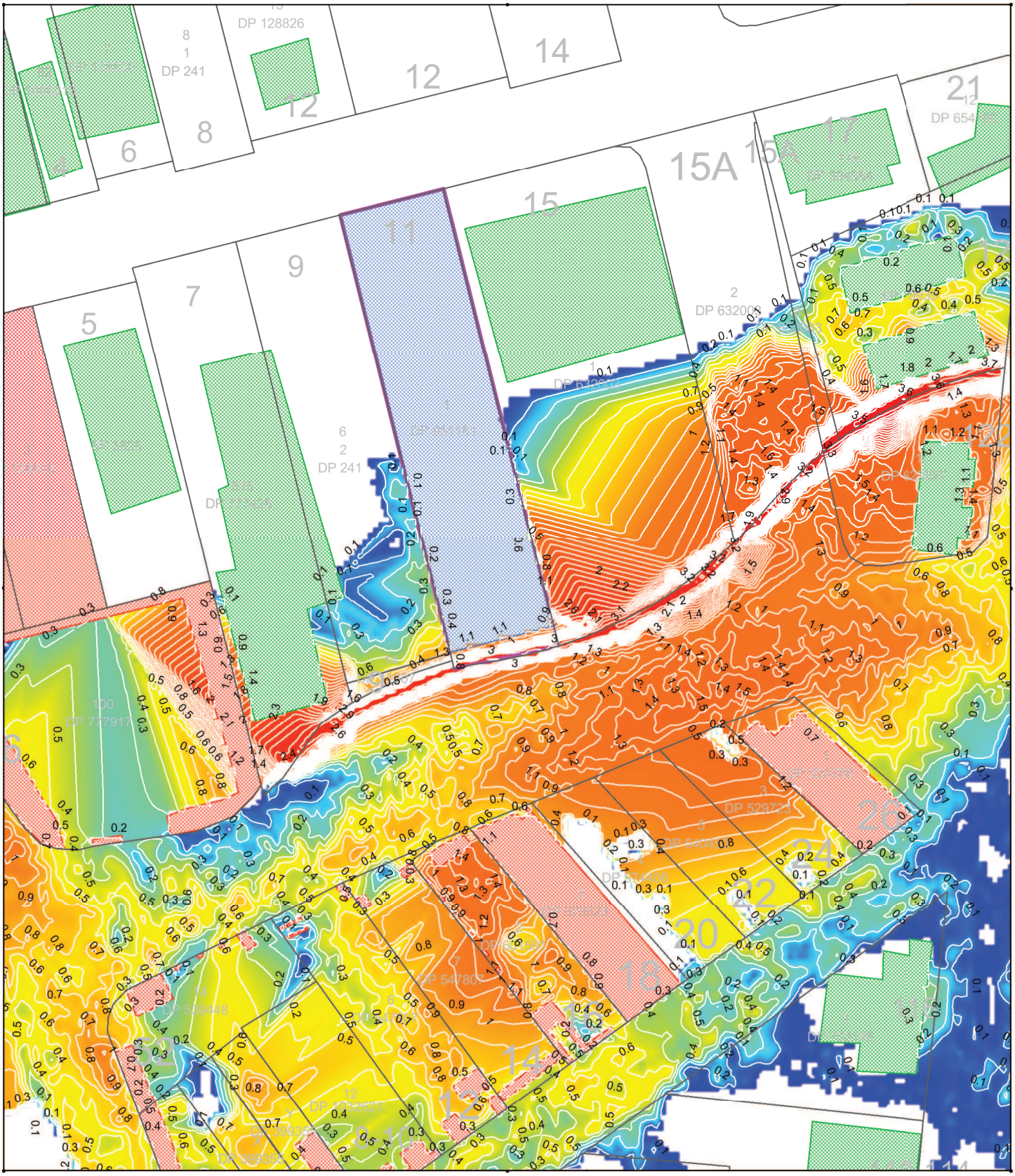

Title

11 Hassall Street
100 year Event
Ultimate conditions Flood Depth

Mott MacDonald

25 0 m

N W E S

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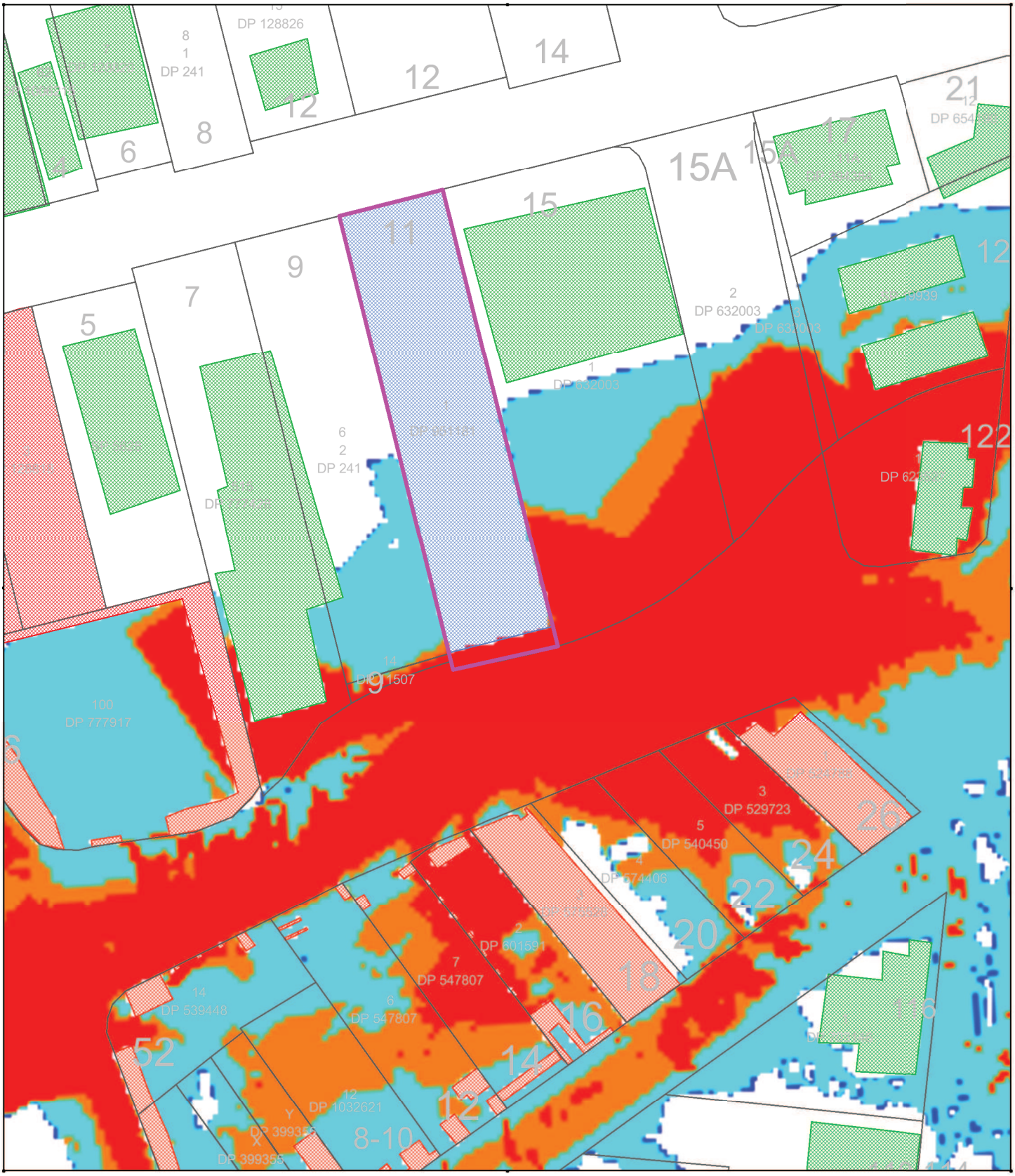

Title

11 Hassall Street
100 year Event
Ultimate conditions Flood Hazard

Mott MacDonald

25 0 m

N W E S

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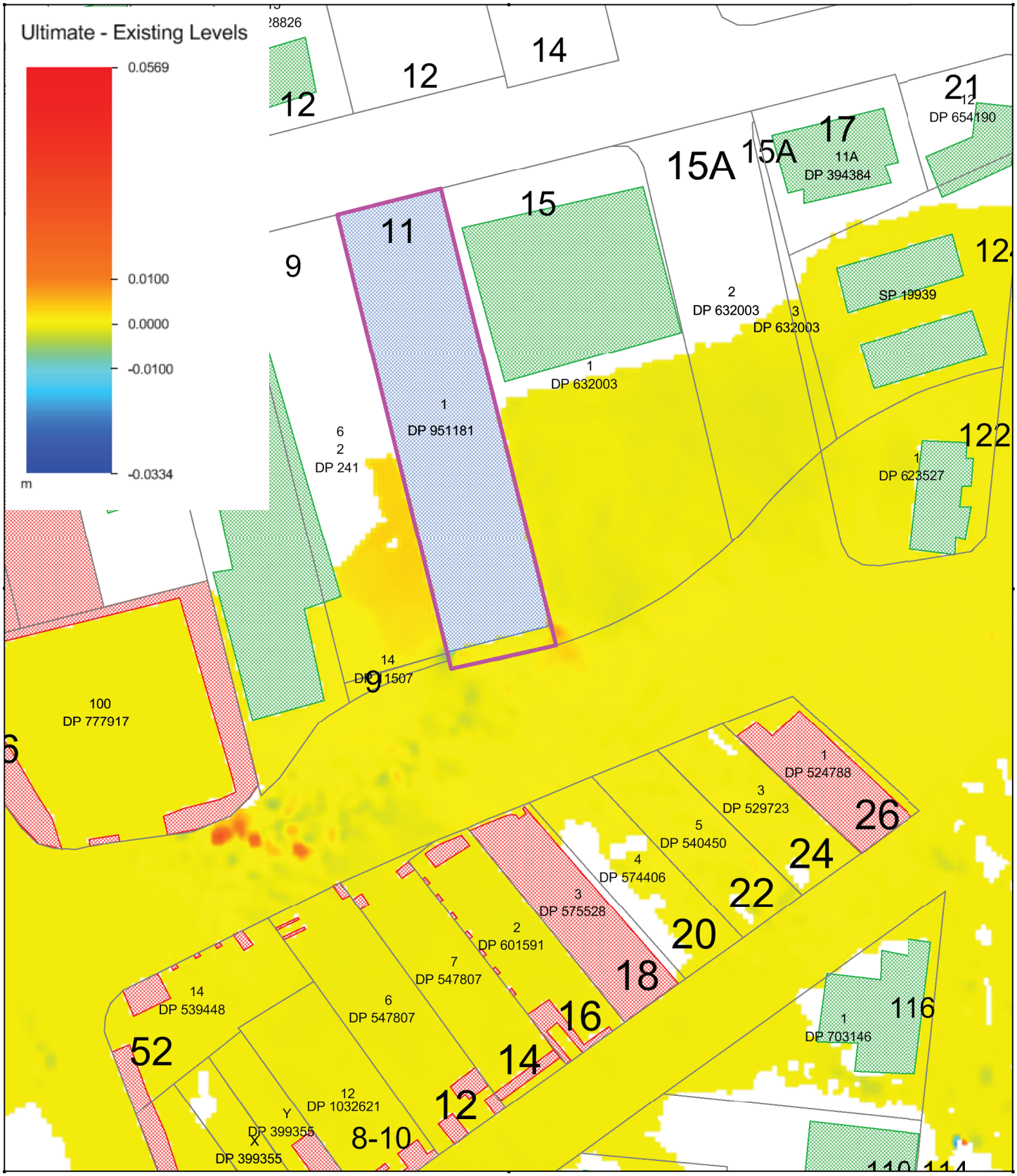


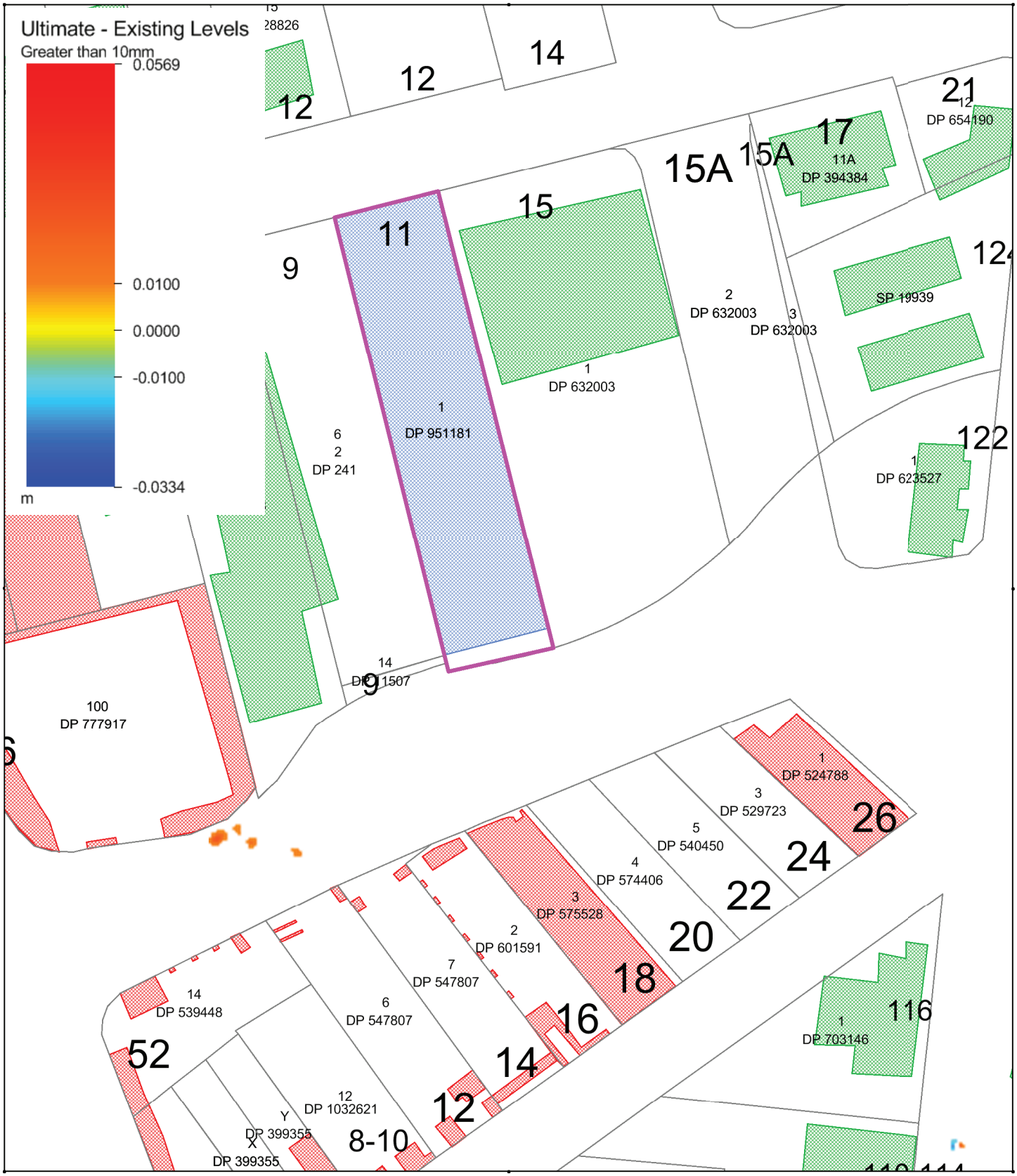
Title

11 Hassall Street
100 year Event
Ultimate-Existing Level Difference

Mott MacDonald

25 0 m

Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
06/06/2014	JM	GL	CA	1000	MMD-Figure D.15	FI	A

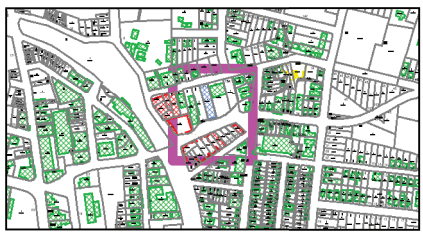


Title

11 Hassall Street
100 year Event
Ultimate-Existing Level Difference

Mott MacDonald

25 0 m



Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
06/06/2014	JM	GL	CA	1000	MMD-Figure D.16	FI	A

Appendix E. Flood Management Plan

FLOOD MANAGEMENT PLAN –
11 HASSALL STREET, PARRAMATTA

Background

Council has advised that this property is subject to flooding in a 1% Annual Exceedance Probability (AEP) (1 in 100 year ARI) storm event. The Probable Maximum Flood (PMF) is the highest flood level that is ever likely to occur, however it is extremely rare. Relevant levels are:

- The 5% AEP flood level is approximately RL 8.02 m AHD;
- The following 1% AEP flood levels are relevant at the southern two corners of the site;
    - South-western Corner (facing Parkes Street) – RL 8.33 m AHD;
    - South-eastern Corner (facing Parkes Street) – RL 8.32 m AHD; and
- The PMF level is RL 9.70 m AHD.

<u>Building</u>

- Ground Floor Level = 10.00 m AHD
- Mezzanine Floor Level = 12.80 m AHD
- Level 1 (Lowest habitable) - Podium = 16.10 m AHD

The above levels give an indication of how the various floods will impact this property. A Flood Evacuation procedure is provided below and shall be implemented in the event of an extreme flood event in order to provide sufficient time for evacuation to a suitable safe point.

General Information

- The property is situated in a flood storage area and is affected by flood waters which overtop the banks of Clay Cliff Creek during extreme events. Flowpaths are also present within the Parkes Street road reserve during large storm events.
- During a 5% AEP flood event (1 in 20 years), Parkes Street will be affected by flooding. Traveling through floodwaters on foot or in a vehicle can be very dangerous as obstructions can be hidden under the floodwaters, or you could be swept away, even in a car. **All residents and visitors are advised to follow instructions from the Flood Management Plan for directions to evacuation points and safe areas.**
- If there is time prior to evacuation gather medicines, food, mobile phones, first aid kit, special papers and any small valuables into a bag in one location.
- Ground Floor is the primary evacuation point in the event of major flooding. Residents and visitors should evacuate up to higher levels of the building using the stairs.
- During large storm events, the safest evacuation option is to remain within the building on Ground Floor or higher. Due to the fast rising nature of flood waters in the precinct, the surrounding road network will flood quickly and can become unsafe for both cars and pedestrians. It is recommended that residents and visitors do not leave the site unless it is absolutely necessary.

- Whilst vehicular entry to the basement is above the PMF flood level, it is important to note that surrounding streets may be inundated with water and unsafe to travel through by foot or by vehicle.
- Flood depth markers and signage are provided at the south west corner of the site adjacent the Parkes Street floodway which may become flooded in large storm events.
  - In the event that the southern end of the site becomes inundated to a depth of 0.3m (i.e. RL7.5) residents/tenants are to be notified that travelling from the site may be unsafe as surrounding streets may be flooded.
  - Residents will instead be instructed by the building emergency management system to relocate to Ground Floor (or above) of the building.
  - Do not evacuate the building at this time and wait until the flood recedes. Remember floodwaters are much deeper and run much faster outside.
- In the case of a medical or other life threatening emergency ring 000 as normal, but explain the flooding situation.
- A laminated copy of this flood plan should be permanently attached (glued) adjacent to the exits on all Basement levels, the Ground floor, Level 1 and Level 2 of the building.

Procedure

The following evacuation procedure shall be implemented for the safe evacuation of pedestrians above the PMF.

Safe points above the PMF are available and include:

- Ground Floor and above within the building,

Stair access to Ground, Mezzanine and Levels 1 - Roof (which are above the PMF) is provided on basement levels.

Evacuation procedures to these safe points include the following steps:

- Depth gauge signage shall be placed along the carpark entrance and at the Hassall Street stair access of the proposed development.
- During large storm events, the safest evacuation option is to remain within the building on Ground Floor or higher. Due to the fast rising nature of flood waters in the precinct, the surrounding road network will flood quickly and can become unsafe for both cars and pedestrians. It is recommended that residents and visitors do not leave the site unless it is absolutely necessary.
- If residents and visitors should need to evacuate the site, they should leave the site from the Hassall Street frontage. It is also recommended that residents and visitors avoid the Parkes Street frontage as flood waters will be considerably deeper on the southern side of the development.
- When flood waters reach a depth of 0.3m at the footpath along Hassall Street, it is considered unsafe for vehicles and pedestrians to leave the property (vehicles are deemed to be unstable in flood depths >= 300mm). When flood levels reach this point, it is recommended that residents do not attempt to exit the site as surrounding roads become inundated during large events.
- Once the flood levels in the development site approach RL9.70 (PMF) a siren will sound with flashing lights and the Security Entry Gate will close on the basement carpark. Vehicles will no longer be allowed to leave the development.

- An alarm will sound throughout the buildings emergency management system, alerting residents of the hazards and instructing them to evacuate the basement and proceed to higher levels of the development.
- Residents and visitors are instructed by the Flood Management Plan to seek shelter within Ground Floor of the building which is at RL 10.00 m AHD and above the PMF level. Stair access is available for evacuation to Mezzanine and higher in the occurrence of extreme flood events until flooding alleviates.
- Residents and visitors are instructed by the Flood Management Plan not to evacuate the building at this time and wait until the flood recedes.