St George Community Housing Limited

Proposed Residential Units
9-11 Edgeworth Place, Cartwright

Subject Site at 9-11 Edgeworth Place, Cartwright

Flood Assessment Report

August 2016

FloodMit

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August 2016

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1 INTRODUCTION

FloodMit Pty Ltd was commissioned by St George Community Housing Limited to provide a flood assessment report to accompany an application for a proposed six storey residential unit development at 9-11 Edgeworth Place, Cartwright (Lots 502 & 503 DP 236840).

A locality plan is included at **Figure 1**.

It is understood that the proposed development will provide low cost community housing. An adjacent unit complex at 249-251 Hoxton Park Road similarly provides low cost community housing, and some integration of communal areas from the two sites has been proposed.

The site occupies an area of approximately 1,170m^2 on land zoned R4 High Density Residential under Liverpool LEP 2008. The site has access to both Edgeworth Place and a slip road to Hoxton Park Road. Two single storey residential brick dwellings with detached garages currently occupy the site.

The proposed development at ground level is shown on **Figure 2**. It includes a six storey residential development incorporating a total of 31 units (five one bedroom and 26 two bedroom). It integrates with the adjacent community housing provided at 249-251 Hoxton Park Road, including shared driveway (within the adjacent property), shared parking and communal open space at the top of the new building. The proposed building footprint (at ground level) has been digitised and included on subsequent figures for reference purposes.

The site is within the Cabramatta Creek catchment, between Cabramatta Creek and Maxwells Creek. The site has been identified by Liverpool Council as being within the flood planning area (ie within the 100 year flood level plus 0.5m freeboard). It is therefore subject to a number of flood risk management development controls, including minimum floor level requirements.

A comprehensive flood model for Cabramatta Creek was developed for Liverpool Council as part of the Cabramatta Creek Flood Study and Basin Strategy Review (Bewsher 2011). The flood model is a two-dimensional hydraulic model, known as TUFLOW, which includes the subject site. Information from this model has been used in this flood assessment report.

This report provides a flood assessment of the proposed development, including:

i) a review of flood behaviour;

ii) an assessment of potential flood impacts due to the development; and

iii) an assessment of the proposal in terms of Council's flood risk management policies.

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Date: 15/2/16

Figure 1
Locality and Subject Site

9-11 Edgeworth Place

249-251 Hoxton Park Road

EDGEWORTH PLACE

HOXTON PARK ROAD

Site Boundary

New 1800 high Fence

New Entry gate & fence

Communal Open Space
RL. +20.130

High Screening plants

RL. +21.100

Bicycle Parking (6)

Cleaner's Store

Fire Hydrant Pump Room

Drying Yard
RL. +20.850

2B
A: 70 m²

G.01

G.02

G.03

G.04

1B
A: 51 m²

Rainwater Tank & onsite detention tanks below

Car Park (15 Spaces)

Small car space

Existing Pergola

New Path

Lobby
RL. +21.100

WC

Combined Bin Room (52)
24 x General Waste
24 x Recycling
4 x Green bins
RL. +20.800

Switch Room
RL. +21.100

Shared Zone
1:40 FALL

Substation to future detail

Fire Hydrant & Sprinkler Booster

Lot Boundary

Line of building above

POTENTIAL FUTURE DEVELOPMENT

EXISTING NO. 7 SINGLE STOREY BRICK RESIDENCE

New 1800h fence

6m Habitable Setback

3m Non-Habitable Setback

6m Habitable Setback

Entry

Car Park Entry

Feature brick & metal screen wall in front of car park

H03
Living/ Dining

Bed 1

H02
Living/ Dining

Bed 1

H01
Living/ Dining

Lobby
RL. +20.670

Bath

Storage

Fire Stair

Waste Room

Bed 1

Bed 1

Ex. Diesel Pump Room

0 1 2 3 4 5

Figure 2

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A	Development Application Issue	24/08/2016
B	Development Application Issue	31/08/2016

Project Name	SGCH Cartwright
Project Number	11363
Date	31/08/2016
Scale	1:200@A3

Drawing Name	Ground Floor Plan
Drawing Number	**DA0200**
Revision	A

2 REVIEW OF FLOOD BEHAVIOUR

2.1 SOURCE OF INFORMATION

The site is within the Cabramatta Creek catchment. A number of flood studies and other investigations have been undertaken within the Cabramatta Creek catchment, the most relevant to the current proposal include:

i) The Cabramatta Creek Floodplain Management Study and Plan (Bewsher, 2004); and

ii) Cabramatta Creek Flood Study and Basin Strategy Review (Bewsher, 2011).

The Cabramatta Creek Floodplain Management Study and Plan was a comprehensive study of flooding and floodplain management measures to manage the risk of flooding within the Cabramatta Creek catchment. The report was originally prepared in 1999, and updated in 2004. Design flood levels were determined using the RAFTS hydrologic model to estimate catchment flows and an RMA-2 hydraulic model to estimated flood levels within the main waterways and floodplain. These models were based on aerial photography and photogrammetric survey that was undertaken in 1996.

The Cabramatta Creek Flood Study and Basin Strategy Review was commissioned by Liverpool City Council in 2008 to review flood behaviour within the catchment. The review is based on aerial photography flown in 2007 and LIDAR survey acquired by Council in 2008. The study uses the same RAFTS hydrologic model as the previous study, but uses a more sophisticated two-dimensional hydraulic model (TUFLOW) to estimate flood levels throughout the catchment. The study also incorporates changes that have occurred within the catchment since 1996, including:

i) the construction of the M7 Motorway;

ii) other infrastructure within the catchment;

iii) new release area development; and

iv) construction of a number of new detention basins within the catchment;

The study was exhibited during 2011, and has since been formally adopted by Council. Flood Levels and flood mapping quoted in this report are sourced from this study.

2.2 DESCRIPTION OF FLOODING

The Flood Study (Bewsher 2011) considers flood behaviour over three different catchment conditions. These conditions relate to:

i) Previous (1989) conditions;

ii) Existing (2008) conditions; and

iii) Future (2026) conditions.

Flood conditions within the subject site are similar under existing (2008) conditions and future (2026 conditions). Consequently flood behaviour in this report is quoted for existing (2008) conditions.

The extent of flooding and flood level contours in a 100 year flood is illustrated on **Figure 3**.

The main Cabramatta Creek culvert under Hoxton Park Road is overtopped approximately 1.2km to the west of the subject site. A flowpath is also established on the upstream side of Hoxton Park Road along the south side of the road, flowing in an easterly direction. This

flowpath crosses to the northern side of Hoxton Park Road opposite Mawson Drive, and continues along the northern side of Hoxton Park Road towards the subject site. Selwyn Place, Edgeworth Place, and Woolnough Place are affected by this flowpath. The depth of inundation in Edgeworth Place typically varies from 0.6m to 1.0m in the 100 year flood. The depth of flooding within the subject site typically varies from 0.0 to 0.4m.

Subsequent to the flood study (Bewsher 2011), Council reviewed the potential overtopping of Hoxton Park Road from this flowpath, and concluded that overtopping at this location was unlikely in events up to the 100 year flood. It is understood that this was based on a review of more recently acquired centreline road levels against the flood levels predicted by the flood model. Consequently the flowpath along Hoxton Park Road was deleted from Council mapping. This is reflected in Council's latest flood risk maps that classify the subject site as "Low Flood Risk". This implies that the site would only be inundated in events more extreme than a 100 year flood.

Flood Planning maps were more recently prepared for Council, which indicate those areas of the floodplain that are within Council's flood planning level (the 100 year flood plus 0.5m freeboard). This is the area where new residential development is subject to minimum floor level controls. The flood planning map in the vicinity of the subject site is shown on **Figure 4**. The subject site has been identified as being within the residential flood planning area, and consequently minimum floor levels will apply to new development.

2.3 DESIGN FLOOD LEVELS

Design flood levels for the subject site are provided in **Table 1**.

The flood level for the 100 year flood has been nominated based on results from the TUFLOW model (Bewsher 2011) despite Council's conclusion that this flowpath may not exist in floods up to the 100 year event. This decision is based on the fact that:

i) a 100 year flood level for the site is required in order to establish minimum floor level controls, and the level predicted in the TUFLOW model is the best currently available;

ii) floods slightly larger than a 100 year event could still be expected to overtop Hoxton Park Road to form a similar flowpath predicted by the flood model; and

iii) it provides a conservative estimate of flood conditions affecting the site.

Table 1
Design Flood Levels for the Subject Site
9-11 Edgeworth Place, Cartwright
(Source : Bewsher, 2011)

Design Flood (Average Recurrence Interval)	Maximum Flood Level within Site (m AHD)
20 Year Flood	N/A
50 Year Flood	N/A
100 Year Flood	20.6
Probable Maximum Flood (PMF)	21.6

2.4 CLASSIFICATION OF FLOOD RISK

The Cabramatta Creek Floodplain Management Study and Plan categorised the floodplain into three different flood risk areas. These include:

High Flood Risk – Land below the 100 year flood that is subject to a high hydraulic hazard or where there are significant evacuation issues;

Medium Flood Risk – Land below the 100 year flood that is not subject to a high hydraulic hazard and where there are no significant evacuation issues;

Low Flood Risk – Land that is above the 100 year food, but still potentially affect by floods up to the probable maximum flood (PMF).

The flood risk maps were updated as part of the Cabramatta Creek Flood Study and Basin Strategy Review, and have been further reviewed by Council officers. The current flood risk mapping in the vicinity of the subject site is shown on **Figure 5**.

The entire area of the subject site has been classified by Council as having a *Low Flood Risk*.

N

0 100 200
meters

Cabramatta Creek

Winamatta Dr

Cartwright Ave

Mawson Dr

Selwyn Pl

Edgeworth Pl

Woolnough Pl

Hoxton Park Road

Subject Site
9-11 Edgeworth Place

Ash Road

Lyn Pde

Wyalla Pl

Maxwells Creek

17.0
18.0
19.0
20.0
20.2
20.4
20.6
20.8
21.0
22.0
22.6
19.6

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Figure 3
100 Year Flood Extent and
Flood Level Contours (m AHD)

(Source: Bewsher, 2011)

N

0 100 200

meters

Cabramatta Creek

Cartwright Ave

Winamatta Dr

Mawson Dr

Selwyn Pl

Edgeworth Pl

Woolnough Pl

Hoxton Park Road

Subject Site
9-11 Edgeworth Place

Wyalla Pl

Ash Road

Lyn Pde

Maxwells Creek

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Figure 4
Residential Flood Planning Area
(100 Year + 0.5m Freeboard)

(Source: FloodMit, 2015)

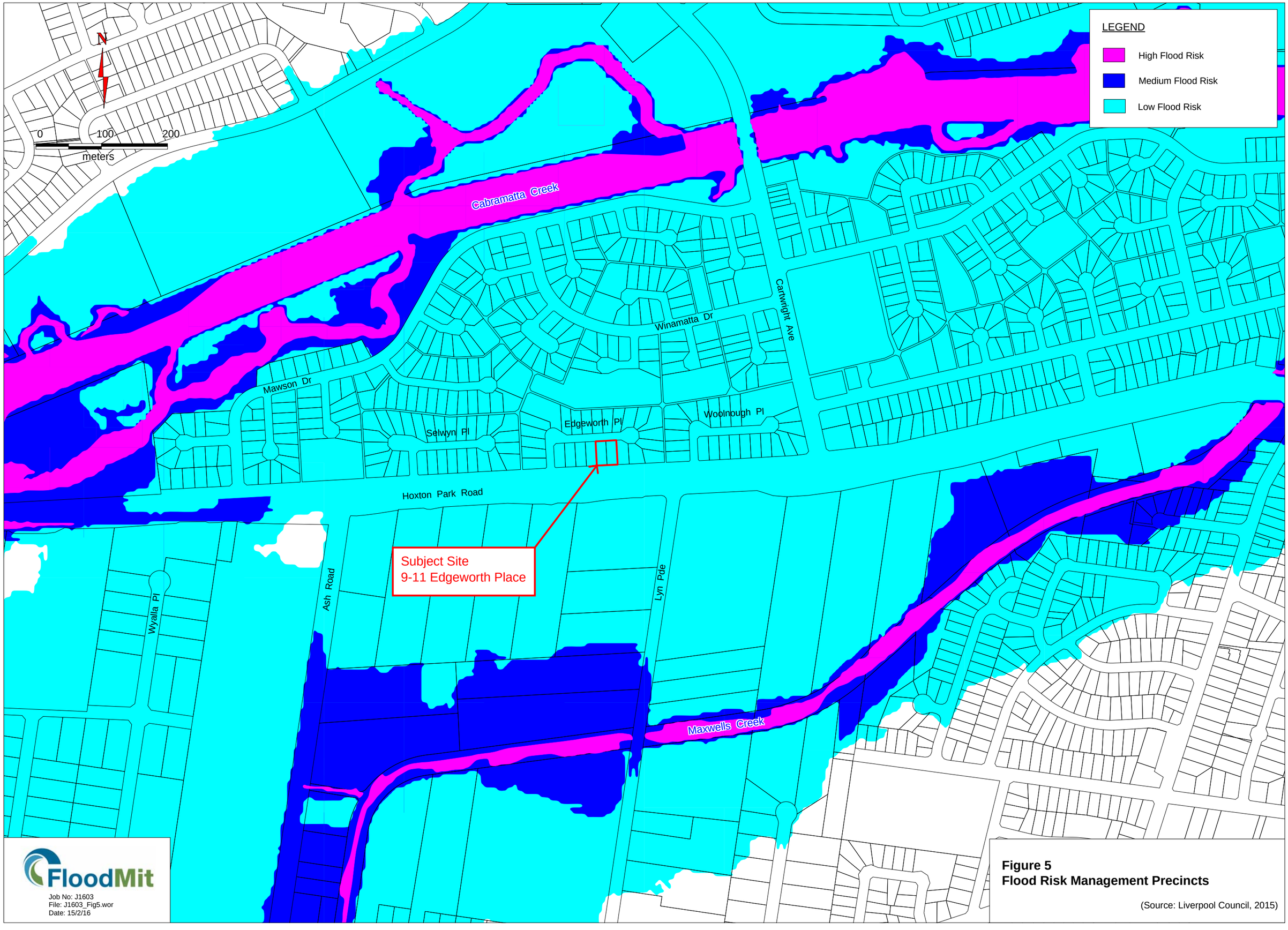

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Figure 5
Flood Risk Management Precincts

(Source: Liverpool Council, 2015)

3 PROPOSED SITE WORKS

3.1 SITE SURVEY

A site survey was undertaken by Norton Survey Partners on 22nd January 2016. The survey includes site features, ground levels, and contours at 0.5m intervals.

The TUFLOW flood model results, including the extent of flood inundation, is based on the results of a digital elevation model that was prepared from LIDAR survey acquired by Liverpool City Council in 2008. A comparison of the digital elevation model and the site survey has been made to determine whether the LIDAR survey provides an accurate depiction of the surface terrain across the site.

The original comparison indicated differences between the two survey sources of between 0.8 to 0.9m. This was referred back to the survey team who found an anomaly with the bench mark PM level that the survey was based on. This was subsequently corrected and an amended survey issued on 1st February 2016.

Some 87 surveyed ground levels within and immediately adjacent to the subject site were extracted from the amended survey and compared with the corresponding level derived from the digital elevation model from the 2008 LIDAR survey. The mean difference for all points compared was determined to be +0.125m. That is, the site survey is on average 0.125m above the LIDAR survey. This difference is within the tolerance of the LIDAR survey, but is still greater than would normally be expected.

The 87 surveyed ground levels were then compared with corresponding levels derived from a separate digital elevation model derived from 2011 LIDAR survey. This provided much better agreement with the mean difference for all points determined to be -0.019m. A map showing the difference between the survey ground level and the corresponding 2011 LIDAR level is provided on **Figure 6**.

This comparison indicates that the 2008 LIDAR, which forms the basis of the TUFLOW model terrain, is typically 0.1m lower than both the site survey and the more recent 2011 LIDAR survey in the vicinity of the subject site. This suggests that the depth and extent of inundation within the subject site predicted by the TUFLOW model could be overstated in the 100 year flood.

3.2 PROPOSED SITE DEVELOPMENT

It is proposed to remove the two existing dwellings and detached garages from 9-11 Edgeworth Place, Cartwright and to construct a six storey residential block of units to provide low cost community housing.

A total of 31 units have been proposed, including 5 one bedroom units and 26 two bedroom units.

The new block is adjacent to an existing four storey block of units at 249-251 Hoxton Park Road that also provide low cost community housing. It has been proposed to integrate the new development with the adjacent block, including shared driveway (within the adjacent property), additional parking (within the subject site), and a communal open space area at the top level of the new building.

Development proposed at ground level, shown on Figure 2, has the potential to impact on flood behaviour. Ground level development includes:

i) entrance lobby and four ground floor units with a finished floor level of RL 21.1m AHD (0.5m above the 100 year flood level from the TUFLOW model);

ii) minor rooms to accommodate switch room (RL 21.1m AHD), bin storage and fire hydrant pump (the floor level for the fire hydrant pump is not specified, but all electrical wiring and equipment susceptible to flood damage should be located above RL 21.1m AHD);

iii) open space parking for 15 cars within the subject site at ground level;

iv) removal of the boundary fence between the subject site and the adjacent units;

v) use of the existing driveway through the adjacent property to provide access to the slip road to Hoxton Park Road.

The building footprint at ground level is located towards the western boundary of the subject site. This opens up the space at ground level between the proposed units and the existing units on the adjacent property. This unobstructed space coincides with the lowest landform within the subject site and importantly allows any ponded floodwater "trapped" within Edgeworth Avenue to drain back to Hoxton Park Road. This is illustrated in **Figure 7**, and is further discussed below.

3.3 POTENTIAL IMPACT ON FLOODING

The proposed development could potentially impact on flood behaviour through either:

i) a loss in flood storage volume in areas previously inundated: or

ii) a reduction in flow conveyance within active flowpath areas.

These are reviewed in the following sections.

3.4 FLOOD STORAGE REVIEW

The change in flood storage volume in the 100 year flood has been determined by integrating the flood depth grid from the TUFLOW model over the proposed ground floor building footprints and comparing this with the volume over the existing dwelling footprints on the two lots. The comparison is shown in Table 2.

Table 2
Change in Flood Storage Volume (100 Year Flood)

Location	Area (m^2)	Av depth (m)	Storage (m^3)
Existing Situation			
Dwelling @ 9 Edgeworth Ave	103	0.10	11
Dwelling @ 11 Edgeworth Ave	141	0.29	37
Total Existing			48
Proposed Development			
Ground floor unit footprint	379	0.18	65
LOSS IN STORAGE			17

The proposed development results in a loss in flood storage volume of 17m^3 in the 100 year flood. This is considered to be a minor change, and is considered to be negligible for the following reasons:

i) Council's amended mapping show the entire site to be within a Low Flood Risk precinct, which implies that it is not affected by the 100 year flood and consequently there would be no loss in flood storage in such an event;

ii) The TUFLOW model results rely on a terrain surface derived from 2008 LIDAR survey, which was shown to be on average 0.1m lower than both the site survey and a more recent 2011 LIDAR survey in this vicinity. Consequently the depth of flooding within the site is likely to be overstated in the TUFLOW model and any loss in storage volume similarly overstated;

iii) The calculation ignores any loss in storage from other ancillary structures within the existing development, including garages and other structures;

iv) Any minor loss in flood storage will be more than compensated by the improved conveyance across the eastern low-lying part of the site towards Hoxton Park Road.

3.5 CHANGES TO FLOW CONVEYANCE

Edgeworth Place is within a natural depression, with the roadway at least 1.0m lower than the surrounding terrain. The existing stormwater drainage system relies on an 825mm diameter stormwater pipe at the end of Edgeworth Place to divert stormwater runoff to Cabramatta Creek. Whilst this is sufficient for the local catchment area (2.9Ha), it is unlikely to be sufficient to cope with any flowpaths from the Cabramatta Creek catchment that overtop Hoxton Park Road.

Whilst Council has deemed this unlikely to occur in a 100 year flood, it could still happen in slightly more severe events, and should still be considered. Any flowpath from the upstream catchment that overtops Hoxton Park Road is diverted towards Edgeworth Place, where it will pond until it reaches a height where it can once again flow out to Hoxton Park Road. Potential outflow locations are shown on **Figure 7**. The first outflow occurs at RL 20.6m AHD (which is the estimated 100 year flood level in the TUFLOW model) which occurs near the boundary of the subject site and the adjacent block of units at 249-251 Hoxton Park Road. A second outflow location to Hoxton Park Road occurs at RL 20.7m AHD further to the east. Finally, a third outflow occurs at RL 20.8m AHD which allows floodwater to spill to the north towards Cabramatta Creek.

It is important that the new development does not impede the first outflow path to Hoxton Park Road, or flood levels within Edgeworth Place could potentially increase by up to 0.2m.

The proposed ground floor development footprint maximises the unobstructed flowpath over the low lying area between the subject site and the adjacent block of units. The removal of the existing dwelling at 11 Edgeworth Place will further improve the conveyance of floodwater along this flowpath to Hoxton Park Road.

It is considered that the proposed development will improve the flow conveyance from Edgeworth Place back to Hoxton Park Road, and will consequently have a positive impact on reducing flood levels within this vicinity.

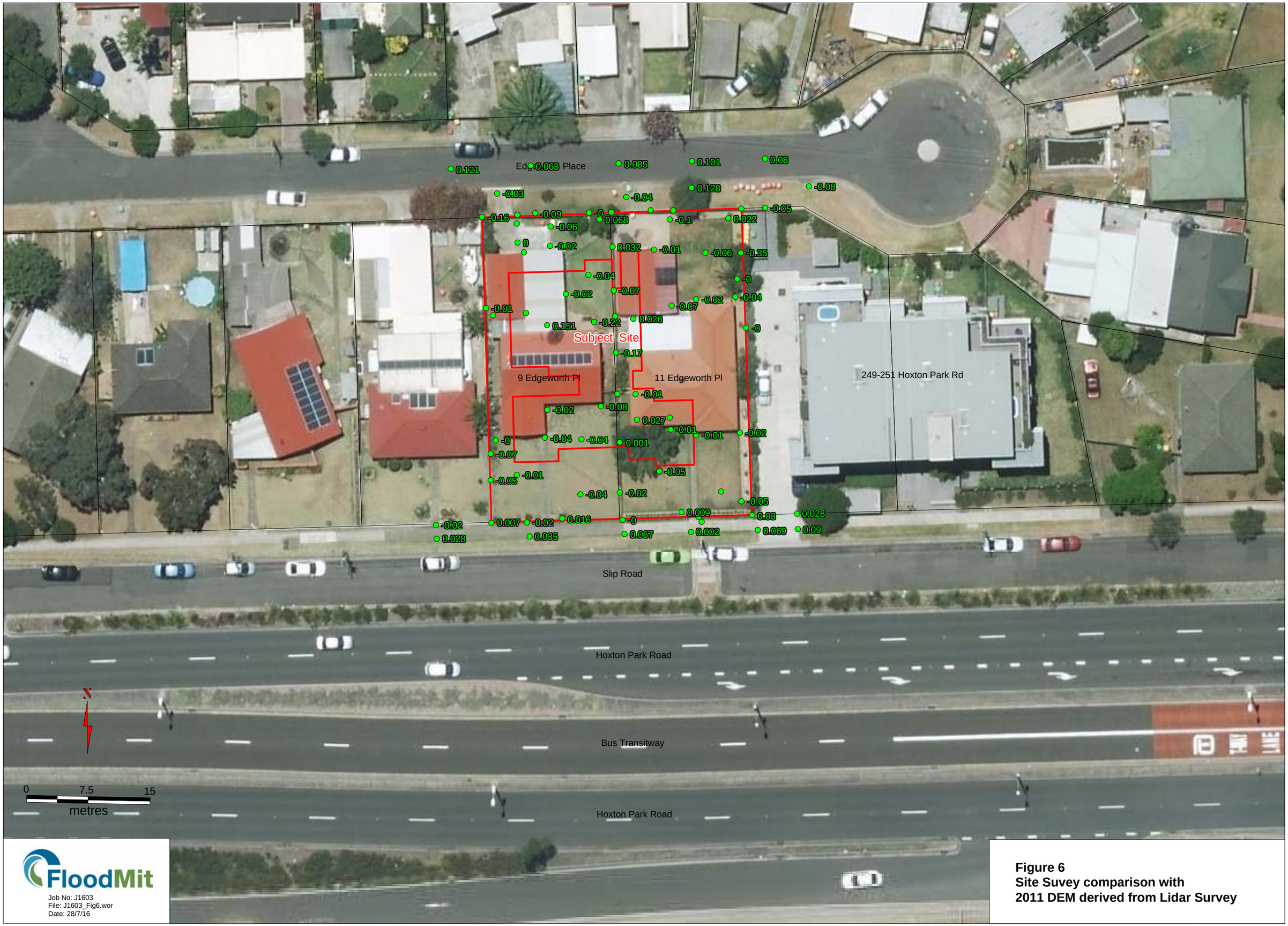

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Figure 6
Site Suvey comparison with
2011 DEM derived from Lidar Survey

Legend

- Edgeworth Ave Ponding Level 20.4
- Edgeworth Ave Ponding Level 20.6
- Local Catchment Boundary
- Potential Flowpaths

Outflow at 20.8

Outflow at 20.7

Outflow at 20.6

Subject Site

249-253 Hoxton Park Rd

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Figure 7
Potential Flowpaths and Critical Levels

4 DEVELOPMENT CONSIDERATIONS

Liverpool Development Control Plan 2008 outlines controls that apply to future development that is subject to potential flooding. These controls recognise the type of development proposed and the flood risk of the site where the development is to be located.

Controls that apply to development in the Cabramatta Creek catchment are outlined in Table 3 of Liverpool DCP – Part 1, Flood Risk. The proposed development is classified as *'residential'*, and is located within a *'low flood risk'* precinct. The flood risk management requirements are detailed below.

4.1 FLOOR LEVEL

Requirement 2 – Non habitable floor levels to be as high as practical but no less than the 5% AEP (20 year) flood level.

The site has been classified as being totally within a low flood risk precinct (Figure 5). Consequently all areas within the development site will be above the 5% AEP (20 year) flood level.

This requirement is satisfied.

Requirement 6 – Habitable floor levels to be no less than the 1% AEP (100 year) flood level plus 500mm freeboard.

The 100 year flood level within the vicinity of the site has been estimated at RL 20.6m AHD (Table 1 and Figure 3).

The floor level proposed for the ground floor units is RL 21.1m AHD. This is 500mm above the estimated 100 year flood level for the site.

This requirement is satisfied.

4.2 BUILDING COMPONENTS AND METHODS

Requirement 3 – All Structures to have flood compatible building components below the 1% AEP flood level plus 500mm freeboard or a PMF if required to satisfy evacuation criteria.

All material below the 100 year flood level plus 500mm freeboard (RL 21.1m AHD) is anticipated to be reinforced concrete slabs or footings, which are flood compatible materials.

This requirement is satisfied.

4.3 STRUCTURAL SOUNDNESS

Requirement 3 – Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP flood plus 500mm freeboard.

The ground floor level of the proposed units is at the 100 year flood level plus 500mm freeboard. Flood conditions within the vicinity of the building are relatively minor and normal building practices would be sufficient to ensure that the building can withstand the forces of flooding.

This requirement can be satisfied.

4.4 FLOOD EFFECTS

Requirements – No controls apply in relation to flood effects for land located within the Low Flood Risk precinct

There are no requirements in relation to the impact of development on flood behaviour for development located within the low flood risk precinct.

Potential flood impacts are discussed in Section 3. It is considered that the siting of the new ground floor development footprint on the western side of the site will optimise the available flowpath from Edgeworth Place to Hoxton Park Road, which is an important consideration for floods that overtop Hoxton Park Road.

Whilst there are no requirements, the proposal is considered to provide positive flood benefits during large floods.

4.5 CAR PARKING AND DRIVEWAY ACCESS

Requirement 2 – The minimum surface level of a car parking space, which is not enclosed (eg open car parking space or carport) shall be as high as practical, but no lower than the 5% AEP flood level or the level of the crest of the road at the highest point where the site can be accessed. In the case of garages, the minimum surface level shall be as high as practical, but no lower than the 5% AEP flood.

The site has been classified as being totally within a low flood risk precinct (Figure 5). Consequently all areas within the development site will be above the 5% AEP (20 year) flood level.

This requirement is satisfied.

Requirement 3 –Garages capable of accommodating more than 3 vehicles on land zoned for urban purposes, or basement car parking, must be protected from inundation by floods equal to or greater than the 1% AEP flood plus 0.1m freeboard.

No garages or basement car parking is proposed.

This requirement is not applicable.

Requirement 7 – Basement car parking or car parking areas accommodating more than 3 vehicles (other than on rural zoned land) with a floor level below the 5% AEP flood or more than 0.8m below the 1% AEP flood level shall have adequate warning systems, signage and exits.

No basement car parking or other car parking areas below the 5% flood is proposed.

This requirement is not applicable.

4.6 EVACUATION

Requirement 3 – Reliable access for pedestrians or vehicles required from the building to an area of refuge above the PMF level, or a minimum of 20% of the habitable floor area is above the PMF.

Ground floor units are 500mm above the estimated 100 year flood level. All other levels are above the probable maximum flood level (PMF).

Residents within the ground floor units have ready access to higher levels within the building, above the PMF level, including the common area on the top floor.

This requirement is satisfied.

Requirement 6 – The development is to be consistent with any relevant flood evacuation strategy or similar plan.

There are no known flood evacuation strategies or plans for this part of the floodplain.

4.7 MANAGEMENT AND DESIGN

Requirements – No controls apply in relation to flood effects for land located within the Low Flood Risk precinct

There are no requirements.

4.8 FENCING

Requirements – No controls apply in relation to flood effects for land located within the Low Flood Risk precinct

There are no requirements for fencing.

Nevertheless, it is recommended that new fencing across the north-east portion of the site, in front of the proposed car parking spaces, be of a permeable nature (eg horizontal timber slats) so that it does not impede the potential flowpath towards Hoxton Park Road in large flood events.

5 CONCLUSIONS

FloodMit Pty Ltd was commissioned by St George Community Housing Limited to provide a flood assessment report to accompany an application for a proposed six storey residential unit development at 9-11 Edgeworth Place, Cartwright (Lots 502 & 503 DP 236840).

It is proposed to remove two existing dwellings and detached garages from 9-11 Edgeworth Place, Cartwright and to construct a six storey residential block of units to provide low cost community housing. A total of 31 units have been proposed, including 5 one bedroom units and 26 two bedroom units. Some integration with the adjacent units, which also provide for low cost community housing, has also been proposed.

The site is within the Cabramatta Creek catchment, between Maxwells Creek and Cabramatta Creek. The site has been identified by Liverpool Council as being within the flood planning area (ie within the 100 year flood level plus 0.5m freeboard). It is therefore subject to a number of flood risk management development controls, including minimum floor level requirements.

Flood information for the site has been based on results from the Cabramatta Creek Flood Study and Basin Strategy Review (Bewsher 2011). The study shows that the site is affected by a flowpath from the Cabramatta Creek catchment that overtops Hoxton Park Road in a 100 year flood. Floodwater ponds in Edgeworth Place before flowing back to Hoxton Park Road in the vicinity of the subject site. The estimated 100 year flood level within the subject site is RL 20.6m AHD.

Subsequent to the flood study, Council reviewed the potential for Hoxton Park Road to overtop, and concluded that it is unlikely to do so in events up to the 100 year flood. Consequently Council classified the subject site as “Low Flood Risk”. Despite this finding, the 100 year flood level estimate provided from the flood study has been maintained for planning purposes.

Liverpool Development Control Plan 2008 outlines flood risk management controls that apply to future development that is subject to flooding. The controls that relate to residential development located within a ‘low flood risk’ area are outlined in Section 4. These controls relate to floor levels of buildings; building components; structural soundness; flood effects (not applicable); car parking and driveway access; evacuation; management and design considerations (not applicable); and fencing (not applicable).

It is considered that these requirements can be readily satisfied with two recommendations:

i) that all electrical wiring and equipment susceptible to flood damage within the fire hydrant pump room be located above RL 21.1m AHD (100 year plus 500mm freeboard); and

ii) new fencing across the north-east portion of the site, in front of the proposed car parking spaces, be of a permeable nature (eg horizontal timber slats) so that it does not impede the potential flowpath towards Hoxton Park Road in large flood events.

6 REFERENCES

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