

Dee Why Town Centre Upgrade

Report of civil engineering implications

12 September 2014 | 14-106

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Introduction

Warringah Council is currently preparing a Master Plan for the Dee Why Town Centre. The area covered by the Master Plan is approximately 36ha in size, with the extent shown in Figure 1.

This report has been prepared to document the civil engineering implications of the works proposed in the Master Plan. It considers issues such as the impact on overland flow paths, the need for additional stormwater drainage and new civil infrastructure that may be required due to the works.

Council's records have indicated that flooding occurs within this precinct during major storm events. This has been further reinforced by Cardno's 2013 "Stage 3: Flood Study Report – Dee Why South Catchment Flood Study" (referred to as the Cardno Flood Study) and Cardno's 2014 "Floodplain Risk Management Study – Dee Why South Catchment Floodplain Risk Management Study" (referred to as the Cardno Risk Management Study). As such, the potential impact of the proposed works on flooding need to be considered.



Figure 1 – Area of works

Within the overall area of the Master Plan, the proposed works and their impacts will be considered in separate areas. These areas are:

- Dee Why Parade
- Howard Avenue
- Oaks Avenue
- Avon Road
- New Link Road
- New Link Lane
- Pacific Parade
- St David Avenue
- Fisher Road
- Redman Road Plaza
- Pittwater Road South
- Walter Gors Park
- Triangle Park North and South

Refer to Figure 2 for the location of these streets / areas.

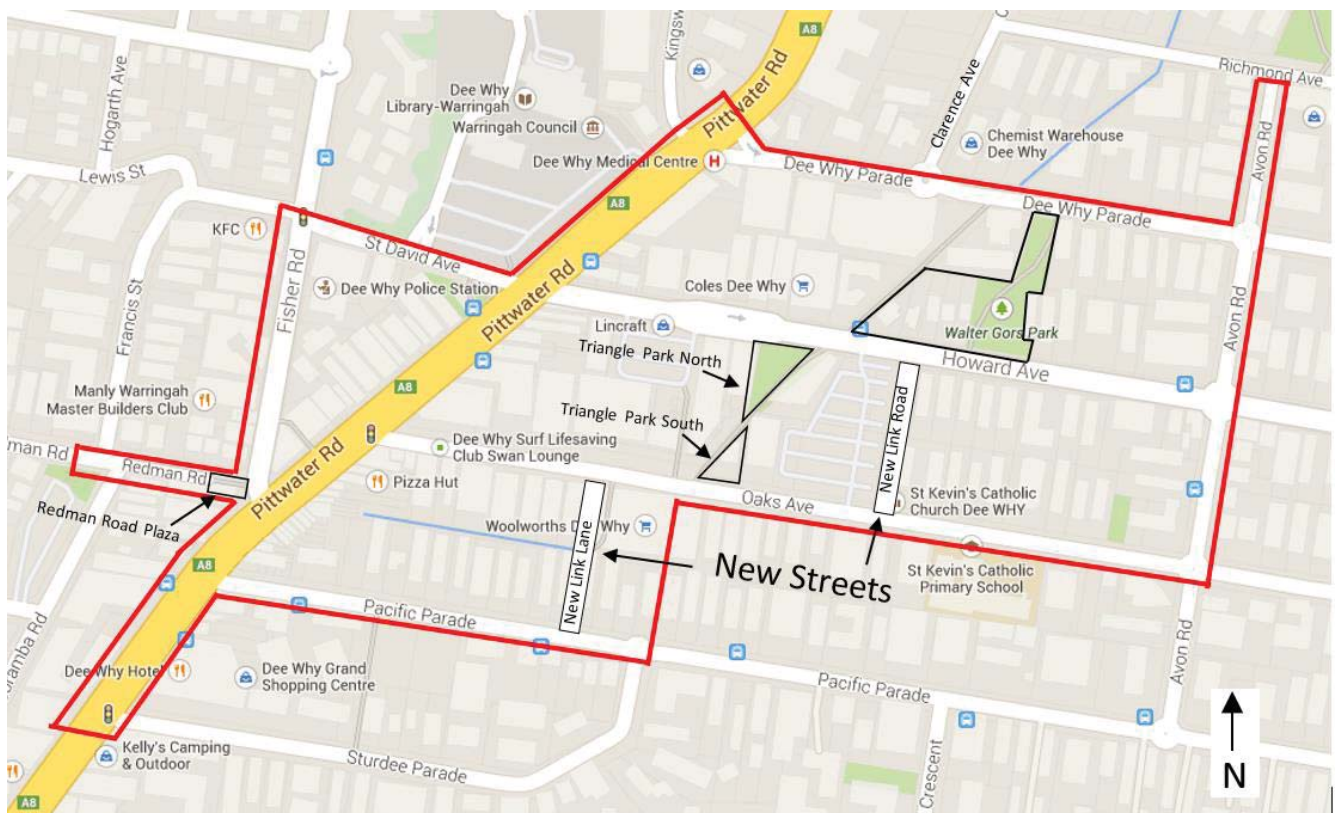


Figure 2 – Locations of streets / areas

Proposed Works

The revitalisation of Dee Why Town Centre as proposed by the Master Plan involves various works, which include:

- New bicycle lanes
- New streets and lane reconfigurations to improve traffic flow
- New car parking spaces
- Kerb extensions and realignments
- New pedestrian crossings and refuges
- Separated medians
- New landscaping and paving
- New open spaces including the expansion of Walter Gors Park

The following section details the works along each street / area and the civil implications of these works. Refer to Appendix A for drawings showing the proposed works.

Civil Implications of Proposed Works

Dee Why Parade

Proposed works

The works along Dee Why Parade occur between Clarence Avenue and Avon Road. They consist of:

- a new pedestrian crossing with kerb extensions located 60m east of Clarence Avenue
- a separated cycleway on the northern side of the road, from the crossing to Avon Road, and
- a reconstructed kerb at Avon Road.

Potential impacts

Dee Why Parade falls from Pittwater Road to Avon Road. The Cardno Flow Study shows that Dee Why Parade, from 140m east of Clarence Avenue to Avon Road, is part of the major overland flow path for the catchment and experiences significant flooding during major flood events, with depths of 0.3-0.5m near Avon Road and 0.15-0.3m in other areas during a 1% AEP storm event. Refer to the Catchment Plan in Appendix B and extracts from the Flood Study in Appendix C for further details.

The proposed pedestrian crossing is located within this major overland flow path, in a location where existing flood depths are 0.15-0.3m deep. As it will consist of kerb extensions and possibly a raised threshold, it will reduce the area available within the road for water flow, resulting in a rise in flood levels. The actual extent of the rise is beyond the scope of this report, and would need to be considered as part of the overall flood mitigation measures proposed for the catchment.

In smaller storm events, the kerb extension proposed for the crossing will block stormwater flows along the gutter. This will require new stormwater pits, to prevent ponding of water.

The separated cycleway involves relocation of the kerb 0.7-0.8m to the south, which reduces the roadway width within the overland flow path, and hence its capacity for flood flows, in a section of the road that experiences flood depths of 0.3-0.5m. If no flood mitigation works are undertaken, this will result in an increase in flood levels.

The relocation of the kerb up to Avon Road will have other minor civil engineering implications, as it will require driveways and kerb ramps to be reconstructed and a stormwater pit to be extended / replaced or an additional pit provided.

Mitigation measures

Both the pedestrian crossing and the kerb relocation for the cycleway will result in a rise in flood level if no mitigation works are undertaken. The extent of this rise is beyond the scope of this report, as it forms part of the overall flood analysis for the catchment. However, mitigation works will be required to offset this rise, and will need to be considered during the design phase for these works, so as not to increase flood levels.

Howard Avenue

Proposed works

Howard Avenue, from Pittwater Road to New Link Road, will be converted into a one way system with two lanes of traffic flow in a westerly direction. For this section of road, the proposed works include:

- parallel parking on both sides of the road,
- relocation of the kerb
- a raised pedestrian crossing with kerb extensions and
- blisters within parking lanes

Howard Avenue, from New Link Road to Avon Road, will remain as a two way system with one lane of traffic in each direction. For this section of road, the proposed works include:

- parallel parking on both sides of the road,
- relocation of the kerb
- a separated cycleway on the northern side of the road and
- kerb extensions at various locations.

Potential impacts

Howard Avenue from Pittwater Road to Avon Road falls to a low point approximately 60m west of Avon Road. The Cardno Flood Study shows that Howard Avenue acts as a major floodway during 1% AEP storm event. The Cardno Risk Management Study classifies this floodway as a high hazard based on the flood depths and velocities. Flood depths in a 1% AEP storm are generally 0.15-0.3m deep along Howard Ave, with the depth increasing to 0.3-0.5m near New Link Road and towards Avon Road. Refer to extracts from the Cardno Flood Study and the Cardno Risk Management Study in Appendix C for further details.

The proposed pedestrian crossing is located in a position where the flood depths are between 0.3-0.5m. As the crossing will involve kerb extension and potentially a raised threshold, it will restrict the flow path and raise flood levels.

From Pittwater Road to New Link Road, on the southern side of the road, the kerb will be relocated 1.2-1.6m. From New Link Road to Avon Road the kerb will be relocated 0.8m. These relocations will reduce the capacity of the roadway to carry overland flows, particularly during major storm events, and will result in an increase in flood levels. This will be exacerbated at locations where there are blisters or kerb extensions along the road.

Mitigation measures

The potential rise in flood levels due to the pedestrian crossing, kerb relocations and blisters will require mitigation measures to reduce the impact. The extent of the measures required is beyond the scope of this report, and needs to be considered in detailed design and as part of the overall flood mitigation works proposed for the catchment, as detailed in the Cardno Risk Management Study. The

measures may include changes to the road crossfall to create a larger overland flow path, or additional in-ground pipes.

Oaks Avenue

Proposed works

Oaks Avenue, from Pittwater Road to New Link Road, will be converted into a one way system with two lanes of traffic flow in an easterly direction. For this section of road, the proposed works include:

- parallel parking on both sides of the road,
- relocation of the kerb
- a new pedestrian crossing, located between the new link road and the new link lane'
- a reconstructed driveway approximately 40m west of New Link Road and
- kerb extensions at the Pittwater Road / Oaks Avenue intersection and Oaks Avenue / New Link Lane intersection.

Oaks Avenue, from New Link Road to Avon Road, will remain as a two way system with one lane of traffic in each direction. For this section of road, the proposed works include:

- parallel parking on both sides of the road, and
- relocation of the kerb

Potential impacts

Oaks Avenue, from Pittwater Road to New Link Road, falls to a low point approximately 105m west of New Link Road. The Cardno Flood Study shows that the Oaks Avenue acts as a floodway during 1% AEP storm event, while the Cardno Risk Management Study classifies the western end of this floodway as a high hazard due to its depth and velocity. From the Cardno Flood Study, flood depths at the western end are generally up to 0.5m deep. The deepest locations are in the vicinity of the proposed new link road and new link lane. Refer to extracts from the Cardno Flood Study and the Cardno Risk Management Study in Appendix C for further details.

Between Pittwater Road and Oaks Ave, the relocation of the kerb is minor, and will have minimal impact on flood areas. The new blisters / kerb extension at Pittwater Road will restrict flows into Oaks Ave, potentially increasing flows or flood depth in Pittwater Road. This will require further consideration during detailed design, to minimise the impact.

The proposed pedestrian crossing, located between the link road and link lane, is in the section of the street with the greatest flood depths at present. If no other works occur, the crossing will potentially increase these depths, as the kerb extensions and raised threshold reduce the flood path available. However, the new link road will form a new flood path, which will assist in offsetting the increase.

Between New Link Road and Avon Road the kerb relocations are minor and there are no existing flood paths. Consequently, the works in this area will have no impact on flood levels.

Mitigation measures

The works proposed at the eastern end of Oaks Ave will require mitigation measures, to reduce the impact on flood levels, particularly due to the pedestrian crossing. The proposed new link road may provide sufficient overland flow capacity to offset the pedestrian crossing. However, this will need to be considered as part of all flood mitigation measures proposed for the area by the Cardno studies and further investigation undertaken during the detailed design phase.

Avon Road

Proposed works

The works along Avon Road occur between Howard Avenue and Richmond Avenue. They consist of:

- A separated cycleway on the western side of the road
- A relocated kerb between Howard Avenue and Richmond Avenue

Potential impacts

Avon Road falls to the north from Howard Avenue to Richmond Avenue. The Cardno Flood Study shows that Avon Road, from Dee Why Parade to Richmond Avenue, acts as a floodway during 1% AEP storm events, with flood depths of up to 0.5m at the Dee Why Parade / Richmond Avenue intersection. Refer to extracts from the Cardno Flood Study and the Cardno Risk Management Study in Appendix C for further details.

The separated cycleway will have negligible impact on the floodway, as the separator median contains numerous breaks for the stormwater to flow through.

The kerb relocation between Howard Avenue and Richmond Avenue will not affect flooding, but will have other minor civil engineering implications. This includes reconstructing kerb ramps and extending / replacing stormwater pits.

Mitigation measures

The works proposed will have minimal effects and are not likely to reduce mitigation measures. However this will need to be confirmed during detailed design.

New Link Road

Proposed works

New Link Road will be a new north-south connecting road between Howard Avenue and Oaks Avenue. It will be a four lane carriage way with two lanes of traffic flow in a northerly direction and one lane of parking on either side of the road. Numerous 2.5m wide kerb extensions will be located on both sides of the road.

Potential impacts

New Link Road is located just to the east of the existing flow path between Howard Ave and Oaks Parade. It will provide an alternate route for existing overland flows, which currently have depths of 0.5-1.0m between these two streets. Due to the width of the proposed road, the total depth of flow should be reduced by the roadway.

The blisters / kerb extension proposed for the new link road will require pits located in suitable positions, to minimise ponding.

New Link Lane

Proposed works

New Link Lane will be a new north-south connecting road between Pacific Parade and Oaks Avenue. It will be a two lane carriage way with one lane of traffic flow in each direction.

Potential impacts

New Link Lane is located in a similar location to the existing overland flow path / flood storage area between Pacific Parade and Oaks Avenue. It will provide a formalised route for overland flows between the two streets. The depth of flow along the lane will need to be considered during detailed design,

Pacific Parade

Proposed works

The works along Pacific Parade occur between Pittwater Road and Sturdee Parade. They include:

- removal of the traffic signals at the Pittwater Road intersection
- relocation of kerbs
- kerb extensions / blisters at Pittwater Road
- a raised pedestrian crossing with kerb extensions.

Potential impacts

Between Pittwater Road and Sturdee Parade there are two low points on Pacific Parade. The first low point is located approximately 150m east of Pittwater Road, while the second low point is located approximately 250m east of Pittwater Road. The Cardno Flood Study details both low points providing flood storage during a 1% AEP storm event, with flood depths of 0.15-0.3m. Refer to extracts from the Cardno Flood Study in Appendix C for further details.

The proposed raised pedestrian crossing is situated west of the first low point in a position clear of the flood. However as the crossing will contain kerb extensions and potentially a raised threshold, it has potential to impact flood flows in this area. Further analysis will be required during the detailed design.

From Pittwater Road to Sturdee Parade, the kerbs will be relocated by 0.5 – 1m on both sides of the road. However as there is no flood flow along the majority of the street, these changes will have minimal impact on flood levels. The relocations will require adjustments to existing stormwater pits and other services.

Mitigation measures

As the street has minimal flood issues, mitigation measures may not be necessary. This will need to be further assessed during the detailed design, to confirm that measures are not required.

St David Avenue

Proposed works

The works on St David Avenue include lane reconfigurations and a kerb realignment at the Fisher Road intersection.

Potential impacts

The works in St David Avenue will have no impact on flooding in the area, as they do not change flow paths or flood areas. The kerb realignment at the Fisher Street intersection will require modifications to service pits.

Fisher Road

Proposed works

The proposed works for Fisher Road occur between St David Avenue and Pittwater Road. They consist of a 1.3m-1.5m wide separated median and a kerb extension at Pittwater Road.

Potential impacts

Fisher Road falls to the south from St David Avenue to Pittwater Road. The Cardno Flood Study shows that the southern end of Fisher Road is a floodway during the 1% AEP storm event, with flood depths up to 1m. Refer to extracts from the Cardno Flood Study in Appendix C for further details.

At the southern end of Fisher Road the kerb extension and median will result in a minor reduction in the roadway width. This will potentially result in an increase in flood levels.

The kerb extension at Pittwater Road will require a stormwater pit to be extended / replaced.

Mitigation measures

The works proposed at the southern end of Fisher Road will require mitigation measures, to reduce the impact on flood levels. The extent of the measures required is beyond the scope of this report and needs to be considered during detailed design, in conjunction with the flood mitigation measures detailed in the Cardno Risk Management Study.

Redman Road Plaza

Proposed works

The proposed works for Redman Road Plaza include:

- relocation of kerbs
- upgrades to the plaza space, including paving, landscaping and seating and planting
- shutting off Redman Road at Mooramba Road / Francis Street

Potential impacts

Redman Road falls towards Pittwater Road. The Cardno Flood Study shows that the eastern end of Redman Road is a floodway during 1% AEP storm events, with maximum flood depths between 0.3-0.5m. The Cardno Risk Management Study classifies this floodway as a high hazard due to its depth and velocity. Refer to extracts from the Cardno Flood Study and the Cardno Risk Management Study in Appendix C for further details.

Redman Road will be closed to public traffic at Francis Street / Mooramba Road through the construction of a new kerb. The new kerb will require flood flows to pond at this location until they can overtop the kerb. This will potentially locally increase flood levels, and will need consideration of the kerb profile to minimise the impacts.

The landscape works proposed for the Plaza will have potential to reduce floodway capacity, depending on the scale of structures proposed.

Mitigation measures

The rise in flood levels due to the kerb realignments and upgrades to plaza space will require mitigation measures to reduce the impact. The extent of the measures is beyond the scope of this report, and needs to be considered during detailed design, in conjunction with mitigation methods proposed in the Cardno Risk Management Study.

Pittwater Road

Proposed works

The proposed works for Pittwater Road occur between Sturdee Parade and Howard Avenue. They include:

- kerb relocations
- replacement / relocation and extension of an existing median
- a new 45m long bus bay

Potential impacts

As detailed by the Cardno Flood Study, Pittwater Road is a floodway during 1% AEP storm events, with the section between Redman Road and Howard Avenue showing a greater width of flooding. Flood depths are generally 0.15-0.3m deep, increasing to 0.3-0.5m along the eastern side between Redman Road and Howard Avenue.

In the section between Redman Road and Howard Avenue, which currently has the greater flow path, the proposed works consist of a new median and a bus bay. These works will have no impact on flooding in the area, as they do not reduce the flood path.

Between Redman Road and Sturdee Parade, the works consist of a new median and relocation of the kerb, which increases roadway width. These works will either have negligible effect or reduce flood levels in this section.

The kerb relocations and bus bay will potentially require modifications to service pits, which will need to be considered during detailed design.

Mitigation measures

The works may potentially impact service pits, which will need to be considered during detailed design. During this phase, investigation will be required to confirm works do not negatively impact on flood levels.

Walter Gors Park

Proposed works

Walter Gors Park is to be extended and upgraded. The proposed works include:

- removing existing council cottages
- new landscaping
- market stalls

Potential impacts

Walter Gors Park, including the proposed extension, falls to the east. The Cardno Flood Study details that this location provides flood storage during the 1% AEP storm event, with flood depths between 0.15-0.3m. Refer to extracts from the Cardno Flood Study in Appendix C for further details.

The works proposed for this area include demolition of existing cottages, construction of a new water feature / WSUD area, new landscaping and an area for market stalls along the southern boundary. As the area provides flood storage, and is adjacent to an existing floodway, there is potential for the works to affect flood levels. This will require consideration and investigation during detailed design.

Mitigation measures

Consideration will be required during detailed design on the extent of the flood storage area, so that the works do not negatively impact on flooding.

Triangle Park North and South

Proposed works

The proposed works for Triangle Park North and South include:

- new stairs and seating
- new landscaping
- market stalls
- the removal of an existing building (Triangle Park South) and construction of a new park area

Potential impacts

Triangle Park North and South falls to the north-east. The Cardno Flood Study shows that this entire area is part of a floodway during the 1% AEP, with flood depths generally between 0.15-0.3m. Refer to extracts from the Cardno Flood Study in Appendix C for further details.

The proposed works are located within the floodway and have the potential to increase flood levels if they block the floodway or reduce the flowpath. The removal of the existing building will potentially increase the floodway area.

Mitigation measures

The detailed design of the works in the parks will require careful consideration to ensure that floodways are not blocked and the flood capacity is not reduced. Mitigation measures may be required and will need to be determined during detailed design.

Summary

Many of the proposed works are located within existing floodways or flood affected areas of the catchment. This will require consideration, during detailed design, of mitigation measures, which may be required and which will need to be considered in conjunction with the works recommended by the Cardno Risk Management Study. The works proposed in the new parks, New Link Road and New Link Lane may also mitigate the effects.

All the new blisters / extensions will need new stormwater pits to prevent water ponding at the kerb. Kerb relocations will require existing stormwater pits to be replaced or modified, and may require alterations to other existing service pits.

Appendix A

Drawings





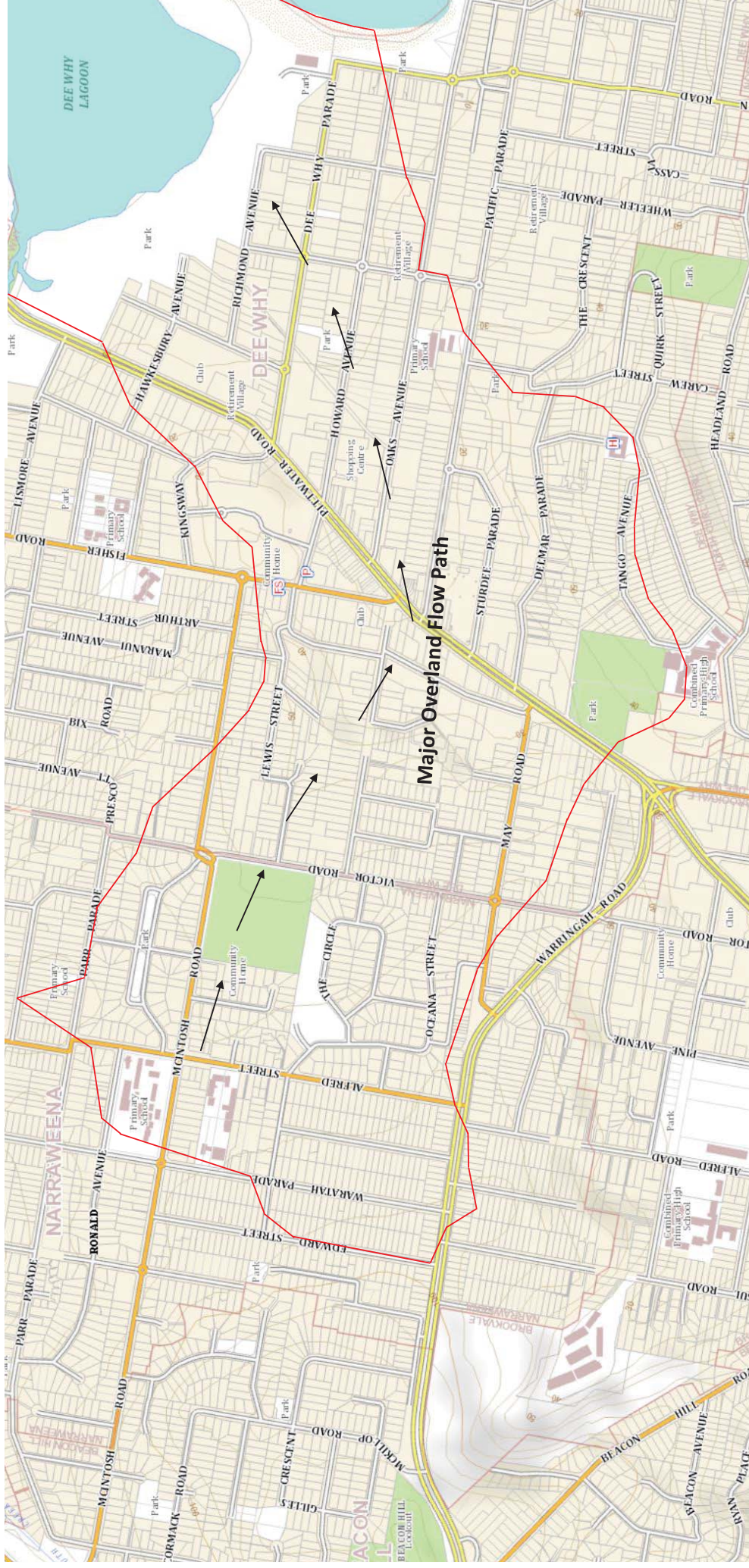




Appendix B

Catchment Area

Dee Why South Catchment Plan



Appendix C

Extracts from Cardno Reports

Figure 6-7 Design Event 1% AEP Peak Depth

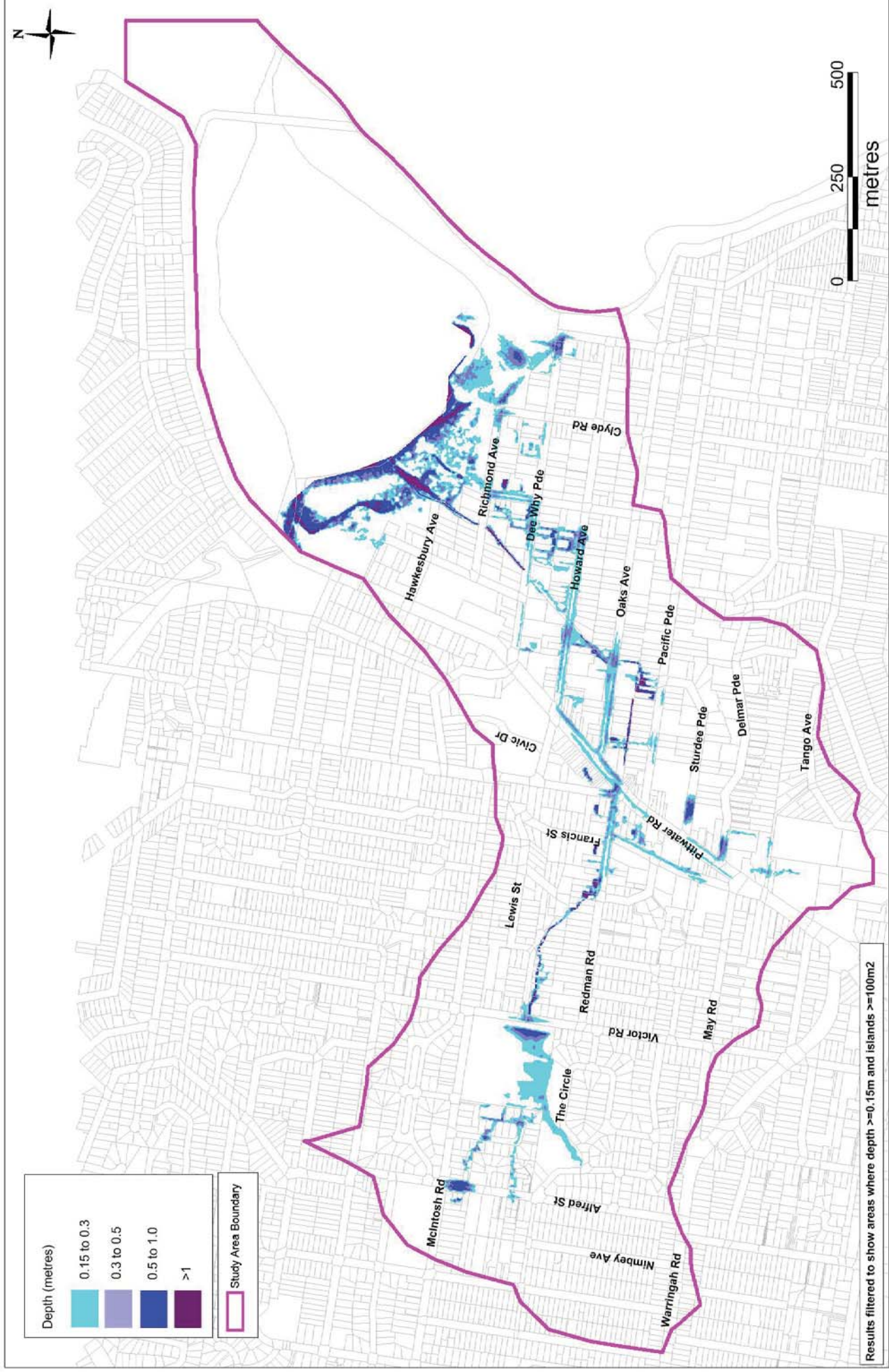
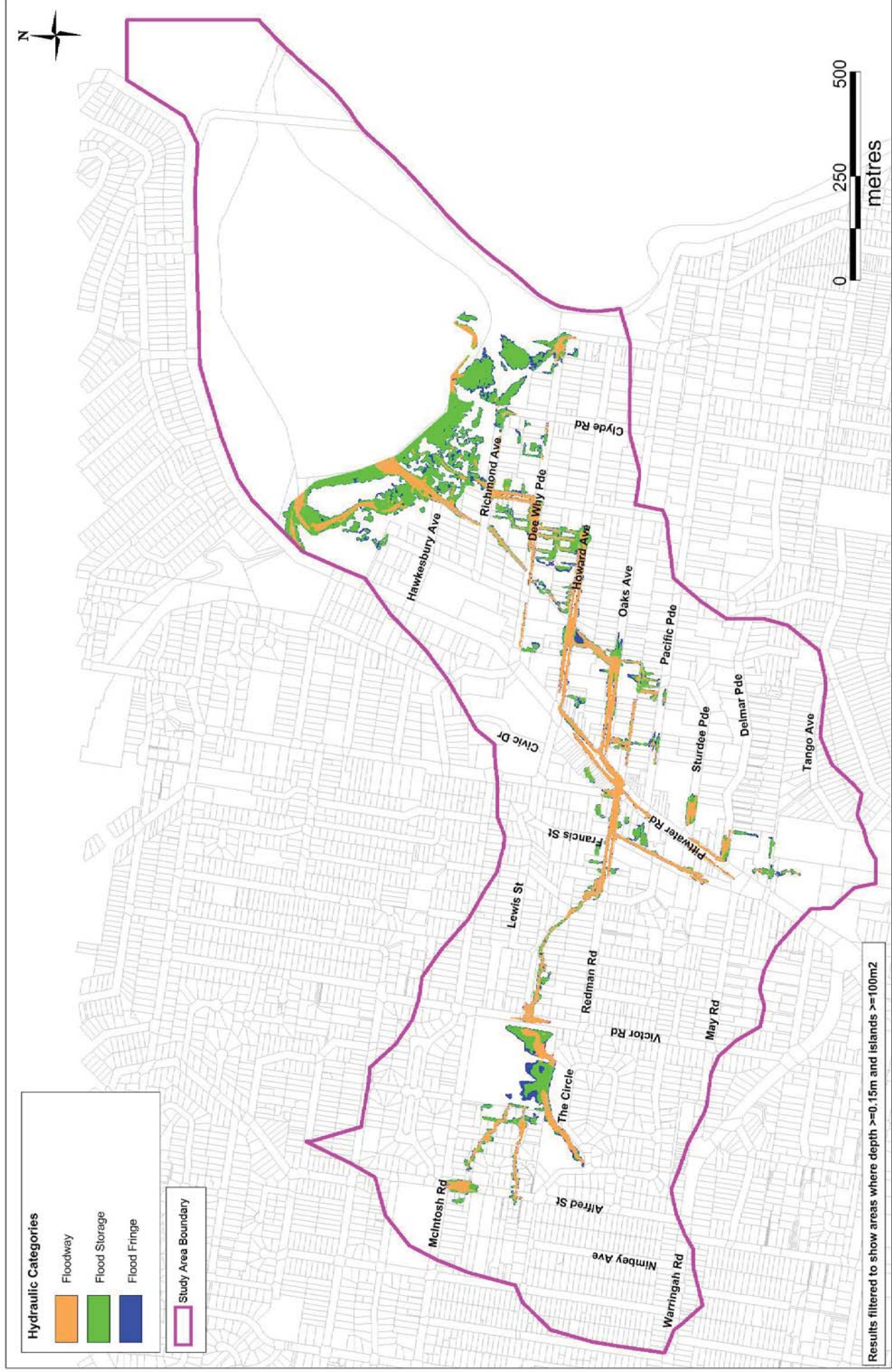


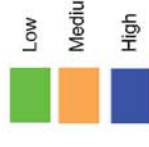
Figure 8-2 Hydraulic Categorisation 1% AEP Event



**Figure - Existing Hazard
100yr ARI Event**

**DEE WHY SOUTH
FRMS**

Provisional Hazard



Map Produced by Cardno NSWACT Pty Ltd
Date: May 2014
Coordinate System: MGA Zone 56

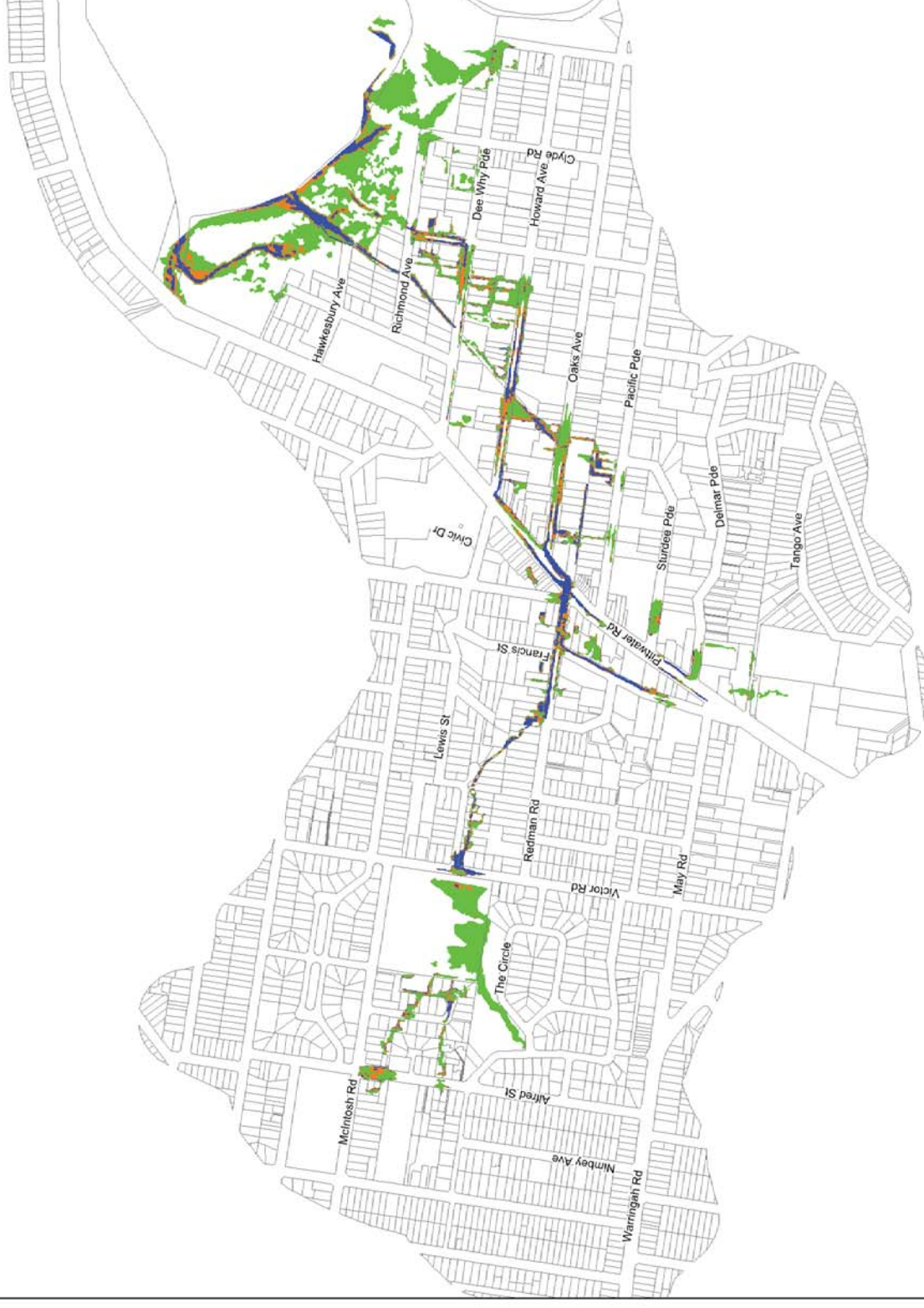


Figure 5-4 – 100y ARI Provisional Hazard – Existing Conditions