To	From
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Copy: Nick Roberts, Cassandra Ng	*W-REF: P16-335* *19 February 2021*

Memorandum

Stormwater Memo – Fulton Hogan Fast Track Referral Application

1. Introduction

Fulton Hogan Land Development ("FHLD") propose to lodge an application for a referred project under the Covid-19 Recovery (Fast-track Consenting) Act 2020 (the "Act") to utilise the fast-track consenting process via an expert consenting panel.

This application relates to the development of a contiguous landholding at 86 and 94 Fitzgerald Road, 251 and 383 Waihoehoe Road, 65, 76 and 108 Fielding Road ("the site").

This landholding forms part of a larger land area within Drury East that is currently subject to a private plan change process Drury East Private Plan Change ("PC49") to rezone the land from Future Urban to Business – Mixed Use Zone and Residential Zones under the Auckland Unitary Plan ("AUP") which will enable quality urban development and well-functioning urban environments. This proposal for a referred project will give effect to the purpose of the Act to promote employment and New Zealand's recovery to the economic and social impacts of Covid-19 through enabling the construction and delivery of a comprehensive development that offers employment opportunities and an accelerated supply of quality housing choice and diversity.

To support the application for a referred project, this memo provides a high-level review of the stormwater aspects of the proposal, including:

- Summary of the proposal and site description;
- Summary of work completed to date;
- High level stormwater assessment of proposal; and
- Overview of works required to achieve the proposal.

2. Site Description & Proposal

2.1. Site Description

FHLD have entered into unconditional sale and purchase agreements for the land which the project will be located on. These agreements provide Fulton Hogan with full control of the sites for development. These sites are 86 and 94 Fitzgerald Road, 251 and 383 Waihoehoe Road, 65, 76 and 108 Fielding Road which is currently zoned Future Urban ("FUZ") under the AUP. The proposed development area is approximately 32.33 ha. The development area is located within the lower Hingaia Stream and Slippery Creek catchments (refer Figure 1) which are part of the greater Drury-Opāheke catchment. The draft Drury-Opāheke Future Urban Zone Stormwater Management Plan (FUZ SMP) notes that the topography across the majority of the Drury-Opāheke catchment is "characterised by low elevation gently undulating land".

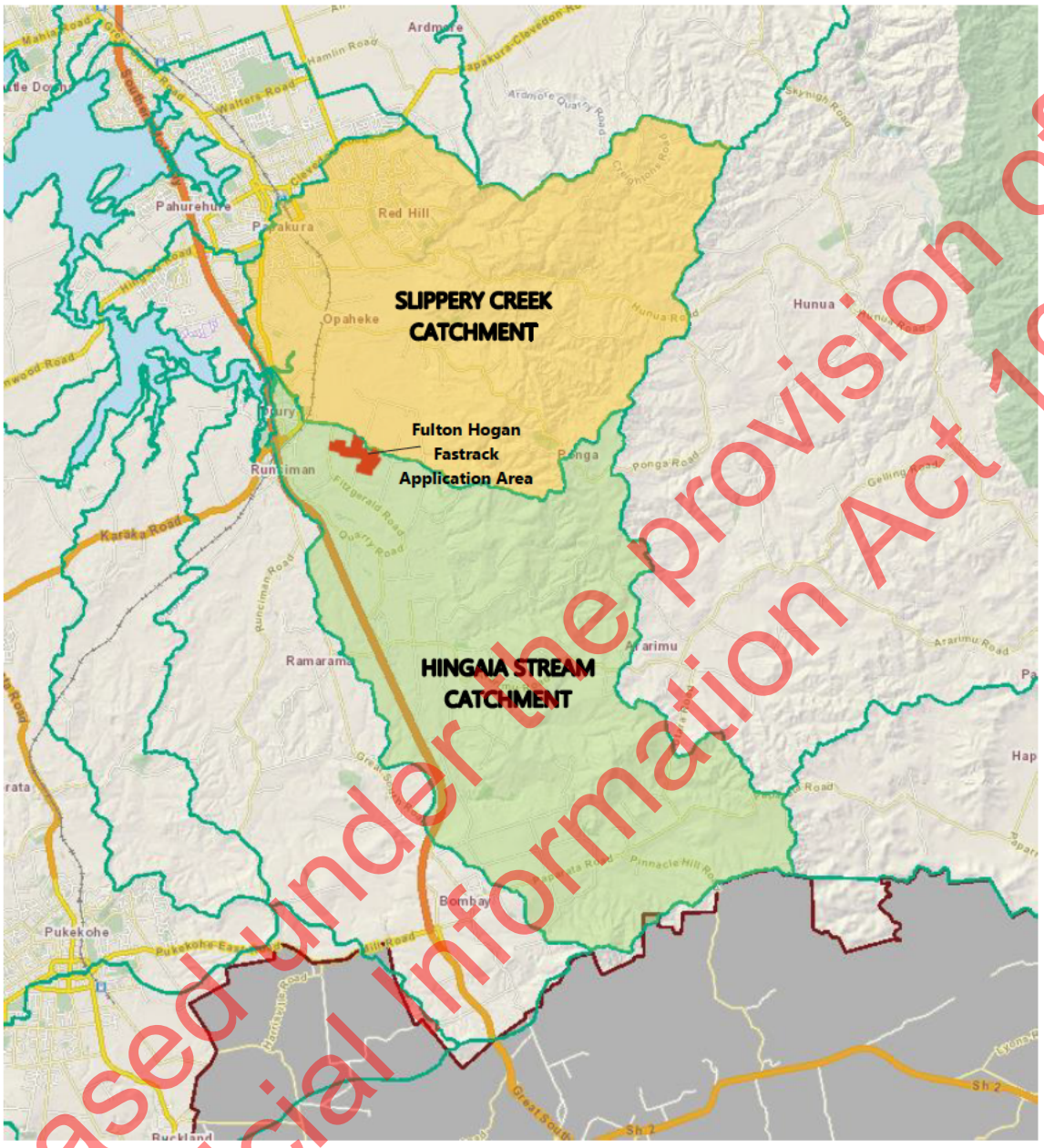

Figure 1: Hingaia & Slippery Creek Catchment Extents and Fastrack Application Area

The existing topography of the FHLD is mostly undulating with several ridgelines which range between 13 mRL and 25 mRL from Fitzgerald to Fielding Road, the topography rises up to approximately 47 mRL closer to the hills along Drury Hills Road.

Fitzgerald stream is located in the northern half of the site. This permanent stream is fed by contributions from small and unnamed intermittent streams. It drains north-west via the perched culvert under Fitzgerald Road and then into the Hingaia Stream.

There are a number of culverts passing under Cossey Road, Fielding Road and Fitzgerald Road. These culverts are not shown on Auckland Council GeoMaps and hence are assumed to be private.

A locality plan showing the area included within this application indicated in red is shown in Figure 2.

Figure 2: Locality Plan - Fasttrack Application Area

2.2. Proposal

FHLD are proposing the staged development of this land into 248 residential lots, 28 residential superlots and supporting roading and servicing infrastructure. Figure 3 shows the proposed development.

2.3. Masterplan

The masterplan for the development has considered existing overland flow paths and flood areas. Consideration will be required within the layout for the placement of communal stormwater management devices and secondary flow conveyance as part of the detailed engineering design.

A schematic of the preliminary masterplan is shown in Figure 3, with the fast track application area highlighted in red.

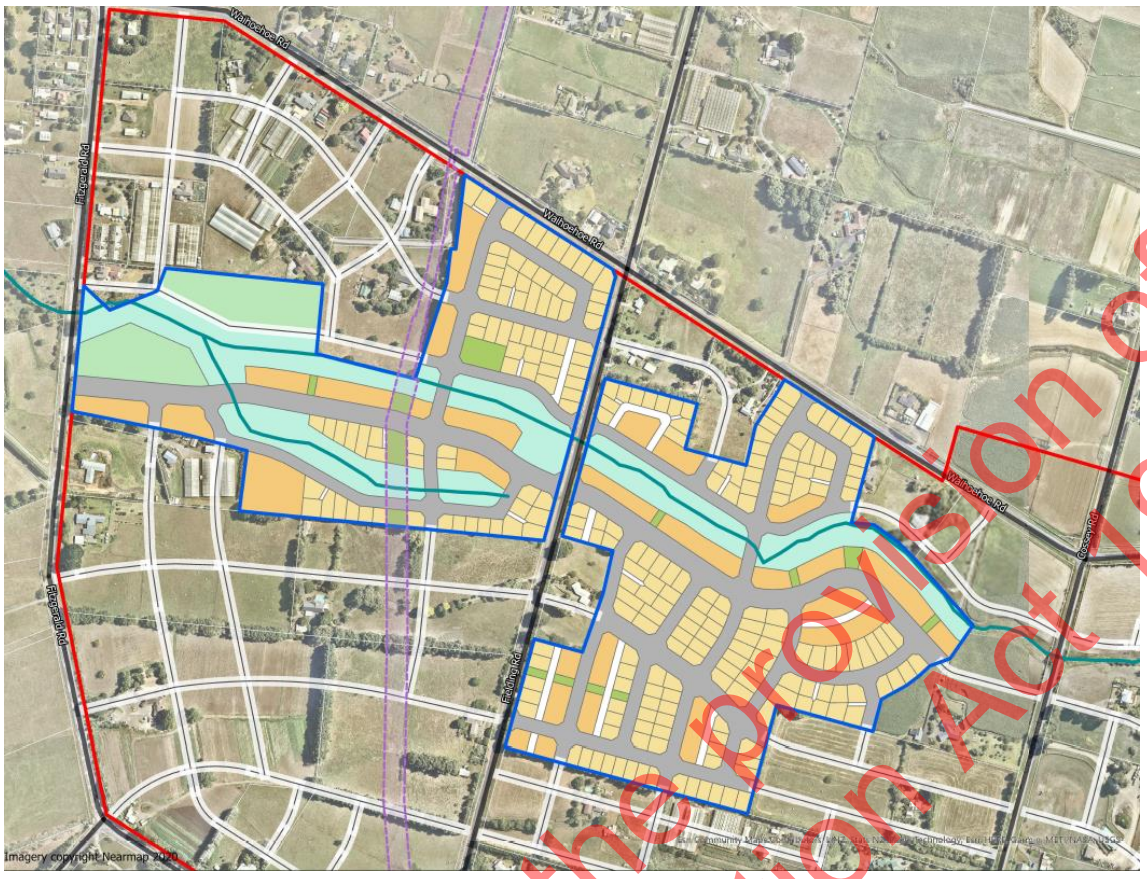

Figure 3: Proposed Development Masterplan

3. Background Analysis

A Stormwater Management Plan has been prepared to support the Plan Change applications for the Drury Centre and Drury East Areas. The stormwater management for the project is covered in the *Drury East Stormwater Management Plan: Drury Centre and Drury East Plan Change Areas prepared by Tonkin & Taylor & Woods; June 2020.*

The approach outlined in the Stormwater Management Plan is based on water sensitive design to deliver water quality, conveyance, hydrological and flood mitigation outcomes. This comprises of:

- Water quality and hydrology mitigation;
- Stream erosion; and
- Flood mitigation.

These are discussed further below.

Water Quality & Hydrology Mitigation

In terms of water quality and hydrology mitigation:

- Preserve, protect and enhance streams and floodplains in the Blue-Green network corridor, which can also provide amenity and connectivity with communities.
- Eliminate and minimise the generation of contaminants. Provide near-source water quality treatment of runoff for all contaminant generating impervious surfaces.
    - Water quality treatment to target sediment, metals and gross pollutants to be provided.
    - Options to adopt a conventional at source approach or use of communal devices (refer Figure 4).

- The catchment does not fall within a SMAF 1 or SMAF 2 zone. However, the general approach to water quantity management for small storm events is to provide a minimum of SMAF 1 hydrological mitigation for all impervious surfaces. The SMAF 1 hydrological mitigation objectives outlined in the AUP are:
    - Retention of at least 5 mm of runoff depth from impervious surfaces where possible
    - Detention and a drain-down period of 24 hours for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24-hour rainfall event less the achieved retention volume, over the impervious area for which hydrological mitigation is required
- A stormwater management toolbox (Figure 5) was developed to assist in selecting appropriate devices for different land uses and shows alignment of stormwater quality, hydrological mitigation and flood attenuation approaches.
- This toolbox will be used to develop an integrated stormwater management approach for the project.

Stream Erosion

Findings in terms of stream erosion noted that:

- A Modified Stream Erosion Risk Assessment was undertaken and found very minor increase to erosion potential during the 2, 10 and 100 year ARI storm events and predicted that the application of SMAF 1 hydrological mitigation would result in an even smaller increase to the erosion risk. The benefit from SMAF 1 hydrological mitigation would also increase for smaller events (i.e. the 95th percentile design storm event) because the retention/detention volumes are a large proportion of the events.
- It is noted that the SMP recommended that additional stream erosion mitigation measures are also undertaken such as:
    - Removal of stock from the site and therefore avoiding active bank de-stabilisation through stock access and pugging
    - Incorporation of green spaces adjacent to stream networks to provide for planting of riparian margins to improve bank stability and reduce erosion potential
    - Remediation or removal of existing in-stream structures (culverts, inlets/outlets) which are currently identified as having erosion issues
    - Realignment of streams which have been channelised to a more natural alignment
    - Incorporation of erosion and scour protection measures at all outfalls to minimise erosion at new structures
    - Targeted in-stream erosion protection measures may be required within larger streams
    - Restoration of streams including restoring sinuosity, removal of inline ponds, adding retreats and armouring where appropriate is also expected to improve stream habitat quality
    - Proposed riparian planting along stream corridors to develop the Blue-Green network corridor, which will result in a demonstrable improvement in instream habitat (i.e., increased stability, woody debris) and water temperature control that will enhance conditions for aquatic fauna.

Flood Mitigation

In terms of flood mitigation:

- Flood modelling undertaken to date indicates that stormwater flows should be "passed forward" to avoid coincidence of peak flows from the upstream catchments.
- Existing stormwater infrastructure (Figure 6) do not have capacity for the full maximum probable development.
- An interim solution prior to upgrading the Flanagan/Railway and Great South Road culverts located downstream end of the development area, it is proposed to provide temporarily provide on-site flood attenuation, which would ensure no increase in pre-development peak flows up to the 100 year ARI before the culverts are upgraded. The additional volume will be temporarily stored onsite, in devices such as detention basins, wetland and ponds, and released at a rate which does not exceed pre-development peak flows. Accordingly, by implementing this solution as provided for on the masterplan, there will be no net effect on the extent of flooding on downstream properties or receiving environments.

Climate Change Resilience

Allowances for climate change have been made as a part of the work undertaken to date, this is summarised as follows:

- Flood modelling scenarios have been undertaken with:
    - Future rainfall in accordance with ministry for Environment guidelines noted in TP108 that allow for increases in temperature to 2.1°C.
    - Boundary conditions modelled with Mean High-Water Springs (MHWS) 10 percentile, tidal amplitude and 1m sea level rise as per Auckland Unitary Plan.
- Habitable finished floor levels to be set above the 100yr floodplain (inclusive of climate change) as per Auckland Unitary Plan which is greater than that required within the Building Code.
- Primary network design has been sized to allow for climate change as per Stormwater code of Practice requirements.

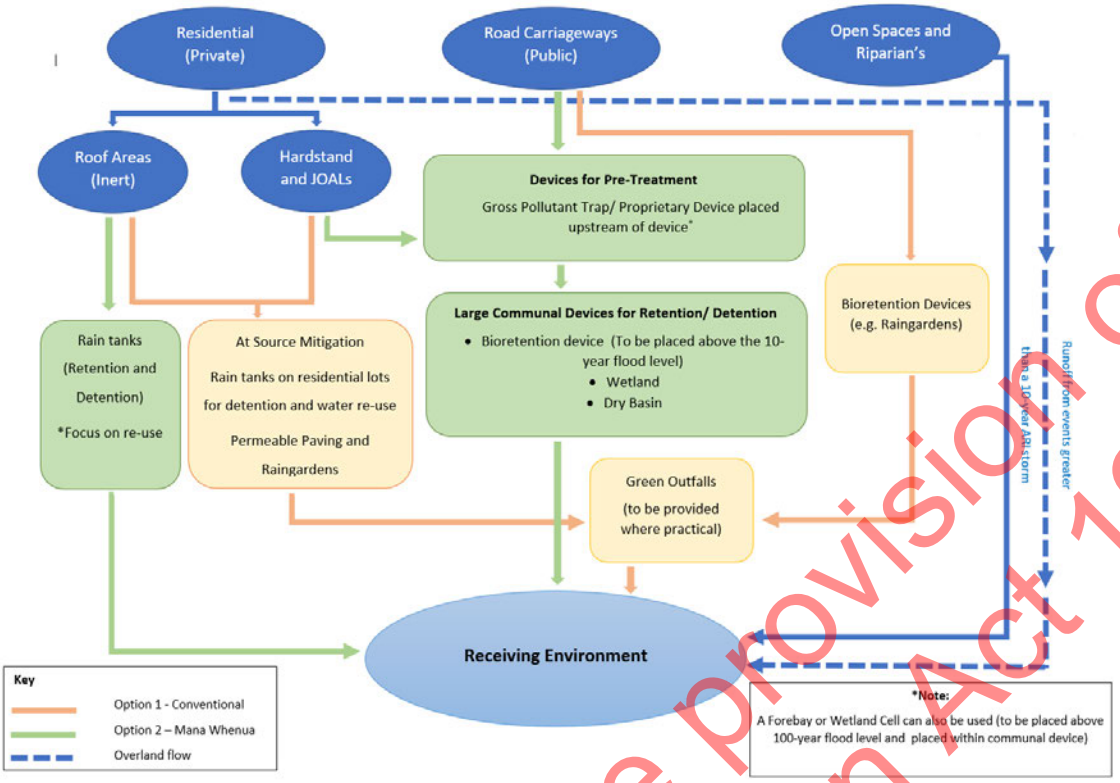

Figure 4: Proposed Stormwater Management Strategy Flow Chart

Zone	Land Use	Performance Outcomes				Toolbox	Notes
		Water Quality	Hydrological Mitigation	Flood Attenuation	Water Sensitivity Design [1]		
Performance standard		GD01[2]	AUP: SMAF 1 minimum[3]	100 Year ARI: Not worsen downstream flooding [4]			[1] The proposed stormwater management options adopt a Blue-Green network approach that includes other devices or measures which are not listed in this table i.e. filter strips, green outfalls (where practicable), streams protected and enhanced with riparian buffer and re-vegetation planting. The need for bank stabilisation/instream works to be determined by stream erosion assessments. [2] Stormwater Management Devices in the Auckland Region –Guideline Document 20017/001 (GD01). (December 2017). Auckland Council Eliminate or minimise the generation and discharge of contaminants. Treat all contaminant generating impervious areas at or near source by a water quality device designed in accordance with GD01 to target sediment, metals and gross pollutants. Elimination of contamination generation is considered the BPO option so if inert roofing materials are used, these impervious surfaces will not generate contaminants and therefore will not require water quality treatment. [3] AUP Auckland Council The PCA does not fall within a Stormwater Management Area - Flow 1 (SMAF 1) overlay but this will be adopted as the minimum requirement across all three sites. This stormwater management approach is consistent with Policy E1.3.10. The minimum hydrological mitigation requirements proposed are as follows: • Retention (volume reduction) of at least 5mm of runoff depth from impervious surfaces • Detention of the 95th percentile event for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24 hour rainfall event minus the achieved retention volume. Exceptions for providing retention can be made in cases where soil infiltration rates preclude disposal to ground and rainwater reuse is not possible. It is noted that if retention cannot be met, devices are to be lined with the retention volume being treated as a detention through bioretention devices. An erosion assessment is to be carried out to determine if additional measures (such as additional detention requirements) are required to mitigate the hydrological impacts of development. [4] No increase in peak flood level effects to properties upstream and downstream of the PCAs [5] Devices will be provided and sized for WQ treatment for carparks (greater than 30 vehicles) only for the Residential Zones. [6] Includes the option for large communal devices to provide treatment and hydrology mitigation to public roads and impervious areas. Gross Pollutant Traps (GPT) or alternative proprietary devices will be installed upstream of communal devices. The communal devices may be dual-purpose as they could also provide flood attenuation, if required. [8] Hydrology mitigation will be provided for these impervious areas. Bio-retention devices generally have the added benefit of providing WQ treatment too.
Mixed use Metropolitan Centre	Roads	✓	✓	✗	✓	**Bio-retention devices including:** • Raingardens • Tree pits • Vegetated swales	
	Carparks	✓	✓	✓	✓		
	Other	✓[2]	✓	✓	✓	Inert Building materials Rainwater tanks for re-use of roof runoff Permeable pavements for public realm areas Communal detention devices	
Mixed Housing – Urban Mixed Housing – Suburban Terraced Housing Apartment Buildings	Roads	✓	✓	✓[6]	✓	Communal devices[5] **Bio-retention devices including:** • Raingardens • Tree pits • Vegetated swales	
	Carparks > 30 Vehicles	✓[5]	✓	✓[6]	✓		
	Roofs, jointly-own access lot driveways, driveways, gardens/landscaping	✗✓[8]	✓	✓	✓	Inert Building materials Rainwater tanks for re-use of roof runoff Permeable pavements for driveways or laneways Communal devices[5] **Bio-retention devices including:** • Living Roofs • Raingardens • Tree pits • Vegetated swales	

Figure 5: Stormwater Management Toolbox

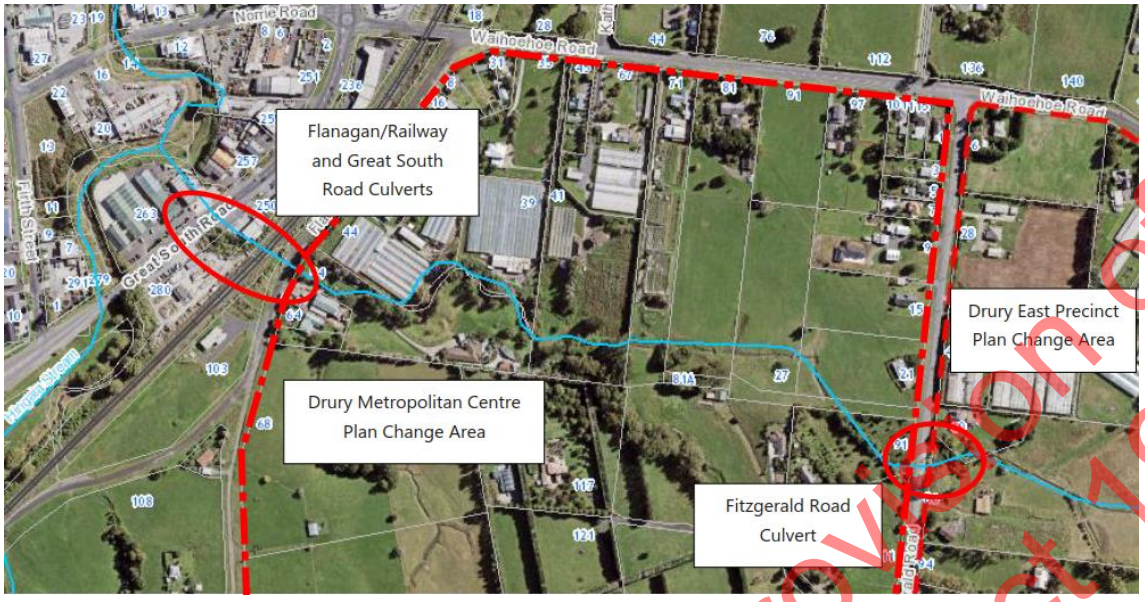

Figure 6: Flanagan/ Railway/ Great South Road & Fitzgerald Road

4. Assessment

The general approach to stormwater management for the project remains consistent with the SMP. This section discusses specific stormwater matters in more detail as they relate to the subject site and the referral project application.

There is suitable area within the subject site for management of increased stormwater flows generated by the development. The proposed stormwater management measures are detailed in the *Drury East Stormwater Management Plan: Drury Centre and Drury East Plan Change Areas prepared by Tonkin & Taylor & Woods; June 2020.*

Detailed flood modelling undertaken to date has indicated that the capacity of the existing Fitzgerald/Railway and Great South Road culverts is inadequate to support developed on the basis of Maximum Probable Development (MPD). However, there are alternative interim solutions to culvert upgrades, including the provision of on-site flood attenuation to provide for the difference between the pre-development and post-development flows.

The attenuation devices could then be removed once the Great South Road and Flannagan/Railway culverts are upgraded and the "pass flows forward" is made viable.

5. Conclusion

Based on the background analysis and stormwater modelling that have been completed to date, it is expected that stormwater effects from the project area can be managed safely in accordance with accepted best practice and without adversely affecting the receiving environment. Further details and supporting analysis will be provided in the final application if the proposal is accepted as a referred project.

Therefore, we consider that the development can proceed without any fundamental concerns relating to stormwater management and flooding.