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Engineering

Working Beyond Expectations

Detail Design Report

Road Infrastructure Upgrades

Governor Macquarie Drive (GMD)
Alfred Road to Childs Road Upgrade,
Chipping Norton

Prepared For:
Liverpool City Council

LIVERPOOL CITY COUNCIL

Date:
Dec 2022

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Project Management • Town Planning • Engineering • Surveying
Visualisation • Social Impact • Urban Planning

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Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Initial Issue	Dec 2022	N Wall	I Brown

Limitations Statement

This report has been prepared in accordance with and for the purposes outlined in the scope of services agreed between ADW Johnson Pty Ltd and the Client. It has been prepared based on the information supplied by the Client, as well as investigation undertaken by ADW Johnson and the sub-consultants engaged by the Client for the project.

Unless otherwise specified in this report, information and advice received from external parties during the course of this project was not independently verified. However, any such information was, in our opinion, deemed to be current and relevant prior to its use. Whilst all reasonable skill, diligence and care have been taken to provide accurate information and appropriate recommendations, it is not warranted or guaranteed and no responsibility or liability for any information, opinion or commentary contained herein or for any consequences of its use will be accepted by ADW Johnson or by any person involved in the preparation of this assessment and report.

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The Client should be aware that this report does not guarantee the approval of any application by any Council, Government agency or any other regulatory authority.

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1.0 Project Description & Objectives

ADW Johnson has been engaged by Liverpool City Council to prepare the concept and detailed design of road upgrades along Governor Macquarie Drive between Alfred Road and Childs Road to provide a four-lane divided road with on-street parking on the east side only. As part of this upgrade, the existing single lane roundabout at the intersection with Childs Road would be upgraded to a dual lane roundabout and the intersection with Alfred Road would be upgraded to a signalised intersection. Lane configuration is to be similar to the existing configuration south of this GMD road section.

The project objective is to improve the performance and safety of both intersections, accommodate greater traffic volumes along Governor Macquarie Drive, provide parking along one side of the road and provide access to industrial developments along both sides of the road.

Figure 1.1: Existing Road Section – Governor Macquarie Drive

(Source: Nearmap)

2.0 Road Upgrades Configuration

The proposed upgrade works along Governor Macquarie Drive alter the existing configuration to incorporate the following components:

2.1 GOVERNOR MACQUARIE DRIVE - NORTHBOUND

- Existing kerb alignment is retained for southern half between Alfred Rd and Childs Rd;
- Revised carriageway cross section for southern portion of GMD between Alfred Rd and Childs Rd to incorporate a shoulder/parking lane and two (2) through lanes; and
- Road widening for northern portion of GMD between Alfred Rd and Childs Rd to accommodate two (2) through lanes.

2.2 GOVERNOR MACQUARIE DRIVE - SOUTHBOUND

- Existing kerb alignment is retained for full length;
- Revised carriageway cross section to incorporate a parking lane and two (2) through lanes between both intersections for entire length; and
- Incorporation of central median island to separate northbound and southbound travel lanes.

2.3 INTERSECTION: ALFRED ROAD & GOVERNOR MACQUARIE DRIVE

- Intersection re-configuration from dual-lane roundabout to a signalised intersection;
- Road widening on approach to intersection to incorporate two (2) through lanes (for both northbound and southbound directions);
- Signalised "Left turn only" lane introduced on approach to intersection (for both northbound and southbound directions);
- Signalised right turn lanes by addition of central channelised right turn lane;
- Through lane and left-hand turn lane for both westbound and eastbound approach to intersection along Alfred Road;
- Single westbound and eastbound departure lane on Alfred Road retained;
- Revised lane widths in accordance with TCS layout – revised central median alignment and transition of lane widths on southern side of intersection;
- Median islands designed to accommodate design vehicle swept paths; and
- Kerb alignments modified based on revised lane configuration and accommodating design vehicle swept paths.

2.4 INTERSECTION: CHILDS ROAD & GOVERNOR MACQUARIE DRIVE

- Intersection re-configuration from single-lane roundabout to dual-lane roundabout;
- Road widening on approach to roundabout to incorporate two (2) through lanes (for both north-bound and south-bound directions);
- Single westbound and eastbound approach/departure lanes on Childs Rd retained;
- Revised lane widths in accordance with TCS layout – central median alignment and transition of lane widths on northern side of intersection;
- Median islands designed to accommodate design vehicle swept paths; and
- Kerb alignments modified based on revised lane configuration and accommodating design vehicle swept paths.

3.0 Geometric Design

3.1 DESIGN STANDARDS

The following design standards were used in the preparation of the geometric design;

- Austroads Guide to Road Design (2021) – Various Parts & TfNSW AGRD Supplements
- TfNSW - "Traffic Signal Design" & "Delineation"
- TfNSW CADD Manual
- LCC Standard Drawings - Drainage, Roads & Landscape
- Australian Standard 1742 – Manual of Uniform Traffic Control Devices
- Australian Rainfall and Runoff

3.2 PROPOSED HORIZONTAL GEOMETRY AND CROSS SECTION

3.2.1 Horizontal Curves and Superelevation

Governor Macquarie Drive features six (6) horizontal curves within our limit of works. Each curve has been designed in accordance with the AGRD Part 3 Section 7.4.1.

The first two (2) horizontal curves (CH500-540) are on approach to the intersection of Alfred Rd with Governor Macquarie Dr. The curves have been designed to transition from the existing configuration and lane widths to the revised configuration and lane widths in accordance with the TCS layout.

A horizontal curve occurs through the intersection (CH580-623) of Alfred Rd with Governor Macquarie Dr. The curve radius has been informed by the existing kerb alignment on the Eastern side of Governor Macquarie Drive (that is being retained) and accommodates the configuration and lane widths in accordance with the TCS layout. Similarly, the next horizontal curve occurs between CH695-773 and has been informed by the existing kerb alignment on the Eastern side of Governor Macquarie Drive (that is being retained).

The northbound lanes have been super-elevated on approach to the intersection of Childs Rd with Governor Macquarie Dr to maintain a consistent crossfall through the intersection for the northbound traffic lanes. A lower design speed has been used to inform the maximum rate of rotation due its proximity to the intersection.

The last two (2) horizontal curves (CH1050-1120) are occurring through the proposed intersection of Childs Rd with Governor Macquarie Dr and tying into existing at the limit of works. The curves have been designed to transition from the exit through lanes of the proposed roundabout (both northbound and southbound) to match into the existing cross-section and existing horizontal road alignment at the limit of works. Each curve has been designed conservatively in accordance with the AGRD Part 3 Section 7.4.1. The northbound lane has been super-elevated to tie into existing crossfalls at the limit of works.

The horizontal alignment of Alfred Rd is consistent with the existing alignment with a slight offset crown introduced on the eastbound approach to incorporate the revised configuration and lane widths in accordance with the TCS layout.

The horizontal alignment of Childs Rd follows the existing alignment from the limit of works through to the intersection (on both approaches) with no superelevation introduced.

3.2.2 Typical Cross Sections

The cross-section geometry for both Governor Macquarie Dr and Alfred Rd is shown below.

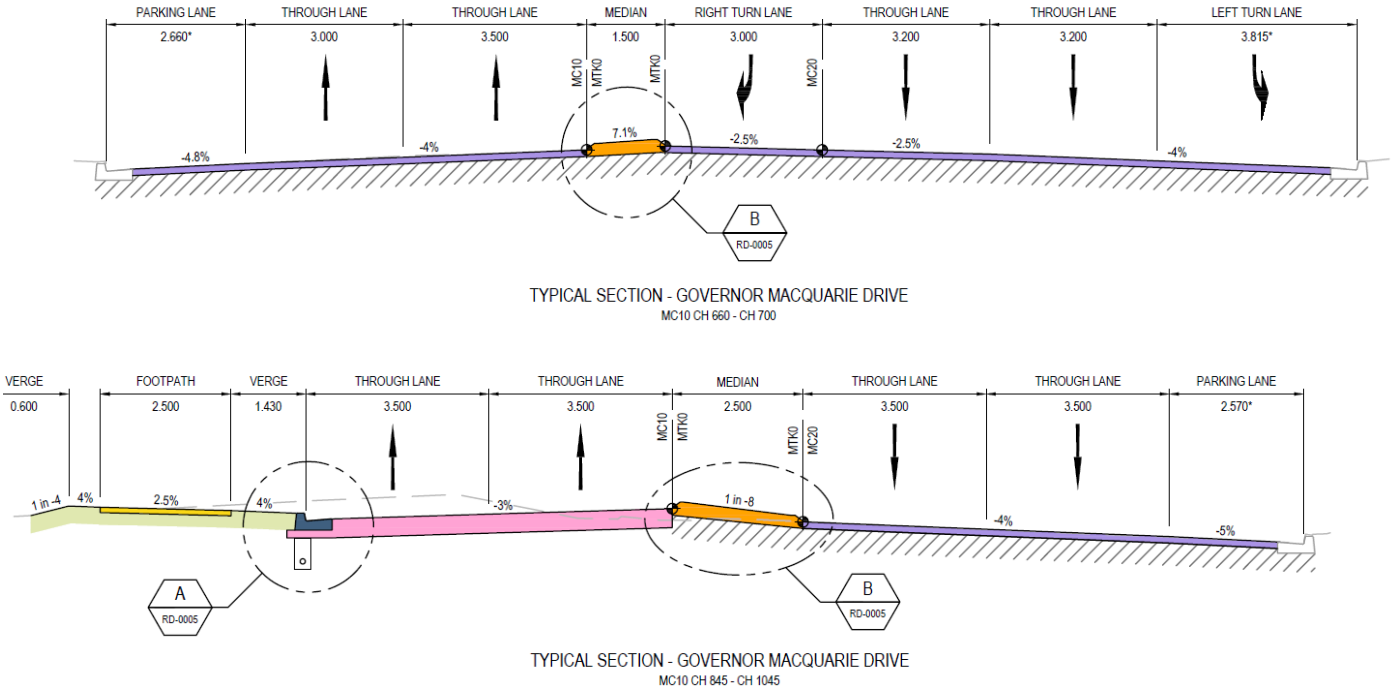

Figure 3.1: Proposed Typical Cross Sections – Governor Macquarie Drive

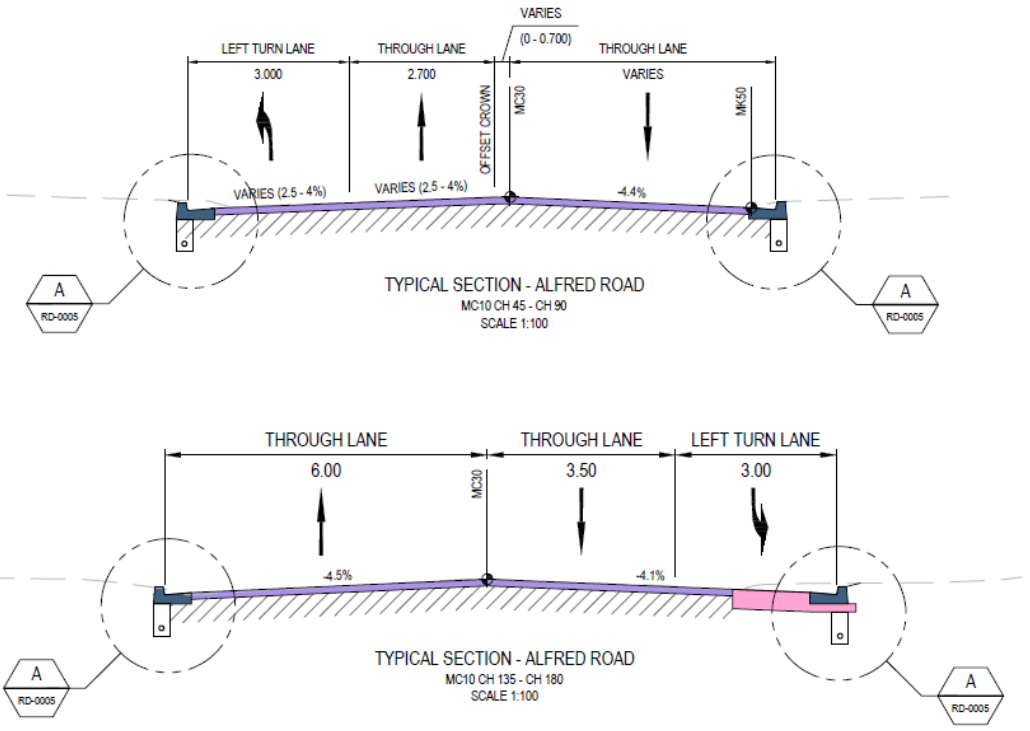

Figure 3.2: Proposed Typical Cross Sections – Alfred Road

3.3 PROPOSED VERTICAL GEOMETRY

The longitudinal vertical geometry of Governor Macquarie Drive between CH580-830 has been designed to generally match existing levels to ensure that the finished surface levels remain between 0-100mm above the existing pavement. Where road widening has been incorporated into the design, the existing road crossfalls have been projected to inform the vertical alignment of the proposed kerb.

Between CH830-1050 the vertical alignment on the southbound lanes has been designed to generally match existing levels to ensure that the finished surface levels remain between 0-100mm above the existing pavement.

The proposed road widening along Governor Macquarie Drive (CH830-1050), constituting the northbound lanes through this section, has been designed vertically to reduce the required excavations through this section of road whilst ensuring the resultant crossfall within the central median islands does not exceed the maximum 12.5%. Between CH945-1050 the northbound lanes have been super-elevated on approach to the intersection (with Childs Rd) to maintain a consistent crossfall through the intersection for the northbound traffic lanes. Super-elevation cross-fall transition lengths have been designed in accordance with AGRD Part 3.

The section of Governor Macquarie Drive to the north of the intersection with Childs Rd (CH1080-1135) has been designed to generally match existing levels to ensure that the finished surface levels remain between 0-100mm above the existing pavement.

The longitudinal vertical geometry of both Alfred Road and Childs Road has been designed to generally match existing levels to ensure that the finished surface levels remain between 0-100mm above the existing pavement. Where road widening has been incorporated into the design, the existing road crossfalls have been projected to inform the vertical alignment of the proposed kerb.

3.4 PROVISION FOR PEDESTRIANS

Existing signalised pedestrian crosswalks have been retained in their original configuration but adjusted to suit proposed geometry. An additional signalised pedestrian crosswalk has been added prior to the intersection of Governor Macquarie Drive and Childs Road with a refuge located within the central median island.

3.5 LINEMARKING & SIGNPOSTING

The extent and type of new line marking has been provided on the detailed design plans. Any linemarking made redundant by the upgrade works will be removed in accordance with TfNSW requirements.

Details of the proposed signposting have been provided on the detailed design plans. Signposting related to the traffic signal works have been included on the TCS design drawing prepared by TTPA which has been included in the Detailed Design Submission.

4.0 Stormwater Drainage Design

4.1 EXISTING DRAINAGE

Between CH580-940, the existing drainage network collects runoff from the northbound and southbound lanes on Governor Macquarie Drive and is conveyed to the south of the limit of works through a trunk drainage line centrally located within the road carriageway. Refer to **Figure 4.1** for location as indicated by DBYD searches.

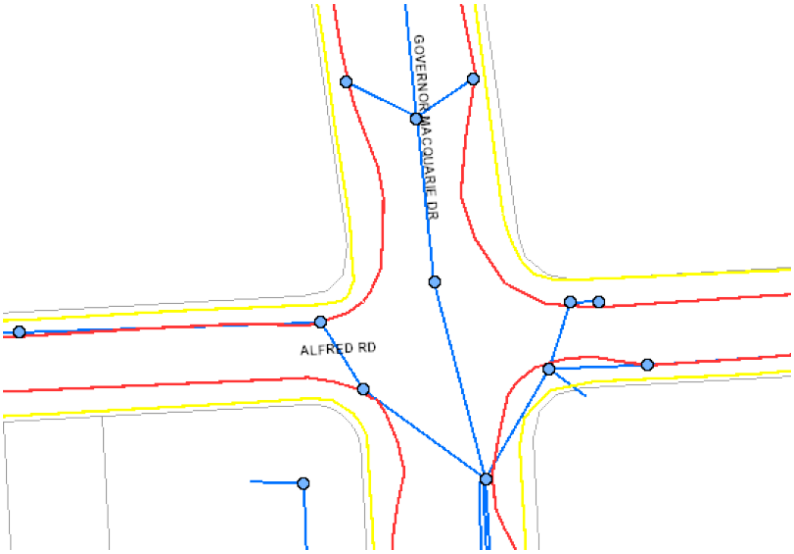

Figure 4.1: Existing Stormwater Network (South)

Between CH940-1120, the existing drainage network collects runoff from the northbound and southbound lanes on Governor Macquarie Drive and is conveyed to the east of the limit of works through a trunk drainage line running east along the south side of Childs Rd. The alignment of the trunk drainage line was not included in the survey file provided by LCC; however, DBYD searches indicate the approximate alignment, as detailed in **Figure 4.2.** The location of the existing trunk line is to be confirmed prior to the next design submission.

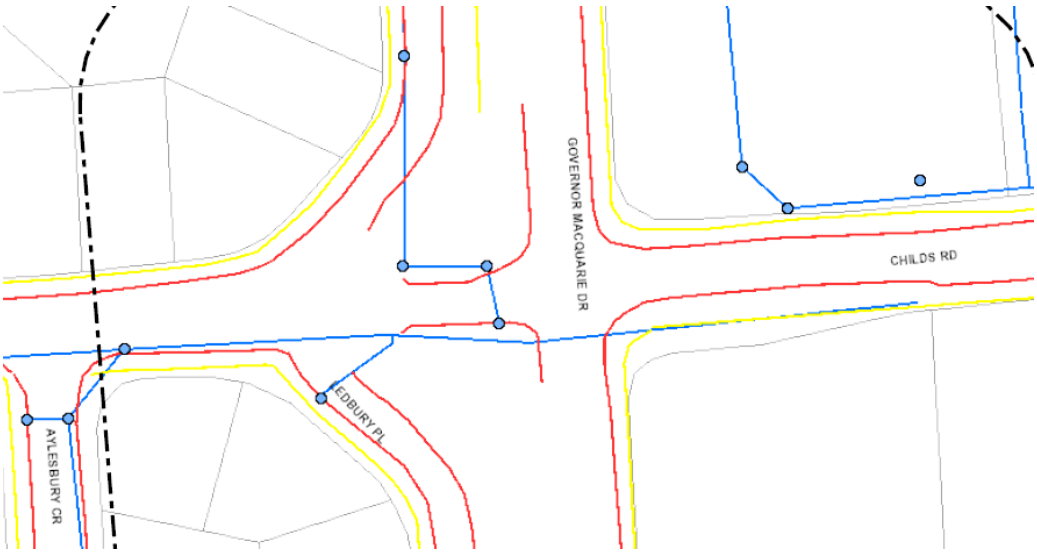

Figure 4.2: Existing Stormwater Network (North)

4.2 PROPOSED DRAINAGE

The proposed drainage system incorporates additional stormwater drainage infrastructure for the section of road widening along the northbound section of Governor Macquarie Drive. The proposed stormwater drainage infrastructure will capture overland flows and convey them downstream to tie-in with existing drainage infrastructure.

In addition to this, where localised road widening is proposed, the design includes the disposal of redundant drainage infrastructure that is within the proposed road pavement and the reconstruction of drainage inlet pits/pipework on revised alignments as required. Details of the proposed drainage upgrades are included in the detailed design submission.

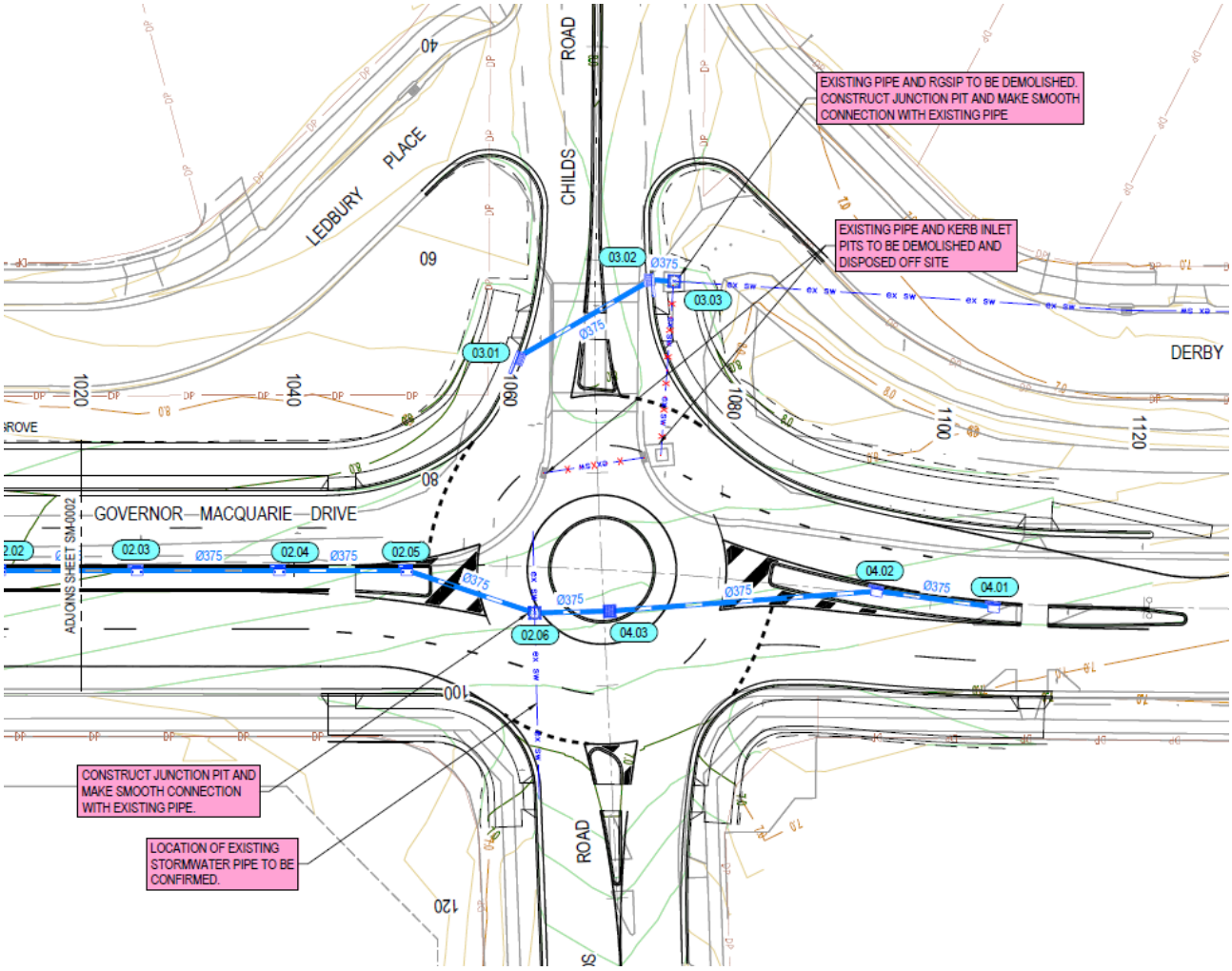

Figure 4.3: Proposed Stormwater Network (North)

It is assumed the existing trunk drainage lines for the southern and northern section of the GMD upgrades have the capacity to accommodate the nominal increases in flow resulting from the road widening of the northbound lanes. Drainage hydraulic calculations for the proposed drainage infrastructure will be included in the final detailed design submission.

5.0 Consultant Designs

5.1 TRAFFIC CONTROL SIGNAL DESIGN

As part of the Concept Design submission, a traffic control signal (TCS) design was prepared by TTPA Pty Ltd and submitted to LCC and TfNSW for review. The TCS design details have been incorporated in the civil design including TfNSW comments on the TCS and civil designs.

The TCS design prepared by TTPA plans (yet to be finalised) will be included in the next Detailed Design Submission.

5.2 GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN

A geotechnical investigation and pavement design is to be provided by LCC utilising the concept design previously submitted. A copy of pavement design is to be provided by LCC to be incorporated within the 100% detailed design submission.

5.3 SERVICES INVESTIGATION & UTILITIES DESIGN

ADWJ have previously submitted plans suitable for service utilities investigation and realignment. Upon completion of the detailed horizontal and vertical road alignment, ADWJ provided plans for each service authority that identified areas where new works are occurring above existing utilities infrastructure, and provided existing and proposed surface levels so the proposed impacts on the services can be reviewed.

LCC are arranging for services investigations to be undertaken and a copy of any utilities designs is to be provided by LCC to be incorporated within the 100% detailed design submission.

5.4 STREET LIGHTING DESIGN

A street lighting design is to be provided by LCC utilising the concept design previously submitted. A copy of certified street lighting design is to be provided by LCC to be incorporated within the 100% detailed design submission.

5.5 REF & COMMUNITY CONSULTATION

ADWJ have submitted plans suitable for community consultation as part of this design submission. Council will prepare REF in consultation with TfNSW and undertake community consultation based on the updated concept design. Any outcomes as a result of community consultation are to be provided by LCC to be incorporated within the 100% detailed design submission.