Minta Farm Precinct Structure Plan

Concept Road Design Report

Client:

Victorian Planning Authority

Project No. 161910

Final Report – 05/10/17

1st Floor 132 Upper Heidelberg Road Ivanhoe Vic 3079
PO Box 417 Ivanhoe Vic 3079 Ph: (03) 9490 5900 Fax: (03) 9490 5910
www.trafficworks.com.au

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Document prepared by:

Trafficworks Pty Ltd

ABN 59 125 488 977

1st Floor 132 Upper Heidelberg Rd Ivanhoe Vic 3079

PO Box 417 Ivanhoe Vic 3079

Ph (03) 9490 5900

Fax (03) 9490 5910

www.trafficworks.com.au

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ATTACHMENT A – CONCEPT ROAD DESIGN

1 INTRODUCTION

Trafficworks has been engaged by the Victorian Planning Authority (VPA) to undertake concept designs for key intersections and road lengths within the Minta Farm precinct in Berwick. This includes six intersections and four road segments, as follows:

- IN-01 – North-south Arterial / O'Shea Road
- IN-02 – North-south Arterial / East-west connector (north)
- IN-03 – North-south Arterial / East-west connector (central)
- IN-04 – North-south Arterial / East-west connector (south)
- IN-05 – North-south Arterial / Grices Road
- IN-06 – North-south Connector / Grices Road
- RD-01, RD-02, RD-03, RD-04 – North-South Arterial, between O'Shea Road (north) and Grices Road / Soldiers Road (south).

The Minta Farm precinct concept designs have been prepared in line with the following documents to ensure the appropriate standards, regulations and guidelines are satisfied.

- GAA Engineering Design and Constructing Manual for Subdivision in Growth Areas
- the VicRoads Guidelines for Planning Road Networks in Growth Areas
- Austroads Guide to Road Design Part 3: Geometric Design
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections
- Australian Standards
- VPA standard cross-sections for Minta Farm Precinct

This report has been prepared to outline the methodology applied in relation to design vehicles, geometric design parameters, cross sections etc. and to determine the existing services that may impact on the design.

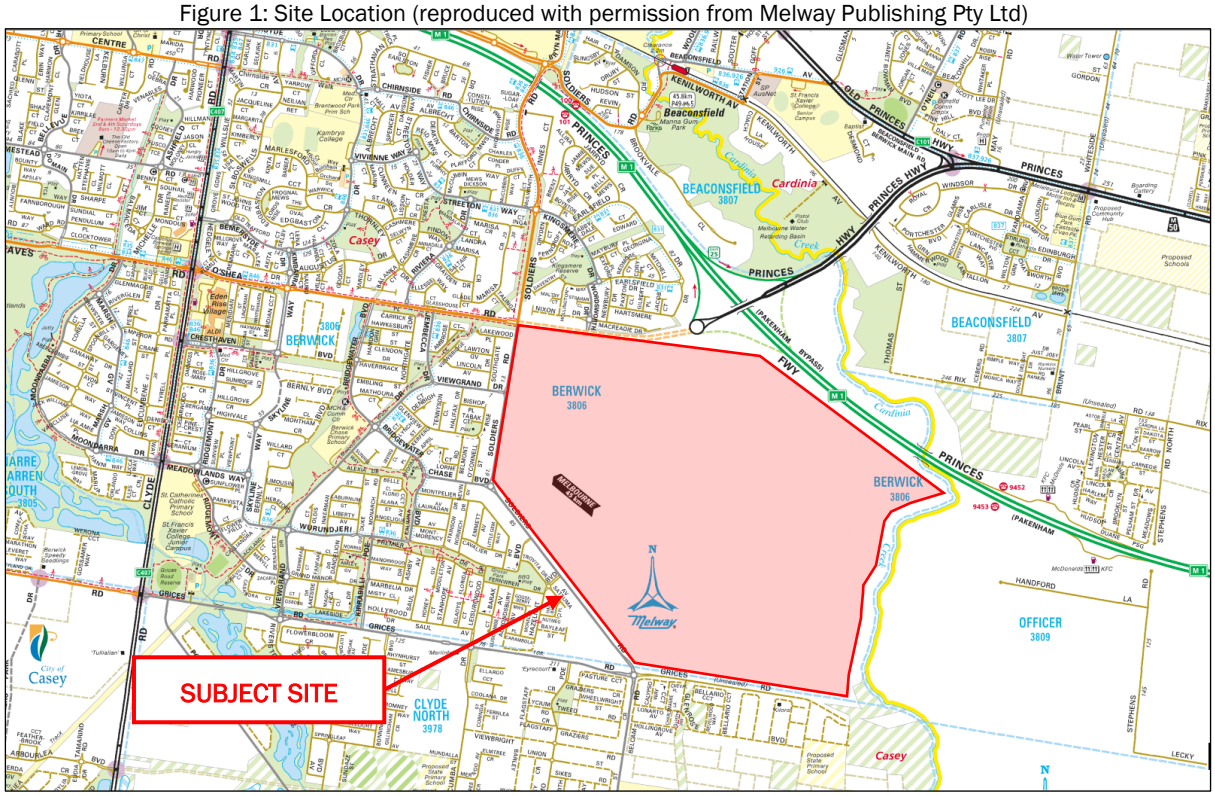
2 BACKGROUND

The Minta Farm is a single property previously used for farming purposes and covers an approximate area of 286 hectares. The properties surrounding the site comprise a combination of existing residential dwellings, parklands and schools, as well as additional proposed future residential development, generally to the south of the site. The site is also bordered by the Princes Freeway to the north and Cardinia Creek to the east.

The VPA is in the process of preparing a precinct structure plan (PSP) to guide the future development of this site. The PSP seeks to provide a mix of residential and employment opportunities, a local town centre, school and a range of parks and sporting facilities. These concept design plans will inform the Minta Farm PSP.

The subject site and the surrounding road environment is shown in Figure 1.

Figure 1: Site Location (reproduced with permission from Melway Publishing Pty Ltd)

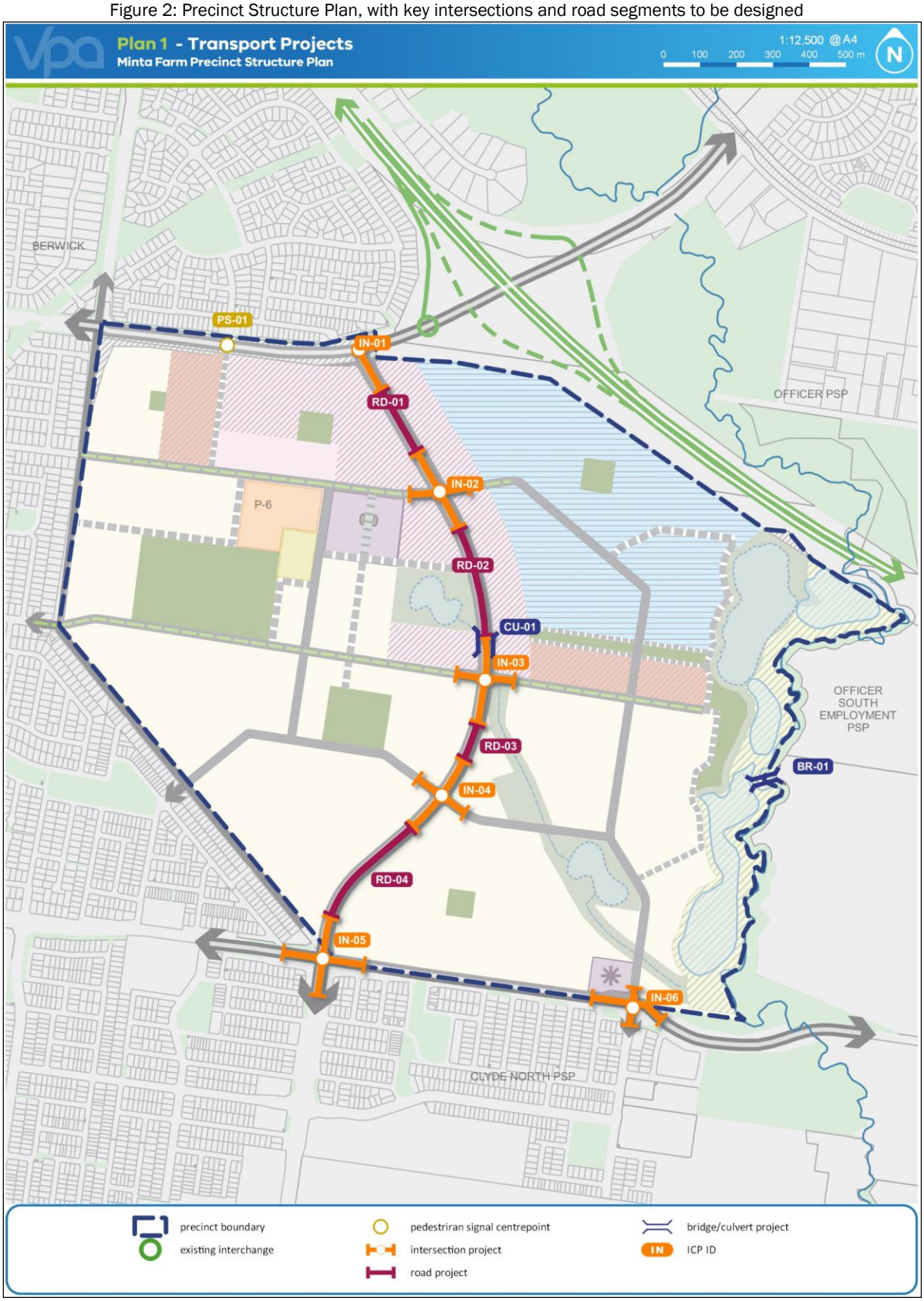


The Minta Farm development area will gain access to the surrounding network via an extension of O'Shea Road to the north, Grices Road to the south and Soldiers Road to the west. O'Shea Road is currently classified as a local road, configured with one traffic lane in each direction. Future planning for O'Shea Road indicates that it will become a six-lane arterial road.

A new north-south arterial through the development site will provide the last link in the major north-south arterial network. This north-south arterial will provide access to the Princes Freeway at the Beaconsfield interchange (via O'Shea Road) for the south-east development corridor, including the Clyde North PSP area located south of the Minta Farm development site.

The draft precinct structure plan for the site is shown in Figure 2. This plan indicates the key features and land uses within the precinct, as well as the key arterial and collector roads to be developed.

Figure 2: Precinct Structure Plan, with key intersections and road segments to be designed



3 DESIGN PHILOSOPHY

Concept road design plans for both interim and ultimate arrangements have been prepared for the five key intersections and four road segments to be considered within the Minta Farm precinct. This design philosophy report provides guidance on the principles, guidelines and standards applied in preparing the concept designs.

3.1 Road Cross Sections

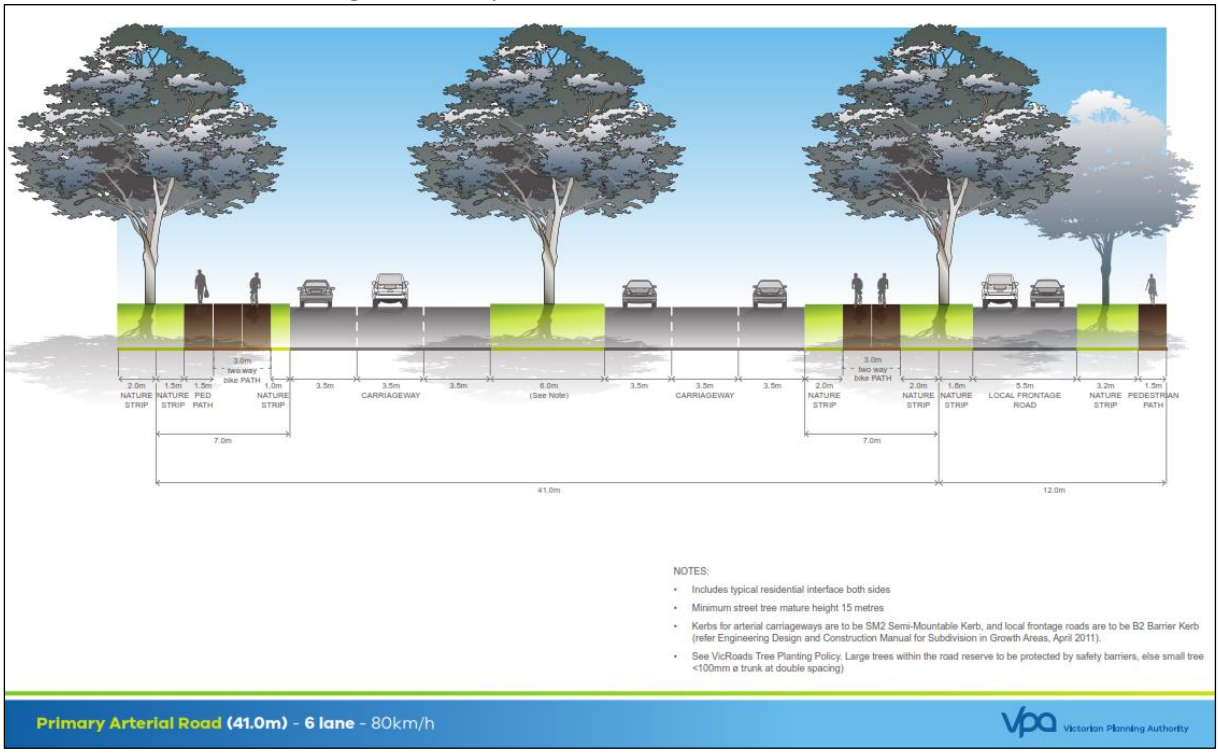
The VPA has prepared a series of standard cross sections for roads of varying function for the Minta Farm Precinct. All concept road and intersection designs have been developed in line with these standard road cross sections. The function of the road has been used when considering which cross section to apply (primary arterial, secondary arterial or connector street).

3.1.1 Primary Arterial Road (6 lanes)

The VPA has provided a standard cross section for a six-lane primary arterial road, with an operating speed of 80km/h (refer to Figure 3). This specifies a 41m wide road reserve, with two 10.5m wide carriageways separated by a 6m wide central median. There is also provision for two-way off-road bicycle paths and separate pedestrian paths on both sides of the road.

The north-south arterial and O'Shea Road function as primary arterials.

Figure 3: Primary Arterial Road standard cross section

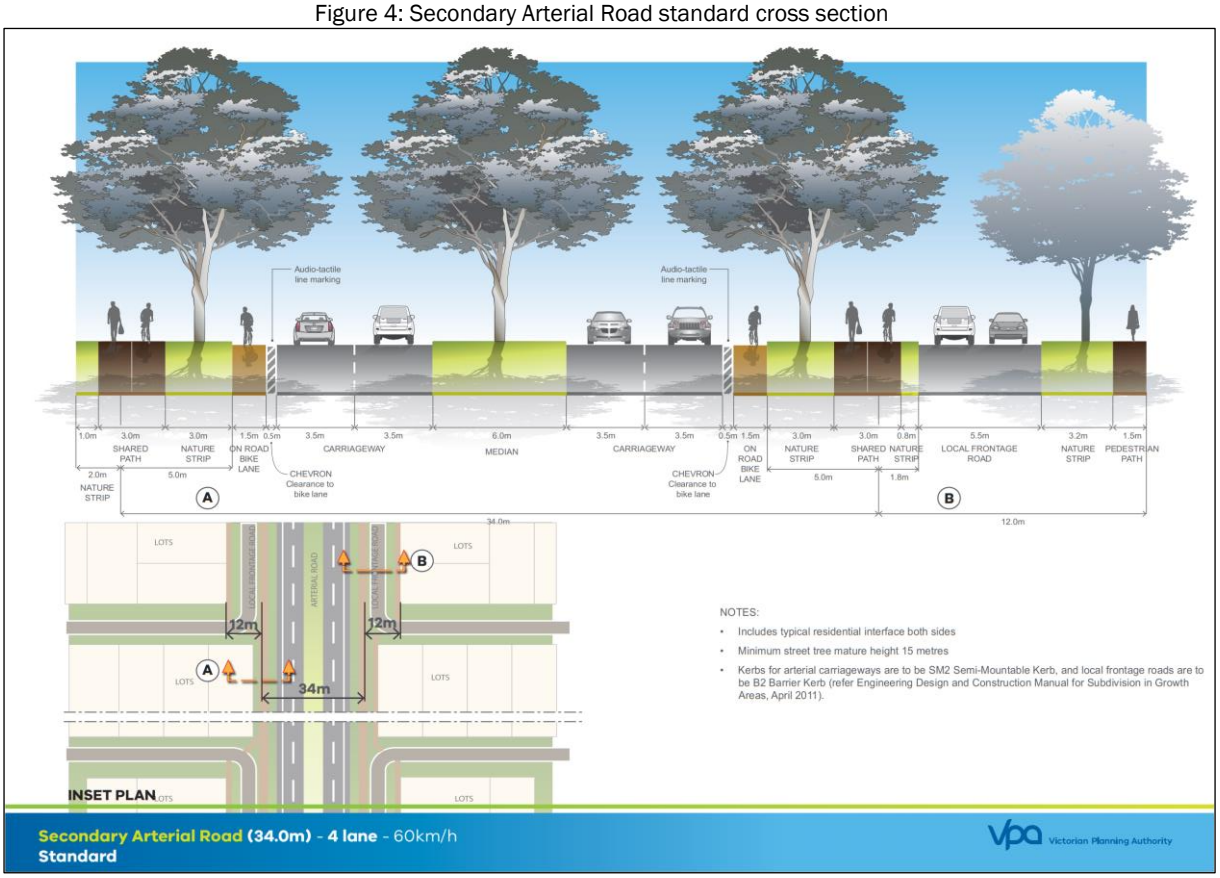


3.1.2 Secondary Arterial Road (4 lanes)

The VPA has provided a standard cross section for a four-lane secondary arterial road, with an operating speed of 60km/h (refer to Figure 4). This specifies a 34m wide road reserve, with two 7.0m wide carriageways separated by a 6m wide central median. There is also provision for on-road bicycle lanes in each direction and shared paths on both sides of the road.

Grices Road functions as a secondary arterial.

Figure 4: Secondary Arterial Road standard cross section



3.1.3 Connector Streets

The VPA has provided a standard cross section for a boulevard connector street, an industrial connector street and a residential connector street. The type of cross section applied will rely on the abutting land use.

The VPA standard cross sections for connector streets specify a 25m road reserve for connector streets, a 26m road reserve for industrial connector streets and a 28 – 31m wide road reserve for connector boulevards. Additionally, cross sections comprise two 3.5m wide traffic lanes (separated by a central median for a boulevard) and an indented parking lane on both sides of the road. The parking lane is either 2.1m wide (connector streets and connector boulevards) or 2.6m wide (industrial connector streets). There is also provision for a two-way off-road bicycle path on one side of the road and separate pedestrian paths on both sides of the road.

The standard cross sections for the three types of connector street are shown in Figure 5, Figure 6 and Figure 7.

Each of the connector streets have been designed in accordance with one of the possible connector street cross sections. The cross section applied in each location has been based on the proposed abutting land uses.

Figure 5: Boulevard Connector Street standard cross section

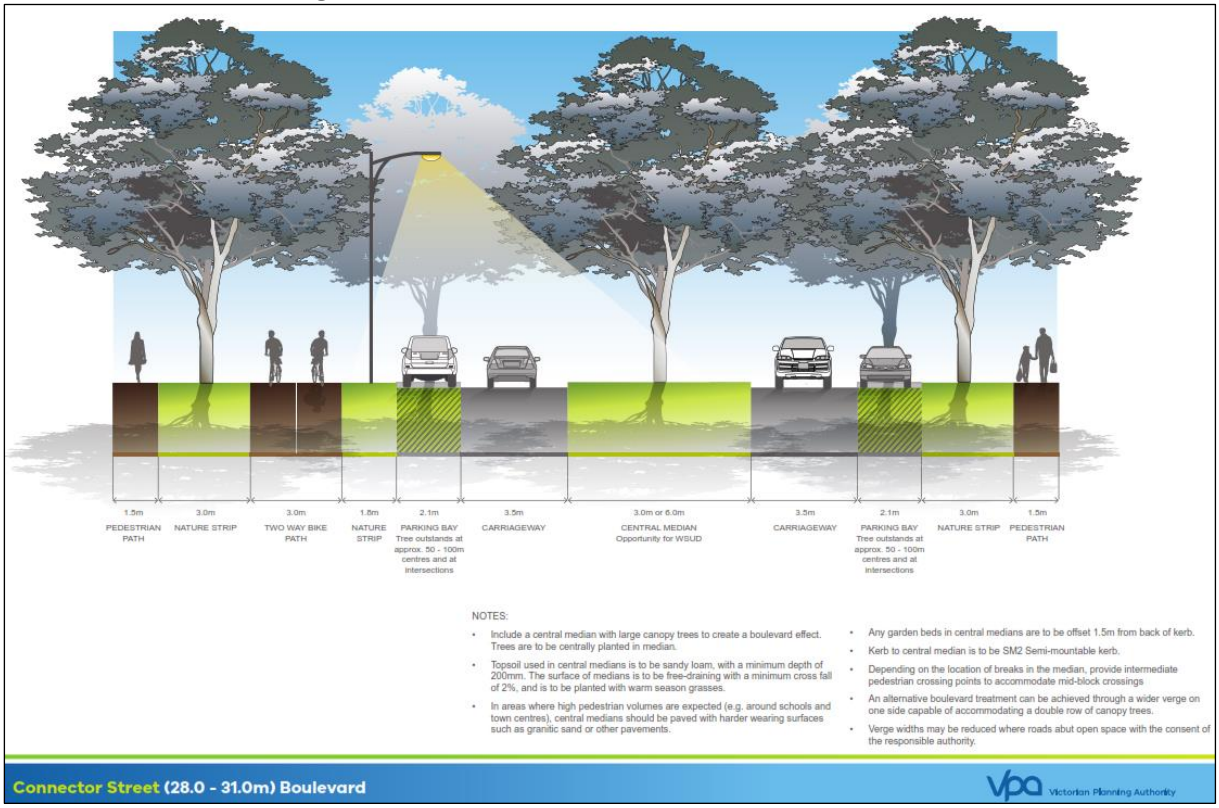


Figure 6: Industrial Connector Street standard cross section

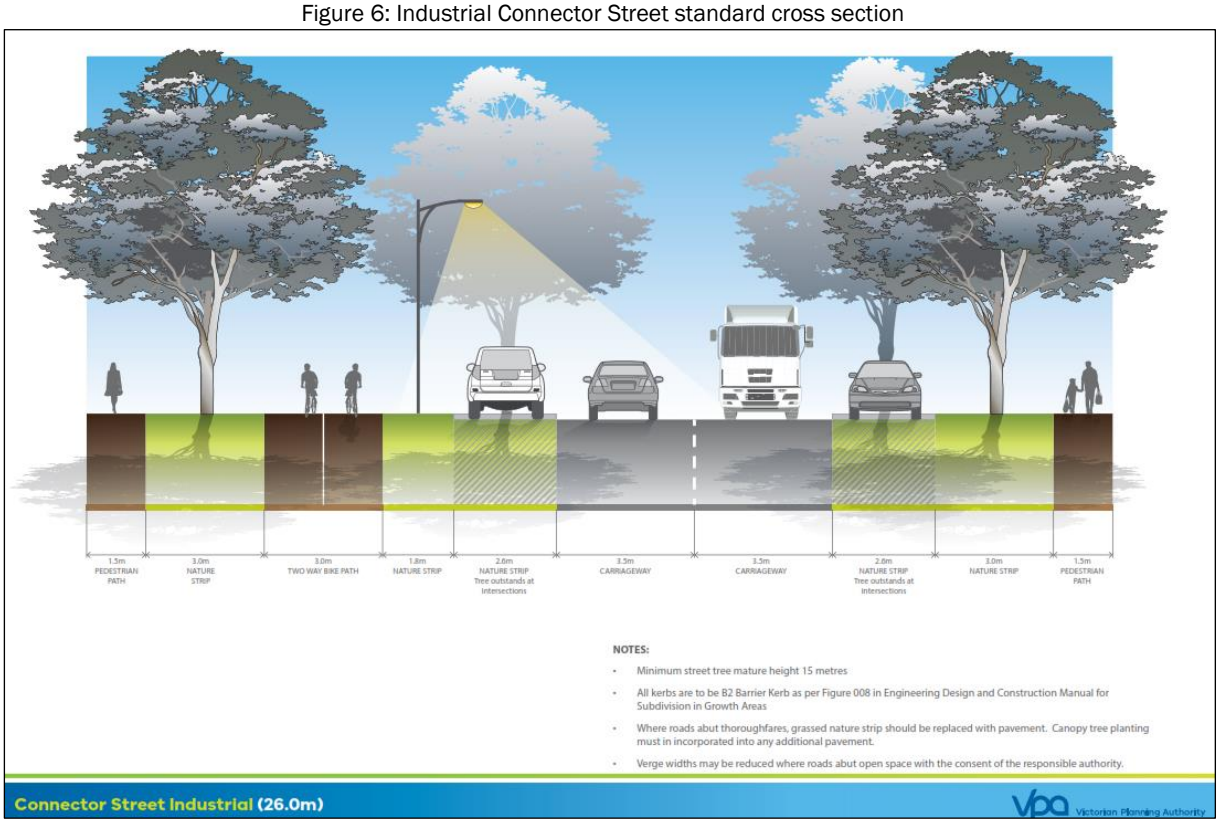
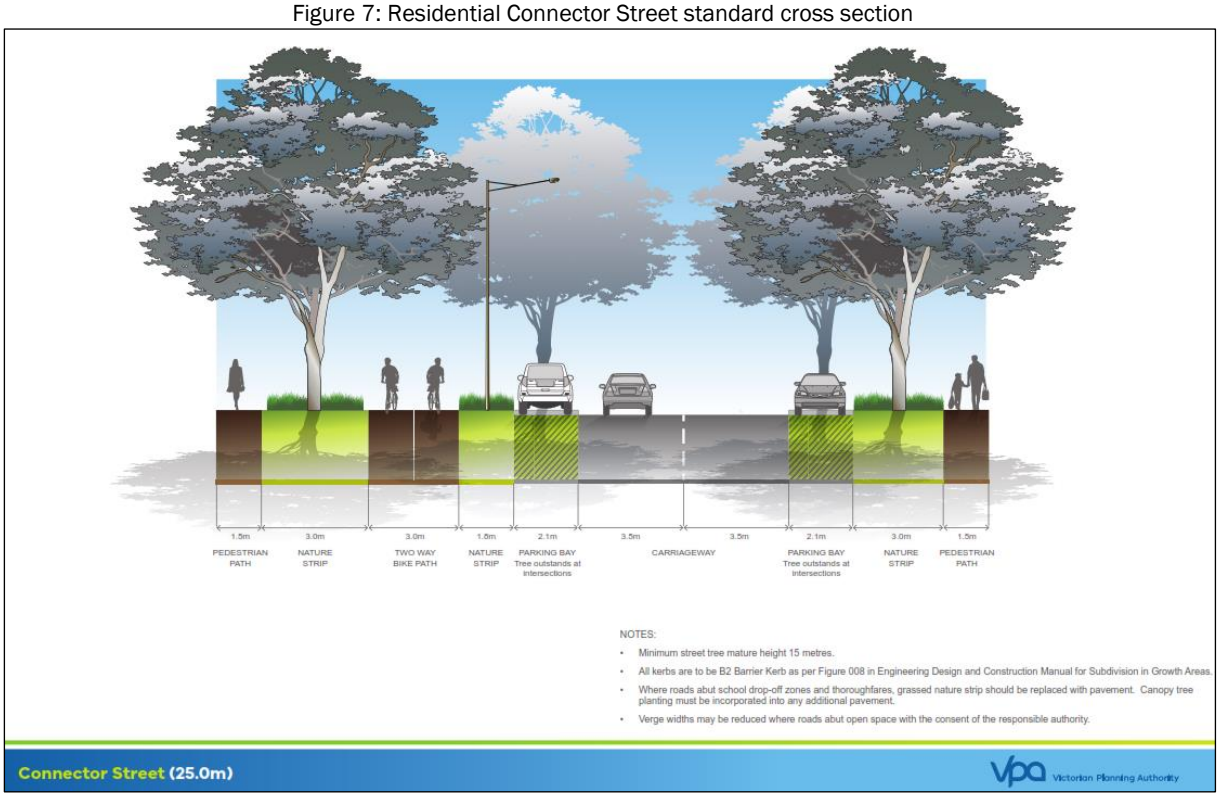


Figure 7: Residential Connector Street standard cross section



3.2 Lane Geometry

The intersection layouts include turn lanes to accommodate left and right turning vehicles at each of the intersections. VicRoads *Guide for Planning Road Networks in Growth Areas* specifies lengths for turn lanes to be provided along arterial and connector streets. Table 1 (reproduced from Table 4-1 in VicRoads *Guide for Planning Road Networks in Growth Areas*) indicates the typical turn lane lengths to be implemented for the ultimate intersection configurations.

The turn lane lengths specified in Table 1 have been applied when designing each of the intersection concept designs. The north-south arterial and O'Shea Road are classified as primary arterials and Grices Road is classified as a secondary arterial. Each of the remaining intersecting roads are classified as connector streets.

Table 1: Typical Turn Lane Lengths – Ultimate intersection configuration

ROAD TYPE	TURN LANE	ASSUMED TURN VOLUME	TOTAL TURN LANE LENGTH INC. TAPER
Primary Arterial	Left	400 veh/hr	100m (inc. 25m taper)
	Single Right	200 veh/hr	200m (inc. 25m taper)
	Double Right	400 veh/hr	170m (inc. 55m taper)
Secondary Arterial	Left	400 veh/hr	100m (inc. 20m taper)
	Single Right	200 veh/hr	200m (inc. 20m taper)
Connector Street	Left	500 veh/hr	100m (inc. 15m taper)
	Right	500 veh/hr	100m (inc. 30m taper)

Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections (AGRD4A) also provides guidance on the required length of deceleration turn lanes. AGRD4A specifies the required dimensions of deceleration turn lanes in terms of the deceleration length to ensure vehicles can safely slow to a stop from the approach speed and the additional length required to store a design vehicle while waiting to turn. As per AGRD4A:

- turn lanes along primary arterial roads (80km/h speed) should be 120m long (100m deceleration plus 19m storage)
- turn lanes along secondary arterial roads (60km/h) should be 75m long (55m deceleration plus 19m storage)
- turn lanes along connector streets (50km/h) should be 60m long (40m deceleration plus 19m storage).

It is noted that turn lane lengths as per AGRD4A are shorter than indicated by the VicRoads Guide. Hence, the turn lane lengths have been designed in accordance with Table 1.

3.3 Intersection Geometry

3.3.1 Slip Lanes

Slip lanes have been considered at the intersections along the primary arterial road (north-south arterial). Slip lanes have been included in the design at the north-south arterial / Grices Road intersection (IN-05). However, slip lanes have not be included at IN-02, IN-03 and IN-04, as per the brief.

3.3.2 O'Shea Road and North-South Arterial intersection - VicRoads concept design

O'Shea Road has been designed by VicRoads. The design of the intersection with the north-south arterial included a left turn slip lane from east to south which provided three traffic lanes. The design also resulted in the north-south arterial and O'Shea Road intersection being skewed (i.e. at 70 degrees). Trafficworks design of the north-south arterial at O'Shea Road accommodates these three left turn lanes and the intersection skew.

As a result of the alignment of the O'Shea Road and the north-south arterial intersection, the design of IN-02 is also at 70 degrees. This can affect the opposing right turns along the north-south arterial at the intersection. These turns have been accommodated at the intersection, but particular consideration should be given to the opposing right turns during detailed design.

3.3.3 Swept Paths

Swept path assessments at each of the intersections have been undertaken to ensure the following design (and check) vehicles can safely perform turning manoeuvres:

- The north-south arterial / O'Shea Road intersection and the north-south arterial / Grices Road intersection (two arterial roads) have been designed to allow two 19m semi-trailers to concurrently perform opposing (diamond) right turns
- Intersections between an arterial road and a connector road have been designed to allow:
    - one 12.5m rigid truck and one 19m semi-trailer to concurrently perform opposing (diamond) right turns
    - a 12.5m rigid truck (design vehicle) to perform a left turn at the intersection
    - a 19m semi-trailer (check vehicle) to perform a left turn at the intersection, however will be required to encroach into the through lane
    - Industrial connector roads have been design to accommodate 19m semi-trailers.

3.4 Road Alignment

3.4.1 Vertical Alignment

Grade lines have been checked along the north-south arterial. The grade is undulating, generally follows the topography of the land and review indicates grades of up to 4% along its length.

3.4.2 Horizontal Road Alignment

The horizontal curve radii in the road alignment along the north-south arterial have been designed in excess of the desirable requirements for V80 design speeds on urban roads (desirable 230m minimum radius).

3.5 Interim and Ultimate Layout Interaction

The interim intersection and road layouts have been designed to fit within the ultimate layouts in order to minimise the rework required to implement the ultimate layout.

The north-south arterial, O'Shea Road and Grices Road comprise divided carriageways in the ultimate condition.

The interim layout of these roads (mid-block) is to be designed to ensure that the interim two-way traffic lanes will fit within a single carriageway in the ultimate condition. This will result in the interim carriageway being shifted to one side of the road reserve, rather than being centrally placed.

The interim layout at intersections should be designed so that the intersection is located in its ultimate position. This involves shifting traffic lanes along the single undivided carriageway to match in with the ultimate divided carriageway intersection layout in advance of the intersection. Implementation of this also involves creating the interim right turn lane in the ultimate location of the central through lane. Installation of a wider central median adjacent to the interim right turn lane allows for the ultimate right turn lane to be widened into the median.

To match in with existing road infrastructure and carriageway locations, the interim layout will utilise the following carriageways:

- eastbound carriageway along O'Shea Road
- southbound carriageway along the north-south arterial
- eastbound carriageway along Grices Road

3.6 Pedestrian and Cyclist Facilities

The proposed road network within the Minta Farm Precinct indicates that pedestrian and cyclist facilities are to be provided along all arterial and connector type roads. This includes a combination of pedestrian footpaths, shared paths, off-road bicycle paths and on-road bicycle lanes.

- The north-south arterial and O'Shea Road (primary arterial roads) propose an off-road bicycle path to be provided along both sides of the road, with an adjacent pedestrian footpath.
- Grices Road (secondary arterial road) proposes on-road bicycle lanes, with a 0.5m painted buffer zone, along both sides of the road and shared paths on both sides of the road.
- All other connector roads propose an off-road bicycle path to be provided along one side of the road and pedestrian footpaths to be provided on both sides of the road.

The above facilities should be provided as per the standard cross sections and provide suitable connections between shared paths, off-road bicycle paths and footpaths at intersections to ensure confusion is minimised and the function of each paths is clearly understood.

Connectivity needs to be provided between shared paths / off-road bicycle paths across intersections. This has been designed in accordance with VicRoads *Guide for Planning Road Networks in Growth Areas*. Crosswalks at intersections are at least 3.0m wide, to accommodate both pedestrians and cyclists at the intersection. In addition, the installation of bicycle lanterns at crosswalks and/or implementation of cut-through islands to safely accommodate bicycles should be considered.

3.6.1 IN-06 Grices Road

At IN-06 (Grices Road), an equestrian lantern should be installed at the crossing alongside the pedestrian lantern.

3.7 Land Acquisition

All land required to accommodate the road reserves is located within the existing Minta Farm property (single property). Hence, no external land acquisition is required for other properties.

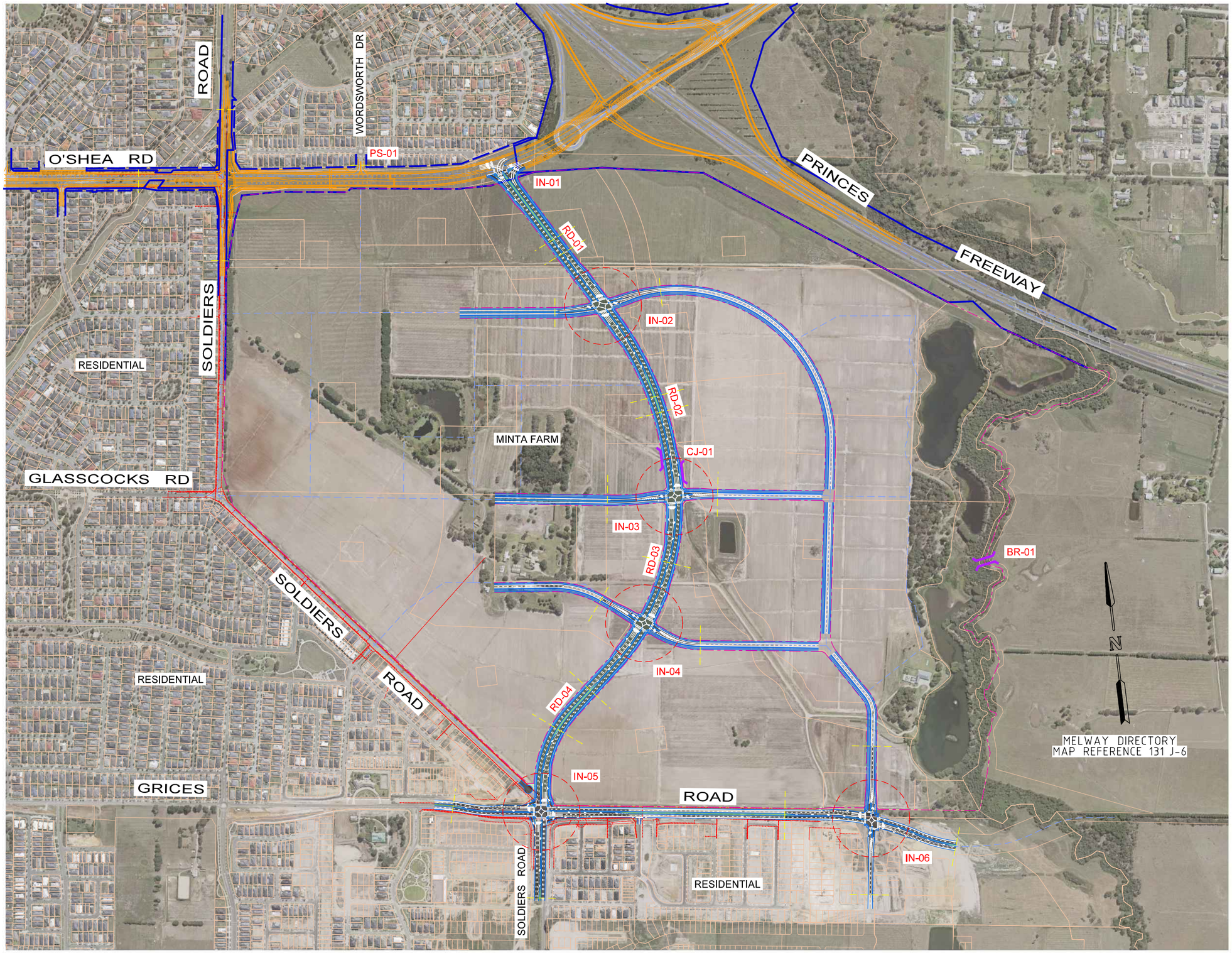
3.8 Services Affected by Proposed Works

A "Dial Before You Dig" enquiry of the services in the vicinity of the proposed works has been undertaken. A review of the services / utilities information indicates the following notable services are located within the vicinity of the Soldiers Road / Grices Road intersection:

- Soldiers Road / Grices Road intersection
    - APA Gas – distribution gas main (south side of Grices Road, crossing Solders Road on south side of intersection)
    - Ausnet Electricity – underground high voltage cable (south side of Grices Road, crossing Solders Road on south side of intersection)
    - Casey City Council – drainage channel (south side of Grices Road, crossing Solders Road on south side of intersection)
    - South East Water - water main (south-west side of Soldiers Road north and south side of Grices Road)
    - South East Water - sewer main (west side of Soldiers Road south, crossing Grices Road west of the intersection)
    - South East Water – recycled water main (east and west sides of Soldiers Road south and south side of Grices Road, crossing Soldiers Road south of the intersection)
    - NBN cable – cable and duct (south side of Grices Road west, north side of Grices Road east, crosses Soldiers Road on the south side of the intersection)

Locations of underground services need to be verified on-site and approvals to work within the vicinity of these services sought from the relevant service authority / company.

ATTACHMENT A – CONCEPT ROAD DESIGN



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MINTA FARM
PRECINCT STRUCTURE PLAN - PSP11
CITY OF CASEY
CONCEPT LOCALITY PLAN

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PROPOSED O'SHEA ROAD

MINTA FARM

NORTH SOUTH ARTERIAL - RD 01

MINTA FARM

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MELWAY DIRECTORY
MAP REFERENCE 131 J-5

PRELIMINARY PLAN
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BEWARE OF UNDERGROUND SERVICES
The locations of underground services shown are approximate only and their exact position should be proven on site.

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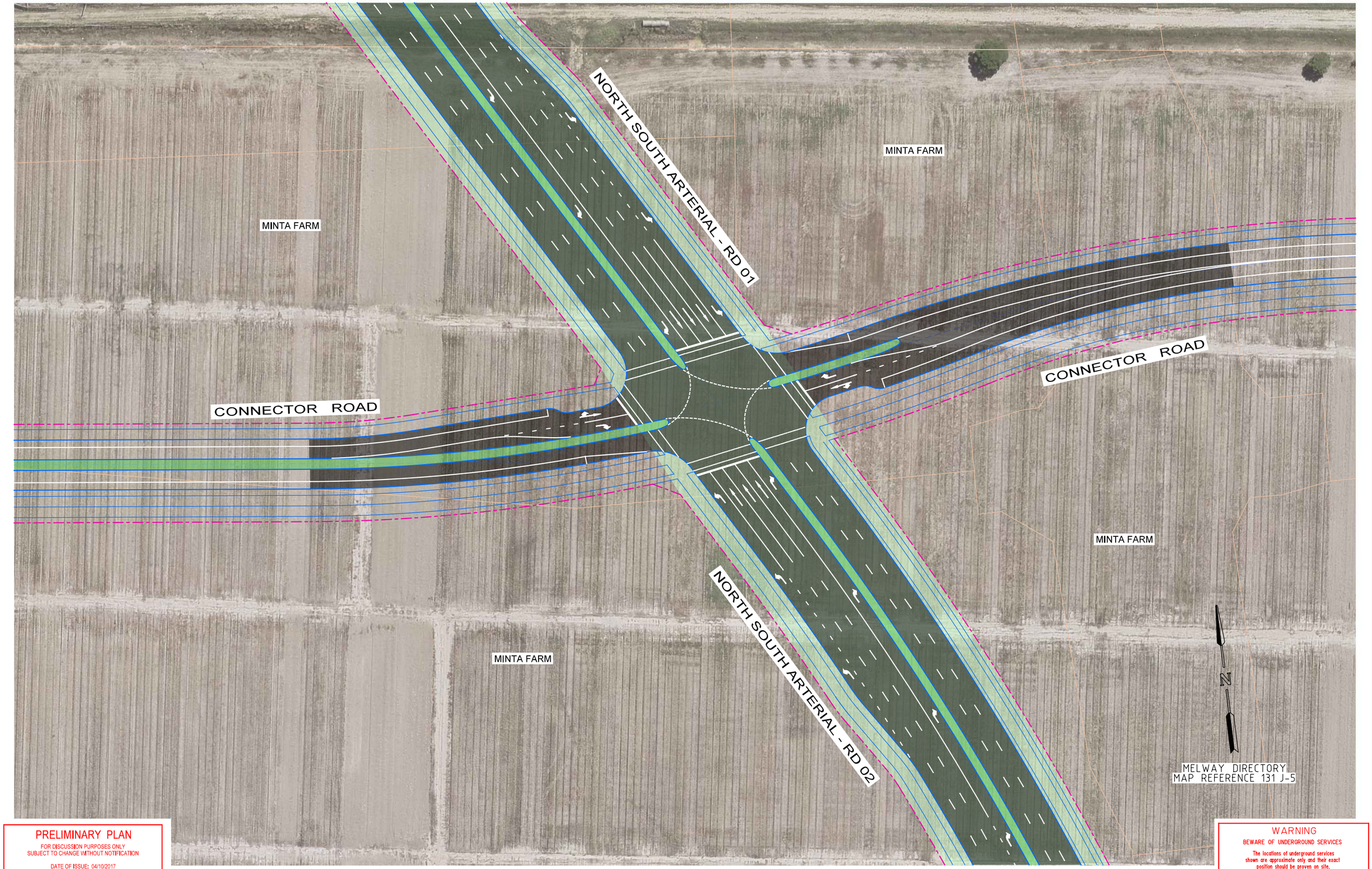

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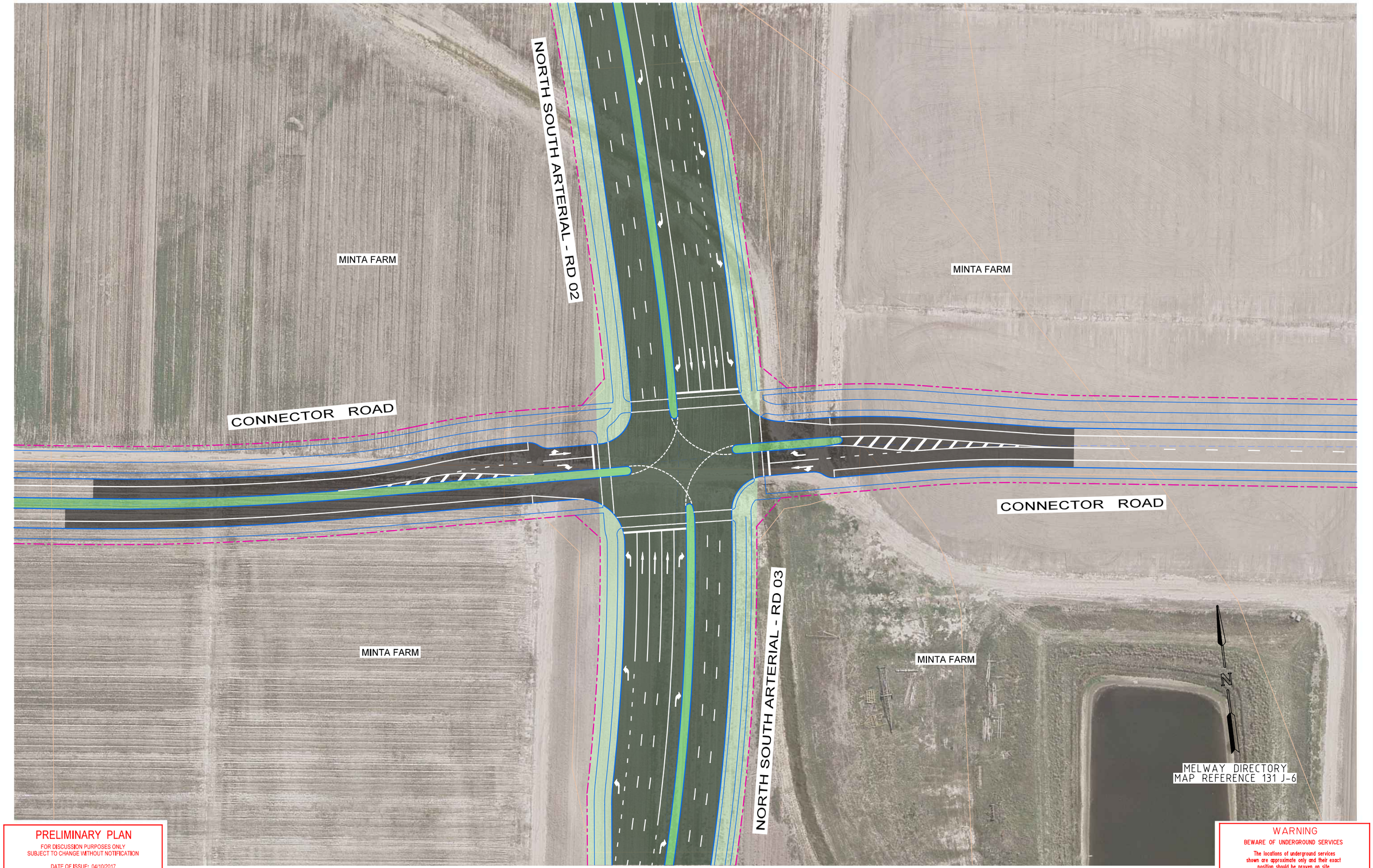

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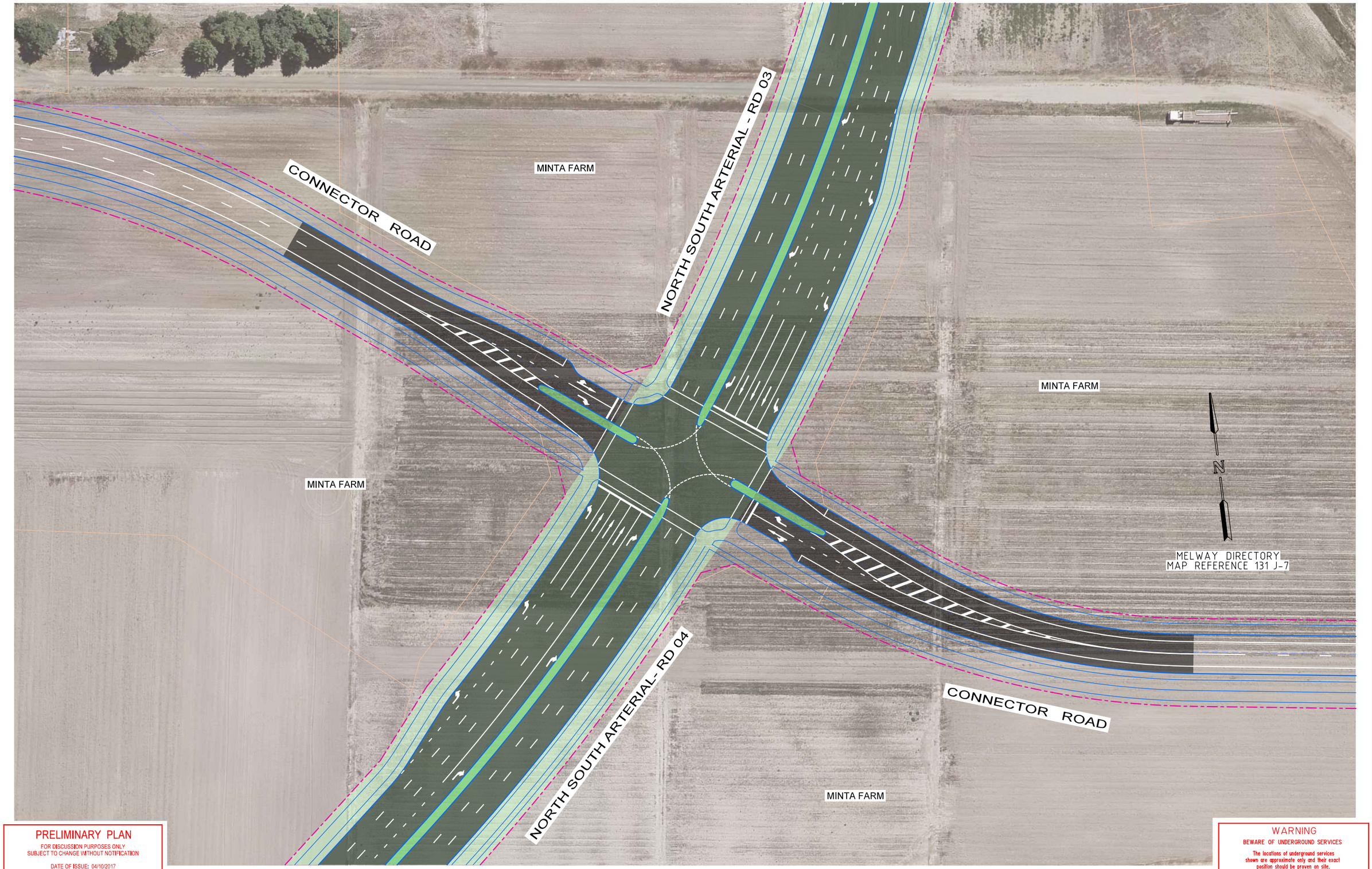

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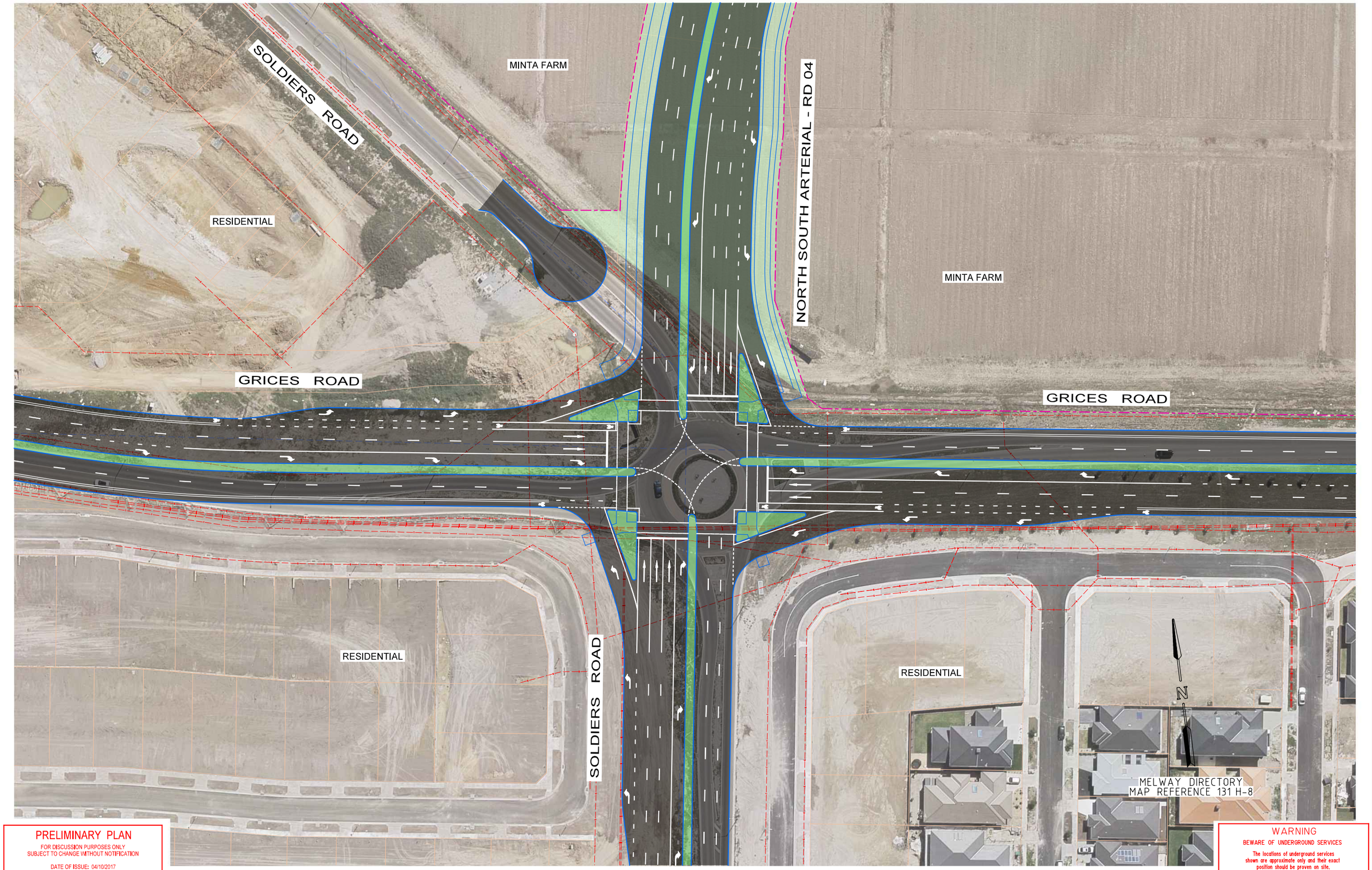

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SCALE	SHEET NO.	DRAWING NO.	ISSUE
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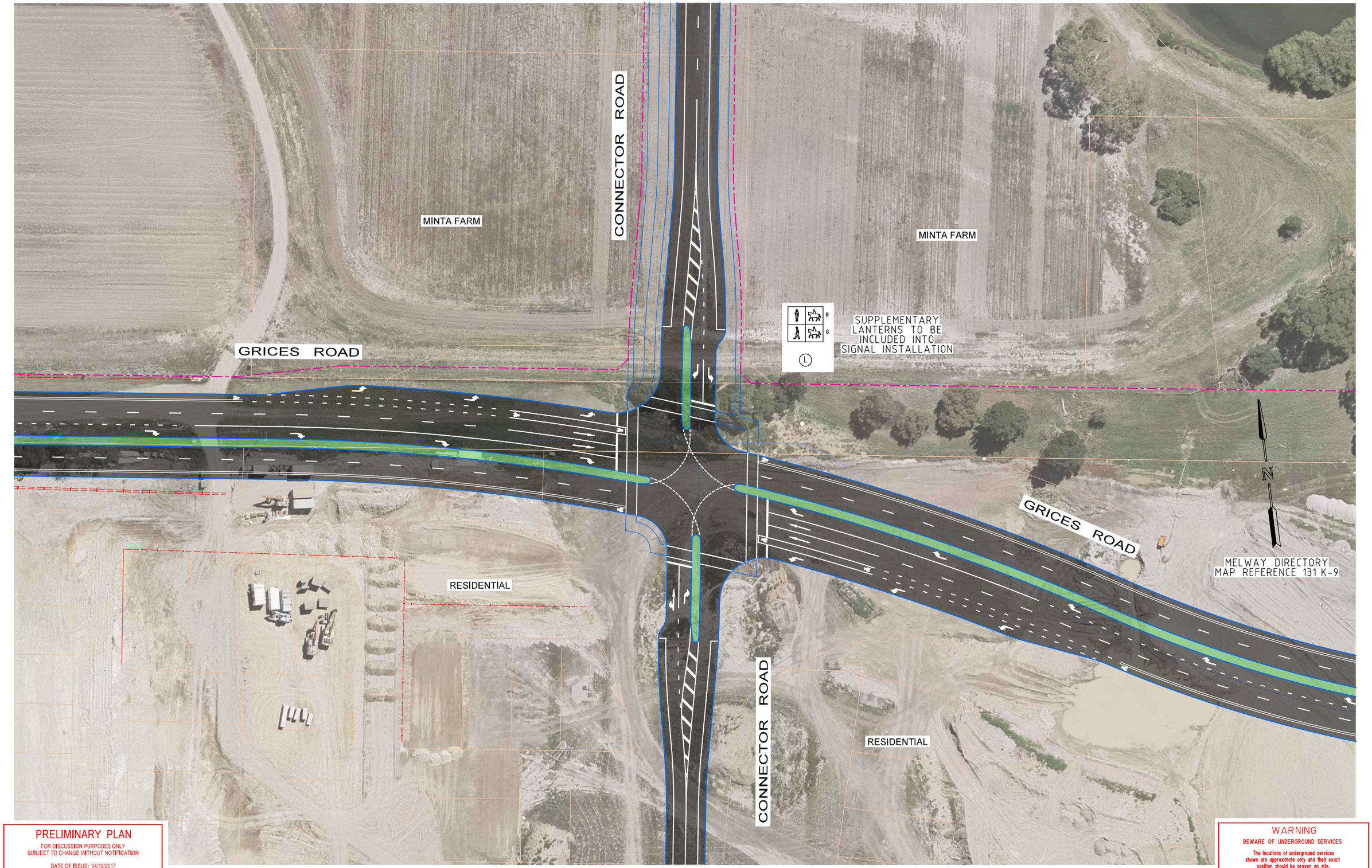

PRELIMINARY PLAN

FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

DATE OF ISSUE: 04/10/2017

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services shown are approximate only and their exact position should be proven on site.

ISSUE	APP'D	DATE	AMENDMENT

GENERAL NOTES

1 BASE INFORMATION FROM AERIAL PHOTOGRAPHY FOR CONCEPTUAL PURPOSES ONLY.
2 ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS OTHERWISE SHOWN.

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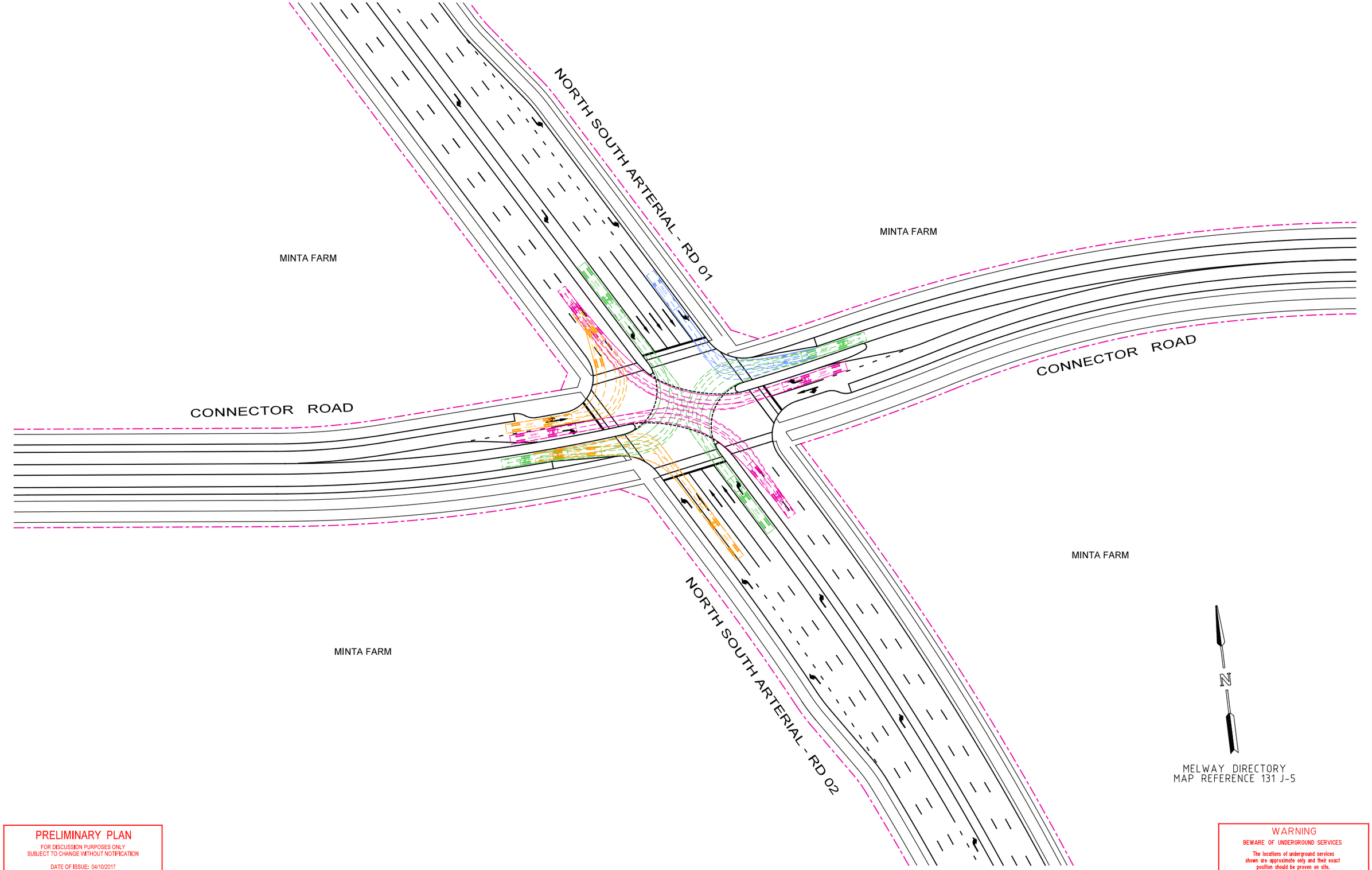
MINTA FARM
PRECINCT STRUCTURE PLAN - PSP11
CITY OF CASEY
CONCEPT LAYOUT - IN 06

SCALE	SHEET NO.	DRAWING NO.	ISSUE
1:1000 @ A3	7	161910-CPT-08	P5

4/10/17 4:23:44 PM 161910-CPT-08 T:\1617 Projects\161910\Design\161910-CPT-01-P5.dgn



MELWAY DIRECTORY
MAP REFERENCE 131 J-5

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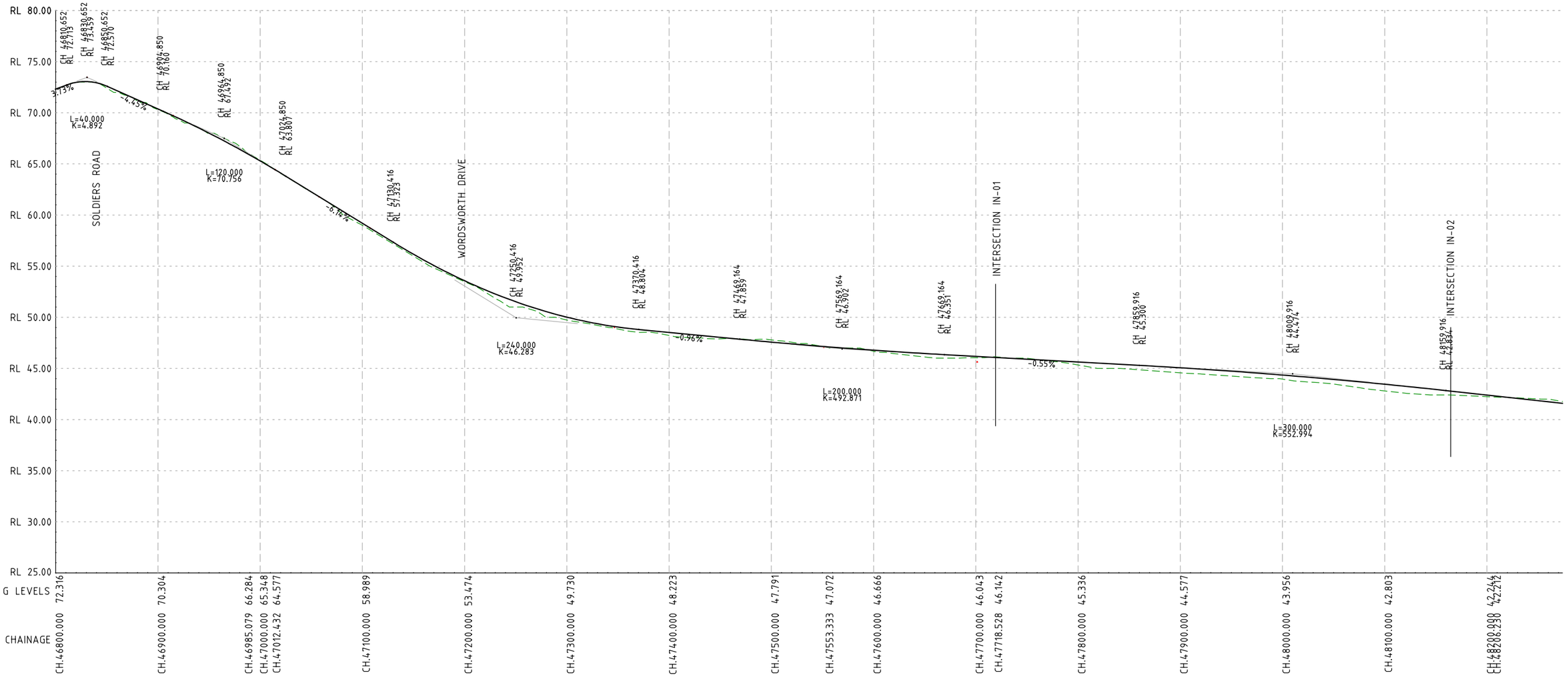
MINTA FARM
PRECINCT STRUCTURE PLAN - PSP11
CITY OF CASEY
CONCEPT LAYOUT - TURNING MOVEMENTS

SCALE	SHEET NO.	DRAWING NO.	ISSUE
1:1000 @ A3	8	161910-CPT-09	P5

4/10/17 4:23:44 PM T:\1617 Projects\161910\Design\161910-CPT-01-P5.dgn 161910-CPT-09



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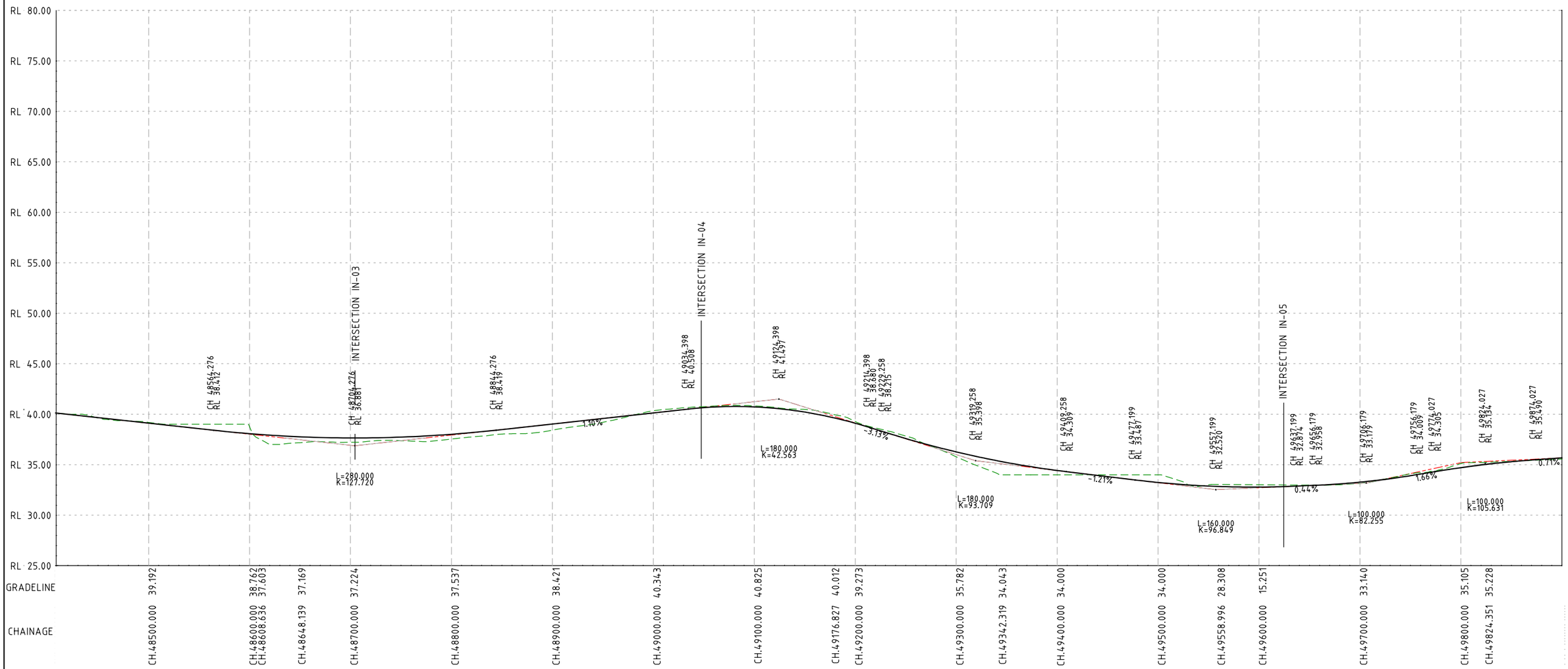
MINTA FARM
PRECINCT STRUCTURE PLAN - PSP11
CITY OF CASEY
LONGITUDINAL SECTION

SCALE	SHEET NO.	DRAWING NO.	ISSUE
1:4000 @ A3	9	161910-CPT-10	P5

4/10/17 4:23:44 PM 161910-CPT-10 T:\1617 Projects\161910\Design\161910-CPT-01-P5.dgn



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LONGITUDINAL SECTION

SCALE	SHEET NO.	DRAWING NO.	ISSUE
1:4000 @ A3	10	161910-CPT-11	P5

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PO Box 417 Ivanhoe Vic 3079
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Ph: (03) 9490 5900 Fax: (03) 9490 5910
www.trafficworks.com.au