3rd June 2025

Robe and Roche Investments Limited
c- Tandem Group

**MEM-3917-C-01 REV E PRELIMINARY STAGE ROAD DESIGN MEMO**
**PARKLANDS RESIDENTIAL SUBDIVISION**
**56 POHUTUKAWA PLACE, BELL BLOCK, NEW PLYMOUTH**

## 1.0 INTRODUCTION

At the request of the client, Red Jacket Limited have been engaged to provide engineering services as part of the proposed urban residential subdivision located at 56 Pohutukawa Place, Bell Block legal description of Lot 3 DP347297. Refer the development Scheme Plan, Figure 1 below.

The project is currently at the preliminary design stage with a Subdivision and Land Use Resource Consent application lodged in 2021 with the New Plymouth District Council (NPDC). Red Jacket have undertaken preliminary design of the full roading network and 3-waters design.

This design memo focuses on the roading design aspects of the preliminary stage design and has been undertaken in accordance with NPDC Infrastructure Standards for Land Development, New Zealand Transport Agency (NZTA) standards and guidelines, and Austroads standards. Other engineering aspects such as geotechnical, structural, and civil are excluded from this design memo.

This report should be read in conjunction with the following documents:

- McKinlay Surveyors Scheme Plan B-231212 dated 01/05/25
- Red Jacket Preliminary Engineering Drawings DWG-3917-C-03

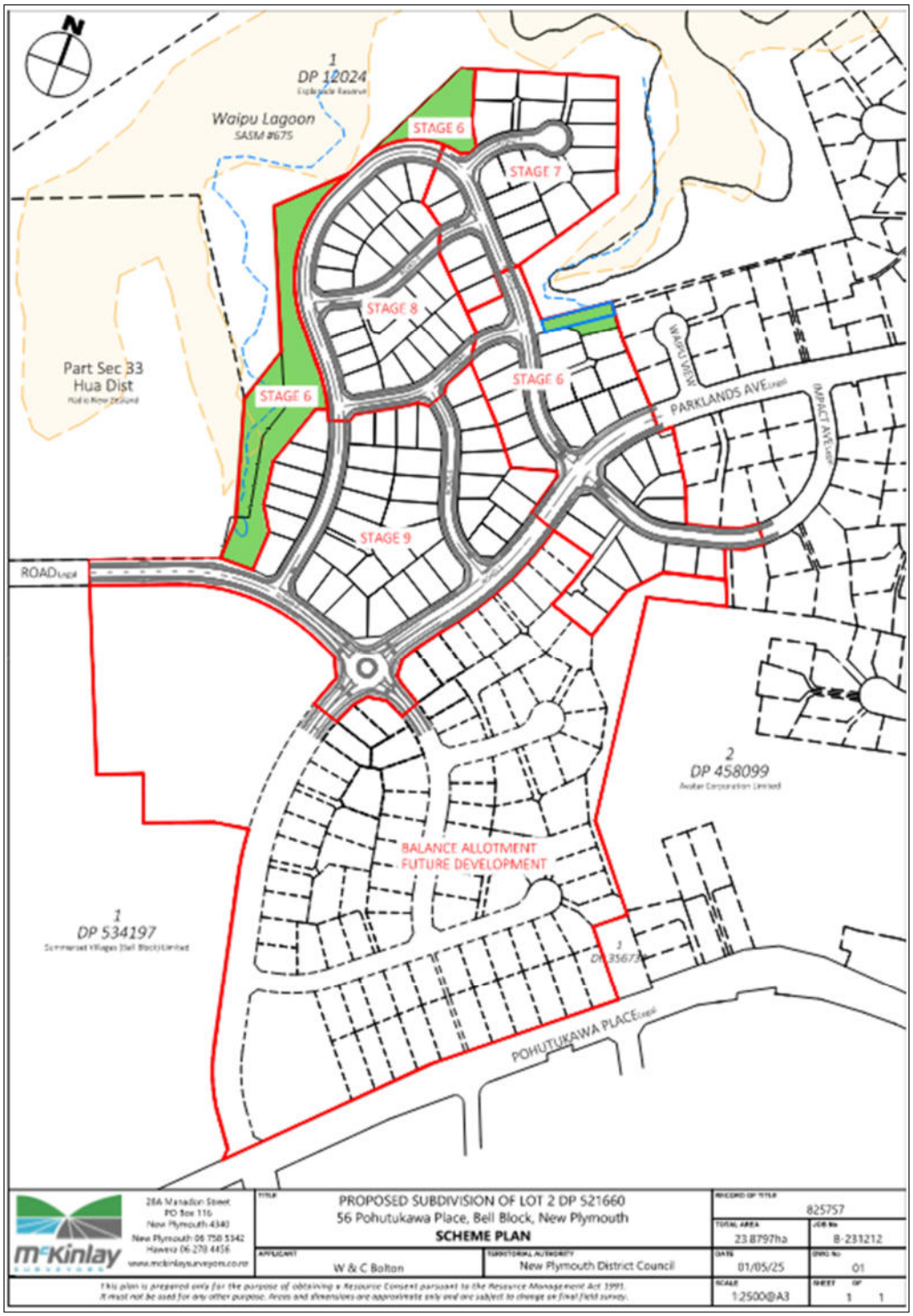


**Figure 1 – McKinlay Surveyors Scheme Plan**

## 2.0 PROPOSED DEVELOPMENT

The proposed development is outlined in the McKinlay Surveyors Limited Scheme Plan, including staging, refer Figure 1 above.

The proposed development is the continuation of urban development on the eastern side of the Bell Block suburb, extending Parklands Avenue east towards Pohutukawa Place. It is understood this development is part of overarching plans for residential development of the wider area between Parklands Avenue, Pohutukawa Place, and the Links Drive. This includes the expansion of the recently constructed Somerset Retirement Village located on Pohutukawa Place.

This urban development consists of creating 113 new residential Lots (Lots 1 – 113), and 7 new Lots for the roads to vest (303, and 305 – 307). The development is proposed over 4 stages, being Stage 6 to 9. This memo outlines the basis of design for the roading network for all 4 stages.

The development proposes the formation of six new roads to be vested to NPDC, and extension to existing legal roads being Parklands Avenue, and Impact Avenue. Refer Figure 2 below. All roads are located in the urban environment and will have a posted speed of 50 km/hr. Road 1 will encompass the extension of Parklands Avenue, with Road 8 encompassing the Impact Avenue extension. Road 1, Road 7, and Road 9 will terminate at the extent of the staging plan, and will allow for continuation of the road and connectivity for future residential development. Road 9 will not be formed as part of the development.

The extension of Parklands Avenue and Impact Avenue generally follows the Indicative Road Transport Network layer as outlined in the New Plymouth Proposed District Plan. Some deviations of the alignment have been made to allow for natural ground contours, matching the alignment of existing infrastructure, and constraints with existing Lot boundaries.

A total of 10 road intersections are proposed within the roading network. The proposed road intersections are broken-down as follows:

- One intersection will be 4-way junction with stop control, located:
    1. Parklands Avenue, intersected by Impact Avenue (Road 8) to the east, and Road 2 to the east.
- One intersection will be 4-way junction with roundabout control, located:
    1. Parklands Avenue, intersected by Road 9 to the east, and Road 7 to the east.
- Four intersections will be 3-way junctions with give-way control
    1. Road 2 and Road 4 intersection (east), with Road 2 having priority.
    2. Road 2 and Road 4 intersection (west), with Road 2 having priority.
    3. Road 1 and Road 6 intersection, with Road 1 having priority.
    4. Road 2 and Road 7, with Road 7 having priority.
- Four intersections will be uncontrolled 3-way junctions
    1. Road 2 and Road 5 intersections (east and west).
    2. Road 2 and Road 3.
    3. Road 6 and Road 5.

The Scheme Plan Lot layout indicates a total of 5 Right of Ways (ROWs) will be formed. The proposed ROWs are broken-down as follows:

- Two ROWs will extend from Road 2 servicing 2 rear Lots each.

- A ROW will extend from the Impact Avenue extension (Road 8) to service three rear Lots. An L-shaped turning head is provided.
- Two ROWs will extend from Road 3 servicing 2 rear Lots each.

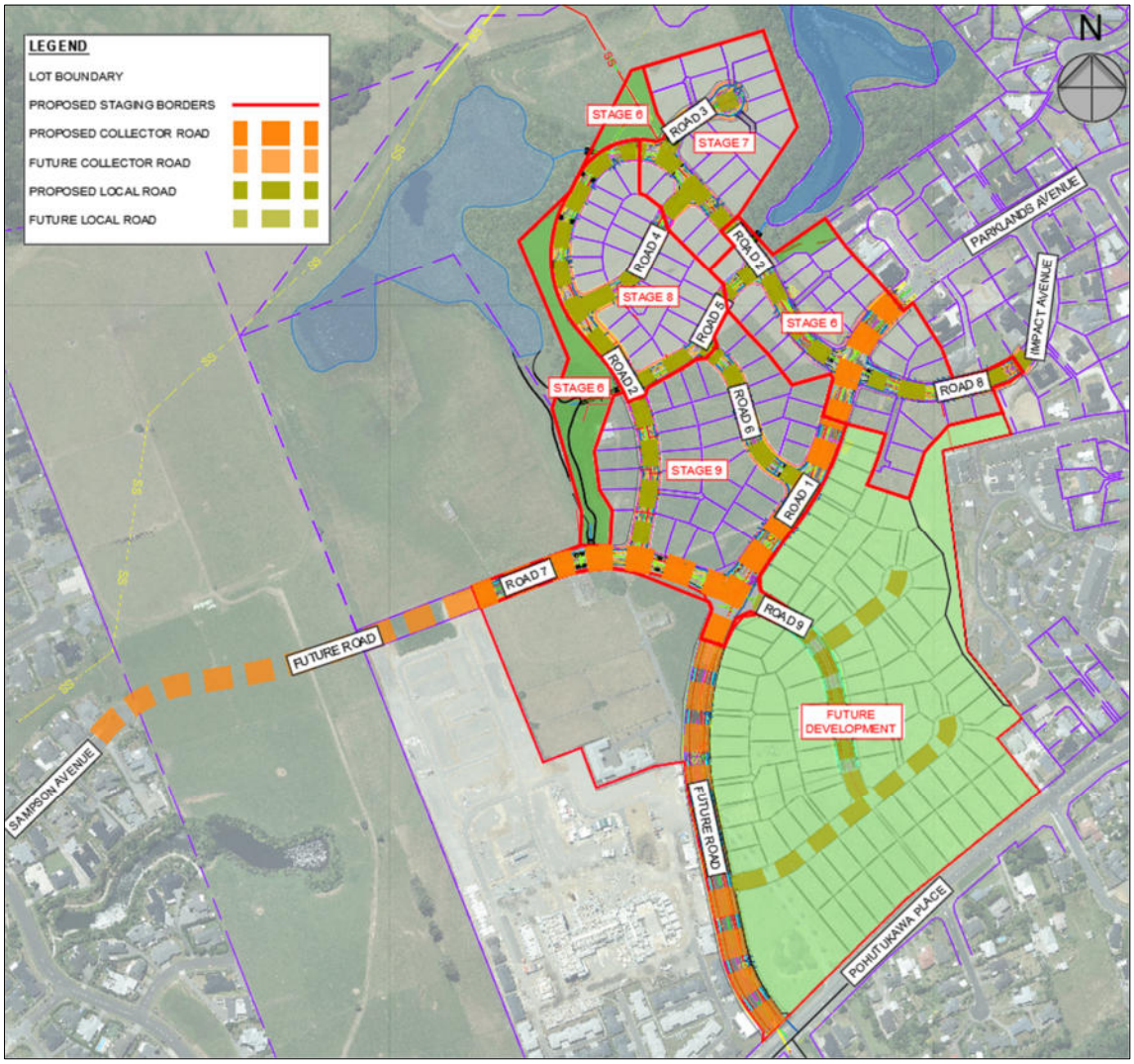


**Figure 2 – Red Jacket Roading Layout Plan**

## 3.0 BASIS OF ROAD DESIGN

This Section outlines the basis of design for each of the new road formations, existing road extensions, ROW formations, and road intersections.

## 3.1 ROAD DESIGN

The following Sections are provided for each identified road outlining the key road design characteristics, including:

- Road Status – as outlined by the New Plymouth Proposed District and the New Zealand Transport Agency (NZTA) One Network Road Classification (ONRC)
- Road geometry – road length, horizontal and vertical geometry, cross section, design vehicle
- Lots directly served – property access, sight visibility, proximity to intersections
- Public transport
- Accommodation of pedestrians and cyclists
- Road lighting
- Compliance with NPDC Infrastructure Standard roading standards

### 3.1.1 Road 1 – Parklands Avenue Extension

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Collector road.<br><br>NZTA ONRC – The online classification system currently has Parklands Avenue a mixture of Primary Collector, Secondary Collector, and Access as it tapers to the dead-end. | As requested by NPDC we have designed Road 1 Parklands Avenue extension as a Collector Road.<br><br>We envisage that as Parklands Avenue is extended and ultimately connects with Pohutukawa Place, the road will have a ONRC of Primary Collector. This fits in well with the defining attributes of the system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E13 for a Collector road. | <u>Road Layout</u><br>• Two lane each way road<br>• 350 m total length<br>• Road begins at the current Parklands Avenue termination point.<br>• Road ends at the termination point of Stage 8.<br><u>Horizontal Geometry</u><br>• Three sweeping horizontal curves connected by short straights to match the Lot layout.<br>• First curve 147 m radius with 91 m length.<br>• Second curve 255 m radius with 100.5 m length.<br>• Third curve 280 m 246.5 m length. |

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| | | • No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 2 %) with forced high/low points to assist with drainage and utility servicing.<br>• Crest curves – curve length of 60 m with K value of 40<br>• Sag curves – curve lengths of 20 – 100 m with K values of 10 – 136<br><u>Road Cross Section</u><br>• 22 m wide road reserve legal boundary<br>• 13.2 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 3.0 m wide live lanes<br>• 1.5 m wide cycle lanes each side<br>• 2.1 m wide parking bays each side<br>• 1.0 m wide grassed road-side berms each side<br>• 1.8 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E13. Up to 800 dwelling units, with up to 8000 vpd.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Collector – 90 m<br>- NZTA RTS 06 Collector – 45 m<br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Collector – 9 m<br>- NZTA RTS 06 Collector – 9 m | <u>Lots Served</u><br>• 21 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>Given the proposed road geometry with sweeping horizontal curves and relatively flat vertical geometry, the 45 – 90 m distance should be able to be adhered to.<br>To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |
| Public Transport | Given the Collector road status, public transport should allowed for, such as bus bays. | Not provided at this stage of the development. To be assessed and allowed for at detailed design stage in conjunction with local authority who manage bus routes. |

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| Accommodation of pedestrians and cyclists | Given the Collector status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.8 m wide concrete footpaths are provided both sides of the road.<br><br>Courtesy crossings are provided at each leg of the RAB intersections to accommodate safe pedestrian movements.<br><br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br><br>1.6 m wide marked cycle lanes are provided both sides of the carriageway.<br><br>At this stage no provisions are made for cyclist movements through the intersections. However, at detailed design stage, shared pathways will be investigated to provide a safe option for cyclists movements through the intersection. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br><br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Collector Road – Figure E13**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 800 dwelling units<br>- Classification – Local road (≈ 8000 vpd)<br>- Target operating speed of 50 km/hr<br>- Minimum road boundary width of 20 – 22 m<br>- Maximum road grade of 10 %<br>- Movement lane – 2 x 4.2 m wide sealed movement lane with shared cyclists, or 6.6 – 7.0 movement lane with separate cycle lanes<br>- Passing parking, loading, and shoulder to be separate and recessed parking<br>- Pedestrians – 1.8 m width footpath each side<br>- Cyclists – shared in the movement lane with movement lane of 2 x 4.2 m, or | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E13.<br><br>The minor deviation is related to the proposed cycle lanes width of 1.5 m and live lane width of 3.0 m, rather than the standard requirement of 2.0 m and 3.3 m, respectively.<br><br>It is understood NPDC preference is for 3.0 m wide lanes, and allowance of narrower 1.5 m cycle lanes are acceptable. |

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| | separate 2.0 m each side, with 6.6 – 7.0 m total movement lane. | |

### 3.1.2 Road 2

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
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| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br><br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 2 as a Local road.<br><br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | <u>Road Layout</u><br>• Two lane each way road<br>• 690 m total length<br>• Road begins at the Road 1 intersection point (proposed RAB).<br>• Road ends at the Road 7 intersection point (proposed T-intersection).<br><u>Horizontal Geometry</u><br>• Five short and low radii to sweeping horizontal curves connected by short straights to match the Lot layout.<br>• First curve 80 m radius and 57 m length.<br>• Second curve 200 m radius and 51 m length.<br>• Third curve 50 m radius and 97 m length.<br>• Fourth curve 92 m radius and 108 m length.<br>• Fifth curve 158 m radius and 141 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 2 %) with forced high/low points to assist with drainage and utility servicing. A short section of the alignment steepens up to between 3.3 – 6.2 %.<br>• Crest curves – curve lengths of 37 - 66 m with K values of 7 – 12.1<br>• Sag curves – curve lengths of 13 – 32 m with K values of 7 – 13<br><u>Road Cross Section</u><br>• 16 m wide road reserve legal boundary<br>• 8.7 m wide total carriageway (face of kerb to face of kerb) |

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| | | • Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 3.0 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.1 m wide parking bay on alternating sides<br>• 0.5 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units, with up to 2000 vpd.<br><br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br><br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br><br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br><br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | <u>Lots Served</u><br>• 48 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><br><u>Sight Visibility at Lot Vehicles Crossings</u><br><br>Lots located long the straight portions of road and sweeping horizontal curves, the 40 m distance should be able to be adhered to.<br><br>Lots located adjacent to the tight radius curves at the north-eastern portion of the alignment may have restricted sight visibility available. Vehicle crossings will need to be located to maximise available sight visibility.<br><br>To be confirmed at detailed design stage.<br><br><u>Proximity to Intersections</u><br><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br><br>To be confirmed at detailed design stage. |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br><br>A courtesy crossing is provided at eastern leg of the RAB intersection to accommodate safe pedestrian movements.<br><br>Pram crossings are not indicated at proposed T-intersections at this stage. This will be investigated at the detailed design stage.<br><br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage. |

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| | | It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side<br>- Cyclists – shared in the movement lane | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed 16 m legal road reserve width which is generally accepted by NPDC. |

### 3.1.3 Road 3

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 3 as a Local road.<br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br>Road cross section is generally dictated by NPDC Infrastructure Standard road | <u>Road Layout</u><br>• Two lane each way road<br>• 90 m total length<br>• Road begins at the Road 2 intersection point (proposed T-intersection). |

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| | standard being a Figure E12 for a Local road. | • Road ends at a circular turning head at the northern end.<br><u>Horizontal Geometry</u><br>• One sweeping horizontal curve connected by short straights to match the Lot layout.<br>• The curve has 50 m radius with 39 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 2 %) with forced high/low points to assist with drainage and utility servicing.<br>• Sag curve – curve length of 10 m with K values of 5<br><u>Road Cross Section</u><br>• 15 m wide road reserve legal boundary<br>• 7.2 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 2.5 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.2 m wide parking bay on alternating sides<br>• 0.75 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Local – 9 m | <u>Lots Served</u><br>• 13 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>Due to the short length of the road, the 40 m distance should be able to be adhered to. To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |

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| | - NZTA RTS 06 Local – 9 m | |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local road status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br>Pram crossings are not indicated at proposed intersection at this stage. This will be investigated at the detailed design stage.<br>No mid-block crossing points are required due to the short length of the road.<br>It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed road reserve legal boundary width of 15 m, which is 2 – 4 m less than the E12 requirement. |

### 3.1.4 Road 4

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br><br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 4 as a Local road.<br><br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | <u>Road Layout</u><br>• Two lane each way road<br>• 156 m total length<br>• Road begins at the Road 2 intersection point north (proposed T-intersection).<br>• Road ends at the Road 2 intersection point south (proposed T-intersection).<br><u>Horizontal Geometry</u><br>• Two low radius horizontal curves connected by short straights to match the Lot layout.<br>• Curve one has a 42.5 m radius with 15 m length.<br>• Curve two has a 57.5 m radius with 37 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 3 %) with forced high/low points to assist with drainage and utility servicing.<br>• Crest curve – curve length of 50 m with K value of 14<br>• Sag curve – curve length of 6 m with K values of 1.5<br><u>Road Cross Section</u><br>• 15 m wide road reserve legal boundary<br>• 7.2 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 2.5 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.2 m wide parking bay on alternating sides |

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| | | • 0.75 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | <u>Lots Served</u><br>• 13 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>The alignment layout should allow 40 m sight distance.<br>To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local road status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br>Pram crossings are not indicated at proposed intersection at this stage. This will be investigated at the detailed design stage.<br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br>It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed road reserve legal boundary width of 15 m, which is 2 – 4 m less than the E12 requirement. |

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| | - Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side | |

### 3.1.5 Road 5

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br><br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 5 as a Local road.<br><br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | <u>Road Layout</u><br>• Two lane each way road<br>• 160 m total length<br>• Road begins at the Road 2 intersection point north (proposed T-intersection).<br>• Road ends at the Road 2 intersection point south (proposed T-intersection).<br><u>Horizontal Geometry</u><br>• Two low radius horizontal curves connected by short straights to match the Lot layout.<br>• Curve one has a 50 m radius with 27 m length.<br>• Curve two has a 57.5 m radius with 34 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u> |

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| | | • Relatively flat grades (less than 2.5 %) with forced high/low points to assist with drainage and utility servicing.<br>• Crest curve – curve length of 50 m with K value of 12<br><u>Road Cross Section</u><br>• 15 m wide road reserve legal boundary<br>• 7.2 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 2.5 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.2 m wide parking bay on alternating sides<br>• 0.75 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | <u>Lots Served</u><br>• 14 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>The alignment layout should allow 40 m sight distance.<br>To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local road status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br>Pram crossings are not indicated at proposed intersection at this stage. This will be investigated at the detailed design stage.<br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage. |

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| | | It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed road reserve legal boundary width of 15 m, which is 2 – 4 m less than the E12 requirement. |

### 3.1.6 Road 6

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 6 as a Local road.<br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines. | <u>Road Layout</u><br>• Two lane each way road<br>• 164 m total length<br>• Road begins at the Road 1 intersection point south (proposed T-intersection). |

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| | Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | • Road ends at the Road 5 intersection point north (proposed T-intersection).<br><u>Horizontal Geometry</u><br>• Two low radius horizontal curves connected by short straights to match the Lot layout.<br>• Curve one has a 50 m radius with 30 m length.<br>• Curve two has a 57.5 m radius with 45 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 2.0 %) with forced high/low points to assist with drainage and utility servicing.<br>• Crest curve – curve length of 50 m with K value of 12<br><u>Road Cross Section</u><br>• 15 m wide road reserve legal boundary<br>• 7.2 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 2.5 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.2 m wide parking bay on alternating sides<br>• 0.75 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m | <u>Lots Served</u><br>• 13 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>The alignment layout should allow 40 m sight distance.<br>To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to. |

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| | Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | To be confirmed at detailed design stage. |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local road status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br>Pram crossings are not indicated at proposed intersection at this stage. This will be investigated at the detailed design stage.<br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br>It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed road reserve legal boundary width of 15 m, which is 2 – 4 m less than the E12 requirement. |

### 3.1.7 Road 7

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Collector road.<br><br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 7 as a Collector road.<br><br>A classification of Primary Collector road will fit in well with the defining attributes of the ONRC system, as the road will ultimately connection through to the Links Drive |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E13 for a Collector road. | <u>Road Layout</u><br>• Two lane each way road<br>• 340 m total length<br>• Road begins at the Road 1 intersection point (proposed RAB).<br>• Road ends at the termination point of Stage 8.<br><u>Horizontal Geometry</u><br>• One sweeping horizontal curve connected by short straights to match the Lot layout.<br>• The curve has 150 m radius with 111 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 2 %) with forced high/low points to assist with drainage and utility servicing.<br>• Sag curve – curve length of 50 m with K values of 28<br><u>Road Cross Section</u><br>• 20 m wide road reserve legal boundary<br>• 8.7 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 3.0 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.1 m wide parking bay on alternating sides<br>• 1.5 m wide grassed road-side berms each side<br>• 1.8 m wide concrete footpaths<br>• 1.5 m wide minimum grassed berms each side |

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| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E13. Up to 800 dwelling units, with up to 8000 vpd.<br><br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br><br>- NPDC PDP Collector – 90 m<br>- NZTA RTS 06 Collector – 45 m<br><br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br><br>- NPDC PDP Collector – 9 m<br>- NZTA RTS 06 Collector – 9 m | <u>Lots Served</u><br>• 6 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><br><u>Sight Visibility at Lot Vehicles Crossings</u><br>Given the proposed road geometry with sweeping horizontal curves and relatively flat vertical geometry, the 45 – 90 m distance should be able to be adhered to.<br>To be confirmed at detailed design stage.<br><br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |
| Public Transport | Given the Collector road status, public transport should allowed for, such as bus bays. | Not provided at this stage of the development. To be assessed and allowed for at detailed design stage in conjunction with local authority who manage bus routes. |
| Accommodation of pedestrians and cyclists | Given the Collector status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.8 m wide concrete footpaths are provided both sides of the road.<br><br>A courtesy crossing is provided at eastern leg of the RAB intersection to accommodate safe pedestrian movements.<br><br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br><br>No marked cycle lanes are provided. It is envisaged that cyclists will share the movement lane.<br><br>At this stage no provisions are made for cyclist movements through the RAB intersection. However, at detailed design stage, shared pathways will be investigated to provide a safe option for cyclists movements through the intersection. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br><br>To be assessed and allowed for at detailed design stage. |

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| Compliance with NPDC Infrastructure Standard roading standards | **Collector Road – Figure E13**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 800 dwelling units<br>- Classification – Local road (≈ 8000 vpd)<br>- Target operating speed of 50 km/hr<br>- Minimum road boundary width of 20 – 22 m<br>- Maximum road grade of 10 %<br>- Movement lane – 2 x 4.2 m wide sealed movement lane with shared cyclists, or 6.6 – 7.0 movement lane with separate cycle lanes<br>- Passing parking, loading, and shoulder to be separate and recessed parking<br>- Pedestrians – 1.8 m width footpath each side<br>- Cyclists – shared in the movement lane with movement lane of 2 x 4.2 m, or separate 2.0 m each side, with 6.6 – 7.0 m total movement lane. | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E13.<br>Deviations from the standard include:<br>• No separate cycle lanes are provided and proposed live lanes are 3.0 m. With cyclist sharing the movement lane, the movement lane should be 2 x 4.2 m. |

### 3.1.8 Road 8 – Impact Avenue Extension

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br>NZTA ONRC – The online classification system currently has Impact Avenue as Access. | NPDC have accepted Road 8 as a Local road.<br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | <u>Road Layout</u><br>• Two lane each way road<br>• 177 m total length<br>• Road begins at the current termination point of Impact Avenue.<br>• Road ends at the Road 1 intersection point (proposed RAB).<br><u>Horizontal Geometry</u> |

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| | | • Two low radius horizontal curves connected by short straights to match the Lot layout.<br>• Curve one has a 80 m radius wit4830 m length.<br>• Curve two has a 31 m radius with 50 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• A relatively steep grade of 10 % due to the natural ground contours.<br>• Sag curve – curve length of 50 m with K value of 6<br><u>Road Cross Section</u><br>• 15.9 m wide road reserve legal boundary<br>• 8.1 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 3.0 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.2 m wide parking bay on alternating sides<br>• 1.2 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units.<br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | <u>Lots Served</u><br>• 11 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><u>Sight Visibility at Lot Vehicles Crossings</u><br>The alignment layout should allow 40 m sight distance.<br>To be confirmed at detailed design stage.<br><u>Proximity to Intersections</u><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br>To be confirmed at detailed design stage. |

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|---|---|---|
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local road status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br><br>A courtesy crossing is provided at western leg of the RAB intersection to accommodate safe pedestrian movements.<br><br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br><br>It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br><br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br>- Local attributes – primary access to housing<br>- Locality served – up to 200 dwelling units<br>- Classification – Local road (≈ 2000 vpd)<br>- Target operating speed of 40 km/hr<br>- Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br>A minor deviation is the proposed road reserve legal boundary width of 15.9 m, which is 1.1 – 3.1 m less than the E12 requirement. |

### 3.1.9 Road 9 (Not formed as part of the development)

| Key Road Characteristic | Road Design Standard Requirements | Proposed Design and Commentary |
|---|---|---|
| Road Status | New Plymouth PDP – NPDC have indicated this will be a Local Road<br><br>NZTA ONRC – No data due to new road formation. | NPDC have accepted Road 9 as a Local road.<br><br>A classification of Access road will fit in well with the defining attributes of the ONRC system. |
| Road Geometry | Road geometry is dictated by future Lot layout, natural ground contours, in accordance with Austroads Guidelines.<br><br>Road cross section is generally dictated by NPDC Infrastructure Standard road standard being a Figure E12 for a Local road. | <u>Road Layout</u><br>• Two lane each way road<br>• 45 m total length<br>• Road begins at the Road 1 intersection point (proposed RAB).<br>• Road ends at the Stage 8 termination point.<br><u>Horizontal Geometry</u><br>• One sweeping horizontal curve connected by short straights to match the Lot layout.<br>• The curve had 87 m radius and 82.5 m length.<br>• No superelevation is planned given the urban nature and 50 km/hr posted speed.<br><u>Vertical Geometry</u><br>• Relatively flat grades (less than 3.5 %) with forced high/low points to assist with drainage and utility servicing.<br>• Crest curves – curve lengths of 40 – 50 m with K values of 8 – 38.5<br>• Sag curve – curve length of 10 m with K values of 6<br><u>Road Cross Section</u><br>• 16 m wide road reserve legal boundary<br>• 8.7 m wide total carriageway (face of kerb to face of kerb)<br>• Unbound granular pavement with AC surfacing<br>• -3 % crowned crossfall<br>• 3.0 m wide live lanes<br>• Cyclist to share the movement lane<br>• 2.1 m wide parking bay on alternating sides<br>• 0.5 m wide grassed road-side berms each side<br>• 1.5 m wide concrete footpaths<br>• 1.5 m wide grassed berms each side |

| | | |
|---|---|---|
| Locality Served | Number of Lots/dwelling units serviced is governed by NPDC Infrastructure Standard Figure E12. Up to 200 dwelling units, with up to 2000 vpd.<br><br>Sight visibility is governed by the NPDC Proposed District Plan, and NZTA RTS 06 Guideline, for Low Volume driveways on roads with 50 km/hr posted speed/operating speed, being:<br><br>- NPDC PDP Local – 40 m<br>- NZTA RTS 06 Local – 40 m<br><br>Proximity of vehicle crossings to intersections is governed by NPDP and NZTA RTS 06 Guideline.<br><br>- NPDC PDP Local – 9 m<br>- NZTA RTS 06 Local – 9 m | <u>Lots Served</u><br>• 2 Lots directly served<br>• Lots indirectly served to be assessed at detailed design stage.<br>• Estimated vehicles per day to be assessed at detailed design stage.<br><br><u>Sight Visibility at Lot Vehicles Crossings</u><br><br>The alignment layout should allow 40 m sight distance.<br><br>To be confirmed at detailed design stage.<br><br><u>Proximity to Intersections</u><br><br>Given the Lot road boundary widths, the 9 m separation should be able to be adhered to.<br><br>To be confirmed at detailed design stage. |
| Public Transport | Given the Local road status, public transport is not allowed for. | N/A |
| Accommodation of pedestrians and cyclists | Given the Local status, the NPDC Infrastructure Standard requires allowance for separate pedestrian and cycling facilities. | 1.5 m wide concrete footpaths are provided both sides of the road.<br><br>A courtesy crossing is provided at eastern leg of the RAB intersection to accommodate safe pedestrian movements.<br><br>No mid-block crossing points are indicated at this stage. This will be investigated at the detailed design stage.<br><br>It is envisaged that cyclists will share the movement lane. |
| Road Lighting | NPDC Infrastructure Standard requires compliances with AS/NZS 1158, NZTA M30 and Austroads Guides. | Streetlights are shown on the typical cross sections, but no details are provided for type and spacing at this stage of the development.<br><br>To be assessed and allowed for at detailed design stage. |
| Compliance with NPDC Infrastructure Standard roading standards | **Local Road – Figure E12**<br><br>- Area & Land Use – Urban – servicing moderate to high density housing with other uses such that combined population of residents, employees, and students is typically 50 per hectare or greater<br><br>- Local attributes – primary access to housing<br><br>- Locality served – up to 200 dwelling units<br><br>- Classification – Local road (≈ 2000 vpd)<br><br>- Target operating speed of 40 km/hr | The proposed road cross section generally complies NPDC Infrastructure Standard roading standards Figure E12.<br><br>A minor deviation is the proposed 16 m legal road reserve width which is generally accepted by NPDC. |

| | | |
|---|---|---|
| | - Minimum road boundary width of 17 – 19 m<br>- Maximum road grade of 12.5 %<br>- Movement lane – 5.5 - 5.7 m wide sealed movement lane with separate and recessed parking, or 7.2 – 7.5 m with parking shared in the movement lane<br>- Passing parking, loading, and shoulder depends on movement lane width – separate and recessed parking, or parking shared in the movement lane<br>- Pedestrians – 1.5 m width footpath each side<br>- Cyclists – shared in the movement lane | |

## 3.2 INTERSECTION DESIGN

The following Sections are provided for each identified road intersection outlining the key road design characteristics, including:

- Intersection geometry – design vehicle swept paths, proximity of vehicle crossings
- Accommodation of pedestrians and cyclists
- Road lighting
- Vehicle sight visibility – this has been assessed against Austroads requirements including Safe Intersection Sight Distance (SISD) and Approach Site Distance (ASD)
- Pedestrian sight visibility – this has been assessed against Austroads requirements including ASD, and Crossing Sight Distance (CSD)

### 3.2.1 4-way Junction Intersections

As outlined above, there are two 4-way junction intersections within the proposed roading network, located:

1. Parklands Avenue, intersected by Impact Avenue (Road 8) to the east, and Road 3 to the east.

   The 4-way junction is proposed to be controlled with a stop control with Parklands Avenue (Road 1) having priority. This will be formed as part of Stage 6.

2. Parklands Avenue, intersected by Road 9 to the east, and Road 2 to the east.

   This 4-way junction is proposed to be ultimately controlled with a RAB placed centrally with all four legs to allow for future development south of Road 1 and Road 9.

   During Stage 9, the RAB will not be formed as part of the development as only two legs of the intersection will be formed, being Road 1 (east) and Road 7. Therefore, the intersection layout during Stage 8 construction will consist of a straight-through road on a low-radius horizontal curve connecting Road 1 and Road 7.

#### Intersection Geometry

The key aspects of the preliminary 4-way junction intersection (item 1. above) design geometry is as follows:

- operating speed of 50 km/hr approach speed on a Collector Road (Road 1) and 40 km/hr for Local road (Road 2 and 8). An operating speed of 30 km/hr is targeted through the intersection for all legs.
- kerb return radius of 12.5 m at each leg – allowance for light vehicle traffic and typical service vehicles (refuse truck), being NZTA RTS 18 Medium rigid truck
- stop control at Road 2 and Road 8 legs
- raised pedestrian courtesy crossings at Road 2 and Road 8 legs. Courtesy crossing complies with NZTA RTS 14.
- to is understood that cyclists will be encouraged to 'take the lane' through the intersection.
- no details of road lighting are provided at this stage of the design.

Initially the RAB geometry was designed in accordance with Austroads AGTRD Part 4B Roundabouts, with a focus on the following key aspects:

- decrease speed at the RAB approaches
- larger central islands and roundel to assist with deflection within the circulating carriageway and to assist larger vehicles movements
- low speed RAB entry to decrease speed within the circulating carriageway

However, after consultation with NPDC, they had concern with the overall footprint of RAB, and their preference was to utilise a similar layout to the recently constructed RAB intersection of Parklands Avenue / Mangati Road.

The key aspects of the current RAB (item 2. above) design geometry is as follows:

- operating speed of 50 km/hr approach speed on a Collector Road (Road 1 and Road 3) and 40 km/hr for Local road (Road 9). An operating speed of 30 km/hr is targeted through the intersection for all legs.
- raised central island radius of 4 m
- raised mountable roundel radius of 10 m – allowance for heavy vehicle movements being NZTA RTS 18 Semi-trailer and Tour coach turning paths
- circulating carriageway width of 5 m – generally sized to allow easy movements of light vehicle traffic and typical service vehicles (refuse truck), being NZTA RTS 18 Medium rigid truck
- give-way control at each leg
- raised mountable build-outs at the kerb returns
- central splitter island at each leg with taper flushed median markings
- pedestrian courtesy crossing at each leg. Courtesy crossing complies with NZTA RTS 14.
- to is understood that cyclists will be encouraged to 'take the lane' through the RAB, or otherwise mount the shared pathways at each leg of the intersection.
- no details of road lighting are provided at this stage of the design.

The current layouts have been peer reviewed by Mark Georgeson of Stantec, as part their overarching traffic engineering assessment of the development.

#### Vehicle Sight Visibility

Sight distance at 4-road junctions are assessed against AGTRD Part 4B Roundabouts, with requirements as per as follows:

- Safe Intersection Sight Distance (SISD) of 97 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)
- Minimum Gap Sight Distance (MGSD) of 69 m minimum (based 50 km/hr design speed with an acceptable gap of 4 – 5 secs)
- Approach Sight Distance (ASD) of 55 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)

Sight distance at RAB are assessed against AGTRD Part 4B Roundabouts, with requirements as per as follows:

- Minimum Gap Sight Distance (MGSD) of 69 m minimum (based 50 km/hr design speed with an acceptable gap of 4 – 5 secs)
- Approach Sight Distance (ASD) of 55 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)

At detailed design stage each leg of the intersections will be assessed and designed to achieve the required SISD, MGSD and ASD.

#### Pedestrian Sight Visibility

Pedestrian sight distance is assessed against AGTRD Part 4A Unsignalised and Signalised Intersections, with requirements as per as follows:

- Approach Sight Distance (ASD) of 55 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)
- Crossing Sight Distance (CSD) of 94 – 157 m minimum (depending on operating speed and a maximum crossing width of 10 m)

ASD is for approaching vehicles viewing the surface of the roadway for marked pedestrian crossings. At this stage the pedestrian crossings points are unmarked courtesy crossings, therefore ASD does not apply.

CSD is provided between approaching vehicles and pedestrians waiting to cross the road. At detailed design stage each side of crossing points will be assessed and designed to achieve the required CSD.

### 3.2.1 3-way Junction Intersections

As outlined above, there are eight 3-way junction intersections within the proposed roading network, located:

1. Road 1 and Road 6, with Road 1 having priority.
2. Road 2 and Road 4 intersection (east), with Road 2 having priority.
3. Road 2 and Road 4 intersection (west), with Road 2 having priority.
4. Road 7 and Road 2 intersection, with Road 7 having priority.
5. Road 2 and Road 3.
6. Road 2 and Road 5 intersection (east).
7. Road 2 and Road 5 intersection (west).
8. Road 5 and Road 6.

At this stage intersections 1 – 4 will be give-way controlled due to the higher road traffic, and / or the potentially restricted sight visibility.

All remaining intersections (5 – 8) are proposed as uncontrolled intersections given their low volume road status, and increased sight visibility.

The key aspects of the current T-intersection design geometry is as follows:

- operating speed of 50 km/hr approach speed on Collector Road (Road 1 and Road 3) and 40 km/hr for Local road (Road 2, 4 – 9). An operating speed of 30 km/hr is targeted through the intersection turning manoeuvres for all legs.
- all intersecting roads are designed perpendicular to help with sight visibility, approach speed, bvbvand turning paths.
- kerb radius of 12.5 m – generally sized to allow easy movements of light vehicle traffic and typical service vehicles (refuse truck), being NZTA RTS 18 Medium rigid truck.
- no pram crossings are provided for at this stage of the design.
- to is understood that cyclists will be encouraged to 'take the lane' through the intersections.
- no details of road lighting are provided at this stage of the design.

### Vehicle Sight Visibility

Sight distance at the intersections are assessed against AGTRD Part 4B Roundabouts, with requirements as per as follows:

- Safe Intersection Sight Distance (SISD) of 97 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)
- Approach Sight Distance (ASD) of 55 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)
- Minimum Gap Sight Distance (MGSD) of 69 m minimum (based 50 km/hr design speed with an acceptable gap of 5 secs)

At detailed design stage each leg of the intersection will be assessed and designed to achieve the required SISD, MGSD and ASD.

### Pedestrian Sight Visibility

Pedestrian sight distance is assessed against AGTRD Part 4A Unsignalised and Signalised Intersections, with requirements as per as follows:

- Approach Sight Distance (ASD) of 55 m minimum (based on 50 km/hr design speed with $R_T$ of 2.0 secs)
- Crossing Sight Distance (CSD) of 94 – 157 m minimum (depending on operating speed and a maximum crossing width of 10 m)

As outlined above, no pram crossings are provided for at this stage of the design. At detailed design stage, pedestrian crossing sight visibility will need to be assessed and allowed for.

## 4.0 CONCLUSION

Overall, the preliminary road network has been designed to suit an efficient Lot layout to benefit cultural, commercial, and aesthetic aspects, while working in with the natural contours of the land. A key constraint of the Road 1 and Road 2 alignments was to follow the NPDC owned existing sewer main infrastructure to maintain serviceability to the surrounding suburbs.

The roading layout is in keeping with the surrounding Bell Block suburb, with added benefits such as roading alignments with targeted operating speeds, efficient traffic movement, purposeful parking layouts, and improved connectivity for roading, pedestrians, cyclists, and alternative modes of transport. The proposed Collector roads will provide for future bus routes.

The design is in general accordance with NPDC Infrastructure Standards, NZTA guidelines and Austroads guidelines, and deviates from the standards where necessary such as local authority preferences.

The roading geometry design will likely be subject to consent conditions set by the consent authority, which may influence the detailed design to be progressed post consent. However, the current roading alignment and boundary positions are intended as fixed.

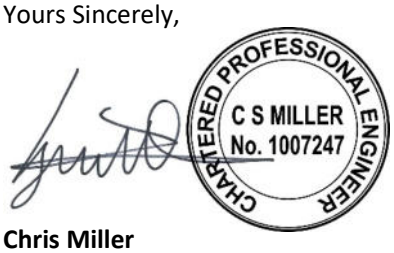
## 5.0 LIMITATIONS

This report is prepared for your use and for your agents for the stated purpose and cannot be used for any other purpose or by others unless authority is given by Red Jacket.

This assessment is based on information provided by the client and information provide by third parties.

This report was prepared in general accordance with current standards, codes, and best practice at the time of this report. These may be subject to change.

Yours Sincerely,

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