TE TUPU NGĀTAHI
SUPPORTING GROWTH

Drury Development Contributions Policy
Transport Assessment

August 2022

Version 0.6

WAKA KOTAHI
NZ TRANSPORT AGENCY

AT

New Zealand Government

Document Status

Responsibility	Name
Author	Andrew Murray
Reviewer	Joe Phillips (SGA), Anna Jennings (AT), Brigid Duffield (AC)
Approvers	Alastair Lovell

Revision Status

Version	Date	Reason for Issue
0.1		First Draft on Methodology section
0.2	1/4/22	Updated Report with outcomes and addressing review comments
0.3	12/7/22	Updated report with revised growth forecasts and approach to collector road types
0.4	20/7/22	Draft Final Report
0.5	25/7/22	Draft Final with DIFF Report Attached
0.6	25/8/22	Final report

Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

Table of Contents

Appendices

Appendix A – Detailed Project Schedules
Appendix B – DIFF Transport Report

Executive Summary

This assessment has updated the preliminary transport assessment undertaken in mid-2021 to inform Council's development of a Development Contributions (**DC**) policy for Drury. SGA has provided this assessment based on the knowledge and information developed by SGA for its long-term route protection work for this network. Beyond these inputs, SGA has not provided advice to Council directly regarding development of their DC policy itself.

The transport planning and engineering information used to prepare this assessment is therefore developed at a more 'strategic' level, and not from detailed site investigations, design or modelling analysis (such as would be undertaken for implementation of a project). Given the significant scale and long-term development of this programme, it is not considered feasible to develop detailed designs and capital cost estimates for this extensive programme. This approach is considered suitable for this assessment, when coupled with Council's proposal to include regular updates to the DC policy inputs as new information becomes available.

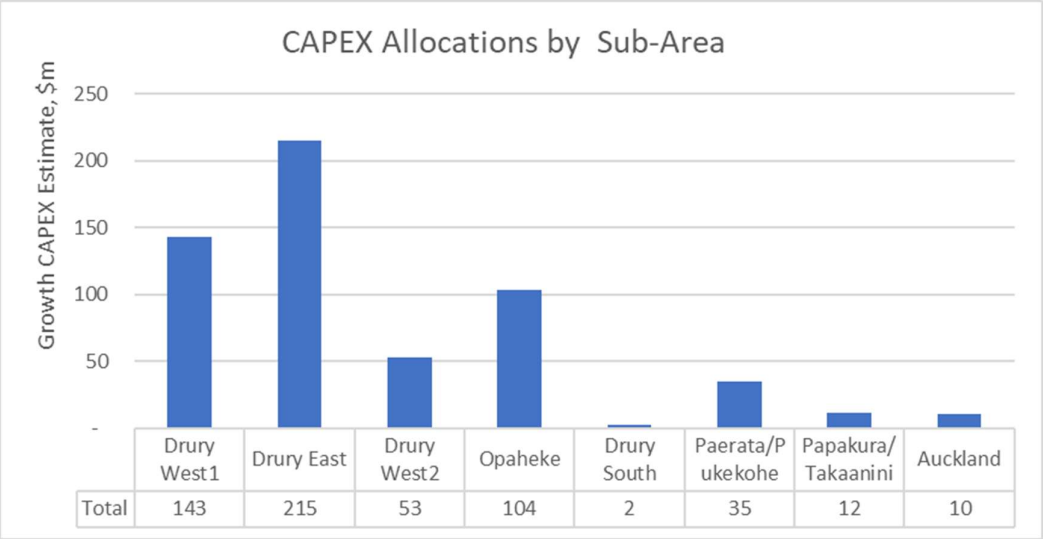
This assessment remains based on the suggested sequencing of transport infrastructure upgrades needed to support urban development developed through the 2021 DIFF study, albeit revised with new information regarding land use or transport system planning decisions available up until June 2022.

This report documents the methodology adapted from Auckland Transport's applications elsewhere and applies it to this long-term programme of upgrades. There are significant uncertainties around how the area will grow and infrastructure is provided over the next 30 years, which the methodology has recognised. This uncertainty is addressed through both the methods used to undertake this assessment as well as by Council's policy framework that includes regular review of the inputs.

The assessment follows the following key steps:

1. Define a sequenced programme of transport projects to support the assumed type, location and rate of growth (adapted from DIFF)
2. Assign a project type and likely delivery agency for each project element
3. Estimate and remove potential infrastructure renewal costs
4. Estimate the growth component of the infrastructure costs
5. Assess beneficiaries for each network element to estimate cost share for sub-areas
6. Apply sub-area cost shares to project CAPEX estimates
7. Aggregate costs by area, delivery agency, project type and decade

The assessment identified some $1.066b of CAPEX for the in-scope projects, of which $646m was identified by Auckland council to be included within the DC policy assessment. After removal of renewal and level-of-service uplift elements this left $573m of growth-related costs for allocation across the sub-areas. The allocation to sub-areas was based on causation and beneficiary assessments, resulting in the following shares for each sub-area (with a combined total of $513m for the Drury/Opaheke area):



The assessment has identified key areas of ongoing uncertainty with this long-term programme-level assessment, as indicated in the following table. While sensitivity tests were undertaken on key methodology assumptions, key risk areas remain regarding sequencing and outcomes of land use decisions, decisions regarding external funding of parts of the programme and the level of detail in the CAPEX estimates. Given the large scale and extended time-frame for this DC Policy, a regular review of the inputs and assumptions will be required as new information becomes available to address these uncertainties.

Assessment of Key Areas of Uncertainty

No	Indicative Scale	Topic	Discussion	Approach
1	Medium	Scope of projects	The scope of projects for this assessment is that defined within the DIFF assessment, and focussed on development in Drury East and Drury West1. It does not have a complete assessment (especially in terms of collector roads) in Opaheke or in Drury West 2 (south of SH22)	This is dependant to Council's pending decision on the funding area(s) to be adopted, for which Council will need to consider the future need to expand the assessment for these longer-term development areas.
2	Medium	Rate and sequencing of development	This assessment was undertaken prior to final decision/appeal being announced on the Drury East plan changes (or the associated fast-track consenting elements). It has been based on revised growth rates provided by Auckland Council however those will remain at risk of change following resolution of appeals.	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment to address this item.
3	Low	Timing of project implementation	The DIFF and this updated assessment suggest a date when the project is likely to be needed, based on assumptions about land use development. Those assessments did not explicitly consider constraints on funding of the infrastructure, which could defer implementation dates within the programme.	Council to consider any modifications to indicated delivery times based on any constraints/requirements of the DC policy itself.
4	High	External funding	Ongoing regional or national funding decisions (such as ATAP and NZUP), for elements of this programme are likely over the life of the programme and can't be readily predicted. These uncertainties could significantly alter the total CAPEX: New external funding of projects could reduce the assessed CAPEX requirements (such as potential NZUP funding of some local Drury Projects). Conversely, projects such as Mill Road south which are assumed to be externally funded may not be, requiring significant increase in CAPEX to provide the required local access links.	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment.
5	High	CAPEX estimates	The CAPEX estimates for this assessment are those developed by SGA solely for route-protection purposes, and as such include high levels of uncertainty regarding engineering conditions, detailed design, property costs	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a

			etc. Estimates for interim stages and non-SGA elements (such as collector roads), are based on the lowest level of design detail and hence subject to the highest uncertainty.	regular review of the DC assessment as new information becomes available.
6	Low	Causation Assessments	In many cases causation will be confirmed through mitigation requirements in land use planning decisions, including via direct agreement between developers and road controlling authorities. This assessment has necessarily relied on assumptions and judgement regarding those likely outcomes.	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment as new information becomes available.
7	Low	Beneficiary Assessment	The wide range of types of benefit and complex inter-dependency between elements has meant this assessment has necessarily relied on assumptions and judgement regarding those allocations to sub-areas. Guidance and principals have been used to provide greater transparency of the assessment and a framework for future updates. This Drury assessment becomes less sensitive to assumptions with a larger funding-area	Council to consider uncertainties and sensitivities in defining the funding area(s) and include a regular review of the DC assessment as new information becomes available.
8	Medium	Sub-areas	The size and number of any sub-areas used will alter the beneficiary/causation assessments. Larger funding areas will provide more consistent results and be less sensitive to local assumptions, but will be less responsive to specific local development outcomes.	Council to consider uncertainties and sensitivities in defining the funding area(s) and include a regular review of the DC assessment as new information becomes available.
9	Low	Level of service uplift and renewal cost estimates	The assessment has adopted Auckland Transport's approach to these issues, however, uncertainty is inherent in renewal costs over such a large programme.	The assessment could be updated at regular intervals with specific renewal projects if such information becomes available.
10	Medium	Treatment of developer-mitigation works	This assessment has been undertaken for sub-areas rather than individual developments. Those sub-areas contain an evolving mix of live-zoned development and Future-Urban Zoned land. It therefore cannot comprehensively predict where individual developers may provide elements of this programme as part of their mitigation works. Council have considered this issue in regards to works that may either be funded or built directly by developers This included consideration of the elements that developers are likely to fund and build.	This will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment as new information becomes available.

1 Purpose, Context and Scope

1.1 Purpose and Background

This report documents the transport assessment undertaken by the Te Tupu Ngatahi Supporting Growth Alliance (**SGA**) in regard to preparing transport inputs to Auckland Council's proposed Development Contributions policy for Drury (**DC Policy**). SGA's role was to prepare a transportation assessment as specified by Auckland Council and did not involve providing advice on the development of the policy itself. The transportation assessment was guided by Auckland Transport and Auckland Council staff, based on the Councils Development Contributions Policy (2022) and methods adopted in other locations.

An initial assessment was undertaken by SGA in mid-2021 and used by Council in their draft DC policy presented for public consultation. This report provides an update to include new information and to provide more detailed documentation of the methodology, assumptions and outputs.

This analysis includes reference to infrastructure capital cost estimates prepared for SGA route protection purposes. Although aggregate network results are presented in this report, the detail of the individual project elemnts are not included here.

1.2 DIFF Study

A key input into the assessment is the transport network upgrade schedule developed through the Drury Infrastructure Funding and Financing Study (DIFF). That Council-led study considered options to fund and finance the infrastructure needed to fully develop the Drury area to its planned future urban state. As part of that DIFF study, SGA prepared a Transportation Assessment that outlined the recommended sequencing of transport network upgrades to support the type and rate of urban growth proposed for the area. This included consideration of both Council (e.g. Structure Planning) and private-sector growth planning processes (such as Proposed Plan Changes). The DIFF Transportation Assessment Report provides background to the planned and potential sequence of urban development, the assessment methdology and the resulting transport network Staging Plan. That Staging Plan was developed based on the information available at the time and for a specific growth scenario, namely growth proceeding as envisaged by the private plan changes unconstarined by infrastructure funding or financing. The DIFF Staging Plan was developed in advance of the regulatory hearings into the various Private Plan Changes and solely for the purposes of Council considering various funding and financing options. As such, the Staging Plan does not have a formal status and could differ based on the outcomes of the various plan changes, development plans and regional or national funding decisions. The DIFF Transport Assessment Report is attached here as **Appendix B.**

1.3 Relationship to Plan Change and Infrastructure Planning Processes

Since the initial assessment undertaken in mid-2021, various regulatory approval processes have been progressed, all of which could influence the sequencing of urban development and provision of transport infrastructure. At the time of preparation of this report decisions on most of the private plan

changes were still pending (or under appeal). The current status of each plan change is described later in this report.

This study therefore is based on ongoing uncertainty of regulatory decisions regarding the detail and timing of the urban development. Those processes only relate to current land use and infrastructure decisions, noting that the large scale and extended (30+ year) implementation period of the planned growth in Drury means there will be many more future land use and infrastructure decisions in this area. Recognition of the current and future uncertainty regarding the pace, order and details of the planned growth is therefore an important element of this work. In light of this issue, the following approach has been adopted:

- Acknowledgement of the uncertainty and hence the need for any infrastructure sequencing and funding plans to be flexible and able to adapt to such ongoing changes in assumptions
- Use of a methodology that:
  - considers both short and long-term, so that longer-term outcomes are not compromised
  - Accepts the need to use assumptions regarding the future, acknowledging the inherent uncertainty in those assumptions
  - Can be readily updated without requiring highly detailed and complex analytical assessment that is highly dependent on the assumptions and inputs used
  - Includes sensitivity testing on key methodology assumptions to inform the likely scale of impact

1.4 Assumptions on NZ Upgrade Programme

A number of transport projects proposed for the southern growth area of Auckland were identified for delivery in the NZ Upgrade Programme (NZUP) announced in early 2020 (see **Figure 1-1**), including:

- The full Mill Road corridor between Manukau and Drury South
- SH1 Papakura to Drury South upgrade
- The two Drury Rail Stations
- Papakura to Pukekohe rail electrification

Figure 1-1 NZ Upgrade Projects in Southern Auckland

The NZUP programme subsequently went through a re-baselining exercise with a decision in June 2021 that included:

- Expansion to include delivery of three rail stations (Paerata, Drury West and Drury Central)
- Confirmed delivery of the Papakura to Pukekohe rail electrification
- Confirmed delivery of the Papakura-Drury upgrade of SH1, but not the subsequent stage from Drury to Drury South
- Re-scoping of the full Mill Road project within a fixed budget allocation to instead
  - Deliver a scaled-down version of Mill Road in the northern (Manukau) area focussed on addressing safety problems
  - Investigation of potential funding of a (non-specified) local package of upgrades to support growth in Drury

The latter item (i.e. potential funding of projects in Drury) is awaiting decisions and announcements by the relevant Ministers on specific projects that could be included in that programme. As no-such decision has been announced at the time of preparing this assessment (June 2022), no such projects in Drury were assumed to be funded through NZUP. However, a sensitivity test was undertaken where the upgrade to Waihoehoe Road between Gt South Road and the rail station access road (at Kath Henry Lane), were removed from the assessment to gauge the scale of this impact[1].

Although removed from the NZUP programme for delivery, the Government decisions did not confirm that projects such as the Drury South Interchange and remainder of Mill Road should be removed from all future network planning. The DIFF work confirmed previous assessments that Drury East could not be fully developed as planned without new connections to the north (Papakura) and south (SH1), both of which would be provided by the originally planned Mill Road project (noting that Mill

[1] The potential NZUP funding of elements of SH22 were not tested because state highway projects were excluded from the DC policy.

Road also has other, regional functions). The timeframe for the planning of any revised version of Mill Road remains uncertain at this time.

Given the need to consider the longer-term, full development of Drury East in this work, connections north to Papakura and south to SH1 will continue to be assumed as part of the required network in undertaking this assessment.

It is noted that longer-term decisions on the alignment, form and timing of projects such as the Drury South interchange and Mill Road will remain influenced by regional or national priorities, rather than solely on the needs of local development in Drury. This means that any indication provided in this report regarding the timing of those elements remains highly uncertain. For reference, the technically preferred alignment option for Mill Road identified for public engagement in May 2020 is shown in **Figure 1-2** below.

Figure 1-2 Options Considered for Mill Road Corridor Alignment

Given the likely regional or national strategic function of such a corridor, it is assumed for this assessment that such a project would be funded at regional or national level, and not by this DC Policy. This is a significant assumption as it would mean no DCs being collected for such projects.

1.5 Scope of Transport Elements Considered

This DC assessment was based on the scope of projects used in the DIFF assessment. The following description of that scope therefore applies to both the previous DIFF and this current DC Policy assessment.

The approved SGA Indicative Business Case (IBC) for the Southern Growth area of Auckland provides a range of projects and interventions between Manukau and Pukekohe to accommodate the long-term planned growth in this area, including inter-regional growth. The scope of projects included in these assessments were a sub-set of those IBC projects involving new or upgraded transport infrastructure to support the parts of Drury subject to current Plan Changes (and their immediate surrounds). It is however noted that growth in adjacent and wider areas is still considered when estimating the required timing and scale of projects.

In addition to the SGA arterial and strategic projects, the DIFF study also included key collector roads in Drury East and West, but not proposed local streets. This DC Policy assessment retained those collector roads.

Key projects included in Drury West north of SH22 will also support later growth in Drury West (Stage 2, south of SH22). However, the specific additional elements needed within that later growth area are not included (as there are no active plan changes and it was indicated for later development under FULSS). Some of the projects included also have wider growth or strategic transport functions, making ring-fencing of the Drury-specific projects complex.

The local street network design also has a key role in supporting the urban form and mode shift objectives sought for this area, however those elements were not included in the assessments as they are assumed to be the responsibility of developers for delivery.

The assessments focussed on new or upgraded transport infrastructure needed to improve access, safety or capacity (by any mode), but has not considered any consideration of construction related traffic effects nor has it included any assessment on the existing carriageway quality to support the anticipated traffic flows during construction. This omission of potentially increased maintenance costs is considered suitable for this DC assessment due to:

- The DC Policy does not cover maintenance costs
- Assessment of accelerated road deterioration due to development construction activity would not be practical across the whole area due to uncertainty of construction activities over the extended period
- It is likely that the majority of construction impacts would be on parts of the existing rural network that need to be upgraded to urban roads as part of the development anyway, and are therefore already captured either through developer mitigation works or within the CAPEX estimate used in this estimate

Although focussed on the Drury area, other key strategic IBC projects identified to support the whole southern growth area that are excluded from this assessment include:

- Pukekohe Expressway and arterial connections to Drury and Paerata
- Paerata rail station
- Pukekohe arterials

- Rail 4-tracking
- Takaanini rail crossings
- Opaheke and Gt South Road Frequent Transit Routes (FTNs) between Drury and Papakura
- Mill Road, within and north of Papakura, including associated connections
- SH1 FTN and other long-term upgrades north of Papakura
- Regional Active Mode Corridor (south of Drury west)
- Collector roads within Opaheke and Drury West south of SH22

The majority of these ommitted elements are either outside the Drury area likely to be funded through other sources, and hence not within the scope of projects considered for this Drury DC policy. The key elements most relevent to this Drury DC scope are the Opaheke and Drury West (Stage 2) arterial and collector roads, and which were not included in the DIFF assessment used as the basis of this DC analysis. Notable arterial roads not included are the southern extension of Jesmond Road in Drury West to the FUZ boundary and the Ponga Road/Opaheke Road corridor in Opaheke. Any later update to the Policy would likely need to include those areas in more detail if needed (noting those areas are both indicated for later development in FULSS).

This assessment therefore represents a technical assessment by SGA for a specific purpose and based on key assumptions. It does not represent a commitment by Auckland Transport or Waka Kotahi to a specific programme of transport infrastructure upgrades. This is however considered the most suitable data available on which to develop a DC policy for an extended programme of urban development such as this.

The general scope of projects considered in DIFF (and in this updated assessment), are indicated in the following **Figure 1-3**.

Figure 1-3 Extent of Network Considered in DIFF

1.6 Report Structure

The remainder of his report is structured as follows:

Chapter 2: Provides the growth context for Drury, including the current network and land use planning processes

Chapter 3: Describes the development of the assessment methodology

Chapter 4: Details the assessment of individual projects and aggregate results

Chapter 5: Discusses key uncertainties and sensitivity testing

Chapter 6: Provides a summary of the key outcomes of this assessment

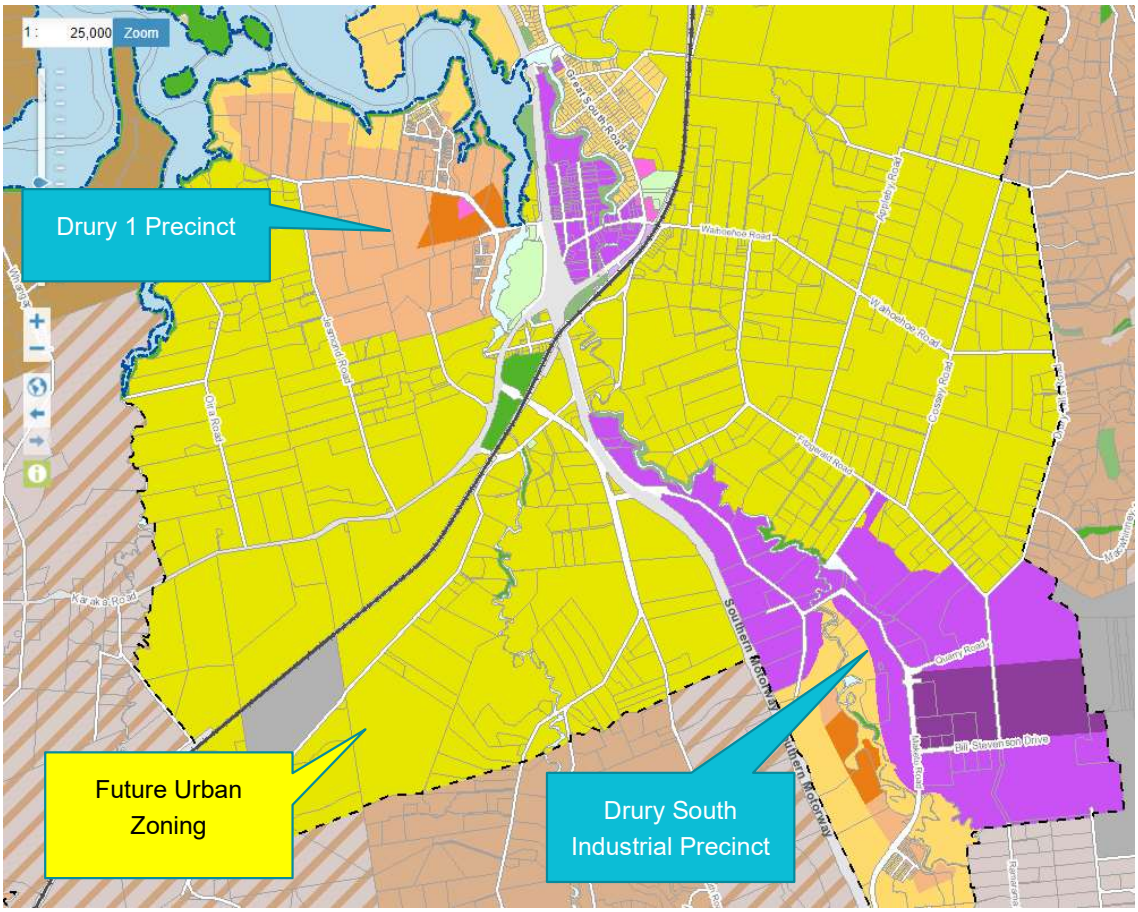
2 Drury Urban Growth Context

This Chapter outlines the planning and development context for Drury, as relevant to this transport assessment. This report only focusses on the overall growth story, with greater detail contained in the DIFF Transport Assessment Report regarding specific development areas and travel movement estimates.

2.1 Auckland Unitary Plan and Structure Plan

The AUP zoning for the Drury area is indicated in the following figure, highlighting the live-zoned areas and the extensive area of Future Urban Zone (FUZ, shown in yellow).

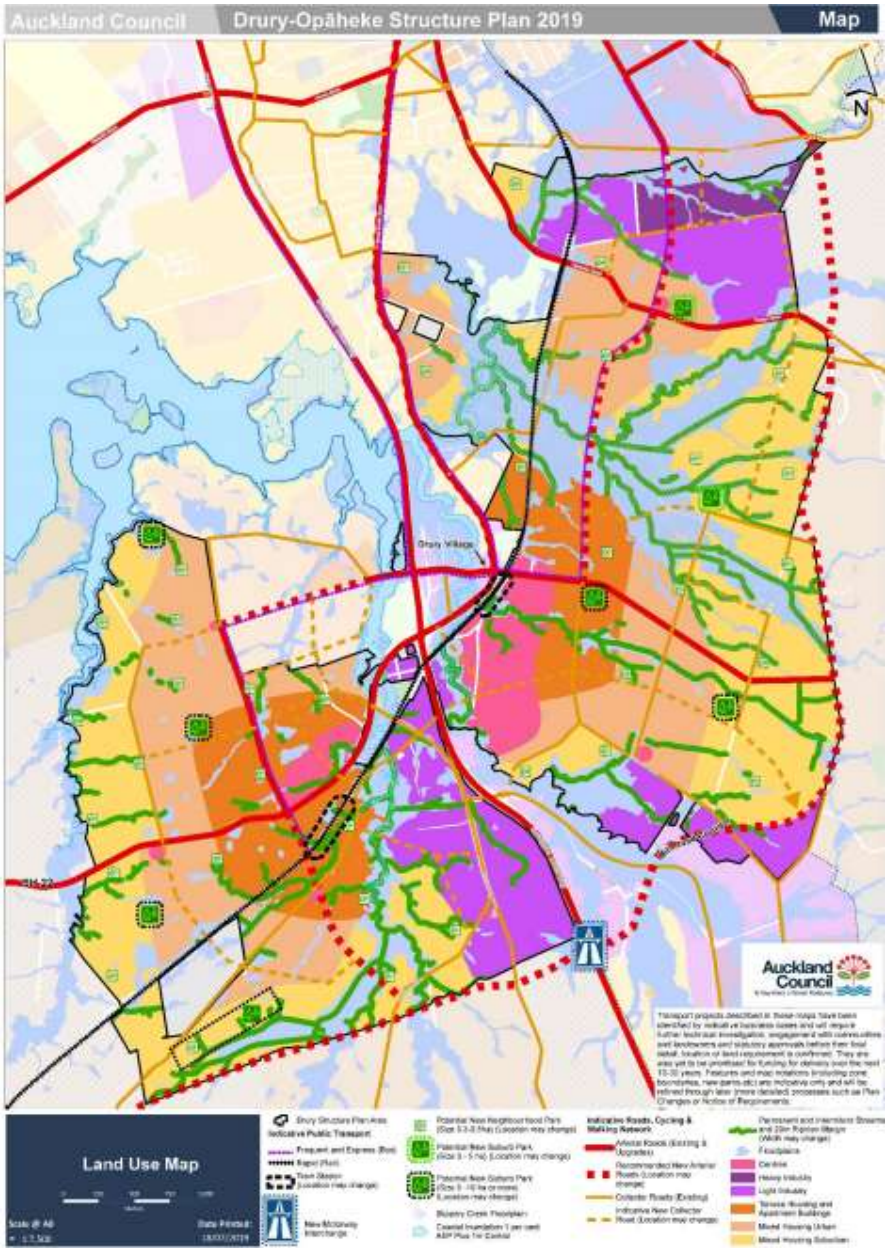
Figure 2-1 Auckland Unitary Plan Zoning and Precincts



Council progressed the next stage of land use planning by completing the Structure Plan for Drury and Opaheke in 2019. The resulting Structure Plan map (**Figure 2-2**), indicates the preferred type and location of land use activities, as well as the indicative transport network to support it. The indicative transport network indicated includes the SGA strategic network[2] and indicative collector road network. Elements of the SGA network are currently being progressed through more detailed business case investigations.

[2] As defined in the 2019 Indicative Business Case, but subject to refinement through the subsequent and ongoing detailed business cases

Figure 2-2 Drury Opaheke Structure Plan



2.2 FULSS

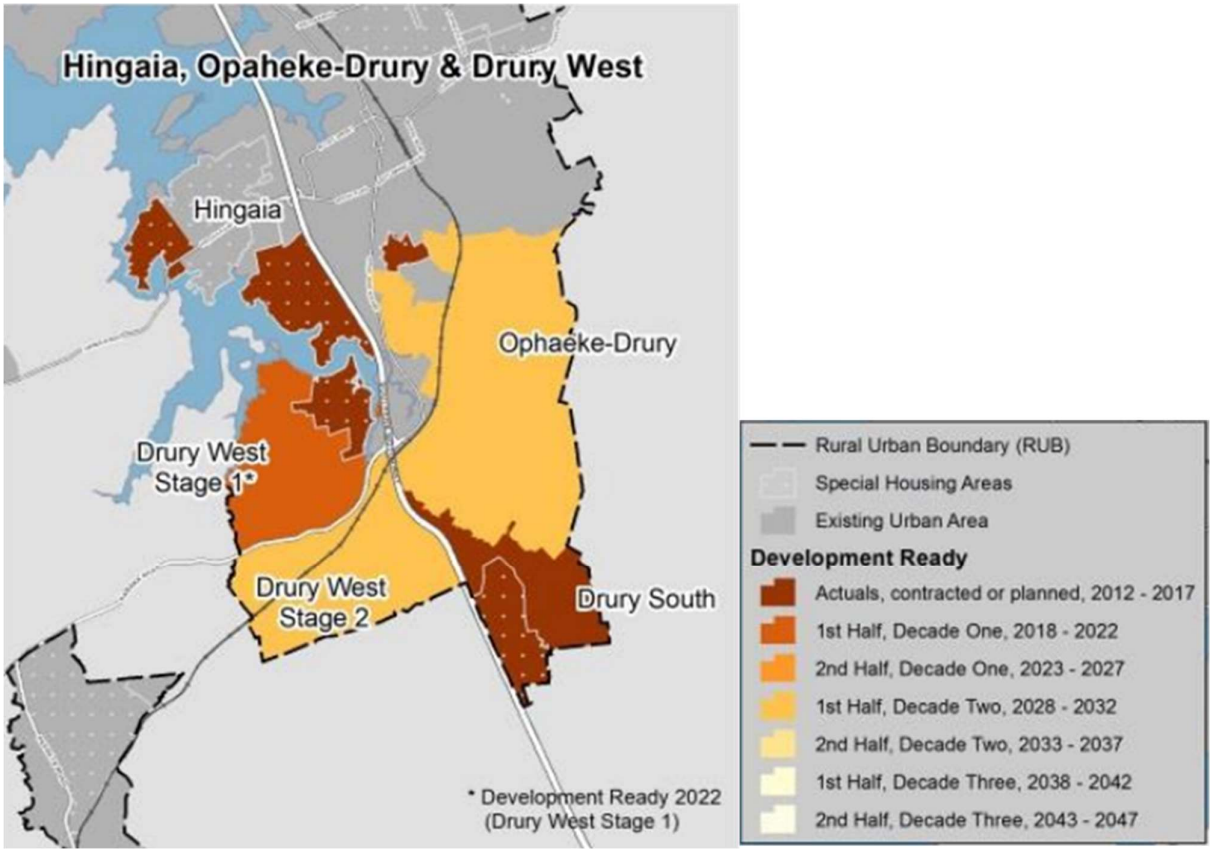
Another key land use planning document that informs both the SGA work and this assessment is Council's Future Urban Supply Strategy (FULSS, 2017). That strategy indicates the preferred sequencing of greenfield (FUZ) land. Relevant to this area is the staged sequencing of new urban areas indicated in **Figure 2-3**. Of relevant in this area is the following:

- Drury West Stage 1 (north of SH22) is indicated for the earliest development, by 2022
- Drury West Stage 2 (south of SH22) is indicated for being development ready by 2032
- Drury East and Opaheke are indicated for being development ready by 2032

It is noted that some of the private plan changes are aligned with this strategy, while those in Drury East involve acceleration ahead of the Strategy.

As noted earlier, this assessment has treated the seven plan changes at face value, assuming all could proceed immediately, regardless of the FULSS. However, the growth assumptions in the wider area remain generally aligned with FULSS (as reflected in the regional land use forecasts).

Figure 2-3 FULSS



2.3 Regional Growth Forecasts

Auckland Council, in liaison with Auckland Transport and Waka Kotahi[3], regularly update their regional land use forecasts. Those forecasts are estimates of long-term regional growth undertaken at a strategic level. They are not intended to provide precise predictions of future land use activities in all areas. Forecasting future land use activities has inherent uncertainty, particular in greenfield growth areas subject to such significant change.

The forecasts are developed from Statistics NZ population forecasts, and reflect various known developments, unitary plan zoning and strategies such as FULSS. The forecasts are used in the transport forecasting undertaken for the regional and sub-regional transport planning, including that undertaken by SGA. The current SGA assessments are based on forecast Scenario I11.5, albeit with

[3] This collaboration of agencies is reflected through the jointly owned Auckland Forecasting Centre

an additional horizon added with full build-out of the FUZ areas (and referred to as the 2048+ forecast). Scenario I11.6 was released in mid-2020 and is being progressively introduced into new SGA business cases. The updated regional scenarios typically reflect changes in the predicted rate of growth in various areas, with total yields in greenfield areas not typically changing unless subject to refined structure planning or plan changes[4]. The Scenario I11.6 forecasts were also created in 2020, with prevailing high levels of uncertainty regarding post-COVID economic and growth conditions.

This DIFF study has also used different assumptions for the Plan Change areas, relying on the regional forecasts only for wider-area growth. The DIFF study used more optimistic (earlier) development growth as it was targeted at identifying network requirements to support the aspirations of the plan changes.

Council subsequently provided revised growth forecasts for the Drury area for the purposes of these DC assessments. Those forecasts retained the long-term full-buildout levels used previously by SGA but with rates of growth based on newer information than available for Scenario I11.5/6 (such as land use planning) . The overall level of planned growth between Manukau and Pokeno is summarised in the following **Table 2-1**.

Table 2-1 Growth Estimates for Southern Auckland

Area	Households	Population	Employment
Drury/Opaheke Structure Plan	22,000	60,000	12,000
Pukekohe/Paerata Structure Plan	12,520	33,800	5,010
Other, Manukau-Pokeno	35,329	66,571	26,777
Total Manukau-Pokeno	69,849	160,371	43,787

This demonstrates new greenfield growth in Drury and Opaheke of some 60,000 people, along with an additional 100,000 population for the wider southern Auckland area. For reference, this total population growth of 160,000 people is equivalent to the current population of Hamilton City.

In addition to the population growth, there is expected to be sustained high growth in inter-regional travel movements, as measured by vehicle movements on SH1 crossing the Bombay Hills to/from the Waikato region. The Auckland Regional Transport model indicates a doubling of current vehicle movements to 100,000 per day over the next 30 years.

In terms of the revised growth rates provided by Council, the following figures compare the Scenario I11.5, DIFF and Councils Revised forecasts, and indicate:

- The growth in Drury East in the Revised forecasts is substantially slower in the first decade than that assumed for DIFF, albeit with an accelerated growth in the second decade to match previous Scenario I11.5 totals
- The Revised forecasts in Drury West 1 (north of SH22) remain similar to those in DIFF and slightly faster than Scenario I11.5
- No DIFF adjustments were made in Drury West 2, however the revised forecasts slightly delay the start of growth compared to Scenario I11.5, albeit again followed by a period of faster growth

[4] This comment relates to the regional forecasts and models. It is noted that the local traffic models used in this assessment did apply different assumptions on total yield and build-rate.

- The revised employment growth forecasts showed similar trends to the household forecasts, especially with Drury East growth being delayed relative to DIFF and Scenario I11.5, but then having a period of faster growth to overtake that indicated in Scenario I11.5

Based on the Revised growth forecasts provided by Council, the following broad changes were applied to the project schedule identified in DIFF:

1. Early projects in Drury East were deferred by typically 8 years with mid-term projects delayed by some 5 years
2. Projects in Drury West were broadly retained from DIFF, except where new information on specific projects was available (such as funding of Drury West rail station and connecting road)

Figure 2-4 Household Growth Comparison, Drury East

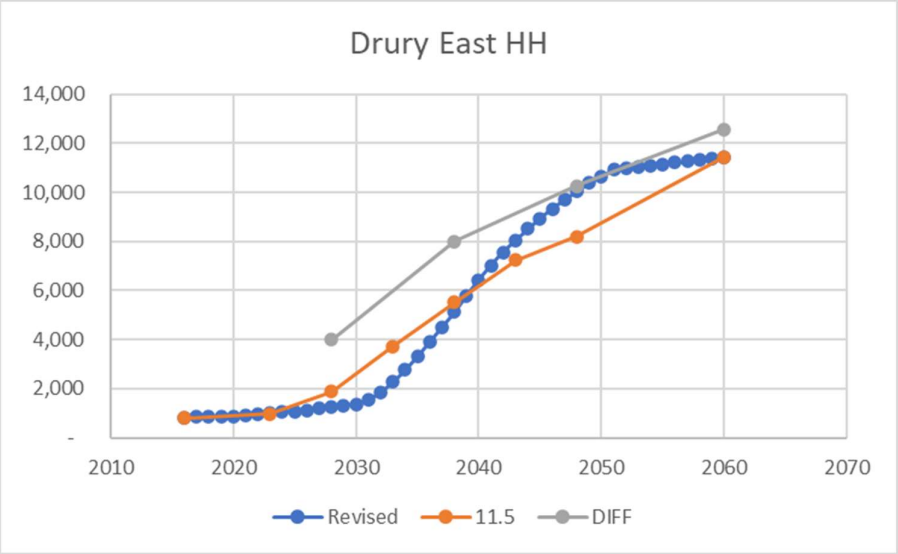


Figure 2-5 Household Growth Comparison, Drury West 1

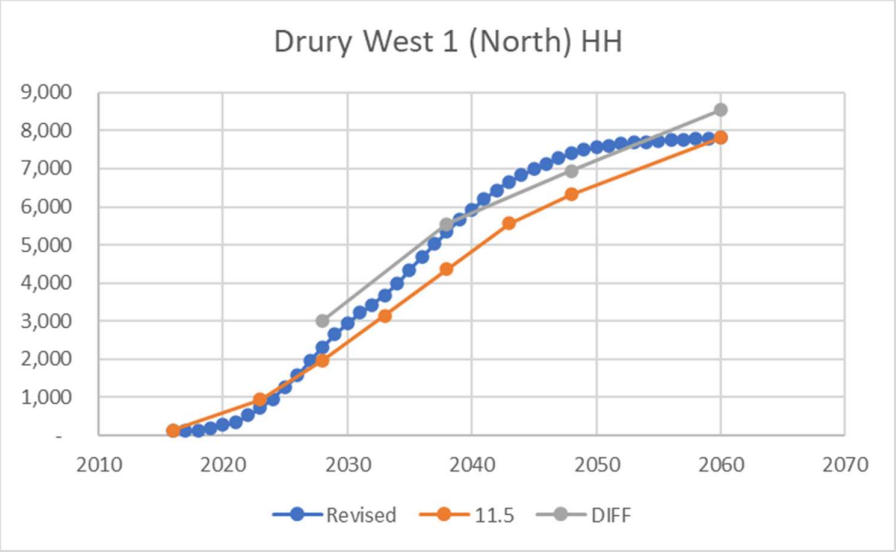
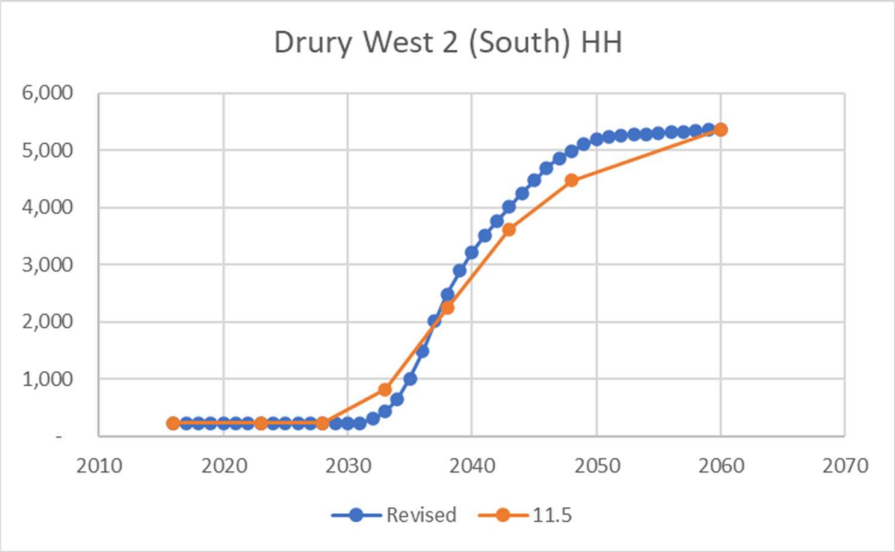


Figure 2-6 Household Growth Comparison, Drury West 2



2.4 Recent and Current Plan Changes

The status (at the time of reporting) of the regulatory processes for the current major private plan changes (see **Figure 2-7**) and infrastructure planning is as follows:

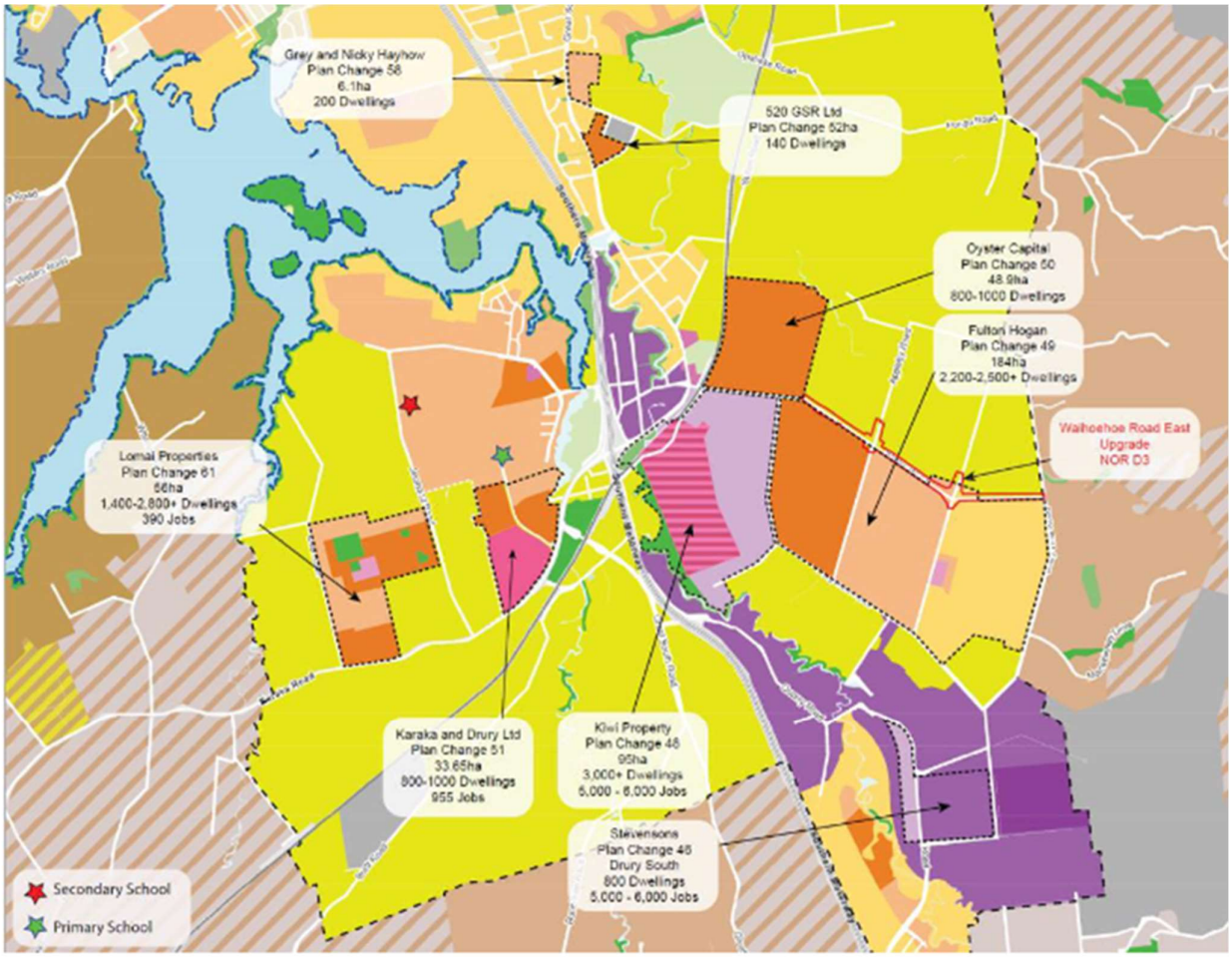
- Two small scale private plan changes north of Drury township (PPC52 and 58) have been approved
- In regards to the larger private plan changes, those in Drury East were approved by independent commissioners, however those decisions have been appealed by various parties, including Auckland Council.
- It should be noted fast track applications for consent for the first stage of the above 3 areas were lodged but have been withdrawn due to Council's appeal on the Plan Changes in Drury East.
- In regards to Drury West - PC51 decision has been issued approving plan change. The decision outlined the works required to be provided by the developer, one of which was only required if not provided by others. The key points relevant to this report are:
  - The existing intersection of Burberry Road/SH22 is to be closed and subdivision and development must develop alternative access. Increased traffic will exacerbate safety concerns at this intersection. A signalised intersection of the Mainstreet Collector Road with SH22 providing the necessary access to the Precinct,
  - The Mainstreet Collector Road, its intersection with SH22 and approach lanes (including alignment with adjacent intersection upgrades) is constructed and operational prior to or with the first stage of subdivision and / or development.
  - If an alternative roading connection is made outside of the Precinct prior to the Mainstreet Collector Road intersection with SH22 being operational, then that would trigger the requirement for an upgrade to the intersection of SH22 and Jesmond Road because of existing capacity limitation with that intersection.
  - Separated active transport provision is to be provided on SH22 to the intersection of SH22 and Jesmond Road to connect to the Drury West rail station.

- The panel's view in PC51 decision was that developers need only address the direct effects from their development.
- PC61 was initially declined on the basis of inappropriate and unworkable provisions. The decision report gave a clear signal it would have been approved with different drafting. This decision was appealed and now subsequently approved

- Drury Arterials Notice of Requirements: Hearing completed and awaiting decision

Additional details on the current plan changes are provided in the DIFF report, in terms of expected yield, proposed transport networks and expected level of travel.

Figure 2-7 Current Private Plan Changes in Drury



2.5 Transport System Planning and Role of SGA

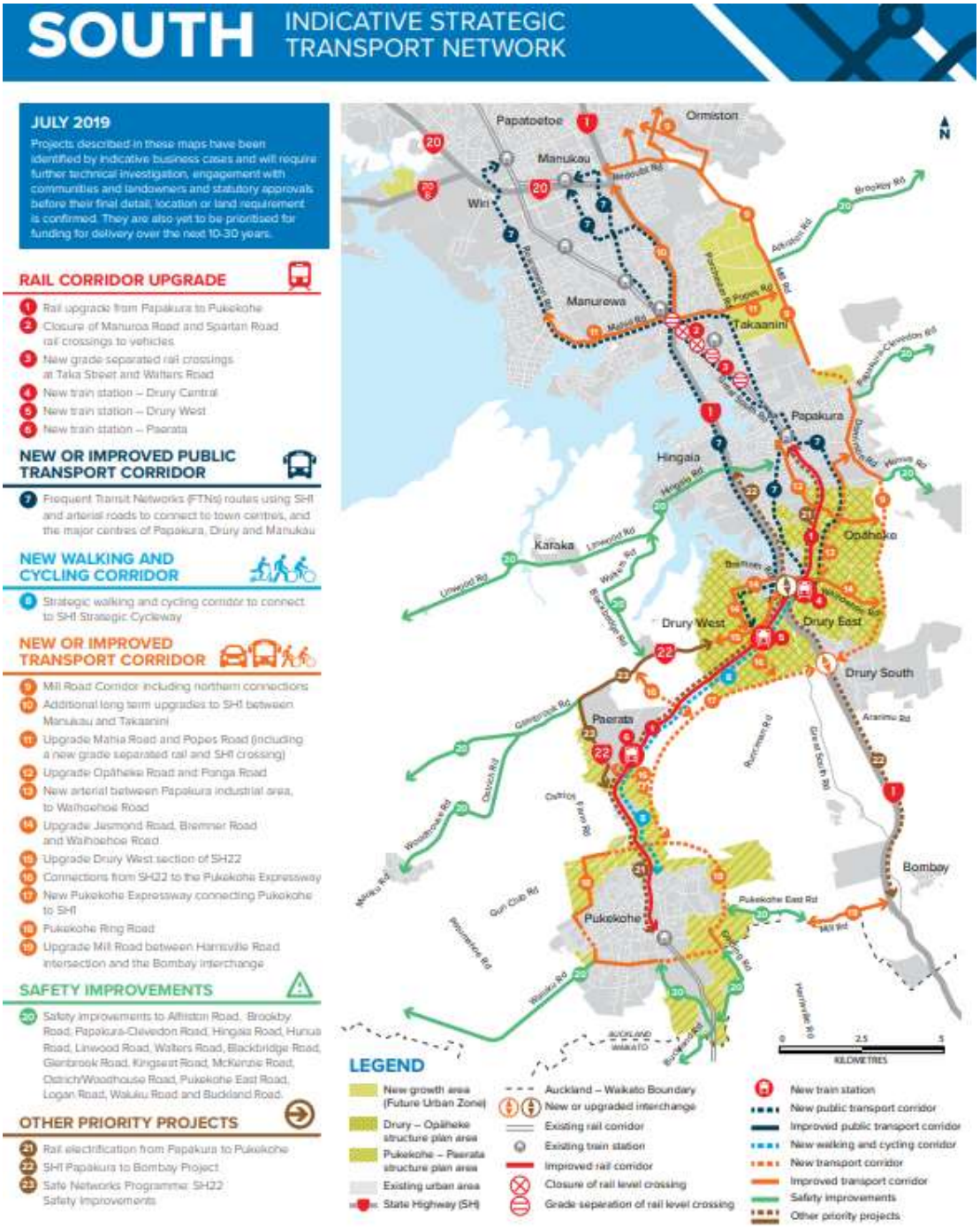
In 2019 the SGA IBC identified a full system solution to support the planned growth in southern Auckland, as indicated in **Figure 2-8**. In addition to the infrastructure projects shown in the Map, the business case identified the need for supporting initiatives related to demand management and land use-transport integration. The land-use-transport integration work has included continuous liaison between SGA and Council on planning for both the transport projects and the land use planning. This included the Drury Opaheke Structure Plan for which SGA prepared the Integrated Transport Assessment for Council. The IBC Strategic Network was approved by the respective Boards of Auckland Transport and Waka Kotahi.

The role of SGA is to achieve long-term route protection of the recommended networks, with subsequent project implementation decisions and processes remaining with Auckland Transport and Waka Kotahi. This means that the SGA work is focused on identifying required corridor footprints and does not imply any specific implementation status. SGA are progressing detailed business cases (DBCs) for elements of the network and have recently completed the hearing process for the route protection (Notice of Requirement) of the Drury Arterials package. As such SGA have the most up to date and strategic network perspective of the wider Drury area.

The SGA IBC/DBC work and the Council planning documents[5] therefore form the key basis for the planned growth, desired outcomes and strategic projects used in this work.

[5] Including the Unitary Plan, Drury Opaheke Structure Plan and Future Urban Supply Strategy

Figure 2-8 SGA IBC Network



2.6 Outcomes Sought

As identified in the DIFF Transport Assessment Report, the transport and land use planning for this southern area has identified the need for a move away from low density, car-dependent developments in order to minimise adverse outcomes in terms of:

- Inefficient use of scarce land
- Poor environmental outcomes, including carbon emissions from car-dominated travel
- Poor urban form outcomes from dispersed development with car and movement-dominated transport systems
- Poor safety outcomes from conflicts with and between walking/cycling and high traffic flows in urban areas
- Poor economic outcomes from inefficient freight movement and poor business accessibility
- Poor social and economic outcomes from poor accessibility to social and economic opportunities and limited travel options
- Poor economic outcomes through a lack of resilience in the transport system

The key outcomes sought through the SGA business cases to address these issues include:

- Transport systems that support quality, compact urban form, including through higher density around major public transport corridors
- Mutually supportive transport and land use systems that:
    - provide safe travel across all modes
    - provide a transformation in mode share to more sustainable modes, such as public transport, walking and cycling to aide decarbonisation goals
    - provide improved choices of travel
    - provide efficient freight movement
    - provide high levels of accessibility to social and economic opportunities
- a resilient transport system

These outcomes are used in the SGA business cases and have also been used in the DIFF assessment.

2.7 Approach to DIFF Staging Assessment

The DIFF assessment was substantially based on design and timing principles that will help deliver the desired outcomes, particularly regarding mode shift and safety. It is acknowledged that there is significant uncertainty in growth planning in greenfield areas, including:

- The outcome of land use planning decisions, such as the various private Plan Changes
- The exact sequencing of how each site will develop, which is complicated by the large area and multiple land-owners
- The rate of development
- The timing of key infrastructure to support growth
- The growth demands that impact this area from other locations, such as Northern Waikato

Due to these uncertainties, it was not considered appropriate nor feasible to predict or model all possible interim scenarios. Instead, the assessment needed to consider general principles that would apply to growth in a specific area, a range of scenarios for provision of new connections or major infrastructure and the potential cumulative effects of growth across many areas.

The broad approach to the DIFF work was therefore as follows:

- Apply design and timing principles to identify key transport elements needed to support each area, especially as regards PT, walk and cycle facilities
- Consider key constraints to access to Drury West and Drury East
- Use traffic data and models where needed to identify access strategies/needs under different scenarios for key infrastructure
- Consider the cumulative effect of growth in both Drury east and west, including on the key east-west linkages
- Identify opportunities for interim stages of needed upgrades
- Develop indicative project sequencing strategy

The assessment is based on provisions of high-quality walking/cycling and PT facilities from the outset of development, to support compact urban form, high mode shift and associated demand management and climate objectives. Transport modelling was used to inform, rather than dictate this approach.

Further details of the Staging Principles used are contained in the DIFF Transport Assessment Report.

3 Assessment Methodology

This Chapter describes the development of the overall approach to this assessment. Detail on specific assumptions and inputs are included in the subsequent chapter.

3.1 Methodology Development Process

This DC Assessment was undertaken based on guidance from Auckland Council and Auckland Transport regarding the over-arching approach. It is based on Auckland Council's Development Contributions Policy which itself was developed consistent with the Local Government Act (2002).

The core methodology was developed from a series of technical workshops held with staff from Auckland Transport and Auckland Council. The purpose of those workshops was to:

- Agree the specific outputs of the assessment
- Provide guidance to SGA on the general approach to assessing DC inputs, particularly regarding assessment of renewal elements, growth components and beneficiary assessment
- Present and discuss emerging outcomes and any issue arising

Following the workshops, the assessed growth share of each project in the DIFF Staging Plan was provided to Auckland Council for incorporation into their draft DC policy.

This June 2022 update revises the Staging Plan based on new information and provides more extensive documentation of the assessment process. The Transport inputs provided by SGA to the Council's DC policy can therefore be summarised as follows:

1. Preparation of the **DIFF Transportation Assessment** (early 2021). Although prepared by SGA, that report was developed through a liaison process managed by Auckland Council, that included extensive engagement with Auckland Transport, Waka Kotahi and the various proponents of the major private plan changes in Drury;
2. **Scoping the application of the Council/AT DC Methodology** (May -June 2021), as guided by Auckland Council and Auckland Transport
3. **Application of the core methodology to the DIFF Staging Plan (June 2021)**
4. **Update of the assessment** and detailed documentation (this report July 2022)

3.2 Key Requirements of DC Transport Assessment

The outputs requested by Auckland Council from the DC assessment were:

- Estimated growth-related transport infrastructure capital costs to support planned urban developed in Drury, broken down by:
  - sub-area, based on assessment of causation and beneficiaries of the works
  - likely decade for delivery
  - likely delivery agency
  - project type

3.3 Key Assessment Steps

The overall methodology applied (as guided by Auckland Transport and Auckland Council) included the following key steps:

1. Define a sequenced programme of transport projects to support the assumed type, location and rate of growth (adapted from DIFF)
2. Assign a project type and likely delivery agency for each project element
3. Estimate and remove potential infrastructure renewal costs
4. Estimate the growth component of the infrastructure costs
5. Assess beneficiaries for each network element to estimate cost share for sub-areas
6. Apply sub-area cost shares to project CAPEX estimates
7. Aggregate costs by area, delivery agency, project type and decade

3.3.1 Project Type and Delivery Agency

Each item in the DIFF Staging Plan was assigned a project type and likely Delivery Agency as indicated in it the following **Table 3-1**. The likely Delivery Agency for each project is based on assumptions as the actual delivery agency is not confirmed and may alter.

Table 3-1 Project Type and Likely Delivery Agency

Project Type	Description	Likely Delivery Agency
Strategic	Elements with national or significant regional functions, including State Highways and strategic rail infrastructure	Waka Kotahi (State Highways) NZUP Programme[6] (for defined projects)
Arterial corridors	Projects with regional or sub-regional function, including arterial roads and Frequent Transit Networks	Auckland Transport
Regional active mode corridors	Stand-alone active mode corridors	Auckland Transport

[6] The physical delivery agency for the NZ Upgrade projects is yet to be confirmed but could include Waka \Kotahi, Kiwirail or possibly even Auckland Transport.

Collector Roads (in greenfield locations)	Roads and streets that support new urban development and connect between local streets and arterial networks. Generally such streets are associated, and provided concurrently with, the release of new development. However, some of the collectors have a more important role in connecting adjacent developments.	Property Developers
Key Collectors	Elements of the planned collector road network identified by Auckland Transport as at a higher risk of not being delivered by developers (see note below).	Auckland Transport (or potentially property developers)
Upgrade Collectors	Existing rural roads requiring upgrades to urban collector roads. These are predominantly considered the responsibility of the developers, however some gaps may require input from Auckland Transport	Developers (with some potential Auckland Transport inputs)
Local streets (not included in DIFF or DC scope)	*Local streets*	*Property Developers*

As noted in the table, the reliance on developers to provide the collector networks can result in critical gaps in the completed network. This is less of an issue with the local street network as those do not have wider-network connectivity functions. Potential gaps in the network can be due to different sequencing of adjacent development, inability to access 3rd party property or avoidance of more complex elements such as water crossings etc. This approach means that some transport functions become inefficient (such as effective local bus routing), or an over-reliance on the adjacent arterial or strategic network for movements better served by the collector network. Addressing those unfunded gaps in the networks will then often fall to Auckland Transport. Auckland Transport identified the following four key collector elements:

- (#28a) Bridge connection to station within Boulevard connection of Drury West
- (#14a) Brookfield-Quarry link (and intersections)
- (#59) New intersection where Drury west collector intersects Jesmond Road
- (#55) New east-west collector in Drury West connecting Aurunga to Jesmond Road
- (#22) upgrade to Quarry Road/Gt South Road intersection
- (#69) Quarry Road Walking/Cycling bridge

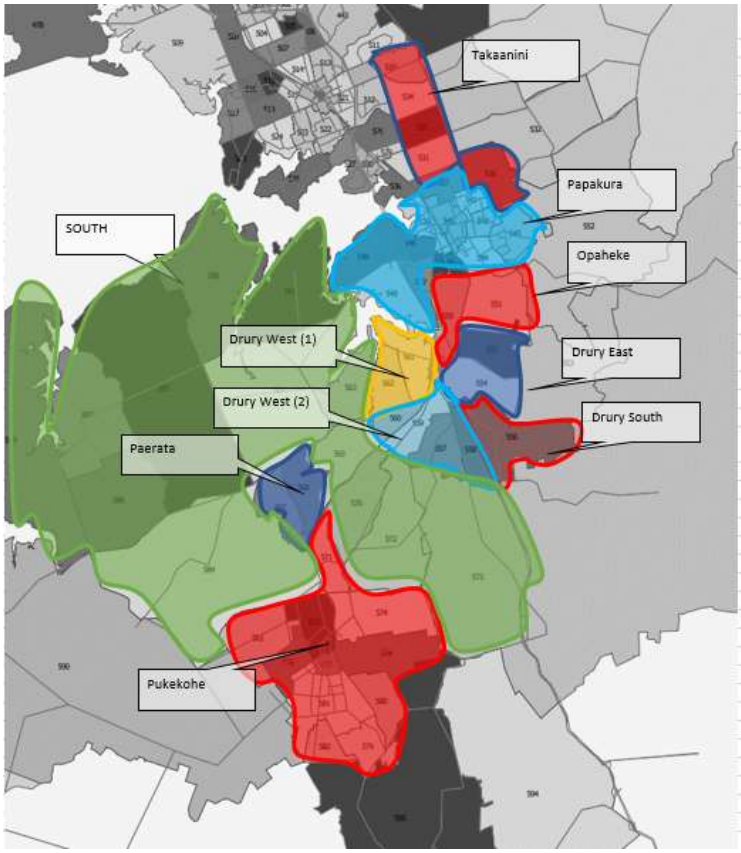
3.3.2 Sub Areas for Assessment

At the time of undertaking the initial assessment the Funding Area over which the Drury DC policy would be applied was yet to be confirmed by Auckland Council. As such, the assessment used a number of sub-areas within the greater Drury/Opaheke growth area, which would allow the council to

aggregate in different ways to confirm their final Funding Area. Consistent with Councils DC policy (2019), the sub-areas were based on the spatial system used in the regional growth and transport models. The transport model zone system in the current version of the regional transport model (MSM[7]), was used to develop the sub-areas indicated in **Figure 3-1**.

Although the Council subsequently identified a Funding Area for its draft Drury DC policy, the same sub-areas were retained for this update for consistency and to match the scope of projects used in DIFF (see Figure 1-3).

Figure 3-1 Assessment Sub-Areas



A full transport system has been planned for the Drury and adjacent growth areas that integrates into the existing system. This full network is considered necessary for those local communities to be connected and integrated together (especially given the severing nature of the existing state highway and rail infrastructure). As such, the proposed network is for the functioning of the wider community rather than solely for specific developments. This connected-network approach implies that smaller sub-areas would not be appropriate. The smaller sub-areas used here are useful to identify if there are significant differences in funding needs for the areas, however the ability to differentiate the beneficiaries becomes more difficult as the sub-areas get smaller.

It is also noted that development will proceed for specific areas within these sub-areas, which may have different timing and/or causation/beneficiary outcomes than adjacent development within that same sub-area. For example, the Drury West (1) sub-area contains both live-zoned areas (Auranga), recommended live-zone areas (via Plan Change 51) and also residual Future Urban areas. The

[7] The Macro Strategic Model

causation/beneficiary assessment was assessed for the Drury West 1 areas as a whole and not for each developer. This is because beyond the existing private plan changes, it is not possible to know at this time the scale, form or timing of future plan changes.

Live-zoned areas (such as Auranga) will have often have precinct plan provisions staging development until specific transport infrastructure is provided. This means that developers will often agree with the road controlling authority to directly fund or physically deliver infrastructure as part of mitigation/development of their site. Council have addressed this by discounting the costs included in the DC policy by excluding the typical components likely provided by developers (see Section 3.3.4 below).

3.3.3 Estimated Project Delivery

The DIFF transport assessment identified potential project delivery timeframes based on the rate of growth indicated by the private plan change proponents. That DIFF sequencing assessment did not consider funding methods or constraints in delivering the infrastructure, and was undertaken prior to specific staging provisions being confirmed for each plan change. The key purpose of the DIFF assessment was to inform Council's consideration of options to fund and finance the required infrastructure for Drury.

Following the DIFF study Council advised that they wished to explore a Drury DC policy as a key method to fund the required transport networks. They also submitted to the hearings on the private plan changes indicating their opposition to acceleration of urban development due to the lack of infrastructure funding to support such development.

For the initial DC work in mid-2021 Council advised that apart from any projects with committed funding, the delivery of transport projects should be delayed until post decade 1. This meant that projects identified in DIFF as being desirable for immediate (unconstrained) growth development should be deferred until decade 2. Based on the Revised growth forecasts, most arterial projects included in the DC policy were already delayed beyond 10 years so further delay to projects was not required.

3.3.4 Cost to be Included

The Council DC Policy 2022 notes specific asset costs that should not be included in the DC assessment:

> 28. Within these activities, development contributions will not be required to fund:
>
> a. operating and maintenance costs
> b. any part of capital expenditure projects that is funded from another source
> c. costs incurred by the council to fund renewal of assets and/or to increase existing levels of service that are below the stated service standard.

As per the DIFF assessment, only infrastructure CAPEX costs were included in this DC assessment, without consideration of operating and maintenance costs. Auckland Council requested this assessment be based on the following basis:

Collector projects

- Key Collectors (identified in Section 3.3.1 above):

    - **100%** of the cost included in DCs (property & non property cost)
- Upgrades of existing rural roads to collector standard (or if any doubt on the following criteria):
    - **25%** of the cost included in DCs (property & non property cost)
- New (greenfields) roads on developers' land:
    - **0%** of the cost included in DCs

Arterials

- Interim arterial (where an existing road will in future become an arterial and where there is a first interim step)
    - 15% of the cost included in DCs (property & non property cost)
- 2 lane arterial
    - 40% of the non property cost included in DCs
    - 60% of the property cost included in DCs
- 4 lane arterial
    - 60% of the non property cost included in DCs
    - 80% of the property cost included in DCs
- Major structures
    - 100% of the non property cost included in DCs
    - 100% of the property cost included in DCs

Intersections

- Projects for intersections are treated the same as the intersecting road with the highest capacity/status (state highway, arterial, collector) e.g. an arterial intersecting with a collector is treated as an arterial , an intersection of 2 collectors is treated as a collector

State Highways

- Costs associated with upgrades to SH22 were excluded from this assessment as they are assumed to be funded by Waka Kotahi (which may include direct funding agreements between developers and Waka Kotahi)

Some project costs are known to be funded by other sources (such as the NZ Upgrade projects) and hence have not been included in this assessment. However, over the life of this programme to fully develop the future Drury area it is not possible to determine which other parts of the network could also be funded by such non-standard sources. As such, this transport assessment has included all other projects, to allow Council to adapt and update the assessment as and when any such other funding sources appear.

The DC Policy requires exclusion of asset renewal and increases in levels of service, the approach to which is detailed in the next Sections.

3.3.5 Renewal Costs

As noted in the Council's 2022 DC Policy, costs associated with renewal of existing infrastructure should not be included in the DC assessments. The existing local transport network in Drury generally comprises rural roads which will need to be converted to urban roads. The CAPEX estimates for the projects typically assume full re-construction of the existing road to provide the appropriate urban streets. As such, it is likely that those full re-construction costs would replace or remove the need for renewal of those roads if they remained rural. An estimate of renewal costs for the rural roads was therefore made and removed from the full CAPEX estimates. This implies that a

proportion of the reconstruction CAPEX estimates should apply to existing rate payers rather than to new urban development.

Auckland Transport advised an average renewal cost of $500,000/lane-km of road. Given that the existing rural roads are all 2-lane roads, an equivalent renewal cost was therefore applied at a rate of $1million/km. Given the rural nature of the existing roads, these rates were assumed to include renewal costs at intersections as well as along existing roads. These renewals estimates were then removed from the CAPEX estimates for use in the DC assessment.

3.3.6 Estimation of Service Level Increases

Similar to renewal costs, the methodology requested by Auckland Transport/Council required that only costs associated with growth should be included in the CAPEX estimates for DC assessment. Specifically, this required removal of elements of the CAPEX estimates that provided an increased level of service to existing landowners in the area. Estimating such level-of-service-uplifts becomes difficult in such areas expected to transform from rural to urban environments. While the existing landowners may not cause the need for the new or enhanced urban infrastructure, they may arguably benefit from an improved transport system. For example, the planned network for Drury could provide existing landowners:

- Enhanced public transport facilities
- Enhanced travel choices including walking and cycling networks
- Safer roads
- Improved accessibility via new connections or corridors

It is not considered feasible to estimate levels of service for each element of the system before and after the proposed works to estimate the level of service uplift[8]. Instead, a simplifying method was adopted as used elsewhere by Auckland Transport whereby the growth component of the CAPEX was assumed to be the share of the future development that was new. That is, the share of the ultimate development that currently exists was removed. For example, if the current level of land use activity for the area is 1,000 and the future is estimated to be 10,000, then the growth share is assumed to be 90% (9,000 new growth out of 10,000 future). Conversely, the share to existing landowners through level-of-service-uplift was assumed to be 10%.

Because the existing and planned future development includes both residential development and business (commercial, retail and industrial) activities, use of simple population values were not considered appropriate. Instead a weighted measure of growth was used based on the households plus 0.5 weighting on future employment. This gives a result similar to the use of Household Unit Equivalents (HUEs) used in the Council's DC policy that allow non-residential activities to be assessed for DCs. This simplification is considered suitable for this overall level of growth share, given the lack of detailed forecasts on floor areas by activity type. However, the actual application of the DC policy to specific activities would be expected to continue to use the more detailed HUE rates within the Councils policy document.

The source of future land use activities for this work (and the land use and transport planning for the area) is Auckland Council's regional growth forecasts as defined in their transport models. Those forecasts use employment estimates for non-residential activities rather than floor areas.

[8] Noting that agreed measures and specific standards for 'acceptable' levels of service for some outcomes do not typically exist.

The June 2021 assessment used Scenario I11.5 land use forecasts, with the additional full-development yield included for SGA growth areas (referred to as 2048+ forecast). The estimates of growth share were calculated for various sub-areas in and surrounding Drury as each had different levels of existing and planned activity. However, for the final assessment a single, average value for Drury was adopted for the following reasons:

- The sub-area values were all broadly similar, in the context of the uncertainties inherent in estimating future land use activity
- Most transport projects spanned across sub-areas or benefited more than just the area in which they were located. Subsequently it became infeasible to adopt differing growth shares for projects that benefited the different areas (to a greater or lesser degree)
- To avoid double-counting the beneficiary assessment for projects that benefited more than a single sub-area

A growth share of 92% was initially adopted for all projects, based on the combined Drury/Opaheke values. The combined Drury/Opaheke rate was subsequently updated with the Revised land use forecasts provided by Auckland Council (see **Table 3-2**), which changed the growth share from the 92% initially used to the adopted 91%. This table also includes updated values for Drury West and Drury East, which were used in sensitivity testing.

Table 3-2 Updated Growth Share using Revised Growth Forecasts

Area	2022 Est HH	2022 Est Emp	2060 HH	2060 EMP	HH Growth	Emp Growth	2022 HH+0.5EMP	2060 HH+0.5EMP	HH+0.5EMP Growth	Growth % of 2060
Drury/Opaheke	1,699	2,315	24,630	11,270	22,931	8,955	2,856	30,265	27,409	91%
Drury West	755	681	13,182	4,321	12,426	3,640	1,096	15,342	14,246	93%
Drury East	943	1,634	11,448	6,949	10,505	5,315	1,760	14,923	13,162	88%

3.3.7 Assessment of Beneficiaries

The use of a beneficiary assessment is based on the principle that the project should be funded by those who benefit from it. As noted in the Auckland Council DC Policy (2022), the DC's are levied in accordance with the Local Government Act (2002). Clause 197AB (1)(c) of the Act specifically notes the following in this regard:

> (c) cost allocations used to establish development contributions should be determined according to, and be proportional to, the persons who will benefit from the assets to be provided (including the community as a whole) as well as those who create the need for those assets:

This notes that DCs should be allocated both to those who cause the need for the project as well as those who benefit from it. Based on this directive and the guidance from Auckland Transport from other DC policy applications, the following approach was adopted:

1. Allocate growth-related CAPEX costs to sub-areas based on those who cause the need for the project (causation assessment)
2. Allocate growth-related CAPEX costs to sub-areas based on those who benefit from the operation of the project (beneficiary assessment)
3. The adopted allocations for each sub-area were based on a 50:50 weighting of these two assessments based on advice from Auckland Transport (sensitivity tests on this assumption were also undertaken)

Note: Although separate causation and beneficiary assessments were undertaken, for simplicity these two elements are collectively referred to as the 'beneficiary assessment' elsewhere in this report.

For the causation assessment costs were allocated to areas based on a judgement of whether the projects were likely to be required to provide the capacity or outcomes directly needed to support the planned new urban development. For the beneficiary assessment costs were proportionally allocated to sub-areas based on a judgement of the areas/communities or movements that would gain improved transport outcomes, including improved accessibility, safety, travel choice or network resilience.

The type and scale of benefit will vary significantly between areas and between projects. For example, transport benefits could include:

- Local or wider-area travellers who benefit from direct usage of the new facility or service (e.g. via greater accessibility or safety)
- Local or wider-area travellers who benefit from having additional transport choices available
- Local or wider-area travellers who derive a benefit through an improved overall transport system, even if they don't directly use the facility (e.g. indirect benefits through reduced congestion or improved network resilience)
- Local or wider-area communities that benefit from reduced vehicle movement through their neighbourhoods (e.g. through improved safety and amenity)
- Local or regional communities who benefit from the projects helping imbed changes in general travel behaviours (such as a shift to more sustainable travel modes)

It can be seen that beneficiaries could be either people who gain direct and regular benefits (such as improved accessibility between communities), or less direct and less frequent benefits (such as improved travel choices or a more resilient network). Additionally, the scale and timing of benefits for some project elements will be dependent on the timing of other elements in the network. For example, the improved accessibility benefits of a new link could be different depending if another proposed new link is assumed to be in place at that time horizon.

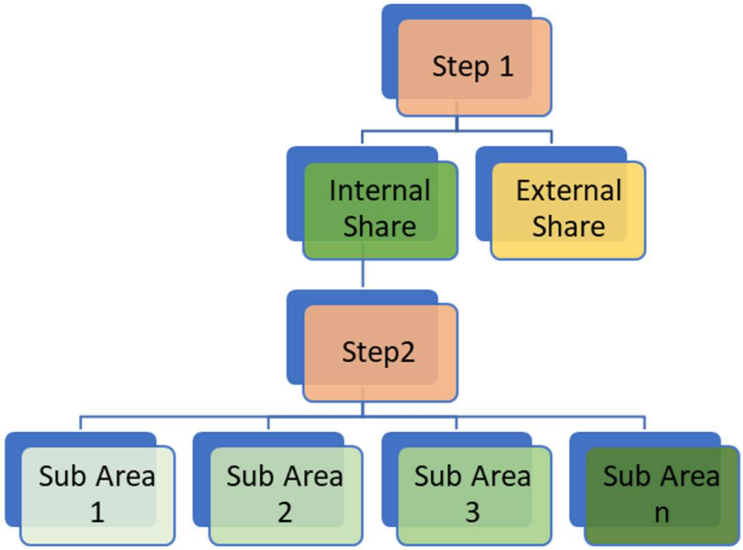
Some types of benefits could be attempted to be estimated analytically (such as via traffic model predictions of likely usage or accessibility improvements for specific projects), however this would be less feasible for benefits such as improved travel choices and network resilience. It would also become complex and require judgement to explicitly weight the different types of benefits to a single result. Additionally, analytical results from transport models would also be much more sensitive to the assumptions used in the model, such as the level of growth and inter-dependency with the presence of other projects. This would result in assessments that varied over time and were highly dependent on project sequencing assumptions.

Because of the complexities of the type and scale of benefits and the inherent uncertainties in predicting outcomes for specific future horizons, a simpler method was adopted based on informed judgement of the proportional benefit of each project to each sub-area. This judgement-based allocation was informed by the previous business case studies, detailed investigation undertaken for the DIFF transport assessment and default values for external shares as outlined below. Such studies provided insights into the intended purpose and effect of each element, from which the likely beneficiaries can be estimated.

A 2-step process of assessment was undertaken for causation and beneficiary assessment (see **Figure 3-2**), comprising:

1. Adopt values for the **external** share (i.e. the share beyond Drury/Opaheke)
2. Split the residual **internal** share between the smaller **sub-areas**

Figure 3-2 2-Step Beneficiary Assessment



The external shares were selected based on the type of project (Strategic, Arterial or Collector facilities) and its primary purpose. The need to include the purpose was because the project type categorisation alone may not suitably reflect the purpose of the work and hence beneficiary allocations. For example, rail stations are deemed part of the Strategic transport system, however the purpose of the specific Drury Stations is predominantly to support the local growth. Conversely, a project such as providing more overall capacity to the rail system would also be deemed Strategic but have a wider, more regional purpose[9]. The consideration of the project purpose helps differentiate these different situations. The purpose categories were defined as follows:

- Projects primarily in response to external (regional or sub-regional) growth pressures outside the funding area and/or required to address wider network purposes
- Projects primarily in response to growth pressures internal to the funding area
- Projects with a mix of both internal or external purposes

The default external shares for causation and beneficiary are shown in **Table 3-3 and Table 3-4,** allowing consistent selection of external values based on the project type and its purpose. The rationale for these default values was:

- Strategic projects with a primarily regional purpose would typically have very high external causation and beneficiary allocations, in contrast to collector road projects, which by definition won't have regional purposes
- The external share of Strategic projects will depend on the primary purpose of the works, decreasing as that purpose shifts from regional to local

[9] These examples are provided for illustrative purposes only, noting that the Drury rail stations are being funded by the NZUP Programme so are not included in the Drury DC policy.

- The beneficiaries of a project will typically have a wider coverage area than that for causation, reflecting inter-regional connectivity and network resilience benefits. This means that the external shares can be higher for beneficiaries than for causation

Table 3-3 Default External Share for Causation Assessment

Type\Purpose	Predominantly for external purposes	Mix of internal and external purposes	Predominantly for internal (local) growth purposes
Strategic	80%	40%	20%
Arterial	10%	5%	0%
Key Collector	n/a	0%	0%
Collector	n/a	n/a	0%

Table 3-4 Default External Share for Beneficiary Assessment

Type\Purpose	Predominantly for external purposes	Mix of internal and external purposes	Predominantly for internal (local) growth purposes
Strategic	80%	50%	40%
Arterial	20%	10%	5%
Key Collector	n/a	5%	5%
Collector	n/a	n/a	0%

Exceptions to these default values were adopted where the scale or type of project did not suit these simplifying assumptions. Typically such exceptions involved:

- An increased external share where the project was on the edge of the potential funding area and on a major (strategic) route connecting to adjacent communities
- Reduced external share for connections onto strategic or arterial corridors which were effectively only to support local development and don't benefit a wider area (for example, a new, controlled intersection to allow development access to strategic corridor would not materially benefit a wider area)

Allocation between the smaller, internal sub-areas was more project and context specific, but again based on similar considerations such as:

- Which growth areas are primarily causing the need for the upgrade, with higher weighting for those areas directly supported by the project and lower weighting for adjacent areas that contribute to the cumulative travel on the network
- Projects with interim stages were allocated more to directly adjacent areas, while longer-term upgrades applied higher weighting to adjacent growth to address cumulative effects. The interim stages also considered the relative amount growth that would have occurred at the particular time of implementation in the relevant sub-areas

- Although the area will be development incrementally via a series of independent Plan Changes and developments, many of the projects are required to facilitate a cohesive, connected future community across the whole growth area

3.4 Illustrative Example

The methodology adopted is illustrated by the following hypothetical example (and as indicated in **Figure 3-3** and **Figure 3-4**):

1. Project X involves an upgrade of a 2km existing rural road to a strategic facility suitable for urban development. Its primary role included both supporting adjacent local urban development and providing improved regional multi-modal connections and network resilience between the two adjacent growth areas (sub-areas A and B)
2. From the SGA route protection work, the indicative CAPEX to fully redevelop the corridor into the proposed new form is $50m
3. The works would remove the need for an expected renewal of the existing rural road (assuming no urban develop). This renewal cost is estimated at $2m based on the average rate of $1m/km. This $2m renewal cost is removed from the $50m CAPEX estimate to give $48m of upgrade costs
4. The local community currently comprises 500 existing households and 100 jobs (giving an estimated HUE of 550), which is expected to grow to 5,000 households and 3,000 jobs (with an estimated HUE of 6,500). This means that the existing community comprises 8.4% of the future development, which is assumed to gain an increased level of service through the works. This means that the 91.6% is considered the growth component
5. Applying the 91.6% growth proportion to the $48m CAPEX gives $44m of growth-related CAPEX to be allocated
6. The default external share for this project was set at 40% for causation based on Table 3-3, being A Strategic project needed in response to both local and external purposes. The residual internal causation assessment (60%) indicated that the need for the project was caused equally between sub-area A and B (i.e. 30% allocated to each of sub-areas A and B)
7. The default beneficiary external share for this project was set at 50% (Table 3-4). The remaining internal beneficiary assessment (of 50%) indicated that both sub-areas A and B would gain similar benefits from improved accessibility and mode choice, leaving equal shares of 25% each
8. The average of the causation and beneficiary assessments gives 27.5% of each of areas A and B and 45% for the wider (external) area.

Figure 3-3 Illustrative Project Example

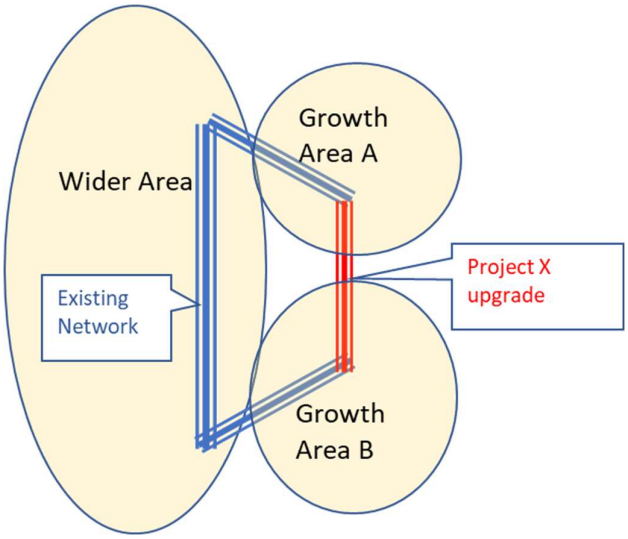


Figure 3-4 Illustrative Example of CAPEX allocation

Step	Calculation
Project Description	2km upgrade of existing rural road to support new urban development. Connects sub-areas A and B
SGA CAPEX Estimate	$50m
Renewal Estimate	2km x $1m/km = $2m
CAPEX net of renewal	$50m - $2m = $48m
Current HUE estimate	500HH + 0.5 x 100 jobs = 550
Future HUE estimate	5,000HH + 0.5 x 3,000 jobs = 6,500
Growth Share	(6500-550)/6500 = 91.6%
Growth-Related CAPEX	$48m x 96.4% = $44m
Causation Allocation	Area A = 30%, area B = 30%, wider area = 40%
Beneficiary allocation	Area A = 25%, area B = 25%, wider area = 50%
Averaged Beneficiary:	A = 27.5%, B=27.5%, wider area = 45%
Growth cost allocated	A= $12.1m, B=$12.1m, wider area = $19.8m

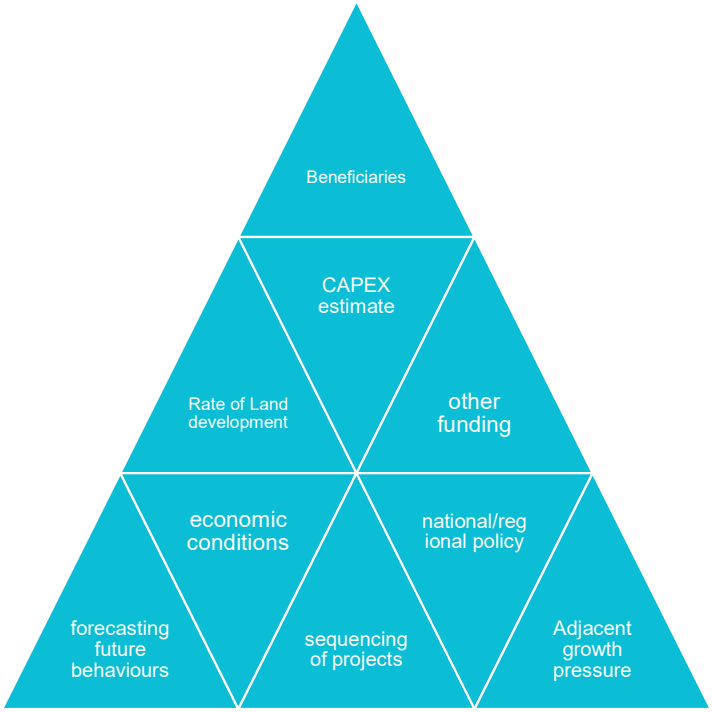
3.5 Consideration of Uncertainties

As noted in the discussions above, there are uncertainties in most of the key inputs and assumptions required for this assessment. For example, the following **Figure 3-5** indicates a number of the inputs, assumptions and methods that are required for this assessment. These kinds of uncertainties are inherent given the scale and timeframes for this kind of programme of major urban expansion in a greenfield setting. The approach adopted recognises these uncertainties, including via the following:

- Use of simplifying methodologies rather than attempting extensive analytical modelling that would be more sensitive to changes in specific inputs
- Assessment built up from specific project elements that would allow Council to update the assessment as new information becomes available

- Aggregate assessment at a larger, programme level that could be more resilient to changes in specific individual items
- High-level sensitivity testing using different assumptions

Figure 3-5 Illustrative Combination of Key Risks and Uncertainties



4 Assessment and Results

4.1 Updates to DIFF

The previous DIFF schedule has been modified based on updates from:

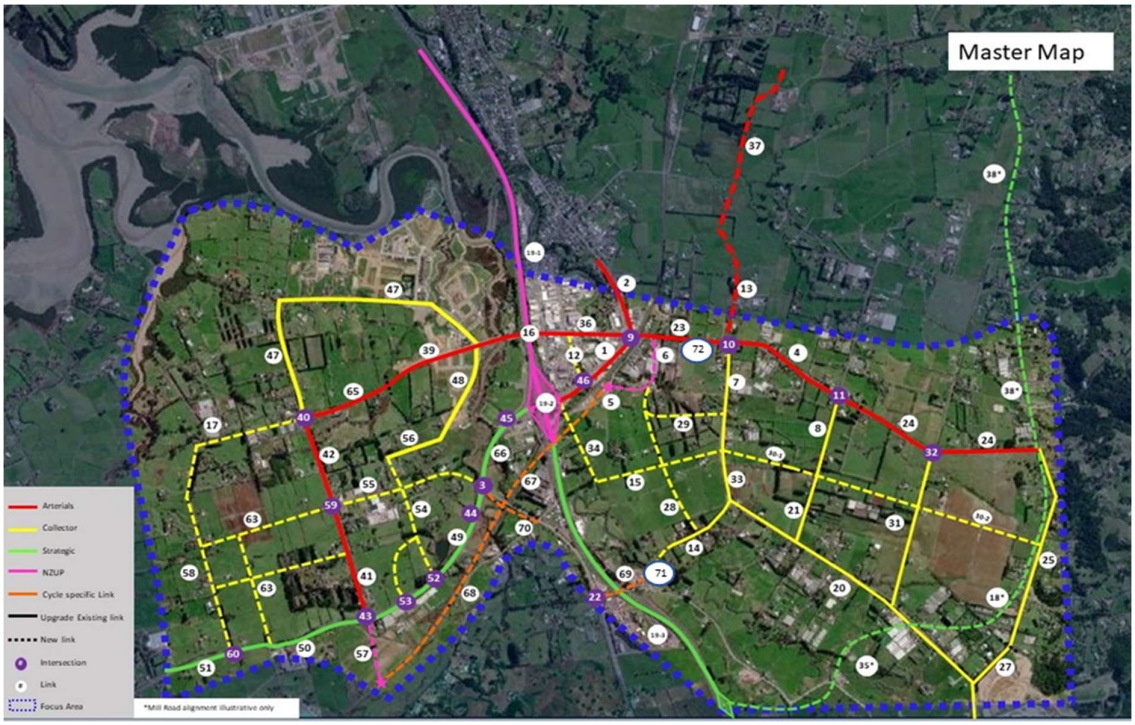
- The SGA business cases and Drury Arterials Notice of Requirement process
- NZUP business case progression, including funding of all three rail stations
- Revised land use forecasts provided by Auckland Council
-

Detailed updates on specific project items are recorded in the schedules, however the key changes include the following revised assumptions:

- Projects confirmed within the NZUP programme were assumed to be coordinated to a date of 2024
- Delay to Drury East early works based on revised growth rate forecasts
- Assume interim traffic signals on Waihoehoe Road as part of fast-track development consenting in Drury East
- Split upgrades to Brookfield Road (included in early works) from longer-term link to Quarry Road
- Split Waihoehoe Road west into two sections east and west of Kath Henry Lane
- Assume construction directly to the ultimate (traffic signal) form at SH22/Jesmond Road intersection as part of station access work
- Split Key Collector elements from original collector project.

The schedule of infrastructure works includes numbered project elements, as indicated in the following **Figure 4-1**.

Figure 4-1 Project Elements



4.2 Project Capex Estimates

CAPEX costs for each project element are documented separately, with this report only reporting the aggregate totals. The Capex estimates used in this aggregate assessment only include the proportion of costs identified by Auckland Council for use in the DC policy, as outlined earlier in Section 3.3.1.

4.3 Causation and Beneficiary Assessment

Each project element was allocated across the sub-areas based on the assessed proportion of causation and beneficiary. These are documented in the Schedule for each individual item, however the rationale used is summarised at a corridor level in the following **Table 4-1**. Some items have been excluded from the DC policy (as noted), however they are retained in this Table for completeness and to demonstrate the beneficiary/causation assessments.

Table 4-1 Summary of Causation/Beneficiary Assessment by Corridor

No	Corridor	Future Function	Causation	Beneficiary
23	Waihoehoe Road west (Gt South Road to North-South Arterial/Fitzgerald Road), including bridge replacement over the rail corridor	This is a key access link into Drury East for all modes (including to the Drury Central station), and part of the Jesmond-Bremner-Waihoehoe-Opaheke FTN	Required to release Drury East development	Interim stages only benefit Drury East development, however later stages provide FTN accessibility and resilience benefits to adjacent areas
4, 24	Waihoehoe Road east (North-south arterial to Drury Hills Road	Arterial road linking Mill Road corridor into Drury and arterial corridor for walking/cycling movement and local bus services	Required to release Drury East development	Interim stages only benefit Drury East development, however later stages provide benefits to adjacent areas via east-west arterial access to the Mill Road corridor
7,33,20	Fitzgerald Road	Urban collector Road for Drury East and walk/cycle and local bus connectivity to Drury South	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
14	Brookfield Road (including link to Quarry Road)	Proposed as important collector access to Drury East, to provide resilience and capacity to access routes and walk/cycle and local bus routes connecting Drury East and West	Required to release full Drury East Development	Provides access and resilience benefits to Drury East as well as to Drury West via alternative east-west connections over SH1
1,2	Gt South Road (north of Drury Interchange)	Regional north-south arterial, access to Drury East and FTN route	Required mostly for Drury East but also cumulative effect of Drury/Paerata and Opaheke growth areas	Provides resilience, FTN and active mode accessibility benefits to southern growth area as a key north-south connection

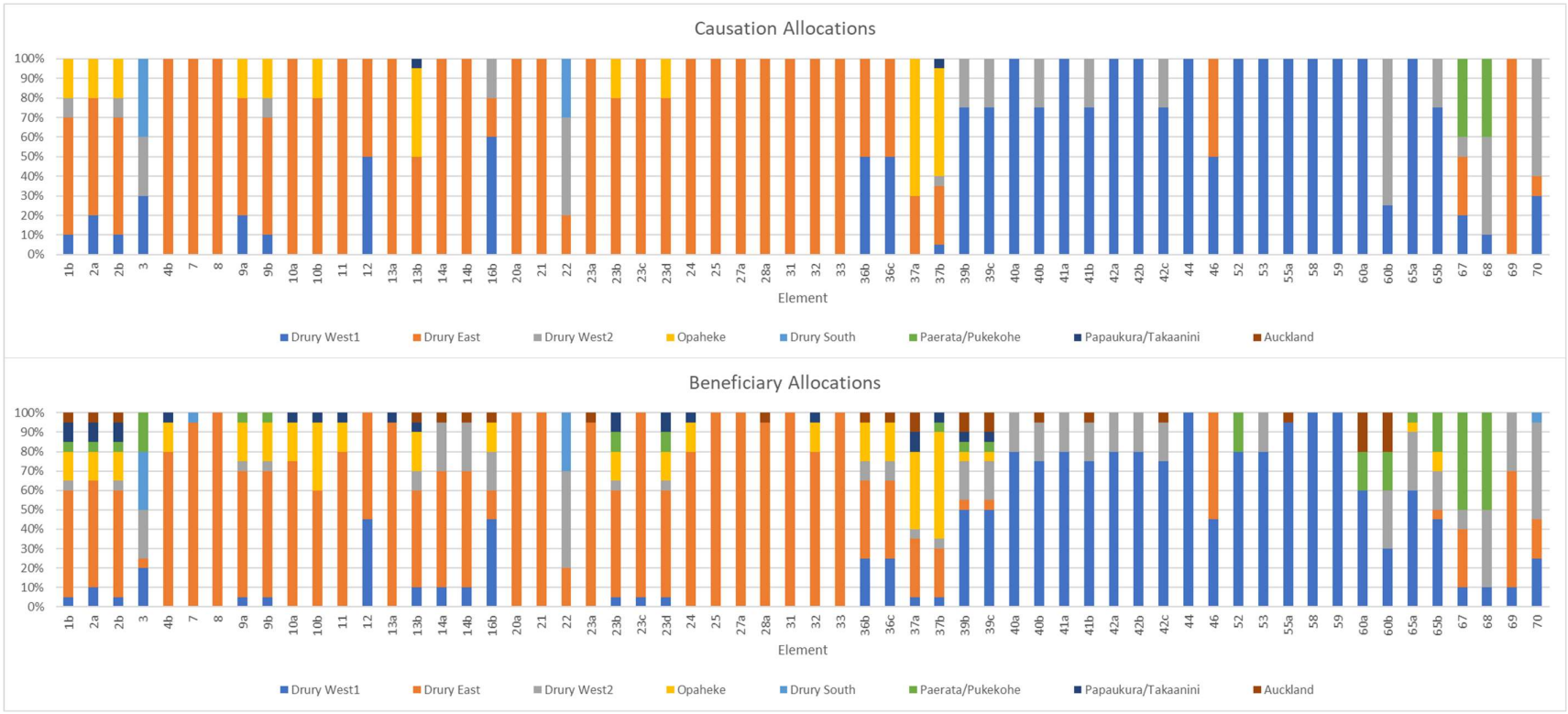
37	Opaheke North-South Arterial	New arterial connection between Drury and Papakura with FTN function	Required mostly for full Drury East and Opaheke development but also cumulative effect of Drury/Paerata and Opaheke growth areas	Provides resilience, FTN and active mode accessibility benefits to southern growth area via additional north-south connection
34 (EXCLUDED FROM DC)	Drury Interchange Ramp	Provide direct access (entry-only) from SH1 into the Drury East area, via a new ramp from the southbound off ramp	Required for access to Drury East Development	Access and resilience benefits Drury east
35 (EXCLUDED FROM DC)	Mill Road: Drury South Interchange to Fitzgerald Road	Regional strategic arterial and access to Drury East and Drury South developments	Required for additional access to Drury East as well as to address cumulative effect of local and inter-regional growth	Provides resilience, access and active mode benefits to southern growth area and Inter-regional movements
18	Mill Road: Maketu Road to Waihoehoe Road	Regional strategic arterial. **Note: The alignment of this section has not been confirmed**	Required for additional access to Drury East as well as to address cumulative effect of local and inter-regional growth	Provides resilience, access and active mode benefits to southern growth area and Inter-regional movements
31	Cosey Road: Fitzgerald Road to Waihoehoe Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function would be managed. **Note: This link could be replaced by Mill Road, depending on its chosen alignment**	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
38 (EXCLUDED FROM DC)	Mill Road: Drury to Papakura	Regional arterial and access to Drury East and Opaheke	Required to address cumulative effect of both local and inter-regional growth	Provides resilience, access and active mode benefits to both southern growth area and Inter-regional movements
30 (EXCLUDED FROM DC)	East-West Collector	Urban collector road. Desirable this would allow quality east-west walk/cycle functions but east-west traffic function would be restricted to prioritise use of arterials and create low-traffic neighbourhood	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South

8,21	Fielding Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function managed	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
25,27	Drury Hills Road	Urban collector road.	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
28 (PART EXCLUDED FROM DC)	North-south town centre Boulevard	Town centre local boulevard, prioritising walk/cycle movement	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
29 (EXCLUDED FROM DC)	East-west town centre access	Town centre local boulevard, station access to Fitzgerald Road prioritising walk/cycle movement	Required to release Drury East Development	Active mode and urbanisation benefits to Drury East with some benefits connecting to adjacent Drury South
36, 12, 46, 16	Bremner Road East	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	Required to support growth in Drury East and Drury West via improved east-west connectivity	Improved resilience and FTN and active mode accessibility between Drury east and West, as well as to Opaheke
3, 22	Gt South Road (west of SH1)	Arterial connection accessing adjacent development, east-west connection and alternative access to SH1 for Drury East	Required to support Drury south and Drury west as well as supporting additional access into Drury East (via Quarry Road)	Improved resilience, access, active mode and safety benefits between Drury east, west and south
66, 67, 68, 69 and 70	Regional Active Mode Corridor (Drury West to Drury East)	Regional walk./cycle corridor connecting Drury East to Drury West, Paerata and Pukekohe	Northern sections required to support active-mode connectivity between Drury East and West, as well as cumulative growth in Paerata and Pukekohe	Active-mode benefits connecting Drury east and west as well as to Paerata and Pukekohe

45,66,3,44,49, 52,53,43,50,60 (PART EXCLUDED FROM DC)	SH22: Drury Interchange to west of Oira Road	Regional state highway (until any new Pukekohe expressway corridor) and local arterial road for Drury West development, providing walk/cycle, bus and vehicle access to SH1, Drury East, Opaheke and Papakura	Required to directly support growth in Drury west, and indirectly support growth in Paerata and Pukekohe	Safety, active mode, urbanisation and resilience benefits primarily to Drury west but also to adjacent areas
39,65	Bremner Road/New Bremner Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	Required to support growth in Drury West	Interim stages provide urbanisation and FTN accessibility benefits to Drury west, with later stages providing FTN connectivity and resilience benefits to adjacent areas of Drury East, Opaheke and Paerata
41,42	Jesmond Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	Required to support growth in Drury West	Urbanisation and FTN accessibility benefits to Drury west
58	Oira Road	Collector road	Required to support growth in Drury West	Active mode and urbanisation benefits to Drury west
63, 17 (EXCLUDED FROM DC)	Waipupuke area internal collector roads	Collector road	Required to support growth in Drury West	Active mode and urbanisation benefits to Drury west
55,54,56 (PART EXCLUDED FROM DC)	Auranga/Drury west collector roads	Collector roads	Required to support growth in Drury West	Active mode and urbanisation benefits to Drury west
57 (EXCLUDED FROM DC)	Drury West Station and access	Rail station and access and longer-term arterial south to Pukekohe Expressway	Required to directly support Drury west	Primary mode choice benefits to Drury west but also some to adjacent areas semi-rural communities

The allocations of each project are illustrated in the following figures. It should be noted that these allocations are indicated for some elements that may subsequently be removed from the DC policy scope, such as Mill Road. They are retained here to demonstrate the allocation process across a range of project types.

Figure 4-2 Causation and Beneficiary Allocations



4.4 Result Aggregation

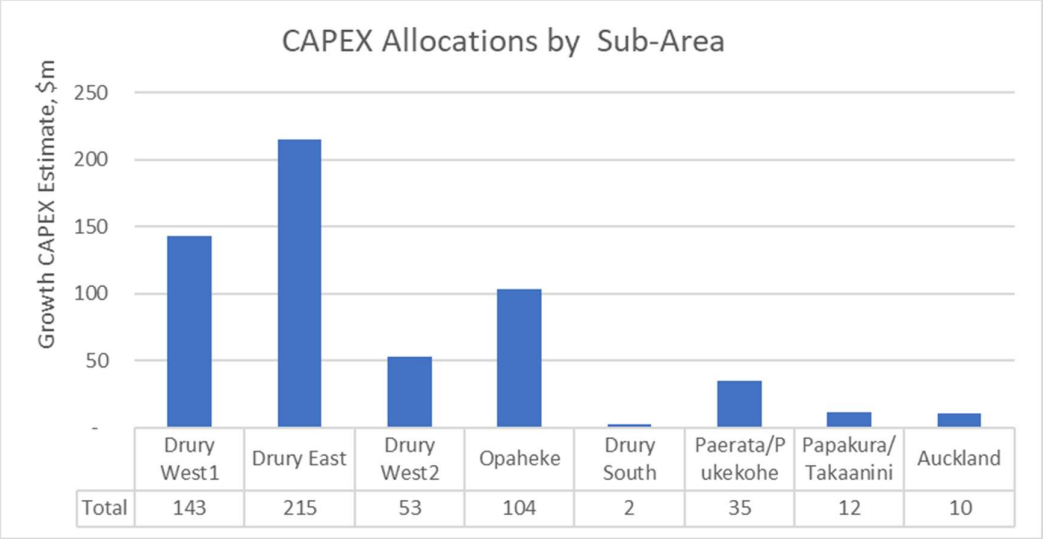
The overall CAPEX estimates for the in-scope projects are indicated in **Figure 4-3**[10].

Table 4-2 CAPEX estimates

Item	Value, $m
Total CAPEX for in-scope projects	1,066
Total DC component for in-scope projects	646.2
Renewal estimate	-13.4
Level of service uplift	-59.7
Net Growth CAPEX for DCs	573

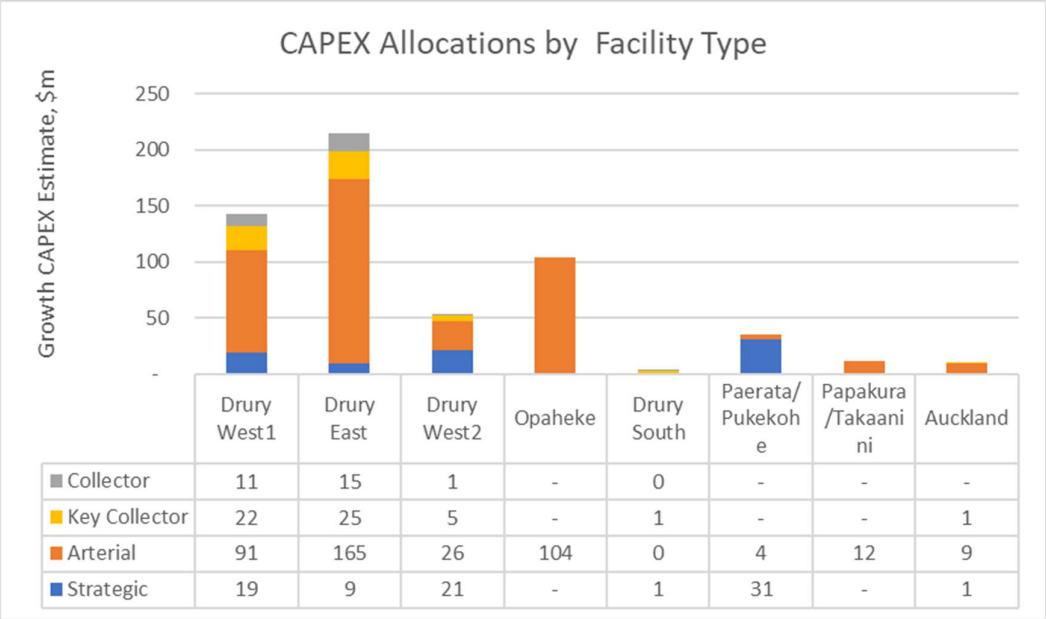
The total CAPEX for the in-scope projects was assessed as $1,066m, of which $646m was included for DC assessment (see assumptions in **Section 3.3.4**). This was reduced to $573m after removal of renewal and level of service uplift estimates. This $573m was then allocated to sub-areas via the causation/beneficiary assessments, as shown in **Figure 4-4** (by sub-area) and **Figure 4-3** (by sub-area and project type**)**.

Table 4-3 Growth CAPEX by Sub-Area



[10] For Reference, these results are based on workbook *Drury DC Analysis Update_v18.xlsx*

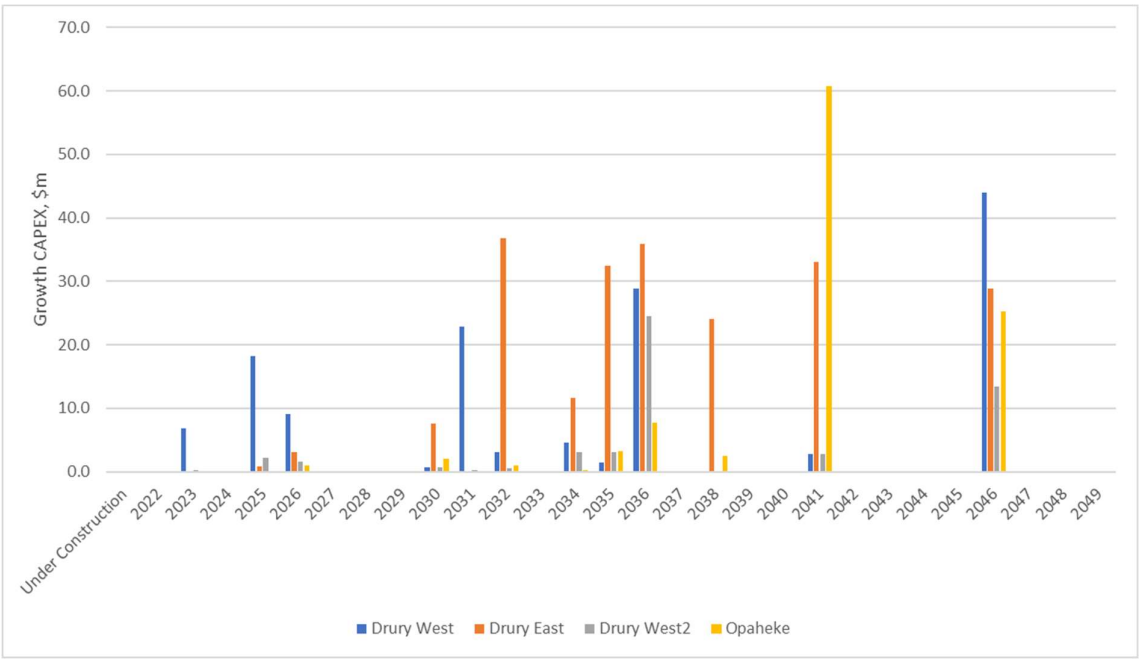
Figure 4-3 Growth CAPEX by Sub-Area and Facility Type



	Drury West1	Drury East	Drury West2	Opaheke	Drury South	Paerata/ Pukekohe	Papakura /Takaanini	Auckland
Collector	11	15	1	-	0	-	-	-
Key Collector	22	25	5	-	1	-	-	1
Arterial	91	165	26	104	0	4	12	9
Strategic	19	9	21	-	1	31	-	1

An indication of the profile of costs over the programme life is indicated in **Figure 4-4**. It should be noted that in that graph, the full growth CAPEX is allocated to the year it is estimated to be operational, and as such does not reflect the likely cash-flow where projects take longer than 1 year to implement. Of the $646.2m for Total DC component for in-scope projects from table 4-2 Capex estimates, this graph only includes the $613m allocated to the Drury/Opaheke areas.

Figure 4-4 Indicative Growth CAPEX Over Time



5 Uncertainties and Sensitivity Testing

5.1 Key Areas of Uncertainty

As noted earlier, there are a number of notable uncertainties in this long-term, programme-level assessment. The key areas of uncertainty are identified and discussed in the following **Table 5-1**. This includes an indication of the potential scale of uncertainty.

5.2 Sensitivity Tests

The following sensitivity tests were undertaken:

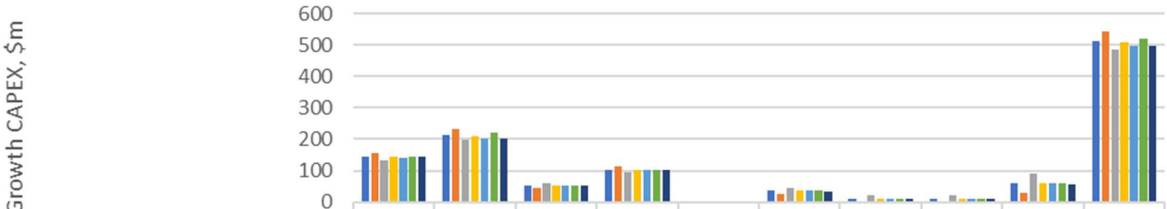
1. Use 100% causation allocation, rather than 50% causation:50% beneficiary
2. Use 100% beneficiary allocation, rather than 50% causation:50% beneficiary
3. Allocate growth share (for level of service uplift) by sub-area rather than aggregate total
4. Increase renewal costs from $0.5m/lane-km to $1.5m/lane-km, to test an assumption where renewals of the existing rural roads maybe required multiple times over the life of the programme
5. Reduce renewal costs from $0.5m/lane-km to $0.25m/lane-km
6. Remove the upgrade to Waihoehoe West (elements #23a/23b) on the assumption that element could be funded by the NZUP programme

The total CAPEX costs by sub-area for these tests are shown in **Figure 5-1**, with the variances from the Base assessment (absolute and %) shown in **Figure 5-2** and **Figure 5-3**. As well as the individual sub-areas, this graphs shows the combined total for Drury West+Drury East+ Opaheke.

It can be seen from these tests that while the totals for the sub-areas varies across the tests, the combined value for Drury+Opaheke varies by no more than 6%. Not unexpectedly, the largest impact on the total cost allocated to Drury/Opaheke areas is the relative weighting of causation and beneficiary – with a 6% higher allocation to Drury/Opaheke area when only causation is considered, or a 6% reduction if only beneficiaries are included.

Using more localised growth forecasts changes results within the Drury/Opaheke area by only some 1%. Increasing the renewal rate has the largest impact on Drury East, due to its proportionally higher share of upgrades of existing roads (versus new corridors).

Figure 5-1 Sensitivity Tests



	Drury West1	Drury East	Drury West2	Opaheke	Drury South	Paeratia/Pukekohe	Papakura/Takaanini	Auckland	External	sum drury/opaheke
Base	142.6	214.5	52.5	103.7	2.3	35.1	11.8	10.5	59.7	513.3
100% Causation	154.1	230.9	43.7	113.7	2.3	26.4	2.0	0.0	30.7	542.3
100% beneficiary	131.2	198.2	61.3	93.6	2.3	43.8	21.6	21.0	88.7	484.4
Growth Share by sub-area	145.0	210.3	53.1	101.1	2.3	35.5	11.5	10.4	59.7	509.5
Triple Renewal cost	139.6	200.9	52.2	103.0	2.2	35.0	11.6	10.4	59.3	495.8
Half Renewal cost	143.6	219.2	52.6	103.8	2.3	35.1	11.9	10.5	59.8	519.2
Remove Waihoehoe West (23a/b)	142.2	201.7	52.0	100.4	2.3	34.2	10.9	10.5	57.8	496.3

Figure 5-2 Absolute Variance from Base

	Drury West1	Drury East	Drury West2	Opaheke	Drury South	Paeratia/Pukekohe	Papakura/Takaanini	Auckland	External	sum drury/opaheke
100% Causation	11	16	-9	10	0	-9	-10	-10	-29	29
100% beneficiary	-11	-16	9	-10	-0	9	10	10	29	-29
Growth Share by sub-area	2	-4	1	-3	0	0	-0	-0	-0	-4
Triple Renewal cost	-3	-14	-0	-1	-0	-0	-0	-0	-0	-18
Half Renewal cost	1	5	0	0	0	0	0	0	0	6
Remove Waihoehoe West (23a/b)	-0	-13	-0	-3	-	-1	-1	-0	-2	-17

Figure 5-3 Percentage Variance from Base

	Drury West1	Drury East	Drury West2	Opaheke	Drury South	Paeratra/Pukekohe	Papakura/Takaanini	Auckland	External	sum drury/opaheke
100% Causation	8%	8%	-17%	10%	0%	-25%	-83%	-100%	-49%	6%
100% beneficiary	-8%	-8%	17%	-10%	0%	25%	83%	100%	49%	-6%
Growth Share by sub-area	2%	-2%	1%	-2%	1%	1%	-3%	-1%	0%	-1%
Triple Renewal cost	-2%	-6%	-1%	-1%	-1%	0%	-2%	-1%	-1%	-3%
Half Renewal cost	1%	2%	0%	0%	0%	0%	0%	0%	0%	1%
Remove Waihoehoe West (23a/b)	0%	-6%	-1%	-3%	0%	-3%	-8%	0%	-3%	-3%

Table 5-1 Discussion of Key Uncertainties

1	Medium	Scope of projects	The scope of projects for this assessment is that defined within the DIFF assessment, and focussed on development in Drury East and Drury West1. It does not have a complete assessment (especially in terms of collector roads) in Opaheke or in Drury West 2 (south of SH22)	This is dependant to Council's pending decision on the funding area(s) to be adopted, for which Council will need to consider the future need to expand the assessment for these longer-term development areas.
2	Medium	Rate and sequencing of development	This assessment was undertaken prior to decisions being announced on the Drury East plan changes (or the associated fast-track consenting elements). This means that the assessment has relied on assumptions about the timing and form of land use decisions.	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment to address this item.
3	Low	Timing of project implementation	The DIFF and this updated assessment suggest a date when the project is likely to be needed, based on assumptions about land use development. Those assessments did not explicitly consider constraints on funding of the infrastructure, which could defer implementation dates within the programme.	Council to consider any modifications to indicated delivery times based on any constraints/requirements of the PC policy itself.
4	High	External funding	Ongoing regional or national funding decisions (such as ATAP and NZUP), for elements of this programme are likely over the life of the programme and can't be readily predicted. These uncertainties could significantly alter the total CAPEX: New external funding of projects could reduce the assessed CAPEX requirements (such as potential NZUP funding of some local Drury Projects). Conversely, projects such as Mill Road south which are assumed to be externally funded may not be, requiring significant increase in CAPEX to provide the required local access links.	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment
5	High	CAPEX estimates	The CAPEX estimates for this assessment are those developed by SGA solely for route-protection purposes, and as such include high levels of uncertainty regarding engineering conditions, detailed design, property costs etc	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment as new information becomes available

6	Low	Causation Assessments	In many cases causation will be confirmed through mitigation requirements in land use planning decisions, including via direct agreement between developers and road controlling authorities. This assessment has necessarily relied on assumptions and judgement regarding those likely outcomes	This uncertainty will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment as new information becomes available
7	Low	Beneficiary Assessment	The wide range of types of benefit and complex inter-dependency between elements has meant this assessment has necessarily relied on assumptions and judgement regarding those allocations to sub-areas. The assessment becomes less sensitive to assumptions with a larger funding-area.	Council to consider uncertainties and sensitivities in defining the funding area(s) and include a regular review of the DC assessment as new information becomes available
8	Medium	Sub-areas	The size and number of any sub-areas used will alter the beneficiary/causation assessments. Larger funding areas will provide more consistent results and be less sensitive to local assumptions, but will be less responsive to specific local development outcomes	Council to consider uncertainties and sensitivities in defining the funding area(s) and include a regular review of the DC assessment as new information becomes available
9	Low	Level of service uplift and renewal cost estimates	The assessment has adopted Auckland Transport's approach to these issues, however uncertainty is inherent in renewal costs over such a large programme.	The assessment could be updated at regular intervals with specific renewal projects if such information becomes available
10	Medium	Treatment of developer-mitigation works	This assessment has been undertaken for sub-areas rather than individual developments. Those sub-areas contain an evolving mix of live-zoned development and Future-Urban Zoned land. It therefore cannot comprehensively predict where individual developers may provide elements of this programme as part of their mitigation works. Council have considered this issue in regards to works that may either be funded or built directly by developers This included consideration of the elements that developers are likely to fund and build.	This will remain as an area of uncertainty over the 30+-year development of this area. Council propose a regular review of the DC assessment as new information becomes available.

6 Summary

This assessment has updated the preliminary transport assessment undertaken for Council in mid-2021 to inform Council's development of a Development Contributions (DC) policy for Drury. SGA has provided this assessment based on the knowledge and information developed by SGA for its long-term route protection work for this network. Beyond these inputs, SGA has not provided advice to Council directly regarding development of their DC policy itself.

The transport planning and engineering information used to prepare this assessment is therefore developed at a more 'strategic' level, and not from detailed design site investigations, design or modelling analysis. Given the significant scale and long-term development of this programme, it is not considered feasible to develop detailed designs and capital cost estimates for this extensive programme. This approach is considered suitable for this assessment, when coupled with Council's proposal to include regular updates to the DC policy inputs as new information becomes available.

This assessment remains based on the suggested sequencing of transport infrastructure upgrades needed to support urban development developed through the 2021 DIFF study, albeit revised with new information regarding land use or transport system planning decisions available up until June 2022.

This report documents the methodology adapted from Auckland Transport's applications elsewhere and applies it to this long-term programme of upgrades. There are significant uncertainties around how the area will grow and infrastructure is provided over the next 30 years, which the methodology has recognised. This uncertainty is addressed through both the methods used to undertake this assessments as well as by Council's policy framework that includes regular review of the inputs.

The assessment follows the following key steps:

1. Define a sequenced programme of transport projects to support the assumed type, location and rate of growth (adapted from DIFF)
2. Assign a project type and likely delivery agency for each project element
3. Estimate and remove potential infrastructure renewal costs
4. Estimate the growth component of the infrastructure costs
5. Assess beneficiaries for each network element to estimate cost share for sub-areas
6. Apply sub-area cost shares to project CAPEX estimates
7. Aggregate costs by area, delivery agency, project type and decade

The assessment identified some $1.066b of CAPEX for the in-scope projects, of which $646m was identified by Auckland council to be included within the DC policy assessment. After removal of renewal and level-of-service uplift elements this left $573m of growth-related costs for allocation across the sub-areas.

Through the beneficiary assessment some of this cost was allocated to areas outside the likely funding area, leaving $513m allocated within Drury/Opaheke.

Appendix A – Detailed Project Schedules

No	Location	MSM Zone	Project Name	Project Stage	Project Description	Type	DIFF Indicative Timing	Update to DIFF for DC Assessment June 2022	Updated Ideal Date
1b	DE	550	GSR improvements - Waihoehoe Rd to Drury Interchange	Ultimate	4-lane urban- existing road layout with active modes on both sides + intersection improvements (TDM)	Arterial	2036	No change.	2036
2a	DE	550	GSR improvements - From Drury School to Waihoehoe Rd	Interim	2-lane urban- existing road layout with active modes on both sides + intersection improvements (TDM)	Arterial	2026	Assume interim upgrades with GSR/Waihoehoe upgrade	2026
2b	DE	550	GSR improvements - From Drury School to Waihoehoe Rd	Ultimate	4-lane urban- existing road layout with active modes on both sides + intersection improvements (TDM)	Arterial	2036	No change. Somewhat dependent on Opaheke NS arterial/Mill Rd	2036
3	DW	561	Intersection upgrade on GSR/Karaka Rd intersection	Ultimate	**Intersection upgrades- existing intersection with active modes crossings (TDM)**	Strategic	2022	No Change. Assume ultimate form thru any developer inputs + Potential NZUP project	2026
4b	DE	554/555	Waihoehoe Rd East upgrades- from Fitzgerald Rd to before Cossey Rd (development boundary)	Ultimate	Expand to 24m cross section	Arterial	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2032
7	DE	554	Fitzgerald Rd upgrades (from Waihoehoe Rd to development boundary)	Ultimate	2-lane urban - upgrade existing road layout with active modes on both sides	Collector	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2032
8	DE	554	Fielding Rd upgrades (from Waihoehoe Rd to development boundary)	Ultimate	2-lane urban - upgrade existing road layout with active modes on both sides	Collector	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2032
9a	DE	550	Upgrade in Norrie Rd/GSR/Waihoehoe intersection	Interim	2-lane signalised intersection with active mode crossings	Arterial	2022	Assume now signals and included as part of any fast-track development consent. May be subsumed in 9b	2026
9b	DE	550	Upgrade in Norrie Rd/GSR/Waihoehoe intersection	Ultimate	multi-lane signalised intersection with active mode crossings, SGA design	Arterial	2036	Potential to be brought-forward as part of NZUP package (TBC)	2030
10a	DE	554/555	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Interim	2-lane signalised intersection with active mode crossings	Arterial	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2030
10b	DE	554/555	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Ultimate	**multi-lane roundabout with active mode crossings, SGA design**	Arterial	2031	Assume upgraded for later develoment stages	2036
11	DE	554/555	Intersection upgrade Waihoehoe Rd/Fielding Rd/Appleby Rd	Ultimate	**Roundabout as per SGA design**	Arterial	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2034
12	DE	550	Interim walking, cycling and bus connections within Drury Centre (includes Bremner/Norrie/Firth Intersection upgrades, active mode on Norrie) -overlap with project 36 and 46	Interim	Intersection improvements on Bremner-Firth Rd, Norrie-Firth Rd, GSR-Firth Rd, Active mode facilities on both sides of Firth & Norrie Rd	Collector	2022	Assume required post-station upgrade for improvving active access and bus movements (defer to 2028). Assume coordinated with Firth signals (#46)	2032
13a	DE	555	N-S Opaheke Arterial across development (upto Waihoehoe Stream)	Interim	2-lane urban- new 2-lane arterial with active modes on both sides + intersection improvements (TDM)	Arterial	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2032
13b	DE	555	N-S Opaheke Arterial across development (upto Waihoihoi Stream)	Ultimate	4-lane urban- upgrade 2-lane arterial with SGA design + intersection improvements (TDM)	Arterial	2046	No change	2046
14a	DE/DW	556	Western end of Brookefield Road Extension tie in with Quarry Rd	Ulitmate	2-lane urban (upgrade existing road layout with active modes on both sides + intersection improvements + new connection to Quarry Rd)	Key Collector	2026	Assume later stages of DE development as not in fast-track	2035
14b	DE	554	Brookefield Road Upgrade	Ultimate	2-lane urban (New Road connection to Quarry Road with active modes on both sides + intersection improvements)	Key Collector	2026	Split into upgrade Brookfield (this #14) and the Brookfield-Quarry Link (**new #14a**) - but delay as per revised growth forecasts	2032
16b	DE/DW	550	Widen Bremner Road Bridge ove SH1 to 4-lanes	NZUP	4-lane urban- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	2046	no change	2046
20a	DE	554	Upgrade Fitzgerald Rd from Brookefield to Cossey Rd for active modes	Ultimate	Active mode upgrades- existing road layout with active modes on both sides + intersection upgrades for active mode crossing	Collector	2026	Defer, pending plan change decision	2035

No	Location	MSM Zone	Project Name	Project Stage	Project Description	Type	DIFF Indicative Timing	Update to DIFF for DC Assessment June 2022	Updated Ideal Date
21	DE	554	Fielding Rd upgrades for active modes (from Fitzgerald Rd to development boundary)	Ultimate	Active mode upgrades- existing road layout with active modes on both sides + intersection upgrades for active mode crossing	Collector	2026	Defer, pending plan change decision	2035
22	DE/DW	558/559	Upgrade Intersection at Quarry/ GSR	Ultimate	Upgrade intersection with active modes facilities(TDM)	Key Collector	2022	Delay due to new forecasts, but still required for Drury South	2025
23a	DE	554/555	Waihoehoe Rd West upgrades- between GSR & Kath Henry	Interim	Interim 2-lane – install kerb and channel within existing road corridor with provision of active modes on both sides, 20m cross-section	Arterial	2022	Shown in Fast-track consents but unknown decision and Council appeal on plan changes. Delay based on revised growth forecasts	2032
23b	DE	554/555	Waihoehoe Rd West upgrades- between GSR & Kath Henry	Ultimate	Final 4-lane - following interim option, upgrade Road corridor to provide four lanes with additional turning lanes at intersections where required (as indicated in SGA Design	Arterial	2022	Split into #23 and new #72. Potential inclusion in NZUP, pending Ministers decision. Delay due to appeals/new growth	2035
23c	DE	554/555	Waihoehoe Rd West upgrades- between Kath Henry Lane and Fitzgerald Rd	Interim	Interim 2-lane – install kerb and channel within existing road corridor with provision of active modes on both sides, 20m cross-section	Arterial	2022	Split from #23 (Potential inclusion in NZUP). Included in fast-track works. Delay with revised growth forecast	2032
23d	DE	554/555	Waihoehoe Rd West upgrades- between Kath Henry Lane and Fitzgerald Rd	Ultimate	4-lane urban- upgrade existing road layout with active modes on both sides + intersection upgrades (TDM)	Arterial	2022	Split from #23 (Potential inclusion in NZUP). Included in fast-track works. Delay with revised growth forecast	2038
24	DE	554/555	Upgrades on Waihoehoe Rd east- from project 4 to Drury Hills + Drury Hills Intersection	Ultimate	2-lane urban - upgrade existing road layout with active modes on both sides, 20m cross-section	Arterial	2031	Delay with new growth	2038
25	DE	554	Upgrades on Drury Hills from Waihoehoe Rd to Macwhinney Dr	Ultimate	2-lane urban- upgrade existing road layout to 2-lane urban with active modes on both sides	Collector	2036	Delay with new growth	2038
27a	DE	554/556	Active mode facilities from Drury hills and Fitzgerald to Quarry Rd (2 links and intersections)	Interim	Active mode upgrades- existing road layout with active modes on both sides + intersection upgrades for active mode crossing	Collector	2026	Delay with new growth	2038
28a	DE	554	Northern Section of new collector in N-S direction parallel to Fitzgerald Rd	Ultimate	2-lane collector to connect with Drury Central Station, including bridge over streamM)	Key Collector	2026	Delay with new growth	2036
31	DE	554	Upgrades on Cossey Rd between Fitzgerald & Waihoehoe Rd	Ultimate	2-lane urban - upgrade existing roadwith active modes on both sides / Mill Road design ?	Collector	2031	Delay with new growth	2038
32	DE	554/555	New Intersection on Cossey Rd/Waihoehoe Rd	Ultimate	**Assume 1 simple roundabout intesection**	Arterial	2031	Delay with new growth	2038
33	DE	554	Upgrade Fitzgerald Rd from project 7 to Brookefield Rd	Ultimate	2-lane urban- upgrade existing road layout to 2-lane urban with active modes on both sides (TDM)	Collector	2022	Proposed in fast-track application but delay with new forecasts	2032
36a	DE/DW	550	Bremner-Norrie Road east of SH1 up to GSR (overlap with project 12)	Ultimate	2-lane urban- upgrade existing road layout with active modes on both sides (Under construction)	Arterial	2036	Assume potential to bring forward from any re-allocated RLTS funding	2036
36b	DE/DW	550	Complete Bremner-Norrie Road connection from SH1 up to GSR excluding Bridge (overlap with project 12)	Ultimate	4-lane urban- upgrade interim 2-lane urban corridor to a 4-lane corridor with active modes on both sides (SGA design)	Arterial	2036	Assume potential to bring forward from any re-allocated RLTS funding	2046
36c	DE/DW	550	Complete Bremner-Norrie Road connection from SH1 up to GSR - Bridge structure (overlap with project 12)	Ultimate	Upgrade interim 2-lane bridges (3No. to 4 lane bridges with active modes on both sides (SGA design)	Arterial	2036	Assume potential to bring forward from any re-allocated RLTS funding	2046
37a	DE	555/551	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM, depends on timing of #37)	Arterial	2041	No Change	2041
37b	DE	555/551	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Ultimate	**4-lane urban**- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	2046	No Change	2046
39b	DW	561	New Bremner Rd arterial from SH1 to Auranga development	Ultimate	4-lane urban- upgrade 2-lane urban excl bridge	Arterial	2046	No Change	2046
39c	DW	561	New Bremner Rd arterial from SH1 to Auranga development	Ultimate	4-lane urban- upgrade 2-lane bridge widening	Arterial	2046	No Change	2046
40a	DW	561/562	New intersection on Jesmond/Bremner Rd	Interim	2-lane signalised intersection (new intersection with active mode crossings)	Arterial	2026	No Change	2026
40b	DW	561/562	Upgrade intersection on Jesmond/Bremner Rd	Ultimate	Multi-lane signalised intersection (upgrade intersection with active mode crossings)	Arterial	2036	No Change	2036
41a	DW	561/562	Jesmond Rd upgrades from SH22 to Waipupuke development boundary	Interim	2-lane urban- upgrade existing road with active modes on both sides (TDM)	Arterial	2022	Assume delay from PC61 decision but assume new plan changes come forward	2025
41b	DW	561/562	Jesmond Rd from SH22 to Waipupuke development boundary	Ultimate	4-lane urban- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	2046	No change	2046
42a	DW	561/562	Jesmond Rd upgrades from project 41 to New Bremner Rd	Interim	**Interim active modes e.g. shared path on one side**	Arterial	2022	Assume delay from PC61 decision but assume new plan changes come forward	2026
42b	DW	561/562	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	**2-lane urban- upgrade existing road with active mode facility on both sides (TDM)**	Arterial	2031	No change	2031

No	Location	MSM Zone	Project Name	Project Stage	Project Description	Type	DIFF Indicative Timing	Update to DIFF for DC Assessment June 2022	Updated Ideal Date
42c	DW	561/562	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	4-lane urban FTN- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	2046	No change	2046
44	DW	561	Intersection at SH22/Burberry Rd (likely to close entirely)	Ultimate	Interim design and likely to close - subject to Auranga assessment	Strategic	2022	Included in PC51	2023
46	DW	550	Upgrades in GSR/Firth St intersection (overlap with project12)	Interim	Possible signals(subject to Auranga assessment)	Arterial	2022	Assume timed with #12	2032
52	DW	560/561	Intersection upgrade- on SH22/ McPherson Rd/Karaka Rd (Auranga B1)	Ultimate	**Ultimate intersection form**	Strategic	2022	Assume included in PC51	2023
53	DW	560/561	New intersection east of Jesmond Rd (Auranga B1 main street)	Ultimate	**Ultimate intersection form (left-in left-out)**	Strategic	2022	Assume included in PC51	2023
55a	DW	561	New E-W collector Jesmond Rd to Burberry Rd	Ultimate	2-lane urban- new collector with active mode on both sides + intersection improvements (TDM)	Key Collector	2031	No Change	2031
58	DW	562	Oira Rd upgrades from SH22 to proposed east-west collector	Ultimate	2-lane urban- upgrade existing road layout with active modes on both sides + intersection improvements (TDM)	Collector	2022	Assume deferred following PC61 decision	2025
59	DW	561/562	New Intersection on Jesmond Rd/collector (PC61)	Ultimate	2-lane intersection (new intersection + active mode crossings)	Arterial	2022	Assume deferred following PC61 decision. Also depends on new plan changes emerging	2025
60a	DW	560/562	SH22 Intersection upgrade - Oira Rd (3 leg)	Interim	**Interim Roundabout**	Strategic	2022	Assume deferred following PC61 decision.	2025
60b	DW	560/562	SH22 Intersection upgrade - Oira Rd (4 leg)	Ultimate	**Ultimate intersection form**	Strategic	2036	No Change	2036
65a	DW	561	New Bremner Rd arterial from Auranga development to Jesmond Rd	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM)	Arterial	2036	No Change	2036
65b	DW	561	New Bremner Rd arterial from Auranga development to Jesmond Rd	Ultimate	**4-lane urban FTN** - upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	2046	No Change	2046
67	DE/DW	559/560	Active Mode Corridor Drury Central to GSR	Ultimate	0	Strategic	2026	Defer with new DE growth	2034
68	DW	559/560	Active Mode Corridor GSR to Drury West	Ultimate	0	Strategic	2031	No Change	2036
69	DE/DW	556	walk/cycle bridges on Quarry Road bridge (oiver SH1)	Interim	New cycle bridge 5m wide, 90m long, approach lengths 200m total for both sides. No property required	Collector	2026	Time with new #71	2035
70	DE/DW	559	walk/cycle bridges on GSR Road bridge over the rail corridor	Interim	New cycle bridge 5m wide, 80m long, approach lengths 270m total for both sides. No property required	Arterial	2026	Assume delayed after first stage of active mode corridor, with new growth forecasts	2036

Appendix B – DIFF Transport Assessment Report

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Drury Infrastructure Funding and Financing Study (DIFF) Transport Assessment

June 2021

Version 0.2

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

Document Status

Responsibility	Name
Author	Andrew Murray
Reviewer	Werner Pretorius
Approvers	Alastair Lovell

Revision Status

Version	Date	Reason for Issue
0.1		Early Draft for internal review
0.2		Draft Final Report
0.3		

Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

Table of Contents

Appendices

Executive Summary

Purpose and Scope

This report presents the transport assessment element of the Drury Infrastructure Funding and Finance study (DIFF), being undertaken by Auckland Council. The transport assessment seeks to identify a potential Staging Schedule of transport infrastructure upgrades to support the growth proposed in the Drury area.

The purpose and context of the resulting Staging Schedule is important to note, including that:

- It is for the purpose of Council considering funding and financing options, and as such has not explicitly considered funding constraints or delivery mechanisms
- It is based on transport facilities to serve the full release of the proposed plan changes in Drury, using assumed yield and build-out rates derived from the Plan Change documents. It therefore has not considered land use approval, funding, network, economic or other constraints on growth
- It is based on application of SGA transport planning principles and processes in this context and hence does not reflect a committed infrastructure staging plan by Auckland Transport, Auckland Council or Waka Kotahi
- While the ultimate corridor forms are based on the SGA work, opportunities for potential interim stages remain conceptual options only, with the design, form and timing of any works remaining for agreement between developers and the relevant road controlling authority
- The Staging Schedule therefore does not have the status of committed projects endorsed by Auckland Transport or Waka Kotahi and is subject to change in response to funding methods, delivery mechanisms, land use decisions and regional investment priorities. Nor does the Staging Schedule reflect specific projects that Auckland Transport or Waka Kotahi would deliver.

By design, this assessment has not considered design, planning or submission detail related to the Private Plan changes in Drury. While it has utilised information provided with the Plan Change applications in its assessment, it has focussed on a more strategic assessment of the bulk transport infrastructure needs. The work was progressed with liaison with the proponents and advisers for the plan changes, including sharing of staging principles, modelling, access strategies and the draft Staging Schedule.

The scope of projects considered in this assessment are new or upgraded transport infrastructure within the Drury area needed to support the plan changes. Key projects included in Drury West will also support later growth in Drury West Stage 2 (south of SH22), however the specific additional elements needed within that later growth area are not included. Some of the projects included also have wider growth or strategic transport functions, making ring-fencing of the Drury-specific projects very complex. The local street network design also has a key role in supporting the urban form and mode shift objectives sought for this area, however those elements were not included in this assessment as they are assumed to be the responsibility of developers for delivery. This work has not included construction traffic effects, maintenance, rehabilitation, renewals or services and omits transport projects needed for growth wider than the Plan Change areas of east and west Drury, some of which are located in Drury.

Approach

The Staging Schedule was developed based on the application of Staging Principles which sought the following outcomes:

- Transport systems that support quality, compact urban form, including through higher density around major public transport corridors
- Mutually supportive transport and land use systems that:
    - provide safe travel across all modes
    - provide a transformation in mode share to more sustainable modes, such as public transport, walking and cycling to support decarbonisation goals
    - provide improved choices of travel
    - provide efficient freight movement
    - provide high levels of accessibility to social and economic opportunities
- a resilient transport system

A key component of this approach is transport infrastructure that supports high mode shift to more sustainable modes, as well as supporting the land use activities and place function. A heavy emphasis was therefore placed on the provision of quality walking, cycling and PT infrastructure from the outset of development. Traffic data and modelling was then used to inform the assessment of key access points to the Drury West and East areas, including linkages between the two. The traffic modelling applied first-principle estimates of trip generation for the plan change areas, including mode share assumptions of up to 46% by walk/cycle or PT. These mode shares are significantly higher than traditional rates for such areas, and are considered feasible only with supporting infrastructure, land use planning, local street design, public transport services and land use planning provisions.

Although the focus has been on the plan change areas in Drury, the assessment has considered the cumulative effect of both this growth and ongoing growth in adjacent and wider areas.

During development of this assessment there was uncertainty regarding the outcomes of the re-baselining of the NZ Upgrade (NZUP) programme. As such, this assessment considered scenarios with and without key elements such as the Drury South Interchange, Mill Road and Drury West Station. The NZ Government announced in June 2021 the outcomes of that re-baselining, namely:

- Delivery of all three rail stations (Paerata, Drury West and Drury Central)
- Delivery of only a scaled-down version of Mill Road in Manukau (i.e. no delivery of Mill Road in this Drury area)
- Delivery of the Papakura-Drury upgrade of SH1, but not the subsequent stage from Drury to Drury South
- Funding of a (non-specified) local package of upgrades to support growth in Drury

Because of the early consideration of scenarios with and without key elements (such as Mill Road and the Drury South interchange), it was not considered necessary for the purposes of this assessment to revisit the basis of this work, beyond altering the indicated timing and staging opportunities of key projects in response to these decisions. The timing, alignment and form of the Mill Road corridor where it passes through these plan change areas also remains unconfirmed, with any potential timing and alignments shown here being indicative only.

Growth Inputs and Assumptions

Assumptions on the total yield and build-out rate for the plan change areas was derived from the Plan Change documents where possible. This assessment was based on the regional transport model (MSM) zones in which the plan changes fell, meaning they did include some adjacent areas of Future Urban Zoned (FUZ) land. For this assessment 'Drury West' includes the FUZ-zoned land north of SH22 but not the FUZ to the south of SH22, while 'Drury East' includes some adjacent FUZ in Drury East, but not Opaheke.

For these definitions, Drury East is indicated to provide some 8,500[1] dwellings and 186,000m2 GFA of business/community floor area, while Drury West provides some 8,500 dwellings and 12,000m2 GFA of business area. Even with the aggressive mode shift assumptions, total vehicle movements are expected to be some 65,000 trips per day associated with Drury East and 46,000 vehicles per day for Drury West. For context, SH1 north of Drury recently recorded some 62,000 vehicles per day while SH22 carries approximately 22,000 vehicles per day.

Drury East Movement and Access

Current access to Drury East is highly constrained, being only via the existing rural roads of Waihoehoe Road (into Drury Village) and Ramarama Road (south to Drury South industrial area). Those roads are typically rural roads, without suitable walking, cycling PT or other urban street functionality. The wider receiving network is also constrained for the scale of growth proposed, being only via the SH1, Gt South Road and Rail corridors.

The Drury Central rail station is considered the critical element in providing PT access to/from this development area, supported by feeder bus routes and quality walk/cycle access. A supporting network of internal arterial, collector and local streets is also required. The analysis confirmed that the two existing access corridors (Waihoehoe Road and Ramarama Road), are not sufficient to support development of this full Drury East area. A number of new access roads were indicated in the Plan Change Movement Plans, however not all were indicated as being delivered by the developers. This assessment has confirmed that a number of those access links are necessary to support full development of this site, namley that:

- A new access to the west (such as the Brookfield-Quarry Link) is required to provide alternative access to Waihoehoe Road and provide connections between East and West Drury
- Enhanced access from the north is needed to provide relief to Waihoehoe Road, such as via the proposed direct entry from the Drury southbound motorway off-ramp
- Additional access capacity to SH1 is required for travel south and north on SH1, such as via the Drury South Interchange and access roads
- An additional connection is needed north to Papakura to provide improved connectivity and to reduce traffic on SH1 and Gt South Road by allowing direct access to Papakura and communities east of SH1

[1] This includes the Plan Change areas as well as the remaining FUZ area within MSM Zone 555

The Brookfield-Quarry Road link and drirect Drury access ramp were found to be needed both short and long-term, even with Mill Road in place. However, the estimated level of traffic on these links will require careful design to integrate with the internal street networks.

The high mode share aspirations for walking and cycling in these areas will also require careful design of local street networks to help increase their safety and attractiveness. It is therefore recommended that the local street network is developed with appropriate access controls and speed environments to both minimise through traffic and maximise the safety and attractiveness of walking and cycling within those internal street systems.

Drury West Movement and Access

The current primary access to Drury West is via SH22, which is a high-speed rural road providing strategic movement function connecting Drury to Pukekohe and surrounding areas. Its current form is unsuitable for adjacent urban development. Secondary access is via the Bremner Road crossing over SH1 into the Drury Village. That route into Drury Village is also constrained via poor walk/cycle connections and the low lying, single-lane bridge on Norrie Road that is susceptible to flooding.

The Drury West rail station will directly support the southern and central parts of Drury West, with the northern parts of the Aurunga development having the choice of both the Drury West and Drury Central stations. The arterial networks have been developed with quality walk/cycle and frequent transit (bus) corridors to both access those stations and connect the east and west communities through the supporting network. SH22 is currently a critical movement corridor which is operating effectively at the capacity of a rural road, which will need to change to a low-speed urban environment as the areas to both the north and south develop. Upgrading that corridor to a 4-lane urban arterial form with segregated walk and cycle facilities is identified as being needed to support release and integration of further urban growth in Drury West.

The long-term recommended network for the Southern Auckland growth area also includes the Pukekohe expressway to aid the transition of SH22 from its current strategic movement function to a localised urban function. This includes a southern extension of Jesmond Road from SH22 to connect with the strategic expressway. Those elements south of SH22 (including the collector road network), are needed to support Drury West Stage 2 and wider regional growth. An initial stage of the Jesmond Road southern extension is included as part of access to the Drury West Station, but those strategic elements were not included in this assessment.

As with the Drury East network, it is recommended that the local street design within Drury West is developed with appropriate access controls and speed environments to both minimise through traffic and maximise the safety and attractiveness of walking and cycling within those internal street systems.

East West Connections

In addition to internal or access corridors for Drury west and east, a number of more strategic upgrades have been identified that are needed to improve connections between the two communities, including:

- Upgrades to Norrie Road (Bremner road east FTN)
- Regional active mode corridor between Drury and Pukekohe, of which the section between Drury Central and Drury West has been considered for this assessment; and

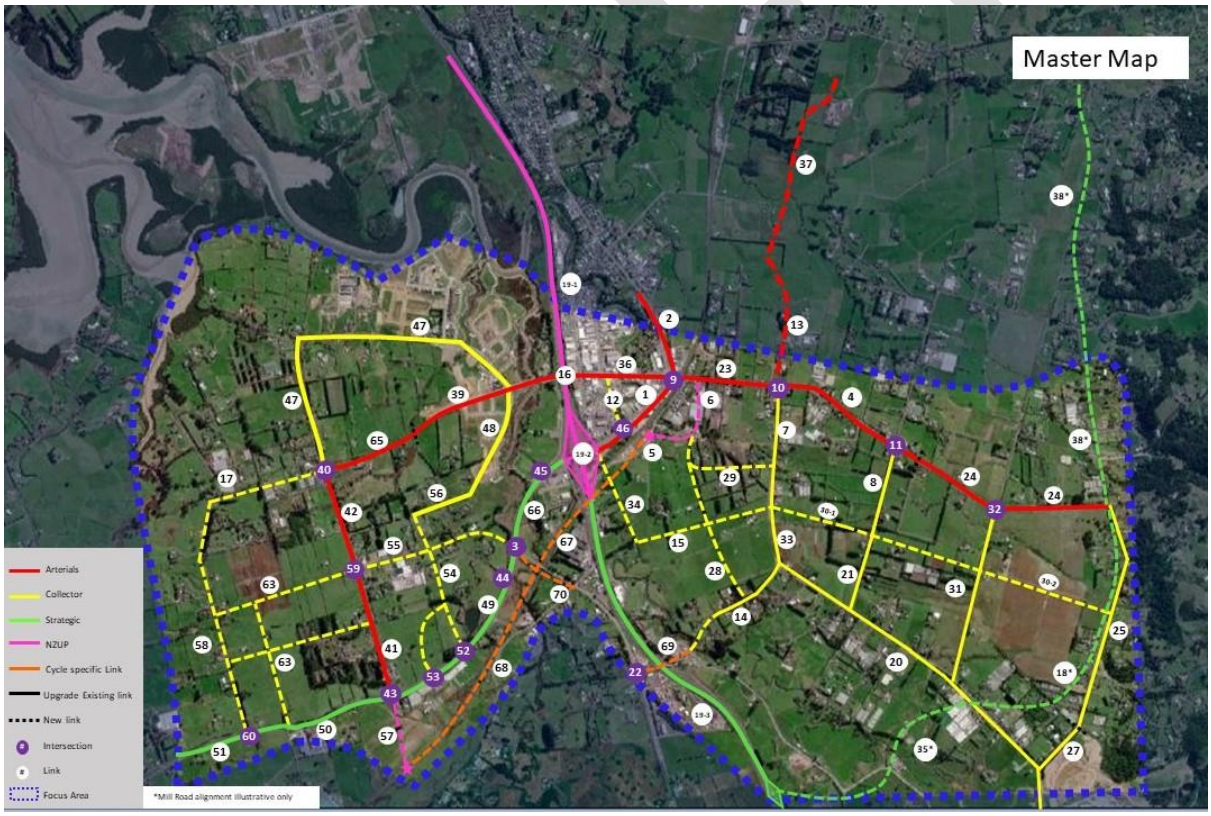
- Gt South Road between Karaka Road and Quarry Road

Network upgrades in Drury West south of SH22 have not been explicitly included in the scope of this assessment as there are no current plan changes. However, it is noted that the confirmation that NZUP will deliver this station early indicate that additional growth (and hence infrastructure needs) could occur in Drury West, outside the scope of projects included here.

Staging Schedule

A Staging Schedule has been developed with indicative time horizons and identifying the growth areas they support. As noted above, there are significant uncertainties as to the roll out of the development and the timing of key transport infrastructure. As such, this Staging Schedule provides one potential scenario for such development, to assist Council develop infrastructure funding methods. While this Staging Schedule is subject to change based on other decisions and economic or other drivers, the key principles applied and outcomes sought are considered to remain valid under the various possible scenarios of how this area will develop into a new urban community.

The detailed Schedule is provided later in this report, based on the network elements in the following Figure.



Conclusions

Key conclusions of this work include:

- Both the Drury East and Drury West areas constitute a significant scale of urban growth

- That Drury growth is itself only a sub-set of the total growth planned and expected in the southern parts of Auckland
- This scale of growth requires an extensive network of new or upgraded transport corridors, both within the immediate growth area and on the surrounding receiving environment. This network will need to comprise both strategic network and local network elements in order to deliver on the mode change aspirations
- The long-term arterial and strategic network to support this growth has been identified through the SGA IBC and is being further developed through SGA detailed business cases. The local network has been assumed to be represented by the master plan networks put forward for the Plan Change areas. Some opportunities for the staged implementation of the new or upgraded corridors has been identified in this assessment, however the feasibility, design and timing of any such interim upgrades will remain to be agreed directly with the appropriate road controlling authority
- Drury is located where all movements between Auckland and the south must pass, meaning that the transport networks have been scaled for local, regional and inter-regional growth. This means it is not feasible to fully isolate the projects needed to support just the Drury plan change areas from growth in the wider network. While this assessment has focussed on the projects needed for Drury, it includes some elements in Drury to accommodate wider growth but excludes wider-network projects which will benefit the Drury area.

1 Purpose, Context and Scope

1.1 Purpose and Background

This report documents an assessment of the transport infrastructure needed to support the planned growth in Drury, with the desired land use and transport outcomes.

Auckland Council are undertaking the Drury Infrastructure Funding and Financing Study (DIFF), which seeks to:

- "*Provide for integrated and timely infrastructure delivery that enables and supports growth in the Drury area in a way that uses current and alternative funding, financing and delivery opportunities*"

Council commissioned the Te Tupu Ngatahi Supporting Growth Alliance (SGA), to undertake the transport infrastructure component of that study. Specifically, it requested SGA to identify sequencing/staging of transport infrastructure to support progressive urban development of Drury.

This work was similar to the previous DTIP study undertaken by Council, but with the following refinements to address feedback on the previous work:

- Use of new information, including ATAP, Private Plan Change Applications, NZUP, SGA Detailed Business cases etc
- More granular staging of infrastructure (physical and temporal), not just corridor sequencing
- More extensive liaison with key parties (including developers), on inputs, assumptions and methodologies

1.2 Relationship to Private Plan Change Regulatory Processes

This work is primarily targeted at Council's consideration of funding options and is not intended to duplicate or replace Council's, Auckland Transport's or Waka Kotahi's detailed assessment of each Private Plan Change. In regard to the Plan Change processes, this work:

- Has a broader-network focus than just the individual plan changes, looking at the cumulative growth across both the various plan changes and the wider growth pressures
- Has a focus on the 'strategic' rather than local elements of the network, and especially does not cover local street design or delivery
- Is not considering detailed plan change provisions or submission points
- Is focussed on 'bulk' transport infrastructure, not detailed provisions (e.g. parking policy, local street design, staging triggers etc)
- Is using different transport advisers (i.e. SGA) to those from Council[2], Auckland Transport or Waka Kotahi involved directly in the Plan Change process

[2] Regulatory

1.3 Scope of Transport Elements Considered

The approved SGA Indicative Business Case (IBC) for the Southern Growth area of Auckland provides a range of projects and interventions between Manukau and Pukekohe to accommodate the long-term planned growth in this area, including inter-regional growth. The scope of projects included in this assessment are a sub-set of those projects involving new or upgraded transport infrastructure to support the Plan Changes. It is however noted that growth in adjacent and wider areas is still considered when estimating the required timing and scale of projects.

In addition to the SGA arterial and strategic projects, this study also includes key collector roads in Drury East and West, but not local streets.

Key projects included in Drury West will support later growth in Drury West (Stage 2, south of SH22), however the specific additional elements needed within that later growth area are not included (as there are no active plan changes and it was indicated for later development under FULSS). Some of the projects included also have wider growth or strategic transport functions, making ring-fencing of the Drury-specific projects very complex. The local street network design also has a key role in supporting the urban form and mode shift objectives sought for this area, however those elements were not included in this assessment as they are assumed to be the responsibility of developers for delivery.

It focusses on new or upgraded transport infrastructure needed to improve access, safety or capacity (by any mode), but has not considered any consideration of construction related traffic effects nor has it included any assessment on the existing carriageway quality to support the anticipated traffic flows.

Although focussed on the Drury area, other key strategic IBC projects identified to support the whole southern growth area that are omitted from this assessment include:

- Pukekohe Expressway and arterial connections
- Paerata rail station
- Pukekohe arterials
- Rail 4-tracking
- Takaanini rail crossings
- Opaheke and Gt South Road Frequent Transit Routes (FTNs) between Drury and Papakura
- Mill Road, north of Papakura, including associated connections
- SH1 FTN and other long-term upgrades north of Papakura
- Regional Active Mode Corridor (south of Drury)

This assessment therefore, represents a technical assessment by SGA (who are not parties to the Plan Change hearings), for a specific purpose and based on key assumptions. It therefore, does not represent a formal endorsement by Council, Auckland Transport or Waka Kotahi for any specific staging or sequencing of transport infrastructure.

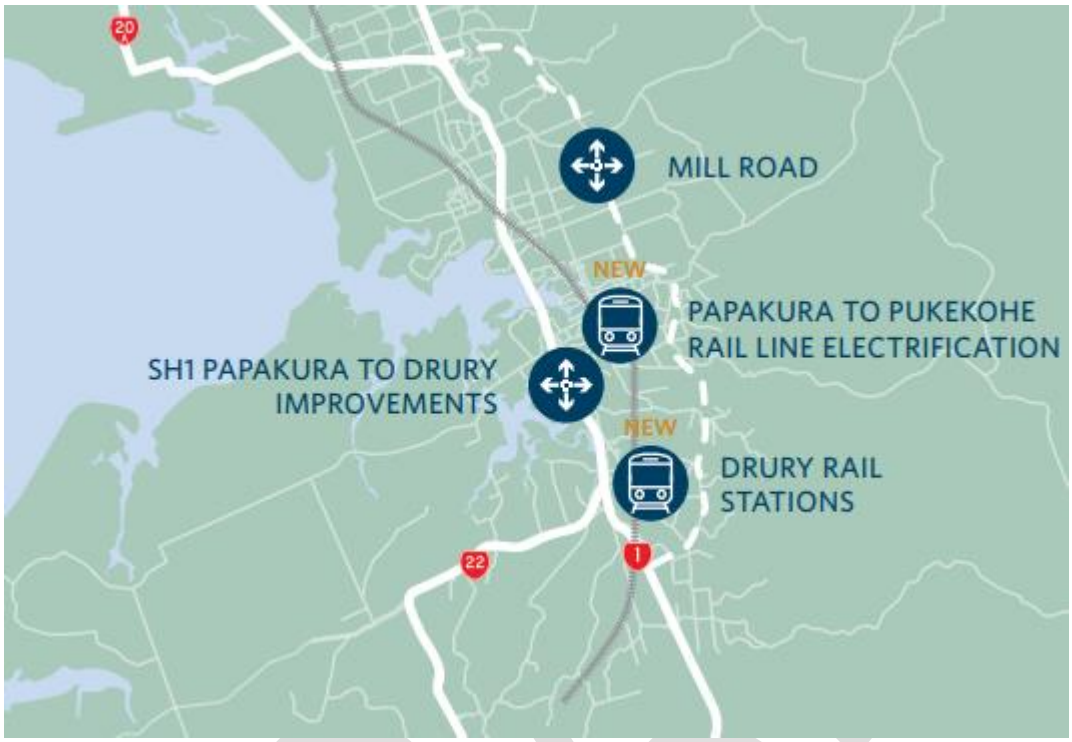
1.4 Assumptions on NZ Upgrade Projects

A number of projects proposed for this area were incorporated in the NZ Upgrade Programme (NZUP) announced in early 2020, including (see):

- Mill Road

- Papakura to Drury South
- Drury Rail Stations
- Papakura to Pukekohe rail electrification

Figure 1-1 NZ Upgrade Projects in Southern Auckland



During the preparation of this assessment, NZUP was going through a re-baselining exercise for the whole programme. Due to this uncertainty on the exact scope and timing of elements of the NZUP programme that could emerge from the process, it was considered necessary to consider scenarios with and without key elements. Solely for the purposes of progressing an initial assessment ahead of decisions on the re-baselining, the following was assumed:

- Assume the rail electrification proceeds, due to progression of design and construction planning
- Consider scenarios with and without Mill Road (at least the parts south of Papakura of most relevance to this work)
- Assume Stage 1 of the Papakura-Drury South project (between Papakura and Drury only), due to progression of design and construction
- Stage 2 of the Papakura to Drury South project (the section between Drury to Drury South) is considered inter-related to assumptions on Mill Road
- Consider with and without the immediate delivery of Drury West Station

A decision was subsequently announced on the NZUP projects in June 2021 (just before completion of this study), and included:

- Delivery of all three rail stations (Paerata, Drury West and Drury Central)
- Delivery of only a scaled-down version of Mill Road in Manukau (i.e. no delivery of Mill Road in this Drury area)

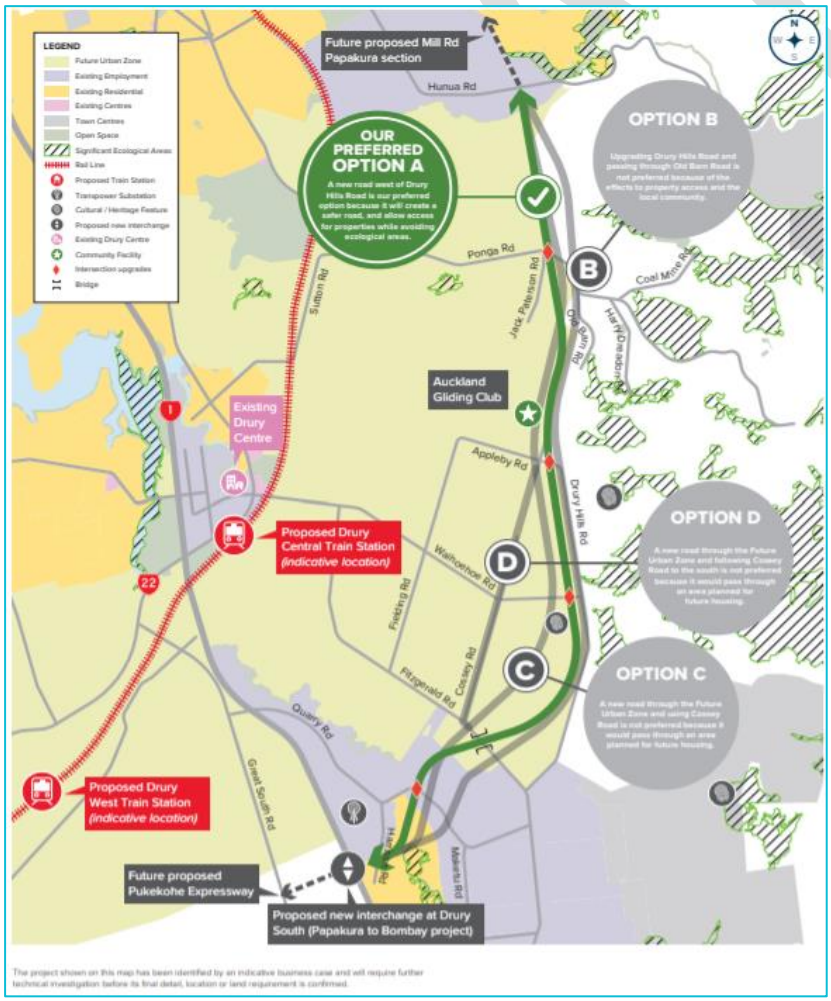
- Delivery of the Papakura-Drury upgrade of SH1, but not the subsequent stage from Drury to Drury South
- Potential funding of a (non-specified) local package of upgrades to support growth in Drury

Although removed from the NZUP delivery programme, it is not confirmed that projects such as the Drury South Interchange and Mill Road should be removed from all future network planning. The key changes made to the initial Staging Schedule following the NZUP decisions were:

- An accelerated need for the full upgrade on Waihoehoe Road west, given this would remain the primary access into Drury East with the removal of the Drury South interchange and Mill Roads from NZUP delivery
- An acceleration of the need for the full upgrade to SH22 (east of Jesmond Road) to assist transition to an urban environment following the confirmation of the early delivery of the Drury West station south of SH22

It is noted that longer-term decisions on the alignment, form and timing of projects such as the Drury South interchange and Mill Road will remain influenced by regional or national priorities, rather than solely on the needs of local development in Drury. This means that any indication provided in this report regarding the timing of those elements remains highly uncertain. For reference, the technically preferred alignment option for Mill Road identified for public engagement in May 2020 is shown in **Figure 1-2** below.

Figure 1-2 Options Considered for Mill Road Corridor Alignment



1.5 Stakeholder Liaison

As noted above, the scope for this SGA assessment does not include detailed consideration of the Plan Change proposals or submissions but does include liaison with key parties. Liaison with external parties was managed by Council, and included:

- Attendance at steering group and technical (transport) meetings with:
  - Drury East developer group (Fulton Hogan, Kiwi Property and Oyster Capital)
  - Aurunga development in Drury West
  - Waipupuke development in Drury West
- Representatives of Auckland Transport and Waka Kotahi were included in these meetings

Information shared with parties during this process included:

- Staging Principles (as described later in this report)
- Site trip generation estimates
- Emerging access strategies
- Traffic model scenarios
- Draft Staging Schedule

1.6 Report Structure

The remainder of his report is structured as follows:

Chapter 2: Describes the approach to this assessment

Chapter 3: Outlines the growth in this area

Chapter 4: Considers the potential yield, travel movements and access requirements for the plan change areas

Chapter 5: Discusses the purpose, form and opportunities for staging each key element of the network and presents the resulting Staging Schedule

Chapter 6: Provides key conclusions

2 Assessment Approach

This Chapter describes the overall approach to this assessment, including the ongoing land use and transport system planning context. Detail on growth inputs are included in the subsequent chapter.

2.1 Full System Solution and Role of SGA

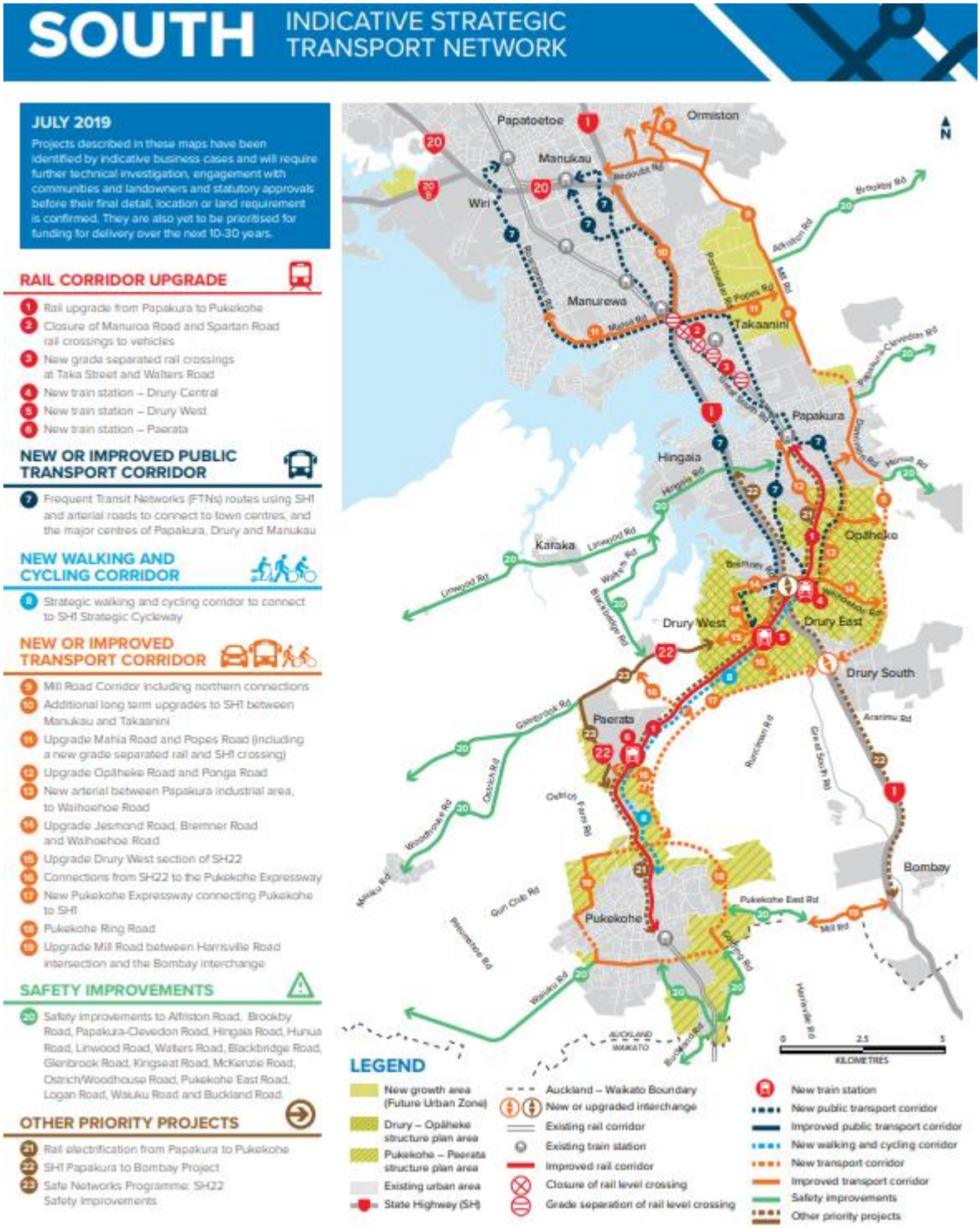
As noted above, the SGA IBC identified a full system solution to support the planned growth in southern Auckland, as indicated in **Figure 2-1**. In addition to the infrastructure projects shown in the Map, the business case identified the need for supporting initiatives related to demand management and land use-transport integration. The land-use-transport integration work has included continuous liaison between SGA and Council on planning for both the transport projects and the land use planning. This included the Drury Opaheke Structure Plan for which SGA prepared the Integrated Transport Assessment for Council.

The role of SGA is to achieve long-term route protection of the recommended networks, with subsequent project implementation decisions and processes remaining with Auckland Transport and Waka Kotahi. This means that the SGA work is focused on identifying required corridor footprints and does not imply any specific implementation status. SGA are progressing detailed business cases (DBCs) for elements of the network and have recently lodged a Notice of Requirement for the Drury Arterials package.

The SGA IBC/DBC work and the Council planning documents[3] therefore form the key basis for the planned growth, desired outcomes and strategic projects used in this work.

[3] Including the Unitary Plan, Drury Opaheke Structure Plan and Future Urban Supply Strategy

Figure 2-1 SGA IBC Network



2.2 Approach to Plan Changes

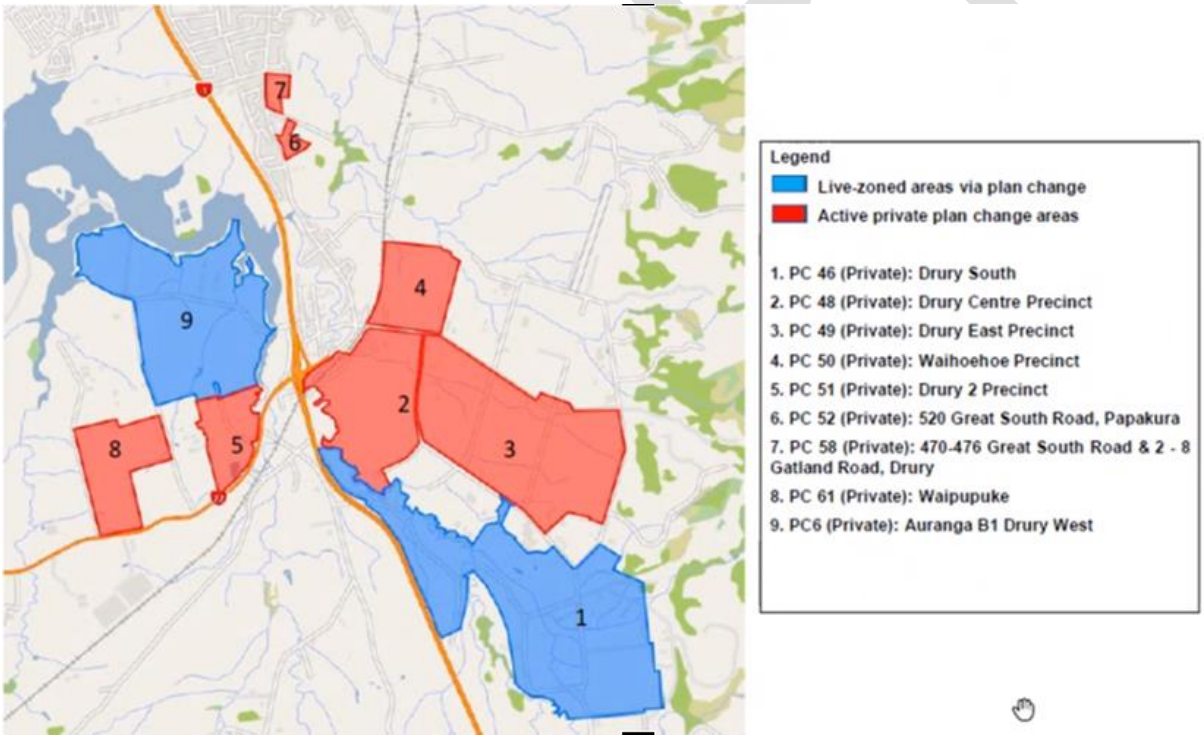
As noted above, this assessment has treated the lodged Plan Change documents at face value, and used their key elements for this assessment, including:

- proposed type, location and yield of indicated land use activities
- proposed transport connections
- Indications of potential land use sequencing

This work has not considered the detailed planning provisions proposed in the documents to manage transportation effects or specific transport policies, nor provided a view on the appropriateness of the proposals. The plan changes are indicated in **Figure 2-2** below. To avoid potential confusion from the multiple numbers, the Plan Changes are also referred to here by their proponent developer, namely:

- Kiwi Properties for PC48 (Drury Centre)
- Oyster Capital for PC50 (Waihoehoe)
- Fulton Hogan for PC49 (Drury East)

Figure 2-2 Recent and Current Plan Changes



Although the Drury 1 and Drury South Industrial precincts are live-zoned, they are only partially developed and include planning provisions (via AUP Precinct Plans) regarding the provision of key transportation elements to allow full development that are relevant to this work. Additionally, the Drury South Industrial area has a new Private Plan Change to revise some aspects of the existing Precinct Plan.

2.3 Transport Outcomes Sought

The transport and land use planning for this southern area has identified the need for a move away from low density, car-dependent developments in order to minimise adverse outcomes in terms of:

- Inefficient use of scarce land
- Poor environmental outcomes, including carbon emissions from car-dominated travel
- Poor urban form outcomes from dispersed development with car and movement-dominated transport systems
- Poor safety outcomes from conflicts with and between walking/cycling and high traffic flows in urban areas
- Poor economic outcomes from inefficient freight movement and poor business accessibility
- Poor social and economic outcomes from poor accessibility to social and economic opportunities and limited travel options
- Poor economic outcomes through a lack of resilience in the transport system

The key outcomes sought through the SGA business cases to address these issues include:

- Transport systems that support quality, compact urban form, including through higher density around major public transport corridors
- Mutually supportive transport and land use systems that:
    - provide safe travel across all modes
    - provide a transformation in mode share to more sustainable modes, such as public transport, walking and cycling to aide decarbonisation goals
    - provide improved choices of travel
    - provide efficient freight movement
    - provide high levels of accessibility to social and economic opportunities
- a resilient transport system

These outcomes are used in the SGA business cases and have also been used for this assessment.

2.4 Approach to Staging Assessment

This assessment is substantially based on design and timing principles that will help deliver the desired outcomes, particularly regarding mode shift and safety. It is acknowledged that there is significant uncertainty in growth planning in greenfield areas, including:

- The outcome of land use planning decisions, such as the various private Plan Changes
- The exact sequencing of how each site will develop, which is complicated by the large area and multiple land-owners
- The rate of development
- The timing of key infrastructure to support growth
- The growth demands that impact this area from other locations, such as Northern Waikato

Due to these uncertainties, it has not been possible to predict or model all possible interim scenarios. Instead, the assessment needed to consider general principles that would apply to growth in a specific area, a range of scenarios for provision of new connections or major infrastructure and the potential cumulative effects of growth across many areas.

The broad approach to this work is therefore as follows:

- Apply design and timing principles to identify key transport elements needed to support each area, especially as regards PT, walk and cycle facilities
- Consider key constraints to access to Drury West and Drury East
- Use traffic data and models where needed to identify access strategies/needs under different scenarios for key infrastructure
- Consider the cumulative effect of growth in both Drury east and west, including on the key east-west linkages
- Identify opportunities for interim stages of needed upgrades
- Develop indicative project sequencing strategy

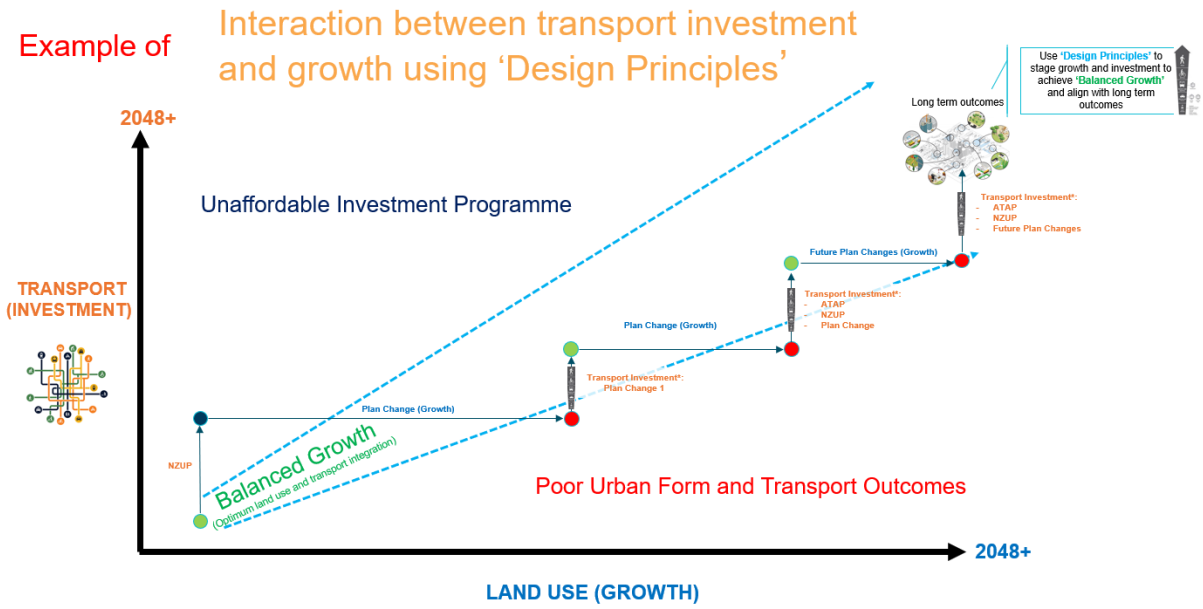
The assessment is based on provisions of high-quality walking/cycling and PT facilities from the outset of development, to support compact urban form, high mode shift and associated demand management and climate objectives. Transport modelling has been used to inform, rather than dictate this approach.

2.5 Staging Principles Overview

Due to the uncertainty regarding the timing and form of specific land-use activities staged over three decades surrounding Drury, a principle/design-based approach is regarded as the best way to manage and deliver the desired transport and land use outcomes consistently.

The 'Timing and Design Principles' are intended to provide guidance to stage transport infrastructure to achieve balanced growth, that aligns with the long-term outcomes and achieve optimum land use and transport integration over time. **Figure 2-3** provides an example of how the interaction between transport investment and growth using 'Timing and Design Principles' to help develop staging plan(s).

Figure 2-3 Example of desired outcomes over time



2.5.1 Timing and Design Principles

A set of timing and design principles were developed to guide the strategy development. These principles are based on the desired transport outcomes and reflect the need to stage the upgrades in an integrated way with land use development. The principles related to early provision of mode-shift and demand management initiatives are a key element of strategies to decarbonise the transport system.

Timing Principles:

1. On sites where urban development is occurring:
    a) Urbanise existing corridors within and adjacent to development concurrently with that development
    b) Provide for, or do not preclude, planned transport corridors within/adjacent to development, including through providing interim facilities as part of development
    c) Where transport improvements are provided in an interim form, ensure alignment with the full build-out network
2. Beyond sites where development is occurring, stage the form and capacity of the transport network progressively to match both development stages and system needs, including cumulative effects of urban development on transport demands on the network.
3. Provide safe and efficient public transport and active mode facilities from the outset of urban development to support a shift to more sustainable travel.
4. Sequence the provision of rail stations and facilities for gaining access to rail stations to coincide with and support:
    a) A commitment to adjacent land use of significant scale within walking distance
    b) The need to serve as a strategic PT hub to service a wider catchment with poor PT options
    c) Support significant mode shift to PT from early in the development cycle
    d) Noting a need to find a balance between criteria (4a and 4c)

Design Principles:

1. Include elements to support place function, not solely movement function (i.e. design standards change based on place value)
2. Provide safe travel by all modes
3. Provide walk and cycle connections from the start of residential development to the following key destinations/attractors within walk/cycle catchments:
    a) Closest train station
    b) Nearby education facilities
    c) Closest Major Centre
    d) Existing Centre
    e) Major employment area
4. Provide walk and cycle connections from the start of non-residential development to the following key locations within walk/cycle catchments:
    a) Closest train station
    b) Existing Centre
    c) Adjacent residential areas
5. FTN services & infrastructure provisions when needed to provide reliable, efficient & attractive frequent public transport
6. Provide local bus services and associated facilities to respond to timing, scale and location of urban development
7. General traffic improvement when needed for:
    a) Safety
    b) Wider network resilience
    c) Accessibility to key destination
    d) Inter-peak reliability & LoS for all modes
    e) Alleviation of severe peak-period congestion

   f) Alleviation of impact on public transport services
8. Coordination of adjacent projects for the purpose of practical construction staging

This process seeks opportunities to stage upgrades to match specific growth or system needs, however it is noted that such opportunities for interim stages may add to costs or difficulty in subsequent future upgrades. It is beyond the scope of this assessment to quantify and determine the economically optimal strategy for every part of the network, particularly given the uncertainty in how the various growth areas will indeed develop.

2.6 Transport Modelling

Transport modelling has been used to inform this work, however due to inherent uncertainties noted above, traffic modelling has not been the primary method to determine the recommended strategy.

Key points to note with the modelling include:

- Recommendations on walk/cycle and PT facilities have been driven by the Staging Principles, alignment with desired outcomes and considerations for long-term integration of land use and transport, and not directly by modelling
- The traffic models have been used to identify/assess the impact of potential new access links, rather than as specific forecasts of the future
- Transport modelling, especially in greenfield growth areas, has quite high levels of uncertainty, including the type and rate of growth, timing of infrastructure, the influence of policy decisions and the design and performance of key parts of the system. In such circumstances the models are considered least accurate at a disaggregate level (e.g. hourly turning flows and delays at key locations), and more likely to be accurate at aggregate levels (e.g. daily 2-way traffic flows)
- In some locations the lodged Plan Change documents indicate different type and scale of development than is indicated in the regional land use forecasts (which were informed in part by the Structure Plan for Drury). Subsequently, first-principle estimates of traffic generation were made for Drury East and West (north of SH22), based on the Plan Change documents. The 'standard'[4] traffic models were then adjusted to match these estimates
- Data was used from both the regional demand (MSM) and the local traffic (S3M) models

The specific assumptions on yield and trip generation in each area are discussed in the following Chapter.

A number of scenarios were used to test the effects of various network changes. Due to the significant number of potential combinations of network and land use inputs that could be considered, these tests were kept at a simple level to understand key effects. This included using fixed demand patterns for some tests with/without key links, rather than fully re-running both the regional demand and local traffic models in all cases. The limitations of this approach were acknowledged and various other methods used to inform the analysis, including use of existing traffic count data, outcomes of similar corridors elsewhere and high-level assessments of the daily flows likely to want to head in each direction.

[4] These are models using the regional growth forecasts

The various scenarios modelled are described in **Table 2-1** with resulting daily and maximum hourly flows at key locations shown in **Figure 2-4**. The locations of the key flow estimates are indicated in **Table 2-2.**

Table 2-1 Model Scenarios

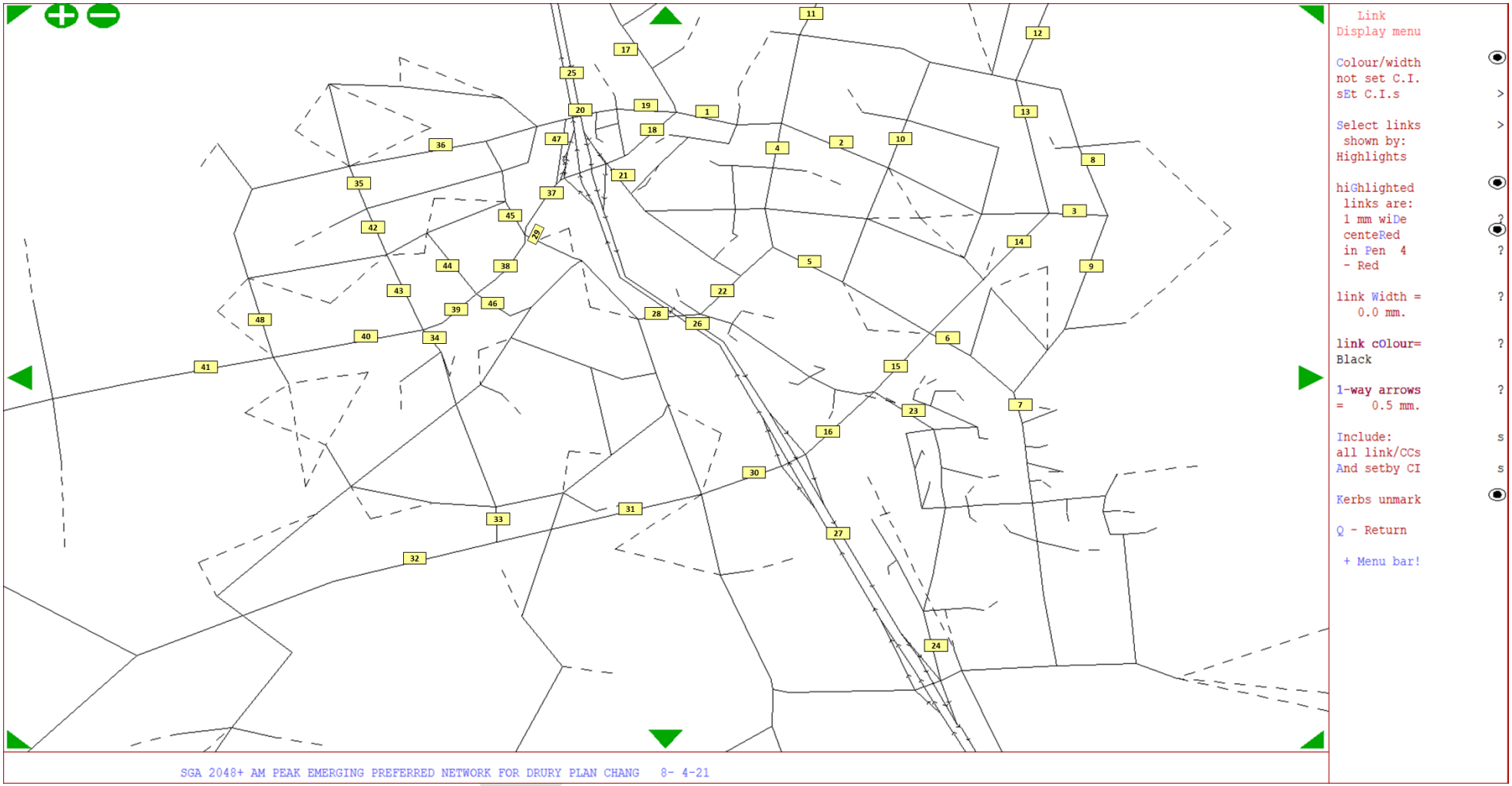
Scenario	Description	Purpose
2028 Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	A reference scenario similar to that used in the plan change assessments
B	Remove (Ban) Mill Road between Drury and Papakura, but still includes Drury South Interchange	To test the effect of only having the Drury South Interchange element of Mill Road
C	Remove all of Mill Road south of Papakura, but include Maketu-Waihoehoe Road internal collector roads	To test the effect of having no Mill Road
D	Scenario C + BQL + DKR	To test the effect of adding the additional Access Links
2038 Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	A reference scenario similar to that used in the plan change assessments
B	Scenario A+ BQL + DKR + change signals to roundabouts on North-South arterial	To test the effect of adding the additional Access Links
2048+ Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-	A reference scenario with the full SGA network and full growth development

Scenario	Description	Purpose
	Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	
B	Scenario A+ BQL + DKR	To test the effect of adding the additional Access Links
C	Scenario A With the change to Roundabouts on North South Arterial	To test the effect of different intersection forms
D	Scenario B With the change to Roundabouts on North South Arterial	To test the effect of different intersection forms

Table 2-2 Modelled Traffic Flow Estimates

	Demand Flows (Vehicles)		2028								2038				2048+							
			Scenario A		Scenario B		Scenario C		Scenario D		Scenario A		Scenario B		Scenario A		Scenario B		Scenario C		Scenario D	
S.No	Road Name	Road Section	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT
1	Waihoehoe Road	GSR-Kath Henry Lane	1,173	20,162	1,273	24,210	1,356	27,706	1,208	19,644	1,331	22,802	1,162	17,101	1,276	23,968	1,226	17,284	1,401	25,970	1,188	17,891
2	Waihoehoe Road	FitzgeraldRd-ApplebyRd	397	5,739	238	4,507	352	6,575	507	6,323	134	2,168	127	2,558	244	4,360	217	3,874	207	4,692	287	4,816
3	Waihoehoe Road	MillRd-DruryHillsRd	127	2,190	162	2,701	225	3,776	239	3,857	194	3,470	205	3,679	546	7,993	538	8,124	547	8,001	547	8,188
4	Fitzgerald Road	NewParallelRd-WaihohoeRd	214	3,736	281	4,857	361	6,710	259	4,501	429	7,421	524	8,632	415	7,118	478	7,141	607	10,556	771	10,203
5	Fitzgerald Road	BrookfieldRd-FieldingRd	349	6,025	499	6,623	581	8,213	481	8,681	539	11,857	359	8,265	640	10,531	349	6,659	666	11,119	361	7,204
6	Fitzgerald Road	CoseyRd-DruryHillsRd	249	6,193	277	6,547	181	4,818	234	5,699	419	10,837	480	10,777	360	7,790	411	8,127	386	7,939	454	8,185
7	Fitzgerald Road	QyarryRd-DruryHillsRd	185	4,036	141	3,223	166	3,374	175	4,096	341	7,314	392	7,408	449	8,425	476	8,291	449	8,426	465	8,376
8	Drury Hills Road	WaihohoeRd-ApplebyRd	70	1,373	140	2,582	168	3,234	193	3,297	78	1,835	100	2,063	248	4,993	259	5,136	236	4,981	260	5,139
9	Drury Hills Road	WaihohoeRd-MacwhinneryDr	66	955	28	257	63	687	55	706	132	1,899	138	1,873	415	5,567	401	5,258	417	5,445	410	5,244
10	Appleby Road	WaihohoeRd-HarryDoddRd	365	6,262	84	1,595	84	1,610	85	1,628	273	4,033	132	1,820	386	4,945	321	5,227	212	3,760	274	4,259
11	NorthSouthArterial	HarryDoddRd(NSArterial)-PongaRd	0	0	0	0	0	0	0	0	726	7,840	783	11,846	1,290	12,572	1,297	14,610	1,297	14,982	1,283	17,156
12	Mill Road	ApplebyRd-PongaRd	1,672	21,819	0	0	0	0	0	0	1,693	28,462	1,657	25,113	2,110	36,123	2,106	34,638	2,110	34,611	2,139	33,249
13	Mill Road	WaihohoeRd-ApplebyRd	1,220	14,679	9	195	6	122	5	115	1,527	24,489	1,495	23,242	1,914	30,516	1,829	29,361	1,918	30,142	1,870	28,696
14	Mill Road	FitzgeraldRd-WaihohoeRd	1,151	14,231	70	1,232	36	627	32	576	1,383	23,624	1,345	22,181	1,597	28,418	1,518	27,345	1,591	28,158	1,543	26,641
15	Mill Road	MaketuRd-FitzgeraldRd	1,496	20,789	649	11,044	581	8,649	284	5,115	1,853	36,067	1,573	28,812	2,366	39,975	1,891	32,193	2,340	39,613	1,913	31,755
16	Mill Road	DSIC-MaketuRd	1,314	18,070	824	14,752	0	0	0	0	1,481	30,494	1,432	25,751	1,855	33,946	1,694	30,035	1,846	33,588	1,698	29,784
17	Great South Road	EastSt-SuttonRd	741	17,488	1,400	25,748	1,410	26,758	1,420	25,410	1,060	19,577	1,051	17,940	1,473	22,909	1,502	22,255	1,474	22,387	1,504	21,547
18	Great South Road	FirthSt-WaihohoeRd	845	12,162	1,035	16,976	1,013	18,201	894	12,585	1,007	14,170	741	8,083	1,051	17,426	800	10,439	1,160	18,565	881	10,886
19	Norrie Road	FirthSt-GSR	610	12,079	945	13,931	944	15,448	963	15,734	1,031	16,349	1,009	16,663	1,409	19,750	1,321	20,076	1,344	19,409	1,355	19,562
20	Bremner Road	VictoriaSt-CreekSt	709	10,436	695	10,501	644	10,635	698	11,001	1,000	14,958	1,056	15,358	1,253	17,639	1,215	18,176	1,229	17,469	1,228	17,904
21	Drury Interchange SH1 Off Ramp	SH1OffRamp-FlanaganRd	0	0	0	0	0	0	522	7,564	0	0	441	6,000	0	0	523	5,554	0	0	494	5,302
22	Brookfield Road	MaketuRd-Brookfield Rd	0	0	0	0	0	0	529	7,962	0	0	916	11,396	0	0	921	14,394	0	0	953	15,250
23	Maketu Road	MaketuRd-MillRd	568	10,261	400	9,830	489	8,919	381	7,730	1,040	19,191	1,036	18,999	1,178	20,809	1,083	20,882	1,124	20,782	1,087	20,629
24	Maketu Road	Ararimu Rd-MceldownieRd	366	4,568	318	4,691	604	11,741	446	8,880	960	9,605	902	9,106	1,199	11,332	996	10,330	1,130	11,179	995	10,081
25	SH1	Drury I/C-Papakura I/C	4,374	106,802	5,151	117,833	5,156	116,019	5,152	117,618	5,480	128,626	5,488	129,296	6,237	144,183	6,207	144,792	6,186	143,995	6,184	144,357
26	SH1	Drury South I/C-Drury I/C	3,084	79,080	3,982	91,028	3,787	83,875	3,824	83,075	4,477	107,652	4,455	107,438	5,221	124,051	5,219	124,390	5,222	123,677	5,223	124,082
27	SH1	RamaRama I/C-Drury South I/C	3,900	82,598	3,946	82,911	3,786	83,873	3,824	83,074	3,312	88,272	3,346	88,171	4,313	110,894	4,362	110,890	4,351	110,695	4,357	111,095
28	Quarry Road	GSR-QuarryRd	259	3,427	176	3,063	433	6,904	737	10,097	490	3,978	1,110	11,592	606	5,750	1,175	14,782	530	5,449	1,204	15,566
29	Great South Road	SH22-GSR	262	5,297	245	5,736	502	9,300	712	10,807	408	6,349	570	6,827	797	11,572	611	10,308	704	11,359	616	10,048
30	GSR - Drury South I/C	GSR-Drury South I/C	0	0	0	0	0	0	0	0	1,944	39,159	1,845	36,824	1,933	41,316	1,830	40,071	1,904	41,235	1,814	39,713
31	Pukekohe Expressway	RunchimanRd-GSR	0	0	0	0	0	0	0	0	2,138	40,751	2,043	40,527	2,148	46,128	2,069	46,014	2,152	46,014	2,073	45,797
32	Pukekohe Expressway	BurttRd-RunchimanRd	0	0	0	0	0	0	0	0	2,162	38,594	2,195	39,610	2,172	43,648	2,216	44,695	2,165	43,544	2,208	44,632
33	Extension of Jesmond Road	Pukekohe Expway-Runchiman/Burtt	0	0	0	0	0	0	0	0	280	6,730	440	6,956	588	11,401	585	11,752	576	11,141	573	11,558
34	Extension of Jesmond Road	JesmondRd Extn-SH22	360	5,515	360	5,747	346	5,690	337	5,530	246	4,421	217	3,986	497	7,307	543	7,022	493	7,397	536	6,851
35	Jesmond Road	NewParallelRd-South of Bremner Ro	299	4,235	291	4,194	291	4,310	274	4,183	459	7,566	450	7,373	481	9,517	518	9,417	527	9,555	493	9,302
36	New Bremner Road	Jesmond Rd-Auranga Dr	335	4,401	322	4,260	312	4,025	297	4,022	591	9,307	588	9,361	611	10,898	691	11,091	627	10,406	707	11,479
37	SH22	GSR-SH1 OffRamp	1,554	27,471	1,434	27,185	1,406	28,578	1,388	26,230	1,200	17,711	871	12,944	1,408	23,587	1,236	17,741	1,516	24,435	1,217	17,927
38	SH22	McPhersonRd-GSR	1,567	26,492	1,359	25,429	1,354	24,901	1,339	24,906	1,168	15,341	1,040	13,422	1,257	18,410	1,115	17,221	1,274	19,265	1,124	17,751
39	SH22	JesmondRd-McPhersonRd	1,567	26,494	1,360	25,431	1,354	24,901	1,340	24,907	1,092	14,158	984	12,676	1,102	16,588	1,048	15,744	1,117	17,257	1,052	15,789
40	SH22	OiraRd-JesmondRd	1,354	23,428	1,133	22,123	1,134	21,389	1,124	21,506	993	14,712	926	13,169	997	18,020	1,043	17,278	1,047	18,513	1,080	17,383
41	SH22	Whangapouri Rd-OiraRd	1,362	23,822	1,144	22,521	1,144	21,795	1,137	21,907	922	14,434	893	13,123	850	16,762	921	16,521	912	17,077	942	16,591
42	Jesmond Road	NewParallelRd-South of Bremner Ro	280	4,150	275	4,112	276	4,286	261	4,035	438	7,501	410	7,243	522	9,346	523	9,197	503	9,380	490	8,931
43	Jesmond Road	SH22-NewParallelRd	351	5,371	326	5,364	330	5,712	300	5,751	515	8,933	519	8,924	681	11,734	715	11,566	695	11,731	674	11,441
44	NewNSRoad	SH22-NewNSRoad b/w JesmondRd/E	0	0	0	0	0	0	0	0	75	1,184	56	748	157	1,970	143	1,703	158	2,119	139	2,032
45	NewNSRoad	SH22-NewNSRoad East of BurberryRd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	NewNSRoad	BruttRd-SH22	0	2	0	2	0	1	0	1	0	1	0	2	53	148	87	226	39	110	22	70
47	Victoria Street	Bremner Rd-SH22	125	3,004	139	2,736	180	2,931	156	3,291	198	4,296	175	4,359	164	3,786	173	4,290	171	3,864	146	3,613
48	Oira Road	SH22-NewEWRoad b/w OiraRd/Jesm	46	849	47	861	47	865	47	880	79	1,555	78	1,591	154	2,873	151	2,859	157	2,923	154	2,942

Figure 2-4 Location of Key Traffic Flow Estimates



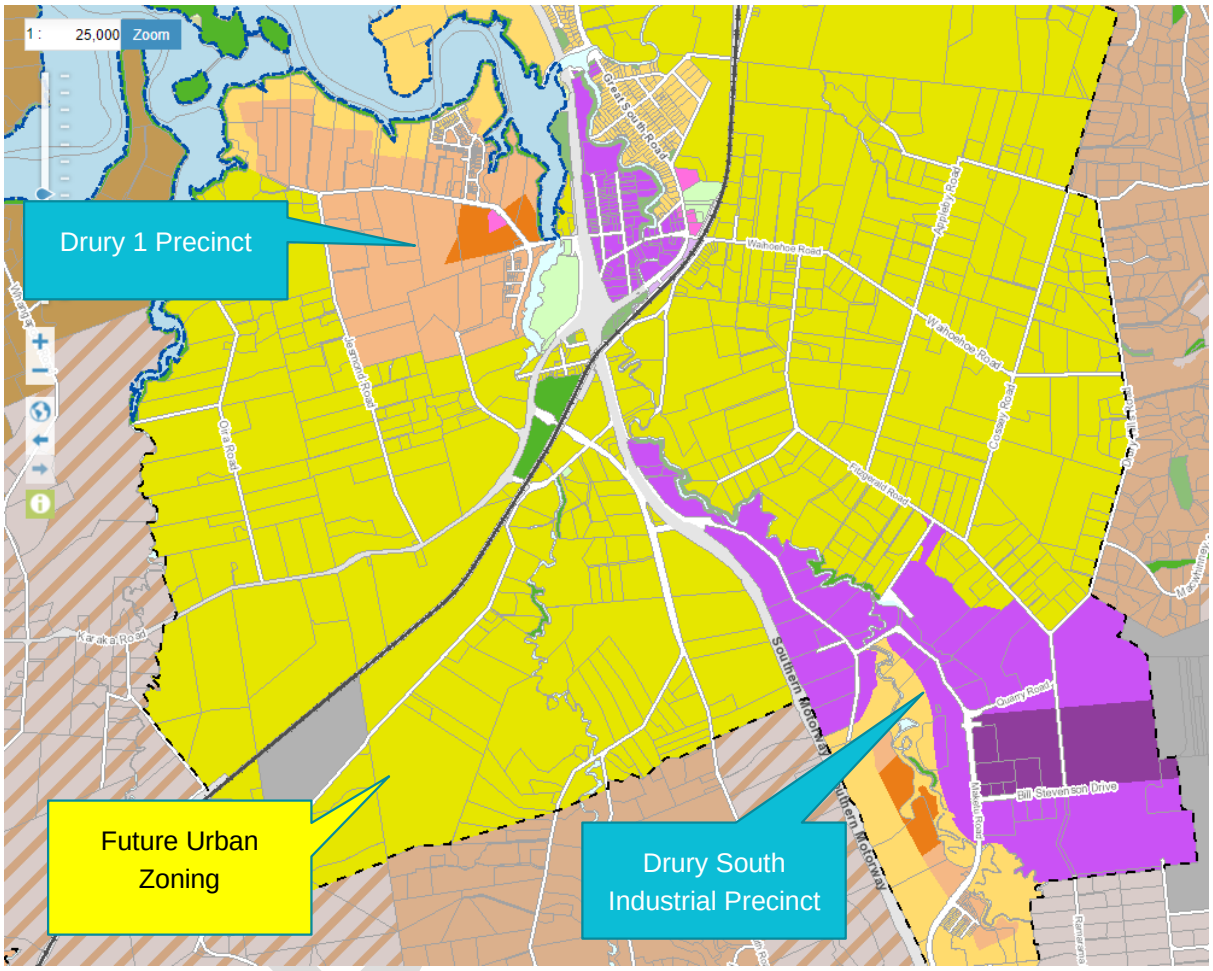
3 Growth Inputs

This chapter outlines the key growth inputs and assumptions used in this assessment.

3.1 Auckland Unitary Plan and Structure Plan

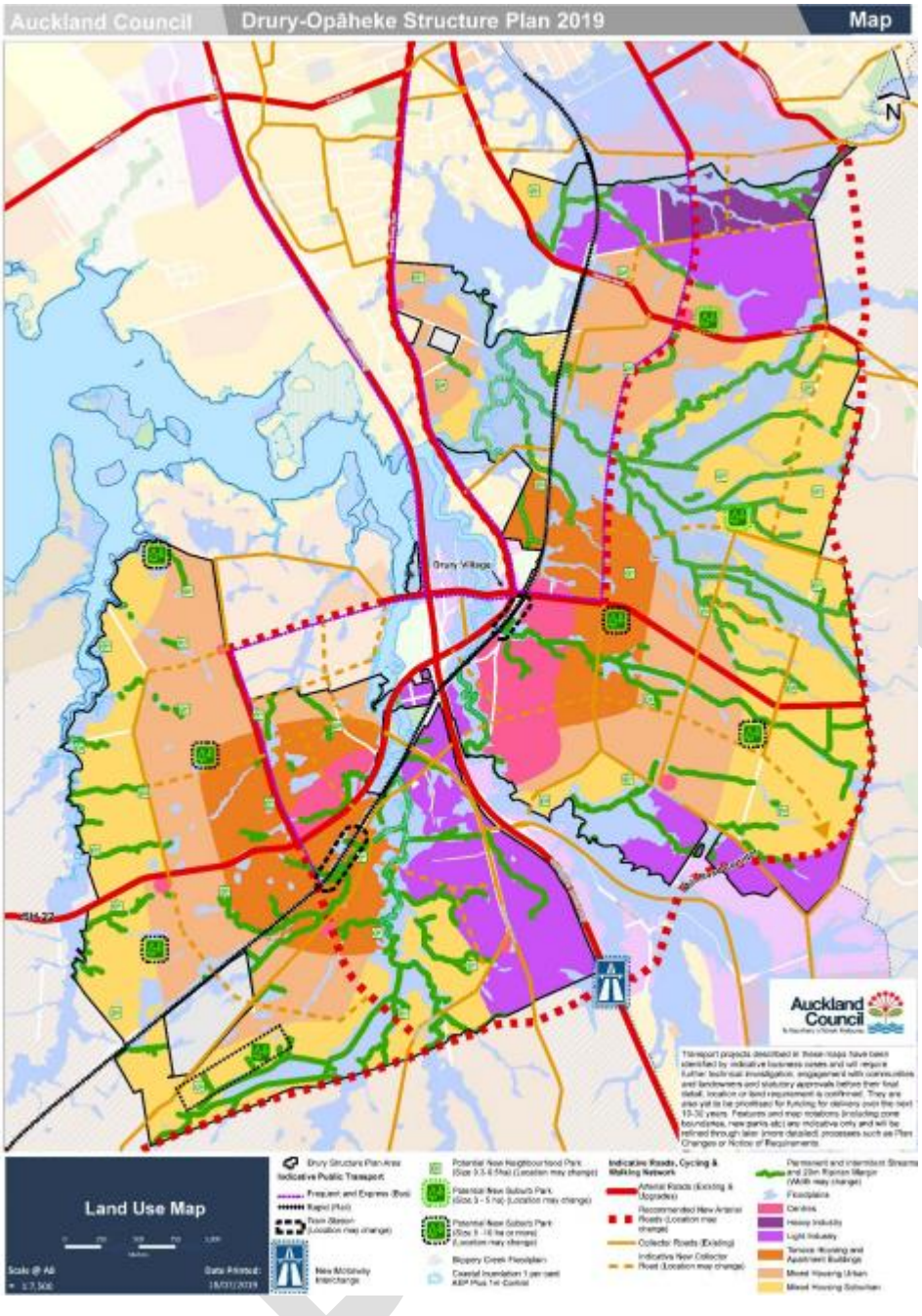
The AUP zoning for the Drury area is indicated in the following figure, highlighting the live-zoned areas and the extensive area of Future Urban Zone (FUZ, shown in yellow).

Figure 3-1 Auckland Unitary Plan Zoning and Precincts



Council progressed the next stage of land use planning by completing the Structure Plan for Drury and Opaheke in 2019. The resulting Structure Plan map (**Figure 3-2**), indicates the preferred type and location of land use activities, as well as the indicative transport network to support it. The indicative transport network indicated includes the SGA strategic network and indicative collector road network. Elements of the SGA network are currently being progressed through more detailed business case investigations.

Figure 3-2 Drury Opaheke Structure Plan



3.2 FULSS

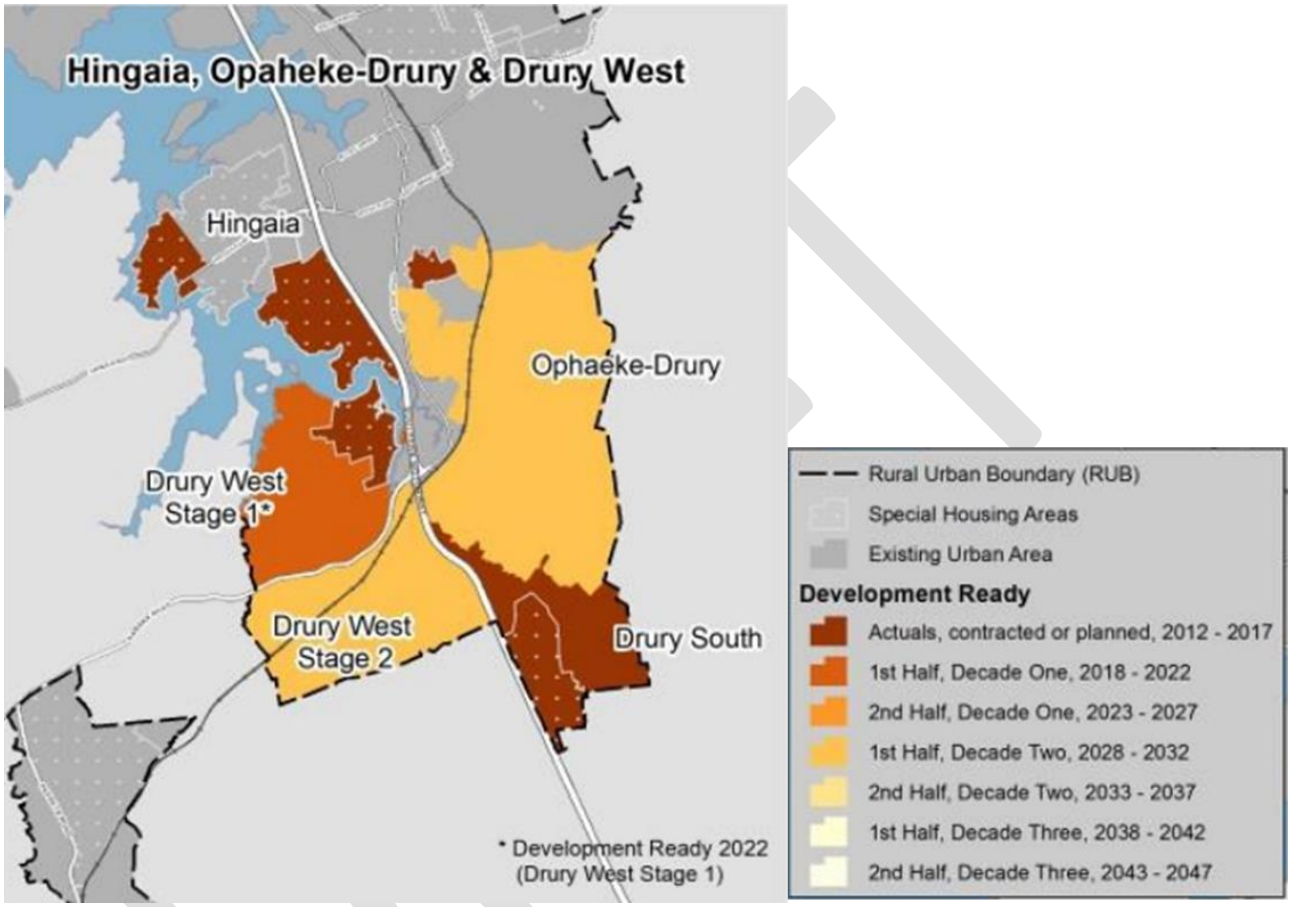
Another key land use planning document that informs both the SGA work and this assessment is Council's Future Urban Supply Strategy (FULSS, 2017). That strategy indicates the preferred sequencing of greenfield (FUZ) land. Relevant to this area is the staged sequencing of new urban areas indicated in **Figure 3-3**. Of relevant in this area is the following:

- Drury West Stage 1 (north of SH22) is indicated for the earliest development, by 2022
- Drury West Stage 2 (south of SH22) is indicated for being development ready by 2032
- Drury East and Opaheke are indicated for being development ready by 2032

It is noted that some of the private plan changes are aligned with this strategy, while those in Drury East involve acceleration ahead of the Strategy.

As noted earlier, this assessment has treated the seven plan changes at face value, assuming all could proceed immediately, regardless of the FULSS. However, the growth assumptions in the wider area remain generally aligned with FULSS (as reflected in the regional land use forecasts).

Figure 3-3 FULSS



3.3 Regional Growth Forecasts

Auckland Council, in liaison with Auckland Transport and Waka Kotahi[5], regularly update their regional land use forecasts. Those forecasts are estimates of long-term regional growth undertaken at a strategic level. They are not intended to provide precise predictions of future land use activities in all areas. Forecasting future land use activities has inherent uncertainty, particular in greenfield growth areas subject to such significant change.

The forecasts are developed from Statistics NZ population forecasts, and reflect various known developments, unitary plan zoning and strategies such as FULSS. The forecasts are used in the transport forecasting undertaken for the regional and sub-regional transport planning, including that undertaken by SGA. The current SGA assessments are based on forecast Scenario I11.5, albeit with

[5] This collaboration of agencies is reflected through the jointly owned Auckland Forecasting Centre

an additional horizon added with full build-out of the FUZ areas (and referred to as the 2048+ forecast). Scenario I11.6 was released in mid-2020 and is being progressively introduced into new SGA business cases. The updated regional scenarios typically reflect changes in the predicted rate of growth in various areas, with total yields in greenfield areas not typically changing unless subject to refined structure planning or plan changes[6]. The Scenario I11.6 forecasts were also created in 2020, with prevailing high levels of uncertainty regarding post-COVID economic and growth conditions.

This DIFF study has also used different assumptions for the Plan Change areas, relying on the regional forecasts only for wider-area growth. While the timing of development (both within and beyond the Plan Change areas), remains uncertain, the use of Scenario I11.5 rather scenario I11.6 is not considered likely to significantly impact the conclusions of this assessment.

3.4 Recent and Current Plan Changes

The following sections summarise the key yield and transport elements of the proposed plan changes, with more detailed estimates of growth rate and trip generation in the Subsequent Chapter 4.

3.4.1 Drury South

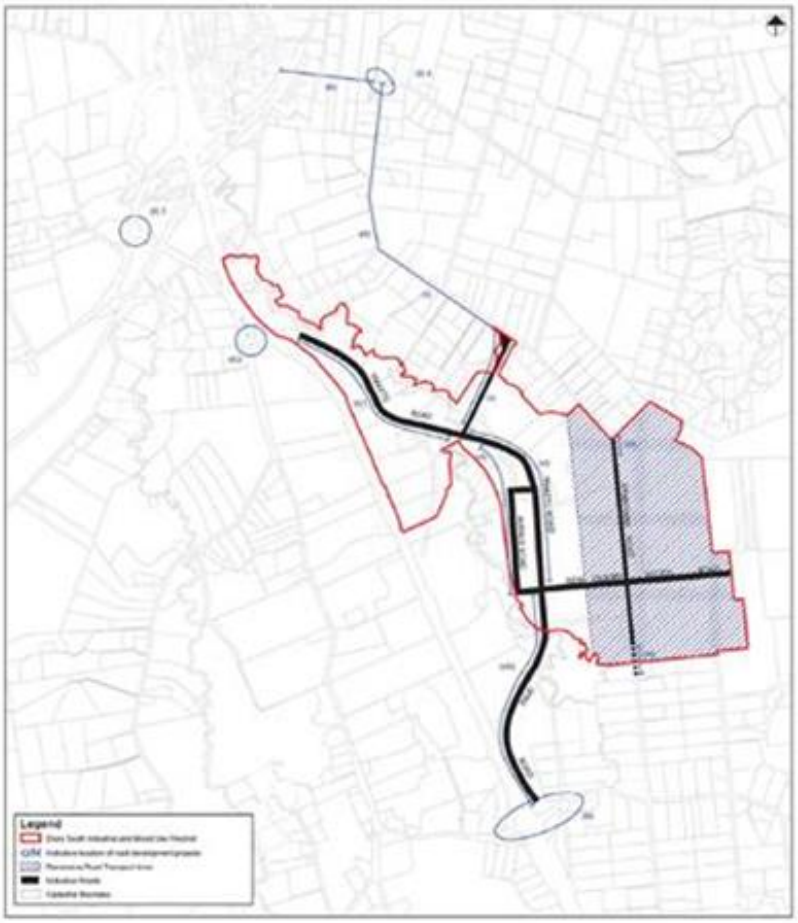
The Drury South Industrial Precinct includes around 185 hectares of Land Extensive Industrial Activities providing for heavy and light industrial activities. The adjacent Drury South Residential Precinct provides for residential development (approximately 750 dwellings). Plan Change 46 has recently been approved which has re-zoned the 'Commercial Services' area in the western part of the Industrial Precinct to Mixed Use.

This area was live-zoned prior to consideration of FUZ areas north and west of the Precinct, and that context is reflected in some of the precinct provisions. The Mill Road corridor with its connection through the Precinct to connect to SH1 was in its early stages of development and not reflected in the Precinct provisions. The transport network is indicated in **Figure 3-4** below. The key elements relevant to this assessment include:

- Use of Quarry Road / Gt South Road and Fitzgerald Rd as the access to the north, along with provisions requiring consideration of upgrades at the Quarry Road/Gt South Road and SH22/Gt South Road intersections. Interim safety upgrades have been implemented at both intersections
- Provisions requiring consideration of a minor upgrade at the Waihoehoe Road/Fitzgerald Road intersection (implemented) and a walk/cycle path on Fitzgerald Road (implemented)
- Creation of a new link road between Quarry Road and Fitzgerald Road to provide a new link to Fitzgerald Road. Note: As closure of Ramarama Road is no longer identified and the possibility of the NZ Upgrade Mill Road project using that same corridor, the provision of this new corridor is somewhat uncertain
- Provisions requiring consideration of upgrades to the Ramarama Interchange intersections, which provides the main access to the south. A full roundabout upgrade has been completed on the east side and an interim safety upgrade has already been provided on the west side.

[6] This comment relates to the regional forecasts and models. It is noted that the local traffic models used in this assessment did apply different assumptions on total yield and build-rate.

Figure 3-4 Drury South Industrial Precinct Transport Plan



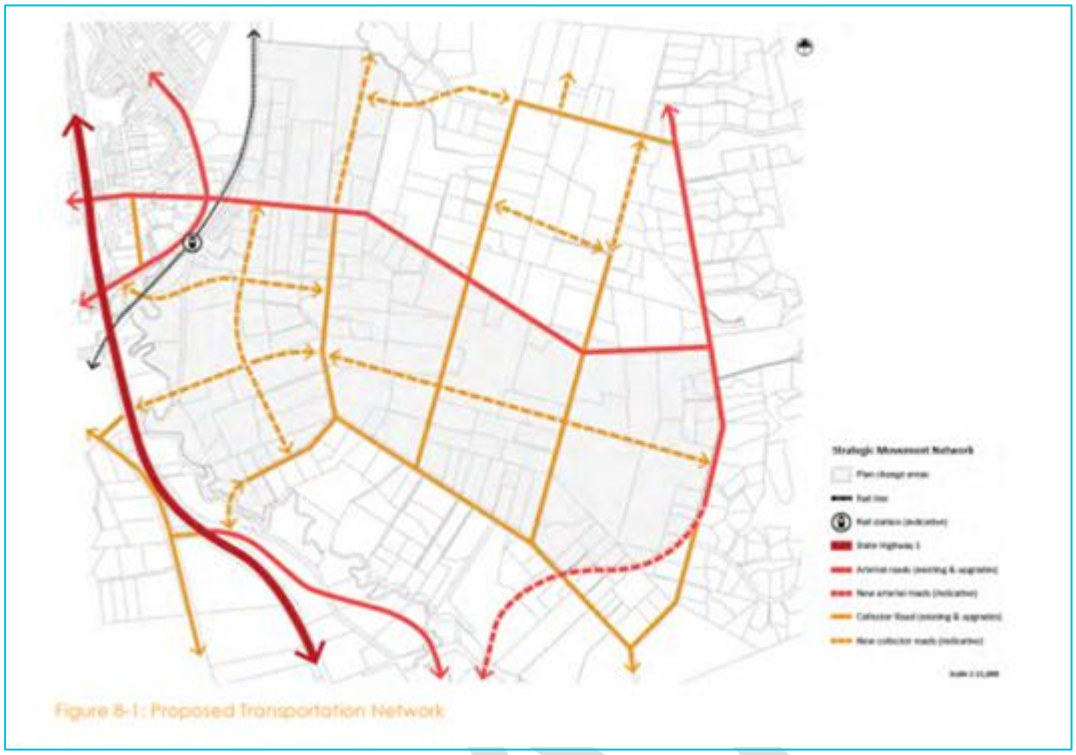
3.4.2 Drury East

Three private plan changes have been lodged covering the Drury East area. Those three Plan Changes have identified a common transport plan, indicated in **Figure 3-5** below.

Based on the plan change documents, the three plan changes suggest combined yield of:

- 7,000+ residential dwellings
- 100,000m^2 GFA of retail development
- 60,000m^2 GFA of commercial activity
- 16,000 m^2 GFA of community space

Figure 3-5 Drury East Proposed Transport Network[7]



3.4.3 Drury West

For this assessment, Drury West comprises the areas within the two MSM model zones north of SH22, including

- The live-zoned Aurunga A/B1 area (as included in the Drury 1 Precinct)
- The Aurunga B2 private Plan change 51
- The Waipupuke Private Plan Change 61
- Residual FUZ areas north of SH22

For this combined area, a yield of some 8,500 dwellings is indicated, along with a 12,000m2 GFA Centre. The network plans for the various plan change areas are indicated in the following figures (as sourced from the Plan Change documents or Unitary Plan).

[7] Background map sourced from Plan Change documents

Figure 3-6 Drury 1 Precinct Plan

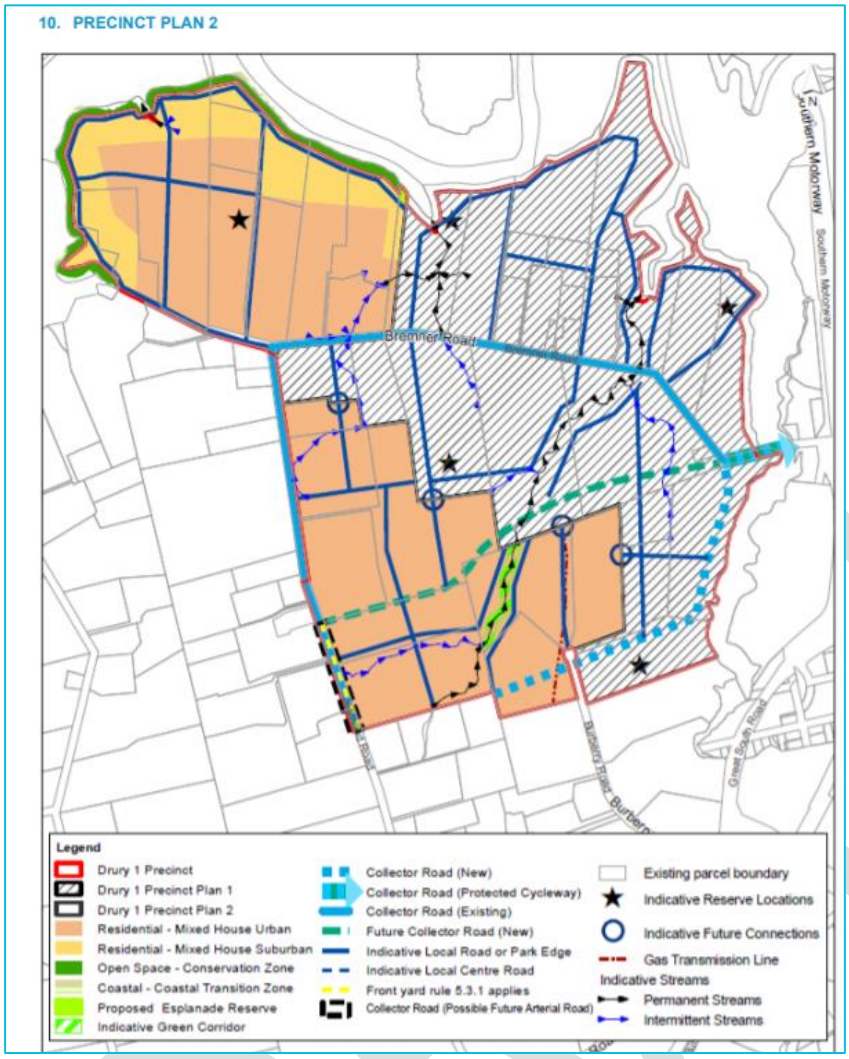


Figure 3-7 Plan Change 51 (Sourced from PC51 ITA Report)

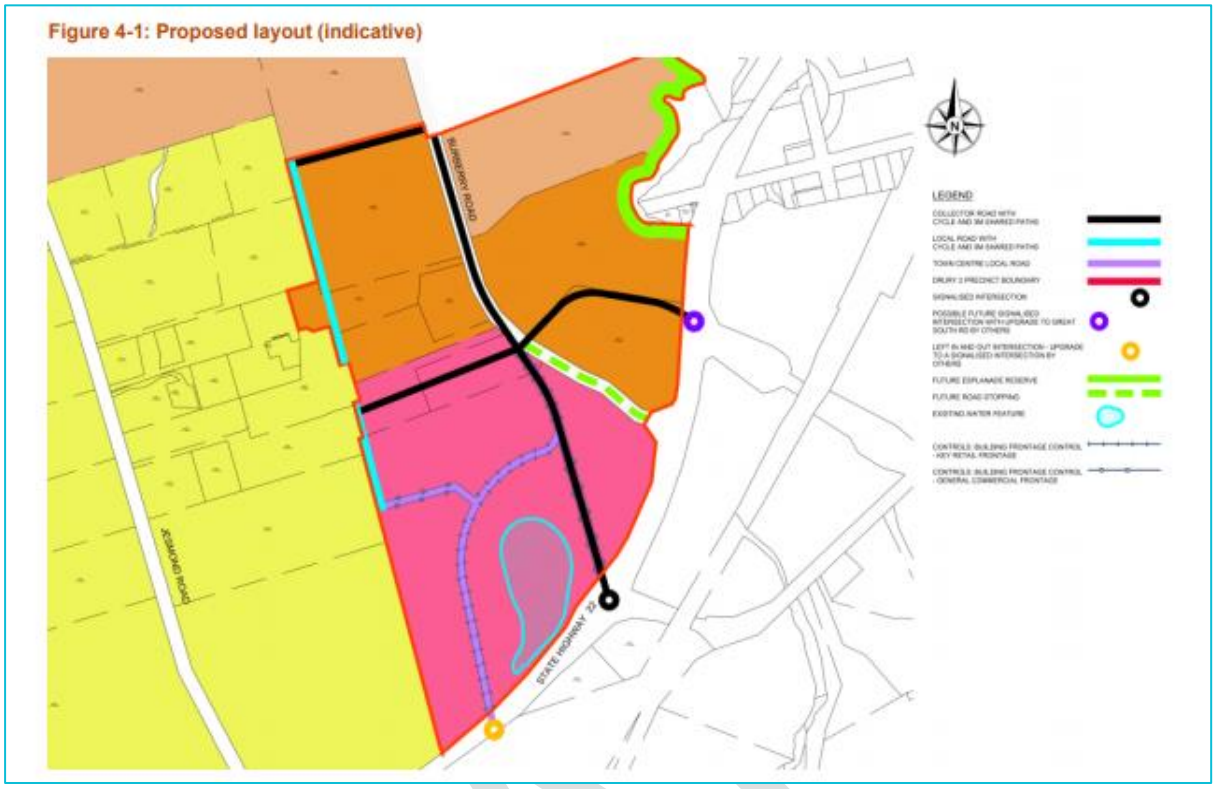


Figure 3-8 Plan Change 61 (Waipupuke) – Sourced from PC61 ITA Report

4 Movement and Access Assessments

This chapter considers likely traffic demands for Drury East and Drury West and key access requirements. The requirements and timing for PT, walking and cycling facilities were primarily derived from the Staging Principles. The traffic generation estimates used here are net, after assuming quite significant changes in traditional mode share.

4.1 Drury East

4.1.1 Trip Generation

For the purposes of this assessment, Drury East is defined as the area contained in MSM zones 554 and 555. These two zones cover the extent of the three plan changes for Drury East, but also includes a portion of future urban zone immediately north of Waihoehoe Road.

Detailed assumptions on development roll-out and the estimated vehicle trip generation for Drury East are contained in **Appendix A** and summarised in the following Figures. The figures also include estimates from the regional growth forecasts (Scenario I11.5). The Plan Change documents indicate total employment of some 6,000, which has been used here for comparison with the regional forecasts (with pro-rata from the floor area growth for interim years).

It can be seen that the total number of dwellings is some 18% higher than the regional forecasts, and with a faster/earlier growth rate. The total employment is however substantially higher than the regional forecasts[8].

The estimates of traffic generation, even after substantial assumptions of mode shift, indicate a very significant scale of demand, at nearly 65,000 vehicle movements per day. To put this in context, SH1 just north of Drury had 62,000 vpd in 2018. It is noted that these trip generation estimates are for future occupiers of the urban growth, and do not include construction-related traffic.

[8] It is possible that the Plan Change estimates use a different definition of jobs than the regional forecasts (e.g. employee counts versus full-time equivalents). The modelling check undertaken for this study used the estimated floor areas, rather than predicted employees.

Figure 4-1 Drury East Build Out Assumptions

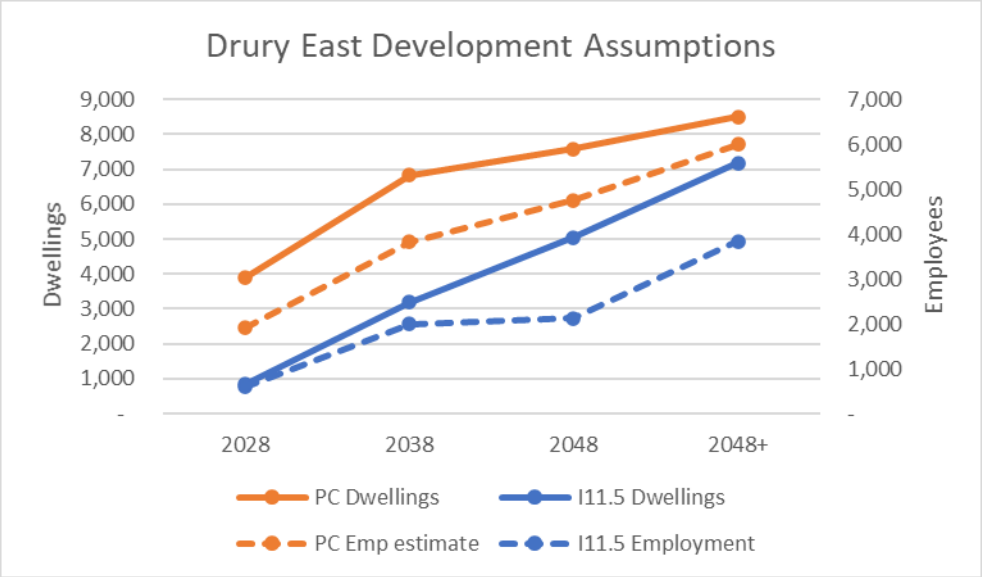
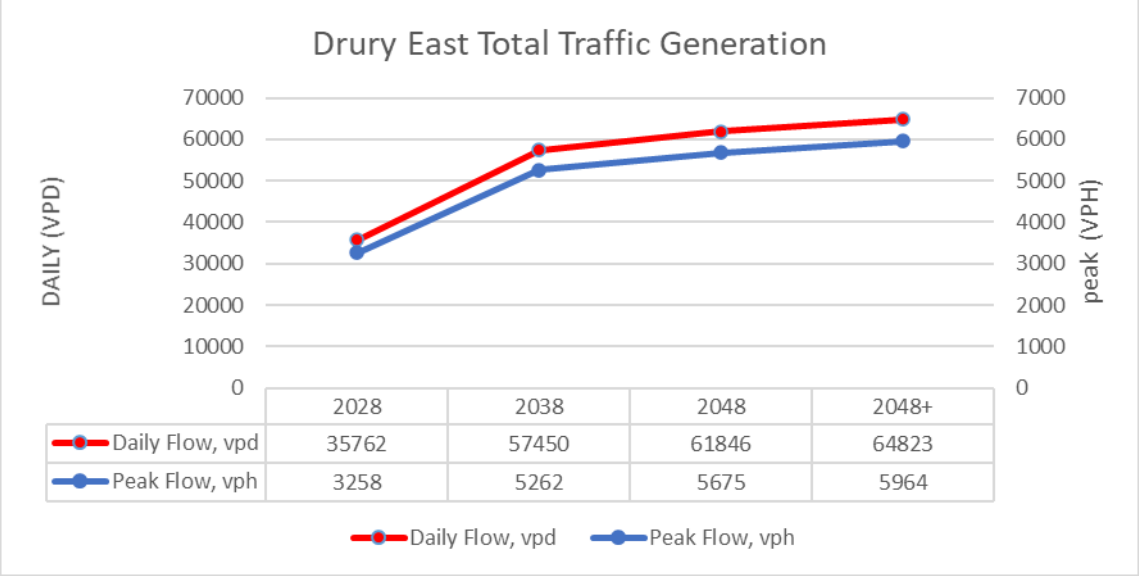


Figure 4-2 Drury East Vehicle Trip Generation Estimates



4.1.2 Drury East Access

Drury East access is constrained by the SH1 and rail corridors and the undeveloped rural Opaheke area to the north. It is currently accessed only by two roads, being Waihoehoe Road to the west (into Drury Village), and Ramarama Road to the south (which can then connect to Quarry Road or south on Maketu Road).

The Drury East Plan Change documents indicate a number of potential new access points (**Figure 4-3**), including:

1. An access to SH1 at the Drury South interchange (it is understood that current options considered for this link involve a direct ramp into the site from the existing southbound off-ramp)
2. A new link over SH1 to the west to connect to Pitt Road
3. A new link from Brookfield Road to Quarry Road

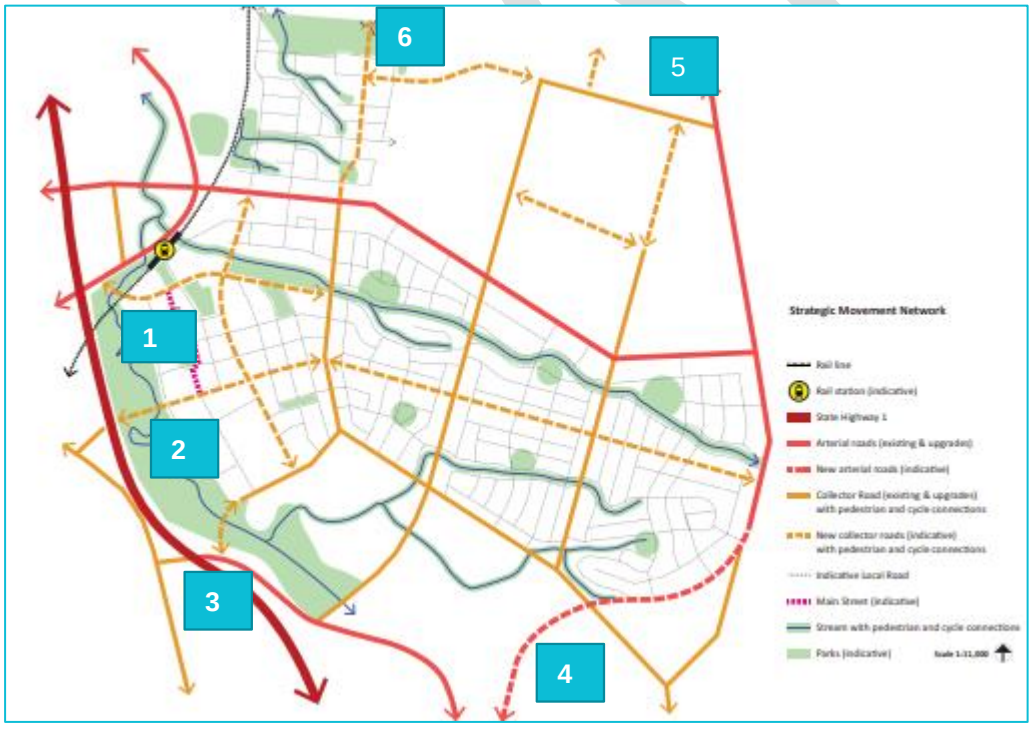
4. A new connection to SH1 via the proposed Mill Road corridor and the associated Drury South interchange
5. A new connection north to Papakura via the proposed Mill Road corridor
6. A new connection north to Opaheke via the proposed Opaheke North South arterial

Although shown in the Movement Map, the Plan Change assessments suggested that the Drury ramp, Pitt Road and Brookfield connections were not required for development. This assessment has however considered the case for additional connections, particularly due to uncertainty around strategic projects like Mill Road.

The Mill Road project would provide additional access north to Papakura and also south to SH1 (and then further south or north on SH1). The SGA work indicates that the Opaheke North-South arterial is likely to be a longer-term project dependent on full development of the Drury East and Opaheke areas. The Pitt Road connection appears useful in providing an access to/from the west, however is considered less likely to be the preferred connection to the west given it would involve an extensive new structure spanning SH1.

The Brookfield-Quarry Link would provide a similar access to the west, (and the additional route to access SH1 at Drury via Quarry Road, Gt South Road and SH22), which would relieve traffic flows on Waihoehoe Road and allow easier east-west movement via routes that don't have motorway interchanges. The feasibility of that connection would however need to be confirmed, due to its crossing of the Hingaia stream.

Figure 4-3 Drury East Access Links (Background map sourced from plan change documents)

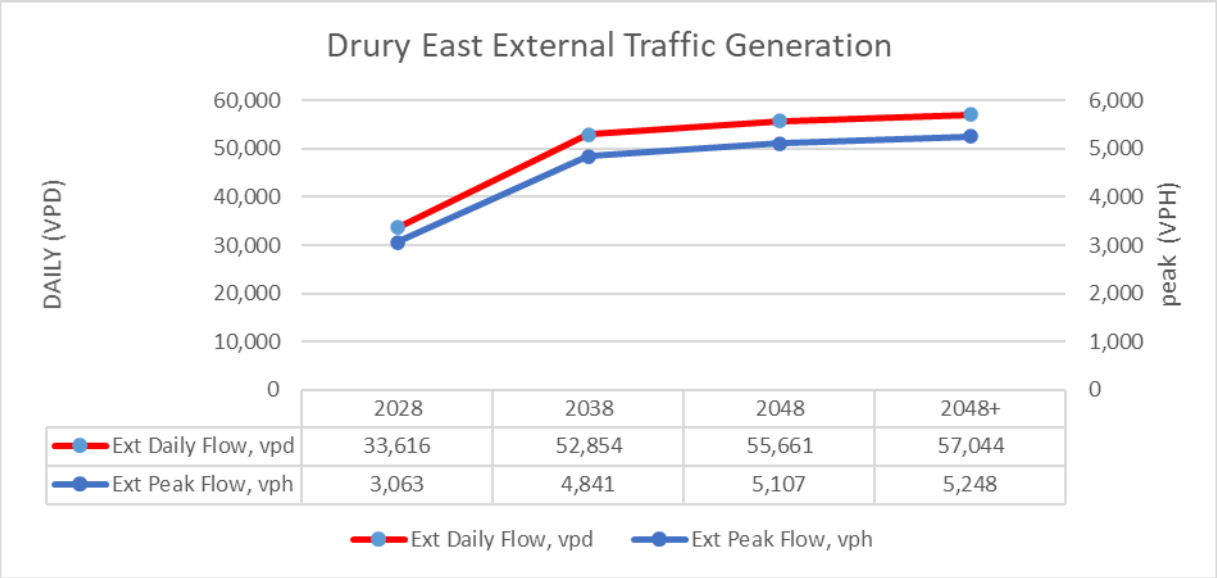


Given the uncertainty of the timing of strategic links such as Mill Road, model tests were undertaken with and without the southern elements of Mill Road. Given the additional uncertainty of the scale and timing of growth, these were simple model tests, assuming the same travel demand patterns. While removing a key strategic link such as Mill Road would be expected to alter the distribution of trips,

these tests have focussed on total trips entering/leaving the site. As such, the distribution of trips beyond the key access points is considered less critical.

The total daily and peak hourly traffic flow entering/leaving Drury East are indicated in **Figure 4-4** (note this differs from Figure 4-2 above as it excludes trips remaining within Drury East). This indicates some 33,600 movements per day accessing this area in 2028, rising to 57,000 movements per day at full build out. This 'external' trip generation only relates to generation from activities within Drury East, however the network to which it is applied will also include through traffic from other adjacent areas.

Figure 4-4 Drury East External Traffic



The need for new access points has been identified by using estimates of maximum 'desirable' daily flows on the access points. These daily flows are used in preference to hourly delays as they are considered less sensitive to specific intersection or network design assumptions, and also more representative of the business periods outside commuter peaks[9].

Waihoehoe Road west has a current daily traffic flow of some 4,500 vehicles per day, which is expected to increase with the live-zoned growth occurring from Drury South. This road is planned as a key FTN route and a critical walk-cycle access from Gt South Road into both the Drury East area and the rail station. As such, a desirable daily flow of less than 15,000-18,000 vpd is considered suitable. The SGA planning proposes Waihoehoe Road to ultimately be a 4-lane corridor, however the intention is to retain 2 lanes for traffic, with the additional lanes for bus priority on this important FTN corridor.

Ramarama Road is the southern access to this area, with existing flows estimated at closer to some 2,000 vpd. As a rural collector road, a desirable maximum daily flow would be less than some 8,000 vpd, rising higher to maybe 10,000 vpd as an urban road. However, only a relatively small proportion of the Drury East traffic is expected to head south via Ramarama Road. This proportion would vary depending on what links are in the wider network, however 20% is assumed for this assessment.

[9] As noted in the Staging Principles, congestion in commuter peaks is considered generally less important than during interpeak periods (and in fact, some levels of congestion are useful to drive consideration of other modes)

Hence, Waihoehoe Road is estimated to have 'spare' capacity for maybe 10,000 vpd from Drury East (depending on the background growth from Drury South), while Ramarama Road could maybe take some 5,000 vpd. Therefore, the existing access points are considered only able to absorb up to 15,000 vpd from Drury East development. It is clearly apparent that the 33,000 vpd movements accessing the site by 2028 cannot be accommodated on the existing two access points.

It should be noted that these roads would need to be upgraded to urban roads to support growth in this area, so this assessment applies to the upgraded roads, not the existing, rural roads.

Selected traffic model flows are extracted for a cordon around the site indicated in **Figure 4-5**, with daily flows shown in **Table 4-1**.

Figure 4-5 Traffic Flows and Cordon for Drury East

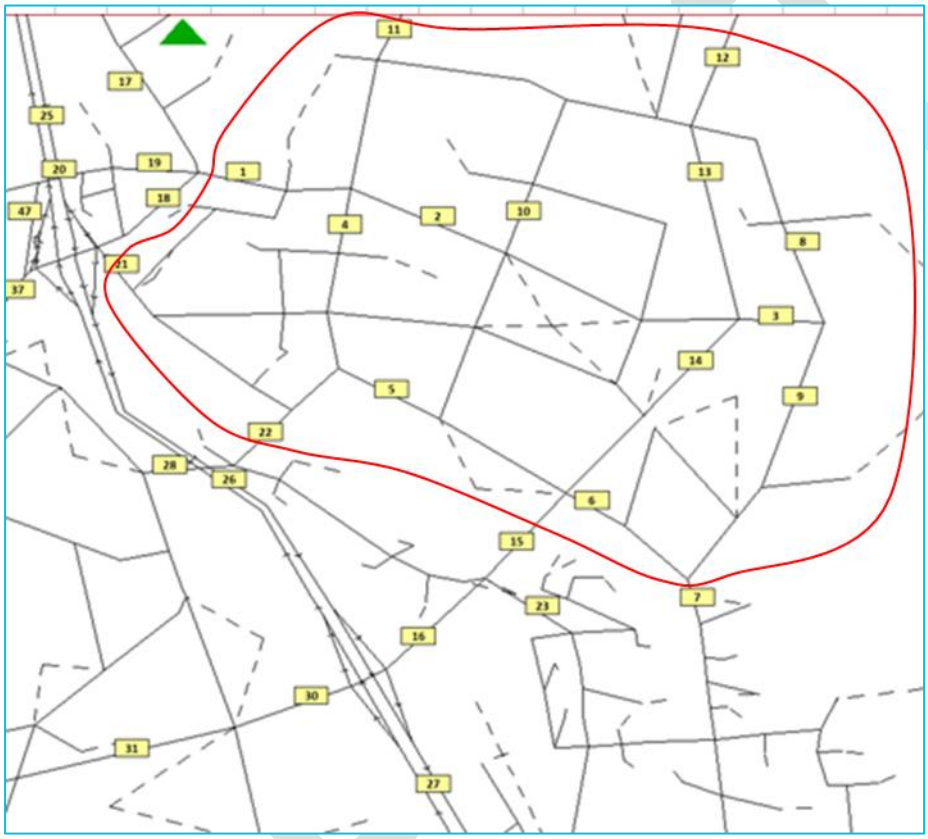


Table 4-1 Estimated Daily Traffic Flows

ID	Connection	2028				2038		2048+	
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario A	Scenario B	Scenario A	Scenario D
		All Mill Rd	Only Drury South I/C	No Mill Rd	No Mill Rd + access links	All Mill Rd	All Mill rd + access links	All Mill Rd	All Mill rd + access links
1	Waihoehoe Road West	20,200	24,200	27,700	19,600	22,800	17,100	24,000	17,900
21	Drury I/C Access	-	-	-	7,600	-	6,000	-	5,300
22	Brookfield-Quarry Link	-	-	-	8,000	-	11,400	-	15,300
15	Mill rd Fitzgerald-Maketu	20,800	11,000	8,600	5,100	36,100	28,800	40,000	31,800
7	Ramarama Road	4,000	3,200	3,400	4,100	7,300	7,400	8,400	8,400
12	Mill Road North of Waihoehoe	21,800	-	-	-	28,500	25,100	36,100	33,200
11	Opaheke North-South Arterial	-	-	-	-	7,800	11,800	12,600	17,200
	Total Cordon	66,800	38,400	39,700	44,400	102,500	107,600	121,100	129,100
	Drury East External Traffic	33,600	33,600	33,600	33,600	52,900	52,900	57,000	57,000
	Other (through) traffic	33,200	4,800	6,100	10,800	49,600	54,700	64,100	72,100
17	Gt South Road	17,500	25,700	26,800	25,400	19,600	17,900	22,900	21,500
25	SH1	106,800	117,800	116,000	117,600	128,600	129,300	144,200	144,400

This analysis indicated:

2028 Models:

- Without Mill Road or the additional access links (Scenario C), resulted in flows on Waihoehoe Road west of 27,700 vpd which would significantly exceed the desired flow. The flow towards the south (Ramarama Road and the link road between Fitzgerald and Maketu Road) indicated a combined flow of 11,500 vpd, which also exceeds the desired flow on Ramarama Road
- Adding the two Additional Access links[10] (Scenario D) takes significant flow off Waihoehoe Road west, bringing it close to (but still exceeding) its desired level. Similarly, the flows likely on Ramarama Road (assuming Link 15 is not built), are 8,500, which near the desired maximum level
- With parts of Mill Road (scenarios A and B), but without the additional access links also shows flows on Waihoehoe Road significantly in excess of the desired level, but those on Ramarama Road (link 7 only) would be below the desired maximum
- The Brookfield-Quarry Link is estimated to have some 11,400 vpd, which is likley to exceed the desired maximum flow for a collector road
- This suggests that additional access links are required to relieve traffic on Waihoehoe Road, even with Mill Road in place
- It can also be seen that the flows on Gt South Road also increase without Mill Road, to levels that would be undesirable for its intended FTN function

2038 Models:

- These scenarios include both Mill Road and the Opaheke North South Arterial, whichaffects wider network flows, noting these are only modellings assumptions as neither project has committed funding.
- Even with Mill Road and the Opaheke North-south arterial, the flows on Waihoehoe Road west exceed the desired maximum if the additional Access Links are not provided
- The Brookfiled-Quarry link serves some 8,500 vpd, and the Direct Drury Interchange access is estimated to serve some 7,800 vpd, reducing flows on Waioehoe Road to desired levels
- This again suggests the the Additional Access links are required to relieve traffic on Waihoehoe Road, even with Mill Road and the Opaheke North-South arterial in place
- Without the Opaheke arterial, the flows on Wiahoehoe Road and Gt South Road would be expected to be higher than shown in these models

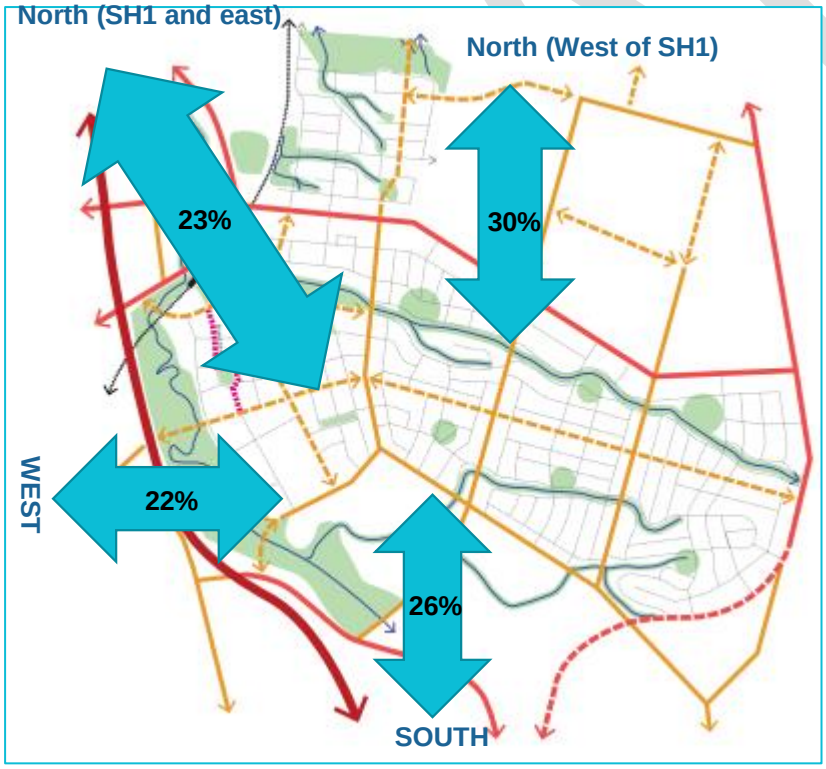
[10] This refers to both the Brookfield-Quarry Link and the Drury Interchange ramp

2048+ Models

- Again, the Additional Access links are required to bring Waihoehoe West to more desirable levels (this is consistent both short and long term)
- The Brookfield-Quarry Link is the most effective access, carrying nearly 3 times more traffic than the Drury Interchange access
- The Brookfield-Quarry Link is estimated to have some 15,400 vpd, which is likely to exceed the desired maximum flow for a collector road. This flow could be even higher if the direct Drury Interchange link was not in place

To further explore the need for accesd links, the potential distribution of site traffic was extracted from the models. This reduces the issues with the modelled flows on any link to a great extent depending on the assumed land use and network assumptions made for that scenario. This distribution of daily vehicle trips was estimated from the models, and summarised in **Figure 4-6**. It is noted that these porportions are indicative only, and would change somewhat with different network assumptions. However, the broad pattern is considered suitable for this analysis. These distributions were then applied dto the total external trips estimated for Drury East, as indicated in **Table 4-2**.

Figure 4-6 Estimated General Distribution of Vehicle Trips[11]



[11] Background map sourced from Plan Change documents

Table 4-2 Estimated Distribution of Drury East Traffic Movements

Year	2028	2038	2048	2048+
Daily External Traffic Movement	33,600	52,900	55,700	57,000
North/East	9,900	15,600	16,400	16,800
North/West	7,700	12,200	12,800	13,100
South	8,600	13,600	14,300	14,600
West	7,300	11,500	12,100	12,400

As noted above, the 'spare' capacity on Waihoehoe Road access is estimated at some 10,000 vpd, with spare capacity on southern Ramarama Road access of some 5,000 vpd. This analysis does not directly consider through traffic on the key access roads, which will vary depending on what new access links are provided. However, this data indicates that for the full development of Drury East:

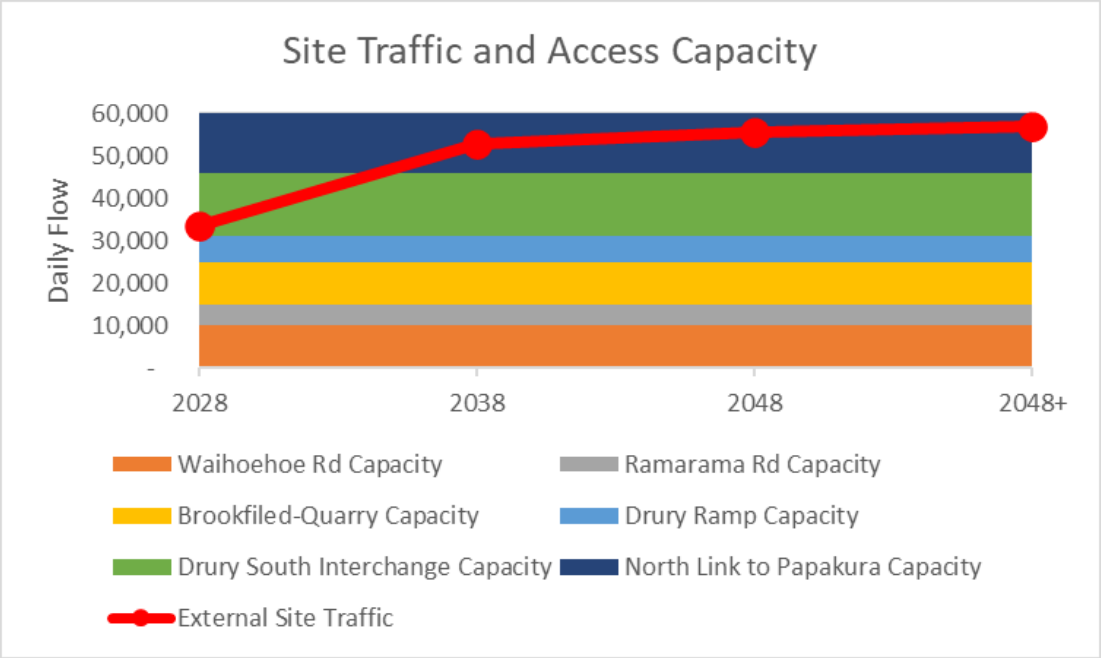
- A new access to the west is required, such as the Brookfield-Quarry Link
- An additional access to SH1 is required for travel south and north on SH1, such as the Drury South Interchange and access roads
- An additional connection is needed north to Papakura to reduce traffic on Waihoehoe Road, SH1 and Gt South Road

To demonstrate this outcome, the 'available' capacity on key link roads were estimated to identify the total access points required:

- Waihoehoe Road was estimated at some **10,000 vpd**, based on background/through traffic of some 8,000 vpd and a desirable maximum of 18,000 vpd
- Ramarama Road was estimated at **5,000 vpd**, based on background/through traffic of some 4,000 vpd and a desirable maximum of 10,000 vpd once urbanised
- The brookfield-Quarry Link was estimated at up to **10,000 vpd**, for an urbanised route, and assuming upgrades to the receiving Gt South Road
- The direct Drury Interchange ramp was estimated to offer some **7,000 vpd**. This flow could vary depending on the design and how it connects into the local network within Drury East
- The SH1 Drury South access was estimated to offer some **15,000 vpd.** This value is indicative as it dpeends on whether the northern part of Mill Road is in place, and hence how much regional through traffic would be on the link. However, SH1 north would remain a key constraint on traffic that could be accommodated from Drury East via the Drury South interchange
- A northern link to Papakura was estimated to offer some **15,000 vpd.** This value is also indicative as it depends on which link is provided (Mill Road or the Opaheke North-South arterial), and hence how much regional through traffic would be on the link.

The cumulative access capacity and total (external) site generation is indicated in **Figure 4-7** below. It should be noted that this is indicative, as the traffic flows and 'available' capacity are dependent on which links are in place and wider-network assumptions. However, it confirms that multiple new connections are required to service the full development of Drury East, including new links to the west, south (SH1) and north.

Figure 4-7 Estimated Drury East External Traffic and Available Access Capacity



Overall, this analysis confirms that:

- Multiple additional Access points are needed to serve the full build-out of Drury East:
- The Brookfield-Quarry Road is needed to relieve traffic flows on Waihoehoe Road, even with Mill Road in place. This level of traffic may in fact be too high for a collector road and the models indicate potential through traffic on this route. This suggests that careful network design and traffic calming measures could be required to avoid this route having too much traffic
- An additional connection to SH1 (such as via the Drury South Interchange) is needed to reduce flows on Waihoehoe Road, as well as on the Brookfield-Quarry Link
- An additional connection north to Papakura is need to allow full build out
- A number of these new access links would be needed by 2028 to accommodate the estimated level of initial development

4.2 Drury West

For the purposes of this assessment, Drury West is the area contained in MSM zones 561 and 562, north of SH22. These two zones cover the extent of the three plan changes for Drury west, as well as some future urban areas. Growth areas south of SH22 do not have specific plan changes for them, so relied on the regional growth forecasts.

4.2.1 Trip Generation

Detailed assumptions on development roll-out and the estimated vehicle trip generation for Drury West is contained in **Appendix A** and summarised in the following figures. The figures also include estimates from the regional growth forecasts (Scenario I11.5). The Plan Change documents provided indications of total business yield for the areas north of SH22, which allowed a comparison against regional land forecasts.

It can be seen that the total number of dwellings is some 9% higher than the regional forecasts, and an earlier/faster start to the growth. The estimated number of employees is also higher than regional forecasts, by about 26%[12]. It can be seen that the total estimated traffic generation reaches some 46,500 movements per day. For context, SH22 had some 20,000-24,000 vpd on this section of highway[13].

Figure 4-8 Drury West Land Use Assumptions (all FUZ areas north of SH22)

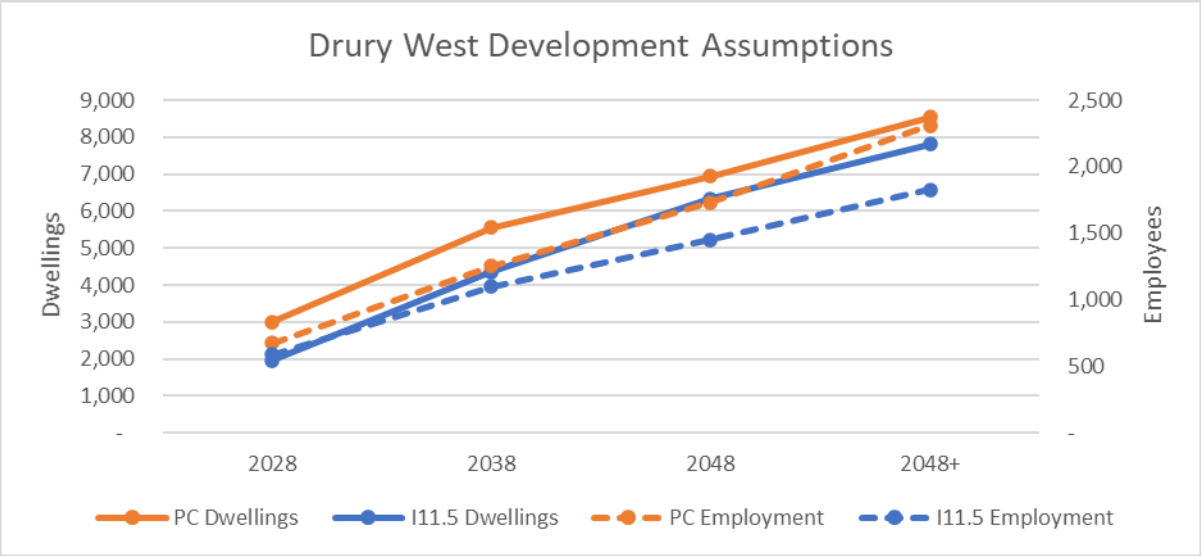
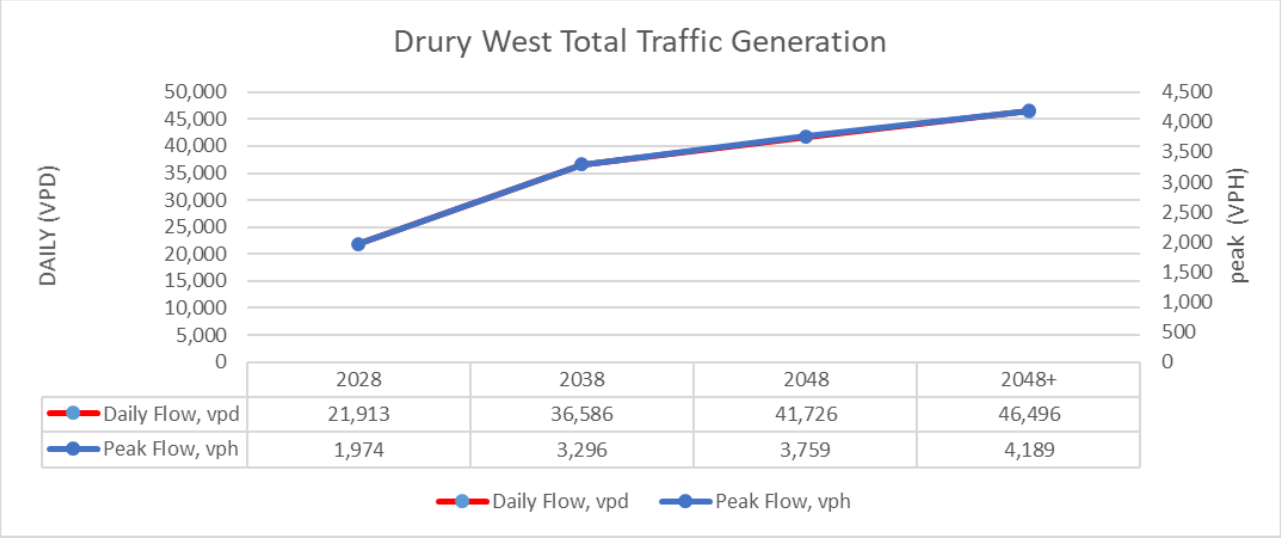


Figure 4-9 Drury West Total Vehicle Generation



4.3 Access

The access to Drury West is either south onto SH22, or east via Bremner Road, over SH1 to Gt South Road (see **Figure 4-10**).

[12] It is possible that the Plan Change estimates use a different definition of jobs than the regional forecasts (e.g. employee counts versus full-time equivalents). The modelling check undertaken for this study used the estimated floor areas, rather than predicted employees.
[13] Source: Waipupuke and Aurunga transport Plan Change assessments

Bremner Road crosses over SH1 and connects to Gt South Road via either Firth Street or Norrie Road (which is constrained by a single-lane bridge). The SGA recommended network proposes Bremner Road to become an arterial road with a critical FTN function, which includes a new connection directly west to Jesmond Road and an upgraded route through the Drury industrial area to replace the Norrie Road bridge. The long-term proposal for this corridor involves 4 lanes, with 2 indicated for general traffic and two for bus or high-priority vehicles.

SH22 is a high-speed, rural road, with traffic flows of some 24,000 vpd. These flows are somewhat influenced by conditions on the nearby SH1, with some traffic from Paerata and west diverting north to the Hingaia Road access when congestion extents south of Papakura. This level of traffic flow is considered to be at or approaching the maximum flows than could be accommodated on this kind of road. The high volumes and speeds are such that the existing priority (Giveway) controlled roads connecting to SH22 are already considered potential crash risks. Any release of new growth areas north of SH22 are therefore considered essential to have controlled intersections (roundabouts, signals or restricted right turns), along with a lowered speed environment. The urbanisation adjacent to SH22 (initially to the north then also on the south), will require this section of SH22 to change in form to better suit this new environment. This is expected to include lower speed environment, segregated walk/cycle facilities, controlled pedestrian crossings and suitable kerb/channel and street facilities to improve the place function and environment for walk and cycle modes. This route will however also maintain its State Highway status and related movement and freight function, until the Pukekohe Expressway is available.

Figure 4-10 Key Access points to Drury West

Traffic count data from the Waipupuke Plan Change documents are shown in **Figure 4-11** below, which show directional hourly traffic flows of some 1,050 vph in the morning peak and nearly 1,400 vph in the evening peak. These flows are considered at or approaching the maximum capacity of such roads. This was checked by investigating SH16 east of Kumeu, which is a similar road environment but with regular queueing indicating it is at capacity. That analysis indicated that the rural form of road and key intersections resulted in maximum directional hourly flows of some 1,350 vph.

Figure 4-11 Traffic Counts on SH22 (Source: Waipupuke Traffic Assessment)

Figure 4-1: Traffic profile for westbound traffic on SH22

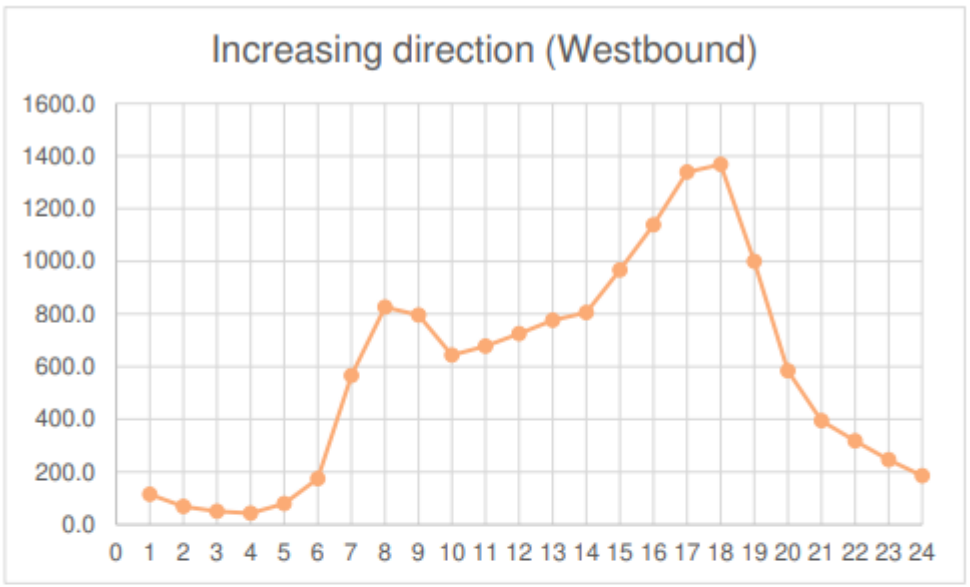
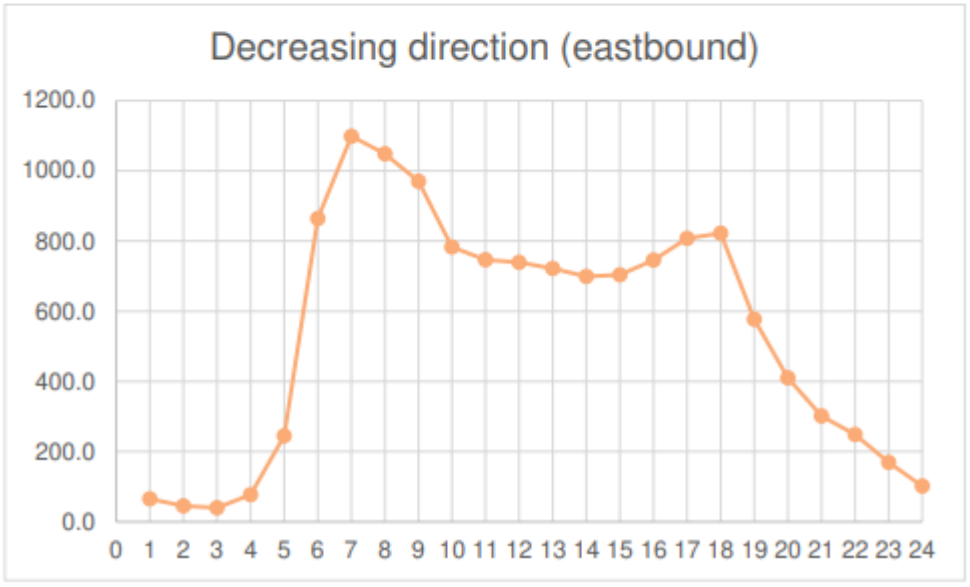


Figure 4-2: Traffic profile for Eastbound traffic on SH22



It is likely that the major intersections on SH16 contribute to this constrained capacity, due to the interruptions from turning and merging traffic. This suggests that while controlled intersections would be required to safely accommodate the expected traffic from Drury West, those intersections themselves are likely to reduce the throughput of SH22 below its current levels. Additional lanes on SH22 are therefore considered necessary to mitigate the additional access traffic, whilst maintaining the strategic function of the highway.

The specific location, form and timing of intersections with SH22 will remain to be agreed between developers and Waka Kotahi, however the following are indicated from the plan change documents:

- Oira Road – full controlled intersection, likely multi-lane roundabout
- Jesmond Road – full controlled, either roundabout or signals

- Town centre access (east of Jesmond Road) – likely to be controlled left-in/out movements only
- Realigned Burberry Road to near McPherson Road – controlled intersection suitable for walk/cycle crossing (it is noted that long-term with 4-tracking of the rail line, the height and width restrictions of the McPherson Road underpass mean it is likely to close to traffic
- Burberry Road – to be closed
- Gt South Road – full controlled, either signals or roundabout
- Victoria Street – no specific plans in Plan Changes, however the Papakura to Drury NZUP project has recently identified the need to install signals at this location for that project. The DIFF modelling indicated this road could attract high volumes of through traffic under some conditions on the wider network. As such, some traffic calming measures on Victoria Street may be needed to be considered if through traffic creates safety issues for the activities on Victoria Street

Model flows in Drury West are presented in **Table 4-3**, for the locations identified in **Figure 4-12**.

Figure 4-12 Location of Selected Model Flows in Drury West

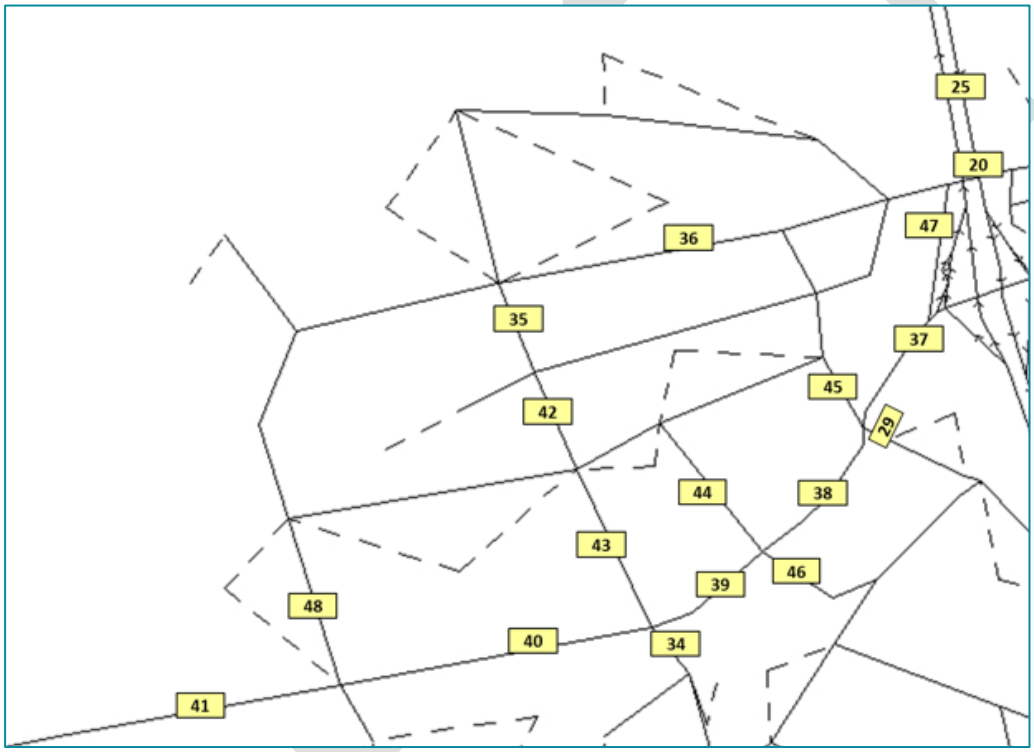


Table 4-3 Selected Daily Flows in Drury West

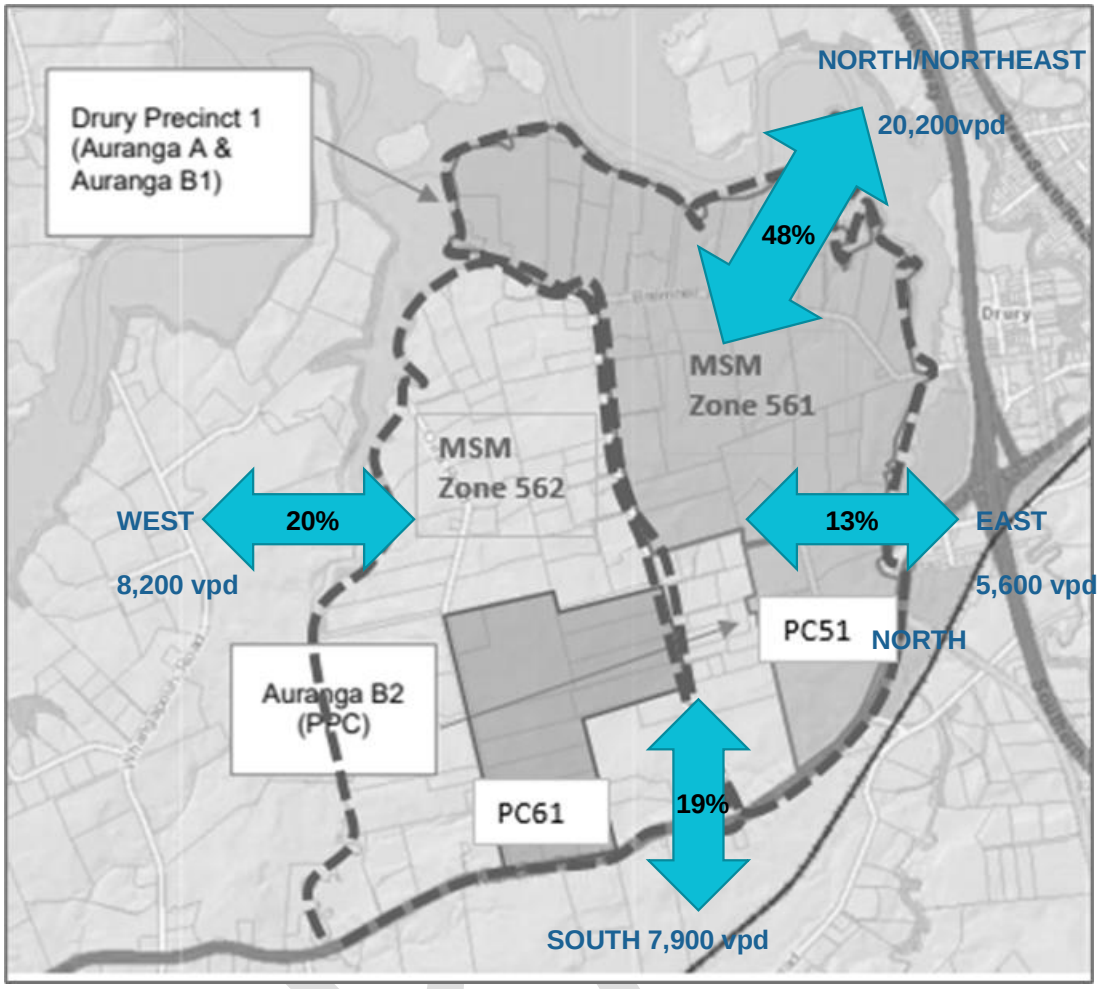
ID	Connection	2028				2038		2048+	
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario A	Scenario B	Scenario A	Scenario D
		All Mill Rd	Only Drury South I/C	No Mill Rd	No Mill Rd + access links	All Mill Rd	All Mill rd + access links	All Mill Rd	All Mill rd + access links
37	SH22	27,500	27,200	28,600	26,200	17,700	12,900	23,600	17,900
38	SH22	26,500	25,400	24,900	24,900	15,300	13,400	18,400	17,800
40	SH22	23,400	22,100	21,400	21,500	14,700	13,200	18,000	17,400
41	SH22	23,800	22,500	21,800	21,900	14,400	13,100	16,800	16,600
29	Great South Road	5,300	5,700	9,300	10,800	6,300	6,800	11,600	10,000
48	Oira Road	800	900	900	900	1,600	1,600	2,900	2,900
43	Jesmond Road	5,400	5,400	5,700	5,800	8,900	8,900	11,700	11,400
44	NewNSRoad	-	-	-	-	1,200	700	2,000	2,000
47	Victoria Street	3,000	2,700	2,900	3,300	4,300	4,400	3,800	3,600
20	Bremner Road	10,400	10,500	10,600	11,000	15,000	15,400	17,600	17,900

This data indicates:

- That except for Gt South Road, the presence of Mill Road has little impact on the traffic flows in Drury West
- The flows on SH22 are very high in 2028, but reduce in later years (due to the assumption that Pukekohe Expressway is included in those models)
- The flows on SH22 will require a four-lane facility to be accommodated
- The model indicates potential for high flows on Victoria Street
- Flows on other roads generally remain within desirable levels

The distribution and potential quantum of traffic from Drury West are indicated in **Figure 4-13**. This demonstrates the important role of SH22 in accessing Drury West for general traffic.

Figure 4-13 Estimated General Distribution of Vehicles



5 Infrastructure Project Assessments

This Chapter provides commentary on the main corridors, followed by presentation of the recommended staging plan.

5.1 Corridor Form and Function

Figure 5-1 indicates the corridors and project elements referred to in the Staging Schedule. **Table 5-1** summarises the intended function, form, staging opportunities and interdependencies of each corridor.

Figure 5-1 Corridors and Project Numbers

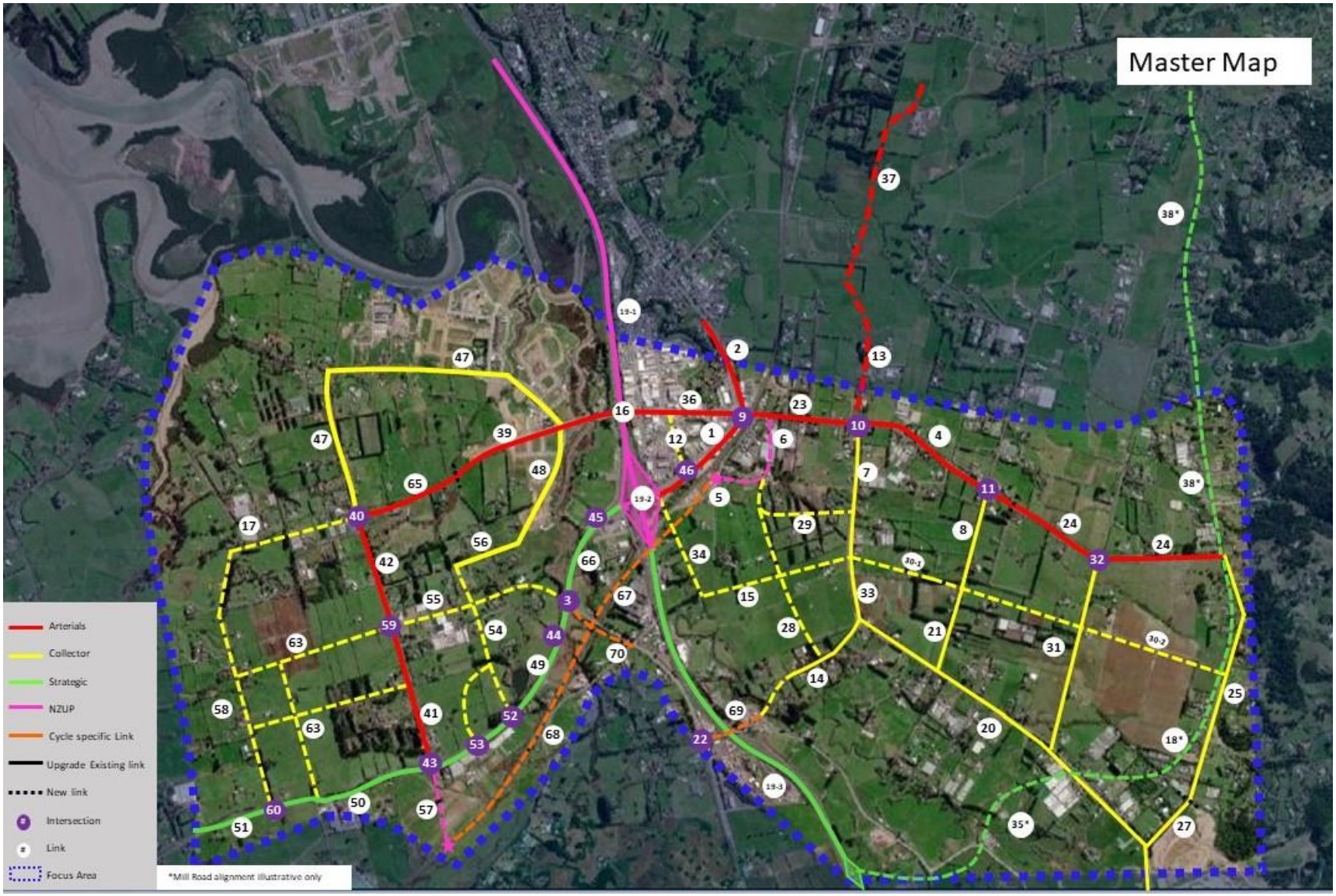


Table 5-1 Corridor Form and Function

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
Drury East				
23	Waihoehoe Road west (Gt South Road to North-South Arterial/Fitzgerald Road), including bridge replacement over the rail corridor	This is a key access link into Drury East for all modes (including to the Drury Central station), and part of the Jesmond-Bremner-Waihoehoe-Opaheke FTN	4-lane corridor with segregated walk/cycle and with widened/lengthened bridge over the rail. From an operational perspective there is some limited potential to have an interim upgrade focussed only on high-quality walk/cycle links (likely to require temporary bridges over the rail). However, the complexity of the design inter-dependencies suggests that this should be constructed directly to its ultimate form to avoid poor outcomes for the interim form, later re-work and traffic disruptions during construction. The potential need for major pavement rehabilitation and to manage concurrent traffic effects may also require the immediate formation of the ultimate form of key intersections, such as the Waihoehoe Road/Fitzgerald Road intersection.	Construction inter-dependencies with the station access road, closure of Flanagan Road, bridge lengthening for 4-tracks, vertical re-grading for sight distance, upgrade to adjacent Gt South Road intersection and urbanisation of the corridor and integration with adjacent land use development and timing and frequency of bus services. This will also be a key part of the network for managing effects during any concurrent development and road construction activities.
4, 24	Waihoehoe Road east (North-south arterial to Drury Hills Road	Arterial road linking Mill Road corridor into Drury and arterial corridor for walking/cycling movement and local bus services	2-lane urban corridor with segregated walk/cycle. The eastern extent will depend on the alignment for any Mill Road corridor. An NOR has been lodged that allows for a 24m corridor. Interim options within the existing 20m road reserve were considered, however Auckland Transport advised this would not be desirable, with direct development	Inter-dependencies include alignment of Mill Road, rate and location of development along the corridor and integration with earthworks/levels on adjacent development sites to optimise geometric profiles

[14] Note: While the proposed form of the arterial roads has been developed by SGA, the specific form of Collector and local streets will be determined between developers and Auckland Transport.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
			of the ultimate form requested to deliver the desired urban form, transport, constructability and land form integration outcomes.	
7,33,20	Fitzgerald Road	Urban collector Road for Drury East and walk/cycle and local bus connectivity to Drury South	2-lane urban collector road with segregated walk/cycle. Staging opportunities were considered based on location of adjacent development, however urbanisation should be contiguous from the north (to provide continuous walk/cycle links to the town centre and station). Safe walk/cycle connections through to Ramarama Road would also be needed to connect to the jobs and services and residential area n Drury South	Adjacent cycle/walk networks, location of development along the corridor and earthworks on adjacent development sites to integrate and optimise geometric profiles
14	Brookfield Road (including link to Quarry Road)	Proposed as important collector access to Drury East, to provide resilience and capacity to access routes and walk/cycle and local bus routes connecting Drury East and West	2 lane urban collector road with segregated walk/cycle. Potential for initial urban upgrade on existing section of Brookfield Road, prior to construction of link across Hingaia Stream to Quarry Road	A connection to Quarry Road would likely require intersection upgrades to Quarry/Gt South and Gt South/SH22 intersections. Also dependent on adjacent cycle networks, such as on Fitzgerald Road, Quarry Road, Gt South Road and/or the SH1 Drury-to-Drury-South project's walk/cycle links
1,2	Gt South Road (north of Drury Interchange)	Regional north-south arterial, access to Drury East and FTN route	4-lane urban corridor with segregated walk/cycle. Opportunities for interim walk/cycle facilities between Firth Street and Waihoehoe Road	Form of interim works will depend on timing of Norrie Road upgrade. Also related to the timing of FTN north of Waihoehoe
37	Opaheke North-South Arterial	New arterial connection between Drury and Papakura with FTN function	4-lane urban arterial with segregated walk/cycle. Opportunity for interim 2-lane corridor, with bus lanes added when traffic conditions demand	Timing and scale of Opaheke development, timing of Mill Road (Papakura-Drury), Fitzgerald/Waihoehoe intersection capacity and timing and frequency of bus services

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
34	Drury Interchange Ramp	Provide direct access (entry-only) from SH1 into the Drury East area, via a new ramp from the southbound off ramp	Feasible options have been identified by NZUP to include this ramp into the upgrade of Drury interchange, however, the construction of the ramp is not within the defined scope of the NZUP project. This ramp would therefore be subject to new local funding, which if available could allow construction concurrently with the NZUP project, or at a later date. With the removal of the Drury South interchange from delivery within the NZUP programme, there would be benefits in this ramp being provided early to provide alternative access into Drury East and provide construction efficiencies.	Ability to co-ordinate delivery with the NZUP Papakura-Drury project and form of connection of the ramp into the local street network within Drury East.
35	Mill Road: Drury South Interchange to Fitzgerald Road	Regional strategic arterial and access to Drury East and Drury South developments	4-lane regional arterial with segregated walk/cycle. Interim 2-lane versions and only north-facing ramps to SH1 could be potentially considered for interim access to Drury East, prior to any strategic function for Mill Road	Timing of development in Drury East, timing, form and alignment of Mill Road and Papakura-Drury South SH1 upgrade and timing of other accesses to Drury East such as Opaheke North-South arterial, Brookfield-Quarry Link, Waihoehoe Road upgrade and the Drury interchange access ramp
18	Mill Road: Maketu Road to Waihoehoe Road	Regional strategic arterial. **Note: The alignment of this section has not been confirmed**	4-lane regional arterial. Interim use of existing roads could be suitable for any interim Drury South interchange (assuming no strategic Mill Road function to the north)	Timing of development, timing, form and alignment of Mill Road and Drury South interchange and timing of other accesses to Drury East such as Opaheke North-South arterial, Brookfield-Quarry Link, Waihoehoe Road upgrade and the Drury interchange access ramp

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
31	Cosey Road: Fitzgerald Road to Waihoehoe Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function would be managed. **Note: This link could be replaced by Mill Road, depending on its chosen alignment**	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development and alignment for Mill Road
38	Mill Road: Drury to Papakura	Regional arterial and access to Drury East and Opaheke	4-lane regional arterial.	Timing of development in Drury East and Opaheke, timing, form and alignment of Mill Road and timing of Opaheke north-south arterial
30	East-West Collector	Urban collector road. Desirable this would allow quality east-west walk/cycle functions but east-west traffic function would be restricted to prioritise use of arterials and create low-traffic neighbourhood	2-lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Timing of urban development, alignment of Mill Road, timing of Waihoehoe Road upgrade
8,21	Fielding Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function managed	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development.
25,27	Drury Hills Road	Urban collector road.	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development.
28	North-south town centre Boulevard	Town centre local boulevard, prioritising walk/cycle movement	2-lane boulevard	Town centre development and station access needs

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
29	East-west town centre access	Town centre local boulevard, station access to Fitzgerald Road prioritising walk/cycle movement	2-lane boulevard	Town centre development and station access needs
Drury East-West Connections				
36, 12, 46, 16	Bremner Road East	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle and new Norrie Road bridge alignment. Opportunities for interim walk/cycle upgrades between east and west Drury were identified via Firth Street and Gt South Road.	SH1 bridge upgrade as part of Papakura to Drury Project, and timing and frequency of bus services
3, 22	Gt South Road (west of SH21)	Arterial connection accessing adjacent development, east-west connection and alternative access to SH1 for Drury East	2-lane arterial with segregated walk/cycle. Interim version possible with major intersection upgrades prior to development of adjacent land use	Adjacent development, Brookfield/Quarry Link, SH22 upgrades
66, 67, 68, 69 and 70	Regional Active Mode Corridor (Drury West to Drury East)	Regional walk./cycle corridor connecting Drury East to Drury West, Paerata and Pukekohe	Separated walk/cycle facilities adjacent to rail corridor. Opportunity for interim stage for section between Drury East town centre/station and Drury West development station	Rail 4-track, Drury west station, development south of SH22 in Drury West
Drury West				
45,66,3,44,49, 52,53,43,50,60	SH22: Drury Interchange to west of Oira Road	Regional state highway (until any new Pukekohe expressway corridor) and local arterial road for Drury West development, providing walk/cycle, bus and vehicle access to SH1, Drury East, Opaheke and Papakura	4-lane urban arterial with segregated walk/cycle. Opportunities for interim versions were not considered suitable east of Jesmond Road, due to geometric reasons, scale of growth, the need to mitigate new access traffic and need to improve north-south crossings. This corridor will also transition to an urban form, so it would be desirable this was implemented concurrently with adjacent urban development, rather than after the	Pukekohe Expressway Rate and location of growth north of SH22 Rate and location of growth south of SH22, especially based around the Drury West station now committed for delivery through NZUP.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
			development had occurred. A single-stage upgrade would also remove the need for traffic impacts during construction associated with multi-staged construction. Hence it is recommended that this section east of Jesmond Road progresses directly to its 4-lane ultimate arterial form with high quality walk and cycle facilities. Opportunities for interim upgrades west of Jesmond Road were identified, including intersection treatments (Oira Road), lowered speed environment, retaining 2 traffic lanes and walk/cycle facilities only on the north side	
39,65	Bremner Road/New Bremner Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle (2 lanes for buses) Opportunities for interim 2-lane facility	Rate and location of development and timing and frequency of bus services
41,42	Jesmond Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle (2 lanes for buses) Opportunities for interim 2-lane facility	Rate and location of development, Drury West station timing, timing and form of SH22 upgrades and timing and frequency of bus services
58	Oira Road	Collector road	2-lane collector with quality walk/cycle facilities and local bus services.	Rate and location of development and timing and form of SH22 upgrades
63, 17	Waipupuke area internal collector roads	Collector road	2-lane collector with quality walk/cycle facilities and local bus services. Desirably these would allow quality walk/cycle function but in some locations through traffic function could be restricted to prioritise use of arterials and support low-traffic neighbourhood	Rate and location of development, timing and form of SH22 upgrades and the timing and form of connections to Jesmond Road.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
55,54,56	Aurunga/Drury west collector roads	Collector roads	2-lane collector with quality walk/cycle facilities and local bus services. Desirably these would allow quality walk/cycle function but in some locations through traffic function could be restricted to prioritise use of arterials and support low-traffic neighbourhood	Rate and location of development and timing and form of SH22 upgrades
57	Drury West Station and access	Rail station and access and longer-term arterial south to Pukekohe Expressway	4-lane arterial with segregated walk/cycle. Opportunities for 2-lane interim prior to extension south of rail corridor	Development south of SH22 and timing and form of SH22 upgrades

5.2 Recommended Staging Schedule

5.2.1 Purpose and Context

An indicative staging schedule for the Drury projects has been developed from the preceding information. The context for this assessment is important, in that:

- It is for the purpose of Council considering funding and financing options, and as such has not explicitly considered funding constraints or delivery mechanisms
- It is based on transport facilities to serve the proposed plan changes in Drury, using assumed yield and build out rates. It therefore has not considered funding, network, economic or other constraints on growth
- It is based on SGA transport planning principles and processes, and hence does not reflect committed staging agreed by Auckland Transport, Auckland Council or Waka Kotahi
- The ultimate corridor forms are based on the SGA work. Opportunities for potential interim stages remain conceptual options only, with the design, form and timing of any works meaning for agreement between developers and relevant authority (Auckland Transport or Waka Kotahi)

The Staging Schedule is therefore likely to change in response to funding methods, delivery mechanisms, land use decisions and regional investment priorities.

5.2.2 Definitions

The proposed Staging Schedule provides the following information:

- Name of project/stage
- Description of ultimate or potential interim stage
- Corridor hierarchy
- The key growth areas/Developments for which the projects are needed
- An indicative timeframe for the works being needed
- The Staging Principles used in the assessment

Developer areas for which the projects are needed are designated as follows:

- Specific plan change areas
- Cumulative Development in Drury East
- Cumulative Development in Drury West
- Cumulative Development in Drury (being both east and west)
- Opaheke FUZ
- Drury West FUZ (excludes the plan change areas)
- Cumulative growth for Southwest (being Drury, Paerata, Pukekohe)
- Cumulative growth for South Auckland (being growth south of Manukau)

These designations refer to areas for which the project is needed to provide the outcomes identified in the Staging Principles. It is noted that the need, cause or beneficiary of the works may not be equal across all areas. That complexity could be addressed through funding mechanisms.

Timing is intended to be indicative rather than being specific to any year, as follows:

- '2022' refers to being needed at the outset of Plan Change development
- '2026' refers to within the first 5 years of development
- '2031' refers to within the first 10 years of development
- '2036' refers to within the first 15 years of development
- '2041' refers to within the first 20 years of development
- '2046' refers to within the first 25 years of development
- Under construction

5.2.3 Staging Schedule

The Staging Schedule is provided in the **Table 5-2** and following Figures.

Table 5-2 Staging Schedule

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
1a	DE	GSR improvements - Waihoehoe Rd to Drury Interchange	Interim	**2-lane urban**- with active modes on both sides + local intersection improvements (TDM)	Arterial	Cumulative Drury	2022
1b	DE	GSR improvements - Waihoehoe Rd to Drury Interchange	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2036
2a	DE	GSR improvements - From Drury School to Waihoehoe Rd	Interim	**2-lane urban**- with active modes on both sides + intersection improvements (TDM)	Arterial	Cumulative Drury East & local developments	2026
2b	DE	GSR improvements - From Drury School to Waihoehoe Rd	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative All South (Depends on Mill Rd & N-S Arterial)	2036
3	DW	Intersection upgrade on GSR/Karaka Rd intersection	Ultimate	**Ultimate intersection form**	Strategic	Drury All South + Auranga + Cumulative South West	2022
4	DE	Waihoehoe Rd East upgrades- from Fitzgerald Rd to before Cossey Rd (depending on development boundary)	Ultimate	**2-lane urban** - upgrade with active modes on both sides, 24m cross-section	Arterial	Fulton Hogan	2022
5	DE	Drury Central Station	NZUP	NZUP Delivered Rail Station	Rail	Cumulative Drury East + Auranga	2022
6	DE	Drury Station Connection	NZUP	NZUP Delivered Rail Station Access Road	Collector	Cumulative Drury East + Auranga	2022
7	DE	Fitzgerald Rd upgrades (from Waihoehoe Rd to First Stage development boundary , north of Brookefield)	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Collector	Fulton Hogan + Kiwi	2022
8	DE	Fielding Rd upgrades (from Waihoehoe Rd to development boundary)	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Collector	Fulton Hogan	2022
9a	DE	Upgrade in GSR/Waihoehoe intersection/Norrie Rd	Interim	**Upgrade intersection** with active mode crossings and additional approach capacity, tieing into Waihoehoe Road upgrade and bridge replacement	Arterial	Cumulative Drury East + Auranga + Station Park & Ride	2022
9b	DE	Additional Upgrade for Norrioe Apporach to tie-in to Norrie FTN Upgrade	Ultimate	**multi-lane signalised intersection** with active mode crossings, SGA design	Arterial	Cumulative Drury East	2036
10a	DE	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Interim	**Earthwork and land form for 2-lane roundabout but potential initial use as single-lane intersection** - with active mode crossings from outset	Arterial	Oyster+ Fulton Hogan	2022
10b	DE	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Ultimate	**Upgrade to ultimate form**	Arterial	Cumulative Drury East	2031
11	DE	Intersection upgrade Waihoehoe Rd/Fielding Rd/Appleby Rd	Ultimate	**Roundabout as per SGA NOR design**	Arterial	Fulton Hogan	2022
12	DE	Interim walking, cycling and bus connections to Drury Centre (includes Bremner/Norrie/Firth intersection upgrades, active mode on Norrie) -overlap with project 36 and 46	Interim	**Intersection improvements** on Bremner-Firth Rd, Norrie-Firth Rd, GSR-Firth Rd, Active mode facilities on both sides of Firth & Norrie Rd	Collector	Fulton Hogan + Kiwi + Oyster + Auranga	2022
13a	DE	N-S Opaheke Arterial across development (upto Waihoihoi Stream)	Interim	**2-lane urban**- new 2-lane arterial with active modes on both sides + intersection improvements (TDM)	Arterial	Oyster	2022
13b	DE	N-S Opaheke Arterial across development (upto Waihoihoi Stream)	Ultimate	**4-lane urban**- upgrade 2-lane arterial with SGA design + intersection improvements (TDM)	Arterial	Cumulative Drury East + Opaheke	2046
14	DE	Upgrade Brookefield Road from Fitzgerald to Quarry Rd+ New connection + Intersections on Quarry & Fitzgerald	Ultimate	**2-lane urban** upgrade with active modes on both sides + intersection improvements + new connection to Quarry Rd)	Collector	Cumulative Drury East	2026
15	DE	New Collector road E-W from Fitzgerald Rd (collector 1) + Intersections	Ultimate	**2-lane collector**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with development staging)	2026
16a	DE/DW	2-lane bridge over Bremner/Waihoehoe Rd **(included in NZUP project 19-1)**	NZUP	**2-lane urban** with active modes on both sides (replacing existing bridge as part of SH1 P2D NZUP)	Arterial	Cumulative Drury (funded through NZUP)	2022
16b	DE/DW	4-lane bridge over Bremner/Waihoehoe Rd	NZUP	**4-lane urban**- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	Cumulative Drury	2046
19-1	DE/DW	SH1 3-laning and cycleway upgrades from Papakura to Drury Interchange	NZUP	NZUP Delivered upgrade to SH1	Strategic	NZUP	Under Construction
19-2	DE/DW	SH1 Drury Interchange including ramps	NZUP	NZUP Delivered upgrade to Drury Interchange	Strategic	depends on NZUP P2D re-baselining scope	2022
19-3	DE/DW	SH1 3-laning and cycleway upgrades from Drury Interchange To Drury South	NZUP	Papakura-Drury South Stage 2 (prev NZUP)	Strategic	depends on NZUP P2D & Mill Rd re-baselining	2036

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
20	DE	Upgrade Fitzgerald Rd from Brookefield to Ramarama Road	Ultimate	**2-lane urban**- upgrade with active modes on both sides + intersection upgrades (TDM)	Collector	Fulton Hogan (progress with development staging) + Cumulative Drury East	2026
21	DE	Fielding Rd upgrades for active modes (from Fitzgerald Rd to development boundary)	Ultimate	**Active mode upgrades**- existing road layout with active modes on both sides + intersection upgrades for active mode crossing	Collector	Fulton Hogan (progress with development staging)	2026
22	DE/DW	Upgrade Intersection at Quarry/ GSR	Ultimate	**Upgrade intersection** (roundabout) with active modes facilities(TDM)	Collector	Cumulative East+ Drury South	2022
23	DE	Waihoehoe Rd West upgrades- between GSR & Fitzgerald Rd, including bridge replacement over rail corridor	Ultimate	**4-lane urban FTN**- upgrade with active modes on both sides, SGA design	Arterial	Cumulative Drury East and Opaheke (depends on Mill Rd & N-S Arterial & Brookefield Rd and four-tracking)	2022
24	DE	Upgrades on Waihoehoe Rd east- from project 4 to Drury Hills + Drury Hills Intersection	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Arterial	Fulton Hogan (progress with development staging)	2031
25	DE	Upgrades on Drury Hills from Waihoehoe Rd to Macwhinney Dr	Ultimate	**2-lane urban**- upgrade to 2-lane urban collector with active modes on both sides	Collector	Fulton Hogan (progress with development staging)	2036
27a	DE	Active mode facilities from Drury Hills and Fitzgerald to Maketu Road	Interim	**Active mode upgrades**- active modes on both sides + intersection upgrades for active mode crossing	Collector	Cumulative Drury East (progress with development staging)	2026
27b	DE	Urban road with active mode facilities from Drury Hills and Fitzgerald to Maketu Road	Ultimate	**2-lane urban**- upgrade to urban collector with active modes on both sides + intersection upgrades	Collector	Drury East FUZ (Southeast)	2036
28	DE	New collector in N-S direction parallel to Fitzgerald Rd (Boulevard)	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with Town Centre development staging)	2026
29	DE	New collector in E-W direction between Flanagan & Fitzgerald Rd (collector 2)	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with development staging)	2026
30-1	DE	2-lane internal collector between Fitzgerald & Fielding Rd E-W direction	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Fulton Hogan (progress with development staging)	2022
30-2	DE	2-lane internal collector between Fielding & Drury Hills E-W direction	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Fulton Hogan (progress with development staging)	2031
31	DE	Upgrades on Cossey Rd between Fitzgerald & Waihoehoe Rd (Depends on Mill Rd Alignment)	Ultimate	**2-lane urban** - upgrade with active modes on both sides **(depends on Mill Road alignment)**	Collector	depends on Mill Rd alignment & timing	2031
32	DE	New Intersection on Cossey Rd/Waihoehoe Rd	Ultimate	**SGA design (depends on Mill Road design)**	Arterial	Fulton Hogan (progress with development staging)+ depends on Mill Rd	2031
33	DE	Upgrade Fitzgerald Rd from project 7 to Brookefield Rd	Ultimate	**2-lane urban**- upgrade to 2-lane urban with active modes on both sides (TDM)	Collector	Fulton Hogan + Kiwi	2022
34	DE	New Drury Interchange connection to Kiwi development	Ultimate	new direct access from SH1 into Kiwi development, potentially coordinated with reconstruction of Drury Interchange	Collector	Kiwi (depends on pace of centre development and coordination with P2D)	2026
35a	DE	Mill Road : Drury South connection from Fitzgerald/Cossey intersection to SH1 + Interchange (north facing ramps only)	Interim	**2-lane**- new road layout with active modes on both sides (depends on Mill Road design and sequencing)	Strategic	Cumulative East + Strategic	2031
35b	DE	Mill Road : Drury South connection from Fitzgerald/Cossey intersection to SH1 + Interchange (north and south ramps)	Ultimate	**4-lane**- new road layout with active modes on both sides (depends on Mill Road design and sequencing)	Strategic	Strategic	2041
36	DE/DW	Bremner-Norrie Road east of SH1 upto GSR (overlap with project 12)	Ultimate	**4-lane urban**- new road layout with active modes on both sides	Arterial	Cumulative Drury	2036
37a	DE	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM, depends on timing of #37)	Arterial	Cumulative Drury East and Opaheke (timing dependent on Mill Rd)	2041
37b	DE	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Ultimate	**4-lane urban**- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	Cumulative Drury East and Opaheke (timing dependent on Mill Rd)	2046
38a	DE	Mill Road: From Waihoehoe Rd to Papakura (alternative project 37)	Interim	**2-lane urban**- new road layout with active modes on both sides, TDM , (depends on Mill Rd and timing of #37)	Strategic	Cumulative Drury East + Cumulative All South	2036
38b	DE	Mill Road: From Waihoehoe Rd to Papakura (alternative project 37)	Ultimate	**4-lane urban**- with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2046

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
18a	DE	Mill Road: From Waihoehoe Rd to Fitzgerald Road (depends on Mill Road alignment)	Interim	**2-lane urban-** new road layout with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2036
18b	DE	Mill Road: From Waihoehoe Rd to Fitzgerald Road (depends on Mill Road alignment)	Ultimate	**4-lane urban-** with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2046
39a	DW	New Bremner Rd arterial from SH1 to Auranga development	Interim	**2-lane urban-** new road layout with active modes on both sides (Under construction)	Arterial	Drury Precinct	Under Construction
39b	DW	New Bremner Rd arterial from SH1 to Auranga development	Ultimate	**4-lane urban FTN-** upgrade 2-lane urban with active modes on both sides (TDM)	Arterial	Cumulative Drury	2046
40a	DW	New intersection on Jesmond/Bremner Rd	Interim	**single-lane controlled intersection** (new intersection with active mode crossings)	Arterial	Cumulative Drury West (depends on surrounding growth and timing of project 65)	2026
40b	DW	Upgrade intersection on Jesmond/Bremner Rd	Ultimate	**Ultimate lane intersection** form	Arterial	Cumulative Drury + Future Growth (depends on surrounding growth and timing of project 65)	2036
41a	DW	Jesmond Rd upgrades from SH22 to (and including) Waipupuke development boundary	Interim	**2-lane urban** - upgrade with active modes on both sides (TDM)	Arterial	Waipupuke	2022
41b	DW	Jesmond Rd from SH22 to Waipupuke development boundary	Ultimate	**4-lane urban FTN-** upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury West	2046
42a	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Interim	**Interim active modes e.g. shared path on one side**	Arterial	Waipupuke	2022
42b	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	**2-lane urban- upgrade existing road with active mode facility on both sides (TDM)**	Arterial	Drury West FUZ	2031
42c	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	**4-lane urban FTN-** upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2046
43a	DW	Intersection upgrade on SH22 Rd/Jesmond Rd	Interim	**2-lane Roundabout** (active mode crossings) via NZUP Station access	Strategic	Cumulative Drury West + Station	2022
43b	DW	Intersection upgrade on SH22 Rd/Jesmond Rd	Ultimate	**Ultimate intersection form (for fully urbanised corridor)**	Strategic	Cumulative Drury West + subject to SH22 improvements and station timings	2031
44	DW	Intersection at SH22/Burberry Rd (likely to close entirely)	Ultimate	Auruna develoment proposes intersection is closed	Strategic	Auranga B1	2022
45	DW	Upgrade intersection at SH22/Victoria Rd	Interim	Signals to be installed as part of Papakura-Drury Project	Strategic	Auranga B1	Under Construction
46	DW	Upgrades in GSR/Firth Rd intersection (overlap with project 12)	Interim	Possible signals for active mode crossings, depending on Statuion Access signals	Arterial	Fulton Hogan + Kiwi + Oyster + Auranga	2022
47	DW	Old Bremner Road Upgrade from Jesmond Road to Auranga Precinct	Ultimate	**2-lane urban-** new road layout with active modes on both sides (Under construction)	Collector	Auranga	Under Construction
17	DW	Jesmond Road to Oira Road Collector	Ultimate	**2-lane urban-** new road layout with active modes on both sides	Collector	Drury West FUZ	2036
48	DW	Collector road south of New Bremner/ Old Bremner intersection	Ultimate	**2-lane urban-** new road layout with active modes on both sides (Under construction)	Collector	Auranga	Under Construction
49	DW	SH22 improvements from GSR Intersection to Jesmond Rd	Ultimate	**4-lane urban-** upgrade 2-lane urban to 4-lane with active modes on both sides	Strategic	Waipupuke + Auranga + Drury West FUZ + Cumulative South/West	2022
50a	DW	SH22 improvements from Jesmond Rd to Oira Rd- active mode upgrades	Interim	**2-lane urban** - upgrade with active modes and urban frontage on north side only	Strategic	Waipupuke	2022
50b	DW	SH22 improvements from Jesmond Rd to Oira Rd	Ultimate	**4-lane urban-** upgrade 2-lane urban to 4-lane with active modes and urban frontage on both sides	Strategic	Drury West FUZ + Cumulative South/West	2031
51	DW	SH22 improvements from Oira Rd to Oira Creek - subject to design, could be incorporated with project 60	Interim	Upgrade road layout to future urban boundary + active modes and urban frontage on both sides	Strategic	Drury West FUZ + Cumulative South/West	2036
52	DW	Intersection upgrade- on SH22/ McPherson Rd/Karaka Rd (Auranga B1)	Ultimate	**Ultimate intersection form (note that McPherson bridge under rail likley to close to vehicles with rail 4-track)**	Strategic	Auranga	2022
53	DW	New intersection east of Jesmond Rd (Auranga B1 main street)	Ultimate	**Ultimate intersection form (left-in left-out)**	Strategic	Auranga	2022
54	DW	New N-S collectors internal to Auranga B1 (2 links)+ Intersections	Ultimate	**2-lane urban-** new collector with active mode on both sides + intersection improvements (TDM)	Collector	Auranga B2 (depends on pace of development)	2022

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
55	DW	New E-W collector to Jesmond Rd	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Drury West FUZ	2031
56	DW	Burberry Rd north connection to Auranga Precinct	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Auranga	Under Construction
57	DW	Drury West Station + New access road	NZUP	**2-lane urban** road layout with active modes on both sides for access to station	Arterial	Cumulative Drury West	2026
58	DW	Oira Rd upgrades from SH22 to Waipupuke development boundary	Ultimate	**2-lane urban**- upgrade with active modes on both sides + intersection improvements (TDM)	Collector	Waipupuke	2022
59	DW	New Intersection on Jesmond Rd/collector (PC61)	Ultimate	**2/4-lane intersection** (new intersection + active mode crossings)	Arterial	Waipupuke	2022
60a	DW	SH22 Intersection upgrade - Oira Rd (3 leg)	Interim	**Interim Roundabout**	Strategic	Waipupuke	2022
60b	DW	SH22 Intersection upgrade - Oira Rd (4 leg)	Ultimate	**Ultimate intersection form**	Strategic	Drury West FUZ	2036
63	DW	New collectors internal to Waipupuke PC61 (3 links)+ Intersections	Ultimate	**2-lane urban** - new collector with active mode on both sides + intersection improvements (TDM)	Collector	Waipupuke	2022
65a	DW	New Bremner Rd arterial from Auranga development to Jesmond Rd	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM)	Arterial	Cumulative Drury West	2036
65b	DW	New Bremner Rd arterial from Auranga development to Jesmond Rd	Ultimate	**4-lane urban FTN** - upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2046
66	DW	SH22 improvements - west of SH1 interchange to GSR	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Strategic	Waipupuke + Auranga + Drury West FUZ + Cumulative South/West	2022
67	DW/DE	Active mode corridor from Drury East Town Centre to GSR	Ultimate	Segregated active-modes corridor beside rail corridor	Strategic	Cumulative Drury + Cumulative South-West	2026
68	DW	Active mode corridor from GSR to Drury West Town Centre/ Station	Ultimate	Segregated active-modes corridor beside rail corridor	Strategic	Cumulative Drury + Cumulative South-West	2031
69	DW/DE	Quarry Road walking cycling bridge	Interim	Active-modes facility over SH1	Collector	Cumulative Drury	2026
70	DW/DE	GSR Road walking cycling bridge	Interim	Active-modes facility over Rail corridor	Arterial	Cumulative Drury	2026

Figure 5-2 Stage 1 Projects

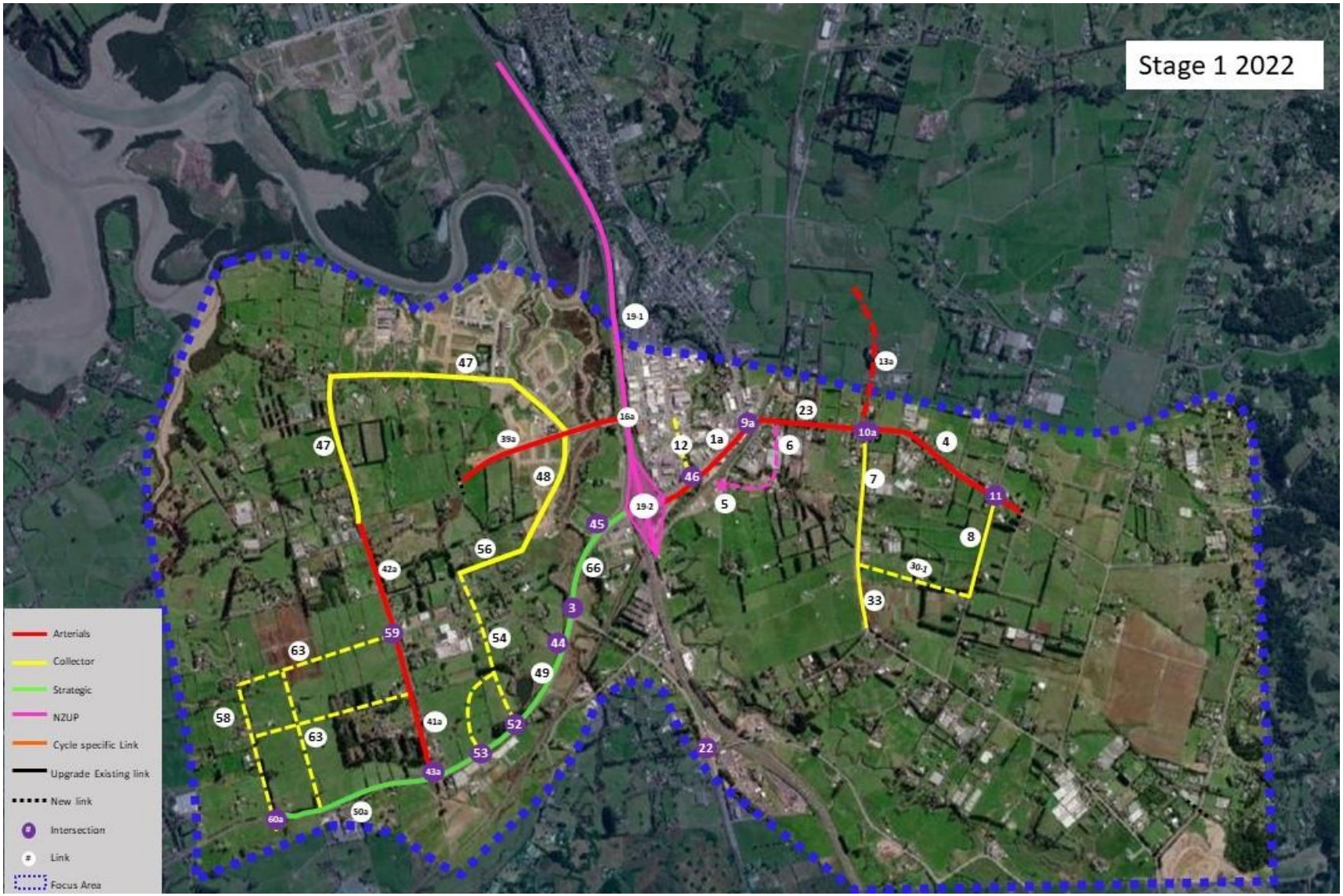


Figure 5-3 Stage 2 Projects

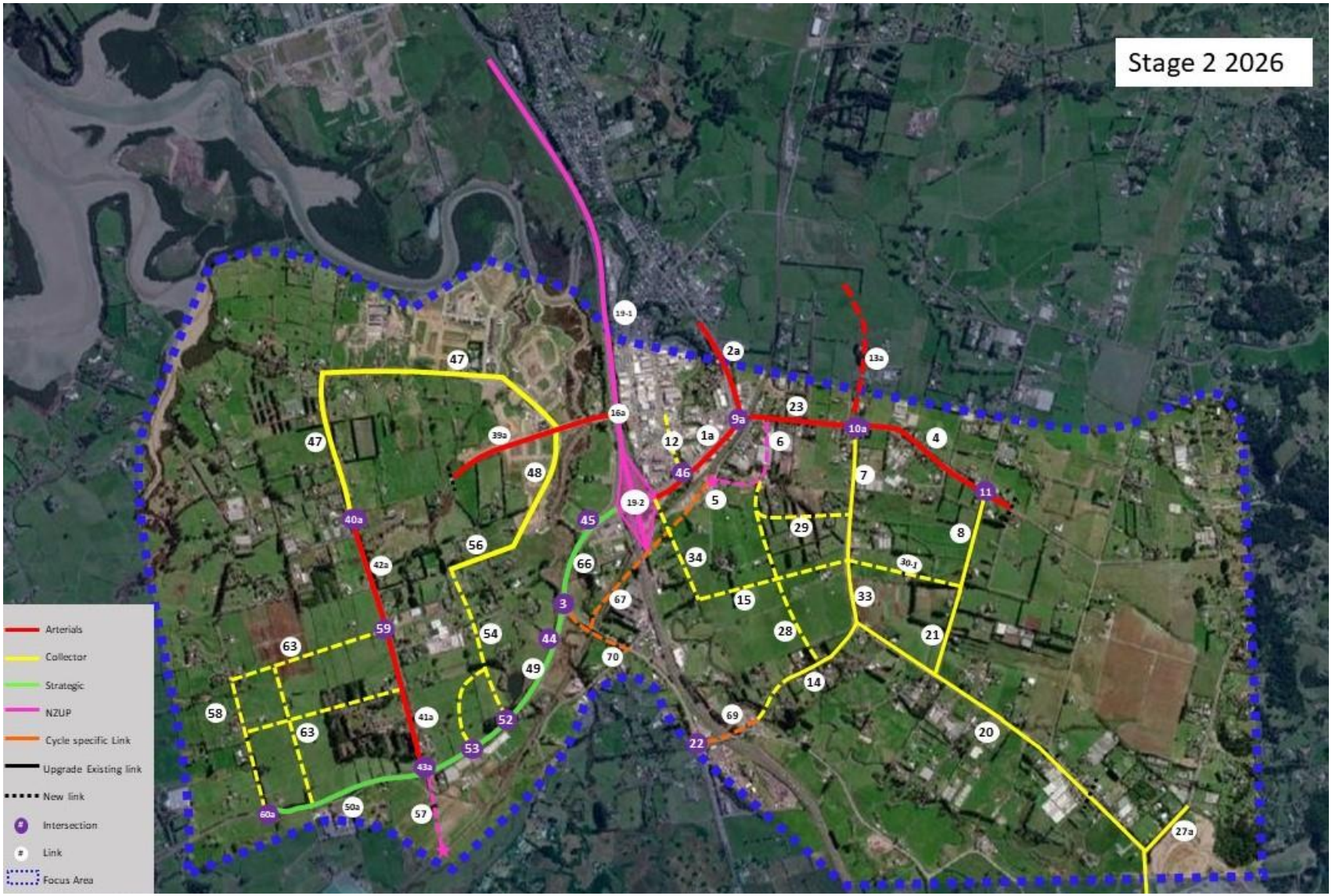


Figure 5-4 Stage 3 Projects

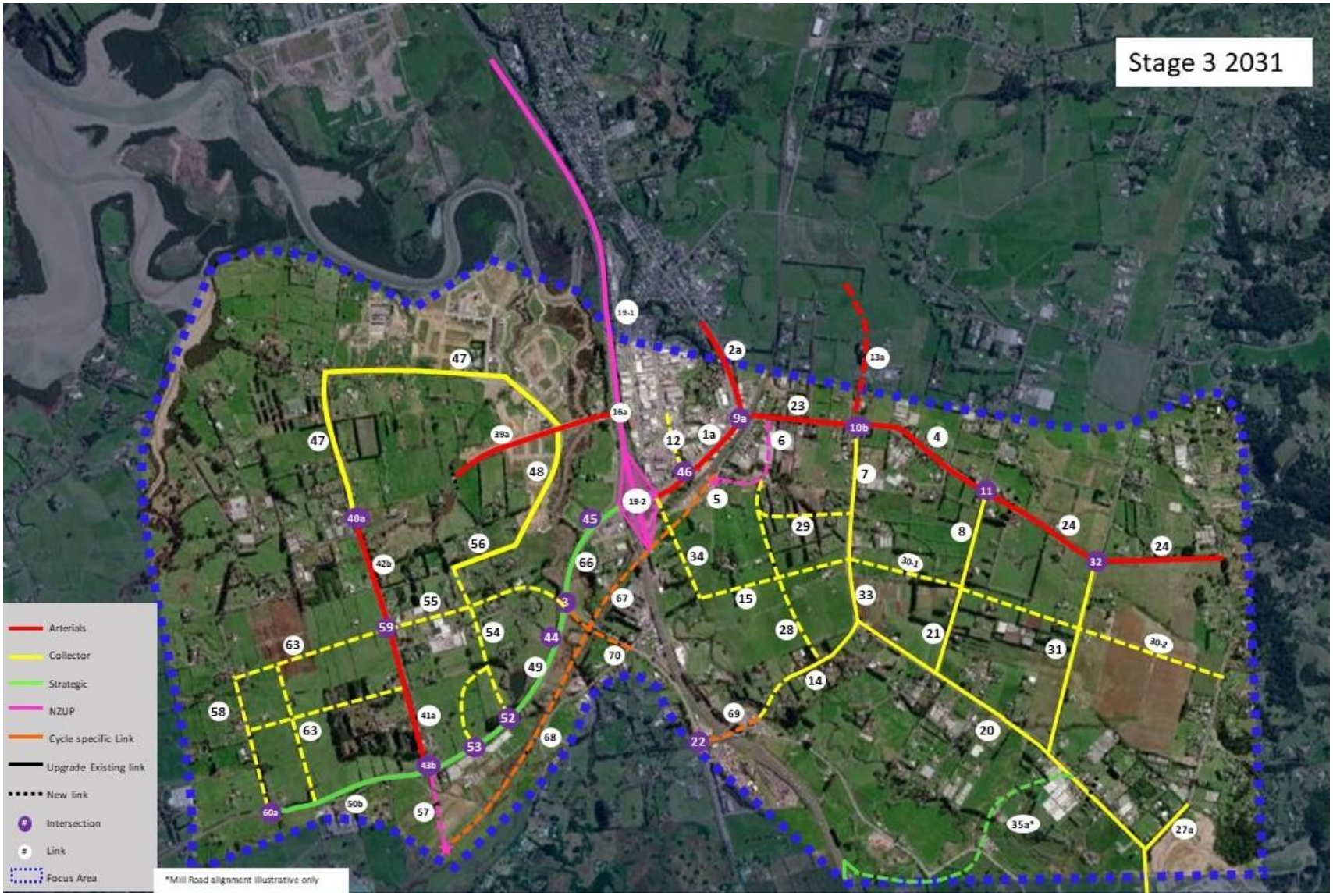
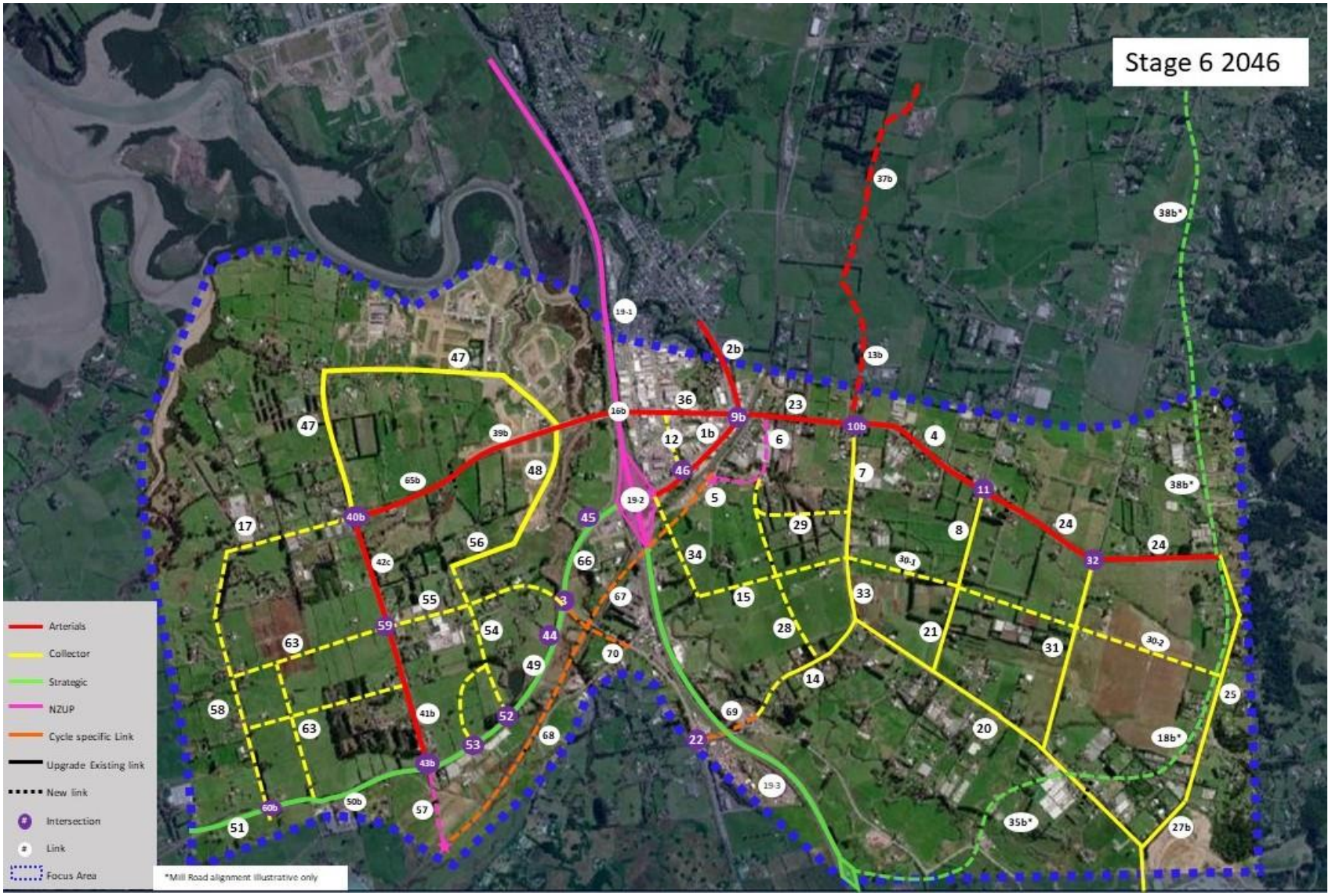


Figure 5-5 Stage 4 Projects

Figure 5-6 Stage 5 Projects

Figure 5-7 Stage 6 Projects



6 Conclusions

This assessment has identified a potential transport infrastructure Staging Schedule to support the plan changes in Drury. This has been developed with awareness of the uncertainties inherent in the timing of both the roll out of the development and the timing of major transport infrastructure. This assessment is to assist Council to consider funding and financing options, and as such has relied on inputs and assumptions that are subject to change. The Staging Schedule therefore is a technical assessment to inform subsequent decision making and should not be viewed as a committed programme of projects for delivery.

In reviewing this Schedule, the purpose, scope and approach to the work should be kept in mind. Key conclusions of this work include:

- Both the Drury East and Drury West areas constitute a significant scale or urban growth
- That Drury growth is itself only a sub-set of the total growth planned and expected in the southern parts of Auckland
- This scale of growth requires an extensive network of new or upgraded transport infrastructure, both to the immediate growth area and the surrounding receiving environment
- The long-term arterial and strategic network to support this growth has been identified through the SGA IBC and is being further developed through SGA detailed business cases. Some opportunities for the staged implementation of those corridors has been identified in this assessment, however the feasibility, design and timing of any such interim upgrades will remain to be agreed directly with the appropriate road controlling authority
- It is not feasible to fully isolate the projects needed to support just the Drury plan change areas from growth in the wider network, as Drury is at the key location where all north-south movements must pass, including all movements between Auckland and the rest of the country to the south. While this assessment has focussed on the projects needed for Drury, the scale or need for some of those projects are to accommodate wider growth, while there are other wider-network projects which will benefit the Drury area

Appendix A Yield and Trip Generation Review

Technical Note

Date Prepared: 16/03/2021

Prepared by: Andrew Murray, Subramanyam Uppuluri

Transport Assessment

Purpose

This note details the model test undertaken of the potential trip generation associated with the Drury East and West Plan Changes.

Document Status

Responsibility	Name
Author	Subramanyam Uppuluri
Reviewer	Andrew Murray
Approver	Andrew Murray

Revision Status

Version	Date	Reason for Issue
1	Draft for comment send to parties	1/4/21
2	Include Drury West assessment	12/5/21

Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Table of Contents

Tables (items show up here from the table 'caption' style)

Figures (items show up here from the figure 'caption' style)

Appendices

No table of contents entries found.

1 Purpose

This technical note details the traffic models developed to inform the Drury Infrastructure Funding and Finance (DIFF) study. Specifically, it updates the SGA traffic models to include refined estimates of the traffic associated with the Private Plan Changes.

This note covers:

- Drury East plan changes: PC48 (Kiwi), PC49 (Fulton Hogan) and PC50 (Oyster)
- Drury West plan changes: PC51 (Auranga B2), PC61 (Waipupuke)

The Auranga A and B1 area is live-zoned but is adjacent to the above private plan changes, so has been included in this consideration.

1.1 SGA Models

The various business cases being developed by SGA are focused on long-term route-protection of the transport facilities/corridors needed to support the identified growth. This includes a series of transport models, including:

- MSM regional multi-modal model: which estimates travel patterns based on input land use and network assumptions
- S3M area traffic model: Which assigns the MSM traffic demands via a more detailed representation of the road network

The key land use inputs to the models are:

- Land use forecasts developed by Auckland Council and the Auckland Forecasting Centre (AFC). The forecasts currently used by SGA are referred to as Scenario I11.5
- Yield estimates in the FUZ areas estimated by Auckland Council for a full build model scenario referred to as 2048+

As such, the models used by SGA reflect Council's yield estimates (including from available Structure Plans) and growth timing reflecting the Future Urban Land Supply Strategy (FULSS), as reflected in the Scenario I11.5 forecasts. The model scenarios used by SGA are regularly updated as the project options are developed.

1.2 Drury East Plan Change Models

The three private plan changes lodged with Council (PC48, PC49 and PC50) have been developed in an integrated way, based on common modelling. That modelling was undertaken some time ago, using early versions of the SGA S3M models. Key updates made to the SGA versions[15] since those IBC versions include:

- Refined zone system and road networks for use in the Drury-Opaheke Structure Plan

[15] Although referred to here as the 'SGA' versions, the SH1 model validation check was undertaken jointly with the Papakura to Drury Project (P2D) team for ongoing use by both studies.

- Explicit inclusion of vehicle trips accessing rail stations
- Updates to the various SGA projects as business cases developed
- A 'stocktake' review of the models that expanded the simulation area near Pukekohe and reviewed the model validation for the 2016 base year, specifically on the SH1 corridor

Although based on older versions of the SGA S3M models, the PPC models were updated with demands from a specific MSM model run with their proposed yields and land use forecasts to inform the ITA for the PPCs.

The modelling report for the PPCs has directly relied on the trip generation for the area estimated in MSM. The report includes a check of the implied vehicle trip rate for residential activities but has not included a first-principle assessment of the likely trip generation associated with the commercial or retail elements of the site.

1.3 Drury West Models

The Integrated Transport Assessments (ITA's_ for Waipupuke and Auranga B2 included some localised intersection assessments, but have not created or used be-spoke area-wide models. They have instead relied on local data and assessments and previous Structure Plan modelling.

2 Drury East Trip Generation Review

SGA have tested the possible traffic generation from the Drury East PPCs by:

- Undertaking their own estimate of likely traffic generation for the PPC area
- Factoring the demands in the SGA S3M models to match those first-principle estimates
- Comparing traffic flows against those in the PPC models

Rather than a simple review of the PPC models, these 'test' models were developed in the SGA version of the models to take advantage of the more refined zone and network system.

The vehicle trip generation estimates developed here assume that the full suite of projects identified to support the growth areas are implemented, including the full network of walking, cycling and PT facilities and the desired land use outcomes identified in the Structure Plan. These vehicle trip rate estimates will therefore not be applicable for scenarios without those land use forms or supporting networks.

2.1 Spatial Area and Full-Build Yield

The three PPCs fall within two MSM model zones as follows:

- PC48 (Kiwi) and PC49 (Fulton Hogan) are both contained within MSM zone 554, and effectively comprise the whole of that zone
- PC50 (Oyster) falls within MSM zone 555, comprising approximately 1/3rd of that zone at the western end.

The MSM zone system is indicated in Figure 2-1 and the three PPCs in Figure 2. The PPC Modelling Report and associated ITAs indicate the following yields:

Table 2-1 Yields Indicated for Plan Change Areas

PPC	Dwellings	Retail GFA, m2	Commercial GFA, m2	Community GFA, m2
PC50 Oyster	1,000	•	•	•
PC49 Fulton Hogan	2,500	•	•	•
PC48 Kiwi	3,000	107,000	63,000	16,000

Figure 2-1 MSM Spatial (Zone) System

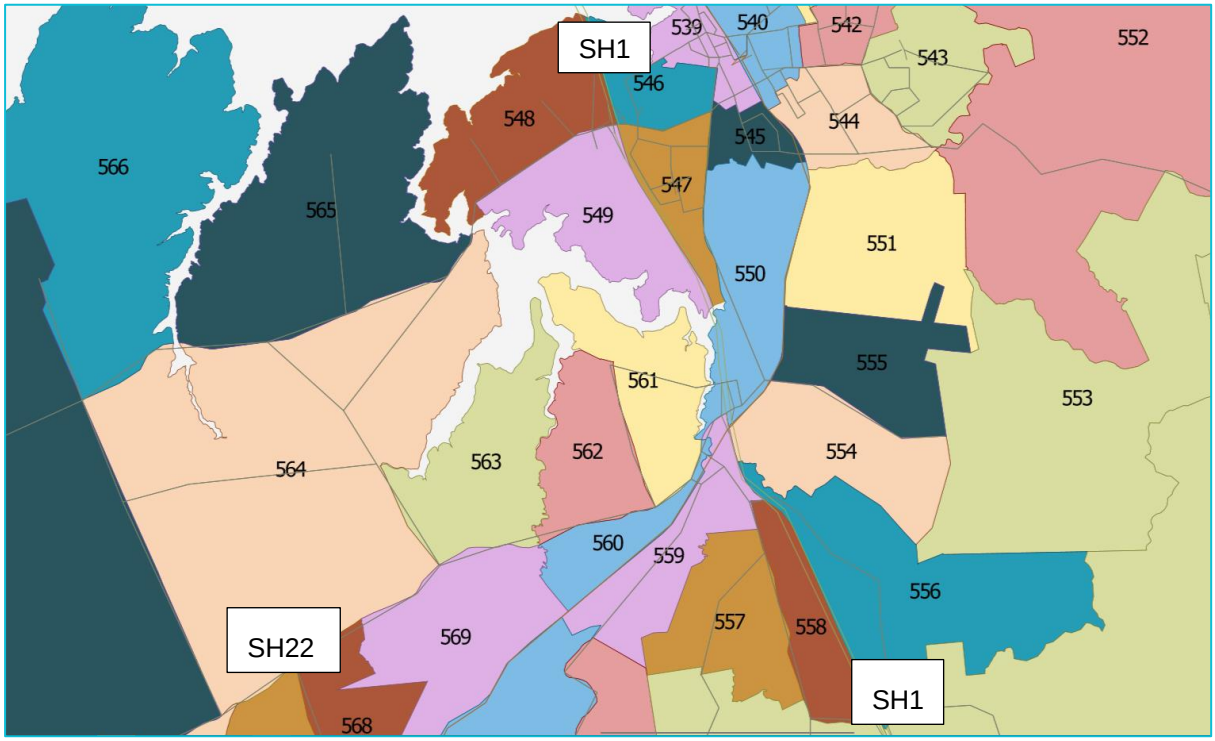
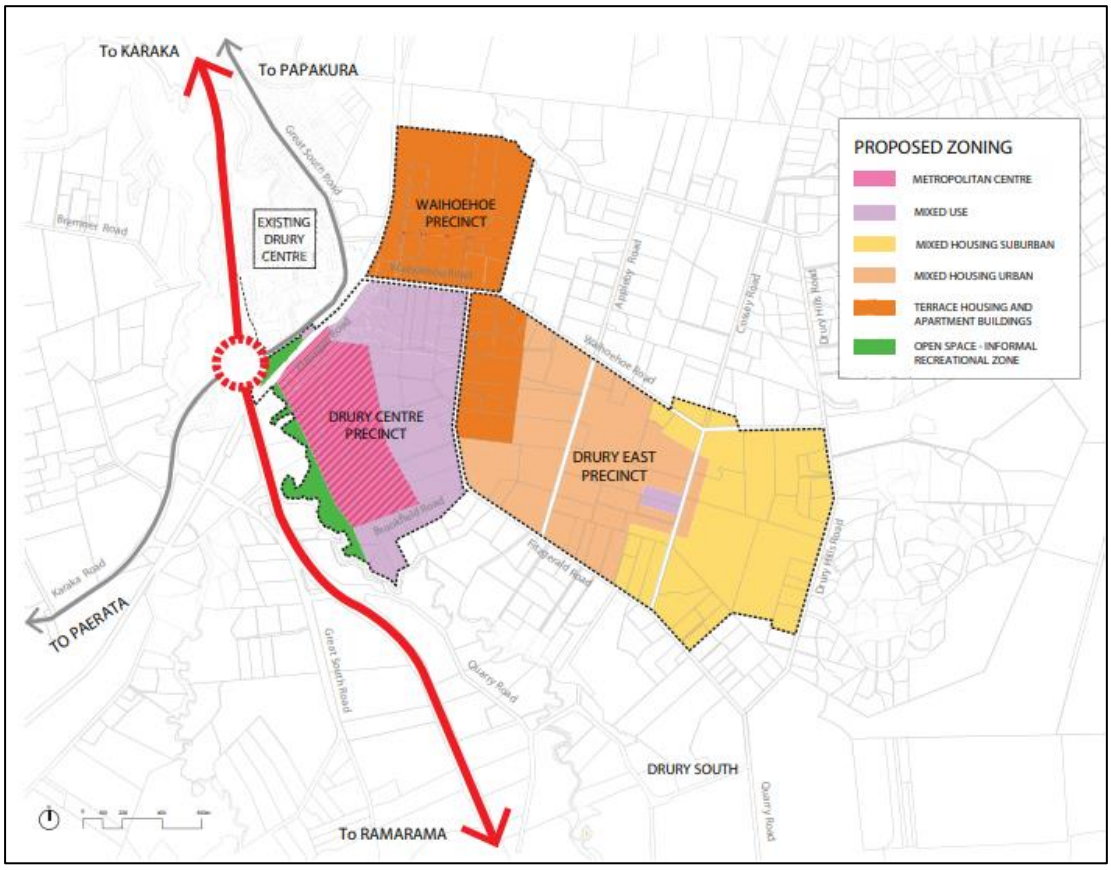


Figure 2-2 Drury East Plan Changes (Source: PC Documents)



The trip generation review has been undertaken for the complete area comprising MSM Zones 554 and 555. This therefore requires an estimate of the residential yield in MSM Zone 555 outside the Oyster Site. The Council's yield estimates for that zone are some 3,000 dwellings. With approximately 1,000 expected for the Oyster sites, 2,000 dwellings were assumed in the residual FUZ area. This assumption is considered plausible given that the Oyster site comprised approximately 1/3rd of that zone.

The trip generation estimates undertaken here are based on the detailed estimates of floor area contained in the PPCs. The regional modelling (via MSM) uses employment as the predictor for business generation, rather than floor areas. The Previous Structure Plan modelling included some 3,100 employees in the MSM Zone 554, which is noticeably larger than the 6,000[?] potential employees indicated in the PPC documents. For this test, the MSM has not been re-run with revised values, instead the traffic flow sin the S3M model have been directly factored to match the estimates.

2.2 Approach to Estimation of Trip Generation

The trip generation for Drury East area (MSM Zones 554 and 555) was estimated as follows:

- Estimate residential trip generation totals
- Estimate commercial/retail generation totals

- Apply 'pass-by' reductions to commercial/retail trips that are external to the Drury East Area (i.e. the pass-by reductions were not applied to internal trips)
- Increase the proportion of total trips expected to remain internal to the site from that estimated in MSM
- Derive target trip numbers for each zone for both total trips and external trips
- Develop factors to apply to the SGA demands to match the target trip totals

2.3 Residential Generation

Residential trip generation was estimated as follows:

7. Estimate average people per household for Low, Medium and High density dwellings
8. Apply a typical trip rate of 4.0 trips per person per day[16] to get person-trip generation estimates
9. Estimate PT/Active mode shares based on density and proximity to rail station
10. Subtract PT/Active trips to obtain estimated trip rates by vehicle
11. Apply average vehicle occupancy of 1.2 persons per vehicle to obtain daily vehicle trip rates
12. Apply percentages of the daily values to get AM (9%), interpeak (5.5%) and PM peak (9%) generation estimates

The total person trip rates and vehicle occupancies were kept constant over time, however other assumptions were varied through the modelled years as follows:

- The average people per household was reduced over time to reflect demographic trends (10% increase over 40 years was assumed)
- The PT/Active mode shares were increased over time to reflect expected increasing relative attractiveness of these modes relative to vehicle travel and completeness of the wide network.

The resulting daily person-trip rates (per dwelling) are provided in Table 2-2. Because the assumed mode shares varied by location, these are discussed further below.

Table 2-2 Estimated Daily Person Trip Rates

	People/HH					Daily Person Trip Rates				
Type	**2018**	**2028**	**2038**	**2048**	**2048+**	**2018**	**2028**	**2038**	**2048**	**2048+**
Low Density	3.0	2.9	2.9	2.8	2.7	11.9	11.6	11.3	11.0	10.7
Med Denity	2.7	2.6	2.6	2.5	2.4	10.7	10.4	10.2	9.9	9.6
High Density	2.0	2.0	1.9	1.9	1.8	7.9	7.7	7.5	7.3	7.1

The potential active/PT mode shares were estimated based on density and proximity to key facilities. The S3M (yellow boxes) and MSM (red text) zone system is indicated in the following Figure 2-3. The assumed mode shares shown in Table 2-3. The mode shares were assumed to increase over time, based on the following broad assumptions:

- Low Density: 2018 Start value of 18%, increasing by 50% of that by full development (i.e. 9% point increase over 40 years)
- Medium Density: 2018 Start value of 20%, increasing by 80% of that by full development (i.e. 16% point increase over 40 years)

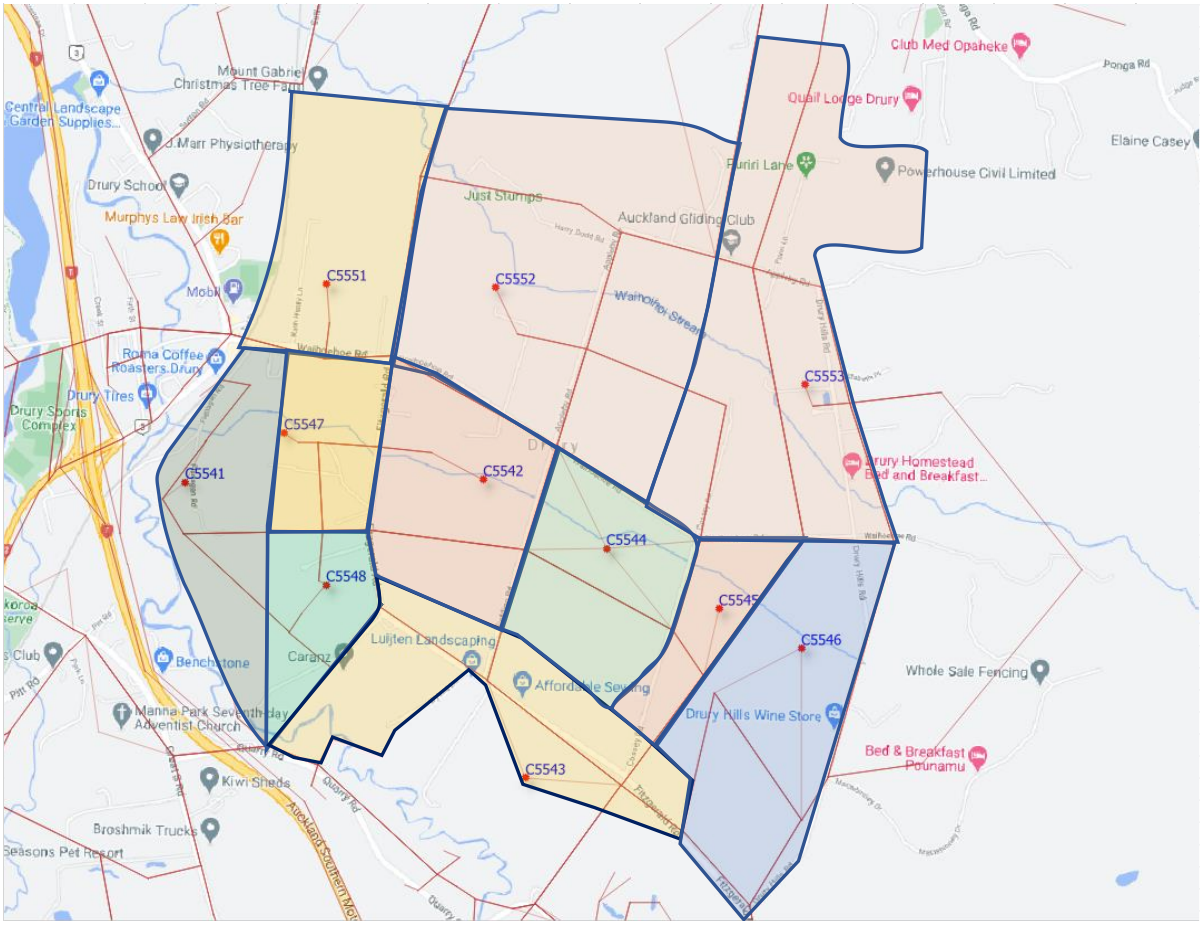
[16] This is based on typical combined rates in MSM

- High Density: 2018 Start value of 23%, increasing by 100% of that by full development (i.e. 23% point increase over 40 years)

Table 2-3 Activities Modelled for each S3M Model Zone and Assumed PT/Active mode share

MSM Model Zone	S3M Model Zone	Plan Change	Activity assumed (for modelling)	2028	2038	2048	2048+
554	5541	PC48 Kiwi	Retail/Commercial	See below for business trip generation			
	5547	PC48 Kiwi	High density residential	28.8%	34.5%	40.3%	46.0%
	5548	PC48 Kiwi	High density residential	28.8%	34.5%	40.3%	46.0%
	5542	PC49 Fulton Hogan	High density residential	22.8%	28.5%	34.3%	40.0%
	5543	PC49 Fulton Hogan	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5544	PC49 Fulton Hogan	Medium density residential	18.0%	22.0%	26.0%	30.0%
	5545	PC49 Fulton Hogan	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5546	PC49 Fulton Hogan	Low density residential	13.3%	15.5%	17.8%	20.0%
555	5551	PC50 Oyster	High density residential	22.8%	28.5%	34.3%	40.0%
	5552	N/A (FUZ)	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5553	N/A (FUZ)	Low density residential	13.3%	15.5%	17.8%	20.0%

Figure 2-3 S3M Zone System for DIFF Test



The resulting peak-hour vehicle trip rates for each zone are therefore as indicated in Table 2-4. It should be noted that the resulting trip rates are heavily influenced by the assumptions on reducing household size and increasing active/PT mode share. As noted above, these vehicle trip rates could be expected to be significantly higher if those assumptions are not borne out, which could occur if the high-density land use with high quality network of active mode and PT facilities, and local employment and services does not occur.

Table 2-4 Residential Vehicle Peak Hour Trip Rates

	2028			2038			2048			2048+		
Zone	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
5542	0.45	0.27	0.45	0.40	0.25	0.40	0.36	0.22	0.36	0.32	0.20	0.32
5543	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5544	0.64	0.39	0.64	0.59	0.36	0.59	0.55	0.34	0.55	0.51	0.31	0.51
5545	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5546	0.75	0.46	0.75	0.72	0.44	0.72	0.68	0.41	0.68	0.64	0.39	0.64
5547	0.41	0.25	0.41	0.37	0.23	0.37	0.33	0.20	0.33	0.29	0.18	0.29
5548	0.41	0.25	0.41	0.37	0.23	0.37	0.33	0.20	0.33	0.29	0.18	0.29
5551	0.45	0.27	0.45	0.40	0.25	0.40	0.36	0.22	0.36	0.32	0.20	0.32
5552	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5553	0.75	0.46	0.75	0.72	0.44	0.72	0.68	0.41	0.68	0.64	0.39	0.64

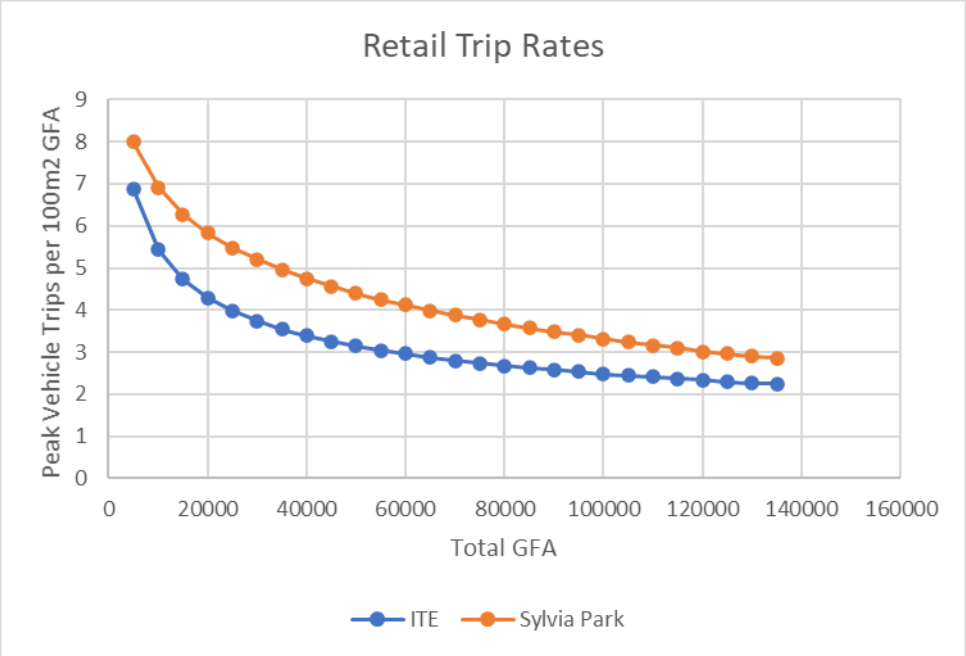
2.4 Business Trip Generation

The trip generation for the business areas were estimated as follows:

- Estimate peak-hour vehicle trip rates per 100m2 GFA from typical sources for each of the retail, commercial and community service activities
- Estimate the potential mode shift to active/PT modes for this location to derive reduced vehicle trip rates
- Apply the peak-hour trip rates to the relevant period (PM peak for retail, AM peak for Commercial and interpeak for community activities)
- Estimate trip rates for the other periods, as a percentage of the peak rates
- Apply pass-by discounts for the trips external to the site

Retail trip rates were based on data provided by Flow Transportation Ltd and used on other projects such as a plan change in Tauranga City. That data includes trip-rates from the ITE manual and also compiled from survey data from the Sylvia Park shopping Centre in Auckland. Both data are based on trip rates (per GFA) reducing as the scale of retail development increases, as shown in the Figure 2-4. The ITE data indicates rates lower than found at the Sylvia Park site. For the purposes of this analysis, rates half-way between the two data sets were adopted.

Figure 2-4 Retail Trip Rates



Peak hour vehicle trip rates for the commercial areas were assumed to be 1.8/100m2 GFA, while those for community services were assumed to be 1.0.

Mode share were then applied based on simple assumptions about potential mode share. The active/PT mode shares were assumed to grow from 0% in 2028 to 25% at full build-out (2048+).

The peak generation was then assigned to the respective model peaks and as assumed proportion applied for the other periods as indicated in the following Table 2-5. Because the starting trip rates were already vehicle trip rates, a factor for vehicle occupancy was not required.

Table 2-5 Proportion of Peak Generation

Activity Type	AM	Interpeak	PM
Retail	25%	80%	100%
Commercial	100%	30%	90%
Community	30%	100%	70%

Pass-by discounts were then applied to external trips as follows:

- Retail = 30%
- Commercial = 5%
- Community services = 40%

2.5 Combined Trip Generation

The total vehicle trip generation for the Drury East area (MSM zones 554 and 555) was therefore estimated as follows:

- Estimate the yield for each activity type/zone for each forecast year
- Combine the estimated residential and business trip generation
- Adjust the target value based on the expected level of internalisation

The build-out of the Drury East area was assumed based on the following information:

- Information provided by the Drury East developers of potential first stage of development, as indicated in the Figure 2-5
- Land use estimates for each year from Table A-1 of the PC Drury East Modelling Report

Figure 2-5 Potential Initial Stage of Development, as indicated by Drury East developers

Table 2-6 Assumed Business Build-out

Year	General Retail(sqm)	Commercial (sqm)	Community facilites(sqm)
2028	42%	20%	10%
2038	78%	50%	20%
2048	89%	70%	50%
2048+	100%	100%	100%

Table 2-7 Assumed Residential Build-out

Year	Zone 554	Zone 555
2028	36%	65%
2038	78%	85%
2048	89%	90%
2048+	100%	100%

The MSM-derived demands in the SGA models indicate some 6% of the trips generated within the two zones remain within the zone. While this could be plausible in early stages of development, it is considered potentially low for full build out. This could be influenced by the MSM having a lower number of jobs than is suggested by the plan change documents.

Although the proportion of total person trips remaining internal is expected to be relatively significant, a high proportion of those short internal trips are expected to be undertaken by active modes. Hence the proportion of vehicle trips remaining within the zone is not expected to be particularly high. To gauge a suitable value, the trip length distribution from MSM was investigated. Most internal trips within the two zones would be less than 2km, which the MSM data suggested would be about 12% of vehicle trips. Hence for full build-out, the internal and external target trip generation was modified to increase the internalisation from 6% to 12%. For modelling purposes, the rate of internalisation was assumed to be as follows:

- 6% in 2028
- 8% in 2038
- 10% in 2048
- 12% in 2048+

The target trip generation (inbound+outbound) was estimated for both total trips and external trips, as indicated in the Table 2-8.

Table 2-8 Target Trip Generation (Total Trips and Total External Trips)

Plan Change Area	MSM Zone	S3M Zone	2028				2038				2048				2048+			
			AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily
Total Trips (Includes Internal Trips and with Pass-by discounts)																		
Fulton Hogan	554	5542	57	35	57	635	113	69	113	1,256	116	71	116	1,284	115	71	115	1,282
		5543	87	53	87	966	177	108	177	1,968	188	115	188	2,083	195	119	195	2,163
		5544	82	50	82	910	167	102	167	1,850	176	107	176	1,951	182	111	182	2,019
		5545	87	53	87	966	177	108	177	1,968	188	115	188	2,083	195	119	195	2,163
		5546	257	157	257	2,854	535	327	535	5,938	579	354	579	6,425	616	376	616	6,835
		Total	**570**	**349**	**570**	**6,331**	**1,170**	**715**	**1,170**	**12,981**	**1,246**	**761**	**1,246**	**13,826**	**1,303**	**796**	**1,303**	**14,461**
Kiwi	554	5541	582	1,268	1,688	18,334	986	1,794	2,479	26,566	1,055	1,643	2,346	24,900	1,192	1,587	2,348	24,688
		5547	220	134	220	2,441	432	264	432	4,794	438	268	438	4,862	433	265	433	4,806
		5548	220	134	220	2,441	432	264	432	4,794	438	268	438	4,862	433	265	433	4,806
		Total	**1,022**	**1,537**	**2,128**	**23,217**	**1,850**	**2,322**	**3,343**	**36,155**	**1,931**	**2,178**	**3,222**	**34,624**	**2,058**	**2,116**	**3,214**	**34,300**
Oyster	555	5551	289	177	289	3,208	343	210	343	3,806	325	199	325	3,609	321	196	321	3,560
		5552	128	79	128	1,426	191	116	191	2,115	409	250	409	4,538	515	315	515	5,721
		5553	142	87	142	1,580	216	132	216	2,392	473	289	473	5,249	611	373	611	6,781
		Total	**560**	**342**	**560**	**6,214**	**749**	**458**	**749**	**8,314**	**1,207**	**738**	**1,207**	**13,396**	**1,447**	**884**	**1,447**	**16,062**
Grand Total Trips			**2,152**	**2,228**	**3,258**	**35,762**	**3,769**	**3,494**	**5,262**	**57,450**	**4,384**	**3,677**	**5,675**	**61,846**	**4,808**	**3,797**	**5,964**	**64,823**
Total External Trips (Excludes Internal Trips and with Pass-by discounts)																		
Fulton Hogan	554	5542	54	33	54	597	104	64	104	1,156	104	64	104	1,156	102	62	102	1,128
		5543	82	50	82	908	163	100	163	1,811	169	103	169	1,875	171	105	171	1,903
		5544	77	47	77	856	153	94	153	1,702	158	97	158	1,756	160	98	160	1,776
		5545	82	50	82	908	163	100	163	1,811	169	103	169	1,875	171	105	171	1,903
		5546	242	148	242	2,682	492	301	492	5,463	521	318	521	5,783	542	331	542	6,015
		Total	**536**	**328**	**536**	**5,951**	**1,076**	**658**	**1,076**	**11,942**	**1,121**	**685**	**1,121**	**12,443**	**1,147**	**701**	**1,147**	**12,726**
Kiwi	554	5541	547	1,192	1,587	17,234	908	1,650	2,281	24,441	950	1,479	2,111	22,410	1,049	1,396	2,066	21,726
		5547	207	126	207	2,295	397	243	397	4,411	394	241	394	4,376	381	233	381	4,229
		5548	207	126	207	2,295	397	243	397	4,411	394	241	394	4,376	381	233	381	4,229
		Total	**961**	**1,445**	**2,000**	**21,824**	**1,702**	**2,136**	**3,076**	**33,263**	**1,738**	**1,961**	**2,900**	**31,162**	**1,811**	**1,862**	**2,828**	**30,184**
Oyster	555	5551	272	166	272	3,015	316	193	316	3,502	293	179	293	3,248	282	172	282	3,133
		5552	121	74	121	1,340	175	107	175	1,946	368	225	368	4,084	454	277	454	5,035
		5553	134	82	134	1,485	198	121	198	2,201	426	260	426	4,725	538	329	538	5,967
		Total	**526**	**322**	**526**	**5,841**	**689**	**421**	**689**	**7,649**	**1,086**	**664**	**1,086**	**12,056**	**1,273**	**778**	**1,273**	**14,134**
Grand Total External Trips			**2,023**	**2,094**	**3,063**	**33,616**	**3,468**	**3,215**	**4,841**	**52,854**	**3,946**	**3,310**	**5,107**	**55,661**	**4,231**	**3,341**	**5,248**	**57,044**

2.5.1 Sensitivity Tests

A sensitivity test was undertaken on the vehicle trip generation by removing the future assumptions about mode share and demographic changes (that is, 2018 assumptions for people per household and active/PT mode share were retained in the future years. This implied daily residential vehicle trip rates similar to typical current values of between 5.1 (high density) and 8.1 (low density).

This indicated vehicle trip generation values are shown in Table 2-9.

Table 2-9 Total Daily Vehicle Trips in Drury East with 2018 Mode Share Assumptions

Scenario	2028	2038	2048	2048+
Base	35,800	57,400	61,800	64,800
Sensitivity test with 2018 parameters	36,100	60,800	69,000	76,800
Difference (Sensitivity Test- Base)	300	3,400	7,200	12,000
% Difference	0.8%	5.9%	11.7%	18.5%

An additional sensitivity test was undertaken using the retail trip rates assessed for the Sylvia Park shopping centre, rather than the average of those and the ITE rates. These indicate similar scale of impact as the mode share assumptions tested above.

Table 2-10 Total Daily Vehicle Trips in Drury East with 2018 Mode Share Assumptions

Scenario	2028	2038	2048	2048+
Base	35,800	57,400	61,800	64,800
Sensitivity test with Sylvia Park retail rates	38,400	61,200	67,300	76,800
Difference (Sensitivity Test- Base)	2,600	3,800	5,500	12,000
% Difference	7.3%	6.6%	8.9%	18.5%

Both tests indicate that the assumptions used for mode share, demographic trends and retail trip rates have resulted in significantly lower vehicle trip generation than would be the case with less optimistic assumptions. While the assumptions adopted here are considered plausible and suitable for the land use and transport systems proposed for those area assumed, it reinforces the fact that those assumptions are only valid if all the integrated waking, cycling, PT and land use outcomes are realised.

3 Comparison with Plan Change Models

The total trip generation from the Plan Change models provided by Stantec Ltd were compared for the same two MSM zones as shown in Table 3-1.

Table 3-1 Comparison of Total Trip Generation - DIFF Models vs Stantec Plan Change models

MSM Zone	SGA DIFF Models			Plan Change Models			Difference		
	2028	2038	2048+	2028	2038	2048+	2028	2038	2048+
AM Peak Hour									
554	1,593	3,020	3,361	1,989	3,510	3,800	-20%	-14%	-12%
555	560	749	1,447	374	575	1,299	50%	30%	11%
Total	**2,152**	**3,769**	**4,808**	**2,363**	**4,085**	**5,100**	**-9%**	**-8%**	**-6%**
PM Peak Hour									
554	2,698	4,513	4,517	2,059	3,735	4,088	31%	21%	10%
555	560	749	1,447	441	743	1,379	27%	1%	5%
Total	**3,258**	**5,262**	**5,964**	**2,500**	**4,478**	**5,467**	**30%**	**18%**	**9%**

Key points of note:

- The SGA DIFF models indicate different spatial allocation between the two MSM zones, especially in the morning peak
- The SGA DIFF models have higher trip generation in MSM Zone 555 in all peaks and all years. This is due to a higher total yield and an assumed faster build-out rate
- In the morning peak, the SGA DIFF models include slightly less potential traffic generation than the Plan Change models. The differences are small at full build-out but more pronounced in earlier years
- In the evening peak, the SGA DIFF models indicate significantly higher flows in the early years (2028), but only slightly higher at full build-out
- The differences are sensitive to key assumptions, such as mode share

Because the network detail of the models was so different, flow difference plots between the two models were not useful. Instead, predicted flows were compared at key locations on the network. Note that the differences will not just be due to the different trip generation estimates, but also due to differing assumptions about other projects in the wider network and differences in network and zonal detail.

4 Drury West Review

The same approach used for Drury East was adopted for Drury West, albeit without a specific Plan Change model to compare with.

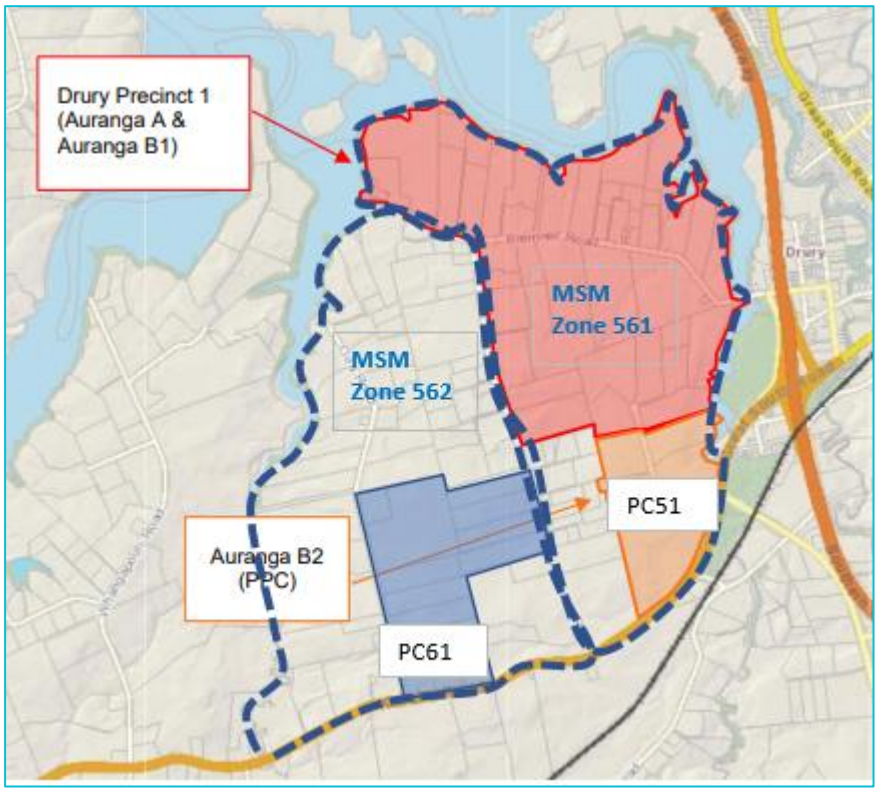
4.1 Spatial Area and Full-Build Yield

The live-zoned Aurunga A/B1 area and the two new PPCs fall within two MSM model zones as follows:

The three PPCs fall within two MSM model zones as follows:

- Aurunga A and B1 and PPC 51 (Aurunga B2) fall within MSM zone 561. There is a residual area in zone 561 beside Jesmond Road not included in the plan changes
- PPC61 (Waipupuke) falls within MSM Zone 562, with residual areas north, west and south-east of the PPC

Figure 4-1 MSM Zones and Plan Change Areas



The MSM zone system is indicated in Figure 4-1 and the three PPCs in Figure 2. The PPC Modelling Report and associated ITAs indicate the following yields:

Table 4-1 Yields Indicated for Drury West Plan Change Areas

PPC	Dwellings	Centre GFA, m2	Source
Aurunga A/B1	2,650	Local only	ITA for PC51
Aurunga B2	890	7,000	ITA for PC51
Waipupuke	1,400-2,800	Local only	ITA and PC documents for PPC61

Figure 4-2 MSM Spatial (Zone) System

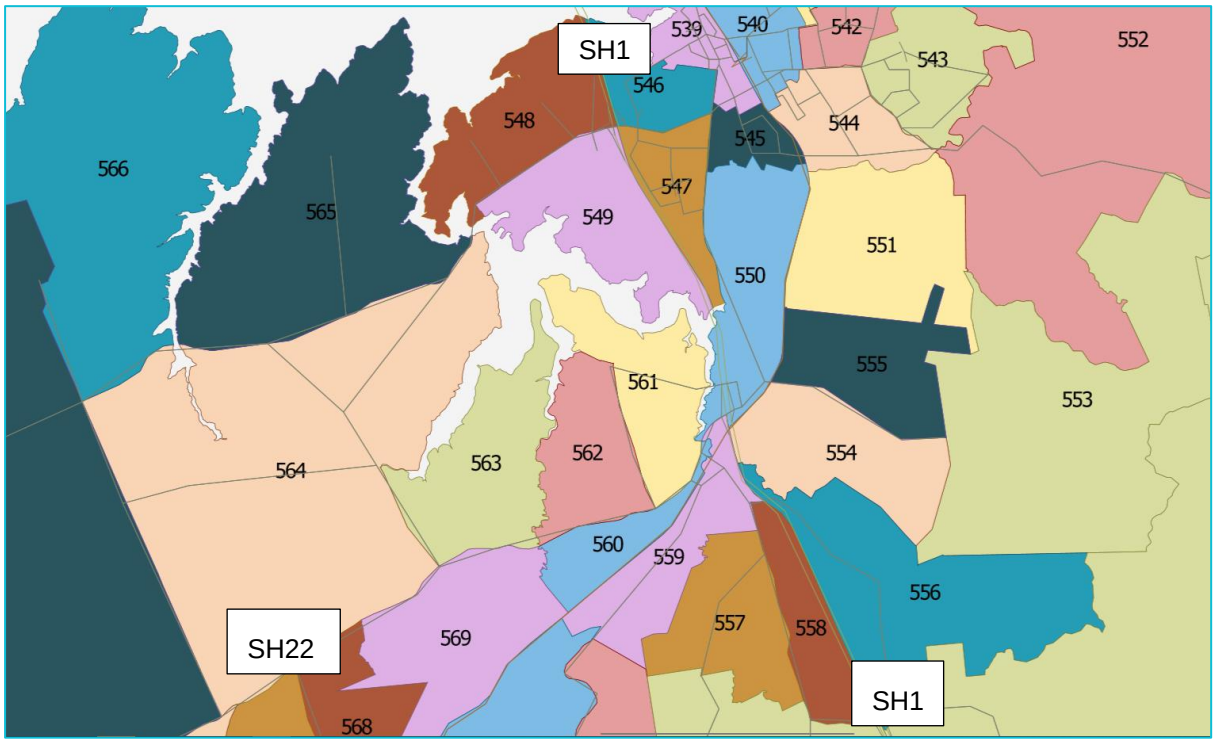


Figure 4-3 Aurunga B2 Plan Changes (Source: PC Documents)

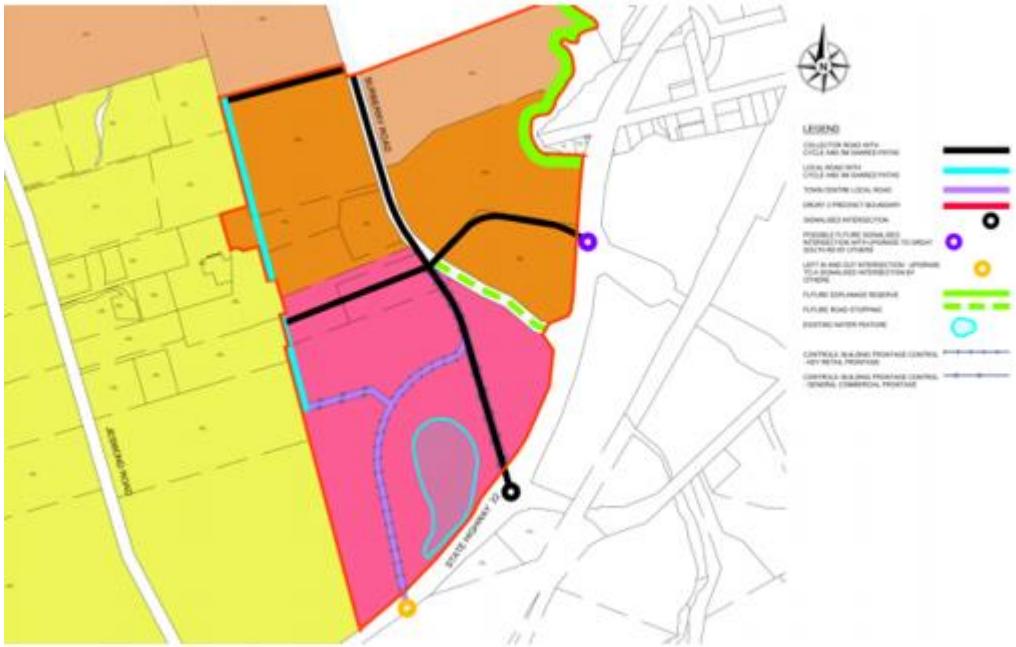


Figure 4-4 Waipupuke Plan Changes (Source: PC Documents)

The trip generation review has been undertaken for the complete area comprising MSM Zones 561 and 562. This therefore requires an estimate of the yield outside the plan change areas.

For Zone 562, the following data and assumptions were used:

- The PPC 61 ITA indicates 1,400 dwellings, although the Economics report indicates a range up to 2,800
- It also indicates that the Waipupuke plan change comprises some 56 ha, comprising 21ha of MHU residential zoning and 35ha of THAB
- The residual 175 ha of FUZ in that MSM zone area was suggested to have some 85ha of MHSU, 64ha of MHU and 24ha of THAB
- Net developable area was assumed at 50% of the gross area, and density rates (dwellings/net ha) were assumed to be 16, 33 and 56 for MHSU, MHU and THAB respectively. These were compared with rates used in the Structure Plan, which included rates of 28, 33 and 56 dwellings per ha
- These density rates provided a range of 1330-1416 dwellings for the plan change area, matching the 1,400 used in the ITA
- Using the same two sets of density rates for the residual area gives between 2,200 and 2,900 dwellings, from which an assumption of 2,600 was adopted
- The combined total for the MSM zone therefore had a range between 3,600 and 4,200, from which an estimate of 4,000 was adopted for this assessment
- This is close to the total Structure Plan estimate of 3,990 dwellings

For Zone 561, the following data and assumptions were used:

- 168ha for Aurunga A/B1 and 33.6ha for Aurunga B2
- Some 2,650 dwellings for Aurunga A and B1 and 890 dwellings and a 7,000m2 Centre proposed for Aurunga B2 based on the plan change ITA
- Approximately 80ha for the residual FUZ area adjacent to Jesmond Road
- Similar zoning type and area indicated in the Structure Plan for the residual area as in Aurunga B2

- Hence similar assumptions were used for the residual FUZ area, giving a range between 1000-2200 dwellings and approximately a 5,000m2 centre
- This gives a total for MSM 561 of between 4,540 and 5,700 dwellings, which is significantly higher than the estimate of 3,820 in the Structure Plan. As such, the lower level of 4540 dwellings was adopted for this assessment, along with a combined total of a 12,000m2 Centre

4.2 Approach to Estimation of Trip Generation

The trip generation for Drury West (MSM Zones 561 and 562) was estimated using the same method as used for Drury East. The planned Centre in Drury West is smaller in scale than that proposed in Drury East, however for this assessment that area was assumed to be predominantly retail development.

The MSM zones are sub-divided in the SATURN model, as shown in Figure 4-5. Because detailed plan changes have not been completed for this area, the sub-zones were sub-divided based on likely loading points to the network, rather than on specific spatial areas with fixed boundaries. Hence the map shows the centroid location and assumed loading point, rather than zone boundaries.

The assumed build-out rate is shown in Table 4-2. Mode share assumptions were based on proximity to the stations, as indicated in Table 4-3.

Note: It was noted that the SATURN model has transposed the loading of zones 561 and 562.The yield and traffic generation remains correct for each zone, however the numbering is transposed. The following figure and tables show the SATURN zone numbers as they should be to avoid confusion, however they are transposed in the actual model.

Figure 4-5 Drury West SATURN Model Zones

Table 4-2 Drury West Build-Out Assumptions

PC/Activity	MSM Zone	Saturn Zone	2028	2038	2048	2048+
RESIDENTIAL UNITS						
THAB	562	5621	800	1,400	1,400	1,400
THAB/Med	562	5622	400	600	1,000	1,100
Med/Low	562	5623	100	200	400	834
Med/Low	562	5624	50	100	200	333
Med/Low	562	5625	50	100	200	333
SUM	**562**		**1,400**	**2,400**	**3,200**	**4,000**
FUZ, Residential	561	5611	10	100	500	1,000
Aurunga B2	561	5612	100	400	600	890
Aurunga B1	561	5613	500	1,350	1,350	1,350
Aurunga A	561	5614	1,000	1,300	1,300	1,300
SUM	**561**		**1,610**	**3,150**	**3,750**	**4,540**
TOTAL	**561/562**		**3,010**	**5,550**	**6,950**	**8,540**
BUSINESS (GFA, m2)						
FUZ, Residential	561	5611	-	1,500	3,000	5,000
Aurunga B2	561	5612	3,500	5,000	6,000	7,000
SUM	**561**		**3,500**	**6,500**	**9,000**	**12,000**

Table 4-3 Drury West Mode Share Assumptions

PC/Activity	MSM Zone	Saturn Zone	2028	2038	2048	2048+
THAB	562	5621	23%	29%	34%	40%
THAB/Med	562	5622	18%	22%	26%	30%
Med/Low	562	5623	18%	22%	26%	30%
Med/Low	562	5624	13%	16%	18%	20%
Med/Low	562	5625	13%	17%	21%	25%
FUZ, Residential	561	5611	23%	29%	34%	40%
Aurunga B2	561	5612	8%	14%	19%	25%
Aurunga B1	561	5613	13%	17%	21%	25%
Aurunga A	561	5614	18%	21%	23%	25%

4.3 Combined Trip Generation

The total vehicle trip generation for the Drury West area (MSM zones 561 and 562) was therefore estimated as follows:

Table 4-4 Drury West Target Trip Generation (Total Trips and Total External Trips)

Plan Change Area	MSM Zone	S3M Zone	2028				2038				2048				2048+			
			AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily
Total Trips (Includes Internal Trips and with Pass-by discounts)																		
	562	5621	358	219	358	3,972	565	345	565	6,269	506	309	506	5,613	449	274	449	4,984
		5622	256	157	256	2,846	357	218	357	3,957	549	335	549	6,092	556	340	556	6,168
		5623	64	39	64	712	119	73	119	1,319	220	134	220	2,437	421	257	421	4,676
		5624	38	23	38	418	72	44	72	794	136	83	136	1,505	214	131	214	2,371
		5625	34	21	34	377	63	39	63	702	117	72	117	1,301	180	110	180	2,001
		Total	**750**	**458**	**750**	**8,326**	**1,175**	**718**	**1,175**	**13,041**	**1,527**	**933**	**1,527**	**16,948**	**1,820**	**1,112**	**1,820**	**20,200**
	561	5611	4	3	4	50	49	54	77	851	195	155	236	2,622	339	256	395	4,388
		5612	82	125	169	1,880	225	216	316	3,511	294	252	377	4,189	383	302	461	5,120
		5613	340	208	340	3,775	854	522	854	9,474	791	483	791	8,780	731	447	731	8,110
		5614	710	434	710	7,882	875	535	875	9,709	828	506	828	9,186	782	478	782	8,678
		Total	**1,137**	**770**	**1,224**	**13,587**	**2,003**	**1,326**	**2,121**	**23,545**	**2,107**	**1,396**	**2,232**	**24,778**	**2,235**	**1,482**	**2,369**	**26,296**
Grand Total Trips			**1,887**	**1,228**	**1,974**	**21,913**	**3,178**	**2,044**	**3,296**	**36,586**	**3,634**	**2,329**	**3,759**	**41,726**	**4,055**	**2,594**	**4,189**	**46,496**
Total External Trips (Excludes Internal Trips and with Pass-by discounts)																		
	562	5621	337	201	336	3,688	521	312	519	5,718	465	279	463	5,105	407	246	407	4,489
		5622	241	144	241	2,643	329	197	328	3,609	504	303	503	5,541	504	304	503	5,555
		5623	60	36	60	661	110	66	109	1,203	202	121	201	2,216	382	231	382	4,211
		5624	35	21	35	388	66	40	66	724	125	75	124	1,369	194	117	194	2,135
		5625	32	19	32	350	58	35	58	640	108	65	107	1,183	163	99	163	1,802
		Total	**706**	**421**	**705**	**7,730**	**1,084**	**650**	**1,081**	**11,894**	**1,403**	**843**	**1,399**	**15,414**	**1,650**	**996**	**1,649**	**18,192**
	561	5611	4	3	4	46	46	49	70	775	179	140	216	2,383	308	229	358	3,950
		5612	78	115	159	1,741	208	195	291	3,198	270	227	346	3,807	347	270	418	4,609
		5613	320	191	319	3,505	788	472	785	8,641	727	436	725	7,985	663	400	662	7,304
		5614	669	399	667	7,318	807	484	804	8,856	761	457	758	8,355	709	428	708	7,815
		Total	**1,071**	**707**	**1,150**	**12,610**	**1,849**	**1,200**	**1,951**	**21,470**	**1,937**	**1,260**	**2,045**	**22,530**	**2,027**	**1,327**	**2,146**	**23,678**
Grand Total External Trips			**1,777**	**1,128**	**1,854**	**20,341**	**2,933**	**1,849**	**3,031**	**33,364**	**3,340**	**2,103**	**3,444**	**37,944**	**3,677**	**2,324**	**3,795**	**41,870**