

Greater Christchurch Partnership

Te Tira Tū Tahī

One Group, Standing Together

National Policy Statement Urban Development Capacity

Housing Capacity Assessment — Methodology

Prepared for the Greater Christchurch Partnership

Revision 7

Dated 31 October 2018

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1 Purpose of report and structure of the Housing Capacity Assessment

The purpose of this report is to document and explain the methodology for the Housing Capacity Assessment (HCA) for Greater Christchurch. Specifically, the report outlines the approach to select the study area and the division of demand across the study area by type, price point and location. It outlines the approach to the assessment of enabled and feasible housing development capacity for greenfield areas and for redevelopment areas. It also includes an analysis of the outcomes to identify issues with the process and further steps required to expand information and improve the robustness of the analysis.

This report includes a number of appendices that address the specifics of the population projections selected for this work, the approach to assessing the demand for housing based on these population projections and information that supports the feasibility methodology.

The Housing Capacity Assessment is to be prepared as a series of individual reports as follows:

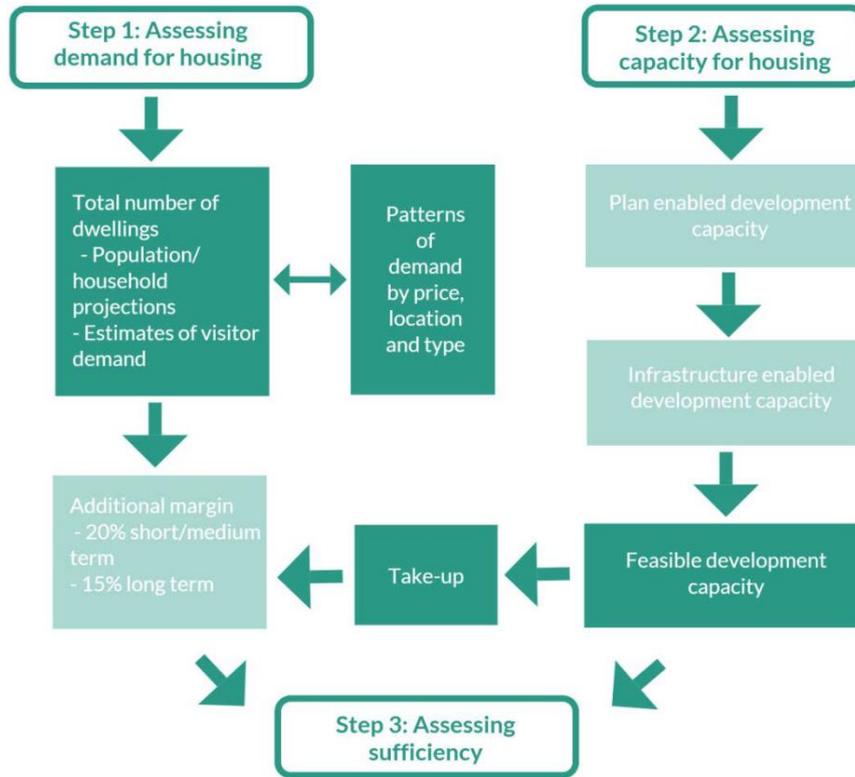
- Report 1: Overview Report on Housing Demand
- (Report 1 Supporting Assessment: Livingston and Associates Limited (2017) Research Report Housing Demand in Greater Christchurch)
- Report 2: Housing Development Capacity Assessment – An Assessment of Plan-Enabled and Infrastructure Serviced Capacity
- Report 3: Housing Commercially Feasible Development Capacity and Sufficiency within Greater Christchurch
- Report 4: Housing and Business Interactions
- Methodology.

2 Abbreviations

Abbreviation	Reference
AU2013	SNZ Area Unit 2013
BCA	Business Capacity Assessment
CDP	Christchurch City District Plan
ECan	Environment Canterbury, the regional council
FDS	Future Development Strategy
MBIE/MfE feasibility tool	Unless otherwise stated this refers to excel based feasibility tool supplied to the Greater Christchurch Partnership. This differs from the version of the tool available from the MBIE website. Where a further (GCP originated) revision of the tool was used, this is noted.
MBIE - LDM	The land development components of the MBIE feasibility tool
MBIE - BDM	The building development components of the MBIE feasibility tool
GCHMA 2013	2013 Greater Christchurch Housing Market Assessment
GCP	Greater Christchurch Partnership (Christchurch City, SDC, WDC, ECan, NZTA)
HCA	Housing Capacity Assessment
MBIE	Ministry of Business Innovation and Enterprise
MfE	Ministry for the Environment
NPS-UDC	National Policy Statement on Urban Development Capacity 2016
NPS-UDC Guidance	National Policy Statement on Urban Development: Guide to Evidence and Monitoring
NZTA	New Zealand Transport Agency
ODP	Outline Development Plan (from the District Plans).
SA2	SNZ Statistical Area 2
SDC	Selwyn District Council
SDCDP	Selwyn District, District Plan
SNZ	Statistics New Zealand
UDS	Urban Development Strategy
WDC	Waimakariri District Council
WDCDP	Waimakariri District Council, District Plan

3 Guidance

The recommended overall process for the HCA is set out in the NPS-UDC Guidance document:



NPS-UDC Guidance. Flow chart of recommended assessment process.

The methodology for the HCA broadly follows this process. This report expands on the methodology for each step in the process.

There are policies within the NPD-UDC which are of particular relevance to the HCA, principally Policy PB1 which states that local authorities shall:

...on a three yearly-yearly basis, carry out a housing and business development capacity assessment that:

a) Estimates the demand for dwelling, including the demand for different types of dwellings, locations and price points, and the supply of development capacity to meet that demand, the short, medium and long-terms;...

The NPS UDC, with respect to housing, defines demand as (underline emphasis added):

The demand for dwellings in an urban environment in the short, medium and long-term, including:

a) The total number of dwellings required to meet projected housing growth and projected visitor accommodation growth;

b) Demand for different types of dwellings;

c) The demand for different locations within the urban environment; and

d) The demand for different price points

Recognising that people will trade off b, c, and d, to meet their own needs and preferences.

The HCA has been structured to directly respond to these policy requirements and those contained within Policy PB2, which is also directly relevant to housing demand.

Where the demand assessment deviates from the recommended approaches in the NPS-UDC Guidance, this is documented and a rationale provided.

4 Growth Projections

The NPS-UDC Guidance suggests that the starting point for the demand assessment are the growth projections from SNZ. For the study area the following will be used:

- For Christchurch City Council the Medium Growth projection. For Selwyn District and Waimakariri District the Medium-High Growth projection.

A detailed rationale for the selection of growth projections to underpin the HCA can be found in Appendix 2 of this report.

5 Study area and geographical division

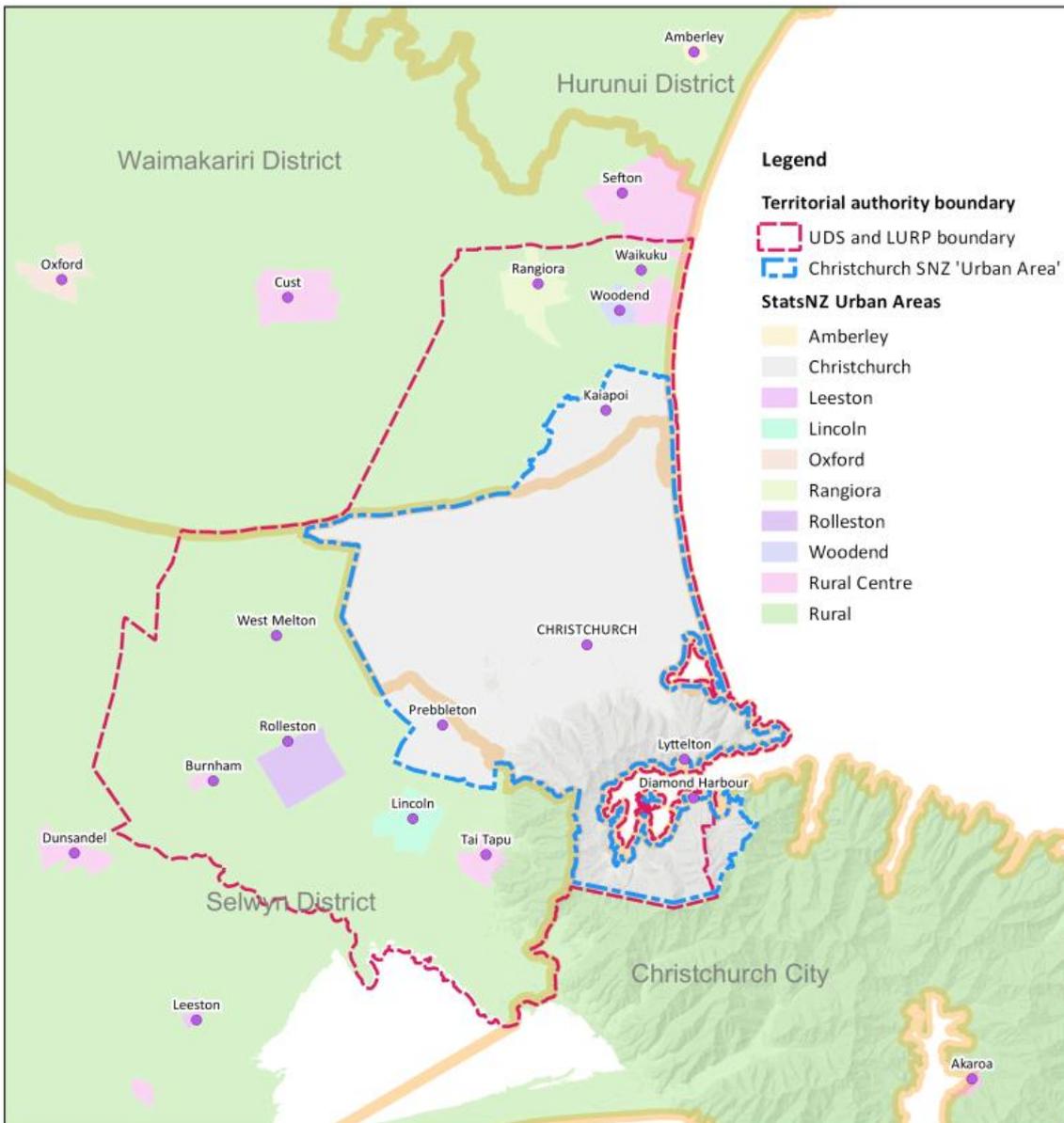
5.1 Study Area

The NPS-UDC uses the SNZ *Urban Areas* in high growth as the trigger for when each policy of the NPS-UDC becomes applicable. Within the Greater Christchurch area the SNZ *Christchurch Urban Area* is a high-growth area. It overlaps the territorial boundaries of Christchurch City, Selwyn District and Waimakariri District.

The NPS-UDC places a strong emphasis on cross-boundary coordination between local authorities who occupy the same urban and housing market. It notes that the application of the policies need not be restricted to the high-growth area. The NPS-UDC also encourages the use of existing coordination arrangements between local authorities and the agreement of a shared area. The existing boundary of the Greater Christchurch Urban Development Strategy (UDS) aligns with the intent and specifics of the NPS-UDC and consequently is an appropriate boundary for the HCA. The advantages of using the UDS boundary as the Study Area are:

- Existing arrangements for Cross-border collaboration (between Christchurch City, Selwyn and Waimakariri Districts, and Environment Canterbury on development and continual implementation of the UDS).
- Match to SNZ boundaries
 - Alignment with starting point for assessment, e.g. population projections and demographics, statistical Area Unit boundaries.
 - Alignment with MBIE capacity, price reporting (based on statistical Area Units).
 - Alignment with draft SA2 boundaries (future proof).
 - Encompasses SNZ *Urban Area* (with the exception of one AU2013)

The main disadvantage is the imperfect alignment with SNZ *Urban Area*, however, this is limited to a single AU2013 and will be resolved with the introduction of the new SA2 area boundaries. The approach will align the study area boundary with the anticipated SA2 boundaries and the existing boundary of the UDS. This will ensure future and on-going assessments for the HCA are comparable to this first assessment.



Map 1: Comparison of Territorial Authority boundaries, the UDS/LURP boundary and the SNZ *Urban Areas* boundaries.

5.2 Division of the study area into sub-areas

These sub-areas will provide the framework for the assessment of demand location. The NPS-UDC Guidance suggests that the approach to assessing the geographical distribution of demand need not be overly detailed and that a *broad-brush* approach is acceptable. Specifically, a recommended approach is to divide any given study area along general classifications of locations:

“To ensure the analysis remains manageable, it may make sense to aggregate area units into more general classifications of location, for example, central business district, inner city suburbs, peripheral suburbs and areas with high amenity... These general categories may be more useful than individual suburbs, given that households are mobile within urban areas and will accept trade-offs between similar types of suburbs.”

5.2.1 Division of Christchurch City

For Christchurch City, the division is into four broad areas; the Central City and inner suburbs, remaining flat land, Port Hills and Lyttelton Harbour. The large flat land area is further divided into a four sub-areas.

The Central City and inner suburbs divisions separate the denser areas in and close to the Central City from the more suburban outer suburbs of Christchurch. The AU2013 boundaries have no direct relationship with zone boundaries, except where there is a correlation as a consequence of different population densities in different areas (i.e. area units are geographically smaller where population density is highest, which tends to correlate with areas where historically zones have provided for higher density development). The AU2013 that border the Central City contain a range of zones that enable a range of densities, however, the majority of land is zoned for Residential Medium Density. It is necessary to group the AU2013 of the Central City and the inner suburbs in order to provide sufficient population data to inform meaningful population and demographic projections. Considered alone, the three AU2013 of the Central City do not provide a sufficient population base from which to project future trends.

The wider flat land suburban area is divided into four sub-areas. Each of these areas contains a range of housing choices and living environments across a variety of District Plan zones. These include areas which are of older suburban development, new greenfield development (both completed and vacant), brownfield sites and areas zoned for medium-density, particularly around Key Activity Centres. While further division of these areas may be considered, it carries with it a risk of undermining the reliability of the analysis due to the lower population of smaller aggregations of AU2013.

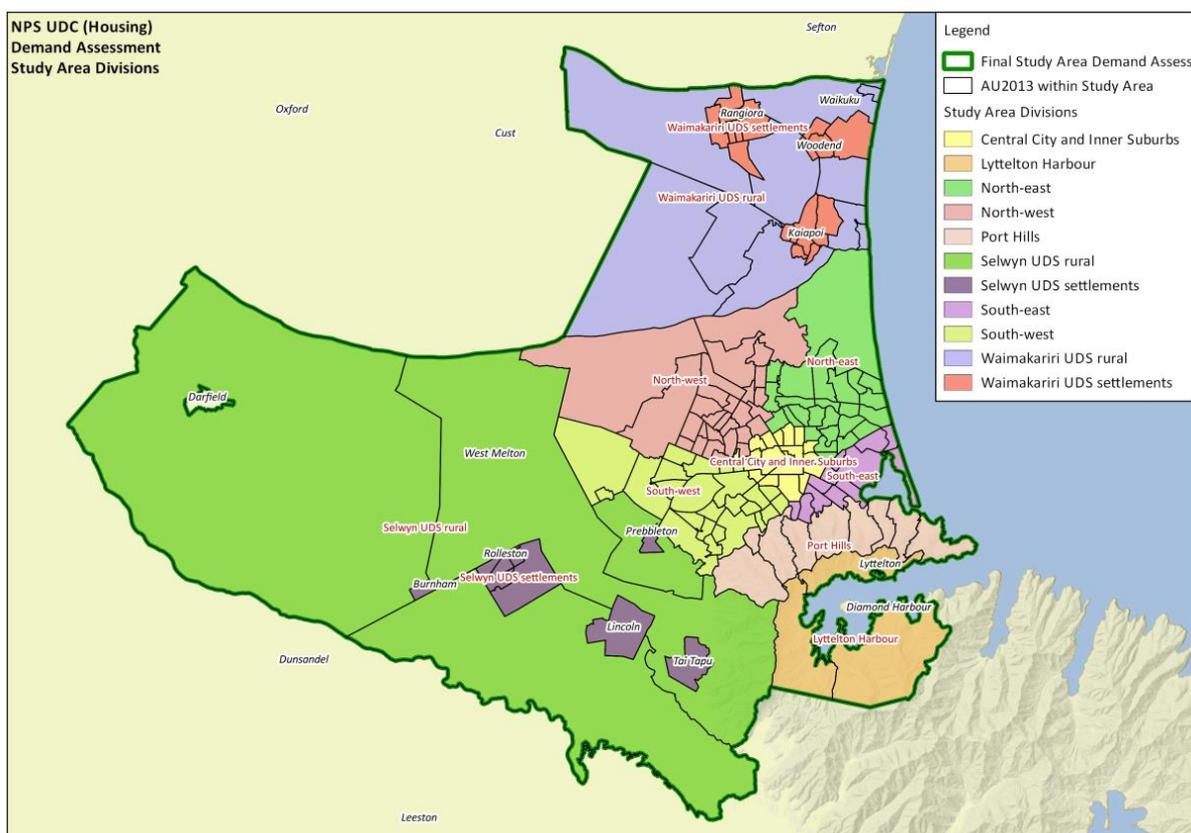
Christchurch division	Sub-area	Extent and key inclusions
Central city and inner suburbs	n/a	Central city (four avenues) and inner-city suburbs bordering the central city
Flat land urban	North-east	Covers the suburbs of Shirley, Parklands, New Brighton, Mairihau, Avondale, North New Brighton and Burwood . Includes KACs in Shirley and New Brighton (in part). Includes greenfield areas at Highfields and Prestons.
	South-east	Covers the suburbs of St Martins, Opawa, Woolston, Bromley and South New Brighton Includes KACs at Linwood and New Brighton (in part). Does not contain any new or proposed greenfield areas.
	South-west	Covers the suburbs of Spreydon, Hoon Hay, Hornby, Islington, Wigram and Halswell. Incudes KACs at Riccarton (part), Church Corner, Hallswell, Barrington and Hornby. Includes the greenfield areas of Awatea and the various Halswells greenfields. Also includes the Riccarton Racecourse area.
	North-west	Covers the suburbs of Fendalton, Ilam , Burnside, Papanui, Bishopdale, Belfast and Harewood. Includes the Belfast and Papanui KAC, and also the airport. Includes a number of greenfield areas around Belfast.
Port Hills	n/a	Covers the suburbs of Westmoorland, Cashmere, Mount Pleasant, Heathcote Valley, Redcliffs and Sumner. Does not include any KAC or greenfield areas. The area is mostly hills but does include flat land areas at the base of Port Hills.

Lyttelton Harbour Basin	n/a	Covers Lyttelton and all the harbour side settlements around to and including Diamond Harbour. Does not include any greenfield areas and the higher proportion of rural land of all the divisions.
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5.2.2 Division of Selwyn and Waimakariri Districts

For Selwyn and Waimakariri Districts the study area division makes a distinction primarily between a rural living and urban living environment. The division groups the main settlements of each respective district together, recognising that they offer broadly the same types of housing typology choice.

SDW/WDC Division	Extent and key inclusions
Urban SDC	Larger settlements including Prebbleton, Tai Tapu, Lincoln, Rolleston, Springston (inclusive of Burnham Military Camp and the Kirwee Area Unit)
Rural SDC	The remainder of AU2013 within the study area. West Melton is included in the rural division. Includes parts of the rural SDC area that fall outside the study area due to the large size of some AU2013 that cover rural areas.
Urban WDC	Larger settlements including Rangiora, Kaiapoi and Woodend (including Pegasus).
Rural WDC	The remainder of AU2013 within the study area. Includes parts of the rural WDC area that fall outside the study area due to the large size of some AU2013 that cover rural areas.



Map 2. Study Area and sub-area divisions

5.2.3 Selection of sub-areas

The divisions listed in 5.2.1 and 5.2.2 have been informed by the MBIE *housing market sub-areas* that were used in the 2013 GCHMA. The significant differences and similarities between the two sets of divisions are outlined below, with an explanation provided where appropriate:

- The 2013 GCHMA used MBIE *housing market sub-areas* based on the SNZ 2006 version of area units. The study area division is based on the more up-to-date AU2013 which are better aligned with the SA2 boundaries.
- The 2013 GCHMA used MBIE *housing market sub-areas*. These did not separate out the urban settlements of Selwyn and Waimakariri District.
- For Christchurch the MBIE *housing market sub-areas* agglomerated the inner suburbs to the east of the Central City with the outer suburbs of eastern Christchurch. The divisions used for the assessment (grouping the AU2013 that adjoin the Central City AU2013 with the Central City) better aligns with the NPS-UDC guidance which suggest separating areas offering significantly different housing options.
- The MBIE *housing market sub-areas* agglomerated the hill suburbs with a number of flat land suburbs. For the HCA, the AU2013 areas covering the Port Hills and south-eastern coastal suburbs form a separate sub-area from the remaining flat land AU2013. This better aligns with the NPS-UDC guidance which suggest separating areas offering a particularly different amenity option (e.g. hill and coastal suburbs).

The proposed division of the study area is into 11 sub-areas. This is the same as the number used for the 2013 GCHMA report, albeit not repeating the same boundaries (as noted above).

5.3 Options for detailed analysis

In the interests of expedience and manageability, the overall approach to the demand assessment will be at a sub-area level. However, the use of AU2013 as the building blocks for the demand assessment affords the opportunity to further investigate the finer detail of demand in more specific locations. For example, what the demand may be for different types of housing around Key Activity Centres, or to distinguish patterns of demand between the settlements within Waimakariri and Selwyn Districts. Opportunities will be identified as the assessments are completed.

6 Demand Assessment – HCA Report 1 and Supplementary Report

The Housing Demand Assessment forms the benchmark for determining if there is a sufficient feasible supply of housing, and if this supply is of the appropriate type, price point and in the appropriate locations. This is Step 1 of the recommended approach.

The Housing Demand Assessment has, as suggested in the NPS-UDC guidance, taken the SNZ population projections as a starting point for the assessment of overall demand. Overall demand will then be stratified across different household types, taking into account age, family composition, income and housing need (e.g. affordable housing). The demand across households will inform an assessment of the level of demand for different housing typologies and the geographical distribution of this demand.

6.1 Demand by location

The location of housing demand has been assessed for each of the study area divisions. Demand across different household typologies

The selection of housing typologies are broad and align with the categories used in the MBIE/MfE feasibility tool. Demand is assessed for standalone houses, multi-unit houses and for apartments.

Demand is also assessed for households by bedroom number, recognising that all three housing typologies categories can accommodate a range of household sizes. More detail of the split across housing typologies can be found in demand assessment proposal attached as Appendix 1.

6.2 Methodology summary

The demand assessment models future demand and affordability by tenure and household characteristics using a multi-dimensional matrix methodology.

There are a number of stages in the modelling of future housing demand and affordability. These include:

- An assessment of the historical trend in housing demand by age and household composition, combined with statistics New Zealand's projected growth by age and family composition;
- A multi-dimensional matrix is used to track household cohorts (by tenure, age and household composition) over time (1991 forwards) to model future trends in tenure (including the number of owner occupied and renter households);
- The implications of the trends in tenure and demographic characteristics are modelled taking into account the projected change in household characteristics and the preference of those households for dwellings of different sizes and typologies. The trend in dwelling preferences is initially based on details modelled from the 2013 census data combined with some assumptions associated with a trend to more intensive living over time.

The outcome of the demand assessment forms Report 2 of the HCA.

7 Housing Development Capacity Assessment – Report 2

7.1 Plan Enabled capacity assessment – approach and process steps

Step 2 of the NPS-UDC Guidance recommended approach to an HCA will consider the capacity for housing development that is enabled through each of the three District Plans operative in the study area. Each district provides for residential activity across a variety of different zones, each with a set of rules. In addition, some areas are within plan overlays which can alter one or more of the general rules for the zone. An assessment of the maximum development capacity under each set of rules provides an estimate of the plan enabled capacity.

As a starting point for the assessment, *Development Capacity* in the NPS-UDC is defined as the capacity of land intended for urban development based on:

-
- a) *The zoning, objectives, policies, rules and overlays that apply to the land, in relevant proposed and operative regional policy statements, regional plans and district plans, and*
 - b) *The provision of adequate development infrastructure to support the development of land.*
- NPS-UDC, page 7.*
-

The approach to this assessment has been adjusted slightly to suit each of the three District Plans operative in the Greater Christchurch area as of November, 2017. The same broad steps will apply across all three plans:

1. Establish the extent of land zoned for residential activity within the study area.

2. Establish the proportion and extent of zoned residential land that is also the subject of an overlay (where applicable) that constrains or extends development potential.
3. Determine the level of development that could theoretically occur (the theoretical maximum), based on the rules of the operative district plan, including the influence of overlays.
4. Determine the level of development that could occur (to be reported as the modified capacity), based on:
 - a. The capacity of all greenfield areas when developed to the minimum density required under the Regional Policy Statement.
 - b. The past trends of intensification type development in Christchurch City
 - c. An assessment of the spatial capacity for infill development in the existing urban areas of Selwyn District and Waimakariri District.
5. Consider and determine the impact of the Canterbury Regional Policy Statement on development capacity (including the minimum density target).

This assessment will deliver an estimate of theoretical capacity and modified capacity across the Greater Christchurch area and individually for each of the three districts.

7.2 Measures of plan enabled capacity

For modified capacity the approach has differed between districts to reflect the different areas of emphasis for delivery of housing supply. While the approach to the greenfield capacity assessment is consistent across the three districts, the approach to assessing additional capacity within the existing urban areas reflects the greater emphases on infill in SDC and WDC and on redevelopment in Christchurch City. For Christchurch City the policy direction of the District Plan encourages redevelopment of existing land parcels as comprehensive development, including across multiple amalgamated sites. Capacity as suburban infill in Christchurch City (i.e. subdividing the vacant rear part of an existing allotment) is limited; most opportunities having already been taken-up. For Selwyn and Waimakariri, housing capacity is primarily delivered through greenfield uptake and is supplemented by backfill capacity in suburban zones. There is less focus on comprehensive site redevelopment. The CRPS signals that only limited housing supply is anticipated through redevelopment in Selwyn and Waimakariri.

7.2.1 Theoretical capacity

Theoretical capacity estimates the maximum number of dwellings that could be developed under the provisions of each district plan zone. The theoretical capacity assumes ideal development conditions, the maximisation of opportunity, and the minimisation of controllable or mitigatable constraints (i.e. other than those imposed by overlays etc.). It also ignores existing land use and property boundaries. Essentially each urban block is considered as if it were a single development site.

It is recognised that a block scale of development is unlikely to be realised extensively in the Greater Christchurch area¹. Theoretical capacity as an indicator for actual capacity will vary considerably between zones and for individual sites within zones, dependent on the degree of certainty around development outcomes. For greenfield areas that have been the subject of an Outline Development Plan process there is more certainty around the development outcome (i.e. the theoretical capacity is likely to be close to the anticipated capacity). For redevelopment of the existing urban area (e.g. through intensification) there is far less certainty. In this instance the theoretical capacity is an overstatement of what is realistically achievable

¹ Unlikely under current development and market conditions. Block scale redevelopment has occurred in cities as a consequence of urban regeneration programmes and also through private development initiatives where market conditions are suitable to support this level of investment. In Christchurch there are examples of block level redevelopment, although these are almost exclusively of former commercial/industrial brownfield sites rather than of sites that require the removal of existing low density housing.

when considering the complexities of removing existing dwellings and existing property boundaries. Conversely, theoretical capacity models only a narrow definition of 'plan enabled' capacity (see section 7.3), being limited to permitted development, controlled and restricted discretionary activities. Development capacity realised as restricted and non-complying activity has not been estimated.

7.2.2 Modified capacity

An assessment of the modified capacity will consider what has been achieved, on average, through development in each zone under similar planning conditions and use this as the basis for estimating potential capacity across a zone. For example, the yield from development in the (superseded) Christchurch City Plan Living 3 zone over the last two decades can be used as a guide to the likely yield from development in the Christchurch District Plan Residential Medium Density zone (the two zones have similar rules, albeit the RMD zone is more permitting of development overall). This observed development yield can be averaged and projected across the entirety of the zone to calculate the modified capacity should all development proceed in the similar pattern to past development. By definition, the modified capacity will incorporate an element of development feasibility; the approach uses data on past developments that have been built, and so were feasible at the time they were built.

The approach has been amended for the RSDT zone in Christchurch. The recent review of the Christchurch District Plan introduced a new provision on the zone for multi-unit development. This essentially avoids the limitation of the minimum sub-division size that remains a feature of the RSDT zone carried over from the superseded Living 2 zone of the Christchurch City Plan (operative until 2016). The new provision is theoretically enabling of more development in the zone than it has historically been possible to achieve, and therefore an assessment of modified capacity should be adjusted to properly account for this. This assessment involved considering historical level of development in the Living 3 zone as a proportion of theoretical capacity and applying this proportion to the RSDT zone to set a lower and upper range of modified capacity, albeit tempered to account for a lower enablement than found in the superseded L3 zone.

For the RCC zone the current density is skewed down by a number of older properties and vacant sites. To more accurately assess modified capacity in this zone the trends in recent development only were considered. This approach has taken the average density achieved in developments over the last two decades and projects this density across the entire zone.

7.2.3 Minimum density capacity

Minimum densities are set by the CRPS for new greenfield development, medium-density development (i.e. the RMD zone) and the Central City. They are the density that developments in must achieve and the rules of the district plans give effect to these. The minimums are:

- For new greenfield development in Christchurch City, 15 households per hectare (averaged over an Outline Development Plan area)
- For new greenfield development in Selwyn and Waimakariri Districts, 10 households per hectare (averaged over an Outline Development Plan area).
- For Christchurch Central City, 50 households per hectare (for individual development sites).
- For Medium-density zoned areas (RMD in the CDP), 30 households per hectare (for individual development sites).

A capacity based on minimum density has not been reported separately.

7.3 District Plan activity tables – 'Plan enabled' limit on capacity assessment

District plans enable a range of possible residential activities in residential zones. These are set out in the activity table for each zone. Permitted activities are redevelopment that is enabled 'as of right' with, for built-

form activity standards, no need for further assessment by Councils (assuming that all rules are adhered to). Permitted development does not require a resource consent (subdivision consent may still be required). Controlled and Restricted Discretionary activities do require a resource consent, but one that is limited to a specific area or topic of development, or where a specific matter for assessment exists. Development is enabled beyond these three activity types (i.e. as Fully Discretionary and Non-Complying) but will necessitate a more complex resource consent process, which can be reflected both in time and cost for development. In theory, there is no limit on the type of development for which a resource consent as a Discretionary and Non-complying activity may be sought. Such consents are assessed on their merits and as such there is a considerable degree of uncertainty associated with quantifying and estimating the capacity for housing supply that may be delivered through such developments. The costs and fees of Fully Discretionary and Non-Complying consents are also uncertain and variable, making it difficult to generalise for the purposes of modelling either plan enabled or feasible capacity.

In summary, the assessment of plan enabled capacity will be limited to that which can be achieved as Permitted, Controlled and Restricted Discretionary development. Ongoing Monitoring of development activity and resource consents will help to inform the extent to which discretionary and non-complying developments are a source of housing supply.

7.4 Specifics of the Plan Enabled Supply assessment

As noted, the broad steps in the assessment of plan enabled capacity will be adjusted to better suit the three District Plans operative in the study area. Different approaches have been taken in the three Districts.

7.4.1 Christchurch City

The approach is to consider housing supply both through greenfield and redevelopment areas. Both theoretical and modified capacity are assessed at an urban block level. The capacity for each block is rounded down to the nearest whole number. Other determinants of the assessment process are as follows:

- Land zoned Residential Guest Accommodation was excluded as it is anticipated that this is used for hotels and not housing (i.e. a commercial activity). Also, land within the accommodation and community facilities overlay was excluded as currently it is used for commercial accommodation (e.g. motels and hotels). The District Plan encourages this activity in the overlay and discourages it elsewhere.
- Land within the High Flood Hazard area is not considered to have significant additional capacity. The District Plan seeks to avoid development within these areas due to the flood risk, which is reflected in the low site density rule for the zone.
- Commercial Zones (outside the Central City): The Commercial Core, Commercial Local, Commercial Banks Peninsula, and Commercial Mixed Use Zones all permit residential activity located either above or at the rear of a commercial activity. Assessment of residential activity within these zones shows that take-up is currently negative. There is potential capacity within these areas, however, recent evidence suggests it is not occurring (Since 2011 more residential units have been removed from commercial zoned areas than have been built) and, therefore, this potential has not been assessed.
- Commercial Central City: Areas such as the 'Frame' and the Central City Mixed Use zone have been included in the assessment. The Commercial Central City Business Zone permits housing above the ground floor however, this type of development is complex and a different approach to assessment is required to determine the potential capacity of the zone.
- Papakāinga/Kāinga Nohoanga Zone: There is one Papakāinga zone located within Greater Christchurch (within Christchurch City), located in Rāpaki. The Papakāinga zone allows contiguous Māori land (identified through Te Ture Whenua Maori Act 1993) to be treated as one site and has no site density

controls. This provides potential for a wide variation in density. Four residential houses have been built since 2012. More work needs to be done to determine the potential capacity of this zone.

The Christchurch District Plan introduced several overlays that enable development at a higher density than the underlying zone. For the calculation of capacity in an area that was identified within an overlay, the density option ignores the anticipated density of the underlying zone and instead uses the anticipated density of the overlay provision.

7.4.2 Other considerations for Christchurch City plan enabled assessment

The following are specific considerations and exclusions taken into account when determining plan enabled capacity in Christchurch.

Non-residential activities in residential zones: Currently 2.7% of residential sites are occupied by non-residential activities (e.g. meeting halls, schools and community facilities). Accounting for these activities reduces the theoretical housing capacity by approximately two percent. The calculation of the modified capacity is by default inclusive of non-residential activities (i.e. historic density includes these land areas but with no contributing housing).

Residential Medium Density Zone: The theoretical and modified density applied to the RMD zoned areas is based on the study of density achieved for redevelopment in the Riccarton area since 1995². This area was rezoned from a low-density suburban zone to a medium density zone in the 1995 City Plan and provides a useful case study area to show the effect of rezoning with comparable planning rules in place. This analysis showed that over two thirds of all medium-density development since 1995 achieved in excess of 30 hh/ha. More recent developments (since 2000) have generally achieved higher densities, with about 40% of developments above 40 hh/ha, as well as 30% of developments between 35-40 hh/ha. The trend is a gradual increase in the average density of development over time. The minimum density in the RMD zone is now 30 hh/ha. The theoretical density of 60 hh/ha represents the estimated and approximated highest potential for all sites (again, based on the study, but noting that there is no 'maximum' density as such. Some development sites have achieved in excess of 60 hh/ha in the RMD zone).

Residential Central City Zone: This provides for high density housing, with a higher height limit than the Medium Density Zone resulting in a theoretical potential yield of in excess of 100 hh/ha. A 100hh/ha theoretical yield is obtainable based on the density outcomes of the range of housing typologies set out in the guide 'Exploring New Housing Choices'. The guide provides examples of five storey courts (typology 11) reaching 124 hh/ha and a walk-up corner (typology 9) reaching 80 hh/ha³. There exist a number of medium to high-density residential developments within the Central City that have achieved or exceeded this level of density.

Commercial Mixed Use Zone and East Frame: The District Plan permits residential and commercial activities within the Mixed Use Zone. Christchurch City Council recently undertook a land use survey within part of the Mixed Use zone to determine the proportional split of ground floor activities. This survey indicates that housing occupies approximately five percent of ground floor activity. This equates to about five hectares of residential capacity. The government initiated East Frame development in the mixed use zone is consented for development of 900 houses.

² <http://www.chchplan.ihp.govt.nz/wp-content/uploads/2016/04/CCC-Rebuttal-evidence-Sarah-Oliver-22-06-16.pdf> Pg13. Also this study area was an area with a two storey height limit where RMD in some areas permits three story buildings

³ <https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Urban-Design/Exploring-New-Housing-Choices.pdf>

Residential Suburban Density Transition Zone: The RSDT zone allows for either suburban, single house, development on smaller sites, or comprehensive redevelopment of sites as multi-unit complexes of up to four units. Therefore, the zone supports both infill development, sub-division redevelopment and comprehensive medium-density redevelopment. However, the provision for multi-unit development in the zone was made operative relatively recently (2015), and so there is only limited data with which a theoretical or modified density for the zone can be determined. Notwithstanding this, as part of the Christchurch City Council's evidence under the District Plan Review, a comparative modelling analysis was undertaken of the potential for different scales of development in the Residential zones. Based on this analysis, for theoretical capacity, the assumption is that RSDT could typically yield a density of 60hh/ha using the multi-unit terrace typology.

Minor Residential Units: Minor residential units are permitted activities within the Residential Suburban Zone. This provision allows for small, independent units to be built on sites greater than 450m² and was introduced in 2015 as part of the District Plan Review⁴. Consequently, there is currently insufficient historical data with which to make an assessment of the likely uptake of Minor Residential Units for the modified capacity assessment.

Retirement Villages within all Residential Zones: Retirement villages are permitted activities throughout the residential zones. They may increase the total for theoretical capacity, however, more detailed analysis is required to understand and identify future potential retirement village locations and impact on capacity (both as a contributor to capacity and in lieu of other development).

Enhanced Development Mechanism (EDM): The EDM allows for comprehensive development over and above the zone provisions if a development site meets certain size attribute and spatial criteria. The mechanism was inserted into the superseded Christchurch City Plan by the Land Use Recovery Plan. The EDM may provide additional opportunities for increasing household yield, however, it is likely that uptake of the mechanism will be limited. The extent of the EDM does not exist as an overlay in the District Plan, making it difficult to define spatially for the location component of the demand assessment. The density gains enabled through the EDM can be achieved in part using the new District Plan rules for the RSDT zone. For the RMD zone there is little difference between what is achievable under the standard rules of the zone vs. the rules of the Mechanism.

7.4.3 Selwyn and Waimakariri District

Selwyn and Waimakariri Districts have separately commissioned Market Economics to build a stand-alone Growth Model for each district. The two growth models will estimate potential capacity, by location, using a combination of spatial data and assumptions to establish the Zone Enabled Capacity for the districts. This is also the maximum theoretical potential capacity for development.

For SDC/WDC, the growth models utilise parcel based information to determine the modified capacity⁵. This adjusts the theoretical capacity in recognition that the market rarely provides for housing fully to the densities and typologies enabled by District Plan subdivision standards and land use rules. It also accounts for the reality that there will be a range of lot sizes as a consequence of natural features, demand profiles and infrastructure needs.

The modified capacity is an estimate of the contemporary level of development that is being produced by the market within sample areas using spatial data to determine the extent to which the realised subdivision density is consistent with the underlying zones.

⁴ The superseded Christchurch City Plan contained provision for family flats. This provision had a similar development outcome to Minor Residential Units, however a family flat was restricted by specific tenure requirements. The provisions are therefore not directly comparable.

⁵ Refer to the SGM and WGM Technical Reports respectively and note that modified capacity in the SGM is referred to as 'Modified Development Potential'.

The SDC/WDC Models determine 'Zoned Enabled Capacity' by undertaking the following steps (which have been simplified for conciseness):

- *Zone developable land* – Zoned with development potential using LINZ sourced parcel boundaries and excluding undevelopable parcels (rivers, reserves etc.)
- *Rateable boundaries* – Data cleansing
- *Theoretical Zone enabled capacity* – Combines parcels boundaries with the land use rules to estimate theoretical capacity enabled by the Plan (permitted and some controlled activities) and applies assumptions (percentage of land required for infrastructure, excludes business activities and applies a Floor Area Ratio (FAR))
- *Current development* – Establishes areas of land utilised or developed through rates information and permitted land use rules i.e. what land has been fully developed, what has not.
- *Zone development potential* – Combines the previous steps to determine Zoned Enabled Capacity, 'vacant' (no buildings) and 'vacant potential' (potential for some form of additional development based on permitted activity rules).

For redevelopment, the Market Economics approach focuses on infill capacity. That is to say, where in the existing townships, based on the zone, are opportunities to retain the existing dwelling on site and create a new development site through sub-division.

7.5 Infrastructure capacity

A requirement of the HCA is to determine the extent to which enabled capacity is or will be serviced by infrastructure. This assessment shall be informed by each local authorities *Infrastructure Strategy* and through direct engagement with infrastructure engineering and planning staff. Included in the assessment are the timelines for resolution of any constraints that are identified, or if constraints can be addressed using alternative solutions (e.g. on-site mitigation of effects). This work will draw extensively on existing information and investigations recently completed or that are ongoing to inform District Plan review processes, strategic planning, Long Term Plan preparation or for the development of growth models.

7.5.1 Christchurch City infrastructure capacity assessment

For Christchurch the infrastructure constraints are well understood by the Council's Asset Planning Teams. A number of areas of constrained infrastructure capacity are mapped. For redevelopment that relies on a connection to existing infrastructure, these constraints do not necessarily preclude development. They do, however, mean that proposed development will be subject to an infrastructure assessment to determine if there is capacity within the localised catchment, and if not on-site mitigation measures may be required.

Greenfield areas for growth in Christchurch have been identified partly based on the ability of the areas to be serviced using existing or planned trunk infrastructure. The Council has a programme of works in its Long Term Plan to ensure these areas are serviced with trunk infrastructure in a timely manner.

For intensification of land use in the existing urban area the Council's programme of infrastructure network upgrades and replacement is addressing any capacity constraints that have been identified. As noted, for development in infrastructure constrained areas an assessment at the planning stage is required to assess the impact on the local network.

7.5.2 Assessment steps for redevelopment areas

Redevelopment potential of the existing urban area relies upon existing infrastructure being available. The steps to determine the extent of infrastructure capacity are:

- Review the Council’s Asset Planning Teams information on areas where infrastructure is constrained.
- Ensure that this information is up-to-date and that the programme of infrastructure upgrades and replacements is current and reflected in the Council Long Term Plan.
- Map areas of constraint, overlaid with areas of enabled capacity. In particular identify constraints in areas where medium to high density housing typologies are enabled in the Plan and if any constraint curtails development entirely, or alternatively limits the extent to which sites can be developed.
- Determine the geographical extent of alternative approaches available in areas where capacity is constrained and what degree of capacity that is enabled through alternative approaches (the cost associated with alternative approaches is not a consideration for the capacity assessment but will be considered as part of development feasibility).
- Identify infrastructure constrained areas where future Council work will remove or reduce the constraint, and when this will happen.

The findings of this work have been summarised and provided as part of the Plan Enabled Capacity report.

7.5.3 For greenfield development in Christchurch

Greenfield development areas of Christchurch have been the subject of detailed planning analysis over a number of years and the infrastructure constraints are generally well known and have been recently traversed in detail as part of the District Plan Review. In particular, long-term and detailed planning for infrastructure capacity and timing of delivery was completed as part of the Belfast Area Plan and South West Area Plan strategic planning processes (these two areas include the majority of Christchurch greenfield areas). Identified through these processes and others was an extensive programme of infrastructure capacity works to ensure that greenfield areas can be serviced once development commences.

These sources of information that have been reviewed as part of this process, including:

- Cross-check of plans for infrastructure with funding and scheduling of work in the Council Long Term Plan.
- For other greenfield areas (e.g. Cranford Basin and Highfields) determine the extent to which these areas are serviced, or will be serviced, with infrastructure, and when this will happen.

Some greenfield areas are plan enabled but infrastructure constrained until a (usually known) point in the future once trunk infrastructure works are completed.

7.5.4 Selwyn infrastructure capacity assessment

For Selwyn District the infrastructure capacity assessment has drawn on a number of completed and ongoing infrastructure work programmes. This includes work underway to inform the development of the Selwyn Growth Model. The current work is based on interim population projections through to 2048. This is primarily because the Long Term Plan planning needs to happen in advance of the Growth Model being completed.

The SDC has commissioned reports on transport, water and wastewater to determine infrastructure capacity and the capital works programmes through to 2048. This includes wastewater servicing arrangements for the rural zoned land within the CRPS Map A ‘infrastructure boundary’ for both the residential area to the east of the Farringdon subdivision and the north of the I-Port industrial area.

7.5.5 Waimakariri infrastructure capacity assessment

Infrastructure capacity is well understood in Waimakariri District as a result of past investigation and planning work. This information was reviewed to inform the capacity assessment. Where there are constraints, works to increase capacity are already underway or are programmed for future implementation.

8 Housing Capacity Assessment – Report 3: Commercially feasible development capacity

The NPS-UDC requires that Territorial Authorities shall as part of their three yearly assessment of development capacity:

Estimates the demand for dwellings, including the demand for different types of dwellings, locations and price points, and the supply of development capacity to meet that demand, in the short, medium and long-terms.(PB1 (b))

Further, it requires that this estimate includes:

The current feasibility of development capacity (PB3 (c)).

Feasibility is defined in the NPS-UDC as:

Feasible means that development is commercially viable, taking into account the current likely costs, revenue and yield of developing; and feasibility has a corresponding meaning.

Commercially viable is not specifically defined either in the NPS-UDC or the guidance document. The common definition is that to be a viable proposition a development must ‘make a profit’. The NPS-UDC guidance recommends that feasible development should be from the perspective of the developer, which makes it distinct from the more encompassing economically feasible, i.e. feasibility is a financial consideration. For any individual development site the approach should be similar to what a developer may do before proceeding with development, at the current time and in the current market conditions. This applies to whether the development is of a greenfield subdivision or of an individual parcel of land (i.e. redevelopment). A *developer perspective* approach must include an assessment of development against what is deemed a suitable level of profit expectation for a typical developer that is sufficient to accommodate the risk of cost escalation during the development process and provide an actual gain for the developer (i.e. the margin is encompassing of both of these considerations).

8.1 Overall approach

Different approaches have been taken for greenfield and for redevelopment. For greenfield development a greater emphasis is placed on the feasibility of the land component of development (to bring the land from paddock to building ready subdivision), to which standard building typologies can be applied. For redevelopment the focus has been on testing the feasibility of developing a wide variety of different sites, under different development conditions and using different typologies, with an assumption that the land development component does not apply for most sites (they being already building ready).

The MBIE/MfE feasibility tool has been used as the starting point for the feasibility assessment. The tool has been reviewed by Council staff and development consultants and found to be generally encompassing of the variety of factors that are typically considered as part of the feasibility assessment. However, it was also found

that the assumptions built into the feasibility tool required further review and refinement to account for a wider variety of local development conditions, and to correct some errors in the formulas built into the tool.

8.2 Expert opinion in modelling inputs

The MBIE/MfE guidance recommends that local authorities seek the view of property development experts familiar with the local market. To this end, two Christchurch based consultancies were commissioned to inform the base cost inputs into the feasibility assessment:

- Harrison Grierson, assessed the civil works costs and other inputs into the feasibility assessment for greenfield areas.
- WT Partnership (Quantity Surveyors) assessed the costs associated with redevelopment of sites within the existing urban area, with a focus on building development costs (generalised land development costs for brownfield sites⁶ and larger redevelopment sites were also be considered).

Both consultancies have extensive experience of working with developers on a wide range of development projects in the Greater Christchurch area.

8.3 Developer margin

The profit margin is a significant determinate of development feasibility, particularly when using a residual value approach (as adopted by the MBIE/MfE feasibility tool). The NPS-UDC requires developments to be commercially viable. Feasible developments are those that are both commercially viable and meet a developers expectations for margin. Margin is, however, an input that can be influenced by a number of factors and one that can vary significantly between developments and developers. The margin will reflect the complexity and uncertainty of a development project, the resources available to the developer, the developer's own tolerance for risk and anticipation of a particular level of profit, the state of the local housing market (in turn influenced by the current and anticipated economic cycle) and the view on risk taken by the lenders (assuming the developer requires finance, which may not always be the case). Margin is not a fixed value, it is determined through a complex assessment and decision making process. It is both difficult to generalise and often a matter of commercial sensitivity for the developer.

The NPS-UDC Guidance does not make an explicit recommendation of an appropriate developer margin. However, the version of the MBIE/MfE feasibility tool supplied to the GCP suggests a 20% margin as a starting point.

A literature review of recent research, commentary and planning documents suggests that there are a wide range of different margins dependent upon the development conditions and the developer expectations and the expectations of lenders (see Appendix 3). The reported range is from 0% for some state-led housing development, up to 40% for higher risk development. The generally accepted median for a margin is between 15% (below which a development may be deemed not feasible) and 30%. A margin of 20% is a frequently cited reference point and noted also as the typical level that financiers will seek before lending for a project. An individual developers expectations of profit may be lower or higher.

The base assumption for modelling is a 20% margin, with a 10% margin used to test the sensitivity of the model to different profit expectations.

⁶ brownfield sites will require individual assessment due the variety and combination of ground conditions likely to be encountered and the associated costs of remediation, which are likely to vary considerably between sites.

8.4 Property sales price — sources of information

A component of both the greenfield and redevelopment feasibility modelling is estimating the final sales price of sections and/or dwellings. The price estimates used for the assessment have drawn on a number of sources of property valuation data and ongoing sales data. Some sources of price data have been used directly to determine price in the model, while others are used as a reference point for checking and assessment of outputs. Price points can be further informed by seeking the opinion of the property development and real estate sales community, and/or with reference to developer's own published price expectations for developed land/buildings.

Sources of data for sales and property values include (with limitations noted as applicable):

Table 8.4 Price data sources	
Source	Explanation and Limitations
Christchurch City, SDC and WDC rating valuations.	These valuations are estimated for the purposes of setting a rate for each property and do not necessarily correlate with what a property may actually sell for. New valuations are undertaken every three years so data may become out-of-date periodically.
Property sales data – Christchurch City Council	As part of maintaining a rating database, Christchurch City Council collects data for each property sale including location, price, typology and floor area. Data is provided by individual property vendors and can sometimes be reported late or contain omissions, duplicates, errors and non-standard coding. Data requires extensive cleaning before use.
MBIE development dashboard	MBIE provide information on sales and rents on a per Area Unit bases. This information is periodically updated. The data is currently only available aggregated and summarised to AU2013 areas (previously more detail was available but this service has now been withdrawn). The dashboard does not provide detail of property typology or other specific attributes beyond sales price, nor does it provide information on individual property sales or their location within a AU2013 area.
REINZ – property sales data	Monthly property reports. Aggregated to groups of suburbs. No specific detail. Shows median price only.
Trade-me listings data	Trade-me makes available listings of properties that have been for sale and rental on the Trade-me website. It does not include details of all specific property attributes, nor what an individual property actually sold for (only that it was in a wide range). The data is aggregated and summarised to suburbs rather than AU2013 areas. Trade me current listings for individual properties were also accessed for testing and calibration purposes.
Quotable Value	Offers data on recent property sales and time comparisons with previous sales. Also offers comparisons between selling price and rateable value.
Developer published and provided	Many greenfield developers will list prices for sections that are available for purchase directly from the developer. For redevelopment, some developers will publish sales literature for off-plan purchases, including the developer's price expectation.

Property sales data from across the range of sources from Table 8.4 has been used for the assessment. In particular, the comprehensive information held by the Councils for the purposes of updating the rating database provides the greatest depth of information, notwithstanding the quality issues that may be encountered.

8.5 Greenfield development feasibility assessment

The approach to assessing feasibility of greenfield development is generally consistent across the three districts, while taking into account the degree of detail contained within Outline Development Plans, the extent of existing development in the greenfields and any substantial areas of land required to be set-aside for major infrastructure works.

The approach in Selwyn and Waimakariri considers both the land development and building development components.

The approach for Christchurch has been limited in this version to the feasibility of developing greenfields to subdivision consent stage. It does not include the further step of house development. The higher minimum density requirements of Christchurch greenfields necessitate a mix of typologies across each greenfield (i.e. incorporating in some circumstances a significant component of medium-density). This information is not contained within ODPs and further work is necessary to consider how to estimate this mix (or a range of possible scenarios) across each greenfield for the purposes of modelling building feasibility.

Apart from the differences noted, the outputs for greenfield areas are consistent across the three Districts.

8.5.1 Greenfield areas identified for assessment

The three District Plans identify thirty greenfield ODP areas that have to date not been substantially developed into housing. Some greenfield areas are partially developed and these have been included where there is still considerable potential for housing supply (the already developed sections removed). Greenfield areas that have been substantially completed are deemed feasible by default.

The thirty remaining greenfield areas that will be subject to assessment are:

Table 8.5 Greenfield areas for feasibility assessment	
District	Area name
Christchurch City	Awatea (part)
	East Belfast
	Hawthornden Road
	Hendersons
	Highfield Park (North)
	Highfield Park (South)
	North Halswell
	North West Belfast
	Prestons
	Riccarton Park ⁷
	South East Belfast
	South East Halswell
	South Halswell
	South Masham
	South West Halswell
	Upper Styx
Wigram	
Yaldhurst	

⁷ Progress on development at Riccarton Park has been rapid since the start of the UDC process. Therefore it has been deemed feasible.

	Cranford Basin
Selwyn District	Rolleston: ODP4 ODP10 ODP13 ODP39 Holmes Block ODP40 Skellerup Block Lincoln: ODP1 Lincoln Land Development ODP5 Denwood Trustees ODP6 Vegie Block ODP7 Te Whariki Neighbourhood Centre ODP8 Denwood Trustees Prebbleton: ODP4 Tai Tapu: ODP48 Crofts and Williams
Waimakariri District	Rangiora West

8.5.2 Development Cost and fee inputs — greenfield development

The ODP for each of the greenfield areas identified in Table 8.5 outlines the anticipated activities within each area, including detail of land that may be required for infrastructure. For Christchurch City a number of greenfield areas require land to be allocated for stormwater infrastructure. The capacity and location of this infrastructure is planned as part of a wider network, with the general distribution of activities across each greenfield established in advance as part of the ODP to ensure the functioning of the wider network. Therefore, the areas available for housing development are broadly set-out in each Christchurch ODP.

For greenfield areas in Selwyn and Waimakariri districts, land areas for local infrastructure, such as stormwater management schemes or extensions to mains or roads, are signalled in ODPs. Funding is allocated and scheduled through the LTP, or by developers where they chose to develop in advance of the scheduled upgrades.

The ODPs and associated information around net areas for residential activity (where applicable) were supplied to Harrison Grierson. Harrison Grierson was able to take the base information of each ODP as a starting point to determine the costs and fees associated with bringing the land to a subdivided stage of development. The assessment included:

- Overall land preparation costs including excavation, filling and other ground preparation such as compaction.
- The cost, per linear meter, for roads, waste water, local stormwater and water connections.
- The costs associated with any larger scale stormwater mitigation, such as retention basins and treatment reserves. Where appropriate this will be calculated as a Development Contribution discount (i.e. the cost will be captured).
- Costs and fees associated with connections to trunk infrastructure and the provision of other non-Council infrastructure and services (e.g. power and telecommunications).
- Costs and fees associated with consenting, including final sub-division consent, adjusted for the approach adopted by each Council to charging for such services.
- An estimate of lot yield which will be used to calculate likely development contributions payable (less discounts for infrastructure works).
- Costs associated with marketing and advertising of new subdivisions.
- Other professional fees and costs not captured elsewhere.

It should be noted that the assessment undertaken by Harrison Grearson was a high-level and not to the same level of detail that would be required by a developer in advance of developing a greenfield area.

8.5.3 Modelling – Selwyn and Waimakariri Greenfields

For Selwyn and Waimakariri the cost inputs were incorporated into the MBIE/MfE Feasibility tool by Market Economics. For commentary on the Market Economics approach refer to the Report 3 on feasibility (SDC and WDC section).

8.5.4 Modelling – Christchurch Greenfields

For Christchurch, modelling of greenfield development has been limited to subdivision stage. The land development component of the MBIE/MfE feasibility tool has been used as the basis for determining feasibility.

Figure 8.5.4 shows an extract of the land development model. The critical inputs are highlighted, being: anticipated sections (identified in red); subdivision costs – such as land purchase, civil works, fees and contingency; land value (identified in orange); and, section size and price (identified in blue and green).

Figure 8.5.4. Annotated extract from the land development component of the MBIE/MfE Feasibility Tool.

Type	Item	Units	Value	Type	Section price function	Comment	
	Gross residential site area	ha	103.0			Note: This requires users to enter local prices for two lots of varying size, eg a price for a 400m2 and a 800m2 lot. This allows prices for sections of varying sizes to be estimated below.	
	Land capital value (CV)	\$	\$43,369,592				
	Land sale price relative to CV, ex GST	%	100%				
	Road Reserve area for 15 dw/ha	% of area	20%				
Physical	Extra roading for increased dw/ha	% per dw/ha	0.30%	Revenue	New Lot Area 1		450 m2
	Landscape Reserve for 15 dw/ha	% of area	4%		New Lot Price 1		\$260,000 Section price \$
	Extra landscape reserve for dw/ha	% per dw/ha	0.05%		New Lot Area 2		600 m2
	Wastewater/stormwater Reserve	% of area	4%		New Lot Price 2		\$320,000 Section price \$
	Other constraints that reduce net site area	% of land area	0%				m 0.722 Section price gradient
	Minimum net density	dwelling/ha	15				c 8 Section price intercept
	Maximum net density	dwelling/ha	30				
	Time to develop	months	24				
View modelled section price gradient							
Density of dwellings [dwellings / ha]							
Type	Item	Units	15	19	23	26	30
Ancillary	DC contributions factor	%	100%	100%	100%	95%	90%
Cost parameters	Project contingency	%	10%	10%	10%	10%	10%
	Civil works		Select civil works costs				
	Fees and charges		Select fees and charges				
Density of dwellings [dwellings / ha]							
Type	Item	Units	15	19	23	26	30
Net Land Area Cals	Road Reserve Area	ha of land	19.44	20.60	21.76	22.92	24.08
	Landscape Reserve Area	ha of land	3.93	4.12	4.31	4.51	4.70
	Stormwater Reserve Area	ha of land	4.12	4.12	4.12	4.12	4.12
	Other constraints that reduce net site area	ha of land	-	-	-	-	-
	Net Developable land Area	ha of land	75.51	74.16	72.81	71.46	70.10
	Subdivision Lots created	total lots	1,545	1,931	2,318	2,704	3,090
	Average section size	som / site	489	384	314	264	227
Revenue	Average sales price (inc GST)	per section	\$215,913	\$231,877	\$200,604	\$177,070	\$158,599
	Average sales price (ex GST)	per section	\$239,976	\$201,632	\$174,438	\$153,974	\$137,912
	Total revenue	\$	\$370,763,385	\$389,401,641	\$404,260,961	\$416,307,000	\$426,149,391
Costs	1 Raw land purchase and holding cost		\$52,477,206	\$52,477,206	\$52,477,206	\$52,477,206	\$52,477,206
	2 Civil works, incl holding costs		\$131,253,753	\$134,399,192	\$137,544,631	\$140,690,070	\$143,835,509
	3 Fees and charges, incl holding costs		\$133,620,806	\$155,363,836	\$176,756,768	\$197,889,066	\$218,817,208
	4 Project contingency		\$31,735,177	\$34,224,023	\$36,677,861	\$39,105,634	\$41,512,992
	Total costs		\$349,086,942	\$376,464,258	\$403,456,466	\$430,161,976	\$456,642,915
	per section costs (excl raw land)		\$191,980	\$167,760	\$151,447	\$139,689	\$130,798
	per section (total)		\$225,946	\$194,933	\$174,091	\$159,098	\$147,781
Profit	Pre tax profit \$		\$21,676,442	\$12,937,383	\$804,495	-\$13,854,977	-\$30,493,525
	Pre tax margin %		6.2%	3.4%	0.2%	-3.2%	-6.7%

8.5.4.1 Anticipated Sections

The anticipated section number (red in Figure 8.5.4) is the yield anticipated from the residential area identified in each ODP. The gross site area is, therefore, not the whole outline development plan area but rather the area identified only for housing. The remainder will likely be purchased by the Council for the provision of infrastructure and therefore is excluded from the capital value calculation.

8.5.4.2 Land value – Christchurch greenfields

The initial 'study area' used for determining land value is based on the residential land identified in each of the outline development plans. This excludes the identified stormwater and collector roads. The residual residential zoned land is in most instances separated into a number of lots. These have different land values

(standardised to a square meter value). The value of each parcels reflects the size of the land parcels, the zone (or historical zoning) the location and the any improvements (e.g. a dwelling). As a general observation, the smaller the land parcel the higher the square meter value of the land – smaller land parcels are generally associated with improvements (e.g. a former large rural parcel subdivided into a series of smaller rural residential lots, each with a number if improvements).

In determining the size of developable land for each site, existing development, improvements or land activity must be taken into account, including the value that this generates and bestows on the entire parcel of the land. Once these elements are accounted for and separated, the value of the residual land can be determined without improvement value.

In summary, the value of undeveloped greenfield land varies depending on the size of site and zoning of the site, as well as its proximity to current development. Land with an existing dwelling (e.g. as a lifestyle block) is generally worth more, and the more a block of land is subdivided over time (e.g. from agricultural use into lifestyle blocks) the greater the value of the land tends to be on a square meter basis.

The following worked examples highlight some of the complexities around determining underlying land value of the purposes of testing feasibility.

8.5.4.2.1 ODP land value and development feasibility — Small subdivision example, Christchurch

This example takes a two hectare site with an existing dwelling. The site was valued at \$750,000 in 2010, held as a single lifestyle block and zoned for rural residential activity. When tested, at this valuation the land is profitable to develop as urban land, achieving a margin of 13%. Through the District Plan Review, in 2015, the land zone changed to Residential New Neighbourhood, and a subdivision consent was sought for the land shortly thereafter. In 2016, the land, with a consented subdivision plan was sold for \$2,000,000. As a whole, the land at this valuation, with the same development approach and costs as previously tested would now show a negative profit (-8.8%), entirely attributable to the increase in land cost. However, the existing dwelling (covering 0.4ha of the site) is subdivided off and sold separately for \$800,000, and a slightly larger (0.5ha) parcel also separated and sold with consent for sub-division for \$800,000, effectively recouping some of the initial land cost outlay, less costs. The remaining 1.1ha block of land, potentially capable of yielding 16 dwellings, returns a 14.4% profit based on a residual land cost and a sales price of \$400,000/dwelling (consistent with current sales in the area).

Rural Lifestyle Land	Residential Consent	Sections Created after existing house sold
2ha \$750k site	2ha \$2m site	1.1ha \$400k/dwelling
Profitable but Unfeasible (13.5%)	Not profitable and Unfeasible (-8.8%)	Profitable but Unfeasible (14.4%)

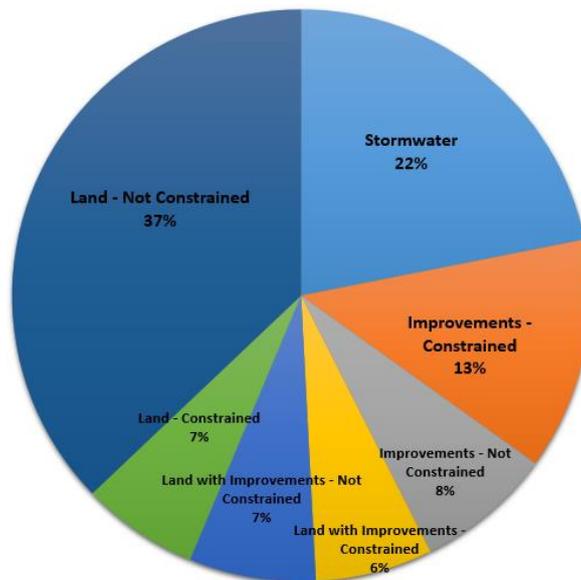
8.5.4.2.2 ODP land value and development feasibility — An ODP area example, Christchurch

The South Halswell ODP covers 50.7 hectares. The recorded valuations for the site area land at \$14.5 million and improvements at \$3.8 million (equates to approximately \$361,000/ha). The ODP records a significant area of the land required for stormwater. The total area for residential (excluding the stormwater areas) is 35.8ha. There is also existing houses and land identified as more constrained, which effect the size and pricing. The values for each part of land within the ODP is outlined in this table. The lifestyle rate is based on the per

hectare value of a site within the ODP. The site is 1.35ha and the land value is \$610k. The residual rate is based on the remaining land of 45.2ha with a value of \$12m (Area A, F and G). This leads to a \$265k.

Table 8.5.4.2.2 A: South Halswell, allocation of area and value.

Area	Hectares	Value	Reason
A - Stormwater	14.9ha	\$4m	The is the land value based on a 'residual' rate of \$0.265m
B - Improvements within constrained area	0ha	\$2.4m	This is the improvement values from the council database
C - Improvements outside constrained area	0ha	\$1.4m	This is the improvement values from the council database
D - Land with improvements within constrained area	2.7ha	\$1.2m	This is the land value based on a 'lifestyle' rate of \$0.45m
E - Land with improvements outside constrained area	2.8ha	\$1.3m	This is the land value based on a 'lifestyle' rate of \$0.45m
F - Land within constrained area	4.6ha	\$1.2m	The is the land value based on a 'residual' rate of \$0.265m
G - Land outside constrained area	25.7ha	\$6.8m	The is the land value based on a 'residual' rate of \$0.265m
Total	50.7ha	\$18.3m	



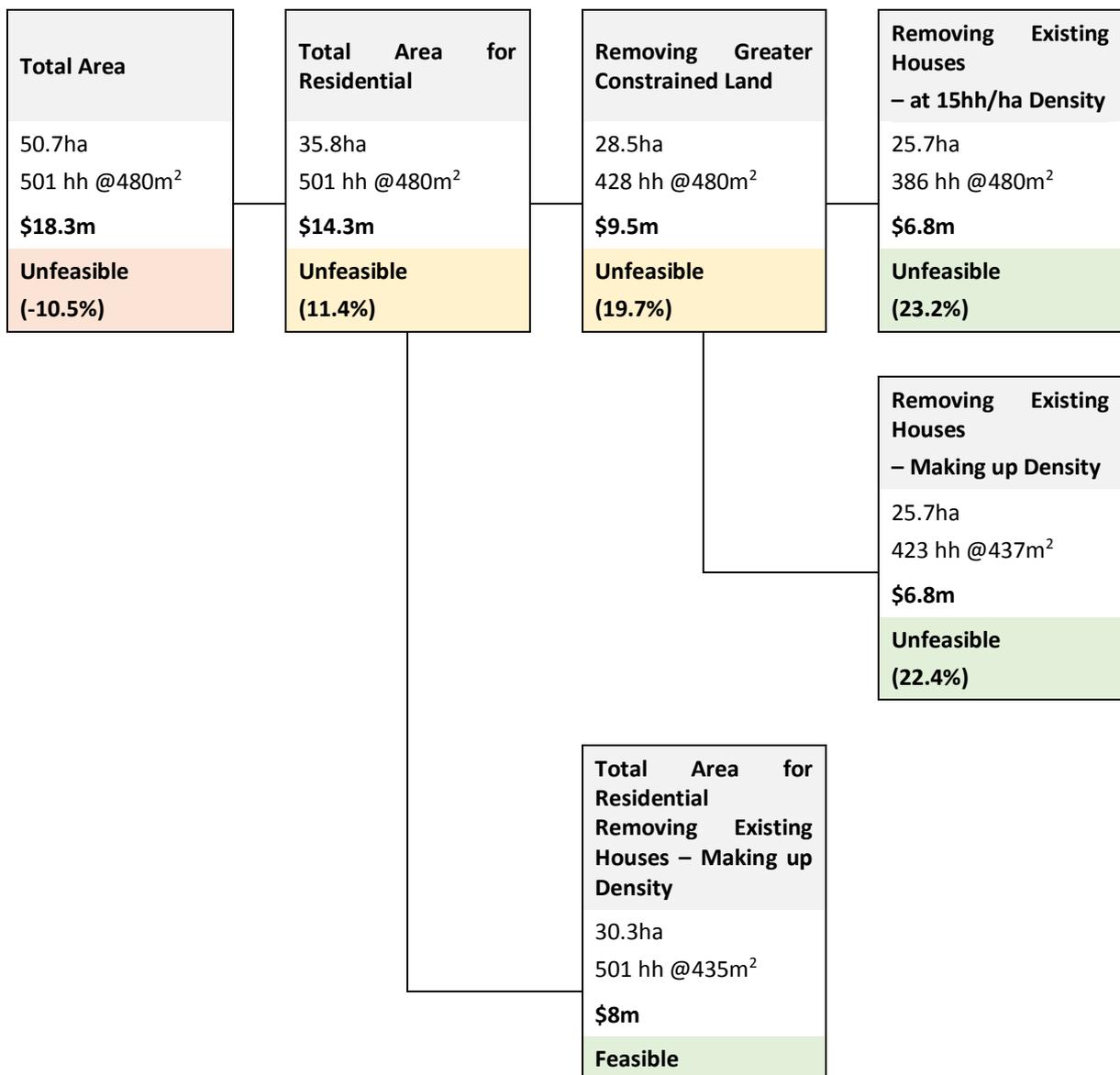
The scenarios tested for feasibility are outlined below, this explains what areas and corresponding values were included (from the table above) and then the feasibility test for these. The test used the higher sales price information.

Table 8.5.4.2.2 B: South Halswell, feasibility scenario

Name	Area included	Hectares	Value	Explanation
Total Area	A – G	50.7ha	\$18.3m	

Total Area for Residential	B – G	= 2.7 + 2.8 + 4.6 + 25.7 = 35.8ha	= 2.4 + 1.4 + 1.2 + 1.3 + 1.2 + 6.8 = \$14.3m	This excludes the stormwater area
Total Area for Residential Removing Existing Houses – Making up Density	F – G	= 4.6 + 25.7 = 30.3ha	= 1.2 + 6.8 = \$8m	This excludes the improvements and the land allocated to the them
Removing Greater Constrained Land	C, E, G	= 2.8 + 25.7 = 28.5ha	= 1.4 + 1.3 + 6.8 = \$9.5m	This removes the constrained land, including the improvements on them.
Removing Existing Houses - @15hh/ha	G	25.7ha	\$6.8m	This removes the improvements and the land allocated to them as well the rest of the constrained land.
Removing Existing Houses – Making up Density	G	25.7ha	\$6.8m	This removes the improvements and the land allocated to them as well the rest of the constrained land.

Table 8.5.4.2.2 C: South Halswell, feasibility scenario outputs



(21.6%)

Considering the ODP block as a whole, at the current value it is not profitable to develop the ODP to the potential yield of 501 dwellings. However, taking only the land identified for housing makes development profitable, but still not feasible. If the area of constrained land is not considered, net density increases and profit increases (however, it remains not feasible at a 20% margin target). If the existing housing area is also excluded, then the overall value for the land decreases (and held as small lifestyle blocks being worth more per hectare) and the development is feasible. Also, still including constrained land but removing existing houses, the development stays feasible.

The process for determining land value requires further work to bring together all these variables for each greenfield. Further work is also required to understand the feasibility of current subdivisions in terms of remaining land value, net of existing activity. The above examples also illustrates that ideally historical land sale values should be a consideration in determining feasibility. Land purchased by a developer prior to a zone change may well have been acquired at a significantly lower value, which if factored into a feasibility assessment will often change the outcome, even when accounting for holding costs.

8.5.4.3 Land — Assumed base value for modelling, Christchurch greenfields

For the purposes of the preliminary feasibility results, the following values are used. These values are based on the South Halswell example given in 9.5.4.2. High value is the total area value i.e. \$18.3m / 50.7 ha = \$361k. Low value is the most feasible outcome, i.e. \$6.8m / 25.7ha = \$265k.

Capital Value	Value per Hectare
Low	\$265,000
High	\$361,000

8.5.4.4 Section price and size — Assumed value for modelling, Christchurch greenfields

The section size takes into account additional requirements such as road, landscaping and local stormwater reserves/infrastructure that are not identified separately in each the ODP. Based on the pattern of development observed in completed greenfield development, these activates account for on average 28% of the residential land area. Therefore, meeting the minimum density target of 15 households per hectare (gross sites of 667m²) requires a site to be on average 480m². In practise, for greenfield development in Christchurch, sections sizes will be across a broad range of sizes, which on average across the ODP achieve the minimum density requirement. The section price used in the model is based on recent sales and current listings, shown in Appendix 6.

Section Price (1 st quarter 2018)	450m ²	600m ²
Low	\$220,000	\$250,000
High	\$280,000	\$355,000

8.5.4.5 Alterations to calculation assumptions for the MBIE/MfE land development tool

On the advice of MBIE⁸ the overall 'Project Contingency' level was reduced to 0%. Contingencies for each individual costs component were retained in the model.

⁸ Christchurch City Council staff met with MBIE in May 2018 to discuss Christchurch City feasibility modelling approaches. During this discussion it was noted that the level of detail on costs provided for greenfield areas was sufficient to provide certainty of those costs and allow the overall 'Project contingency' to be set at 0% (from a default of 10%). Individual cost component contingencies are still applied.

8.6 Redevelopment in existing urban area, Christchurch

The process for assessing redevelopment feasibility is focussed on Christchurch City, which is where most redevelopment capacity is located and directed too occur by regional and local planning policies. Christchurch City also has the widest variety of site and area specific conditions that are likely to affect the feasibility of development. These include variations in planning rules across and between zones, variations in construction requirements and land quality, and stratification of the housing market into various sub-markets, which influences sales price and land values.

The feasibility assessment has used existing lot boundaries as the basis for assessment. Essentially, each existing site will be treated as a development site in isolation. This approach is necessary for establishing the spatial inputs into the modelling but ignores the potential for land assembly to construct larger development sites. The potential and process for land assembly is complex to model and will be considered further as a separate piece of work.

The assessment of redevelopment capacity is confined to the following zones:

- Residential Suburban
- Residential Suburban Density Transition
- Residential Medium Density
- Residential Hills
- Residential Banks Peninsula
- Residential Central City

Other zones have the potential to accommodate residential activity, but this is either at very low density (e.g. rural residential) or as incidental to the main purpose of the zone (e.g. residential activity in business zones).

8.6.1 Cost and fees inputs — redevelopment model

Quantity surveyors WT Partnership considered the costs and fees associated with developing a variety of housing typologies in the Christchurch City area (appendix 7). WT Partnership have extensive experience of advising on property redevelopment cost and feasibility assessment in the Christchurch market, including for a number of suburban medium-density developments and Central City developments. Their focus has been on, as a starting point, the cost elements outlined in the Building Development component of the MBIE/MfE feasibility tool. Some costs have been adjusted to a range to account for a variety of development conditions or constraints that may be encountered by a developer in Christchurch. Unlike the approach for assessing building as part of a greenfield development, any constraints related to ground conditions must be considered in the feasibility assessment for redevelopment. Such constraints (and possible impact) may include:

- **Ground quality, which determines the approach to the site preparation and investigation, and the design, construction and cost of building foundations.**
- **The scale of development and how this may alter costs for some elements of a development, for example, design and construction requirements for access and parking increase at certain unit thresholds.**
- Flood hazard areas, which may require higher finished floor levels and larger foundations with greater costs.

The variations in costs are estimated across a range of housing typologies while holding ground conditions variables as a constant, i.e. testing the feasibility of different development typologies on the same development site. This approach will be relevant where plan enabled development allows for a number of different development outcomes within a zone. For the first version of the redevelopment model only those in bold have been considered.

For Building Consent fees the estimate supplied by WTP was only used for detached dwellings. For Multi-unit development (for all typologies) the current average figures quoted by Christchurch City Council have been used⁹. It is noted that this is a significant area of uncertainty for estimating costs. Total building consent costs are not certain until a development has been completed, particularly for larger apartment type projects.

Development Contribution costs are drawn from Christchurch City Council held information. For Christchurch City, Development Contributions are calculated as a Household Unit Equivalent (HUE) using a catchment approach for some services. Unlike greenfields, there is less opportunity for seek deductions to development contributions through developer built infrastructure. Therefore, the standard charge per net new residential unit is calculated and used. However, the Christchurch City Development Contributions Policy allows for discounts to be sought for smaller dwellings and discounts can also apply for credits from previous activity on site. The Central City currently also has a contribution rebate scheme in operation for residential development. In redevelopment situations, any existing HUE on a site are discounted.

8.6.2 Redevelopment model approach — Christchurch City

8.6.2.1 Extent of assessment and overall approach

There are approximately 150,000 potential redevelopment sites contained within the assessed zones. Only plan enabled sites were considered for redevelopment and consequently the potential pool of sites was first reduced to approximately the 45,000 sites that meet the minimum size criteria of the zone which applies. The distribution of potential development sites across the residential zones is approximately:

- RMD: 12,000
- RSDT: 11,000
- RS: 19,000
- RH: 1,000
- RBP: 900
- RCC: 1,500

In summary, almost all RMD, RSDT and RCC sites are considered. Only those RH, RBP and RS sites of a size suitable for subdivision are considered, a small proportion of the total.

The MBIE/MfE feasibility tool is suited to the assessment of single development and greenfields, but is not suitable for a bulk assessment of a large number of redevelopment sites. The MBIE/MfE feasibility tool was instead used as the basis for developing a model that could undertake a bulk assessment of all potential development sites. The variations in District Plan rules between the residential zones necessitated developing a separate model stream for each.

In effect, the modelling process generates the outputs of the MBIE/MfE feasibility tool as if a separate calculator had been populated for each of the 45,000 development sites. Data preparation and modelling was completed using Geographical Information Systems and data manipulation software packages. The model is constructed in a way that allows any of the input values of the model to be adjusted for the purposes of scenario testing.

⁹ <https://www.ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/plans/long-term-plan-and-annual-plans/fees-and-charges/fees-building-control/>

Such a model has not previously been developed for Christchurch City redevelopment and this is in effect the first version of the model. Refinement of the model will be required to better account for variables and inputs into the development process and to increase the range of potential scenarios that may be tested.

The modelling process captures all land parcels regardless of size. This may include areas of more recently zoned land that have been zoned for one of the residential zones, rather than, for example, greenfield development (as Residential New Neighbourhood). These parcels are usually identifiable by their size. The model outputs are filtered to remove these parcels. Large sites generally require a more detailed investigation, similar to that for the greenfield areas, in order to determine if land development costs need also apply. The cut-off for parcel size in the model is 5,000 square meters, above which land parcels will need a site specific assessment of costs. Land parcels that fall into this category will be assessed for build feasibility but will be reported separately, noting that not all costs may be captured.

8.6.2.2 Types of plan enabled development excluded from this model version

Certain types of development have not been tested. These require a separate version of the model with different cost inputs and with consideration of a different set of planning controls. This type of development will also be in lieu of other types of development that has been tested or, if built, effectively prevent other development from taking place (or at least impact on feasibility for a period of time). For example, a minor dwelling unit may be developed in the RMD zone but is not likely to be a development undertaken by a property developer looking for the most efficient use of a site (unless the options are limited). The types of potential housing supply development that have not been tested are:

- Retirement complexes.
- Minor dwelling units.
- Community housing (which allows for higher density development in certain residential zones).
- Mixed-use development (i.e. residential mixed with non-residential activity).
- Enhance Development Mechanism development.

These types of development will be tested as a further piece of work.

8.6.2.3 Large development sites

Larger redevelopment sites are identified using the geographical area of individual parcels, with the cut-off being sites above 5,000m². These sites are subject to a lengthened assessment process that combined elements of both the land development assessment and the redevelopment assessment.

An initial filtering of these sites was completed to determine those not developable and not appropriate for assessment, on the basis of:

- Size, shape and/or existing use; long and narrow land parcels at the edge of roads and private roads, long areas under power lines, or an established non-residential use, such as churches.
- Sites already developed or accommodating multiple small residential units, such as retirement villages and larger social housing complexes.
- Sites not being 'plan enabled' for development due to an additional rule of a District Plan overlay that prevents development until a particular infrastructure constraint had been removed.

Of those that remain many sites are compromised to a greater or lesser extent by site characteristics (e.g. steep slope), hazard risk (e.g. coastal and rock fall hazards), flood management, heritage and cultural restrictions or partial use by non-residential activity (e.g. bisected by power lines). An assessment was made of these constraints and each site allocated a low, medium or high constraint rating based on the incidents and severity of constraints.

Sites located on the hill suburbs and the majority are on steep terrain, often with slope stability related hazards. Development is possible on such sites, however without recourse to a detailed site specific assessment it is not reasonably practicable to determine the land development costs for such sites as a desktop exercise. However, an attempt to make a more detailed assessment of the sites potential yield has been undertaken, albeit using a different approach than for redevelopment in general. See section 8.6.3.2 for detail of this assessment.

8.6.2.4 Model processing steps

As noted, the bulk assessment for redevelopment feasibility follows a similar process to that of the MBIE/MfE feasibility tool. The model was built using pre-prepared look-up tables, pre-prepared spatial data and a series of data transformations to process the inputs and perform a sequence of calculations that replicate those of the MBIE/MfE feasibility tool.

Data sources:

1. Land parcels (Council data)
2. Rating information and values (Council data)
3. Property sales – all sales 2016/2017 (Council collated from individual industry reports)
4. Development contributions policy application, values and spatial catchments (Council data)
5. Building footprints (Council held, various sources)
6. Fees and charges (Council data)
7. Area Units 2013 (Statistics New Zealand)
8. Land Technical Category, spatial distribution (MBIE source, Council data)
9. Estimated building costs (Quantity surveyor supplied)
10. District Plan – rules and standards (Council data)

These various processes were combined into following series of modelling steps:

1. Identify all parcels within the residential zones.
2. Calculate developable area within each parcel, net of area of land that are excluded from site size calculations as per District Plan definitions. Remove parcels that do not meet the minimum subdivision of site size standard (as applicable).
3. Join attributes to each parcel (using pre-processed and prepared look-up tables), including: Capital value, Development Contribution level, MBIE Land Technical Classification, Count of existing dwellings, Study Division, Area Unit location.
4. Using Council sourced building footprint data, use the square meter value for existing structures on each site to estimate demolition costs.
5. For each Area Unit independently, using 2016 and 2017 sales data within each Area Unit, estimate the median sales for each dwelling size, with separate assessment for standalone dwellings and medium-density typologies (apartments, multi-unit town houses and town houses at medium density). This is achieved by determining the trend line for price plotted against dwelling size to give a price per square meter in one meter steps. Property sales data requires extensive cleaning and correction before use to remove errors, duplicates and inconsistent coding (assumed to have occurred at input stage).
6. Define for each scenario: typology, target dwelling size and size-range (if applicable), estimated sales price data source, development time, defined price (if applicable), number of stories, weighted cost of capital, Development Contribution — level of discount (defined or policy driven), build quality specification, and target number of car parks per dwelling.
7. Calculate for each parcel, the maximum building footprint area and maximum habitable floor area; varies depending on zone rules, number of car parks selected, building height selected. For the RCC

zone building footprint and floor area is calculated through a concurrent calculation of space required for private open space and the number of dwellings. Reduce floor area available above ground floor to correspond to estimated impact of recession planes.

8. Calculate the number of dwellings based on floor area or maximum number of sites (as applicable and capped if necessary); round down to nearest whole dwelling and recalculate dwelling size to use all available floor space.
9. Calculate car parking sufficiency.
10. Join parcel and dwelling attributes to development cost (look-up tables); calculate all development costs except post-sale costs.
11. Calculate dwelling price; depends on scenario selected price source or user defined sales price using pre-prepared look-up tables. Sales price can be an average for typology, or based on like for like comparisons across typology and dwelling size standardised to square meter values, or defined. Alternatively the sales price required to meet a margin target may be calculated.
12. Calculate final post-sale costs; determine overall cost of development, profit and margin.
13. Output scenario data; select exclusions e.g. does not meet car parking minimums; flag anomalies such as zero capital value or comprehensive existing development.
14. Calculate alignment of each typology output sales price to the pre-prepared estimated median dwelling sales price for the tested dwelling size, to indicate that price is below, within 10%, 20%, 30% above, or greater than 30%, of the median sales price for dwelling size.
15. Check random sample of output for individual parcels in a spreadsheet version of the model (an amended version of the MBIE/MfE feasibility tool).
16. Re-run model for different scenarios.
17. Raw output of model results exported to excel (raw output allows sorting of all typology tests for all parcels).
18. Combine output of scenarios; identify all feasible development scenarios for each land parcel that completed in the model; identify which of these is the most profitable. Exported to excel.
19. Output conditions as feasible and most profitable for reporting purposes; output all other typology scenarios for comparison and references for testing (e.g. profitable developments that achieve less than 20% margin). Results can also be selected on the basis of maximum yield (or any other variable). End result is one development typology per parcel ID. Excel is used to sort outputs.

Outputs can be sorted and reported as a series of tables. As each parcel goes through the model the Parcel ID is maintained as the key reference attribute allowing the results to also be spatially mapped as required.

8.6.2.5 Assumptions and limitations of the modelling approach, data sources.

When reviewing the model outputs it must be noted that the approach has some limitations and that a number of generalisations and assumptions have been made.

Development costs and typologies:

The range of dwelling typologies tested was limited in order to limit the number of costs estimate variations required. The types of typology tested were:

- Single and two storey detached
- Terrace or multi-unit (at two storey)
- Town house (two and three storey)
- Low-rise apartment (two to three storey)
- Mid-rise apartment (three to five storey)

These typologies are representative of the common typologies found throughout the residential zones. Costs are also representative. A mixing of typologies on individual development sites has not been tested.

Development sites:

All sites are assumed to be developed as clear sites that can connect to and use existing Council infrastructure. Larger brownfield sites that are appropriately zoned are assessed but further site specific analysis of these sites may be required to determine if land development costs need also apply. This version of the model has not specifically tested intensification achieved through infill (i.e. where the existing dwelling is retained on site).

Demolition costs:

Demolition costs have been estimated based on a single square meter value applied to recorded building footprint size data. The building footprints information held by Council is derived from aerial photography and cannot be considered to be 100% accurate. Furthermore the assessment cannot account for site specific and building specific issues such as foundation type or the presence of hazardous building materials, which may significantly increase the demolition costs in some instances.

Dwelling size, height and floor space:

Dwelling size can either be a target or a defined amount, depending on which is the most appropriate approach for the zone. Where the dwelling size is a target the model will calculate the number of possible dwellings that can be accommodated within the available floor space of a development, rounding down to the nearest whole of the defined floor space. Floor space above the nearest whole is distributed to the remaining dwellings. In effect, the target is the minimum from which dwelling size will increase to fill the available floor space. In addition, a maximum dwelling size can be specified to limit the degree to which dwelling size increases to fill available floor space.

Where the dwelling size is defined, dwellings will not exceed this value. For some zones dwelling size is reduced if the maximum site coverage is exceeded.

Dwelling sizes are tested in 25m² steps, starting at 50m² for the RCC zone and 75m² elsewhere, and ending at 150m² for all zones except the RS zone which was tested to 200m² (however, only results to 150m² are reported for alignment with outputs from other zones).

Dwelling height is set by the zone standard, unless a height overlay applies (in the RCC and RMD zones). The modelling approach assumes that developers will build to the maximum height permitted by the zone and the number of storeys is based on a three meter per storey calculation. For the RMD zone, both the terrace typology and small apartment typology were tested. The terrace/town house typology has been costed on the assumption of a two story height.

The model assumes that available floor area will only include the main floor levels. No allowance is made for using the roof space to create additional floor space for dwellings. For example, the floor space for a three storey development will be the building footprint multiplied by three, less any deductions on upper floors to accommodate recession plane restrictions. Building footprint is assumed to be either the maximum site coverage for the zone or the size of the defined dwelling size (adjusted to account for single or multiple storeys), whichever is smallest. The exception to this approach is for the RCC zone. In the RCC zone the building footprint is determined by the area required at ground level for open space, which is in turn determined by the number of dwellings, which in turn requires more ground floor for habitable space, creating a feedback loop. These three elements are calculated together to determine the maximum number of dwellings on any one development site. Generally the smaller site coverage maximum of the other residential zones avoids the requirement to undertake this step (i.e. car parking space and open space can be readily provided in the remaining space). Issues are only encountered if a high number of parking spaces per dwelling is specified. This was however only tried for testing purposes and not reported.

Amenity: It is assumed that outdoor amenity space will be provided at the minimum levels set by the District Plan. In practise, developers may choose to offer more open space, or built form standards may necessitate a higher provision at ground floor level than the rule alone directs (e.g. to meet set-back or recession plane requirements).

Landscaping costs: These are calculated based on the open space provision of the site (i.e. site area less building footprint), rather than the entire area of the site.

Development time and Weighted Cost of Capital: This has by necessity been generalised across development typologies, using the suggested time periods of the MBIE/MfE feasibility tool (as reviewed by WTP). In practise, development time will vary considerably between individual developments dependent on the complexity of the build and the underlying site conditions. Weighted Costs of Capital will also vary considerably between different development sites, typologies and developers. The value has been set for each scenario at a default rate of 10% but is adjustable to test variations.

Car Parking: As a plan enabled activity, any housing development can be built with no parking provision (Permitted Development standards become Restricted Discretionary where there is a shortfall). However, for the model, car parking has by default been assumed to be provided on the basis that most developers will seek to provide some off-street parking with their developments. It is accepted that in practise some developers will not take this approach and will build developments with more parking than required or with no parking provided (e.g. in the Central City, where there are examples of both approaches).

The RCC zone has no minimum standard for car parking. For this zone the modelling process sets car parking provision as a target with the actual provision being dependent on the ground floor building area available for parking space, net of space required for habitable dwelling space. In practise this means that parking is generally modelled at less than one space per dwelling. It is assumed that parking is provided within the building in order to maximise site space for the building footprint (as outside car parking space will be in addition to outdoor living space).

The approach to parking costs taken in the MBIR/MfE feasibility tool was to calculate car parking costs based on site area. This approach was found to produce inconsistent results when applied across a range of typologies and site sizes. Therefore, for the redevelopment model a per car park cost was used. The cost estimates assume internal parking with some allowance for access and aisle space, based on the District Plan standard for 90° car parks. The cost is partially accounted for in the overall build cost, and partially as a separate item. One further assumption is that a developer will not attempt to provide parking off-site in lieu of on-site provision (a possibility, particularly in the Central City).

Ground conditions and slope: It is assumed that the cost of foundation design and construction is determined by the MBIE Land Classification for each development site. In practise there will be considerable variation in ground conditions across potential development sites. Actual ground conditions for each development site (and the approach to foundation design so required) can only be determined with a detailed site by site investigation, which it is not reasonably practicable to do for this exercise. This version the model has not considered the impact of site slope on development costs and feasibility (e.g. the need for stabilisation, cutting and fill). Again, a site by site analysis is required to obtain a reasonable assessment of the additional costs associated with such site conditions.

Dwelling sale price and site purchase cost: The site purchase cost input into the model was based on the Rating Valuation (RV). Sites with no recorded capital value were processed by the model but were flagged and excluded from the outputs on the basis of incomplete data. The same limitations with reference to sales price should also be assumed to apply for valuations in site acquisition. It is additionally noted that a quality component is not entirely captured by RV, and may not account for, as an example, properties that have an 'as-is, where-is' value.

The current rating data for Christchurch City is from mid-2016. Comparison with current trends in sales (available from QV) indicates that properties in Christchurch are, on average, selling for prices that are within 1% of the 2016 level. This of course masks the variations in growth (or loss) that may be found on a more localised level.

Sales data was for all sales reported to Council in 2016 and 2017. A review of the sales data exposed some flaws in the quality of the data. Issues included:

- New dwelling sales price recorded as that of the whole development for each dwelling, rather than apportioned between dwellings.
- Multi-unit developments recorded as a single sale (e.g. on completion of development).
- Incorrect or double coding making it difficult to distinguish between sales of houses, flats and apartments.
- Single property sales recorded multiple times. These may be errors or legitimate sales, however the effect is the skew the data on a local level.

In addition to these specific quality issues there are some inherent limitations in what data is recorded for sales information. This reduces the accuracy of the comparison of like for like development typologies. These include:

- Lack of information around the distribution of the sale value between the dwelling and the land.
- Information around finish and specification of development, or quality of private/communal open space or access to shared facilities for tenants. It is assumed that the sales price will partly reflect these attributes.
- For testing newly enabled development typologies in some zones there is limited sales with which to make a like-for-like comparison. In particular, multi-unit complexes in the RSDT zone; there are currently very few examples of completed development which may be used to estimate anticipated sales price for the model, necessitating the use of a more generalised dataset that includes all dwelling typologies.

Significant cleaning and processing of sales data was required to address the shortcomings. This involved removing obvious errors or omissions that skewed data.

To estimate sales price at any given dwelling size and typologies a trend line was calculated through all relevant data points. There is a general relationship between dwelling size and location, and price. However it is accepted that there are other influences in price that have not been taken into account. This is identified as an area for future work (ideally thorough the development of a hedonic price model predictor for Christchurch).

Other sources of sales data (real estate current listings and historic data) were considered but found to be lacking sufficient depth of information (both in terms of total quality and in detail on specific property) to be useful for as a modelling input. However, these sources were used for testing and referencing purposes.

Site specific infrastructure constraints: For some development sites in some parts of Christchurch a site specific assessment must be undertaken to determine, if applicable, the means by which an infrastructure constraint may be mitigated. This may include, for example, the provision of storm water holding tanks on a development site to mitigate storm water run-off in areas of limited public infrastructure capacity. Due to the site condition specific necessity and application of such mitigation infrastructure, it has not been possible to account for it in the model.

Identification of ‘brown field’ sites or larger undeveloped housing sites: Parcels for development were selected on the basis of their zoning and minimum site size. This will therefore include some larger sites that are suitable for development but require additional costs to be considered for public service infrastructure (new roads, new public waste and water). These sites were processed separately using different approach.

Developer capacity, expertise and economies of scale: Estimated costs are fixed and no allowance has been made for costs to be altered to reflect different scales of developers. Economies of scale may be realised by larger developers and can reduce overall costs (see BRANZ Study report No.196).

8.6.3 Redevelopment — scenario testing

A base scenario was used to test a range of housing typologies and dwelling sizes across each of the residential zones. The parameters of the base scenario were:

- Dwelling sale price set as the median value of like typology and size in the vicinity of the development site using 13 months sales data, to January 2018, averaged to AU2013.
- Margin at 20%, net of GST, deemed feasible.
- Larger sites were included but flagged to indicate that a land development cost component may also apply.
- Specification costs are medium unless otherwise stated (or additional scenarios completed).
- Larger sites with multiple existing dwellings were excluded from the assessment (in general these are residential care homes, retirement villages or similar).
- Car parking is a target generally aligned with permitted development requirements.

Table 8.6.3.1, the typologies tested:

Zone	Size square meters Target (T), defined, or range	Carparks	Typology	Height in storeys	Default Development time	Variations
RMD	75 (T)	1	Small apartment	3	12	Low spec
RMD	100 (T)	1	Small apartment	3	12	Low spec
RMD	125 (T)	1	Small apartment	3	12	Low spec
RMD	150 (T)	2	Small apartment	3	12	Low spec
RMD	75 (T)	1	Terrace	2	12	Low spec
RMD	100 (T)	1	Terrace	2	12	Low spec
RMD	124 (T)	2	Terrace	2	12	Low spec
RSDT	75 (T)	1	Terrace	2	12	Low spec
RSDT	100 (T)	1	Terrace	2	12	Low spec
RSDT	125 (T)	1	Terrace	2	12	Low spec
RSDT	150 (T)	2	Terrace	2	12	Low spec
RS	75	1	Detached	1	6	
RS	100	2	Detached	1	6	
RS	125	2	Detached	2	6	
RS	150	2	Detached	1	6	
RS	150	2	Detached	2	6	
RS	200	2	Detached	2	6	
RCC	50	0	2-3 & 4-5 Storey Apartment (height limit determined)	3, 4 or 5	21	
RCC	75	0	2-3 & 4-5 Storey Apartment (height limit determined)	3, 4 or 5	21	

RCC	100	1 T	2-3 & 4-5 Storey Apartment (height limit determined)	3, 4 or 5	21	
RCC	125	1 T	2-3 & 4-5 Storey Apartment (height limit determined)	3, 4 or 5	21	
RCC	150	1 T	2-3 & 4-5 Storey Apartment (height limit determined)	3, 4 or 5	21	
RH	100 - 200	1	Detached	1	9	
RH	200 – 300	2	Detached	1	9	
RH	120 - 200	2	Detached	2	9	
RBP	100	1	Detached	1	9	
RBP	125	1	Detached	1	9	
RBP	150	2	Detached	1	9	
RBP	200	2	Detached	1	9	

8.6.3.1 Model output — results sorting

Each typology is tested for each zone and produces a measure of development feasibility for each parcel. This output is sorted to select which typology is the most profitable for each site, and from these sites, those that achieve the feasibility margin target may be identified (i.e. sites that are commercially feasible for profit and margin at 20% net GST). Alternatively the model outputs as specific size points to test feasible, but not most profitable, yield. The output of the model could be prioritised to any value.

8.6.3.2 Alternative approach for large sites

Larger redevelopment sites were identified over 5000m² in size. These sites were subject to a lengthened assessment process that combined some elements of both the land development assessment and the redevelopment assessment. Approximately 350 large sites were identified as being zoned for residential use and 'plan enabled' by the standard rules of the zone. An initial filtering of these sites reduced this number to 134, removing sites unlikely to be developed (e.g. narrow strips beside roads, linear areas for power lines)

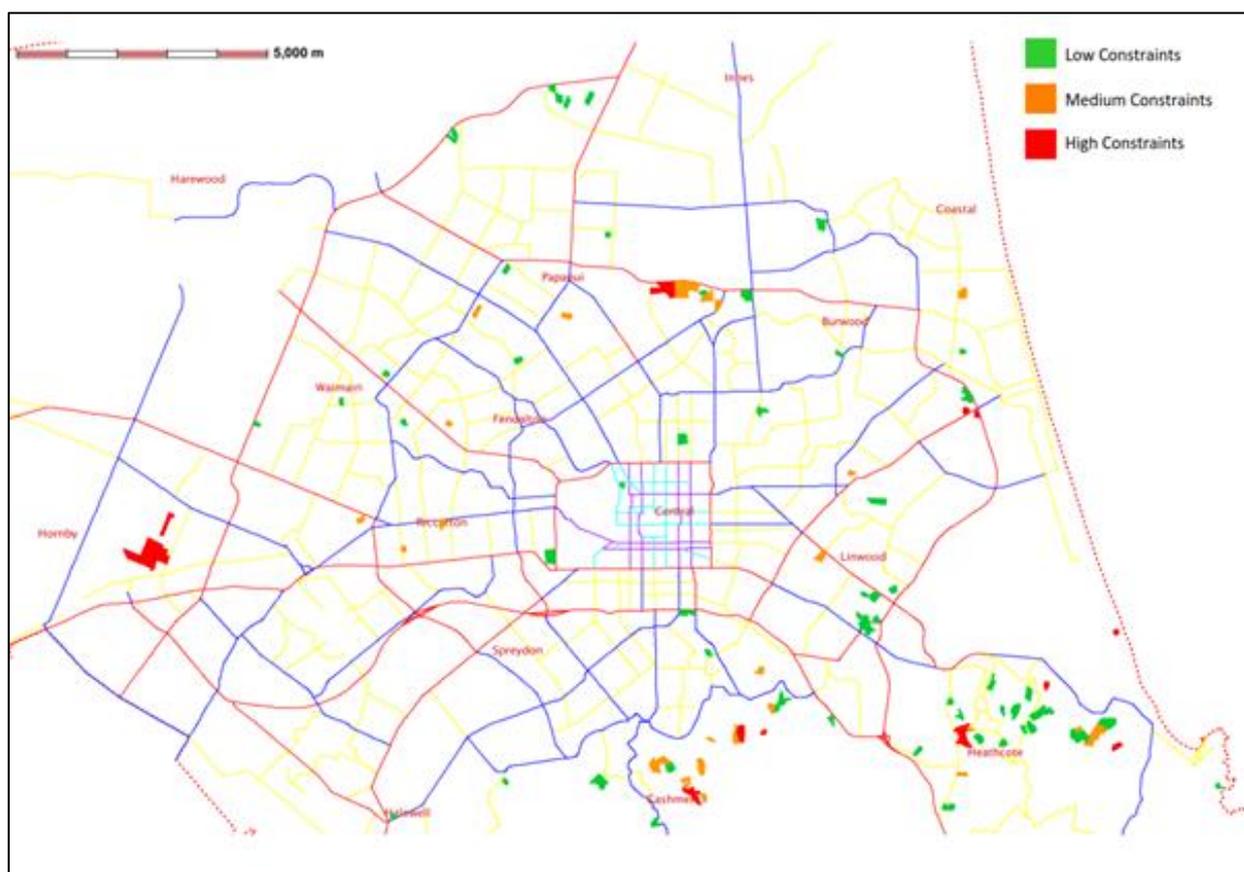
Many larger sites are compromised to a greater or lesser extent by site characteristics (e.g. steep slope), hazard risk (e.g. coastal and rock fall hazards), flood management, heritage and cultural restrictions or partial use by non-residential activity (e.g. partly bisected by power lines). An assessment was made of these constraints and each site allocated a low, medium or high constraint rating based on the incident and severity of constraints. For some sites it is not reasonably practicable to determine feasibility without a site specific assessment of land development constraints. This applies to many of the hill suburb located sites (65 of the 134 identified) where extensive earth works may be required to overcome slope and hazard constraints. The contribution to yield from such sites will be small and likely at the upper end of the price spectrum. Ultimately, the assessment was confined to a relatively small selection of sites, generally being brownfield (formally non-residential use) sites in the flat land parts of Christchurch.

A calculation of potential dwelling yields was then undertaken applying historical development rates for similarly zoned sites.

- Based on this assessment, it is expected that the development of large sites (noting that these have been excluded from the redevelopment modelling) could supply: 1396 additional residential units on the 74 low constraint sites
- 489 additional residential units on the 40 medium constraint sites
- 673 additional residential units on the 20 high constraint site (noting that 400 of these are from a site at 31 Gilberthorpes Road including an Orion substation therefore it is unlikely all of the 400 would be achieved).

This would result in a total of 2558 additional potential dwellings (noting that this number excludes Housing New Zealand and Christchurch City Council housing sites which also have redevelopment potential). However, for the purpose of reaching an aggregate commercially viable housing number (such to meet the policy requirements under the NPS-UDC Policy PB3), only the expected dwelling yield from the low and medium constraint sites has been counted (this being 1885 new dwellings). It is recommended that future feasibility assessments be undertaken on these large sites, and ideally in collaboration with the land owners and/or potential developers, to further validate the number of commercially viable dwellings expected to be yielded.

Map 3: Low, medium and high constraint sites assessed for potential new dwelling yields



8.6.3.3 Sensitivity analysis, findings, and discussion of testing results.

Analysis of the modelling outputs for redevelopment feasibility was undertaken to determine which inputs have the most influence and could be tested further in a variety of scenarios. The influence weighting of the various inputs varies between development typologies and sites.

Price - All developments across all typologies and zones are sensitive to changes in dwelling sales price. Increases in sales price directly increase margin with only changes to two costs (marketing and legal costs). To test this each typology was modelled with dwelling price increased in \$10,000 increments above the median price until the point where the target margin was achieved. This allowed for an assessment of what price was required for a margin target. As some costs (and therefore the margin) are determined by selling price, the costs of development were recalculated at each increment. Sales price is a significant driver of feasibility particularly for multi-unit and apartment type developments where an increase in a per-unit sales price is magnified by a high number of units. Calculated sales price was then compared to estimated sales price (i.e.

based on actual sales) after modelling was complete. **Car parking** - The need to provide parking was insignificant for most development outside of the RCC and RMD zones, and only significant for denser developments with smaller units in the RMD zone. A removal of parking provision (or under supply) raised the feasibility of development with small dwelling sizes relative to developments with larger dwelling size.

Building costs - Above ground construction costs account for the greatest proportion of development costs. Further refinement of the cost was sought to allow for testing of scenarios using a range of quality specifications from basic, through medium, to premium. This is consistent with what most house builders will offer to consumers when pricing dwelling build costs. Caution should be noted because any change in finish specification may need to be accompanied by an allied alteration to the sales price expectation. However, it is difficult to determine what this alteration should be given that specification information does not form part of the sales data used to determine price and is, in any case, a subjective assessment.

Contingency - This was found to be a significant component of costs and particular if also included in the base sum for the Weighted Cost of Capital. A further scenario may consider how contingency need only be factored as an increase margin expectation, allied with a removal of these costs from the inputs into the feasibility assessment. Application of a contingency for each cost input at 100% was the default methodology. Adjusting to contingency to a lower level (i.e. an assumption that not all the contingency must be costed into the dwelling sale price) was found to lower the dwelling price required to achieve a target margin. The application of contingencies at 100% is questionable and is closely related to an identified short-coming of the approach overall, this being that the ability of the individual developers to reduce costs and risk is difficult to accommodate in the model.

Fees, professional costs and charges - In the model, ancillary costs taken as a whole constitute a significant component of overall costs. The proportion varies with development scale and anticipated sales price. Of the ancillary costs, sales/marketing, legal and design costs are the largest costs, being between 50% and 70% of the total ancillary component including the cost of capital. Further scenarios could test the effect of lowering such costs, for example, to reflect where larger developers have these functions in-house. The proportion of the total costs associated with Council fees and Development Contributions varies with development size and estimated sales price. In the model, fees only increase as a total based on the number of units in a development. If a resource consent fee is assumed to apply (which it should not be, for permitted development) then the proportion of this fee falls as development size increases. Scenarios could test the impact of discounted Development Contribution across more development typologies (the model applied discounts for small units only).

Goods and Services Tax - At 15% of sales, GST represents one of the higher costs associated with development. In addition to a direct effect on feasibility and dwelling price it also complicates the process of comparing calculated dwelling sales price for redevelopment with the sale of existing 2nd-hand dwellings (being sold GST free)

8.6.4 Reporting feasibility

Outputs of the feasibility modelling are aggregated by type, location and price point as is necessary for the purposes of reporting and comparison to the outputs of the demand assessment or for any other reporting need. The base level of aggregation will be to the study area divisions. Greenfield redevelopment reported as a single block of development per greenfield and also incorporated into the totals for the study divisions. Feasibility for each study area division has been summarised to provide the total feasibility across housing typologies to allow direct comparison to the output of the demand assessment. Any figures that are reported are done so with acknowledgement and full disclosure of the scenario context. Figures are not reported without an accompanying summary of the scenario parameters from which the figures are derived. The inputs

to the feasibility assessment that will require ongoing update in order to remain valid. Any reported feasibility is a point in time assessment (being the start of 2018).

9 Housing Capacity Assessment – Report 3: Take-up rates

Rates of take-up have assessed:

- The proportion of feasible capacity that will not be developed.
- The proportion of feasible capacity that will be under-developed.
- Where feasible capacity is exceeded.

Historic rates of development can be determined using existing monitoring of development activity and of historical changes to census data. Process steps include:

- Collate historical rates of take-up for greenfield and intensification for each local authority.
- Predict rates of take-up based on data and whether additional margin is required, to inform the assessment of sufficiency.

10 Housing Capacity Assessment – Report 3: Sufficiency

Following identification of demand and feasible supply, a comparison of the two is proposed to identify whether there is sufficient feasible development capacity to accommodate future growth in housing across price, typologies and the broad locations. The comparison will also extend across the three time periods covering the next three years, three to ten years, and ten to thirty years (short, medium and long-term). The analysis will take into account the historical patterns and rate of development (i.e. take-up).

This section of work has included both quantitative and qualitative elements. The quantitative element will consider and identify areas of under and over supply, in terms of location, at price points and across the range of housing typologies, comparing the output of the demand assessment with the feasibility assessment. The qualitative element will consider the overall 'picture' of demand and supply, drawing also on the conclusions of the plan enabled assessment. The sufficiency report will focus on addressing the three bullet points of the NPS-UDC Guidance, p44.

The methodology is to compare the projected demand with the current feasible capacity over the short, medium and long term by territorial authority and, for Christchurch City, by study area division. This report also provides comparison of capacity and demand of typologies and at different price points. This is to meet the NPS-UDC policy requirements of PB1 and PB4 specifically.

“PB1: Local authorities shall, on at least a three-yearly basis, carry out a housing and business development capacity assessment that:

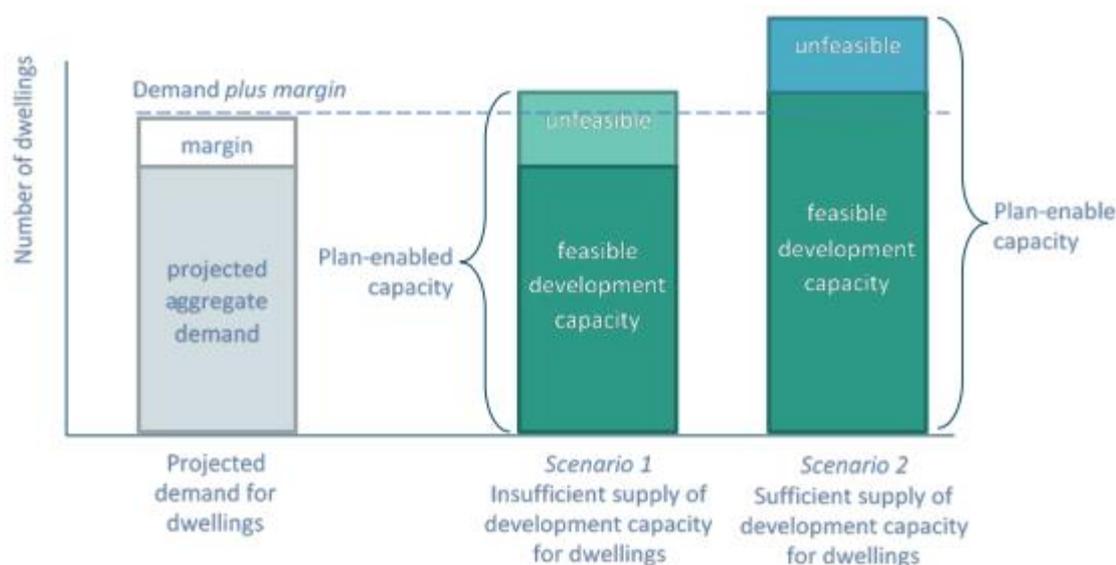
a. Estimates the demand for dwellings, including the demand for different types of dwellings, locations and price points, and the supply of development capacity to meet that demand, in the short, medium and long-terms; and

b. Estimates the demand for the different types and locations of business land and floor area for businesses, and the supply of development capacity to meet that demand, in the short, medium and long-terms; and

c. Assesses interactions between housing and business activities, and their impacts on each other.

PB4: The assessment under policy PB1 shall estimate the additional development capacity needed if any of the factors in PB3 indicate that the supply of development capacity is not likely to meet demand in the short, medium or long term.”

The approach to determining sufficiency follows the direction and approaches contained within the National Policy Statement on Urban Development Capacity: Guide to Evidence and Monitoring. The following figure (found on pg44 of the guide) illustrates the approach. Essentially this is a comparison of the demand plus the margin and the feasible capacity.



This comparison is done at a Greater Christchurch level, with further detail provided at the territorial authority level. Following the comparison, a discussion relating to the enabling of choices to meet demand with different types, locations and price and sensitivity analysis, identifying possible drivers of demand and supply.

11 Housing Capacity Assessment – Report 4: Housing and Business Interactions

Policy PB1 requires local authorities to assess the interaction between housing and business demand and supply. The NPS-UDC Guidance directs local authorities to consider:

- a) Reconciliation of housing and business land supply to avoid double counting land supply as available for both activities.
- b) Assess the spatial interaction between housing and business activities and the impacts on accessibility, e.g. the distance people are required to travel to work, or the ability of business to readily access labour markets; and
- c) Identifying barriers and opportunities for change and development, e.g. a change in use of industrial land and reverse sensitivity with housing activities.

11.1 Reconciliation

This will be addressed as part of the process of assessing plan enabled capacity, principally the avoidance of over-estimating the supply of business land for housing activity (e.g. as part of mixed-use development or where housing replaces business activity).

For Christchurch there is provision in the plan for business activity to occur in residential areas and vice versa. The extent of this alters depending on the zone. There is also explicit provision for mixed use across some zones. Provisions include:

- Using residential zone land for business activity (noting that some existing activity may not comply with the rule of the plan but operates as an historic activity). Typical examples include childcare facilities and small medical practises.
- Operating business from residential homes.
- Use of the upper floors of buildings in business areas for residential activity where the ground and possibly lower floors are used for business. This is an anticipated activity in some areas.
- Mixed-use in business zones (e.g. live/work units).

The extent to which these provisions are currently used and how they have been used historically will be assessed (with acknowledgement of a changes brought about by the District Plan Review in Christchurch) and this information applied to the housing capacity analysis to determine an adjustment to the overall enabled capacity for housing.

The spatial interactions, b), will consider the appropriateness of housing supply location in relation to the location of business land, with particular regard to accessibility between different land uses and the impacts on the efficiency of the transport network. This will help to inform in particular the longer-term capacity assessment and preparation of the Future Development Strategy.

Part c) will be considered as part of the Future Development Strategy, a separate piece of work.

12 Engagement and consultation

Engagement will be across a range of activities and initiatives.

12.1 Significant land holdings

A requirement of the NPS-UDC is to engage with people and organisations that hold significant areas of land that have potential for development or redevelopment for housing. For Greater Christchurch the approach to identifying holders of significant areas of land varies between each of the three Districts.

12.1.1 Christchurch City

People and organisations were identified based on the location and extent of land holdings in the residential zoned areas of the city. Whether an area of land is a significant land holding depends on its size and development potential. For example, a large section in a low density zoned area may have the same potential for housing supply as a much smaller section in the Central City. The following criteria have been used:

Zone	Criteria
Residential Central City	>500m ² single parcel or contiguous parcels
Central City Mixed Use	>500m ² single parcel or contiguous parcels
Residential Medium Density	>5,000m ² single parcel or contiguous parcels or, >10 separate land parcels
Residential Suburban Density Transition	>5,000m ² single parcel or contiguous parcels
Residential Suburban	>4,000m ² single parcel or contiguous parcels
Residential Hills	>10,000m ² single parcel or contiguous parcels
Residential New Neighbourhood	>1,500m ²
Residential Banks Peninsula	>1,500m ²
Residential Guest Accommodation	>1,500m ²
Residential Large Lot	>1,500m ²
Residential Small Settlement	>1,500m ²

In total the criteria generated 2,500 individual land owners in Christchurch City across all residential zones. This included a many institutional owners, including Housing New Zealand, Ministry of Education and a number of churches. The first contact with these land holders was to raise awareness of the work and invite each land owner to participate in further engagement activity. These activities will include a discussion of future intentions for their land and if land holders have identified any constraints or opportunities for development of their land. This work will help inform the feasibility work in particular but also the planning response.

12.1.2 Selwyn and Waimakariri District

SDC and WDC also applied a criteria based approach to identify significant land owners. The criteria set out in Table 14.1.2 below generated 26 leads for SDC and also a number for WDC (final number was not confirmed). Correspondence through the Greater Christchurch Partnership was emailed and posted to these individuals and organisations. Follow-up engagement meetings that were targeted towards some of the identified significant land owners and development sector representatives were also had with some developers.

Table 12.1.12 Significant land holding – SDC/WDC Criteria for identification

- 1. Land owners within the spatial areas identified for capacity assessments; and**
 - a) Land owners that have a contiguous¹⁰ land area of not less than 10ha in these areas; or
 - b) Own 10 or more rateable properties
- 2. Landowners of other land known to be of strategic significance¹¹ to residential development**

12.2 Engagement with the development community

An integral part of the NPS-UDC response is to involve the development community in the process and discussion of the outcomes of the capacity assessments. In particular the inputs of property development experts is valuable and expected for the assessment of feasible development.

Local development expert knowledge has been sought to inform the cost inputs into the assessment of feasible development, as outlined in section 8.2. Early engagement with the local Property Council representatives has also occurred. Ongoing engagement with the property development community through, for example, the Development Forum was also used to help inform values for inputs into the model and to identify useful scenarios to test.

Where possible information was also sought on recently completed developments in order to calibrate the model outputs. Some of this information was publically available and some commercially sensitive.

Comment was sought from greenfield developers on matters including the estimate of land development costs produced for each greenfield and on how greenfield developers estimate a price points in advance for dwelling sales that they may use in their own feasibility assessments.

13 Technical and Peer review

A high level assessment will be undertaken to test the robustness of the methodology, processes and outputs. To include:

- Technical and peer review of the demand assessment.
- Technical and peer review of the feasibility modelling approaches.
- Peer review of the final reports on each section.

It is assumed that the technical review process will be primarily internal and across the GCP partners.

14 Integration of HCA and BCA

For reporting purposes the final HCA and BCA will be incorporated into an overall summary Urban Development Capacity report. The report will bring together both these largely discrete pieces of work, with the addition of the co-produced section on housing and business interactions.

15 Risks

The following risks have been identified.

¹⁰ 10ha for a contiguous land ownership has been selected to capture the large number of lifestyle blocks that sit within some of the zoned 'greenfield' development areas. Contiguous ownership of 10ha or more would indicate consolidation of land parcels, which would confirm the land owner as being 'significant'

¹¹ 'Strategic significance' may include: (i) An owner of a piece of land that is important for continued development of an area; (ii) Land subject to a resource consent for development that is currently held in multiple ownership, and may include the developer/applicant of the subdivision application as well as the land owner(s).

- a. The methodology and assumptions are challenged by stakeholders, or are found to be partially flawed during peer review.
- b. Incompatibility between the outputs of the Housing and Business components of the NPS-UDC process prevents a meaningful assessment of interactions.
- c. Ensuring consistency in approaches, methodologies and assumptions across the Greater Christchurch Partnership Territorial Authorities.
- d. Availability of resources for technical and peer review.
- e. Availability and reliability of sources of data for feasibility assessments, for example on property sale and rental prices.
- f. Over-generalisation of the modelling inputs to facilitate the modelling process reduces the reliability and accuracy of the output.
- g. Failure to meet in part or in full all the requirements of the NPS-UDC that relate to housing.

16 Timeframes

The timeframe for completion of the Housing Capacity Assessment is for inclusion on the agendas of the committees of the Greater Christchurch Partnership. This includes the Senior Managers Group, Chief Executives Advisory Group, Greater Christchurch Partnership Committee and subsequently the respective Councils of each Territorial Authority.

17 Appendices

1. Ian Mitchell, Demand assessment proposal letter (final page on costs redacted).
2. Population projections. Reproduction of section 3 of the Greater Christchurch *Housing and Business Development Capacity Assessment*.
3. Development Margin – literature review research.
4. Sample of anticipated section sales prices – Christchurch greenfield development.
5. Example of land parcel fragmentation in a greenfield subdivision.
6. Estimates of greenfield development costs.
7. Estimates of dwelling development costs.
8. Distribution of modelled redevelopment sites.

18 References

1. NPS-UDC. <http://www.mfe.govt.nz/publications/towns-and-cities/national-policy-statement-urban-development-capacity-2016>
2. Greater Christchurch Housing Market Assessment, 2013. <http://greaterchristchurch.org.nz/assets/Uploads/Final-GreaterChristchurchHousingMarketAssessment-20130817-Copy.pdf>
3. MBIE/MfE guidance documentation: <http://www.mfe.govt.nz/more/towns-and-cities/implementing-national-policy-statement-urban-development-capacity>
4. MBIE feasibility tool (non-adjusted): <http://www.mbie.govt.nz/info-services/housing-property/national-policy-statement-urban-development/?searchterm=national%20policy%20statement%2A>
5. MBIE Urban development dashboard: <http://www.mbie.govt.nz/info-services/housing-property/national-policy-statement-urban-development?searchterm=national+policy+statement>
6. Christchurch City Council/Jasmax Architects, 2010. *Exploring New Housing Choices*. <https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Urban-Design/Exploring-New-Housing-Choices.pdf>
7. BRANZ, 2008. *Study Report No.196[2008]. New House price modelling*. Retrieved: https://www.branz.co.nz/cms_show_download.php?id=20fcfdc1151f17dcb00bce0a7f31993a65b914f57

Appendix 1 Housing demand assessment



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By Email

Your Ref:
Our Ref: R17024

Date: 10th August 2017

Dear Sarah

NPS – Assessment of housing demand in Greater Christchurch

Thank you for the opportunity to submit our proposal to provide you with our proposal outlining how we can assist you with modelling housing demand in Greater Christchurch. We understand you require detailed housing demand projections by demographic characteristics across greater Christchurch over the next 30 years to meet your requirements under the National Policy Statement on Urban Development Capacity. Our proposal is presented in the following sections:

- A summary of the scope of the proposed assignment;
- Geographical area and sub areas included in the analysis;
- Key assumptions;
- Report structure; and
- Estimated cost.

1: Project's scope

Our understanding is you require an assessment of the likely housing demand in Greater Christchurch over the next 30 years. The outputs from our research will include demand estimates of the change in number of households by a range of demographic characteristics including:

- Tenure (owner occupiers, private renters and the need for social housing);
- Age of the household reference person; and
- Family composition (household types will include couple only, couples with children, one parent, one person and other).

Our modelling methodology incorporates the trend in the age of residents, changes in family structure, levels of household income, growth in key property market prices, and changes in the level of owner occupation. The implications of these trends in terms of the type and size of dwelling typology required for future growth also flows from this analysis. The range of dwelling typologies included in the analysis are:

- Stand-alone housing;
- Multi-unit: and
- Apartments.



In addition to the overall demand estimates, housing affordability will be considered for both owner occupier and renter households. A number of scenarios will be included in the analysis based on assumptions associated with changes in household income and their implications on demand at different price points. Consideration of gaps in the supply side of the market will be discussed relative to the demographic and affordability trends identified in the modelling to provide estimates of unmet housing need within the housing continuum.

Demand projections will be produced to meet the key time frames you have specified. These include short, medium and long-term estimates. The definition of these are:

- Short term means the next three years (commencing 31 December 2017);
- Medium term means over the next 10 years; and
- Long term means over the next 30 years.

As discussed, we would prefer to provide projections with a start date of either 30th June 2017 or 30th June 2018 as these align with the dates used in Statistics New Zealand's populations estimates and projections. However, if you prefer we can use December years although this adds some additional steps to our modelling process.

2: Study area: broad spatial divisions

The study area includes boundary of the Greater Christchurch Urban Development Strategy area (UDS), with the addition of the whole of the three area units that partially overlap the UDS boundary. As discussed, the analysis of housing demand will include a number of geographical divisions in the data. As agreed Christchurch City Council will provide detailed information on the actual statistical boundaries for each area.

Christchurch City sub areas will include:

- Central City;
- North-west;
- North-east;
- South-west;
- South-east;
- Port Hills; and
- Lyttelton Harbour.

Selwyn District sub areas will include:

- Selwyn UDS Settlements (with the following areas grouped together Rolleston, Lincoln, Tai Tapu, and West Melton); and
- Selwyn UDS Rural.

Waimakariri District sub areas will include:

- Waimakariri UDS Settlements (with the following areas grouped together Rangiora, Woodend, and Kaiapoi); and
- Waimakariri UDS Rural.



3: Key Assumptions

The key underlying assumptions associated with the study include the population growth projections used as the underlying foundation for the housing demand projections. The base projections for the study are:

- Christchurch City Council will use Statistic New Zealand's medium growth projection; and
- Selwyn District and Waimakariri District will use Statistic New Zealand's medium-high growth projection.

As discussed to take into account the implications on demand of population projections being under and over that used in the base demand projections the following scenarios will be considered:

- Christchurch City the *under* projection shall be medium-low level projections and the *over* projection shall be medium-high level projections; and
- Selwyn District and Waimakariri District the *under* projection shall be medium level and the *over* projection shall be high level projections

4: Report structure

Unless agreed otherwise the report will be structure as follows:

- Contextual statement around the process associated with modelling the demand estimates, the assumptions used, and the factors influencing the report's conclusions;
- High level demand estimates with accompanying analysis of the implications associated with the potential variation (under and overs) in actual population growth relative to projected growth used in the base population projections;
- Summary of the detailed housing demand estimates by tenure, age of the household reference person, household composition and the implications on the demand by dwelling typology. Detailed tables to be included in Appendix One;
- Summary of the distribution of demand by geographical sub area. Detailed tables to be included in Appendix One; and
- Summary of the analysis of demand by key price points by demographic characteristics, location and dwelling typology. Detailed tables to be included in Appendix One.

The report will include the following Appendices:

- Appendix One: tables presenting the detailed housing demand estimates as discussed above; and
- Appendix Two: an overview of the modelling methodology and discussion of the data sources used.

Appendix 2 – Population and household projections – a basis for undertaking the Housing and Business Capacity Assessments

To achieve the H&BDCA requirements, having robust population and household projections is key to addressing the level of demand and subsequent supply required in both housing and business markets in the Greater Christchurch area.

As outlined in the NPS, PB2 and PB2a states:

PB2: The assessment under policy Pb1 shall use information about demand including:

- a) *Demographic changes using, as a starting point, the most recent Statistics New Zealand population projections;*

The guidance¹² cites several advantages to using Statistics NZ Projections namely:

- The projection methodology is applied consistently across TA areas
- Projections are regularly reproduced over time using consistent and internationally-accepted methods, rather than on an ad-hoc basis.
- The projections are produced by an independent agency with access to the most comprehensive data inputs.

The guidance acknowledges that “the future is inherently uncertain and impossible to accurately predict, especially over the long term” and therefore that this risk should be managed by:

- Using the most up-to-date and robust projection methodologies that address the key drivers of uncertainty
- Presenting a range or results of sensitivity testing, as well as chosen projection
- Frequently updating information.

Statistics New Zealand considers that the medium projection to be the most suitable for assessing future population and household changes but advises that if a local authority wishes to depart from that projection, the rationale should be explained in the assessment in a way that can be traced and audited¹³.

3.3.1 Statistics New Zealand Projections

Statistics New Zealand produce population projections every two to three years and provides the following guidance on how their projections are developed.

“Population projections are derived from an assessment of historical, current, and likely future trends in births, deaths, and migration – the three components of population change. Assumptions about future fertility (births), mortality (deaths), and migration are formulated after analysis of short-term and long-term historical trends, government policy, information provided by local planners and other relevant information. Assumptions are set first at the national level and used as a constraint for the subnational assumptions (this ‘top-down’ approach prevents implausible projections for any area).

Fertility

¹²MfE/MBIE (2017) NPS-UDC: Guide on Evidence and Monitoring, page 26.

¹³MfE/MBIE (2017) NPS-UDC: Guide on Evidence and Monitoring, page 28.

Fertility assumptions for each area are formulated in terms of age-specific fertility rates for each time period. The rates are based on the recent number of registered births in each area. The rates are then applied to the (female) population in each area to give the number of births for each time period.

Mortality

Mortality assumptions for each area are formulated in terms of male and female age-specific survival rates for each time period. The rates are based on the recent number of registered deaths in each area. The rates are then applied to the population in each area to give the number of people who survive each time period (the number of deaths is calculated indirectly).

Migration

The assumed net migration level and age-sex pattern for each area is based on a consideration of observed past patterns, the capacity of the area for further growth (for areas with net inflow), whether historical outflows can be sustained (for areas with net outflow), and information available from and about local authorities relating to current and future developments which may affect population change”.

The projections produced by Statistics New Zealand are not to be considered as predictions, but an indication of likely future population change given specific assumptions listed above. As the future is inherently uncertain and very challenging to predict with any precision, Statistics New Zealand provides three growth scenarios based on three changes to the assumptions that users can utilise depending on their circumstances, namely:

- Low Growth Rate – Low Fertility, High Mortality, Low Migration
- Medium Growth Rate– Medium Fertility, Medium Mortality, Medium Migration
- High Growth Rate – High Fertility, Low Mortality, High Migration

The latest population projections¹⁴ that are relevant for Territorial Authorities (TAs) were released by Statistics New Zealand on 22 February 2017. In addition, area unit projections which breakdown the overall LA projections into small individual catchments were released for Selwyn District on 31 March 2017, Waimakariri District on 5 July 2017 and Christchurch City on 9 August 2017. These area unit projections are important for the H&BDCA, as they align to the Greater Christchurch H&BDCA study area. For the detailed population projections for all growth rates for Greater Christchurch, refer to Appendix 2 and for a full list of the area units that form the H&BDCA study area, refer to Appendix 3.

As recommended by the guide, the population projections to be used in the H&BDCA will utilise the recently released Statistics New Zealand projections. The growth rates from the latest population projections are set out below.

	Low Growth Rate	Medium Growth Rate	High Growth Rate
Waimakariri	0.7%	1.6% (19,800 additional people)	2.3% (38,200 additional people)
Selwyn	1.7%	2.6% (38,900 additional people)	3.3% (58,800 additional people)
Christchurch	0.3%	0.8% (79,900 additional people)	1.3% (151,000 additional people)

Table 1: Average annual population growth rate for the Greater Christchurch H&BDCA study area

¹⁴ Subnational Population Projections: 2013 (base)-2043 update for Regional Councils, Territorial Authorities and Auckland Local Board Areas

3.3.2 Which growth rate to use?

The following information (split into categories) has been used to determine the population growth rate to be used as part of the H&BDCA for each LA area within the Greater Christchurch Study area:

Relevant data sources used to determine the growth rate to be used	Reason
<p>Historic Population Trends</p> <ul style="list-style-type: none"> Estimates (from 1996 – 2017) Increase (overall) of 20 years Change as a percentage Annual Growth Rates 	<p>Statistics New Zealand produce population estimates and growth rates on an annual basis to inform LAs on how the population within New Zealand is changing over time. As the actual population in New Zealand is only determined via the five yearly Census process, it is important to understand the population estimates and growth trends on an annual basis using this data.</p>
<p>Origin of Growth and the Impact of the Canterbury Earthquakes (2010-2011)</p>	<p>For cities or districts, two factors determine if the population has either increased or decreased. They are:</p> <ol style="list-style-type: none"> Natural change in the existing population of cities or district – (via births / deaths) Change in internal migration from within NZ or international migration to cities or districts <p>It is important to understand the proportion of growth that is occurring in the GCP regarding both natural change and migration growth to understand the influence it may have in determining the future growth rate. (eg if growth in a particular area has been reliant on migration, there could be a risk that if it decreases for any reason in the future, it will impact on the growth rate).</p> <p>The Canterbury earthquakes in 2010 and 2011 had a significant impact on the population within the Greater Christchurch area and their impacts need to be considered as part of this assessment.</p> <p>Statistics New Zealand released a paper which outlined how they tried to estimate the population after the Canterbury earthquakes¹⁵.</p>
<p>Impact of Growth</p> <p>Building Consents – Residential New Dwellings</p>	<p>A proxy indicator for considering the accuracy of population estimates and annual growth rates is to consider the level of new dwelling building consents being approved in TAs in-between the five year Census count. If new dwellings are being constructed it can be assumed that additional dwellings are required to meet the demand from population growth, particular if a significant amount of population growth is occurring from either international or internal migration within New Zealand.</p>
<p>Population projections released between</p> <ul style="list-style-type: none"> 1996-2006 2007-2017 Growth rate 	<p>Statistics New Zealand produce population projections every two to three years. These projections provide an opportunity to assist future planning, with information about the likely future size and structure of the population helping territorial authorities, and communities to plan for infrastructure and facilities to meet the needs of a changing population.</p>

This results of this information for Greater Christchurch is summarised in table 2 below:

		Waimakariri	Selwyn	Christchurch
Population Estimates				
Population Estimates ¹⁶ (as at 30 June)	1996 2017	33,000 59,200	25,500 59,300	325,700 381,500

¹⁵ “Estimating local populations after the 2010/11 Canterbury earthquakes” released by Statistics New Zealand in October 2011

¹⁶ “How accurate are population estimates and projections?” released by Statistics New Zealand in September 2016. Refer to Appendix 4 for a summary of the results of this research.

Population Increase	1996-2017	26,000	33,800	55,800
Percentage Change	1996-2017	+79%	+133%	+17%
Population Growth Rates	1996-2001 2001-2006 2006-2011 2011-2016 2017	2.81% 3.08% 2.30% 3.19% 2.42%	2.11% 4.28% 4.21% 5.55% 5.52%	0.58% 1.53% 0.03% 0.69% 1.76%
Population Average Yearly Growth Rate	1996-2017	2.82%	4.10%	0.76%

Source of Growth

Natural (net Births/Deaths)	1996-2017	5,300 (20%)	7,200 (21%)	37,100 (67%)
Net Migration (Inflow/Outflow) ¹⁷	1996-2017	20,700 (80%)	26,600 (79%)	18,700 (33%)
Impact of the Earthquake - Population Change 2011/12 and 2012/13 ¹⁸	Two years after the first Canterbury Earthquake	+2,900 people or 6% due to increase in migration levels	+3,400 people or 8% due to increase in migration levels	- 21,000 people or - 6%

Impact of Growth

Historical Building Consents for New Dwellings Issued (July to June) ¹⁹	1996-2001 2002-2006 2007-2011 2012-2016 ²⁰ 2017	2,467 2,384 2,207 4,570 653	1,840 2,725 2,661 5,495 1,260	11,202 10,812 8,032 14,663 2,620
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Population Projections

Previous Population Projections 1996 – 2006 (at both the Medium and High Growth Rate) ¹²	1997 (at 2011)	Under projected	Under projected	Under projected (medium rate only)
	2000 (at 2011)	Under projected	Under projected	Under projected (medium rate only)
	2002 (at 2011)	Under projected	Under projected	Under projected (medium rate only)
	2005 (at 2011)	Under projected	Under projected	Over projected
	Overall (from 1996 projected to 2011)	Under projected -15.5%	Under projected -26.4%	Under projected -1.6%
Previous Population Projections 2007 - 2017 Growth Rates	2007 Release	Medium 1.5% High 2.0%	Medium 1.7% High 2.4%	Medium 0.6% High 0.9%
	2010 Release	1.6% 2.2%	2.0% 2.7%	0.6% 1.0%
	2012 Release	1.3% 2.2%	2.2% 2.9%	0.6% 1.0%
	2015 Release	1.3% 2.2%	2.2% 3.3%	0.7% 1.3%
Latest Population Projections Growth Rates	2017 Release	Medium 1.6% High 2.3%	Medium 2.6% High 3.3%	Medium 0.8% High 1.3%

¹⁷ Figures for Net Migration (Total Population Increase in TAs minus Net Births/Deaths). There is limited information recorded from Census 2013 on the level of international and internal migration per LAs. Refer to Appendix 4 for a summary of the results from the Census

¹⁸ RBNZ Bulletin Vol 79 No3 February 2016

¹⁹ The number of building consent for new residential dwellings per year from 1996 to 2017 refer to Appendix 5 (these numbers do include replacement dwellings from the recovery from the Canterbury earthquakes)

²⁰ Earthquake Impact – Rebuilding of earthquake damaged/destroyed dwellings in existing location or movement to less affected areas within the Greater Christchurch area, for example Christchurch to Selwyn/Waimakariri

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Table 2: Information used to determine growth rates

3.3.3 Assessment for each Council (based on the information from Table 2)

The GCP Councils have considered what growth rate to adopt for strategic planning purposes (to 2048) including whether to adopt the Statistics NZ medium projections recommended in the NPS-UDC guidance. A low growth rate is not considered to be appropriate on the basis that Christchurch City, Selwyn District and Waimakariri District Councils have collectively been determined as part of a high growth urban area under the NPS-UDC. Consideration has therefore focused on whether the medium or a higher projection is appropriate for Greater Christchurch or a combination therefore for each TA. This consideration has been informed by the results contained in table 2. This section provides an explanation behind the selection of growth rates for each of the LAs within the GCP study area.

Waimakariri District - Rationale for the Waimakariri District (Greater Christchurch area only) to use a Medium High Growth Rate is based on the following:

- Significant amount of population growth in the District over the past twenty years.
- 80% of this growth is occurring from migration either from within NZ or overseas.
- As migration (both internal and international)²¹ has a significant influence on the level of growth in the District, any policy changes enacted by the government could have an impact on the population growth for this District. This will need to be carefully monitored in between three yearly capacity assessments.
- The annual population growth rate has been significant over the past twenty years and consistently higher than projected by Statistics New Zealand.
- While building consents have been significantly higher from 2012 to 2014 (as a result of the recovery from the Canterbury earthquakes), this level has been returning to levels seen before the earthquakes.
- While the average growth rate (over the past twenty years) of 2.82% is higher than the projected high growth rate of 2.3%, consideration of the historical trend over the past twenty years suggests that using the Statistics New Zealand high growth rate would be too high (taking into account how quickly the growth rate could change in this district due to the high reliance on migration), while the medium growth rate would be too conservative. On the basis of the information contained in table 2 it is appropriate to consider a rate somewhere in-between medium and high growth rates (a medium high growth rate). This is particularly prudent when the projections extend over such a long time period (projecting out 30 years) and where the three yearly cycle for preparing capacity assessments under the NPS requires a re-evaluation to be made at relatively regular intervals.

Selwyn District - Rationale for the Selwyn District (Greater Christchurch area only) to use a Medium High Growth Rate is based on the following:

- Significant amount of population growth in the District over the past twenty years.
- 80% of this growth is occurring from migration either from within NZ or overseas
- As migration (both internal and international)²² is a significant influence to the level of growth in the District, any policy changes enacted by the government could have an impact on the population growth for this District. This will need to be carefully monitored in between three yearly capacity assessments.

²¹ Refer to Appendix 4 – for the specific detail around the under and over estimates of population in each LAs

²² See Appendix 4 – migration data from Census 2013

- The annual population growth rate has been significant over the past twenty years and consistently higher than projected by Statistics New Zealand.
- Building consents have been significantly higher from 2013 to the present day (this has been influenced by the internal migration changes as a result of the earthquake and the strategic planning and land use zoning that occurred in townships within Rolleston, Lincoln and Prebbleton that resulted in significant rural land onto the market for residential purposes)
- While the average growth rate of 4.1% is higher than the projected high growth rate of 3.3%, it is unrealistic for this rate to continue into the long term future. Therefore consideration of the historical trend over the past twenty years suggests that using the Statistics New Zealand high growth rate is too high (taking into account how quickly the growth rate could change in this district due to the high reliance on migration), while the medium growth rate is too conservative. On the basis of the information contained in table 2, it is appropriate to apply a rate in-between medium and high growth rates (a medium high growth rate). This is particularly prudent when the projections extend over such a long time period (projecting out 30 years) and where the three yearly cycle for preparing capacity assessments under the NPS requires a re-evaluation to be made at relatively regular intervals.

Christchurch City - Rationale for Christchurch City to use a Medium High Growth Rate is based on the following:

- The annual average growth rate for Christchurch (of 0.76%) has almost matched the Statistics New Zealand medium growth rate (of 0.8%) projected for the next 30 years.
- On the basis of the information contained in table 2, it is appropriate to apply a medium growth rates for Christchurch. This is particularly prudent when the projections extend over such a long time period (projecting out 30 years) and where the three yearly cycle for preparing capacity assessments under the NPS requires a re-evaluation to be made at relatively regular intervals.

Recommendation: the Christchurch City use a Medium Growth Rate as shown in section 3.3.4.

3.3.4 Population and Household Projections to be used to inform the Urban Development Capacity Assessments for each Council

Table 3.3.4.1 Applied Population Projections

	2018	2023	2028	2033	2038	2043	2048	Additional Population 2018-2048
Selwyn GCP (Medium High Growth Rate)	49,500	59,900	67,900	75,700	83,600	91,300	98,400	48,900
Waimakariri GCP (Medium High Growth Rate)	48,800	54,800	59,900	64,800	69,400	73,700	77,800	29,000
Christchurch GCP (Medium Growth Rate)	383,800	405,200	420,000	433,600	445,100	455,000	463,700	80,000
TOTAL GCP	482,100	519,900	547,800	574,100	598,100	620,000	639,900	157,900

Table 3: Subnational/Area Unit Population Projections 2017 (Source Statistics New Zealand, GCP)

Households Projections - To convert the population projections to households, the following process was used:

1. Source data from Statistics New Zealand on what the average household size within the GCP study area could be over the next 30 years. This data is shown in Table 4.
2. Take the population data for each year and divided it by the household size for that same year (eg for Selwyn, at 2018, -the population figure of 49,500 was divided by the household size of 2.9 to determine that the amount of households for that year would be 17,100)
3. Then take the difference between the 2018 households to the 2048 households, to provide the amount of additional households required over the time period of the NPS.
4. Then add a 20% overprovision between 2018 and 2028 (for the short /medium term) and 15% overprovision between 2028 and 2048, as required under policy PC1 of the NPS.

	2018	2023	2028	2033	2038	2043	2048
Selwyn GCP	2.9	2.8	2.8	2.7	2.7	2.7	2.6
Waimakariri GCP	2.6	2.6	2.5	2.5	2.5	2.5	2.4
Christchurch GCP	2.5	2.5	2.5	2.4	2.4	2.4	2.4

Table 4: Average Household Size Projections (Source: Statistics New Zealand)

Table 3.3.4.2 Applied Household Projections

	2018	2023	2028	2033	2038	2043	2048	Additional Households 2018-2048	NPS Additional Households 2018-2048 ²³
Selwyn GCP (Medium High Growth Rate)	17,100	21,400	24,300	28,000	31,000	33,800	37,800	20,800	24,200
Waimakariri GCP (Medium High Growth Rate)	18,800	21,100	24,000	25,900	27,700	29,500	32,400	13,700	16,000
Christchurch GCP (Medium Growth Rate)	153,500	162,100	168,000	180,700	185,500	189,600	193,200	39,700	46,400
TOTAL GCP	189,400	204,600	216,300	234,600	244,200	252,900	263,400	74,200	86,600

Table 5: Household Projections 2017 (Source: Statistics New Zealand, GCP)

3.3.5 Checklist against the Guide (re the use of Population Projections)

²³ Household Growth with additional margin of capacity as required under the NPS, eg Short Term (20%), Medium Term (20%) and Long Term (15%).

Has the population projection methodology been applied consistently across the LA areas	Yes	The GCP has used the Statistics New Zealand Projection methodology for all LAs
Are the projections produced by an independent agency with access to the most comprehensive data inputs	Yes	Statistics New Zealand is an independent agency
The projections are regularly reproduced over time using consistent and internationally accepted methods	Yes	Statistics New Zealand Projections are released every two to three years
That the projections manage uncertainty by: <ul style="list-style-type: none"> • using the most up-to-date and robust projection methodologies that address the key drivers of uncertainty • present a range or results of sensitivity testing, as well as a chosen projection • frequently updating information 	Yes	Using the Statistics New Zealand Projection methodology provides for sensitivity testing and is updated frequently
Statistics New Zealand considers the medium projection to be the most suitable for assessing future population and household changes	Yes	For Christchurch City only
If LAs consider that a different growth rate should be used, then the rationale for the change should be explained in the H&BDCA in a way that can be traced and audited.	Yes	Recommended that Selwyn and Waimakariri District Councils use Medium High Growth Rate. Assessment for this provided in section 3.3.2 and 3.3.3 of this report.

Appendix 3 – Development Margin Literature Review

Development Feasibility — Developer Margin Expectations

Literature Review

A literature review was undertaken on the subject of the expectations of residential property developers for profit, or margin, they may seek from a potential development opportunity and what factors may influence their decision. The literature review focused on New Zealand and Australian sources where recent studies had been undertaken or where developer input had been sought, rather than on academic literature on property development. Most of the studies derive data from case study examples of development or from interviews with operators in the development sector.

Margin has a number of definitions and care was taken to ascertain what was included in margin as it was discussed in each of the reports. Margin is generally taken to be a combination of the developer's minimum expectation of profit, factoring in a contingency for extra development costs and the minimum requirements that may be set by banks and other lenders. Where margin refers to some other similar variable or is derived differently, then this is noted.

New Zealand

1. Wellington City Council, *Medium Density Housing Research Project Report, 2016*

From: <http://planningoursuburbs.org.nz/assets/images-and-files/documents/files-documents/economic-supply-demand-assessment-report.pdf>

Conclusions:

Discussions with developers around profit expectations concluded that generally:

- Single lot as low as 10% (low risk)
- 10% to 15% on smaller development
- 20% on higher risk development, larger size
- Modelled development margin for different housing typologies varied between different areas.

2. Wellington City Council, *Valuation Impact Assessment, 2015*

From: <https://wellington.govt.nz/~media/your-council/projects/files/housing-choice-supply/Medium-density-housing/valuation-impact-study-on-medium-density-development-for-tawa-and-karori-2015.pdf>

Conclusions:

- Current market expects 15% to 25% profit.
- Anything above 15% is acceptable, below 10% is unacceptable.
- Study of nine developments found a range of 9% to 25%, development size of 5 to 54 units.
- Banks typically expect 20% before lending.
- The extent to which medium-density will develop will rely heavily on margins and market demand.
- Lower anticipated sale price make margins tighter, albeit somewhat offset by lower land price.
- Economies of scale for larger developments can improve margins.
- High up-front costs for land can preclude development occurring by reducing margin below 10%.
- Delivery of smaller units at higher density can increase margin, but only possible in areas where market accepts smaller units.

3. Wellington City Council, *Residential Intensification and the Wellington Urban Development Strategy, 2007*

From: <https://wellington.govt.nz/~media/your-council/projects/files/infill-resintens.pdf>

Conclusions:

- A number of different markets and market players, changes developer margin depending on these variables.
- Canvased both large and small developers for opinion and found a divergence of views.
- Market as a whole accepts 20% as a reasonable return. Some developers will work to lower margins and some to higher.
- Minimum threshold required by lenders typically 20%.

4. BRANZ, *Medium-density housing demand and supply analysis, 2017*

From:

https://www.branz.co.nz/cms_show_download.php?id=b9e3c80b41f71bc69a1de9afef38a89fd960b769

Conclusions:

- Medium-density needs a good location, good design, desirable, and a sound margin to cover unforeseen costs.
- 18% margin typical of low-rise apartments at outset. Cost overruns etc. will likely erode this over the course of development.
- Land price increases have directly impacted on margins and undermined project feasibility.
- Medium Density Housing developments look at 20% to 25% margin at outset.
- 50% margins were not uncommon in the past, 25% now a struggle (Auckland centric view) – possibly land price driven.
- Demand and supply of particular labour skills can cut into margins for some types of projects using particular construction techniques.

5. Boffa Miskel, Parliamentary Report, *Case Studies of Intensive Urban Residential Development Projects, 2009*

From: <https://www.parliament.nz/resource/0000119091>

Conclusions:

- HNZA development is different. No Land holding costs, internal funding and no expectation of profit. Very low margin accepted.
- Targeting sites for development (in Auckland) would usually increase price and reduce margin.
- Banks look for good margins. Anything below the 15-20% range may be considered higher risk to the bank.

6. BRANZ, *New house price modelling, 2008*

From:

https://www.branz.co.nz/cms_show_download.php?id=20fcddc1151f17dcb00bce0a7f31993a65b914f57

- Profit margins for builders in the 8-12% range

7. Auckland Council, *Auckland Unitary Plan Section 32 analysis, 2013*

From:

<http://temp.aucklandcouncil.govt.nz/EN/planspoliciesprojects/plansstrategies/unitaryplan/Documents/Section32report/Appendices/Appendix%203.21.3.pdf>

Conclusions:

- 20% was the consensus for profit vs costs
- Report used 20% as the starting point for static models of development feasibility to test inclusionary zoning policy implications. Sensitivity test to 25% and 30% also.
- Incorporating affordable units necessitated increase margin to 25% to 30%.
- Margins differ for different types of development. Higher risk developments need a greater margin.

Australia

8. Reserve Bank of Australia, *Supply side issues in the Housing Sector, 2012*

From: <https://www.rba.gov.au/publications/bulletin/2012/sep/pdf/bu-0912-2.pdf>

Conclusions:

- Considered estimated attained margins (i.e. post-development) rather than developer expectations at the outset of the project.
- Greenfield development estimated attained margin ranged from 3% (Sydney) to 14% (Perth).
- Infill development estimated attained margin ranged from 10% (Sydney) to 14% (Melbourne/Brisbane).

9. Australian Housing and Urban Research Institute, *The Financing of Residential Development in Australia, 2009*

From: https://www.ahuri.edu.au/_data/assets/pdf_file/0011/2009/AHURI_Final_Report_No219_The-financing-of-residential-development-in-Australia.pdf

Conclusions:

- Acceptable range may be between 10% and 25%, to be determined by risk.
- Noted that cost of debt directly impacts upon margin.
- Joint ventures such as with a land owner can improve the margin in return for a potential share of the profit as part of the venture. The developer benefits from the reduction in risk and cost of debt.
- For debt funded development the impact of delay can be significant on margin.

Smaller, infill, type developers can accept lower margins and may use family labour to reduce construction costs.

10. Bryant, Lyndall, *Constraints to Cost Effective Land Supply, 2010*

From: <https://eprints.qut.edu.au/32586/1/32586A.pdf>

Conclusions:

- Industry experience suggest that 20% to 25% is the acceptable range.

- Margins under or over are applicable under certain circumstances dependent on risks involved and the developer's appetite for risk.

11. Sharam, Bryany, Alves, *De-risking development of medium density housing to improve housing affordability and boost supply*, Submission to the Senate Economics References Committee Inquiry into Affordable Housing (Victoria), 2014

From:

<https://www.google.co.nz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiw86ObgYvYAhUM6LwKHxkxBl0QFggnMAA&url=https%3A%2F%2Fwww.aph.gov.au%2FDocumentStore.ashx%3Fid%3Ddf83dfe-c66e-4123-913a-f875df774106%26subid%3D299699&usg=AOvVaw3hKAcXuP4ASIBAApktzo7a>

Conclusions:

- De-risking developments improves margins.
- No specific margin suggested. Noted that small developers were more nimble and may accept lower margins for, for example, infill development.
- Higher risk developments, such as multi-storey apartment blocks, are riskier and have higher margin expectations, but generally only undertaken by developers of sufficient size to mitigate the risks.

12. Australian Housing and Urban Research Institute, *Final Report No193 Delivering diverse and affordable housing on infill development sites*, 2012.

From:

https://www.ahuri.edu.au/_data/assets/pdf_file/0014/2066/AHURI_Final_Report_No193_Delivering_diverse_and_affordable_housing_on_infill_development_sites.pdf

- Infill development rarely produces the profit margin that are often perceived.
- Developers usually seek 15-25% on costs.
- If risks are too high then development will not proceed with a lower order margin.
- Different housing typologies attract different margins, e.g. building above single storey generally increases risk and costs so margin must be higher.
- Risks and impediments vary considerably between markets; in Sydney the impediment to margin was land costs, while in Perth the impediment was construction costs.
- In some market plan enablement of development potential (e.g. increased height limit) pushed up land prices to the point where margins were eroded below feasibility.
- Lenders expect 20%, but may go to 15% if they have trust in the developer (i.e. a good track record of development of a specific type of project for which lending is sought).

Summary of Conclusions:

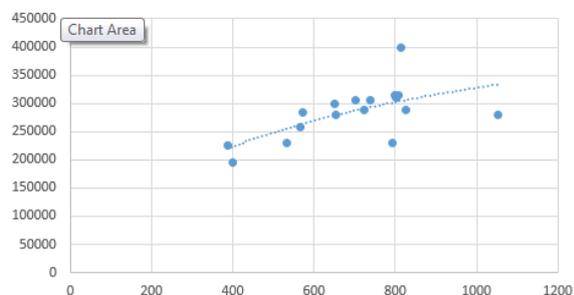
Development margin is reported to be anywhere from 0% to 40% at project outset. The level will depend partly on the resources of the developer and partly on the risk of the development, which is influenced by the type of development, supply of skills in the local market and the demand and price in the sales market. Lower risk development can have a lower outset margin, higher risk developments must have a higher outset margin to cover the greater potential for cost overruns. In addition, well-resourced developers with good experience and track-records can justify and borrow against lower margin expectations. These outset margin expectations are generally driven by finance providers who have different lending criteria depending on the developer, but 20% is considered a minimum. In addition to the outset margin, developers will also have their own profit expectations for developments, which will vary considerably between different developers.

Overall, the studies considered conclude that there are too many variables to take into account in establishing a definitive median or average margin. However, the general consensus is that a margin of 15% to 20% is a reasonable 'rule of thumb', with 20% being the lenders typical minimum expectation.

Appendix 4 – Examples of Christchurch section prices

TradeMe, recent listings (defining the 'Low Value') of completed sections and distribution graph (1st quarter 2018):

Address	Location	Size	Price
1 Ishwar Ganda Blvd	Longhurst	387	225000
2 Dow Sq	Awatea	400	195000
12 Maka Ln	Longhurst	533	229500
5 Endurance Lane	Awatea	565	259000
115 Kittyhawk Ave	Wigram	573	285000
152 The Runway	Wigram	650	299500
Dunbars Rd	Kirkwood	654	279000
Saddleback Green	Kirkwood	701	305000
Tongariro St	Longhurst	722	289000
127 Awatea Rd	Awatea	738	305000
20 Hurutini Way	Longhurst	793	229000
Lot 24 Prestons	Prestons	800	315000
10 Little Gem Rd	Awatea	802	310000
Lot 56 Prestons	Prestons	808	315000
48 Ruapani St	Prestons	813	399000
111 Skyhawk Rd	Wigram	827	289000
38 Bronco Dr	Kirkwood	1054	280000



Appendix 4 – Examples of Christchurch section prices

Highsted Sections (defining the ‘High Value’)

The asking price for sections in the Highsted development, developer’s expectation.

Source: <http://highsted.co.nz/sections/>, retrieved on the 14th February 2018.

Lot	Size	Price/Status
21	800m ²	SOLD
62	600m ²	SOLD
63	600m ²	SOLD
65	700m ²	SOLD
66	650m ²	SOLD
67	650m ²	SOLD
68	604m ²	SOLD
69	604m ²	SOLD
70	604m ²	SOLD
71	605m ²	Under Contract
72	620m ²	SOLD
73	641m ² + ROW	SOLD
74	613m ² + ROW	\$355,000.00
75	613m ²	SOLD

Lot	Size	Price/Status
82	378m ²	\$825,000.00 House & land
83	356m ²	\$799,000.00 House & land
89	400m ²	\$283,000.00
90	400m ²	\$280,000.00
91	410m ²	\$283,000.00
92	410m ²	SOLD
93	445m ²	Hold
94	450m ²	Under contract
95	450m ²	SOLD
96	446m ²	SOLD
97	450m ²	SOLD
98	375m ²	SOLD
99	350m ²	\$280,000.00
100	400m ²	\$280,000.00
101	396m ²	\$280,000.00
102	418m ²	\$293,000.00
103	425m ²	SOLD
104	425m ²	SOLD
105	450m ²	Under Contract
106	416m ²	SOLD
107	418m ²	\$268,000.00
108	387m ²	\$273,000.00
109	409m ²	\$273,000.00
110	300m ²	\$265,000.00/Hold
111	301m ²	\$265,000.00/Hold
112	327m ²	SOLD
113	300m ²	SOLD
114	300m ²	SOLD
115	300m ²	SOLD
116	300m ²	SOLD
117	447m ²	\$290,000.00
118	445m ²	SOLD

Appendix 6 — Estimated development Costs, land (greenfield) development

DEVELOPMENT FEASIBILITY ASSESSMENT - GREENFIELDS

Development Expert Review of Feasibility Calculator Inputs

Greater Christchurch Partnership




DOCUMENT CONTROL RECORD

CLIENT Greater Christchurch Partnership

PROJECT Development Feasibility Assessment - Greenfields

HG PROJECT NO. 2150-142757-01

HG DOCUMENT NO. N:\2150\142757_01 NPS-UDC Housing Capacity Advice\R001-NPSUDC Input Review-dwm.docx

DOCUMENT Development Expert Review of Feasibility Calculator Inputs

ISSUE AND REVISION RECORD

DATE OF ISSUE 10 April 2018

STATUS Client Issue 2

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HG PROJECT NO 2150-142757-01

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APPENDICES

Appendix 1	Feasibility Tool Inputs
Appendix 2	Case Study

1.0 DEVELOPMENT FEASIBILITY ASSESSMENT

The scope of this project was to complete an assessment of the Feasibility Tool inputs for the Housing Capacity Assessment of the Settlement Pattern Review project. In particular:

1. Review the inputs for the Financial Assumptions and Land Development Key Inputs & Outputs. Provide advice on whether they appear reasonable or rationale to vary the inputs.
2. Review the Land Development Civil Costs and provide timing and unit costs for each of the 29 Greenfield areas across the Christchurch, Waimakariri and Selwyn regions.
3. Review the Land Development Fees and Charges and provide timing and unit costs for each of the 29 Greenfield areas across the Christchurch, Waimakariri and Selwyn regions.
4. Review the inputs for the Building Development Model. Provide advice on factors that may affect the inputs, where appropriate.

A populated Feasibility Tool was provided for this assessment together with publicly available Greenfield area Outline Plans and supporting information.

Our Feasibility Tool inputs are tabulated in Appendix 1.

2.0 METHODOLOGY

2.2 SCOPE ITEMS 1-3. FINANCIAL ASSUMPTIONS, CIVIL COSTS, FEES & CHARGES

The methodology used to establish the cost inputs for the Land Development Civil Works and Fees and Charges is as follows:

1. Actual civil works costs, fees and charges were compiled from a selection of recent Greenfield land development projects in the Greater Christchurch area.
2. Scheduled cost items were collated to align with the cost input categories used in the Feasibility Tool
3. Each cost item was converted to the same units used in the Feasibility Tool
4. Lower and upper limits were established for each cost input. These cost ranges address the sensitivity component of the project.
5. Opportunities and constraints were identified for each of the 29 Greenfield areas, based on a desktop assessment of publicly available information and our land development experience in Canterbury. No detailed site analysis or site investigations were undertaken as part of this process.
6. Cost input rates were estimated/rated for each Greenfield site based on analysis of the opportunities and constraints associated with each Greenfield site. A sliding scale was used to establish estimated input rates, based on a rating from 1 to 10 (1 being a low relative development cost and 10 a high relative development cost).

7. A quality assurance check was carried out by comparing estimates across a selection of the Greenfield sites with our actual costs from recent Greenfield land developments.

Site specific opportunities and constraints were identified using:

- Current aerial imagery was used to establish the potential scale and extent of site clearance and to identify potential site specific issues
- Potential ground conditions (including potential Technical Categories) were drawn from the CERA Residential Technical Category classifications/maps
- Council Service Plans were used to assess infrastructure upgrade requirements
- Notes provided by Council engineers were used to assess infrastructure capacity and potential connection locations
- Council funding information (fees and development contributions) were sourced from Council information
- Local utility providers for electricity and telecommunications were consulted for their typical connection fees
- Other costs or rates were estimated based on our land development experience and/or publicly available cost information.
- Explanatory notes accompanying District Plan ODP documentation

2.3 BUILDING DEVELOPMENT MODEL

Review and advice on the Financial Assumptions and Building Development Model inputs were principally based on our land development experience and understanding of the land development process and timing of costs.

3.0 FINANCIAL ASSUMPTIONS

From a land development consultant perspective, the financial assumption inputs are considered reasonable for Canterbury.

We note that we are not financial advisors. For more in-depth analysis and financial advice we would recommend seeking advice from registered or authorised financial advisors.

The feasibility calculator provided did not include a description of costs to be captured within each of the cost inputs. Decisions were made based on our opinion of best practice and what is suitable for this financial analysis. Included in section 4 below is an explanation of what is included in each cost input.

4.0 LAND DEVELOPMENT MODEL INPUTS

4.2 KEY INPUTS AND OUTPUTS (LD)

We understand that these inputs are to be reviewed by other specialists including Quantity Surveyors, Registered Valuers and Real Estate agents.

We have considered the inputs for road, landscape and stormwater reserve areas. In our experience the road reserves typically comprise 20-25% of the gross site area, depending on the density of development, and that the stormwater reserves commonly comprise 10-12% of the gross site area.

4.3 CIVIL WORKS INPUTS

In Canterbury it is common for a number of cost items to fall within a Preliminary & General category. These items include insurances, site establishment etc. The Feasibility Calculator spreadsheet does not currently include a Preliminary & General cost item and so we have proportionally distributed this cost to other cost inputs.

4.3.4 TIMING INPUTS

The timing inputs are considered generally appropriate for typical Greenfield development in the Canterbury region, based on development process including design, construction and sales periods.

4.3.5 SUBDIVISION COSTS

The scope of this input was unclear. We decided to ignore this input and include all the civil works costs in the other inputs. We recommend this line item is removed.

4.3.6 EXISTING LAND CLEARANCE

This cost item covers all physical site works required in preparation for earthworks, servicing and access works to commence.

Includes but is not limited to:

- Removal of vegetation
- Building demolition/removal
- Removal of unwanted material

Units:

Agreed the appropriate unit is per ha of raw land

The cost range for existing land clearance is broad. This is in recognition of the variable condition of each site prior to development. The existing condition of each site ranges from large vacant paddocks with minimal infrastructure to sites with multiple lifestyle dwellings, shelterbelts, stream boundaries, hardstand areas, implement buildings and other agricultural infrastructure.

Rating Scale and Factors (1-10):

1. Open pasture, clear fields. Maybe a few fences and a couple of trees
5. Dwellings/sheds/trees, typical farm and improvements
10. Numerous dwellings/buildings, significant vegetation, water race (divert)

Sensitivity Range:

Lower Limit: \$5,000 per ha of raw land

Upper Limit: \$25,000 per ha of raw land

4.3.7 EARTHWORKS & SITE PREPARATION (EARTHWORKS)

The ODP Greenfield sites are typically flat with minor bulk earthworks being required to achieve desired overland flow paths. The excavation of road corridors and stormwater basins down to subgrade level or excavation of poor soils typically form a large portion of the earthworks component.

The cost range adopted for the earthworks costs principally recognise the variable nature of the soils across the Greater Christchurch region, the assumed Technical Category (TC) rating, risk of contaminated soils and the effects of groundwater (particularly high groundwater) on bulk earthworks.

Includes but not limited to:

- Bulk earthworks
- Road corridor excavation
- Contamination remediation
- Re-spread topsoil
- Ground improvement

Units:

Agreed the appropriate unit m³ of raw land moved.

Rating Scale and Factors (1-10):

1. Minor shaping, no significant fill
3. Simple silts/gravels
5. Clays, Wet
7. Significant level of earthworks required
10. Significant ground improvements/walls/filling gullies/contamination remediation

Sensitivity Range:

Lower Limit: \$10 per m³ of raw land moved; 1000m³ per ha

Upper Limit: \$35 per m³ of raw land moved; 12,000m³ per ha

4.3.8 ROADING (ROADING & STORMWATER)

We note that there was no specific stormwater drainage item in the calculator. Roading and stormwater are closely aligned due to roads functioning as stormwater catchment and drainage features (kerb and channels) and include stormwater piped drainage. It is recommended that the name of this item is changed to "Roading & Stormwater"

Includes but not limited to:

- Lay and compact foundation metals
- Road surface
- Kerb and Channel
- Footpath
- Common Services/utilities (includes design and installation of telecommunications and electrical reticulation)
- Street trees (design and installation)
- Stormwater collection structures and pipes (but excludes major stormwater attenuation and treatment structures, i.e. lower catchment stormwater basins).

Units:

We agree that the appropriate unit is per m² road reserve.

We note that the calculator specifies 20% of a site is required for road reserve (Key Inputs & Outputs (LD) cell E10). This value could be increased to 25% where developments include some roads fronting parks or esplanade reserves.

The cost range for Roading & Stormwater recognises external road upgrading, potential for unsuitable materials and the effects of groundwater on road construction costs.

Rating Scale and Factors (1-10):

1. Good ground (Rolleston), internal roads only, and stormwater to soakage
5. Average ground conditions, standard roading constraints/issues
10. Bad ground materials, one sided street frontages, upgrade existing, big stormwater pipes, high water table.

Sensitivity Range:

Lower Limit: \$100 per m² road reserve

Upper Limit: \$250 per m² road reserve

4.3.9 WATER SUPPLY

Water supply typically includes:

- 1 x watermain. In carriageway for CCC, in berm for SDC & WDC
- 2 x rider mains along legal boundaries with CCC, 1 x rider main within SDC & WDC
- Hydrants, valves, meters, thrust blocks etc.

Units:

We agree the appropriate unit is per lineal metre of pipe.

The cost range for water supply recognises some Greenfield areas will require large trunk water mains constructed through them and external trunk water mains where the Council has indicated it must be a developer cost.

Rating Scale and Factors (1-10):

1. 1 x main with connections only
4. One sided rider main (WDS/SDC), minimum main size 100mm diameter
5. "Typical" site with minimum main size 150mm diameter and two submains
10. New bores required, trunk main to reservoir upgrades

Sensitivity Range:

Lower Limit: \$100 per lineal m of pipe, 300m pipe per ha

Upper Limit: \$250 per lineal m of pipe, 700m pipe per ha

4.3.10 WASTEWATER

Wastewater typically includes:

- 1 x gravity main located within the road carriageway
- Manholes
- Private laterals to each private allotment
- Lift station or pump station as necessary
- Cleaning and testing
- CCTV inspection

In recent times the option of a low pressure sewer system is gathering momentum. This option carries a low cost for mains installation. The purchaser of the residential sections is required to install a wastewater pump with ongoing maintenance required by either council or homeowner.

Units:

We agree the appropriate unit is per lineal metre of pipe

The wastewater cost range is principally influenced by the effects of groundwater and soft soils on wastewater infrastructure construction costs and the need for lift/pump stations. We have allowed for local lift stations within sites but generally assumed off-site major infrastructure such as pump stations will be funded through development contributions. Several sites also require new trunk mains laid between the site and the existing Council network.

Rating Scale and Factors (1-10):

1. Low pressure pipes sewer systems (LPPSS)
4. Minimum 150mm diameter gravity main, good ground
5. Minimum 150mm diameter gravity main, high ground water (typical developments)
6. Minimum 150mm diameter gravity main, good ground, pumps, odour control
7. Poor ground, trench s/g improvement
10. High ground water, pump stations, offsite link, stream or bridge crossing, high density housing

Sensitivity Range:

Lower Limit: \$150 per lineal m of pipe; 200m pipe per ha

Upper Limit: \$900 per lineal m of pipe; 600m pipe per ha

4.3.11 LANDSCAPE & STORMWATER RESERVES (LANDSCAPING)

We recommend this cost input is removed. The scope of this input was unclear.

- Landscape street trees are incorporated into the roading cost.
- Stormwater reserves are covered by development contributions. A credit is given where the development includes a reserve/basin. We understand this credit cover landscaping of the utility reserve.

4.3.12 CIVIL WORKS CONTINGENCY

We would typically recommend a civil works contingency of 5-15% depending on the complexity of the development and the ground conditions. However, we recognise that the unit costings being applied in the Feasibility Tool are not based on any specific designs for each Greenfield area and accordingly, we consider the proposed 25% contingency factor is appropriate for the purposes of the Feasibility Tool.

4.4 FEES & CHARGES INPUTS

The timing inputs are considered generally appropriate for typical Greenfield developments in the Canterbury region, based on the development process including consent, design, construction and sales periods.

Table 1 below provides commentary on the sources and factors considered when assessing the unit cost inputs.

ITEM	COMMENT	UNIT
Resource Consent Fees	<p>Lower Limit: \$500 Upper Limit: \$1,000</p> <p>Sourced from Council Fees and Charges information and records of actual final fees charged. The rating for this input closely aligns with the rating of Consultant Fees. The exception to this being WDC and SDC have generally lower consent fees than CCC.</p> <p>Rating scale and factors:</p> <p>1 – minor planning matters required to be addressed</p> <p>10 – waterways, cultural heritage items, protected trees, contamination, odour.</p>	Per lot
Council Development and Financial Contributions	Sourced from current Council Development Contribution Policies	Per lot
Legal	<p>The Feasibility Tool includes two "Legal" inputs with the second one being combined with accounting and surveying. Each of the inputs in the calculator were set at 2% of sales price.</p> <p>It is not clear what costs each legal input covers.</p> <p>Based on our experience, the combined 4% rate is considered more than enough. Therefore each of the legal inputs can remain at 2% of sales price.</p> <p>For more detailed assessment we would recommend consulting the local Law Society.</p>	% of sale price
Water Connection	Connection to networks are installed and paid for within civil works. No further fees are required upon dwelling construction and connection.	Per dwelling
Sewerage Connection		Per dwelling
Stormwater Connection		Per dwelling
Electricity Connection	We confirm that no connection fees apply at subdivision stage.	Per dwelling
Telecommunications Connection	We confirm that no connection fee applies at subdivision stage. (currently government funded)	Per dwelling

Gas Connection	Reticulation not typically provided in Canterbury, so we have not allowed for any Gas costings in our assessments.	Per dwelling
Site/Project Management	<p>Lower Limit: 3% Upper Limit: 5%</p> <p>We have proposed a range based on our experience with development companies often engaging internal or external development managers for greenfield land developments.</p> <p>There is no way to accurately estimate the level of project management due to the large number of variables. We therefore recommend utilising the mean value of 4% of Civil Costs</p>	% of Civil Costs
Consultant Fees	<p>Lower Limit: 6% Upper Limit: 12%</p> <p>Includes:</p> <ul style="list-style-type: none"> • Planning - City Council Consent applications • Planning - Regional Council Consent applications • Land Surveying • Land Development Engineering Design • Stormwater Catchment Modelling • Contract Management & Construction Completion • Geotechnical Engineering • Ecologist • Iwi Consultation • Landscaping <p>Rating scale and factors: 1 – good ground, low water table, clear site 10 – waterways, cultural heritage items, protected trees, contamination, odour, service upgrades</p>	% of Civil Costs
Legal, Accounting & Surveying	<p>Refer to Legal input above.</p> <p>We have assumed Surveying is excluded from this input, as it is captured in the Consultant Fees input. This input may be referring to Quantity Surveying?</p>	% of sale price

Sales and Marketing	Based on our knowledge of advertised residential Real Estate agent commission rates, we consider the 3% rate is appropriate. For more detailed assessment we would recommend consulting the local Real Estate Institute.	% of sale price
Fees and charges costs contingency	Lower Limit: 10% Upper Limit: 20% Our cost contingency range is based on the potential for unknown or additional costs to be incurred, generally due to potential for unknown groundcondition complications and/or the effects of groundwater on land development. We believe that this input variation is closely aligned with the Consultant Fee and Consent Fee. The same rating has been used for all three of these inputs.	No unit noted. We assume this is a % of the Fees & Charges Total

5.0 BUILDING DEVELOPMENT MODEL INPUTS

5.2 KEY INPUTS AND OUTPUTS (BD)

We understand that these inputs are to be provided by others, including building development specialists.

5.3 SITE PREPARATION

We note that all residential sites in a Greenfield area are developed to achieve Technical Category 2 as a minimum, with the following Greenfield areas likely to achieve TC1:

- Hawthornden Road
- Riccarton Park
- South Masham
- Yaldhurst
- All Rolleston township Greenfield areas

The TC category achieved through the Greenfield land development process will influence the cost inputs for site preparation as part of the building development process.

5.4 CONSTRUCTION

The same cost input considerations identified for Site Preparation above will also apply to Site Prep Costs in the Construction table.

5.5 ANCILLARY

We have adopted the convention that the development contributions are fully accounted for in the land development process. Accordingly, there should be no development contributions payable in the building development process.

6.0 CASE STUDIES

Refer Appendix 2 for summary table of actual civil costs and fees or charges for a selection of recent Greenfield area land developments.

7.0 LIMITATIONS

7.2 GENERAL

This report is for the use by Greater Christchurch Partnership only, and should not be used or relied upon by any other person or entity or for any other project.

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

7.3 ESTIMATES

This report contains potential estimates for future works or services, physical or consulting, those estimates can only be considered appropriate for the purposes of this report and only reflect the limited extent to which the detail of each Greenfield area is known to the consultant (pre-feasibility) at the time given.

The client is solely responsible for obtaining updated estimates from the consultant as the detail of the project evolves and/or as time elapses.

APPENDIX 1 FEASIBILITY TOOL INPUTS

National Policy Statement Urban Development Capacity

Feasibility Calculator - Development Expert Inputs
HG Job # 2150-142757-01
Date 10/04/2018

	Item	Unit	Timing	Sensitivity Range		Awatea		East Belfast		Hawthornden Road		Hendersons	
				Lower Limit	Upper Limit	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha
Civil Works Cost Input	Subdivision costs	per new lot	10%	?	?	?		?		?		?	
	Existing Land Clearance	per ha raw land	10%	\$5,000	\$25,000	\$17,000		\$9,000		\$9,000		\$11,000	
	Earthworks & Site Preparation	per m3 raw land moved	10%	\$10	\$35	\$28	7500	\$33	8500	\$18	5000	\$28	8000
	Roading	per m2 road res	25%	\$100	\$250	\$190		\$220		\$175		\$205	
	Water supply	per lin m of pipe	25%	\$100	\$250	\$190	400	\$175	400	\$175	400	\$175	400
	Wastewater	per lin m of pipe	25%	\$150	\$900	\$750	300	\$750	300	\$450	300	\$750	300
	Landscaping	per lin m of road	50%			\$0		\$0		\$0		\$0	
	Civil works contingency	% of civil costs	50%	5%	15%	25%		25%		25%		25%	
	Resource Consent Fees	per dwelling	10%	\$500	\$1,000	\$800		\$1,000		\$750		\$850	
	Council Development and Financial Contributions	per dwelling	50%	N/A	N/A	\$36,467		\$39,170		\$32,267		\$34,226	
Fees & Charges Inputs	Legal - Real Estate Agent	% of sales price	50%	2%	2%	2%		2%		2%		2%	
	Electricity Connection	per dwelling	50%	N/A	N/A	N/A		N/A		N/A		N/A	
	Telecoms Connection	per dwelling	50%	N/A	N/A	N/A		N/A		N/A		N/A	
	Gas Connection	per dwelling	50%	N/A	N/A	N/A		N/A		N/A		N/A	
	Site/Project Management	% of Civil Costs	50%	3%	5%	4%		4%		4%		4%	
	Consultant Fees	% of Civil Costs	10%	6%	12%	10%		12%		8%		10%	
	Accounting, Quantity Surveying?	% of sales price	60%	2%	2%	2%		2%		2%		2%	
	Sales and Marketing	% of sales price	75%	3%	3%	3%		3%		3%		3%	
	Fees and charges costs contingency	% of Total Fees and Charges	75%	10%	20%	16%		20%		13%		17%	

National Policy Statement Urban Development Capacity

Feasibility Calculator - Development Expert Inputs
HG Job # 2150-142757-01
Date 18/01/2018

	Item	Unit	Highfield Park (North)		Highfield Park (South)		North Halswell		North West Belfast		Riccarton Park		South East Belfast	
			Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha
Civil Works Cost Input	Subdivision costs	per new lot	?		?		?		?		?		?	
	Existing Land Clearance	per ha raw land	\$17,000		\$17,000		\$9,000		\$11,000		\$9,000		\$13,000	
	Earthworks & Site Preparation	per m3 raw land moved	\$25	10000	\$25	7000	\$25	8000	\$30	10000	\$18	6000	\$25	8000
	Roading	per m2 road res	\$205		\$205		\$190		\$190		\$205		\$205	
	Water supply	per lin m of pipe	\$175	400	\$175	400	\$190	400	\$175	400	\$190	400	\$175	400
	Wastewater	per lin m of pipe	\$375	300	\$600	300	\$300	300	\$600	300	\$600	300	\$750	300
	Landscaping	per lin m of road	\$0		\$0		\$0		\$0		\$0		\$0	
	Civil works contingency	% of civil costs	25%		25%		25%		25%		25%		25%	
	Resource Consent Fees	per dwelling	\$850		\$800		\$800		\$850		\$900		\$900	
	Council Development and Financial Contributions	per dwelling	\$39,170		\$39,170		\$34,226		\$31,755		\$34,226		\$39,170	
Fees & Charges Inputs	Legal - Real Estate Agent	% of sales price	2%		2%		2%		2%		2%		2%	
	Electricity Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
	Telecoms Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
	Gas Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
	Site/Project Management	% of Civil Costs	4%		4%		4%		4%		4%		4%	
	Consultant Fees	% of Civil Costs	10%		10%		10%		10%		11%		11%	
	Accounting, Quantity Surveying?	% of sales price	2%		2%		2%		2%		2%		2%	
	Sales and Marketing	% of sales price	3%		3%		3%		3%		3%		3%	
	Fees and charges costs contingency	% of Total Fees and Charges	17%		16%		16%		17%		18%		18%	

**National Policy Statement Urban
Development Capacity**

Feasibility Calculator - Development Expert Inputs
HG Job # 2150-142757-01
Date 18/01/2018

Item	Unit	South East Halswell		South Halswell		South Masham		South West Halswell		Upper Styx		Yaldhurst		Cranford Basin	
		Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha
Civil Works Cost Input															
Subdivision costs	per new lot	?		?		?		?		?		?		?	
Existing Land Clearance	per ha raw land	\$17,000		\$13,000		\$7,000		\$9,000		\$19,000		\$21,000		\$19,000	
Earthworks & Site Preparation	per m3 raw land moved	\$28	8000	\$28	8000	\$18	5000	\$25	6000	\$28	8000	\$20	6000	\$30	10000
Roading	per m2 road res	\$220		\$220		\$160		\$190		\$220		\$160		\$205	
Water supply	per lin m of pipe	\$175	400	\$175	400	\$175	400	\$175	400	\$175	400	\$175	400	\$175	400
Wastewater	per lin m of pipe	\$300	300	\$300	300	\$450	300	\$300	300	\$300	300	\$450	300	\$825	300
Landscaping	per lin m of road	\$0		\$0		\$0		\$0		\$0		\$0		\$0	
Civil works contingency	% of civil costs	25%		25%		25%		25%		25%		25%		25%	
Resource Consent Fees	per dwelling	\$850		\$850		\$800		\$800		\$850		\$850		\$950	
Council Development and Financial Contributions	per dwelling	\$34,226		\$36,467		\$34,226		\$36,467		\$39,170		\$34,226		\$22,098	
Legal - Real Estate Agent	% of sales price	2%		2%		2%		2%		2%		2%		2%	
Electricity Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Telecoms Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Gas Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Site/Project Management	% of Civil Costs	4%		4%		4%		4%		4%		4%		4%	
Consultant Fees	% of Civil Costs	10%		10%		9%		10%		10%		10%		11%	
Accounting, Quantity Surveying?	% of sales price	2%		2%		2%		2%		2%		2%		2%	
Sales and Marketing	% of sales price	3%		3%		3%		3%		3%		3%		3%	
Fees and charges costs contingency	% of Total Fees and Charges	17%		17%		15%		16%		17%		17%		19%	

**National Policy Statement Urban
Development Capacity**

Feasibility Calculator - Development Expert Inputs
HG Job # 2150-142757-01
Date 18/01/2018

Item	Unit	Rolleston ODP4		Rolleston ODP10		Rolleston ODP13		Rolleston ODP39 Holmes Block		Rolleston ODP40 Skellerup Block		Lincoln ODP1 Lincoln Land Development	
		Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha
Civil Works Cost Input													
Subdivision costs	per new lot	?		?		?		?		?		?	
Existing Land Clearance	per ha raw land	\$15,000		\$21,000		\$21,000		\$7,000		\$9,000		\$9,000	
Earthworks & Site Preparation	per m3 raw land moved	\$15	3000	\$18	5000	\$18	5000	\$15	1000	\$15	1000	\$23	10000
Roading	per m2 road res	\$145		\$160		\$160		\$115		\$115		\$175	
Water supply	per lin m of pipe	\$190	300	\$160	300	\$160	300	\$160	300	\$160	300	\$160	300
Wastewater	per lin m of pipe	\$450	250	\$450	250	\$450	250	\$450	250	\$450	250	\$675	250
Landscaping	per lin m of road	\$0		\$0		\$0		\$0		\$0		\$0	
Civil works contingency	% of civil costs	25%		25%		25%		25%		25%		25%	
Resource Consent Fees	per dwelling	\$600		\$650		\$650		\$650		\$600		\$700	
Council Development and Financial Contributions	per dwelling	\$30,715		\$30,715		\$30,715		\$30,715		\$30,715		\$35,625	
Legal - Real Estate Agent	% of sales price	2%		2%		2%		2%		2%		2%	
Electricity Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
Telecoms Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
Gas Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A	
Site/Project Management	% of Civil Costs	4%		4%		4%		4%		4%		4%	
Consultant Fees	% of Civil Costs	7%		8%		8%		8%		7%		10%	
Accounting, Quantity Surveying?	% of sales price	2%		2%		2%		2%		2%		2%	
Sales and Marketing	% of sales price	3%		3%		3%		3%		3%		3%	
Fees and charges costs contingency	% of Total Fees and Charges	12%		13%		13%		13%		12%		16%	

National Policy Statement Urban Development Capacity

Feasibility Calculator - Development Expert Inputs
HG Job # 2150-142757-01
Date 18/01/2018

Item	Unit	Lincoln ODP5 Denwood Trustees		Lincoln ODP6 Vegie Block		Lincoln ODP7 Te Whariki Neighbourhood Centre		Lincoln ODP8 Denwood Trustees		Prebbleton ODP4		Tai Tapu ODP48 Crofts and Williams		Rangiora West	
		Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha	Unit Cost	Rates / ha
Civil Works Cost Input															
Subdivision costs	per new lot	?		?		?		?		?		?		?	
Existing Land Clearance	per ha raw land	\$11,000		\$9,000		\$9,000		\$7,000		\$13,000		\$7,000		\$15,000	
Earthworks & Site Preparation	per m3 raw land moved	\$23	7500	\$13	500	\$18	5000	\$23	7500	\$20	4000	\$20	5000	\$23	7500
Roading	per m2 road res	\$175		\$100		\$205		\$175		\$175		\$175		\$205	
Water supply	per lin m of pipe	\$175	300	\$115	300	\$160	300	\$160	300	\$160	300	\$160	300	\$160	300
Wastewater	per lin m of pipe	\$675	250	\$300	250	\$450	250	\$600	250	\$600	250	\$675	250	\$600	250
Landscaping	per lin m of road	\$0		\$0		\$0		\$0		\$0		\$0		\$0	
Civil works contingency	% of civil costs	25%		25%		25%		25%		25%		25%		25%	
Resource Consent Fees	per dwelling	\$700		\$650		\$750		\$700		\$700		\$700		\$750	
Council Development and Financial Contributions	per dwelling	\$35,625		\$35,625		\$35,625		\$35,625		\$30,671		\$29,425		\$20,957	
Legal - Real Estate Agent	% of sales price	2%		2%		2%		2%		2%		2%		2%	
Electricity Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Telecoms Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Gas Connection	per dwelling	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Site/Project Management	% of Civil Costs	4%		4%		4%		4%		4%		4%		4%	
Consultant Fees	% of Civil Costs	9%		8%		10%		9%		10%		10%		10%	
Accounting, Quantity Surveying?	% of sales price	2%		2%		2%		2%		2%		2%		2%	
Sales and Marketing	% of sales price	3%		3%		3%		3%		3%		3%		3%	
Fees and charges costs contingency	% of Total Fees and Charges	15%		13%		16%		15%		17%		17%		16%	

APPENDIX 2 CASE STUDY

National Policy Urban Design Development Capacity

Sensitivity Limits & Case Study Summary
HG Job # 2150-142757-01



Item	Unit	Sensitivity Limits				Site 1		Site 2		Site 3		Site 4	
		Lower	Upper	Lower rate/ha	Upper rate/ha	Unit Cost	Rates / ha						
Subdivision costs	?			N/A	N/A	?		?		?		?	
Existing Land Clearance	per ha raw land	\$5,000	\$25,000	N/A	N/A	\$9,500		\$3,800		\$5,500		\$16,000	
Earthworks & Site Preparation	per m3 raw land moved	\$10	\$35	1,000	12,000	\$19	10000	N/A	N/A	\$29	5900	\$13	750
Roading	per m2 road res	\$100	\$250			\$245		\$148		\$121		\$65	
Water supply	per lin m of pipe	\$100	\$250	300	700	\$231	620	\$226	360	\$125	300	\$105	205
Wastewater	per lin m of pipe	\$150	\$900	200	600	\$950	530	\$630	260	\$125	250	\$315	150
Landscaping	?	-	-										
Civil works contingency	% of civil costs	5	15			7.5%		7.5%		15.0%		10.0%	
Resource Consent Fees	per dwelling	\$500	\$1,000										
Council Development and Financial Contributions	per dwelling	N/A	N/A			\$36,467		\$39,170		\$32,267		\$34,226	
Legal - Real Estate Agent	% of sales price	-	-			?		?		?		?	
Electricity Connection	per dwelling	N/A	N/A			N/A		N/A		N/A		N/A	
Telecoms Connection	per dwelling	N/A	N/A			N/A		N/A		N/A		N/A	
Gas Connection	per dwelling	N/A	N/A			N/A		N/A		N/A		N/A	
Site/Project Management	% of Civil Costs	3%	5%			?		?		?		?	
Consultant Fees	% of Civil Costs	6%	12%			9%		13%		10%		5%	
Accounting	% of sales price	-	-			?		?		?		?	
Sales and Marketing	% of sales price	-	-			?		?		?		?	
Fees and charges costs contingency	% of Total Fees and Charges	10%	20%			?		?		?		?	

Case Study No. and description	Description of major development considerations
Site 1 - Stage 1 of a multi-stage development	<ul style="list-style-type: none"> - 64 Residential Lots - Natural stream running through the site - Contamination remediation matters to address - Iwi consultation required, archaeological find during construction - High water table, SW basins included in build with high level of dewatering needed - Large portion of trunk watermain needed for connection to network and to future proof reticulation in the area - Wastewater lift station required - offsite gravity connection needed to several hundred metres away - Long portion of road only servicing roads on one side, provides open stream corridor - Road upgrade to existing adjacent metal road
Site 2 - Stage 2 of Site 1 development	<ul style="list-style-type: none"> - 45 Residential Lots - High water table - Natural stream running through the site requiring a new culvert/bridge - Contamination remediation matters to address
Site 3 - Multi Stage Residential development	<ul style="list-style-type: none"> - 197 Residential Lots - Construction contract is for all 197 Lots, Title Survey divided into 5 Stages - Low pressure sewer system
Site 4 - Residential development in Selwyn	<ul style="list-style-type: none"> - 55 Residential lots - Diversion and piping of water race included in site clearance - Stormwater was direct connection to new soak holes - Wastewater was standard gravity network with connection at site boundary - Water reticulation was standard pipe network with connection at adjacent road - Low level of earthworks required - Some water race stabilisation needed

Appendix 7 — Estimated development costs, individual site (building) development

CCC: NPS Development Feasibility Calculator
Building Development Inputs

Item	Model	Category / Section	Description	Unit	Rate						Timing	Comments and Notes
					Detached	Duplex	Terrace	2-3 Storey	4-7 Storey	8-12 Storey		
26a	Building Development	Site Preparation	Site / Civil / Landscaping	m2	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	10%	
26b	Building Development	Site Preparation	Demolition of existing building(s)	m2 of existing building	\$ 110	\$ 110	\$ 110	\$ 110	\$ 110	\$ 110	10%	New item added
27	Building Development	Site Preparation	Preparation contingency	%	25%	25%	25%	25%	25%	25%	10%	To be discussed. As noted above, costs are minimal so this percentage has little impact.
28a	Building Development	Construction	TC1 - Site prep costs - below slab, piling etc	\$/m2	\$ 210	\$ 210	\$ 210	\$ 260	\$ 570	\$ 290	25%	Refer detailed breakdown.
28b	Building Development	Construction	TC2 - Site prep costs - below slab, piling etc	\$/m2	\$ 390	\$ 390	\$ 390	\$ 450	\$ 630	\$ 310	25%	Refer detailed breakdown.
28c	Building Development	Construction	TC3 - Site prep costs - below slab, piling etc	\$/m2	\$ 594	\$ 594	\$ 594	\$ 594	\$ 793	\$ 352	25%	Refer detailed breakdown.
29a	Building Development	Construction	Construction costs, ground floor and up** LOW SPECIFICATION	\$/m2	\$ 1,430	\$ 1,460	\$ 1,480	\$ 1,940	\$ 2,560	\$ 2,560	55%	Refer detailed breakdown.
29b	Building Development	Construction	Construction costs, ground floor and up** MEDIUM SPECIFICATION	\$/m2	\$ 1,700	\$ 1,760	\$ 1,740	\$ 2,240	\$ 2,940	\$ 3,160	55%	Refer detailed breakdown.
29c	Building Development	Construction	Construction costs, ground floor and up** HIGH SPECIFICATION	\$/m2	\$ 2,970	\$ 2,850	\$ 2,950	\$ 3,190	\$ 4,360	\$ 4,560	55%	Refer detailed breakdown.
30	Building Development	Construction	Driveway and parking area costs	\$/m2	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	\$ 100	70%	
31	Building Development	Construction	Build Cost Contingency	%	7%	8%	9%	10%	12%	15%	50%	Generally as original calculator, although suggest that the larger building should have a slightly higher contingency value.
32	Building Development	Ancillary	Resource Consent Fees	per dwelling	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	25%	Refer detailed breakdown.
33	Building Development	Ancillary	Building Consent Fees	per dwelling	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 12,580	\$ 12,580	25%	As CCC standard charges.
34	Building Development	Ancillary	Council Development Contribution	per dwelling	\$ 21,478	\$ 21,478	\$ 21,478	\$ 21,478	\$ 21,478	\$ 21,478	25%	Refer comment to item 32.
35	Building Development	Ancillary	Water Connection	per dwelling	\$ 670	\$ 670	\$ 670	\$ 670	\$ 670	\$ 670	50%	Ditto
36	Building Development	Ancillary	Sewerage Connection	per dwelling	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	50%	Ditto
37	Building Development	Ancillary	Stormwater Connection	per dwelling	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	50%	Ditto
38	Building Development	Ancillary	Electricity Connection	per dwelling	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	50%	Ditto
39	Building Development	Ancillary	Telecoms Connection	per dwelling	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	50%	Ditto
40	Building Development	Ancillary	Gas Connection	per dwelling	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	50%	Ditto
41	Building Development	Ancillary	Technical (RC Application etc)	% of cons. Costs	0.3%	0.4%	0.4%	0.3%	0.3%	0.3%	25%	Would expect for rates to be between 8-16%, with detached houses at the lower end and high rise buildings at the upper end. This broadly aligns with the overall allowances included within items 41-43.
42	Building Development	Ancillary	Design/Architect/Building Plans (BC appn)	% of cons. Costs	5.0%	6.0%	10.0%	10.0%	12.0%	12.0%	75%	See comment above.
43	Building Development	Ancillary	Site/Project Management	% of cons. Costs	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	50%	See comment above.
44	Building Development	Ancillary	Sales and Marketing	% of sales price	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	60%	Rate appears suitable, although may be a double-up depending upon how the calculators are to be used.
45	Building Development	Ancillary	Legal, Accounting, Surveying	% of sales price	0.2%	0.4%	1.5%	1.5%	1.5%	1.5%	60%	Rate appears suitable, although may be a double-up depending upon how the calculators are to be used.
46	Building Development	Ancillary	Ancillary costs contingency		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	50%	Suggest a flat rate of 5%

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
5	Existing land clearance												
a	Generally WTP1 allow between \$0.25 to \$0.50/m2 for greenfield site clearance												
b	Brownfield site clearance												
6	Earthworks and site preparation												
	0-300mm Raising of Site Levels					0.1	per Ha	\$ 94,000	\$ 9,320				
a	Strip topsoil to stockpile; average 200mm thick	2,000	m3	\$ 7	14,043								
b	Imported fill to raise levels	1,000	m3	\$ 55	54,918								
c	Spread topsoil; 200mm thick	2,000	m3	\$ 7	14,043								
d	Hydroseed	10,000	m2	\$ 1	9,133								
e	Geogrid to perimeter slope												
	300-600mm Raising of Site Levels					0.5	per Ha	\$ 295,000	\$ 29,479				
k	Strip topsoil to stockpile; average 200mm thick	2,000	m3	\$ 7	14,043								
l	Imported fill to raise levels	3,000	m3	\$ 49	244,080								
m	Spread topsoil; 200mm thick	2,000	m3	\$ 7	14,043								
n	Hydroseed	10,000	m2	\$ 1	9,133								
o	Geogrid to perimeter slope	664	m2	\$ 18	12,157								
	600-900mm Raising of Site Levels					0.8	per Ha	\$ 448,000	\$ 44,726				
p	Strip topsoil to stockpile; average 200mm thick	2,000	m3	\$ 7	14,043								
q	Imported fill to raise levels	8,000	m3	\$ 49	390,528								
r	Spread topsoil; 200mm thick	2,000	m3	\$ 7	14,043								
s	Hydroseed	10,000	m2	\$ 1	9,133								
t	Geogrid to perimeter slope	996	m2	\$ 18	18,233								
	900-1200mm Raising of Site Levels					1.1	per Ha	\$ 600,000	\$ 59,732				
u	Strip topsoil to stockpile; average 200mm thick	2,000	m3	\$ 7	14,043								
v	Imported fill to raise levels	11,000	m3	\$ 49	536,978								
w	Spread topsoil; 200mm thick	2,000	m3	\$ 7	14,043								
x	Hydroseed	10,000	m2	\$ 1	9,133								
y	Geogrid to perimeter slope	1,328	m2	\$ 18	24,313								
7	Roading					12.0	per m2 road res	\$ 200	\$ 2,390				
	Cost based upon road reserve as follows:												
	Carriageway - 6m												
	Footway - 2m either side												
	Berm - 1m each side												
	Kerb and Channel - both sides												
	Tree pit - every 20m one side												
	Lighting - pole every 20m												
	Carriageway	6	m2	\$ 345	2,071								
a	Cut to fill	1.54	m3	\$ 18.3	28.2								
b	Geotextile layer	6.00	m2	\$ 5.5	33.0								
c	Sub-base: AP53; 150mm thick	0.90	m3	\$ 91.5	82.4								
d	Basecourse: AP40; 100mm thick	0.60	m3	\$ 103.7	62.2								
e	Asphalt; 40mm thick	6.00	m2	\$ 36.0	219.7								
f	Kerb; standard CCC concrete x&c	2.00	m	\$ 85.4	170.8								

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
g	Trench pit and tree					0.05	no	\$	010.2	\$		30.5	
h	Light pole and reticulation					0.05	no	\$	7,322.4	\$		366.1	
i	SW sumps					0.10	no	\$	2,135.7	\$		213.6	
j	SW line; 300mm dia; 0-1500 deep					1.00	m	\$	427.1	\$		427.1	
k	SW manhole; every 30m					0.03	no	\$	4,881.6	\$		162.7	
l	Shared service trench including ducts					1.00	m	\$	274.0	\$		274.0	
Footway													
						4	m2	\$	77	\$		308	
m	Cut to fill					0.03	m3	\$	18.3	\$		11.4	
n	Geotextile layer					4.00	m2	\$	5.5	\$		22.0	
o	Sub-base; AP20; 150mm thick					0.00	m3	\$	91.5	\$		54.9	
p	Asphalt; 25mm thick					4.00	m2	\$	30.5	\$		122.0	
q	Timber edge					2.00	m	\$	48.8	\$		97.0	
Berm													
						2	m2	\$	5	\$		11	
r	Cut to fill					0.33	m3	\$	18.3	\$		5.9	
s	Topsoil; 200mm; from onsite stockpile					0.40	m3	\$	7.3	\$		2.9	
t	Hydroseed					2.00	m2	\$	0.9	\$		1.8	
Water supply**													
						1	per lin m of pipe	\$	208	\$		208	
Trenching, not exceeding 1m deep													
a	Cut to stockpile					0.50	m3	\$	36.6	\$		18	
b	Backfill and bedding with AP20					0.15	m3	\$	146.4	\$		22	
c	Backfill with cut material					0.35	m3	\$	36.6	\$		13	
d	Disposal of surplus material					0.13	m3	\$	36.6	\$		5	
e	Allow for soft spots; over excavate 300mm and backfill with AP20					0.02	m3	\$	183.1	\$		3	
Pipe													
f	Supply and install 32mm dia PE pipe					30%	m	\$	42.7				
g	Supply and install 50mm dia PE pipe					35%	m	\$	01.0				
h	Supply and install 80mm dia PE pipe					20%	m	\$	91.5				
i	Supply and install 100mm dia PE pipe					10%	m	\$	115.9				
j	Supply and install 120mm dia PE pipe					5%	m	\$	134.2				
k	Average Rate					1	m	\$	71	\$		71	
Chambers and Valves													
l	Allow for valve and access chamber every 30m					0.03	no	\$	2,196.7	\$		73	
Testing and Commissioning													
	Allow for testing and commissioning					1	item	\$	3	\$		3	
Wastewater**													
						1	per lin m of pipe	\$	045	\$		045	
Trenching, average not exceeding 1500mm													
a	Cut to stockpile					1.80	m3	\$	36.6	\$		66	
b	Backfill and bedding with AP20					0.20	m3	\$	146.4	\$		29	
c	Backfill with cut material					1.20	m3	\$	36.6	\$		44	
d	Disposal of surplus material					0.00	m3	\$	36.6	\$		22	

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
e	Allow for soft spots; over excavate 300mm and backfill with AP20					0.06	m3	\$	183.1	\$		11	
f	Allow for trench shields					1.00	m	\$	73.2	\$		73	
g	Allow for dewatering					1.00	m	\$	66.7	\$		67	
Pipe													
h	Supply and install 125mm dia PE pipe					20%	m	\$	109.8				
i	Supply and install 150mm dia PE pipe					50%	m	\$	128.1				
j	Supply and install 200mm dia PE pipe					15%	m	\$	183.1				
k	Supply and install 300mm dia PE pipe					5%	m	\$	213.0				
l	Average Rate					1	m	\$	124	\$		112	
Manholes													
m	Allow for manhole every 30m					0.03	no	\$	4,881.6	\$		103	
10 Landscape & stormwater reserves													
						1	per m2 reserve	\$	54				
Assumed Reserve Area													
						10,000	m2	\$	54	\$		542,707	
Stormwater Treatment													
						20%							
a	Strip topsoil to stockpile; average 200mm thick					400	m3	\$	7.3	\$		2,929	
b	Cut to fill					2,400	m3	\$	18.3	\$		43,934	
c	Allow for inlet and outlet structures					2	no	\$	20,000	\$		40,000	
d	Allow for connection to pipework					1	item	\$	10,000	\$		10,000	
e	Topsoil; 200mm; from onsite stockpile					400	m3	\$	7.3	\$		2,929.0	
f	Hydroseed					1,700	m2	\$	0.9	\$		1,536.0	
g	Riparian planting					300	m2	\$	14.6	\$		4,393.4	
Reserve Area													
						80%							
h	Strip topsoil to stockpile; average 200mm thick					1,000	m3	\$	7.3	\$		11,716	
i	Cut to fill					2,400	m3	\$	18.3	\$		43,934	
j	Topsoil; 200mm; from onsite stockpile					1,000	m3	\$	7.3	\$		11,716	
k	Hydroseed					4,400	m2	\$	0.9	\$		4,027	
l	Shrub planting					2,400	m2	\$	29.3	\$		70,293	
m	Allow for trees					80	no	\$	549.2	\$		43,934	
n	Footpaths; asphalt with timber edging					1,200	m2	\$	81.4	\$		97,632	
o	Allow for street furniture					1	item	\$	26,848.8	\$		26,849	
p	Allow for lighting					1	item	\$	126,921.6	\$		126,922	
12 & 32 Resource Consent Fees													
									per dwelling	\$		790	
Consent Fees													
CCC Resource Management Fee Schedule 2013-2016													
a	0-10 lots								per dwelling	\$		775	
b	11-30 lots								per dwelling	\$		720	
c	31-50 lots								per dwelling	\$		670	
d	50+ lots								per dwelling	\$		620	
e	Average rate								per dwelling	\$		690	
Monitoring													
f	Monitoring programme administration fee					1	per consent	\$	98	\$		98	
g	Consent management fee					1	per consent	\$	98	\$		98	
h	Monitoring Fees Assume monthly					24	per dwelling / per visit	\$	112	\$		2,688	

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
1	Subtotal								\$ 2,884				
j	Say average of 30 dwellings per subdivision					30	per dwelling	\$ 96.13					
13	Council Development and Financial Contributions					1	per dwelling	\$ 21,478	\$ 21,478				
	Reserves												
a	Regional Parks					1	item	\$ 2,489	\$ 2,489				
b	Garden & Heritage Parks					1	item	\$ 169	\$ 169				
c	Sport Parks					1	item	\$ 2,320	\$ 2,320				
d	Neighbourhood Parks					1	item	\$ 1,862	\$ 1,862				
	Network infrastructure												
e	Water Supply					1	item	\$ 2,422	\$ 2,422				
f	Wastewater Collection					1	item	\$ 5,724	\$ 5,724				
g	Wastewater Treatment and Disposal					1	item	\$ 2,944	\$ 2,944				
h	Stormwater & Floor Protection					1	item	\$ 1,907	\$ 1,907				
i	Road Network					1	item	\$ 889	\$ 889				
j	Active Travel					1	item	\$ 326	\$ 326				
k	Public Transport					1	item	\$ 425	\$ 425				
15	Water Connection							per dwelling	\$ 670				
a	Water supply connection fee as CCC Fees - Water and Wastewater							per connection	\$ 670				
26a	Site / Civil / Landscaping					1	m2	\$ 26	\$ 26				
a	Strip topsoil and dispose off-site					0.2	m3	\$ 29.3	\$ 6				
b	Allow to landscape site					0.4	m2	\$ 50.0	\$ 20				
26b	Demolition of existing building(s)					1	m2 of existing building	\$ 110	\$ 110				
a	Demolish building including removal of slab and foundations					1.0	m2	\$ 110.0	\$ 110				
28a	TC1 - Site prep costs - below slab, piling etc							\$/m2					
	Technical Category 1												
	Detached House / Duplex / Terrace					1.0	m2	\$ 208	\$ 208				
a	Foundations					1.0	m2	\$ 208	\$ 208				
	2-3 Storey					1.0	m2	\$ 260	\$ 260				
b	Foundations					1.0	m2	\$ 260	\$ 260				
	4-7 Storey					1,000.0	m2	\$ 564	\$ 564,000				
c	Foundations					200.0	m2	\$ 320	\$ 64,000				
d	Basement: 1 level					200.0	m2	\$ 2,500.0	\$ 500,000				
	8-12 Storey					4,000.0	m2	\$ 285	\$ 1,138,000				
e	Foundations					400.0	m2	\$ 345	\$ 138,000				
f	Basement: 1 level					400.0	m2	\$ 2,500.0	\$ 1,000,000				
	Technical Category 2												

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
	Detached House / Duplex / Terrace					180.0	m2	\$ 389	\$ 70,000				
g	Foundations					180.0	m2	\$ 208	\$ 37,300				
h	Geotechnical fees / investigations					1.0	item	\$ 10,000	\$ 10,000				
i	Allow for enhancements to foundation (slab thickenings, etc)					180.0	m2	\$ 123	\$ 22,300				
2-3 Storey						180.0	m2	\$ 441	\$ 79,300				
j	Foundations					180.0	m2	\$ 260	\$ 46,800				
k	Geotechnical fees / investigations					1.0	item	\$ 10,000	\$ 10,000				
l	Allow for enhancements to foundation (slab thickenings, etc)					180.0	m2	\$ 123	\$ 22,300				
4-7 Storey						1,000.0	m2	\$ 624	\$ 624,000				
m	Foundations					200.0	m2	\$ 320	\$ 64,000				
n	Basement: 1 level					200.0	m2	\$ 2,500.0	\$ 500,000				
o	Geotechnical fees / investigations					1.0	item	\$ 20,000	\$ 20,000				
p	Allow for enhancements to foundation					200.0	m2	\$ 200	\$ 40,000				
8-12 Storey						4,000.0	m2	\$ 310	\$ 1,238,000				
q	Foundations					400.0	m2	\$ 345	\$ 138,000				
r	Basement: 1 level					400.0	m2	\$ 2,500.0	\$ 1,000,000				
s	Geotechnical fees / investigations					1.0	item	\$ 20,000	\$ 20,000				
t	Allow for enhancements to foundation					400.0	m2	\$ 200	\$ 80,000				
	Technical Category 3												
	Detached House / Duplex / Terrace & 2-3 Storey Options					150.0	m2	\$ 594	\$ 89,125				
	Ribraft or similar					150.0	m2	\$ 210					
	Raft foundation: reinforced aggregate densified raft					150.0	m2	\$ 250					
	Driven timber piles: 4m deep					150.0	m2	\$ 300					
	Stone Columns: 8m deep					150.0	m2	\$ 390					
u	Average improvement rate					150.0	m2	\$ 288	\$ 43,125				
v	Raised timber pile floor					150.0	m2	\$ 140	\$ 21,000				
w	Geotechnical design fees / investigations					1.0	item	\$ 25,000	\$ 25,000				
	4-7 Storey: Assume 3 storey building with 200m2 per storey, therefore 1,000m2 GFA					1,000.0	m2	\$ 793	\$ 792,750				
	Deep soil mixing: 10m deep					225.0	m2	\$ 1,200					
	Piled solution					200.0	m2	\$ 800					
	Screw piles					200.0	m2	\$ 250					
x	Average rate					225.0	m2	\$ 750	\$ 168,750				
y	Base cost (as TC1)					1,000.0	m2	\$ 624	\$ 624,000				
	8-12 Storey: Assume 3D storey building with 400m2 per storey, therefore 4,000m2 GFA					4,000.0	m2	\$ 352	\$ 1,406,750				
	Deep soil mixing: 10m deep					441.0	m2	\$ 1,200					
	Piled solution					400.0	m2	\$ 800					
	Screw piles					400.0	m2	\$ 250					
z	Average rate					225.0	m2	\$ 750	\$ 168,750				
aa	Base cost (as TC1)					4,000.0	m2	\$ 310	\$ 1,238,000				

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
29b	Construction costs ground floor up		\$/m2				\$/m2				\$/m2		
	Detached House	170.0	m2	\$ 1,426	\$ 242,500	200.0	m2	\$ 1,096	\$ 339,150	250.0	m2	\$ 2,962	\$ 740,500
a	House Cost	140.0	m2	\$ 1,550	\$ 217,000	170.0	m2	\$ 1,845	\$ 313,650	220.0	m2	\$ 3,250	\$ 715,000
b	Garage	30.0	m2	\$ 850	\$ 25,500	30.0	m2	\$ 850	\$ 25,500	30.0	m2	\$ 850	\$ 25,500
	Duplex	300.0	m2	\$ 1,454	\$ 523,500	300.0	m2	\$ 1,754	\$ 631,500	300.0	m2	\$ 2,850	\$ 1,026,000
a	House Cost	300.0	m2	\$ 1,575	\$ 472,500	300.0	m2	\$ 1,935	\$ 580,500	300.0	m2	\$ 3,250	\$ 975,000
b	Garage	60.0	m2	\$ 850	\$ 51,000	60.0	m2	\$ 850	\$ 51,000	60.0	m2	\$ 850	\$ 51,000
	Terrace	168.0	m2	\$ 1,475	\$ 247,800	168.0	m2	\$ 1,738	\$ 292,050	168.0	m2	\$ 2,948	\$ 495,300
a	House Cost	150.0	m2	\$ 1,550	\$ 232,500	150.0	m2	\$ 1,845	\$ 276,750	150.0	m2	\$ 3,200	\$ 480,000
b	Garage	18.0	m2	\$ 850	\$ 15,300	18.0	m2	\$ 850	\$ 15,300	18.0	m2	\$ 850	\$ 15,300
	2-3 Storey Apartments	178.0	m2	\$ 1,931	\$ 343,800	178.0	m2	\$ 2,237	\$ 398,200	178.0	m2	\$ 3,190	\$ 567,800
a	Base Building Cost	160.0	m2	\$ 2,000	\$ 320,000	160.0	m2	\$ 2,340	\$ 374,400	160.0	m2	\$ 3,400	\$ 544,000
b	Garage	18.0	m2	\$ 850	\$ 15,300	18.0	m2	\$ 850	\$ 15,300	18.0	m2	\$ 850	\$ 15,300
c	Balcony	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500
	4-7 Storey Apartments	160.0	m2	\$ 2,553	\$ 408,500	160.0	m2	\$ 2,933	\$ 469,300	160.0	m2	\$ 4,353	\$ 696,500
a	Base Building Cost	160.0	m2	\$ 2,500	\$ 400,000	160.0	m2	\$ 2,880	\$ 460,800	160.0	m2	\$ 4,300	\$ 688,000
b	Garage		m2		Excluded		m2		Excluded		m2		Excluded
c	Balcony	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500
	8-12 Storey Apartments	160.0	m2	\$ 2,553	\$ 408,500	160.0	m2	\$ 3,158	\$ 505,300	160.0	m2	\$ 4,553	\$ 728,500
a	Base Building Cost	160.0	m2	\$ 2,500	\$ 400,000	160.0	m2	\$ 3,105	\$ 496,800	160.0	m2	\$ 4,500	\$ 720,000
b	Garage		m2		Excluded		m2		Excluded		m2		Excluded
c	Balcony	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500	10.0	m2	\$ 850	\$ 8,500
30	Driveway and parking area costs					1	\$/m2	\$ 98	\$ 98				

CCC: NPS Development Feasibility Calculator
Rate Breakdown

Item	Description	Low Specification				Medium Specification				High Specification			
		Qty	Unit	Rate	Total	Qty	Unit	Rate	Total	Qty	Unit	Rate	Total
a	Cut to fill					0.28	m3	\$ 42.7	\$ 12.0				
b	Geotextile layer					1.00	m2	\$ 5.3	\$ 5.3				
c	Sub-base; AP05; 250mm thick					0.25	m3	\$ 91.5	\$ 22.9				
e	Asphalt; 30mm thick					1.00	m2	\$ 26.8	\$ 26.8				
f	Edge restraints					0.50	m	\$ 61.0	\$ 30.5				
33	Building Consent Fees												
	Low Rise Residential					1.0	per dwelling	\$ 4,000.0	\$ 4,000				
a	Deposit for Residential Applications					1.0	item	\$ 2,800.0	\$ 2,800				
b	Inspections					6.0	no	\$ 200.0	\$ 1,200				
	High Rise Residential					1.0	per dwelling	\$ 12,580.0	\$ 12,580				
a	Deposit for Residential Applications					1.0	item	\$ 7,990.0	\$ 7,990				
b	Inspections					18.0	no	\$ 255.0	\$ 4,590				

Appendix 8 — Map of Land Parcels identified for assessment for the redevelopment model

