

AUCKLAND UNITARY PLAN  
INDEPENDENT HEARINGS PANEL

*Te Paepae Kaiwawao Motuhake o te Mahere Kotahitanga o Tāmaki Makaurau*

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**Report to Auckland Council  
Overview of Recommendations**

**Annexure 1 Enabling growth**

**July 2016**

## Annexure 1 Enabling growth

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# Memo

8<sup>th</sup> July 2016

To: Auckland Unitary Plan Independent Hearings Panel  
From: Kyle Balderston (RIMU)

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Subject: **Estimating Total Feasible Dwelling Supply:  
From the Proposed to the Recommended Auckland Unitary Plan.**

## A. Background:

This memo provides a highly summarised description of the process of aggregating the very diverse sources of dwelling growth information available and generated through the AUP hearings and evaluation process to provide an overall summary of the likely 'feasible dwelling supply' under selected iterations of the Auckland Unitary Plan, to be as consistent as is practicable.

The process of providing an overall summary picture necessarily skips over the significant amount of detail and difference in the development, measurement, assessment and meanings that are or have been associated with 'the numbers' themselves.

Without going into the detail of the differences, it is important to note that the *process of measuring has evolved in parallel with the evolution of the object being measured*, and is likely to further evolve as the practice of capacity measurement and assessment rolls out across the country<sup>1</sup>. As a further complication, the assessment process, including methodology and conceptual basis used for each of the location components of the overall regional picture is also highly variable<sup>2</sup>, as is the timeframe or horizon the individual assessment has been designed to cover.

Given these technical issues, in my view it is better to consider the figures collated as an indication, or independent confirmation or enumeration of what would be reasonably expected, in relation to the *direction of change*, perhaps even the *magnitude* of that change (i.e. the plan has moved from less to more enabling, the 'number' is expected to get bigger by an amount related to the degree of change in enablement) rather than a definitive measurement of the exact *amount* of change between plans, or an exact indication of growth enabled<sup>3</sup> by each plan measured.

As far as possible the information presented in the summary tables is taken from publicly available sources or evidence presented to the Panel. This has obviously not been possible for the Panels Recommended Plan, or for application of the 'feasible development' to all locations in every Plan as this was not traversed in detail, or at all, in the relevant public hearings.

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<sup>1</sup> The Proposed National Policy Statement on Urban Development Capacity proposes a framework of monitoring, assessment and actions largely similar to that which has been partially developed and implemented via this hearings process. Additional attention and practice in this space is likely to improve the process significantly.

<sup>2</sup> While it is a rather conceptual point, the definition or meaning of a unit of measurement (*what is capacity?*), the measuring tool itself (*plan enabled and feasible capacity models*) the object being measured (*Plan, including rules and zonings*) have all varied and evolved through the process. This is quite different from the normal observational situation where the units of measurement and the measurement tools and methodologies are well defined and calibrated, and limitations and assumptions are largely understood by all, and only the object being measured changes, preferably one discrete aspect at a time such that a change in the measured result can be solely attributed to the change made to the object of measurement. In this case many aspects of the plan itself changed as well as the measurement techniques making it difficult to fully attribute changes in model outputs completely to changes in the plan alone. Ideally a single model version would be used to assess each iteration, with changes made to the model settings only to the degree necessary to reflect the limitations of the plan being modelled itself.

<sup>3</sup> In particular care should be taken to avoid using or referring to the capacity figures (plan enabled or currently feasible) as a 'forecast' or a 'target', but rather in indication of the upper limit of potential enabled by the plan, as far as can be ascertained with the information available, as at the time of assessment.

## B. Summary Results

This section presents the aggregated details from the three iterations of the AUP that the IHP requested be assessed.

These are referred to as

- Proposed Auckland Unitary Plan (**PAUP**)
- PAUP with Auckland Council Amended (residential) Provisions (**ACAP**)
- The Panels Recommended Auckland Unitary Plan (**Recommended Plan**)

The three iterations are outlined in more detail in Section C.

Table 1 below shows a comparison by capacity source across the three plans indicating the effect of various changes to rules (PAUP to ACAP) and then further changes to Rules and Zonings (ACAP to Recommended Plan).

Capacity Source	PAUP as Notified	With Council's Modified Residential Rules, no rezoning	Recommended Plan
<b>Residential Zones (excl HNZC)</b>	<b>33,592</b>	<b>93,654</b>	<b>146,339</b>
Large Lot	248	132	86
Rural and Coastal settlement	165	205	439
Single House	9,000	7,036	10,734
Mixed Housing Suburban	13,910	47,911	49,744
Mixed Housing Urban	5,267	18,411	47,698
Terrace Housing and Apartment Buildings	5,002	19,959	37,638
<b>HNZC Estimated Dwelling supply</b>	<b>19,000</b>	<b>23,000</b>	<b>39,000</b>
<b>Business Zones (excl HNZC)</b>	<b>30,828</b>	<b>50,511</b>	<b>84,732</b>
Mixed Use	5,978	17,572	28,768
Neighbourhood Centre	100	1,632	969
Local Centre	371	1,525	2,359
Town Centre	4,111	5,312	15,517
Metropolitan Centre	6,952	7,243	23,998
City Centre	13,316	17,227	13,121
<b>Total Residential and Business Zones (incl HNZC)</b>	<b>83,420</b>	<b>167,165</b>	<b>270,071</b>
<b>Rural Zones</b>	<b>13,929</b>	<b>13,929</b>	<b>14,220</b>
<b>New Urban Areas</b>	<b>115,260</b>	<b>115,260</b>	<b>138,177</b>
Future Urban Zone	115,260	115,260	115,546
Live Zoning	0	0	22,631
<b>Estimated Total Dwelling Supply</b>	<b>212,609</b>	<b>296,354</b>	<b>422,468</b>

Table 1: Summary Data by AUP iteration by generalised capacity source

Figure 1 below graphs the data in Table 1 above.

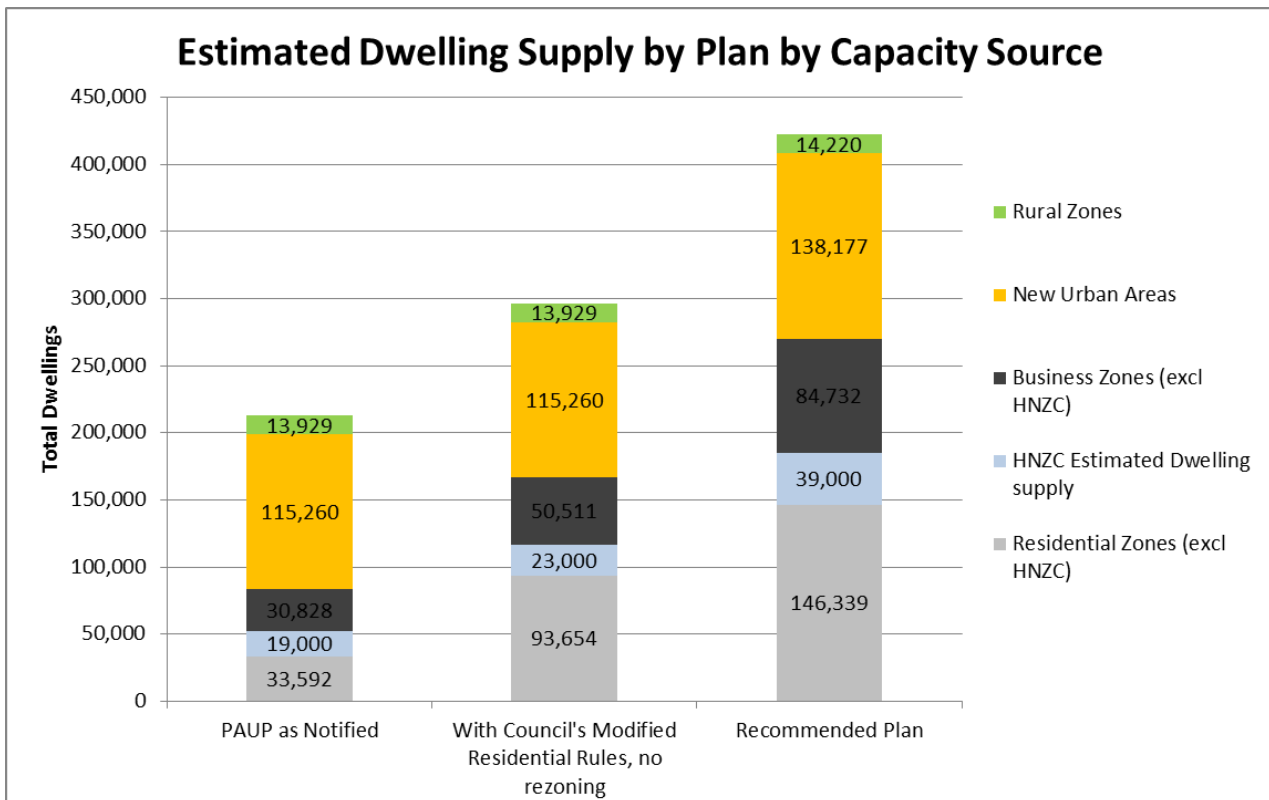


Figure 1: Summary Data by AUP iteration by generalised capacity source

Table 2 below summarises the three plan iterations by location

- against the 2010 MUL, which is the Auckland Plans 70:40 Target<sup>4</sup>
- against the IHPs preferred measurement framework of existing urban areas and other areas<sup>5</sup>

Capacity Source	PAUP as Notified	With Council's Modified Residential Rules, no rezoning	Recommended Plan
<b>Total Inside 2010 MUL</b>	75,857	150,728	249,443
<b>Total Outside 2010 MUL</b>	136,752	145,626	173,025
<b>% Inside 2010 MUL</b>	36%	51%	59%
<b>% Outside 2010 MUL</b>	64%	49%	41%
<b>Total Existing Urban Areas</b>	83,420	167,165	270,071
<b>Total Other Areas</b>	129,189	129,189	152,397
<b>% Dwellings from Existing Urban Areas</b>	39%	56%	64%
<b>% Dwellings from Other Areas</b>	61%	44%	36%

Table 2: Summary Data by AUP iteration by location

Figure 2, Figure 3, and Figure 4 below graph some of the data from Table 2.

<sup>4</sup> Between 2011 and 2041, up to 70% of total dwelling growth will occur inside, and up to 40% will occur outside, the 2010 MUL

<sup>5</sup> Refer Section C for discussion.

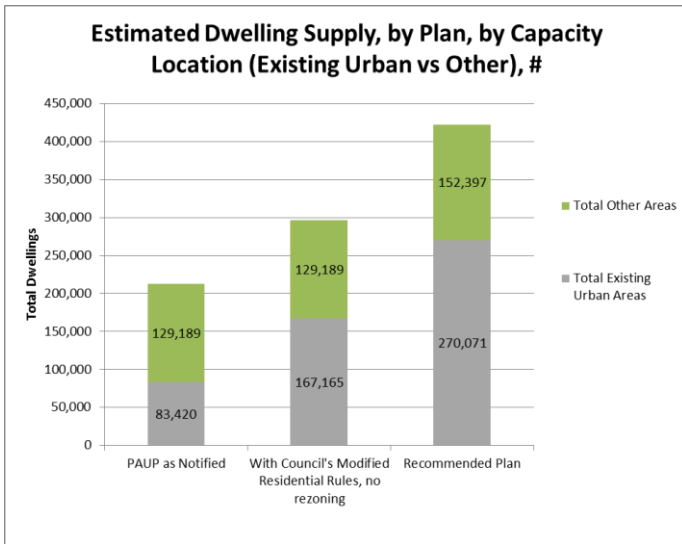


Figure 2: Summary Data by AUP iteration by location (Existing Urban And Other Areas), numbers

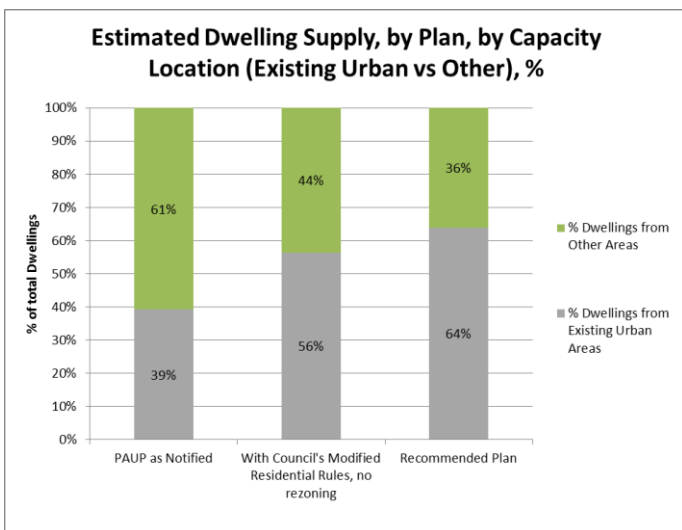


Figure 3: Summary Data by AUP iteration by location (Existing Urban And Other Areas), proportions

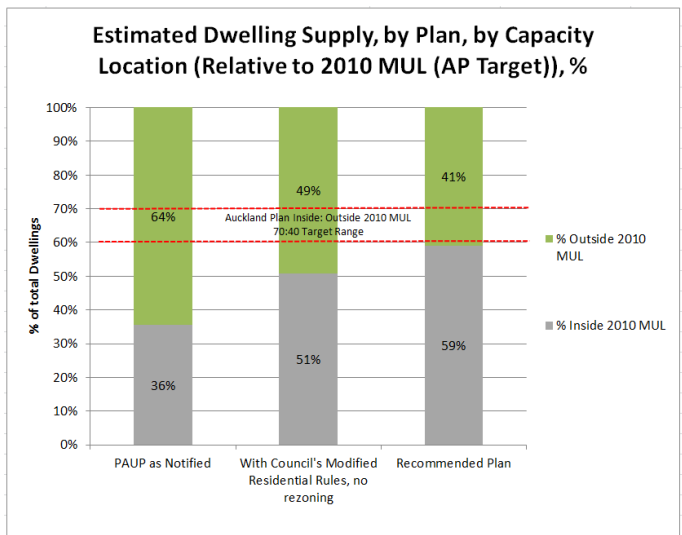


Figure 4: Summary Data by AUP iteration by location (Inside and Outside 2010 MUL, 70:40 AP Target), proportions

Table 3 provides additional detail of the break down by location of the expected supply from the recommended AUP.

Reccomended Auckland Unitary Plan					
Capacity Source	Total	Inside 2010 MUL	Outside 2010 MUL	Existing Urban Areas	Other
<b>Residential Zones</b>	<b>146,339</b>	<b>127,669</b>	<b>18,670</b>	<b>146,339</b>	-
Large Lot	86	86	-	86	-
Rural and Coastal settlement	439	-	439	439	-
Single House	10,734	6,458	4,276	10,734	-
Mixed Housing Suburban	49,744	40,222	9,522	49,744	-
Mixed Housing Urban	47,698	43,403	4,295	47,698	-
Terrace Housing and Apartment Buildings	37,638	37,500	138	37,638	-
<b>Housing New Zealand Estimated Dwelling supply</b>	<b>39,000</b>	<b>38,398</b>	<b>602</b>	<b>39,000</b>	-
<b>Business Zones</b>	<b>84,732</b>	<b>83,376</b>	<b>1,356</b>	<b>84,732</b>	-
Mixed Use	28,768	28,223	545	28,768	-
Neighbourhood Centre	969	646	323	969	-
Local Centre	2,359	2,018	341	2,359	-
Town Centre	15,517	15,370	147	15,517	-
Metropolitan Centre	23,998	23,998	-	23,998	-
City Centre	13,121	13,121	-	13,121	-
<b>Rural Zones</b>	<b>14,220</b>	-	<b>14,220</b>	-	<b>14,220</b>
<b>New Urban Areas</b>	<b>138,177</b>	-	<b>138,177</b>	-	<b>138,177</b>
Future Urban Zone	115,546	-	115,546	-	115,546
Live Zoning	22,631	-	22,631	-	22,631
<b>Estimated Total Dwelling Supply</b>	<b>422,468</b>	<b>249,443</b>	<b>173,025</b>	<b>270,071</b>	<b>152,397</b>
		<b>59%</b>	<b>41%</b>	<b>64%</b>	<b>36%</b>

Table 3: Summary Data, detail of Reccomened AUP by Capacity Source and Location

## C. Definitions and Data Sources

The Panel has requested a simple table or tables laying out, as far as possible, the various locational components that make up total regional supply from the various plans.

The details, definitions and sources of information about each of the components are limited and determined by the data or evidence available in a consistent way across each capacity source and location, and each 'plan'.

### (1) The Plans being measured:

Results from three key stages of the AUP evolution are presented.

- a) The Proposed Auckland Unitary Plan (PAUP) – the zoning, precincts and overlays as well as the relevant provisions (rules) relating to those locations, as notified in September 2013.
- b) Auckland Council Amended (Residential) Provisions (PAUP + ACAP) – the zoning, precincts and overlays as per the September 2013 notification, but where the Residential zone rules were amended as per Council's Evidence (following mediation) to Topic 059-063 – these provisions represented a major shift in the plan enabled and feasible residential capacity possible within the proposed plans' spatial zoning framework. While business and

rural zonings were also amended in concurrent topics, changes in feasible capacity results from these non-residential zone changes are not included in this data.

- c) IHP Recommended Auckland Unitary Plan (Recommended Plan) – the base zoning only (no precincts or overlays<sup>6</sup>) and advice regarding the residential, business and rural rules that were to be included in the IHP Recommended Plan<sup>7</sup>. At the time of modelling, the urban zoning pattern was the highest zoning of Council’s in-scope re-zoning evidence, and Housing New Zealand Corporation evidence. FUZ and CSL zoning was as provided by the IHP, and Rural zoning was assumed to be the same as the PAUP less the expanded FUZ and CSL. Drafts of the residential Rules were provided by the IHP and for the purposes of modelling the ACAP provisions were amended to reflect these draft Rules. Business and Rural rules were advised to be modelled as per the Councils final legal submissions to the relevant zone provision topic.

## (2) Residential and Business Zones

A significant amount of attention and effort has been on the urban area rules (defined as the Residential and Business zones), given these will provide the framework for the majority of dwelling growth (both in the existing urban areas, and ultimately in the land within the Future Urban Zone).

The main source of this information is the Auckland Council Development Capacity (**ACDC**) Model(s), which have undergone significant evolution more or less in parallel with the AUP itself.

The ACDC model’s methodology and assessment framework have altered considerably between Plan iterations meaning that not all of the difference in zone or locational results can be attributed to changes in the Plan itself. This data does however represent the best information available and I consider the direction of change and the order of magnitude between plans shown is to be reflective of what would be expected, even if some of the differences in the fine details are less reliable.

The following section outlines some of the major differences.

Table 4: ACDC Model Development Table 4 below outlines the source of each data set and some comment on the major differences in methodology:

Plan	ACDC version	Total Supply Range ('000s)	Source/Detail	Major Features Differences
PAUP	V1	64	013 E.G. Report #1 Balderston Evidence to 013	First iteration. Single ‘optimised’ development per site. No Price Ceiling. June 2014 CV’s and Mid 2015 Sales

<sup>6</sup> Excepting the Additional Height Control Overlay (for various zone Heights) and the Additional Subdivision Controls (Rural Only). The full RAUP will include a greater number of precincts and overlays than has been modelled, but they were not available at the time of assessment. The PAUP and ACAP figures also exclude many of these features from consideration, but this was for simplicity.

<sup>7</sup> A number of changes from the version used to generate these figures is expected as the Panel refines its recommended Plan.

ACAP	V2 (High Price Ceiling) <sup>8</sup>	108-144	013EG report #2 Balderston Evidence to 059-063	Largely as per V1 with a price ceiling (high and low) to exclude over-specified 'optimised' developments and some amendments to the development to reflect rule changes. June 2014 CV's and Mid 2015 Sales.
ACAP (not used in this report)	V3.7	224-308	013EG Report #3 Balderston Evidence to 081	Full rebuild of v1/v2 model, 9 developments per site (S, M, L House, Terrace and Apartments), all calibrated to be <= Price Ceiling, single development chosen from feasible options. Amendments to the developments to reflect rule changes. June 2014 CV's and Mid 2015 Sales prices (additional sales data).
Recommended Plan	V3.8	234-302 <sup>9</sup>	Balderston & Fredrickson Memo to IHP <sup>10</sup> SD4 Memo to IHP <sup>11</sup>	Further Evolution of Version 3.7, Amendments to the developments to reflect rule changes. CVs and other costs adjusted to Mid 2016 and new sales prices set for Mid 2016.

Table 4: ACDC Model Development

The ACDC model recalculates the capacity (from v3 onwards, for each of 9 potential developments) on sites that have been identified by the CfGS as having plan enabled capacity, and in latter versions chooses a single feasible development option to report. The CfGS does not calculate capacity on 100% of the sites within residential or business base zones, due to the influence of precincts and overlays<sup>12</sup>.

The modelling of the Recommended Plan largely excluded such precinct and overlay complications (only base zoning was available) and this factor accounts for a proportion of the differences from the earlier PAUP and ACAP figures.

The ACDC model also contains a number of post processing filters to remove sites with Designations, various existing uses considered immutable<sup>13</sup>, and sites identified within HNZCs land holdings for submission purposes.

In addition, all versions of the ACDC Model outputs are not a forecast of development – they are a measurement, based on a snapshot in time of the opportunities for commercially feasible development given 'today's' costs, prices and planning frameworks. Relativity between model outputs can be used to compare the relative amount of enabled development the plan being tested facilitates.

<sup>8</sup> SD4 has made some adjustments to the spread of results across the lower 4 ranked residential zones in light of results from the other model runs and that it is likely that the model under estimated feasible capacity in the lower order zones. This has not affected the overall residential totals.

<sup>9</sup> Note, includes supply from HNZC sites where this supply is feasible. Apparent reduction from v3.7 is due to significant changes in methodology and timeframe and remodelling of ACAP using a customised v3.7 would likely show a greater differential.

<sup>10</sup> Balderston & Fredrickson, Memo 17<sup>th</sup> May, *Feasible Capacity of AUIHP Revised Spatial Zoning and Rules*.

<sup>11</sup> SD4 Memo 5<sup>th</sup> July 2016, *The ACDC Development Capacity Model: v3.8 Results, Description and Explanation*.

<sup>12</sup> These locations were sometimes modelled if the rules were easily translatable into modelable parameters. In many cases information on expected yields was taken from legacy planning documents (which the precinct or overlay largely translated) or structure planning documentation where this was appropriate.

<sup>13</sup> In the short term, such as undesignated schools, churches and other social and physical infrastructure. These assessments (based on information in the rating data) is consistent across all model runs.



However, given the absence of other information, and as discussed elsewhere in this report, using the ACDC Model outputs as a *proxy* for a 30 year supply is considered reasonable.<sup>14</sup>

### (3) Housing New Zealand Corporation Estimated Dwelling Supply

As noted above, sites identified within HNZCs land holdings are excluded from the ACDC model. The reasoning for this is outlined in the 013EG reports, but is because:

- a) HNZC has a ‘feasibility’ threshold that differs from the ‘average commercially motivated developer’ whose behaviours the ACDC model attempts to model;
- b) HNZCs land holdings are extensive, widespread and diverse, but also often concentrated to enable aggregation of holdings into much larger development sites to gain additional advantages of scale of site in addition to their purchasing power, access to capital and experience;
- c) HNZC also have well developed development, planning and assessment capability which they have applied to provide information on how the various rules and zonings would combine with the factors above. In short they are able to provide better information on what they would do under the planning rules on their land than we could.

Information on the likely supply from HNZC holdings is identified separately, as it has been provided as a single regional figure (so cannot be allocated to individual zones).

All HNZC supply has been allocated to the ‘Existing Urban Area’ (based on the known location of the sites in question) and capacity has been proportionately allocated to the inside/outside MUL locations pro-rata based on v3.8 Model outputs, which initially included HNZC sites in the results.

HNZC figures are an assessment of the approximate likely dwelling supply they will be able to supply over the next 30 years given the rule parameters in question which also include some adjustments to precincts and overlays consistent with their submissions on these matters.

The source of the figures is outlined in Table 5 below:

Plan	Figures	Detail/Source
PAUP	19,000	Submission, and G Sowry Evidence (p10.3, 8 Dec 14) to Topic 013
ACAP	23,000	T Heath and P Osbourne Evidence (p7.3, 28 Sept 2015) to Topic 059-063
Rec P	39,000	A Lindsey Evidence (verbal response to Panel Question) in Topic 081

Table 5: Housing New Zealand Corporation Supply, Estimated consentable Dwellings under various plan iterations.

### (4) Rural Zones and Countryside Living Zones

Figures represent plan enabled capacity – given the lack of feasibility assessments, the assumed level of demand and limited supply, 100% of the plan enabled capacity is assumed to be taken up over the 30 year horizon.

Estimations of rural capacity is complicated by the complex interaction of the ability to donate and receive, create and transfer development (either existing vacant potential OR via the protection of,

<sup>14</sup> This is predicated on the basis of the supply indicated, particularly from the recommended plan, will facilitate a more competitive land market, such that rapid land (and dwelling sale price) appreciation rates will slow, to reduce the differential rate of change between these factors and the other components of development costing, to move closer to the general rate of inflation. This will in turn reduce the ‘effect of time’ on development feasibility to closer to the longrun rate of existing improvement depreciation, meaning the results (captured at today's prices) would be a significant proportion of results under ‘tomorrow's’ prices. In particular, a reduced rate of land inflation from a greater supply (even if it is not locationally equivalent) could enable the calculated development returns (set at >20%) to exceed present high rates of land holding returns resulting in more development (as the relative return on capital between holding and development would shift towards favouring development).

or establishment of (Recommended Plan only) Significant Environmental Areas (SEA)) as well as basic subdivision.

Figures for the PAUP and ACAP are based on the Capacity for Growth Study 2013 (PAUP) results.

Figures for the Recommended Plan are based on a factoring up of the equivalent PAUP CfGS results (that relate to locations controlled by Table 10 CSL locations) based on SD4's assessment<sup>15</sup> of the increased CSL base zoned area (that includes areas controlled by other provisions, particularly overlays and or precincts) and amendments to the Recommended CSL rules.

The remaining rural area capacity (including areas outside of Table 10 CSL locations) is taken from the relevant CfGS results for the PAUP, and the evidence of Mr B Mosley<sup>16</sup> was used as the basis for newer provisions included in the Recommended Plan.

The Council's amended position on the rural provisions did increase the potential from SEA enhancement, but other changes to other rules do partially offset the supply from SEA based rule relaxation. These offsetting factors include changes to the other rural area rules including vacant site transfer potential and the overall reduction in non CSL rural area due to the expansion of both CSL and FUZ.

## **(5) Future Urban Zone**

Supply from within the Future Urban Zone is based on work undertaken by SD4 (refer SD4 Memo, 5<sup>th</sup> July 2016: *Feasible Development Capacity of the PAUP's FUZ and the IHP's FUZ.*).

The recommended Plan includes some 'operative zoning' of the more advanced (in terms of infrastructure capacity or structure planning) of these areas with totals and zonings provided by the IHP, this being based on the relevant evidence presented on the areas in question.

The supply from the Live Zoning are aggregated into the 'New Urban Area' totals rather than allocated to the respective zonings within the 'Existing Urban Area'.

## **(6) Other potential dwelling supply not included**

In addition to the capacity identified above, the various plans also provide the potential for additional development opportunities (or may preclude opportunities modelled) that are not specifically modelled or considered.

These include:

- Second dwelling conversions<sup>17</sup>
- Minor Household Units (Recommended Plan only)
- Applications for Non-complying activities or other non-modelled developments
- Future Plan changes and variations
- Developments of dwellings on non-modelled sites including zones that are not residential or business, or those that have been filtered out due to existing uses, designations or data issues.

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<sup>15</sup> SD4 Memo, 5<sup>th</sup> July 2016, *Feasible Dwelling Capacity of the PAUP's Countryside Living (CSL) and the IHP's CSL*

<sup>16</sup> Topic 057, Rebuttal Evidence, Page 30.

<sup>17</sup> This option could provide a significant source of affordable dwellings that may also better 'reformat' the existing dwelling stock to meet the smaller average household sizes expected. Conversely such opportunities may also preclude more comprehensive redevelopment.

A range of other factors that could increase or decrease outcomes over the 30 year horizon from the ACDC sourced totals (noting these outputs are not in and of themselves a forecast) are outlined in the 013EG reports – overall these matters are considered to be relatively self-compensating, especially in the regional aggregate and over the longer term.

## (7) Locational Definitions

### a) Inside and Outside the 2010 MUL

This is a spatial definition outlined in the Auckland Plan as a baseline for monitoring the ‘70:40’ 2011-2041 dwelling growth target<sup>18</sup>. The location of the 2010 MUL is defined and known and able to be used to query spatial data of the type used to generate the summary tables.

Based on the analysis presented in this report, setting aside the limitations therein and assuming there is no further changes to the planning system over the next 30 years, only the Recommended Plan provides the conditions necessary to achieve this long term strategic outcome.

### b) ‘Existing Urban Areas’ and Other Areas

The IHP requested estimates of the distribution of feasible capacity in relation to urban areas existing at the time the PAUP was notified relative to new (or other) urban areas.

From a modelling perspective this was a new distinction and we did not have ready to hand data on precise spatial boundaries for this distinction. To provide an approximation of this distinction we utilised the base zoning in each plan to identify capacity supplied from clearly ‘new’ urban areas (e.g. in Future Urban Zones and new operative Zones in areas that otherwise would have been Future Urban Zones, plus Rural), and all other capacity as coming from “existing urban areas”. We consider this a reasonable approach to estimating this distribution of capacity as requested.

Table 6 below outlines the relationships between the key base zones and the aggregate definitions used in this summary report.

Aggregate Location 1	Aggregate Location 2 <sup>19</sup>	Base Zone Group	Base Zone
Existing Urban Areas	Existing Urban Areas	Residential	Large Lot
			Rural and Coastal settlement
			Single House
			Mixed Housing Suburban
			Mixed Housing Urban
			Terrace Housing and Apartment Buildings
		Business	Mixed Use
			Neighbourhood Centre
			Local Centre

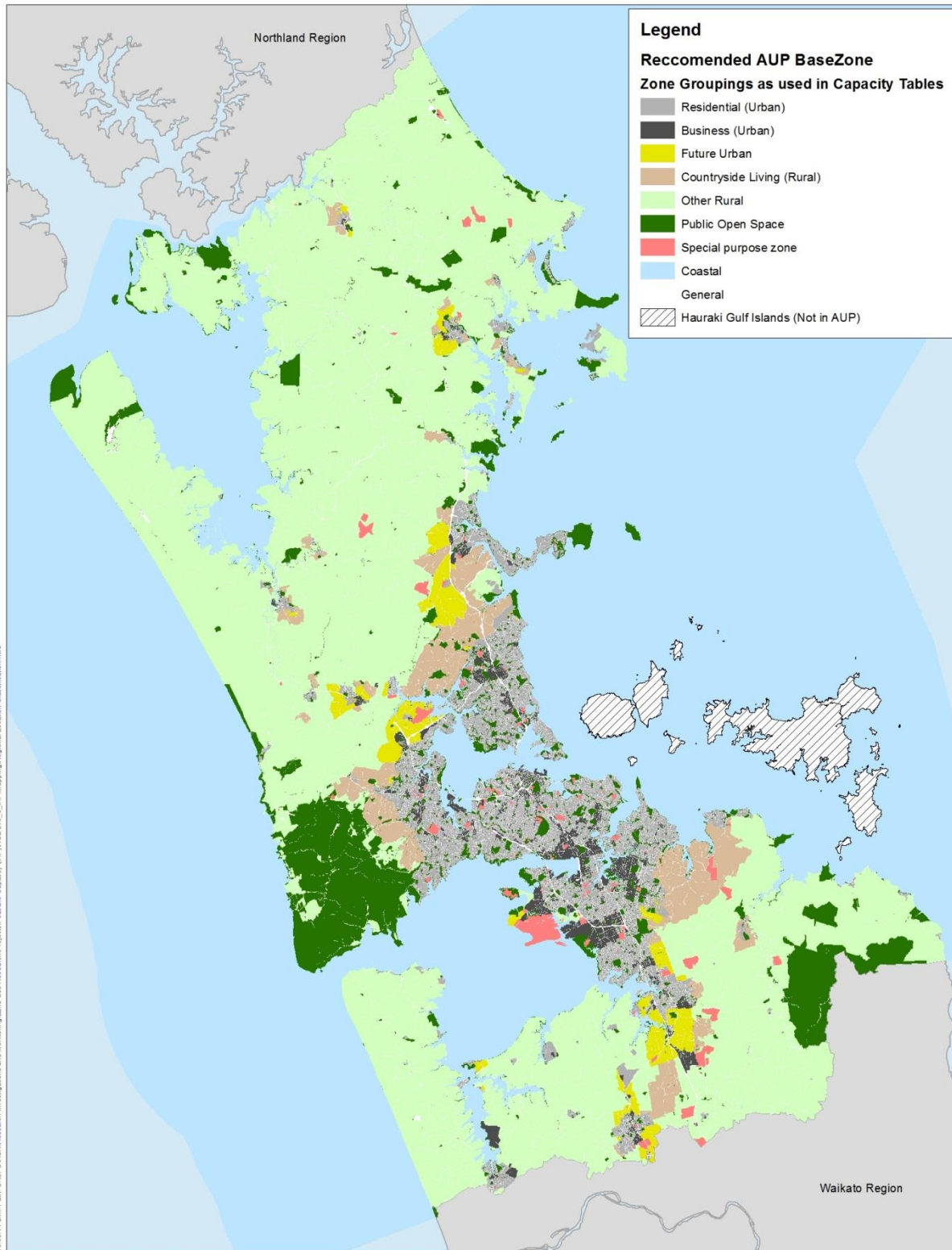
<sup>18</sup> Auckland Plan Para 129: “We will provide for 60% to 70% of total new dwellings inside the existing core urban area as defined by the 2010 MUL. Consequently, between 30% and 40% of total new dwellings will be outside of the baseline 2010 MUL\* in new greenfields, satellite towns, and rural and coastal towns. By enabling quality urban intensification, we aim to achieve the 70% inside figure at the end of the 30-year life of the Plan. We will also have flexibility to provide for 40% outside the MUL. \* The baseline 2010 MUL is the urban limit that was agreed to by the former Auckland Regional Council and territorial land authorities. The Auckland Plan uses it as a baseline to monitor urban expansion.”

<sup>19</sup>

			Town Centre
			Metropolitan Centre
			City Centre
Other Areas	New Urban Areas	Future Urban Zone	Future Urban Zone
			'Live Zoning'
	Rural	Rural	Countryside Living
			All other Rural zones
	N/A		All other Zones

Table 6: Zoning relationship to categorisation used in summary tables.

The spatial definitions used for the Recommended Plan assessment are shown in Figure 5 and Figure 6 below. Note that for the PAUP the New Urban Areas, and Rural areas will be slightly different due to the different zoning patterns particularly the relative expansion of FUZ into the Rural Area.



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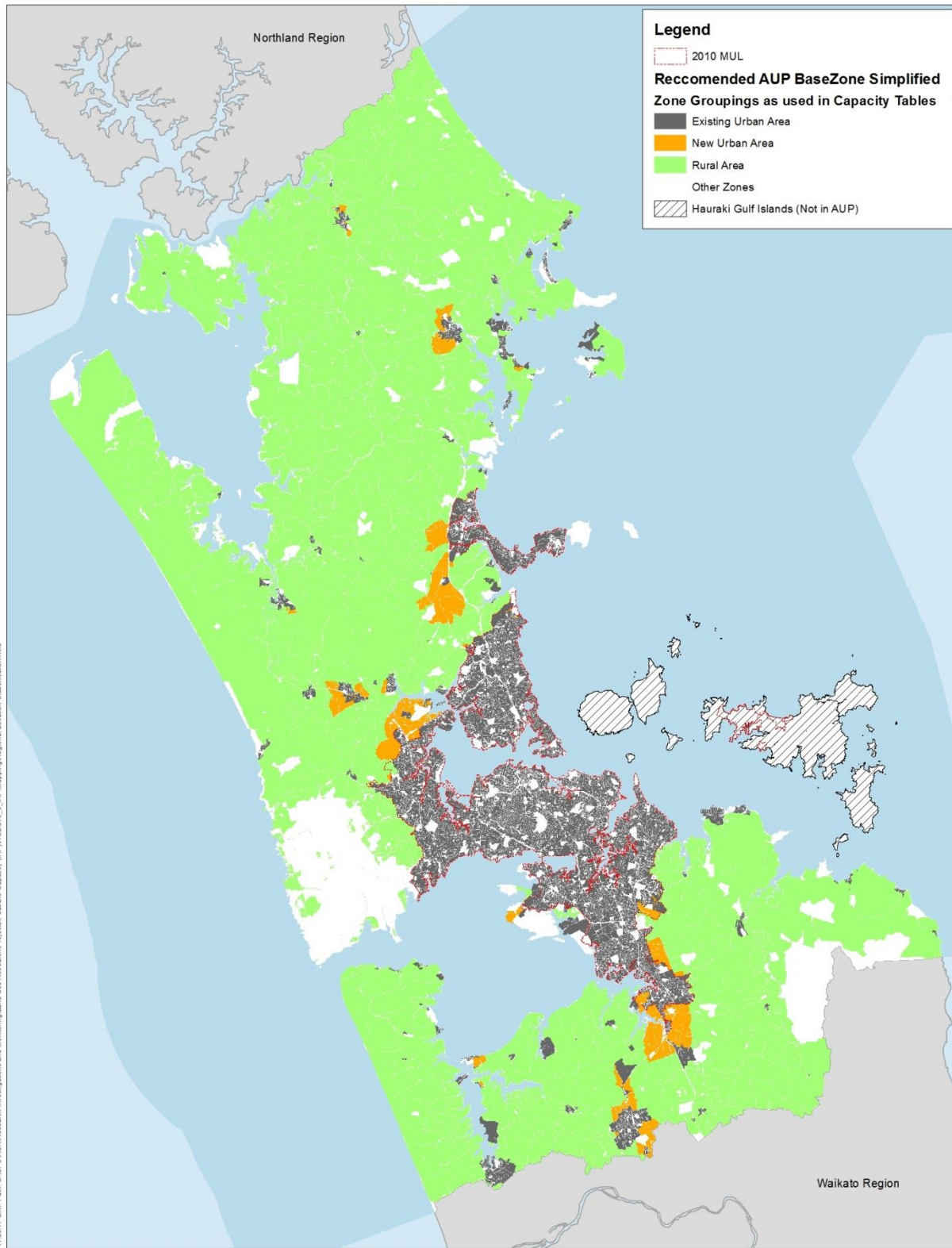
**Zone Groupings as used in Capacity Tables  
(As Modelled for IHP Reccomended AUP)**

Map Produced by  
K Balderston  
RIMU



**Auckland Council**  
Te Kaitiaki Take Kōwhiri

Figure 5: Recommended Plan; Generalised Zone Groupings



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**Zone Groupings as used in Capacity Tables  
(As Modelled for as Proposed AUP)**

Map Produced by  
K Balderston  
RIMU  
  
**Auckland Council**  
Kaitiaki Take Kōwhiri

Figure 6: Recommended Plan Highly Generalized Zoning



Table 7 below summarises the data sources and Table 8 summarises the nature of that data, as used in this report.

Data Source				
Capacity Source		PAUP as Notified	With Council's Modified Residential Rules, no rezoning	Recommended Plan
Residential Zones (excl HNZC)		ACDC v1, 013EG Report #1	ACDC v2 (HPC), KB Evidence to Topic 059-063 + further PF Adjustment	ACDC v3.8, See Balderston & SD4 Memos to IHP + Urban 'Live Zoning' as supplied by IHP
HNZC Estimated Dwelling supply		HNZC Submission and Sowry Evidence to Topic 013	HNZC (Heath and Osbourne) Evidence to topic 059-063	HNZC (Lindsay) verbal confirmation to to topic 081
Business Zones (excl HNZC)		ACDC v1, 013EG Report #1	ACDC v2 (HPC), KB Evidence to Topic 059-063	ACDC v3.8, See Memo to IHP
<b>Total Residential and Business Zones (incl HNZC)</b>		Sum of Above	Sum of Above	Sum of Above
Rural Zones		CfGS 2013	CfGS 2013	Combination of AC Evidence (Mosely and Balderston) and SD4 Assessment (CSL Only) and CfGS 2013
New Urban Areas				
	Future Urban Zone	SD4 Assessment	SD4 Assessment	SD4 Assessment less Live Zoning
	Live Zoning	N/A	N/A	As supplied by IHP/SD4 Assessment
<b>Estimated Total Dwelling Supply</b>		<b>Sum of Above</b>	<b>Sum of Above</b>	<b>Sum of Above</b>

Table 7: Summary of Data Sources used in this report

Capacity 'Type'				
Capacity Source		PAUP as Notified	With Council's Modified Residential Rules, no rezoning	Recommended Plan
Residential Zones (excl HNZC)		Current (2014 base) Feasible Capacity, used as proxy for 30 year supply	Current (2014 base) Feasible Capacity, used as proxy for 30 year supply	Current (2016 Base) Feasible Capacity, used as proxy for 30 year supply
HNZC Estimated Dwelling supply		Estimated consentable dwelling supply over 30 years	Estimated consentable dwelling supply over 30 years	Estimated consentable dwelling supply over 30 years
Business Zones (excl HNZC)		Current Feasible Capacity, used as proxy for 30 year supply	Current Feasible Capacity, used as proxy for 30 year supply	Current Feasible Capacity, used as proxy for 30 year supply
Rural Zones		Plan Enabled Capacity used as Proxy for 30 year supply	Plan Enabled Capacity used as Proxy for 30 year supply	Plan Enabled Capacity used as Proxy for 30 year supply
New Urban Areas				
	Future Urban Zone	Estimated dwelling supply over 30 years	Estimated dwelling supply over 30 years	Estimated dwelling supply over 30 years
	Live Zoning	-	-	Plan Enabled Capacity used as Proxy for 30 year supply

Table 8: Summary of the nature of the figures used in this report

# Memo

5<sup>th</sup> July 2016

To: Auckland Unitary Plan Independent Hearings Panel

From: Patrick Fontein

---

Subject: **The ACDC Development Capacity Model: v3.8 Results, Description and Explanation.**

## 1.0 Introduction

Patrick Fontein of Studio D4 (SD4) has been engaged by the Auckland Unitary Plan Independent Hearings Panel (IHP) to work with Auckland Council (AC), to review the residential development capacity of the urban Auckland areas, using the IHP's proposed rules and zoning of areas, using the ACDC Model, as described in the Section below.

SD4 have been provided with the proposed IHP changes during the last few months, and these have been fully incorporated into these latest results of the ACDC. Please refer to the IHP's Report for the details of the proposed rules and zone changes. The urban area definition is also contained within the IHP Report.

## 2.0 Background to the ACDC Model Evolution, to reach the ACDC v3.8 Results

I was part of the Auckland Plan Advisory Committee, set up by Auckland Council from late 2010, throughout 2011, prior to the Auckland Plan release in early 2012. During 2011, SD4 worked for AC to provide property advice on the Auckland Plan, which included reviewing the development capacity of areas of Auckland, relating to proposed planning rules being considered. The Auckland Plan considered an increase of 400,000 dwellings in greater Auckland in a 70:40 format, with a target of 240-280,000 (60-70%) dwellings within the existing urban Auckland footprint, and 120-160,000 (30-40%) outside of existing urban areas.

The early SD4 work on development capacity analysis with Auckland Council evolved during 2012 through to 2014, with SD4 carrying out various consultancy tasks for AC during this time. In early 2015, the IHP requested an expert group be established to review the development capacity enabled by the Proposed Auckland Unitary Plan (the PAUP), the 013 Topic Expert Group (013EG). I was part of the 013EG. From Feb-July 2015 the 013EG set up the Auckland Council Development Capacity (ACDC) Model.

The ACDC Model was created by the 013EG Members, with the main contributors to its formation being AC's Kyle Balderston, Adam Thompson, Doug Fairgray and myself. The 013EG Report to the IHP, dated 22<sup>nd</sup> July 2015 describes in detail how the ACDC Model works, what it's assumptions are etc.

My further background that is of relevance to this consulting work and development capacity analysis is provided in a number of submissions to the IHP during 2014 and 2015, and will not be repeated here.





The 013EG produced the initial Model run of the ACDC (v1), that considered the existing urban residential development capacity that the PAUP enabled. See the 013EG Report of 22<sup>nd</sup> July 2015. The urban residential development capacity of the PAUP (using ACDC v1) was 83,420 dwellings, which included 19,000 Housing NZ Corp (HNZC) dwellings, see Appendix 1 attached.

The strong benefit of the ACDC Model is that it can review the development capacity impact of proposed changes to planning rules and zone changes.

During Aug-Sept 2015, AC considered a series of proposed modified residential zoning rules (which evolved into Auckland Council Amended Plan, or ACAP). As the ACAP rules were being considered, the ACDC Model considered a number of scenarios, which eventually led to the ACDC v2.4. (Note: v2.4 did not make allowance for any up zoning of areas, also considered by AC in late 2015). AC's ACAP, using ACDC v2.4 provided a development capacity of 167,165 dwellings, which included 23,000 HNZC dwellings, see Appendix 1.

### **3.0 The further ACDC Model Analysis, leading to ACDC v3.8**

The changes proposed by AC under ACAP that produced the ACDC v2.4 results, created an urban development capacity of 167,165 dwellings over a 30 year period, which for a target of 400,000 dwellings was just over 40%, and well short of the 60-70% target.

In early 2016, the IHP engaged SD4 directly to review the development capacity impact of a variety of IHP proposed zoning rule modifications and changes to where the zones would be applied, in an effort to create sufficient urban dwelling development capacity to reach the 60-70% target of the Auckland Plan.

During the last 3 months I have been working closely with AC's Kyle Balderston and the IHP team (under Confidentiality) to carefully refine the inner workings of the ACDC Model (effectively a full "Commissioning" of the ACDC Model, which we had not had the time to implement during 2015), and have the ACDC Model evaluate a range of scenarios that the IHP team asked us to consider.

The latest evaluations were under the ACDC "v3.range", and the final results which have formed the IHP Recommended Plan, have been provided here as ACDC v3.8.

The ACDC Modelling that led to v3.8 followed a similar approach as the earlier ACDC modelling. However as the modifications of rules proposed by the IHP required changes to the formulae that drive the ACDC Model, we thought it prudent to engage with the 013 Property Development Expert Group (the 013PDEG) Members again, to ensure that a wide range of property development experts were satisfied and were willing to "sign off" with the methodology of the ACDC v3 changes. All the 013PDEG Members as the 013EG Group (see 013EG Report for Member names, in Appendix C) contributed, and Mr Chris Dibble was added to this 013PDEG to provide the latest 2015-2016 property market sales information. All of the interchange of communication between the 013PDEG and SD4 were provided to the IHP.

The final results of the IHP's proposed changes, has yielded an existing urban development capacity of 270,071 dwellings within ACDC v3.8, which is within the 60-70% range sought as part of the Auckland Plan.

The following section will provide a brief commentary on the differences that the IHP's planning rule and zone modifications have made to the development capacity of the urban areas, since the PAUP as notified (ACDC v1) and using AC's modified residential planning rules, ACAP (ACDC v2.4).

People reviewing the ACDC results will see a row for Housing NZ Corp, separate from the ACDC calculations. The HNZC development capacity numbers have been kept separate as they have been evaluated by SD4 and AC in conjunction with HNZC. HNZC often have different economic drivers than those of the private sector and that used in the ACDC Model. A consistent approach has been used, whereby the HNZC land has been excluded from the ACDC modelling in all cases. The development capacity numbers for HNZC steadily increase from the original PAUP's 19,000, to 39,000 when following the IHP's recommended modifications.



## 4.0 Development Capacity changes created by the IHP's Rule and Zoning Modifications

Appendix 1 highlights the changes in development capacity achieved by the IHP planning rule and zoning modifications. The main variances, which can also be clearly seen in the "Heat Maps" produced by AC as part of the IHP Report, are as follows:

- An increase in the amount of land zoned Mixed Housing Urban, THAB and Mixed Use
- Rule changes that have allowed many more properties to become "development feasible". The main contributing rule changes have been:
  - Removing the restrictions on dwelling density (number of units viz land size) in MHS and MHU.
  - Slight increases in allowable building heights in the MHU zone
  - Slight increases in allowable building coverage in the MHS and MHU zones
  - Changes to the minimum apartment size requirements

## 5.0 Further work undertaken by SD4 for the IHP in recent months

SD4 have also undertaken work for the IHP on the following:

- Calculating the current (mid 2016) unmet Auckland dwelling demand (housing shortfall), taking account of all other Reports and analysis on this subject.
- Calculating the residential and business land development capacity within the proposed Future Urban Zone (the FUZ).
- Calculating the residential development capacity of the Countryside Living areas (the CSL).

Whilst all of this work has been undertaken separately, there are connected strands which we have taken account of. The development capacity using the IHP's recommendations of all of these areas, and within the existing urban areas (as this Report) can all be seen in Appendix 1.

Appendix 2 has been provided to show in graphical form, all of these results.

## 6.0 Conclusion

The IHP have considered all of the submissions made to it, and have proposed a series of planning rule changes and modified the locations in which the various zonings should apply, in an effort to provide sufficient realistic feasible development capacity within urban Auckland.

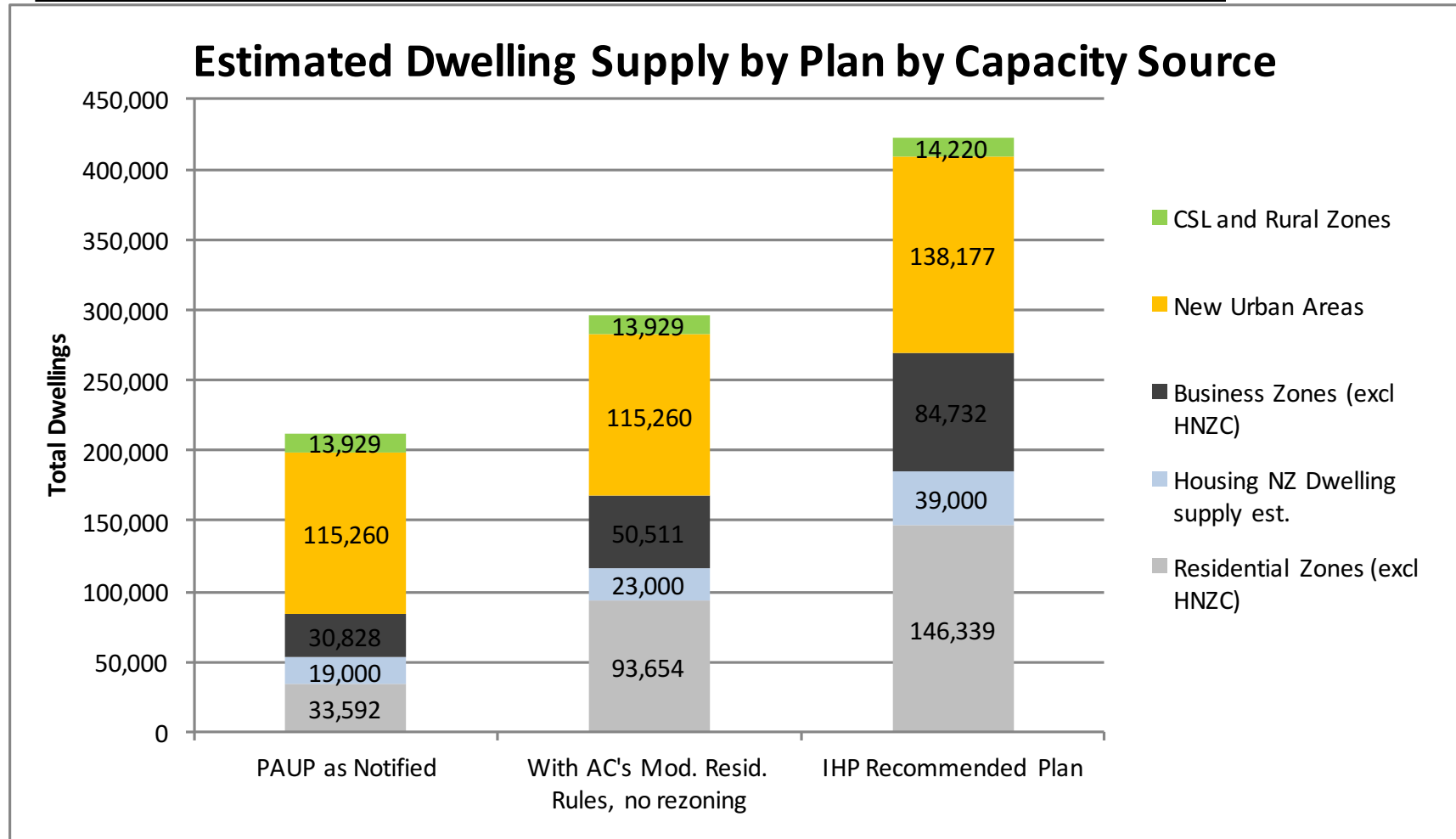
The ACDC Model is an industry accepted process to evaluate residential development capacity, and the recommended IHP modifications have provided a feasible urban development capacity of 270,071 dwellings within ACDC's Model v3.8, assuming a 30 year development period, which is comfortably within the 60-70% Auckland Plan target range.



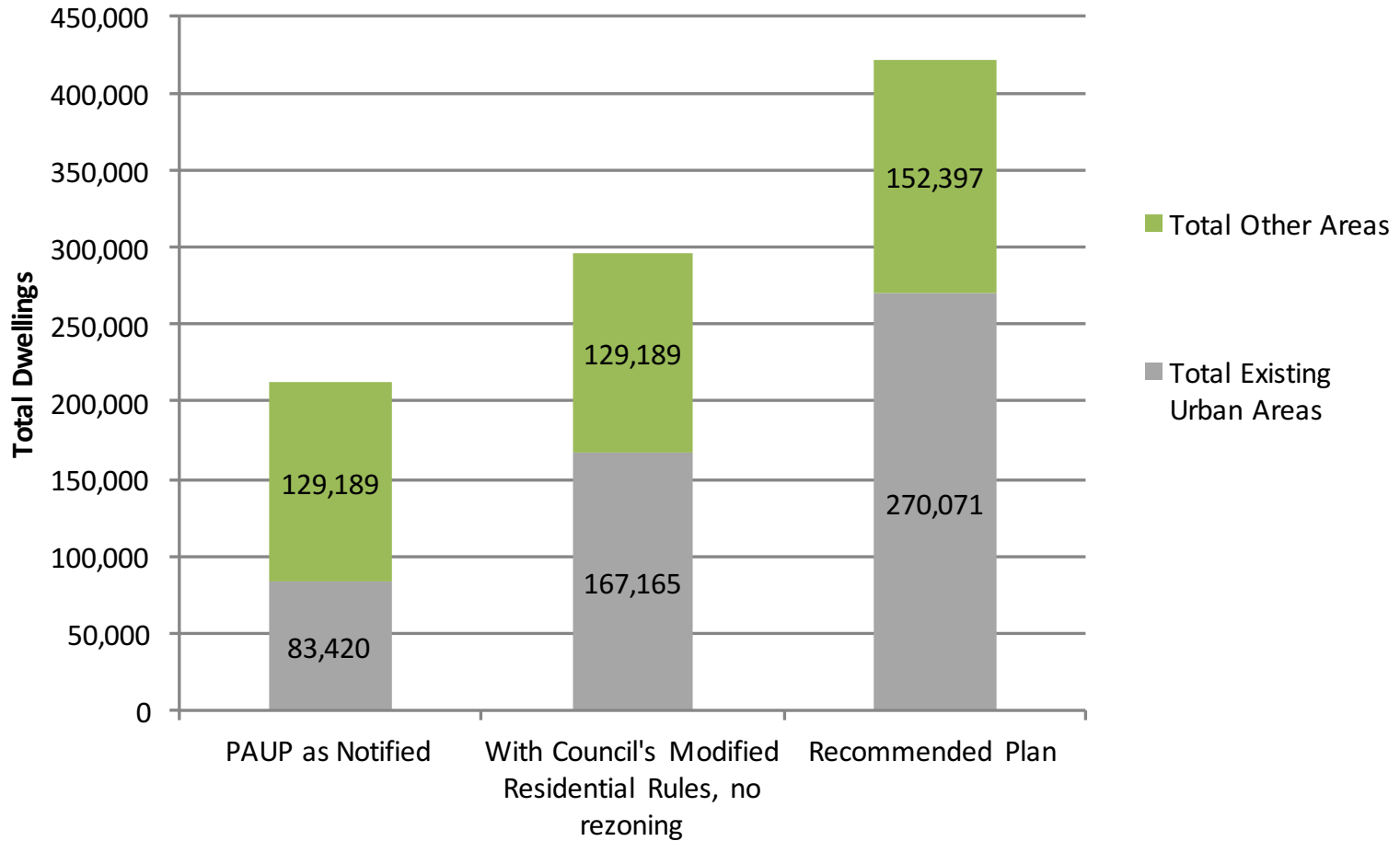
## Appendix 1: Feasible Development Capacity Numbers

Capacity Source	PAUP as Notified	With AC's Mod. Resid. Rules, no rezoning	IHP Recommended Plan
<b>Residential Zones (excl HNZC)</b>	<b>33,592</b>	<b>93,654</b>	<b>146,339</b>
Large Lot	248	132	86
Rural and Coastal settlement	165	205	439
Single House	9,000	7,036	10,734
Mixed Housing Suburban	13,910	47,911	49,744
Mixed Housing Urban	5,267	18,411	47,698
Terrace House & Apartment Building	5,002	19,959	37,638
<b>Housing NZ Dwelling supply est.</b>	<b>19,000</b>	<b>23,000</b>	<b>39,000</b>
<b>Business Zones (excl HNZC)</b>	<b>30,828</b>	<b>50,511</b>	<b>84,732</b>
Mixed Use	5,978	17,572	28,768
Neighbourhood Centre	100	1,632	969
Local Centre	371	1,525	2,359
Town Centre	4,111	5,312	15,517
Metropolitan Centre	6,952	7,243	23,998
City Centre	13,316	17,227	13,121
<b>Total Res &amp; Bus Zones (incl HNZC)</b>	<b>83,420</b>	<b>167,165</b>	<b>270,071</b>
<b>CSL and Rural Zones</b>	<b>13,929</b>	<b>13,929</b>	<b>14,220</b>
<b>New Urban Areas</b>	<b>115,260</b>	<b>115,260</b>	<b>138,177</b>
Future Urban Zone	115,260	115,260	115,546
Live Zoning	0	0	22,631
<b>Estimated Total Dwelling Supply</b>	<b>212,609</b>	<b>296,354</b>	<b>422,468</b>

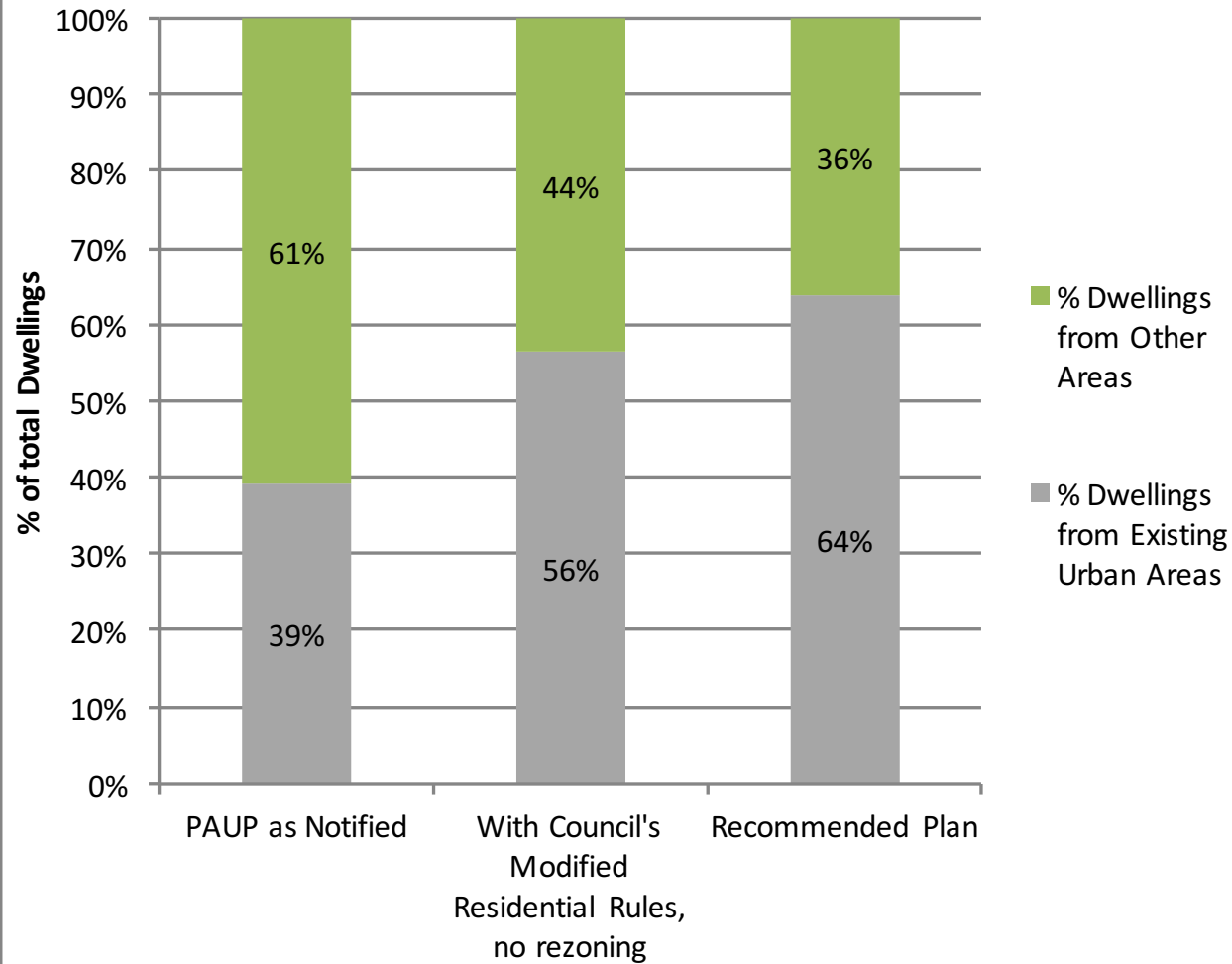
## Appendix 2: Graphical display of development capacity analysis results



## Estimated Dwelling Supply Number, by Plan, by Capacity Location (Existing Urban vs Other)



## Estimated Dwelling Supply, by Plan, by Capacity Locat. (Exist Urban v Other), %



# Memo

5<sup>th</sup> July 2016

To: Auckland Unitary Plan Independent Hearings Panel

From: Patrick Fontein

---

Subject: **An Analysis of the Current Auckland Unmet Dwelling Demand (Housing Shortfall)**

## 1.0 Executive Summary

There have been a series of reviews and comments on Auckland's housing shortfall. This analysis considers these reviews and then takes a robust analytical approach to assessing Auckland's current unmet dwelling demand.

The current Auckland dwelling demand can be considered as the ratio of "population divided by the People per Household (PpH)". For an efficient housing market, we can call this "People per Household Efficient", or "PpHE". When we have determined the current Auckland Dwelling Demand, in an efficient market, and we then subtract the current household numbers within Auckland, this then leaves the current Unmet Dwelling Demand estimate.

This analysis shows 1,535,000 people in Auckland as at early 2016, divided by 494,000 dwellings, or a PpH of 3.11. In an efficient market, the long term trend should have Auckland show a PpH of between 2.85 to 2.90, as at 2016.

At a PpH of 2.85 Auckland has an unmet dwelling demand of 44,600 dwellings and at a PpH of 2.90 Auckland has an unmet dwelling demand of 35,300 dwellings.

Based on the above, **we believe a fair and reasonable figure of the unmet dwelling demand for Auckland as at early-mid 2016, is 40,000 dwellings.**



## 2.0 Previous Reviews of Auckland's housing shortfall

There have been a series of reviews and comments on Auckland's housing shortfall. We will briefly summarise these below:

### 2.1 MBIE

In 2014, the Ministry of Business Innovation and Employment in their post-election briefing to the Minister Dr Smith last year estimated the shortage to be **18,000 dwellings**. Page 7. <http://www.mbie.govt.nz/about-us/publications/BIMs/2014-bims/building-housing.pdf>

### 2.2 The Salvation Army

The Salvation Army in their 2015 State of the Nation report estimated the shortage to be between **12,000 and 13,000**. Page 75. <http://www.salvationarmy.org.nz/sites/default/files/uploads/20150211SOTN2015%20update%20WEB.pdf>

### 2.3 Auckland Council

In late 2013, Auckland Council stated "There is no definitive estimate of the housing shortage in Auckland, but it's likely to be between 1 and 2 years worth of supply at the current levels of consent activity." That adds up to between **7,500 and 15,000**. The Council were previously frequently cited as estimating the shortage to be between 20,000 and 30,000 houses, but this was cut when the 2013 Census revealed less population growth in Auckland than estimated between 2006 and 2013.

<http://www.aucklandcouncil.govt.nz/EN/AboutCouncil/businessandecconomy/Documents/housingmattersdecember2013.pdf>

This work is now 2-3 years old and there has been a massive surge in population and housing demand since.

### 2.4 Tony Alexander

Tony Alexander has considered the issues of Auckland's housing shortfall in a review <http://tonyalexander.co.nz/wp-content/uploads/2015/04/Sporadic-6-April-29-2015.pdf>

Tony's analysis considers the Persons per Household "PpH" in Auckland sits at approx. 3.0 Tony then postulates that if the PpH in Auckland was to assimilate what the PpH is for the rest of NZ, at 2.58, then Auckland would have a housing shortfall of 76,000 dwellings. Tony doesn't state that Auckland will (or should) move to a PpH of 2.58, and is merely stating that if it was 2.58, this is what the number would be. Tony reaches no further conclusions.

In the sections below, we will take a more detailed review of the main issues affecting the Auckland unmet dwelling demand.

## 3.0 Introduction and Methodology of the SD4 Analysis

The current Auckland dwelling demand can be considered as the ratio of "population divided by the People per Household (PpH)". For an efficient housing market, we can call this "People per Household Efficient, or "PpHE". When we have determined the current Auckland Dwelling Demand, in an efficient market, and we then subtract the current household numbers within Auckland, this then leaves the current Unmet Dwelling demand estimate.

So that leaves three main inputs to evaluate:

1. What should the population figure for Auckland in 2016 be?
2. What is the number of occupied households or dwellings in 2016?
3. What is a reasonable PpHE, if Auckland was an efficient housing market in 2016?





In the sections below, we will look at each of the 3 points:

#### 4.0 What should the Auckland 2016 population figure be?

SD4 have no specific population estimation expertise, however we have researched the data from the relevant experts and provided this below:

- The Feb 2013 NZ Census Auckland population figure was 1,415,550.
- The Feb 2013 NZ Census has 473,448 occupied dwellings in Auckland, and with 33,360 un-occupied dwellings has a total dwellings of 509,625.
- The figures above provide a ratio of 2.99 PpH for occupied dwellings as at Feb 2013. This is the most relevant figure as the unoccupied dwellings do not include occupants, who “may” have been away from Auckland at that time.
- In the 3 years since the Feb 2013 Census there has been very rapid population growth. Auckland Council released information on the 23<sup>rd</sup> October 2015, (<http://ourauckland.aucklandcouncil.govt.nz/articles/news/2015/10/aucklands-growing-population/>) that Auckland was growing by 43,000 houses per year, as at June 2015. This aligns with Doug Fairgray’s evidence to the IHP, Topic 081a, dated 31 March 2016, Footnote 17, p35, where he states that the population growth rate to 2015 has been above the high projection rate.
- The anecdotally reported population growth to June 2016 has been even greater in the last 12 months.
- There are some slight differences over the classification of population between “usually resident population count”, which adjusts for people missed or counted more than once by the census, residents temporarily overseas etc, and the Census count process. Therefore we will focus on the *increase* in population since Census count in Feb 2013.
- On the basis of the above, I will use a conservative increase of 120,000 over the 1,415,550 figure, for the 3 year period since the Feb 2013 Census, so **1,535,000** people.

#### 5.0 What is the occupied dwellings figure in Auckland in 2016?

- We need to use the 473,448 occupied dwellings and add the increase in dwelling numbers in the last 3 years.
- Building consents are the most reliable figure for this, although they don’t allow for:
  - The existing houses that are demolished (or removed) to make way for the new dwellings
  - Dwellings consented and not built
  - The time lag between when a dwelling consent is issued and when the dwelling is occupied
  - Whether the completed dwelling is actually occupied, or left un-occupied.
  - Based on the above 4 points (especially Point 1), I believe it is fair and reasonable to make a 10-15% deduction on the building consent figures, to provide additional occupied dwellings.
- So lets use the building consent figures in Auckland for the last 3 years of 6,364 in 2013; 7,657 in 2014 and 8,716 in 2015, totalling an extra 22,737 dwellings. With a 10% deduction factor, lets assume this creates an extra 20,500 occupied dwellings.
- This provides a total occupied dwelling figure in 2016 of 494,000 dwellings.



## **6.0 What is a reasonable PpHE, if Auckland was an efficient housing market in 2016?**

The section above provides a 2016 PpH of 1,535,000 divided by 494,000 dwellings, or 3.11.

In an efficient market, the long term trend should have Auckland show a PpH of between 2.85 to 2.90, as at 2016. (see Doug Fairgray's submission to IHP on Topic 081a, dated 31<sup>st</sup> March 2016, Cl 6.38, pg36 where there is debate of a number between 2.86 and 2.89).

The PpHE for Auckland in 2016 should we believe therefore be between 2.85 and 2.90.

## **7.0 SD4 comments on the previous review of Auckland's housing shortfall**

The Auckland Council's (AC) reviews was carried out in late 2013, MBIE's in 2014 and the Salvation Army's (SA) in 2015. There is an obvious impact on timing, as there has been extremely strong population growth in Auckland and NZ during the last 2-3 years. New dwelling construction has lagged far behind the desired / required 13,000 dwellings per annum, so all of the figures stated by these parties will now need to be revised upwards.

Tony Alexander's discussion / review in 2015 highlighted all of the key issues and merely postulated that "if" Auckland was to have a PpH similar to the rest of NZ, of 2.58, then the housing shortfall would be 76,000 dwellings. Auckland has different demographic and family make up issues than the rest of NZ, so it is unlikely that Auckland will get close to the rest of NZ's PpH.

We believe the biggest issue that the Auckland Council, MBIE and Salvation Army reviews don't directly state but is implicit, is that Auckland's extreme housing affordability issues is actually creating a reduction in demand, from the demand that would exist if Auckland was a normal functioning (more affordable) or efficient housing market.

So when we consider the MBIE, AC and SA numbers of 12-18,000; add a further amount accounting for the last 2-3 years of under-supply; add a further quantum of demand that would move Auckland from the current "unaffordable" market state to an efficient market, then the MBIE, AC and SA assessments could reasonably move towards the 35,000 to 45,000 range.

## **8.0 Conclusion**

For a population of 1,535,000 at a PpH of 2.85, Auckland would need 538,600 dwellings.

For a population of 1,535,000 at a PpH of 2.90, Auckland would need 529,310 dwellings.

At a PpH of 2.85 Auckland has an unmet demand of 44,600 dwellings and at a PpH of 2.90 Auckland has an unmet demand of 35,300 dwellings.

Based on the above, **we believe a fair and reasonable figure of the unmet dwelling demand for Auckland as at early-mid 2016, is 40,000 dwellings.**



# Memo

5<sup>th</sup> July 2016

To: Auckland Unitary Plan Independent Hearings Panel

From: Patrick Fontein

Subject: **Feasible Development Capacity of the PAUP's FUZ and the IHP's FUZ.**

## 1.0 Background and Introduction.

Patrick Fontein of Studio D4 (SD4) has been engaged by the Auckland Unitary Plan Independent Hearings Panel (IHP) to review the feasible development capacity of:

1. The PAUP's Future Urban Zone (FUZ) land area.
2. the IHP's Future Urban Zone (FUZ) land area.

The PAUP's FUZ land locations and their gross areas were provided by the IHP, attached as Appendix 1.

The IHP's FUZ land locations and their gross areas were provided by the IHP (under Confidentiality) on the 27<sup>th</sup> April 2016, attached as Appendix 2.

The IHP have requested SD4 to ascertain the realistic development capacity of the PAUP's FUZ and the IHP FUZ areas, taking account of the areas likely to be taken for road reserves, landscape reserves and with an allowance for business land.

Below we highlight the analysis methodology and the assumptions made. We then provide a commentary on the Results, followed by the Conclusions.

## 2.0 The Analysis Methodology and Assumptions Made

**2.1 FUZ Gross Area.** We have taken the FUZ land locations and gross areas and tabulated these into a spreadsheet. This spreadsheet is provided in Appendix 3 for the PAUP FUZ and Appendix 4 for the IHP FUZ. The contents of each of the columns are described in detail below. The PAUP FUZ has a gross land area of 10,112 hectares. The IHP FUZ has a gross land area of 12,119 hectares, so approximately 20% more.

**2.2 Adjacent Density.** We have then considered the density of nearby residential neighbourhoods, which give a clear indication of the likely dwelling / hectare density of the future new neighbourhoods.

**2.3 New Suburb Site Size.** The terrain of the gross land areas was then considered. Areas with more undulating terrain were given a more generous reserve requirement, to take account of the contours.



**2.4 Road Reserves.** The Road Reserves takes a lot of area off the gross site area. Careful analysis was undertaken of recent subdivisions of similar section sizes, with the amount of land the road reserves took up. The road reserve area of 25% for larger sections and 28% for smaller sections is considered representative.

**2.5 Landscape Reserves.** The Landscape reserves consisted of circa 10% of gross area. This takes account of passive and active open space reserves, as well as some stormwater reserves.

**2.6 Net Development Area.** Accounting for all of the above factors gives the Net Development Area. The results show an area of approx. 2/3 of the gross land area, which is representative of recent subdivisions.

**2.7 Business Area.** With business land, for this FUZ assessment we refer to light and heavy industry, rather than town centres. There are two columns which consider the amount of business zoned land for each location relative to the total net area, and then a column which provides the Net Business area for each location. Any future town centre residential development can be considered *within* the residential areas and dwelling numbers provided. Careful consideration was taken of:

- Auckland Council's Jeremy Wyatt's submission to the IHP, dated 27<sup>th</sup> July 2015
- The relative proportion of residential to business in most large cities. 8-10% of residential areas seemed a reasonable allowance.
- The relative quantum of business zoned land required within the Auckland Plan. SD4's Vacant Industrial Land Fine Grained analysis conducted for Auckland Council in 2014 highlighted approx. 300 vacant hectares of business zone land. A further 700 hectares of land would provide 1,000 hectares of vacant and future business zoned land, which Industry would be satisfied with.
- The locations of FUZ business land was considered, relative to industry's demand and the land owner's willingness to provide. The southern corridor / Drury is the most likely and highest future demand area for business zoned land.

**2.8 Net Residential Area.** Subtracting the business land area from the net developable area provides the Net Residential Area, in hectares. For the PAUP's FUZ a result of 6,109 hectares and for the IHP's FUZ, a result of 7,373 hectares. For both FUZ, the net residential area is just over 60% of the gross overall land area, a percentage which we feel is reasonable.

**2.9 Intensification Levels.** This section then considers the likely levels of intensification that could prevail within each location. Flat Bush and Hobsonville are already showing strong intensification and are likely to maintain this. This also takes some allowance for future higher residential densities in and surrounding future town centres. Conversely the more distant and rural areas are likely to have less intensification.

**2.10 New Dwellings / Hectare.** Considering the likely section sizes and the likely intensification factors, gives a dwelling per hectare assumption. This ranges between 15 to 30-35 dwellings per hectare, with a slight anomaly of the small Hobsonville site near the water. The dwellings / hectare take account of the existing dwellings that are on each site. An overall *new* dwelling / hectare density of circa 18.7-18.9 in FUZ areas, means the overall average dwelling density / hectare will be circa 20 when taking existing dwellings into account. This is considered fair and consistent with the more recent subdivisions completed on the outskirts of Auckland.

**2.11 Resultant Dwellings.** Taking the Net Residential developable land area and multiplying this by the dwellings per hectare, gives the total dwellings likely to be yielded for each FUZ area. For the PAUP FUZ this gives a total of 115,260 and for the IHP FUZ gives 138,177 dwellings that can reasonably be provided within the FUZ area. As a back check this is a dwelling density from the overall gross land area of circa 11.4 dwellings / hectare, which also feels sensible.

**2.12 Take Up Rate and Existing Use Lot Size.** These two issues are related. When a FUZ area is predominated with Lifestyle blocks of relatively small land area, they are going to be harder to re-develop to subdivisions, relative to a 100 hectare site. The result is that these smaller existing use lots will take longer to develop. Another major factor in take up rate is the distance to the main Auckland urban area. An Albany or Flat Bush FUZ site will have a take up rate that is much faster than a FUZ site in (say) distant Helensville.



### 3.0 Commentary on the Results and Conclusion

#### 3.1 The PAUP FUZ Area

The provision of 10,112 hectares of FUZ gross land area has yielded the following:

- 627 net hectares of business zoned land
- 6,109 net hectares of residentially zoned land
- at a dwellings / net hectare of 18,87, **115,260 extra dwellings** are able to be developed within the PAUP FUZ area, as shown in Appendix 1.

#### 3.2 The IHP FUZ Area

The provision of 12,119 hectares of FUZ gross land area has yielded the following:

- 700 net hectares of business zoned land
- 7,373 net hectares of residentially zoned land
- at a dwellings / net hectare of 18.74, **138,177 extra dwellings** are able to be developed within the IHP's FUZ area, as shown in Appendix 2.

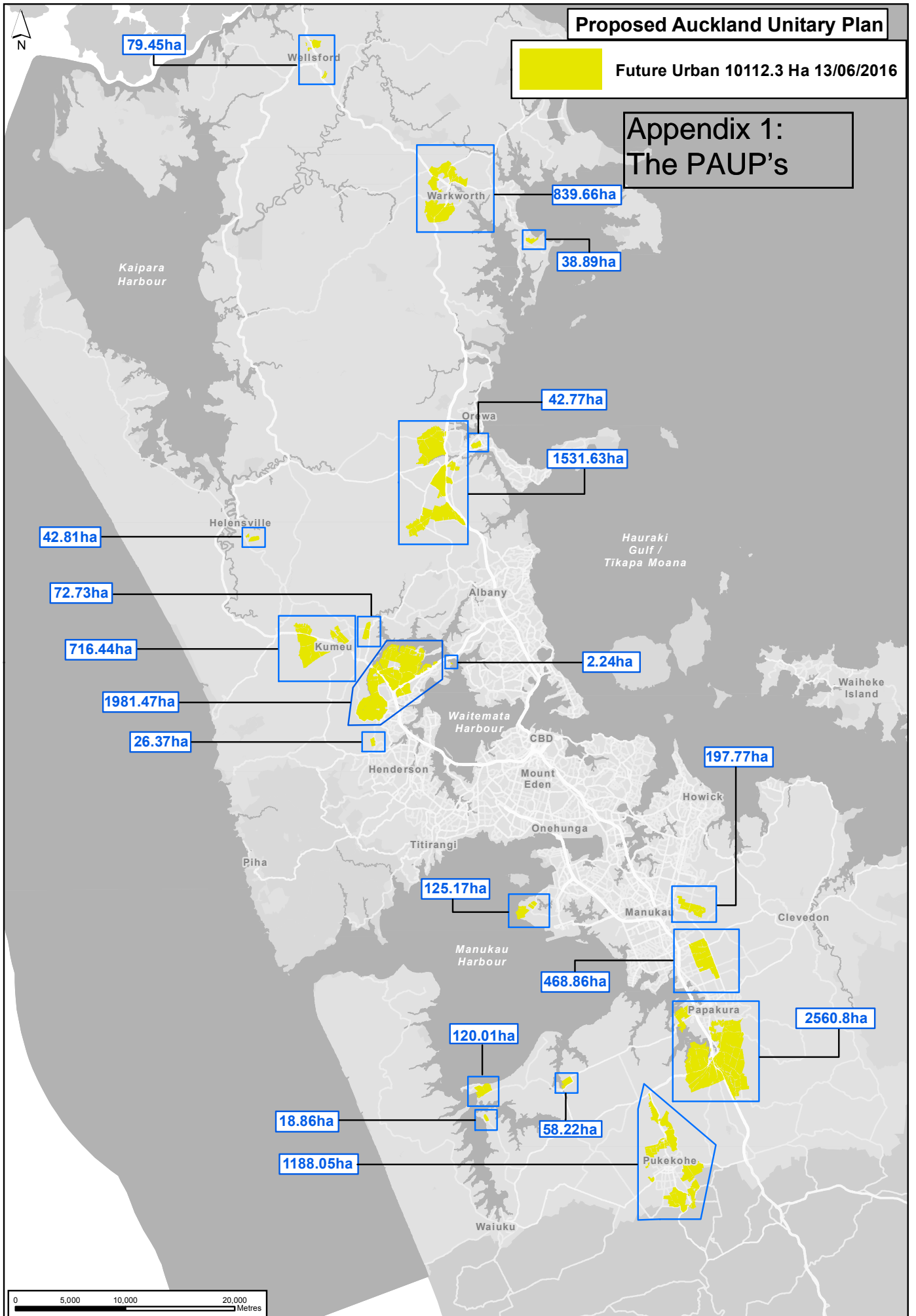
#### 3.3 Variances between the PAUP and the IHP FUZ Areas

The IHP's FUZ has provided an additional 2,007 hectares of FUZ gross land area, compared to the PAUP FUZ. The differences in resultant yields are as follows:

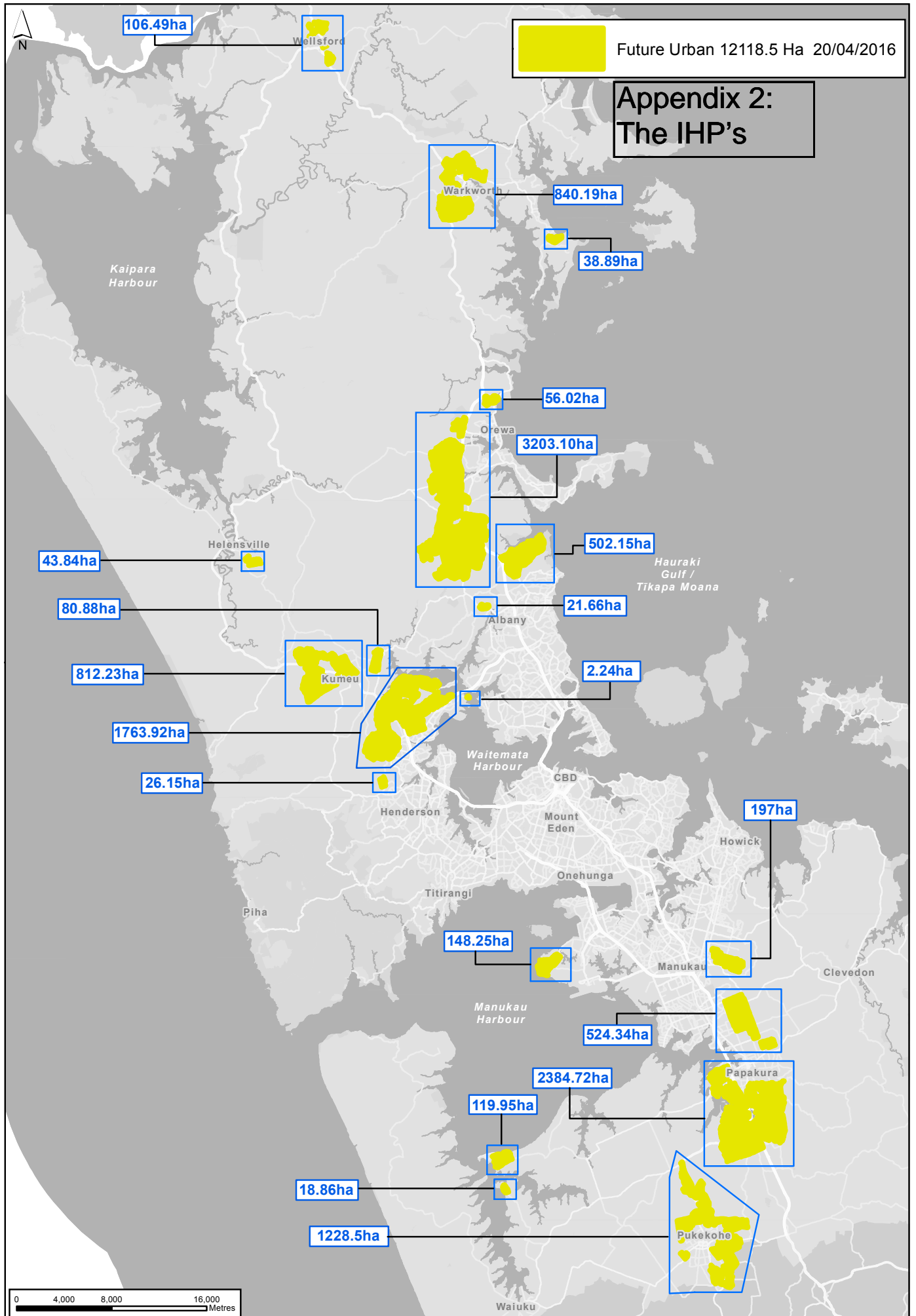
- The IHP has an increase of 77 net hectares of business zoned land, relative to the PAUP.
- The IHP has **22,917 extra dwellings** able to be developed within the FUZ area, relative to the PAUP.

We believe we have followed a fair and robust methodology, that should be widely accepted within the overall property community, for reviewing the extra dwelling and business land capacity of the PAUP and the IHP FUZ. We are satisfied that this robust process has produced reliable results.









### Appendix 3: PAUP Future Urban Zones Analysis

by Patrick Fontein, Studio D4

28/06/16 16:11

	FUZ Location Name	FUZ Zone Gross Area	adjacent Density	New Sub Site Size	Terrain	Road Reserve	Landscape Reserves	Net Dev Area	Business % of Net	assumed Bus Area	Net Resid Area	Intensification	new dwell / hectare	Dwellings	Take Up Rate	Exist Use, Lot Size*	
1	Wellsford	79.45	D	D	A	25%	10%	53.63	8%	4.29	49.34	D	15	740	D	A	
2	Warkworth	839.66	D	D	B	25%	10%	566.77	8%	45.34	521.43	D	15	7,821	D	C	
3	Mahurangi	38.89	C	C	C	26%	12%	25.33	8%	2.03	23.30	C	18	419	C	A	
4	Red Beach	42.77	C	C	B	26%	10%	28.48	8%	2.28	26.21	C	18	472	C	A	
5	Dairy Flat-Silverd	1,531.63	C	C	B	26%	10%	1,020.07	6%	61.20	958.86	C	18	17,260	C	C	
6	Okura & Albany	-	C	C	B	26%	10%	-	8%	0.00	-	C	18	-	C	C	
7	Helensville	42.81	D	D	C	25%	12%	28.25	8%	2.26	25.99	D	15	390	D	A	
8	Kumeu	716.44	D	D	A	25%	10%	483.60	6%	29.02	454.58	D	16	7,273	C	B	
9	Riverhead	72.73	D	D	A	25%	10%	49.09	8%	3.93	45.17	D	16	723	C	A	
10	Whenuapai-Redh	1,981.47	C	C	A	26%	10%	1,319.66	5%	65.98	1,253.68	C	18	22,566	B	A	
11	Ranui	26.37	C	C	B	26%	10%	17.56	5%	0.88	16.68	C	18	300	B	A	
12	Hobsonville	2.24	A	A	A	0%	15%	1.90	0%	0.00	1.90	A	80	152	A	A	
13	Ihumatao	125.17	C	C	A	26%	10%	83.36	8%	6.67	76.69	C	20	1,534	C	A	
14	Flat Bush	197.77	A	A	C	28%	12%	125.31	8%	10.02	115.28	A	35	4,035	A	A	
15	Takanini	468.86	A	A	A	28%	10%	303.82	5%	15.19	288.63	A	30	8,659	A	C	
16	Drury	2,560.80	C	C	B	26%	10%	1,705.49	19%	322.51	1,382.98	C	20	27,660	C	D	
17	Pukekohe	1,188.05	C	C	A	26%	10%	791.24	6%	47.47	743.77	C	18	13,388	C	C	
18	Kingseat	58.22	C	C	A	26%	10%	38.77	6%	2.33	36.45	C	15	547	C	C	
19	Clarks Beach	120.01	D	D	A	25%	10%	81.01	6%	4.86	76.15	D	15	1,142	D	A	
20	Glenbrook Beach	18.86	D	D	A	25%	10%	12.73	6%	0.81	11.92	D	15	179	D	A	
		<b>10,112.20</b>				<b>33.39%</b>		<b>6,736.08</b>	<b>9.3%</b>	<b>627.07</b>	<b>6,109.01</b>		<b>18.87</b>	<b>115,260</b>			
		A < 400m2 B = 400-500 C = 500-600 D > 600m2+	A < 400 B=400-500 C=500-600 D > 600+	A = Level B = Easy C=Moder. D=Tough	<b>2,623</b> Hectares	<b>1,017</b> Hectares	<b>66.61%</b>		<b>6.20%</b>	<b>60.41%</b>	A = High B = Some C = Min D = Unlikely	Net R	<b>11.40</b> Gross R	A = Fast B = Good C = Moder. D = Slow	A = Large B=Med-Lge C = Medium D = Small it's FUZ area		



# Appendix 4: IHP Future Urban Zones Analysis

by Patrick Fontein, Studio D4

28/06/16 16:11

	FUZ Location Name	FUZ Zone Gross Area	nt Density	New Sub Site Size	Terrain	Reserv e	cape Reserv	Net Dev Area	ss % of Net	assumed Bus Area	Net Resid Area	Intensif ication	new dwell / hectare	Dwellings	Take Up Rate	Exist Use, Lot Size*
1	Wellsford	106.49	D	D	A	25%	10%	71.88	8%	5.75	66.13	D	15	992	D	A
2	Warkworth	840.19	D	D	B	25%	10%	567.13	8%	45.37	521.76	D	15	7,826	D	C
3	Mahurangi	38.89	C	C	C	26%	12%	25.33	8%	2.03	23.30	C	18	419	C	A
4	Hatfields Beach	56.02	C	C	B	26%	10%	37.31	8%	2.98	34.32	C	18	618	C	A
5	Dairy Flat-Silverc	3,203.10	C	C	B	26%	10%	2,133.26	6%	128.00	2,005.27	C	18	36,095	C	C
6	Okura	502.15	C	C	B	26%	10%	334.43	8%	26.75	307.68	C	18	5,538	C	C
7	Albany	21.66	C	C	B	26%	10%	14.43	0%	0.00	14.43	C	18	260	A	A
8	Helensville	43.84	D	D	C	25%	12%	28.93	8%	2.31	26.62	D	15	399	D	A
9	Kumeu	812.23	D	D	A	25%	10%	548.26	6%	32.90	515.36	D	16	8,246	C	B
10	Riverhead	80.88	D	D	A	25%	10%	54.59	8%	4.37	50.23	D	16	804	C	A
11	Whenuapai-Redh	1,763.92	C	C	A	26%	10%	1,174.77	5%	58.74	1,116.03	C	18	20,089	B	A
12	Ranui	26.15	C	C	B	26%	10%	17.42	5%	0.87	16.55	C	18	298	B	A
13	Hobsonville	2.24	A	A	A	0%	15%	1.90	0%	0.00	1.90	A	80	152	A	A
14	Ihumatao	148.25	C	C	A	26%	10%	98.73	8%	7.90	90.84	C	20	1,817	C	A
15	Flat Bush	197.00	A	A	C	28%	12%	124.82	8%	9.99	114.83	A	35	4,019	A	A
16	Takanini	524.34	A	A	A	28%	10%	339.77	5%	16.99	322.78	A	30	9,684	A	C
17	Drury	2,384.72	C	C	B	26%	10%	1,588.22	19%	300.33	1,287.89	C	20	25,758	C	D
18	Pukekohe	1,228.50	C	C	A	26%	10%	818.18	6%	49.09	769.09	C	18	13,844	C	C
19	Clarks Beach	119.95	D	D	A	25%	10%	80.97	6%	4.86	76.11	D	15	1,142	D	A
20	Glenbrook Beach	18.86	D	D	A	25%	10%	12.73	6%	0.81	11.92	D	15	179	D	A

<b>12,119.38</b>					<b>33.39%</b>	<b>8,073.07</b>	<b>8.7%</b>	<b>700.04</b>	<b>7,373.03</b>		<b>18.74</b>	<b>138,177</b>				
A < 400m2	A < 400	A = Level	<b>3,145</b>	<b>1,218</b>	<b>66.61%</b>	<b>5.78%</b>	<b>60.84%</b>	A = High	Net R	<b>11.40</b>	A = Fast	A = Large				
B = 400-500	B=400-500	B = Easy	ectares	ectares				B = Some	Gross R		B = Good	B = Med-Lge				
C = 500-600	C=500-600	C=Moder.						C = Min			C = Moder.	C = Medium				
D > 600m2+	D > 600+	D=Tough						D = Unlikely			D = Slow	D = Small				
													* relative to it's FUZ area			

# Memo

5<sup>th</sup> July 2016

To: Auckland Unitary Plan Independent Hearings Panel

From: Patrick Fontein

Subject: **Feasible Dwelling Capacity of the PAUP's Countryside Living (CSL) and the IHP's CSL.**

## 1.0 Background and Introduction.

Patrick Fontein of Studio D4 (SD4) has been engaged by the Auckland Unitary Plan Independent Hearings Panel (IHP) to review the feasible development capacity of:

1. The PAUP's Countryside Living (CSL) land area.
2. The IHP's Countryside Living (CSL) land area.

This CSL work is part of a series of related development capacity analysis SD4 has carried out for the IHP on the Auckland existing urban areas and the future urban zone (the FUZ).

The PAUP's CSL land locations and their gross areas were provided by the IHP, attached as Appendix 1.

The IHP's CSL land locations and their gross areas were provided by the IHP (under Confidentiality) on the 27<sup>th</sup> April 2016, attached as Appendix 2.

The IHP have requested SD4 to ascertain the realistic dwelling capacity of the PAUP's CSL and the IHP CSL areas, taking account of the areas likely to be taken for road reserves and landscape reserves.

Below we highlight the analysis methodology and the assumptions made. We then provide a commentary on the Results, followed by the Conclusions.

## 2.0 The Analysis Methodology and Assumptions Made

**2.1 CSL Gross Area.** We have taken the CSL land locations and gross areas and tabulated these into a spreadsheet. This spreadsheet is provided in Appendix 3 for the PAUP CSL and Appendix 4 for the IHP CSL. The contents of each of the columns are described in detail below. The PAUP CSL has a gross land area of 22,062 hectares. The IHP CSL has a gross land area of 25,354 hectares, so approximately 15% more.

**2.2 Terrain.** We have reviewed the terrain of the countryside living areas. Level land areas will be easier to develop as 1-2 hectare allotments, and will thus yield greater dwellings (per say 100 hectares), than undulating hills covered with native bush.



**2.3 Road Reserves.** For CSL areas, the Road Reserves takes some area off the gross site area, although not in as greater a proportion as normal residential subdivisions, eg for the FUZ. Careful analysis was undertaken of recent lifestyle block subdivisions of similar section sizes, with the amount of land the road reserves took up. We have allowed to take off 5% off the gross land area for road reserves in the CSL areas.

**2.4 Landscape Reserves.** We have made an allowance of circa 8% of gross area. This takes account of most CSL land managing stormwater on site and a small allowance for passive and active open space reserves.

**2.5 Net Development Area.** Accounting for all of the above factors gives the Net Development Area. The results show an area of approx. 87% of the gross land area, which is representative of recent CSL subdivision developments.

**2.6 Business Area.** No allowance has been made by SD4 for any business zoned land within the CSL areas provided. Should business zoned land be desired in future, this is a straight forward exercise, we just need to take off the gross land area to be used for business from the gross CSL land area.

**2.7 Planning Rules Assumptions for PAUP CSL.** Part of the CSL is covered by Table 10 of the PAUP, Part 3, Sect 5 Subdivision. Other parts of the CSL are not covered by Table 10, which we have taken account of.

**2.8 Planning Rules Assumptions for IHP CSL.** Also as Table 10 of the PAUP, Part 3, Sect 5 Subdivision and other parts of the CSL which are not part of Table 10. The IHP's modifications provide greater land surrounding Coatesville, Kumeu and Taupaki, which have more relaxed TRSS rules. This has contributed to the IHP's CSL land providing greater dwellings than the PAUP's.

**2.9 Factors affecting Development Capacity.** Calculating development capacity within the Auckland CSL areas is not a straight forward exercise. As well as more traditional development factors like terrain and existing dwellings (discussed below), there are big differences in the extent of Significant Ecological Areas (SEA) within each location, as well as a number of locations having specific precinct rules, many of which restrict development capacity. This thus leads to an assessment of developable dwellings per chosen area of land, which is discussed in more detail below.

**2.10 Hectares / New Dwelling.** Considering the terrain of the land, the density of the existing dwellings on the land, the extent of SEA and then a location's precinct rules are the main factors which affect an assessment of the amount of new dwellings likely to be able to be developed into each CSL area being evaluated. Areas with easy terrain, low density of existing dwellings, less SEA's etc, will score highest, i.e. use less land per new dwelling. Conversely land that already has a greater proportion of dwelling density, and has tougher terrain, will yield less future dwellings (per say 100 hectares of land). The precinct rules within each location are then an overall "filter" effectively "blocking" development to greater densities than the precinct allowances, in these locations. The above factors are why the areas surrounding the Waitakere Ranges, with substantial native bush and a difficult terrain, have a lower density. The precinct rules have the biggest relative impact in areas such as Matakana, Warkworth and Waimauku. The scores provided are the hectares per *new* dwelling, and take account of the existing dwellings. E.g. for a 100 hectare area, that we have provided a score of 2.5, this equates to 40 new dwellings. If the 100 hectares already had 5 dwellings, the total dwellings for the 100 hectare area will now become 45, or a *total* hectare / dwelling score of circa 2.22.

**2.11 Additional Dwellings.** Taking the net developable land area and dividing this by the hectares per new dwelling, gives the total dwellings likely to be yielded for each CSL area. For the PAUP CSL this gives a total of 7,129 and for the IHP CSL gives 7,979 dwellings that can reasonably be provided within the CSL area. As noted in Appendix 3 and 4 below, the overall hectares / *new* dwelling for both the PAUP and the IHP are between 2.7 and 2.8, providing a *total* hectare / dwelling score of circa 2.5 to 2.6, which we believe is reasonable.

**2.12 Take Up Rate.** This is mainly dependent on the market attraction of the area and the proximity (mainly in travel time) from urban Auckland. The take up rate will only marginally affect the yield. Outlying or slow take up areas may not be fully developed within the 30 year timeframe considered in this assessment.



**2.13 Existing Use Lot Size.** Different to the FUZ analysis, the existing use lot size will not greatly affect the take up rate of further more intensive development. An owner of a 10 hectare block, may well be attracted to subdividing down to 2 hectares, and creating 4 extra lots for dwellings. Larger land parcels will provide a greater overall redevelopment margin, but these larger lots are also more likely to be in more productive existing agricultural or horticultural use than the smaller allotments. The higher the existing residential dwelling density, will reduce the new dwellings able to be provided on a given CSL area.

**2.13 Countryside Living within the total Rural Development Capacity.** This CSL development capacity has been undertaken as part of SD4's work for the IHP on the existing urban area, the FUZ, and the rural / CSL area. Observers of the overall data provided for this work will note that the CSL development capacity numbers for the CSL and rural land are provided as one total number, being the 7,129 within the CSL as part of the overall 13,929 dwelling capacity within the PAUP; and the 7,979 within the CSL as part of the 14,220 as the IHP Recommended Plan, to ensure consistency in the manner in which the analysis was undertaken.

### **3.0 Commentary on the Results and Conclusion**

#### **3.1 The PAUP CSL Area**

The provision of 22,062 hectares of CSL gross land area has yielded **7,129 extra dwellings**, able to be developed within the PAUP CSL area, as shown in Appendix 1.

#### **3.2 The IHP CSL Area**

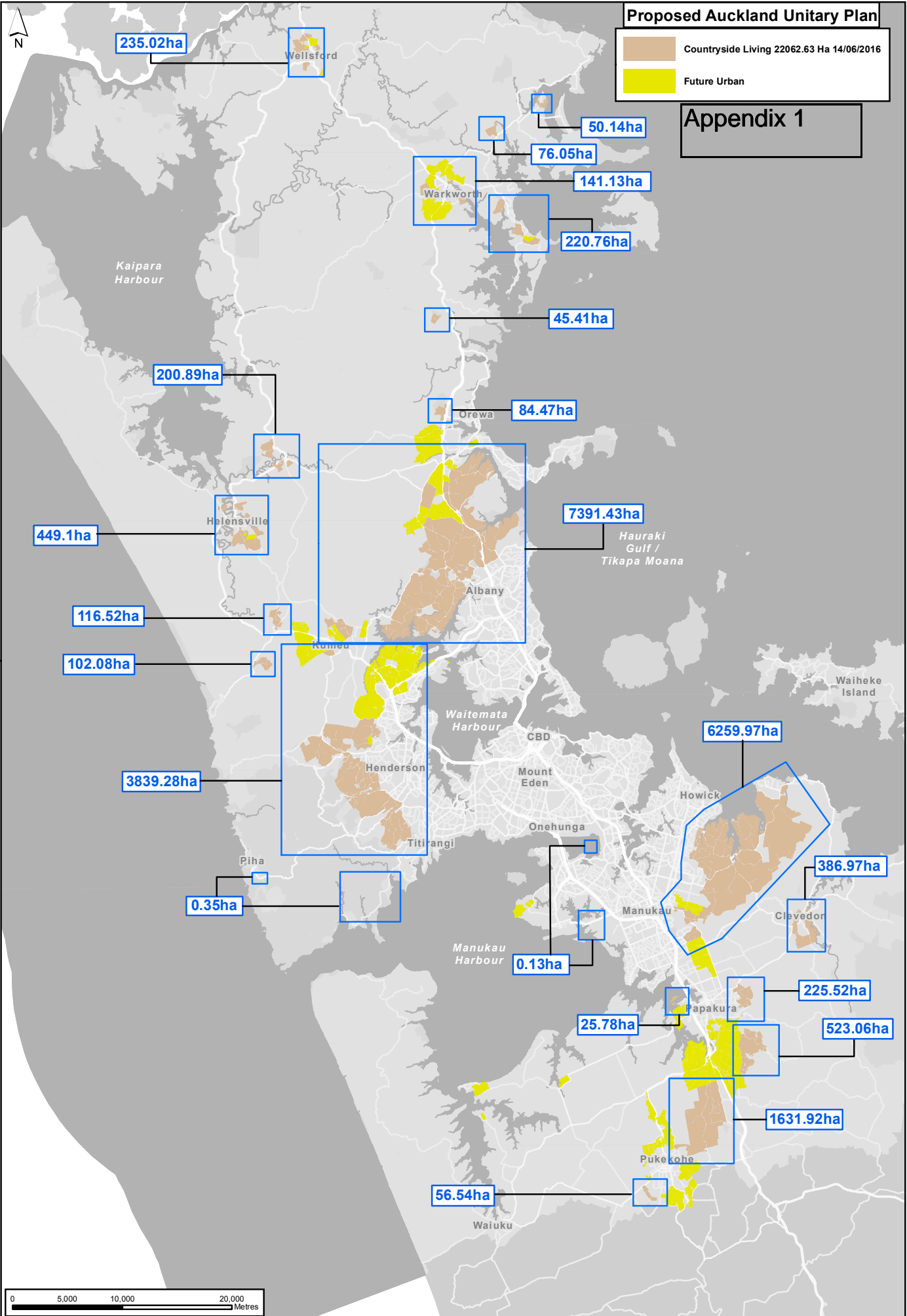
The provision of 25,354 hectares of CSL gross land area has yielded **7,979 extra dwellings**, able to be developed within the IHP CSL area, as shown in Appendix 2.

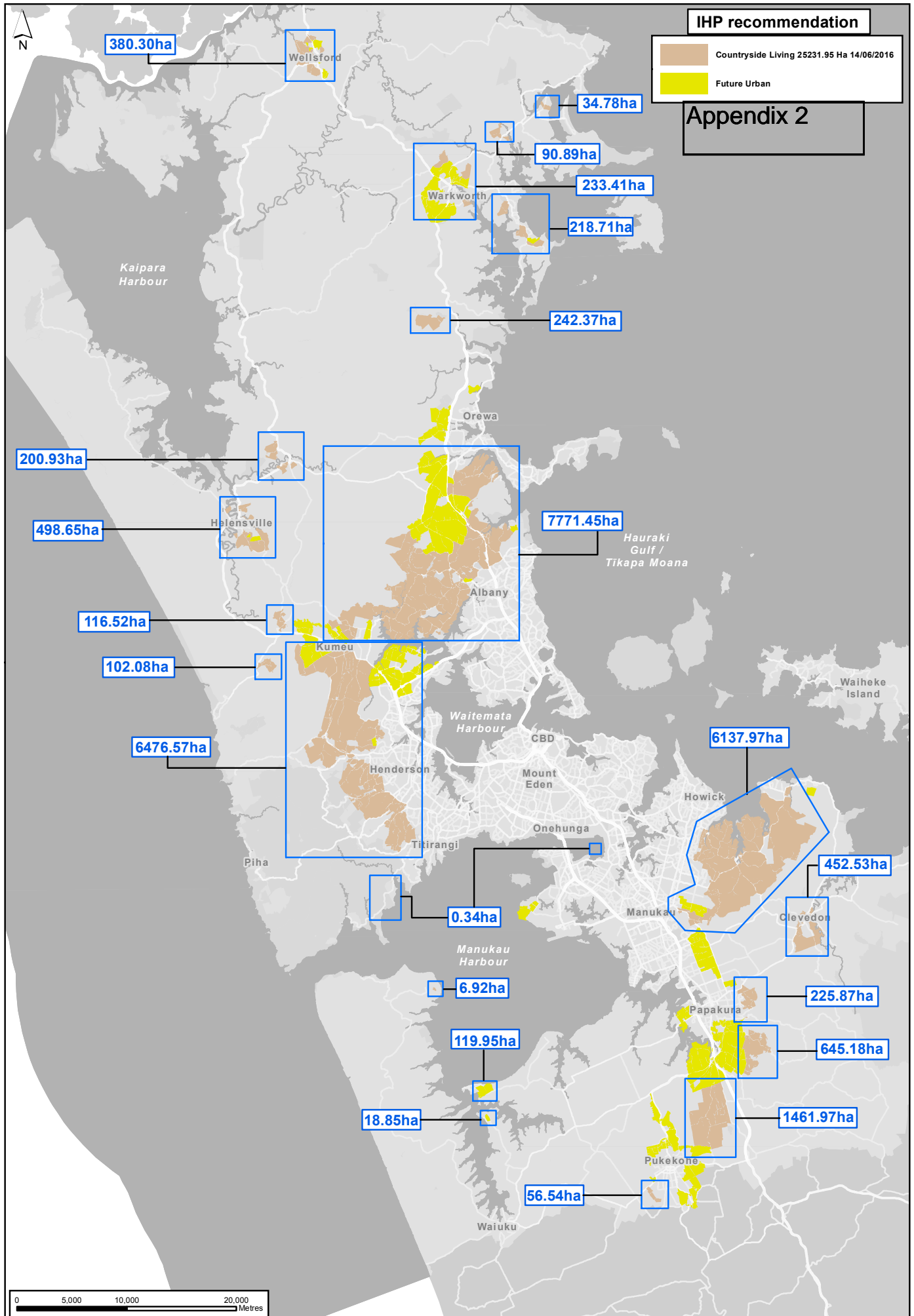
#### **3.3 Variances between the PAUP and the IHP CSL Areas**

The IHP's CSL has provided **850 extra dwellings** able to be developed within the CSL area, relative to the PAUP.

We believe we have followed a fair and robust methodology, that should be widely accepted within the overall property community, for reviewing the extra dwelling capacity of the PAUP and the IHP CSL. We are satisfied that this robust process has produced reliable results.







### Appendix 3: PAUP Countryside Living

2/07/16 9:48

	FUZ Location Name	CSL Zone Gross Area	Terrain	Road Reserve	Landscape Reserves	Net Dev Area	Hect/New Dwelling	Additional Dwellings	Take Up Rate	Exist Use, Lot Size*
1	Wellsford	235.02	A	5%	8%	205.41	2.3	89	D	A
2	Point Wells	50.14	B	5%	8%	43.82	1.5	29	D	C
3	Matakana	76.05	B	5%	8%	66.47	4.4	15	C	A
4	Warkworth	141.13	B	5%	8%	123.35	4.4	28	C	A
5	Mahurangi	220.76	B	5%	8%	192.94	2.5	77	C	C
6	Puhoi	45.41	C	5%	8%	39.69	4.6	9	C	C
7	Kaukapapa	200.89	B	5%	8%	175.58	2.3	76	A	A
8	Helensville	449.10	B	5%	8%	392.51	2.5	157	D	A
9	Waimauku	116.52	B	5%	8%	101.84	4.5	23	C	B
10	Muriwai Rd	102.08	B	5%	8%	89.22	2.4	37	C	A
11	North Auckland	7,475.90	A	5%	8%	6,533.94	3.0	2,178	B	A
12	West Auckland	3,839.28	D	5%	8%	3,355.53	3.2	1,049	B	A
13	East Auckland	6,259.97	B	5%	8%	5,471.21	2.3	2,379	A	A
14	Clevedon	386.97	B	5%	8%	338.21	2.4	141	B	A
15	Pararekau Isl.	25.78	B	5%	8%	22.53	4.1	5	A	A
16	Hunua Rd	225.52	B	5%	8%	197.10	2.3	86	A	A
17	Ararimu	523.06	B	5%	8%	457.15	2.5	183	A	C
18	Ramarama	1,631.92	A	5%	8%	1,426.30	2.6	549	C	D
19	Pukekohe	56.54	A	5%	8%	49.42	2.6	19	C	C
		<b>22,062.04</b>		12.60%		<b>19,282.22</b>	<b>2.70</b>	<b>7,129</b>		

A = Level  
 B = Easy  
 C = Moder.  
 D = Tough

1,103 Hectares  
 1,765 Hectares

87.40%

dw/ha  
 0.32 Gross R

A = Fast  
 B = Good  
 C = Moder.  
 D = Slow

A = Large  
 B = Med-Lge  
 C = Medium  
 D = Small

\* relative to it's FUZ area

## Appendix 4: IHP Countryside Living

2/07/16 9:47

	FUZ Location Name	CSL Zone Gross Area	Terrain	Road Reserve	Landscape Reserves	Net Dev Area	Hect/New Dwelling	Additional Dwellings	Take Up Rate	Exist Use, Lot Size*
1	Wellsford	380.30	A	5%	8%	332.38	2.3	145	D	A
2	Point Wells	34.78	B	5%	8%	30.40	1.5	20	D	C
3	Matakana	90.89	B	5%	8%	79.44	4.4	18	C	A
4	Warkworth	233.41	B	5%	8%	204.00	4.4	46	C	A
5	Mahurangi	218.71	B	5%	8%	191.15	2.5	76	C	C
6	Puhoi	242.37	C	5%	8%	211.83	4.6	46	C	C
7	Kaukapapa	200.93	B	5%	8%	175.61	2.3	76	A	A
8	Helensville	498.65	B	5%	8%	435.82	2.5	174	D	A
9	Waimauku	116.52	B	5%	8%	101.84	4.5	23	C	B
10	Muriwai Rd	102.08	B	5%	8%	89.22	2.4	37	C	A
11	North Auckland	7,771.45	A	5%	8%	6,792.25	3.0	2,264	B	A
12	West Auckland	6,476.57	C	5%	8%	5,660.52	3.2	1,769	B	A
13	East Auckland	6,137.97	B	5%	8%	5,364.59	2.3	2,332	A	A
14	Clevedon	452.53	B	5%	8%	395.51	2.4	165	B	A
15	Hunua Rd	225.87	B	5%	8%	197.41	4.1	48	A	A
16	Ararimu	645.18	B	5%	8%	563.89	2.5	226	A	C
17	Ramarama	1,461.97	A	5%	8%	1,277.76	2.6	491	C	D
18	Pukekohe	56.54	A	5%	8%	49.42	2.6	19	C	C
19	Awhitu	6.92	B	5%	8%	6.05	2.5	2	D	A
		<b>25,353.64</b>			12.60%	<b>22,159.08</b>	<b>2.78</b>	<b>7,979</b>		
			A = Level B = Easy C = Moder. D = Tough	1,268 Hectares	2,028 Hectares	87.40%	dw/ha	0.31 Gross R	A = Fast B = Good C = Moder D = Slow	A = Large B = Med-Lge C = Medium D = Small  * relative to it's FUZ area



# Memo

8<sup>th</sup> June 2016

To: Auckland Unitary Plan Independent Hearings Panel  
From: Kyle Balderston, Craig Frederickson (RIMU)

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Subject: **Feasible Capacity of Recommended Plan.**

## A. Background:

In a memo dated 22/03/2016<sup>1</sup> the panel directed Housing New Zealand Corporation (**HNZC**) to create a shape file combining the corporations submissions with the Councils 'in scope zoning' (**IHP Spatial Zoning**).

Further the Panel indicated that it would direct specified members of the Research and Evaluation Unit (**RIMU**) of Auckland Council, protected by confidentiality agreements, to run the Capacity for Growth Study Model (**CfGS**) and an updated version of the Auckland Development Capacity Model (**ACDC**) utilising a set of draft residential standards (**IHP Rules**) over the revised zoning maps. This combined rule and zoning set is referred to as the **Recommended Plan**.<sup>2</sup>

Further discussions have occurred with the Panel and other members of the modelling team (Mr Fontein) to clarify the scope of:

- changes required to the ACDC model, and the process for determining these changes;
- the nature of the various model outputs and narrative or interpretation of them required to provide useful information that will assist the panel in its deliberations.

This memo provides a 'brief narrative' of the work undertaken focussing on:

- changes made to the ACDC Model (see also report of Mr Patrick Fontein<sup>3</sup> who has provided most of the information and suggestions for changes);
- some detail of the inputs (spatial and rule based) and interpretation and translation process including those that may significantly influence the results;
- the resulting changes in *plan enabled* capacity (from the CfGS Model) between the previously modelled plans (PAUP and ACAP) and the Recommended Plan;
- the resulting changes in *feasible* capacity (from the ACDC Model) between the previously modelled plans (PAUP and ACAP) and the Recommended Plan.

This report focusses on the relative change that the rules and zoning changes of the Recommended Plan are likely to make in terms of *plan enabled* and *feasible* capacity relative to the Proposed Auckland Unitary Plan (**PAUP**) and Councils last modelled position (v3.7 being the last data presented by Auckland Council and v2.4 being the last version of the ACDC Model 'authorised' by PDEG) reflecting Auckland Councils Amended (residential) Provisions (**ACAP**).

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<sup>1</sup> AUIHP, 22 March 2016, Memo: *Capacity Modelling for Residential and Commercial/Industrial*,

<sup>2</sup> Further changes from the zoning and rules tested in this process are expected as the IHP refines their recommendations.

<sup>3</sup> SD4, 5 July 2016, Memo: *The ACDC Development Capacity Model: v3.8 Results, Description and Explanation*.

Ideally when making comparative assessments as many things as possible should be kept constant between data sets, changing only one variable at a time to ensure any resulting variation can be explained by spatial or regulatory changes.

In the case of the ACDC modelling, not only is the model changing (all else being equal, resulting in output changes) but the inputs to the various model versions are also in flux, including the zone rules and the zoning patterns. This has not occurred, meaning not all of the changes in Feasible Capacity (being outputs of the latest version of the model available at the time of assessment) are fully explainable solely by changes in the plan being tested.

Version 3.8 also has an updated 'time' where the model is buying sites at adjusted to April 2016 valuations rather than the June 2014 Valuations further complicating detailed or direct comparisons and making it difficult to isolate the reasons for changes between results to a single explanatory factor.

Figure 1 below illustrates the process undertaken for the assessment outlined in this report:

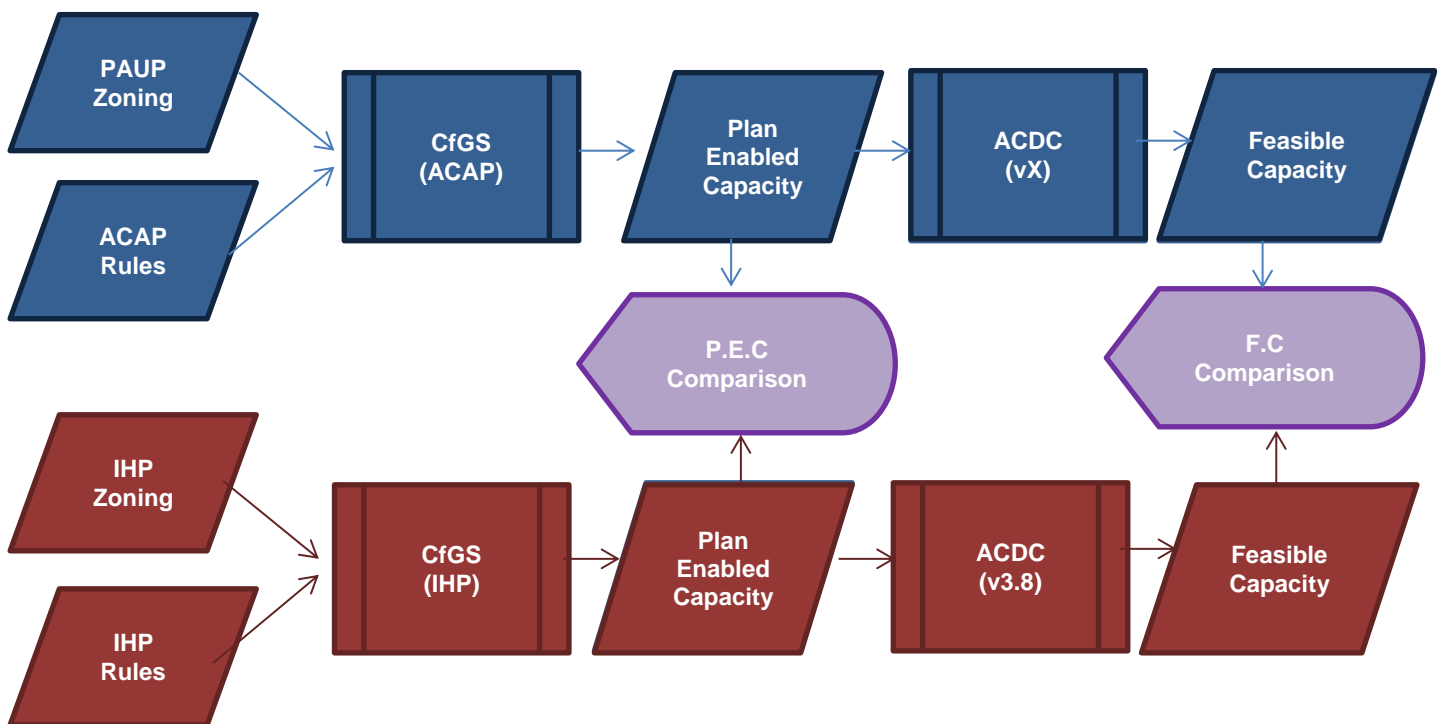


Figure 1: Plan Enabled and Feasible Capacity Analysis and Comparison.

## B. IHP Spatial Zoning Inputs:

As mentioned above the

- **Base Zoning** spatial data for the IHP modelling was provided to RIMU by Shelly Glassey on 4/4/2016 who had received it from Alex Fullerton @ BECA (on behalf of HNZN) earlier that day;
- In order to run the model appropriately, **Designations**<sup>4</sup>, **Additional Height Control Overlays**<sup>5</sup> (AHCO) and **Volcanic Viewshafts**<sup>6</sup> (VVS) have been included, but these have been taken from the last modelled AC zoning dataset<sup>7</sup>, noting that the Panel may be of a mind to amend these controls from the Councils last stated position in light of submissions and evidence.

The instructions from the IHP to HNZN (and therefore BECAs GIS team) were as follows:

### Housing New Zealand Corporation

Housing New Zealand Corporation (HNZN) is directed to provide to the Hearings Panel a shape file that joins together the HNZN zoning shape file (as reflected in its evidence and submission to the 081 hearing) and the Council's in-scope evidence version of its zoning shape file as completed by Council during the week of 21 March 2016.

On the basis that all base data is previously provided to HNZN, the 'joined up' shape file is to be provided to the Hearings Panel by 1 April 2016.

Of particular note is the lack of **Precincts** or **Overlays** in the IHP modelling which act to alter the underlying base zone rules, usually (but not always) by imposing greater restrictions than the base zoning rules facilitate.

We are not aware of the extent to which these provisions will be utilised in the final recommendations of the Panel, (the Special and Historic Character Overlays in particular imposed significant variations in density relative to the underlying zoning) but simply note that their presence in the AC data and absence in the IHP data will account for *at least some of the changes* in capacity and feasibility between the two model runs, and this fact should be kept in mind when comparing the results particularly in locations where these either applied previously or will be applied in the future.

However we also understand that the application of the Single House Zone in the (now withdrawn 'out of scope') Council data was closely aligned with and quite limited to the location of the (refined) Special and Historic Character Overlays, particularly in the main urban area, and it appears that the HNZN data has also utilised this approach in many locations.

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<sup>4</sup> Selected Designations (where they are assessed to preclude the underlying zoned purpose from being realised) have been used to filter parcels so affected from the CfGS and ACDC results.

<sup>5</sup> This includes the setting of height in Town Centre Zones, bonus heights in THAB and some other zones and height restrictions including the effect of Volcanic Viewshafts in other locations. Note that where the zoned area has changed (such as THAB or a Town Centre expansion) the AHCO has not been amended to match and the default zone height has been used instead.

<sup>6</sup> Volcanic Viewshafts have been used in combination with the zone height and Additional Height Control Overlays to set the effective height in many locations.

<sup>7</sup> As presented in the Evidence of Kyle Balderston (Capacity Modelling) to the 081a Rezoning General Topic.

The influence on capacity of the Special and Historic Character Overlays relative to the underlying SHZ densities in the IHP zoning (and rule) data may therefore be considerably less than in the AC version.

## C. IHP Rules:

We have had two meetings with Phill Reid and Vanessa Wilkinson (planners working for the IHP) to discuss the interpretation of the IHPs draft provisions, which we have been provided draft copies of.

While the detailed drafting of the provisions is quite different from the AC evidence, we were advised that the key development controls influencing the *scale and form* of the physical built environment are effectively unchanged, but considerable relaxation of density controls has occurred.

We have therefore interpreted the **IHP draft provisions to be fundamentally similar** (in effect as far as the assessment of capacity is concerned) to the AC final evidence (the 'ACAP' rules) for both residential and business zone development, with the exception of two main points:

1. General **density rules are not provided** (density rules do exist in relation to vacant site subdivision which is not relevant for the bulk of brownfields redevelopment, the focus of our modelling) which in theory enables any number of additional dwellings to be created on any site, provided that the relevant design controls are complied with;
  - a. For LL, R&CS and SHZ the minimum site areas (4000m<sup>2</sup>, 2500m<sup>2</sup> and 600m<sup>2</sup> respectively) are still presumed to be a limiting factor<sup>8</sup> – this approach may therefore underestimate the supply of dwellings from these zones from existing developed site subdivision or subdivision around (or through) established buildings<sup>9</sup> as owners implement developments without density controls;
  - b. For all other residential zones, maximum achievable **proxy densities** based on worked examples developed to support AC evidence on the provisions have been used in the CfGS (these are based on application of the bulk and location rules and design criteria to nominal sites to develop fully compliant developments) – discussions with the IHPs planning staff suggest as the design criteria are not substantially altered, this previous work remains a valid framework for determining plan enabled outcomes in the absence of overt density controls<sup>10</sup>.
  - c. These limits are used in the CFGS study to identify sites with *plan enabled capacity*, and in the ACDC model to provide the upper limits (along with other factors) to the maximum number of dwellings per site under the various typologies tested.
2. All residential zones have the option for either a **Second Dwelling Conversion**<sup>11</sup> and/or a **Minor Dwelling Unit**<sup>12</sup>;
  - a. The potential for new dwellings/accommodation units under these provisions has **not been modelled**.

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<sup>8</sup> We have not sighted the General subdivision rules which may also provide effective limits on achievable density or land per dwelling such as provision of safe, developable building platforms and etc.

<sup>9</sup> As opposed to the land based subdivision traditionally utilised as both a planning control and capacity assessment

<sup>10</sup> Note also that in the MHS zone the worked examples showed maximum achievable density was >200m<sup>2</sup>, which was greater than the density limit that applied on sites <1000m<sup>2</sup> in the

<sup>11</sup> Conversion of an existing dwelling on the site into two dwellings.

<sup>12</sup> MHUs were not provided for in the AC AUP provisions, but were a common 'legacy' development option for the establishment of new non-sub-dividable small (size limited) dwellings on sites with existing dwellings

- b. Supply of dwellings from these options being taken may on the one hand supply more, possibly cheaper dwellings, (particularly from sites that do not have any other plan enabled or feasible development options) but on sites where there are other more comprehensive options available, may preclude site redevelopment due to the ease, cheapness and increased improvement value (and rental return) this form of development represents. There is no information to on which to base any further views on the degree to which this provision will help or hinder dwelling supply but simply note the potential for a further alternative development form to occur than has been modelled.

## D. Recommended Plan, Plan Enabled Capacity (CFGS Modelling)

The CFGS model outputs of plan enabled capacity have been largely superseded as a measure of plan 'sufficiency' by the ACDC (which determines the currently feasible opportunities given the regulations) but it still plays an important role in the feasible capacity assessment process, including by:

- Undertaking considerable data cleansing, parcel tagging and organisation processes enable the feasibility assessment to proceed;
- Allocating key parameters relating to the rules and other physical and man-made attributes of the parcel are attributed and attributable to the parcels;
- The identification of parcels with development capacity provides a key pre-filtering process limiting the processing load in the feasibility assessment (sites that do not first have plan enabled capacity are not considered in the feasible development assessment)

Notwithstanding the current focus on feasible capacity, plan enabled capacity does provide an important metric of the *upper limit of development enabled* by the plan being tested, and comparison of plan enabled capacities can provide a useful indicator of the relative potential provided by various rule or zoning options.

### (1) Residential Zones

Capacity changes in the Residential Zones are significant and mostly explained by two main factors:

- variation in the spatial location and mix of zonings between the AC and IHP patterns (in summary, there is much more 'higher density residential' zoning in the Recommended Plan pattern)
- lack of precincts and overlays (all sites modelled as base zonings (no Special or Historic Character areas, minimal unmodelled or unmodellable 'special areas', resulting in an slight increase in reportable capacity)

The relative effect of these two points is shown in Figure 2 below which compares the total area zoned and modelled – for example, the total area zoned Single House has decreased in the Recommended Plan zoning pattern, but the total area modelled (as SH) has increased relative to the AC data, which is reflected in an increase in reported capacity despite a decrease in zoned area.

Additionally, as the more intensive residential zones (MHU, and THAB) have increase in zoned and modelled area – this would be expected to result in increases in plan enabled capacity, all else being equal:

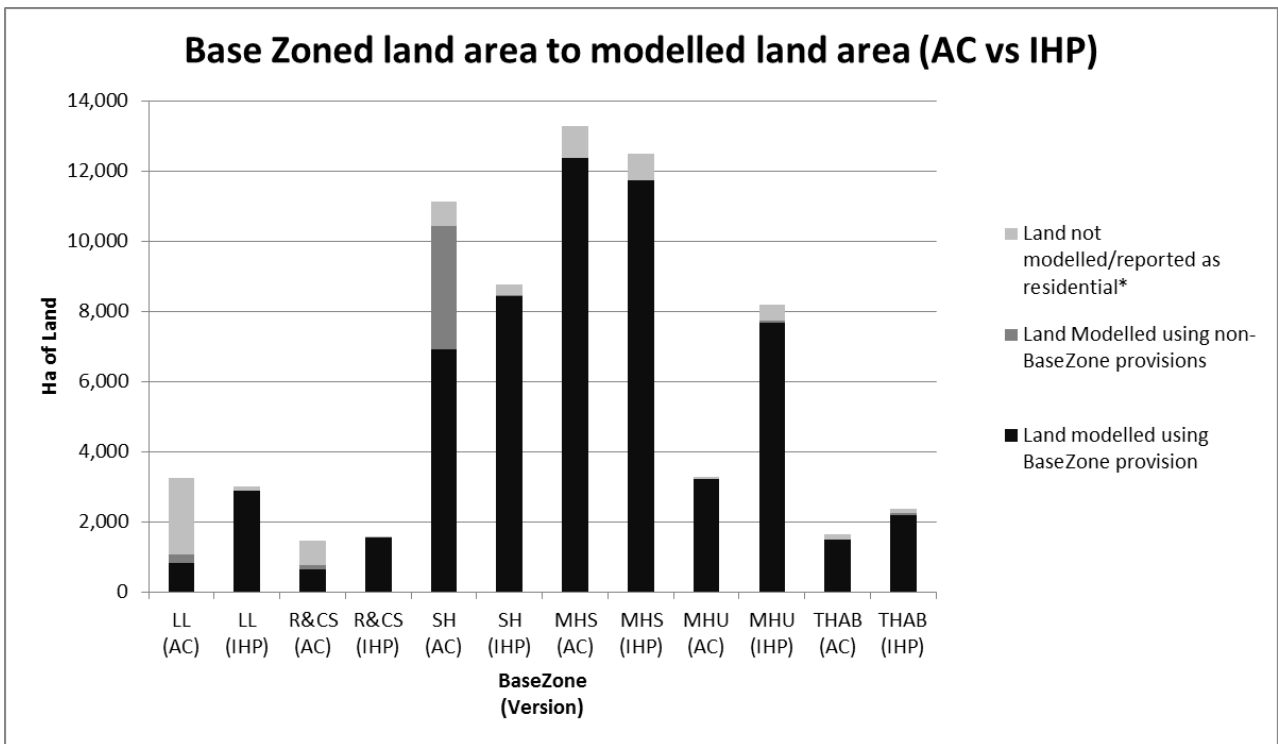


Figure 2: Basezoned Area to Modelled Area

Figure 3 below illustrates the change in residential redevelopment capacity by base zone.

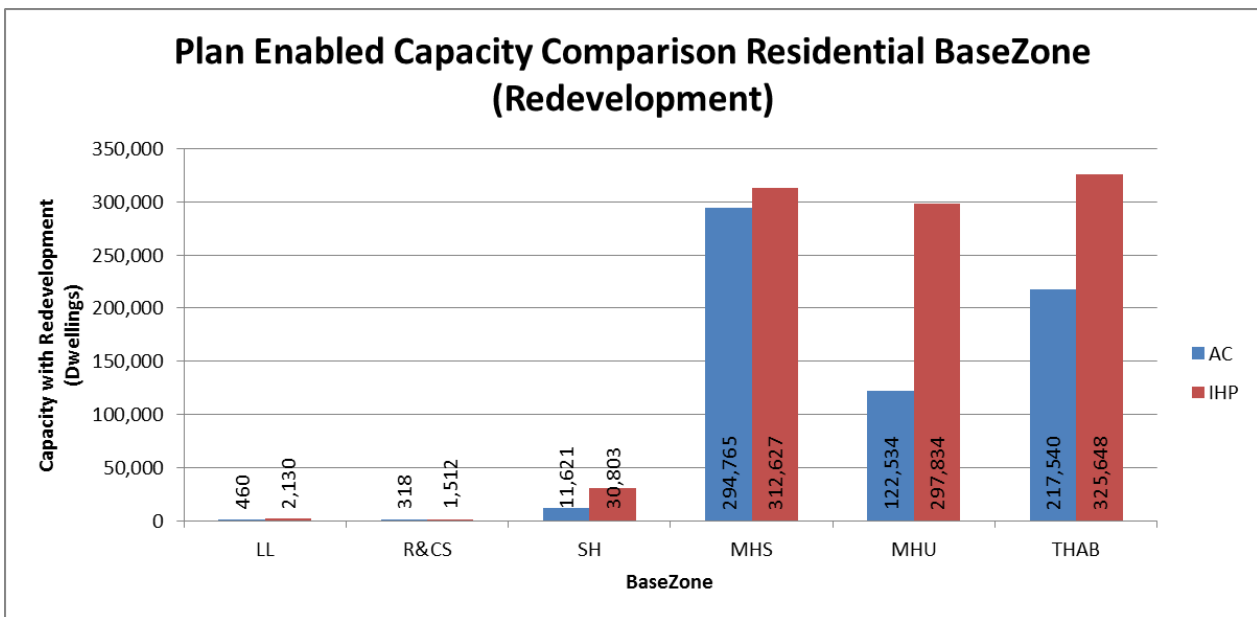


Figure 3: Plan enabled Residential Capacity with Redevelopment

The overall difference in plan enabled capacity is a **85,000 dwelling (or 66%) increase in Infill Capacity** and a **323,000 dwelling increase (or 50%) in Redevelopment Capacity**.

A summary table of plan enabled residential capacity results is contained in **Appendix 1**.

Summary maps of the results by meshblock, as well as a change map including as heatmaps are attached as **Appendix 2**



## (2) Business Zones

Aspects of business building bulk and location (HIRB, Yards, Upper level setbacks, Height and similar) are strongly influenced by the relative location of other more sensitive zonings. Due to the changes in the extent of the business zoning and the changed nature of the relationship to the zones adjacent to or nearby the business zoning, the CfGS business modelling has been updated to reflect these variations to provide an accurate reflection of business zone floorspace capacity (in particular for residential development) and comprehensive urban area coverage.

As mentioned above, while we have not received the draft business provisions, Mr Phill Reid had verbally advised that apart from some changes to industrial building heights (which is not relevant for consideration in our modelling of residential development as it is not enabled in these zones) advises that the business provisions are fundamentally ‘the same’.

We have therefore utilised the parameters and approaches used to model the AC provisions over the new IHP zoning pattern.

**The overall difference in capacity is a 281 ha (or 22%) increase in Vacant Land, 236 ha (or 10%) increase in Vacant Potential Land** as illustrated in Figure 4.

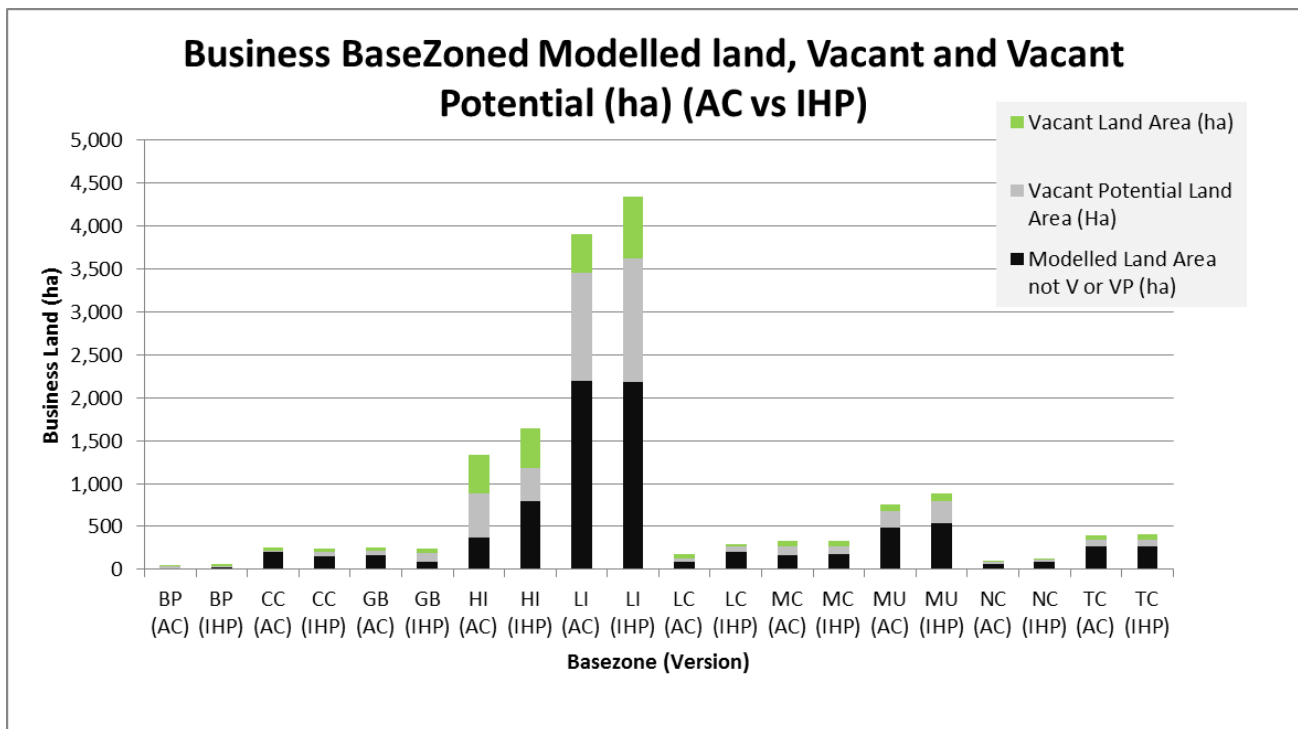


Figure 4: Business BaseZone Land Capacity Categories

However **the total area zoned as business has also increased by 10% (1,022ha)**, and the categories of modelled land have also increased, including as a result of zoning changes and a removal of precincts and overlays (particularly in the City Centre). The Heavy and Light Industry Zones and Mixed Use appear to have expanded the most in terms of intended changes to the zoning patterns.

The changes made to the modelling and input data have also resulted in a **18 million m<sup>2</sup> (or 6%) increase in maximum theoretical floorspace** as indicated by zone in Figure 5.

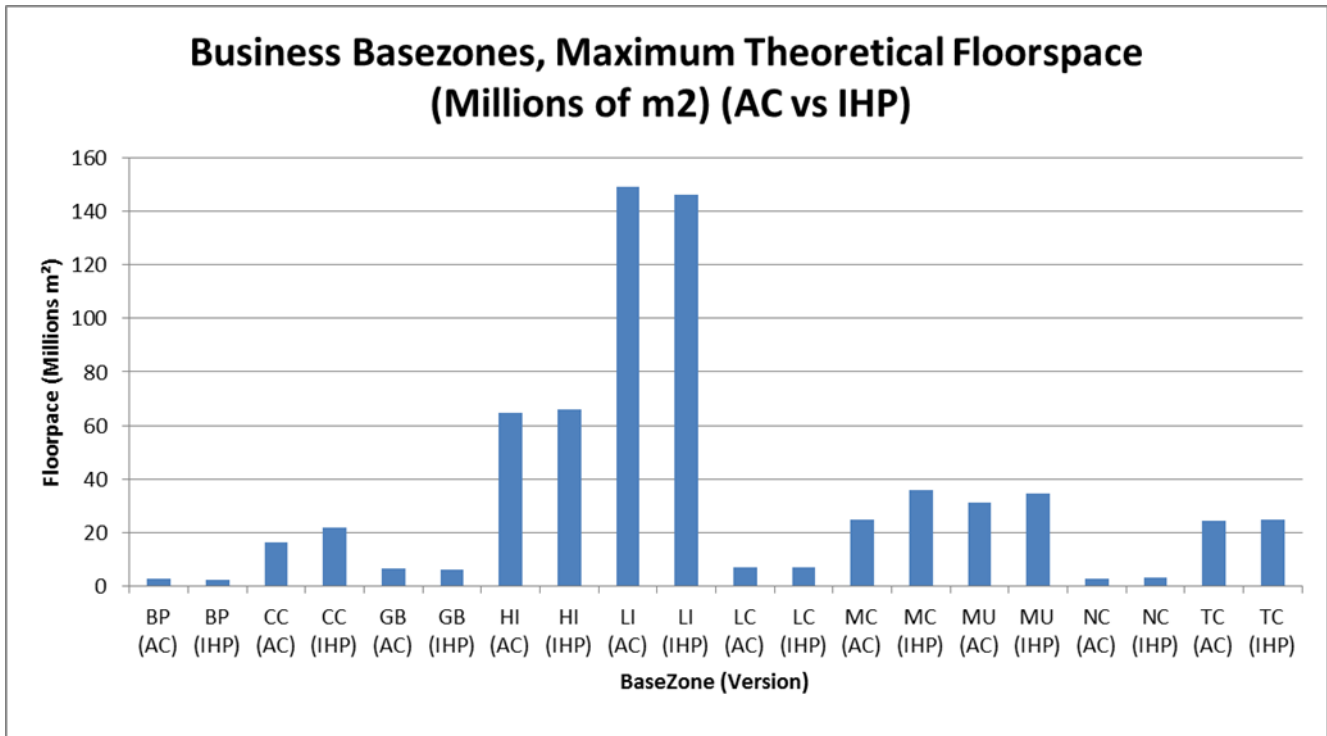


Figure 5: Business Basezone, Maximum Theoretical Floorspace

A summary table of plan enabled business capacity results is contained in **Appendix 3**.

## E. Updates to ACDC Model v3.8

A number of updates and improvements have been undertaken to the ACDC (Feasible Capacity) model.

These include changes to

- input parameters (LUT), which have been largely undertaken by Mr Fontein, and the changes and reasons for them are included in more detail in his **separate report**, and briefly summarised below
- calculations or model architecture, to correct errors, issues or accommodate changes to the input parameters which are briefly summarised below

### (1) Input parameter changes

#### Models Site Purchase Price (\*NEW\* Costs\_SiteCV\_Adjustment\_LUT)

This adjustment factors up the existing June 2014 LVs by Zone and Sales Location to a nominal date of April 2016.

The factors are focussed on the increase in 'development site' prices as advised by the PDEG based on their collective experiences and range from 10% (for Single House) to 70% (for Mixed Use in mid-range locations).

These increases reflect both general price increases but more specifically some increase related to speculative changes in land development potential due to the currently underway AUP process (relative increases in SH vs MU reflect these development potential changes).

This adjustment has the effect of increasing the purchase costs of sites in the model.

This adjustment has also moved the models effective development time period from commencing in June 2014, developing over 18 months and selling in late 2016, to commencing in April 2016, developing over an 18 month time period and selling in mid to late 2017.

Expected sale prices of the completed products are also adjusted upwards slightly to reflect inflation under an 'efficient housing market'<sup>13</sup>, so the price change differential over the 18 month development period is much lower than the previous observed calibrated values, which reflect rapid increases in values (between June 2014 and sales between Jan 2014 and November 2015) that these assumptions implicitly assume will be corrected by an increase in supply.

In addition, the model is reflecting a cautious developers (or financiers) 'go-no go' decision making process where rapid increases in value arguably would not (or more correctly should not) be built into the feasibility assessments.

#### Price Ceilings (Sale\_Price\_Ceiling\_LUT)

In association with general increases in the models purchase prices, dwelling sale prices also increase<sup>14</sup>.

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<sup>13</sup> Defined as one where house and land prices increase at approximately the same rate as the CPI.

<sup>14</sup> they are after all the same thing, the only difference is what side of the transaction you are on.

The reference price Ceilings (what a 'standard' house on an 'average' sized lot would sell for in the sales location) have also increased by between \$50k (low) and \$100k (high value) sales locations. As a percentage, however low value locations have increased by 12.5% with high value locations by just under 7%.

### Sales Location Category

The Sales location categories have been updated slightly to reflect the changing spatial nature of the Auckland housing market since mid-2014, as well as a few minor corrections.

This suggests that using this model as a longer term forecasting tool will need to first consider the spatial distribution of price relativity as demand waxes and wanes in response to not only supply but demand, accessibility, amenity, relative popularity of schools and other matters of fashion that are both notoriously difficult to predict and rather subjective.

### Constraints, Demolition, Build, Civil & Professional Costs (xx\_Costs\_LUT)

Based on advice from PDEG these general costs have been factored upwards by 4.17% to reflect the PDEGs observed increase in these development costs.

Professional fees are calculated as a percentage of various costs. The professional fee percentages have not changed but they will increase in dollar value as the underlying costs components increase.

### Development Contributions and Connections (Costs\_DC\_Connections\_LUT)

Telecoms and Electricity Connections have been increased by 4.17% in line with the other general build costs.

The AC development contributions policy has changes (from June 2015) and costs are applied as a % of a HUE depending on location and typology. Storm water DCs are applied on the basis of m<sup>2</sup> of imperviousness added, based on a nominal medium sized standalone dwelling HUE.

Costs may increase or decrease relative to the 2014 policy depending on the development typology. Refer to the Model Adjustments discussion below.

### Floorspace per m<sup>2</sup> Sale Price (Sale\_Price\_FS\_LUT)

These have been adjusted upwards reflecting the general increase in house prices since the last update varied by typology, sales location and zone.

These adjustments range from 2.6% to 20% increases.

### Floorspace Parameters (Floorspace\_Builtform\_Parameters\_LUT)

The parameters in this table which control the density, FAR and coverage of developments (effectively imposing limitations on the amount of floorspace per site available for conversion into dwellings) have been adjusted slightly to allow for the minor changes made to the IHP rule sets in particular removal of minimum dwelling sizes and density controls.

Mr Fonteins ACDCv3.8 report also discusses these changes and the reasons for them.

## Floorspace per Dwelling (Floorspace\_Area\_LUT)

This LUT sets the size of the dwellings being developed by typology and sales location.

These have been adjusted slightly to reflect changes in the density rules and calibrated against the Sale price per M2 and Factored Price Ceilings to ensure the sales price of the resulting dwelling is no greater than the ceiling.

(Calibration occurs by checking all dwelling sale price per m2 and floorspace size is generates dwellings with a sale price above the factored ceiling are reduced in size until they equal the ceiling, those under the ceiling are untouched – in effect the calibration resizes overpriced dwellings to the other factors which are assumed to be correct:

*IF*

*(Dwelling size (m2) \* dwelling price (\$/m2) ) ≤ (Reference Price Ceiling (\$) \* Typology Factor)*

*THEN*

*Maximum under ceiling dwelling size (m2) = (Reference Price Ceiling (\$) \* Typology Factor) / dwelling price (\$/m2)*

## **(2) Model Architecture changes**

Architecture Changes to v3.8.6 fall into two categories – corrections and adjustments. Adjustments are made to deal with changes in the input data, corrections are made to address issues or errors.

### Adjustments:

- Incorporate CV Adjustment – the new CV adjustment factor is applied to the models purchase price by application to the LV only, IV (if any) is assumed to not increase over June 2014 values (reflecting the normal depreciation of existing building stock). An existing adjustment factor for number of owners (reflecting the time cost and effort of dealing with complex site ownership) is applied to the adjusted CV values.
- Development Contribution Adjustments – as noted above the DC policy has been amended from June 2015. While the policy applies costs that are highly variable by location and typology, the full nuances of the locational variability have not been incorporated into this version of the model (This is an area for further improvement). All sites in the region are tested using values calculated for a ‘typical’ suburban site in Highbury Street, Avondale rather than varied by location in complete accordance with the policy. The main change to the process has been to include variation for typology as a proportion for HUEs , and separate calculation of the Storm water component depending on the (assumed) level of existing imperviousness and the lowest of maximum allowable imperviousness and the HUE equivalent.
- Dwelling Density calculations for Mixed Housing Suburban changed to remove hard coded approach reflecting < 1000m<sup>2</sup> sites 200m<sup>2</sup> density controls (Floorspace\_Builtform\_Parameters\_LUT parameters used for all sized sites)

Corrections:

- Land Area per new dwelling calculation adjusted to use a rounded integer value (i.e. a whole dwelling) rather than initially calculated decimal. Rounding follows rules related to typology – on sites where density controls apply, or House typology being tested are rounded down, for terraces and apartments in non-density controlled zones are rounded up.
- Apartments in Mixed Use zones were previously limited to Terrace maximum density from Floorspace\_Builtform\_Parameters\_LUT, corrected to Apartment Maximum density.

### **(3) Overall Summary of ACDC Changes**

The changes made to the ACDC to 3.8 from v3.7 are largely 'polishing', but are significant.

- updating the input (LUTs) to reflect changes that have occurred in the underlying situation present in Auckland to date (such as costs and Sales Location updates)
- updating the inputs to reflect the changes to the rules being proposed by the IHP, particularly the relaxation of density controls (both overt (minimum site areas) and implicit (compliance with other rules results in effective density limitations))
- a number of minor and major corrections to a number of the to the models calculations to account for changes to inputs, assessment methodologies and general errors or improvements .

## F. ACDC v3.8 Feasible Development Capacity Results

### Summary Results (IHP v3.8, Maximum Return Scenario)

Consistent with all model runs from version 3, as there are a number of development options tested, more than one of which may be viable, a selection scenario is created selecting from the viable option(s) on each site that which best matches the scenario parameters.

A strong variation between scenarios suggest there is a wide range of viable options for 'the market' to choose from enabling the heterogeneous development community to provide a variety of products suiting their own needs, possible oversupply of certain production as well as wider demand changes.

The five scenarios generate a total feasible dwelling range from the parcels tested of between 234k dwellings (under the 'Largest Dwellings' Scenario) and 302k dwellings (under the 'Maximum number of Dwellings' scenario). The mix of dwelling types, sizes, and prices varies between these scenarios, but the location does not (sites without viable capacity never show up, sites with a single viable option have this option in all scenarios, and sites with more than one viable option switch between options)

The 'Maximum percentage return' scenario has been utilised as the representative scenario as it represents the developers assumed first choice option. Its results are located towards the more expensive (larger) and lower overall quantity of dwellings end of the range, and provides for ~247,000 feasible dwellings.

Table 1 below shows the result by typology of the Maximum Return Scenario. Some 22% overall of this supply will be standalone dwellings.

The most obvious changes from previous versions are from the large increase in the apartment typology due to increase opportunities for this development typology across more of the urban area, particularly in higher value areas where present land values enable this approach to be more viable.



Feasible Development Capacity (Dwellings), Maximum Return Scenario						
Dwelling Typology		House	Terrace	Apartment	TOTAL	% of FDC that are Houses
Local Board Group	Local Board					
Rural North	Rodney	3,040		17	3,057	99%
Urban North	Devonport - Takapuna	14	831	18,801	19,646	0%
Urban North	Hibiscus and Bays	5,875	1,740	11,300	18,915	31%
Urban North	Kaipatiki	1,663	2,060	7,793	11,516	14%
Urban North	Upper Harbour	2,794	1,287	17,720	21,801	13%
Urban Central	Albert - Eden	54	479	10,170	10,703	1%
Urban Central	Maungakiekie - Tamaki	582	3,793	31,192	35,567	2%
Urban Central	Orakei	41	611	7,674	8,326	0%
Urban Central	Puketapapa	285	648	6,691	7,624	4%
Urban Central	Waitemata	6	92	19,318	19,416	0%
Urban West	Henderson - Massey	5,202	260	2,270	7,732	67%
Urban West	Waitakere Ranges	2,222	5		2,227	100%
Urban West	Whau	1,422	1,210	13,745	16,377	9%
Urban South	Howick	718	3,320	22,615	26,653	3%
Urban South	Manurewa	5,252	808	12	6,072	86%
Urban South	Mangere - Otahuhu	4,293	640	1,649	6,582	65%
Urban South	Otara - Papatoetoe	5,311	495	666	6,472	82%
Urban South	Papakura	4,966	626	1,339	6,931	72%
Rural South	Franklin	10,663	11	483	11,157	96%
<b>Total</b>	<b>TOTAL</b>	<b>54,403</b>	<b>18,916</b>	<b>173,455</b>	<b>246,774</b>	<b>22%</b>

Table 1: ACDC v3.8 IHP Typology by Local Board, Maximum Return Scenario.

Table 2 below shows the distribution of dwelling by local Board and Price band – in this scenario 15% of dwellings overall would be prices less than \$800,000, though this is highly spatially dependent reflecting not only land values and existing average house prices but also other settings in the model that align to these realities. In higher value areas, relative affordability is only enabled by utilising the high value land more efficiently, whereas in lower value areas, low density options may be the only viable option (but still be viable at a price at or below more intensive options in higher value areas)

Like previous scenarios, the commercially feasible supply of sub-\$500k dwellings appears to be particularly limited. In this run, HNZN owned land has not been excluded (results include commercially feasible development on HNZN land, not added separately)

Note that land purchase and sale prices as well as other associated costs have been inflated from previous scenarios to 'rebase' v3.8 to April 2016 values (up from June 2014 in previous scenarios), which will shift (all else being equal) the input costs, and therefore the feasible price distributions upwards (i.e. nominally more expensive).

Feasible Development Capacity (Dwellings), Maximum Return Scenario											
Price Band		\$400-500k	\$500-600k	\$600-700k	\$700-800k	\$800-900k	\$900k- \$1.0m	\$1.0- \$1.15m	\$1.15- \$1.3m	\$1.3- \$1.5m	% of feasible dwellings <\$800k
Local Board Group	Local Board										
Rural North	Rodney	-	140	864	48	308	-	1,523	174	-	34%
Urban North	Devonport - Takapuna	-	-	-	-	-	-	2,605	1,267	15,774	0%
Urban North	Hibiscus and Bays	-	27	6	278	4,289	2,268	3,299	2,776	5,972	2%
Urban North	Kaipatiki	-	-	-	-	1,809	2,984	2,931	2,488	1,304	0%
Urban North	Upper Harbour	-	-	-	1,217	10,038	1,343	5,977	2,519	707	6%
Urban Central	Albert - Eden	-	-	-	-	5	172	1,453	3,585	5,488	0%
Urban Central	Maungakiekie - Tamaki	-	-	-	3	35	17,226	16,362	1,438	503	0%
Urban Central	Orakei	-	-	-	-	-	600	420	3,014	4,292	0%
Urban Central	Puketapapa	-	-	-	-	153	4,380	2,136	800	155	0%
Urban Central	Waitemata	-	-	-	-	-	-	-	11,377	8,039	0%
Urban West	Henderson - Massey	-	26	2,664	1,586	1,612	578	524	736	6	55%
Urban West	Waitakere Ranges	-	-	1,233	616	-	5	344	28	1	83%
Urban West	Whau	-	-	266	325	13,790	1,948	3	3	42	4%
Urban South	Howick	-	-	-	228	1,088	2,420	14,759	3,472	4,686	1%
Urban South	Manurewa	-	650	1,778	2,021	808	804	-	9	2	73%
Urban South	Mangere - Otahuhu	-	-	2,577	1,491	1,715	532	253	7	7	62%
Urban South	Otara - Papatoetoe	-	742	2,456	2,027	620	576	47	4	-	81%
Urban South	Papakura	1	1,384	2,156	831	448	1,829	17	14	251	63%
Rural South	Franklin	-	1,570	5,864	1,379	116	46	1,225	224	733	79%
<b>Total</b>	<b>TOTAL</b>	<b>1</b>	<b>4,539</b>	<b>19,864</b>	<b>12,050</b>	<b>36,834</b>	<b>37,711</b>	<b>53,878</b>	<b>33,935</b>	<b>47,962</b>	<b>15%</b>

Table 2: ACDCv3.8 IHP, Price Band by Local Board, Maximum Return Scenario

Table 3 below further breaks down the feasible dwelling result results into the base zoning of the source parcel by Local Board. The relative area of each zone is shown in Section D (1), where Mixed Housing Suburban is the largest zone, but provides an approximately equal share of capacity with the much smaller (but more intensive) MHU and THAB zones.

Supply from Mixed Use zone in particular remains high (as it has in all scenarios) reflecting the significant difference in most locations between the existing built form and the MU envelope and the high degree of flexibility offered.

Overall, residential zonings provide for some 66% of feasible dwellings, but this is highly variable by local board, reflecting not just the large amount of business zonings in some local boards (Waitemata for example) but also the limited opportunities outside of business zones in some (Upper Harbour for example).

Feasible Development Capacity (Dwellings), Maximum Return Scenario										
BaseZone		SH, LL, R&CS	MHS	MHU	THAB	MU	Centres	Other	TOTAL	% FDC from non- residential
Local Board Group	Local Board									
Rural North	Rodney	2,190	194	72	-	102	499	-	3,057	20%
Urban North	Devonport - Takapuna	2	3,052	7,154	2,663	2,084	4,691	-	19,646	34%
Urban North	Hibiscus and Bays	3,866	4,814	3,826	2,075	1,429	2,905	-	18,915	23%
Urban North	Kaipatiki	383	3,144	3,032	3,154	512	1,286	5	11,516	16%
Urban North	Upper Harbour	654	4,151	6,069	176	1,053	9,698	-	21,801	49%
Urban Central	Albert - Eden	-	215	1,142	3,337	5,083	926	-	10,703	56%
Urban Central	Maungakiekie - Tamaki	-	2,400	7,182	14,186	5,963	5,461	375	35,567	33%
Urban Central	Orakei	-	1,657	1,370	3,411	1,564	324	-	8,326	23%
Urban Central	Puketapapa	36	664	1,493	3,869	1,205	357	-	7,624	20%
Urban Central	Waitemata	-	32	265	726	4,598	13,776	19	19,416	95%
Urban West	Henderson - Massey	1,098	855	3,243	1,744	245	547	-	7,732	10%
Urban West	Waitakere Ranges	358	1,131	598	140	-	-	-	2,227	0%
Urban West	Whau	37	1,031	2,036	3,322	511	9,417	23	16,377	61%
Urban South	Howick	9	7,510	7,576	4,718	1,029	5,811	-	26,653	26%
Urban South	Manurewa	29	4,896	973	174	-	-	-	6,072	0%
Urban South	Mangere - Otahuhu	27	2,063	2,139	1,244	1,083	14	12	6,582	17%
Urban South	Otara - Papatoetoe	38	2,077	3,476	610	14	244	13	6,472	4%
Urban South	Papakura	266	3,674	1,513	188	1,269	21	-	6,931	19%
Rural South	Franklin	2,266	7,406	591	192	466	236	-	11,157	6%
<b>Total</b>	<b>TOTAL</b>	<b>11,259</b>	<b>50,966</b>	<b>53,750</b>	<b>45,929</b>	<b>28,210</b>	<b>56,213</b>	<b>447</b>	<b>246,774</b>	<b>34%</b>

Table 3: ACDCv3.8 IHP, Feasible Capacity by Zone by Local Board

More detailed Tables are provided in **Appendix 4**. Additional details including of any previous scenario can be provided on request.

### **Heat maps**

Heat maps illustrating the results of the Maximum Return Scenario from v2.4 High Price Ceiling (ACAP rules on PAUP zoning) and IHP Zoning and Rules though v3.8 are attached as **Appendix 5**.

The maps indicate the relative density of feasible capacity between the two modelling zoning patterns at the mesh block scale, and include a difference map.

### **Numerical Difference Maps**

The heat maps show relative 'density' of capacity across the mapped area based on the sum of opportunities at the meshblock scale using the 'kernel density' method and are useful for quickly identifying 'hot spots'. Heat maps do however have the potential to hide or distort the underlying data or patterns.

The meshblock absolute numbers data used to generate the heat maps is shown in a more traditional form in the maps included in **Appendix 6**

### **Typology Maps**

Consistent with previous modelling outputs, Maps showing the typology of development chosen by each Scenario at the parcel scale are included at **Appendix 7** (v3.7 IHP) – these illustrate the mix of opportunities possible under the different scenarios.

## G. Further work and the difficulty of making direct comparisons between versions.

Figure 6 below summarises at a high level the various input changes between results of the various reported iterations of the ACDC model that have been reported in both Council evidence or the reports of the 013 E.G.

While the details are difficult to compare, the changes in the outputs at a high level reflect largely what would be expected as a result of the changes that have been made which largely relate to:

- PAUP zoning with PAUP rules (version 1 PAUP)
  - o Change occurs to PAUP rules to considerably relax density controls in the residential zones resulting in significant increases in capacity as a result.
- PAUP Zoning with ACAP Rules (Version 1 ACAP to Version 3.7)
  - o These models essentially relate to remodelling the same thing differently (i.e. how much of an effect did the rule changes really have?) - Variation in and between these results are therefore not as substantial or meaningful as the spatial effect that is shown in all versions from the residential rule change which has enabled significantly more plan enabled and feasible capacity compared with the PAUP situation as modelled in Version 1 (PAUP)
- Recommended Plan
  - o While the model itself has also been considerably updated and improved including changes in site purchase costs to a new 'time', the effect expected from the rule AND zoning changes is also obvious enabling more plan enable and feasible capacity in locations where the zoning pattern is higher density and especially in areas where values are high – these expected changes have been reflected in changes in the results when compared to all previous modelling.

Model Version	Model Version 'Name'	Notes	Residential Rules (Provisions)	Residential Zoning (Spatial)	Business Rules (Provisions)	Business Zoning (Spatial)	CRGS Inputs Set	ACAP LUT's Designed to reflect	SHALand Included	HNZ Land Included	Version Regional Results Low/Min (000's)	Version Regional Results High/Max (000s)
V1	V1: PAUP/PAUP	Single Development tested	PAUP	PAUP	PAUP	PAUP	PAUP	PAUP	Yes	No	64	64
V1	V1: ACAP/PAUP	Single Development tested	ACAP	PAUP	PAUP	PAUP	ACAP	PAUP	Yes	No	181	181
V2.4	V2.4: ACAP/PAUP	Inclusion of Price Ceilings	ACAP	PAUP	PAUP	PAUP	ACAP	ACAP	Yes	No	108	144
V3.6	V3.6: ACAP/PAUP	Revision of Modelling Approach, 9 developments	ACAP	PAUP	PAUP	PAUP	ACAP	ACAP	Yes	No	198	256
V3.7	V3.7: ACAP/PAUP	Correction to above (no SL 10)	ACAP	PAUP	PAUP	PAUP	ACAP	ACAP	Yes	No	224	308
V3.8	V3.8: ACAP/PAUP	Further revision of V3.6 approach reflecting changes in costs, and rule parameters, reflecting IHP draft rules, but using V3.6 and 3.7 capacity inputs INCLUDES HNZ	ACAP	PAUP	ACAP	PAUP	ACAP	IHP	Yes	Yes	213	272
V3.8	V3.8: IHP/IHP	As above, but with IHP zoning, rules and capacity inputs INCLUDES HNZ	IHP	IHP	IHP	IHP	IHP	IHP	Yes	Yes	234	302

Figure 6: ACDC Model and Overall Results Comparison

## H. APPENDICIES

- (1) Plan Enabled Capacity – Residential Zone Results Summary Table**
- (2) Plan Enabled Capacity – Residential Zone Results Summary Maps (Redevelopment)**
- (3) Plan Enabled Capacity – Business Zone Results Summary Table**
- (4) Feasible Capacity – IHP v3.8 Feasible Capacity Results Maximum Return Summary Table Results**
- (5) Feasible Capacity – IHP v3.8 Feasible Capacity Maximum Return Scenario vs other model runs Heat Maps and Difference Heat Maps**
- (6) Feasible Capacity - IHP v3.8 Feasible Capacity Maximum Return Scenario vs other model runs Absolute Number Results and Difference Maps**
- (7) Feasible Capacity – IHP v3.8 Feasible Capacity by Scenario: Typology Maps**

**Proposed Auckland Unitary Plan Zoning with ACAP Residential Rules**

Capacity type	Total Base Zoned Area (ha) <i>(Spatial Data from GIS)</i>	Total Area of modelled Parcels by Basezone (ha) <i>(Cleaned Data where spatial base zone zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply</i>	Total Area of Parcels Modelled using basezone Provisions (ha) <i>(Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )</i>	Vacant capacity (dwellings)	Vacant potential Capacity (dwellings)	Infill capacity (dwellings)	Redevelopment capacity (dwellings)	Total capacity (utilising INFILL)	Total capacity (utilising REDEVELOPMENT)	Total capacity (utilising INFILL) per modelled ha of land	Total capacity (utilising REDEVELOPMENT) per modelled ha of land
Large Lot	3,242.77	1,074.00	829.00	96	358	0	6	454	460	0.55	0.55
Mixed Housing Suburban	13,296.94	12,385.00	12,373.00	10,876	19,432	49,034	264,457	79,342	294,765	6.41	23.82
Mixed Housing Urban	3,291.90	3,217.00	3,207.00	5,002	7,061	13,001	110,471	25,064	122,534	7.82	38.21
Rural and Coastal Settlement	1,453.26	777.00	645.00	63	253	0	2	316	318	0.49	0.49
Single House	11,129.14	10,431.00	6,911.00	4,086	6,344	2,029	1,191	12,459	11,621	1.80	1.68
Terrace Housing and Apartment Building	1,640.53	1,485.00	1,483.00	11,159	0	0	206,381	11,159	217,540	7.52	146.69
<b>Total</b>	<b>34,054.54</b>	<b>29,369.00</b>	<b>25,448.00</b>	<b>31,282</b>	<b>33,448</b>	<b>64,064</b>	<b>582,508</b>	<b>128,794</b>	<b>647,238</b>	<b>5.06</b>	<b>25.43</b>

**IHP Zoning with ACAP Residential Rules**

Capacity type	Total Base Zoned Area (ha)	Total Area of modelled Parcels by Basezone (ha)	Total Area of Parcels Modelled using basezone Provisions (ha)	Vacant capacity (dwellings)	Vacant potential Capacity (dwellings)	Infill capacity (dwellings)	Redevelopment capacity (dwellings)	Total capacity (utilising INFILL)	Total capacity (utilising REDEVELOPMENT)	Total capacity (utilising INFILL) per modelled ha of land	Total capacity (utilising REDEVELOPMENT) per modelled ha of land
Large Lot	3,004.00	2,892.89	2,885.00	597	1,508	0	25	2,105	2,130	0.73	0.74
Mixed Housing Suburban	12,497.00	11,755.81	11,740.00	20,572	38,885	36,750	253,170	96,207	312,627	8.19	26.63
Mixed Housing Urban	8,211.00	7,752.93	7,676.00	17,971	24,156	23,637	255,707	65,764	297,834	8.57	38.80
Rural and Coastal Settlement	1,591.86	1,565.21	1,564.00	271	1,217	0	24	1,488	1,512	0.95	0.97
Single House	8,781.18	8,473.11	8,450.00	8,571	20,615	2,280	1,617	31,466	30,803	3.72	3.65
Terrace Housing and Apartment Building	2,384.40	2,237.79	2,196.00	15,021	2,156	0	308,471	17,177	325,648	7.82	148.29
<b>Total</b>	<b>36,469.44</b>	<b>34,677.73</b>	<b>34,511.00</b>	<b>63,003</b>	<b>88,537</b>	<b>62,667</b>	<b>819,077</b>	<b>214,207</b>	<b>970,617</b>	<b>6.21</b>	<b>28.12</b>

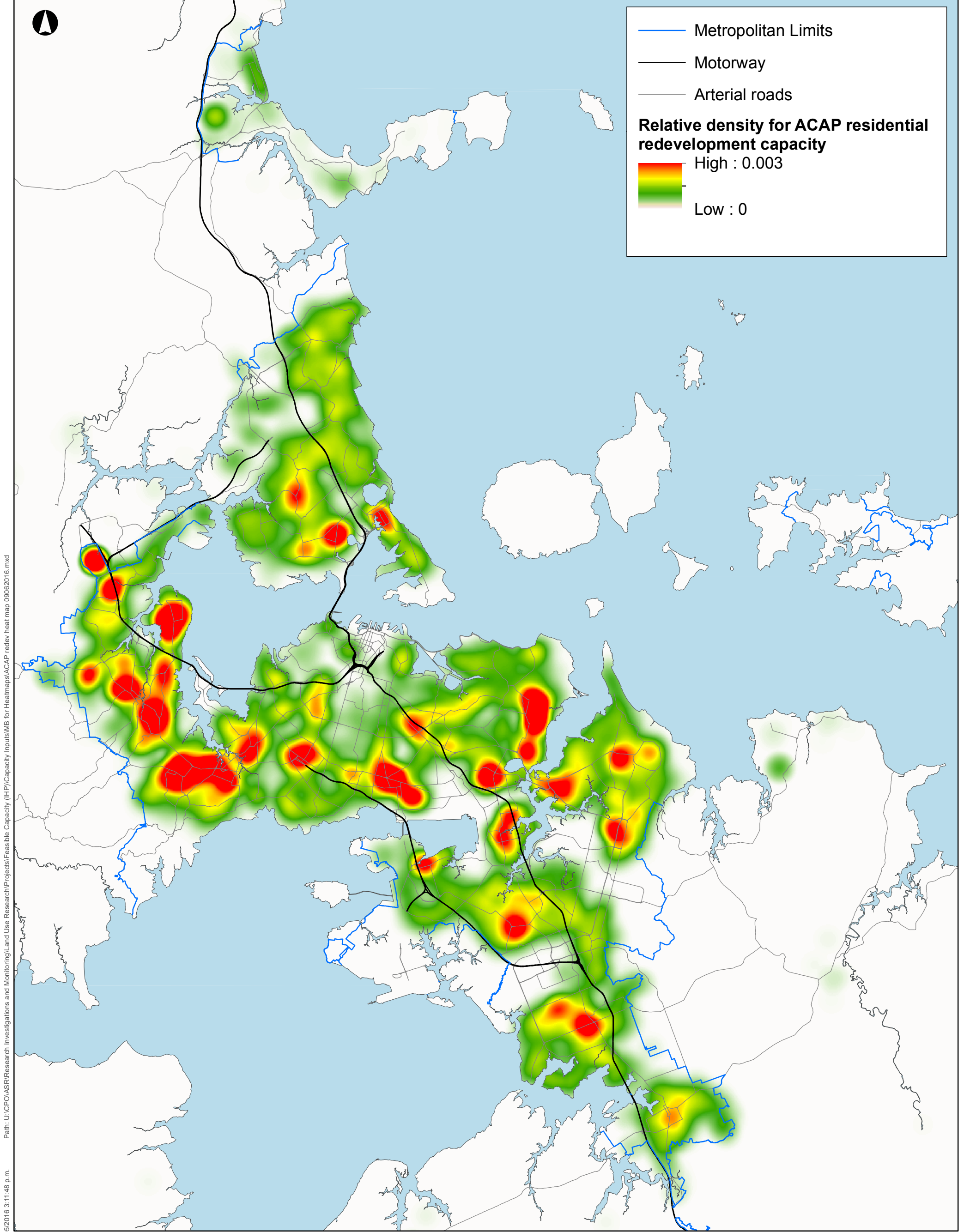
**CHANGE PAUP to IHP Modelled Provisions (#)**

Capacity type	Total Base Zoned Area (ha)	Total Area of modelled Parcels with Basezone (ha)	Total Area of Parcels Modelled using basezone Provisions (ha)	Vacant capacity (dwellings)	Vacant potential Capacity (dwellings)	Infill capacity (dwellings)	Redevelopment capacity (dwellings)	Total capacity (utilising INFILL)	Total capacity (utilising REDEVELOPMENT)	Total capacity (utilising INFILL) per modelled ha of land	Total capacity (utilising REDEVELOPMENT) per modelled ha of land
Large Lot	-238.77	1,818.89	2,056.00	501	1,150	0	19	1,651	1,670	0.18	0.18
Mixed Housing Suburban	-799.94	-629.19	-633.00	9,696	19,453	-12,284	-11,287	16,865	17,862	1.78	2.81
Mixed Housing Urban	4,919.10	4,535.93	4,469.00	12,969	17,095	10,636	145,236	40,700	175,300	0.75	0.59
Rural and Coastal Settlement	138.59	788.21	919.00	208	964	0	22	1,172	1,194	0.46	0.47
Single House	-2,347.96	-1,957.89	1,539.00	4,485	14,271	251	426	19,007	19,182	1.92	1.96
Terrace Housing and Apartment Building	743.87	752.79	713.00	3,862	2,156	0	102,090	6,018	108,108	0.30	1.60
<b>Total</b>	<b>2,414.90</b>	<b>5,308.73</b>	<b>9,063.00</b>	<b>31,721</b>	<b>55,089</b>	<b>-1,397</b>	<b>236,569</b>	<b>85,413</b>	<b>323,379</b>	<b>1.15</b>	<b>2.69</b>

**CHANGE PAUP to IHP Modelled Provisions (% relative to PAUP)**

Capacity type	Total Base Zoned Area (ha)	Total Area of modelled Parcels with Basezone (ha)	Total Area of Parcels Modelled using basezone Provisions (ha)	Vacant capacity (dwellings)	Vacant potential Capacity (dwellings)	Infill capacity (dwellings)	Redevelopment capacity (dwellings)	Total capacity (utilising INFILL)	Total capacity (utilising REDEVELOPMENT)	Total capacity (utilising INFILL) per modelled ha of land	Total capacity (utilising REDEVELOPMENT) per modelled ha of land
Large Lot	-7%	169%	248%	522%	321%	0%	317%	364%	363%	33%	33%
Mixed Housing Suburban	-6%	-5%	-5%	89%	100%	-25%	-4%	21%	6%	28%	12%
Mixed Housing Urban	149%	141%	139%	259%	242%	82%	131%	162%	143%	10%	2%
Rural and Coastal Settlement	10%	101%	142%	330%	381%	0%	1100%	371%	375%	94%	96%
Single House	-21%	-19%	22%	110%	225%	12%	36%	153%	165%	107%	117%
Terrace Housing and Apartment Building	45%	51%	48%	35% N/A	0%	0%	49%	54%	50%	4%	1%
<b>Total</b>	<b>7%</b>	<b>18%</b>	<b>36%</b>	<b>101%</b>	<b>165%</b>	<b>-2%</b>	<b>41%</b>	<b>66%</b>	<b>50%</b>	<b>23%</b>	<b>11%</b>





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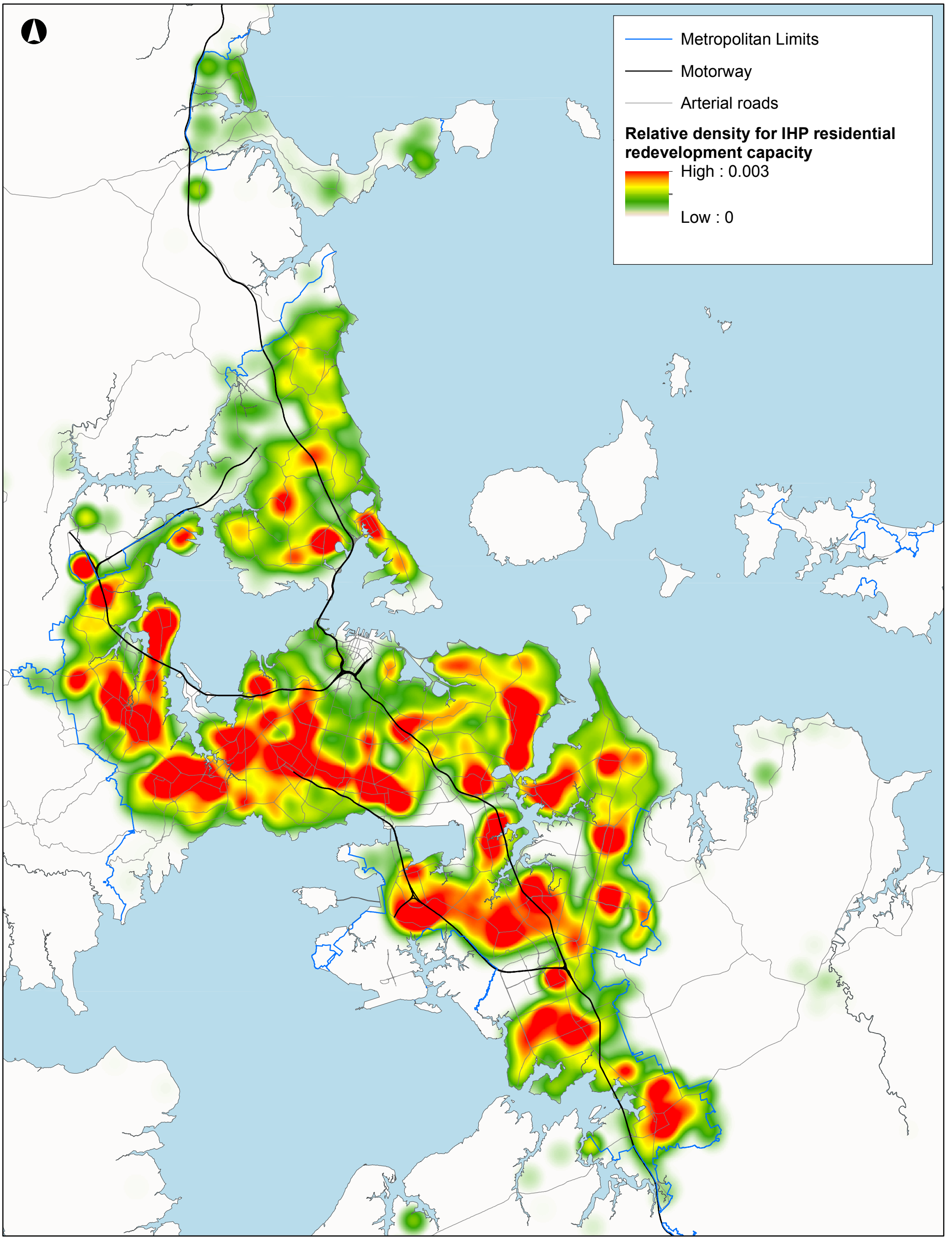
## Relative density for ACAP provisions for residential redevelopment capacity from residential zones

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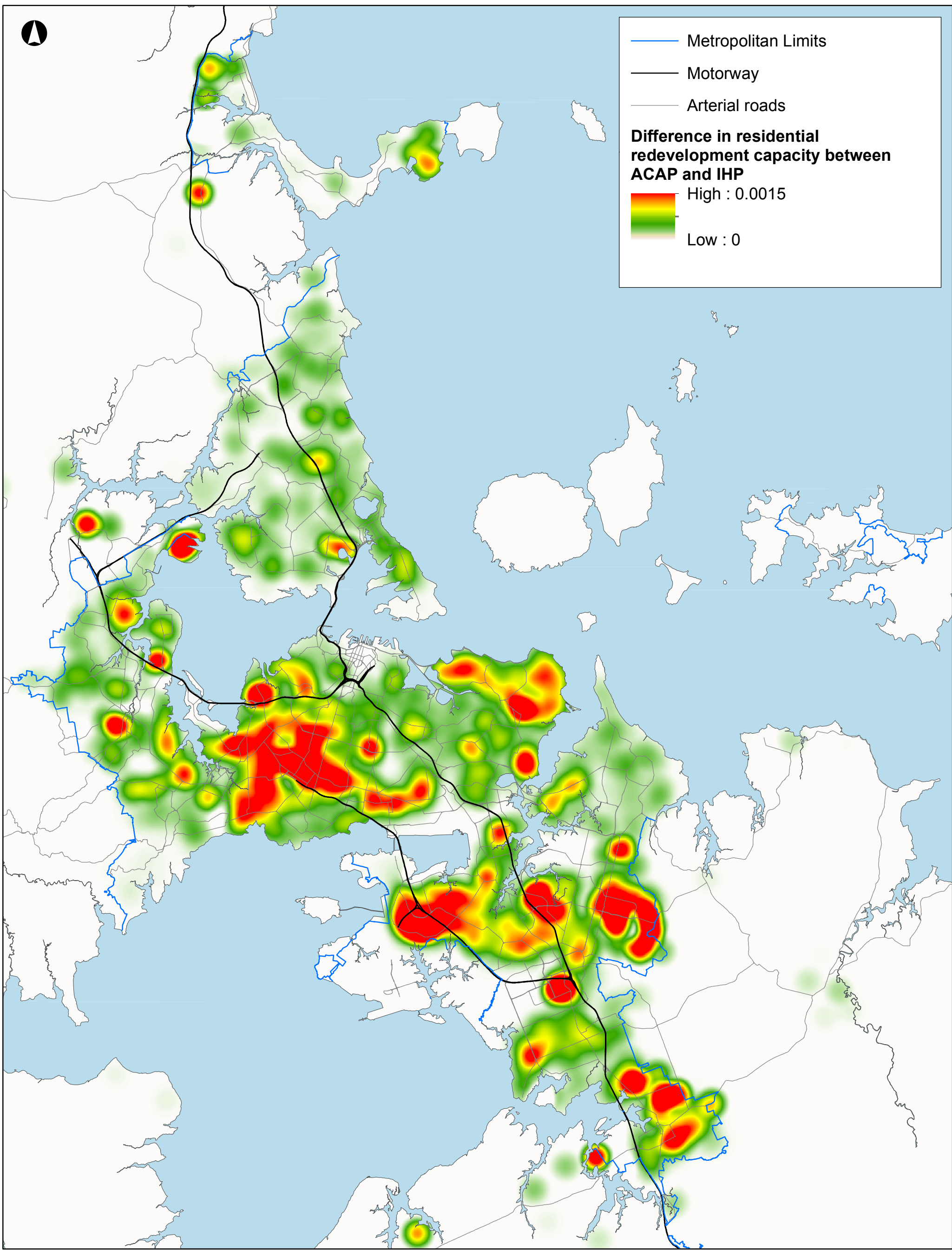


## Relative density for IHP provisions for residential redevelopment capacity from residential zones

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Research Department



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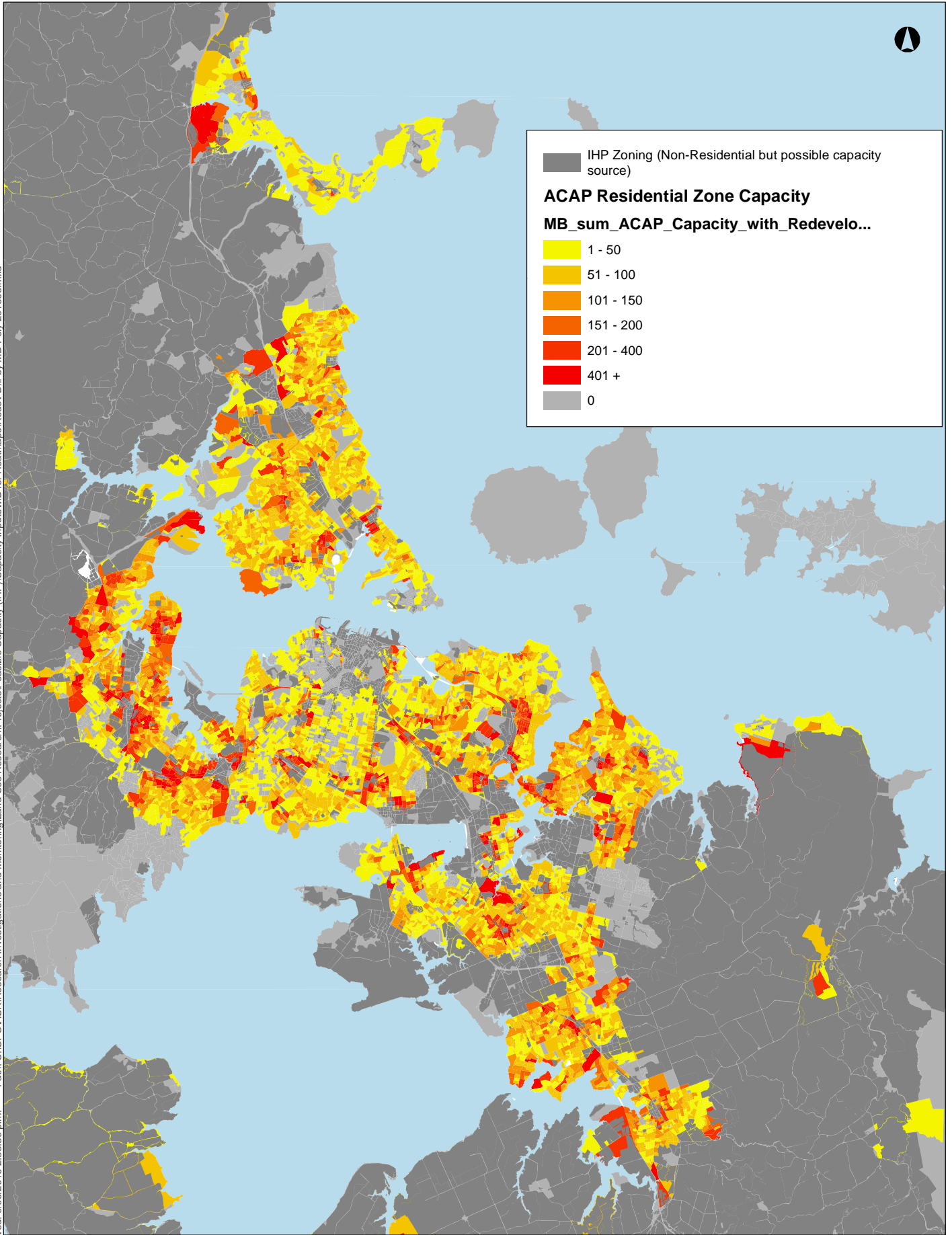
# Areas of relative difference between ACAP and IHP provisions for residential redevelopment capacity from residential zones

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Research Department





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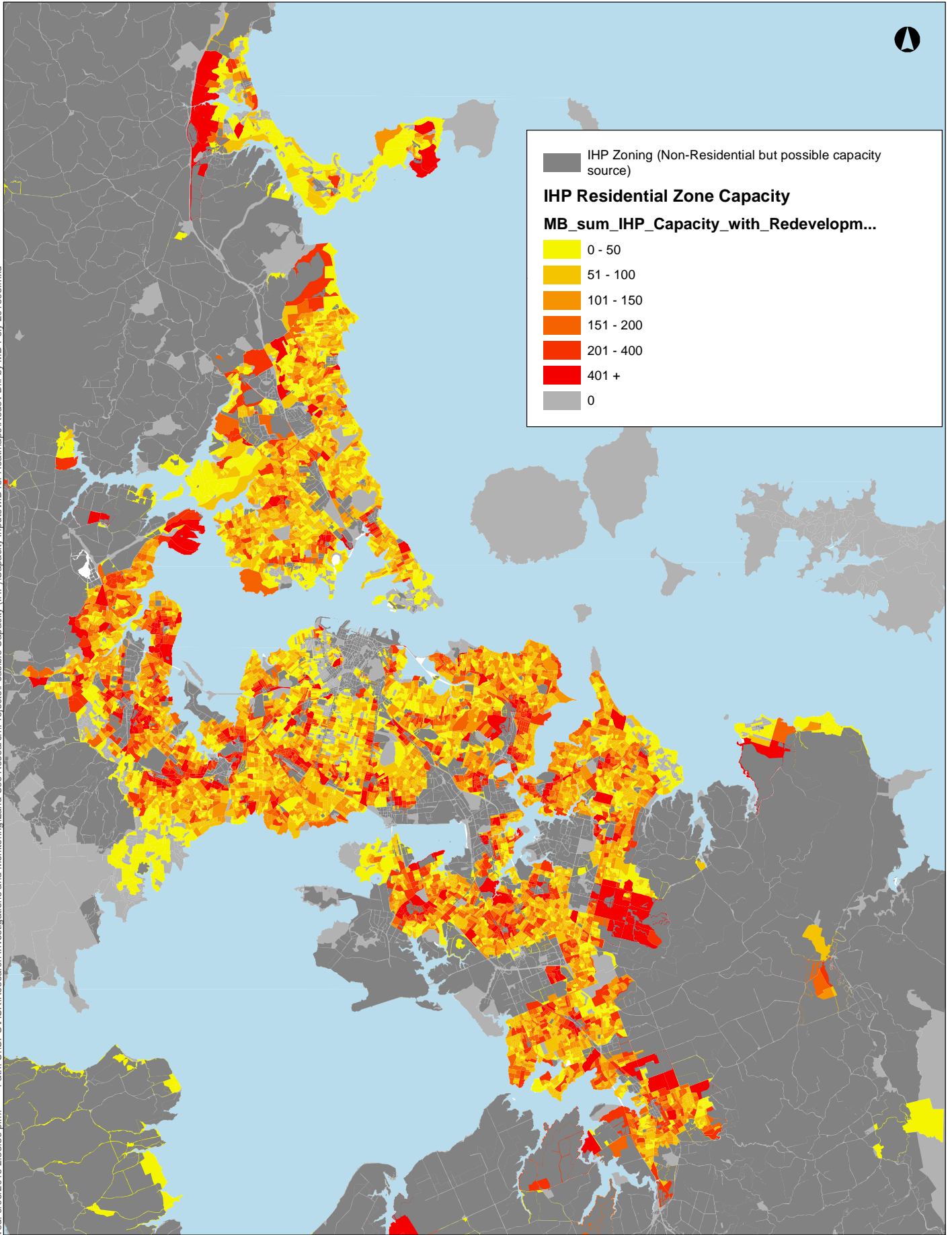


# Plan Enabled REDEVELOPMENT Capacity (Residential Zones Only) AC: (PAUP Zoning with ACAP Rules)

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and Research Department



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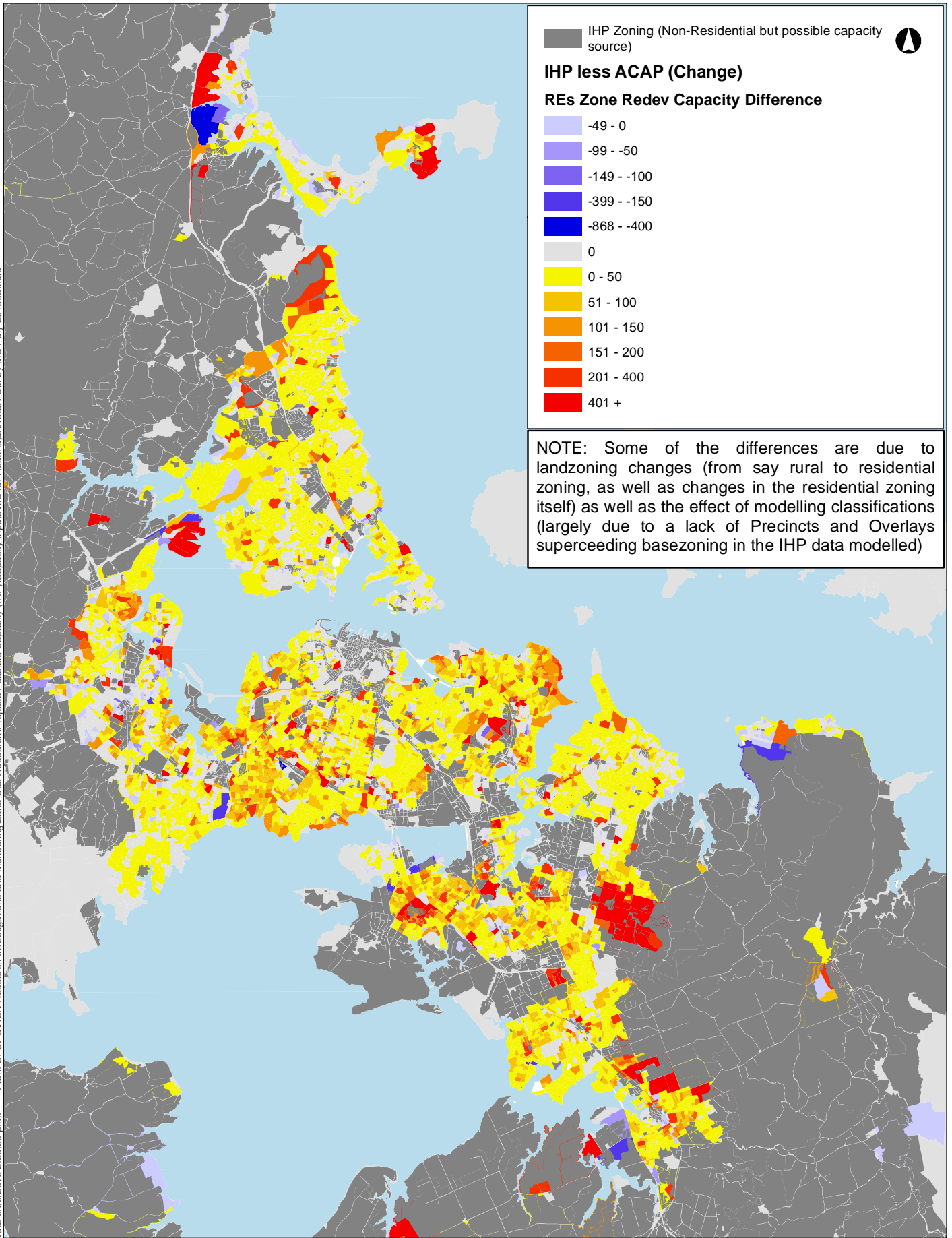
# Plan Enabled REDEVELOPMENT Capacity (Residential Zones Only) IHP: (IHP Zoning with IHP Rules)

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## Plan Enabled REDEVELOPMENT Capacity (Residential Zones Only) Change (IHP less ACAP)

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Proposed Auckland Unitary Plan Zoning with PAUP Business Rules

Capacity type	Total Base Zoned Area (ha) (Spatial Data from GIS)	Total Area of modelled Parcels by Basezone (ha) (Cleaned Data where spatial base zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply	Total Area of Parcels Modelled using basezone Provisions (ha) (Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )	Vacant Land (ha)	Vacant potential Land (ha)	Business Floorspace (Maximum Theoretical) (sqm)	FAR (Maximum Theoretical Floorspace (ha)/ Basezone Modelled Parcel Area (Ha))	% sites modelled as Baszone as % of Parcels by Basezone
Business Park	50.65	47.86	37.03	11.80	16.20	1,913,872	5.17	77%
City Centre	507.35	257.82	80.71	13.60	53.60		0.00	31%
General Business	286.46	258.29	178.97	47.70	64.90	7,005,002	3.91	69%
Heavy Industry	1,465.50	1,340.04	1,340.04	290.20	423.40	53,193,838	3.97	100%
Light Industry	4,223.37	3,902.02	3,797.58	1,044.00	434.30	148,274,348	3.90	97%
Local Centre	190.88	178.73	157.81	28.50	24.80	6,019,169	3.81	88%
Metropolitan Centre	340.05	330.36	296.07	89.70	61.90	34,212,228	11.56	90%
Mixed Use	778.46	752.40	693.48	85.90	86.30	28,145,777	4.06	92%
Neighbourhood Centre	113.93	94.06	93.50	10.10	12.00	2,250,295	2.41	99%
Town Centre	432.83	394.76	332.72	43.60	52.30	16,548,742	4.97	84%
Total	8,389.49	7,556.32	7,007.91	1,665.10	1,229.70	295,649,400	4.22	93%

Proposed Auckland Unitary Plan Zoning with ACAP Business Rules

Capacity type	Total Base Zoned Area (ha) (Spatial Data from GIS)	Total Area of modelled Parcels by Basezone (ha) (Cleaned Data where spatial base zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply	Total Area of Parcels Modelled using basezone Provisions (ha) (Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )	Vacant Land (ha)	Vacant potential Land (ha)	Business Floorspace (Maximum Theoretical) (sqm)	FAR (Maximum Theoretical Floorspace (ha)/ Basezone Modelled Parcel Area (Ha))	% sites modelled as Baszone as % of Parcels by Basezone
Business Park	50.65	47.86	37.03	16.52	23.32	2,841,622	7.67	77%
City Centre	507.35	257.82	80.71	37.97	12.43	16,086,708	19.93	31%
General Business	286.46	258.29	178.97	45.96	48.47	6,569,171	3.67	69%
Heavy Industry	1,465.50	1,340.04	1,340.04	458.37	508.35	64,616,715	4.82	100%
Light Industry	4,223.37	3,902.02	3,797.58	451.65	1,252.05	148,980,848	3.92	97%
Local Centre	190.88	178.73	157.81	55.06	40.54	6,911,708	4.38	88%
Metropolitan Centre	340.05	330.36	296.07	66.59	100.25	24,624,542	8.32	90%
Mixed Use	778.46	752.40	693.48	77.74	187.05	31,218,593	4.50	92%
Neighbourhood Centre	113.93	94.06	93.50	5.10	21.86	2,787,429	2.98	99%
Town Centre	432.83	394.76	332.72	51.08	70.66	24,177,451	7.27	84%
Total	8,389.49	7,556.32	7,007.91	1,266.03	2,264.99	328,814,787	4.69	93%

IHP Zoning with ACAP Business Rules

Capacity type	Total Base Zoned Area (ha) (Spatial Data from GIS)	Total Area of modelled Parcels by Basezone (ha) (Cleaned Data where spatial base zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply	Total Area of Parcels Modelled using basezone Provisions (ha) (Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )	Vacant Land (ha)	Vacant potential Land (ha)	Business Floorspace (Maximum Theoretical) (sqm)	FAR (Maximum Theoretical Floorspace (ha)/ Basezone Modelled Parcel Area (Ha))	% sites modelled as Baszone as % of Parcels by Basezone
Business Park	60.27	57.47	57.47	16.52	23.91	2,365,220	4.12	100%
City Centre	270.18	242.75	242.75	37.21	50.28	21,794,908	8.98	100%
General Business	282.30	245.37	244.05	54.85	100.06	5,890,445	2.41	99%
Heavy Industry	1,855.85	1,648.30	1,639.98	464.64	386.21	65,814,249	4.01	99%
Light Industry	4,709.80	4,337.84	4,321.45	716.24	1,440.19	146,275,776	3.38	100%
Local Centre	229.12	293.10	285.01	29.53	54.87	7,033,285	2.47	97%
Metropolitan Centre	343.64	331.95	331.95	61.66	94.03	35,880,982	10.81	100%
Mixed Use	947.53	882.88	881.40	87.52	251.69	34,382,998	3.90	100%
Neighbourhood Centre	132.67	127.19	127.19	12.49	26.50	3,149,466	2.48	100%
Town Centre	435.71	412.17	412.17	65.88	72.80	24,560,378	5.96	100%
Total	9,267.06	8,579.03	8,543.42	1,546.55	2,500.55	347,147,709	4.06	100%

CHANGE PAUP with ACAP to IHP Modelled Provisions (#)

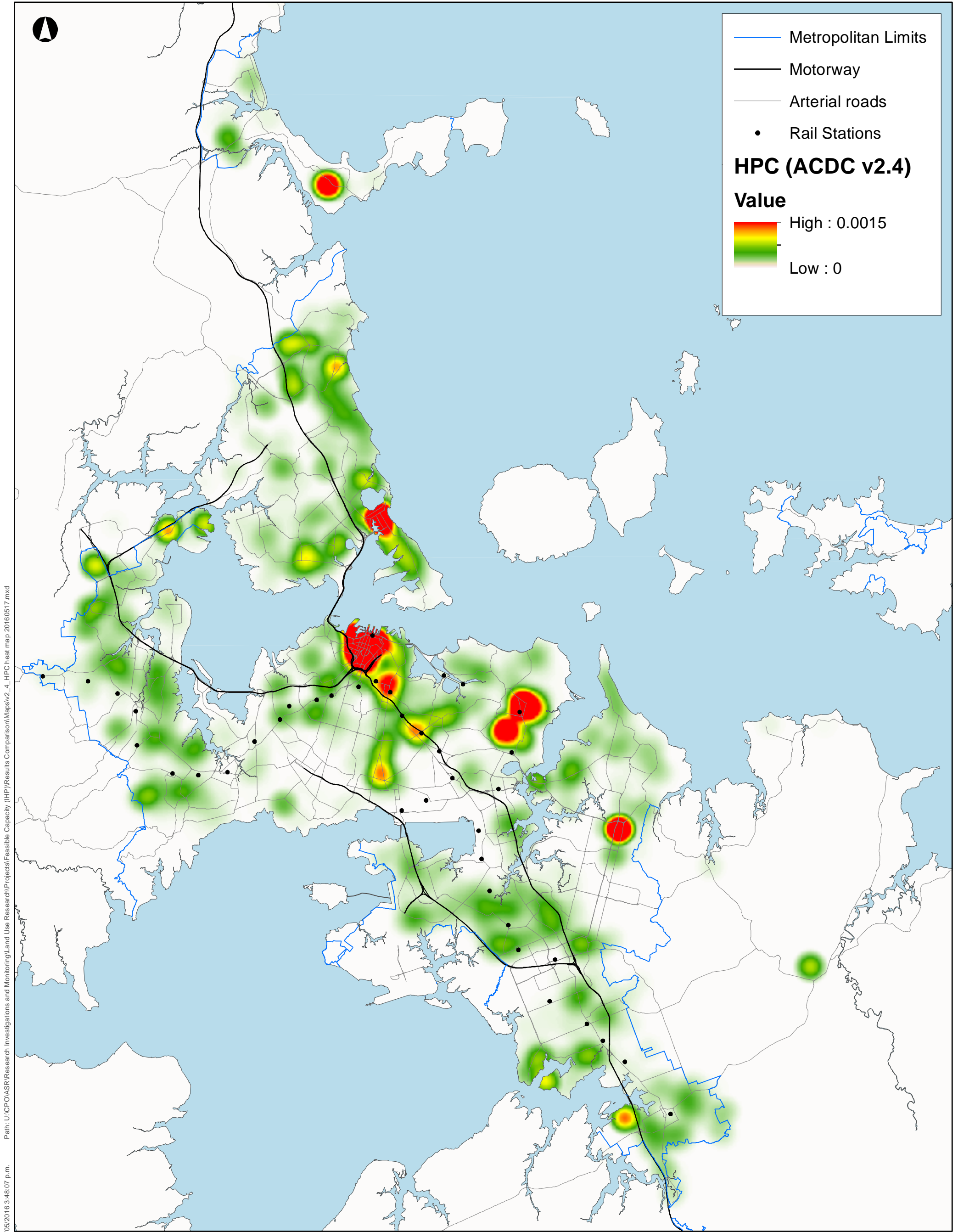
Capacity type	Total Base Zoned Area (ha) (Spatial Data from GIS)	Total Area of modelled Parcels by Basezone (ha) (Cleaned Data where spatial base zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply	Total Area of Parcels Modelled using basezone Provisions (ha) (Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )	Vacant Land (ha)	Vacant potential Land (ha)	Business Floorspace (Maximum Theoretical) (sqm)	FAR (Maximum Theoretical Floorspace (ha)/ Basezone Modelled Parcel Area (Ha))	% sites modelled as Baszone as % of Parcels by Basezone
Business Park	9.62	9.61	20.44	0.00	0.59	-476,401.56	-3.56	0.23
City Centre	-237.17	-15.06	162.04	-0.76	37.85	5,708,200.25	-10.95	0.69
General Business	-4.16	-12.91	65.08	8.90	51.59	-678,725.62	-1.26	0.30
Heavy Industry	390.35	308.26	299.94	6.27	-122.14	1,197,534.11	-0.81	-0.01
Light Industry	486.42	435.82	523.87	264.59	188.15	-2,705,071.88	-0.54	0.02
Local Centre	38.24	114.37	127.20	-25.53	14.32	121,577.22	-1.91	0.09
Metropolitan Centre	3.60	1.60	35.88	-4.93	-6.23	11,256,440.18	2.49	0.10
Mixed Use	169.07	130.49	187.92	9.78	64.64	3,164,405.35	-0.60	0.08
Neighbourhood Centre	18.74	33.13	33.69	7.39	4.64	362,037.10	-0.51	0.01
Town Centre	2.87	17.41	79.45	14.81	2.14	382,927.00	-1.31	0.16
Total	877.57	1,022.71	1,535.51	281	236	18,332,922	-0.63	0.07

CHANGE PAUP to IHP Modelled Provisions (% relative to PAUP)

Capacity type	Total Base Zoned Area (ha) (Spatial Data from GIS)	Total Area of modelled Parcels by Basezone (ha) (Cleaned Data where spatial base zone allocated to valid land parcel) All Capacity results in this table are reported by the basezone even where precinct and overlay rules apply	Total Area of Parcels Modelled using basezone Provisions (ha) (Area of parcels where basezone rules apply - difference from Column C is effect of Overlays and Precincts and Special Areas )	Vacant Land (ha)	Vacant potential Land (ha)	Business Floorspace (Maximum Theoretical) (sqm)	FAR	% sites modelled as Baszone as % of Parcels by Basezone
Business Park	19%	20%	55%	0%	3%	-17%	-46%	29%
City Centre	-47%	-6%	201%	-2%	304%	35%	-55%	219%
General Business	-1%	-5%	36%	19%	106%	-10%	-34%	44%
Heavy Industry	27%	23%	22%	1%	-24%	2%	-17%	-1%
Light Industry	12%	11%	14%	59%	15%	-2%	-14%	2%
Local Centre	20%	64%	81%	-46%	35%	2%	-44%	10%
Metropolitan Centre	1%	0%	12%	-7%	-6%	46%	30%	12%
Mixed Use	22%	17%	27%	13%	35%	10%	-13%	8%
Neighbourhood Centre	16%	35%	36%	145%	21%	13%	-17%	1%
Town Centre	1%	4%	24%	29%	3%	2%	-18%	19%
Total	10%	14%	22%	22%	10%	6%	-13%	7%

Sum of Capacity with FDC	Column Labels														
Row Labels	City Centre	Large Lot	Light Industry	Local Centre	Metropolitan Centre	Mixed Housing Suburban	Mixed Housing Urban	Mixed Use	Neighbourhood Centre	Rural and Coastal settlement	School	Single House	Terrace Housing and Apartment Buildings	Town Centre	Grand Total
ALED				479		215	1142	5083	88				3337	359	10703
DEVT				85	3324	3052	7154	2084	38			2	2663	1244	19646
FRAN				46		7406	591	466	185	301		1965	192	5	11157
HEMA				91	422	855	3243	245	14			1098	1744	20	7732
HIBA		86		79		4814	3826	1429	74			3780	2075	2752	18915
HOWK				322	1739	7510	7576	1029	133			9	4718	3617	26653
KAIP				118		3144	3032	512	112		5	383	3154	1056	11516
MANU						4896	973					29	174		6072
MAOT						2063	2139	1083			12	27	1244	14	6582
MATA			375	73	261	2400	7182	5963	8				14186	5119	35567
ORAK				192		1657	1370	1564	99				3411	33	8326
OTPA					8	2077	3476	14			13	38	610	236	6472
PAPK					6	3674	1513	1269	12			266	188	3	6931
PUKE				67		664	1493	1205	46			36	3869	244	7624
RODN				239		194	72	102	118	138		2052		142	3057
UPHA				406	9284	4151	6069	1053	8			654	176		21801
WAIR						1131	598					358	140		2227
WAIT	13121		19	169	301	32	265	4598	43				726	142	19416
WHAU					8653	1031	2036	511			23	37	3322	764	16377
<b>Grand Total</b>	<b>13121</b>	<b>86</b>	<b>394</b>	<b>2366</b>	<b>23998</b>	<b>50966</b>	<b>53750</b>	<b>28210</b>	<b>978</b>	<b>439</b>	<b>53</b>	<b>10734</b>	<b>45929</b>	<b>15750</b>	<b>246774</b>





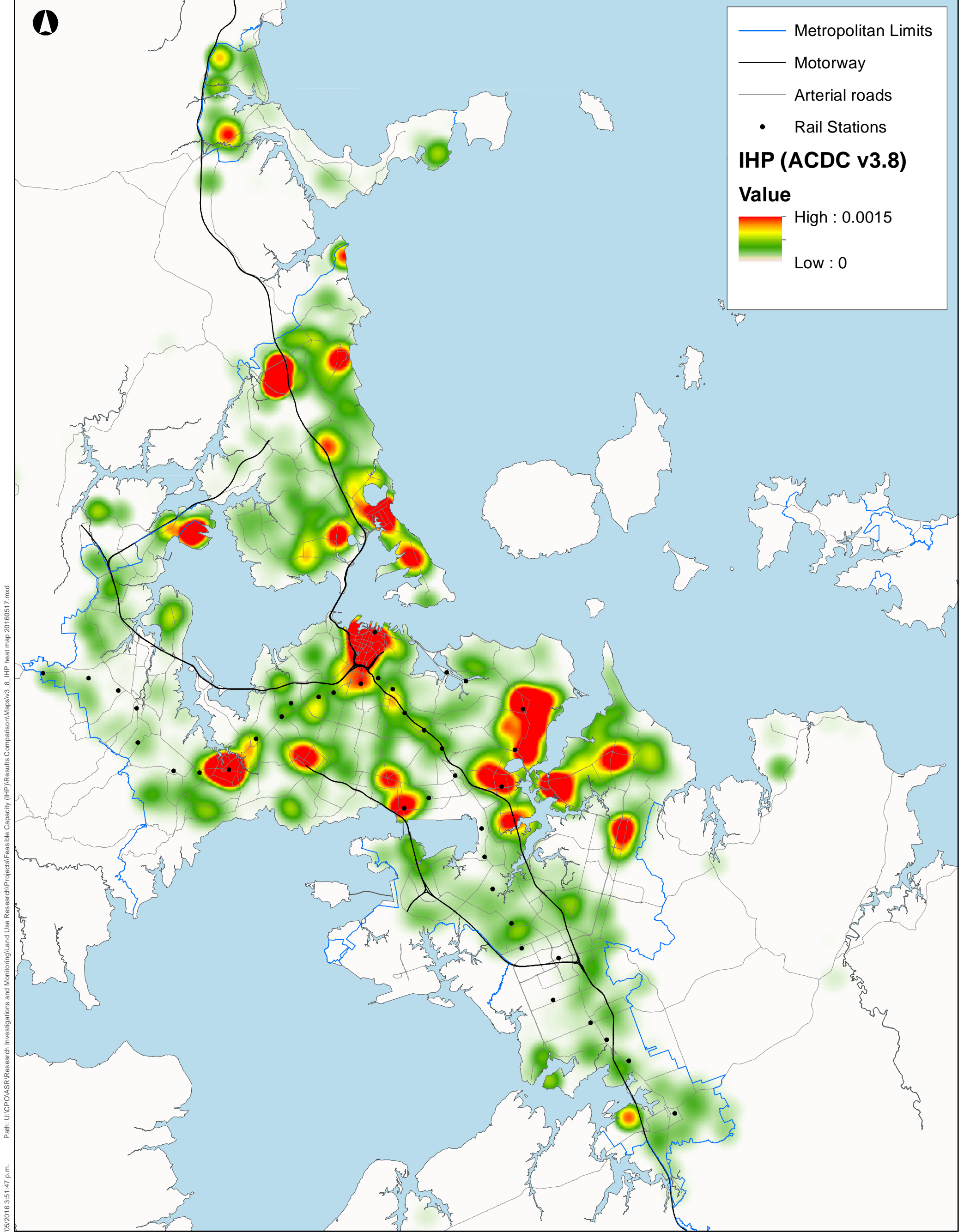
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## Relative density feasible capacity (ACDC v2.4 HPC)

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 Research & Evaluation Unit  
 Auckland Plan, Strategy &  
 Research Department







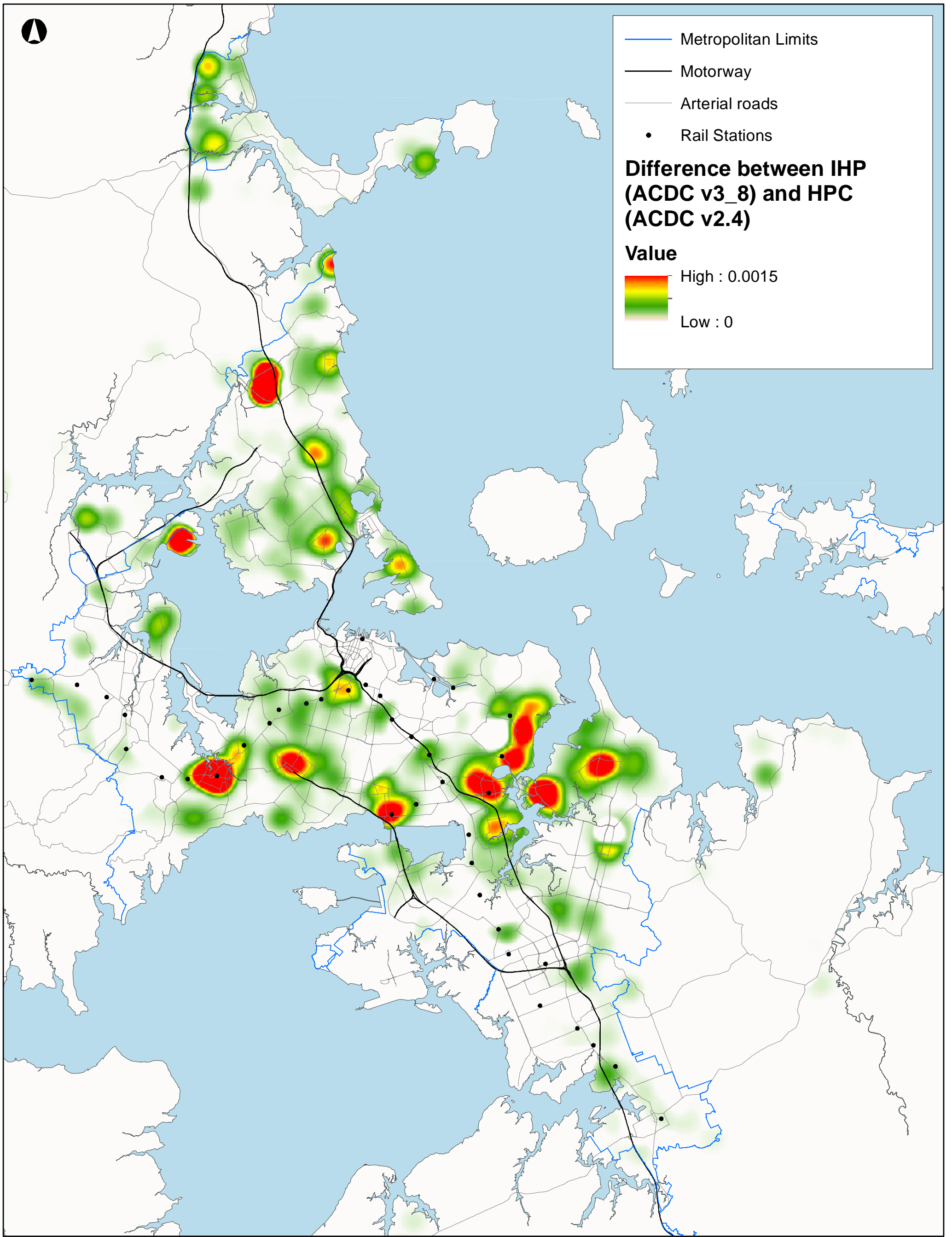
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## Relative density of feasible capacity (ACDC v3.8 - IHP)

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 Auckland Plan, Strategy &  
 Research Department



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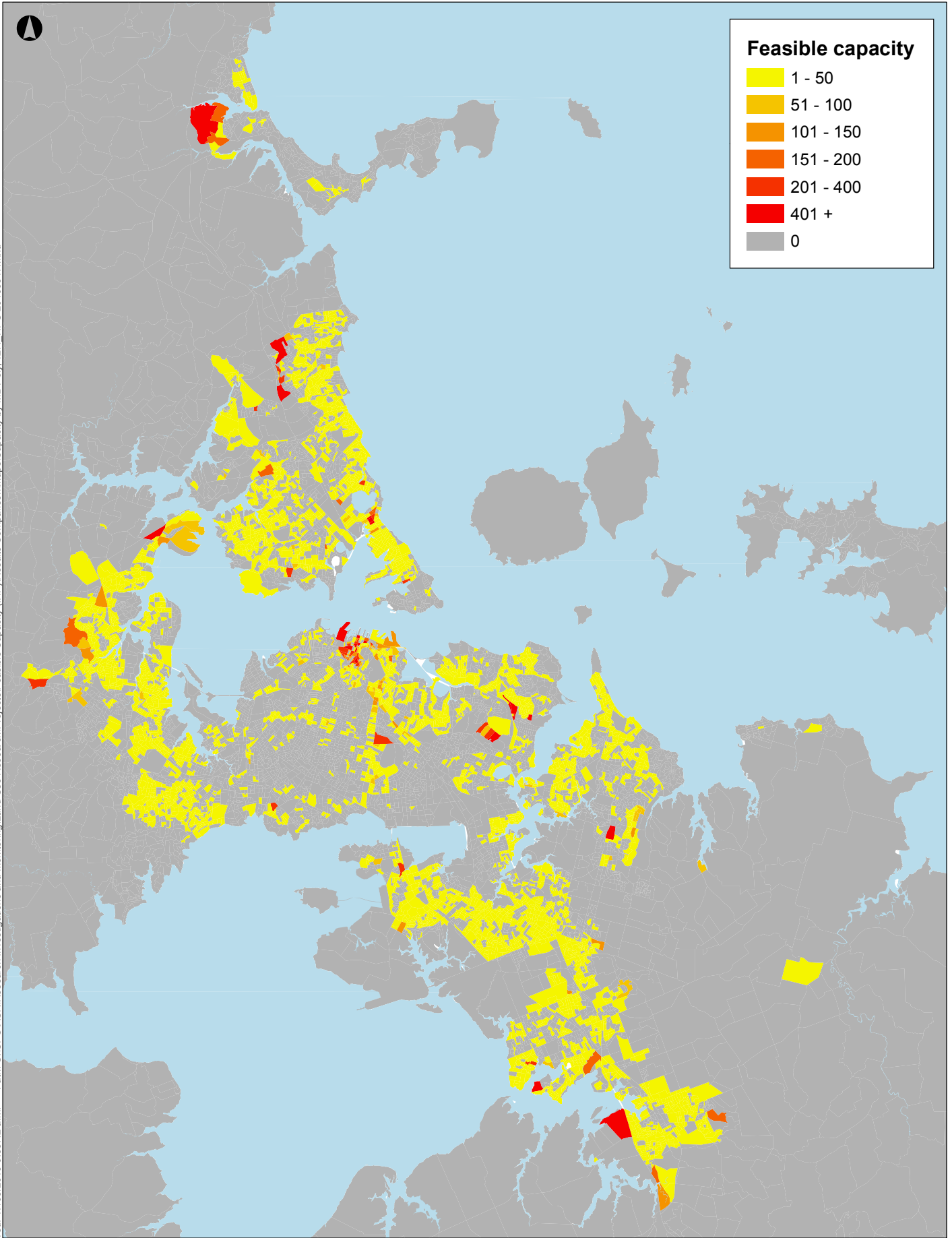
**Relative DIFFERENCE in feasible capacity  
ACDC v3.8 IHP less ACDC v2.4 HiPC**

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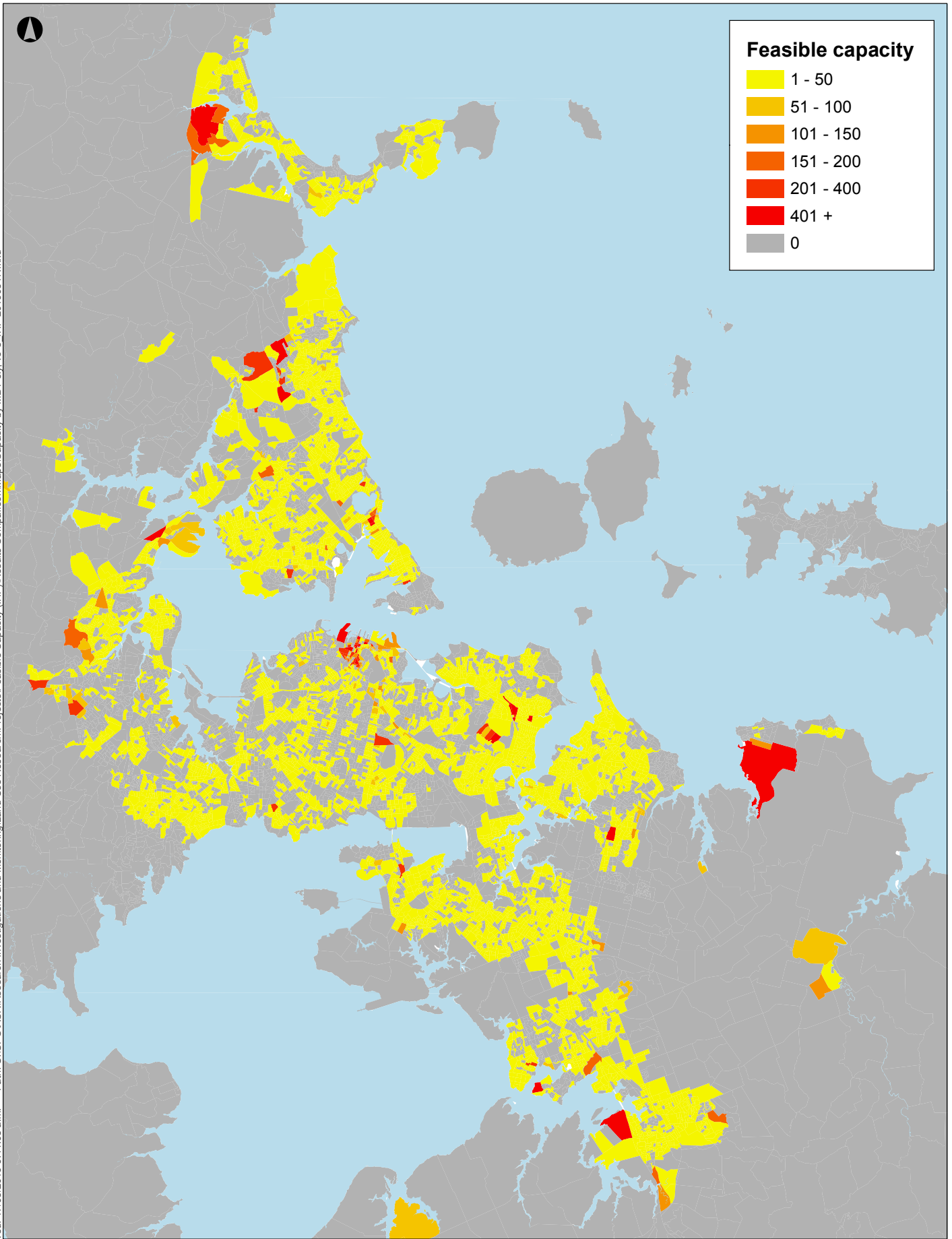


## Feasible capacity HPC: ACDC model v2.4

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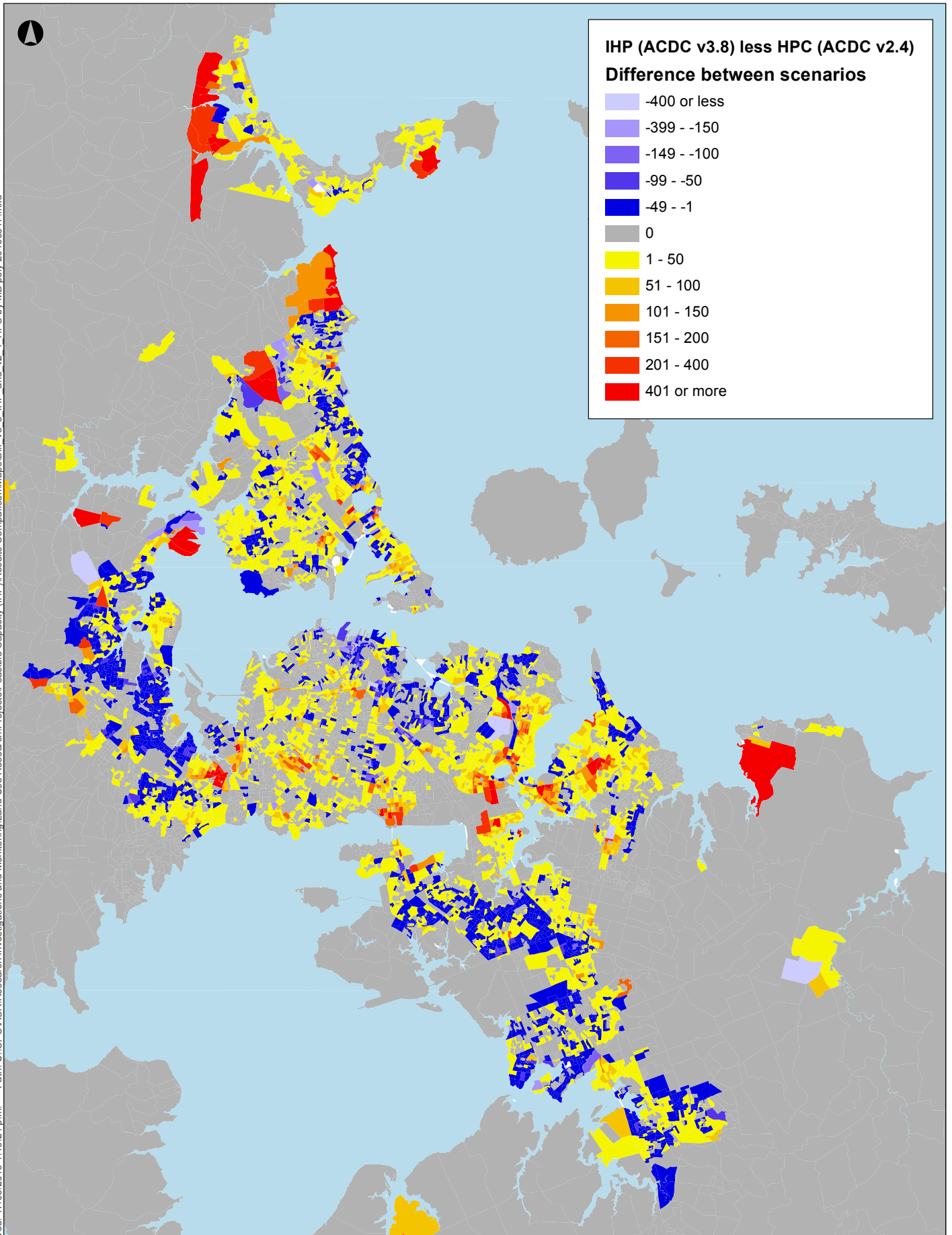


## Feasible capacity IHP: ACDC model v3.8

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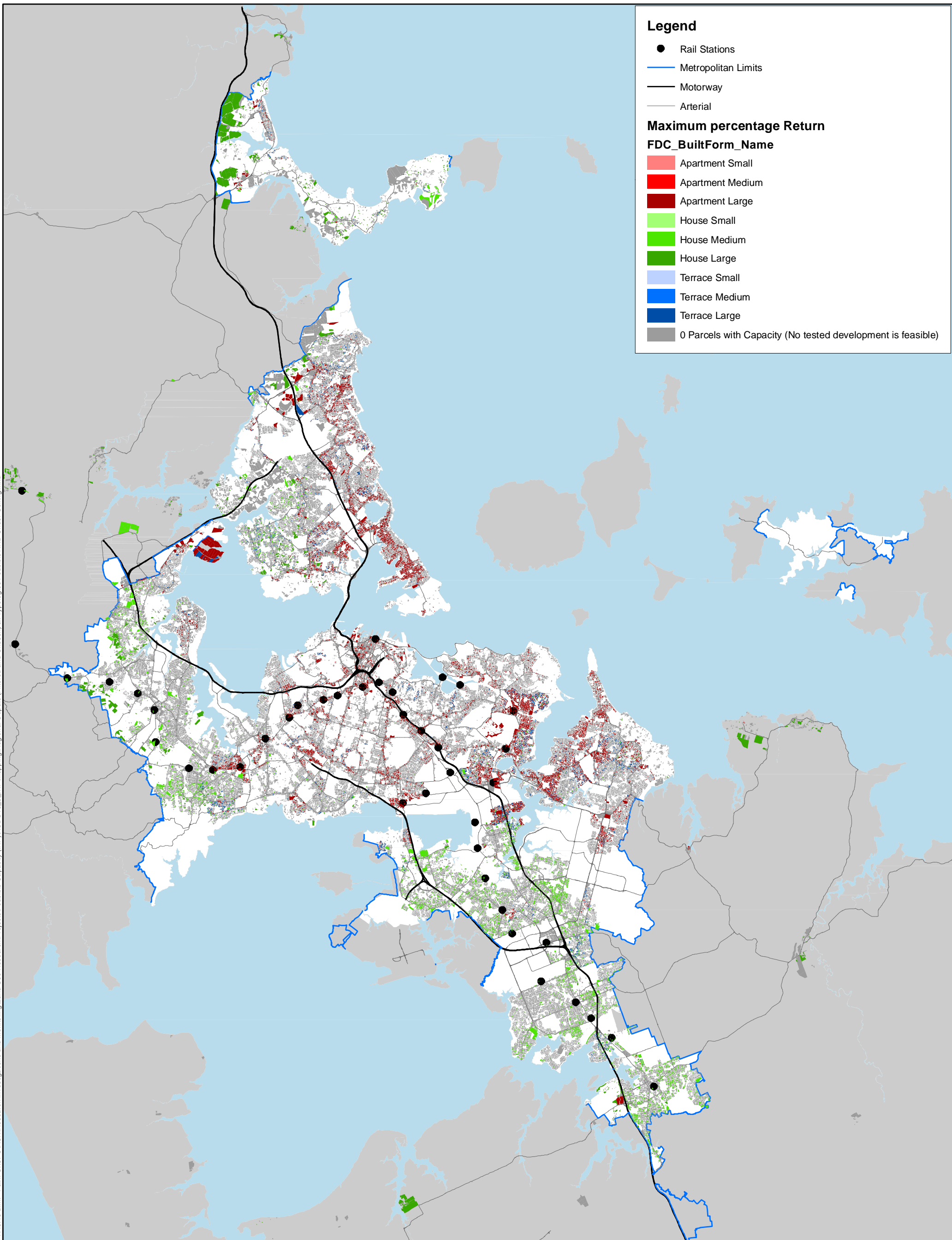
Difference in feasible capacity:  
IHP (ACDC v3.8) less HPC (ACDC v2.4)

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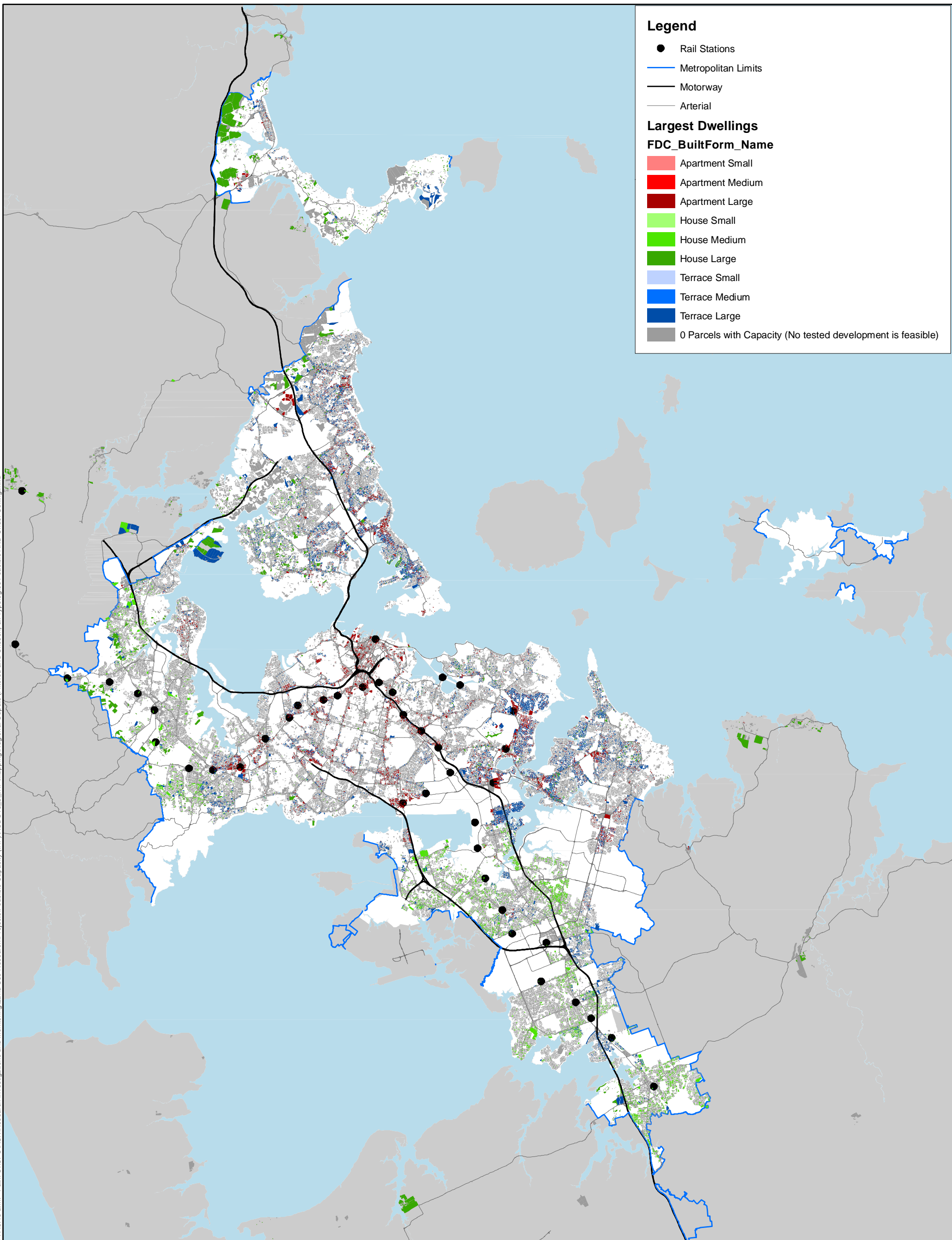
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Filtered and 'Chosen' Outputs (Feasible)  
Regional Run v3.8 IHP 17/05/2016  
Feasible & Under Ceiling - All Typologies

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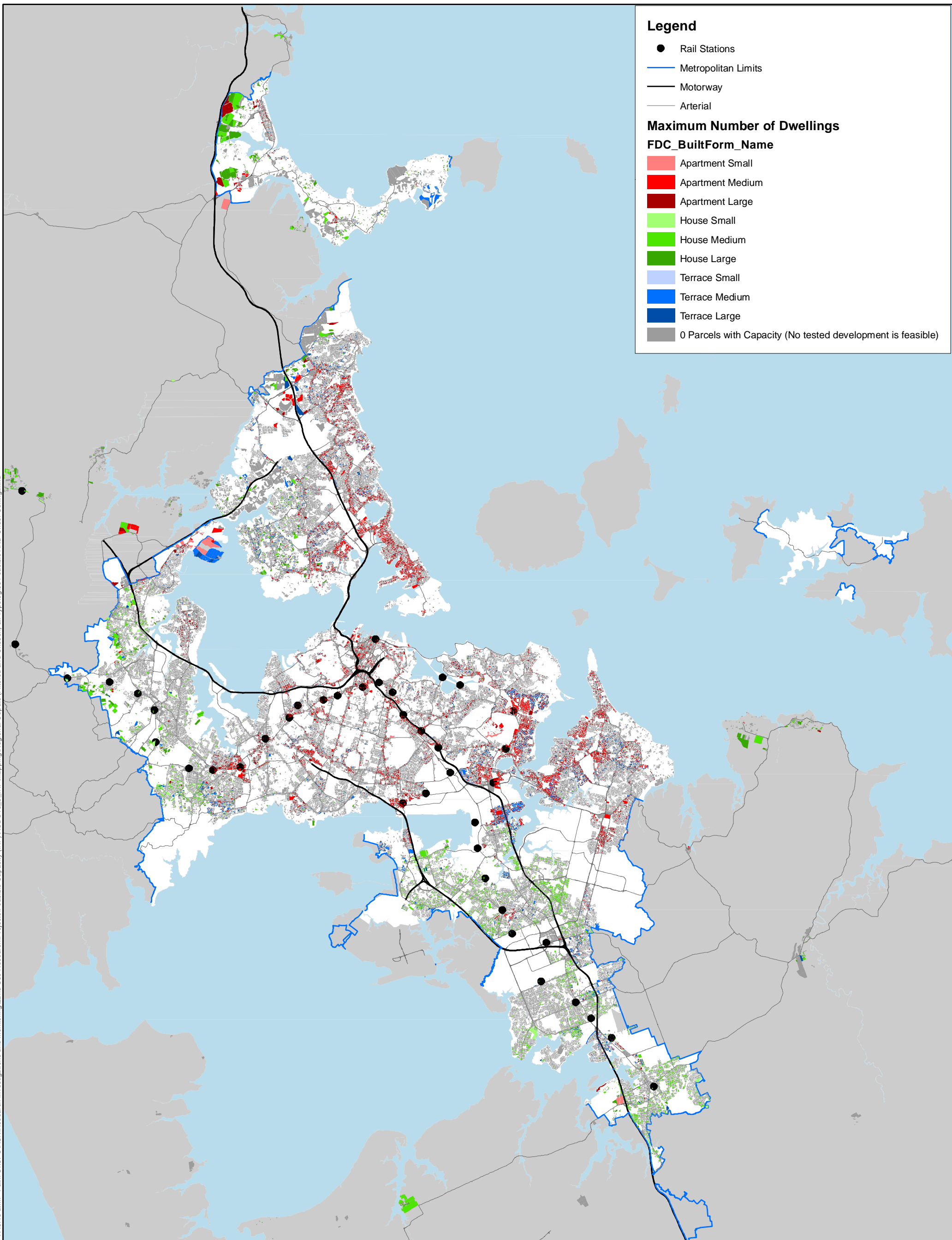
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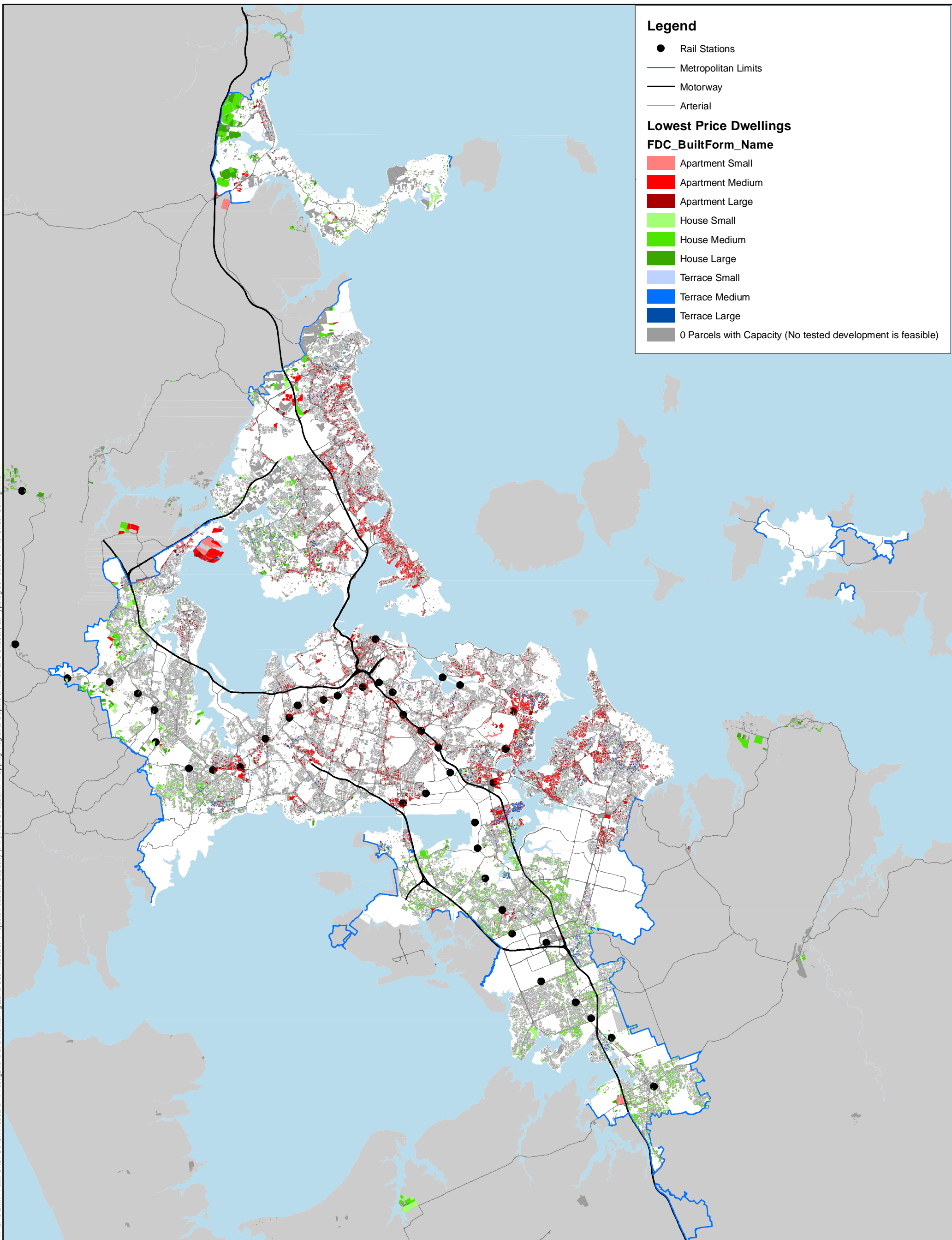
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**Legend**

- Rail Stations
- Metropolitan Limits
- Motorway
- Arterial

**Lowest Price Dwellings**

**FDC\_BuiltForm\_Name**

- Apartment Small
- Apartment Medium
- Apartment Large
- House Small
- House Medium
- House Large
- Terrace Small
- Terrace Medium
- Terrace Large
- 0 Parcels with Capacity (No tested development is feasible)

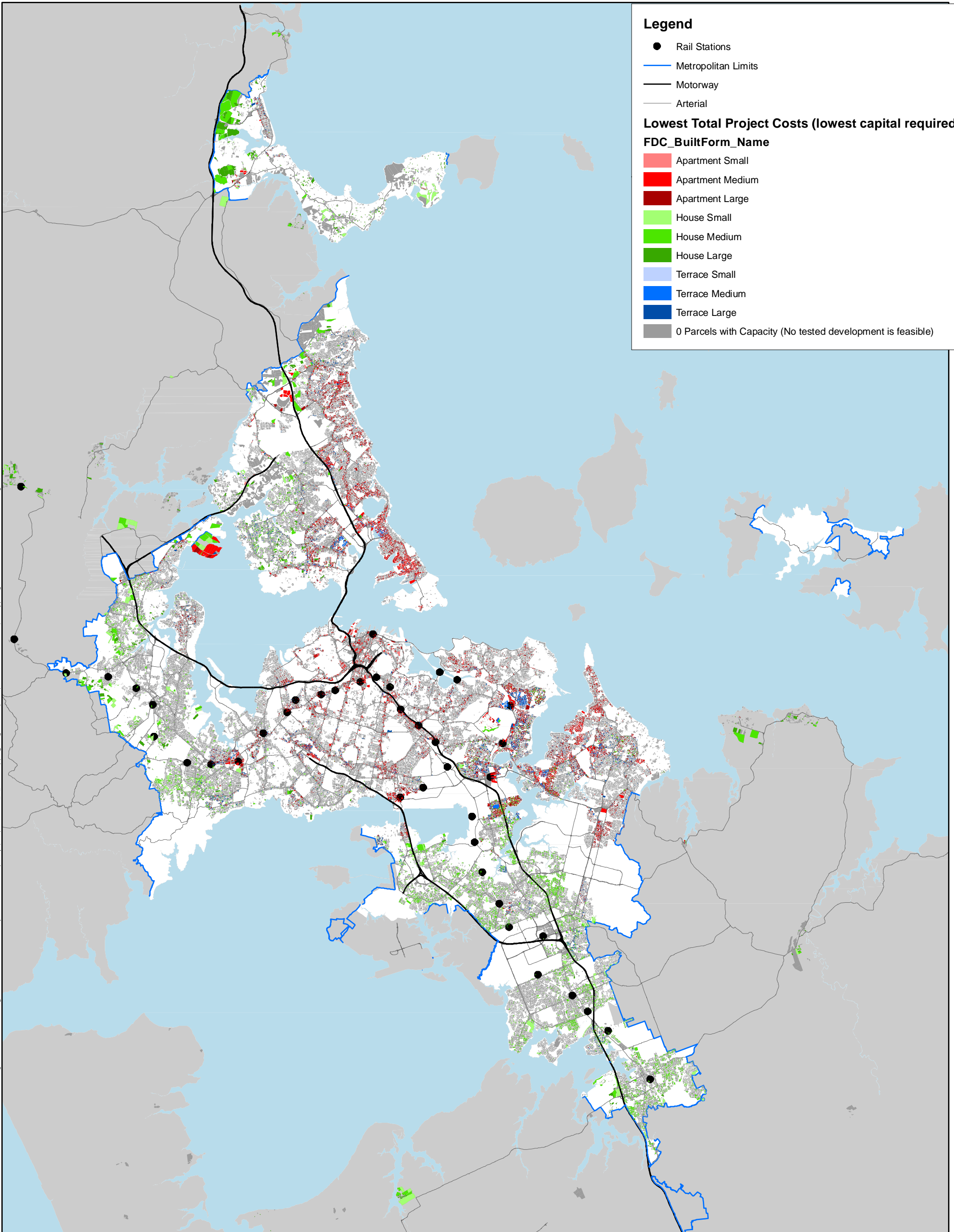
**Chosen Development Option: See Legend**  
Filtered and 'Chosen' Outputs (Feasible)  
Regional Run v3.8 IHP 17/05/2016  
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**Legend**

- Rail Stations
- Metropolitan Limits
- Motorway
- Arterial

**Lowest Total Project Costs (lowest capital required)**

**FDC\_BuiltForm\_Name**

- Apartment Small
- Apartment Medium
- Apartment Large
- House Small
- House Medium
- House Large
- Terrace Small
- Terrace Medium
- Terrace Large
- 0 Parcels with Capacity (No tested development is feasible)

**Chosen Development Option: See Legend**  
Filtered and 'Chosen' Outputs (Feasible)  
Regional Run v3.8 IHP 17/05/2016  
Feasible & Under Ceiling - All Typologies

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