



NAPIER CITY COUNCIL

Greenfield Growth in the Hills Capacity Review

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Disclaimer

The findings and recommendations in this report are based on an examination of available relevant information that has been provided. However, it must be recognised that accuracy cannot be guaranteed since no site verification has been undertaken. While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the project team or their organisation.

We certify that we have used the available plans and have undertaken a desktop analysis of the specified environment. The assumptions identified have been noted in this report.

1 Introduction

1.1 Background

Napier City Council (NCC) is in the early stages of a full District Plan review. This process provides the opportunity to plan for future urban growth of the city. The Heretaunga Plains Urban Development Strategy (“HPUDS”) identifies Riverbend, The Loop and South Pirimai as future greenfield growth areas (currently not zoned for urban development). However, these areas are located on flat land that is likely to become subject to increasing hazards as a result of climate change. Further, this land contains soil types which may fall under the framework of the upcoming National Policy Statement for Productive Soils. Napier City Council is therefore strategically looking at the potential to move future urban expansion into the western hills to improve resilience and retain flat land for productive purposes.

“Greenfield Growth in the Hills” is one of the six key outcomes for the District Plan Review. Public pre-engagement on this direction was undertaken in late 2018-early 2019 and the majority of the feedback supported this approach¹. To date no feasibility studies have been undertaken on the capacity of the western hills to provide for further urban growth.

1.2 Purpose of the Review

WSP Opus have been engaged by Napier City Council to undertake an initial high level desktop capacity review of the western hills to inform further analysis of potential opportunities for urban expansion to assist the next HPUDS review. The purpose of this capacity review is to:

- Identify and map existing rural residential zoned land that may be suitable for future urban development, having regard to the requirements of the Regional Policy Statement and subject to further analysis and structure planning;
- Identify and map existing rural residential zoned land that is likely unsuitable for future urban development and should be retained as non-urban;
- Estimate the indicative yields for the study areas. I.e the number of dwellings that could be developed within the areas mapped as developable areas;
- Indicate and map the three waters infrastructure required to service the developable areas and indicative roads to test the accessibility of the study areas.

This desktop review is not intended to be a structure planning exercise. Depending on the results of this study, additional feasibility investigations and stakeholder engagement may be undertaken to inform the next HPUDS review.

¹ Source - Napier City Council

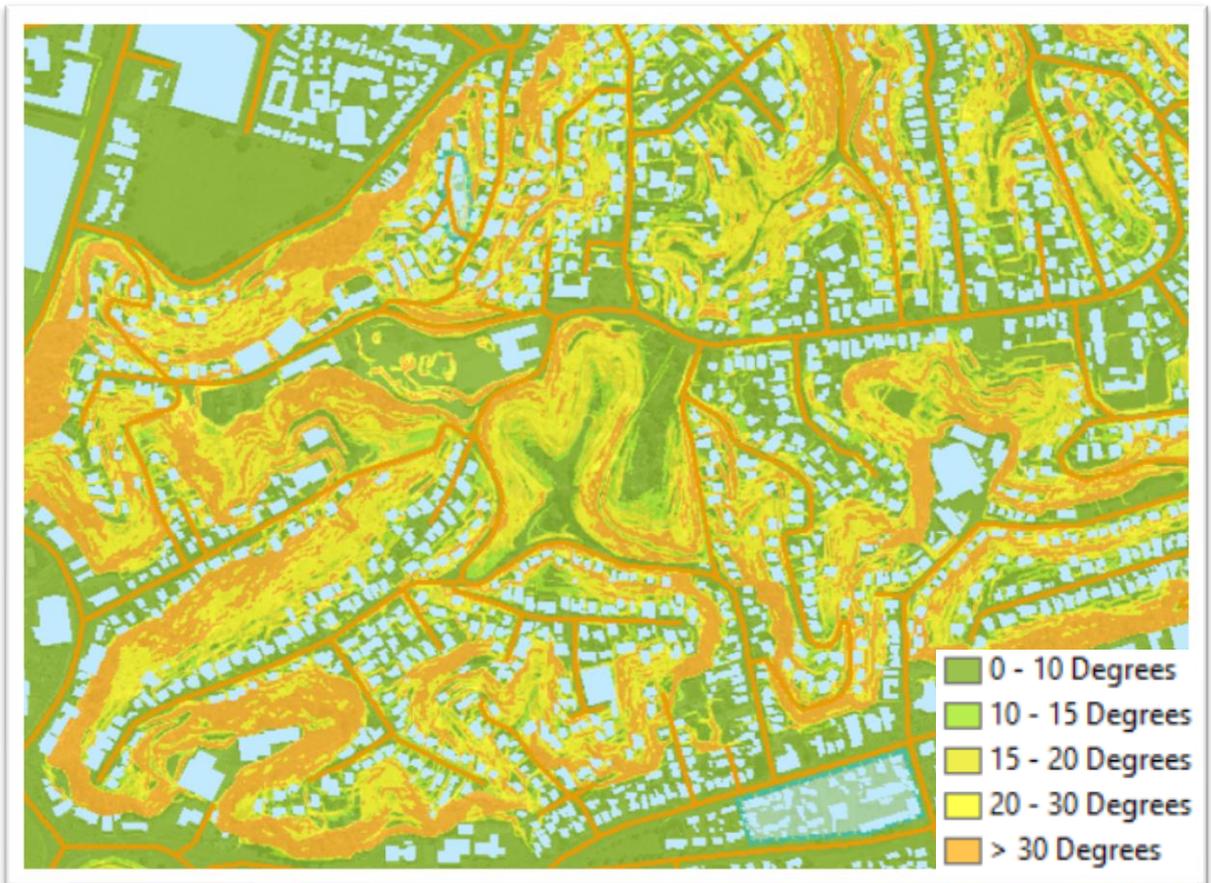
1.3 Methodology used in this review

The following methodology was used to differentiate between land that may be suitable for residential development and to estimate developments yields:

1. A slope analysis was undertaken across the study areas using lidar contours, and GIS mapping. The purpose of this slope analysis was to identify slopes most likely to be suitable for residential development based on the likely feasibility of constructing houses and roads on steeper slopes. For the purposes of this study, a slope of up to 20% was adopted as the threshold for 'developable'. It is possible that earthworks could convert some of the slopes greater than 20% into suitable grades for development. However, it is also likely that some areas less than 20% will be found to be unfeasible after geotechnical investigations have taken place due to high remediation costs. As such, up to 20% is deemed appropriate for this capacity review.

The suitability of a 20% threshold was checked by reviewing the slope grades which accommodated houses on Hospital Hill, in Napier. Figure 1.1 below shows that the majority of houses are located on slopes up to 20%.

Figure 1.1 – Slope grades on Hospital Hill in Napier (buildings shown in blue)



2. A desktop geotechnical review of the study area was undertaken to identify any geotechnical constraints that might affect the suitability of land for housing. These areas were mapped as unsuitable for development. Generally speaking, these areas coincided with slopes greater than 20%;

3. Transpower's 37m building setback requirements from the high voltage mains were mapped and made unsuitable for development for the purposes of this yield analysis. (note - it is possible that a smaller setback could be negotiated with Transpower);
4. Land identified as being a significant landscape in the Napier Landscape Study² (Isthmus - 02 April 2019) was mapped. There were no significant landscapes in the two study areas;
5. Land identified as containing significant natural areas in the Napier Significant Natural Areas Assessment Report³ was mapped as unsuitable for development;
6. Areas of land identified as having Significance to Iwi on the City of Napier District Plan were mapped as unsuitable for development for the purposes of the yield analysis;
7. The stormwater catchments across the study areas were identified;
8. Existing and indicative roads were identified as well as possible three waters infrastructure locations and routes;
9. High level housing yields were estimated for the areas identified as developable.

A summary of the findings of the above reviews and the assumptions made in estimating yields are provided in Sections 3 to 5 of this report.

² Napier Landscape Study, Isthmus, 02 April 2019)

³ Napier Significant Natural Areas Assessment Report, Environment Research Institute University of Waikato, 2019

2 The Study Areas

There are two study areas in the review, termed Study Area 1 – Taradale West, and Study Area 2 – Poraiti Hills.

2.1 Study Area 1 – Taradale West

The Taradale West Study Area consists of a hill country landscape with a series of steep ridges and valleys. The area is largely undeveloped grazing land with lifestyle housing on the lower slopes above Churchill Drive and Puketapu Road. Land to the northeast and north is zoned Residential.

The study area is zoned Rural Residential under the District Plan. To the west of the study area is land zoned Rural under the Hastings District Plan, and a strip of land zoned Rural under the District Plan is situated to the south on the opposite site of Springfield Road.

A newly developed lifestyle subdivision is currently under construction on the slopes above Puketapu Road at the northern end of the study area.

A large stormwater detention dam which is operated by the Hawke’s Bay Regional Council is situated in a depression above Churchill Drive and to the south of the Dolbel Reserve.

There are no reticulated services serving the study area, with the exception of several houses off Churchill Drive on the lower slopes of the study area which have connections to the network.

Land of Significance to Iwi / Archaeology

The southern end of the study area includes the Otātara-Hikurangi hills on which the Otātara Pa is situated, which has cultural and historic significance to Māori. This land is identified on the planning maps as having Significance to Iwi. We have mapped this area as unsuitable for development. There is also a high concentration of mapped archaeological sites in this area, which relate to historic Māori use of the land. There are also several mapped archaeological sites at the northern end of the study area. These have not been excluded from the developable area as the extent of these sites (buffer areas) are not known or precisely located. However, they are not anticipated to take up large areas of land. These will need to be identified at the structure planning stages.

Geotechnical Constraints

A desktop geotechnical review of the study area was undertaken by a Geotechnical Engineer from WSP Opus to identify any geotechnical constraints that might affect the suitability of land for housing. This involved the engineer reviewing readily available published and unpublished geotechnical and geological reports, geological mapping, historic aerial imagery, and the Hawke’s Bay Regional Council Hazard Portal. The review identified a number of areas potentially subject to rock fall, surface creep and moderately deep seated slide. These areas were mapped and identified as unsuitable for development. All of these geotechnical hazard risk areas fell within the area already identified as being unsuitable for development due to topography. There are no known fault lines in the study areas.

Transpower High Voltage Lines

Large high voltage power lines from the Transpower substation on Springfield Road traverse the southern end of the study area. We have mapped the required 37m off-set from these lines and made this area unsuitable for development.

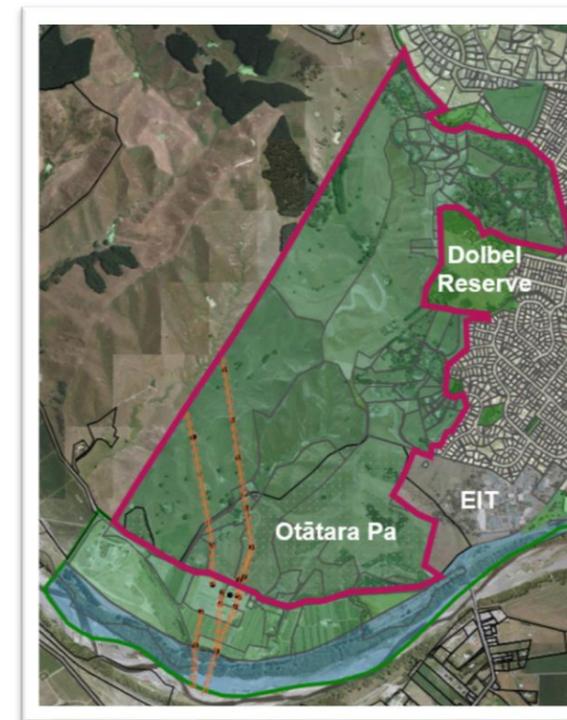
Areas of Ecological Significance

There are no significant natural areas within the study area according to the Napier Significant Natural Areas Assessment Report⁴. This report does however identify the potential for ecological corridor linkages through the study area. These essentially link together the areas identified as having ecological significance located outside of the study area. The routes for these linkages are flexible and so will need to be considered at the structure plan stage if the land is to be developed for residential purposes.

Areas of Landscape Significance

The Napier Landscape Study⁵ (Isthmus - 02 April 2019) did not identify any significant landscapes within the area defined in the report as ‘Taradale Hill’s’. In relation to the ‘Taradale Hills’ the study found that the ‘*patchwork character of the Taradale Hills means they can generally accommodate further development. At the same time, they are moderately sensitive to poorly designed development and earthworks on the steep hill faces and skyline*’. There were therefore no landscapes identified as undevelopable within the Taradale Hills Study Area. It is noted that Otātara-Hikurangi hills are already mapped as unsuitable for development in this review due to its cultural/historical significance.

Figure 2.1.1 – Study Area 1 – Taradale West



⁴ Napier Significant Natural Areas Assessment Report, Environment Research Institute University of Waikato, 2019

⁵ Napier Landscape Study, Isthmus, 02 April 2019)

2.2 Study Area 2 – Poraiti Hills

The Poraiti Hills Study Area also consists of a large area of Rural Residential Zoned Land. The study area differs from Study Area 1 in that it contains a range of landforms from steeper hills and valleys to rolling hillsides. There are also various small pockets of flattish land. The other notable difference is that the Poraiti Hills Study Area contains a large number of rural lifestyle properties (approximately 300) meaning that the land is quite fragmented into smaller allotments.

Puketitiri Road and Poraiti Road are the primary collector roads through the study area. Smaller local roads feed off from these two roads. Generally speaking, the roads are relatively narrow and winding and do not contain footpaths.

There are no reticulated utility services serving the study area.

Land of Significance to Iwi / Archaeology

The north eastern edge of the study area contains land overlooking the Ahuriri Estuary to the east that is identified on the planning maps as having significance to iwi. We have mapped these areas as unsuitable for development.

There are also several mapped archaeological sites in this study area, most of which are located on land identified as undevelopable due to topography. For the purposes of the high level yield estimates, those archaeological sites that fall within the developable area have not been excluded from development as the extent of these sites (buffer areas) are not known or precisely located. However, they are not anticipated to take up large areas of land. These will need to be identified at the structure planning stages.

Geotechnical Constraints

Similar to Study Area 1, the desktop geotechnical review identified a number of areas potentially subject to rock fall, surface creep and moderately deep seated slide. These areas were mapped and identified as unsuitable for development. All of these geotechnical hazard risk areas fell within the area already identified as being unsuitable for development due to topography. There are no known fault lines in the study area.

Transpower High Voltage Lines

Large high voltage power lines from the Transpower substation on Springfield Road traverse through the western side of the study area. We have mapped the required 37m off-set from these lines and made this area unsuitable for development.

Areas of Ecological Significance

Similar to Study Area 1, there are no significant natural areas within the study area according to the Napier Significant Natural Areas Assessment Report⁶. The report does however identify the potential for ecological corridor linkages through the study area. These essentially link together the areas identified as having ecological significance located outside of the study area. The routes for these linkages are flexible so will need to be considered at the structure plan stage if the land is to be developed for residential purposes.

⁶ Napier Significant Natural Areas Assessment Report, Environment Research Institute University of Waikato, 2019

Areas of Landscape Significance

The Napier Landscape Study⁷ (Isthmus - 02 April 2019) did not identify any significant landscapes within the area defined as Taradale Hill's area or Poraiti Hills area.

There were therefore no landscapes identified as undevelopable within the study area. It is noted that Pukekura/Sugar Loaf and the 'Mission Hills' are outside of the study area.

Figure 2.2 – Study Area 2 – Poraiti Hills



⁷ Napier Landscape Study, Isthmus, 02 April 2019)

3 Housing Yield Estimates

The maps in Appendix A identify the land within the two study areas that may be suitable for development. As the identification of these areas was based on a desktop exercise, the maps should be used for high level housing yield analysis purposes only. It is important to note that the areas identified as undevelopable may be able to be developed, but the costs of developing will be greater and the level of density possible will be much lower.

The areas identified as suitable for development have been split into areas A to L for ease of yield analysis and reporting purposes. The area boundaries do not always follow properties boundaries. For Study Area 2 the area boundaries have been defined by stormwater catchment or to align with road boundaries. For Study Area 1, the area boundaries were positioned for ease of reporting and analysis and do not necessarily follow catchment boundaries.

A number of constraints have been factored in when estimating the yields for the two study areas. These are outlined in Sections 3.1 to 3.4 below.

3.1 Topographical Constraints

The topography of both study areas is undulating and, in many instances the developable areas follow ridges and valleys. As a consequence, it is much harder to achieve an efficient lot layout compared to a flatter area where blocks have a typical width. Topography influences the location of roads and driveways and can create development constraints such as wet areas and concentrated stormwater flow paths.

It is also likely that there will be instances where building setbacks are required from gully slopes or slip/rockfall hazards which can affect the efficient layout of lots within the developable areas. Topographical constraints are common in other New Zealand cities and remedial earthworks may be able to address these constraints.

The north western end of Area F is situated within a low-lying area which is likely to need drainage works to enable housing development. As a consequence, a lower density of development than that indicated in the the two Residential Density Scenarios below is possible for this area.

3.2 Fragmentation constraints

Most areas identified for development have a large number of existing houses and have been fragmented into smaller landholdings. As such, an efficient lot layout is less likely to be achieved compared to an undeveloped greenfield site.

Most of the areas have a high number of existing houses/lots in separate ownership. Areas F, G1, H1, C and D are the exception and have a small number or no dwellings. Areas K and L have a large number of houses/landowners relative to size of the area.

Structure planning and subdivision are much more difficult when sites have been fragmented into smaller landholdings/ownership and it is likely that in many instances road routes will need to be designated, constructed by Council and funded by development contributions.

3.3 Access constraints

Access to some parts of the areas identified as developable could be challenging due to the landform and layout of the existing housing settlements which effectively create an access barrier. The indicative roads shown on the maps mostly follow existing driveways. They are shown on the maps to test accessibility to developable areas. Detailed route investigations will take place at the structure planning stage. In Areas F, G1, G2, H1 and H2 the indicative roads are shown along ridgelines and valleys to test possible accessibility. An assessment of the access suitability is provided in Section 3.8 below.

3.4 Yields Estimates

For the purposes of yield analysis we have estimated the number of new households/lots that could be accommodated based on various development scenarios (see Tables 3.1 - 3.4 below).

Residential Density Scenario 1

The District Plan sets a minimum lot size of 350m² in the Residential Zone. Recent greenfield developments in Napier (Parklands) have an average lot size of between 650m² and 700m² which caters for the size of modern houses. Generally speaking, blocks of medium density housing of around 350m² is typically provided for in select locations along transportation routes or adjacent to public reserves.

Typically for a flattish greenfield area, development yields are calculated by dividing the development area by 650 - 750m², after allowing for roads, schools, reserves and utility infrastructure such as stormwater ponds. The Hawke's Bay Regional Policy Statement seeks 15 lots per hectare (average of 650m²).

The recent Special Mission Character Zone which is situated on the hills adjoining Study Area 1 has been structure planned and anticipates 1 house per 9.3ha of net developable land, or an average lot size of 1079m². The Mission Special Character Zone has more forgiving slopes than the two study areas and does not contain any existing dwellings.

Tables 3.1 below estimates household yield estimates for each area assuming that the land is zoned residential. In this scenario we have assumed that 10% of the developable areas will be roads and private driveways or marginal land. Stormwater pond areas have been estimated based on the size of the catchment. We have also assumed that approximately 1500m² will be retained around each existing dwelling.

This scenario assumes a yield of approximately **6 houses per ha or an average of one site/house per 1500m²**. Due to the above-mentioned constraints, we are of the view that this ratio is the most appropriate for estimating yields for residential zoning in this instance. Further investigations would be required to test whether higher densities could be achieved.

Residential Density Scenario 2

Table 3.2 assumes that a density of approximately **10 houses per hectare or an average of one site/house per 750m²** can be achieved through good structure planning and incorporating blocks of medium to higher density housing. This scenario achieves Council's objectives of providing for a range of housing typologies.

Lifestyle Density Scenario 1

The existing Rural Residential density sought by the District Plan is **0.67 houses per hectare or an average of one site/house per 1.5ha**.

Table 3.3 assumes a density of approximately **5 houses per ha or an average of one site/house per 2000m²**. A lot size of 2000m² is large enough to accommodate an average sized new house and effluent disposal fields. Typically slopes up to 15% are utilised for effluent fields. Steeper slopes typically require a larger effluent disposal field.

Lifestyle Density Scenario 2

Table 3.4 assumes a density of approximately **2 houses per ha or an average of one site/house per 5000m²**. This density is more appropriately applied to the gross area, rather than net developable area. This is because the houses and effluent fields would need to occupy the developable land and the remaining 3000m² could be on the undevelopable land (steeper slopes). As a consequence, the housing estimates provided for areas A, B, C, G, H, I and J in Table 3.4 below are likely to be under represented. This is because these areas consist of isolated developable areas surrounded by steep slopes. As such, for these areas the estimates provided in Table 3.3 might be a better estimate of the number of households that could be achieved at a density of 1 house per 5000m².

Table 3.1 – Residential Density Scenario 1⁸

	Total developable area (ha)	Assumes 10% of developable area as roads/private driveways/marginal land	Estimated area taken up up stormwater ponds	Estimated area taken up by neighbourhood reserves 1.375ha/1000 people	Allowance for primary schools (1.5ha)	Approx number of existing dwellings	Area of existing sites (assuming 1500m2 retained for each existing dwelling)	Net developable area	Potential new house sites assuming 1 per 1500m2 is achieved	Total new and existing houses	Houses per hectare of developable area	Number of residents - (2.7 persons /household)
Study Area 1												
A	28.08	2.808		0.61		17	2.55	22.11	147	164	6	444
B	32.56	3.256		0.71		17	2.55	26.04	174	191	6	515
C	19.96	1.996		0.43		1	0.15	17.38	116	117	6	316
D	15.23	1.523	0.5	0.33		3	0.45	12.43	83	86	6	232
Study Area 2												
E	27.47	2.747		0.6		28	4.2	19.92	133	161	6	434
F	64.31	6.431	0.26	1.39		0	0	56.23	375	375	6	1012
G1	28.14	2.814		0.61		4	0.6	24.12	161	165	6	445
G2	41.75	4.175		0.91		23	3.45	33.22	221	244	6	660
H1	25.68	2.568		0.57		0	0	22.54	150	150	6	406
H2	81.41	8.141	1.42	1.73		38	5.7	64.42	429	467	6	1262
I	49.04	4.904		1.07		30	4.5	38.57	257	287	6	775
J	28.85	2.885		0.63		27	4.05	21.29	142	169	6	456
K	65.52	6.552	0.38	1.38	1.5	55	8.25	47.45	316	371	6	1003
L	120.3	12.034	0.32	2.57	1.5	85	12.75	91.16	608	693	6	1870

Table 3.2 – Residential Density Scenario 2

	Total developable area (ha)	Assumes 20% of developable area as roads/private driveways/inefficiency/marginal land	Estimated area taken up by stormwater ponds	Estimated area taken up by neighbourhood reserves 1.375ha/1000 people	Allowance for primary schools (1.5ha)	Number of existing dwellings	Area of existing sites (assuming 750m2 retained for each existing dwelling)	Net developable area	Potential new house sites assuming 1 per 750m2 density	Total new and existing houses	Houses per hectare of developable area	Number of residents (2.7 persons /household)
Study Area 1												
A	28.08	5.6		1.06		17	1.3	20.1	268	285	10	771
B	32.56	6.5		1.23		17	1.275	23.5	314	331	10	893
C	19.96	4.0		0.75		1	0.1	15.1	202	203	10	548
D	15.23	3.0	0.5	0.57		3	0.225	10.9	145	148	10	400
Study Area 2												
E	27.47	5.5		1.03		28	2.1	18.8	251	279	10	754
F	64.31	12.9	0.26	2.42		0	0	48.8	650	650	10	1756
G1	28.14	5.6		1.06		4	0.3	21.2	282	286	10	772
G2	41.75	8.4		1.57		23	1.7	30.1	401	424	10	1146
H1	25.68	5.1		0.98		0	0.0	19.6	261	261	10	704
H2	81.41	16.3	1.42	3		38	2.9	57.9	771	809	10	2186
I	49.04	9.8		1.85		30	2.3	35.1	468	498	10	1346
J	28.85	5.8		1.09		27	2.025	20.0	266	293	10	792
K	65.52	13.1	0.38	2.38	1.5	55	4.1	44.0	587	642	10	1733
L	120.34	24.1	0.32	4.45	1.5	85	6.375	83.6	1115	1200	10	3240

⁸ Note - Some Areas have the stormwater ponds located on undevelopable land or in within HDC boundary and therefore these pond areas are not shown in the tables. See Section 3.7 below. The number of residents per household at 2.7 is the national average.

Table 3.3 – Lifestyle Scenario 1⁹

	Total developable area (ha)	Assumes 10% of Developable Area as roads/private driveways	Estimated area taken up by stormwater ponds	Estimated area taken up by neighbourhood reserves 1.375ha/1000 people	Allowance for primary schools (1.5ha)	Number of existing dwellings	Area of existing sites (assuming 2000m2 retained for each existing dwelling)	Net developable area	Potential new house sites assuming 1 per 2000m2 density	Total new and existing houses	Houses per hectare of developable area	Number of residents (2.7 persons /household)
Study Area 1												
A	28.08	2.8				17	3.4	21.9	109	126	5	341
B	32.56	3.3				17	3.4	25.9	130	147	5	396
C	19.96	2.0				1	0.2	17.8	89	90	5	243
D	15.23	1.5	0.50			3	0.6	12.6	63	66	4	178
Study Area 2												
E	27.47	2.7				28	5.6	19.1	96	124	5	334
F	64.31	6.4	0.26			0	0.0	57.6	288	288	4	778
G1	28.14	2.8				4	0.8	24.5	123	127	5	342
G2	41.75	4.2				23	4.6	33.0	165	188	5	507
H1	25.68	2.6				0	0.0	23.1	116	116	5	312
H2	81.41	8.1	1.42			38	7.6	64.3	321	359	4	970
I	49.04	4.9				30	6.0	38.1	191	221	5	596
J	28.85	2.9				27	5.4	20.6	103	130	5	351
K	65.52	6.6	0.38			55	11.0	48.0	240	295	5	796
L	120.34	12.0	0.32			85	17.0	91.3	457	542	5	1462

Table 3.4 – Lifestyle Scenario 2

	Total developable area (ha)	Assumes 10% of developable area as roads/private driveways	Estimated area taken up by stormwater ponds	Estimated area taken up by neighbourhood reserves 1.375ha/1000 people	Allowance for primary schools (1.5ha)	Number of existing dwellings	Area of existing sites (assuming 5000m2 retained for each existing dwelling)	Net developable area	Potential new house sites assuming 1 per 5000m2 density	Total new and existing houses	Houses per hectare of developable area	Number of residents (2.7 persons /household)
Study Area 1												
A	28.08	2.8				17	8.5	16.8	34	51	2	136
B	32.56	3.3				17	8.5	20.8	42	59	2	158
C	19.96	2.0				1	0.5	17.5	35	36	2	97
D	15.23	1.5	0.5			3	1.5	11.7	23	26	2	71
Study Area 2												
E	27.47	2.7				28	14.0	10.7	21	49	2	134
F	64.31	6.4	0.26			0	0	57.6	115	115	2	311
G1	28.14	2.8				4	2.0	23.3	47	51	2	137
G2	41.75	4.2				23	11.5	26.1	52	75	2	203
H1	25.68	2.6				0	0	23.1	46	46	2	125
H2	81.41	8.1	1.42			38	19.0	52.9	106	144	2	388
I	49.04	4.9				30	15.0	29.1	58	88	2	238
J	28.85	2.9				27	13.5	12.5	25	52	2	140
K	65.52	6.6	0.38			55	27.5	31.5	63	118	2	318
L	120.34	12.0	0.32			85	42.5	65.8	132	217	2	585

⁹ No reserves or primary schools are likely to be provided with the Rural Residential Scenarios

3.5 Wastewater Infrastructure

We have reviewed each area with respect to its ability to collect and dispose of wastewater via public reticulation. For the purposes of this high-level analysis we have not checked the capacity of the existing wastewater network to cater for increased flows and it can be assumed that if connections to the existing network are to be undertaken, some upgrades to the existing networks may be required. For community-based wastewater treatment and disposal options, we have not investigated where this might occur. Further feasibility studies that consider the infrastructure costs vs housing yield will be necessary to test the feasibility of urban development. For Study Area 2, we have identified possible wastewater pump station locations based on the low points in the catchments.

Area A and B

Gravity wastewater mains aligned along the roads and connected to the existing Taradale reticulation would service these two sub areas.

Area C and D

Area C is less suited to residential zoning due to its steep grade. Area D is relatively isolated from Taradale's wastewater reticulation. If a residential density is desired for these two areas, a pump station at the bottom of the catchment and the construction of a new reticulated wastewater mains along Springfield Road to Taradale would be required.

Area E

Tironui Drive is fully serviced with 3 waters reticulation. It is expected that extensions to the existing public wastewater reticulation on Kent Terrace or/and Tironui Drive will enable the servicing of the undeveloped area.

Area F

Area F mainly consists of a low-lying valley. If a residential density is desired, a similar approach to Areas I, K and L outlined below, would service this area. Drainage work is likely to be needed if on-site effluent discharge to land is needed for the lifestyle scenarios due to the low-lying nature of this land.

Area G, H and J

The developable areas are spread out along ridges and gullies, and are relatively remote from the existing urban area. The low points for these areas are also to the west of the study area, whereas areas K, L and I drain to the east. As such, the cost of servicing these areas by reticulated mains connected to Taradale would be relatively high. However, if an urban density is desired, a similar approach to Areas I, K and L outlined below, would service this area. Integrating urban development on both sides of the territorial boundary may assist with the feasibility of providing infrastructure.

Areas I, K and L

There are three possible options that may be viable for servicing the sewage reticulation requirements in these areas. Possible sewer pump locations have been identified in the low points to maximise the potential use of gravity flows. The preferred option would be to reticulate the total septic waste stream into the existing Council reticulated system.

The second option would be to pump the liquid fraction of the waste into the Council's existing reticulated system and retain the solid fraction in holding tanks that would need to be serviced on a regular basis. Pump stations would still be required in the identified locations. Council's Engineers have indicated that this option is not preferred as it is too reliant on maintenance and monitoring and is likely to be the most expensive option overall.

The third option would be a complete standalone treatment plant to service the area with the treated waste being discharged to land. Generally speaking, if land is not suitable for housing due to its grade, soils or groundwater properties, it is typically not suitable for effluent disposal. As a general rule of thumb, the slope of an irrigation area is best suited to grades less than 10% and the discharge to land application rates are around 5000m³/ha/year. This means approximately 1ha of irrigation land would be required per 25 households, based on 200l/person/day (2.7 people per household). As such, this discharge option is not likely to be feasible within the areas identified as undevelopable. However, feasible irrigation land might be available in the Hastings District territorial area to the west.

The treatment and disposal to the adjacent estuary is unlikely to be feasible from an environmental and cultural standpoint.

A wastewater mains over the Taipo Stream is likely to be technically feasible, but there will be challenges from an environmental and cultural perspective.

3.6 Water Supply Infrastructure

Additional water storage capacity at the public water reservoir above the Mission Estate Winery (accessed off Tironui Drive) should service a reticulated supply through Study Area 2 (Poraiti Hills). The reservoir location is significantly higher than the study areas at 120m. The mains would likely connect through the proposed Mission Special Character Area. Additional water reservoirs could feasibly be established elsewhere in the study area if required. For firefighting resilience, additional reservoirs and looped reticulation may be desirable throughout the study areas.

The reservoir may also service most of Areas A and B. The northern part of Area A is unlikely to be serviced due to its height and a separate reservoir is likely to be required at the top of this area. Area D is quite remote, so reticulation would need to be extended along Springfield Road.

Council's Engineers have indicated that bore water in Poraiti has some quality issues, but additional more could be investigated to the western side of the Poraiti Hills Study Area.

3.7 Stormwater Infrastructure

For the purposes of the study, we have assumed that each house will be required to have attenuation tanks to attenuate run-off from roofs and other impervious areas within the lot for the 10 year Annual Recurrence Interval rain event. These will typically be 5000 – 15,000 litres per household, depending on house size and hard stand area. We have also assumed that roads and shared private accesses will occupy 10% of the developable area. We have indicated on the maps where stormwater attenuation ponds are likely to be required based on the topography, size of the contributing catchment and distance to the end discharge point. The area of each pond has been estimated based on the above assumptions using the Rational Method and has been incorporated in the yield analysis in the tables above. The ponds for Areas G, H and J are likely to be best located on land contained within the Hasting District. For Area B, the volume of the existing stormwater attenuation pond will need to be increased.

In terms of Area E, discharging additional peak run-off to the Taipo Stream may not be feasible due to existing capacity issues.

3.8 Roads and Connectivity

On the yield maps we have plotted the existing roads and indicated possible new road routes to test the serviceability of the study areas. The new road routes were chosen as they generally followed existing shared private access ways/roads or tracks or followed ridges or valleys. The routes indicated should not necessarily inform the structure planning of the area. They have been included to identify to test access feasibility.

It is likely that new internal roads will comprise a combination of 6m and 5.5m wide carriageway roads, providing access for the sites and connecting into the existing surrounding road network. It is likely that existing roads and shared private accesses/road will need be widened in places to accommodate the level of development estimated.

Puketitiri Road and Poraiti Roads

As part of the Mission Special Character Area development, some local improvements to Puketitiri Road are proposed. These include curve easing and local intersection improvements to both Poraiti Road and Fryer Road together with general geometric improvements such as improved sightlines and road markings. It is anticipated that as part of the Poraiti Study Area, additional geometric improvements are required for the portion between Poraiti Road and Rotowhenua Road. These improvements include alignment changes, and curve widening/easing to ensure an 80km/h design speed is maintained. These are likely to be accommodated within the existing legal road boundary.

Poraiti Road has a 20m road reserve and given the numerous tight bends, some localised curve treatments could be linked to the development of this area, thereby reinforcing its road function as a secondary collector road.

Other local roads in Poraiti

The existing public local roads in Poraiti generally have a legal width of 20m. The carriageway widths vary along these roads. NCC's road design standards require a standard legal width of 20m and a minimum legal width of 17m for a residential collector road serving less than 375 dwelling units. With these road widths, road carriageway upgrades and widening will generally be able to take place without the need for extra land. However, structure planning is likely to seek localised curve easing which might require the taking of private land.

We have indicated on the study area maps in Appendix A locations where intersections upgrades / new intersections / connections to the existing network will be required. Commentary on the suitability of each of these intersections is provided in Table 3.8 below.

Table 3.8 – Road Connection Assessment

Area	Map Ref	Map Symbol	Treatment likely required	Comment
A	A1		Upgrade of the existing driveway intersection to a road intersection onto Puketapu Rd	Minor improvements are deemed necessary to formalise the road intersection.
	A2		Upgrade of the existing driveway intersection	The driveway access onto Puketapu Rd will need to be formalised and visibility improvements will need to be made.
	Additional notes – The existing shared drives ways are tighter, narrower and steeper than the engineering code of practice. These driveways will need to be upgraded.			
B	B1		Upgrade the existing driveway intersection onto Churchill Dr	The expected traffic volumes might require an upgrade to this 'crossroad' intersection. The approach gradient will likely need to be reduced to improve sightlines in both directions.
	Additional Notes: Connectivity to Area A and over to the Hastings District Council territory is highly desirable to prevent Area B becoming a large cul-de-sac.			

Area	Map Ref	Map Symbol	Treatment likely required	Comment
C	C1		New road connection	The existing driveway connection with Churchill Dr will need to be formalised.
	Additional Notes – Council is unlikely to accept a public road with high maintenance costs for the very little yield that is likely in this area. The construction of roads and private shared access is likely to be difficult/costly in this area due to the steep terrain.			
D	D1		Upgrade the existing driveway onto Springfield Rd to a priority controlled intersection	Localised improvements required including realignment of section of Springfield Rd to improve sightlines. Embankment cutting and stabilising existing steep slopes.
	Additional Notes: The intersection of Springfield Road and Gloucester Street has limited capacity and the proximity of the bridge over the Tutaekuri River requires further investigation to improve safety at this location. An indicative road in Area D has not been identified on the map, as there are a number of feasible options for road layouts in this area.			
E	E1		New intersection	A new intersection with Tironui Dr will need to be constructed where the multiple driveways intersect.
	Additional Notes: This road intersection allows connection with Area F. A road connection with Kent Terrace would be desirable, but is not likely to be feasible due to the steep grades and location of existing houses at the upper end of Kent Terrace.			
F	F1		New road connection	Future connection with Mission Estate subdivision is desirable because Area F should not be allowed to become a large cul-de-sac.
	Additional Notes: Northern connection with Area G. Primary access will be via Area E (i.e. Tironui Dr). This access is likely to be expensive to construct due to the steep topography.			
G	G1		New road connection with Silverton Rd	An extension of Silverton Rd is likely to be required to provide access as well as resilience.
	G2		Intersection upgrade	Minor improvements will be required to improve this intersection onto Puketitiri Rd
	G3		New priority controlled intersection onto Puketitiri Rd	There are limited alternative locations available along Puketitiri Rd due to steep embankments. Construction costs likely to be high. This intersection connection provides some resilience for Areas G1 & G2.
	Additional Notes: Connectivity to Area F and an additional road connection within Area G1 to Puketitiri Road is desirable to reduce the reliance on intersection G3.			

Area	Map Ref	Map Symbol	Treatment likely required	Comment
H	H1		Intersection upgrade with Rotowhenua Rd	Minor improvements are required to improve sightlines (hedge trimming) at this intersection.
	H2		New intersection with Quarry Ridge	A new intersection is likely to be required as it bolsters resilience by allowing connectivity to Area I.
	H3		New intersection with Puketitiri Rd	There are limited locations along Puketitiri Rd for new intersections due to the steep embankments. An intersection here allows connectivity to Area I.
I	I1		Upgrade existing driveway onto Poraiti Rd	The existing intersection with the road will need to be upgraded.
	I2		Upgrade existing driveway onto Poraiti Rd	The existing intersection with the road will need to be upgraded.
	I3		New intersection with Pineleigh Dr	This intersection will provide connectivity to Area H.
J	J1		New road connection with Rotowhenua Rd	A new road extension is indicated to improve connectivity to Puketitiri Rd. This reduces dependency on Longview Rd.
	Additional Notes: Smaller local connections are not shown but all utilise existing driveways connecting onto either Longview Rd or Ballantyne Rd.			
K	K1		Upgrade existing driveway	The existing driveway onto Poraiti Rd will need to be formalised
	K2		New intersection with Nigiri Rd	There are multiple driveways which will likely need to be converted into a single road intersection to avoid driver confusion. The existing driveways have limited sightlines.
	K3		Intersection Upgrade onto Poraiti Rd	Local improvements required (road markings, signage)
Additional Notes: No future eastern connections are deemed possible due to the proximity of the estuary.				
L	L1		Upgrade existing driveway onto Poraiti Rd	The existing crossing will need to be upgraded to a road intersection.
	L2		New intersection with Boyd Rd	Minor treatment will be required to ensure motorists understand the road priority.
	L3		New intersection with Poraiti Rd	Potentially costly to construct. Steep slopes require substantial embankment excavation.
	L4		New intersection with Puketitiri Rd	The crossing could be retained as a driveway access depending on number of new units sharing the access. It might need to be upgraded

Area	Map Ref	Map Symbol	Treatment likely required	Comment
				to priority intersection in combination with the adjacent driveway.
	L5		New road connection linking into Oak Place	The existing intersection will need to be upgraded.
	L6		Intersection upgrade with Fryer Rd	Minor improvements to existing intersection will be required (road marking, signage, street name)
	L7		Upgrade existing driveway	Minor improvements to existing intersection will be required (road marking, signage, street name)

Transportation Summary

Overall, the initial transport review has not identified any ‘showstoppers’ limiting future development in these areas. It is acknowledged that some improvements might require high capital investment.

Public transport and cycling within Study Area 2 is presently poor while walking opportunities is better, but can be significantly improved. Included on the study area maps are existing walkways and indicative walkways provided by the NCC. These walkway locations are not fixed in stone and later structure planning of the areas will inform these future routes.

Resilience Improvements

The Poraiti Study Area has limited access with regards to alternative routes. In the event that Poraiti Road becomes blocked, large portions of the area will become stranded with no secondary routes being available. In order to remedy this, a secondary route is recommended. For this reason we have indicated a possible new road linking the development in the Poraiti Road area to Rotowhenua Road which links back to Puketitiri Road. Structure Planning of these areas will identify the most suitable linkage route.

Future Connectivity

Both study areas adjoin rural land within the Hastings District Council jurisdiction. The adjoining land has not been reviewed for its suitability for urban development, however the indicative road layout for Areas B, F and G could provide for linkages to this adjoining land if required in the future. Puketitiri Road provides an arterial linkage between Taradale and the land to the west in Hastings District.

Trip Generation

The residential densities planned for each of the development phases have been used to predict the likely trip generation for the sites, which has informed the likely infrastructure improvements required. This analysis is included in Appendix B.

3.9 Schools

In the field analysis we have allowed 1.5ha for a single primary school within Areas K and L which have the highest estimated populations. The 1.5ha was derived from the area of Napier Central School on Hospital Hill in Napier. No engagement with the Ministry of Education has taken place to ascertain whether a school would be needed based on the estimated population.

3.1 Parks and Reserves

The 2018 Napier City Council Activity Management Plans set out the defined Levels of Service for Greenspace Provision, which is based on New Zealand Recreational Association Guidelines. The table in Appendix E lists the park and reserves categories and provides comment on the provision likely to be needed in the Study Areas should residential development occur. When estimating the housing yields, we have only allowed for 'Neighbourhood Reserves'. The reasons for this are set out in the table.

Schools and reserves have not been allowed for when estimating yields for the lifestyle scenarios.

4 Planning Analysis and Recommendations

4.1 Assessment Against Hawkes' Bay Regional Policy Statement

The Hawkes' Bay Regional Policy Statement (HBRPS) is a key document in the assessment of the suitability of the study areas for residential development. When read in conjunction with relevant provisions such as Issues UD1 and UD2, and Objectives UD1, UD4, OBJ5 and OBJ6, it is clear that the HBRPS intends managed rather than 'ad hoc' urban growth. Existing housing development in the study areas has occurred in a largely 'ad hoc' fashion. With increasing pressure for more housing in the hills, this unstructured form of development is expected to continue.

Pol UD4.2 provides a series of criteria that determines whether or not an urban development area is appropriate. Policy UD4.3 lists those areas considered appropriate and references further criteria against which those areas should be tested if developed. Policy UD4.4 identifies areas considered inappropriate for development. Neither of the study areas are listed as inappropriate for development.

The tables in Appendix D provide an assessment of each study area with respect to the criteria in Policy UD4.2 and other relevant provisions in the HBRPS.

To summarise, the assessment finds that Areas A, B, E, F, I, L, and K are able to be structure planned to the meet the criteria in Policy UD4.2. Area H is more dispersed and less compact, but compliance with the criteria in UD4.2 may be possible. This indicates that the identified land may be suitable for consideration as part of NCC's strategic planning of future urban growth areas.

Areas C, D, and possibly G2, H2 and J are less connected to urban areas and will result in a less compact urban area due to the steep landform. In addition, infrastructure servicing may be less efficient with the yields anticipated in these areas. As such, these areas are less favourable when assessed against Policy UD4.2.

4.2 Assessment Against National Policy Statement on Urban Land Capacity

The National Policy Statement on Urban Development Capacity 2016 (Policy Statement) directs local authorities to provide sufficient development capacity in their resource management plans, supported by infrastructure, to meet demand for housing and business space. The Policy Statement provides objectives and policies to achieve this direction. Napier City is categorised in this document as a medium growth urban area which has specific policies.

The policies for medium and high growth areas directs local authorities to carry out housing capacity assessments at least three-yearly. This study will form parts of this capacity assessment.

Other provisions of relevance to this study are Policies PA1 and PA2. These policies seek to ensure that there is sufficient development capacity that is feasible, and that the infrastructure required to service the development areas is available. The servicing of the identified developable areas is

likely to be physically feasible, but further investigations will be required to determine the financial feasibility of the areas.

The subject review should assist Napier City Council to meet its requirements under this Policy Statement.

4.3 Assessment Against Heretaunga Plains Urban Development Strategy

HPUDS is the overarching strategy guiding urban growth in Hawke's Bay. This Strategy has been developed jointly by Napier City Council, Hastings District Council and Hawke's Bay Regional Council. The purpose of HPUDS is to assist the local authorities to plan and manage growth. It quantifies the level of growth expected over a 30 year period (2015 - 2045) and how that growth is to be effectively managed. HPUDS provides the overall framework for managing growth in Hawke's Bay.

HPUDS sets out a preferred settlement pattern of 'compact design' for the Heretaunga Plains. A particular driver for the strategy is the need, and community's preference to, maintain the versatile land of the Heretaunga Plains for production purposes.

Defined growth areas are a key element of the settlement pattern sought by HPUDS. One of the premises of HPUDS is that defined growth areas are more efficient and cost effective from an infrastructure and servicing point of view. Another is that growth on the versatile land of the Heretaunga Plains should be avoided as much as possible. The strategy lists the residential greenfield growth areas that have been identified within Napier City and Hastings District.

Study areas 1 and 2 have not been identified as residential greenfield growth areas or reserve areas in HPUDS. However, some parts of the study areas may be considered favourably in future HPUDS reviews, as the land is not located on versatile soils and is not at risk from sea level rise or other natural hazards such as liquefaction or sinking land levels. A key consideration with respect to the suitability of the study areas in any review is the efficiency of providing infrastructure servicing to these areas. Recommendations have been made in this regard in Section 3 of this report.

5 Capacity Review Summary

The table below summarises the findings of the review with respect to each identified area. An overall rating has been provided to assist Napier City Council to determine which areas should be prioritised for further investigation. Generally speaking, Areas A and B from Study Area 1, and E, F, G1 and H1, K, L and I from Study Area 2 are likely to be more favourable for residential development. In terms of staging, developing the land adjoining Taradale outward in a concentric fashion is likely to be favourable in terms of road upgrading and network infrastructure extensions. Reducing the Rural Residential minimum lot size and removing the average lot size is potentially an option for consideration for those areas less suitable for urban development.

Area	Yield estimate range (Residential) Excludes existing houses ¹⁰	Yield estimate range (Rural Residential) Excludes existing houses ¹¹	Existing fragmentation	Public Wastewater Reticulation	Public Water Supply Reticulation	Public Stormwater Reticulation ¹²	Roads and connectivity	Consistency with RPS Policy UD4.2	Overall Rating and Comments
			3 - Low 2 - Medium 1 - High	3 - Reasonable solutions to service possible 2 - Moderate complexity and moderate costs to service 1 - More complex / higher costs to service				3 - Consistent with criteria 2 - Some potential inconsistencies 1 - Likely inconsistent	
A	147 – 268	34 - 109	High – 1	3	2	3	3	3	15 – Highly fragmented. Access is currently via private road only. This land is currently being developed at a rural residential density. Benefits by being situated adjacent to Taradale’s residential area.
B	174 – 314	42 - 130	High – 1	3	2	3	3	3	15 – Fragmented in places, but situated adjacent to existing roads and public reticulation.
C	116 – 202	35 - 89	Low – 3	1	1	1	1	1	8 – Consists of steep land that will be difficult to develop at a residential density.
D	83 – 145	23 - 63	Low – 3	1	1	3	3	1	12 – Reasonably isolated from the existing residential area and is fragmented by high voltage lines which make it less suitable for residential development.
E	133 – 251	21 – 96	High – 1	3	3	3	3	3	16 – Highly fragmented but a good candidate for infill residential housing. Good structure planning will be required to achieve the yield range.
F	375 – 650	115 – 288	Low – 3	2	3	3	2	3	16 – Road access to this area could be reasonably expensive and stormwater flows will need to be managed, but a compact density could be achieved.
G1	161 – 282	47 – 123	Low – 3	1	1	2	2	2	11 – Developable areas are dispersed and align with the tops of ridges and gully’s. Lot layout inefficiencies are likely due to the likely ratio of road length to the number of houses that can be provided for.
G2	221 – 401	52 - 165	Medium - 2	1	1	2	2	2	10 – Moderately fragmented. Developable areas are dispersed and align with the tops of ridges and gully’s. Lot layout inefficiencies are likely due to the likely ratio of road length to the number of houses that can be provided for.
H1	150 - 261	46 – 116	Low – 3	1	1	2	2	2	11 - Developable areas are dispersed and align with the tops of ridges and gully’s. Lot layout inefficiencies are likely due to the ratio of road length to the number of houses that can be provided for. The catchment flows to the west which may increase infrastructure servicing costs. Benefits from proximity to Area I and L and Puketitiri Road.
H2	429 – 771	106 - 321	Medium - 2	1	1	2	2	2	10 - Moderately fragmented. Developable areas are dispersed and align with the tops of ridges and gully’s. Lot layout inefficiencies are likely due to the ratio of road length to the number of houses that can be provided for. The catchment flows to the west which may increase infrastructure servicing costs.
I	257 – 468	58 - 191	High – 1	3	3	3	3	3	16 – Highly fragmented. Benefits from proximity to Areas L and K and Poraiti Road.
J	142 – 261	25 - 103	High – 1	1	1	2	2	2	9 – Highly fragmented. Developable areas are dispersed and align with the tops of ridges and gully’s. Relatively isolated from the existing urban area resulting in increased servicing costs.
K	316 – 771	63 - 240	High – 1	3	3	3	3	3	16 - Highly fragmented. Benefits from proximity to Areas I and Poraiti Road. Has existing public and private roads.
L	608 - 1115	132 - 457	High - 1	3	3	3	3	3	16 - Highly fragmented. Benefits from proximity to Taradale, Poraiti Road and Puketitiri Road. Has existing public and private roads.

¹⁰ The range is based on the Scenarios in Section 3. Refer to the suggested scenarios in Section 3 of this report

¹¹ The range is based on the Scenarios in Section 3. Refer to the suggested scenarios in Section 3 of this report

¹² The 3 waters ratings are based on public reticulated systems rather than private on-site systems. On-site 3 waters servicing should be rated 3 in the lifestyle scenarios

6 Capacity Review Conclusions

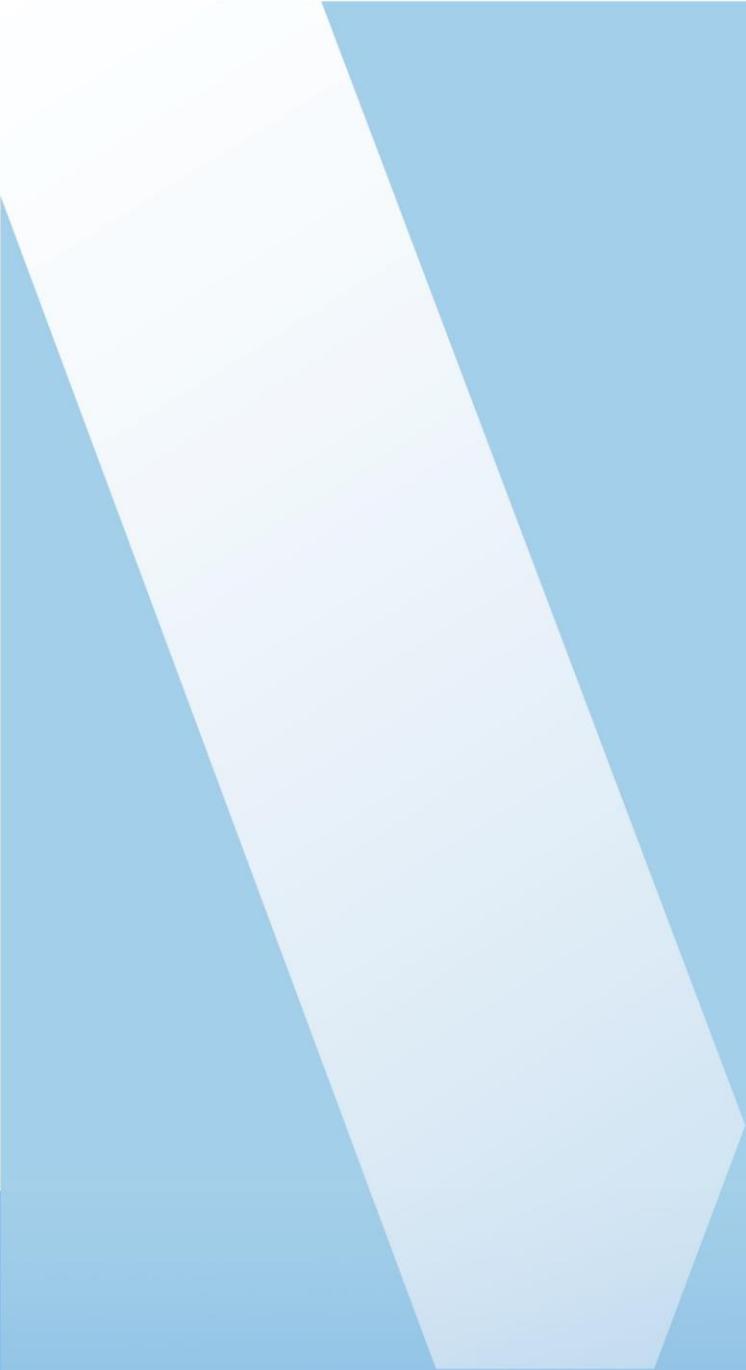
This high-level capacity review has identified that there is likely to be land suitable for residential development within the two study areas from a physical and infrastructure perspective. In addition, a number of the areas, in particular Areas A, B, E, F, G1, H1, I, K, H and L, appear to be consistent with, or could be designed to be consistent with the greenfield growth selection criteria in Policy UD4.2 of the Hawkes Bay Regional Policy Statement.

If the land were to be rezoned residential in the future, one of the risks to achieving a suitable urban density and good urban design outcomes is the further fragmentation of the land before that rezoning occurs. Most of the areas identified as being developable are already fragmented into small rural lots. This is likely to result in greater challenges from a structure planning and plan change perspective when compared to a greenfield area with one or two owners. A common method used to reduce the fragmentation of land intended for urban growth in the future is to rezone suitable land as Future Urban Zone. Such a zone tends to restrict undesirable fragmentation and the construction of buildings which might compromise the route of potential future roads or infrastructure. Several of the areas identified in this review as being suitable for development may be suitable candidates for a Future Urban Zoning. Further holistic analysis of the Napier greenfield growth areas and future urban capacity would be needed before determining these areas.

The study areas both contain land that consists of rolling hills to steeper ridges and valleys. The development costs associated with the construction of roads, driveways and house platforms are likely to be significantly higher on hilly land than on flatter land. Further, the costs of piped infrastructure is likely to also be higher than on the Napier plains because underground services in narrow winding roads tend to cost more to provide. House construction costs are also likely to be higher as typical off the shelf houses are less likely to be feasible on hilly topography.

Before confirming the suitability of the land for residential development, it is recommended that more detailed feasibility investigations take place to more accurately estimate the number of households that could be provided for, and to test the financial feasibility and efficiency of providing infrastructure such as wastewater, water supply, stormwater management, electricity services and transportation upgrades, such as road widening and intersection improvements.

It is recommended that any land not rezoned as Future Urban be kept at a lifestyle density.



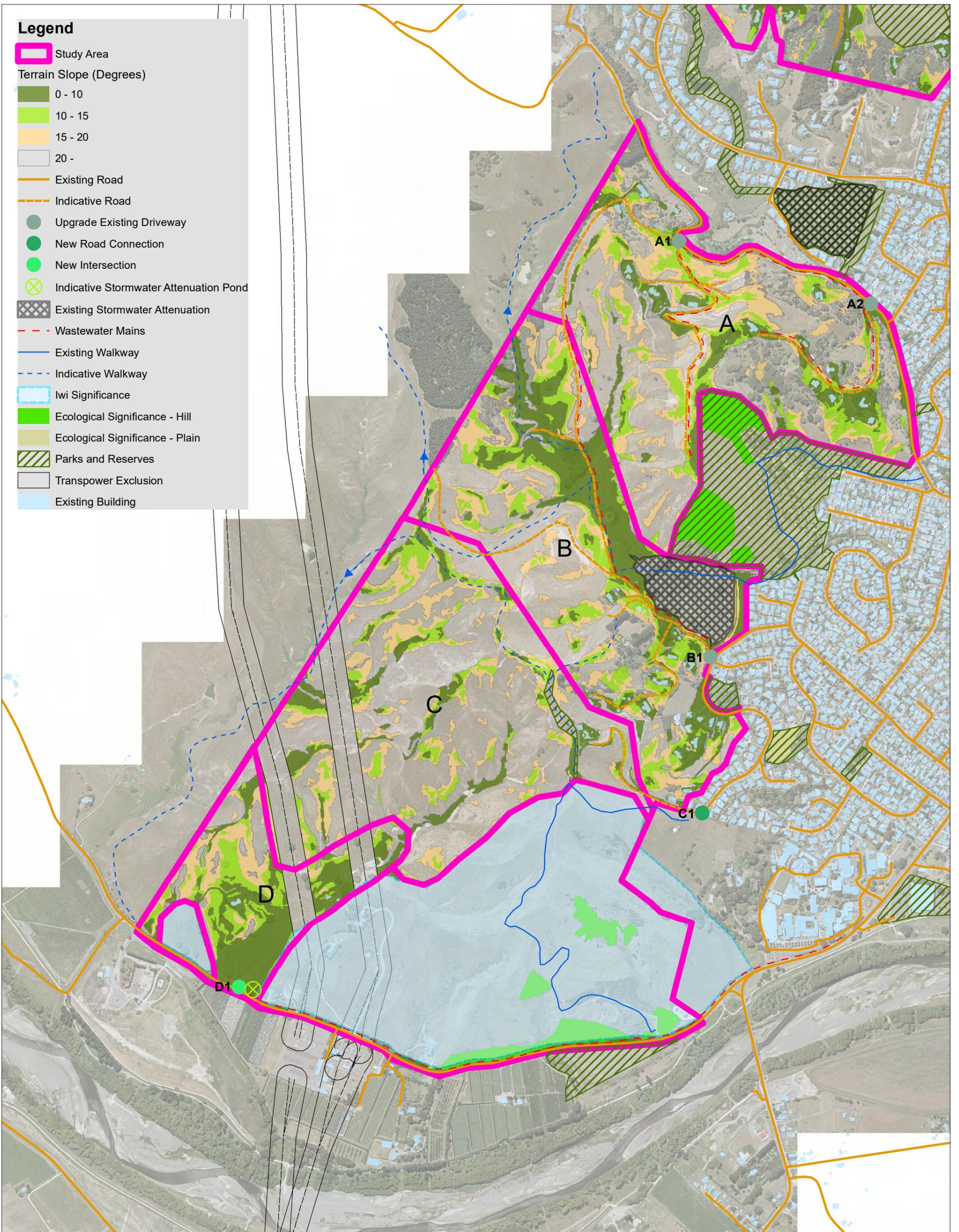
APPENDIX A

Study Area Maps



Legend

- Study Area
- Terrain Slope (Degrees)**
- 0 - 10
- 10 - 15
- 15 - 20
- 20 -
- Existing Road
- Indicative Road
- Upgrade Existing Driveway
- New Road Connection
- New Intersection
- Indicative Stormwater Attenuation Pond
- Existing Stormwater Attenuation
- Wastewater Mains
- Existing Walkway
- Indicative Walkway
- Iwi Significance
- Ecological Significance - Hill
- Ecological Significance - Plain
- Parks and Reserves
- Transpower Exclusion
- Existing Building



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**Greenfield Growth Capacity
Study Area 1 - Taradale West**



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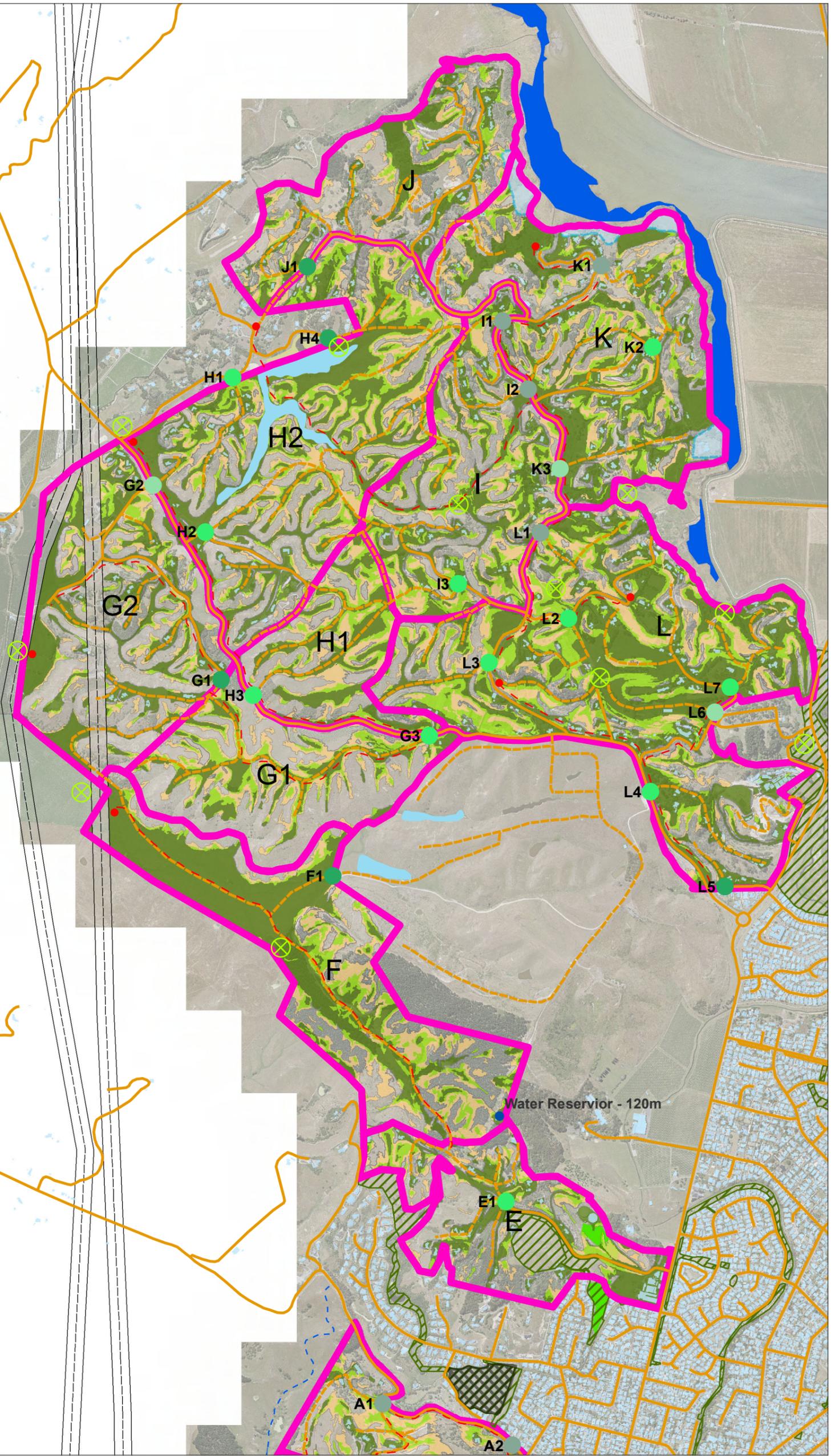
Map includes data layers sourced from NCC, HBRC and LINZ LDS and includes datasets provided under license CC BY INT 4.0

Map Projection: NZTM

Date: 15/01/2020 Revision J

Legend

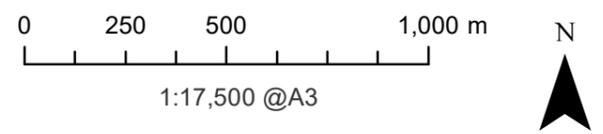
-  Study Area
- Terrain Slope (Degrees)**
-  0 - 10
-  10 - 15
-  15 - 20
-  20 -
-  Existing Road
-  Indicative Road
-  Upgrade Existing Driveway
-  New Road Connection
-  New Intersection
-  Intersection Upgrade
-  Water Reservoir
-  Indicative Stormwater Attenuation Pond
-  Existing Stormwater Attenuation
-  Pond
-  Wastewater Mains
-  Wastewater Pumpstation
-  Indicative Walkway
-  Iwi Significance
-  Ecological Significance - Estuary
-  Ecological Significance - Hill
-  Ecological Significance - Plain
-  Parks and Reserves
-  Transpower Exclusion
-  Existing Building



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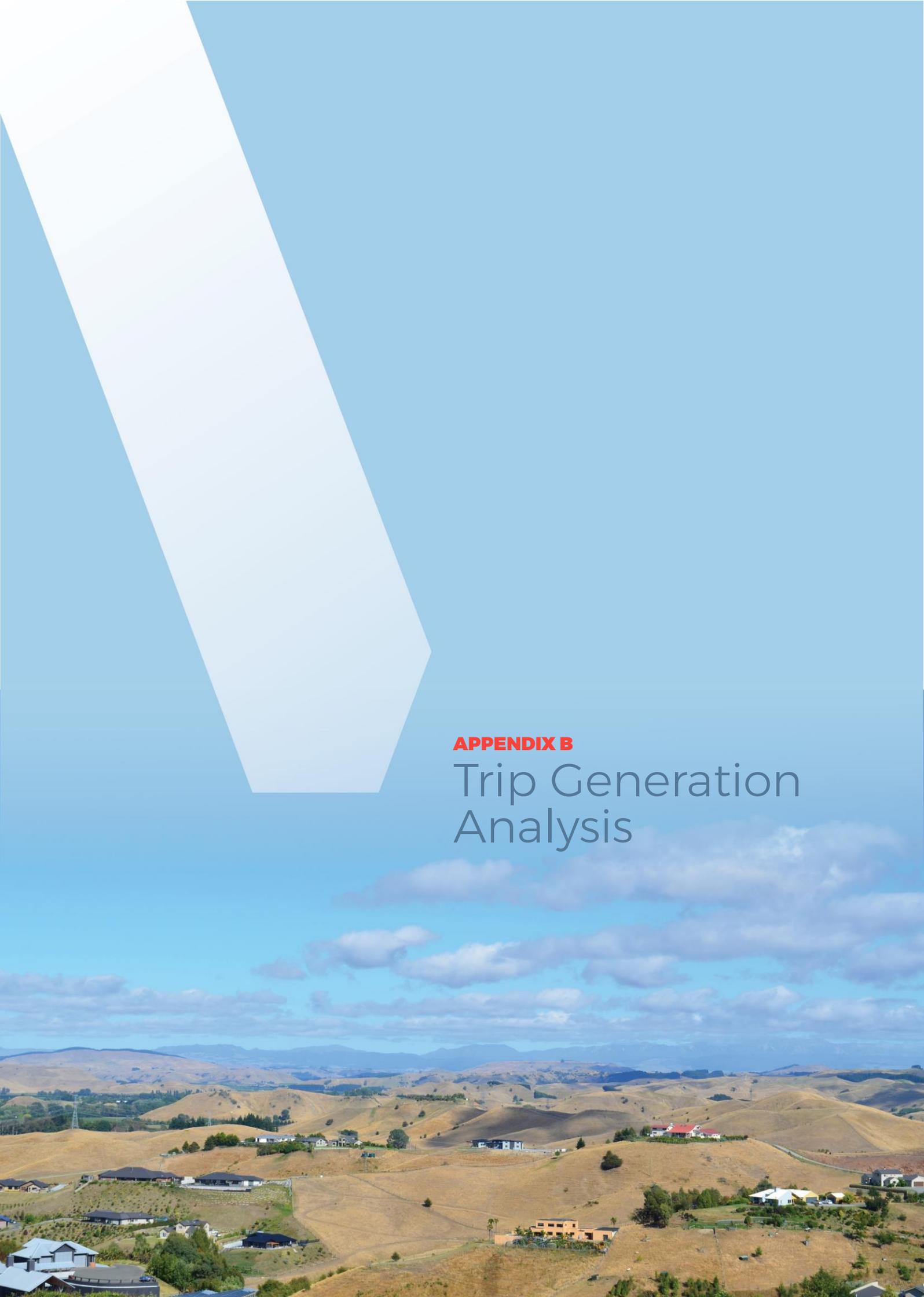
Contact: Andrew.Sowersby@wsp-opus.co.nz
Project No: 2-T4313.00

**Greenfield Growth Capacity
Study Area 2 - Poraiti Hills**



Map includes data layers sourced from NCC, HBRC and LINZ LDS and includes datasets provided under license CC BY INT 4.0

Map Projection: NZTM Date: 28/01/2020 Revision J



APPENDIX B

Trip Generation
Analysis

1 Trip Generation and Distribution

1.1 Trip Generation

The expected traffic generation of activities for the various land areas has been estimated using Table C.1 from "Trips and parking related to land use - November 2011". This table outlines the New Zealand trip generation and parking demand based on land use. To be conservative, the land use for the sites have been classified as comprising 'Dwelling (Outer Suburban)' residential dwellings. This land-use suggests a trip generation rate of 0.9 vehicle movements per dwelling per hour (vph) during peak hour periods and 8.2 vehicle movements per dwelling per day (vpd). Using this trip generation rate, the forecasted number of trips has been calculated for each area within the proposed study areas as shown in **Table 1** and **Table 3**.

1.1.1 Residential Density Scenario 1

Taradale West					
Area	No. New Units	Peak Hour Trip Rate	No. of Trips Generated	Daily Trip Rate	No of Trips Generated
A	151	0.9 per unit	136	8.2 per unit	1,242
B	178		161		1,463
C	119		107		974
D	88		80		725
Total	536		484		4,404

Poraiti					
Area	No. New Units	Peak Hour Trip Rate	No. of Trips Generated	Daily Trip Rate	No of Trips Generated
E	137	0.9 per unit	123	8.2 per unit	1,122
F	373		336		3,061
G	392		353		3,217
H	605		544		4,957
I	264		238		2,167
J	148		133		1,212
K	336		302		2,755
L	625		562		5,124
Total	2880		2591		23,615

Table 1: Predicted Trip Generation (Scenario 1)

On this basis it would be expected that the 536 dwellings within the Taradale West study area could generate up to 484 vph and similarly 4,400 vpd. Similarly, the Poraiti study area, if fully developed with 2,880 additional units, could generate a maximum of 2,591 vph in the peak periods and approximately 23,615 vpd.

The above volumes are total two-way volumes, and it is recognised that residential activity generates a tidal distribution throughout the day. The proportion of forecasted trips entering (inbound) and exiting (outbound) the site has been determined using the Institute of Transportation Engineers Trip Generation Manual (ITE). For single-family detached housing, as proposed, the ITE indicates a directional distribution of 25% inbound and 75% outbound for the AM peak and 63% inbound and 37% outbound for the PM peak.

The peak hour flows are summarised in **Table 2**.

Study Area	Period	Inbound (vph)	Outbound (vph)	Total (vph)
------------	--------	---------------	----------------	-------------

Taradale West	AM	121	362	483 vph
	PM	304	179	483 vph
Poraiti	AM	648	1,944	2,592 vph
	PM	1,633	959	2,592 vph

Table 2: Peak Hour Trip Generation and Distribution (Scenario 1)

1.1.2 Residential Density Scenario 2

Taradale West					
Area	No. New Units	Peak Hour Trip Rate	No. of Trips Generated	Daily Trip Rate	No of Trips Generated
A	320	0.9 per unit	288	8.2 per unit	2,624
B	374		336		3,065
C	239		215		1,956
D	180		162		1,474
Total	1113		1001		9,119

Poraiti					
Area	No. New Units	Peak Hour Trip Rate	No. of Trips Generated	Daily Trip Rate	No of Trips Generated
E	302	0.9 per unit	271	8.2 per unit	2,473
F	746		672		6,121
G	812		731		6,656
H	1247		1,122		10,226
I	558		503		4,580
J	323		290		2,646
K	752		677		6,166
L	1359		1,223		11,144
Total	6099				5,489

Table 3: Predicted Trip Generation (Scenario 2)

On this basis it would be expected that the 1,113 dwellings within the Taradale West study area could generate approximately 1,000 vph and similarly 9,119 vpd. Similarly, the Poraiti study area, if fully developed with 6,099 additional units, could generate a maximum of 5,500 vph in the peak periods and approximately 50,000 vpd.

Using the same directional split as scenario 1, the peak hour flows are summarised in **Table 4** below.

Study Area	Period	Inbound (vph)	Outbound (vph)	Total (vph)
Taradale West	AM	250	751	1001 vph
	PM	631	370	1001 vph
Poraiti	AM	1,372	4,117	5,489 vph
	PM	3,458	2,031	5,489 vph

Table 4: Peak Hour Trip Generation and Distribution (Scenario 2)

Based on the trip generation calculated above The Taradale West study area could, in principal cope with the additional vehicle demand. However, some additional network modelling will need to be undertaken to determine the impact accurately.

The Poraiti study area, assuming it generates almost 5,500 vehicles in the peak hour, will not be able to be accommodated on the exiting road network. The level of additional traffic would only be possible with additional linkages to both Hastings and Napier as Puketitiri Road is wholly inadequate to accommodate this level of additional traffic.

Travel Demand Management such as modal shift, new public transport systems and working from home schemes would all need to be implemented to support such growth.

1.2 Trip Distribution

In terms of distribution onto the wider road network it is clear that since the developments would be bringing forward unplanned residential development, an internal road network will be required to support the developments. Based on the distribution a significant proportion of site traffic would be expected to use Puketitiri Road in the case of the Poraiti study area, while the traffic generated by the Taradale West study area is likely to gravitate onto either Puketapu Road and / or Church Road to connect to the city centres of either Napier or Hastings. In order to assess the likely trip distribution for the site the 2013 census data has been used as an informant and is presented in **Figure 1**.

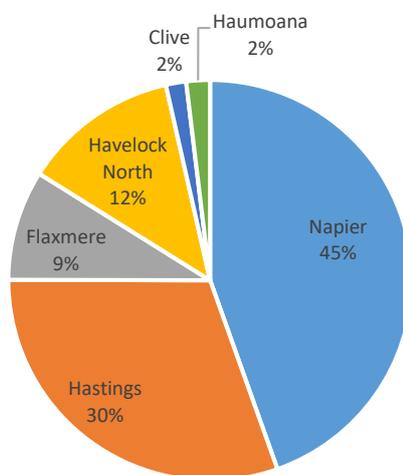


Figure 1 : 2013 Census Data - Population

The population data has been adjusted to reflect the proximity and attractiveness of commercial, business and retail offerings within the context of the study areas. The adjusted proportions have therefore been allocated as shown in **Figure 2**.

It has therefore been assessed that Napier and Hastings as major centres will attract 30% of all the trips generated by the site. Havelock North also includes several educational and retail establishments, although to a lesser extent to Hastings. Smaller suburbs such as Flaxmere and Clive have a 10% catchment area.

Using the aforementioned catchment area percentages together with the predicted number of trips to/from the study areas, it is possible to compute the number of trips along the primary corridors, although this analysis falls outside of this desktop study. The following regional observations are made

- The traffic travelling towards Napier is likely to utilise Church Road and Prebensen Drive, on account that they represent the shortest route. Assuming a 30% catchment, this equates to roughly 640 additional vehicles in the peak hours.
- SH2 (expressway) - Flaxmere, Hastings and Havelock North collectively account for 60% of the catchment area, resulting in an additional 1,300 (approx.) vehicles in the peak hours.

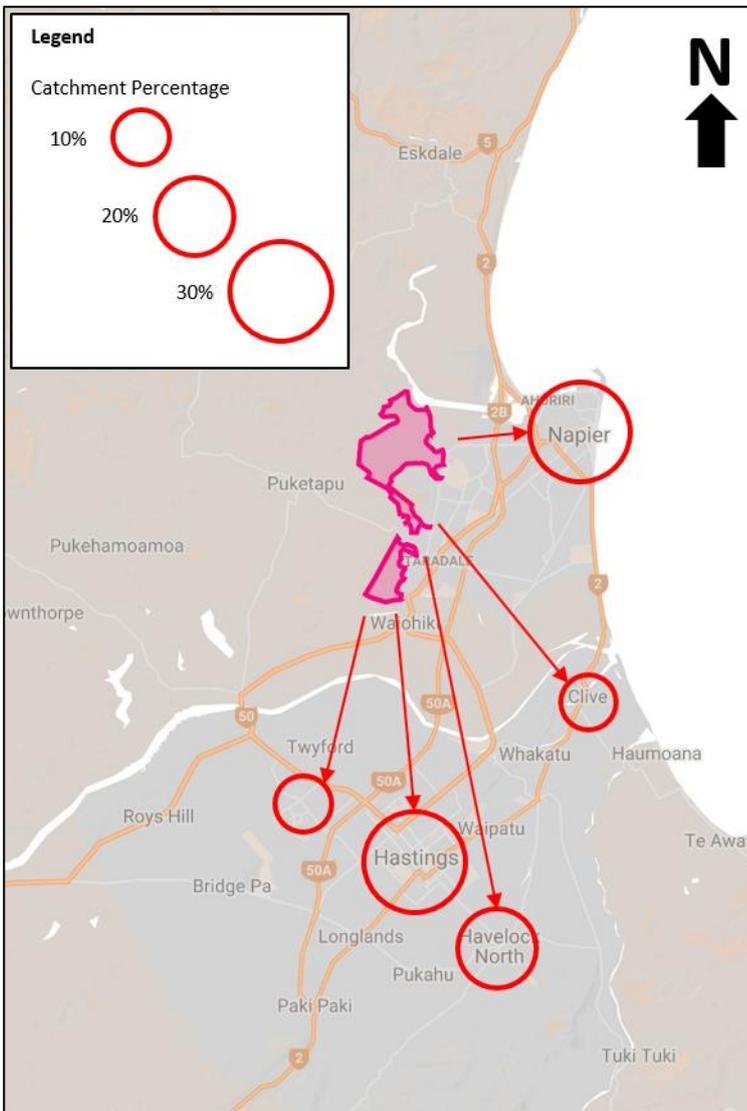
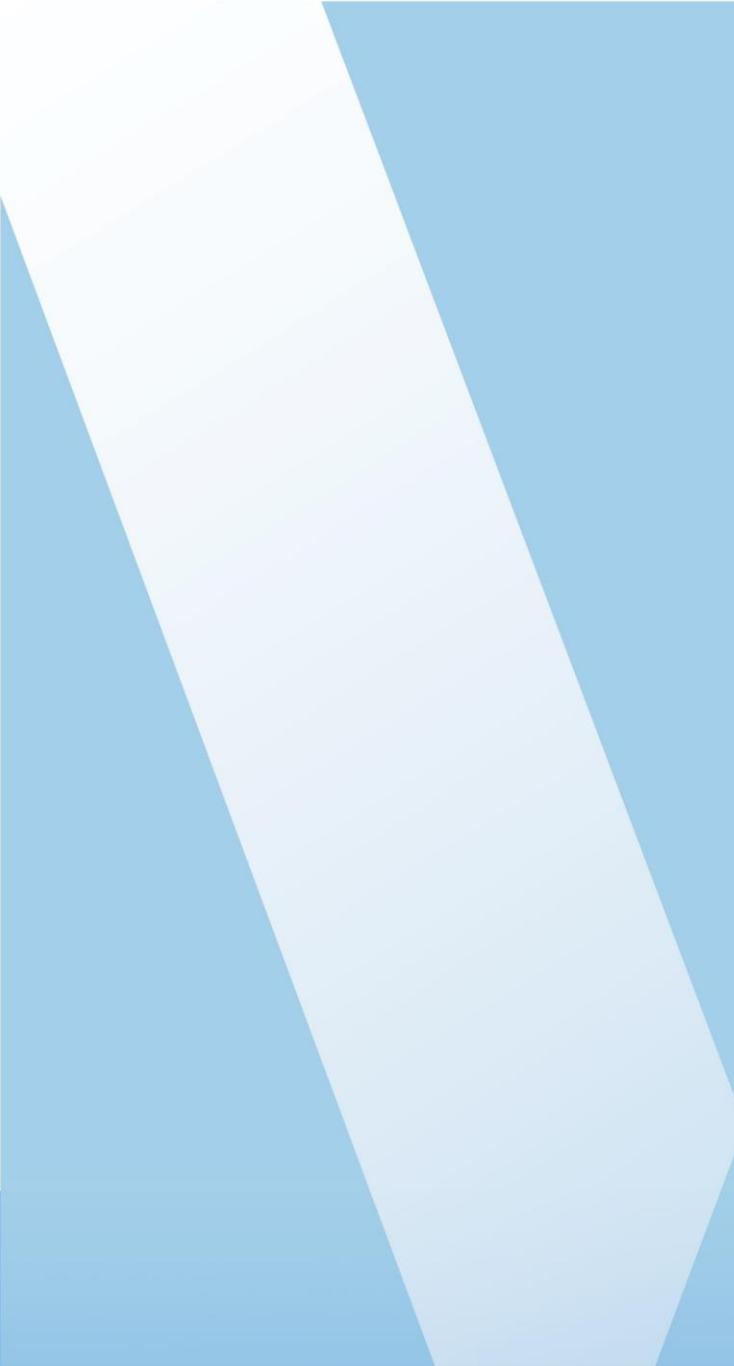


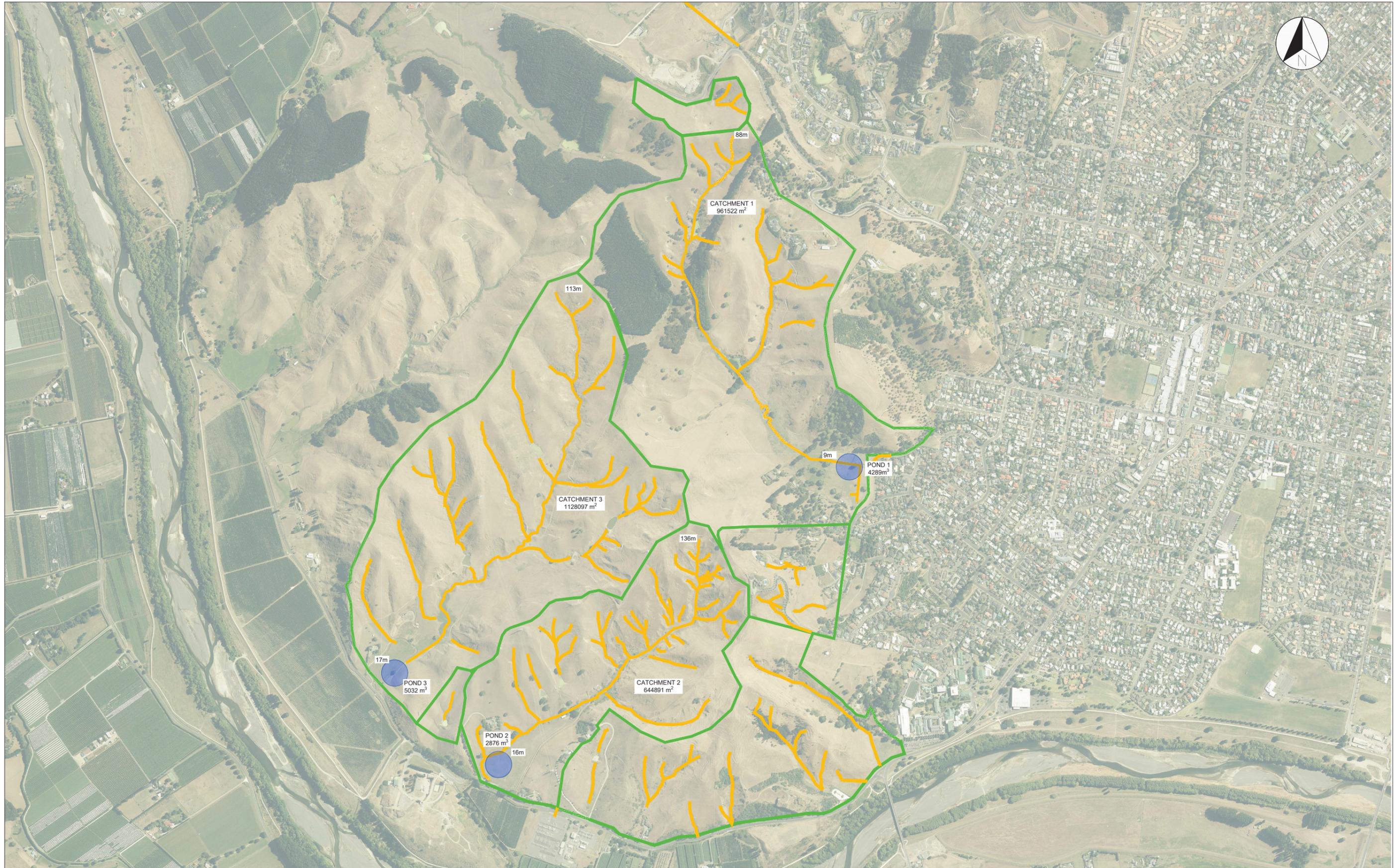
Figure 2 - Catchment Area



APPENDIX C

Stormwater
Catchments and
Pond
Calculations





Revision	Amendment	Approved	Revision Date

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Designed
 A GAIKWAD & G MOAT

Drawn
 A GAIKWAD

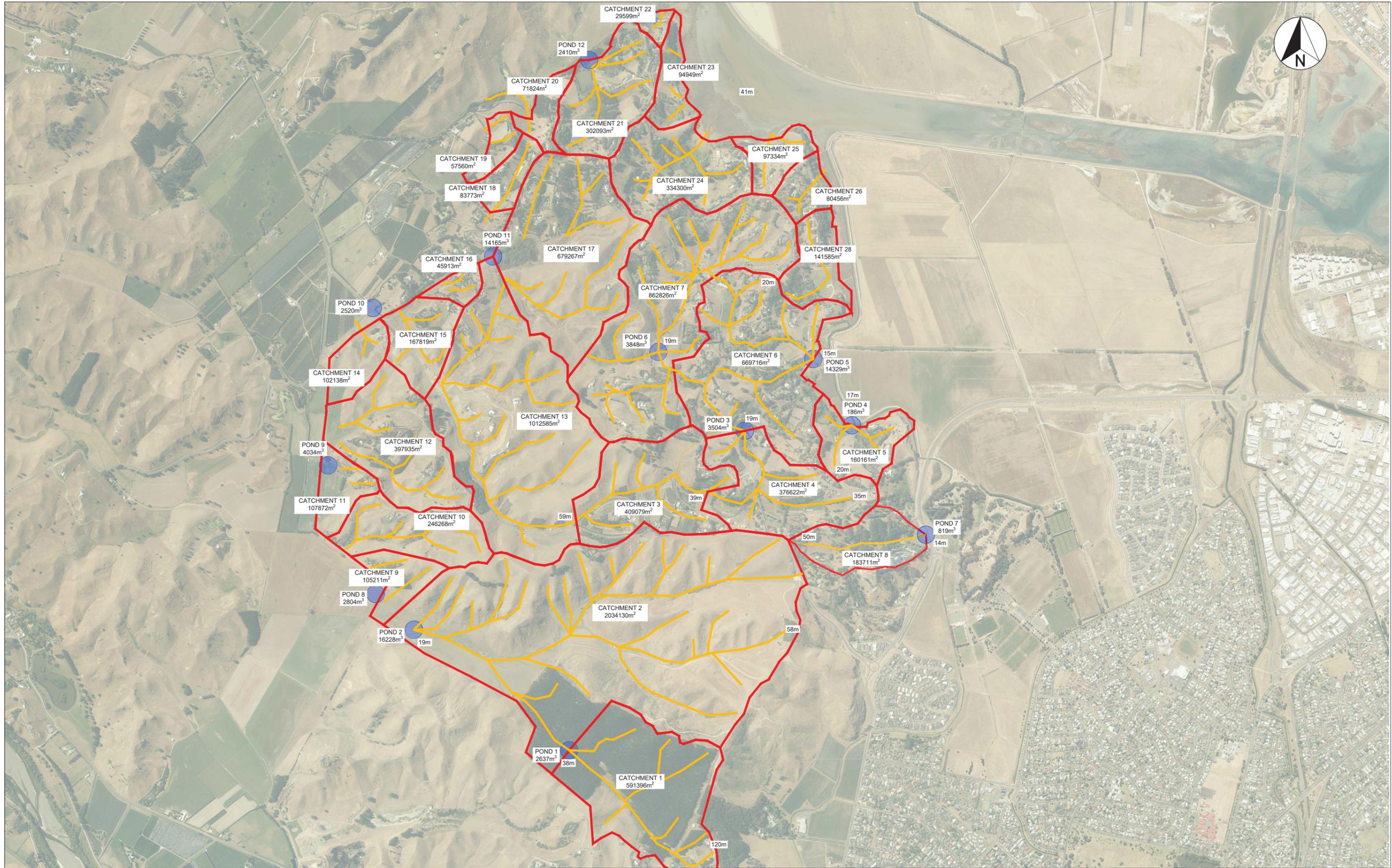
Approved
 A SOWERSBY

Scales
 AS SHOWN

Approved Date
 29/01/2020

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Project No. 2-T4313.00	Sheet No. / Revision C 101 / A

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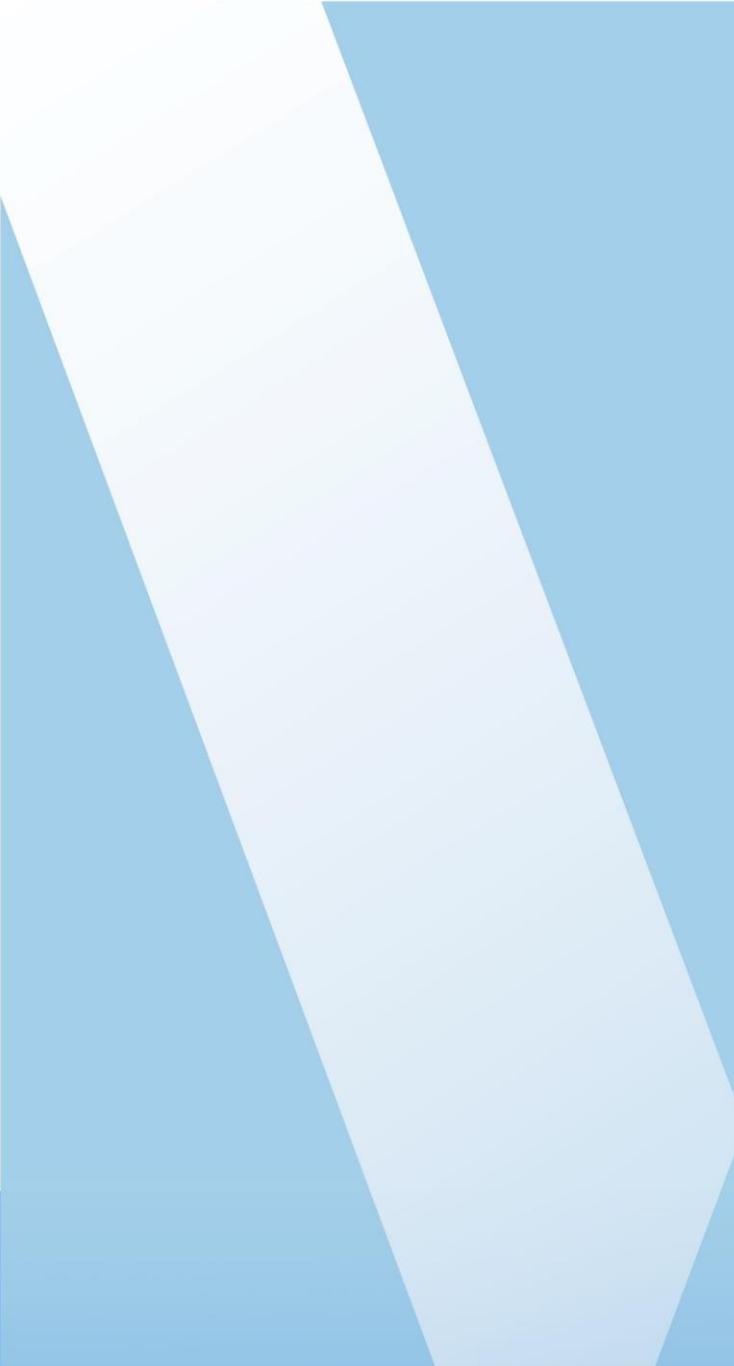


Revision	Amendment	Approved	Revision Date

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Project		NAPIER CITY COUNCIL GREENFIELD GROWTH CAPACITY REVIEW	
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APPENDIX D

Regional Policy
Statement
Analysis



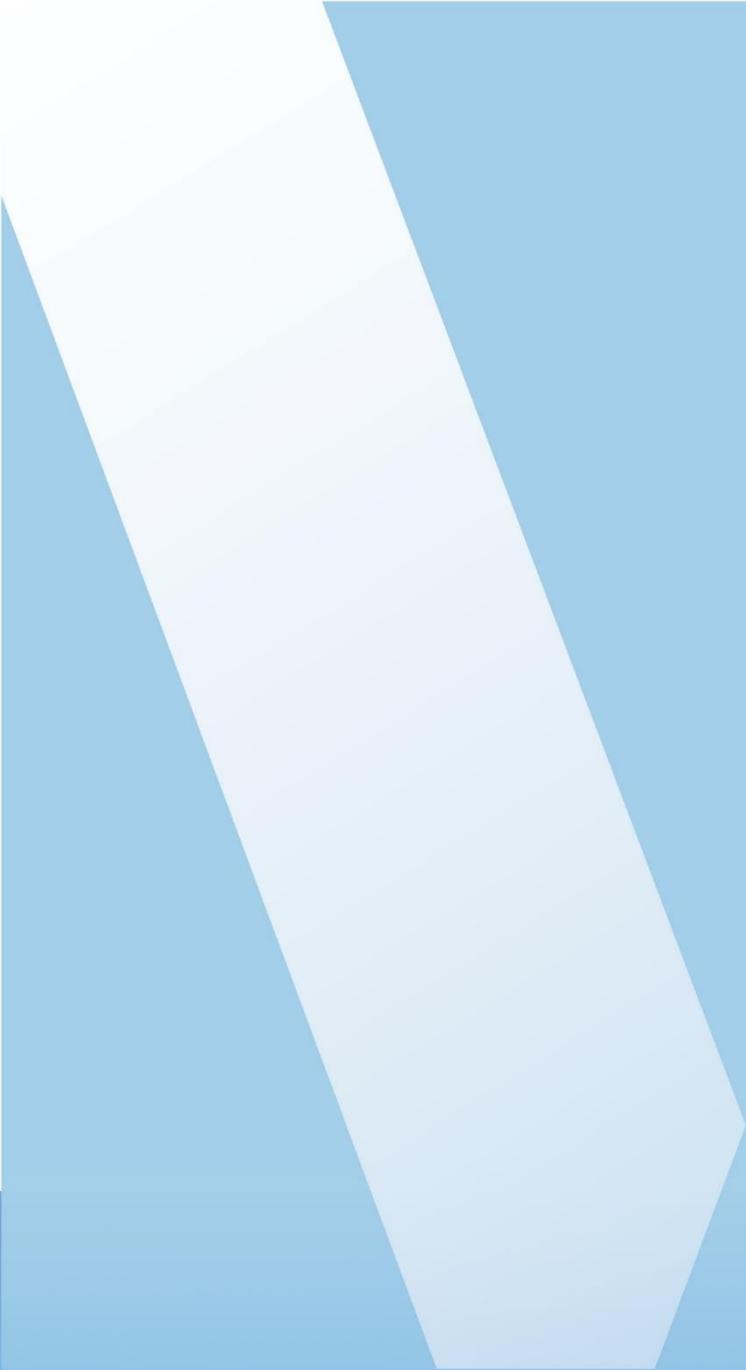
Assessment Against Policy UD4.2

	Criteria	Assessment – Study Area 1 (Taradale West)
<p>POL UD4.2 In determining future Residential Greenfield Growth Areas, not already identified within Policy UD4.3, for inclusion within urban limits in the Heretaunga Plains sub-region, the following general criteria shall apply:</p>	<p>a) Must form an extension contiguous with existing urban areas and settlements.</p>	<p>Areas A and B are consistent with this criterion. Areas C and D do not adjoin an existing urban area and does not meet the criterion.</p>
	<p>b) Land is identified as having low versatility, and/or productive capacity has been compromised by:</p> <ul style="list-style-type: none"> i. Size and shape of land parcels that mitigates against productive use; ii. Surrounding land uses and reverse sensitivity; iii. Lack of water and/or poor drainage. 	<p>The study area is not identified as being versatile and does not have high productive capacity and therefore meets this criteria.</p>
	<p>c) Clear natural boundaries exist, or logical greenbelts could be created to establish a defined urban edge.</p>	<p>There are clear natural boundaries for all three identified areas.</p>
	<p>d) Supports compact urban form.</p>	<p>Urban densities could be established within the identified developable areas to comply with this criterion.</p>
	<p>e) Can be serviced at reasonable cost.</p>	<p>Further analysis of infrastructure cost vs household yield will be needed, but Areas A and B are likely to be more feasible to service than Areas C and D.</p>
	<p>f) Can be integrated with existing development.</p>	<p>There is no existing development or activity that might conflict with the developable areas identified. Structure planning will be required to ensure that integration with existing housing development occurs.</p>
	<p>g) Can be integrated with the provision of strategic and other infrastructure (particularly strategic transport networks in order to limit network congestion, reduce dependency on private motor vehicles and promote the use of active transport modes).</p>	<p>Areas A and B will be able to meet this criteria, although are likely to be further from bus stop locations and are unlikely to be able to be serviced by buses.</p> <p>Areas C and D are not likely to be serviced by public transport and Springfield Road is likely to need an off road cycleway/walkway for safety reasons unless the alternative stop bank route is feasible.</p>
	<p>h) An appropriate separation distance from electricity transmission infrastructure should be maintained in order to ensure the continued safe and efficient operation and development of the electricity transmission network.</p>	<p>37m off-sets have been provided from the Transpower High Voltage lines.</p>
	<p>i) Promotes, and does not compromise, social infrastructure including community, education, sport and recreation facilities and public open space.</p>	<p>The development of this study area is likely to provide more opportunities for sport, recreation and public open space. The existing school capacity would need to be reviewed to determine capacity.</p>
	<p>j) Avoids or mitigates the following locational constraints:</p> <ul style="list-style-type: none"> i. projected sea level rise as a result of climatic changes ii. active coastal erosion and inundation iii. stormwater infrastructure that is unable to mitigate identified flooding risk iv. flood control and drainage schemes that are at or over capacity v. active earthquake faults vi. high liquefaction potential vii. nearby sensitive waterbodies that are susceptible to potential contamination from on-site wastewater systems or stormwater discharges viii. no current wastewater reticulation and the land is poor draining ix. identified water short areas with the potential to affect the provision of an adequate water supply. 	<p>The developable areas are likely to be able to meet these criteria.</p>

	Criteria	Assessment - Study Area 2 - (Poraiti Hills)
<p>POL UD4.2 In determining future Residential Greenfield Growth Areas, not already identified within Policy UD4.3, for inclusion within urban limits in the Heretaunga Plains sub-region, the following general criteria shall apply:</p>	<p>a) Must form an extension contiguous with existing urban areas and settlements.</p>	<p>If developed in sequential fashion, Areas E, F, G1, H1 L, K and I will be consistent with this criterion. Areas G2, H2 and J are likely to be less contiguous with urban areas due to steep landform.</p>
	<p>b) Land is identified as having low versatility, and/or productive capacity has been compromised by:</p> <ul style="list-style-type: none"> i. Size and shape of land parcels that mitigates against productive use; ii. Surrounding land uses and reverse sensitivity; iii. Lack of water and/or poor drainage. 	<p>The study area is not identified as being versatile and does not have high productive capacity and therefore meets this criteria.</p>
	<p>c) Clear natural boundaries exist, or logical greenbelts could be created to establish a defined urban edge.</p>	<p>There are clear natural boundaries for all areas. There edges of areas F, G and J are possibly less defined as they adjoin land that might be potentially developable within the Hastings District Council.</p>
	<p>d) Supports compact urban form.</p>	<p>Urban densities could be established within the identified developable areas to comply with this criterion. Due to the current remoteness of Areas G2, H2 and J, these areas are not likely to be consistent with this criteria unless significant earthworks can increase the compactness of the developable areas.</p>
	<p>e) Can be serviced at reasonable cost.</p>	<p>Further analysis of infrastructure cost vs household yield will be needed, but Areas E, F, I K and L are likely to be more feasible to service due to their compactness.</p>
	<p>f) Can be integrated with existing development.</p>	<p>There is no existing development or activity that might conflict with the developable areas identified. Structure planning will be required to ensure that integration with existing housing development occurs.</p>
	<p>g) Can be integrated with the provision of strategic and other infrastructure (particularly strategic transport networks in order to limit network congestion, reduce dependency on private motor vehicles and promote the use of active transport modes).</p>	<p>The study area will be able to meet this criteria as a bus service could be extended to the developable areas.</p> <p>Off road cycleway/walkways are likely to be required along the existing collector and arterial roads.</p>
	<p>h) An appropriate separation distance from electricity transmission infrastructure should be maintained in order to ensure the continued safe and efficient operation and development of the electricity transmission network.</p>	<p>37m off-sets have been provided from the Transpower High Voltage lines.</p>
	<p>i) Promotes, and does not compromise, social infrastructure including community, education, sport and recreation facilities and public open space.</p>	<p>The development of this study area is likely to provide more opportunities for sport, recreation and public open space. The existing school capacity would need to be reviewed to determine capacity.</p>
	<p>j) Avoids or mitigates the following locational constraints:</p> <ul style="list-style-type: none"> i. projected sea level rise as a result of climatic changes ii. active coastal erosion and inundation iii. stormwater infrastructure that is unable to mitigate identified flooding risk iv. flood control and drainage schemes that are at or over capacity v. active earthquake faults vi. high liquefaction potential vii. nearby sensitive waterbodies that are susceptible to potential contamination from on-site wastewater systems or stormwater discharges viii. no current wastewater reticulation and the land is poor draining ix. identified water short areas with the potential to affect the provision of an adequate water supply. 	<p>The developable areas are likely to be able to meet these criteria.</p>

Assessment Against other relevant HBRP provisions

Policy or Objective	Assessment
<p>OBJ UD1 URBAN FORM (REGION) <i>Establish compact, and strongly connected urban form throughout the Region, that:</i></p> <ul style="list-style-type: none"> a) <i>achieves quality built environments that:</i> <ul style="list-style-type: none"> i. <i>provide for a range of housing choices and affordability,</i> ii. <i>have a sense of character and identity,</i> iii. <i>retain heritage values and values important to tangata whenua,</i> iv. <i>are healthy, environmentally sustainable, functionally efficient, and economically and socially resilient, and v. demonstrates consideration of the principles of urban design;</i> b) <i>avoids, remedies or mitigates reverse sensitivity effects in accordance with objectives and policies in Chapter 3.5 of this plan;</i> c) <i>avoids, remedies or mitigates reverse sensitivity effects on existing strategic and other physical infrastructure in accordance with objectives and policies in Chapter 3.5 and 3.13 of this plan;</i> d) <i>avoids unnecessary encroachment of urban activities on the versatile land of the Heretaunga Plains; and</i> e) <i>avoids or mitigates increasing the frequency or severity of risk to people and property from natural hazards. Principal reasons and explanation</i> <p>Principal reasons and explanation <i>A sprawling uncontrolled pattern of development does not promote sustainable forms of development and promotes less efficient use of existing infrastructure. High levels of amenity, quality living environments, and retention of significant features and values are harder to achieve when development is not well designed and connected. Sprawling development also leads to unsustainable encroachment onto versatile land which underpins much of the Region's economy. Transitioning to a more compact, well-designed and strongly connected urban form better supports the economic, social and cultural wellbeing of the Region's people and communities.</i></p>	<p>The majority of the identified developable land could be developed to meet a) to e). Areas C, D, G2, H2 and J and possibly E are less consistent with the desired 'compact and strongly connected urban form'.</p>
<p>POL UD1 PROVISION FOR URBAN ACTIVITIES (HERETAUNGA PLAINS SUB-REGION) <i>In providing for urban activities in the Heretaunga Plains sub-region, territorial authorities must place priority on:</i></p> <ul style="list-style-type: none"> a) <i>the retention of the versatile land of the Heretaunga Plains for existing and foreseeable future primary production, and</i> b) <i>ensuring efficient utilisation of existing infrastructure, or</i> c) <i>ensuring efficient utilisation of planned infrastructure already committed to by a local authority, but not yet constructed.</i> <p>Principal reasons and explanation <i>Efficient utilisation of existing infrastructure investment (or planned infrastructure already committed to (e.g. by funding) by not yet constructed) and the retention of the versatile land of the Heretaunga Plains for existing and foreseeable future primary production must underpin all decisions surrounding provision for urban activity in the Heretaunga Plains sub-region in order to achieve the desired settlement pattern outlined in HPUDS2010. For clarification, the supply of land for residential and industrial activities where they support effective and efficient use and management of versatile land would not conflict with Policy UD1, and would assist in achieving Policy UD1(a).</i></p>	<p>The development of the study areas is consistent with a).</p> <p>Due to long distances to the existing wastewater treatment plant at Awatoto, the development of the study area may be less efficient at using existing infrastructure than other areas on the Heretaunga Plains closer to the treatment plant.</p>
<p>OBJ UD5 - INTEGRATION OF LAND USE WITH SIGNIFICANT INFRASTRUCTURE (REGION) <i>Ensure through long-term planning for land use change throughout the Region, that the rate and location of development is integrated with the provision of strategic and other infrastructure, the provision of services, and associated funding mechanisms.</i></p> <p>Principal reasons and explanation <i>Strategic infrastructure in the wider region is essential to the well-being and health and safety of people and communities. Consideration needs to be given to sequencing and costs of infrastructure development in decision making. These can have significant effects on efficiency and the economic well-being of communities. Recognition of the importance of strategic infrastructure will lead to greater weight being given to its requirements and the desirability to reduce incompatibility and conflicts.</i></p>	<p>Any structure planning and subsequent rezoning of the study areas will need to ensure that infrastructure is or will be in place to service the developments to meet this Objective.</p>



APPENDIX E

Parks and
Reserves
Provision



Appendix E - Table 1 – Parks and Reserves Provision and comments

Reserve Type / Description ¹³	Ratio ¹⁴	Comments
Neighbourhood Reserves <ul style="list-style-type: none"> • <i>Playgrounds</i> • <i>Recreation facilities, eg skate parks, half courts, bike tracks and other informal recreation activities</i> • <i>Picnic facilities eg barbeques/tables/shelters</i> • <i>Usually small areas (up to 2-5ha) located near or within residential areas</i> • <i>Do exercise areas and dog parks</i> • <i>May have sports field for junior or informal use</i> • <i>May have buildings, eg toilets, community centres/halls, other community service buildings</i> 	1-1.75ha per 1000 people. Located within 500m walking distance	Some parts of Areas A, B and E are within 500m of a reserve. However, as some parts are not, we have taken a conservative approach and have assumed that neighbourhood reserves will be provided at a ratio of 1.375ha per 1000 people on the developable land in all Areas. This ratio represents the midpoint between 1-1.75ha recommended in the 2018 Napier City Council Activity Management Plan.
Public Gardens <ul style="list-style-type: none"> • <i>Horticultural / botanical display plantings</i> • <i>Display houses</i> • <i>High quality landscaping</i> • <i>Interpretation eg plant names, historic or horticultural information, visitor centres, educations programmes</i> • <i>May be used as a venue for events and functions eg weddings, light displays</i> 	0.1-0.2ha per 1000 people	These types of reserve are typically for the city/district use rather than for local purposes and are anticipated to be located in or near central Napier. As such, we have not made provision for these reserves when determining the yield estimates.
Natural Parks Experience <ul style="list-style-type: none"> • <i>Native bush, coastal margins, forestry, wetlands, riparian areas and water bodies</i> • <i>Facilities for walking, biking, horse riding, camping, picnicking, bird watching, scenic and visitor information</i> 	5-15ha per 1000 people	<p>The structure planning of the Taradale Hills will need to identify and set aside these areas. This will need to include the linkages between these areas, both within and external to the Study Areas.</p> <p>The identified developable land within the study areas is generally interspersed with large areas of undevelopable land. As such, there are likely to be lots of opportunities to provide for these natural areas. There are also likely to be many instances where land identified as developable is marginal for development and can be utilised as natural park experience. The marginal nature of some of the identified developable land has been taken into consideration in the yield estimates by allowing for 10-20% of the developable land as being marginal.</p> <p>As such, no further allowance for the provision for these reserves is considered necessary for this high level capacity review.</p>

¹³ Reserve Type/Description is taken from the 2018 Napier City Council Activity Management Plans - Levels of Service for Greenspace Provision

¹⁴ Ratio taken from the 2018 Napier City Council Activity Management Plans - Levels of Service for Greenspace Provision

<p>Linkages (Ecological)</p> <ul style="list-style-type: none"> • Often, but not always linear in nature • May be alongside waterways such as rivers/streams, lakes, coast or drainage infrastructure, or utilise old rail corridors • Variable size and often difficult topography • Grass/tree planting or natural vegetation • Walking and cycling paths and tracks • Often connect or provide access to other parks or waterways • Generally a low level of development other than formed paths and trails 	<p>Minimum 3000m²</p>	<p>As with the 'Natural Parks Experiences', ecological linkages will need to be identified and provided throughout the Study Areas at the time of structure planning. For the same reasons identified above, no further allowance for the provision for these linkages is considered necessary for this high level capacity review.</p>
<p>Cultural Heritage</p> <ul style="list-style-type: none"> • Cultural heritage features eg pā sites • Historic sites, buildings or structures • Memorial sites • Cemeteries 	<p>No minimum size or ratio</p>	<p>The sites shown on the District Plan maps as having 'Significance to Iwi' have been identified as being undevelopable for the purposes of this capacity review. As such, these areas have been discounted from the yield estimates.</p> <p>At the time of writing this review, Napier City Council had not completed its Cemeteries Strategy. Napier City Council has advised that there are currently 30 – 40 years demand catered for, but beyond that additional cemetery space will need to be purchased.</p> <p>As this study is high level, and because new cemeteries are generally not located on land that is identified as being suitable for urban development, we have not discounted the identified developable land for the provision of cemeteries for the purposes of the yield estimates.</p>
<p>Civic space</p> <ul style="list-style-type: none"> • Business/retail area location • Hard paving • Soft landscaping • Seating areas • High standard of presentation and maintenance • Associated with Council service buildings such as town hall, library, swimming pool • 	<p>No ratio or minimum</p>	<p>This type of reserve/space is located in business/retail areas, so is not applicable to this capacity review.</p>
<p>Outdoor Adventure</p> <ul style="list-style-type: none"> • Rural or per-urban setting • Large scale • Multiple range of activities • Nature/environment based recreation activities 	<p>Minimum of 20ha plus</p>	<p>The guidance states that these spaces will be on the outskirts of urban areas or some distance from urban areas. As such, we have not provided for these reserves within the Study Areas for the purposes of estimating the yield estimates.</p>
<p>Sports and Recreation</p> <ul style="list-style-type: none"> • Sport facilities, eg grass fields, hard courts, artificial surfaces 	<p>1.5 – 3ha per 1000 residents</p>	<p>For the purposes of this capacity review, we have assumed that Sports and Recreation Reserves within the existing</p>

<ul style="list-style-type: none"> • <i>Buildings, eg toilets changing rooms, clubrooms, community centres, community activities</i> • <i>Recreation facilities, eg Playgrounds, skate parks, half courts, picnic areas, bike tracks etc</i> • <i>Seating</i> • <i>Landscaping</i> • <i>Usually large size</i> • <i>Leased sites could be small (eg the size of a single club)</i> 		<p>Napier urban area will be utilised/expanded to cater for the increase in population rather than establishing more facilities in the hills.</p>
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