Greater Christchurch Urban Development Strategy Forum

Report #5 – TECHNICAL REPORT ON ASSESSMENT OF OPTIONS AND APPENDIX – 13 December 2004

PURPOSE OF REPORT

The purpose of this report is to provide support to the Report on Assessment of Options (refer report #4). This Technical Assessment of Options includes detailed assessment for the eighteen criteria and indicators for all four options.

Some refinements are required to finalise these results, although refinements will be limited in scope. The report is provided below including Appendix and table of contents on page 9.

This Draft Technical Report outlines in greater detail the assessment approach including key assumptions and indicators used for each of the criteria. Some of these assumptions are outlined below.

Some High-Level Assumptions and information used

For the assessment of options some of the "high-level" assumptions made and additional information used are outlined below:

1. Population and demographic forecasts were provided by Department of Statistics New Zealand for the medium case projection of 430,000 people for 2021 and an extended projection of 500,000 people was also made;
2. Household and land use projections were based upon assumptions outlined in the Options report 14 September 2004 (with further technical reports provided by Max Barber, Planning Consultant);
3. Job forecasts by job type were provided by NZ Institute of Economic Research (NZIER) and further broken down by geographic area by consultant Tim Heath (Property Economics Ltd);
4. All committed infrastructure by Councils in the UDS area is assumed to be completed during the study period (e.g. the Northern Motorway, wastewater treatment expansions, etc.);
5. Current adopted land use zoning decisions for all District Plans are included;
6. Two constraints were adopted by the UDS Forum in options development: a) airport noise contours recently adopted by the Environment Court; b) the "aquifer protection zone" outlined in Environment Canterbury's Natural Resources Regional Plan which prohibits intensification to the northwest of Christchurch City;
7. Minimum open space requirements are for 18 ha/1000 people (although detailed analysis on site and location will be done in the "Draft Strategy");
8. Transport modeling was done using the Christchurch Transport Study model;
9. Transport mode split assumptions utilized those adopted in the recent Regional Land Transport Strategy assessment of options;
10. Infrastructure capital and operating cost assessments were made for residential development for water supply, wastewater and storm-water by GDH Consultants;
11. Residential water demand is higher in larger sections;
12. For a number of the criteria the assessments were qualitative rather than quantitative, and inherently required a degree of professional judgment.[1]

[1] Assessments for the more qualitative criteria (e.g. criteria 6 or 10) were made using a sequence of professional judgment followed by staff/consultant workshops to peer review these professional assessments. The workshops and peer reviews involved approximately 20 staff from all five councils, Transit NZ and 3-5 consultants.

GENERAL OUTLINE

The assessment of each criteria follows the form *italicized* outlined below with: a header for the criteria, a listing of the indicator considered, and the assumptions used, followed by a table which outlines the ranking score (and quantitative figures if available) for each of the options.

Criteria #:

1. *Overall Assumptions – This section explains overall assumptions that have been made in the assessment of options*

2. *Assessment Tables for Each Option - Include list of indicators used*

Rating Score Range 1-5: 1 = low, 5 = high

		Business as Usual		*Concentration*		*Consolidation*		*Dispersal*		
Indicator	*Performance Measure/ Standard (if needed to clarify indicator)*	*Rating 2021 (1-5)*	*Rating 2051 (1-5)*	*Rating 2021 (1-5)*	*Rating 2051 (1-5)*	*Rating 2021 (1-5)*	*Rating 2051 (1-5)*	*Rating 2021 (1-5)*	*Rating 2051 (1-5)*	*Explanation*
	E.g. performance standard for noise contours	*Include quantitative figures here if available – eg $ or Kms, etc. Rating (1 to 5)*								

Presented below is a summary table showing the draft assessment across all criteria and all indicators considered to date.

ASSESSMENT OF OPTIONS - All Criteria (and indicators)

Scoring: 1=low and 5=high

			Bus. As Usual		Concentration		Consolidation		Dispersal	
		YEAR	2021	2051	2021	2051	2021	2051	2021	2051
Criteria	Indicator									
1 Economic Activity			3.2	3.0	3.0	3.4	3.2	3.2	3.4	2.8
	1-jobs in growth sectors		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	2-align with proj econ		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	3-attract wealth gen act		3.0	3.0	3.0	4.0	3.0	3.0	3.0	2.0
	4-large site availability		3.0	2.0	2.0	4.0	3.0	3.0	4.0	2.0
	5-cost of industrial/commercial land		4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
2 Access			3.0	3.0	4.0	4.0	3.0	3.0	2.0	1.7
	1-vehicle k/ms travelled		3.0	3.0	4.0	4.0	3.0	3.0	2.0	1.0
	2-average travel time/trip		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	3-average travel distance/trip		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
3 Public Costs			2.8	2.8	3.4	3.4	3.4	3.4	2.5	2.5
	1, 2 - roading		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	3/4/5/6 - infrastructure		2.0	2.0	5.0	5.0	5.0	5.0	1.0	1.0
	7 - public space		3.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0
	9/10 - education/hospitals		3.0	3.0	3.0	3.0	3.0	3.0	2.5	2.5
	8/12 - electricity/telecom		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4 Private Costs			3.0	3.0	3.3	3.0	3.0	3.0	2.5	2.5
	1/2 - transport		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	3/4 - development		3.0	3.0	2.5	2.0	3.0	3.0	3.0	3.0
5 Community ID			3.0	3.0	3.7	3.7	3.3	3.3	2.7	2.7
	2 - opportunity		3.0	3.0	4.0	4.0	4.0	4.0	2.0	2.0
	3 - local community		3.0	3.0	3.0	3.0	2.0	2.0	4.0	4.0
	4 - access to shops/services		3.0	3.0	4.0	4.0	4.0	4.0	2.0	2.0
6 Residential Quality			2.5	2.5	3.5	3.5	3.5	3.5	3.0	3.0

ASSESSMENT OF OPTIONS - All Criteria (and indicators)

Scoring: 1=low and 5=high

		Bus. As Usual		Concentration		Consolidation		Dispersal	
	YEAR	2021	2051	2021	2051	2021	2051	2021	2051
	1- housing choice	3.0	3.0	3.0	2.0	4.0	4.0	4.0	4.0
	2 - revitalize opportunities.	2.0	2.0	4.0	5.0	3.0	3.0	2.0	2.0
7 Community Health		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	1/2-travel to community facilities	3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
8 Community Education		3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0
	1-travel to education	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0
	3-threshold capacities	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0
9 Open Space		3.0	3.0	3.0	3.0	3.5	3.5	2.5	2.5
	1-regional parks access/quality	3.0	3.0	4.0	4.0	4.0	4.0	3.0	3.0
	2-local parks access/quality	3.0	3.0	2.0	2.0	3.0	3.0	2.0	2.0
10 Cultural		3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
	1-pressure to destroy waahi tapu	3.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0
	2-proximity to cultural assets	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
11 Heritage		3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
	1-pressure to destroy heritage resources	3.0	3.0	1.0	1.0	3.0	3.0	4.0	4.0
	2-economic support for restoration	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0
12 Energy		3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	1-transport fuel use	3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
13 Air Emissions		2.5	2.5	4.0	4.5	3.0	3.0	2.0	1.5
	vehicles	3.0	3.0	4.0	5.0	3.0	3.0	2.0	1.0
	home heating	2.0	2.0	4.0	4.0	3.0	3.0	2.0	2.0
14 Water		3.3	3.3	4.0	4.0	4.0	4.0	3.0	3.0
	1 - demand	3.0	3.0	5.0	5.0	4.0	4.0	2.0	2.0
	5 - ecosystems/habitat	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	wetlands	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
15 Land		3.0	3.0	3.7	3.7	3.3	3.3	2.7	2.7
	soils	3.0	3.0	5.0	5.0	4.0	4.0	2.0	2.0

ASSESSMENT OF OPTIONS - All Criteria (and indicators)

Scoring: 1=low and 5=high

		Bus. As Usual		Concentration		Consolidation		Dispersal	
	YEAR	2021	2051	2021	2051	2021	2051	2021	2051
	landscapes	3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0
	biodiversity	3.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0
16 Strategic Infrastructure		3.5	3.5	3.9	3.9	3.5	3.4	3.0	2.8
	land transport	3.0	3.0	4.0	4.0	3.0	3.0	2.0	1.5
	ports	4.0	4.0	3.8	3.8	4.0	3.8	4.0	4.0
17 Hazards		3.0	3.0	2.0	2.0	3.3	3.3	3.0	3.0
	flooding	3.0	3.0	2.0	2.0	3.0	3.0	2.0	2.0
	earthquake	3.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0
	tsunami	3.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0
	response time	3.0	3.0	2.0	2.0	4.0	4.0	2.0	2.0
18 Robustness		2.6	2.6	3.1	3.1	3.1	3.1	2.3	2.3
	population change positive	3.0	3.0	4.0	4.0	4.0	4.0	2.0	2.0
	population change negative	2.0	2.0	4.0	4.0	3.0	3.0	1.0	1.0
	significant economic growth	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0
	significant economic decline	2.0	2.0	3.0	3.0	3.0	3.0	2.0	2.0
	disease/plague	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0
	climate change	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
	fuel (price) changes	3.0	3.0	5.0	5.0	4.0	4.0	2.0	2.0
	power outages/shortages	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0

SUMMARY "SCORES"								
Simple Total	53	53	61	62	58	58	46	45
Weighted Total for 3X - Public Costs, Comm ID, Strat Infrastructure, Energy, Water, Land, Robustness	96	96	112	113	106	105	83	80

GREATER CHRISTCHURCH URBAN DEVELOPMENT STRATEGY
OPTIONS ASSESSMENT TECHNICAL REPORT
APPENDIX

13 DECEMBER 2004

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Criteria: 13 : Impact on Air Emissions 35

Criteria: 14: Impacts on Water- Urban development enhances the quality of and takes into account effects on rivers and river margins, wetlands, aquatic ecosystems, groundwater and the coast 36

Criteria: 15 :Impacts on Land- Urban development enhances and takes into account effects on land resources (indigenous vegetation, versatile soils, landscapes and natural features, recreational areas, open space etc), biodiversity and ecosystems. 38

Criteria: 16 : Impacts on Strategic Infrastructure -Urban development supports efficient use of strategic infrastructure such as strategic transport networks, Christchurch International Airport, the port, regional solid waste disposal (Burwood), sewage treatment and disposal and composting facilities/areas, electricity and telecommunications 39

Criteria 17: Risks from Natural Hazards – Urban development creates costs/benefits from relative exposure to various natural hazards, and improves risk management, resilience, and recovery to those risks 44

Criteria 18: Robustness – Adaptability of urban development to higher (and lower) rates of population growth, unanticipated socio-economic conditions, technological innovation etc (development pattern of "least regret").. 45

I ECONOMIC WELLBEING

Criteria 1: Future Economy and Distribution- Extent to which urban development supports the desired future economy and likely future distribution of economic activity.

Indicator 1. Opportunity/ support for "growth generators" (primary industry, export orientated industries, air transport services/ aerospace industries, education, research, information technology, tourism).
Rating Score Range 1-5: 1 = low, 5 = high

Assumptions:

(i) The regional and metropolitan economy continues to expand at rates generally equivalent to national rates with a corresponding labour demand.[2]

(ii) Primary industry continues to provide the foundation for the regional and metropolitan economy.

(iii) Long term trends for a shift in economic output and employment from the primary and secondary sectors to the tertiary sector, particularly education, research and development, and tourism, will continue in the future.

(iv) The transport system and energy costs will enable a level of intra-regional accessibility comparable to that of today.

(v) Each concept option is accompanied by such amendments to business zone boundaries as are necessary to accommodate the projected job growth. No priority is ascribed to business or residential activities in any area.

Indicato	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1	Number of jobs at locations with a high potential for the development of growth-generating industries vis the Central Core, Christchurch International Airport, University of Canterbury, Lincoln University/CRI Science Park, rural areas.	3	3	The potential for job growth in growth generating industries in the Central Core and at other key locations is similar under all concept options.	3	3	Although Concentration is likely to be associated with the greatest concentration of total jobs in the Central Core, the number of jobs in growth generating industries does not vary significantly between options. It is noted that limitations on residential growth in rural areas under this option may provide greater opportunities for the protection of rural resources. This factor is taken into account under Criteria 15 Impact on Land, below.	3	3	The potential for job growth in growth generating industries in the Central Core and at other key locations is similar under all concept options.	3	3	The potential for job growth in growth generating industries in the Central Core and at other key locations is similar under all concept options. Dispersal is likely to be associated with the highest number of jobs in rural areas, but no significant difference in FTE employment in the agricultural and natural resource sectors between the options is forecast.

[2] Employment projections used in this assessment relating to the UDS area are based on national and regional projections by the New Zealand Institute of Economic Research (2001 - 2021) extrapolated to 2051.

Indicator 2. Alignment with existing/projected distribution of economic activity. *Rating Score Range 1-5: 1 = low, 5 = high*

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2	Number of jobs/households at the territorial local authority level ("job/household ratio").[3] This aggregate measure has been selected as the simplest way of identifying any significant mismatch between household distribution and economic activity.	3	3	The projected household distribution supports the likely future distribution of economic activity.	3	3	The projected household distribution supports the likely future distribution of economic activity.	3	3	The projected household distribution supports the likely future distribution of economic activity.	3	3	The projected household distribution supports the likely future distribution of economic activity. However, there is a marginally poorer alignment under Dispersal as a result of the relatively lower level of job decentralisation likely with this option.

Indicator 3. Creation of adequately sized and trained labour market(s) to attract wealth generating economic activities in the future. *Rating Score Range 1-5: 1 = low, 5 = high*

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
3	Size of the population aged 15 - 64 years in the principal labour markets or submarkets (Christchurch, Rangiora, Woodend-Pegasus Bay, Kaiapoi, Rolleston, Lincoln, Lyttelton-Diamond Harbour).[2]	3	3	Continuation of present trends results in a balanced distribution of labour force growth throughout the UDS area with an increase in critical mass at smaller urban areas outside Christchurch.	3	4	Concentration provides for the largest concentration of labour at a single location (Christchurch). However, since the UDS area operates as a single job market, the differences between concept options in the size an distribution of labour markets is not significant.	3	3	Consolidation provides for a balanced distribution of labour force growth throughout the UDS area with an increase in critical mass at smaller urban areas outside Christchurch.	3	2	Dispersal results in the smallest concentration of labour in Christchurch. However, since the UDS area operates as a single job market, the differences between concept options in the size and distribution of labour markets is not significant.

[3] The data for this measure is based on the projected job distribution by Tim Heath 10 November 2004.

Indicator 4. Potential to accommodate activities requiring large amounts of space. *Rating Score Range 1-5: 1 = low, 5 = high*

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
4	Availability of sites for activities requiring large amounts of space with good access to suppliers and markets.	3	2	Continuation of present trends allows for a number of possible locations around and beyond Christchurch for the accommodation of activities which could provide a good level of access to suppliers and markets eg South Kaiapoi, Islington/Templeton and Rolleston. However, it is likely that some options could be subject to increased competition from residential development in the latter part of the planning period.	2	4	Concentration may result in some constraint in the short term on land for the accommodation of activities requiring large amounts of space. However, Concentration forecloses fewest options for the accommodation of these activities in the latter part of the planning period because this option requires the least amount of land to be taken up for residential development.	3	3	Consolidation allows continuation of present trends allows for a number of possible locations around and beyond Christchurch for the accommodation of activities which could provide a good level of access to suppliers and markets eg South Kaiapoi, Islington/Templeton and Rolleston. It is likely that some options could be subject to competition from residential development in the latter part of the planning period, although less than under Business as usual.	4	2	Dispersal provides the greatest opportunity in the short term for the accommodation of activities requiring large amounts of space, but similar constraints as under Business as usual apply in the latter part of the planning period. Competition from residential development may be higher with Dispersal, but this disadvantage is offset to some extent by the availability of a larger labour force in rural areas under this option.

Indicator 5. Competitiveness. *Rating Score Range 1-5: 1 = low, 5 = high*

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
5	Cost of industrial and commercial land compared to other centres (in particular Auckland and Wellington).	4	4	It is expected that any variation between options in the cost of land for industrial or commercial development will not alter the current competitive advantage enjoyed by Christchurch over Auckland and Wellington.	4	3	It is expected that any variation between options in the cost of land for industrial or commercial development will not alter the current competitive advantage enjoyed by Christchurch over Auckland and Wellington. Any increase in the cost of land in the Central Core under Concentration could be outweighed by the improved viability of new development and the attraction of high profile tenants, particularly in the office sector.	4	4	It is expected that any variation between options in the cost of land for industrial or commercial development will not alter the current competitive advantage enjoyed by Christchurch over Auckland and Wellington.	4	4	It is expected that any variation between options in the cost of land for industrial or commercial development will not alter the current competitive advantage enjoyed by Christchurch over Auckland and Wellington.

Criteria 2 Access to Employment and Commercial Activity – Urban development promotes or enables reasonable access to employment/job markets, and commercial activity

Indicator 1. Vehicle km travelled (all trip purposes) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

i) Trip data from CTS model (refer to CTS documentation for more detail).
ii) Assume increased PT usage for concentrated concept option, increased reliance on cars for dispersal concept option.

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
1	10.6M veh-km/day 29% increase from 2001 Rating 3	12.9M veh-km/day 57% increase from 2001 Rating 3	9.4M veh-km/day 16% increase from 2001 Rating 4	11.5M veh-km/day 42% increase from 2001 Rating 4	10.4M veh-km/day 27% increase from 2001 Rating 3	12.6M veh-km/day 54% increase from 2001 Rating 3	11.6M veh-km/day 43% increase from 2001 Rating 2	15.5M veh-km/day 91% increase from 2001 Rating 1	Total distance traveled increases into the future (from 8.2M vkm in 2001) as both population and vehicle ownership increase. Consolidation/Base veh-km traveled is intermediate to Concentrated and Dispersal Concept Options.
1	1.87 veh-km/peak 2hr 26% increase from 2001 Rating 3	2.29M veh-km/peak 2hr 55% increase from 2001 Rating 3	1.79M veh-km/peak 2hr 21% increase from 2001 Rating 4	2.14M veh-km/peak 2hr 45% increase from 2001 Rating 4	1.84M veh-km/peak 2hr 24% increase from 2001 Rating 3	2.22M veh-km/peak 2hr 50% increase from 2001 Rating 3	1.94M veh-km/peak 2hr 31% increase from 2001 Rating 2	2.44M veh-km/peak 2hr 65% increase from 2001 Rating 1	Peak trend is similar to daily results(Consolidation/Base veh-km traveled is intermediate to Concentrated and Dispersal Concept Options). Approx 5-6% of travel occurs during the peak 2hr period.

Indicator 2. average travel time per trip (all trip purposes) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

iii) Trip data from CTS model (refer to CTS documentation for more detail).

iv) Assume increased PT usage for concentrated concept option, increased reliance on cars for dispersal concept option.

Indicator	Business As Usual (Modified)		Consolidation		Concentration		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	12.3 min/trip 6% increase from 2001 Rating 3	13.0 min/trip 13% increase from 2001 Rating 3	12.1 min/trip 4% increase from 2001 Rating 4	12.7 min/trip 10% increase from 2001 Rating 4	12.2 min/trip 6% increase from 2001 Rating 3	13.1 min/trip 13% increase from 2001 Rating 3	12.6 min/trip 9% increase from 2001 Rating 2	14.3 min/trip 23% increase from 2001 Rating 2	Average travel time increases into the future due to longer average trip length (see indicator 3) and congestion. Not much difference (absolute) between concept options .

Indicator 3. average travel distance per trip (all trip purposes) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

v) Trip data from CTS model (refer to CTS documentation for more detail).

vi) Assume increased PT usage for concentrated concept option, increased reliance on cars for dispersal concept option.

Indicator	Business As Usual (Modified)		Consolidation		Concentration		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
3	7.2 km/trip 7% increase from 2001 Rating 3	7.2 km/trip 8% increase from 2001 Rating 3	7.0 km/trip 5% increase from 2001 Rating 4	7.0 km/trip 5% increase from 2001 Rating 4	7.1 km/trip 6% increase from 2001 Rating 3	7.1 km/trip 6% increase from 2001 Rating 3	7.3 km/trip 10% increase from 2001 Rating 2	7.5 km/trip 13% increase from 2001 Rating 2	Average trip lengths increase from 2001 average of 6.7 for Base, Consolidation and Dispersal Concept options. Dispersal has greatest increase, Concentration has almost no increase from 2001.

Criteria 3: Public cost or benefit (relative) of transport system, sewage treatment/disposal and water supplies for urban development.

Indicator 1 Roading Costs (NPV) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Roading costs include capital and operational expenditure. Costs are based on current levels of spending, with additional costs based on removing any remaining deficiencies from a 2021 "do minimum" network. Costs are Net Present Value, with a discount rate of 6%p.a.

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
1	$1.23B NPV Rating 3	$1.56B NPV Rating 3	$1.19B NPV Rating 4	$1.51B NPV Rating 4	$1.24B NPV Rating 3	$1.55B NPV Rating 3	$1.27B NPV Rating 2	$1.63B NPV Rating 2	Dispersal requires greatest expenditure on roading to bring congestion down to levels consistent with RLTS target. Concentration requires the least expenditure.

Indicator 2 Public Transport including rail opportunities (NPV) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Roading costs include capital and operational expenditure. Costs are based on current levels of spending, with additional costs based on removing any remaining deficiencies from a 2021 "do minimum" network. Costs are Net Present Value, with a discount rate of 6%p.a.

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	$312M NPV Rating 3	$465M NPV Rating 3	$270M NPV Rating 4	$402M NPV Rating 4	$312M NPV Rating 3	$465M NPV Rating 3	$354M NPV Rating 2	$527M NPV Rating 2	Dispersal requires greatest net expenditure on PT as catchment size increases and utilization (hence revenue) decreases. Conversely, concentration requires the least expenditure (increased utilization/revenue offsets higher gross costs). Assumes lower PT investment for dispersal (pre RLTS BAU) and higher investment (and utilisation) for concentration (RLTS EB). Base/Consolidation use RLTS E assumptions. Annual expenditure likely to be maintained until 2051, lower spending on capital over time offset by increasing maintenance costs

Indicator 7 Open Space (to accepted standard of provision for local/neighbourhood open space) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Assumptions made are that cost/benefit has been assessed considering the reserve contribution requirements set out in each Council's policy not changing over the life of the project – (7.5% contribution for each residential property).
- A policy seeking regional open space has been adopted.
- Adequate local reserve land is assessed as being 18ha per 1000 population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
7	Cost of provision	3	3	Reserve Contributions are based on land value, however to purchase reserves in developed areas the cost of the land plus improvements must be paid.	1	1	Reserve Contributions are based on land value, however to purchase reserves in developed areas the cost of the land plus improvements must be paid.	3	3	In new areas providing open space is more expensive as existing developed land must be purchased to be converted into open space. Reserve Contributions are based on land value, however to purchase reserves in developed areas the cost of the land plus improvements must be paid.	4	4	Reserve contribution is based on the value of the land, so as value increases or decreased so too with the contribution able to be taken. Reserve contribution is based on land value, so reserves in dispersal areas will be more cost effective to purchase. With dispersal a greater number of linkages will be required as distances between developments will be greater.

Indicator 8 Telecommunication costs *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Any predicted growth, from any scenario can be accommodated by both telecommunication electricity supply companies.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
8	Tele-communication costs	3	3	Telecommunication facilities provision is not differentiated between the options. Telecom services within the UDS study area can be provided.	3	3	Telecommunication facilities provision is not differentiated between the options. Telecom services within the UDS study area can be provided.	3	3	Telecommunication facilities provision is not differentiated between the options. Telecom services within the UDS study area can be provided.	3	3	Telecommunication facilities provision is not differentiated between the options. Telecom services within the UDS study area can be provided.

Indicator 9 Education/school provision costs *Rating Score Range 1-5: 1 = low, 5 = high*

Note: *This assessment is concerned only with the cost of education/school provision and hospital provision cost.*

Overall Assumptions –

(i) School age population will decline under the medium projection and only increase marginally under the high projection.

(ii) The population aged 65 years plus will increase significantly under either projection, resulting in increased demands on the health sector.

(iii) Education and health services will continue to be delivered predominantly from "dedicated" locations.

(iv) Education and health services will continue to be provided at threshold population sizes comparable with those of today.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
9.	Relative cost of providing education services (schools) to serve the projected population distribution.	3	3	With little projected growth in the school age population, it is expected that growth in school rolls in some areas will, to a large measure, be matched by falls in others, with the number of schools required being generally the same under each option. However, it is not expected that the cost of developing new sites will be compensated by closures due to pressures to retain existing schools (for education or community purposes) and lags in the disposal process. Consequently, the net cost of providing schools is likely to be higher where a greater number of new schools is required.	3	3	With little projected growth in the school age population, it is expected that growth in school rolls in some areas will, to a large measure, be matched by falls in others, with the number of schools required being generally the same under each option. However, it is not expected that the cost of developing new sites will be compensated by closures due to pressures to retain existing schools (for education or community purposes) and lags in the disposal process. Consequently, the net cost of providing schools is likely to be higher where a greater number of new schools is required. It is unlikely that new school sites will be required in Christchurch, even in the Central Core, under Concentration. It is expected that changing needs throughout the urban area will be met by changes to enrolment zones and rationalisation of existing facilities.	3	3	With little projected growth in the school age population, it is expected that growth in school rolls in some areas will, to a large measure, be matched by falls in others, with the number of schools required being generally the same under each option. It is not expected that the cost of developing new sites will be compensated by closures due to pressures to retain existing schools (for education or community purposes) and lags in the disposal process. Consequently, the net cost of providing schools is likely to be higher where a greater number of new schools is required.	2	2	With little projected growth in the school age population, it is expected that growth in school rolls in some areas will, to a large measure, be matched by falls in others, with the number of schools required being generally the same under each option. However, it is not expected that the cost of developing new sites will be compensated by closures due to pressures to retain existing schools (for education or community purposes) and lags in the disposal process. Consequently, the net cost of providing schools is likely to be higher where a greater number of new schools is required. The net cost of provision is likely to be highest with Dispersal because of the need for a greater number of new school sites under this option.

Indicator 10 Hospital provision costs. *Rating Score Range 1-5: 1 = low, 5 = high*

Note:This assessment is concerned only with the cost of education/school provision and hospital provision cost.

Overall Assumptions –

(i) School age population will decline under the medium projection and only increase marginally under the high projection.

(ii) The population aged 65 years plus will increase significantly under either projection, resulting in increased demands on the health sector.

(iii) Education and health services will continue to be delivered predominantly from "dedicated" locations.

(iv) Education and health services will continue to be provided at threshold population sizes comparable with those of today.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
10.	Relative cost of providing primary health care services (hospitals and medical centres) to serve the projected population distribution.	3	3	It is likely that options such as Concentration or Dispersal may definitely affect decisions about hospital redevelopment sites. Hospital redevelopment plans will also be responsive to changes in population, models of care etc. With respect to primary care, in the future the 'market' may not dictate this as much as health policy, such as CDHB's decisions around primary care centres or health centres. The national move to capitation-based funding for Primary Health Organisations should also be taken into account.	3	3	It is likely that options such as Concentration or Dispersal may definitely affect decisions about hospital redevelopment sites. Hospital redevelopment plans will also be responsive to changes in population, models of care etc. With respect to primary care, in the future the 'market' may not dictate this as much as health policy, such as CDHB's decisions around primary care centres or health centres. The national move to capitation based funding for Primary Health Organisations should also be taken into account.	3	3	It is likely that options such as Concentration or Dispersal may definitely affect decisions about hospital redevelopment sites. Hospital redevelopment plans will also be responsive to changes in population, models of care etc. With respect to primary care, in the future the 'market' may not dictate this as much as health policy, such as CDHB's decisions around primary care centres or health centres. The national move to capitation-based funding for Primary Health Organisations should also be taken into account.	3	3	It is likely that options such as Concentration or Dispersal may definitely affect decisions about hospital redevelopment sites. Hospital redevelopment plans will also be responsive to changes in population, models of care etc. With respect to primary care, in the future the 'market' may not dictate this as much as health policy, such as CDHB's decisions around primary care centres or health centres. The national move to capitation-based funding for Primary Health Organisations should also be taken into account.

Indicator 11 Infrastructure (excluding transport) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Estimated costs are for new residential development and include both capital costs of infrastructure that normally becomes public property (rural developments can be the exception) and the on going operating charges experienced by those new households. The costs are therefore largely private, being those incurred by the householder at the time of purchase and in the on-going payment for services provided.
- Costs have been estimated in terms of present day expenditure, ignoring inflation, and are reported as Net Present Values.
- The capital cost estimates are the sum of the costs experienced by the developer in installing the works plus development contributions levied by the Territorial Authority to recover its own capital expenditure associated with development.
- The scope of the assessment reflects the information supplied which was for household growth, i.e. the figures do not include the cost of commercial/industrial development that could be associated with the four scenarios.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
11	cost	2 NPV $363 Million	2 NPV $560 Million	Business As Usual costs are approaching those of the dispersal option, but significantly higher than the consolidated and concentrated costs. Refer to full report for explanation but key cost generator in the Business As Usual is high ChCh suburban Household numbers and accompanying high cost of surface water management infrastructure brought about by rising land costs and new requirements for stormwater treatment.	5 NPV $ 261 Million	5 NPV $430 Million	Both the consolidated and concentrated options show significant savings over the other two but this is the cheapest option and justifies a better rating. Two key factors-avoidance of high rural stand alone infrastructure development and ability of ChCh infrastructure to accommodate Central city growth without major upgrades beyond those already allowed for. Exception is stormwater but this has been allowed for.	4 NPV $302 Million	4 NPV $480 Million	Both the consolidated and concentrated options show significant savings over the other two. Two key factors-avoidance of high rural stand alone infrastructure development and the ability of ChCh infrastructure to accommodate Central city growth without major upgrade beyond those already allowed for. This option envisages suburban Christchurch growth similar to that for the concentrated scenario but retains significant rural development unlike the concentrated case where rural development is very constrained	1 NPV $378 Million	1 NPV $580 Million	Dispersal costs are similar to the bases case, but significantly higher than the consolidated and concentrated costs. The difference in Business As Usual to Dispersal is considered enough for a point difference. High cost of construction and maintenance of stand alone rural development infrastructure is key to high overall costs of this option

Indicator 12 Energy/Electricity *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Any predicted growth, from any scenario can be accommodated by both telecommunication electricity supply companies.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
12	Energy/ electricity	3	3	The only pressing issue identified is Transpower's ability to supply to the mid/north Canterbury area. This is an issue currently and would need to be addressed regardless of which scenario was considered. Will accommodate growth in new areas, or by upgrading existing infrastructure for development in existing areas, as demand requires.	3	3	The only pressing issue identified is Transpower's ability to supply to the mid/north Canterbury area. This is an issue currently and would need to be addressed regardless of which scenario was considered. Will accommodate growth in new areas, or by upgrading existing infrastructure for development in existing areas, as demand requires.	3	3	The only pressing issue identified is Transpower's ability to supply to the mid/north Canterbury area. This is an issue currently and would need to be addressed regardless of which scenario was considered. Will accommodate growth in new areas, or by upgrading existing infrastructure for development in existing areas, as demand requires.		3	The only pressing issue identified is Transpower's ability to supply to the mid/north Canterbury area. This is an issue currently and would need to be addressed regardless of which scenario was considered. Will accommodate growth in new areas, or by upgrading existing infrastructure for development in existing areas, as demand requires.

Criteria 4 – Private Cost -Extent of private costs including building and transport costs (includes cost of traffic congestion, accidents) associated with urban development.

Indicator 1 Private Transport Costs (including business) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Costs from CTS model (see separate documentation for more detail). Costs are for private cars and goods vehicles only and are combination of travel time cost and vehicle operating costs. Accident costs (based on accident rates) calculated separately for links and intersection.
- Mode split assumptions apply (note private cost for PT is included, but value is insignificant at around $0.05M/day).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
1	$7.5M/day $2.5B/year 28% increase from 2001 Rating 3	$9.3M/day $3.1B/year 67% increase from 2001 Rating 3	$6.6M/day $2.2B/year 16% increase from 2001 Rating 4	$8.5M/day $2.8B/year 49% increase from 2001 Rating 4	$7.4M/day $2.5B/year 28% increase from 2001 Rating 3	$9.3M/day $3.1B/year 67% increase from 2001 Rating 3	$8.1M/day $2.7B/year 42% increase from 2001 Rating 2	$11.5M/day $3.9B/year 102% increase from 2001 Rating 2	Private costs have increased from $5.8M in 2001, but need to consider population increase when looking at the higher costs associated with 2021 and 2051. Costs are lower for Concentration and higher for dispersal.

Indicator 2 Accident costs *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Costs from CTS model (see separate documentation for more detail). Costs are for private cars and goods vehicles only and are combination of travel time cost and vehicle operating costs. Accident costs (based on accident rates) calculated separately for links and intersection.
- Mode split assumptions apply (note private cost for PT increases under concentration option, but value is insignificant at around $0.05M/day).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	$1.8M/day $0.6B/year 29% increase from 2001 Rating 3	$2.3M/day $0.8B/year 71% increase from 2001 Rating 3	$1.6M/day $0.5B/year 14% increase from 2001 Rating 4	$2.1M/day $0.7B/year 50% increase from 2001 Rating 4	$1.8M/day $0.6B/year 29% increase from 2001 Rating 3	$2.3M/day $0.8B/year 71% increase from 2001 Rating 3	$2.0M/day $0.7B/year 42% increase from 2001 Rating 2	$2.9M/day $1.0B/year 107% increase from 2001 Rating 2	Accident costs have increased from $1.4M in 2001. Costs are lower for Concentration and higher for dispersal.

Indicator 4 Building costs *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

(i) The population has the same demographic structure and household characteristics under each concept option, including the ageing of the population.

(ii) The minimum space requirements per person (outdoor space[4] and building floor space) of the future population remain similar to that of today.

(iii) Each concept option is accompanied by such amendments to living/residential zone boundaries as are necessary to accommodate the projected household growth. No priority is ascribed to residential or business activities in any area.

(iv) There is no significant difference between concept options in terms of the amount of urban residential development on hillsides or number of households exposed to natural hazards (except liquefaction). (Provisional - refer Criteria 17).

(v) Residential development will generally occur through the normal operation of the market. However, it is accepted that under some options (notably Concentration), Councils may need to intervene in the market in order to assemble land parcels and, relatively infrequently, undertake development.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
4	Likely differences in building costs (land and buildings) between options (including compliance costs). (a) Land	3	3	The cost of residential development will vary between locations but, overall, it is likely to be higher for those options where there is a constraint on the amount available.	2	1	The cost of residential development will vary between locations but, overall, it is likely to be higher for those options where there is a constraint on the amount available. It is unlikely that the Concentration option will be able to be achieved without a reasonably high level of constraint on land availability. Accordingly, land costs for residential development are likely to be generally higher per unit/lot under this option.	3	3	The cost of residential development will vary between locations but, overall, it is likely to be higher for those options where there is a constraint on the amount available.	3	3	The cost of residential development will vary between locations but, overall, it is likely to be higher for those options where there is a constraint on the amount available.
4	Likely differences in building costs (land and buildings) between options	3	3	The cost of building will vary between locations depending on the quality of development. However, it is expected that overall	3	3	The cost of building will vary between locations depending on the quality of development. However, it is expected that overall the cost of building will not vary significantly between options.	3	3	The cost of building will vary between locations depending on the quality of development. However, it is expected that overall	3	3	The cost of building will vary between locations depending on the quality of development. However, it is expected that overall the cost of building will not vary significantly between

[4] Includes private and public space.

	(including compliance costs). (b) Buildings			the cost of building will not vary significantly between options. Note: Building cost is the highest component in total residential development costs.			Note: Building cost is the highest component in total residential development costs.			the cost of building will not vary significantly between options. Note: Building cost is the highest component in total residential development costs.			options. It is assumed that higher building costs for hillside development on rural-residential sites around the Lyttelton Harbour Basin would be associated, in part at least, with the quality of development in this area. Note: Building cost is the highest component in total residential development costs.

II SOCIAL WELLBEING

Criteria 5: Community Identity and Social Cohesion - Extent to which urban development fosters community identity, community focus and social cohesion

Indicator 2 Opportunities for development of identifiable communities (centres and boundaries) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Scale in local shopping has been determined at 1000 allotments/dwellings to support small group shops meeting local needs (between 2-8 shops). To support a supermarket 5000 dwellings in the catchment are required. The population has the same demographic structure and household characteristics under each concept option, including the ageing of the population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2	There is a defined physical edge to a community.	3	3	Intensification will be based around existing communities and existing community focus points. Development in the fringe areas will need to create their own new focal points. In most situations in Christchurch this will only be in the form of a park or open space, as local shopping, café areas are only economically developed as part of a large scale integrated development (1000 dwellings).	4	4	Intensification is based around existing communities and existing community focus points. In so far as these exist, concentration will build upon this. There is some potential for edges to be blurred, but it may reinforce community focus points by providing scale.	4	4	Intensification will be based around existing communities and existing community focus points. Comments make on concentration apply with a lesser degree of blurring and supporting community focal points. Development in the fringe areas will need to create their own new focal points. In most situations in Christchurch this will only be in the form of a park or open space, as local shopping, café areas are only economically developed as part of a large scale integrated development (1000 dwellings).	2	2	Physically defined edges and focal points are less likely under a dispersal option. For new development some potential for edges (i.e. defined rural residential areas) will result, but it is unlikely to provide scale and density that supports significant community focal points. Existing centres where there is population growth will remain with a strongly defined community and focal point, but there will be reduced potential to develop additional scale.

Indicator 3 Local Community identity *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Scale in local shopping has been determined at 1000 allotments/dwellings to support small group shops meeting local needs (between 2-8 shops). To support a supermarket 5000 dwellings in the catchment are required. The population has the same demographic structure and household characteristics under each concept option, including the ageing of the population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
3		3	3	With greater intensification in some areas community cohesion and similarity of built form that exists in many areas will decrease as new dwellings will be located in established areas and the nature and form of development in some areas will change. The rate of change will be reduced as there is a safety valve of fringe development available for people not wishing to live in more intensified neighbourhoods. The impact of change will be more easily assimilated into the existing community as the rate of change will be less intense than the concentration option.	2	2	With greater intensification community cohesion and similarity of built form that exists in many areas will decrease. New dwellings will be located in established areas and the nature and form of development in some areas will change. The rate of change for existing communities will be the greatest of all options. This may have a greater effect to 2021 as the first changes are more noticeable. Over time the change will become an accepted part of the communities and will not have such a substantial impact.	3	3	With greater intensification in some areas community cohesion and similarity of built form that exists in many areas will decrease as new dwellings will be located in established areas and the nature and form of development in some areas will change. The rate of change will be reduced as there is a safety valve of fringe development available for people not wishing to live in more intensified neighbourhoods. The impact of change will be more easily assimilated into the existing community as the rate of change will be less intense than the concentration option.	4	4	This option will result in the least amount of change in built form of existing areas. Less development will need to be assimilated into existing areas.

Indicator 4 Access to local shopping/services *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Scale in local shopping has been determined at 1000 allotments/dwellings to support small group shops meeting local needs (between 2-8 shops). To support a supermarket 5000 dwellings in the catchment are required. The population has the same demographic structure and household characteristics under each concept option, including the ageing of the population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
4		3	3	Local shopping facilities will generally be based around the existing infrastructure. Developments on the fringe, unless they accommodate more than 1000 dwellings will not be so well served by local shopping facilities and will be required to travel further to meet their demands. However population increases around existing shopping facilities will improve their commercial viability.	4	4	Local shopping facilities will most accessible to the widest range of people of all of the options. Development will be based on existing centres and communities. Scale of population will make existing areas more commercially viable.	4	4	Local shopping facilities will generally be based around the existing infrastructure. Developments on the fringe, unless they accommodate more than 1000 dwellings will not be so well served by local shopping facilities and will be required to travel further to meet their demands. However population increases around existing shopping facilities will improve their commercial viability.	2	2	Local shopping facilities will be based around the existing infrastructure. Under a dispersal scenario it is less likely that new local shopping facilities will be provided as there is insufficient population catchment in the locality to justify the economic expenditure. People will be required to travel to meet their local shopping demands. There is some potential for dispersal to reduce the viability of existing areas if economies of scale are required.

Criteria 6: Residential Quality – Urban development maintains/enhances the character, attractiveness and amenity values of living environments and provides choice of housing opportunities and living environments

Indicator 1 Choice of housing opportunities and living environments *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1	There is a choice of housing including age, location and style.	3	3	This option has a choice in both location and housing types, with opportunities for some Greenfield development and redevelopment in existing areas.	3	2	There will be less locational choice under the concentration option, as the opportunities for Greenfield extensions will be reduced. The locational choices will decline over time as the reduction in the land bank takes effect. There will be a wide range of housing option choices within existing neighbourhoods.	4	4	This option has a choice in both location and housing types, with opportunities for some Greenfield development and redevelopment in existing areas.	4	4	There is the widest locational choice of housing of all options. Opportunities for a wide range of Greenfield development areas will be provided, along with the opportunities to redevelop in existing areas.

Indicator 3 Opportunities for "revitalisation" of degraded housing stock/residential environments *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
3	Creation of economic conditions to promote "revitalisation" of degraded housing stock/residential environments.	2	2	Areas where there is value in redevelopment will continue to be revitalised. However, it is unlikely that there is sufficient population to drive a demand in all existing areas as well as catering for new development areas.	4	5	Concentration will result in fewer options for cheaper (Greenfield) developments. As land on the fringes becomes more expensive (scarcity) the value of redeveloping existing sites will improve, leading to greater redevelopment of some areas of Christchurch.	3	3	Areas where there is value in redevelopment will continue to be revitalised. However, it is unlikely that there is sufficient population to drive a demand in all existing areas as well as catering for new development areas.	2	2	With a wide range of Greenfield land options available there is less incentive to redevelop existing areas, other than high value areas/suburbs. This option may provide a disincentive to more expensive re-development in lower value suburbs. A situation could arise where property values drop to a level that redevelopment on a site –by-site basis will not be sufficient to generate development in an area and sustain it, and a major intervention may be required. Population increase will not be sufficient to ensure redevelopment/ renewal of all existing suburbs plus new areas.

Criteria 7: Community Health – Urban development promotes or enables access to healthcare and recreation opportunities, reduces traffic accidents etc.

Indicator 1 Travel time/cost of travel to healthcare facilities, recreation opportunities, etc. *Rating Score Range 1-5: 1 = low, 5 = high*
Indicator 2 Distance to healthcare, recreation facilities *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Community health is not the same as community health facilities (i.e. doctor availability etc)
- Access to open space is a key determinant to healthy communities.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1/2		3	3	Provision for unstructured exercise exists as there is provision for local parks and linkage areas within close proximity of residences. With development still focussed around existing areas reasonable proximity will be maintained to more formal activities and health clinics.	4	4	Provision for unstructured exercise exists as there is provision for local parks within close proximity of residences. However, the ability to provide for linkages is lessened as the already developed nature of most areas makes providing for linked green spaces difficult. There will be less open space that would exist for the other options. In addition the amenity available would be lessened due to the more intensive urban activity which occurs. This lessened amenity reduces the desire to undertake unstructured exercise. However under this option people would be closer to formal activities, such as gyms, and health clinics.	3	3	Provision for unstructured exercise exists as there is provision for local parks and linkage areas within close proximity of residences. With development still focussed around existing areas reasonable proximity will be maintained to more formal activities and health clinics.	2	2	Less opportunity for public open space are provided under the dispersal options. However, with larger sections opportunity for unstructured exercise on individual properties does exist. Under this option a greater number of people will be located further away from formal activities and health clinics.

Criteria 8: Community Education and Learning – Urban development promotes or enables reasonable access to education and learning facilities

Indicator 1 Travel time/cost of travel to education centres. *Rating Score Range 1-5: 1 = low, 5 = high*
Indicator 3 Thresholds capacity for key education facilities (e.g. Requirements for major schools, libraries, etc). *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Pre-school and Primary school - assume they are based on school population suburb dependant.
- Secondary school – assume predominantly existing schools.
- Tertiary – assume only existing facilities.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1/3	(i) Distance to pre-school, local primary school (walking distance) (ii) Distance to secondary schools (iii) Distance to tertiary institutions	3	3	It is likely that there will be some expansion of existing schools to accommodate the increasing population. The main focus under this option would be on the redevelopment/ expansion of existing schools. Some new pre-schools may be provided. This option is likely to result in additional travel being needed to access primary, secondary and tertiary education for new residential areas. It is less likely that a reasonable sized catchment will exist to result in a new school near the population. The increased demand for larger schools will decline as the school age population declines by 2051.	3	3	This option may require expansion of existing schools, or the development of some new pre-schools. The population will generally be located in close proximity to a primary school, secondary school, and tertiary education for the population based in Christchurch. Providing for extensions or new schools in existing areas may be more expensive. The increased demand for larger schools will decline as the school age population declines by 2051.	3	3	It is likely that there will be some expansion of existing schools to accommodate the increasing population. The main focus under this option would be on the redevelopment/expansion of existing schools. There may be some new pre-schools developed. This option is likely to result in additional travel being needed to access primary, secondary and tertiary education for new residential areas. It is less likely that a reasonable sized catchment will exist to result in a new school near the population. . The increased demand for larger schools will decline as the school age population declines by 2051.	2	2	This option is likely to result in additional travel being needed to access pre-schools, primary, secondary and tertiary education for new residential areas. It is less likely that a reasonable sized catchment will exist to result in a new school near the population. . The increased demand for larger schools will decline as the school age population declines by 2051.

Criteria 9: Access to Open Space – Extent to which urban development promotes or enables access to quality and diverse open space and landscape.

Indicator 1 Access to regional open space. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Assumptions made are that cost/benefit has been assessed considering the reserve contribution requirements set out in each Council's policy not changing over the life of the project – (7.5% contribution for each residential property).
- A policy seeking regional open space has been adopted.
- Adequate local reserve land is assessed as being 18ha per 1000 population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1	Opportunity for provision of Regional reserve network throughout the UDS.	3	3	There is no significant difference between concept options. Any possibility of residential use of land does increase land value. This will make the opportunity for obtaining land and the cost of purchasing regional parks more expensive unless you can trade land for development rights.	4	4	There is no significant difference between concept options. However any possibility of land being available for urban development will result in an increase in cost to provide regional reserves. This situation will not occur under the concentration option.	4	4	There is no significant difference between concept options. This option may be slightly more expensive as any possibility of residential use of land does increase land value. This will make parks more expensive to purchase unless you can trade land for development rights.	3	3	There is no significant difference between concept options. This option may be more expensive as any possibility of residential use of land does increase land value. This will make parks more expensive to purchase unless you can trade land for development rights.

Indicator 2 Open space (to accepted standard of provision for local neighbourhood open space). *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Assumptions made are that cost/benefit has been assessed considering the reserve contribution requirements set out in each Council's policy not changing over the life of the project – (7.5% contribution for each residential property).
- A policy seeking regional open space has been adopted.
- Adequate local reserve land is assessed as being 18ha per 1000 population.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2	Adequate local reserve land is available to serve local population (500 metres from home).	3	3	Reserve contribution is based on the value of the land, so as value increases or decreased so too with the contribution able to be taken. In non-Greenfield areas providing open space is more expensive as existing developed land must be purchased to be converted into open space.	2	2	In areas underrepresented for open space existing developed land must be purchased to be converted into open space. Creating new areas of open space will be the most expensive of the options. If sufficient open space exists to cater for increased population then no additional reserves will be required to be purchased. Reserve Contributions are based on land value, however to purchase reserves in developed areas the cost of the land plus improvements must be paid.	3	3	Reserve contribution is based on the value of the land, so as value increases or decreased so too with the contribution able to be taken. In non-Greenfield areas providing open space is more expensive as existing developed land must be purchased to be converted into open space. Reserve Contributions are based on land value, however to purchase reserves in developed areas the cost of the land plus improvements must be paid.	2	2	Under a dispersal option the reserve requirements are more likely to be focussed on linkages between areas, rather than on traditional local reserves. The reason for this is that with larger sections people provide for their recreation needs on their own properties. Reserve contribution is based on the value of the land, so as value increases or decreased so too with the contribution able to be taken. Reserve contribution is based on land value, so reserves in dispersal areas will be more cost effective to purchase. With dispersed option a greater number of linkages will be required as the distances between development areas will be greater.

III CULTURAL WELLBEING

Criteria 10: Cultural Identity – Urban development enhances cultural values, including resources of significance to Maori and other cultures.

Indicator 2 Enhancement/support of (or impacts on) cultural resources, including resources of significance to Maori and other cultures. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Some form of regulatory regime seeking protection of cultural values exists

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2	Pressure to destroy or modify waahi tapu sites.	3	3	Developing in existing urban areas has less new impact as any existing values have already been compromised when the initial development occurred. Some new development areas on the fringe may result in development in closer proximity. However known areas can be avoided.	4	4	Developing in existing urban areas has less new impact as any existing values have already been compromised when the initial development occurred.	3	3	Developing in existing urban areas has less new impact as any existing values have already been compromised when the initial development occurred. Some new development areas on the fringe may result in development in closer proximity. However known areas can be avoided	3	3	New development areas may result in development in closer proximity to waahi tapu sites. However known areas can be avoided. In addition some aspects can be incorporated into the design of new areas (for example Pegasus Bay)
2	Proximity of population to cultural opportunities, such as Art Gallery, Museum.	3	3	With much of the population still focussed around existing areas reasonable proximity will be maintained with formal cultural activities.	3	3	With the population still focussed around existing areas proximity will be maintained with formal cultural activities.	3	3	With much of the population still focussed around existing areas reasonable proximity will be maintained with formal cultural activities.	3	3	This option is likely to result in the greatest number of people being living further away from formal cultural facilities.

Criteria 11: Heritage Well-being – Urban development enhances heritage values, including resources of significance to Maori and other cultures.

Indicator 1 Enhancement/support of (or impacts on) heritage resources, including the built environment, and heritage resources of significance to Maori and other cultures. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Some form of regulatory regime seeking protection of heritage resources exists

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1	Pressure to destroy or modify heritage resources.	3	3	Some intervention will be required.	1	1	The greatest level of regulatory intervention will be required under the concentration option as pressure for development will occur in existing areas. It is likely that some heritage resources at the lower end of the scale will be under intense pressure for redevelopment or destruction.	3	3	Some intervention will be required.	4	4	The least regulatory intervention will be required to protect heritage resources as demand will be for Greenfield land which will be cheaper and easier to develop.
1	Economic conditions to enhance heritage resources.	3	3	Iconic heritage resources in valuable areas or on valuable sites will be enhanced, as economic conditions will favour this. Others in less desirable locations may decline.	3	3	Concentration will provide the best market incentive for redevelopment and use of heritage resources. However balanced with there will be the best market conditions to justify in economic terms the remove and destruction of heritage resources.	3	3	Iconic heritage resources in valuable areas or on valuable sites will be enhanced, as economic conditions will favour this. Others in less desirable locations may decline.	2	2	There will be less economic incentive for enhancement. While there may be more heritage areas protected, some may decline in quality as they are not used. There will be limited market incentive to develop all but the iconic sites.

IV ENVIRONMENTAL WELL-BEING

Criteria: 12: Impact on Energy Use

Indicator 2 Fuel Use (all trip purposes) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24 hour period. Fuel values obtained by applying typical consumption rate (per vehicle per km) to model link speeds. Assume no changes in vehicle technology for future years.
- Mode split assumptions apply (see criteria 16).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	1.24M L/day 27% increase from 2001 Rating 3	1.53M L/day 58% increase from 2001 Rating 3	1.11M L/day 16% increase from 2001 Rating 4	1.39M L/day 45% increase from 2001 Rating 4	1.23M L/day 27% increase from 2001 Rating 3	1.51M L/day 58% increase from 2001 Rating 3	1.35M L/day 41% increase from 2001 Rating 2	1.87M L/day 95% increase from 2001 Rating 2	Fuel use increases from 0.97M L/day in 2001. Usage for Consolidation/Base is between that required for Concentrated and Dispersal Concept Options.

Criteria: 13: Impact on Air Emissions

Indicator 1 Air quality pollution *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
1	Air Quality – Home Heating	4		3		2		2	The higher the infilling the higher will be rates of replacement of older houses and heating appliances. In Christchurch's central core replacement is assumed to be concentration – 50%, consolidation – 33%, Business As Usual – 19% and dispersal – 8%. Development outside high pollution areas is beneficial to those residents but total emissions would increase, based on existing controls, from sources outside Christchurch Clean Air Zone 1 and within the so called "extended Clean Air Zone".

Indicator 2 Contribution of traffic to air pollutants (CO & CO2). *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24 hour period. Values obtained by applying typical emission rates (per vehicle per km) to total vehicle-km traveled.
- Mode split assumptions apply (see critera 16).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	160 Tonnes/day CO 2900 Tonnes/day CO2 28% increase from 2001 Rating 3	200 Tonnes/day CO 3700 Tonnes/day CO2 64% increase from 2001 Rating 3	140 Tonnes/day CO 2600 Tonnes/day CO2 15% increase from 2001 Rating 4	180 Tonnes/day CO 3400 Tonnes/day CO2 49% increase from 2001 Rating 5	160 Tonnes/day CO 2900 Tonnes/day CO2 28% increase from 2001 Rating 3	200 Tonnes/day CO 3700 Tonnes/day CO2 64% increase from 2001 Rating 3	170 Tonnes/day CO 3200 Tonnes/day CO2 41% increase from 2001 Rating 2	260 Tonnes/day CO 4600 Tonnes/day CO2 103% increase from 2001 Rating 1	Greater concentration of landuse results in lower total emissions than dispersed landuse (for a given population), however local concentration of emissions MAY be greater in areas where landuse is concentrated. Difference between options is mostly due to mode changes (increased PT use for concentrated, increased car use for dispersal.

Criteria: 14: Impacts on Water- Urban development enhances the quality of and takes into account effects on rivers and river margins, wetlands, aquatic ecosystems, groundwater and the coast

Indicator 1 Water Demand. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- There are a variety of ecosystems within the study area some are protected in whole, part or not at all. There was no assumption that further protection would be given to these ecosystems. It was determined that further study is needed to fully understand them.
- Wetlands are areas that are given protection in plans, although not all wetlands are protected.
- Under all scenarios there will be locals events, such as flooding. The district and regional councils set minimum floor heights for flooding. During a major event these areas may experience loss.
- Not all hazards can be engineered for.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1			3	For the 62,511 additional households water demand will be 81,520 m^3/day. (3042 litres per sec for all households)		5	For the 62,511 additional households water demand will be 63,231 m^3/day. This does not include water needed to maintain parks and public landscape areas, which may be higher under this scenario. (2830 litres per sec for all households)		4	For the 62,511 additional households water demand will be 71,384 m^3/day. (2924 litres per sec for all households)		2	For the 62,511 additional households water demand will be greater than 98,664 m^3/day. (3240 litres per sec for all households)

Indicator 5 Impact on Sensitive Ecosystems and Wetlands. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

- There are a variety of ecosystems within the study area some are protected in whole, part or not at all. There was no assumption that further protection would be given to these ecosystems. It was determined that further study is needed to better understand them.
- Wetlands are areas that are given protection in plans, although not all wetlands are protected.
- Under all scenarios there will be locals events, such as flooding. The district and regional councils set minimum floor heights for flooding. During a major event these areas may experience loss.
- Not all hazards can be engineered for.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
5	Sensitive eco-systems/ Habitats		3			3	In Chch adverse impact on the estuary and the streams. Little available land for mitigation. Outside of centralised development areas the ecosystems will more likely be protected. Although if land is used for agriculture it won't protect ecosystems.		3	Enhanced greenbelt protection for sensitive ecosystems, including Macleans Island grasslands. Estuary still could be adversely impacted depending on the development and how it was managed within the catchment.		3	Would limit agricultural intensification. Residential development will assist in creating habitats that have long been lost. Although large areas such as the Macleans Islands grasslands and Port Hills around Selwyn would be under greater pressure and therefore risk. Potential for greater woodland cover and streamside protection.
5	Wetlands		4			4	Chch wetlands will be protected but will be impacted by storm water runoff. Increased agricultural use is a greater threat to the protection of wetlands.		3	Increased agricultural use is a greater threat to the protection of wetlands.		4	Depends on level of protection. Potentially could be drained for agricultural use or development.

Criteria: 15 :Impacts on Land- Urban development enhances and takes into account effects on land resources (indigenous vegetation, versatile soils, landscapes and natural features, recreational areas, open space etc), biodiversity and ecosystems.

Indicator 2. Residential land area/density within areas of versatile soil *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2	Soils		3	4,920 hectares – equivalent land area to 26 Hagley Parks		5	Best for protection of agriculture. 2110 hectares - equivalent land areas to 11 Hagley Parks		4	3900 hectares - equivalent land areas to 21 Hagley Parks		2	6850 hectares – equivalent land area to 36 Hagley Parks

Indicator 4. Residential land area/density within areas of outstanding landscape and natural features *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
4	Landscapes		3			4	Best for protecting.		3			2	More potential for development on the Port Hills, in Selwyn, Lyttelton Harbour, the Waimakariri River valley and coastal development.

Indicator 6. Impact on biodiversity *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
6	Biodiversity					2	Within city there will be some protection, although some habitat will be removed for development with additional pressure on resources. Rural areas will enhance overtime.		3	The change in land uses is both an opportunity and a risk depending on how it is developed. The potential for greater biodiversity is there if the area is planted in a manner that encourages it.		4	Potential for biodiversity depends on the type of greenbelt development.

Comments
If sustaining agriculture on the versatile soils is a goal of the UDS, then options for protection will need to be explored.
The key elements of landscapes in the UDS are the Port Hills, Lyttelton Harbour, coast and beaches, urban/rural interface and the Waimakariri River valley.
Biological diversity, or "biodiversity" for short, describes the variety of all biological life - plants, animals, fungi, and microorganisms - the genes they contain and the ecosystems on land or in water where they live. It is the diversity of life on earth. In the study area, the vast majority of biodiversity can be found in the urbanized areas because it offers the greatest concentration of a variety of plants.

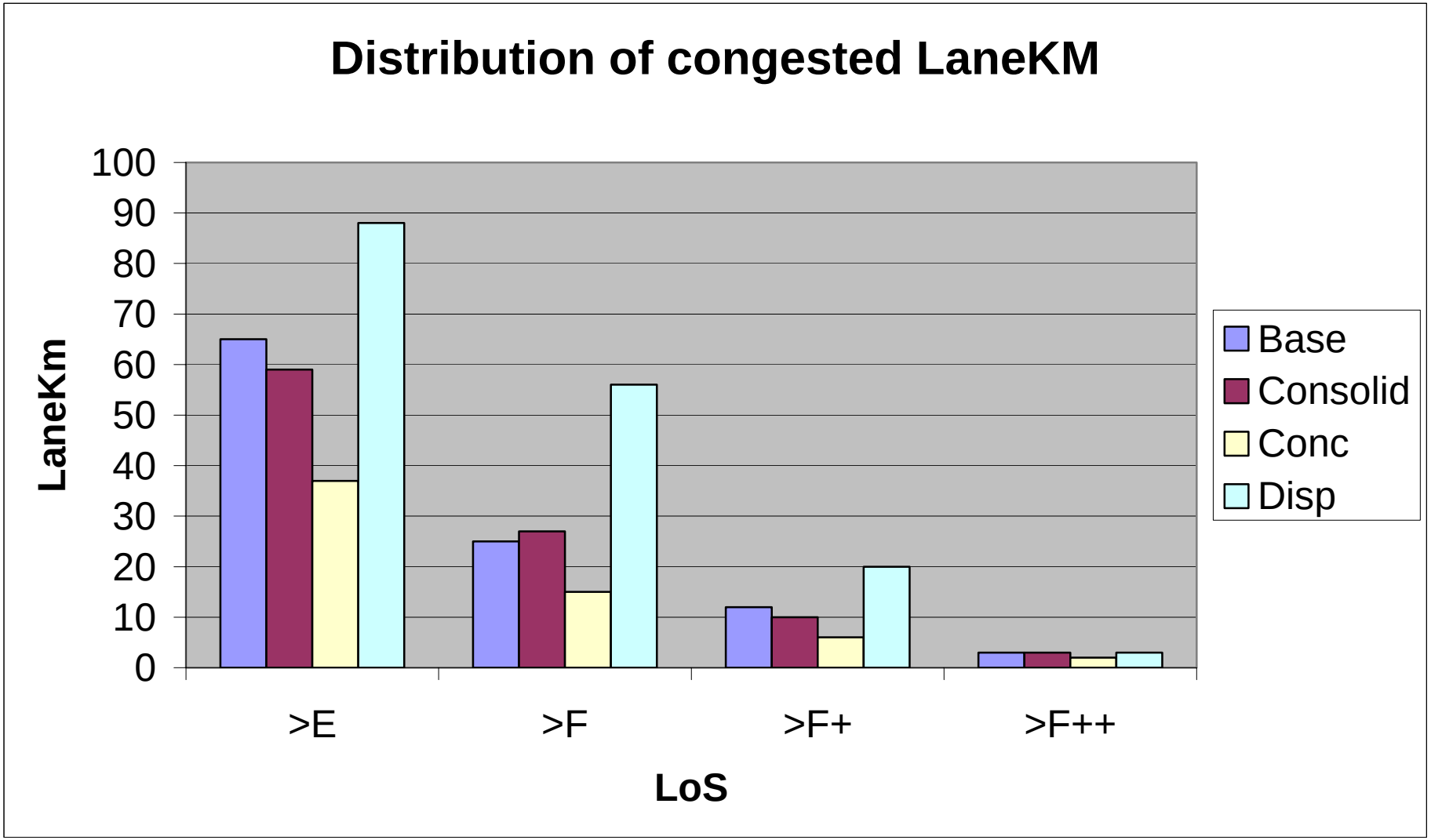
Criteria: 16 : Impacts on Strategic Infrastructure -Urban development supports efficient use of strategic infrastructure such as strategic transport networks, Christchurch International Airport, the port, regional solid waste disposal (Burwood), sewage treatment and disposal and composting facilities/areas, electricity and telecommunications

Indicator 1. Extent to which urban development contributes to congestion (kms) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –
Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24-hour period on "Do Minimum" network. Reported LoS is for links only and is based on vehicle flows and road type (e.g. a Motorway can accommodate much more traffic at LoS D than a Minor Arterial). Congestion should drop below 40 lane km (RLTS target) for all concept options if sufficient infrastructure is provided (see criteria 3 for the cost of this associated with each concept option).

Assessment Graphs for Indicator 1
Degree of congestion (E,F,F+,F++)

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
1	65 lane-km at LoS E (or worse) 160% increase from 2001 Rating 3 140 lane-km at LoS E (or worse) during peak.	106 lane-km at LoS E (or worse) 320% increase from 2001 Rating 3 No reliable estimate for 2051 peak	37 lane-km at LoS E (or worse) 50% increase from 2001 Rating 4 127 lane-km at LoS E (or worse) during peak.	73 lane-km at LoS E (or worse) 190% increase from 2001 Rating 4 No reliable estimate for 2051 peak	59 lane-km at LoS E (or worse) 140% increase from 2001 Rating 3 138 lane-km at LoS E (or worse) during peak.	98 lane-km at LoS E (or worse) 290% increase from 2001 Rating 3 No reliable estimate for 2051 peak	88 lane-km at LoS E (or worse) 250% increase from 2001 Rating 2 138 lane-km at LoS E (or worse) during peak.	182 lane-km at LoS E (or worse) 630% increase from 2001 Rating 1 No reliable estimate for 2051 peak	Congestion continues to increase over time (with peak periods becoming much longer) despite comprehensive network improvements. Very little scope for improving road network further as all critical intersections have been upgraded as much as practically possible (particularly approaches to Christchurch CBD).


Distribution of congested LaneKM
LaneKm
100
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80
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50
40
30
20
10
0
>E
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LoS
Base
Consolid
Conc
Disp

Indicator 2. – Opportunity (including viability) for alternative modes (rail, light rail, PT, cycling and walking).*Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –
Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24 hour period. LoS is for links only and is based on vehicle flows and road type (eg a Motorway can accommodate much more traffic at LoS D than a Minor Arterial).

Indicator	Business As Usual (Modified)		Consolidation		Concentration		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
2	Rail – Not viable Light Rail – Not viable Bus - Adequate Cycle - Adequate Walking - Limited Rating 3	Rail – Not likely Light Rail – Not likely Bus - Adequate Cycle - Adequate Walking - Limited Rating 3	Rail – Not viable Light Rail – Not viable Bus - Adequate Cycle - Good Walking -Good Rating 4	Rail – Not likely Light Rail – Possible Bus - Good Cycle - Good Walking - Good Rating 4	Rail – Not viable Light Rail – Not viable Bus - Adequate Cycle - Adequate Walking - Limited Rating 3	Rail – Not likely Light Rail – Not likely Bus - Adequate Cycle - Adequate Walking - Limited Rating 3	Rail – Not viable Light Rail – Not likely Bus - Poor Cycle - Poor Walking - Limited Rating 2	Rail – Not viable Light Rail –Possible (with huge subsidy) Bus - Poor Cycle - Poor Walking - Limited Rating 2	Rail unlikely to be viable due to relatively low population (even at 2051) spread over a wide area (all directions). There is continued opportunity for PT (buses) and cycling trips. These modes will become increasingly competitive (assuming suitable infrastructure) as congestion increases.

Indicator 3. Impact of traffic congestion on access to airport and seaport *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –
Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24-hour period. LoS is for links only and is based on vehicle flows and road type (eg a Motorway can accommodate much more traffic at LoS D than a Minor Arterial).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
3	Low risk of exceeding currently planned infrastructure Rating 3	Moderate risk of exceeding currently planned infrastructure Rating 2	Low risk of exceeding currently planned infrastructure Rating 3	Low risk of exceeding currently planned infrastructure Rating 3	Low risk of exceeding currently planned infrastructure Rating 3	Moderate risk of exceeding currently planned infrastructure Rating 2	Low risk of exceeding currently planned infrastructure Rating 3	Additional strategic level transport infrastructure (other that currently planned) will almost definitely be required Rating 1	Currently planned infrastructure (with allowance for many minor works and increased PT) should cope (but with varying LoS) for each concept option, except dispersal, where extra capacity needs to be provided along key corridors (between TlAs). Extra capacity may be provided via road or PT.

Indicator 4 Change in public transport patronage *1-5: 1 = low, 5 = high*

Overall Assumptions –
Trip data from CTS model (refer to CTS documentation for more detail). Data is for 24-hour period. LoS is for links only and is based on vehicle flows and road type (e.g. a Motorway can accommodate much more traffic at LoS D than a Minor Arterial).

Indicator	Business As Usual (Modified)		Concentration		Consolidation		Dispersal		Explanation
	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	Rating 2021 (1-5)	Rating 2051 (1-5)	
4	Neutral Rating 3	Neutral Rating 3	Vehicle trips decrease (switch to PT) from Consolidation/Base Option as follows: 0.85 CBD trips (in/to/from) 0.91 Intra Christchurch (outside CBD) Rating 4	Vehicle trips decrease (switch to PT) from Consolidation/Base Option as follows: 0.85 CBD trips (in/to/from) 0.91 Intra Christchurch (outside CBD) Rating 4	Neutral Rating 3	Neutral Rating 3	Decrease – increased reliance on car, despite delays (HH trip rates increase by 0.5% p.a. over Consolidation /Base Option) Rating 2	Decrease – increased reliance on car, despite delays (HH trip rates increase by 0.5% p.a. over Consolidation/Base Option) Rating 2	PT patronage expected to be compatible with currently proposed expenditure on PT services (this means PT patronage should increase over time). Note that utilisation may vary between concept options, but costs of providing services should be similar in all cases.

Indicator 6 Residential land area/density with the airport and seaport protection zones. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –
Note: *This assessment is concerned only with the impact of the various concept options on the efficient use of Christchurch International Airport and the Port of Lyttelton.*

Assumptions:

(i) Urban residential development and other noise sensitive activities are discouraged within the 50 dBA Ldn air noise contour around the airport in order to safeguard the efficient use and safe operation of Christchurch International Airport.

(ii) The air noise contours adopted for this assessment are those defined in the Proposed Christchurch, Waimakariri and Selwyn District Plans.

(iii) Residential development in rural areas complies with the minimum lot size requirements within the air noise contours in the proposed plans.

(iv) New residential development and noise sensitive activities are precluded within the Inner Noise Control Area defined in the Proposed Banks Peninsula District Plan in order to safeguard the efficient use of the Port of Lyttelton.[5]

[5] Residential development and noise sensitive activities are prohibited within the Inner Noise Control Area. There are early indications that the decision on this topic is likely to be subject to variation or review. However, it is unlikely that this will result in an extension to the area subject of control. Note - the Proposed Banks Peninsula District Plan also includes an Outer Noise Control Area where residential development is a restricted discretionary activity. The exercise of discretion is limited to requiring that specified noise acoustic standards are met. The standards can be met by insulation.

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
6	Increase in the number of households within current air noise contours as the result of development of new residential growth areas.	5	5	The projected household distribution supports the efficient use of the airport by avoiding the development of new residential growth areas within the current air noise contours.	5	5	The projected household distribution supports the efficient use of the airport by avoiding the development of new residential growth areas within the current air noise contours.	5	5	The projected household distribution supports the efficient use of the airport by avoiding the development of new residential growth areas within the current air noise contours.	5	5	The projected household distribution supports the efficient use of the airport by avoiding the development of new residential growth areas within the current air noise contours
6	Increase in the number of households within the Inner Noise Control Area at Lyttelton as the result of the development of new residential growth areas.	5	5	The projected household distribution supports the efficient use of the seaport by avoiding the development of new residential growth areas within the Inner Noise Control Area.	5	5	The projected household distribution supports the efficient use of the seaport by avoiding the development of new residential growth areas within the Inner Noise Control Area.	5	5	The projected household distribution supports the efficient use of the seaport by avoiding the development of new residential growth areas within the Inner Noise Control Area.	5	5	The projected household distribution supports the efficient use of the seaport by avoiding the development of new residential growth areas within the Inner Noise Control Area.
6	Increase in the number of households within current air noise contours in existing urban areas as a result of greenfields development or infill.	3	3	All concept options provide for a modest increase in the number of households on currently zoned land within the 50 dBA Ldn noise contour as a result of greenfields development and infill. The increase under this scenario is insignificant.	2	2	All concept options provide for a modest increase in the number of households on currently zoned land within the 50 dBA Ldn noise contour as a result of greenfields development and infill. Concentration will result in the greatest number of households within this noise contour, but the increase is still relatively small compared to the existing number. The increase in the number of households could be minimised by imposing a cap on density, if this were considered necessary.	3	2	All concept options provide for a modest increase in the number of households on currently zoned land within the 50 dBA Ldn noise contour as a result of greenfields development and infill. The increase under this option is small (but greater than either Business as usual or Dispersal) compared to the existing number of households within the 50 dBA Ldn noise contour.	3	3	All concept options provide for a modest increase in the number of households on currently zoned land within the 50 dBA Ldn noise contour as a result of greenfields development and infill. The increase under this option is insignificant.
6	Increase in number of households within the Inner Noise Control Area at Lyttelton as a result of infill.	4	4	The increase in number of households within the Inner Noise Control Area as a result of infill is negligible (if any).	3.75	3.75	The increase in number of households within the Inner Noise Control Area as a result of infill is negligible (if any).	4	3.75	The increase in number of households within the Inner Noise Control Area as a result of infill is negligible (if any).	4	4	The increase in number of households within the Inner Noise Control Area as a result of or infill is negligible (if any).

Criteria 17: Risks from Natural Hazards – Urban development creates costs/benefits from relative exposure to various natural hazards, and improves risk management, resilience, and recovery to those risks

Indicator 1 Residential land area/density within river flood areas. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1	Hazards – flooding		3	Mixture if increased risk in inner Christchurch and reduced risk in outer areas.		2	Potential for greater loss, if the flood hits the urbanised area.		3	Increased risk around urban centers in eastern Christchurch – reduced risk for others e.g. Lincoln		2	Potentially could be less loss. Bigger issue for response.

V OTHER

Criteria 18: Robustness – Adaptability of urban development to higher (and lower) rates of population growth, unanticipated socio-economic conditions, technological innovation etc (development pattern of "least regret").

Indicator 1 Higher or lower population growth rates, changed age/family structures or ethnic mix. *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
1		-3	2		4	3		4	4		2	1	Considered planned commitments and adaptability to major change. Generally Dispersal / BA was least favourable and Concentration / Consolidation better.Potentially could be less loss.

Indicator 2

(a) Adaptability to changing economic considerations *Rating Score Range 1-5: 1 = low, 5 = high*

(b) Adaptability to changing social considerations *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
2 (a)		3	-2		3	3		3	3		2	2	
2 (b)			3			3			2			3	

Indicator 3

- Unexpected (significant) effects of climate change *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
3			2			2			2			3	

Indicator 4

- Vulnerability to fuel shortages or increased cost of fuel (including costs of transport) *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
4			3			4			5			2	

Indicator 5

- Unexpected power shortages *Rating Score Range 1-5: 1 = low, 5 = high*

Overall Assumptions –

Indicator	Performance Measure	Business As Usual			Concentration			Consolidation			Dispersal		
		Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation	Rating 2021 (1-5)	Rating 2051 (1-5)	Explanation
5			3			4			5			2	

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