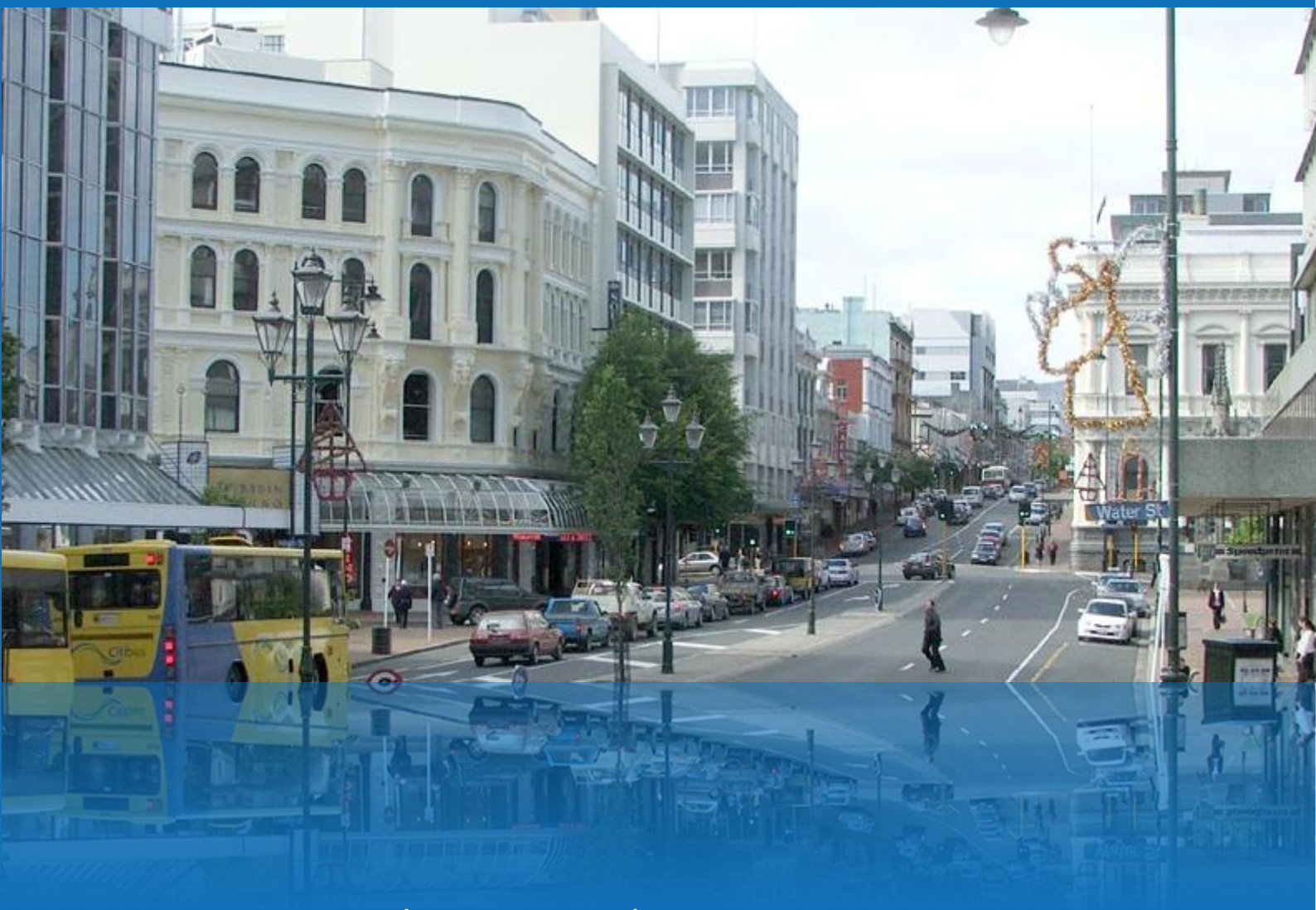
PRINCIPAL ECONOMICS

Business Development Capacity Assessment for Dunedin City



Report to Dunedin City Council

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This report was prepared by Dr Eilya Torshizian, Eugene Isack, and Alina Fehling of Principal Economics.

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Summary

Dunedin City Council (the Council) appointed Principal Economics to assess the sufficiency in development capacity of business land within Dunedin. The National Policy Statement on Urban Development (NPS-UD 2020) aims to ensure that the supply of business land within local authorities is sufficient to meet business demand. Our assessment fulfils requirements under sections 3.21, 3.22, 3.28, 3.29 and 3.3 of the NPS-UD, which include an assessment of demand, supply and sufficiency of business land for different sectors.

Demand for business land increases for transport, hospitality, primary industries, and food retailing sectors

Demand for business land is calculated based on the forecasted economic activity of the sectors and the required floorspace by an employee (for each sector). In our assessment of demand for business activities, we account for the followings:

- The locational requirements of business, including shape, size, access and other market factors.
- The external pressures businesses are facing, including the impact of COVID-19 (and the recovery path), the construction of the new hospital, and the climate change (mitigation).
- Impacts on business activities from reverse sensitivities; locational accessibility to labour markets and customers; changes in demand from population growth; changes in residential distribution.

These factors have mixed impacts in the short (2024-2027), medium (2024-2034) and long (2024-2054) term. As shown in Table 1, the overall floorspace requirement is decreasing in the LT. The results are presented for both medium and high population projection scenarios.

Table 1 Summary of forecasted floorspace requirements by sector

Unit: square metre. The presented figures are total (i.e., not change).

	ST (2027)		MT (2034)		LT (2054)	
Sector	**Medium**	**High**	**Medium**	**High**	**Medium**	**High**
Primary industry	137,705	174,929	158,251	194,519	173,422	258,576
Manufacturing-heavy	251,835	309,112	130,138	159,803	127,851	184,518
Manufacturing-light	268,936	334,535	239,425	294,191	237,651	346,673
Electricity, gas, water and waste services	1,310,663	1,613,776	507,160	621,576	440,663	634,665
Construction	416,168	527,032	298,145	366,424	320,935	476,834
Wholesales	546,262	671,882	298,359	365,834	313,634	452,415
Retail-small	103,547	129,394	90,808	111,539	94,907	139,032
Retail-large	127,663	157,612	96,064	118,078	101,080	146,453
Retail-food	66,124	81,379	62,433	76,584	66,199	95,458

Hospitality	36,032	45,122	49,501	60,861	57,351	84,228
Transport	291,971	366,962	146,471	180,136	386,317	569,295
Office	46,924	57,808	36,722	45,117	38,479	55,609
Education	75,882	93,634	71,153	87,394	74,759	108,203
Health	47,515	59,595	43,874	53,902	46,152	67,918
Arts and recreation	332,145	448,702	255,558	313,454	268,612	424,869
Total	**4,059,371**	**5,071,472**	**2,484,063**	**3,049,411**	**2,748,011**	**4,044,746**

Source: Principal Economics

Note: ST, MT and LT stand for Short-term, Medium-term and Long-term, respectively.

Retail and office, industrial, health and education capacity

Table 2 shows the plan-enabled, infrastructure-ready floorspace capacity by broad sectors according to zoning regulations and assumptions on mixed use zoning composition provided by DCC. Accordingly, there is a significant increase in the industrial sector's capacity in the LT, assuming industrial transition areas are realised over the MT and LT. Changes in capacity within other sectors assume an increase in building density where intensification occurs on underutilised land over the MT and LT.

Table 2 Summary of capacity by broad sectors

Unit: square meter.

Broad sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Industrial	351,000	453,850	453,850
Retail large format	1,600	20,600	20,600
Retail and commercial services	179,300	195,200	195,200
Office	108,700	118,900	118,900

Source: Principal Economics

The Ministry of Education's Education Network Plan suggests that the needs of the schooling network are going to be met over the next decade to 2030 (Ministry of Education, 2022). Also, due to the declining school-aged population, and local distribution of school aged-children, there is no additional space expected to be required for schools in the LT.

Our assessment suggests that there is sufficient land for different sectors in the short, medium and long term

Table 3 illustrates results of our sufficiency assessment including a 20 per cent margin over the short and medium term and 15 per cent over the long term. The competitiveness margins have been applied only to sectors which are forecasted to experience growth over the assessment period. Office and retail capacity have been determined based on past land use ratios for Commercial and Mixed-Use zoned land. As shown, there is sufficient space for office activities in ST, MT and LT. For industrial activities, there is a need for 53,894sqm of additional floorspace in the ST. This shortage disappears in MT and LT. For retail activities, there is a shortage in LT under the high population projection scenario.

We have disaggregated office and retail as per the requirements under the NPS-UD, however under DCC's 2GP District Plan, multiple business sectors (and residential development) are typically permitted to occupy the same zoned land. Given the land substitutability of retail and commercial activities, in addition to health (excluding hospitals and residential health

services) and arts and recreation activities, we find that it is only in the LT and under the high growth scenario that there is insufficient business land capacity within commercial and mixed-use zoned land.[1]

Table 3 Summary of sufficiency by broad sectors

The sufficiency analysis accounts for a wide range of features of land, including size and location.
Unit: sqm. The presented figures are change from 2024 (baseline).

	Medium			High		
Industrial floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	337,411	-1,108,179	-885,656	1,112,100	-703,645	36,847
Demand + margin	404,894	-1,093,214	-856,179	1,310,023	-670,473	135,164
Capacity	351,000	453,850	453,850	351,000	453,850	453,850
Sufficiency/Insufficiency	**-53,894**	**1,547,064**	**1,310,029**	**-959,023**	**1,124,323**	**318,686**
Office floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	2,864	-7,338	-5,581	13,748	1,057	11,549
Demand + margin	3,436	-7,338	-5,581	16,497	1,057	13,281
Capacity	108,700	118,900	118,900	108,700	118,900	118,900
Sufficiency/Insufficiency	**105,264**	**126,238**	**124,481**	**92,203**	**117,843**	**105,619**
Retail floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	22,230	-12,330	8,401	102,370	55,925	154,035
Demand + margin	26,676	-9,088	12,574	122,844	67,409	177,141
Capacity	122,209	151,904	151,904	122,209	151,904	151,904
Sufficiency/Insufficiency	**95,533**	**160,993**	**139,330**	**-635**	**84,495**	**-25,236**

Source: Principal Economics

In later sections of this report, we assume that office, retail (excluding large format) and hospitality will compete for land capacity on Mixed Use Zone areas. This means that sufficiency determined in Table 3 may not match those in Section 3.4 where office/retail take up surplus capacity in the other section and excess demand is shared when both sectors have insufficient capacity.

Limitations of our assessment and the next steps

While the focus of the NPS-UD 2020 has been on the lack of capacity, we suggest that an increasingly higher surplus of land over time requires the councils' attention. Therefore, we suggest the Council to:

a) Further investigate their population projections and update for the latest available information in the aftermath of COVID-19.
b) Identify the drivers of the lower population growth in Dunedin, with a causal assessment of the factors of regional location choice.
c) Further investigate the impact of planning policy on price of residential and business land, which are important factors for the location choice of businesses (and labour).
d) Investigate further the historic/existing constraints on regional economic growth and identify the role of infrastructure investments in unlocking economic growth.

1 The DCC Commercial and mixed-use areas permit a range of activities including but not exclusive to office, retail, residential and community services.

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1. Introduction

Dunedin City Council appointed Principal Economics to undertake an assessment of the sufficiency in development capacity of business land within Dunedin to fulfil requirements under sections 3.21, 3.22, 3.28, 3.29 and 3.3 of the NPS-UD.

This report provides a comprehensive assessment of the requirements listed in Table 4 and the corresponding section in the report addressing each requirement.

Table 4 The NPS-UD requirements and our response

Requirements	Relevant section of the report
The locational requirements of business including shape, size, access, reverse sensitivities, and other market factors	Section 3.2.1
The external pressures businesses are facing (such as the uncertainty of COVID-19 pandemic, and the impact of coastal hazards)	Sections 3.1.1
Impacts on business activities from reverse sensitivities; Locational accessibility to labour markets and customers; Changes in demand from population growth; changes in residential distribution	Section 3.2.1
Infrastructure requirements for different business sectors	Section 3.3.2

Source: Principal Economics

Our assessment is informed by all the available information from the Council, and the local expertise. As we present in Chapter 2, our report provides,

- a clear list of assumptions used for each part of the analysis,
- details and sources and justifications for the assumptions,
- a clear communication of the assessment with an appropriate narrative, which will provide useful information for decision-makers, and
- a clear description of the used methodology and the implications of the modelling techniques (and assumptions) for the findings.

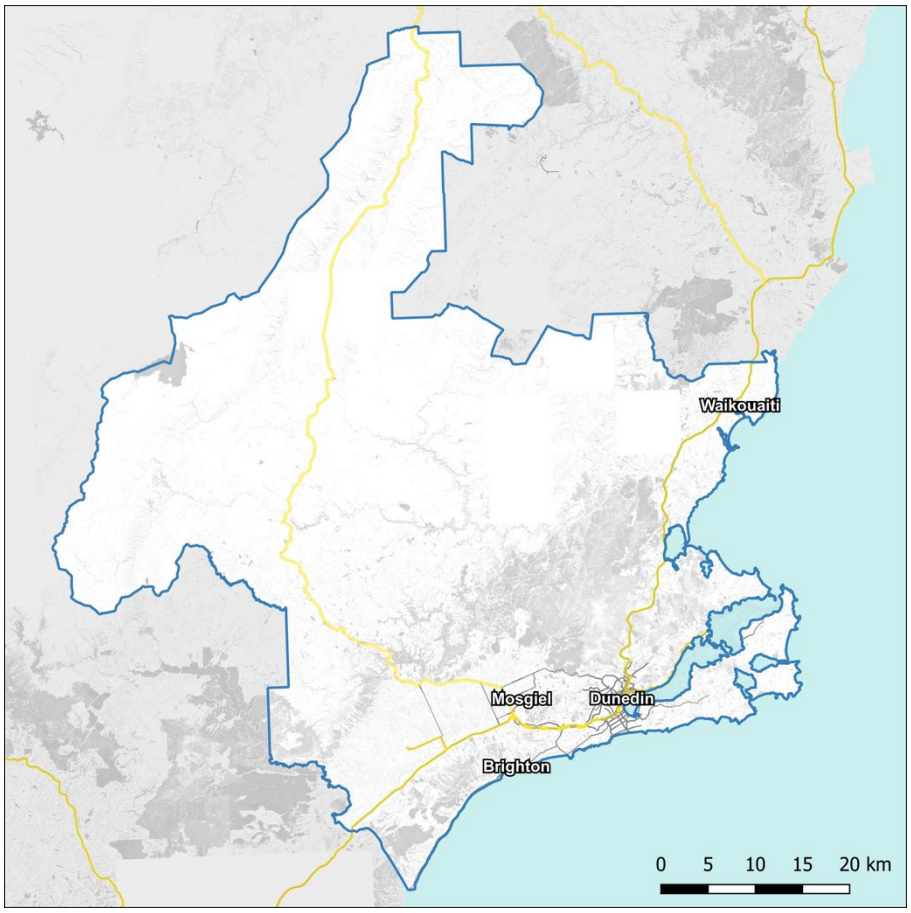
The NPS-UD 2020 approach is to provide the flexibility of choosing the appropriate method for different parts of the Housing and Business Assessment (HBA). In our assessment we provide some further details for the business development capacity assessment (BDCA) than required by the NPS-UD 2020.

To ensure the desired outcomes of attaining a well-functioning urban environment are achieved, it is important to account for (and discuss) the impact of the important events, where possible. This is more important for this round of the BDCA because of the recent disruptions to the economy (from the impact of COVID-19) as well as the expected significant impacts of upcoming significant events. This includes the impact of climate change, and the

recent climate change policy and the impacts from climate change mitigation and adaptation.[2]

The extent of the assessment area, defined as the Dunedin City territorial authority is shown in Figure 1.

Figure 1 Extent of assessment area - Dunedin City territorial authority



Source: Principal Economics, Statistics NZ, Waka Kotahi – NZ Transport Authority, LINZ

1.1.1. Useful outputs for informing decisions

While technical details are important for a robust BDCA, the implications of the findings and their presentations need to be very clear for the use of decision makers. To do this, this the BDCA report:

- Clarifies the underlying assumptions for the models, inputs, scenarios and other related factors and discusses (or preferably evaluating) their implications for the findings of the assessment,
- Provides outputs in a useful format that could be used by different departments across the Council,

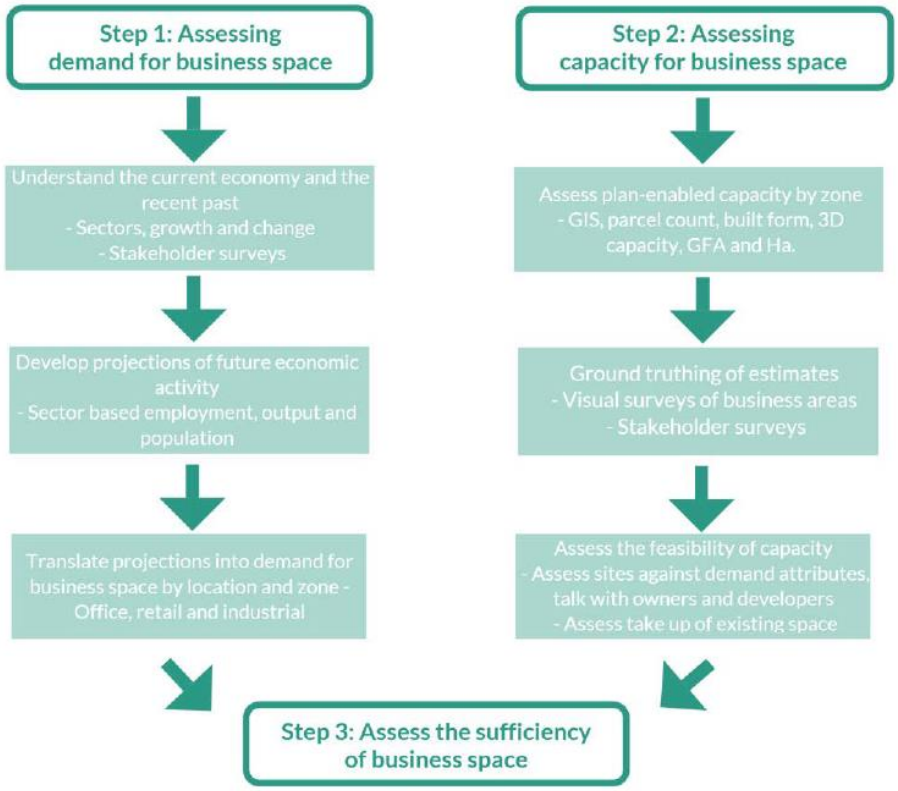
2 On 2 December 2020, the Government declared a climate emergency and committed to take urgent action to reduce emissions. As part of this, legislation sets a domestic target for New Zealand to reduce net emissions by 2050 and requires emission budgets to be set to act as steppingstones towards this long-term budget.

- Provides discussion (and where possible quantification) of the related (local and national) policy issues and their impacts.

2. Our approach for addressing NPS-UD 2020 requirements

MfE & MBIE's (2017) guidance on NPS-UDC identifies 3 steps for the business assessment methodology. These three steps are still the same for the NPS-UD with some minor changes. The three steps are illustrated in Figure 2. We follow these three steps in explaining our approach.

Figure 2 Business assessment methodology overview flow chart NPS-UDC



Source: MfE & MBIE (2017)[3]

Step 1 – Assessing demand for business space – undertaking the following tasks, as required by clause 3.28 of the NPS-UD 2020:

1- Identify business sectors and distinguish between them based on their land use for commercial, retail and industrial uses (Section 3.2.2),
2- Provide the most likely projection of demand for business land (by sector) in the short term, medium term, and long term (Section 3.2),
3- The assumptions and uncertainties associated with the assumptions need to be presented and discussed (Section 2.1)

3 MfE & MBIE, 2017. National Policy Statement on Urban Development Capacity: Guide on Evidence and Monitoring.

Step 2 – Assessing capacity for business space – undertaking the following tasks, as required by clause 3.22 and 3.29 of the NPS-UD 2020:

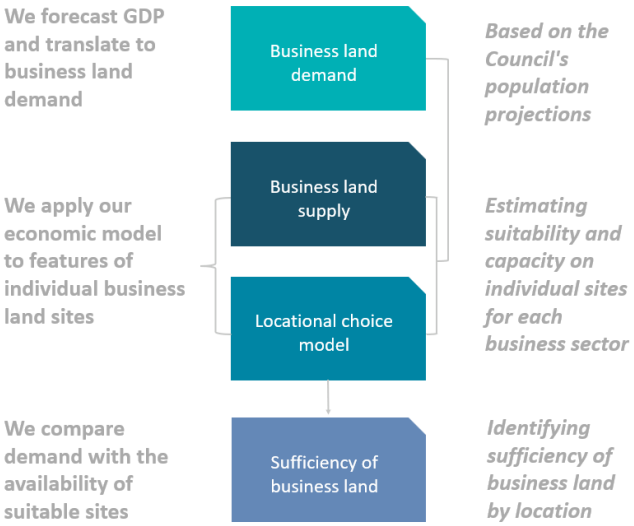
4- Provide estimates of development capacity (i.e., floor areas) to meet the expected demand for business land for each sector (including the competitiveness margins, Section 3.3.1).
5- Provide disaggregation of the development capacity by (i) plan-enabled, (ii) plan-enabled and infrastructure-ready, and (iii) plan-enabled, infrastructure-ready, and suitable for each business sector (We determine plan-enabled development capacity in Section 3.3.1 disaggregated by business sector. Discussions around Dunedin City's infrastructure conditions have been undertaken as part of our stakeholder engagements in our discussions with Council in Section 3.3.2. Apart from Industrial transition areas, all sites assessed in Section 3.3.1 are infrastructure ready). This is because these areas are located next to developed urban areas where developers are required to either fund infrastructure through contributions or self-develop private infrastructure to connect to the city network.
6- For 'suitable' development capacity we will investigate the impact of location, size and shape (Sections 3.13 and 3.3).

Step 3 – Assessing the sufficiency of business space – undertaking the following tasks, as required by clause 3.21, 3.29, and 3.30 of the NPS-UD 2020:

7- Consult with relevant stakeholders including infrastructure providers, large commercial and industrial land developers as other relevant stakeholders that may have material information on the calculation of development capacity (Section 3.3.2),
8- Investigate sufficiency in short, medium and long terms by comparing demand for business land (plus competitiveness margin) with the suitable development capacity (Section 3.4),
9- Provide a clear table at the beginning of the report presenting outcomes of the sufficiency assessment and highlight and discuss any insufficiencies identified. The discussion of potential insufficiency provides details about the location, timing, (affected) sector(s), and timing of the insufficiency (as shown above).

Figure 3 shows the summary of our quantitative workflow. The next sections describe our approach for completing each component of this workflow.

Figure 3 Summary of our quantitative workflow



Source: Principal Economics

2.1. Setting the scene – definitions and assumption for the analysis periods, geographic areas, and the counterfactual scenario

MfE & HUD (2020) note that 'There is no set number of demand projections required. The expectation is for a low-, medium-, and high-growth projection as a minimum. If more projections are useful then local authorities are encouraged to produce more'. Then the guidelines recommend the assessments to pick a preferred population projection scenario and justify that choice of preferred option.

2.1.1. Definition of short-, medium-, and long-term

First, it is important to provide a correct definition for short-, medium-, and long-term.

The problem with an administrative defined timeframe (which is defined based on policy-makers' judgement and available tools) is that they do not provide a flexible enough definition that captures the complex urban life. On the other hand, policymakers need to have a defined timeframe for the purpose of planning.

Conceptually, economic theory provides the following definition for short- and long-term:

- Short-term (ST) is a period during which one factor of production (e.g., location) is fixed.
- Medium-term (MT) is a transition between ST and long-term. During this phase, businesses have further flexibility in relocating to their long-term location.[4]

4 ME is rather an administrative definition of the planning horizon with more immediate impact from the current plans' objectives than the long-term horizon.

- Long-term (LT) is the period when the general price level, contractual wage rates, and expectations adjust fully to the state of the economy.

From the policy perspective, we suggest it is important to have a range of criteria. In our internal meetings with the Dunedin City Council team, we identified the following criteria as important factors for the definition of analysis periods:

- Consistency with other council documents, e.g., Future Development Strategy (FDS).
- Satisfying the requirements of the NPS-UD.
- Availability of population projections.

We combine these two views to specify an appropriate definition of the timeframes. For this, we suggest the definition of time is based on the supply side (planning outcomes) and the demand side of the equation is defined as per the economic concept described above. Hence, we identify the following timeframes appropriate for this analysis, as shown in Table 5. We provide a short description of our solution for evaluating BDCA for different periods, in the last column of the table – this will be discussed further in the next sections.

Table 5 Definition of short-, medium-, and long-term periods

Timeframes	Supply-side considerations	Demand-side considerations	Our solution
Short-term: 2024-2027	Dunedin's FDS is for 2024-2054e	Location of businesses are fixed	In ST, the mismatch between the current location and desired location of businesses captured using regression analysis – see section 3.2 and Appendix C.
Medium-term: 2024-2034	10 years is the standard NPS-UD timeframe for the length of the medium-term	Businesses have further flexibility around their location	The most apparent feature of the MT is the changes in the size and location of economic activities because of different trends identified in section 3.1.1.
Long-term: 2024-2054	The definition is less binding, but important to be consistent with other council documents	Location (and other factors of production) can change	We suggested (and assume) that as a result of ST and MT planning towards supporting businesses, (productive) labour moves to Dunedin in LT.

Source: Principal Economics

2.1.2. Definitions of the baseline and counterfactual scenarios

It is commonly expressed that in the long-term anything could happen. In the context of the BDCA, the lack of certainty is due to the endless possibilities around the factors of production, particularly physical capital (infrastructure), human capital (skilled labour), natural capital (land), technology, and local and central governments' regulations.[5] Amongst

5 There are different definitions of capital stocks. We suggest the current categories provide the most relevant capital stocks for the purpose of the BDCA.

these, natural capital is subject to climate change uncertainties, which the Council is currently working on its assessment.

Changes in physical capital are subject to the findings from the Housing and Business Capacity Assessment (HBCA), including the current BDCA. The level of infrastructural development influences regional (and national) competitiveness, and there is strong evidence that transport infrastructure plays a vital role in economic growth (Holmgren & Merkel, 2017; Sahoo & Dash, 2009). The Council of Economic Advisors estimates that a 10-year, US$1.5 trillion program of infrastructure investment could add between 0.1 and 0.2 percentage point to average annual real growth in gross domestic product (GDP) (CEA, 2018). A simple conversion of this figure to the New Zealand size of GDP implies that a $2.45 billion annual infrastructure investment is associated with an average real GDP growth of between $325.5m and $651m.

Human capital is an important factor for economic growth, and its growth is a function of the rate of natural increase and rate of (regional and national) migration. Migration happens in response to improvements in quality of business and quality of life, both of which are significantly affected by cost of business and housing land.[6] Hence, local government policy affects population growth through improvements in both residential and business opportunities and therefore BDCA has implication for future population growth. More particularly, an efficient allocation of land is associated with lower cost for businesses, which leads to attractiveness of the region to businesses of other regions and eventually an increase in migration (and population growth).

The question that the BDCA intends to answer depends on the definition of the baseline and the counterfactual scenarios. It is agreed that the baseline scenario is the economy (including the urban environment) if it continues based on the current (and historic) trends – i.e., without any changes to any of the factors of economic growth.

For the counterfactual scenario, a BDCA should aim to identify a scenario in which the urban environment enables regional growth, by enhancing the factors of productivity. This approach improves the robustness of our BDCA through reducing its reliance on the status quo (and the historic trends).

We suggest that the counterfactual scenario is significantly related to the timeframes of the (BDCA) assessment, and should consider the factors of production (land, labour, and capital) that could change over time to enhance regional growth. Therefore, we suggest that the appropriate **definition of the counterfactual scenario** is as follows:

> "An urban environment with maximum allocative efficiency, which minimises costs for businesses through providing them with access to locations that minimises their cost of production".

6 There is extensive range of factors affecting quality of life and quality of business. For further details see Maré et al. (2018). Amongst the identified factors, cost of housing has significant impact on the quality of business and the quality of life. This is because of the direct impact of living cost on the location of productive labour force and businesses.

As suggested in our discussion of the timeframes, this long-term equilibrium (i.e., the counterfactual scenario) can be achieved in the long-term. Hence, to provide useful information for planning purposes, this BDCA assumes that "assuming that planning regulations contribute to regional prosperity in short and medium terms, there will be enough capacity for business in long-term". This assumption only has implications on the productivity of labour in the long-term by implying that, in the context of BDCA, a more productive labour could produce the same level of output using a lower floorspace.

2.1.3. Converting business activities to commercial space demand

In our assessment, when we want to convert the estimated demand (in terms of economic activity of each sector) to the square metre (sqm) of commercial space required, we first need to convert the GDP figures to the count of employees and then use some multipliers for converting that to sqm of space. While this could be simplified, these multipliers have significant impact on our assessment, and need to closely relate to the counterfactual scenario.

Inspired from Preston et al. (2018), Principal Economics has established a model of quality of life and quality of business, which provides extensive information for quantifying local governments' policy objectives and their flow-on impact on labour shortage, for example. Figure 4 shows the relative ranking of Dunedin in terms of quality of life (QL) and quality of business (QB) in comparison with other New Zealand towns.

Maré et al. (2018, p. 3) provide the following description for the implications of QL and QB:

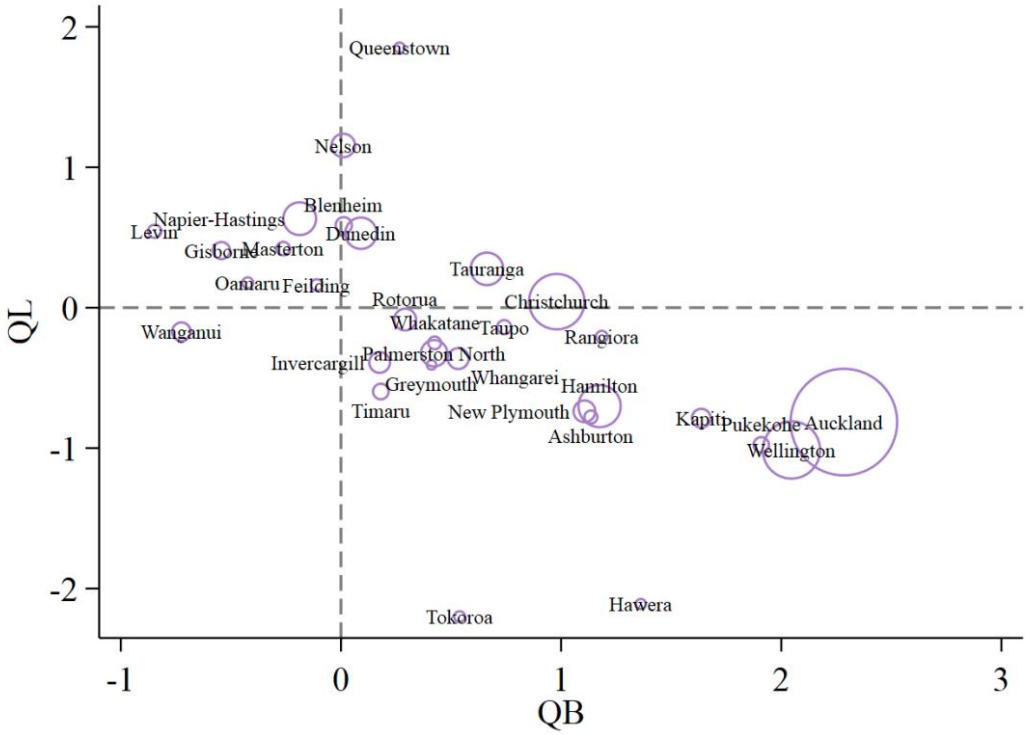
> *"A place with high rents but low wages must have amenities that make it a nice place to live otherwise people would move elsewhere & newcomers would not arrive (sunshine wages)*
>
> *And,*
>
> *A place with high rents and high wages must have amenities that make it a good place to do business otherwise firms would move elsewhere and new firms would not be established (productive)"*

Now the question becomes, what is a reasonable target for the improved quality of business (and quality of life)? It is likely that if the plans lead to improved cost efficiencies for Dunedin businesses and lower housing costs to Dunedin residents, the QL and QB would increase very significantly. However, a reasonable target should consider potential limitations from geographic locations and other fixed features of locations. Hence, we suggest that a conservative outcome of successful improvements in business and housing capacities is to achieve Dunedin's historic high levels of QB and QL.[7]

7 We acknowledge that QB and QL are not solely affected by the availability of land. Our argument only implies that if Dunedin would have to achieve its historic QL and QB, then the city will host more productive businesses and labour force.

Below Figure 4 we illustrate the scores of qualities of life and business for Dunedin over time. Accordingly, the 2013 QB levels could improve to 0.6[8], which the city experienced during 1991. Also, QL could improve to the highest levels of 1996, equal to 0.81. This suggests that in terms of QB, Dunedin could improve to the 2013 levels of Tauranga. We also assume that some towns within that QB range of 0.6 to 1 could be used as a target, and assume Christchurch, Hamilton and Taupo as other towns that Dunedin's QB could be compared with. We use this for our definition of the likely changes in (mixed factor) productivity for our long-term estimates.[9]

Figure 4 Quality of business and quality of life across New Zealand towns



Dunedin	1976	1981	1986	1991	1996	2001	2006	2013
QB	0.49	0.45	0.59	0.6	0.24	-0.03	0.07	0.09
QL	0.31	0.06	0.17	0.7	0.81	0.72	0.74	0.53

Source: Preston et al. (2018)

2.1.4. The definition of location should reflect the dynamic nature of cities

The NPS-UD (2020) and all relevant assessments are based on administrative definitions of geographic areas – such as area units or statistical areas. This does not match the dynamic nature of cities (and planning). It is incorrect to assume that there is a defined location for a business and hence an assessment limited to the administrative boundaries does not provide useful information for BDCA.

8 The QL and QB measures reflect the willingness to pay of workers and firms for a city's local amenities. For further details on these measures see Preston et al. (2018).

9 For this analysis, productivity is important because it affects the space required by an employee to produce a fixed amount of output.

In urban economics, it is known that firms face trade-offs in their choice of location, and they can sum up the features of location such that the overall output stays constant (i.e., there are spatial equilibria). For example, while a large size parcel may fit well for heavy manufacturing activities, a factory may not lose any productivity if it locates closer to the transport network, at the cost of having a smaller parcel.

Therefore, in matching the location of demand with the areas of supply, we will consider a wider range of locations as desired for the business activities.

2.1.5. Applied constraints to our analysis

A limitation of the current NPS-UD assessments (and the current BDCA) is that they treat population projections and business assessments separately. From an economic perspective the production function of different businesses is affected by cost of labour and capital. The cost of capital includes costs of land (lease) and the cost of other machineries. If the improvement in availability of land will lead to a decrease in prices (as a result of competitive land markets) then, assuming other factors fixed, the avoided costs could be allocated to attracting more productive labour to the region.[10,11]

Our analysis is constrained by population projections provided by the Council - sourced from Infometrics (2020)). This is an important constraint for our definition of the counterfactual scenario – as described in section 2.1.2. The implication is that there might have been opportunities for further growth, but because we have constrained our analysis of business demand by population projections, we do not capture any further need for extra capacity to accommodate that growth. This is because population projections are usually a perpetuation of the past (and based on a range of assumptions), and do not capture the possibility of further growth from improved allocative efficiency raised from a permissive planning system. To mitigate the uncertainty due to reliance on population projections, we provide an assessment of sufficiency for both the medium and the high population projection scenarios. We discuss this further in 3.2.

Another constraint of our analysis is the features of parcels. For example, a current parcel may be large, and suitable for large-scale retail activities. However, if that parcel will be divided into ten separate sections, then it may be more suitable for small retail activities and as a result of that the large retail will need to relocate to another parcel, which changes the findings from our business capacity assessment.

2.1.6. Reasons for considering economic activity instead of conventional employment figures

Previous BDCAs use employment in their assessment of demand, to capture the size of demand for each sector of the economy. Conceptually, the advantage of using employment figures is that they provide a *real (i.e., not nominal)* measure of demand while a nominal GDP figure does not provide that information. Technically, however, the employment figures are mainly population driven, based on the growth of the working-age population. In

10 This is assuming population fixed at the levels indicated by the DCC's projections.

11 Principal Economics (2022) also refers to this issue in their view of housing capacity assessment, and recommend the MfE to provide further guidelines.

comparison, the real GDP figures provide more information about the economic factors, such as the productivity of capital. This is important for the BDCA, to account for the impact of economic factors as well as the demographic and population factors.

3. Step 1 – Assessing demand for business space

Forecasting business land demand, particularly long term, should be undertaken with care given the uncertainties around how small changes in the economy may compound over time. For providing a comprehensive and robust solution, we have reviewed the available methods for BDCA's demand analysis with their own strengths and limitations. The methods were identified from the best practice used in the last round of BDCA and our expert knowledge of the available methods. This practice of technical comparisons between the available methods and providing a clear reasoning for choosing one method over the other will improve the reliability of the BDCA.

We listed the available methods against the criteria identified as important to the BDCA and evaluated them using a range of criteria. These criteria were identified based on the requirements of the NPS-UD, the Council's inputs, the discussions we provided on the importance of uncertainty, and our expert technical advice. For further details on each of these models see Appendix B. Based on our evaluation,

- the most useful method for identifying the sectors of the economy is regional Computational General Equilibrium (CGE); and
- the most useful methods for satisfying the requirements for the BDCA's demand analysis are simulation and VAR models, respectively.

Hence, we use our sub-regional CGE model to inform the assessment of demand.

3.1. Sectoral impacts of the international, national, regional and urban area factors

This chapter provides discussions of the combination of the impacts that will improve our understanding of the first task to **'assess the impact of external pressures businesses are facing'** and to **'identify business sectors'**.

Requirement (clause 3.28 of the NPS-UD)

Identify the list of business sectors, and the impact of external pressures businesses are facing.

Our additional analysis

We further investigate the list of business sectors included in our assessment by considering the recent information about the external pressures businesses are facing, including the climate change policy. For business demand, the historic series and the status quo do not provide information about the likely shift in demand for different business sectors as a result of the external pressures.

3.1.1. Assessment of the impact of external pressures facing businesses

There are a range of important factors affecting the economy in short, medium and long terms. These factors are particularly important because of their implications for the sectors that we need to consider in the assessment and their impact on different sectors' activities (and therefore business land demand). To inform our assessment about the impacts of these factors, we have used the best available information and highlight the level of confidence (and the level of uncertainty) with the available information.

Table 6 provides a list of factors affecting GDP and employment in short-, medium- and long-terms.

Table 6 Factors affecting GDP and employment in short, medium and long terms

Factor	Term	ST	MT	LT
COVID-19	Impact	In short terms the economy grows at an average rate of 2.6 percent per annum. That is 0.8 percent lower than our forecasts for this period in absence of COVID-19.	Converge to the rate of growth in absence of COVID-19	Converge to the rate of growth in absence of COVID-19
	Uncertainty	The situation with COVID-19 and its variants evolves constantly. The Treasury's forecasts were based on the latest announcement of the government to open the borders in early 2022. This has already changed to mid-2022 and is subject to further changes. This will increase the uncertainty around the future demand.		
	Source	The Treasury (2021)		
New Hospital	Impact	$42.5 million increase in GDP per annum[12]	$42.5 million increase in GDP per annum	-
	Uncertainty	[Discussed below]		
	Source	Sapere et al. (2021)		
Climate change (impact of mitigation)	Impact	Some ST impacts on employment of specific sectors	Some MT impacts on employment of specific sectors	While there are likely distributional effects, the impact on overall GDP is not material.
	Uncertainty	There are possible uncertainties around implementation and budget impacts of the climate change policy, which are unclear at this stage.		
	Source	Climate Change Commission (2021)		

Source: Principal Economics

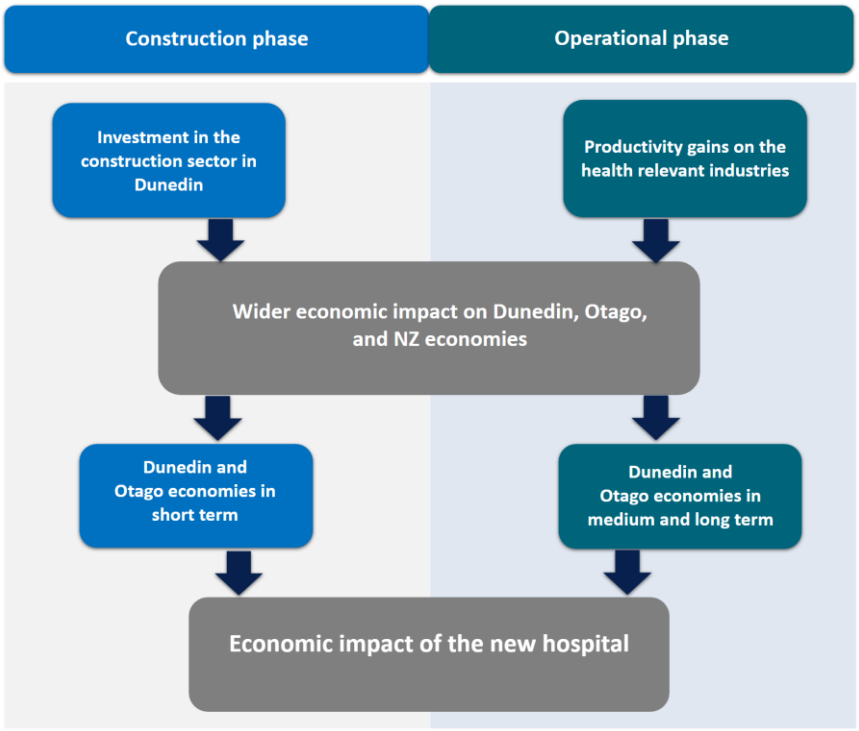
12 These impacts include both direct and indirect (induced) effects.

Note: ST stands for short-term; MT for medium-term; LT for long-term.

An important factor is the impact of the rebuild of the Dunedin Public Hospital and the implications this would have on space both during the build and once the hospital has moved from its current location. As highlighted in Figure 5, the new hospital could potentially increase economic activities both during the construction phase (with significant impacts in short and medium terms) and the operational phase (with significant impacts in medium and long terms). To capture the impacts during the construction phase, we have used the available business case – available here Sapere et al. (2021). The study suggested that the new hospital will boost the economy by $424.9 million over the 10-year construction period. We have used this as an input to our subregional CGE model to investigate which sectors of the economy will benefit the most.

We do not have access to further information about the operational phase. Given that the location of the new hospital is not significantly different from the old hospital, we do not expect major re-distribution of business activities in long-term. We also assume that the economic impacts from the hospital's operation will be the same as the economic activities from the old hospital.

Figure 5 Rebuild of the hospital affects the economy in short, medium and long terms



Source: Principal Economics

In addition to changes from the hospital, there are extensive changes in the roads around the new hospital. There are further discussion of the impacts on the changes in roading transport network provided by Torshizian, as cited in Stantec (2021). Accordingly, there will be likely changes in the desirability of locations for different sectors. Because of overlaps

between these impacts and that captured by Sapere et al. (2021), we do not account for these impacts separately in the current assessment (to avoid double-counting of the effects).

The impact of COVID-19 and the recovery path is another important factor, with more immediate impacts on the short-term and potential medium- and long-term effects. The impacts are particularly important to Dunedin, because of the significant impacts on the education and retail sectors, both of which are amongst the top 5 sectors of the Dunedin economy. We use two sources of information to account for the impacts from COVID-19. To account for the local recovery path, we use the Treasury's 2020 yearly and half-yearly fiscal updates – see here. Our discussions of the international trends and the impacts on the supply chain are informed by the International Monetary Fund's October 2021 World Economic Outlook, which predicted that the world economy grows by 5.9 percent in 2021 and 4.9 percent in 2022.

COVID-19 also may have *potential impacts on online retailing and the wholesale sector*, because of a shift from small retailing (and its implications for business land demand). To capture the impacts on the future of retail, we attempted to use the available information on the impact of COVID-19 on the supply chain and the potential changes in consumers behaviour to inform our analysis of demand. Recent international reports suggest that consumers will be changing their behaviour. Particularly, following the COVID-19 pandemic, consumers will rethink the in-person experience and move towards e-commerce (Yohn, 2020). However, our findings from other countries are mixed. For example, in June 2021, the National Retail Federation reported a significant growth in the United States' retail sector growth and forecasted a return to pre-pandemic levels (Repko, 2021). In absence of further information about the New Zealand retail sector, we have assumed that retail will follow its historic trend.

The impacts of climate change are different across different sectors of the economy. We adopted the findings of the Climate Change Commission's report[13] to inform our assessment by accounting for the impacts on different sectors of the economy. The impacts were provided at ANZSIC level 1 at the 2022-2025, 2022-2030, 2022-2035 and 2022-2050 intervals.[14]

In addition to the factors discussed in this section, we further discussed the impact of following international, national and regional factors to Dunedin's economy in our conversations with the Council's expert team:

- upcoming changes to RMA and their potential impact on location of demand
- technological developments (and their adoption),
- demographic changes and consumption patterns (with increases in affordability of energy saving technologies for lower income groups),
- globalisation & trade (through its impact on industries activities and their consumption),

13 Available here.

14 The outputs are available here.

- natural resources, plus the additional uncertainty driven by households' lack of information about future and their decision making)

Given the high-level of uncertainty with how the situation will evolve in the coming years with respect to each of the additional factors, we decided to exclude them from this assessment for this round of BDCA.

3.1.2. Identifying the business sectors that need to be further investigated in the BDCA

It is important to identify the impacts that are most significant to the economy of Dunedin, with particular focus on the largest sectors of the economy, namely, Wholesale trade, Tourism[15], Tertiary education, Retail trade, and Construction services. To ensure that we capture the impacts with the highest importance to the major sectors of Dunedin's economy, we investigated GDP forecasts for all sectors at the granular ANZSIC level 1 – providing 85 industry classifications.

We then aggregated the industry classifications to the levels that capture a) the important differences in forecasted GDP activities across economic sectors, and b) the industry classifications that matter most for the planning purposes – this was developed in consultation with the Council team. This limited the number of industry sectors included in our analysis to 15 economic sectors – as shown in Table 7. In the rest of this section, we base our analysis on the identified sectors.

Table 7 Sectors of the economy, and the ANZSIC classification

ANZSIC classification	Sector
A Agriculture, Forestry and Fishing	Primary industry
B Mining	Primary industry
C11 Food Product Manufacturing	Manufacturing - light
C12 Beverage and Tobacco Product Manufacturing	Manufacturing - light
C13 Textile, Leather, Clothing and Footwear Manufacturing	Manufacturing - light
C14 Wood Product Manufacturing	Manufacturing - heavy
C15 Pulp, Paper and Converted Paper Product Manufacturing	Manufacturing - heavy
C16 Printing	Manufacturing - light
C17 Petroleum and Coal Product Manufacturing	Manufacturing - heavy
C18 Basic Chemical and Chemical Product Manufacturing	Manufacturing - heavy
C19 Polymer Product and Rubber Product Manufacturing	Manufacturing - light
C20 Non-Metallic Mineral Product Manufacturing	Manufacturing - heavy
C21 Primary Metal and Metal Product Manufacturing	Manufacturing - heavy
C22 Fabricated Metal Product Manufacturing	Manufacturing - heavy
C23 Transport Equipment Manufacturing	Manufacturing - heavy
C24 Machinery and Equipment Manufacturing	Manufacturing - light
C25 Furniture and Other Manufacturing	Manufacturing - light
D Electricity, Gas, Water and Waste Services	Electricity, Gas, Water and Waste Services

15 While Tourism is not categorised as one sector, our model identifies the activities associated with Tourism and categorises that as one sector in the economy. We believe this provides useful information for the BDCA, particularly given the short-term impacts of COVID-19 on Tourism.

E Construction	Construction
F Wholesale Trade	Wholesale
G Retail Trade	Mixed
G39 Motor Vehicle and Motor Vehicle Parts Retailing	Large format retail
G40 Fuel Retailing	Small format retail
G41 Food Retailing	Food retailing
G42 Other Store-Based Retailing	Mixed
G421 Furniture, Floor Coverings, Houseware and Textile Goods Retailing	Large format retail
G422 Electrical and Electronic Goods Retailing	Large format retail
G423 Hardware, Building and Garden Supplies Retailing	Large format retail
G424 Recreational Goods Retailing	Mixed
G424100 Sport and Camping Equipment Retailing	Large format retail
G424200 Entertainment Media Retailing	Large format retail
G424300 Toy and Game Retailing	Small format retail
G424400 Newspaper and Book Retailing	Small format retail
G424500 Marine Equipment Retailing	Large format retail
G425 Clothing, Footwear and Personal Accessories Retailing	Small format retail
G426 Department Stores	Large format retail
G427 Pharmaceutical and Other Store-Based Retailing	Small format retail
G43 Non-Store Retailing and Retail Commission Based Buying and/or Selling	Small format retail
H Accommodation and Food Services	Hospitality
I Transport, Postal and Warehousing	Transport, Postal and Warehousing
J Information Media and Telecommunications	Office
K Financial and Insurance Services	Office
L Rental, Hiring and Real Estate Services	Mixed
L66 Rental and Hiring Services (except Real Estate)	Large format retail
L67 Property Operators and Real Estate Services	Office
M Professional, Scientific and Technical Services	Office
N Administrative and Support Services	Office
O Public Administration and Safety	Office
P Education and Training	Education
Q Health Care and Social Assistance	Health
R Arts and Recreation Services	Arts and Recreation Services
S Other Services	Mixed
S94 Repair and Maintenance	Manufacturing - light
S95 Personal and Other Services	Small format retail

Source: Principal Economics

Data

At the time of preparation of the demand analysis, a range of business data were unavailable for 2021. For example, the National Accounts for ANZSIC06 industry groups was available up to 2020. Hence, 2020 is the start of the forecast period.

3.2. Determine demand for business land

Requirement (clause 3.28 of the NPS-UD)

Determine the most likely projection and demand for business land by business sector clearly outlining assumptions, the uncertainty of those assumptions and their potential effects on our projections.

Further notes on our approach

We provide further details about our modelling approach below. We used different population projection scenarios and different business activity projections to account for a wider range of factors of uncertainty. We also used our stochastic models to improve certainty and account for the widest range of scenarios.

This helps to improve certainty in our estimates, and address the last BDCA's limitation as stated by DCC (2019):

> "[…] the accuracy and reliability of population and economic projections necessarily diminish over these timeframes as uncertainty increases." (DCC, 2019)[16]

Approach

As presented in Table 29, simulation models provide the most appropriate framework for **assessing demand for business activities over time**, which will be converted to demand for space in a next step. For this purpose, we used Principal Economics' Subregional Economic Activity Model (SEAM), which is a stochastic microsimulation model developed based on Stats NZ data. We used the Council's provided information on population forecasts 2020-2068 as an input to our GDP forecasts, which account for the expected impact of COVID-19.[17] The spatial distribution of GDP across SA2 areas is based on the distribution of employment.

We adjusted the regional employment estimates to account for the population projections provided by the Council, as shown in Figure 6 (sourced from Infometrics (2020), shown by dotted lines, and Stats NZ, illustrated using solid lines). The outputs of the SEAM provide details on the economic activities of different business sectors that we identified in the previous section. The timeframes for the outputs of SEAM include the short-, medium- and long-terms (over the 2020-2054 period).

The actual population projections between 2013 and 2018 suggest an annual 0.9 percent (compound) growth rate. The projected population growth rate for 2023 to 2053 (which is an input to the current BDCA), is 0.2 percent. Infometrics (2020) provides the following explanation for the significantly lower projection growth rate:

16 DCC, 2019. Business land capacity assessment Dunedin City. Dunedin City Council. Retrieved from Business-land-capacity-assessment-for-Dunedin-city.pdf.

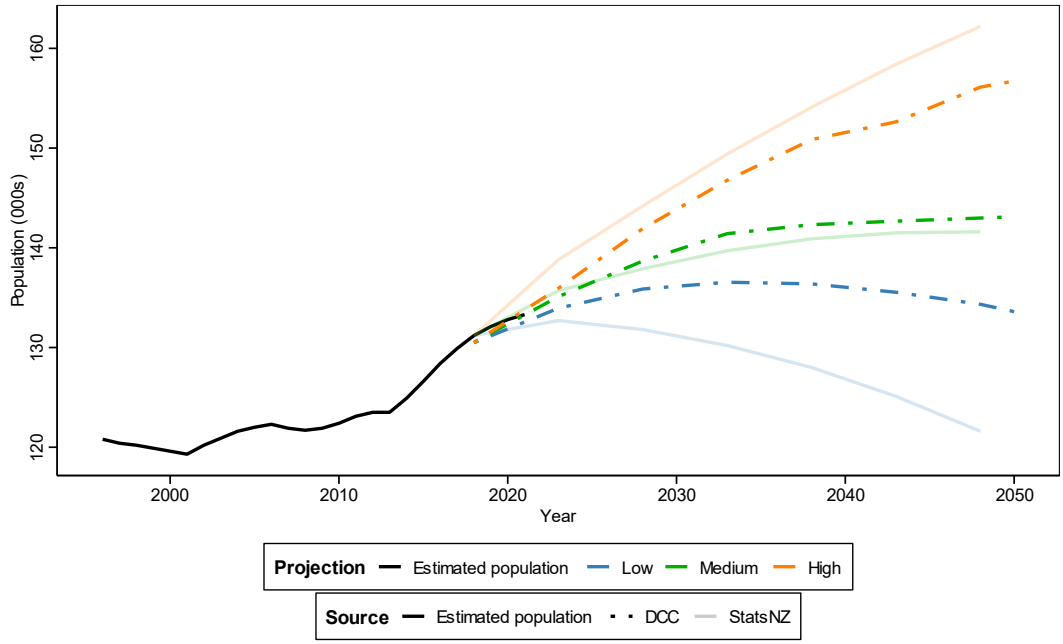
17 By using these projections, we ensure that the outputs of our report will be consistent with the other Council documents, which use the same population projections.

"While the past five years would suggest a high-growth future for Dunedin, this period is too brief to inform the medium (or baseline) scenario of a fifty-year projection. [The medium scenario], based on our national macroeconomic models and the longer-term performance of the city, representing lower growth than has been experienced in the past five years." (Infometrics, 2020, p. 5)

Consistent with other Council documents, and as recommended by Infometrics (2020), we use the medium scenario in this analysis. Given the high sensitivity of the outputs of the BDCA on population projections, we will also account for the high projection scenario in our assessment of sufficiency. For further details on population projections see Infometrics (2020).

Figure 6 Dunedin population projections 2018-2068

Timeframe: 2010-2022



Source: Stats NZ, Russel Jones, Infometrics (2020)

The regional GDP forecasts are shown in Figure 7. Accordingly, there is an initial drop in GDP due to the impact of COVID-19 up to 2025. After that, there is a slow increase in economic activity up to 2034. The reason for that is the dampening effects from the climate change policy. However, in long term, the impact of climate change on economic activity is minimal.[18] The source of uncertainty captured in the illustrated upper and lower bound forecasts is the uncertainties associated with population projections.[19] The outputs presented here are in nominal dollar values. This is because we intend to explain the

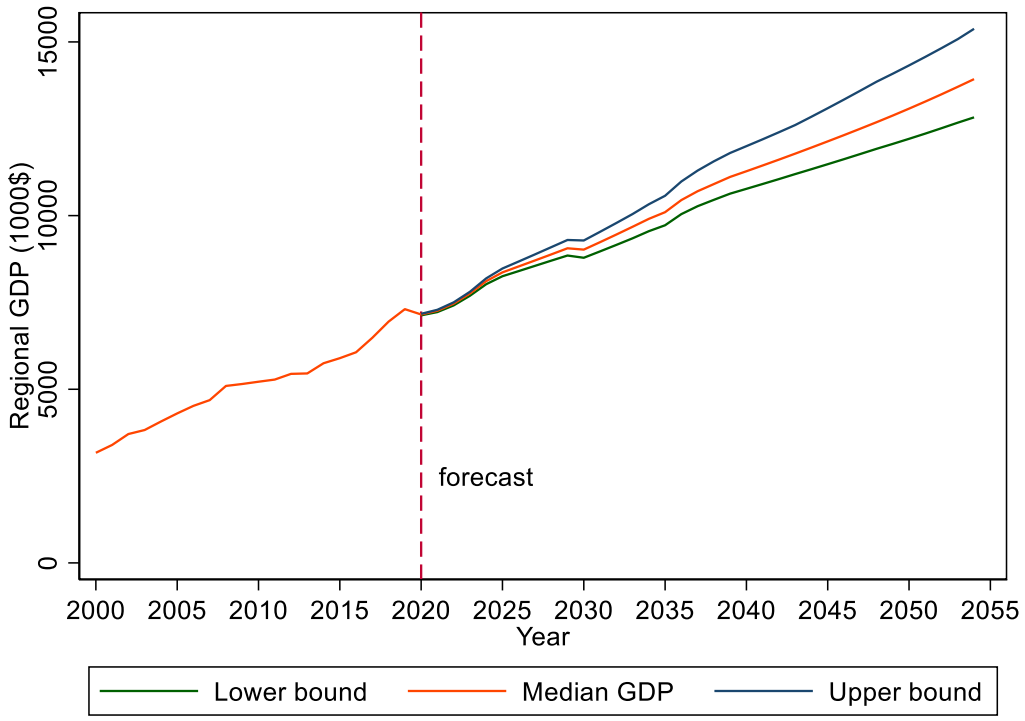
18 The reason for the discontinuous growth path is that the impacts of external factors are not being measured within the simulation model. For example, the impact of climate change on employment is based on Climate Change Commission (2021) report, which is directly summed up with the outputs of our simulation model, and is not an input to our simulation model.

19 For further details on the factors considered in population projections see Infometrics (2020).

captured impact of different external factors listed in Table 6. In the next paragraphs, we will use real dollar values for discussions of economic activities and demand for business land.

Figure 7 Dunedin GDP forecasts by accounting for all identified factors 2020-2054

Nominal (1000$)



Source: Principal Economics

Note: Dashed line represents the available actual data sourced from Statistics New Zealand.

The findings from our demand analysis are shown in Table 8. The provided figures are real GDP (in 2018 prices). Accordingly, there is a moderate increase in real GDP of Dunedin over the LT.

Table 8 Real GDP of different sectors

Unit: million$ - base year: 2020.

Sector	2000	2020	2024	2027	2034	2054
Primary industry	95	121	123	139	160	175
Manufacturing- heavy	160	178	139	200	233	229
Manufacturing- light	687	312	284	380	418	414
Electricity, gas, water and waste services	45	59	61	67	46	40
Construction	254	569	592	609	553	595
Wholesales	226	266	242	258	243	255
Retail-small	318	365	323	349	323	338
Retail-large	258	322	281	300	282	297
Retail-food	235	276	254	271	256	271
Hospitality	419	556	488	521	716	829

Transport	224	299	339	356	179	471
Office	1,035	1,335	1,277	1,360	1,277	1,338
Education	879	947	904	965	905	951
Health	906	1,101	1,061	1,151	1,063	1,118
Arts and recreation	119	170	141	165	141	149
Total	**5,862**	**6,875**	**6,509**	**7,092**	**6,793**	**7,470**

Source: Principal Economics

Note: Consumer Price Index (CPI) sourced from Reserve Bank New Zealand (RBNZ). CPI forecasts sourced from the Treasury's annual economic and fiscal update 2022. For years after 2026, a 2 percent inflation rate assumed, as suggested by the RBNZ.

3.2.1. Assessing the locational requirements of different business sectors

Requirement (clause 3.29(2) of the NPS-UD)

A local authority may define what it means for development capacity to be "suitable" in any way it chooses, but suitability must, at a minimum, include suitability in terms of location and site size.

Our approach

For assessment of land demand and sufficiency, we consider a range of suitability factors including, size, shape, access and reverse sensitivities as well as other market-based factors.

To satisfy these criteria, we identified existing businesses across New Zealand urban areas for each business sector and their locational attributes. We use business sectors' revealed locational preferences to assess the features of land that they have determined as being suitable. The urban areas included in our analysis include Auckland, Wellington, Christchurch, Dunedin and Hamilton.

The output of this analysis provides information about the highest production possibilities of a parcel based on its features. In the next stage, in our analysis of sufficiency, we allocate the land to the forecasted demand based on the most suitability – we will provide more details on the definition of suitability in the next section.

Details on our approach

We use the available information and a transparent methodology to estimate the likely business floorspace, land area and location.

The methodology for this is tailored for Dunedin businesses by comparing each business sector's activity with the location attributes of that business sector in Dunedin. To do this, we used a spatial regression analysis providing us with an estimate of how different spatial factors contribute to where different business activities choose to locate.

We used the 2020 data on GDP distribution across SA2 areas. The geographic disaggregation of GDP is based on ratios derived from highly granular employment counts data (SA2) across New Zealand. Each sector's GDP at SA2 is our dependent variable, which is explained using a

log-log regression analysis using the following features (explanatory variables – the name of variables in our regression result tables are shown in brackets):[20]

- Parcel size (PA1, PA2, PA3) – accounting for land size. We investigate the impact of three (small, medium and large) land size groups.
- Building coverage (Bld coverage) – accounting for parcel shape,[21]
- Distance from arterial roads/state highways (Arterial Road) – accounting for accessibility
- Population density at difference distances (Pop km1, Pop km2, Pop km3) – accounting for reverse sensitivities and labour markets
- Slope – controlling for land attributes
- Distance nearest public transit stop (PT)
- Territorial authority – controlling for regional differences
- Surrounding business sector composition (GDP other)
- Distance from CBD (CBD)
- Distance to ports (Seaport)
- Building heights (Bld height)
- Site rectangularity index (Squareness) – accounting for shape
- Proximity to employment centres (Emp km1, Emp km2, Emp km3, Emp km4) – accounting for agglomeration benefits

In addition to these factors, we investigated the impact of proximity to airport, which was not significant.

The inclusion of population densities at different distances also contributes to our assessment on how encouraging more residential activity in the Central Business District and adjacent commercial zones affect the demand and supply dynamics for commercial space in Dunedin.

As discussed in 2.1.2, the counterfactual scenario needs to enable regional growth. The best empirical solution for identifying the counterfactual scenario, with the available data and resources, is to consider the demand of different sectors for features of land across other urban areas. This provides us with the most likely efficient use of a parcel, with minimum impact of historic trends and planning regulations.[22]

The outcome of this analysis provides us with a detailed understanding of how different factors contribute to the locational choice of each business sector and the most precise definition for a *"suitable"* site for each business sector.

Figure 8 provides a high-level illustration of the 'suitable' location for different sectors. Our regression results, presented in Appendix C, provide further information on the desirability

20 We list the data sources in Appendix D. We test the usefulness of the included variables in explaining the location choice of businesses across different sector. To improve confidence in the estimated parameters (and findings) we include the useful information.

21 We disaggregate the demand and plan-enabled capacity by the location, size and shape. While shape is not a requirement of the NPS-UD, we think that it is an important addition to the criteria. We suggest investigating the importance of shape in explaining the location of the business land using a simple regression analysis. In any case, we provide the required information.

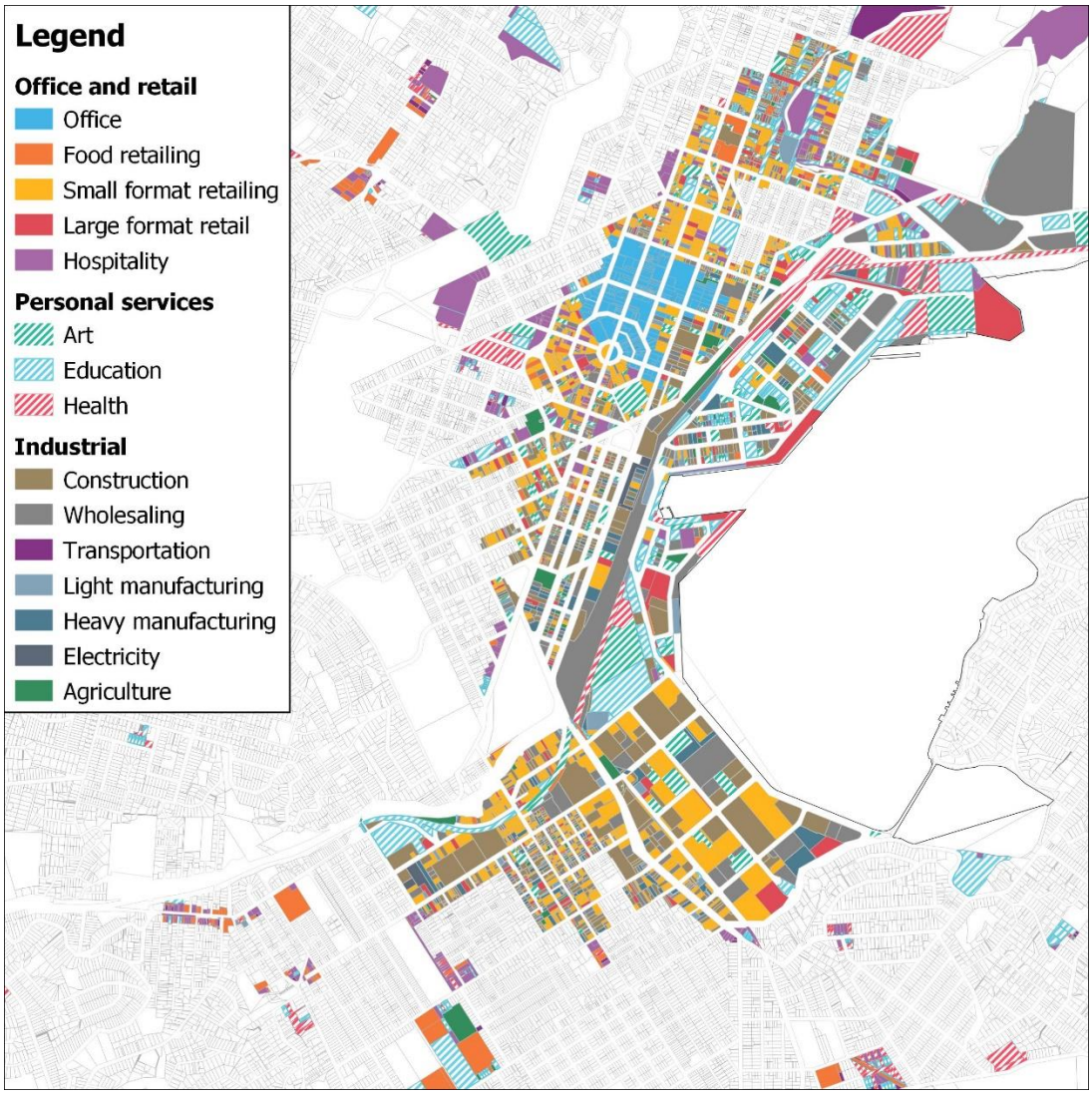
22 We suggest this approach does not (and should not) capture the potential impact of any constraints from central government policies.

of each feature of parcels (and the statistical significance of them) for different sectors of the economy.[23] Based on our definition of suitability, sites are suitable for multiple uses and where a site has a particular 'best use' but that activity doesn't require further land, then the site would be used for the next best use. The desirability of each land for a specific sector is determined using the estimated impacts of the features of that land, using our regression results – as presented in Appendix C. If a land has a higher production capacity for one activity, then it will be allocated to that activity. This continues until the total demand (GDP) of that sector is met. Technically, this is an iterative allocation process for each parcel.

23 One constraint of our results is applying them to the current features of land. For example, a large parcel is more suitable for large-retail activities. However, property sizes can change over time through subdivided or amalgamation with adjacent sites. The model is therefore constrained to current property features. Changes to property features alter the suitability land to different industry sectors. For example, subdivision of a parcel to multiple smaller sites will be more suitable for small retail activities and will require the model to allocate another parcel to the displaced large-retail activity, which will have flow-on impacts on the suitable locations for other activities.

Figure 8 Optimal locations for business sectors based on regression results[24]

Outputs of the regression analysis.



Source: Principal Economics

The caveat of our regression analysis is that we do not have access to firm-level data. Hence, our regression analysis provides information at the Statistical Area 2 level. Then we apply the estimated parameters to the features of parcels. This approach provides us with useful information about the most likely location of a specific business activity. But the shortcoming of this approach is its lack of precision in estimating the levels of economic activity. Therefore, based on the regression results, we know the most likely land use – based on optimising the return on land considering its features. But we do not know how large that economic activity is.

To derive information about the level of economic activities, we calibrate the predicted outputs of all industries (based on the regression results) to the level of regional economic

24 We include land within the Major Facility Zone to account for the locational choices of arts and recreation, educational, and health services.

activity levels in 2018. We should note that, there are still differences between the distribution of economic activities predicted based on our model, and the observed economic activity at the Statistical Area 2 level.

Another caveat of the regression analysis is that it provides estimated outputs at the parcel level. However, as discussed in 2.1.4, there are a range of suitable locations for a business to locate – with no efficiency loss (based on the concept of spatial equilibrium). Hence, we define less restrictive geographic areas, by considering polygons around each parcel, and try to explain the *changes in estimated demand* using the clusters of distance to CBD, port, rail and population centres. If the variations in the efficient demand could be explained using the range of defined polygons, then we suggest the (long-term) demand and (current) supply match.[25] Otherwise, we identify a mismatch.

Our findings suggest mismatches for the following sectors:

1- Heavy manufacturing
2- Retail food
3- Transport
4- Arts and recreation

In addition to these, we also identified mismatches for the primary industry sector. This suggests that in medium- and long-term, there will be a need for improving the availability of land, with the features required for these sectors.

Robustness of our findings from regression analysis

The available data and budget for this work does not allow us to undertake any more detailed analysis of the factors of suitability. Mare and Coleman (2011) used more granular firm-level data to assess the impact of a wider range of factors on the location of businesses. We compared our findings with them and conclude that our current results provide a robust estimate of the significance (and sign) of the impacts of the factors of location choice.

We also compared the findings of our regression analysis with the result from our stakeholder engagement and visual inspection of business zoned land (as will be presented in the next sections). The findings from all these methods were consistent.

3.2.2. Identify the commercial space demand

We use the preferences for the features of land determined in our regression modelling and apply (extrapolate) this to the demand outputs (of GDP and employment counts) over the short, medium, and long terms. This will provide an assessment of aggregate demand of business land sites and their attributes within Dunedin.

As discussed in 2.1.3, the most relevant comparison group for improved quality of business in Dunedin consist of Christchurch, Hamilton, Taupo and Tauranga. A comparison between the production per employee between Dunedin and the average of comparison group is

25 The extent that the variations in estimated demand could be explained using the distance clusters is measured using regression's R-squared measure.

shown in Table 9. Accordingly, the productivity of primary industry, hospitality, transport, education and health should be kept at the current levels. For the other sectors, there is a significant room for improvement. We should note that a lack of increase in productivity does not provide any information about the future demand of the sectors - which we investigated in the previous section.

Table 9 Comparison of productivity between Dunedin and comparable towns

Comparison year: 2018.

Sector	Difference
Primary industry	0.0%
Manufacturing- heavy	125.7%
Manufacturing- light	23.4%
Electricity	76.0%
Construction	26.7%
Wholesales	72.2%
Retail-small	5.7%
Retail-large	24.9%
Retail-food	25.7%
Hospitality	0.0%
Transport	0.0%
Office	20.0%
Education	0.0%
Health	0.0%
Arts and recreation	11.4%

Source: Principal Economics

We use the median floorspace per employee, because the results of using the median are most compatible with the findings from visual inspection and the feedback from the stakeholders. For converting business activity to floorspace requirement, we used a range of available information on floorspace per employee for different sectors from different sources – presented in Appendix E.

The floorspace requirement estimates for medium and high population projection scenarios are shown in Table 10. As illustrated the overall (total) required floor space are decreasing over time. This is because:

1. with improved quality of business (through lowering cost of business land), the productivity of employees (per square metre) increases, i.e., higher production per employee will need less floorspace.
2. with improved desirability of Dunedin (as a result of decreases in cost of business and rent), there will be an increase in migration, and hence and increase in economic activity and further demand for floorspace. As discussed in Section 2.1.5, population is an input to our model. The decrease in floorspace requirement between ST and LT is significantly larger for the medium (population projection) scenario compared to the high scenario.

At the granular sector levels, demand will increase across all sectors. These are driven by increases in population.

Table 10 Summary of forecasted floorspace requirements by sector

Unit: square metre. The presented figures are total (i.e., not change).

Sector	ST (2027)		MT (2034)		LT (2054)	
	Medium	High	Medium	High	Medium	High
Primary industry	137,705	174,929	158,251	194,519	173,422	258,576
Manufacturing-heavy	251,835	309,112	130,138	159,803	127,851	184,518
Manufacturing-light	268,936	334,535	239,425	294,191	237,651	346,673
Electricity, gas, water and waste services	1,310,663	1,613,776	507,160	621,576	440,663	634,665
Construction	416,168	527,032	298,145	366,424	320,935	476,834
Wholesales	546,262	671,882	298,359	365,834	313,634	452,415
Retail-small	103,547	129,394	90,808	111,539	94,907	139,032
Retail-large	127,663	157,612	96,064	118,078	101,080	146,453
Retail-food	66,124	81,379	62,433	76,584	66,199	95,458
Hospitality	36,032	45,122	49,501	60,861	57,351	84,228
Transport	291,971	366,962	146,471	180,136	386,317	569,295
Office	46,924	57,808	36,722	45,117	38,479	55,609
Education	75,882	93,634	71,153	87,394	74,759	108,203
Health	47,515	59,595	43,874	53,902	46,152	67,918
Arts and recreation	332,145	448,702	255,558	313,454	268,612	424,869
Total	**4,059,371**	**5,071,472**	**2,484,063**	**3,049,411**	**2,748,011**	**4,044,746**

Source: Principal Economics

We will use the findings from this chapter to analyse sufficiency in Section 3.4.

3.3. Step 2 – Assessing capacity for business space

Requirement (clause 3.29(1) of the NPS-UD)

Every HBA must estimate the development capacity (in terms of hectares or floor areas) to meet expected demand for business land for each business sector plus the appropriate competitiveness margin. Of that development capacity, the development that is: Plan-enabled; and plan-enabled and infrastructure-ready, and plan-enabled, infrastructure ready, and suitable for each business sector.

A local authority may define what it means for development capacity to be "suitable", but at a minimum suitability must include suitability by location and size.

Note

The NPS-UD detailed a procedure to how business land capacity should be determined. Accordingly, we take a broad approach as outlined in the NPS-UDC in assessing plan-enabled capacity and ground truthing estimates.

As per the NPS-UDC, assessing plan-enabled capacity will entail taking a stocktake of land or space zoned for business activities within Dunedin and the amount of vacant land by zone type. Land that is unable to be developed because of slope, shape and access has been removed from the capacity assessment and only land that is serviced with infrastructure or will be over the next 10-years is included in development capacity.

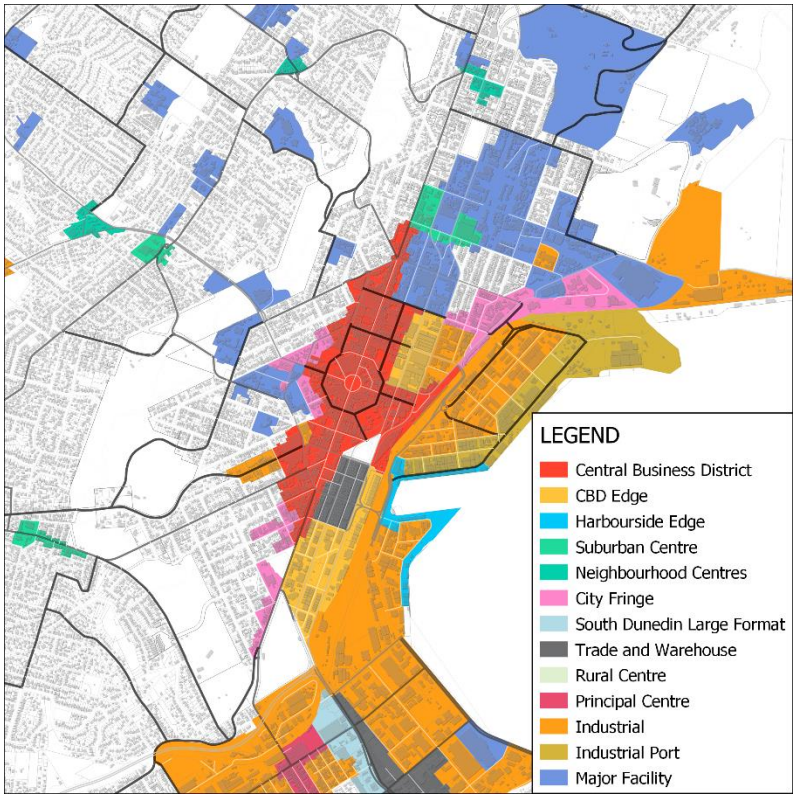
Approach

To determine current business land capacity, we primarily rely on the information provided by the Council on the second-generation district plan. Additionally, we use other relevant information provided, such as resource and building consents, property sales date and price, rating valuation and property and build footprint data to provide us with inputs determining business land capacity within Dunedin.[26]

We determine the plan-enabled business land capacity by first identifying parcels that lie within the business land zones of Commercial and Mixed-use and Industrial as defined under the 2nd Generation District Plan. This is to ensure the assessment includes land available for business use and excludes features such as roading and footpaths that would overestimate the availability business land.

26 See Appendix D for information sources

Figure 9 Dunedin 2nd Generation District Plan



Source: DCC, LINZ

We determine the constraints of planning regulations as per the district plan (and any other council documents) and apply this to individual sites within Dunedin to determine plan-enabled capacity. We rely on qualitative information provided by Dunedin City Council and stakeholder engagement alongside quantitative spatial data on infrastructure provision to assess the infrastructure-readiness of business land.

3.3.1. A stocktake of plan enabled vacant land by location and business zone type

Dunedin has 907,000sqm of industrial land capacity over the long term, assuming that land currently located in transitional industrial areas will be realised over the medium term. Most of this land will be provided in Mosgiel, accounting for 56% of developable industrial land over the long term.

Table 11 industrial zoned land capacity short, medium and long term

Industrial Land area capacity (sqm)			
Area	**ST (2027)**	**MT (2034)**	**LT (2054)**
Mosgiel	501,000	513,400	513,400
Green Island / Fairfield	83,000	169,100	169,100
Burnside	47,000	154,200	154,200

Middlemarch	34,200	34,200	34,200
Port Area North	15,800	15,800	15,800
South Dunedin	6,700	6,700	6,700
Waikouaiti	4,800	4,800	4,800
Sawyers Bay	4,000	4,000	4,000
Bradford	1,800	1,800	1,800
Northeast CBD	1,700	1,700	1,700
Maclaggan Street	1,100	1,100	1,100
Quarry / Ravensbourne	900	900	900
Total	**702,000**	**907,700**	**907,700**

Source: Principal Economics

Office floorspace capacity over the short-term is estimated to be around 108,700sqm assuming that currently undeveloped and underutilised land is developed.[27] Over the medium term we assume that sites within the CBD and surrounds with infill potential are developed to accommodate demand, increasing office capacity to 118,900sqm. While there are potential built sites to increase building heights, we have not estimated additional floorspace to maybe accommodate the redevelopment or construction of additional levels on built sites.

Table 12 Office floorspace capacity short, medium and long term

Office floorspace capacity (sqm)			
Area	**ST (2027)**	**MT (2034)**	**LT (2054)**
CBD and surrounds	51,500	61,700	61,700
Inner suburbs	5,800	5,800	5,800
Mosgiel	13,800	13,800	13,800
Outer suburbs	9,400	9,400	9,400
South Dunedin	2,600	2,600	2,600
Outer urban area	25,600	25,600	25,600
Total	**108,700**	**118,900**	**118,900**

Source: Principal Economics

Retail floorspace capacity over the short term is estimated to be able to accommodate 180,900sqm over the short term. Using the same assumptions for infill potential as office floorspace, this increases to 215,800sqm over the medium term.

27 Note this includes site that are currently being used as council controlled carparking.

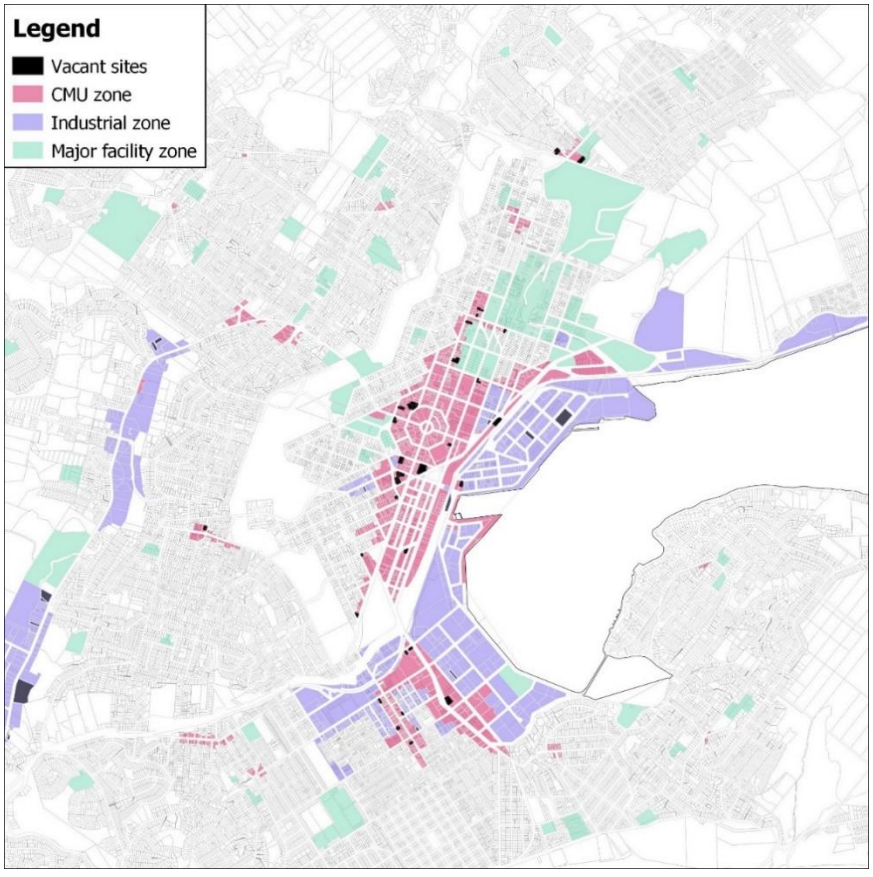
Table 13 Retail floorspace capacity short, medium and long term

Retail floorspace capacity (sqm)			
Area	**ST (2027)**	**MT (2034)**	**LT (2054)**
CBD and surrounds	16,200	51,100	51,100
Inner suburbs	16,600	16,600	16,600
Mosgiel	39,300	39,300	39,300
Outer suburbs	26,800	26,800	26,800
South Dunedin	9,200	9,200	9,200
Outer urban area	72,800	72,800	72,800
Total	**180,900**	**215,800**	**215,800**

Source: Principal Economics

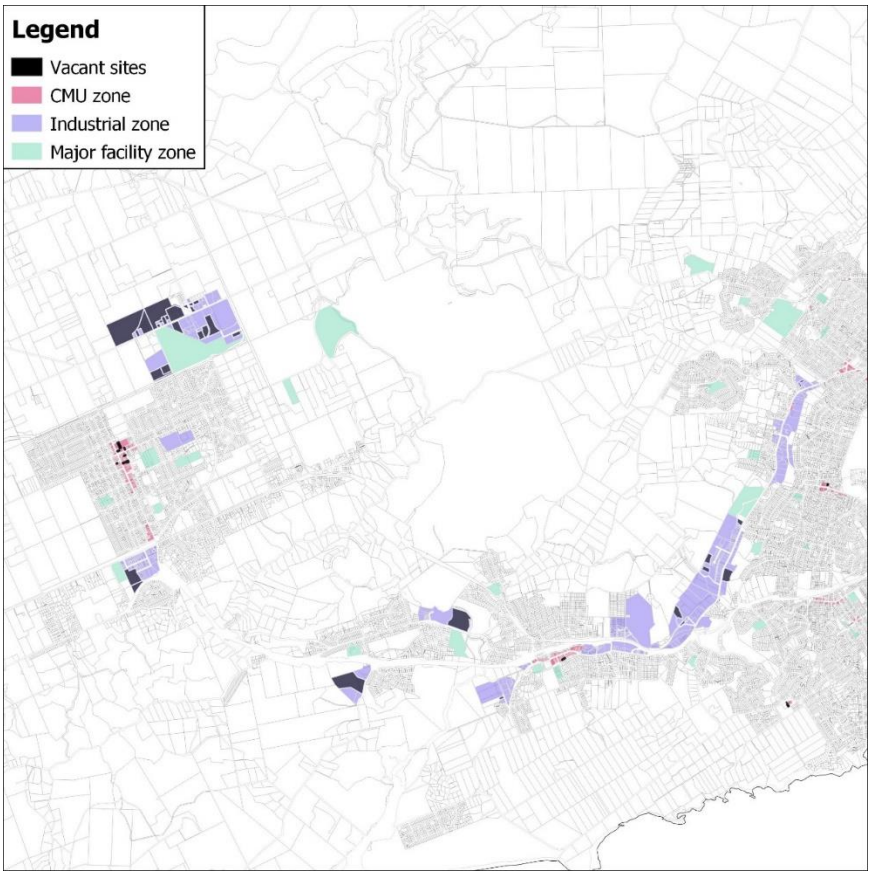
Figure 10 and Figure 11 illustrate the vacant sites identified within the Dunedin's main urban areas, namely the CBD, South Dunedin, Kaikorai Valley, Green Island and Mosgiel.

Figure 10 Identified vacant sites in Dunedin CBD and South Dunedin



Source: Principal Economics, Dunedin City Council, LINZ

Figure 11 Identified vacant sites in Mosgiel, Kaikorai Valley, Green Island



Source: Principal Economics, Dunedin City Council, LINZ

Current industrial land capacity

Using the data available we find that there is an estimated 70.8ha of vacant industrial zoned land within Dunedin City, over 70% of this is located within Mosgiel spanning 24 sites. Much of this land is from 34ha of industrial zoned land established as part of Variation 9B to the Operative District Plan (2006). Vacant sites over 4,000sqm (22 identified) account for 91% of the industrial land identified as vacant within Dunedin City. These larger sites are located within the areas of Mosgiel, Green Island / Fairfield, Burnside, Middlemarch, and Port Area North.

Overall, industrial sites under 4,000sqm account for 73% of vacancies but only 9% of vacant land. In South Dunedin we identify 23 sites as being vacant, with a combined land area of 6,700sqm.

We have identified industrial vacancies using property data provided by DCC and filter for sites that do not have existing building coverage. Vacancy has been confirmed/amended by a site visit undertaken on the week of 23rd May 2022, using property data provided by DCC

and building footprint data provided by DCC and supplementary information sourced from LINZ as the initial base results.[28]

In our assessment of industrial land capacity, we find large variances between what is shown in the data compared to what is occurring on the ground. This manifests in numerous ways, where we find that there are several large sites in Mosgiel that account for most vacant industrial zoned land in Dunedin, sites such as 175 4 Dukes Road are subdivided leasehold properties whose parcel boundaries are not yet defined.[29] Given the site sizes identified in Mosgiel it is highly likely that this is not the only occurrence of such variances between the data reported and actual outcomes. Furthermore, we find that many small sites identified as being vacant using desktop analysis are currently being utilised as carparking.

Where possible we have excluded industrial activity where yard space is required as part of the daily operations and kept general carparking as 'vacant'.[30]

Table 14 Vacant industrial zoned land[31]

	Land area by site size (sqm)					
Industrial zone	**0-500**	**501-1,000**	**1,001-2,000**	**2,001-4,000**	**4,000+**	**Total**
Mosgiel	-	1,000	4,800	14,200	481,100	501,000
Green Island / Fairfield	-	-	-	2,700	80,300	83,000
Burnside	1,100	700	5,200	-	40,000	47,000
Middlemarch	-	-	-	-	34,200	34,200
Port Area North	600	-	-	4,000	11,200	15,800
South Dunedin	4,800	1,900	-	-	-	6,700
Waikouaiti	-	-	1,000	3,800	-	4,800
Sawyers Bay	-	-	1,900	2,100	-	4,000
Bradford	-	800	1,100	-	-	1,800
Northeast CBD	-	1,700	-	-	-	1,700
Maclaggan Street	100	-	1,000	-	-	1,100
Quarry / Ravensbourne	-	900	-	-	-	900
Total	**6,600**	**6,900**	**15,000**	**26,700**	**646,800**	**702,000**

	Number of sites by size (sqm)					
Industrial zone	**0-500**	**501-1,000**	**1,001-2,000**	**2,001-4,000**	**4,000+**	**Total**
Mosgiel		1	4	5	14	24
Green Island / Fairfield				1	1	2

28 We use LINZ to update any new building footprints and supplement the missing areas from the DCC data for areas such as Mosgiel.

29 https://industry-one.nz/For-Lease/20071-Lot_4_Mosgiel_Design-Build_Site

30 This only occurs when the carparking property data is separate from the overarching land parcel. i.e. when the carparking site itself is technically separate from the parcel where a building is located, despite operating in conjunction with the business operating at an adjacent site.

31 A map of industrial areas is attached in Appendix F.

Burnside	3	1	4		4	12
Middlemarch					2	2
Port Area North	2			1	1	4
South Dunedin	20	3				23
Waikouaiti			1	1		2
Sawyers Bay			1	1		2
Bradford		1	1			2
Northeast CBD		2				2
Maclaggan Street	1		1			2
Quarry / Ravensbourne		1				1
Total	**26**	**9**	**12**	**9**	**22**	**78**

Source: Principal Economics

Mosgiel industrial land is likely to be underreported in terms of total land area, alongside a significant difference in the composition of small and large site sizes as aforementioned. Our on-the-ground visit and desktop analysis indicate that there are several large sites that while not technically vacant are currently underutilised small building/site ratios and have little need for yard space as part of business operations.

At Green Island / Fairfield a large 83,000sqm site appears to be vacant, but we are unable to confirm its use. There are large vacant industrial sites in Middlemarch, however given its distance from the central city, it is incompatible with demand for industrial land closer to the city centre.

Two small 300sqm vacant sites that sit adjacent one another in Port Area North are currently being used as carparking by neighbouring businesses. A medium-sized 6,900sqm exists at the boundary of Port Area North and Port Area South adjacent to the railway line and Wharf Street has questionable development potential given its size and proximity to the railway line. Table 14 shows that a large 11,200sqm undeveloped site is present in the middle of the Port Area North industrial zone. Based our discussion with the Council team, this land is owned by Chalmers Properties and while there are potential contamination issues this is likely to be easily remedied for future development

For South Dunedin the majority of sites identified are classified vacant by technicality. These are areas that despite being identified as being individual properties are integrated into operations of other businesses (typically as carparking). We find that there are a handful of sites that do appear to be genuinely vacant which are often adopted by neighbouring businesses for carparking. It is not known if in these cases the site is owned by the adjacent business or being temporarily used while the site remains vacant. This does not include part-vacant land sites whose combined land area is potentially greater than those identified in Table 14.

Smaller industrial areas in Dunedin City such as Sawyers Bay, Bradford and Maclaggan Street are mostly occupied with smaller undeveloped sites remaining vacant.

Future industrial land capacity

The Dunedin 2GP District additionally specifies industrial transition areas adjacent to the industrial areas in Burnside, Green Island / Fairfield and Mosgiel. When and if this land is to be used for industrial purposes, this will increase industrial land capacity in Dunedin by 205,700sqm. It should be noted that industrial transition land shown in Table 15 is not included in Table 14 as it is assumed that in the short term it is yet to be infrastructure ready. In our discussions with the Council the requirements for releasing this land for development are permissive and as such it has been assumed they will be infrastructure ready by the medium term. These areas are included as part of the sufficiency calculations in Section 3.4.

Table 15 Industrial transition

Industrial area	Land area (sqm)
Burnside	107,200
Green Island / Fairfield	86,100
Mosgiel	12,400
Total	**205,700**

Source: Principal Economics, Dunedin City Council

Current commercial and mixed-use capacity

There is 67,900sqm of vacant land area across 81 sites in the commercial mixed-use zone in Dunedin City.[32] Vacancy has been confirmed/amended by a site visit undertaken on the week of 23rd May 2022, using spatial data provided by DCC and building footprint data provided by DCC and supplementary information sourced from LINZ as the initial base results.

Within the CBD and surrounds there is 23,000sqm of vacant land of which 10,800sqm are on sites under 1,000sqm. Within Other Areas we identify 44,900sqm of vacant land across 50 sites.

Similar to industrial land we find large variances in the commercial and mixed-use zone data compared to what is occurring on the ground. Many of the identified 'vacant' sites are adjoined to adjacent business and used as carparks or operate as leased car parks separate and independent from other businesses but defined as separate properties within the property dataset provided. We have excluded sites where carparking is part of a larger area i.e., carparking for supermarkets, and included smaller carparks with individual property titles as they have greater potential for redevelopment.

Within the Central Business District of the seven vacant sites over 1,000sqm within the CBD, four are occupied by pay and display car parking services, including sites on Dowling Street, Filleul Street, Moray Place, and Anzac Ave.

Table 16 shows the total land area and number of identified vacant sites within Dunedin City by commercial mixed-use zone identified by the method noted in Appendix E.

32 See Appendix E for details on the methodology used for determining floorspace capacity within the commercial mixed-use zone.

Table 16 Vacant land in commercial mixed-use sub zones

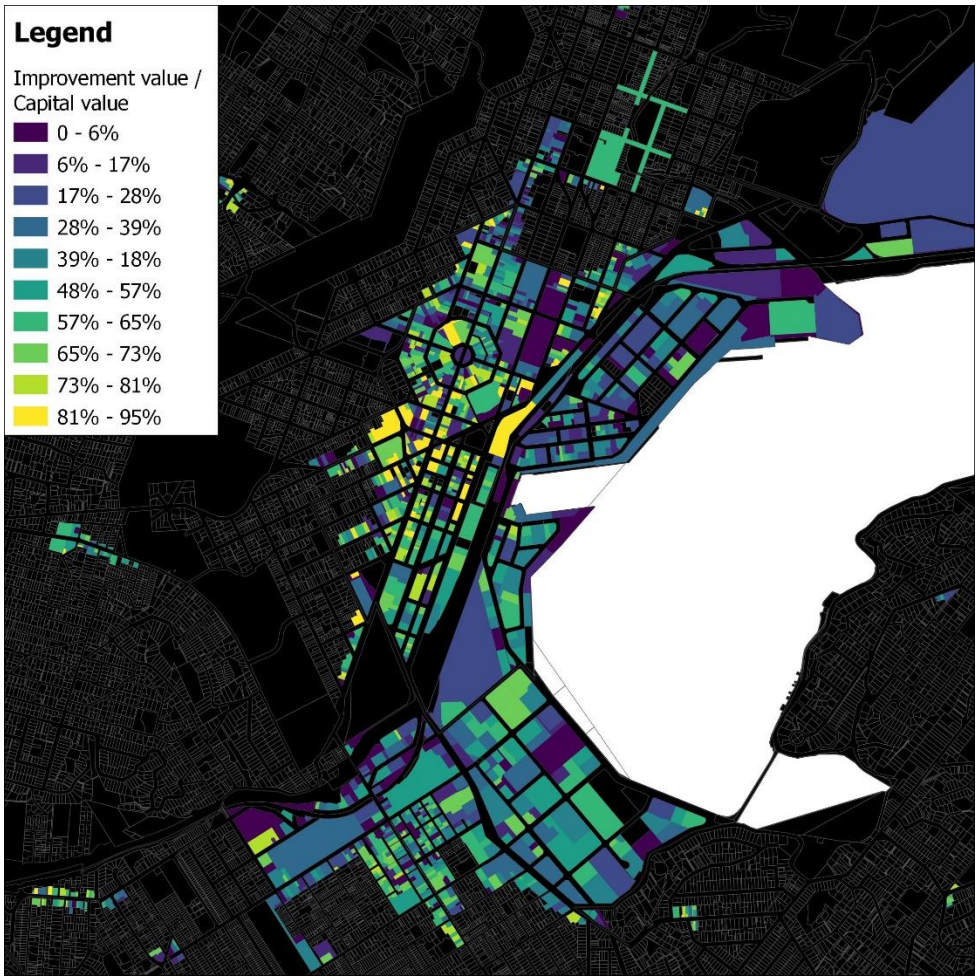
	Land area by site size (sqm)			
Sub zone	**0-500**	**501-1000**	**1000+**	**Total**
Central Business District	2,400	3,500	11,100	17,000
Smith Street and York Place	-	600	1,100	1,700
CBD Edge Commercial North	400	-	-	400
CBD Edge Commercial South	300	-	-	300
Princes, Parry and Harrow Street	700	800	-	1,500
Harbourside Edge	-	800	-	800
Warehouse Precinct	-	1,300	-	1,300
Subtotal - CBD and Surrounds	**3,800**	**7,000**	**12,200**	**23,000**
Neighbourhood Destination Centre	500	800	-	1,300
Principal Centre	3,700	5,300	8,700	17,700
Suburban Centre	1,500	1,800	2,000	5,300
Trade Related	-	900	-	900
Rural Centre	900	4,400	14,400	19,700
Subtotal - Other areas	**6,600**	**13,200**	**25,100**	**44,900**
Total - Dunedin City	**10,400**	**20,200**	**37,300**	**67,900**

	Number of sites by size			
Sub zone	**0-500**	**501-1000**	**1000+**	**Total**
Central Business District	8	6	7	21
Smith Street and York Place	-	1	1	2
CBD Edge Commercial North	1	-	-	1
CBD Edge Commercial South	1	-	-	1
Princes, Parry and Harrow Street	2	1	-	3
Harbourside Edge	-	1	-	1
Warehouse Precinct	-	2	-	2
Subtotal - CBD and Surrounds	**12**	**11**	**8**	**31**
Neighbourhood Destination Centre	2	1	-	3
Principal Centre	11	7	5	23
Suburban Centre	5	3	1	9
Trade Related	-	1	-	1
Rural Centre	2	6	6	14
Subtotal - Other areas	**20**	**18**	**12**	**50**
Total - Dunedin City	**32**	**29**	**20**	**81**

Source: Principal Economics

Figure 12 shows an inconsistent land use pattern with many sites relatively underdeveloped with potential for intensification. The ratio highlights sites with high land productivity (yellow) and low land productivity (purple), effectively illustrating the land leverage ratio across business zoned sites.[33]

Figure 12 Improvement value ratio



Source: Principal Economics, Dunedin City Council, LINZ

Table 17 provides greater detail on the vacant business zoned land within other areas. In South Dunedin there are around 2,900sqm of vacant land located across 8 sites. Rural Centres have ample development potential with 10,700sqm of vacancy across 14 sites. Similarly, Mosgiel has 11 vacant sites with additional development potential of up to 10,700sqm.

As part of the stakeholder engagement, respondents raised the issue of having insufficient sites for large format retail development. This comment is supported by the lack of 1,000sqm and over sites vacant within Dunedin City, and particularly in South Dunedin, where many large format retailers are located.

33 Denne et al. (2016)

Table 17 Vacant land in commercial mixed-use sub zones in other areas[34]

	Number of sites by size (sqm)				Land area by site size (sqm)			
Inner suburbs	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Neighbourhood Destination Centre	1	0	0	1	300	0	0	300
Suburban Centre	5	1	1	7	1,500	600	2,000	4,100
Inner suburbs Total	**6**	**1**	**1**	**8**	**1,800**	**600**	**2,000**	**4,400**

South Dunedin	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Principal Centre	7	0	0	7	2,000	0	0	2,000
Trade Related	0	1	0	1	0	900	0	900
South Dunedin Total	**7**	**1**	**0**	**8**	**2,000**	**900**	**0**	**2,900**

Outer suburbs	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Neighbourhood Destination Centre	1	1	0	2	100	800	0	900
Principal Centre	2	0	3	5	1,000	0	4,200	5,200
Suburban Centre	0	2	0	2	0	1,200	0	1,200
Outer suburbs Total	**3**	**3**	**3**	**9**	**1,100**	**2,000**	**4,200**	**7,300**

Mosgiel	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Principal Centre	**2**	**7**	**2**	**11**	**800**	**5,300**	**4,600**	**10,700**

Outer urban area	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Rural Centre	**2**	**6**	**6**	**14**	**900**	**4,400**	**14,400**	**19,700**

All areas (excl. CBD)	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Total	**20**	**18**	**12**	**50**	**6,600**	**13,200**	**25,200**	**45,000**

Source: Principal Economics

Table 18 shows the potential floorspace at the vacant undeveloped sites identified and assuming that they are developed to their maximum height as per the 2GP District Plan. It is unlikely that all this land will be developed nor developed to this extent.

Table 18 shows the development potential at undeveloped sites only and is conservative in that it omits development potential where intensification is feasible on sites with existing buildings.

Table 18 Vacant floorspace potential in commercial mixed-use zones by urban area

	Ground level floorspace (sqm)

34 A map of the urban areas we have used for reporting commercial mixed use vacancy is attached in Appendix G.

Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	1,600	3,900	16,200	1,300	23,000
Inner suburbs	-	1,300	12,100	-	13,400
Mosgiel	-	3,200	28,700	-	31,900
Outer suburbs	-	2,200	19,600	-	21,800
South Dunedin	-	600	7,200	1,900	9,700
Outer urban area	-	5,900	53,100	-	59,000

	Above ground level floorspace (sqm)				
Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	15,500	47,600	-	-	63,100
Inner suburbs	-	4,500	4,500	-	9,000
Mosgiel	-	10,600	10,600	-	21,200
Outer suburbs	-	7,200	7,200	-	14,400
South Dunedin	-	2,000	2,000	-	4,000
Outer urban area	-	19,700	19,700	-	39,400

	Total floorspace (sqm)				
Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	17,100	51,500	16,200	1,300	86,100
Inner suburbs	-	5,800	16,600	-	22,400
Mosgiel	-	13,800	39,300	-	53,100
Outer suburbs	-	9,400	26,800	-	36,200
South Dunedin	-	2,600	9,200	1,900	13,700
Outer urban area	-	25,600	72,800	-	98,400

Source: Principal Economics

Table 19 focuses on floorspace capacity within the CBD and surrounds, it indicates that identified vacant sites can support an additional 51,500sqm of floorspace for office activities, and 16,200sqm for retail. The majority of potential floorspace is located within the Central Business District sub-zone, where if all identified vacant sites, including the large 1,000sqm plus sites, were to be developed the CBD could accommodate an additional 13,600sqm of retail floorspace and over 45,000sqm of above ground level office space.

Table 19 Floorspace capacity by sector within the CBD and surrounds

	Ground level floorspace (sqm)			
Sub zone	Residential	Office	Retail / Other Commercial	Industrial
Central Business District	-	3,400	13,600	-
Smith Street and York Place	900	-	900	-
CBD Edge Commercial North	-	-	300	100

CBD Edge Commercial South	-	-	200	100
Princes, Parry and Harrow Street	800	-	-	800
Harbourside Edge	-	-	400	400
Warehouse Precinct	-	500	800	-
Subtotal - CBD and Surrounds	**1,600**	**3,920**	**16,200**	**1,300**

	Above ground level floorspace (sqm)			
Principal Centre	**Residential**	**Office**	**Retail / Other Commercial**	**Industrial**
Central Business District	5,000	45,100	-	-
Smith Street and York Place	3,500	-	-	-
CBD Edge Commercial North	-	-	-	-
CBD Edge Commercial South	-	-	-	-
Princes, Parry and Harrow Street	3,000	-	-	-
Harbourside Edge	2,000	500	-	-
Warehouse Precinct	2,000	2,000	-	-
Subtotal - CBD and Surrounds	**15,500**	**47,600**	**-**	**-**

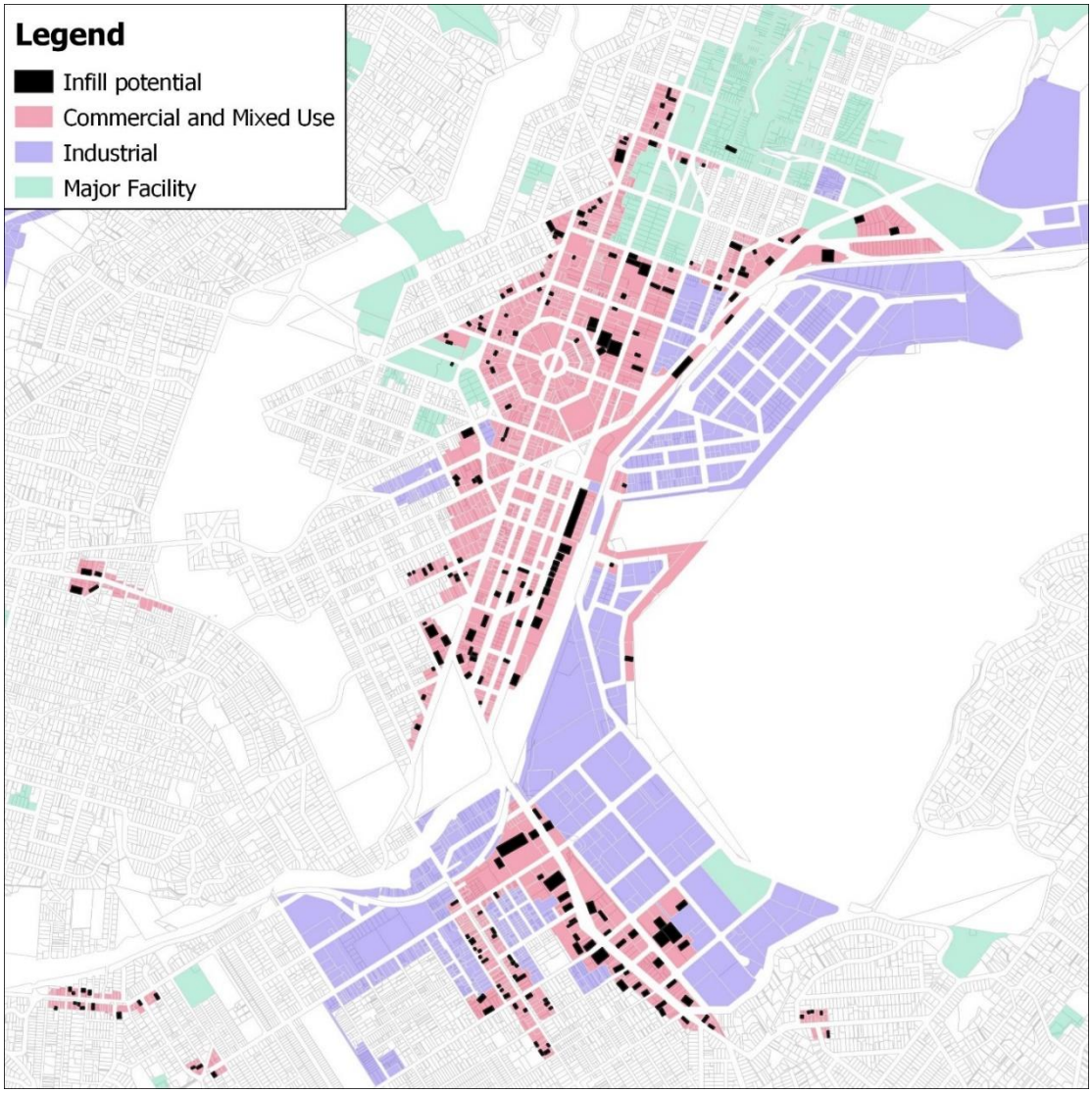
Total floorspace	**17,100**	**51,500**	**16,200**	**1,300**

Source: Principal Economics

Infill potential

We have assessed the potential for infill within the Dunedin CBD and surrounds and find that it has potential infill floorspace of 60,500sqm, at ground level, following findings from our site visit suggesting that many sites are partly developed and have potential for intensification. Details on how infill capacity has been determined can be found in Appendix E.

Figure 13 Infill ground level floorspace potential within the CBD and surrounds[35]



Source: Principal Economics

Table 20 Infill ground level floorspace potential within the CBD and surrounds

	Ground level infill floorspace potential (sqm)			
Sub zone	0-500	501-1000	1000+	Total
Central Business District	6,000	3,500	8,300	17,800
Smith Street and York Place	2,500	0	0	2,500
CBD Edge Commercial North	1,100	1,200	4,000	6,300
CBD Edge Commercial South	5,400	3,800	9,900	19,100
Princes, Parry and Harrow Street	4,700	5,900	3,400	14,000
Harbourside Edge	800	0	0	800

35 We have not reported infill potential within South Dunedin given its focus on large format retailing and industrial activity has a greater reliance on carparks.

Total	**20,500**	**14,400**	**25,600**	**60,500**

Source: Principal Economics

Applying the same activity ratios as used for identified vacancies from partially developed lands, there is an estimated 10,200sqm of additional office space and 34,900sqm of retail / other commercial floorspace that can be potentially accommodated on new infill developments within the CBD.

Table 21 Infill floorspace potential within the CBD and surrounds

	Total infill floorspace potential (sqm)				
Sub zone	**Residential**	**Office**	**Retail / Other Commercial**	**Industrial**	**Total**
Central Business District	1,700	10,200	14,200	0	26,200
Smith Street and York Place	6,300	0	1,300	0	7,500
CBD Edge Commercial North	0	0	4,700	1,000	5,700
CBD Edge Commercial South	0	0	14,300	2,500	16,800
Princes, Parry and Harrow Street	12,600	0	0	1,700	14,300
Harbourside Edge	1,900	0	400	0	2,300
Grand Total	**22,500**	**10,200**	**34,900**	**5,200**	**72,800**

Source: Principal Economics

3.3.2. Engaging with the development sector, experts, and stakeholders

Requirement (clause 3.21 of the NPS-UD)

Contact the development sector and engage the development experts or experienced people in the development sector; and providers of development infrastructure and additional infrastructure; and anyone else who has information that may materially affect the calculation of the development capacity.

Approach

We engaged with providers of development infrastructure through a series of virtual meetings to discuss any information that may materially impact the estimate of development sufficiency within Dunedin City over the BDCA assessment period. As part of this process, we undertook meetings with individuals within DCC related to the provision and management of transport and 3-waters infrastructure.

We also surveyed with a range of industry stakeholders including infrastructure providers, commercial and industrial operators, business land developers and investors, large retail operators, real estate agents, other local experts and users of business land to account for perspectives from both suppliers and users of business land.

For the stakeholder engagement, we sent out 21 questionnaires and we received 9 responses.[36] We suggest that a response rate of 43 percent is a reasonable response rate for this type of analysis (in comparison with other BDCA reports that we are aware of). We also had 4 in-person meetings with the Council's departments.

Response from infrastructure providers

DCC's Transport infrastructure team noted that there were not any capacity issues related to the transport network that would hinder business land development capacity over the foreseeable future. Commercial mixed use, industrial, zoned land are serviced by the roading network and are infrastructure ready. It was noted there are issues with congestion however they broadly meet the needs of the city.

While traffic modelling is undertaken for Dunedin City its use is limited and excludes Mosgiel which is projected to be a significant area of growth for Dunedin.

Several roading issues were identified as needed to be addressed including key congestion areas and improvements in accessibility and road safety.

- Congestion when travelling from Mosgiel to Dunedin CBD
- Safety improvements along Three Mile Hill Road
- Improved bus access to Mosgiel
- Improved cycling network

Potential improvements to Dunedin City transport noted by the transport infrastructure team include:

- Business zoning closer to where households reside (Mosgiel being a key area identified)
- Shifting of inner harbour industrial zoning to the south of the city alongside development of an inland port alleviate inner city transport issues.
- Increase use of the freight at Port Charmers
- Increase usage of the rail network.
- Increased mixed-use planning

Challenges faced by DCC's infrastructure team include:

- Contention around public/private funding for infrastructure
- Lack of integrated land use and transport planning
- Transport planning constraints owing to constraints of the 3-waters network

In November 2021, the Shaping Future Dunedin Transport Programme was endorsed by Waka Kotahi NZ Transport Agency. The programme relates to the relocation of Dunedin Hospital to be adjacent to SH1, triggering a review of the section SH1 that crosses

36 The information was collected via email or virtual meetings – using the questionnaire.

Dunedin's central city. Details of the programme are not yet finalised, both the speed and flow direction of SH1 in the central city still be discussed (Stantec, 2021).

Additionally, the Shaping Future Dunedin Transport Programming includes a range of other amendments to the Dunedin transport network, we list these in Table 22 below.

Table 22 Transport amendments in the Shaping Future Dunedin Transport Programme

State Highway Works
Interim SH1 Safety Improvements
Lower SH1 Speeds
Relocate SH88 to Frederick Street
Pine Hill Intersection Upgrade
Targeted SH1 Amenity Improvements
Queens Gardens to Oval Cycleway

Public Transport Improvements
Central Bus Hub and Superstop Upgrades
Frequency and Fare Review
Southern Bus Priority

Harbour Arterial Upgrade
Directional Signage and Wayfinding
Major and Minor Intersection Upgrades
Corridor Improvements
Ward Street Overbridge Upgrade

Parking Management Improvements
Demand Responsive Pricing
Smart Prioritisation of Parking
Parking Wayfinding System
Upgrade Payment Technologies
Occupancy Sensors
Consolidate Existing Off-Street Parking

Active Mode Improvements
Slow Speed Zone
Princes Street Improvements
Albany Street Cycleway
St Andrew Street Improvements
Bicycle Hubs
Behaviour Change Programme
Sustainable transport programme
Demand management

Park and Ride
Mosgiel Park and Ride
Burnside Park and Ride

Source: Principal Economics, Stantec (2021)

The outcome of Shaping Future Dunedin Transport is expected improve safety, multi-nodal accessibility to and within the central city, walkability, accessibility between key destinations for active modes and help reduce carbon emissions.

Response from 3-Waters

Dunedin's 10-year plan 2021-2031 infrastructure Strategy indicate significant capacity issues within the Mosgiel stormwater systems, with frequent nuisance flooding in small rainfall events, and deep flooding in others. This aligns with comments from developer comments in our stakeholder discussions where development on industrial land is occurring even in areas with constrained infrastructure capacity, albeit this comes at a cost to the developer. The stormwater network in South Dunedin is also notable as an area with having capacity issues leading to flooding of roads, homes, and properties. The 10-year plan notes that DCC

is working with ORC and GNS Science to development a hydraulic model for the area with significant capital works proposed to improve infrastructure standards.

Response from stakeholder survey

As part of the engagement with the development sector we contacted 22 individuals/organisations to undertake a survey on business land development. Respondents were contacted via email survey form in conjunction with interviews conducted by telephone. In total there was a 40% response rate from a mix individuals/organisations ranging from planners, landowners, developers, commercial and industrial real estate agents, investors, construction operations and large format retail operators. The survey form sent to stakeholders has been attached in Appendix D.

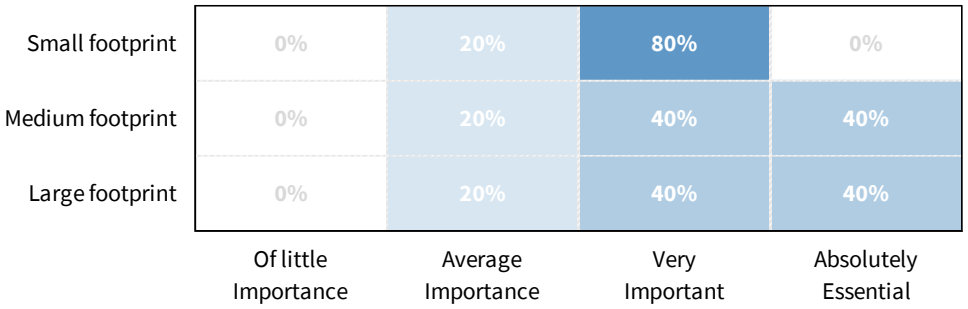
Overall survey responses indicate that there is an insufficient provision of industrial land, particularly larger sites. There seems to be a shortage of sites for large format retailing which competes against industrial business for larger sites within industrial zoning. Dunedin South is noted as needing more strategic direction from council to incorporate the emerging large format retailing sector with existing industrial activity. Respondents indicate sufficient small retail and office land, however, would like greater integration (both in terms of land use and business/council interaction) with the Otago University. Storm and wastewater issues are also noted as being common problems with business land development.

More general notes from respondents, include a wanting council to conduct greater engagement with landlords, consent issuance taking up to 20-working days adding to cost of development, maintain reasonable development levies and increasing investment in the city.

In asking about the importance of different building space requirements, it more notable that for many respondents that medium and large footprints buildings were identified as 'Absolutely Essential'. In contrast small footprint sites were reported as being very important but not essential to most respondents.

This aligns with response to open-ended questions where numerous respondents mentioned a lack of medium and large sites for both large format retailing and industrial activities. We discuss this more later in this report.

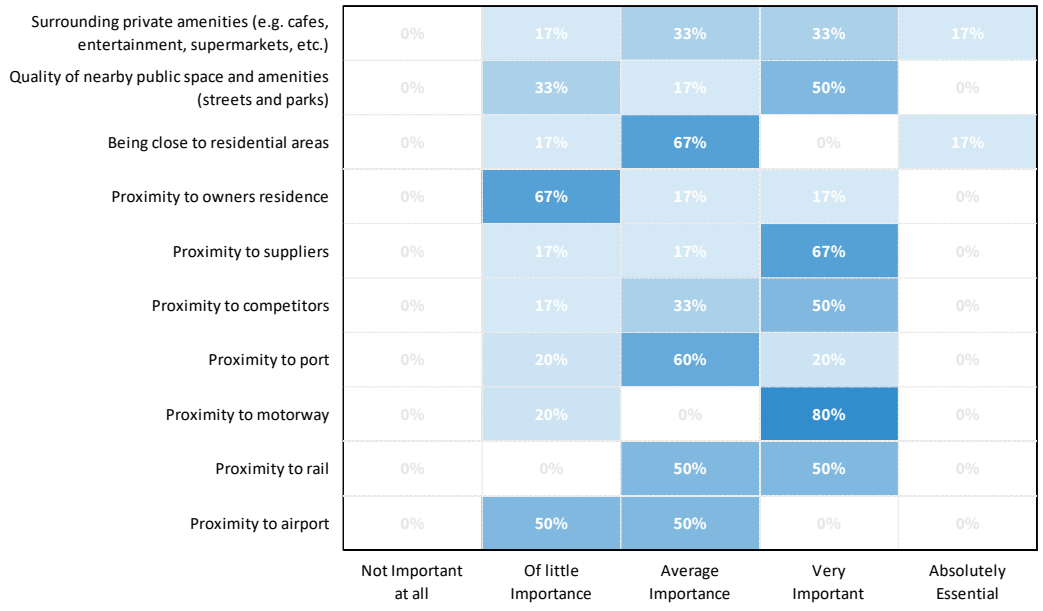
Figure 14 Stakeholder rating of building space requirements[37]



Source: Principal Economics

Regarding the surrounding environment, respondents had a mix of preferences. Private amenities such as cafes, entertainment and supermarkets were generally rated being average to very important. Parks and green spaces were important to some but not others. Importance of distance to residential areas is dependent on business sector i.e., smaller retail businesses prefer to be close to their customers while industrial activities are concerned with issues around reverse sensitivity. Proximity to owners' residences was generally noted as being of little importance, while proximity to supply was very important. Similarly, the importance of proximity to transport infrastructure such as Dunedin Port, railway line and airport was highly dependent on industry sector. Signage opportunities for buildings was noted by one respondent as being an important site attribute.

Figure 15 Stakeholder rating of surroundings / environment



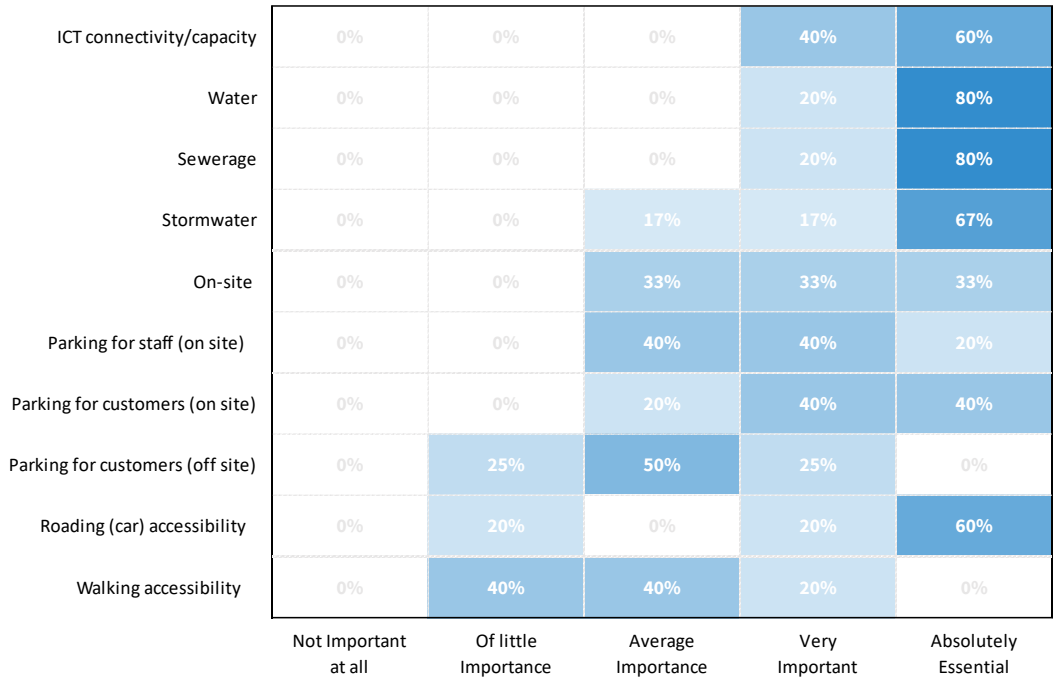
Source: Principal Economics

37 It should be noted that while multi-choice questions provide use comparable metrics from stakeholders, they suffered from low response rates even from those that engaged. As such caution should be used when reading these results.

Building and site infrastructure requirements such as ICT connectivity and 3-Waters are 'very important' to 'absolutely essential'. Often respondents expect the provision of this infrastructure to be present. The exception being stormwater infrastructure which is a known issue for some sites during periods of severe weather. One respondent noted that the lack of adequate land (particularly industrial) has led to development on less-than-ideal sites with known stormwater issues at high cost to developers.

Roading and site access was noted as being important attribute for site selection. Parking within the harbour edge industrial zone is a concern as individuals will occupy carparks within the harbour edge zone and walk to the CBD. One respondent commented that with the property sector looking at using sustainability credibility frameworks, it is important that surrounding amenities and public transport networks to service industrial areas. Hotel services were also reported as having difficulty finding suitable sites with carparking potential.

Figure 16 Stakeholder rating of infrastructure and accessibility



Source: Principal Economics

A lack of land availability particularly for larger sites was commonly noted by many respondents. Respondents mentioned a lack of supply for a range of larger sites from those with 500sqm building footprints, medium and large sites, and freehold sites over 5,000sqm. Specific sectors noted as having insufficient site locations include large format retailing, warehousing, logistics, manufacturing, engineering, and industrial workshops, which typically require large sites.

There is demand for a response to the lack of appropriate sites for large format retailing. Several respondents suggested that are thinking of the zoning strategy at South Dunedin is needed to better revealed preferences for large format retailing in the area. Greater flexibility for industrial, large format retailing and trade activities was suggested. One

respondent suggested that the centres hierarchy framework was not working as intended to accommodate demand for large format retailing. Another indicated that while they had no plans to move, they were considering redevelopment of their site for greater efficiency and facilitate large format retailing.

Insufficient supply of large sites, freehold sites, greenfield sites, unsuitable land typology, liquefaction and flooding issues, and a general undersupply of zoned industrial land were all issues identified for by respondents. While some simply report that industrial sites were lacking everywhere, specific locations identified include Dunedin CBD, Kaikorai Valley, Mosgiel, Harbourside, Fairfield, and Green Island.

Poor subterranean land quality and site slopes were cited as leading to difficulty in finding financially efficient stormwater management solutions on industrial sites. It was noted that there is ongoing development on these sites despite these issues and higher costs involved in development due to a lack of alternate options for industrial land. While these issues are site dependant, stormwater and wastewater are noted as being common. South Dunedin specifically noted as having infrastructure issues.

A lack of availability of industrial land was cited as increasing costs for expansion for business looking to move from older cheaper premises to new sites. This is compounded by the comments that there is a lack of freehold sites available for development within Dunedin. Rezoning of land to industrial in Milton and Mosgiel were suggested for alleviating industrial land constraints, with improvements to road linkages between Mosgiel to Dunedin CBD suggested to help grow the Dunedin business market.

Commentary around retail and office land market was very different than industrial sectors. Supply of retail and commercial space is generally thought as being sufficient. Landowners noted that decision making around intensification in the CBD concerned whether to develop offices or residential on top of existing developments.

Issues around retail and commercial land focused more on the layout and interaction between sectors in Dunedin. A lack of clustering and agglomeration opportunities, and zoning that allowing for a range of business sectors, and integration with Otago University and the wider business market was noted. The 4-storey limit defined in the 2GP was mentioned as being a constraint for Dunedin. Some retail services noted that zoning rules made it difficult to service customers within their local catchments.

3.4. Step 3 – Assessing the sufficiency and competitiveness margin of business space

Requirement (clause 3.30 of the NPS-UD)

Every HBA must clearly identify for the ST, MT and LT, whether there is sufficient development capacity to meet demand for business land.

The determination of sufficiency must be based on a comparison of demand for business land and development capacity as determined under the NPS-UD.

If there is any insufficiency, the HBA must identify where and when this will occur and the extent to which RMA planning documents, a lack of development infrastructure, or both, cause or contribute to the insufficiency.

Note

As discussed above, there are a range of factors affecting the supply and demand of business land. Some factor's impacts could be more significant in medium and long terms. For example, the climate mitigation policies have higher impacts in medium term and will be most significant in long term. The impact of climate adaptation will be most significant in the long term. We discussed the factors that we suggested to take into account for short, medium and long terms' assessment of sufficiency with the Council teams and stakeholders at our team meetings. There are a range of assessments currently being completed by DCC to address uncertainties associated with climate change.

Approach

With a robust forecast of business land, determination of business land capacity and the application of locational factors to determine suitability, a direct comparison will satisfy the NPS-UD requirements and provides a detailed understanding of the dynamics of supply and demand of business land in Dunedin.

We apply our modelled locational requirements (section 3.2) to sites located in business zoned land that we identify as having capacity to determine the suitability of individual sites. This will provide a score for each land parcel and the level and weight of suitability for each attribute to different business sectors. We use the total to determine sites that are most suitable to meet demand within a sector. Another way of thinking about this is that the modelling estimates the contribution of individual locational factors of a site that contribute to the total economic return of a site for each business sector.

By comparing the suitable land area capacity against forecast demand by business sector we estimate the short-, medium- and long-term sufficiency of business land capacity. We aggregate the results from our highly granular analysis by zone type, location, and size. We apply the appropriate competitiveness margins of 15 and 20 per cent to sufficiency estimates as per the NPS-UD requirements.

Where there is any insufficiency, we identify where it will occur and the factors that contribute to the insufficiency. As per the NPS-UD requirements we focus on the extent to which RMA planning documents and development infrastructure contribute to insufficiency.

In this report, we discuss any other factors that contribute to insufficiency both citywide and locational as informed by the qualitative and quantitative analysis outlined in this proposal. We use outcomes from stakeholder engagement, resource and building consent data analysis and aggregate business land demand and supply to inform our citywide assessment.

It is also possible to have sufficient business land at a city level while insufficient at a localised level. This can occur when there is sufficient business zoned land across there city but not where it is demanded. Similarly, increased residential intensification can lead to reverse sensitivities changing the distribution of demand for types of businesses within the local area. i.e., increased population within an area leads to higher demand for retail activities that operate at higher productivity to industrial land uses. We use comparisons of granular SA2 level demand forecasts against site level suitability of zoned business land across a range of factors listed in Section 3.2.1, including size and location, to identify the factors contributing to location insufficiency.

Approach

We provided details on the conversion of economic activities to floorspace in Section 3.2.2. Table 10 provides estimates of changes in floorspace required by sector for ST, MT and LT. Accordingly, while there will be more demand for floorspace in the ST, the required floorspace will decrease significantly in MT and LT (both for the medium- and high-growth scenarios). One main driver of the decrease in demand is the electricity demand, this is because of a combination of the forecasted changes in the industry's activities based on the Climate Change Commission (2021) report.[38] Most importantly, with decreases in other sectors' activities (including construction, wholesales, retail, office and transport sectors), the demand for the electricity sector will decrease.

Table 23 Summary of change in floorspace required by sector, for medium and high population projection scenarios

Unit: square metre. The presented figures are change from 2024 (baseline).

	Medium			High		
Sector	**ST (2024-2027)**	**MT (2024-2034)**	**LT (2024-2054)**	**ST (2024-2027)**	**MT (2024-2034)**	**LT (2024-2054)**
Primary industry	19,021	43,676	59,302	63,690	87,197	157,230
Manufacturing-heavy	92,172	-44,887	-47,174	160,904	-15,222	10,916
Manufacturing-light	81,530	46,117	42,155	160,249	111,836	167,531
Electricity, gas, water and waste services	140,847	-686,130	-752,627	504,582	-571,715	-558,625
Construction	13,941	-106,406	-83,616	122,482	-38,127	83,126
Wholesales	40,652	-214,026	-198,751	191,396	-146,551	-59,971
Retail-small	9,257	-5,025	-926	40,274	18,847	49,679
Retail-large	9,702	-23,513	-18,497	45,641	-1,500	30,907
Retail-food	4,978	548	4,857	23,283	17,529	38,505
Hospitality	2,739	18,901	27,141	13,646	32,533	58,050
Transport	16,731	-131,557	124,531	106,720	-97,892	334,957
Office	3,436	-7,338	-5,581	16,497	1,057	13,281
Education	5,756	82	4,225	27,059	19,570	42,685

38 The marginal increase in floorspace required for the electricity sector is driven by the floorspace required per employee.

Health	4,458	90	2,706	18,954	12,123	27,736
Arts and recreation	57,974	-28,276	-15,221	197,842	35,546	162,191
Total	**503,195**	**-1,137,744**	**-857,477**	**1,693,219**	**-534,768**	**558,198**

Source: Principal Economics

Table 24 summarises infrastructure ready floorspace capacity by broad sectors according to zoning regulations and assumptions on mixed use zoning composition provided by DCC. Industrial land capacity assumes a 50 per cent floorspace to land area ratio. Industrial transition areas and potential infill capacity within are assumed to be infrastructure ready by the medium term.

Table 24 Summary of capacity by broad sectors

Unit: square meter.

Broad sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Industrial	351,000	453,850	453,850
Retail large format	1,600	20,600	20,600
Retail and commercial services	179,300	195,200	195,200
Office	108,700	118,900	118,900

Source: Principal Economics

Table 25 provides summary of sufficiency by sectors under medium and high (population projection) scenarios. Under the medium scenario there is generally enough capacity to meet sufficiency except for large retailing. This is due to the limited number of areas where bulky goods retailing is permitted under the DCC 2GP. As part of our assumptions include the intensification of zoned land, Table 25 shows that this insufficiency is alleviated over the medium term. It is important to note there is significant uncertainty in this assumption as this depends on the intensification of currently occupied but underutilised land, which is particularly scarce given the land area typically used for large format retailing.

Under the high scenario there will be insufficient industrial land over the short-term. This aligns with comments from the stakeholder engagement where many express concerns over the supply of industrial land in Dunedin. This insufficiency is likely to alleviate with the uptake of industrial transition areas, such as those in Green Island / Fairfield and Burnside. Retail and commercial services is projected to have enough capacity under the medium scenario. Under the high scenario insufficiency across these sectors is estimated to be around 77,878sqm over the short term due to higher population growth. This may be partly mitigated by shifts in use from residential to commercial purposes (of which we assumed 17,100sqm to be adopted within commercial Mixed Use zone over the short-term and a total of 39,600sqm over the long term) but will require further intensification of business land through the redevelopment of existing sites (we have not assessed the potential of redevelopment in this report).

We assume that any surplus capacity or insufficiency is experienced by each sector relative to the current composition of floorspace within Dunedin City. We estimate this composition using current employment counts converted to floorspace based on the ratios provided in 0Appendix E .

Zoning constraints (particularly for large format retailing corresponding closely with bulky good retailing within the DCC 2GP) have been applied to reflect the effects of the 2nd Generation District Plan. We disaggregate sufficiency for education and health to exclude activities such as hospitals and schools given that these activities do not generally locate within business land zones. We discuss the sufficiency of these sectors in Section 3.4.1.2.

Table 25 Summary of sufficiency by sectors – Medium scenario

Unit: square meter.

Industrial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Primary industry	-2,315	66,447	56,266
Manufacturing- heavy	-6,093	174,891	148,095
Manufacturing- light	-5,466	156,911	132,870
Electricity, gas, water and waste services	-2,139	61,388	51,983
Construction	-16,794	482,075	408,214
Wholesales	-11,966	343,483	290,856
Transport	-9,122	261,868	221,746
Industrial Total	**-53,894**	**1,547,064**	**1,310,029**

Retail and commercial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Retail-small	33,468	64,568	59,402
Retail-large	-8,102	44,113	39,097
Retail-food	10,043	19,375	17,825
Hospitality	18,758	36,189	33,294
Office	53,485	103,185	94,930
Adult Education	72	139	128
Health (excl. Hospitals and residential health services)	19,558	37,732	34,713
Arts and recreation	30,302	58,459	53,782
Retail and commercial Total	**157,584**	**363,760**	**333,171**

Source: Principal Economics

Table 26 Summary of sufficiency by sector – High scenario

Unit: square metre.

Industrial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Primary industry	-41,191	48,290	13,688
Manufacturing- heavy	-108,415	127,102	36,027
Manufacturing- light	-97,269	114,034	32,323
Electricity, gas, water and waste services	-38,055	44,614	12,646
Construction	-298,838	350,346	99,305
Wholesales	-212,925	249,625	70,755
Transport	-162,332	190,312	53,943
Industrial Total	**-959,023**	**1,124,323**	**318,686**

Retail and commercial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Retail-small	-12,438	39,403	-3,695
Retail-large	-7,687	29,044	-21,669
Retail-food	-3,732	11,824	-1,109
Hospitality	-6,971	22,085	-2,071
Office	-19,877	62,970	-5,905
Adult Education	-27	85	-8
Health (excl. Hospitals and residential health services)	-7,268	23,026	-2,159
Arts and recreation	-19,877	62,970	-5,905
Retail and commercial Total	**-77,878**	**251,407**	**-42,520**

Source: Principal Economics

3.4.1.1. Education and health sufficiency

The Ministry of Education identifies three catchments within Dunedin, North, South, and Taieri. All three areas have been identified as being steady and stable with the Education Network Plan with needs of schooling network being meet over the next decade to 2030 (Ministry of Education, 2022). As noted in the previous Dunedin BDCA, no additional net space is expected to be required for schools due to the declining school-aged population, and local distribution of school aged-children is more likely to be a factor.

Under the population projections used for this assessment individuals aged 0-14 is projected to peak in 2023 at 20,844 and decrease steadily to 19,817 by 2043. Similarly, population projections for individuals aged 15-24 peaked in 2018 with 28,558 people and projected to decrease to 27,774 by 2043.

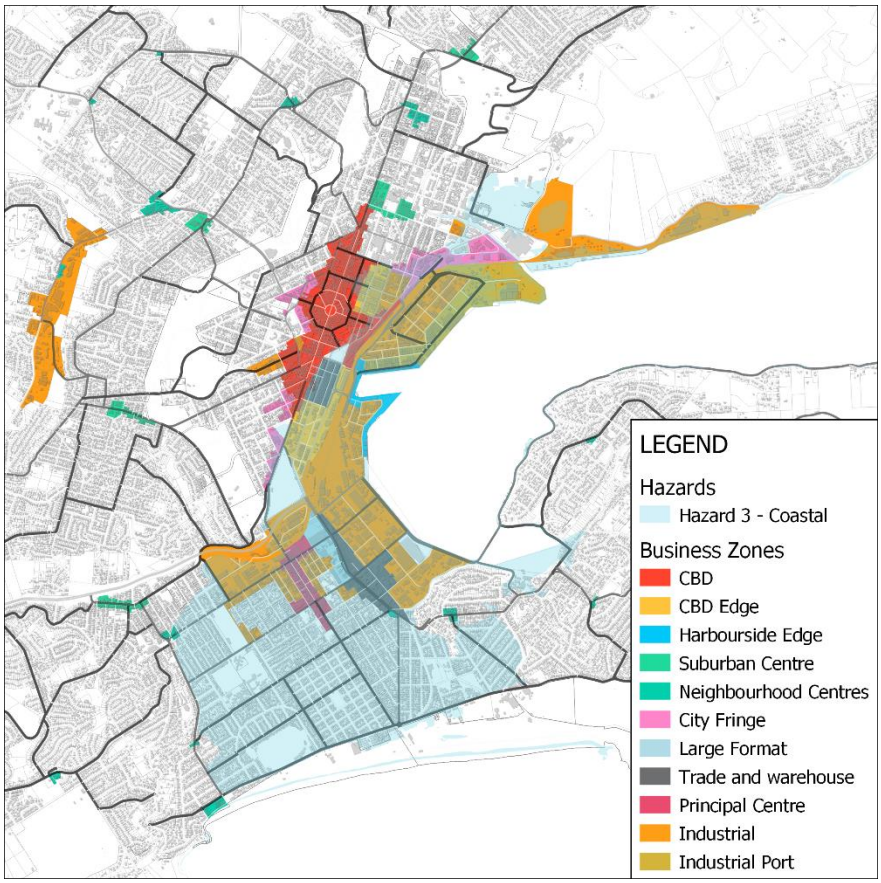
As noted in the Dunedin BDCA 2019, planning for the Dunedin Hospital rebuild was based on demand modelling for Otago and Southerland regions out to 2043 (DCC, 2019). This is further elaborated on in the detailed business case for the New Dunedin Hospital (Sapere et al., 2021).

3.4.1.2. Dunedin specific supply uncertainty

We are aware of the uncertainty that climate change poses to Dunedin City particularly regarding Coastal Hazards and liquefaction. We accounted for the impact of climate change on business demand using the findings from the Climate Change Commission report. Given the uncertainty of events occurring we propose reporting on amount of business land capacity identified as being at risk and their hazard likelihood i.e., 1:100-year storm surge levels. This will provide clarity to readers as to the potential loss in business land capacity within Dunedin if such an event were to occur.

We are aware that the Council are undertaking an assessment of the climate change impacts using Adaptive Decision Policy Pathway (DAPP).[39] This is a useful approach for assessing climate change uncertainties, which supports flexibility in decision making. We suggest the Council should use the outputs of the options (pathways) and use that as an input for the BDCA. This will provide the Council with more information on the plausible sufficiency outcomes in MT and LT.

Figure 17 Uncertainty of climate change in Dunedin – Coastal Hazards



Source: DCC, LINZ

39 Principal Economics (2022) provided suggestions on how an adaptive decision-making (ADM) approach to climate change can be used for evaluating economic land transport activities in New Zealand and be incorporated into Waka Kotahi's Investment Decision Making Framework (IDMF).

4. Further discussion and future research

This report provides a comprehensive assessment of business development capacity in Dunedin and includes references to a range of supporting documents (and analyses). There are wider discussions relevant to this report, which we cover in this chapter.

The recent New Zealand Productivity Commission report discusses that the existing infrastructure deficit has led to a failure to align investment rates with population growth. The report suggests that it is important to build the assets needed to support more people in the community ahead of time: "The inability or unwillingness in the past to fund this infrastructure suggests that pre-pandemic rates of inwards migration will not be sustainable in the future." (NZ Productivity Commission, 2021)

The NZPC report also discusses that "Policy reforms such as better planning, land use regulation, and improved funding and building of infrastructure would have significant wellbeing and productivity benefits for New Zealanders, and should be pursued regardless of immigration levels." (NZPC, 2021; p. 38).

An important constraint in our analysis is the population projections, which is an input to our assessment. The medium projections suggested a lower growth over the coming years, for ST, MT and LT, in comparison to the growth over the last years. Infometrics (2020) provided a range of reasons for this, after accounting for the impact of COVID-19 and the likely recovery path. Infometrics recommended to consider future updates of the population projections to inform the impact of COVID-19 – this is a useful suggestion. In our assessment, we investigated the high-growth scenario in addition to the medium population growth scenario. Our results show significant impacts on our sufficiency assessment when we consider the high-growth scenario. In addition to these scenarios, we suggest that there will be a need for a scenario analysis of 'what if Dunedin's economy would not be constrained by its population growth – i.e., what if Dunedin will provide the living and business environments which will lead to economic (and population) growth?' This is an important question, because we think that an enabling planning regulation could decrease costs of living and business.

The focus of our assessment was on the requirements of the BDCA. We suggest the Council to consider further assessment of the followings:

1- The drivers of the lower population growth in Dunedin, with a causal assessment of the factors of location choice.
2- The impact of planning policy on price of residential and business land. For this assessment a robust methodology will be required.
3- Relevant to the two previous questions, the Council should further investigate the historic/existing constraints on regional economic growth and identify the role of infrastructure investments in unlocking economic growth.

Another issue to raise with the Ministry for the Environment (MfE) and the Ministry of Housing and Urban Development (HUD) is the need for providing further guidelines for the modelling of BDCA. This analysis is very sensitive on the parameters used. It is important to:

- clarify the correct definition of the counterfactual scenario.
- provide a list of criteria, which are important for identifying an appropriate population projection, and short list the important criteria.
- as discussed, the requirement of the NPS-UD 2020 to provide outputs by location requires further clarification on the relevance of administrative boundaries to business demand by taking into account the concept of spatial equilibrium.

Further identification of the shortcoming of the current guidelines provided by the NPS-UD (2020) is beyond the scope of our assessment.

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Appendix A Impacts of climate change policy

The Climate Change Commission report notes that "Our assessment of the impact on GDP provides some useful insights but it does not include these benefits and opportunities, nor the costs related to not acting. It is difficult to fully quantify the benefits of action on the economy and society with any accuracy as there is significant uncertainty in how and when the benefits will be realised." Table 27 provides a description of climate policy's targets in short-, medium-, and long-terms. These impacts are captured in our assessment.

Table 27 Climate policy – description of targets and timing

		Budget 1	Budget 2	Budget 3
Transport	Lower-emissions vehicles	Accelerate uptake of electric and zero-emissions cars, buses and trucks Improve efficiency of vehicles and freight movement		Phase out imports of internal combustion engine light vehicles
	Reducing vehicle trips	Encourage switching to walking, cycling and public transport Reduce demand for travel, for example through smart urban development and increased working from home Increase use of rail and coastal shipping for freight		
	Aviation and shipping	Improve efficiency	Start electrifying ferries and coastal shipping	Start electrifying short-haul flights
	Low carbon liquid fuels		Increase use of biofuels	
Energy, industry and buildings	Buildings	No new fossil gas heating systems installed after 2025 Improve thermal efficiency		Start phasing out existing fossil gas use in buildings
	Electricity	Phase out fossil base-load generation	Transmission and distribution grid upgrades Expand renewable generation	Achieve ~95% renewable generation
	Industrial process heat	Replace coal with biomass and electricity		Replace fossil gas with biomass and electricity
Land	Agriculture	Adopt low-emissions practices on-farm	Adopt low-emissions breeding for sheep	Encourage new low biogenic methane technologies to be adopted when available
	Native forests	Ramp up establishing new native forests		Establish 25,000 ha per year
	Exotic forests	Average 25,000 ha per year of new exotic forests		Ramp down planting new exotic forests for carbon storage
Waste and F-gases	Waste	Divert organic waste from landfill Improve and extend landfill gas capture		
	F-gases	Increase end-of-life recovery of F-gases		

Source: Climate Change Commission (2021, p. 103)

Appendix B Data sources

Table 28 contains information about the data sources used for different parts of the BDCA. This information will be complemented with the information from Statistics New Zealand (Stats NZ) on employment and capital and labour productivity of different sectors, which are inputs to our models.

Table 28 Data sources

Input	Comments	Source
Employment counts	Business demographic data at SA2 and ANZSIC06 Level 3 disaggregation.	Statistics NZ Business Demographics
Business concentration	Businesses tend to cluster for agglomeration benefits which impacts their locational choice.[40]	Statistics NZ Business Demographics and Principal Economics analysis
Parcel sizes	NZ Primary Parcels	LINZ or provided by DCC
Building coverage	NZ Building Outlines	LINZ or provided by DCC
Distance from arterial roads / state highways	Roading network	Open Street Map, LINZ and Principal Economics analysis
Population density	Census 2018, Geographic boundaries	Statistics NZ and Principal Economics analysis
Average site slope	NZ Contours	LINZ and Principal Economics analysis
Territorial authority boundaries	Geographic boundaries	Statistics NZ
Distance from CBD	We use commercial employment concentration as a proxy for determining the centre of CBD.	Statistics NZ and Principal Economics analysis.
Distance from ports	We use the boundary ports land and measure the distance using GIS analysis.	Ministry of Transport and Principal Economics analysis
Distance from nearest public transit stop	We use GTFS data from public transport providers for different urban areas and measure the distance using GIS analysis.	Various providers.
Building heights	To be used in compare planned capacity against existing development.	3DBuildings
Rectangularity index	We determine the “rectangularity” of a site using GIS analysis.[41]	LINZ and Principal Economics analysis.
Exposure and visibility index	We determine level of visibility a site has from the road using GIS analysis.[42]	LINZ and Principal Economics analysis.

40 Maré, David C. and Graham, Daniel J., Agglomeration Elasticities in New Zealand (June 1, 2009). Motu Working Paper No. 09-06

41 Marzeh, Z., Tahmasbi, M., & Mirehi, N. (2019). Algorithm for finding the largest inscribed rectangle in polygon. 1, 13.

42 We define a proxy value of exposure and visibility based on the proportion of a site perimeter that faces the road.

Fibre network connectivity	While we can assess the locational requirements for fibre connection, a scan of the data indicates that nearly all sites in Dunedin are included.	Commerce commission
Resource and building consent data	We use to inform our analysis as a potential existence of business land constraints	DCC
Property sales data	We use this as an input to our assessment of business land demand.	DCC
Capital value, land value and improvement value	We use rating value data as part of our assessment for determining business vacant land in Dunedin.	DCC
Zoning from 2nd Generation District Plan	We use land zoning data to determine the classification of business zone land sites.	DCC
Structural plans for 2nd Generation District Plan	We use structural plans for the 2GP to determine the extent of floorspace permitted on business zoned land sites.	DCC
Population projections	We use population projections from DCC as part of our inputs for forecasting business land demand.	DCC

Source: Principal Economics

We provide a list of the available methods for the required business demand outcomes in Table 29 and evaluate their usefulness based on a range of criteria.

Table 29 Available methods for estimating business activity (and projections/forecasts)

Criteria	Importance for BDCA	Simulation (SEAM)	VAR	IO	Subregional CGE
Exogenous population base	H	✓	✓	✓	
Times series output (forecasts)	H	✓	✓	✓	
Granular business sectors	H	✓*	✓		✓
Granular geographic outputs (SA2)	M	✓	✓		✓*
Uncertainty of parameters	M	✓	✓		
Uncertainty of inputs[43]	M	✓*			✓
Scenario modelling	L	✓		✓	✓
Inter industry relationships	L	✓	✓	✓	✓
Usefulness for identifying the sectors	H				✓

Source: Principal Economics

Notes: L, M and H in the importance for BDCA represent Low, Medium and High importance.

✓ represents the possibility of using the method.

✓* represents the possibility of using the method with some extra steps.

Empty cells suggest the unsuitability of the method for a criterion.

43 This includes accounting for the changes in productivity of land and labour (for different sectors) that may influence future trends – which is important for medium and long terms.

Appendix C Regression results on factors of land demand

Table 30 shows our estimated impact of different factors on choice of location of different sectors. Sectors are labelled as follows:

(1) Agriculture (Primary industry), (2) Manufacturing heavy, (3) Manufacturing light, (4) Electricity, (5) Construction, (6) Wholesales, (7) Retail-small, (8) Retail-large, (9) Retail-food, (10) Hospitality, (11) Transport, (12) Office, (13) Education, (14) Health, (15) Art.

The employed regression method is a linear log-log method, and therefore all explanatory variables are in logarithmic form. For capturing the impact of size, we grouped the parcel areas (PA) to three equal groups in each area, namely PA1, PA2, and PA3. We include three variables of population at 1km, 2km and 3km distance to the parcel.[44] We also include four variables of employment in 1km, 2km and 3km distance. For understanding the significance of these variables, we need to consider their joint significance – as presented in the bottom of the table (those with statistically significant effects are bolded).

44 We have identified the appropriate distance km variables based on their explanation for the output variable – using AIC and adjusted R-squared measures.

Table 30 Regression results on the factors of location choice for different sectors

Method: log-log regression analysis; the output is the logarithm of the GDP of each sector – presented on different columns.

Sector:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
PA1	0.083	0.105	0.107**	-0.197*	0.017	0.040	0.009	-0.023	-0.122*	-0.082*	0.084	-0.067*	-0.095**	-0.019	0.070
	(0.06)	(0.07)	(0.05)	(0.12)	(0.03)	(0.05)	(0.04)	(0.04)	(0.07)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)
PA2	-0.007	0.045	0.072***	-0.080	0.007	-0.001	0.027	0.017	0.010	-0.003	0.080***	0.015	-0.022	0.085**	0.017
	(0.04)	(0.05)	(0.03)	(0.06)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
PA3	0.079**	0.004	-0.054**	0.048	-0.007	0.003	-0.024	-0.057**	-0.026	-0.026	-0.030	-0.044**	0.019	-0.011	0.077**
	(0.03)	(0.05)	(0.02)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Bld coverage	-0.146**	0.217**	0.184***	-0.154	0.032	0.086*	0.009	0.029	0.173**	0.025	0.248***	-0.040	0.004	0.016	0.247***
	(0.07)	(0.11)	(0.06)	(0.18)	(0.04)	(0.05)	(0.05)	(0.05)	(0.08)	(0.06)	(0.07)	(0.06)	(0.05)	(0.09)	(0.08)
Arterial road	0.094*	0.166***	0.045	0.102	0.036	0.132***	-0.076**	-0.018	-0.196***	-0.168***	0.032	-0.068**	0.038	-0.085*	-0.018
	(0.05)	(0.06)	(0.04)	(0.09)	(0.03)	(0.05)	(0.03)	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)	(0.05)
Pop km1	-0.070	-0.203***	-0.186***	-0.224**	-0.131***	-0.248***	0.006	-0.087*	0.041	0.060	-0.186***	-0.095***	0.048	-0.050	-0.116**
	(0.05)	(0.07)	(0.05)	(0.10)	(0.05)	(0.05)	(0.04)	(0.05)	(0.08)	(0.05)	(0.05)	(0.03)	(0.05)	(0.07)	(0.05)
Pop km2	-0.118	0.179*	0.025	0.000	0.062	0.125	0.046	-0.130	0.033	-0.060	0.157*	-0.102**	0.036	0.120	-0.040
	(0.07)	(0.10)	(0.08)	(0.17)	(0.06)	(0.08)	(0.08)	(0.08)	(0.10)	(0.07)	(0.08)	(0.05)	(0.06)	(0.09)	(0.08)
Pop km3	0.027	0.026	-0.035	0.350**	0.014	-0.017	-0.032	0.136*	-0.257***	-0.098	-0.091	0.091	-0.129*	-0.298***	0.067
	(0.07)	(0.10)	(0.09)	(0.15)	(0.06)	(0.09)	(0.07)	(0.08)	(0.09)	(0.07)	(0.08)	(0.06)	(0.07)	(0.10)	(0.08)
Emp km1	0.018	-0.049*	-0.007	-0.040	-0.045***	-0.014	0.030**	0.023	-0.009	0.030**	-0.030*	0.015	0.006	0.020	0.005
	(0.02)	(0.03)	(0.02)	(0.04)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Emp km2	-0.019	-0.016	0.004	-0.022	0.002	0.019	-0.028	0.027	0.022	-0.066*	-0.059	0.029	0.071***	0.088**	0.072**
	(0.04)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)
Emp km3	-0.085*	-0.028	0.075	-0.062	0.010	0.129***	0.052	0.029	0.077	0.095**	0.052	0.065*	0.133***	0.286***	0.041
	(0.05)	(0.05)	(0.05)	(0.08)	(0.03)	(0.05)	(0.03)	(0.04)	(0.06)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.04)

Emp km4	0.000	0.123**	0.063	0.051	0.096***	0.046	0.029	0.001	0.031	0.063*	0.036	0.052*	0.025	-0.003	-0.051
	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.04)	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)
PT	0.046	-0.086	-0.035	-0.094	-0.020	-0.077	0.019	-0.045	0.031	-0.148***	0.032	-0.056	-0.080	-0.083	-0.156**
	(0.07)	(0.07)	(0.05)	(0.13)	(0.04)	(0.05)	(0.04)	(0.04)	(0.08)	(0.04)	(0.05)	(0.04)	(0.05)	(0.05)	(0.06)
Seaport	-0.005	-0.021	0.004	-0.004	0.061	-0.184***	0.088**	-0.046	0.099	-0.027	-0.117*	-0.189***	0.090*	0.098	-0.006
	(0.08)	(0.09)	(0.05)	(0.15)	(0.05)	(0.06)	(0.04)	(0.06)	(0.06)	(0.05)	(0.07)	(0.04)	(0.05)	(0.06)	(0.07)
Airport	-0.133	-0.126	-0.098	0.135	0.091	0.086	0.111*	-0.009	0.085	0.153**	-0.315***	0.231***	-0.045	0.023	-0.090
	(0.14)	(0.10)	(0.08)	(0.22)	(0.06)	(0.08)	(0.06)	(0.08)	(0.10)	(0.08)	(0.11)	(0.07)	(0.07)	(0.08)	(0.10)
Bld height	0.074	-0.189*	-0.102	-0.146	0.127	-0.096	-0.021	-0.006	0.106	0.065	-0.138	0.181**	-0.196***	-0.218**	-0.105
	(0.09)	(0.11)	(0.07)	(0.22)	(0.08)	(0.09)	(0.07)	(0.07)	(0.12)	(0.08)	(0.08)	(0.09)	(0.07)	(0.10)	(0.12)
Slope	-0.148	-0.358***	-0.002	-0.202	-0.078	-0.064	-0.015	-0.102	-0.227**	-0.021	0.033	0.121**	0.011	-0.133	0.059
	(0.10)	(0.12)	(0.07)	(0.17)	(0.06)	(0.07)	(0.05)	(0.07)	(0.09)	(0.06)	(0.08)	(0.06)	(0.07)	(0.08)	(0.09)
GDP others	0.333***	0.790***	0.833***	0.511***	0.458***	0.817***	0.779***	0.943***	0.495***	0.557***	0.700***	0.864***	0.190***	0.146*	0.335***
	(0.08)	(0.09)	(0.07)	(0.14)	(0.05)	(0.07)	(0.05)	(0.06)	(0.08)	(0.06)	(0.06)	(0.06)	(0.06)	(0.09)	(0.07)
Squareness	0.599	-0.967*	-0.328	0.547	-0.126	-0.422	0.464**	0.384	-0.404	0.116	-0.966***	0.260	-0.093	-0.238	-0.727
	(0.37)	(0.50)	(0.40)	(0.80)	(0.25)	(0.28)	(0.22)	(0.24)	(0.32)	(0.25)	(0.31)	(0.27)	(0.26)	(0.56)	(0.48)
CBD dist	0.046	0.305***	0.229***	-0.128	0.184***	0.126	0.011	0.146**	0.251***	-0.098*	0.138*	-0.068	0.069	-0.125	-0.247***
	(0.09)	(0.10)	(0.06)	(0.18)	(0.06)	(0.08)	(0.06)	(0.07)	(0.10)	(0.06)	(0.07)	(0.07)	(0.06)	(0.08)	(0.09)
Constant	-0.040	-5.966***	-3.801***	-1.962	-3.735***	-4.021***	-4.433***	-3.231**	-2.519*	1.035	0.438	-0.632	-0.400	0.853	1.999
	(1.74)	(1.82)	(1.28)	(3.18)	(1.03)	(1.40)	(1.01)	(1.27)	(1.48)	(1.10)	(1.55)	(1.03)	(1.14)	(1.45)	(1.53)
R2_adj	0.415	0.472	0.517	0.283	0.364	0.572	0.596	0.575	0.298	0.476	0.455	0.655	0.206	0.306	0.242
R2	0.458	0.500	0.531	0.382	0.380	0.587	0.606	0.588	0.323	0.490	0.474	0.664	0.227	0.326	0.274
Log likelihood	-382.164	-616.364	-1067.124	-231.206	-1075.749	-885.895	-986.343	-985.396	-932.185	-1046.590	-870.906	-1085.571	-1131.595	-1169.002	-737.131
Pop Wald	**0.05**	0.36	**0.01**	0.24	0.93	0.857	0.59	0.11	0.25	0.232	**0.04**	0.14	**0.10**	**0.07**	**0.01**

Pop margin	0.156	0.154	0.125	-0.229	0.017	0.042	0.012	-0.064	-0.139	-0.111	0.134	-0.095	-0.097	0.054	0.164
Emp Wald	0.21	**0.04**	0.18	0.44	**0.00**	**0.01**	**0.07**	0.32	0.36	**0.01**	0.13	**0.03**	**0.01**	**0.00**	**0.08**
Emp margin	-0.086	0.031	0.135	-0.073	0.063	0.180	0.084	0.079	0.121	0.123	-0.001	0.161	0.235	0.391	0.068

Source: Principal Economics

Note: Standard errors reported in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01; The significance level for joint Pop terms (Pop Km1, Pop Km2, Pop Km3) are jointly reported in the "Pop Wald" row. Similarly, the joint significance levels are reported for Emp km terms. The Pop margin provides information about the impact of all Pop terms. The Emp margin provides information about the impact of all Emp km terms.

Appendix D Stakeholder engagement survey

Business land development capacity assessment
Stakeholder survey

The purpose of this survey is to seek input from anyone who has information that may materially affect the calculation of development capacity as per clause 3.12(1)(c) if the NPS-UD. We have interpreted this clause to include providers, developers, local experts and users of businesses land, accounting for both the supply of business land and demand from users of business land.

Your views will be incorporated in our assessment of business land capacity for Dunedin City Council and how we define the suitability of business land as it relates to its users. This is an important input to the future of business land supply in Dunedin.

All individual responses to this survey are confidential and will not be shared to anyone else.

Your details	Please fill in your details below
Name:	
Organisation:	
Contact email:	

1) Which of the following best describes your role?

Select one - Place an X in the cell you feel applies to you.

Role types	Pick one or more
Investor	
Developer	
Owner occupier	
Leasee	
Property Broker	
Real estate agent	
Other (please specify)	

If other please specify here:

2) What sort of properties do you mainly deal with?

Select one - Place an X in the cell you feel applies to you.

Property types	Pick one or more
Office	
Retail	
Industrial	
Other (please specify)	

If other please specify here:

3) How important are the following criteria to you?

Please fill out each row - Place an X in the cell you feel applies to you.

3a) Building space	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
Floorspace - Small footprint					
Floorspace - Medium footprint					
Floorspace - Large footprint					

3b) Surroundings / Environment	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
Surrounding private amenities (e.g. cafes, entertainment, supermarkets, etc.)					
Quality of nearby public space and amenities (streets and parks)					
Being close to residential areas					
Proximity to owners residence					
Proximity to suppliers					
Proximity to competitors					
Proximity to port					
Proximity to motorway					
Proximity to rail					
Proximity to airport					

3c) Infrastructure and accessibility	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
ICT connectivity/capacity					
Water					
Sewerage					
Stormwater					
On-site					
Parking for staff (on site)					
Parking for customers (on site)					
Parking for customers (off site)					
Roading (car) accessibility					
Walking accessibility					
Public transport accessibility					

3d) Are there any other significant site / building characteristics that are important?

Please specify, if your answer is yes.

4) Is there anything you feel that is limiting the growth of business markets that could be improved by Council?

Please specify, if your answer is yes.

5) Do you feel there is anything the Council could do to help grow business markets?

Please specify, if your answer is yes.

6) What are the challenges you face regarding business land development?

Please specify, if your answer is yes.

7) Do you feel there are insufficient sites in any specific locations?

Please select one - Place an X in the cell you feel applies to you.

	Pick one
Yes	
No	

7a) If so, what specific locations?

If yes, please specify.

For example, Dunedin CBD, Mosgiel, Port Area, Harbourside, Green Island and etc.

7b) If yes, are there specific business sector locations that this applies to?

If yes, please specify.

For example, restaurants and cafes, retail shopping, warehousing, logistics, financial services and etc.

7c) How about for specific site characteristics?

If yes, please specify.

For example, site size, maximum building heights, site slope, etc.

8) Are there any infrastructure constraints worth noting?

If yes, please specify.

For example infrastructure such as Freshwater, Waster water, Stormwater, Electricity, Internet connection, Roading network, Public Transport, Telecommunications and etc.

9) If you are an owner occupier or leasing a commercial/industrial property do you have any plans to move?

Please select one - Place an X in the cell you feel applies to you.

	Pick one
Yes	
No	

9b) If yes, where are you planning to move to?

If yes, please specify.

This is end of the survey, thank you.

Appendix E Employee to floorspace ratios

Table 31 Employee to floorspace ratios

Sector	Floorspace per employee (sqm)	Source
Primary industry	73	Provided by DCC.
Manufacturing - light	60	Market Economics (2021) - Other built industrial
Manufacturing - heavy	138	Market Economics (2021) - Factory
Electricity, Gas, Water and Waste Services	167	Market Economics (2021) - Warehouse
Construction	136	Provided by DCC.
Wholesale	167	Market Economics (2021) - Warehouse
Large format retail	47	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Small format retail	47	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Food retailing	18	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Hospitality	15	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Transport, Postal and Warehousing	136	Provided by DCC.
Office	20	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Education	32	Provided by DCC.
Health	17	Provided by DCC.
Arts and Recreation Services	90	(Home and communities agency, 2015)

Table 32 Employee to floorspace ratios for the health sector

Health sector	Floorspace per employee (sqm)	Source
Q840100 Hospitals (Except Psychiatric Hospitals)	60	DCC HQ Health
Q840200 Psychiatric Hospitals	60	DCC HQ Health
Q851100 General Practice Medical Services	17	DCC MQ Health
Q851200 Specialist Medical Services	17	DCC MQ Health
Q852000 Pathology and Diagnostic Imaging Services	60	DCC HQ Health
Q853100 Dental Services	17	DCC MQ Health
Q853200 Optometry and Optical Dispensing	17	DCC MQ Health
Q853300 Physiotherapy Services	17	DCC MQ Health
Q853400 Chiropractic and Osteopathic Services	17	DCC MQ Health
Q853900 Other Allied Health Services	17	DCC MQ Health
Q859100 Ambulance Services	60	DCC HQ Health

Q859900 Other Health Care Services n.e.c.	17	DCC MQ Health
Q860100 Aged Care Residential Services	60	DCC HQ Health
Q860900 Other Residential Care Services	60	DCC HQ Health
Q871000 Child Care Services	17	DCC MQ Health
Q879000 Other Social Assistance Services	17	DCC MQ Health

Appendix F Determining commercial mixed use land vacancy

To determine current business land capacity, we primarily rely on the information provided by Dunedin District Council on the second-generation district plan. Additionally, we use other relevant information including rating valuation and property and build footprint data.

We determine the plan-enabled business land capacity by first identifying parcels that lie within business land zones as defined under the 2nd Generation District Plan. This is to ensure the assessment includes land available for business use only and excludes features such as roading and footpaths that would overestimate the availability business land. This is to ensure the assessment includes land available for business use only and excludes features such as roading and footpaths that would overestimate the availability of business land.

As part of the capacity assessment, we undertook a visual inspection of business zoned land to ground truth our capacity estimates. Where we found anomalies that did not match our initial outputs, we have adjusted our estimates accordingly.

While there may be cases where development occurs that do not fit the criteria used to determine capacity, we have opted to maintain a level of consistency with the previous Dunedin City Business land capacity assessment to provide comparable results.

Commercial and mixed-use capacity

We have defined vacant land within the zoned area using a range of parameters including:

- Site lies within the Commercial and mixed-use zone boundaries
- Site has less than 10% building footprint coverage
- Total site size is larger than 100sqm
- Site is wider than 8m
- Freehold land title
- Only site areas that lie within the zone boundaries are included
- Improvement value is less than 30% of capital value
- Is not subject to District Plan designation
- Is not used for community, utility services or recreational purposes
- Improvement value is less than $100,000

To determine infill potential, we first determine the land area that is not occupied by an existing structure alongside other limitations including:

- Scheduled heritage sites and structures
- Approximate scheduled tree driplines (assuming a 4m radius from trunks)
- National grid setbacks
- High-risk hazard areas (Hazard 1 overlays)

We omit the constraint of having improvement values less than 30% of capital as this does not require the demolition of existing structures.

A spatial algorithm is used for approximating the largest rectangular building footprint that could potentially fit in the likely 'developable' land area. This method is adopted as rectangle buildings are generally easier to construct, and the most common layout adopted by business land developers.

We apply the maximum height limit based to identified sites and infill development areas based on the sub zone / height overlays defined in the Dunedin 2GP District Plan. Where maximum storey information is unavailable, we use building height limits and assume each building storey requires 4m. The results of these estimates are show in Table 7.

Table 33 Dunedin City 2GP District Plan height limits

Sub zone / height overlay	Building height limit	Estimated number of storeys
Central Business District	16	4
Central Business District - Adjoining George Street	12	3
Smith Street and York Place	12	3
CBD Edge Commercial North	16	4
CBD Edge Commercial South	16	4
Princes, Parry and Harrow Street	12	3
Harbourside Edge	16	4
Warehouse Precinct	16	4
Neighbourhood Destination Centre	12	3
Principal Centre	12	3
Suburban Centre	12	3
Trade Related	16	4
Rural Centre	12	3

Source: Principal Economics

We adopt the activity composition ratios by zone and floor level from the 2019 business land capacity assessment for Dunedin City (DCC, 2019) to estimate potential development capacity by activity. These ratios are attached in shown in Table 34.

Table 34 Ground level and above ground level activity ratios

	Ground level floorspace activity ratio %			
Sub zone	Residential	Office	Retail / Other Commercial	Industrial
Central Business District		20%	80%	
Smith Street and York Place	50%		50%	
CBD Edge Commercial North			75%	25%
CBD Edge Commercial South			75%	25%
Princes, Parry and Harrow Street	50%			50%
Harbourside Edge			50%	50%
Warehouse Precinct		40%	60%	

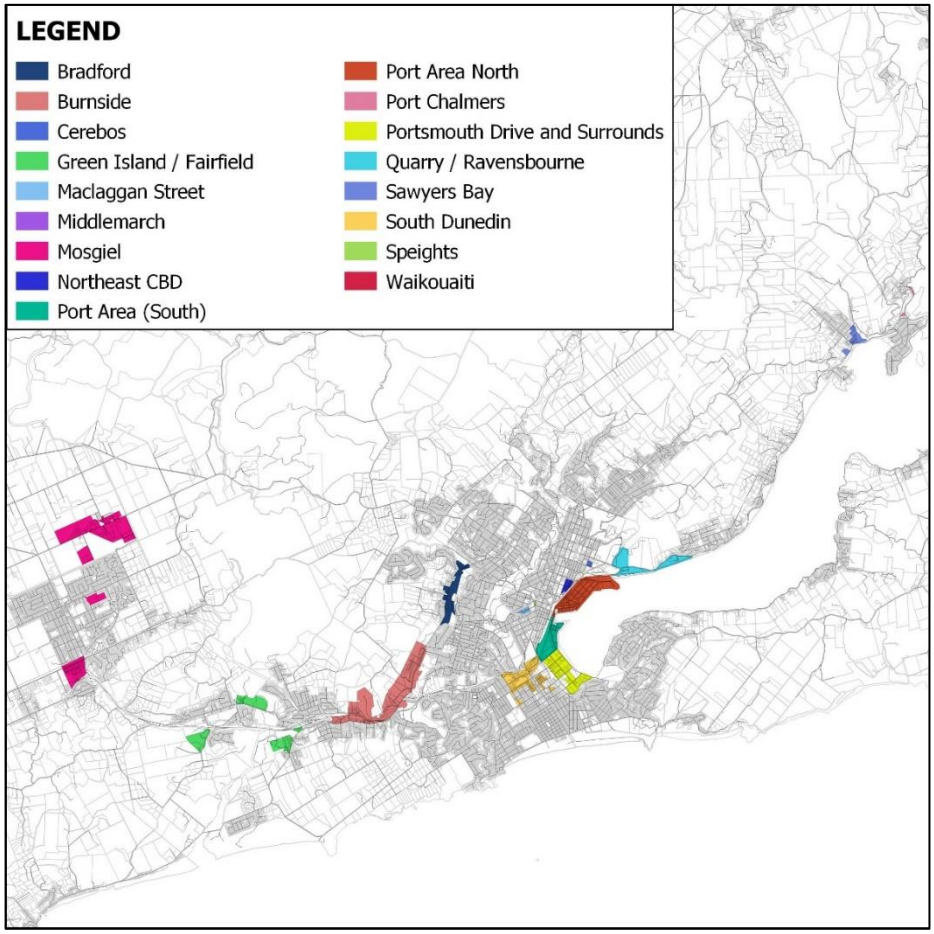
Neighbourhood Destination Centre	10%	90%	0%
Principal Centre	10%	90%	0%
Suburban Centre	10%	90%	50%
Trade Related	0%		
Rural Centre	10%	90%	

	Above ground level floorspace activity ratio %			
	Residential	Office	Retail / Other Commercial	Industrial
Central Business District	10%	90%		
Smith Street and York Place	100%			
CBD Edge Commercial North				
CBD Edge Commercial South				
Princes, Parry and Harrow Street	100%			
Harbourside Edge	80%	20%		
Warehouse Precinct	50%	50%		
Neighbourhood Destination Centre	50%	50%		
Principal Centre	50%	50%		
Suburban Centre	50%	50%		
Trade Related				
Rural Centre				

Source: Dunedin City Council

Appendix G Industrial areas

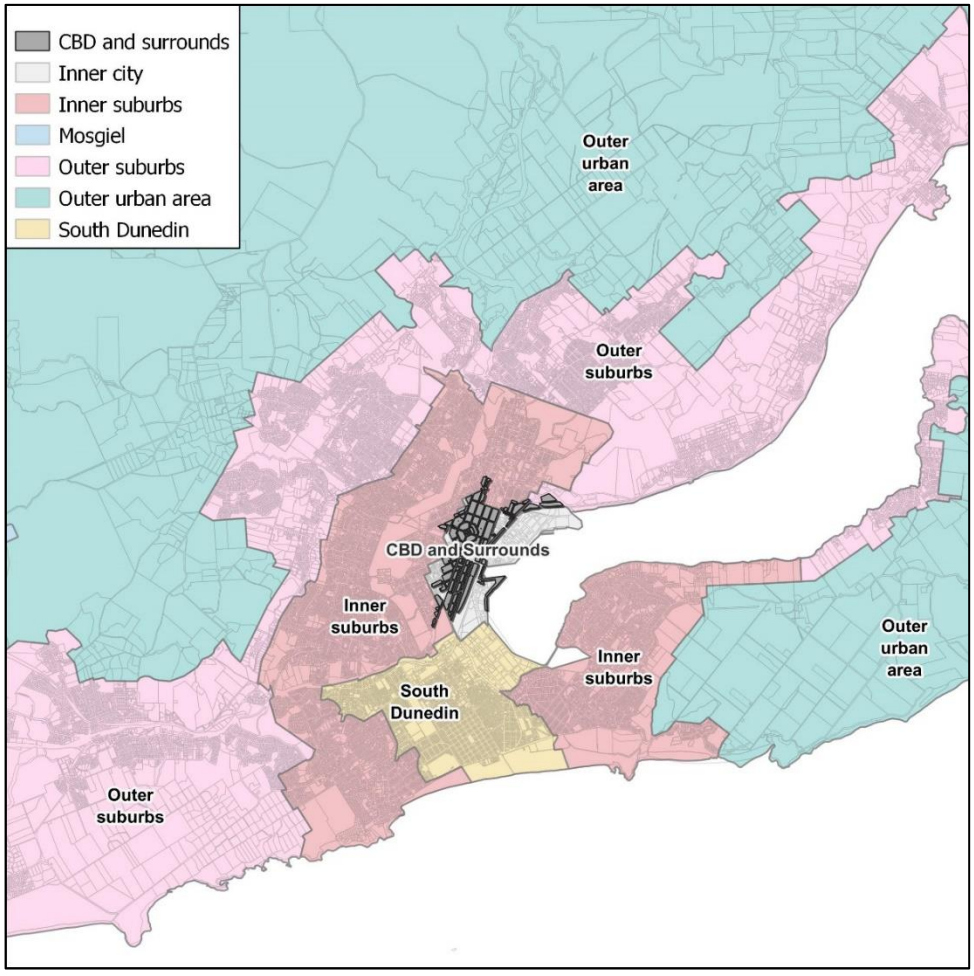
Figure 18 Industrial areas



Source: Dunedin City Council, Principal Economics

Appendix H Urban area catchments

Figure 19 Dunedin commercial and mixed-use zone catchments



Source: Dunedin City Council, Principal Economics